Automatic Transaxle (F4A42)

GENERAL

SPECIFICATION E6335D7C

Item		F4A42		
Torque converter type		3-element, 1-stage, 2-phase type		
Transaxle type		4-speed forward, 1-speed reverse		
Engine displacement		2.0 DSL	2.0L GSL	2.7 GSL
Gear ratio	1st	2.842	2.842	2.842
	2nd	1.529	1.529	1.529
	3rd	1.000	1.000	1.000
	4th	0.712	0.712	0.712
	Reverse	2.480	2.480	2.480
Final gear ratio	2WD	4.042	4.626	4.042
	4WD	4.042	4.626	4.407
Shift pattern		Variable		
Shift range		4range (P-R-N-D) + Sports mode		
Shift range valve		PWM ; 5EA(Duty control)		
Planetary gear		2EA(Output planetary/Overdrive planetary)		
Clutch		3EA		
Brake		2EA		
OWC		1EA		

SERVICE SPECIFICATIONS

Items	Standard value
Output shaft preload	0.01-0.09 mm (0.0004-0.0035 in)
Brake reaction plate end play	0-0.16 mm (0-0.0063 in)
Low and reverse brake end play	1.65-2.11mm (0.065-0.083 in)
Second brake end play	0.79-1.25 mm (0.0311-0.0492 in)
Underdrive sun gear end play	0.25-0.45 mm (0.0098-0.0177 in)
Input shaft end play	0.70-1.20 mm (0.0276-0.0472 in)
Differential case preload	0.045-0.105 mm (0.0018-0.0041 in)
Underdrive clutch end play(wave disk)	1.25-1.45 mm (0.0492-0.057 in)
Overdrive clutch return spring retainer end play	0-0.09 mm (0-0.0035 in)
Overdrive clutch end play(wave disk)	1.6-1.8 mm (0.0630-0.0709 in)
Reverse clutch end play	1.5-1.7 mm (0.0590-0.0609 in)
Backlash between differential side gear and pinion	0.025-0.150 mm (0.001-0.006 in)

TIGHTENING TORQUE

ITEM	N·m	kgf·cm	lbf·ft
Wiring harness bracket	20 ~ 26	200 ~ 260	14 ~ 18
Control cable bracket bolt	20 ~ 26	200 ~ 260	14 ~ 18
Eye bolt	30 ~ 45	300 ~ 450	22 ~ 33
Oil cooler feed tube	10 ~ 12	100 ~120	7 ~ 8
Input shaft speed sensor	10 ~ 12	100 ~ 120	7 ~ 8
Output shaft speed sensor	10 ~ 12	100 ~ 120	7 ~ 8
Manual control lever	18 ~ 25	180 ~ 250	13 ~ 18
Transaxle range switch	10 ~ 12	100 ~ 120	7 ~ 8
Speedometer gear	4 ~ 6	40 ~ 60	3 ~ 4
Valve body cover	8 ~ 10	80 ~ 100	6 ~ 7
Valve body mounting bolt	10 ~ 12	100 ~ 120	7 ~ 8
Oil temperature sensor	10 ~ 12	100 ~ 120	7 ~ 8
Manual control shaft detent	5 ~ 7	50 ~ 70	4 ~ 5
Rear cover	20 ~ 26	200 ~ 260	14 ~ 18
Torque converter housing	42 ~ 54	420 ~ 540	29 ~ 38
Oil pump	20 ~ 26	200 ~ 260	14 ~ 18
Transfer drive gear	16 ~ 22	160 ~ 220	11 ~ 15
Output shaft lock nut	160 ~ 180	1600 ~ 1800	110 ~ 126
Output shaft bearing retainer	20 ~ 26	200 ~ 260	14 ~ 18
Oil filler plug	29 ~ 34	290 ~ 340	21.4 ~ 25.1
Oil drain plug	40 ~ 50	400 ~ 500	29 ~ 36
Transfer drive gear lock nut	180 ~ 210	1800 ~ 2100	126 ~ 147
Differential drive gear to subframe bolts	130 ~ 140	1300 ~ 1400	91 ~ 98
Valve body	10 ~ 12	100 ~ 120	7 ~ 8
Solenoid valve support	5 ~ 7	50 ~ 70	4 ~ 5
Plate	5 ~ 7	50 ~ 70	4 ~ 5
Pressure check plug	8 ~ 10	80 ~ 100	6 ~ 7
Front roll stopper bracket to subframe bolts	40 ~ 55	400 ~ 550	29 ~ 40
Front roll stopper insulator bolt and nut	50 ~ 65	500 ~ 650	36 ~ 47
Front roll stopper bracket to transaxle bolts	60 ~ 80	600 ~ 800	43 ~ 58
Rear roll stopper bracket	40 ~ 55	400 ~ 550	29 ~ 40
Rear roll stopper insulator bolt and nut	50 ~ 65	500 ~ 650	36 ~ 47
Rear roll stopper bracket to transaxle bolts	60 ~ 80	600 ~ 800	43 ~ 58
Transaxle mounting sub bracket nut	60 ~ 80	600 ~ 800	43 ~ 58
Transaxle mounting bracket bolts	40 ~ 55	400 ~ 550	29 ~ 40
Transaxle mounting insulator bolt	90 ~ 110	900 ~ 1100	65 ~ 80

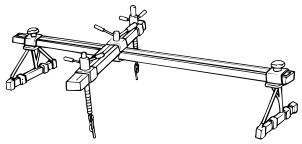
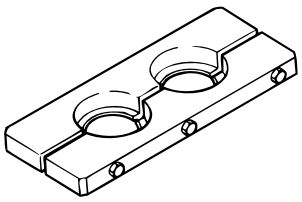
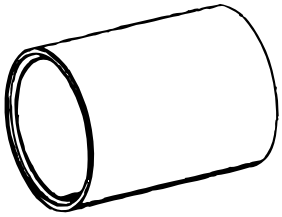
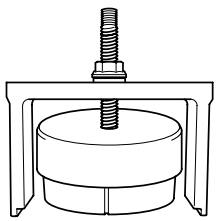
LUBRICANT

Item	Specified lubricant	Quantity
Transmission oil	Diamond ATF SP-III	7.8ℓ (8.2 Us gt, 6.9Imp.gt)

SEALANT

Item	Specified Sealant
Rear cover Torque converter housing Valve body cover	Three Bond - TB 1281B or LOCTITE - FMD - 546
Transmission case side cover	Three Bond - TB 1389 or LOCTITE - 518
Side cover	Three Bond - TB 1389 or LOCTITE - 518/587

SPECIAL TOOLS

TOOL (Number and name)	Illustration	Use
09200 - 38001 Engine support fixture	 D0038001	Removal and installation of transaxle.
09432 - 33200 Bearing removing plate	 D3233200	Removal of 4WD coupling flange oil seal
09478 - 26000 Flange oil seal installer	 EKJA006A	Installation of 4WD coupling flange oil seal
09478 - 26100 Back plate remover	 EKJD506Z	Removal of 4WD coupling back plate

AUTOMATIC TRANSAXLE SYSTEM

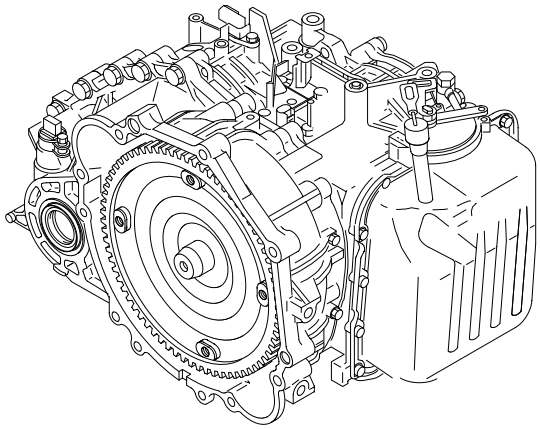
DESCRIPTION EB817FAB

The automatic transmission is a combination of 3-element 2-phase 1-stage torque converter and double shaft electrocally-controlled unit which provides 4 speeds forward and 1 reverse. The entire unit is in line with the engine.

CHARACTERISTICS

HIVEC: Hyundai Intelligent Vehicle Electronic Control
It differs drastically compared to previous T/M such as alpha, Bcta or KM series automatic transaxles.
Hyundai vehicles adopted with an engine volume of 2.0 liters or more has the HIVEC automatic transaxle developed and produced by Hyundai.

Some of the characteristics include:
▶Different power transfer
▶Different component layout
▶New shift logic(HIVEC) to improve shift feeling
▶Position of Valve Body
▶Variable shift pattern
▶Communication protocol and method



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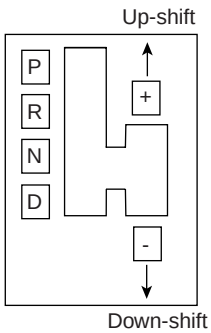
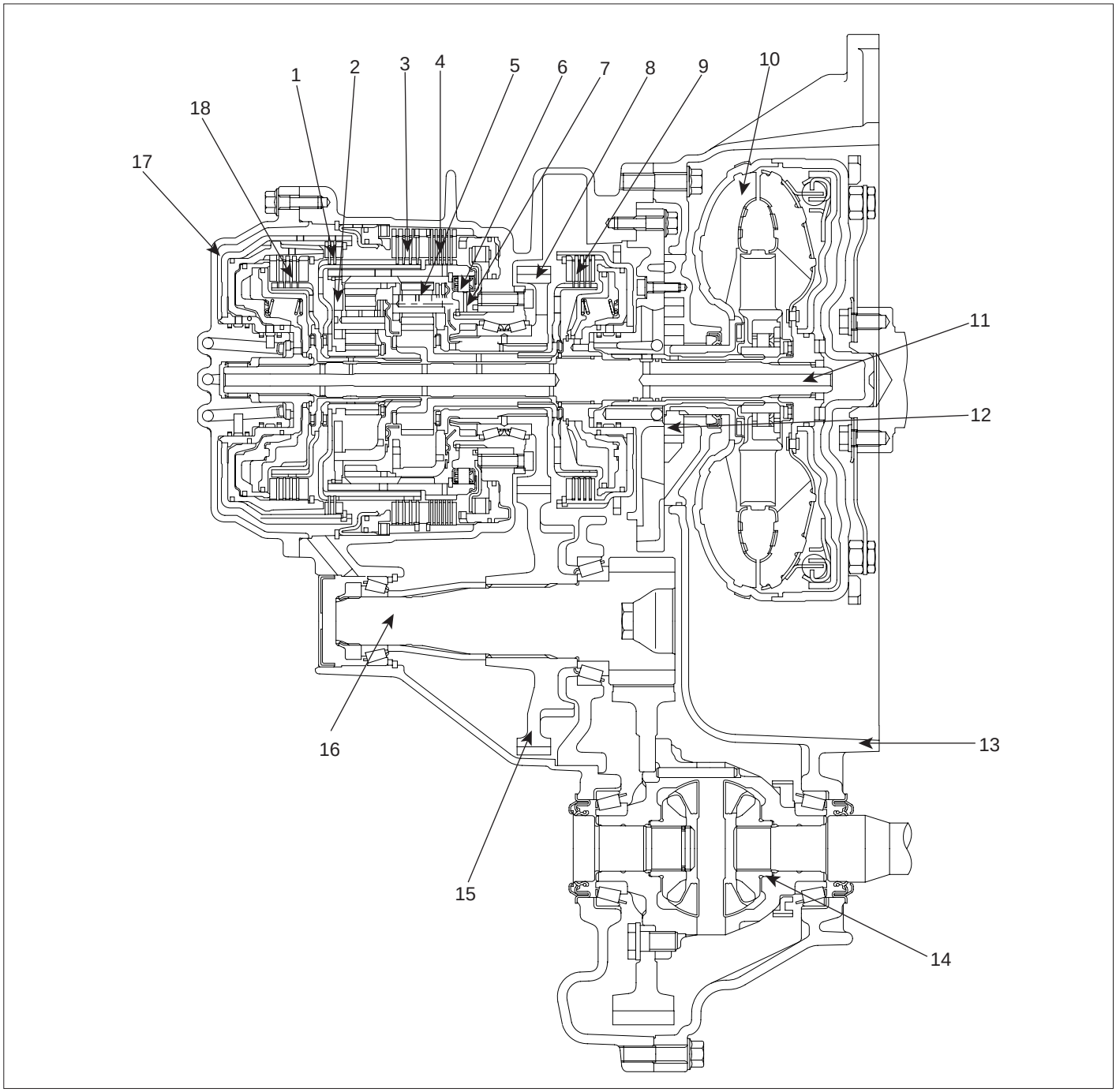
Item	Details
Weight Reduction	1. Aluminum oil pump - 2.3kg Approx 2. Pressed parts - Retainer and hub of brakes and clutches - Carrier of planetary gear set
Better shift quality	1. Independent control of clutches and brakes enabled better control of hydraulic pressure and skip shift possible (4 to 2, 3 to 1) 2. During N to D or N to R shift, feedback control adopted. 3. When starting from Creep condition, reduction of shock.(Creep condition is controlled with 1st gear) 4. Solenoid valve frequency is increased for more accurate control. 35Hz to 61.3Hz except DCCSV that is 35Hz. 5. HIVEC adoption for better shift feeling. 6. Variable shift pattern.
Increase in Power train efficiency	1. Variable oil level - An oil dam is incorporated in the case to temporarily contain ATF, so the damage of power train is decreased at low temperatures
Dynamic drive by sports mode	- Manual shifting possible  ELQE201A



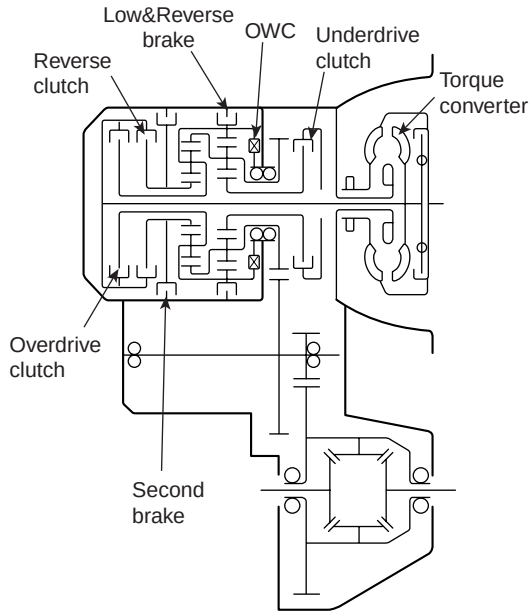
1. Reverse clutch
2. Overdrive planetary gear set
3. Second brake
4. Low-reverse brake
5. Output plantary gear set
6. Oneway clutch
7. Oneway clutch inner race
8. Transfer drive gear
9. Underdrive clutch
10. Torque converter
11. Input shaft
12. Oil pump
13. Converter housing
14. Differential
15. Transfer driven gear
16. Output shaft
17. Rear cover
18. Overdrive clutch

LKIF001B

MECHANICAL SYSTEM

OPERATION COMPONENTS AND FUNCTION

Operating Element	Symbol	Function
Under drive clutch	UD	Connect input shaft and under drive sun gear
Reverse clutch	REV	Connect input shaft and reverse sun gear
Overdrive clutch	OD	Connect input shaft and over drive carrier
Low & Reverse brake	LR	Hold LR annulus gear and OD carrier
Second brake	2ND	Hold reverse sun gear
One way clutch	OWC	Restrict the rotating direction of low & reverse annulus gear



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OPERATING ELEMENTS

	UD/C	OD/C	REV/C	2ND/B	LR/B	OWC
P					●	
R			●		●	
N					●	
D1	●				●	○
D2	●			●		
D3	●	●				
D4		●		●		

1) O : OWC is operated when shifts from 1st gear to 2nd gear.
2) L & R brake is released in 1st gear when the vehicle speed is more than 5KPH approximately.

TORQUE CONVERTER AND SHAFT

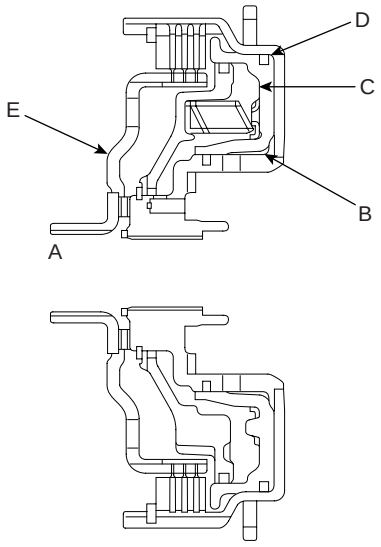
The torque converter consists of a impeller(pump), turbine and stator assembly in a single unit. The pump is connected to the engine crankshaft and turns as the engine turns. This drawing force is transmitted to the turbine through the oil which is recycled by the stator.
The transmission has two parallel shafts ; the input shaft and the output shaft. Both shafts are in line with the engine crankshaft. The input shaft includes the overdrive clutch, reverse clutch, underdrive clutch, one way clutch, 2ND brake, low & reverse brake, overdrive planetary carrier, output planetary carrier and transfer drive gear. The output shaft includes the transfer driven gear.

CLUTCHES

The gear changing mechanism utilizes three multi-disc clutches. The retainers of these clutches are fabricated from high-precision sheet metal for lightness and ease of production. Also, more responsive gearshifts at high engine speeds are achieved by a pressure-balanced piston mechanism that cancels out centrifugal hydraulic pressure. This mechanism replaces the conventional ball check valve.

UNDERDRIVE CLUTCH

The underdrive clutch operates in 1st, 2nd, and 3rd gears and transmits driving force from the input shaft to the underdrive sun gear(A).
The components comprising the under clutch are as illustrated below.
Hydraulic pressure acts in the piston pressure chamber(B) (between the piston(c) and retainer) and thus pushes the piston(C). In turn, the piston depresses the clutch discs and thereby transmits driving force from the retainer(D) to the hub(E) side.



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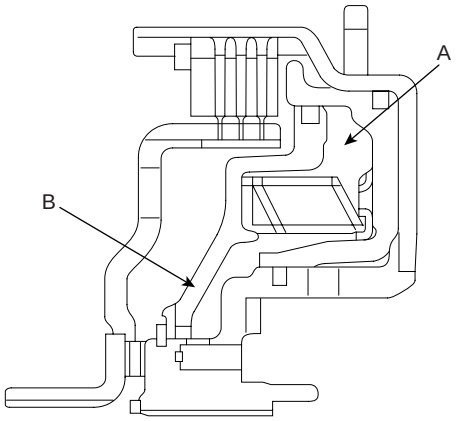
At high speed, fluid remaining in the piston pressure chamber is subjected to centrifugal force and attempts to push the piston.
However, fluid in the balance fluid chamber(A) (the space between the piston and return spring retainer(B)) is also subjected to centrifugal force.
Thus, the hydraulic pressure on one side of the piston cancels out the hydraulic pressure on the other side, and the piston does not move.



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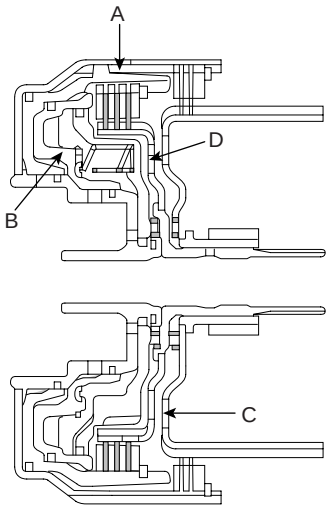
REVERSE CLUTCH AND OVERDRIVE CLUTCH

The reverse clutch(C) operates when the reverse gear is selected and transmits driving force from the input shaft to the reverse sun gear.
The overdrive clutch(D) operates in 3rd and 4th gears and transmits driving force from the input shaft to the overdrive planetary carrier and low-reverse annulus gear.



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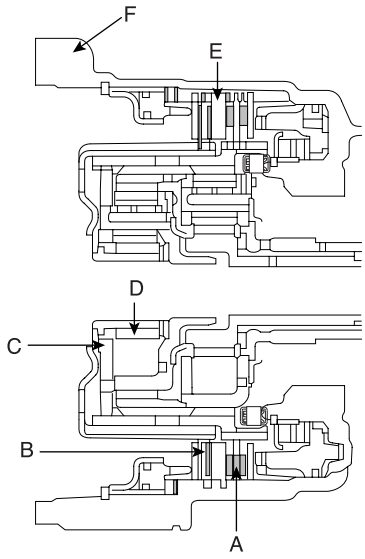
BRAKES

The gear changing mechanism utilizes two multi-disc brakes.

LOW & REVERSE BRAKE AND SECOND BRAKE

The low & reverse brake(A) operates in 1st and reverse gears, when the vehicle is parked, and during manual operation. It locks the low & reverse annulus gear and overdrive planetary carrier to the case.
The second(C) brake(B) operates in 2nd and 4th gears and locks the reverse sun gear(D) to the case.
The components comprising the low & reverse brake and second brake are as illustrated below.
As shown, the discs and plates of the two brakes are arranged on either side of the rear cushion plate(E), which is itself secured to the case(F) by a snap ring.



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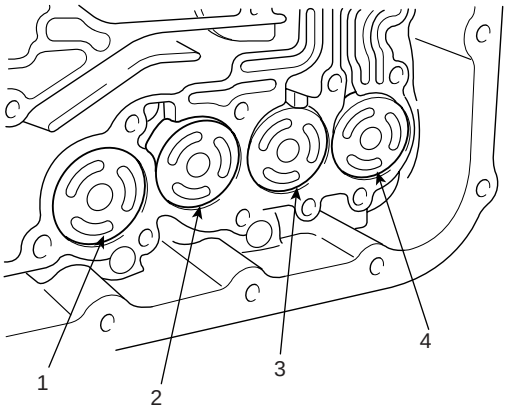
OWC

To improve the shift feeling from 1st. to 2nd gear, OWC was adopted on the Low & reverse brake annulus gear. Instead of hydraulic fixing by Low & reverse brake at the 1st gear, this mechanical fixing device was used. This structure is not new concept, because this OWC already has been installed on the:

ACCUMULATORS

Number	Function Name	Color
1	Low & Reverse Brake	None
2	Underdrive Clutch	Yellow
3	Second Brake	Blue
4	Overdrive Clutch	None



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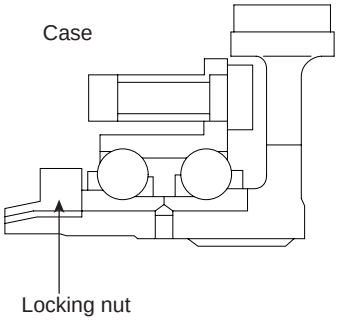
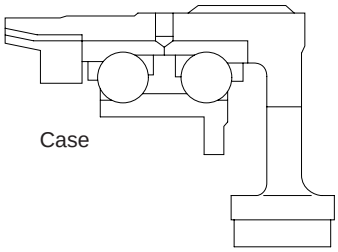
OBJECTIVE

* Energy (hydraulic pressure) storage
* Impact and pulsation damping when solenoid valves operating
* Operation as spring element
* Smooth shifting by preventing sudden operation of clutches and brakes

TRANSFER DRIVE GEAR

With the transfer drive gear, increased tooth height and a higher contact ratio have reduced gear noise.
Also, the bearing that supports the drive gear is a preloaded type that eliminates rattle, and the rigidity of the gear mounting has been increased by bolting the bearing directly onto the case.





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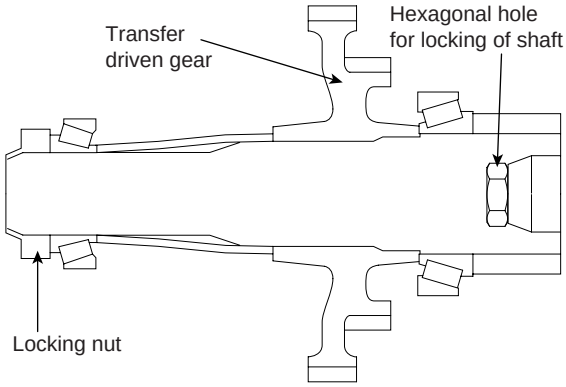
OUTPUT SHAFT/TRANSFER DRIVEN GEAR

As shown in the illustration below, the transfer driven gear is press-fitted onto the output shaft, and the output shaft is secured by a locking nut and supported by bearings.
The locking nut has a left-handed thread, and a hexagonal hole in the other end of the shaft enables the shaft to be held in position for locking nut removal.



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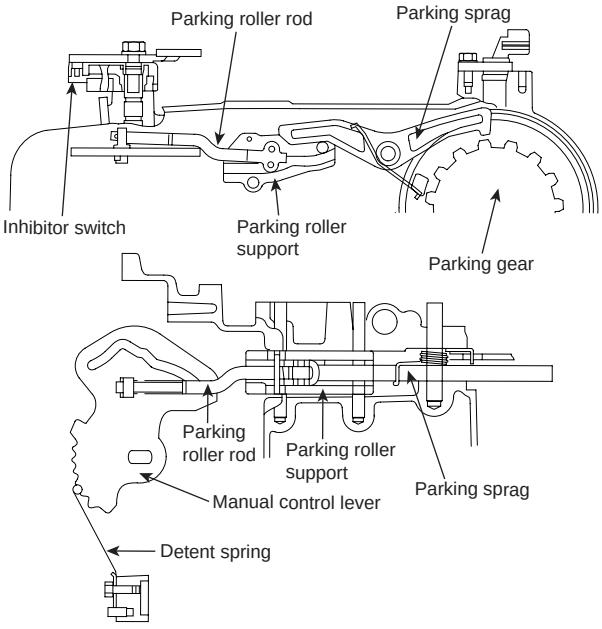
MANUAL CONTROL SYSTEM

MANUAL CONTROL LEVER

The manual control lever is fitted to the top of the valve body and is linked to the parking roller rod and manual control valve pin.
A detent mechanism is provided to improve the gear shift feeling during manual selection.

PARKING MECHANISM

When the manual control lever is moved to the parking position, the parking roller rod moves along the parking roller support and pushes up the parking sprag.
As a result, the parking sprag meshes with the transfer driven gear (parking gear), thereby locking the output shaft. To minimize the operating force required, a roller is fitted to the end of the rod.



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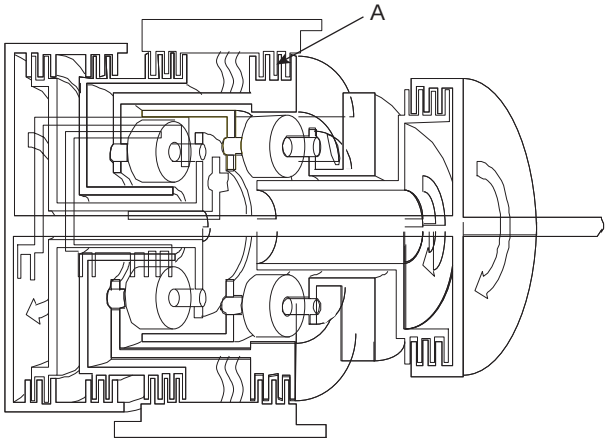
POWER TRAIN ED00ACC2

P POSITION

Hydraulic pressure is applied to the LR brake and the RED brake, so power is not transmitted from the input shaft to the UD clutch or OD clutch, and the output shaft is locked by the park brake pawl interlocking the park gear.

N POSITION

Hydraulic pressure is applied to the LR brake(A) and the RED brake, so power is not transmitted from the input shaft to the UD clutch or OD clutch.



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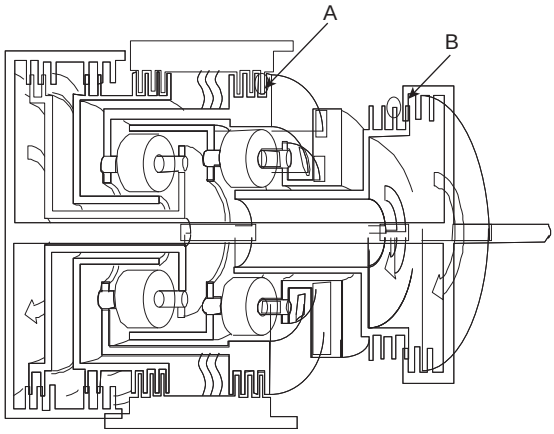
1ST GEAR POWER FLOW

Hydraulic pressure is applied to the UD clutch(B) the LR brake(A) and the one way clutch(OWC), then the UD clutch transmits driving force from the input shaft to the UD sun gear, and the LR brake locks the LR annulus gear to the case.The UD sun gear of the planetary gear drives the output pinion gear, and the LR brake locks the annulus gear, and the output pinion drives the output carriers, and the output carrier drives the transfer drive gear, and the transfer drive gear drives the transfer driven gear of the output shaft, and power is transmitted to the differential gear through the differential drive gear.



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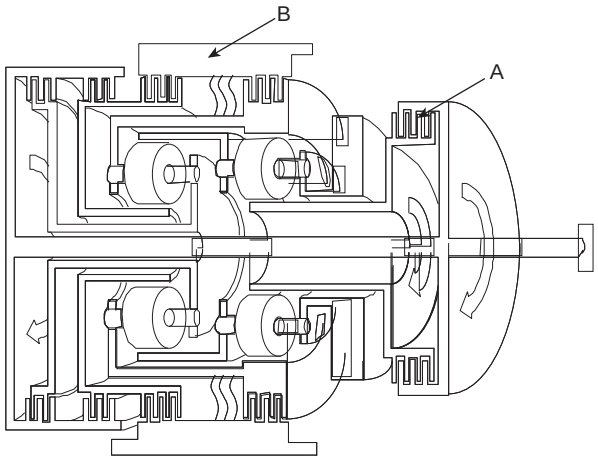
2ND GEAR POWER FLOW

Hydraulic pressure is applied to the UD clutch(A) the 2nd brake(B) and the one way clutch(OWC), then the UD clutch transmits driving force from the input shaft to the UD sun gear, and the 2nd brake locks the reverse sun gear to the case.The UD sun gear of the planetary gear drives the output pinion gear and the LR annulus gear, and the LR annulus gear drives the OD planetary carriers, and OD planetary carriers drives OD pinion gear, and the OD pinion gear drives the output carriers, and the output carrier drives the transfer drive gear, and the transfer drive gear drives the transfer driven gear of the output shaft, and power is transmitted to the differential gear through the differential drive gear.



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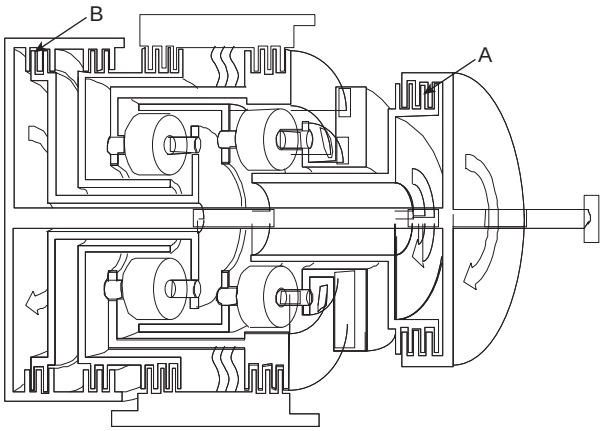
3RD GEAR POWER FLOW

Hydraulic pressure is applied to the UD clutch(A) and the OD clutch(B), then the UD clutch transmits driving force from the input shaft to the UD sun gear, and the OD clutch transmits driving force from the input shaft to the overdrive planetary carrier and low & reverse annulus gear.The UD sun gear of the planetary gear drives the output pinion gear and the LR annulus gear, and the LR annulus gear drives the OD pinion gear through the OD planetary carrier, and the OD pinion gear drives the reverse sun gear and the output carrier.The OD clutch drives the OD carrier, and the OD carrier drives the OD pinion gear, and the OD pinion gear drives the reverse sun gear and the output carrier, and the output carrier drives the transfer drive gear, and the transfer drive gear drives the transfer driven gear of the output shaft, and power is transmitted to the differential gear through the differential drive gear.



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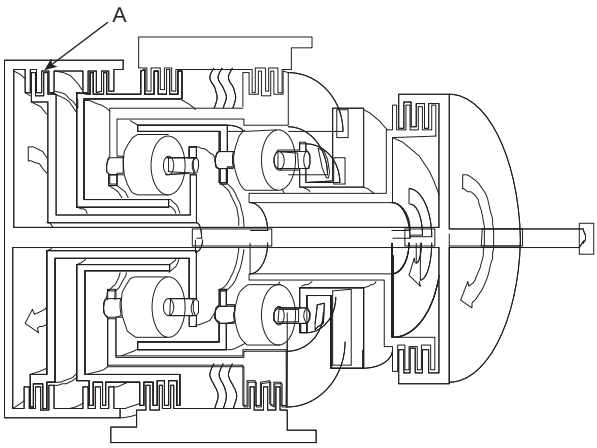
4TH GEAR POWER FLOW

Hydraulic pressure is applied to the OD clutch(A) and the 2nd brake(B), then the OD clutch transmits driving force from the input shaft to the OD planetary carrier and LR annulus gear, and the 2nd brake locks the reverse sun gear to the case.The OD clutch drives the OD carrier, and the OD carrier drives the OD pinion gear and the LR annulus gear, and the OD pinion gear drives the output carrier, and the output carrier drives the transfer drive gear, and the transfer drive gear drives the transfer driven gear of the output shaft, and power is transmitted to the differential gear through the differential drive gear.



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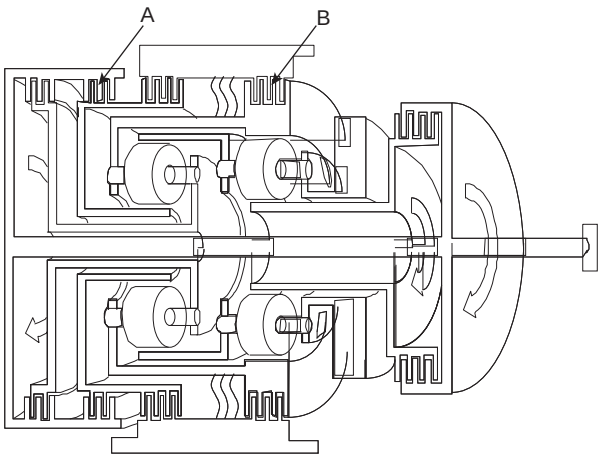
REV GEAR POWER FLOW

Hydraulic pressure is applied to the reverse clutch(A) and the LR brake(B), then the reverse clutch transmits driving force from the input shaft to the reverse sun gear, and the LR brake locks the LR annulus gear and OD planetary carrier to the case.The reverse clutch drives the reverse sun gear, and the reverse sun gear drives the output carrier through the OD pinion gear, and the output carrier drives the transfer drive gear, and the transfer drive gear drives the transfer driven gear of the output shaft, and power is transmitted to the differential gear through the differential drive gear.



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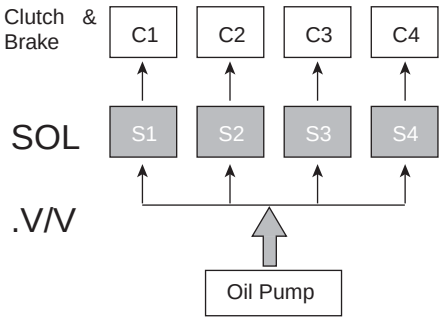
HYDRAULIC CONTROL SYSTEM

DESCRIPTION



Each clutch and brake have a Solenoid valve for independent control of hydraulic pressure

ELQE207A

- Better and smoother shift quality.
- In order to prevent ATF leakage from the valve body or each elements, the exhaust ports have been grouped into only one with an addition of a check ball.
- If a failure occurs in its electric control, the switch valve and fail safe valve is able to move to enable 3rd speed drive or reverse.
- The hydraulic system consists of oil pump, regulator valve, solenoid valves, pressure control valve and valve body.

OPERATION COMPONENTS AND FUNCTIONS

Oil Pump

The oil pump is made of aluminum to reduce its weight. The oil pump is not a serviceable part; it must be replaced as a pump assembly.
Do not disassemble the pump as improper alignment during assembly will cause pump failure and could cause damage to the transaxle.
When removing the oil pump from the T/M case, the S.S.T. (09452-33100) must be used.

OPERATION OF EACH VALVE

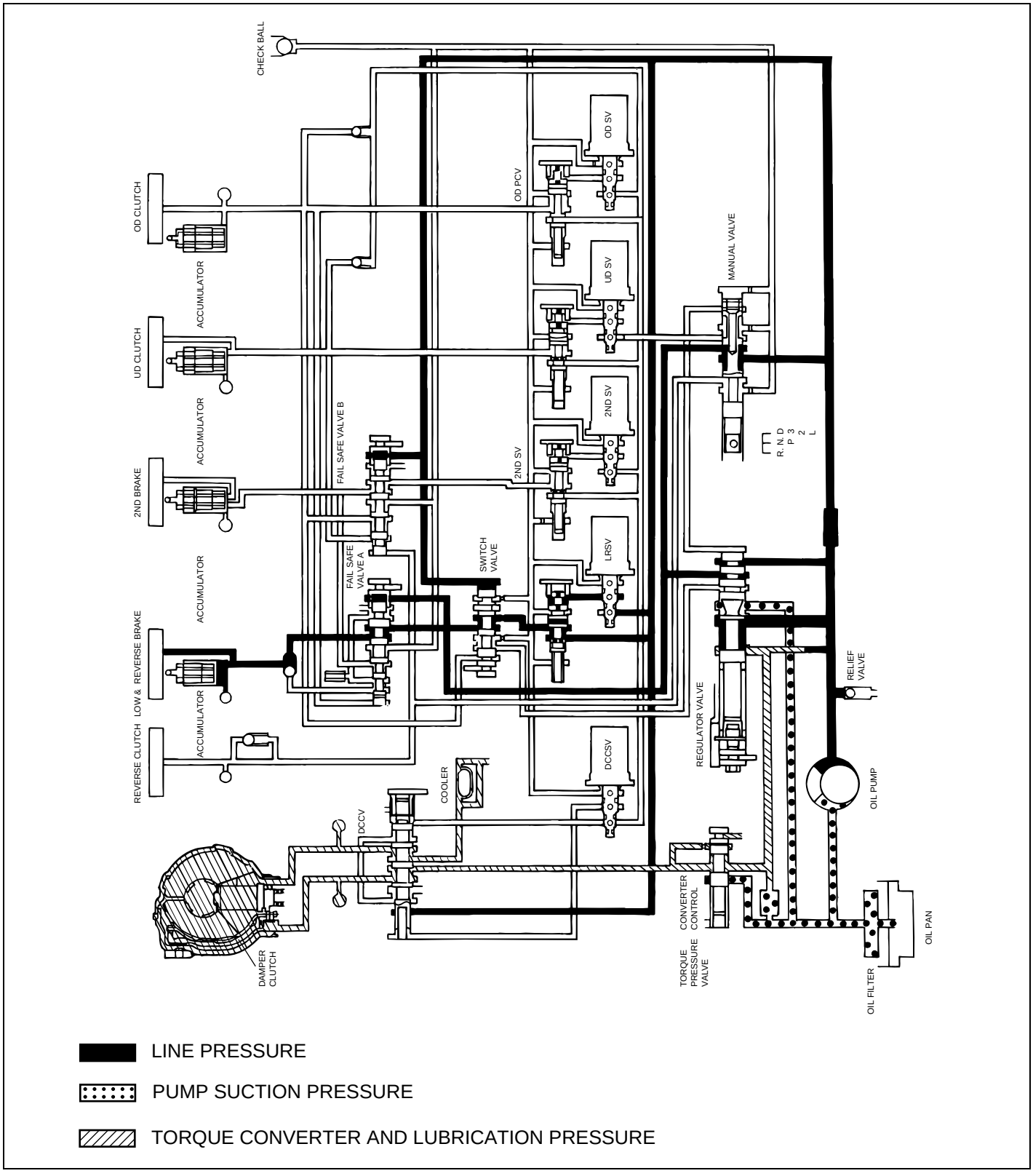
Torque converter pressure control valve : The function of this valve is to maintain a constant pressure within the torque converter.
Damper clutch control valve : Its function is to control the hydraulic pressure that acts on the Damper Clutch. Manual valve :The position of the manual valve is determined by the selector lever and applies or cuts line pressure to different valves.
Pressure control valve & Solenoid valve : The pressure control valve prevents a rapid decrease in hydraulic pressure when the clutch becomes disengaged. It also reduces the sharp increase in input shaft speed during clutch to clutch control.
Switch valve : When the OD clutch is applied, the hydraulic pressure is applied to the regulator valve via the switch valve. Hence, the line pressure is reduced at 3rd and 4th gear.
Fail Safe Valve-A : During fail safe mode, this valve releases the pressure in the LR Brake.
Fail Safe Valve-B : During fail safe mode, this valve cuts the pressure from the 2nd pressure control valve to 2nd brake.

HYDRAULIC FLOW

P AND N POSITION

The TCM(PCM) controls the solenoid valves. The conditions of the solenoid valve and positions of the solenoid valve are as follows :

- The LR solenoid valve is turned off, and the LR pressure solenoid valve is moved to the left side.
- The 2nd solenoid valve is turned on, and the 2nd pressure solenoid valve remains in the right side.
- The UD solenoid valve is turned on, and the UD pressure solenoid valve remains in the right side.
- The OD solenoid valve is turned on, and the OD pressure solenoid valve remains in the right side.
- The line pressure is supplied to the regulator valve and the fail-safe valve A.
- The line pressure is supplied to each element (fail-safe valve B, switch valve, DCCV, LR solenoid valve, LR pressure control valve).
- The fail-safe valve B moves to the left side by the line pressure through the manual valve.
- The switch valve moves to the left side by the line pressure.
- The line pressure is supplied to the DCCV, and DCCV moves to the right side.
- The line pressure is supplied to the LR pressure control valve and the LR solenoid valve, and TCM(PCM) turns off the LR solenoid valve, so the line pressure is supplied to the LR brake through the switch valve and the fail-safe valve A.
- The regulator valve moves to the left side by the line pressure through the manual valve, and the line pressure is supplied to the torque converter pressure control valve and the oil pump.

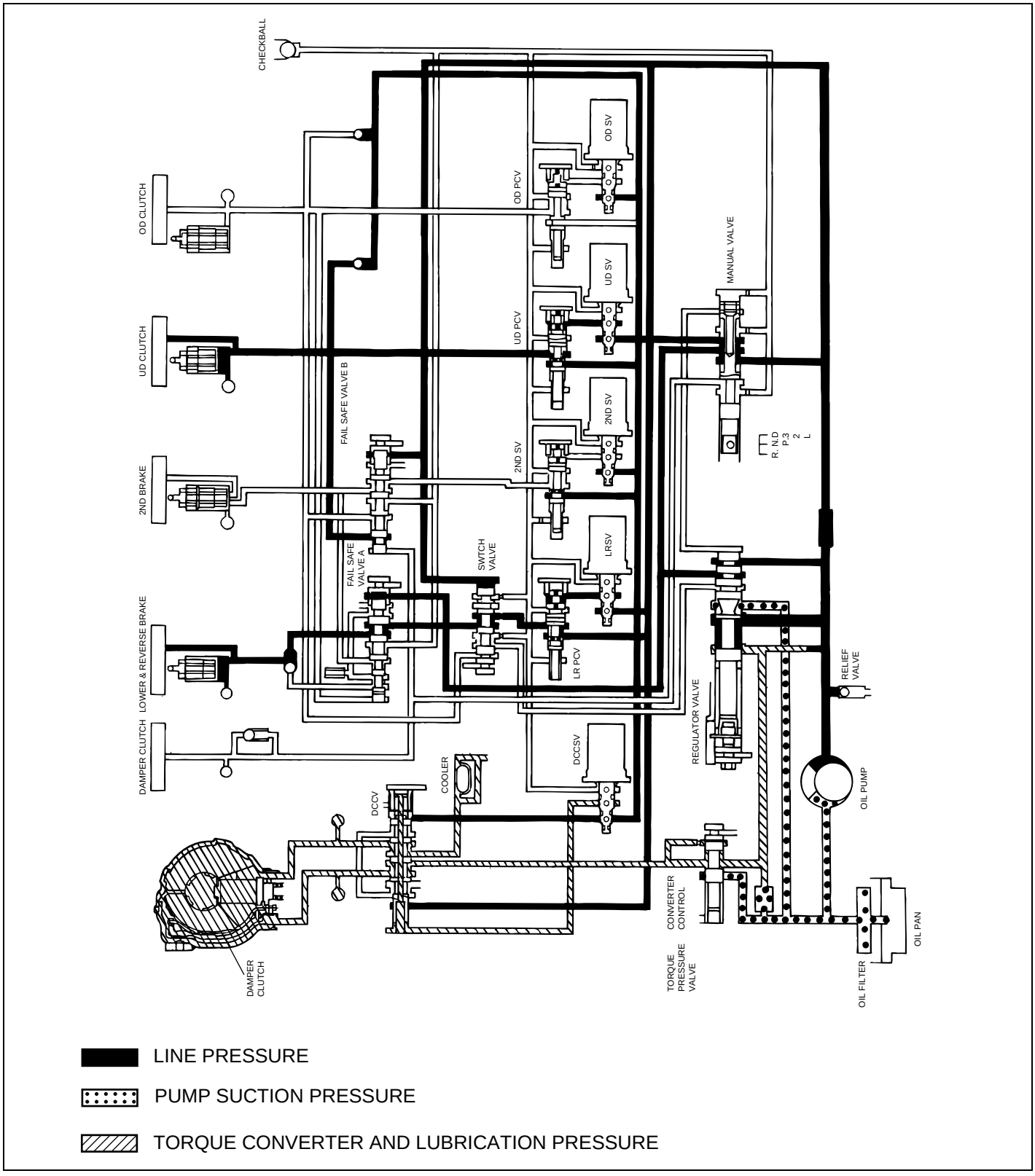


EKA9050A

D POSITION : 1ST GEAR

The TCM(PCM) controls the solenoid valves. The conditions of the solenoid valve and positions of the solenoid valve are as follows :

- The LR solenoid valve is turned off, and the LR pressure solenoid valve is moved to the left side.
- The 2nd solenoid valve is turned on, and the 2nd pressure solenoid valve remains in the right side.
- The UD solenoid valve is turned off, and the UD pressure solenoid valve is moved to the left side.
- The OD solenoid valve is turned on, and the OD pressure solenoid valve remains in the right side.
- The line pressure is supplied to the regulator valve and the fail-safe valve A.
- The line pressure is supplied to each element (fail-safe valve B, switch valve, damper clutch control valve, LR solenoid valve, LR pressure control valve).
- The line pressure through the manual valve is supplied to each element (DCCV, 2nd solenoid valve, 2nd pressure control valve, OD solenoid valve, OD pressure control valve, UD solenoid valve, UD pressure control valve).
- The fail-safe valve B moves to the left side by the line pressure.
- The switch valve moves to the left side by the line pressure.
- The line pressure is supplied to the DCCV, and TCM(PCM) turns off the DCCSV, so the DCCV remains in the right side
- The line pressure is supplied to the LR pressure control valve and the LR solenoid valve, and TCM(PCM) turns off the LR solenoid valve, so the line pressure is supplied to the LR brake through the switch valve and the fail-safe valve A.
- The line pressure is supplied to the UD pressure control valve and the UD solenoid valve, and TCM(PCM) turns off the UD solenoid valve, so the line pressure is supplied to the UD clutch and the fail-safe valve B.
- The regulator valve moves to the left side by the line pressure through the manual valve, and the line pressure is supplied to the torque converter pressure control valve and the oil pump.

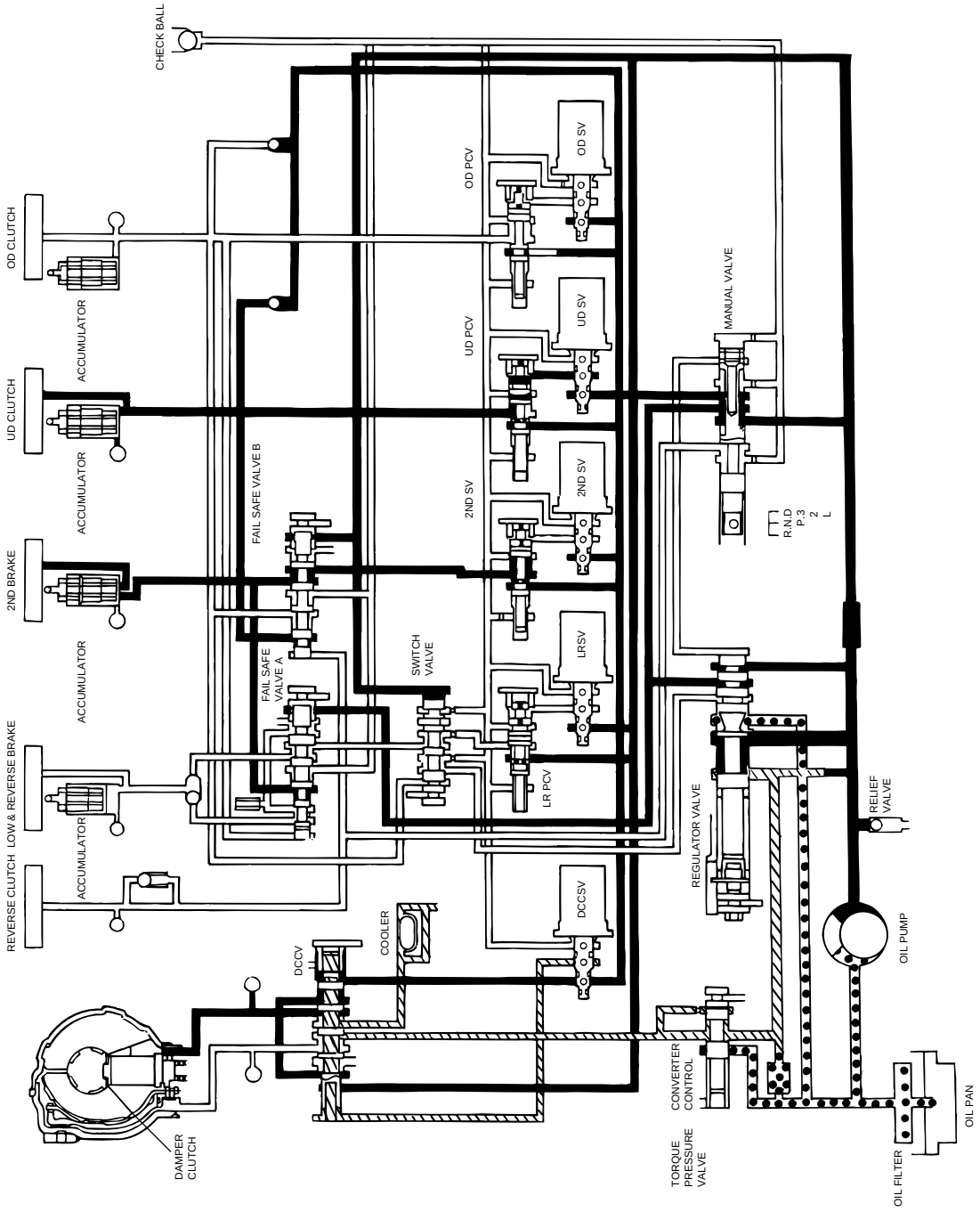


EKA9050B

D POSITION : 2ND GEAR

The TCM(PCM) controls the solenoid valves. The conditions of the solenoid valve and positions of the solenoid valve are as follows :

- The LR solenoid valve is turned on, and the LR pressure solenoid valve remains in the right side.
- The 2nd solenoid valve is turned off, and the 2nd pressure solenoid valve is moved to the left side.
- The UD solenoid valve is turned off, and the UD pressure solenoid valve is moved to the left side.
- The OD solenoid valve is turned on, and the OD pressure solenoid valve remains in the right side.
- The line pressure is supplied to the regulator valve and the fail-safe valve A.
- The line pressure is supplied to each element (fail-safe valve B, switch valve, damper clutch control valve, LR solenoid valve, LR pressure control valve).
- The line pressure through the manual valve is supplied to each element (DCCV, 2nd solenoid valve, 2nd pressure control valve, OD solenoid valve, OD pressure control valve, UD solenoid valve, UD pressure control valve).
- The fail-safe valve B moves to the right side by the line pressure through 2nd pressure control valve and the line pressure through the UD pressure control valve.
- The pressure through the manual valve is supplied to the fail-safe valve A, and the fail-safe valve A moves to the left side
- The switch valve moves to the left side by the line pressure.
- The line pressure is supplied to the DCCV and the DCCSV, and TCM(PCM) turns off the DCCSV, so the DCCV remains in the right side
- The line pressure is supplied to the 2nd pressure control valve and the 2nd solenoid valve, and TCM(PCM) turns off the 2nd solenoid valve, so the line pressure is supplied to the 2nd brake and the fail-safe valve A through the fail-safe valve B.
- The line pressure is supplied to the UD pressure control valve and the UD solenoid valve, and TCM(PCM) turns off the UD solenoid valve, so the line pressure is supplied to the UD clutch and the fail-safe valve B.
- The regulator valve moves to the left side by the line pressure through the manual valve, and the line pressure is supplied to the torque converter pressure control valve and the oil pump.



LINE PRESSURE

PUMP SUCTION PRESSURE

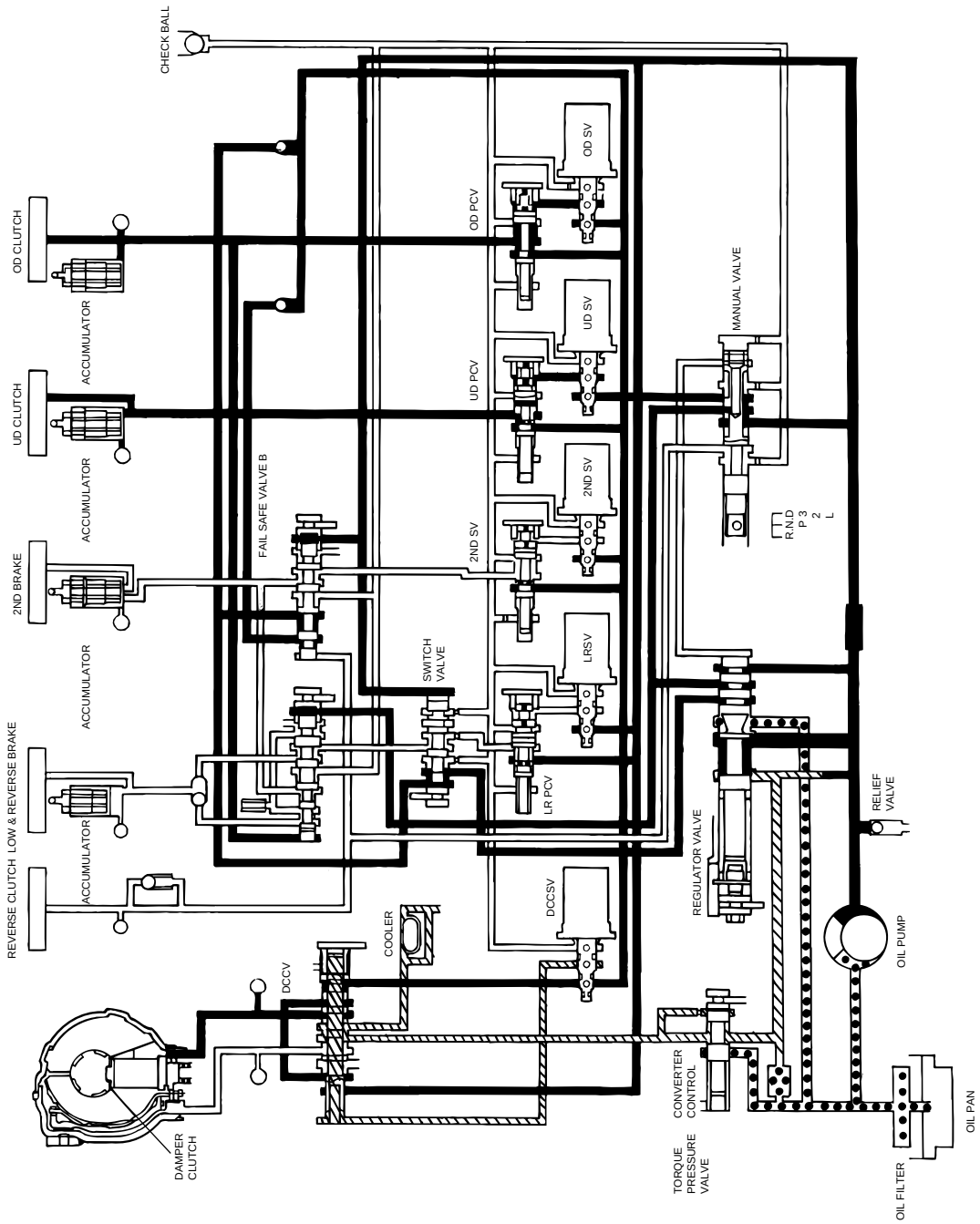
TORQUE CONVERTER AND LUBRICATION PRESSURE

EKA9050C

D POSITION : 3RD GEAR

The TCM(PCM) controls the solenoid valves. The conditions of the solenoid valve and positions of the solenoid valve are as follows :

- The LR solenoid valve is turned on, and the LR pressure solenoid valve remains in the right side.
- The 2nd solenoid valve is turned on, and the 2nd pressure solenoid valve remains in the right side.
- The UD solenoid valve is turned off, and the UD pressure solenoid valve is moved to the left side.
- The OD solenoid valve is turned off, and the OD pressure solenoid valve is moved to the left side.
- The line pressure is supplied to the regulator valve and the fail-safe valve A.
- The line pressure is supplied to each element (fail-safe valve B, switch valve, DCCV, LR solenoid valve, LR pressure control valve).
- The line pressure through the manual valve is supplied to each element (DCCSV, 2nd solenoid valve, 2nd pressure control valve, OD solenoid valve, OD pressure control valve, UD solenoid valve, UD pressure control valve).
- The fail-safe valve B moves to the right side by the line pressure through the UD pressure control valve and the line pressure through the OD pressure control valve.
- The pressure is supplied to the fail-safe valve A through the OD pressure control valve, but the fail-safe valve A does not move to the right side
- The line pressure is supplied to the DCCV and the DCCSV, and TCM(PCM) turns on the DCCSV, and the DCCV moves to the left side, and the damper clutch is operated.
- The line pressure is supplied to the UD pressure control valve and the UD solenoid valve, and TCM(PCM) turns off the UD solenoid valve, so the line pressure is supplied to the UD clutch and the fail-safe valve B.
- The line pressure is supplied to the OD pressure control valve and the OD solenoid valve, and TCM(PCM) turns off the OD solenoid valve, so the line pressure is supplied to the OD clutch and the fail-safe valve A/B and the switch valve.
- The switch valve moves to the right side by the line pressure through the OD pressure control valve.
- The regulator valve moves to the left side by the pressure through the manual valve and the pressure through the switch valve, and the line pressure is more supplied to the oil pump.



LINE PRESSURE

PUMP SUCTION PRESSURE

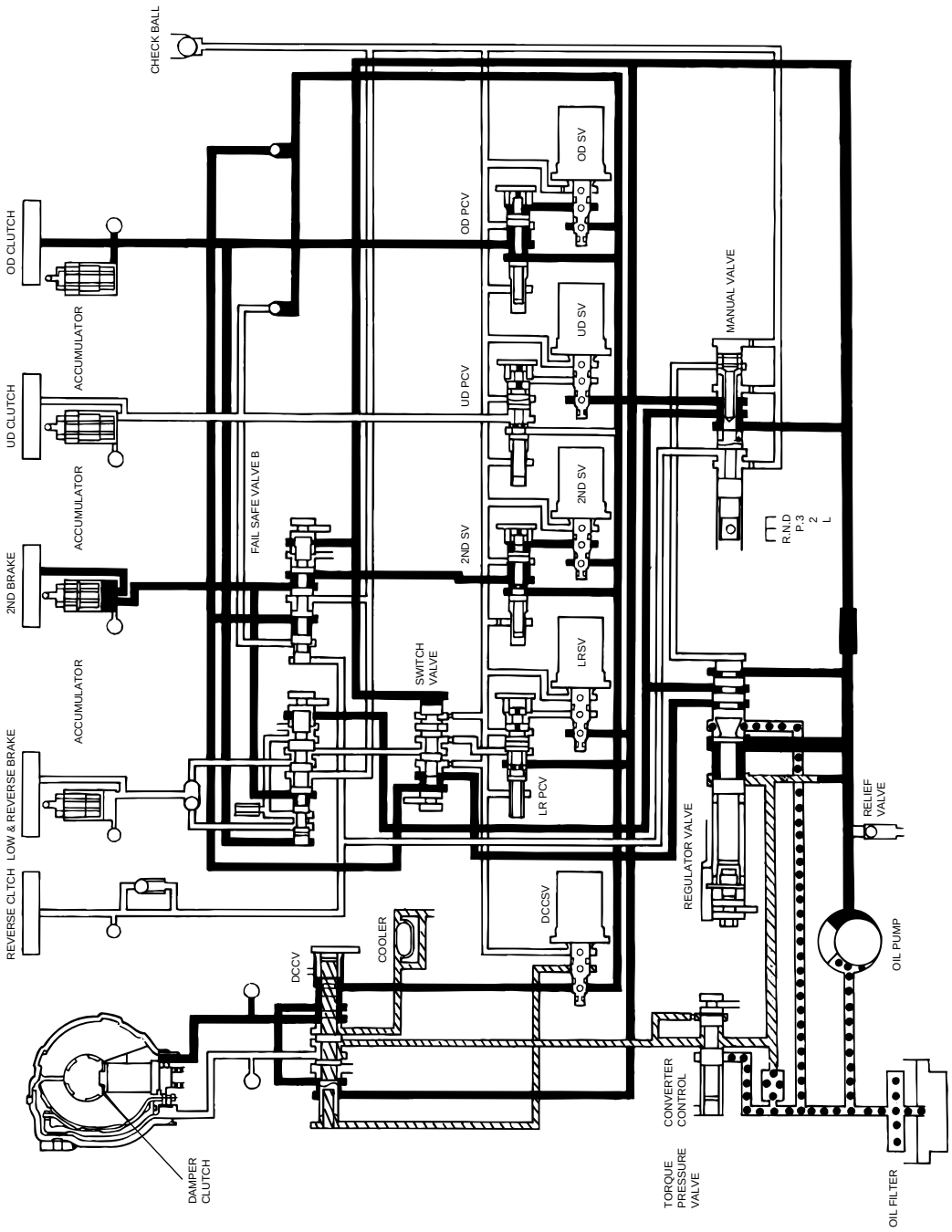
TORQUE CONVERTER AND LUBRICATION PRESSURE

EKA9050D

D POSITION : 4TH GEAR

The TCM(PCM) controls the solenoid valves. The conditions of the solenoid valve and positions of the solenoid valve are as follows :

- The LR solenoid valve is turned on, and the LR pressure solenoid valve remains in the right side.
- The 2nd solenoid valve is turned off, and the 2nd pressure solenoid valve is moved to the left side.
- The UD solenoid valve is turned on, and the UD pressure solenoid valve remains in the right side.
- The OD solenoid valve is turned off, and the OD pressure solenoid valve is moved to the left side.
- The line pressure through the manual valve is supplied to the regulator valve and the fail-safe valve A.
- The line pressure is supplied to each element (fail-safe valve B, switch valve, DCCV, LR solenoid valve, LR pressure control valve).
- The line pressure through the manual valve is supplied to each element (DCCSV, 2nd solenoid valve, 2nd pressure control valve, OD solenoid valve, OD pressure control valve, UD solenoid valve, UD pressure control valve).
- The fail-safe valve B moves to the right side by the line pressure through the 2nd pressure control valve and the line pressure through the OD pressure control valve.
- The line pressure through the OD pressure control valve is supplied to the fail-safe valve A, and the fail-safe valve A moves to the right side by the line pressure through the fail-safe valve B and the line pressure through the OD pressure control valve.
- The line pressure is supplied to the DCCV and the DCCSV, and TCM(PCM) turns on the DCCSV, so DCCV moves to the right side, and the damper clutch is operated.
- The line pressure is supplied to the OD pressure control valve and the OD solenoid valve, and TCM(PCM) turns off the OD solenoid valve, so the line pressure is supplied to the OD clutch and the fail-safe valve A/B and the switch valve.
- The line pressure is supplied to the 2nd pressure control valve and the 2nd solenoid valve, and TCM(PCM) turns off the 2nd solenoid valve, so the line pressure through the 2nd pressure control valve is supplied to the 2nd brake through the fail-safe valve B.
- The regulator valve moves to the left side by the line pressure through the manual valve and the line pressure through the switch valve, and the line pressure is more supplied to the oil pump.



LINE PRESSURE

PUMP SUCTION PRESSURE

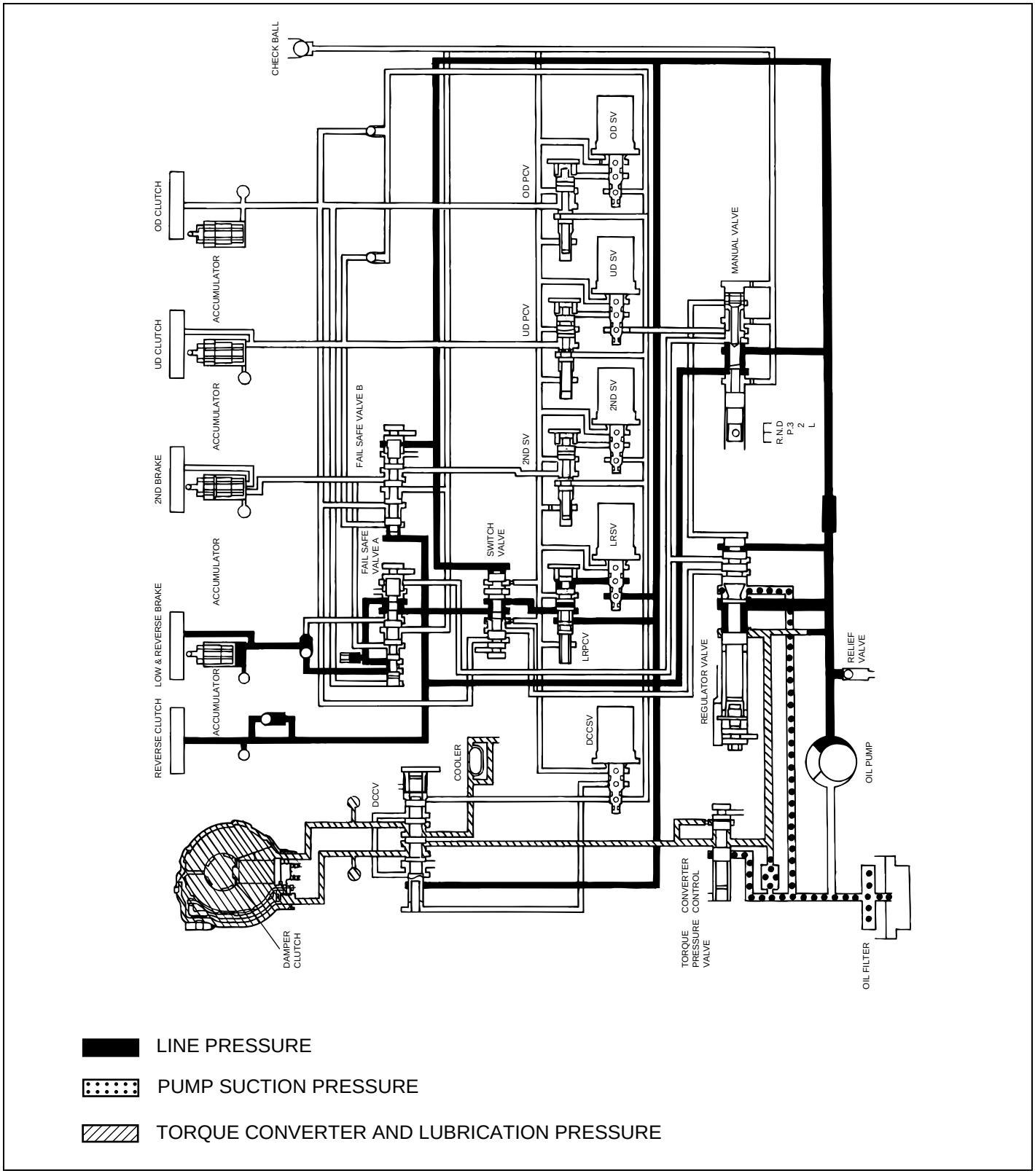
TORQUE CONVERTER AND LUBRICATION PRESSURE

EKA9050E

REVERSE POSITION

The TCM(PCM) controls the solenoid valves. The conditions of the solenoid valve and positions of the solenoid valve are as follows :

- The LR solenoid valve is turned off, and the LR pressure solenoid valve is moved to the left side.
- The 2nd solenoid valve is turned on, and the 2nd pressure solenoid valve remains in the right side.
- The UD solenoid valve is turned on, and the UD pressure solenoid valve remains in the right side.
- The OD solenoid valve is turned on, and the OD pressure solenoid valve remains in the right side.
- The line pressure through the manual valve is supplied to the reverse clutch and the fail-safe valve B.
- The line pressure is supplied to each element (fail-safe valve B, switch valve, DCCV, LR solenoid valve, LR pressure control valve).
- The fail-safe valve B moves to the left side by the line pressure.
- The switch valve moves to left side by the line pressure, and the line pressure through the LR pressure control valve is supplied to the LR brake through the fail-safe valve A.
- The line pressure is supplied to the DCCV, so the DCCV remains in the right side.
- The fail-safe valve A moves to the right side by the line pressure through the switch valve.
- The line pressure is supplied to the LR pressure control valve and the LR solenoid valve, and TCM(PCM) turns off the LR solenoid valve, and the line pressure is supplied to the LR brake through the LR pressure control valve and the switch valve and the fail-safe valve A.
- The regulator valve moves to the right side by the no line pressure through the manual valve, and the line pressure is higher than other range.



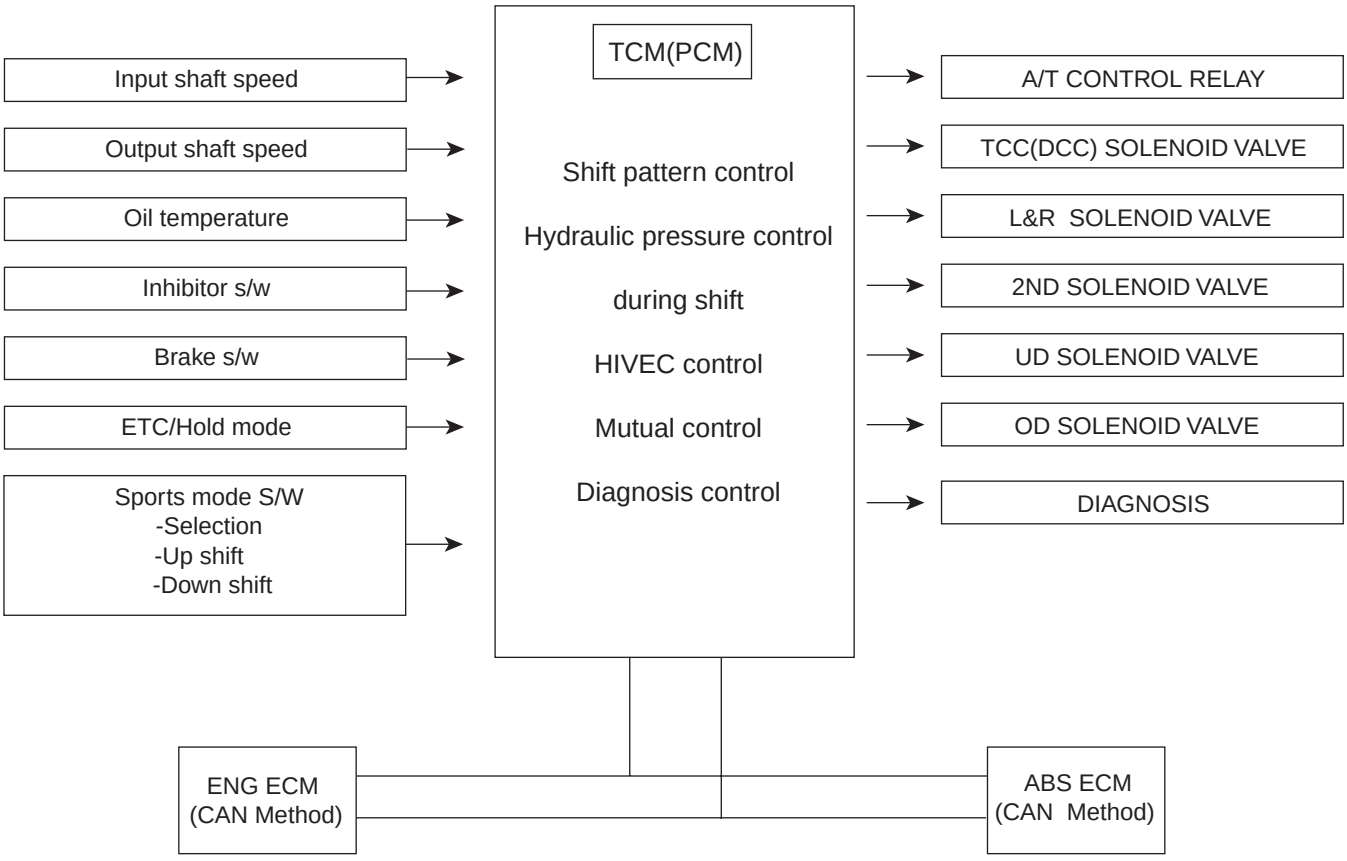
EKA9050F

ELECTRONIC CONTROL SYSTEM

DESCRIPTION

The electronic control system used in the new generation auto transaxle is far superior to the previous systems. This system is able to adopt a variable shift pattern for smooth and problem free shifting.
A solenoid valve is applied to each of the clutches and brakes and is independently controlled. Feedback control and correction control is performed in all gears as well as utilization of mutual control system to increase shift feeling. The torque converter damper clutch uses a partial lock up and full lock-up system. An additional control method called the HIVEC system (neural network) is adopted to increase shift feeling.

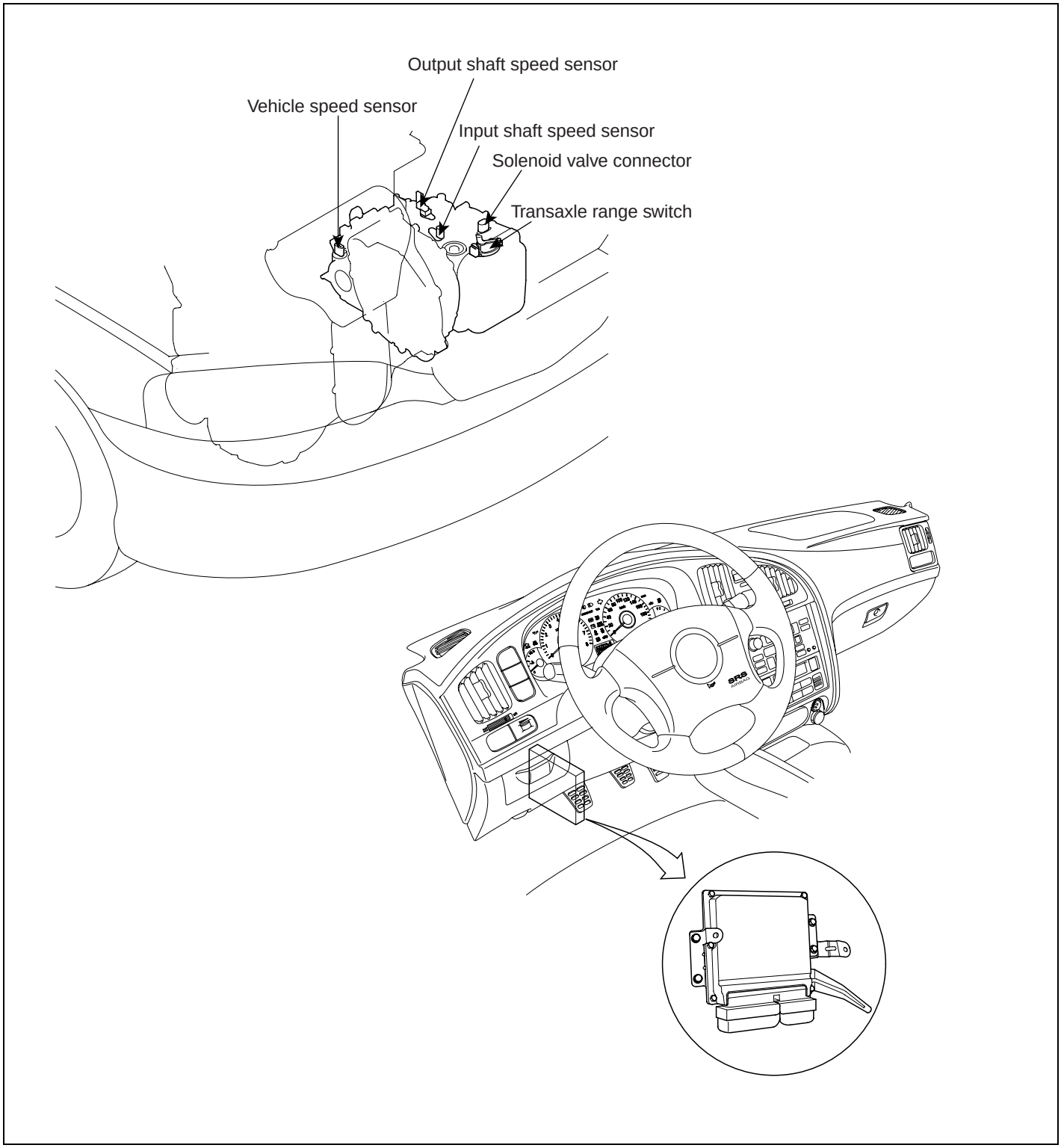
BLOCK DIAGRAM (CAN)



ELQE208A

ELECTRIC CONTROL LOCATION

The TCM(PCM) is located below the dashboard. However,
in the ß-engine vehicles, there is not TCM(PCM).



LKIF002A

OPERATING COMPONENTS AND FUNCTIONS

Sensor	Function
Input shaft speed sensor	Detect turbine speed at UD retainer
Output shaft speed sensor	Detect T/F drive gear speed at T/F driven gear (4A/T)
Crank angle sensor	Detect engine speed
TPS(Gasoline)	Throttle opening ratio by potentiometer
APS(Diesel)	Accelerator position sensor
Air conditioner switch	A/C load by thermister
Inhibitor switch	Select lever position by contact switch
Brake switch	Brake pedal position
Vehicle speed sensor	Detect vehicle speed by speedometer driven gear
Sport mode switch	Sport mode On/Off signal
Kick down servo switch	Kick down piston position
Vehicle speed sensor	Vehicle speed
Sport mode up-shift switch	Sport mode up-shift signal
Sport mode downshift switch	Sport mode downshift signal
Request of torque reduction	Send the request of torque reduction to ECM
ABS-ECM, Engine ECM	In case of CAN communication

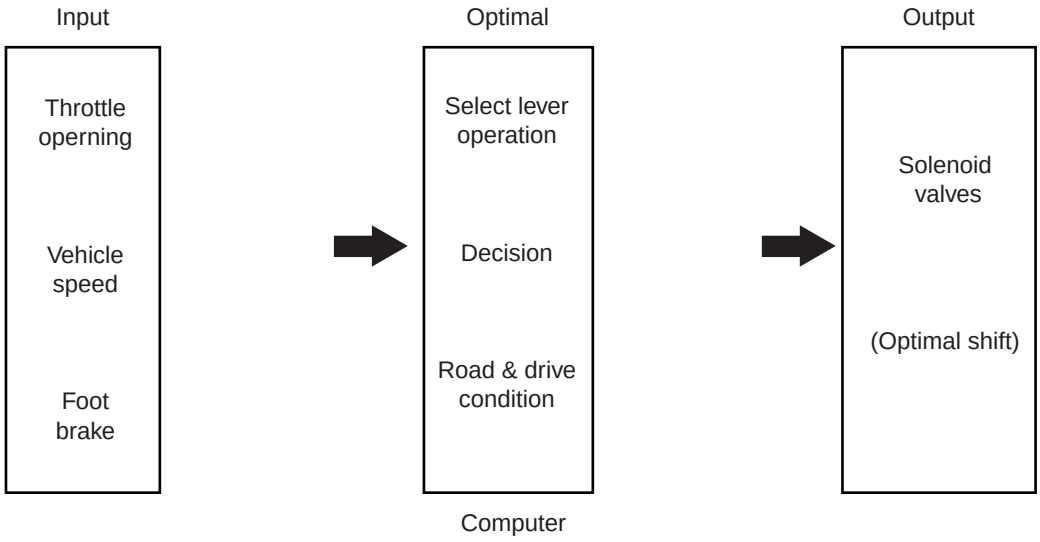
HIVEC

In addition to the variable shift pattern control, the HIVEC system with neural network is also adopted for the first time in HMC. HIVEC uses information from various inputs and feedback adaptation and selects the best appropriate gear position and shift timing under all possible driving conditions.

CONTROL FOR ALL DRIVING CONDITION

This function makes TCM(PCM) decide optimal gear range under all driving condition. The optimal operation of the manual shift lever by several drivers' and various driving condition is pre-set in the TCM(PCM). On the basis of mapping data, TCM(PCM) decides the driving condition from throttle opening, vehicle speed and brake signal. And then TCM(PCM) controls the gear position optimally. Optimal gear position is achieved under various driving condition by HIVEC logic.

OPTIMAL CONTROL FOR ALL DRIVING CONDITION



ELQE209A

HIVEC INHIBIT CONDITIONS

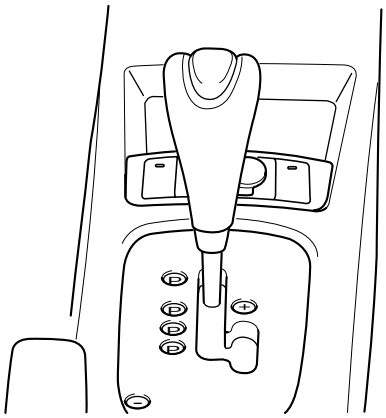
- ATF temperature below 40°C.
- When standard pattern is not used.
  - Inhibitor switch: P, R, N, L
  - Extremely low temperature mode
  - Lower emission shift pattern
  - ATF control variable shift pattern

- During fail safe mode (3rd gear hold)
- In case of prohibition of Intelligent shift
  - TPS faulty (Short: P1702, Open: 1701)
  - ATF Temperature sensor faulty (P1712)
  - Stop lamp s/w faulty (P0703)

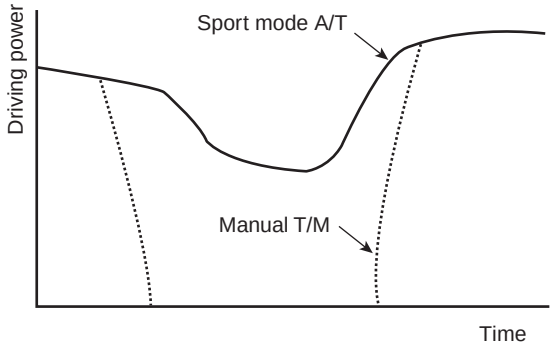
- TCM(PCM) faulty (Check engine lamp ON)
- After IG ON until first time stop lamp S/W comes ON→OFF.

SPORTS MODE

SPORTS MODE SWITCH



AKIE002Q



ELQE210B

Sports mode allows the manual up-shift and downshift with the accelerator pedal is depressed. The prompt response and shift would be obtained due to the continuous shifting without cutting of driving power. The shifting time is also decreased about 0.1sec during up-shift, 0.2sec during downshift. As the selector lever is pushed upward or downward one time, the gear is up shifted or downshifted by one gear.

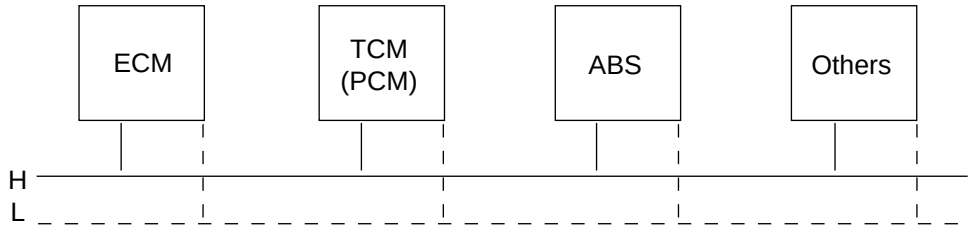
SIGNALS OF SPORTS MODE SWITCH

Items	Mode S/W	UP S/W	DOWN S/W
D range selection	OFF	OFF	OFF
Sports mode selection	ON	OFF	OFF
Sports mode up-shift selection	ON	ON	OFF
Sports mode downshift selection	ON	OFF	ON

CONTROLLER AREA NETWORK (CAN)

Previously, for different computers in the vehicle to share the same information, each signal required a different pin and wiring. However, with the introduction of a CAN system, only two lines are required to achieve the same function. The information is in digital format. This method does not use a integrated ECM.

Frequency: 500Kbit/sec



ELQE212A

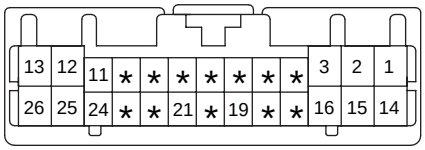
Input signals to TCM(PCM) through ' CAN communication'

- Engine rpm, TPS signal
- A/CON signal, Engine coolant temperature
- Quantity of intake airflow, Vehicle speed
- Shift holding signal (FTCS ON)

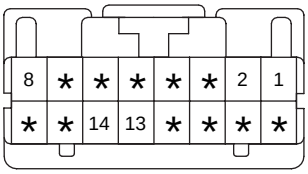
Output signals from TCM(PCM) through ' CAN communication'

- Request signal for torque reduction
- ATF temperature, TCM(PCM) type, TCM(PCM) error or not
- Damper clutch ON, OFF / Gear position

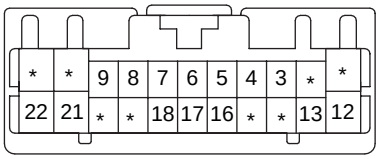
TCM(PCM) PIN DESCRIPITION



C89-1 (2.7 GSL)
C141-1 (2.0 DSL)



C89-2 (2.7 GSL)
C141-2 (2.0 DSL)

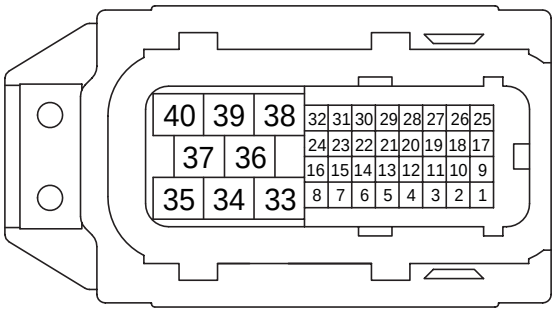


C89-3 (2.7 GSL)
C141-3 (2.0 DSL)

LKIF002B

Terminal Number		Description
C89-1 C141-1	1	SOLENOID VALVE(UD)
	2	POWER 1(SOLENOID VALVE)
	3	POWER 2(SOLENOID VALVE)
	4	-
	5	-
	6	-
	7	-
	8	AUTO CRUISE
	9	-
	10	-
	11	POWER(IG.1)
	12	EARTH FOR POWER
	13	EARTH FOR POWER
	14	SOLENOID VALVE(OD)
	15	SOLENOID VALVE(DCC)
	16	SOLENOID VALVE(2ND)
	17	-
	18	-
	19	POWER FOR FLASH ROM
	20	-
	21	SHIFT POSITION SIGNAL
	22	-
	23	-
	24	POWER(IG.1)
	25	EARTH FOR POWER
	26	EARTH FOR POWER

Terminal Number		Description
C89-2 C141-2	1	SENSOR-INPUT SPEED
	2	SENSOR-OUTPUT SPEED
	3	-
	4	-
	5	-
	6	-
	7	-
	8	POWER FOR S-RAM
	9	-
	10	-
	11	-
	12	-
	13	EARTH FOR SENSOR
	14	OIL TEMPERATURE SENSOR
	15	-
	16	-
C89-1 C141-1	1	-
	2	-
	3	CAN-'HIGH'
	4	CAN-'LOW'
	5	INHIBITOR SW.(P)
	6	INHIBITOR SW.(N)
	7	SPT SELECT SW.
	8	SPT DOWN SW.
	9	STOP LAMP SW.
	10	-
	11	-
	12	SOLENOID VALVE(LR/DIR)
	13	K-LINE
	14	-
	15	-
	16	INHIBITOR SW.(R)
	17	INHIBITOR SW.(D)
	18	SPT UP SW.
	19	-
	20	-
	21	A/T CONTROL RELAY
	22	EARTH FOR SIGNAL



C18-2(2.0 GSL)

LKIF002C

Terminal NO.		PIN Description
C18-2	1	-
	2	-
	3	-
	4	-
	5	Sports down switch
	6	Inhibiter switch(N)
	7	-
	8	-
	9	-
	10	-
	11	Auto cruise
	12	-
	13	Sports up switch
	14	Inhibiter switch(R)
	15	-
	16	-
	17	-
	18	Sensor ground
	19	Stop switch
	20	Output speed sensor
	21	Sports select switch
	22	Inhibiter switch(P)
	23	-
	24	Shift signal(PWM)
	25	-
	26	Oil temperature sensor
	27	-
	28	Input speed sensor

Terminal NO.		PIN Description
C18-2	29	Inhibiter switch(D)
	30	-
	31	-
	32	A/T relay
	33	Solenoid valve(OD)
	34	-
	35	Solenoid valve(DCC)
	36	Power source(SOL.)
	37	Ground1
	38	Solenoid valve(LR)
	39	Solenoid valve(2ND)
	40	Solenoid valve(UD)

TCM(PCM) INPUT/OUTPUT SIGNAL VOLTAGE CHECK SHEET

GASOLINE 2.7 ENGINE (C89-1,2,3) / DIESEL 2.0 ENGINE (C141-1,2,3)

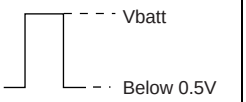
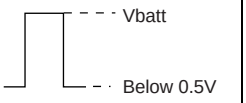
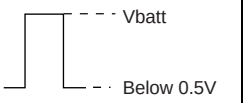
No.		SIGNAL NAME	CONDITION	INPUT/OUTPUT SIGNAL		TEST RESULT	REMARK
				TYPE	Level		
C89-1 C141-1	1	UD Solenoid	Shifting	Pulse	HI : V_BAT LO : Max . 1.0V	14.5V 0.31V	
	2 3	A/T PWR Source	IG Off IG On	DC	Max. 1.0V V_BAT	0.0mV 12.7V	"L"
	4	1ST Lamp	1st Speed Otherwise	DC	V_BAT Max. 1.0V	13.8V 8mV	
	5	3rd Lamp	3rd Speed Otherwise	DC	V_BAT Max. 1.0V	13.8V 8mV	
	6	N.A	-	-	-	-	
	7	N.A	-	-	-	-	
	8	ACC Cancel SIG	Non-operating Operating	DC	V_BAT Max. 0.5V		
	9	N.A	-	-	-	-	
	10	N.A	-	-	-	-	
	11 24	V_IG	IG Off IG On	DC	Max. 0.5 V V_BAT	0.0mV 12.4V	TCM(PCM)
	12	GND_PWR1	Idle	DC	Max. 50 mV	0.0mV	
	13	GND_PWR2	Idle	DC	Max. 50 mV	-2.0mV	
	14	OD Solenoid	Shifting	Pulse			
	15	Damper Clutch Solenoid	Lock_Up On	Pulse	HI : V_BAT LO : Max. 1.0V	14.5V 0.31V	
	16	2ND Solenoid	Shifting	Pulse	HI : V_BAT LO : Max. 1.0V	14.4V 0.27V	
	17	2nd Lamp	2nd Speed Otherwise	DC	V_BAT Max. 1.0V	13.8V 8mV	
	18	4th Lamp	4th Speed Otherwise	DC	V_BAT Max. 1.0V	13.8V 8mV	
	19	Flash PWR Source	IG On IG Off	DC	4.0~5.0V Max. 0.5 V	4.5V 0.0mV	Flash ROM
	20	N.A	-	-	-	-	
	21	N.A	-	-	-	-	
	22	N.A	-	-	-	-	
	23	N.A	-	-	-	-	
	25	GND_PWR3	Idle	DC	Max. 50 mV	-2.0mV	
	26	GND_PWR4	Idle	DC	Max. 50 mV	-2.0mV	

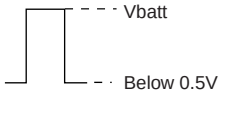
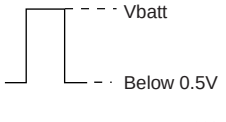
No.		SIGNAL NAME	CONDITION	INPUT/OUTPUT SIGNAL		TEST RESULT	REMARK
				TYPE	Level		
C89-2 C141-2	1	Speed Sensor-Input	Idle	Pulse	HI : Min. 4.0V LO : Max. 1.0V	4.96V 354mV	
	2	Speed Sensor-Output	30kph	Pulse	HI : Min. 4.0V LO : Max. 1.0V	4.95V 359mV	
	3	N.A	-	-	-	-	
	4	N.A	-	-	-	-	
	5	N.A	-	-	-	-	
	6	N.A	-	-	-	-	
	7	N.A	-	-	-	-	
	8	V_BAT	Key removal Always	DC vol. Cur-rent	Below 1.0 mA V_BAT	0.41mA 12.6V	TCM(PCM)
	9	N.A	-	-	-	-	
	10	N.A	-	-	-	-	
	11	N.A	-	-	-	-	
	12	N.A	-	-	-	-	
	13	GND_Sensor	Idle	DC	Max. 50 mV	22mV	OTS/PG-B
	14	Oil Temp. Sensor_ATM	Idle	Analog	0.5V ~ 4.5V	2.5V	at 60.0°C
	15	N.A	-	-	-	-	
	16	N.A	-	-	-	-	
C89-3 C141-3	1	N.A	-	-	-	-	
	2	N.A	-	-	-	-	
	3	CAN_HI	Recessive Dominant	Pulse	2.0 ~ 3.0V 2.75 4.5V	2.51V 3.52V	(Commnica-tio speed : 500kbps)
	4	CAN_LO	Recessive Dominant	Pulse	2.0 ~ 3.0V 0.5 2.25V	2.48V 1.49V	(Commnica-tio speed : 500kbps)
	5	P Range Selection	P Position Otherwise	DC	V_BAT Max. 1.0V	13.8V 21mV	
	6	N Range Selection	N Position Otherwise	DC	V_BAT Max. 1.0V	13.8V 21mV	
	7	SPT Select Selection	Select Position Otherwise	DC	V_BAT Max. 1.0V	14.1V 21mV	
	8	SPT Down Selection	Down Position Otherwise	DC	V_BAT Max. 1.0V	13.9V 26mV	
	9	Brake SW(N.O)	Release Push	DC	Max. 0.5V V_BAT	13.4V 0.0mV	
	10	N.A	-	-	-	-	
	11	N.A	-	-	-	-	

No.		SIGNAL NAME	CONDITION	INPUT/OUTPUT SIGNAL		TEST RESULT	REMARK
				TYPE	Level		
C89-3 C141-3	12	LR Solenoid	Shifting	Pulse	HI : V_BAT LO : Max . 1.0V	14.4V 0.27V	
	13	Diagnosis "K"	GST communication	Pulse	HI : Min V_BAT ∗ 70% LO : Max. V_BAT ∗30%	11.3V 0.21V	(Commnica-tio speed: 10.4kbps)
	14	N.A	-	-	-	-	
	15	N.A	-	-	-	-	
	16	R Range Selection	R Position Otherwise	DC	V_BAT Max. 1.0V	13.4V 0mV	
	17	D Range Selection	D Position Otherwise	DC	V_BAT Max. 1.0V	13.8V 28mV	
	18	SPT Up Selection	Up Position Otherwise	DC	V_BAT Max. 1.0V	13.9V 21mV	
	19	N.A	-	-	-	-	
	20	N.A	-	-	-	-	
	21	RLY A/T Control	RLY Off RLY On	DC	Max. 1.0V V_BAT	0.0mV 12.8V	"S2"
	22	GND_Sensor	Idle	DC	Max. 50 mV	8mV	TCM(PCM) Signal

GASOLINE 2.0 ENGINE (C18-2)

PIN No.	SIGNAL	CONDITION	INPUT. OUTPUT VALUE		TEST RESULT	REMARK
			TYPE	LEVEL		
5	Sport down SW	DOWN ON	Static signal	Vlow < 1.8V Vhigh > 4.2V Active : high	12.37V (Vbatt Level)	Sport mode down SW
		Others			0.2V	
6	N-SW	N ON	Static signal	Vlow < 1.8V Vhigh > 4.2V Active : high	12.37V (Vbatt Level)	Inhibitor SW (N)
		Others			0.2V	
9	V_ATREL	ON	Power		12.4V (Vbatt Level)	Batt. Voltage after A/T RELAY
		OFF			0.2V	
11	Auto cruise	Auto cruise ON	PULL UP INPUT	Vlow < 1.8V Vhigh > 4.2V	12.37V (Vbatt Level)	Auto cruise input from Cruise controller
		Auto cruise OFF			0.2V	
13	Sport up SW	UP ON	Static signal	Vlow < 1.8V Vhigh > 4.2V Active : high	12.37V (Vbatt Level)	Sport mode up SW
		Others			0.2V	
14	R-SW	R ON	Static signal	Vlow < 1.8V Vhigh > 4.2V Active : high	12.37V (Vbatt Level)	Inhibitor SW (R)
		Others			0.2V	
18	Sensor GND	Always	Power		GND level (0V)	
19	BRAKE SW	Brake ON	Sens	Vlow < 1.0V Vhigh > 6V	12.37V (Vbatt Level)	Detect BW input with open status detection function
		Brake OFF			0.2V	
20	Output speed	No signal: 1009 RPM	Pulse	Vlow < 1.8V Vhigh > 4.2V	 LKIF002D	Duty 50±20%, 1.116kHz
21	Sport SEL. SW	SEL. ON	Static signal	Vlow < 1.8V Vhigh > 4.2V Active : high	12.37V (Vbatt Level)	Sport mode Select SW
		Others			0.2V	
22	P-SW	P ON	Static signal	Vlow < 1.8V Vhigh > 4.2V Active : high	12.37V (Vbatt Level)	Inhibitor SW (P)
		Others			0.2V	

PIN No.	SIGNAL	CONDITION	INPUT. OUTPUT VALUE		TEST RESULT	REMARK
			TYPE	LEVEL		
24	Trip computer		PWM	3.0 < I < 5.0 A	50Hz	Sports Mode P,R,N,D range : 100% 1st gear : 12.5% 2nd gear : 27.5% 3rd gear : 42.5 % 4th gear : 57.5 %
26	Oil Temperature sensor		Analog	V = -0.3~VB	85°C → 0.8V	
28	Input speed	Ne signal: 2068 RPM	Pulse	Vlow < 1.8V Vhigh > 4.2V Active : high	 LKIF002D	Duty 50±20%, 2.049kHz
29	D-SW	D ON	Static signal	Vlow < 1.8V Vhigh > 4.2V Active : high	12.37V (Vbatt Level)	Inhibitor SW (D)
		Others			0.2V	
32	A/T Relay	A/T ON	Static signal	Norminal load current 1.1A	11.44V (Vbatt Level)	
		A/T OFF			0.2V	
33	Solenoid valve(OD)	→	PWM	Signal: 3.0 < Isol < 5.0A Supply : V_ATREL.	 LKIF002E	1st,2nd : 2kHz, 30% Positive duty (VB:12V) 3rd,4th: 100% Positive duty
35	Solenoid valve(DCC)	→	PWM	Signal: 3.0 < Isol < 5.0A Supply : V_ATREL.	 LKIF002E	1st,2nd : 100% Positive duty 3rd,4th: unknown
37	Power GND	Always	Power		GND level	
38	Solenoid valve(LR)	→	PWM	Signal: 3.0 < Isol < 5.0A Supply : V_ATREL.	 LKIF002E	1st: 100% Positive duty 2nd,3rd,4th:2kHz, 30% Positive duty (VB:12V)

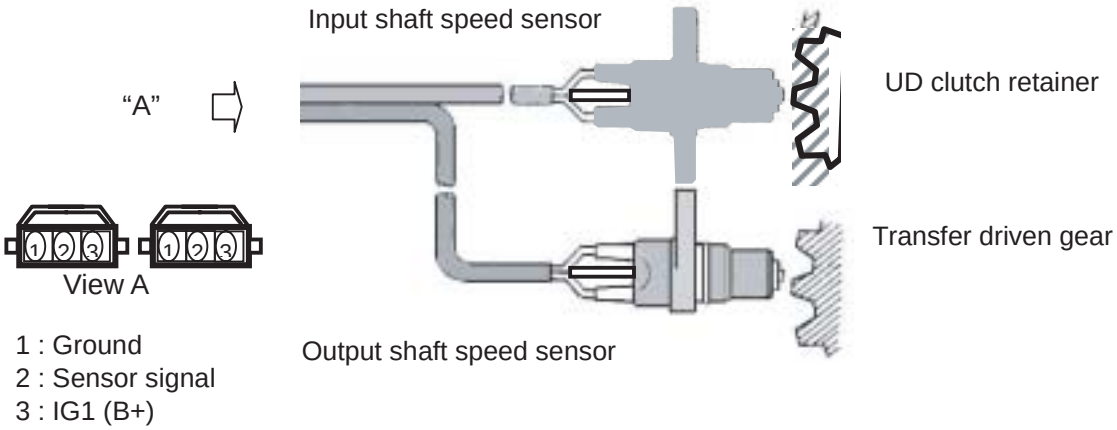
PIN No.	SIGNAL	CONDITION	INPUT. OUTPUT VALUE		TEST RESULT	REMARK
			TYPE	LEVEL		
39	Solenoid valve(2ND)	→	PWM	Signal: 3.0 < Isol < 5.0A Supply : V_ATREL.	 LKIF002E	1st,3rd:2kHz, 30% Positive duty (VB:12V) 2nd,4th : 100% Positive duty
40	Solenoid valve(UD)	→	PWM	Signal: 3.0 < Isol < 5.0A Supply : V_ATREL.	 LKIF002E	1st,2nd,3rd : 100% Positive duty 4th: 2kHz, 30% Positive duty (VB:12V)

SENSORS

- Sensor body and sensor connector have been unified as one.

Input shaft & Output shaft speed sensor

- Type: Hall sensor
- Current consumption: 22mA (MAX.)

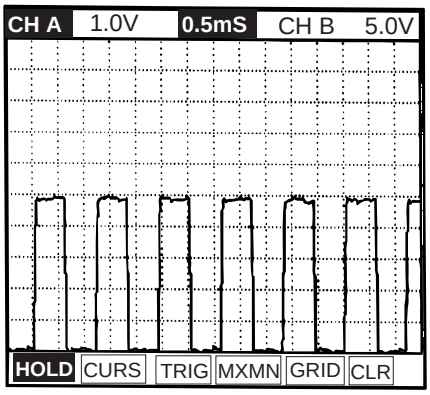


ELQE217A

HALL TYPE SENSOR: SPECIFICATION

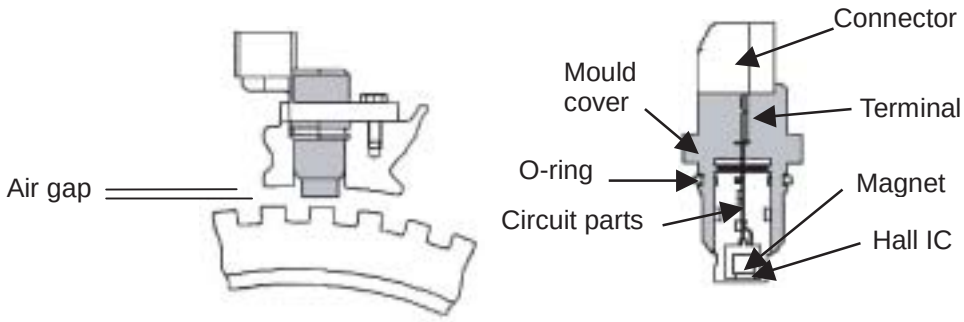
Air gap (mm)	Input shaft speed sensor	1.3
	Output shaft speed sensor	0.85
Coil Resistance	Input shaft speed sensor	over 1MΩ
	Output shaft speed sensor	over 1MΩ
Peak-Peak Voltage	High	4.8~5.2V
	Low	0.8V

WAVE FORM WITH HIGH-SCAN

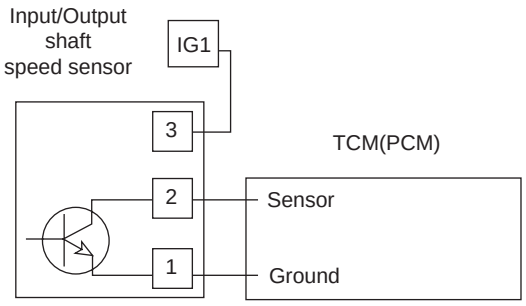


ELQE218A

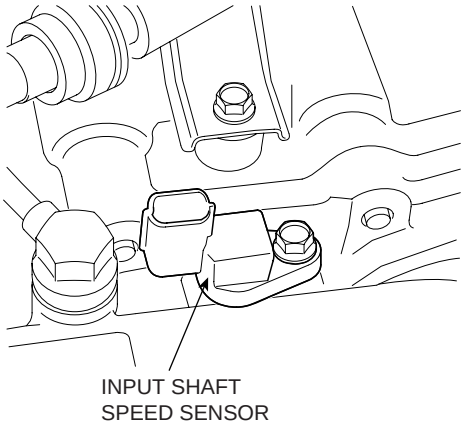
HALL TYPE SENSOR: STRUCTURE & INTERFACE



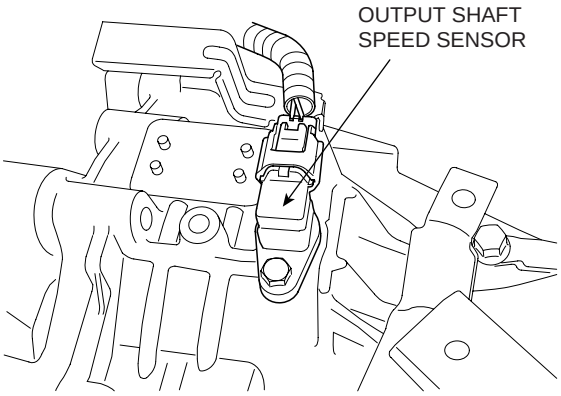
ELQE219A



LKIF003A



LKIF003B



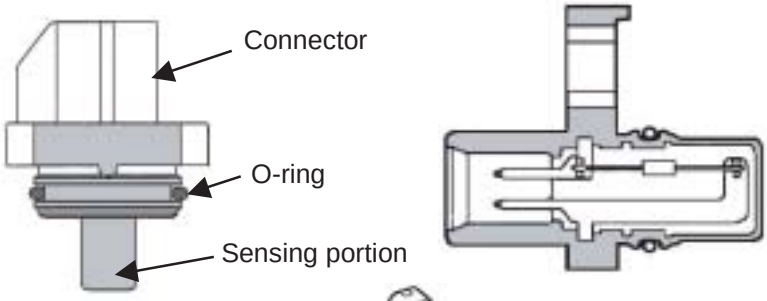
LKIF003C

Oil Temperature Sensor

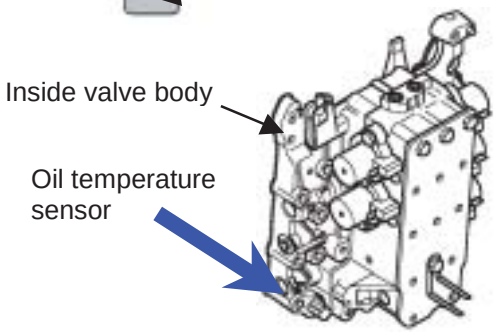
The oil temperature sensor is of the thermistor type, and senses the automatic transaxle fluid temperature. Using the signal from this sensor, TCM(PCM) controls the shift pattern optimally during shift. In order to operate the damper clutch, this signal is also referred.
- Range of temperature : -40°C 145°C
- Type: Separated type (High / Low temperature)
- Standard value of internal resistance

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		

Structure



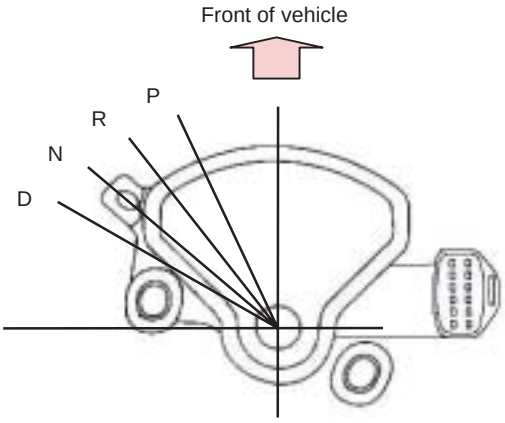
Location



ELQE222A

Inhibitor Switch

- Type: Rotary contact type
- Range of temperature : -40°C 145°C



ELQE223A

INHIBITOR SWITCH - CONTINUITY CHECK(SPORTS MODE)

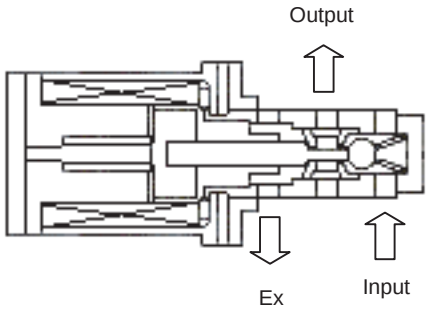
Range	Terminal Number									
	1	2	3	4	5	6	7	8	9	10
P			○					○	○	○
R							○	○		
N				○				○	○	○
D	○							○		

ELQE224A

ACTUATORS

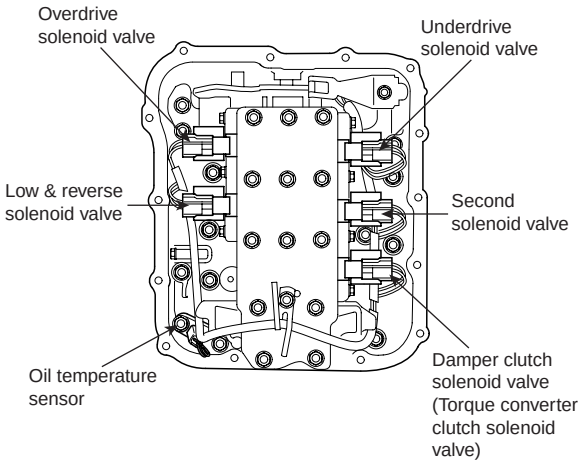
Solenoid Valve for Pressure Control

- Sensor type: Normal open 3-way
- Operating temperature : -30°C 130°C
- Frequency:
LR, 2ND, UD, OD, RED: 61.27Hz (at the ATF temp. -20°C above)
DCC: 30.64Hz
- Internal resistance: 2.6Ω or more
- Surge voltage: 56 V



ELQE225A

LOCATION

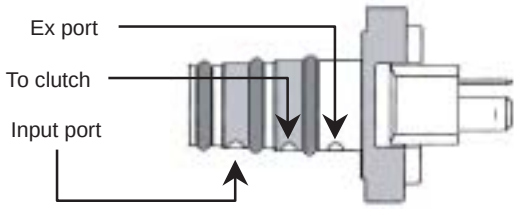


ELQE226A

IDENTIFICATION COLOR OF EACH SOLENOID VALVES

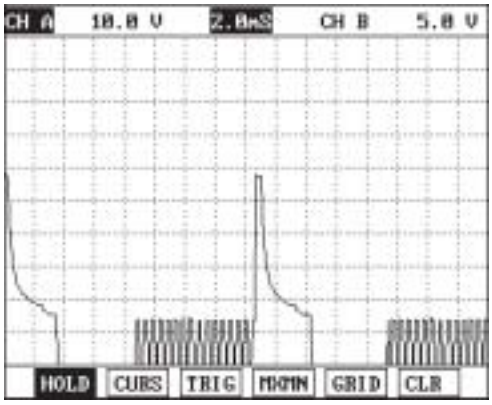
Solenoid valve	Wire color	Housing	Frequency
UD sol. valve	White, Red, Red	Black	61.27 Hz
OD sol. valve	Orange, Red	Black	61.27 Hz
L/R sol. valve	Brown, Yellow	Milky white	61.27 Hz
2nd sol. valve	Green, Red, Red	Milky white	61.27 Hz
DCC sol. valve	Blue, Yellow, Yellow	Black	34.64 Hz
ATF temp. Sensor	Black, Red	Black	

- L/R solenoid valve controls the direct clutch in 5A/T as well as low-reverse brake



ELQE227A

Solenoid valve OFF: Hydraulic pressure is supplied to corresponding clutch or brake.
Except) DCCSV: When the DCCSV is ON, the damper clutch is operated.



Wave Form with High-scan

ELQE228A

Solenoid valve ON: Hydraulic pressure is released from corresponding clutch or brake.

CONTROLLED PRESSURE

Solenoid valve	Duty 0%	Duty 50%	Duty 75%	Duty 100%
UD, OD, LR, 2ND	10.5±0.1	6.4±0.25	3.6±0.25	0.1 or less
DCC	10.5±0.1	5.9±0.3	3.2±0.3	0.1 or less

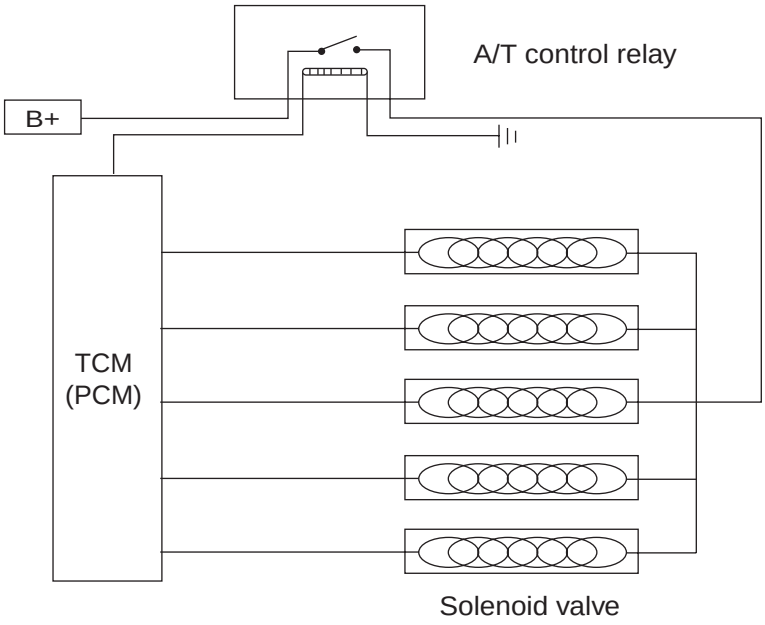
SOLENOID VALVES SCHEDULE

Position	Solenoid valves				
Operation	LR	2ND	UD	OD	* DCC
1st gear	OFF	ON	OFF	ON	OFF
2nd gear	ON	OFF	OFF	ON	OFF
3rd gear	ON	ON	OFF	OFF	ON
4th gear	ON	OFF	ON	OFF	ON
Reverse	OFF	ON	ON	ON	OFF
N, P (STD. mode)	OFF	ON	ON	ON	OFF
N, P (Hold mode)	ON	OFF	ON	ON	OFF

*: Reference value.
(DCC solenoid valve will be ON when the operating condition is satisfied)

A/T Control Relay

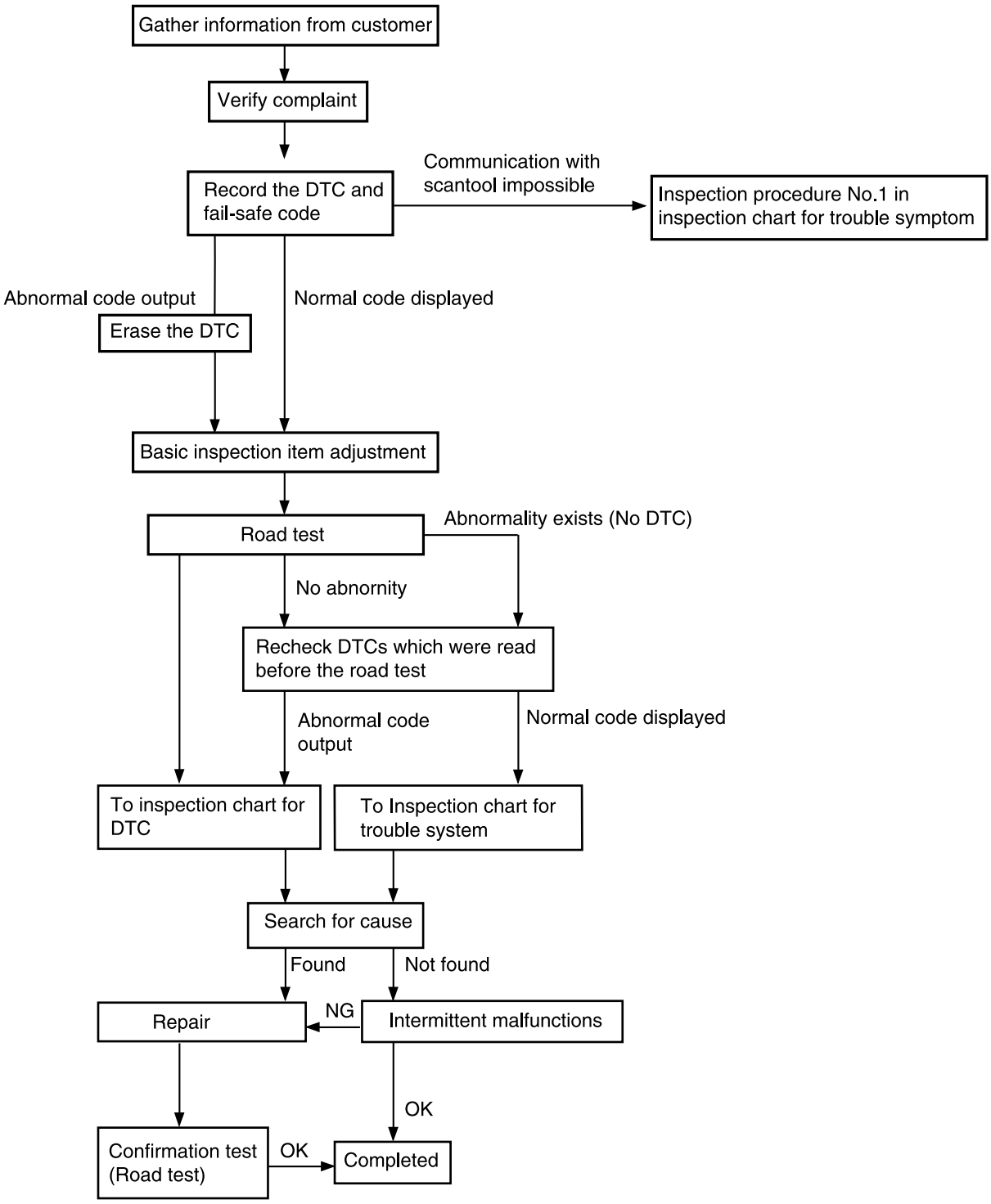
The control relay supplies power to the solenoid valves. As soon as the A/T control relay is ON, the battery voltage is directly supplied to solenoid valves and each solenoid valve is operated when the TCM(PCM) grounds the opposite terminal. ☞ (-) Control At fail safe condition, the power is cut causing 3 gear hold.



ELQE229A

TROUBLESHOOTING E606D9DD

DIAGNOSIS FLOW



ELQE500A

INSPECTION CHART FOR TROUBLE SYMPTOMS

Trouble symptom		Probable cause
Communication with HI-SCAN is not possible If communication with the HI-SCAN is not possible, the cause is probably a defective diagnosis line or the TCM(PCM) is not functioning.		- Malfunction diagnosis line - Malfunction of connector - Malfunction of the TCM(PCM)
Driving impossible	**Starting impossible** Starting is not possible when the selector lever is in P or N range. In such cases, the cause is probably a defective engine system, torque converter or oil pump.	- Malfunction of the engine system - Malfunction of the torque converter - Malfunction of the oil pump
	Does not move forward If the vehicle does not move forward when the selector lever is shifted from N to D, 3, 2 or L range while the engine is idling, the cause is probably abnormal line pressure or a malfunction of the underdrive clutch or valve body.	- Abnormal line pressure - Malfunction of the underdrive solenoid valve - Malfunction of the underdrive clutch - Malfunction of the valve body
	Does not reverse If the vehicle does not reverse when the selector lever is shifted from N to R range while the engine is idling, the cause is probably abnormal pressure in the reverse clutch or low and reverse brake or a malfunction of the reverse clutch, low and reverse brake or valve body.	- Abnormal reverse clutch pressure - Abnormal low and reverse brake pressure - Malfunction of the low and reverse brake solenoid valve - Malfunction of the reverse clutch - Malfunction of the low and reverse brake - Malfunction of the valve body
	Does not move (forward or reverse) If the vehicle does not move forward or reverse when the selector lever is shifted to any position while the engine is idling, the cause is probably abnormal line pressure or a malfunction of the power train, oil pump or valve body.	- Abnormal line pressure - Malfunction of power train - Malfunction of the oil pump - Malfunction of the valve body
Malfunction when starting	**Engine stalling when shifting** If the engine stalls when the selector lever is shifted from N to D or R range while the engine is idling, the cause is probably a malfunction of the engine system, damper clutch solenoid valve, valve body or torque converter (damper clutch malfunction).	- Malfunction of the engine system - Malfunction of the damper clutch control solenoid valve - Malfunction of the valve body - Malfunction of the torque converter (Malfunction of the damper clutch)
	Shocks when changing from N to D and large time lag If abnormal shocks or a time lag of 2 seconds or more occur when the selector lever is shifted from N to D range while the engine is idling, the cause is probably abnormal underdrive clutch pressure or a malfunction of the underdrive clutch, valve body or idle position switch.	- Abnormal underdrive clutch pressure - Abnormal low and reverse brake pressure - Malfunction of the underdrive solenoid valve - Malfunction of the valve body - Malfunction of the idle position switch

Trouble symptom		Probable cause
Malfunction when starting	**Shocks when changing from N to R and large time lag** If abnormal shocks or a time lag of 2 seconds or more occur when the selector lever is shifted from N to R range while the engine is idling, the cause is probably abnormal reverse clutch pressure or low and reverse brake pressure, or a malfunction of the reverse clutch, low and reverse brake, valve body or idle position switch.	- Abnormal reverse clutch pressure - Abnormal low and reverse brake pressure - Malfunction of the low and reverse solenoid valve - Malfunction of the reverse clutch - Malfunction of the low and reverse brake - Malfunction of the valve body - Malfunction of the idle position switch
	Shocks when changing from N to D, N to R and large time lag If abnormal shocks or a time lag of 2 seconds or more occur when the selector lever is shifted from N to D range and from N to R range while the engine is idling, the cause is probably abnormal line pressure or a malfunction of the oil pump or valve body.	- Abnormal line pressure - Malfunction of the oil pump - Malfunction of the valve body
Malfunction when shifting	**Shocks and running up** If shocks occur when driving due to up shifting or down shifting and the transmission speed becomes higher than the engine speed, the cause is probably abnormal line pressure or a malfunction of a solenoid valve, oil pump, valve body or of a brake or clutch.	- Abnormal line pressure - Malfunction of each solenoid valve - Malfunction of the oil pump - Malfunction of the valve body - Malfunction of each brake or each clutch
Displaced shifting points	**All points** If all shift points are displaced while driving, the cause is probably a malfunction of the output shaft speed sensor, TPS or of a solenoid valve.	- Malfunction of the output shaft speed sensor - Malfunction of the throttle position sensor - Malfunction of each solenoid valve - Abnormal line pressure - Malfunction of the valve body - Malfunction of the TCM(PCM)
	Some points If some of the shift points are displaced while driving, the cause is probably a malfunction of the valve body, or it is related to control and is not an abnormality.	- Malfunction of the valve body
Does not shift	**No diagnosis codes** If shifting does not occur while driving and no diagnosis codes are output, the cause is probably a malfunction of the transaxle range switch, or TCM(PCM)	- Malfunction of the transaxle range - Malfunction of the TCM(PCM)
Malfunction while driving	**Poor acceleration** If acceleration is poor even if down shifting occurs while driving, the cause is probably a malfunction of the engine system or of a brake or clutch.	- Malfunction of the engine system - Malfunction of the brake or clutch
Malfunction while driving	**Vibration** If vibration occurs when driving at constant speed or when accelerating and deceleration in top range, the cause is probably abnormal damper clutch pressure or a malfunction of the engine system, damper clutch control solenoid valve, torque converter or valve body.	- Abnormal damper clutch pressure - Malfunction of the engine system - Malfunction of the damper clutch control solenoid valve - Malfunction of the torque converter - Malfunction of the valve body

Trouble symptom	Probable cause
Transaxle range switch system The cause is probably a malfunction of the inhibitor switch circuit, ignition switch circuit or a defective TCM(PCM).	- Malfunction of the transaxle range switch - Malfunction of the ignition switch - Malfunction of connector - Malfunction of the TCM(PCM)
Idle position switch system The cause is probably a defective idle position switch circuit, or a defective TCM(PCM).	- Malfunction of the triple pressure switch - Malfunction of connector - Malfunction of the TCM(PCM)
Triple pressure switch system The cause is probably a defective dual pressure switch circuit or a defective TCM(PCM).	- Malfunction of the triple pressure switch - Malfunction of connector - Malfunction of A/C system - Malfunction of the TCM(PCM)
Vehicle speed sensor system The cause is probably a defective vehicle speed sensor circuit or a defective TCM(PCM).	- Malfunction of the vehicle speed sensor - Malfunction of connector - Malfunction of the TCM(PCM)

HOW TO USE SCAN TOOL

INSTRUCTION

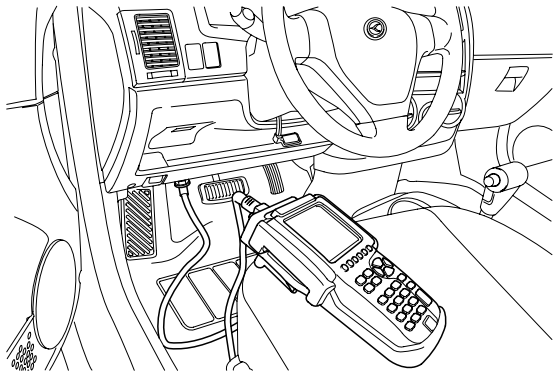
With the advent of electronic control vehicles, the system efficiency increases with the complexities, as you would realize.
As medical diagnostic devices do, the advanced testers can help identify and fix the problems.
The scan tool can provide you with the versatile and user friendly monitoring capabilities.

SCAN TOOL FUNCTION

Scan tool offers the following functionality:
Diagonstic trouble codes
Freeze frame data
Current data
Actuation test

HOW TO CONNECT

For vehicles with 16 pin Data Link Connector(DLC), power is supplied from the DLC terminal through the DLC CABLE without the need for an additional power supply.
For connections between the Hi-scan and these vehicle data link terminals the DLC CABLE 16 is all that is required.



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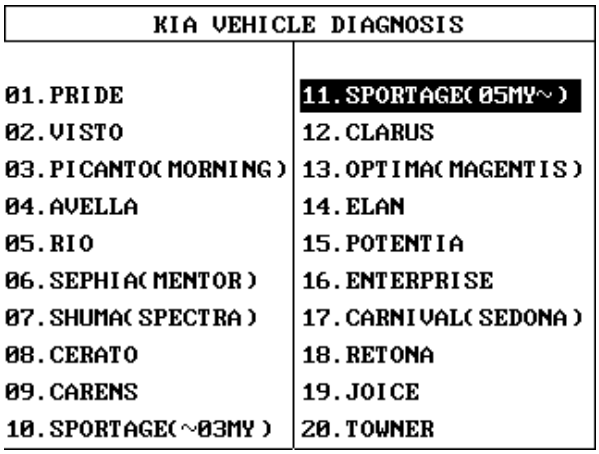
HOW TO SELECT VEHICLE AND SYSTEM

OPERATION FLOW

1. Select "KIA VEHICLE DIAGNOSIS"
2. Select "VEHICLE NAME"



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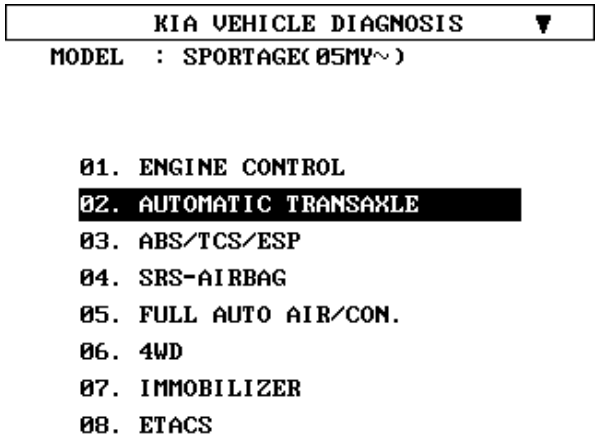
3. Select "AUTOMATIC TRANSAXLE SYSTEM"



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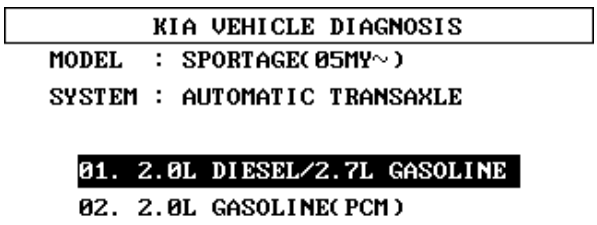
4. Select the engine model.



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BASIC APPLICATION

Having connected and turned on scan tool, the vehicle and system selection must be made from the 1.0 KIA VEHICLE DIAGNOSIS SCREEN.
The support functions vary according to vehicles. Therefore, the correct selection must be made.
Selection may be made by scrolling up or down the screen and pressing ENTER, or by using the numeric keypad to select the appropriate option number and pressing ENTER.

HOW TO READ DTC

OPERATION FLOW

1. Select vehicle and system
   (Refer to How to select vehicle and system)
2. Select 1.1 DIAGNOSTIC TROUBLE CODES

MODE APPLICATION

At this level, Diagnostic trouble codes(DTC) are displayed for the selected TCM(PCM).

HOW TO ERASE DTC

OPERATION FLOW

1. Select "1.1 DIAGNOSTIC TROUBLE CODES"
   (Refer to How to read DTC)
2. Select "ERAS" key on the Diagnostic Trouble codes mode.
3. Select "1.2.2. ERASE FAULT CODE"

MODE APPLICATION

"ERAS"

This soft function key will clear the DTC currently held in the memory of the selected TCM(PCM).
If this option is selected, a message requesting confirmation of the ERAS request will be displayed.
The YES or NO key should be used to confirm or cancel the request to clear the current DTC.

DTC TROBLESHOOTING INDEX

TCM(PCM) DTCS (DSL 2.0 & GSL 2.7)

DTC No.	DESCRIPTION	SEE PAGE
0560	Back-Up BATTERY LINE OPEN	AT-70
0605	EEPROM Abnormal	AT-73
0703	BRAKE SWITCH CIRCUIT	AT-75
0707	TRANS.RANGE SENSOR-LOW	AT-82
0708	TRANS.RANGE SENSOR-HIGH	AT-89
0711	FLUID TEMPERATURE.SENSOR RATIONALITY	AT-93
0712	FLUID TEMPERATURE.SENSOR CIRCUIT-LOW	AT-100
0713	FLUID TEMPERATURE.SENSOR CIRCUIT-HIGH	AT-104
0715	INPUT SPEED SENSOR CIRCUIT	AT-107
0720	OUTPUT SPEED SENSOR CIRCUIT	AT-121
0731	Gear 1 Incorrect Ratio	AT-134
0732	Gear 2 Incorrect Ratio	AT-141
0733	Gear 3 Incorrect Ratio	AT-146
0734	Gear 4 Incorrect Ratio	AT-151
0736	REVERSE INCORRECT RATIO	AT-155
0741	Torque Converter Clutch Circuit Stock off	AT-160
0742	Torque Converter Clutch Circuit Stock on	AT-165
0743	DCC(TCC) Solenoid - Open or ground short(Torque Converter Clutch Circuit Electrical)	AT-168
0750	LR Solenoid - Open or ground short(SCSV "A" CIRCUIT MAL.)	AT-175
0755	UD Solenoid - Open or ground short(SCSV "B" CIRCUIT MAL.)	AT-181
0760	2ND Solenoid - Open or ground short(SCSV "C" CIRCUIT MAL.)	AT-187
0765	OD Solenoid - Open or ground short(SCSV "D" CIRCUIT MAL.)	AT-193
0885	A/T RELAY CIRCUIT MAL	AT-200
1500	VEHICLE SPEED SENSOR CIRCUIT	AT-208
U0001	CAN COMMUNICATION BUS OFF	AT-210
U0100	NO ID From ECU	AT-215

TCM(PCM) DTCS (GSL 2.0)

DTC No.	DESCRIPTION	SEE PAGE
0703	BRAKE SWITCH CIRCUIT	AT-75
0707	TRANS.RANGE SENSOR-LOW	AT-82
0708	TRANS.RANGE SENSOR-HIGH	AT-89
0711	FLUID TEMPERATURE.SENSOR RATIONALITY	AT-93
0712	FLUID TEMPERATURE.SENSOR CIRCUIT-LOW	AT-100
0713	FLUID TEMPERATURE.SENSOR CIRCUIT-HIGH	AT-104
0717	INPUT SPEED SENSOR CIRCUIT	AT-115
0721	OUTPUT SPEED SENSOR	AT-127
0722	OUTPUT SPEED SENSOR CIRCUIT	AT-132
0731	Gear 1 Incorrect Ratio	AT-134
0732	Gear 2 Incorrect Ratio	AT-141
0733	Gear 3 Incorrect Ratio	AT-146
0734	Gear 4 Incorrect Ratio	AT-151
0736	REVERSE INCORRECT RATIO	AT-155
0741	Torque Converter Clutch Circuit Stock off	AT-160
0743	DCC(TCC) Solenoid - Open or ground short(Torque Converter Clutch Circuit Electrical)	AT-168
0750	LR Solenoid - Open or ground short(SCSV "A" CIRCUIT MAL.)	AT-175
0755	UD Solenoid - Open or ground short(SCSV "B" CIRCUIT MAL.)	AT-181
0760	2ND Solenoid - Open or ground short(SCSV "C" CIRCUIT MAL.)	AT-187
0765	OD Solenoid - Open or ground short(SCSV "D" CIRCUIT MAL.)	AT-193
0885	A/T RELAY CIRCUIT MAL	AT-200
U0001	CAN COMMUNICATION BUS OFF	AT-210
U0100	NO ID From ECU	AT-215

SERVICE DATA LIST(WITH SCAN TOOL)

No.	ITEM NAME	UNIT	DATA	Data Description	Failure
1	ENGINE RPM	rpm	700 rpm	Current Engine rpm	0 rpm
2	VEHICLE SPEED	km/h	0km/h	Current Vehicle speed	0km/h
3	THROTTLE P.SENSOR	%	12.5%	Current TPS open angle	0%
4	INPUT SPEED(PG-A)	rpm	700 rpm	Input speed rpm. Always output rpm when turning start ON	0 rpm
5	OUTPUT SPEED(PG-B)	rpm	0 rpm	Output speed rpm. Always output rpm when driving	0 rpm
6	DCC(TCC) SOLENOID DUTY	%	0%	Control 0% → 100% when operating Damper Clutch	
7	DAMPER CLUTCH SLIP	rpm	260 rpm	Current Damper clutch slip ratio	0 rpm
8	LR SOLENOID DUTY	%	100%	Control 100% → 0% when operating brake	0%
9	UD SOLENOID DUTY	%	100%	Control 100% → 0% when operating clutch	0%
10	2ND SOLENOID DUTY	%	100%	Control 100% → 0% when operating clutch	0%
11	OD SOLENOID DUTY	%	100%	Control 100% → 0% when operating clutch	0%
12	OIL TEMPERATURE	°C	40°C	Current Oil temperature	80°C
13	SHIFT POSITION	N,P,REV/1st G/…/5th G	D	Current shift position	P, N
14	TRANSAXLE RANGE SW	P,N/R/D/SPORTS	D	Current shift lever position	P, N
15	HOLD/STD SWITCH	-/-/HOLD/STD	-		-
16	A/CON SWITCH	OFF/ON/-/NOT SUPP	OFF	-	
17	IDLE STATUS	OFF/ON/-/NOT SUPP	ON	When idling, ON	
18	BRAKE SWITCH	OFF/ON/-/NOT SUPP	ON	When braking, ON	
19	CRUISE SWITCH	OFF/ON/-/NOT SUPP			
20	SPORT MODE SELECT SW	OFF/ON/-/NOT SUPP	ON	When selecting sport mode, ON	
21	SPORT MODE UP SW	OFF/ON/-/NOT SUPP	ON	When Selecting Sport mode up, ON	
22	SPORT MODE DOWN SW	OFF/ON/-/NOT SUPP	ON	When selecting sport mode down, ON	
23	A/T CONTROL RELAY VOLT	V	12.9V		0V
24	ENGINE TORQUE	%	20%		
25	HIVEC MODE	A/B/C/D/-/F	F	A/B/C/D is control mode, F is release mode	F

HIVEC -SAT(SIEMENS ADAPTIVE TRANSMISSION CONTROL) MODE (SHIFT PATTEN)

Shift patten	Description(Help)	SCAN DISPLAY
ECONOMY	Economy Driver shift patten for flat road	A
MEDIUM	Shift patten for medium road	B
SPORTS	Shift patten for sport road	C
LOAD 1	Shift patten for low land, slow grade and slope	D
LOAD 3	Shift patten for downhill road	F

ACTUATOR INSPECTION

NO	ITEM NAME	Actuator Driving	Condition
1	LR SOLENOID(SCSV A)	Driving solenoid valve indicated by Scan tool for 5 sec. (Other solenoid valve is not continuity) Blinking for 3 sec.	1. IG Key ON 2. Inhibitor SW normal 3. P range 4. Vehicle speed 0km/h 5. Engine stop 6. No failure 7. TPS < 1V
2	UD SOLENOID(SCSV B)		
3	2ND SOLENOID(SCSV C)		
4	OD SOLENOID(SCSV D)		
5	TORQUE CONVERTER SOLENOID VALVE		
6	A/T CONTROL RELAY	OFF for 3 sec.	–
7	INTELLIGENT SHIFT PROHIBIT	Prohibit until IG off	–
8	CLEAR LEARNING VALUE	–	–

ROAD TEST

No.	Condition	Operation	Judgment value	Check item
1	Ignition switch : OFF	Ignition switch (1) ON	Battery voltage (mV)	Control relay
2	• Ignition switch : ON • Engine : Stopped • Selector lever position : P	Selector lever position (1) P, (2) R, (3) N, (4) D	(1) P, (2) R, (3) N, (4) D	Transaxle range switch
		Accelerator pedal (1) Released (2) Half depressed (3) Depressed	(1) 400~1,000 mV (2)Gradually rises from (1) (3) 4,500~5,000 mV	Throttle position sensor
		Brake pedal (1) Depressed (2) Released	(1) ON (2) OFF	Brake switch
3	• Ignition switch : ST • Engine : Stopped	Starting test with lever P or N range	Starting should be possible	Starting possible or impossible
4	Warming up	Drive for 15 minutes or more so that the automatic fluid temperature becomes 70~90°C	Gradually rises to 70~90°C	Oil temperature sensor
5	• Engine : Idling • Selector lever position : N	A/C switch (1) ON (2) OFF	(1) ON (2) OFF	Triple pressure switch
		Accelerator pedal (1) Released (2) Half depressed	(1) ON (2) OFF	Idle position switch
			(1) 600~900 rpm (2) Gradually rises from (1)	
			(1) Data changes	Communication with engine-ECU
		Selector lever position (1) N→D (2) N→R	Should be no abnormal shifting shocks Time lag should be within 2 seconds	Malfunction when starting

No.	Condition	Operation	Judgment value	Check item
6	Selector lever position : N (Carry out on a flat and straight road)	Selector lever position and vehicle speed 1. Idling in 1st gear (Vehicle stopped) 2. Driving at constant speed of 20 km/h in 1st gear 3. Driving at constant speed of 30 km/h in 2nd gear 4. Driving at 50 km/h in 3rd gear with accelerator fully closed 5. Driving at constant speed of 50 km/h in 4th gear	(2) 1st, (4) 3rd, (3) 2nd, (5) 4th	Shift condition
			(2) 0%, (4) 100%, (3) 100%, (5) 100%	Low and reverse solenoid valve
			(2) 0%, (4) 0%, (3) 0%	Underdrive solenoid valve
			(1) 100%, (2) 0%, (3) 100%	Second solenoid valve
			(2) 100%, (3) 100%, (4) 0%	Overdrive solenoid valve
			(1) 0km/h (4) 50km/h	Vehicle speed sensor
			(4) 1,800 ~ 2,100rpm	Input shaft speed sensor
			(4) 1,800 ~ 2,100rpm	Output shaft speed sensor
7	Selector lever position : D (Carry out on a flat and straight road)	• Accelerate to 4th gear at a throttle position sensor output of 1.5V (accelerator opening angle of 30 %). • Gently decelerate to a standstill. • Accelerate to 4th gear at a throttle position sensor output of 2.5 V (accelerator opening angle of 50%). • While driving at 60 km/h in 4th gear, shift down to 3rd gear. • While driving at 40 km/h in 3rd gear, shift down to 2nd gear. • While driving at 20 km/h in 2nd gear, shift down to 1st gear.	For (1), (2) and (3), the reading should be the same as the specified output shaft torque, and no abnormal shocks should occur. For (4), (5) and (6), downshifting should occur immediately after the shifting operation is made.	Malfunction when shifting
				Displaced shift points
				Does not shift
				Does not shift from 1 to 2 or 2 to 1
				Does not shift from 2 to 3 or 3 to 2
				Does not shift from 3 to 4 or 4 to 3
8	Selector lever position : N (Carry out on a flat and straight road)	Move selector lever to R range drive at constant speed of 10km/h	The ratio between input and output shaft speed sensor data should be the same as the gear ratio when reversing.	Does not shift

TORQUE CONVERTER STALL TEST

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

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
   - Engine coolant temperature : 80~100°C
2. Prevent all the wheel from moving during the test.
3. Pull the parking brake lever up, with the brake pedal fully depressed.
4. Start the engine.
5. Move the selector lever to the "D" position, fully depress the accelerator pedal and take a reading of the maximum engine speed at this time.

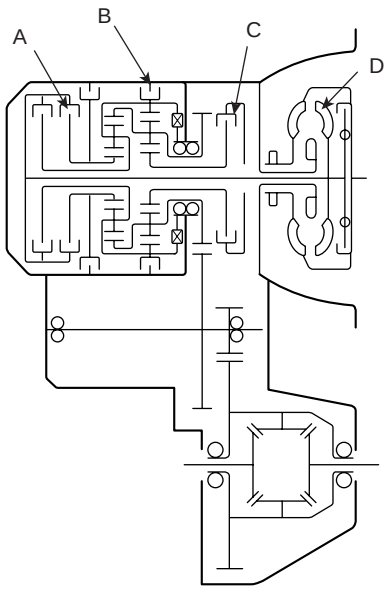
CAUTION

- ***The throttle should not be left fully open for any more than five seconds.***
- ***If carrying out the stall test two or more times, move the selector 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.***

6. Move the selector lever to the "R" position and carry out the same test again.

TORQUE CONVERTER STALL TEST CONCLUSION

1. Stall speed is too high in both "D" and "R" ranges
   - Low line pressure
   - Low & reverse brake(B) slippage
2. Stall speed is to high in "D" range only
   - Underdrive clutch(C) slippage
3. Stall speed is too high in "R" range only
   - Reverse clutch(A) slippage
4. Stall speed too low in both "D" and "R" ranges
   - Malfunction of torque converter(D)
   - Insufficient engine output



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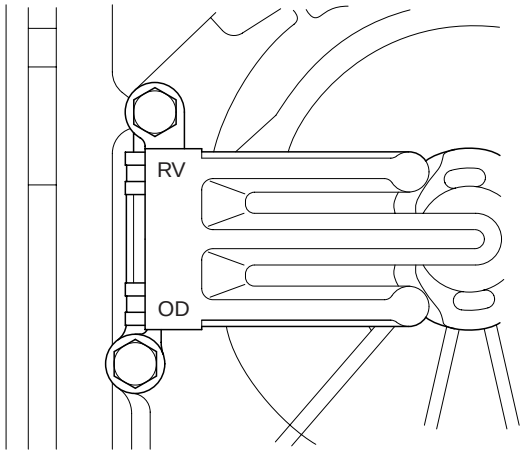
HYDRAULIC PRESSURE TEST

1. Warm up the engine until the automatic transaxle fluid temperature is 80-100°C.
2. Jack up the vehicle so that the wheels are free to turn.
3. Connect the special tool (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.



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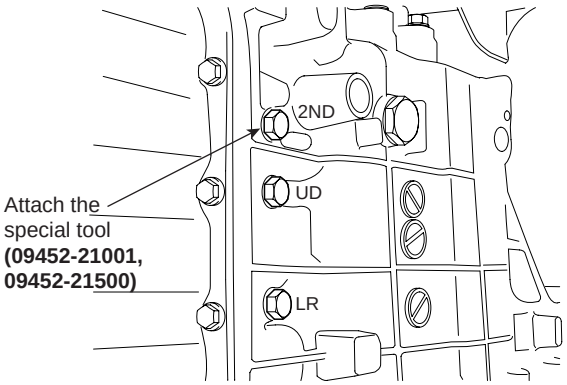

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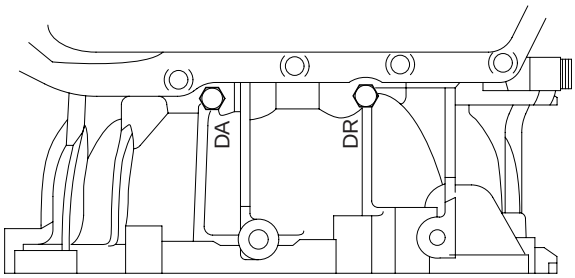

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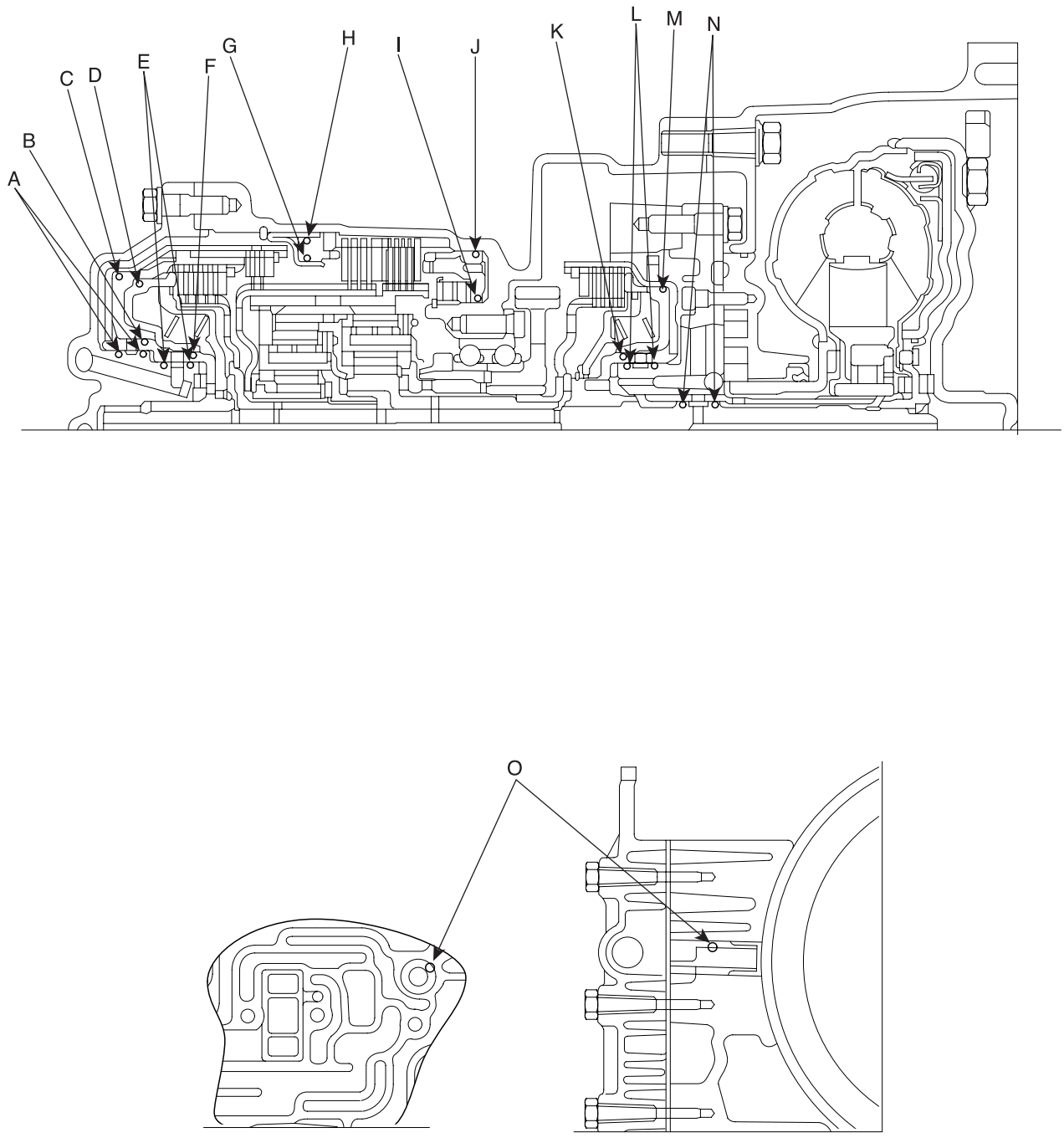
STANDARD HYDRAULIC PRESSURE TEST

Measurement condition			Standard hydraulic pressure kPa (psi)					
Selector lever position	Shift position	Engine speed (rpm)	Under drive clutch pressure	Reverse clutch pressure	Overdrive clutch pressure	Low and reverse brake pressure	Second brake pressure	Torque converter pressure
P	-	2,500	-	-	-	310-390 (45-56)	-	250-350 (36-56)
R	Reverse	2,500	-	1,270-1,770 (185-256)	-	1,270-1,770 (185-256)	-	500-700 (185-256)
N	2,500	-	-	-	-	310-390 (45-56)	-	250-390 (36-56)
D	1st gear	2,500	1,010-1,050 (146-152)	-	-	1,010-1,050 (146-152)	-	500-700 (73-101)
	2nd gear	2,500	1,010-1,050 (146-152)	-	-	-	1,010-1,050 (146-152)	500-700 (73-101)
	3rd gear	2,500	590-690 (85-100)	-	590-690 (85-100)	-	-	450-650 (65-94)
	4th gear	2,500	-	-	590-690 (85-100)	-	590-690 (85-100)	450-650 (65-94)

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

OIL SEAL LOCATION



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HYDRAULIC PRESSURE TEST DIAGNOSIS TABLE

Trouble symptom	Probable cause
All hydraulic pressures are high	Incorrect transmission control cable adjustment
	Malfunction of the regulator valve
All hydraulic pressures are low	Incorrect transmission control cable adjustment
	Malfunction of the oil pump
	Clogged oil filter
	Clogged oil cooler
	Malfunction of the regulator valve
	Malfunction of the relief valve
	Incorrect valve body installation
Hydraulic pressure is abnormal in "R" range only	Malfunction of the regulator valve
	Clogged orifice
	Incorrect valve body installation
Hydraulic pressure is abnormal in "3" or "4" range only	Malfunction of the regulator valve
	Clogged orifice
	Incorrect valve body installation
	Malfunction of the overdrive solenoid valve
	Malfunction of the overdrive pressure control valve
	Malfunction of the regulator valve
	Malfunction of the switch valve
	Clogged orifice
	Incorrect valve body installation
Only underdrive hydraulic pressure is abnormal	Malfunction of the oil seal K
	Malfunction of the oil seal L
	Malfunction of the oil seal M
	Malfunction of the underdrive solenoid valve
	Malfunction of the underdrive pressure control valve
	Malfunction of check ball
	Clogged orifice
	Incorrect valve body installation
Only reverse clutch hydraulic pressure is abnormal	Malfunction of the oil seal A
	Malfunction of the oil seal B
	Malfunction of the oil seal C
	Clogged orifice
	Incorrect valve body installation

Trouble symptom	Probable cause
Only overdrive hydraulic pressure is abnormal	Malfunction of the oil seal D
	Malfunction of the oil seal E
	Malfunction of the oil seal F
	Malfunction of the overdrive solenoid valve
	Malfunction of the overdrive pressure control valve
	Malfunction check ball
	Clogged orifice
	Incorrect valve body installation
Only low and reverse hydraulic pressure is abnormal	Malfunction of the oil seal I
	Malfunction of the oil seal J
	Malfunction of the low and reverse solenoid valve
	Malfunction of the low and reverse pressure control valve
	Malfunction of the switch valve
	Malfunction of the fail safe valve A
	Malfunction of check ball
	Clogged orifice
	Incorrect valve body installation
Only second hydraulic pressure is abnormal	Malfunction of the oil seal G
	Malfunction of the oil seal H
	Malfunction of the oil seal O
	Malfunction of the second solenoid valve
	Malfunction of the second pressure control valve
	Malfunction of the fail safe valve B
	Clogged orifice
	Incorrect valve body installation
Only reverse clutch hydraulic pressure is abnormal	Malfunction of the oil cooler
	Malfunction of the oil seal N
	Malfunction of the damper clutch control solenoid valve
	Malfunction of the damper clutch control valve
	Malfunction of the torque converter pressure control valve
	Clogged orifice
Pressure applied to non operating element	Incorrect valve body installation
	Incorrect transmission control cable adjustment
	Malfunction of the manual valve
	Malfunction of check ball
	Incorrect valve body installation

SERVICE ADJUSTMENT PROCEDURE EB1DBAB0

AUTOMATIC TRANSAXLE FLUID

INSPECTION

1. Drive the vehicle until the fluid reaches normal operating temperature [70~80°C].
2. Place the vehicle on a level surface.
3. Move the selector lever through all gear position. This will fill the torque converter and the hudraulic system with fluid and move the selector lever to the "N" (Neutral) or ” P” (Park) 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 transaxle overhaul may be necessary.

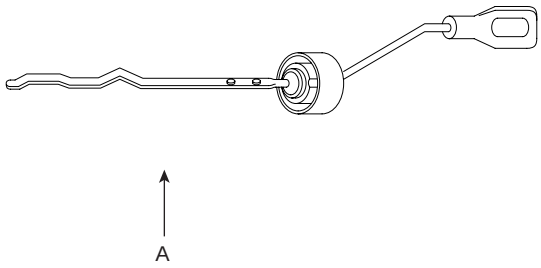
5. Check that the fluid level is at the HOT mark on the oil level gauge. If the fluid level is low, add automatic transaxle fluid until the level reaches the "HOT" mark.

Auto transaxle fluid: DIAMOND ATF SP-III, SK ATF SP-III Quantity : 7.8ℓ (8.2 US qt, 6.9 Imp.qt)

NOTE

Low fluid level can cause a variety of a abnormal conditions because it allows the pump to take in air along with fluid. Air trapped in the hydraulic system forms bubbles, which are compressable. 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 acuse 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.



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NOTE

When new, automatic transmission fluid should be red. The red dye is added so the assembly plant can identify it as transmission fluid and distinguish it from engine oil or antifreeze. The red dye, 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, replace it using the following procedure.

1. Disconnect the hose, which connects the transmission and the oil cooler which is within the radiator only in 2.0L engine(2.7L-the oil cooler is separated).
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. Romove the drain plug from the bottom of the transmission case to drain the fluid.

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

TORQUE :
40 ~ 50Nm (400 ~ 500 kgf.cm, 29 ~ 36 lbf.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.

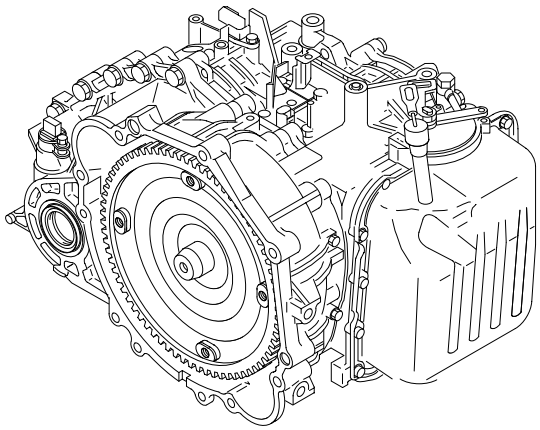
8. Reconnect the hose, which was disconnected in step (1) above, and firmly replace the oil level gauge.(In case of this "replace", this means after wiping off any dirt around the oil level gauge, insert it into the filler tube.)

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

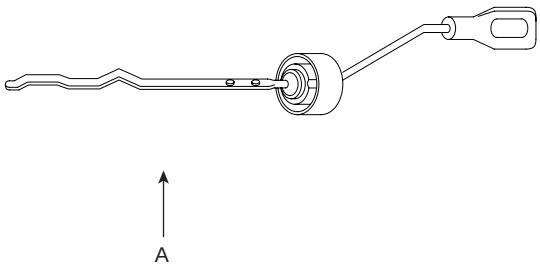
10. Move the select lever through all positions, and then move it to the "N" position.

11. Drive the vehile until the fluid temperature rises to the normal temperature (70~80°C), 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.



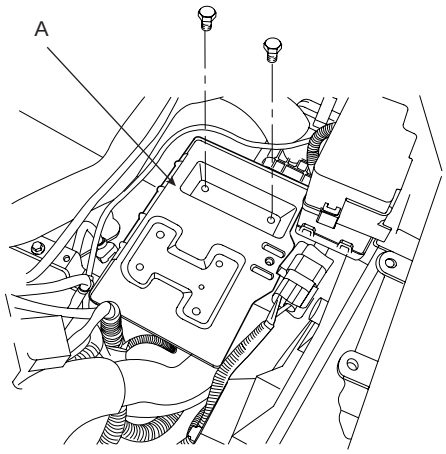
LKIF001A



KKQE101C

TRANSAXLE RANGE SWITCH (INHIBITOR SWITCH) REPLACEMENT

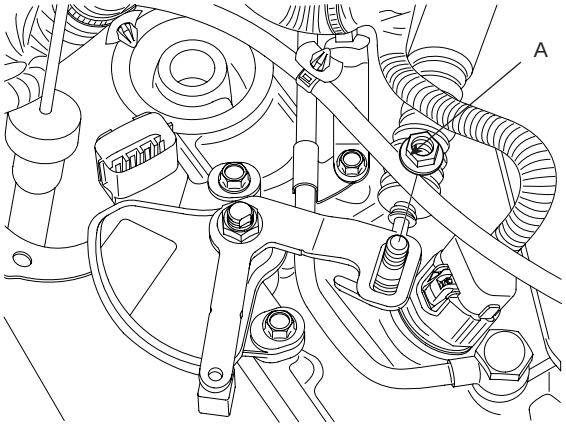
1. Pull up the parking brake.
2. Position the shift lever in 'N' range.
3. Remove the air cleaner assembly.
4. Remove the battery.
5. Remove the battery tray(A).



LKIF005A

6. Remove the inhibiter switch connector.

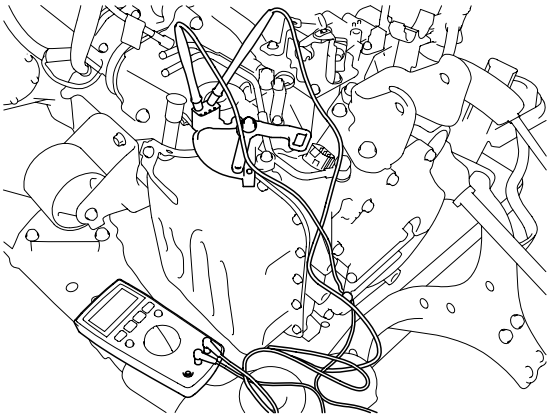
7. Remove the shift cable mounting nut(A).



LKIF005B

8. Remove the inhibiter switch loosening the mounting bolts.

9. Refering to 'INSPECTION', check for continuity. If there is an error, replace the inhibiter switch.



LKIF005C

10. After tightening the shift cable mounting nut, connect the inhibiter switch.

11. Install the battery, battery tray and the air cleaner assembly.

INSPECTION

1. Check for the starter motor when the ignition switch is at 'START' position and the shift lever at 'P' or 'N' range.

2. Check for the rear lamp when the ignition switch if it does not work properly.

3. Check for the inhibiter switch if it does not work properly.

4. If the inhibiter switch is not fixed in a proper position, reassemble it in the right position.

5. Re-check 1 and 2 procedures.

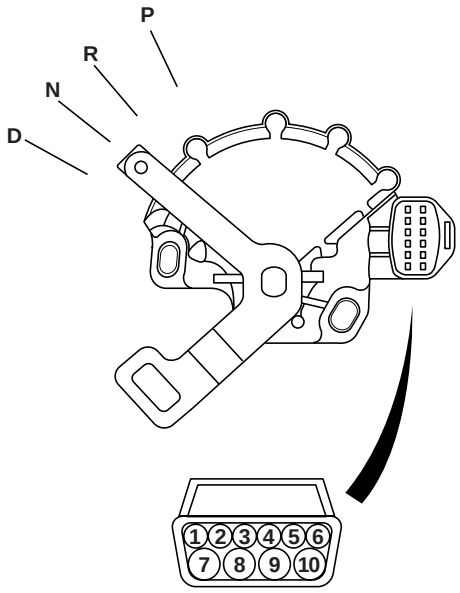
6. Using a scan tool, confirm the DTCs.

7. Disconnect the battery (-) terminal and the inhibiter switch.

8. Check for continuity between terminals at the switch connector.

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

ELQE224A

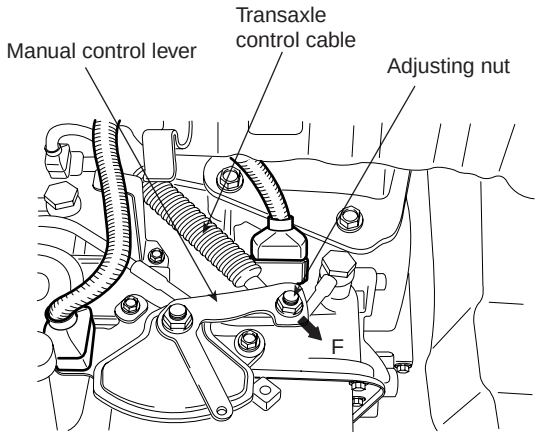


LKIF005D

9. If there are not continuity between the terminals in the table above for each switch position, replace the inhibiter switch.

ADJUSTMENT

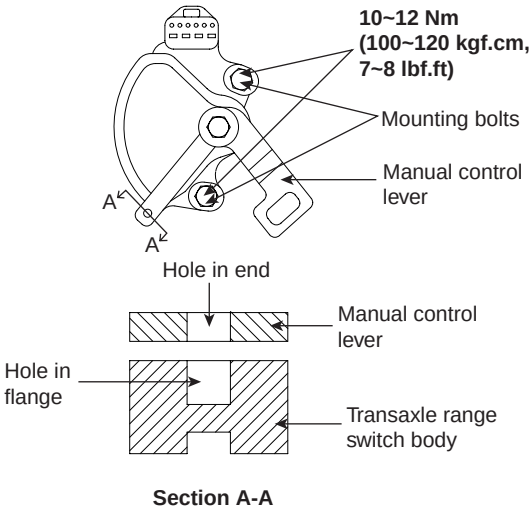
1. Set the select lever to the "N" position.
2. Loosen the control cable to manual control lever coupling nut to free the cable and lever.
3. Set the manual control lever to the neutral position.



LKIF005E

4. Loosen the transaxle range switch body mounting bolts and then turn the transaxle range switch body so the hole in the end of the manual control lever and the hole (cross section A-A in the figure) in the flange of the transaxle range switch body flange are aligned.
5. Tighten the transaxle range switch body mounting bolts to the specified torque. Make sure at this time that the position of the switch body did not move.

TORQUE :
10 12Nm (100~120kgf.cm, 7~8lbf.ft)



Section A-A

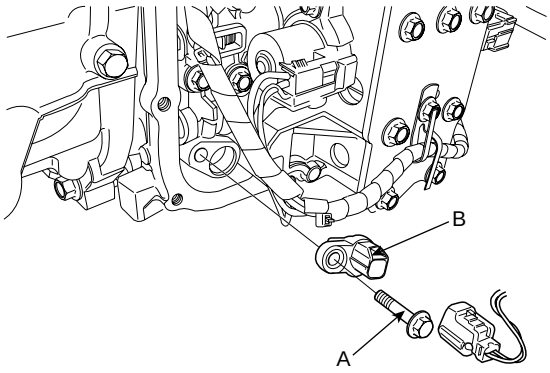
LKIF005F

6. Gently pull the transmission control cable in the direction of the arrow, and then tighten the adjusting nut.
7. Check that the select lever is in the "N" position.

OIL TEMPERATURE SENSOR

REPLACEMENT

1. Remove the automatic transaxle assembly.
2. Remove the valve body cover(refer to the overhaul manual).
3. Disconnect the oil temperature sensor connector.
4. Remove the oil temperature sensor(B), loosening the mounting bolt(A).

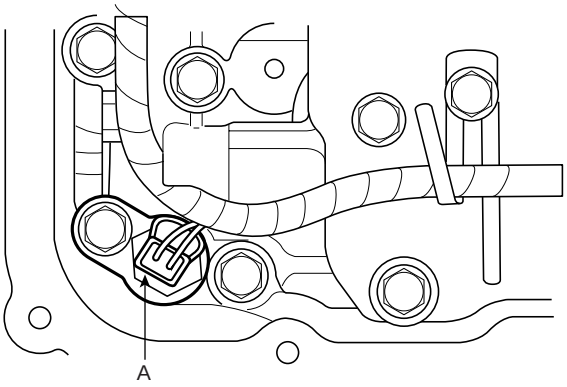


LKIF005G

5. Replace the sensor with the new one and reassemble the rest of the parts.

INSPECTION

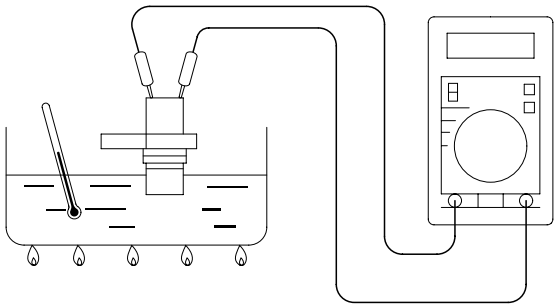
1. Remove the oil temperature sensor(A).



LKIF005H

2. Measure the resistance between the terminal 1 and 2 of the sensor connector.

Temp.[°C(°F)]	Resistance(KΩ)
0(32) 100(212)	18.6 0.63



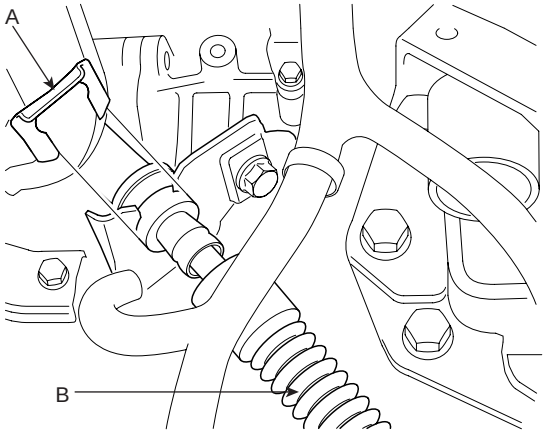
LKIF005I

3. If the value is out of the specfication, replace the oil temperature sensor.

INPUT SHAFT SPEED SENSOR

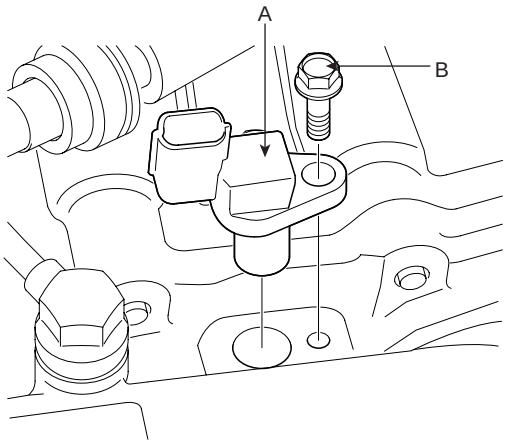
REPLACEMENT

1. Remove the battery and air cleaner (see "Transaxle range switch replacement").
2. Remove the transaxle range switch connector.
3. Remove the control cable to transaxle range switch mounting nut.
4. Remove the clip(A) of the control cable(B).



LKIF005J

5. Remove the control cable mounting bracket.
6. Remove the input shaft speed sensor(A).
   1) Disconnect the input shaft speed sensor connector.
   2) Remove the bolt(B).



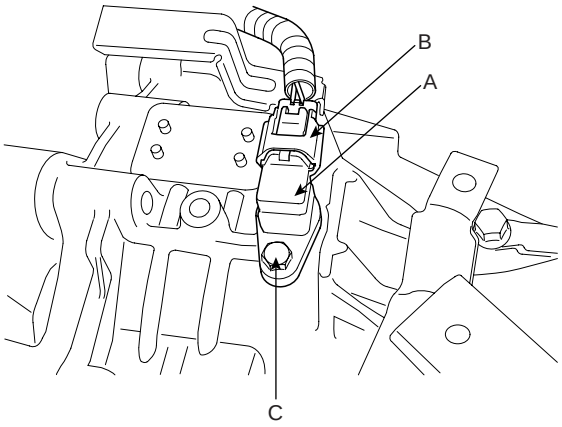
LKIF005K

   3) Inspect the input shaft speed sensor bore.
7. Apply a light coat of automatic transaxle fluid to the O-ring seal before installation.
8. Install the input shaft speed sensor.
9. Install the control cable mounting bracket.
10. Connect the input shaft speed sensor connector.
11. Install the holder of the control cable.
12. Adjust the control cable to transaxle range switch and tighten the transaxle manual lever to the control cable mounting nut. (see "Automatic transaxle shift control installation")
13. Installation is the reverse of removal.

OUTPUT SHAFT SPEED SENSOR

REPLACEMENT

1. Remove the battery and air cleaner. (see "Transaxle range switch replacement")
2. Remove the output shaft speed sensor(A).



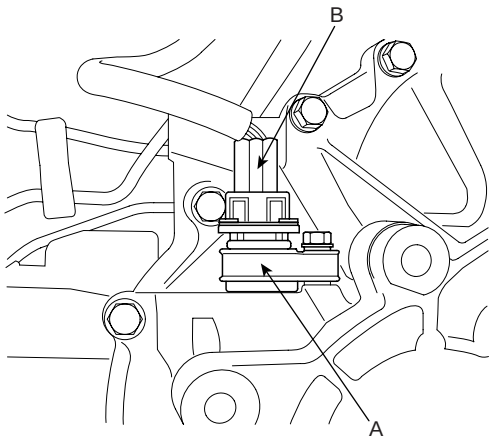
LKIF005L

   1) Disconnect the output shaft speed sensor connector(B).
   2) Remove the bolt(C).
   3) Inspect the output shaft speed sensor bore.
3. Apply a light coat of automatic transaxle fluid to the O-ring seal before installation.
4. Installation is the reverse of removal.

VEHICLE SPEED SENSOR

REPLACEMENT

1. Lift up the vehicle.
2. Remove the vehicle speed sensor(A).

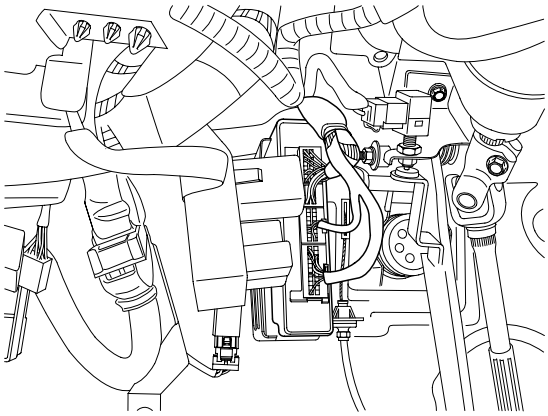


LKIF005M

   1) Disconnect the vehicle speed sensor connector(B).
   2) Remove the bolt (10 mm(0.4 in)).
   3) Inspect the vehicle speed sensor bore.
3. Inspect the O-ring for nicks or cut. Install a new O-ring as necessary.
4. Apply a light coat of automatic transaxle fluid to the O-ring seal before installation.
5. Install the vehicle speed sensor.
6. Connect the vehicle speed sensor connector.
7. Installation is the reverse of removal.

DTC P0560 SYSTEM VOLTAGE

COMPONENT LOCATION E7252025



KKQE001D

GENERAL DESCRIPTION E9F9F3A9

TCM(PCM) saves "LEARNING VALUE" and keeps it at certain value. Through this process, the "LEARNING VALUE" is protected from being erased at disconnecting Battery cable and maintaining related components.

DTC DESCRIPTION E8EEE74D

The TCM(PCM) is detected an unexpected communication error with "EEPROM", the TCM(PCM) sets this code.

DTC DETECTING CONDITION EB81F6CC

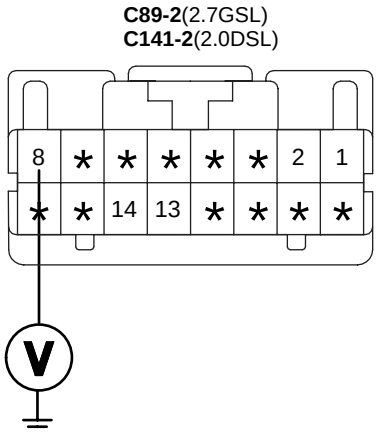
[2.7 GSL]/ [2.0 DSL]

Item	Detecting Condition & Fail Safe	Possible cause
DTC Strategy	• Check Voltage range	• Faulty TCM(PCM) • Fault in harness
Enable Conditions	• Ne is normal • Ne ≥ 400rpm • Vb(Backup-line) ≥ 9V	
Threshold value	• Backup-line ≥ 7 Volt	
Diagnostic Time	• 10 Sec	
Fail Safe		

POWER SUPPLY CIRCUIT INSPECTION EDE7FBE5

1. Ignition "ON" & Engine "OFF".
2. Disonnect the "C89-2/C141-2" of TCM(PCM) connector.
3. Measure the voltage between terminal "8" of the "C89-2/C141-2" of TCM(PCM) harness connector and chassis ground.

Specification : Approx. B+



LKIF100A

4. Is voltage 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. And Go to Component Inspection procedure.

NO

▶ Check the Fuse 37-10A is installed or not blown.
▶ Check for open in harness. Repair as necessary and Go to "Verification Vehicle Repair" procedure.

COMPONENT INSPECTION E5D63707

1. Connect scantool to data link connector.
2. Ignition "ON" & Engine "OFF".
3. Monitor the "DTC".
4. Is DTC Re-displayed?

YES

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

NO

▶ Go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR E6DF878E

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 P0605 INTERNAL CONTROL MODULE READ ONLY MEMORY(ROM) ERROR

COMPONENT LOCATION EC78FAD0

Refer to DTC P0560.

GENERAL DESCRIPTION E58242BC

Refer to DTC P0560.

DTC DETECTING CONDITION E99EAC5E

[2.7 GSL]/ [2.0 DSL]

Item	Detecting Condition & Fail Safe	Possible Cause
DTC Strategy	• Check COMMUNICATION	• Faulty TCM(PCM)
Enable Conditions	• COMMUNICATION ERROR WITH "EEPROM"	
Threshold Value	• Communication fail	
Diagnostic Time		
Fail safe		

COMPONENT INSPECTION ED91EDA4

1. Ignition "ON" & Engine "OFF".
2. Connect scan tool and select "Diagnostic Trouble Codes(DTCs)" mode.
3. Using a scantool, Clear DTC.
4. Using a "SCAN TOOL", Operate "LEARNING " Reset.
5. Perform the "LEARNING"
6. IG OFF ↔ IG ON (Repeat 2~3times),and then Monitor the "DTC"
7. Is DTC Re-displayed ?

YES

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

NO

▶ 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.And Go to Component Inspection procedure.

METHOD OF LEARNING RESET
※IT IS NECESSARY TO LEARNING RESET, AFTER REPLACED TRANSMISSION
1. ERASING CONDITION
1) SELECT LEVER POSITION IS "P" OR "N"
2) VEHICLE SPEED 〓 Okm/h
3) IGNITION "ON" , ENGINE "OFF"

2. USING A SCAN TOOL, OPERATE "LEARNING" RESET

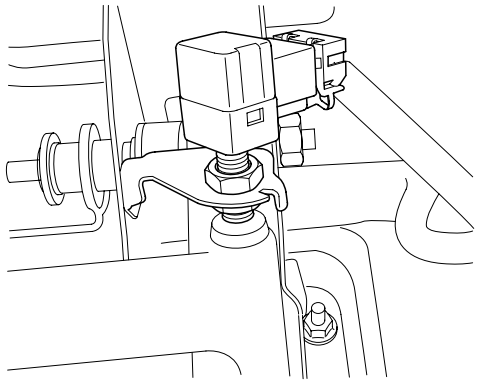
3. IG "ON" ↔ IG "OFF"(2~3 TIMES), AFTER ERASE

VERIFICATION OF VEHICLE REPAIR E1C17475

Refer to DTC P0560.

DTC P0703 BRAKE S/W MALFUNCTION

COMPONENT LOCATION E141D5B5



EKKE148A

GENERAL DESCRIPTION E879BE78

The HIVEC Automatic Transmission's function, of intelligence control, is based on the Fuzzy Control System. The Fuzzy Control System determines optimal gear positions as related to driver's intention and current driving conditions. The Brake Switch provides important information by deciding whether the vehicle is decelerating by the depression of the brake pedal, or if the speed is decreasing because the vehicle is running on the uphill.

DTC DESCRIPTION EAD2C6FE

The TCM(PCM) sets this code if a Brake Switch signal is input continuously, for an extended period of time, when the vehicle is supposed to be running (moving).

DTC DETECTING CONDITION E94008BF

[2.7 GSL]/ [2.0 DSL]

Item	Detecting Condition & Fail Safe	Possible cause
DTC Strategy	• Check signal for B+ Short	• Short to battery in circuit • Faulty Brake SWITCH Adjustment • Faulty Brake SWITCH • Faulty TCM(PCM)
Enable Conditions	• No(Output Speed Sensor)≥ 240rpm • Brake Switch "ON"	
Threshold value	• +B Short	
Diagnostic Time	• More than 5 min	
Fail Safe	• Intelligent-Shift is inhibited	

[2.0 GSL]

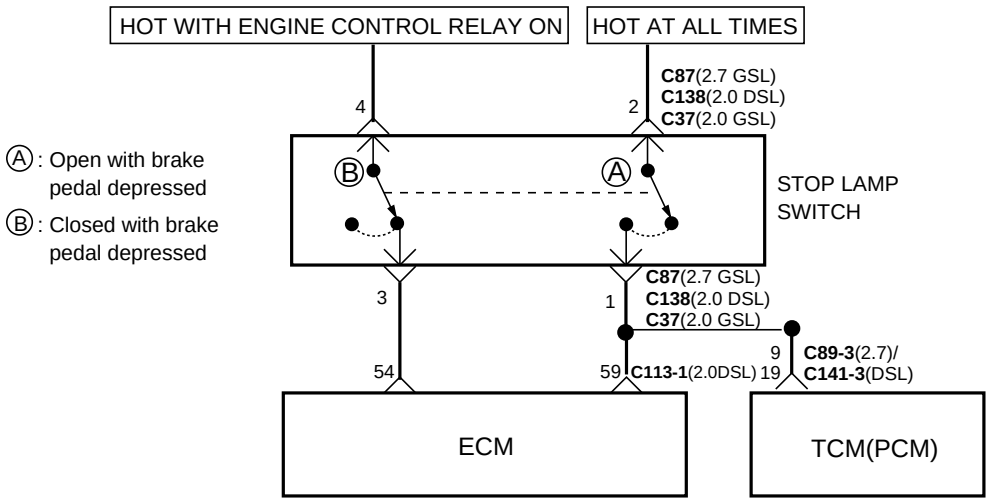
Item		Detecting Condition & Fail Safe	Possible cause
Case 1	**DTC Strategy**	• check for Short to Battery	• Short to battery in circuit • Faulty Brake SWITCH Adjustment • Faulty Brake SWITCH • Faulty PCM
	Enable Conditions	• No(Output Speed Sensor) ≥ 240rpm • Brake Switch "ON"	
	Threshold value	• Short to Battery	
	Diagnostic Time	• More than 5 min.	
Case 2	**DTC Strategy**	• check for Voltage range	
	Enable Conditions	• 2.24 V ≤ Input voltage ≤ 2.76 V	
	Threshold value	• Open	
	Diagnostic Time	• More than 5 min.	
Fail safe		• Intelligent-Shift is inhibited	

SPECIFICATION E925D7FF

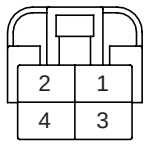
BRAKE	DATA VALUE
Operation	ON
Non-operation	OFF

SCHEMATIC DIAGRAM EDEAE868

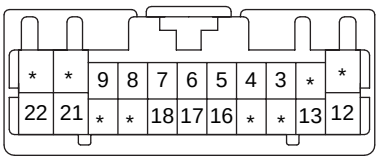
[Circuit Diagram]



[Harness Connector]



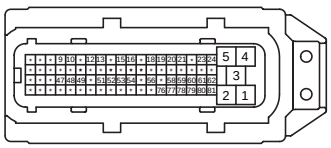
C138(2.7GSL/2.0DSL)
C37(2.0GSL)



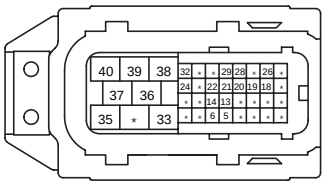
C89-3(2.7GSL)
C141-3(2.0DSL)

[Connetion Information]

Terminal	Connection	Function
C138/C37 No.1	C113-1 No.59	ECM
	C89-3/C141-3 No.9/19	TCM(PCM)
C138/C37 No.2	Hot at all times	
C138/C37 No.4	Hot with engine control relay ON	
C138/C37 No.3	C113-1 No.54	ECM



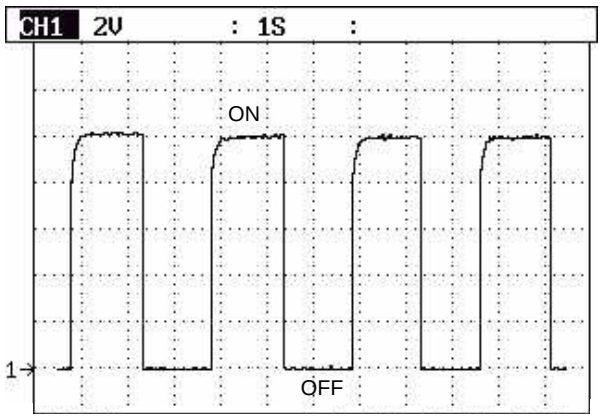
C113-1



C18-2(2.0GSL)

LKIF110A

WAVEFORM INSPECTION EFC26BFD



Observe the change of the waveform(HIGH or LOW), depressing or releasing the brake pedal.

BRAKE PEDAL ON : HIGH

BRAKE PEDAL OFF : LOW

LKIF110D

MONITOR SCANTOOL DATA EBE257BC

1. Connect scantool to data link connector(DLC).
2. Ignition "ON" & Engine "OFF".
3. Monitor the "BRAKE LAMP SWITCH" parameter on the scantool.
4. Depress and release Foot Brake.

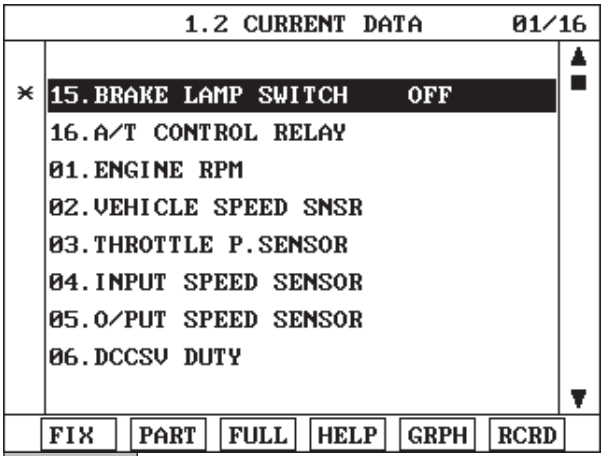


FIG.1)

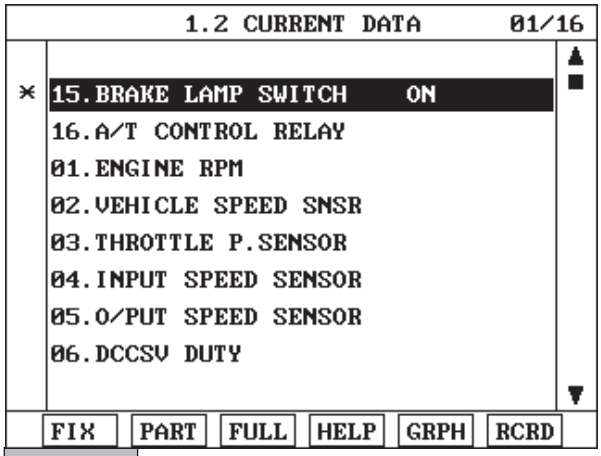


FIG.2)

FIG1) Release foot brake status.
FIG2) Depress foot brake status.

ELQE001A

5. Does "STOP LAMP 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 Vehicle Repair" procedure.

NO

▶ Go to "W/Harness Inspection" procedure.

TERMINAL & CONNECTOR INSPECTION E95CF1B3

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 vehicle Repair" procedure.

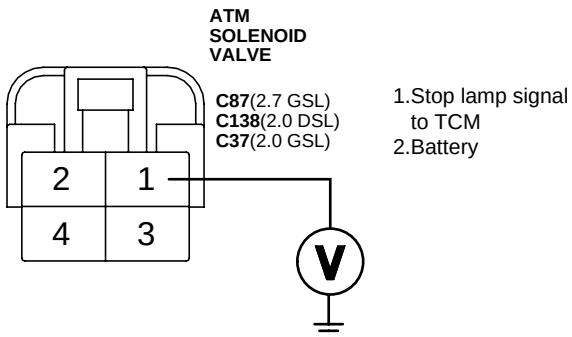
NO

▶ Go to "Signal circuit inspection" procedure.

SIGNAL CIRCUIT INSPECTION E22A2224

1. Ignition "ON" & "OFF".
2. Disconnect "BRAKE LAMP SWITCH" connector.
3. Measure voltage between teminal "1" of the sensor harness connector and chassis ground.

Specification : 0V



LKIF110B

4. Is voltage within specifications?

YES

▶ Go to "Component Inspection" procedure.

NO

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

COMPONENT INSPECTION EB20D51E

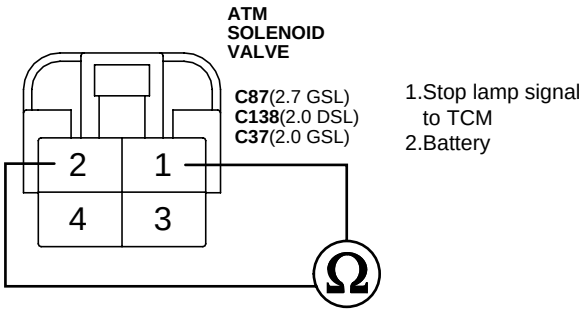
1. Check "STOP LAMP SWITCH".

   1) Ignition "OFF".

   2) Disconnect "STOP LAMP SWITCH" connector and Remove "STOP LAMP SWITCH".

   3) Measure resistance between terminal "1" and "2" of the STOP LAMP SWITCH when plunger of the STOP LAMP SWITCH is pushed in.

Specification : Infinite



LKIF110C

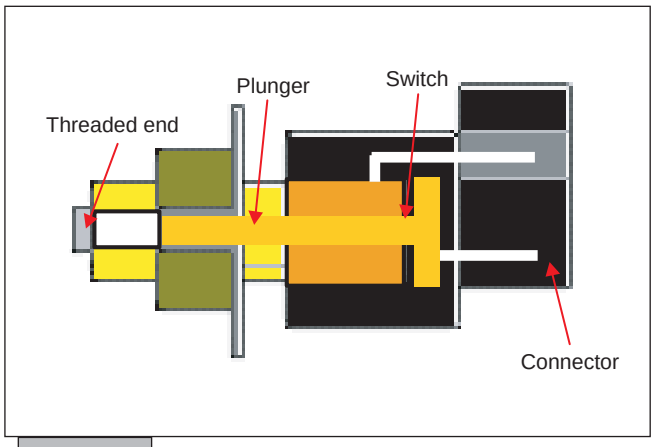


FIG.1)

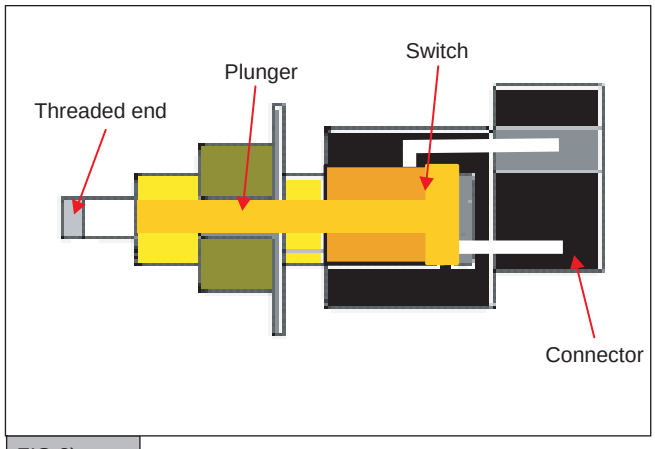


FIG.2)

FIG.1) Brake pedal is released-∞Ω
FIG.2) Brake pedal is depressed-0Ω

ELQE004A

4) Is resistance within specifications?

YES

▶ Go to "Adjust STOP LAMP SWITCH" as below.

NO

▶ Replace "STOP LAMP SWITCH" as necessary and Go to "Verification Vehicle Repair" procedure.

2. Adjust "STOP LAMP SWITCH" Clearance.

1) Ignition "OFF".

2) Reinstall "STOP LAMP SWITCH".

3) Adjust "STOP LAMP SWITCH" Clearance as below.

Specification : 0.9mm(0.04In)

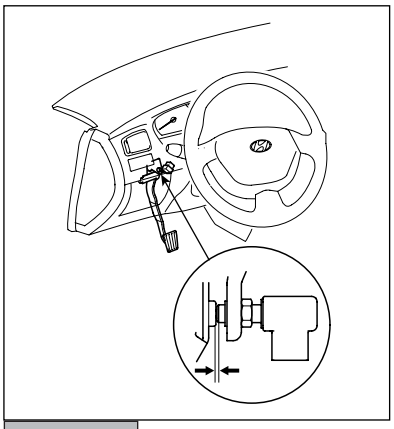


FIG.1)

FIG 1)method of adjust : Screw in the "STOP LAMP SWITCH" until its plunger is fully de-pressed(threaded end (A) touching the pad (B) on the pedal arm). Then back off the switch 3/4 turn to make 0.9mm(0.04In) of clearance between the threaded end and pad Tighten the locknut firmly. Connect the "STOP LAMP SWITCH" connector. Make sure that the stop lamp goes off when the pedal is released.

ELQE005A

4) After Adjusting, Has problem been solved?

YES

▶ Go to "Verification Vehicle Repair" procedure.

NO

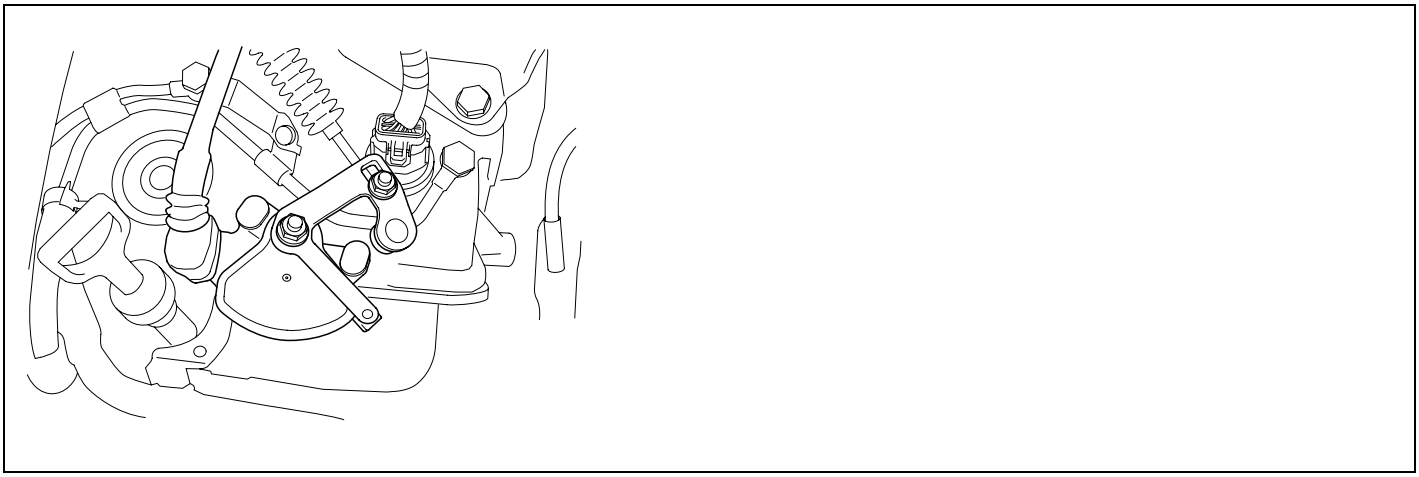
▶ Substitute with a known-good TCM(PCM) and check for proper operation. If the problem is corrected, replace TCM(PCM) as necessary and go to "Verification Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR EBA6CADE

Refer to DTC P0560.

DTC P0707 TRANSAXLE RANGE SENSOR - LOW

COMPONENT LOCATION ED46F439



EKKE108A

GENERAL DESCRIPTION EB5EFF2C

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 ED8086CA

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

DTC DETECTING CONDITION EFD4421A

[2.7 GSL]/ [2.0 DSL]

Item	Detecting Condition & Fail Safe	Possible cause
DTC Strategy	• Check for No signal	• Open or short in circuit • Faulty TRANSAXLE RANGE SWITCH • Faulty TCM(PCM)
Enable Conditions	• Continuous	
Threshold value	• No signal detected	
Diagnostic Time	• More than 30sec	
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. - When sports mode S/W is ON without P,R,N, D-RANGE signals, it is regarded sports mode.(DTC is not set)	

[2.0 GSL]

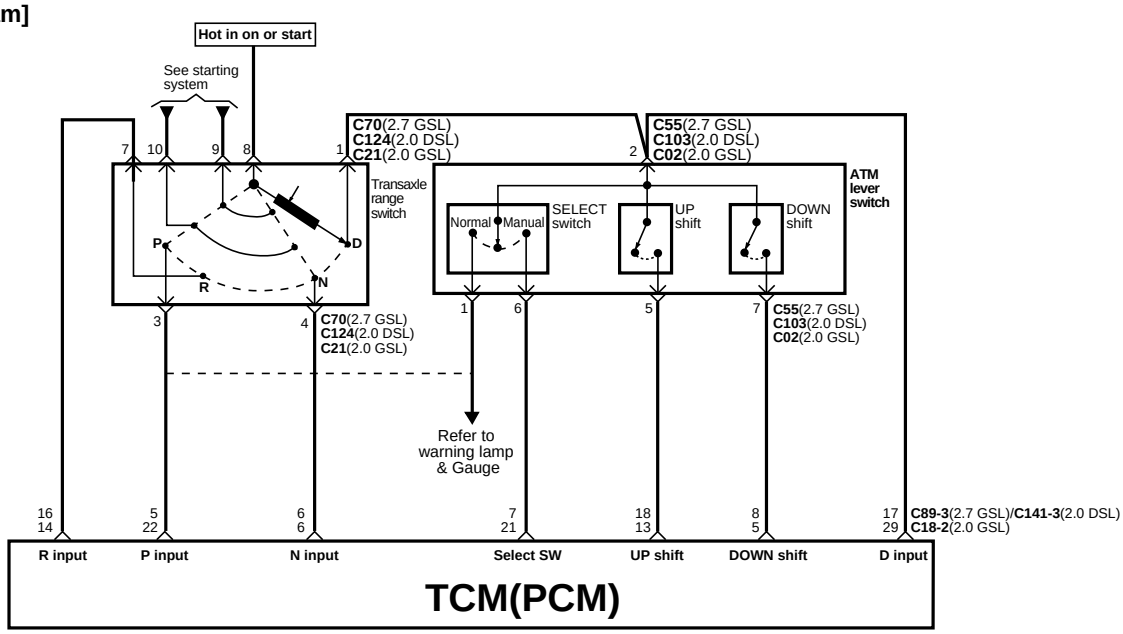
Item	Detecting Condition & Fail Safe	Possible cause
DTC Strategy	• Check for No signal	• Open or short in circuit • Faulty TRANSAXLE RANGE SWITCH • Faulty TCM(PCM)
Enable Conditions	• Ne ≥ 400rpm and TPS ≥ 10%	
Threshold value	• No signal detected	
Diagnostic Time	• More than 30sec	
Fail Safe	• Recognition 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. - When sports mode S/W is ON without P,R,N, D-RANGE signals, it is regarded sports mode.(DTC is not set)	

SPECIFICATION E8400ACF

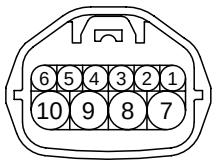
Inspection condition		Reference value
* IG KEY : ON or Engine stall	Shift lever : P	P,N
	Shift lever : R	R
	Shift lever : N	P,N
	Shift lever : D	D

SCHEMATIC DIAGRAM EAFAB3C2

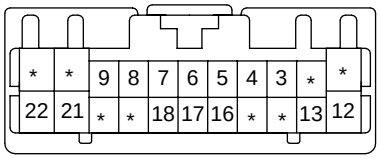
[Circuit Diagram]



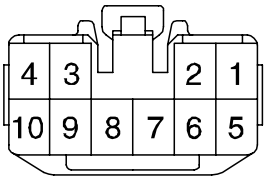
[Harness Connector]



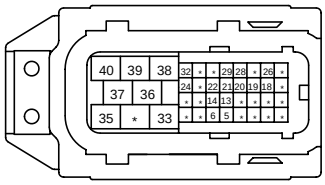
C70(2.7 GSL)
C124(2.0 DSL)
C21(2.0 GSL)



C89-3(2.7 GSL)
C141-3(2.0 DSL)



C55(2.7 GSL)
C103(2.0 DSL)
C02(2.0 GSL)



C18-2(2.0 GSL)

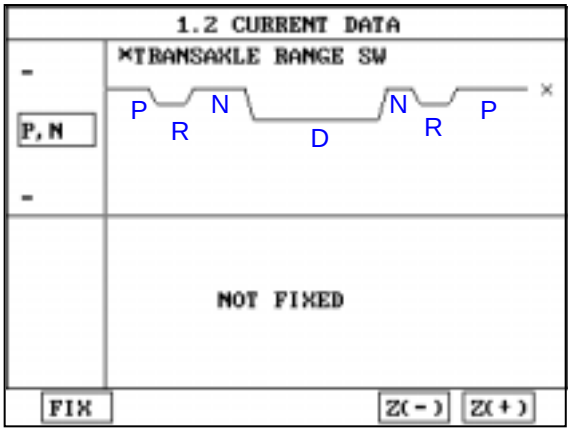
[Connetion Information]

Shift Lever / Terminal	P	R	N	D	Connection
1				O	TCM(C89-3/C141-3 No.17) TCM(C18-2 No.29)
3	O				TCM(C89-3/C141-3 No.5) TCM(C18-2 No.22)
4			O		TCM(C89-3/C141-3 No.6) TCM(C18-2 No.6)
7		O			TCM(C89-3/C141-3 No.16) TCM(C18-2 No.14)
8	O		O	O	Ignition switch(IG 1)
9	O		O		Starting motor
10	O		O		Ignition switch(start)

LKIF120A

MONITOR SCANTOOL DATA EC1E1D91

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 other range.



ELQE006A

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 Vehicle Repair" procedure.

NO

▶ Go to "TERMINAL & CONNECTOR INSPECTION" procedure.

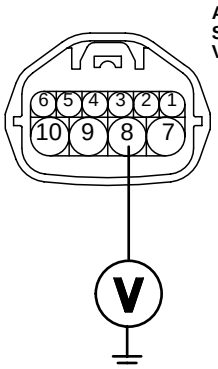
TERMINAL & CONNECTOR INSPECTION EF8E9A58

Refer to DTC P0703.

POWER SUPPLY CIRCUIT INSPECTION E38BB8A9

1. CHECK POWER TO RANGE SWITCH
   1) Disconnect "TRANSAXLE RANGE SWITCH" connector.
   2) Ignition "ON" & Engine "OFF".
   3) Measure voltage between teminal "8" of the sensor harness connector and chassis ground.

Specification : approx. B+



1. D Range
3. P Range
4. N Range
7. R Range
8. Power supply IG1
9. Starting circuit
10. Starting circuit

LKIF120B

4) Is voltage within specifications?

YES

▶ Go to "Signal circuit inspection" procedure.

NO

▶ Check that Fuse 24-10A is installed or not blown.
▶ Check for open in harness. Repair as necessary and Go to "Verification Vehicle Repair" procedure.

SIGNAL CIRCUIT INSPECTION EFC1ECBD

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 : Shown below

[2.7 GSL]

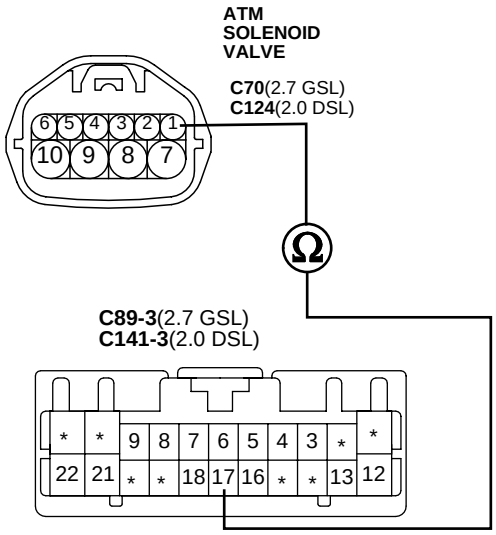
Pin No of "TRANSAXLE RANGE SWITCH"	C70 No1	C70 No3	C70 No4	C70 No7
Pin No of "TCM(PCM)" harness	C89-3 No17	C89-3 No5	C89-3 No6	C89-3 No16
Specification	0Ω	0Ω	0Ω	0Ω

[2.0 GSL]

Pin No of "TRANSAXLE RANGE SWITCH"	C21 No1	C21 No3	C21 No4	C21 No7
Pin No of "TCM(PCM)" harness	C18-2 No29	C18-2 No22	C18-2 No6	C18-2 No14
Specification	0Ω	0Ω	0Ω	0Ω

[2.0 DSL]

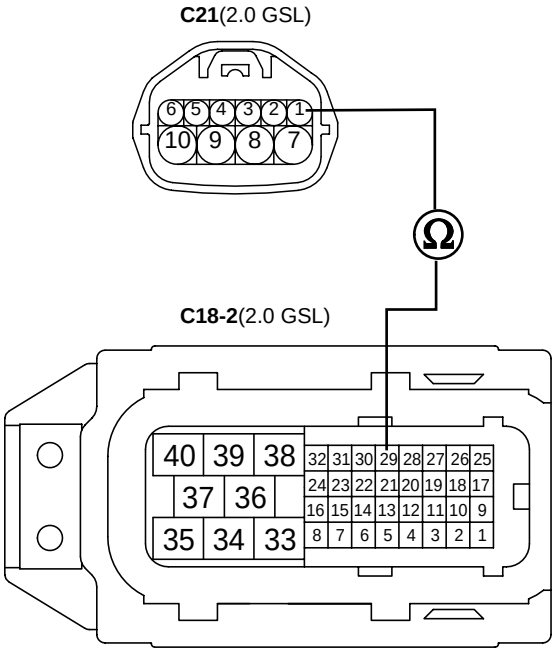
Pin No of "TRANSAXLE RANGE SWITCH"	C124 No1	C124 No3	C124 No4	C124 No7
Pin No of "TCM(PCM)" harness	C141-3 No17	C141-3 No5	C141-3 No6	C141-3 No16
Specification	0Ω	0Ω	0Ω	0Ω



1. D Range
3. P Range
4. N Range
7. R Range
8. Power supply IG1
9. Starting circuit
10. Starting circuit

5. P Range
6. N Range
16. R Range
17. D Range

LKIF120C



1. D Range
3. P Range
4. N Range
7. R Range
8. Power supply IG1
9. Starting circuit
10. Starting circuit

22. P Range
6. N Range
14. R Range
29. D Range

LKIF120D

4. Is resistance within specifications?

YES

▶ Go to "Component inspection" procedure.

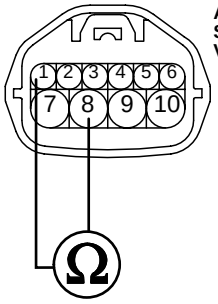
NO

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

COMPONENT INSPECTION E9994B4C

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

Specification : approx. 0 Ω



ATM SOLENOID VALVE

C70(2.7 GSL)
C124(2.0 DSL)
C21(2.0 GSL)
Component side

1. D Range
3. P Range
4. N Range
7. R Range
8. Power supply IG1
9. Starting circuit
10. Starting circuit

LKIF120E

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

[RANGE SWITCH continuity check table]

ELQE011A

4. Is resistance within specifications?

YES

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

NO

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

VERIFICATION OF VEHICLE REPAIR EEF08866

Refer to DTC P0560.

DTC P0708 TRANSAXLE RANGE SENSOR - HIGH

COMPONENT LOCATION E3BAD475

Refer to DTC P0707.

GENERAL DESCRIPTION E50F3FDF

Refer to DTC P0707.

DTC DESCRIPTION EF05F2CD

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

DTC DETECTING CONDITION E8DF5367

[2.7 GSL]/ [2.0 DSL]

Item	Detecting Condition & Fail Safe	Possible cause
DTC Strategy	• Check for multiple signals	• Open or short in TRANSAXLE RANGE SWITCH • Faulty TRANSAXLE RANGE SWITCH • Faulty TCM(PCM)
Enable Conditions	• Continuous	
Threshold value	• Multiple signal	
Diagnostic Time	• More than 30sec	
Fail Safe	• Recognition as previous signal - When signal is input "D" and "N" at the same time, TCM(PCM) regards it as "N" RANGE. - After TCM(PCM) Reset, if the TCM(PCM) detects multiple signals or no signal, then it holds the 3rd gear position.	

[2.0 DGSL]

Item	Detecting Condition & Fail Safe	Possible cause
DTC Strategy	• Check for multiple signals	• Open or short in TRANSAXLE RANGE SWITCH • Faulty TRANSAXLE RANGE SWITCH • Faulty TCM(PCM)
Enable Conditions	• Always	
Threshold value	• Multiple signal	
Diagnostic Time	• More than 30sec	
Fail Safe	• Recognition as previous signal - When signal is input "D" and "N" at the same time, TCM(PCM) regards it as "N" RANGE. - After TCM(PCM) Reset, If the if the TCM(PCM) detects multiple signal or no signal, then it holds the 3rd gear position.	

SPECIFICATION E5BC3828

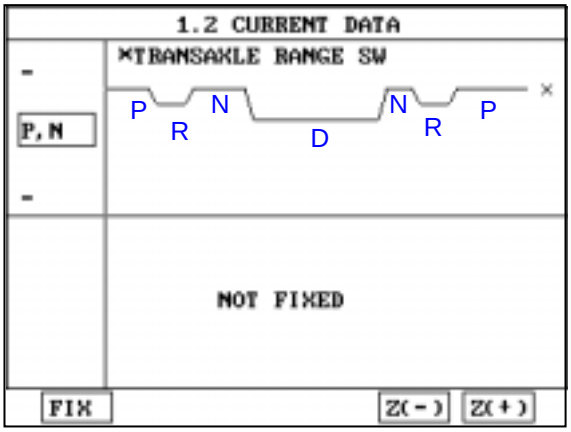
Refer to DTC P0707.

SCHEMATIC DIAGRAM E63ABBE0

Refer to DTC P0707.

MONITOR SCANTOOL DATA E35E1AB9

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.



ELQE006A

5. Does "TRANSAXLE RANGE SWITCH" follow the referance 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. Throughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration or damage. Repair or replace as necessary and go to "Verification Vehicle Repair" procedure.

NO

▶ Go to "TERMINAL & CONNECTOR INSPECTION" procedure.

TERMINAL & CONNECTOR INSPECTION E3B1466A

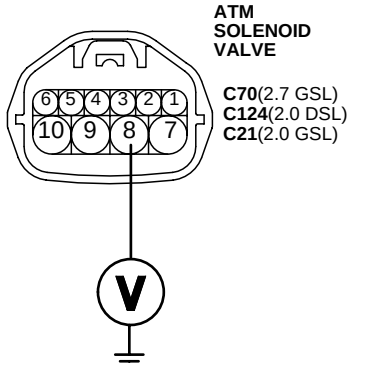
Refer to DTC P0707.

POWER SUPPLY CIRCUIT INSPECTION EC413BB3

1. Disconnect "TRANSAXLE RANGE SWITCH" connector.
2. Ignition "ON" & "OFF".
3. Measure voltage between each terminal(C70/C124/C21) of the sensor harness connector and chassis ground.

Specification : Shown below

TERMINAL - C70(2.7GSL) - C124(2.0DSL) - C21(2.0GSL)	1	3	4	7	8	9	10
SPECIFICATION	0V	12V(PULL UP)	12V(PULL UP)	0V	0V	0V	0V



1. D Range
3. P Range
4. N Range
7. R Range
8. Power supply IG1
9. Starting circuit
10. Starting circuit

LKIF130A

4. Is voltage within specifications?

YES

▶ Go to "Signal circuit inspection" procedure.

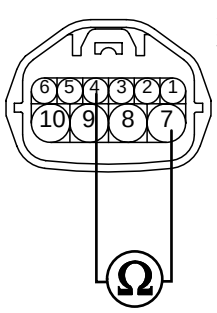
NO

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

SIGNAL CIRCUIT INSPECTION E316D31C

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



ATM SOLENOID VALVE

C70(2.7 GSL)
C124(2.0 DSL)
C21(2.0 GSL)

1. D Range
3. P Range
4. N Range
7. R Range
8. Power supply IG1
9. Starting circuit
10. Starting circuit

LKIF130B

4. Is resistance within specifications?

YES

▶ Go to "Component inspection" procedure.

NO

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

COMPONENT INSPECTION E3C39ACC

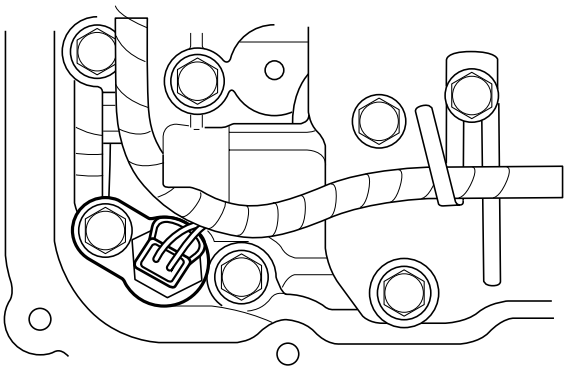
Refer to DTC P0707.

VERIFICATION OF VEHICLE REPAIR E13CA0CC

Refer to DTC P0707.

DTC P0711 TRANSAXLE FLUID TEMPERATURE SENSOR RATIONALITY

COMPONENT LOCATION EDEB0B8B



ELQE043A

GENERAL DESCRIPTION EFFFC55E

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(PCM) supplies a 5V reference voltage to the sensor, and the output voltage.

DTC DESCRIPTION EEDF14FA

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(PCM) regards the ATF temperature as fixed at a value of 80°C(176°F).

DTC DETECTING CONDITION E0BA37BC

[2.7 GSL]/ [2.0 DSL]

Item	Detecting Condition & Fail Safe	Possible cause
DTC Strategy	• Check for ground short	• Sensor signal circuit is short to ground • Faulty sensor • Faulty TCM(PCM)
Enable Conditions 1) JUMP	• -4 °F ≤ OIL TEMP ≤ 248 °F, In condition that Oil TEMP is changed over 10 degrees during 10 sec	
Enable Conditions 2) STUCK ON HIGH TEMP	• OIL TEMP ≥ 86°F and In case of OIL TEMP is higher 15 degrees than WATER TEMP	
Enable Conditions 3) STUCK ON LOW TEMP	• OIL TEMP ≤ 86 °F • Ne ≥ 1000rpm • Maintenance time : 10minutes In condition that OIL TEMP is changed less than 5 degrees	
Threshold value		
Diagnostic Time		
Fail Safe	• Learning control and Intelligent shift are inhibited • Fluid temperature is regarded as 80°C(176°F)	

[2.0 GSL]

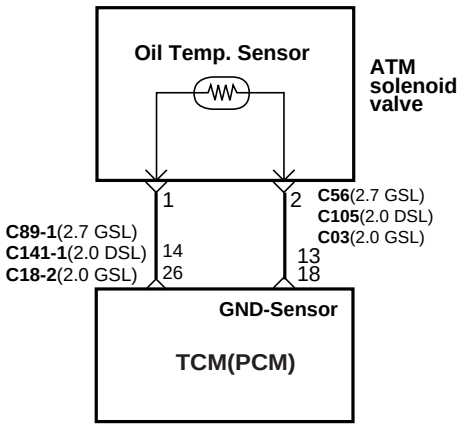
Item		Detecting Condition & Fail Safe	Possible cause
DTC Strategy		• Check rationality	• Sensor signal circuit is short to ground • Faulty sensor • Faulty TCM(PCM)
Enable Conditions	**Case 1**	• Ne≥ 1000rpm and No≥ 1000rpm for 5min cumulative and Engine coolant temperature has changed by more than 40°C since start up and other OTS related error is not detected. In condition that Oil TEMP is not changed more than 2°C	
	Case 2	• OTS output at IG-OFF≥ 50°C and the engine coolant temperature at IG-OFF≥ 73.5°C and the engine coolant temperature have decreased over34°C from IG-OFF of the previous driving. In condition that OTS TEMP is not changed morethan 2°C	
	Case 3	• No ≥ 1000rpm, Ne ≥ 1000rpm for 5min cumulative and the engine coolant temperature≥ 73.5°C. In condition that OTS output ≤ -23.5°C	
Threshold value		• -	
Diagnostic Time		• -	
Fail Safe		• Learning control and Intelligent shift are inhibited • Fluid temperature is regarded as 80°C	

SPECIFICATION EFD805B3

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		

SCHEMATIC DIAGRAM ECC8BF49

[Circuit Diagram]

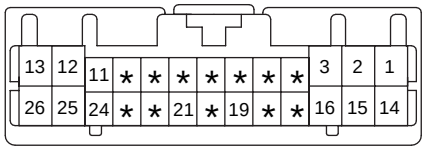


[Connection Information]

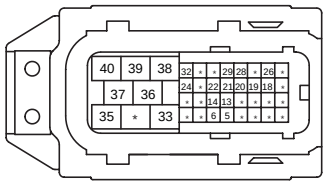
Terminal	Connection	Function
1	C89-1/C141-1 No.14 C18-2(2.0 GSL) No.26	Sensor signal
2	C89-1/C141-1 No.13 C18-2(2.0 GSL) No.18	Sensor ground

[Harness Connector]

C56(2.7 GSL)
C105(2.0 DSL)
C03(2.0 GSL)



C89-1(2.7 GSL)
C141-1(2.0 DSL)



C18-2(2.0 GSL)

LKIF140A

MONITOR SCANTOOL DATA EABCAFDF

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

Specification : Increasing Gradually

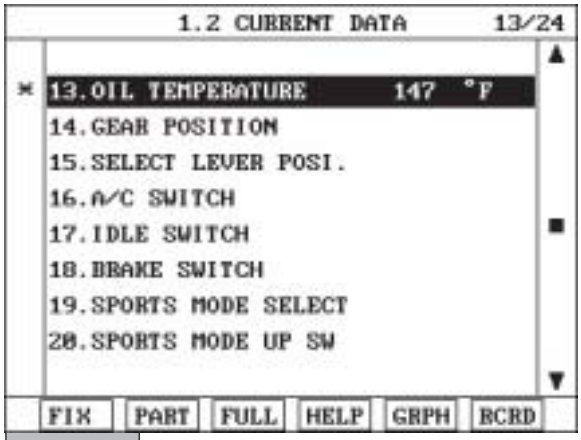


FIG.1)

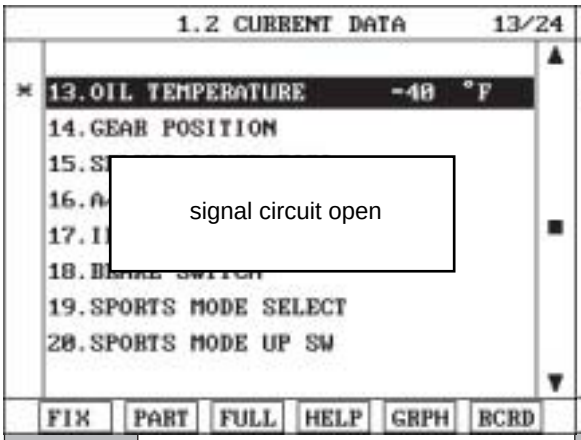


FIG.2)

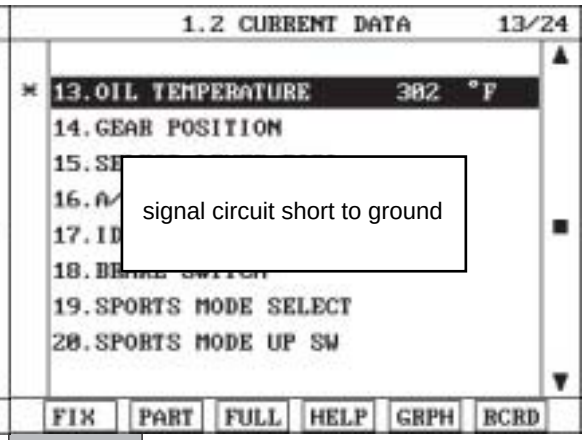


FIG.3)

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

ELQE013A

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 Vehicle Repair" procedure.

NO

▶ Go to "W/Harness Inspection" procedure.

TERMINAL & CONNECTOR INSPECTION E2F5746E

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 vehicle Repair" procedure.

NO

▶ Go to "Component inspection" procedure.

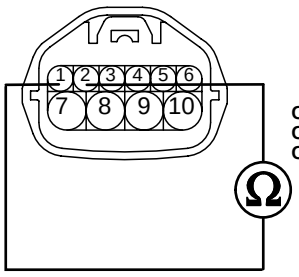
COMPONENT INSPECTION EC07FF96

1. CHECK "TRANSAXLE FLUID TEMPERATURE SENSOR"
   1) Ignition "OFF".
   2) Disconnect the "TRANSAXLE FLUID TEMPERATURE SENSOR" connector.
   3) Measure the resistance between terminals "1" and "2" of the "TRANSMISSION FLUID TEMPERATURE SENSOR".

Specification : Refer to " Reference data"

[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		



ATM SOLENOID VALVE

C56(2.7 GSL)
C105(2.0 DSL)
C03(2.0 GSL)

1.TRANSMISSION FLUID TEMPERATURE SENSOR
2.Sensor ground

LKIF140B

4) Is resistance within specifications?

YES

▶ Go to "CHECK TCM(PCM) " as below.

NO

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

2. CHECK TCM(PCM)

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

2) Connect "TRANSAXLE FLUID TEMPERATURE SENSOR" connector.

3) Install scantool and select a SIMU-SCAN.

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

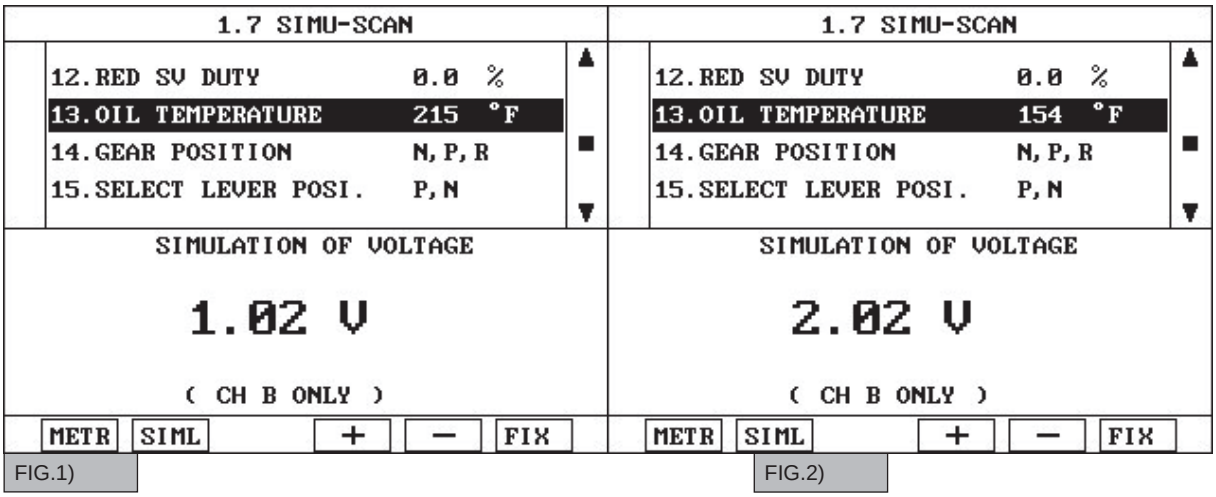


FIG.1) FIG.2)

FIG.1) INPUT 1.02V → 215°F
FIG.2) INPUT 2.02V → 154°F

※ The values are subject to change according to vehicle model

ELQE016A

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 TCM(PCM) and check for proper operation. If the problem is corrected, replace TCM(PCM) as necessary and then go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR E5C1AFDD

Refer to DTC P0707.

DTC P0712 FLUID(OIL) TEMPERATURE SENSOR CIRCUIT - LOW

COMPONENT LOCATION ED6CB3AE

Refer to DTC P0711.

GENERAL DESCRIPTION ECDCDDF7

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(PCM) 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(PCM)'s control of the Torque Converter Clutch, and is also used for many other purposes.

DTC DESCRIPTION E895E75C

Refer to DTC P0711.

DTC DETECTING CONDITION E4937F9A

[2.7 GSL]/ [2.0 DSL]

Item	Detecting Condition & Fail Safe	Possible cause
DTC Strategy	• Check for ground short	• Sensor signal circuit is short to ground • Faulty sensor • Faulty TCM(PCM)
Enable Conditions	• Continuous	
Threshold value	• Voltage < 0.49V	
Diagnostic Time	• More than 1sec	
Fail Safe	• Learning control and Intelligent shift are inhibited • Fluid temperature is regarded as 80°C(176°F)	

[2.0 GSL]

Item	Detecting Condition & Fail Safe	Possible cause
DTC Strategy	• Check for Voltage range	• Sensor signal circuit is short to ground • Faulty sensor • Faulty TCM(PCM)
Enable Conditions	• Always	
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	

SPECIFICATION E7EE12B7

Refer to DTC P0711.

SCHEMATIC DIAGRAM EE49CA02

Refer to DTC P0711.

MONITOR SCANTOOL DATA E5F5FAD0

Refer to DTC P0711.

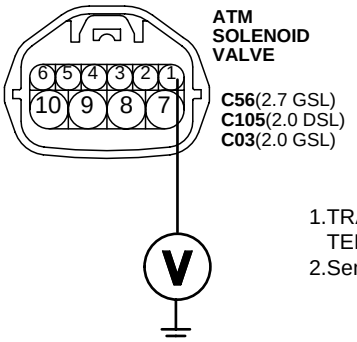
TERMINAL & CONNECTOR INSPECTION EACA5A7E

Refer to DTC P0711.

SIGNAL CIRCUIT INSPECTION ED656E62

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

Specification : Approx. 5V



1.TRANSMISSION FLUID TEMPERATURE SENSOR
2.Sensor ground

LKIF150A

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 Vehicle Repair" procedure .

COMPONENT INSPECTION E020D3DD

1. CHECK "TRANSAXLE FLUID TEMPERATURE SENSOR"

   1) Ignition "OFF".

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

   3) Measure the resistance between terminals "1" and "2" of the "TRANSMISSION FLUID TEMPERATURE SENSOR".

Specification : Refer to " Reference data"

[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 TCM(PCM) " as below.

NO

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

2. CHECK TCM(PCM)

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

2) Connect "TRANSAXLE FLUID TEMPERATURE SENSOR" connector.

3) Install scantool and select a SIMU-SCAN.

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

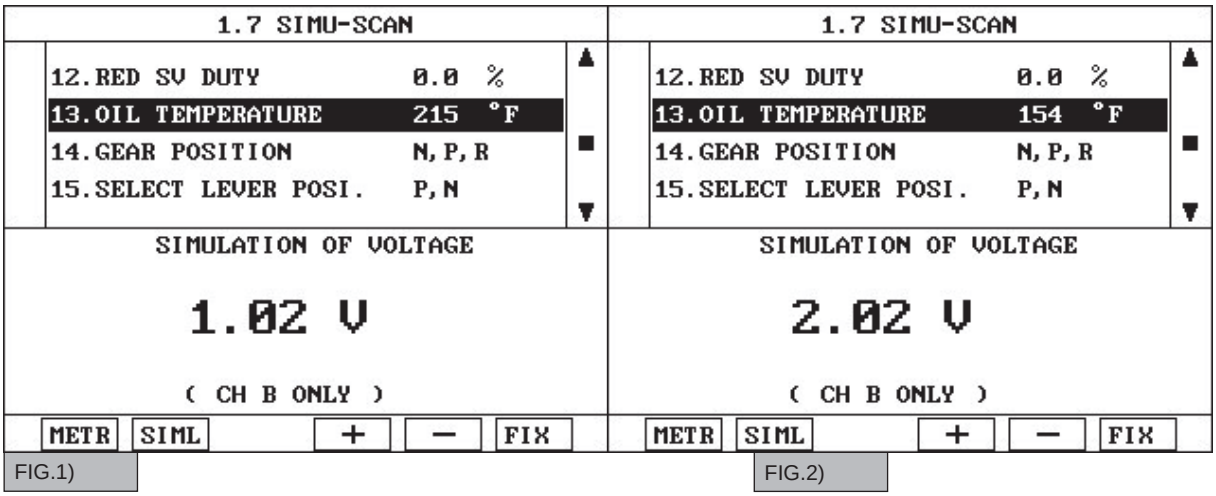


FIG.1) FIG.2)

FIG.1) INPUT 1.02V → 215°F
FIG.2) INPUT 2.02V → 154°F

※ The values are subject to change according to vehicle model

ELQE016A

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 TCM(PCM) and check for proper operation. If the problem is corrected, replace TCM(PCM) as necessary and then go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR EFAF64B9

Refer to DTC P0707.

DTC P0713 FLUID(OIL) TEMPERATURE SENSOR CIRCUIT - HIGH

COMPONENT LOCATION EE3B6A00

Refer to DTC P0711.

GENERAL DESCRIPTION EC11CEC5

Refer to DTC P0712.

DTC DESCRIPTION EDC2D1E5

Refer to DTC P0711.

DTC DETECTING CONDITION ED073F63

[2.7 GSL]/ [2.0 DSL]

Item	Detecting Condition & Fail Safe	Possible cause
DTC Strategy	• Check voltage range	• Open in circuit • Faulty sensor • Faulty TCM(PCM)
Enable Conditions (1)	• Engine speed > 2000rpm • Output speed > 1000rpm • Accumulated time in above condition : 10 min	
Enable Conditions (2)	• Enable Conditions(1) or • Engine speed > 700rpm • Engine Coolant Temperature > 35 °C • Accumulated time in above condition : 60 sec	
Threshold value	• Voltage > 4.5V	
Diagnostic Time	• More than 1sec	
Fail Safe	• Learning control and Intelligent shift are inhibited. • Fluid temperature is regarded as 80°C(176°F)	

[2.0 GSL]

Item	Detecting Condition & Fail Safe	Possible cause
DTC Strategy	• Check for Voltage range	• Sensor signal circuit is short to ground • Faulty sensor • Faulty TCM(PCM)
Enable Conditions	• Always	
Threshold value	• Voltage ≥ 0.49V	
Diagnostic Time	• More than 1sec	
Fail Safe	• Learning control and Intelligent shift are inhibited • Fluid temperature is regarded as 80°C(176°F)	

SPECIFICATION EE3B5EA3

Refer to DTC P0711.

SCHEMATIC DIAGRAM E17DCA0F

Refer to DTC P0711.

MONITOR SCANTOOL DATA EE9B40E1

Refer to DTC P0711.

TERMINAL & CONNECTOR INSPECTION EFF653DF

Refer to DTC P0711.

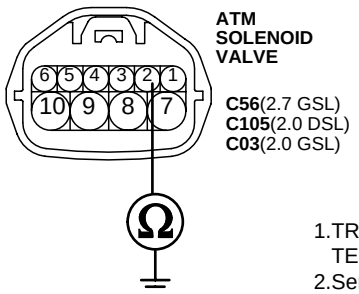
SIGNAL CIRCUIT INSPECTION E47A3F80

Refer to DTC P0712.

GROUND CIRCUIT INSPECTION E08861BC

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

Specification : Approx. 0 Ω



LKIF160A

4. Is resistance within specifications?

YES

▶ Go to "Component inspection" procedure.

NO

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

COMPONENT INSPECTION EC3A25DC

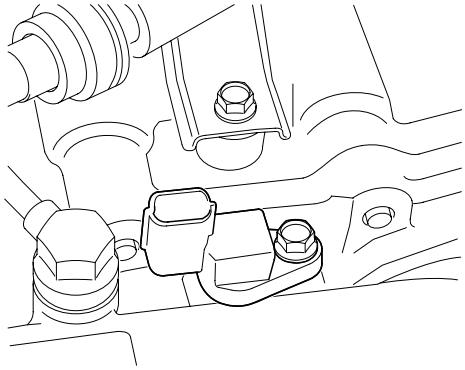
Refer to DTC P0712.

VERIFICATION OF VEHICLE REPAIR E545FE3A

Refer to DTC P0707.

DTC P0715 INPUT SPEED SENSOR CIRCUIT

COMPONENT LOCATION ECFE026C



BKQE004A

GENERAL DESCRIPTION EE4E4FF4

The input(turbine) speed sensor outputs pulse-signals according to the revolutions of the input shaft of the transmission. The TCM(PCM) 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 EC1C92B3

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

DTC DETECTING CONDITION EEA0EB4D

[2.7 GSL]/ [2.0 DSL]

Item	Detecting Condition & Fail Safe	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 TCM(PCM)
Enable Conditions	• Vehicle speed is over 30 Km/h(19 mph) in D,3,2,L(A/T range swhitch) and SP(SPORTS MODE) • But do not check the DTC in below condition - A/T oil temp sensor voltage ＞4.5 V - Eng revolution ＜ 2600 rpm	
Threshold value	• No signal	
Diagnostic Time	• More than 1sec	
Fail Safe	• Locked into 3rd or 2nd gear • Manual shifting is possibe (2 nd → 3 rd ,3 rd → 2 nd)	

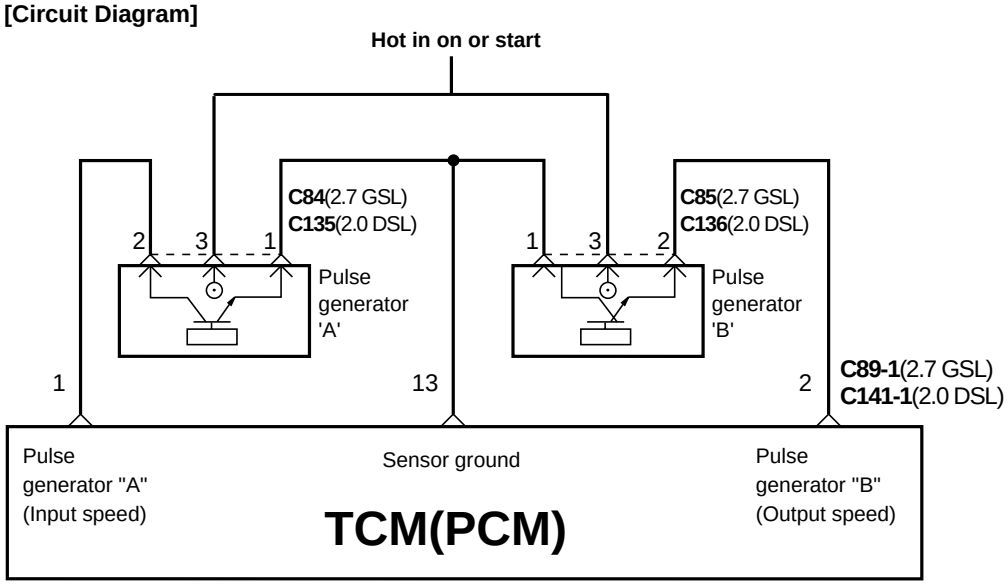
SPECIFICATION EC701FA8

Input shaft & Output shaft speed sensor

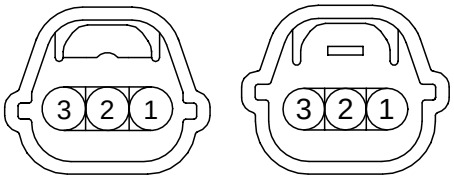
- Type : Hall sensor
- Current consumption : 22mA(MAX)
- sensor body and sensor connector have been unified as one.

SCHEMATIC DIAGRAM EFC43ABB

[Circuit Diagram]

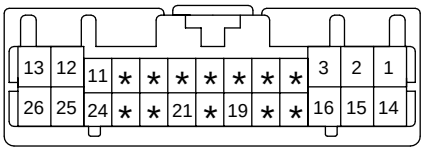


[Harness Connector]



C84(2.7 GSL)
C135(2.0 DSL)

C85(2.7 GSL)
C136(2.0 DSL)



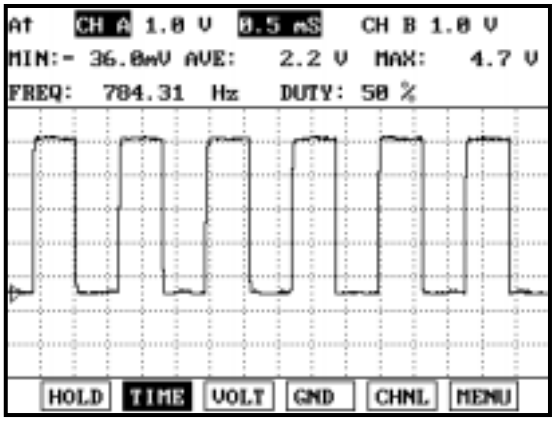
C89-1(2.7 GSL)
C141-1(2.0 DSL)

[Connection Information]

Terminal	Connection	Function
1	C89-1/C141-1 No.13	Sensor ground
2	C89-1/C141-1 No.1	Input speed
3	JC14/JC104 No.46	Hot at all times

LKIF160B

SIGNAL WAVEFORM EDD5C08C



ELQE020A

MONITOR SCANTOOL DATA E4E3BC16

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

Specification : Increasing Gradually

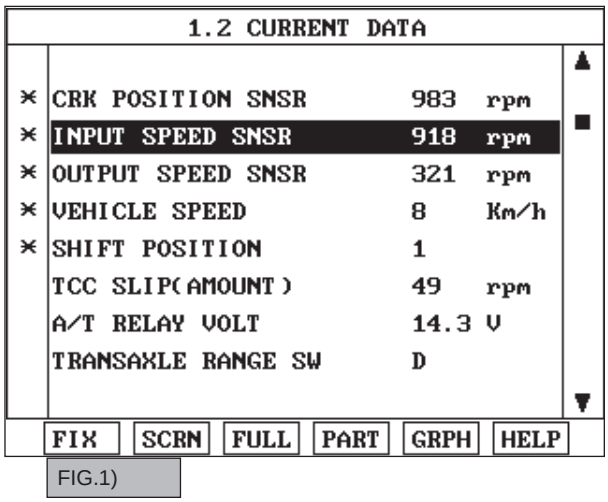


FIG.1)

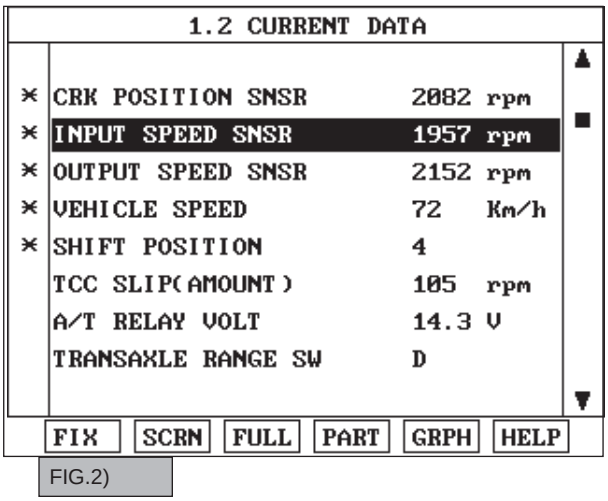


FIG.2)

FIG.1) Idling
FIG.2) Accelerating

ELQE018A

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 Vehicle Repair" procedure.

NO

▶ Go to "W/Harness Inspection" procedure.

TERMINAL & CONNECTOR INSPECTION EB73C23D

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 vehicle Repair" procedure.

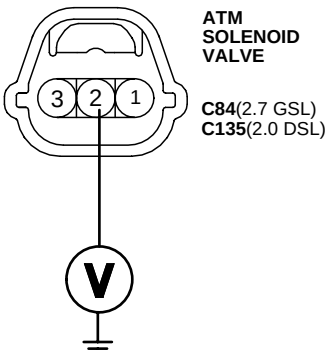
NO

▶ Go to "Signal Supply circuit inspection" procedure.

SIGNAL CIRCUIT INSPECTION EEBCFD36

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



ATM SOLENOID VALVE

C84(2.7 GSL)
C135(2.0 DSL)

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

LKIF160C

4. Is voltage within specification?

YES

▶ Go to "Power Supply circuit Inspection" procedure.

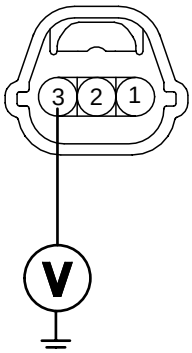
NO

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

POWER SUPPLY CIRCUIT INSPECTION E384ACA5

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+



ATM SOLENOID VALVE

C84(2.7 GSL)
C135(2.0 DSL)

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

LKIF160D

4. Is voltage within specification ?

YES

▶ Go to "Ground circuit inspection" procedure.

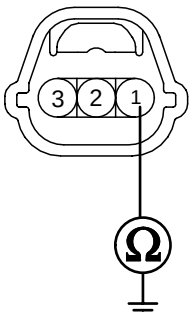
NO

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

GROUND CIRCUIT INSPECTION EF85CDC5

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



ATM SOLENOID VALVE

C84(2.7 GSL)
C135(2.0 DSL)

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

LKIF160E

4. Is resistance within specification ?

YES

▶ Go to "Component Inspection" procedure.

NO

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

COMPONENT INSPECTION E7C3EBD6

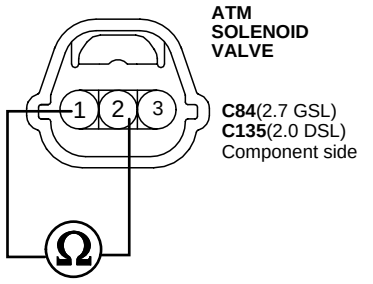
1. Check "INPUT SPEED SENSOR"

   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"



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

LKIF160F

   4) Is resistance within specifications?

[REFERENCE DATA]

Data	Reference Data	
Current	22 mA	
Air Gap	Input sensor	1.3 mm
	Output sensor	0.85 mm
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 TCM(PCM) " as below.

NO

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

2. CHECK TCM(PCM)

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.

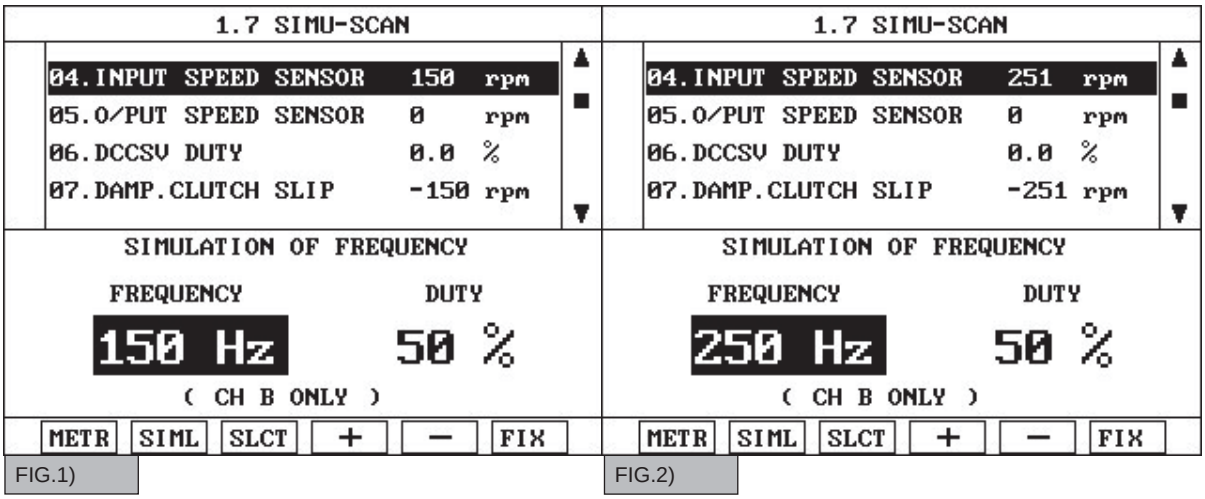


FIG.1) FIG.2)

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

ELQE024A

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 TCM(PCM) and check for proper operation. If the problem is corrected, replace TCM(PCM) as necessary and then go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR E0995A28

Refer to DTC P0707.

DTC P0717 INPUT SPEED SENSOR CIRCUIT

COMPONENT LOCATION E3DE5887

Refer to DTC P0715.

GENERAL DESCRIPTION E0CD4812

Refer to DTC P0715.

DTC DESCRIPTION E5C3D5D1

Refer to DTC P0715.

DTC DETECTING CONDITION E5508ABB

[2.0 GSL]

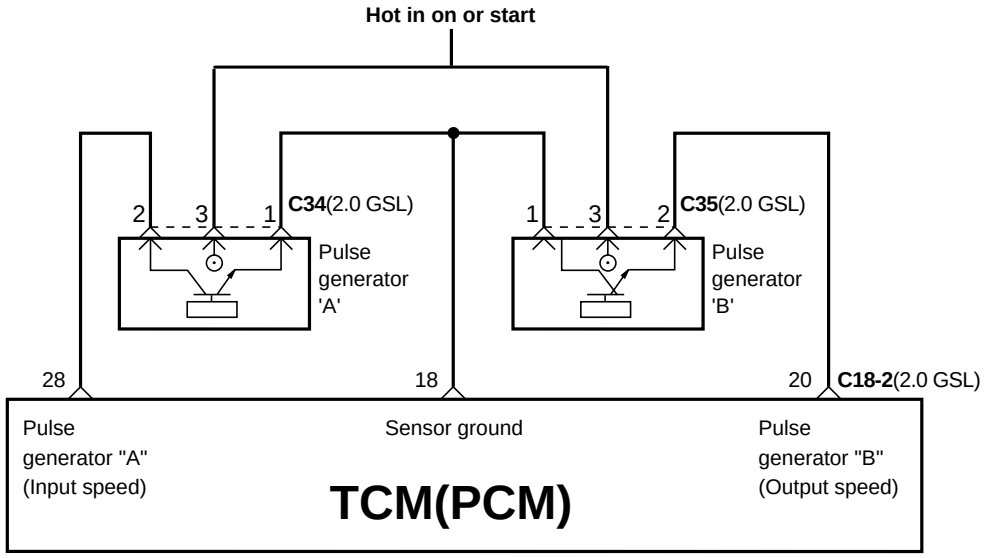
Item	Detecting Condition & Fail Safe	Possible cause
DTC Strategy	• Speed rationality check	• Signal circuit is open or short • Sensor power circuit is open • Sensor ground circuit is open • Faulty INPUT SPEED SENSOR • Faulty TCM(PCM)
Enable Conditions	• Vehicle speed is over 19 Mile/h(30 Km/h) and Ne≥ 2000rpm in D,3,2,L(A/T range swhitch) and SP(SPORTS MODE)	
Threshold value	• No signal	
Diagnostic Time	• More than 1sec	
Fail Safe	• Locked into 3rd or 2nd gear • Manual shifting is possibe (2 nd → 3 rd ,3 rd → 2 nd)	

SPECIFICATION E8DCCBEA

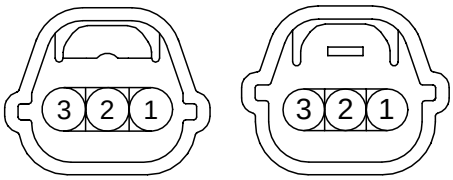
Refer to DTC P0715.

SCHEMATIC DIAGRAM E52907A9

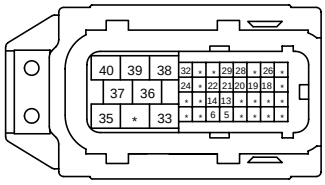
[Circuit Diagram]



[Harness Connector]



C34(2.0 GSL) **C35**(2.0 GSL)



C18-2(2.0 GSL)

[Connection Information]

Terminal	Connection	Function
1	C18-2 No.18	Sensor ground
2	C18-2 No.28	Input speed
3	JC04 No.46	Hot at all times

LKIF170A

SIGNAL WAVEFORM E006203C

Refer to DTC P0715.

MONITOR SCANTOOL DATA E63DAE3E

Refer to DTC P0715.

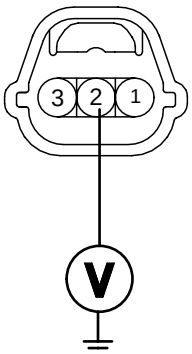
TERMINAL & CONNECTOR INSPECTION E1DB5843

Refer to DTC P0715.

SIGNAL CIRCUIT INSPECTION EDDDD11A

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

LKIF170B

4. Is voltage within specification?

YES

▶ Go to "Power Supply circuit Inspection" procedure.

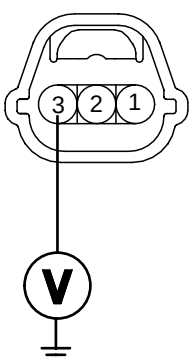
NO

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

POWER SUPPLY CIRCUIT INSPECTION EAD83FA7

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

LKIF170C

4. Is voltage within specification ?

YES

▶ Go to "Ground circuit inspection" procedure.

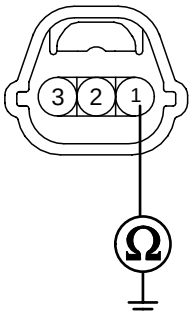
NO

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

GROUND CIRCUIT INSPECTION ED38C344

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



ATM SOLENOID VALVE

C34(2.0 GSL)

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

LKIF170D

4. Is resistance within specification ?

YES

▶ Go to "Component Inspection" procedure.

NO

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

COMPONENT INSPECTION E965E9E4

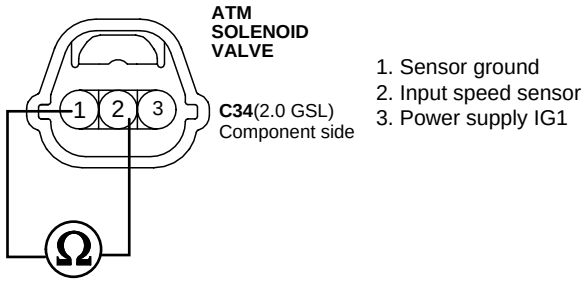
1. Check "INPUT SPEED SENSOR"

   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"



LKIF170E

   4) Is resistance within specifications?

[REFERENCE DATA]

Data	Reference Data	
Current	22 mA	
Air Gap	Input sensor	1.3 mm
	Output sensor	0.85 mm
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 TCM(PCM) " as below.

NO

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

2. CHECK TCM(PCM)

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.

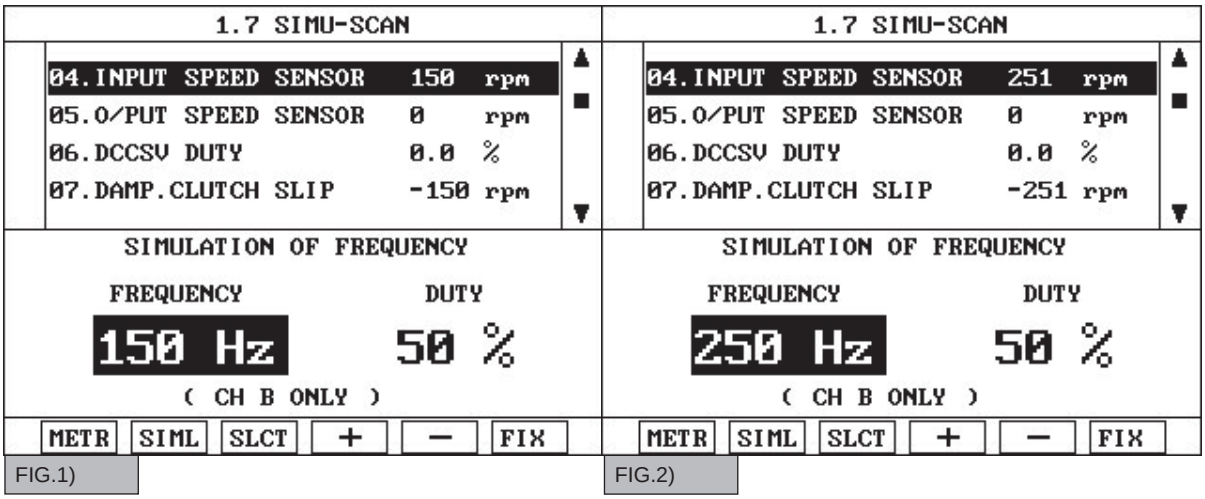


FIG.1) INPUT 150Hz → 150rpm
FIG.2) INPUT 250Hz → 250rpm

ELQE024A

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

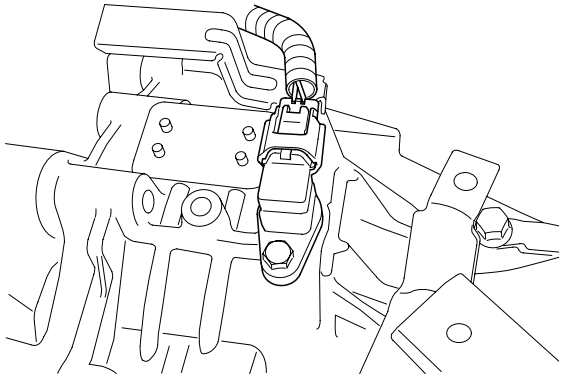
▶ Substitute with a known-good TCM(PCM) and check for proper operation. If the problem is corrected, replace TCM(PCM) as necessary and then go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR E8C7B952

Refer to DTC P0707.

DTC P0720 OUTPUT SPEED SENSOR CIRCUIT

COMPONENT LOCATION EB3FB5F2



BKQE005A

GENERAL DESCRIPTION EF1FAACD

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 EBAF2C4C

The TCM(PCM) 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 30 km/h. The TCM(PCM) will initiate the fail safe function if this code is detected.

DTC DETECTING CONDITION E9A0E4CC

[2.7 GSL]/ [2.0 DSL]

Item	Detecting Condition & Fail Safe	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 TCM(PCM)
Enable Conditions	• Vehicle speed is over 30 Km/h(19 mph) in D,3,2,L(A/T range swhitch) and SP(SPORTS MODE) • But do not check the DTC in below condition - A/T oil temp sensor voltage ＞4.5 V - Eng revolution ＜ 2600 rpm	
Threshold value	• If the output from the output speed sensor is continuously 50% lower than the value calculated by vehicle speed sensor	
Diagnostic Time	• More than 1sec	
Fail Safe	• Locked into 3rd or 2nd gear • Manual shifting is possibe (2 nd → 3 rd ,3 rd → 2 nd)	

SPECIFICATION E08DE3B2

Refer to DTC P0715.

SCHEMATIC DIAGRAM EBFE0F5F

Refer to DTC P0715.

SIGNAL WAVEFORM E753C4DE

Refer to DTC P0715.

MONITOR SCANTOOL DATA ECDDCD5E

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

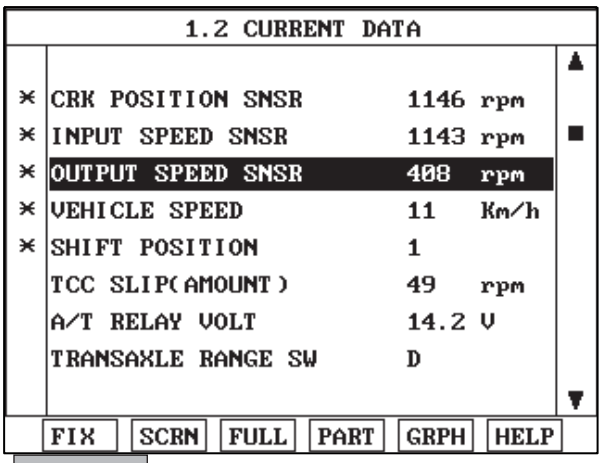


FIG.1)

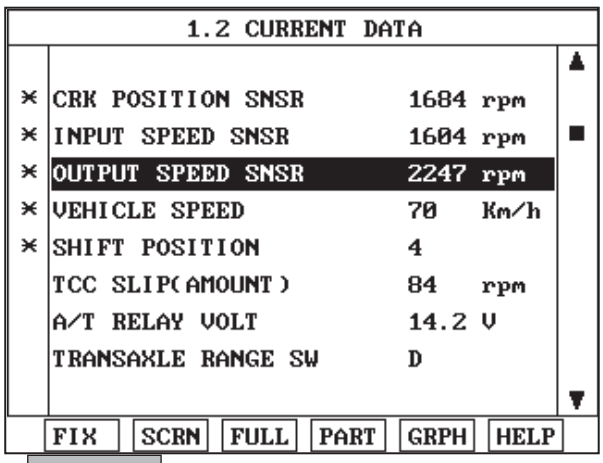


FIG.2)

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

ELQE025A

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 Vehicle Repair" procedure.

NO

▶ Go to "W/Harness Inspection" procedure.

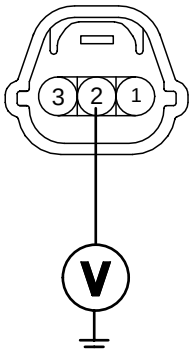
TERMINAL & CONNECTOR INSPECTION E17AEACC

Refer to DTC P0715.

SIGNAL CIRCUIT INSPECTION EF1B7B65

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



ATM SOLENOID VALVE

C85(2.7 GSL)
C136(2.0 DSL)

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

LKIF180B

4. Is voltage within specification?

YES

▶ Go to "Power Supply circuit Inspection" procedure.

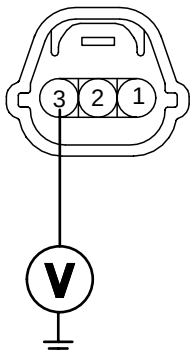
NO

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

POWER SUPPLY CIRCUIT INSPECTION EA553B4C

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+



ATM SOLENOID VALVE

C85(2.7 GSL)
C136(2.0 DSL)

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

LKIF180C

4. Is voltage within specification?

YES

▶ Go to "Ground circuit inspection" procedure.

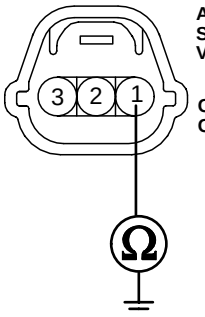
NO

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

GROUND CIRCUIT INSPECTION ECB9ACDD

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.

Specification : approx. 0 Ω



ATM SOLENOID VALVE

C85(2.7 GSL)
C136(2.0 DSL)

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

LKIF180D

4. Is resistance within specification?

YES

▶ Go to "Component Inspection" procedure.

NO

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

COMPONENT INSPECTION EC436770

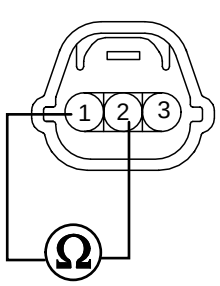
1. Check "OUTPUT SPEED SENSOR"

   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"



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

LKIF180E

   4) Is resistance within specifications?

[REFERENCE DATA]

Data	Reference Data	
Current	22 mA	
Air Gap	Input sensor	1.3 mm
	Output sensor	0.85 mm
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 TCM(PCM) " as below.

NO

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

2. CHECK TCM(PCM)

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.

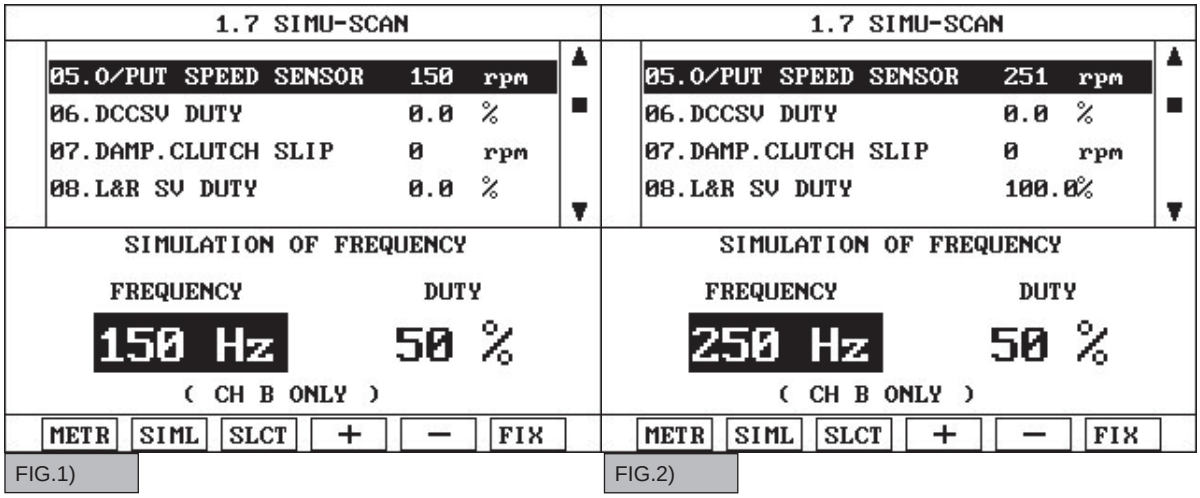


FIG.1) FIG.2)

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

ELQE030A

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 TCM(PCM) and check for proper operation. If the problem is corrected, replace TCM(PCM) as necessary and then go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR EB4880D4

Refer to DTC P0707.

DTC P0721 OUTPUT SPEED SENSOR

COMPONENT LOCATION EDC621E9

Refer to DTC P0720.

GENERAL DESCRIPTION E54A1AE3

Refer to DTC P0720.

DTC DESCRIPTION E6CECEE2

Refer to DTC P0720.

DTC DETECTING CONDITION EE2DDBCD

[2.0 GSL]

Item	Detecting Condition & Fail Safe	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 TCM(PCM)
Enable Conditions	• Vehicle speed is over 31 Mile/h(50 Km/h) in D,3,2,L(A/T range swhitch) and SP(SPORTS MODE)	
Threshold value	• If the output from the output speed sensor is continuously 50% lower or higrer than the value calculated by vehicle speed sensor	
Diagnostic Time	• More than 1sec	
Fail Safe	• Locked into 3rd or 2nd gear • Apply an electric current to Solenoide valve • Manual shifting is possibe (2 nd → 3 rd ,3 rd → 2 nd)	

SPECIFICATION EE0AC971

Refer to DTC P0715.

SCHEMATIC DIAGRAM E3FC76A5

Refer to DTC P0717.

SIGNAL WAVEFORM E1DD47BA

Refer to DTC P0715.

MONITOR SCANTOOL DATA ED3CEAB5

Refer to DTC P0720.

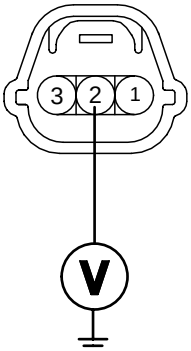
TERMINAL & CONNECTOR INSPECTION E1FDD3FA

Refer to DTC P0715.

SIGNAL CIRCUIT INSPECTION E704B9FA

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



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

LKIF190B

4. Is voltage within specification?

YES

▶ Go to "Power Supply circuit Inspection" procedure.

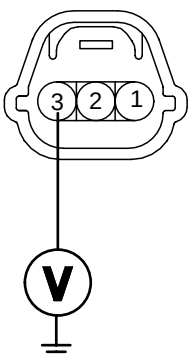
NO

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

POWER SUPPLY CIRCUIT INSPECTION EE038C4C

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

LKIF190C

4. Is voltage within specification?

YES

▶ Go to "Ground circuit inspection" procedure.

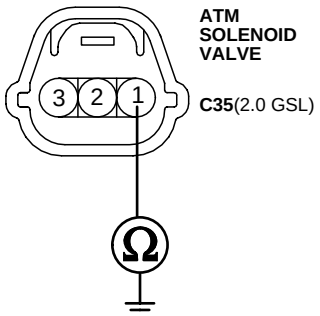
NO

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

GROUND CIRCUIT INSPECTION EAE61DED

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.

Specification : approx. 0 Ω



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

LKIF190D

4. Is resistance within specification?

YES

▶ Go to "Component Inspection" procedure.

NO

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

COMPONENT INSPECTION E6D65D80

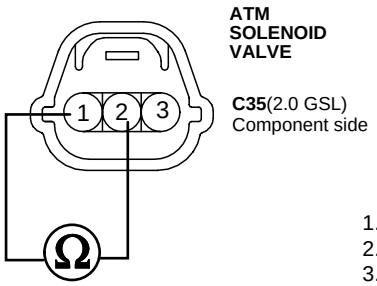
1. Check "OUTPUT SPEED SENSOR"

   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"



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

LKIF190E

   4) Is resistance within specifications?

[REFERENCE DATA]

Data	Reference Data	
Current	22 mA	
Air Gap	Input sensor	1.3 mm
	Output sensor	0.85 mm
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 TCM(PCM) " as below.

NO

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

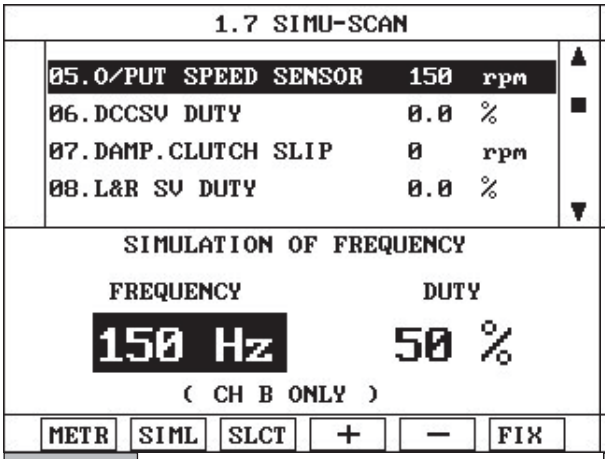
2. CHECK TCM(PCM)

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.



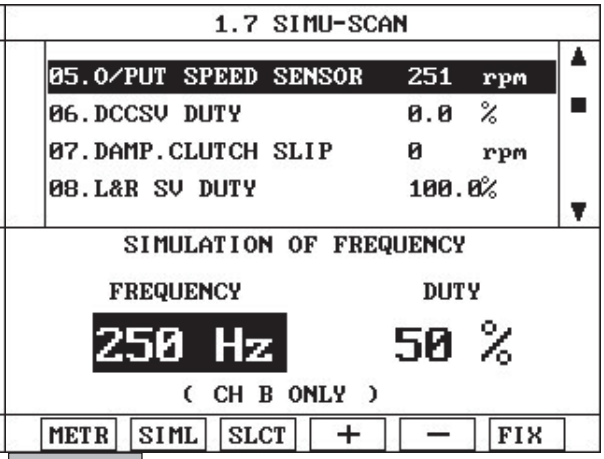


FIG.1) OUTPUT 150Hz → 150rpm
FIG.2) OUTPUT 250Hz → 250rpm

ELQE030A

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 TCM(PCM) and check for proper operation. If the problem is corrected, replace TCM(PCM) as necessary and then go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR E2F6D0E6

Refer to DTC P0707.

DTC P0722 OUTPUT SPEED SENSOR CIRCUIT

COMPONENT LOCATION E6EBBFE1

Refer to DTC P0720.

GENERAL DESCRIPTION EBB758B9

Refer to DTC P0720.

DTC DESCRIPTION EEB93C35

Refer to DTC P0720.

DTC DETECTING CONDITION EA0D5085

[2.0 GSL]

Item	Detecting Condition & Fail Safe	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 TCM(PCM)
Enable Conditions	• Vehicle speed is over 19 Mile/h(30 Km/h) and Ne≥ 2000rpm in D,3,2,L(A/T range swhitch) and SP(SPORTS MODE)	
Threshold value	• No signal	
Diagnostic Time	• More than 1sec	
Fail Safe	• Locked into 3rd or 2nd gear • Apply an electric current to Solenoide valve • Manual shifting is possibe (2 nd → 3 rd ,3 rd → 2 nd)	

SPECIFICATION E7F5DD08

Refer to DTC P0715.

SCHEMATIC DIAGRAM E04DCDF6

Refer to DTC P0717.

SIGNAL WAVEFORM E64F3E5D

Refer to DTC P0715.

MONITOR SCANTOOL DATA E70D3BD3

Refer to DTC P0720.

TERMINAL & CONNECTOR INSPECTION EDA8A491

Refer to DTC P0715.

SIGNAL CIRCUIT INSPECTION E7AEDD06

Refer to DTC P0721.

POWER SUPPLY CIRCUIT INSPECTION E43A90F7

Refer to DTC P0721.

GROUND CIRCUIT INSPECTION EB0887D4

Refer to DTC P0721.

COMPONENT INSPECTION E1408FCA

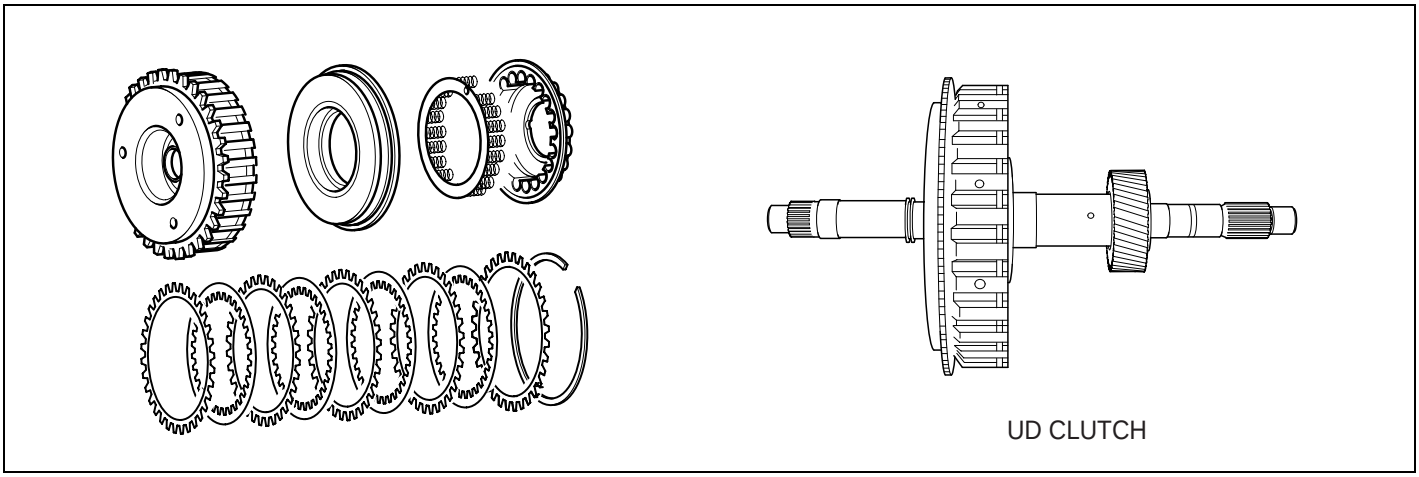
Refer to DTC P0721.

VERIFICATION OF VEHICLE REPAIR E60B2A40

Refer to DTC P0715.

DTC P0731 GEAR 1 INCORRECT RATIO

COMPONENT LOCATION EDB7552E



BKQE006A

GENERAL DESCRIPTION E092F0B0

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 E3DEC53A

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 malfuctioning rather than an electrical issue.

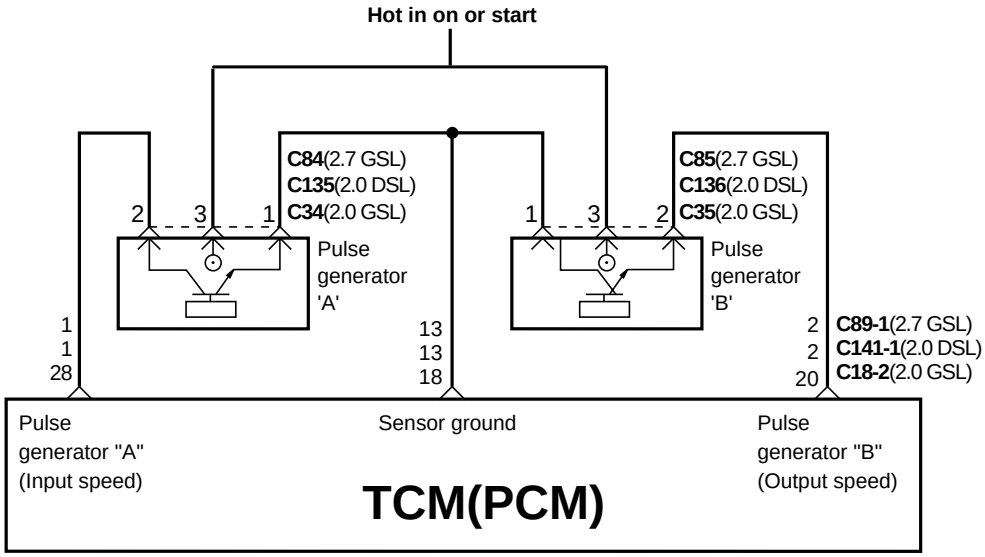
DTC DETECTING CONDITION E6C9B8E8

[2.7 GSL]/ [2.0 DSL]/ [2.0 GSL]

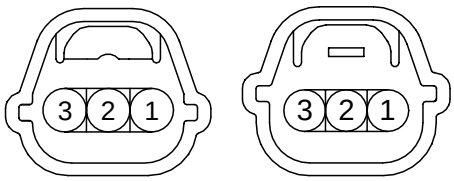
Item	Detecting Condition & Fail Safe	Possible cause
DTC Strategy	• 1st gear incorrect ratio	• Faulty Input speed sensor • Faulty output speed sensor • Faulty UD clutch or LR brake or Oneway clutch
Enable Conditions	• Engine speed ＞450rpm • Output speed ＞350rpm • Shift stage 1st. gear • Input speed ＞0rpm • A/T oil temp sensor voltage ＜4.5V • Voltage of Battery ＞10V • TRANSAXLE RANGE SWITCH is normal	
Threshold value	• | input speed/1st gear ratio - output speed| ≥ 200rpm /1st. gear ratio	
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)	

SCHEMATIC DIAGRAM EAB3F9E7

[Circuit Diagram]

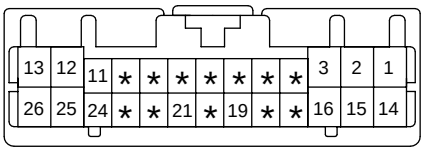


[Harness Connector]

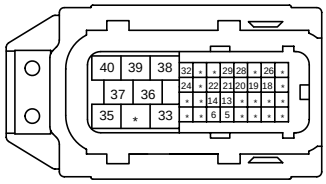


C84(2.7 GSL)
C135(2.0 DSL)
C34(2.0 GSL)

C85(2.7 GSL)
C136(2.0 DSL)
C35(2.0 GSL)



C89-1(2.7 GSL)
C141-1(2.0 DSL)



C18-2(2.0 GSL)

[Input Shaft Speed Sensor]

Terminal	Connection	Function
1	C89-1/C141-1 No.13 C18-2 No.18	Sensor ground
2	C89-1/C141-1 No.1 C18-2 No.28	Input speed
3	JC14/JC104 No.46 JC04 No.46	Hot at all times

[Output Shaft Speed Sensor]

Terminal	Connection	Function
1	C89-1/C141-1 No.13 C18-2 No.18	Sensor ground
2	C89-1/C141-1 No.2 C18-2 No.20	Input speed
3	JC14/JC104 No.46 JC04 No.46	Hot at all times

LKIF200A

SIGNAL WAVEFORM E3D6E871

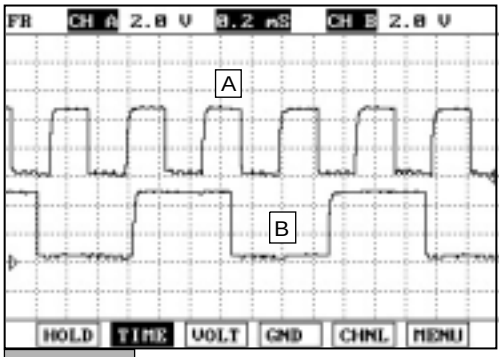


FIG.1)

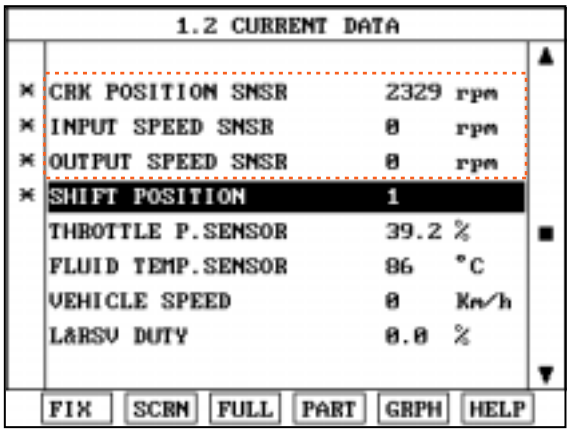
A : INPUT SPEED SENSOR
B : OUTPUT SPEED SENSOR

ELQE031A

MONITOR SCANTOOL DATA E2A54881

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

Specification : 2000~2700 engine rpm



ELQE032A

OPERATING ELEMENT OF EACH SHIFTING RANGE

	UD/C	OD/C	REV/C	2ND/B	LR/B	OWC
P					●	
R			●		●	
N					●	
D1	●				●	○
D2	●			●		
D3	●	●				
D4		●		●		

※ Low & Reverse Brake is released When the Vehicle speed over the 5 MPH(7Km/h).

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. Therfore, 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 of specification.
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

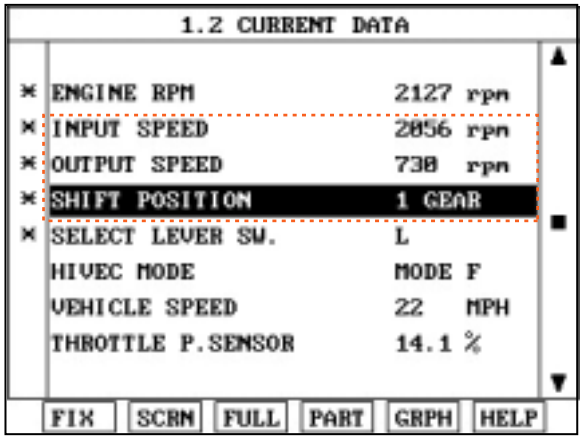
- ***Do not let anybody stand in front of or behind the vehicle while this test is being carried out.***
- ***Check the A/T fluid level and temperature and the engine coolant temperature.***
  - ***Fluid level : At the hot mark on the oil level gauge.***
  - ***Fluid temperature : 176 °F~ 212 °F (80~100 °C).***
  - ***Engine coolant temperature : 176 °F~ 212 °F (80~100 °C).***

- ***Chock both rear wheel(left and right).***
- ***Pull the parking brake lever on with the brake pedal fully depressed.***
- ***The throttle should not be left fully open for more than eight second.***
- ***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 E37CDEDD

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 1st gear.

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



ELQE033A

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

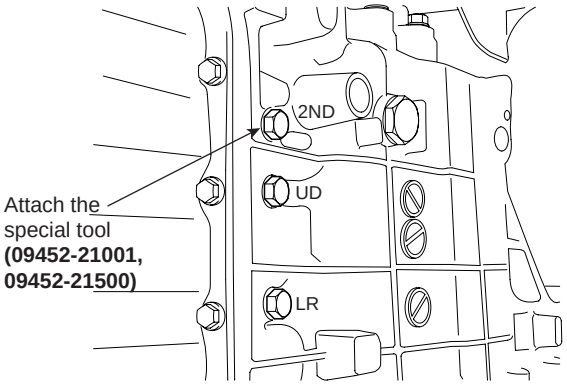
YES

▶ Go to "Component Inspection" procedure.

NO

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

COMPONENT INSPECTION EF3AC48B



LKIF200B

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 referance data as below.

Specification : shown below

Measurement condition			Standard hydraulic pressure kPa (psi)					
Selector lever position	Shift position	Engine speed (rpm)	Under drive clutch pressure	Reverse clutch pressure	Overdrive clutch pressure	Low and reverse brake pressure	Second brake pressure	Torque converter pressure
P	-	2,500	-	-	-	310-390 (45-56)	-	250-350 (36-56)
R	Reverse	2,500	-	1,270-1,770 (185-256)	-	1,270-1,770 (185-256)	-	500-700 (185-256)
N	2,500	-	-	-	-	310-390 (45-56)	-	250-390 (36-56)
D	1st gear	2,500	1,010-1,050 (146-152)	-	-	1,010-1,050 (146-152)	-	500-700 (73-101)
	2nd gear	2,500	1,010-1,050 (146-152)	-	-	-	1,010-1,050 (146-152)	500-700 (73-101)
	3rd gear	2,500	590-690 (85-100)	-	590-690 (85-100)	-	-	450-650 (65-94)
	4th gear	2,500	-	-	590-690 (85-100)	-	590-690 (85-100)	450-650 (65-94)

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

5. Is oil pressure value within specification?

YES

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

NO

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

VERIFICATION OF VEHICLE REPAIR E5A3E1D0

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

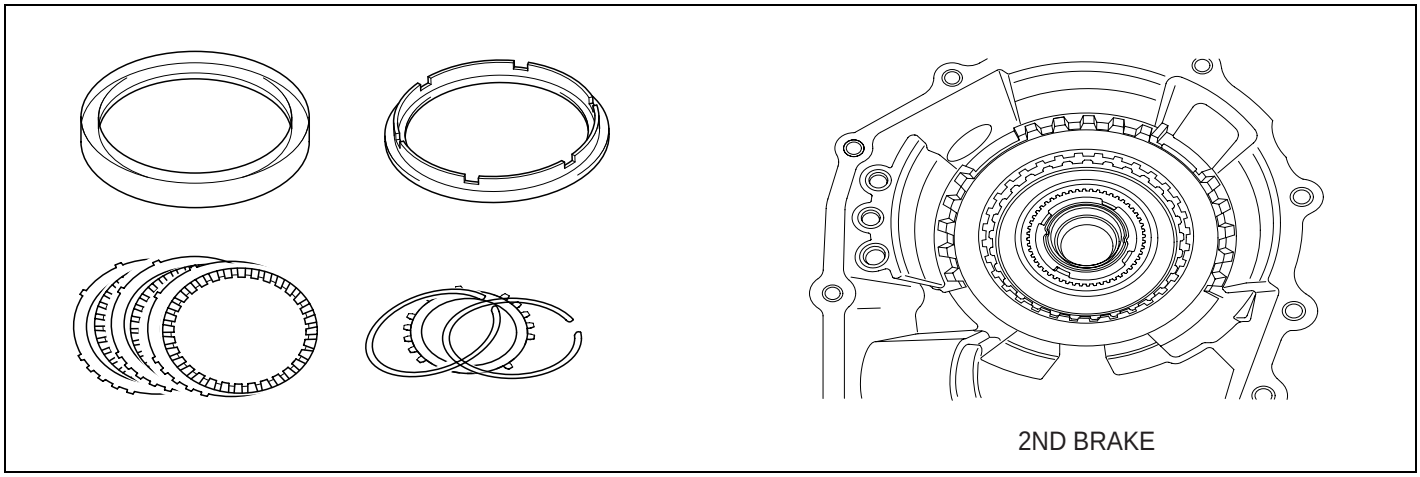
▶ Go to the applicable troubleshooting procedure.

NO

▶ System performing to specification at this time.

DTC P0732 GEAR 2 INCORRECT RATIO

COMPONENT LOCATION E8048602



BKQE007A

GENERAL DESCRIPTION ECEBAA36

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 1,529 rpm.

DTC DESCRIPTION E74BC934

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 malfuctioning rather than an electrical issue.

DTC DETECTING CONDITION E109E4A4

[2.7 GSL]/ [2.0 DSL]/ [2.0 GSL]

Item	Detecting Condition & Fail Safe	Possible cause
DTC Strategy	• 2nd gear incorrect ratio	• Faulty Input speed sensor • Faulty output speed sensor • Faulty UD clutch or 2nd brake
Enable Conditions	• Engine speed ＞450rpm • Output speed ＞350rpm • Shift stage 2nd. gear • Input speed ＞0rpm • A/T oil temp sensor voltage ＜4.5V • Voltage of Battery ＞10V • TRANSAXLE RANGE SWITCH is normal	
Threshold value	• ｜input speed/2nd gear ratio - output speed|≥ 200rpm /2nd. gear ratio	
Diagnostic Time	• More than 1sec	
Fail Safe	• Locked into 3 rd gear. (If diagnosis code P0732 is output four times, the transaxle is locked into 3rd gear)	

SCHEMATIC DIAGRAM EAB489E5

Refer to DTC P0731.

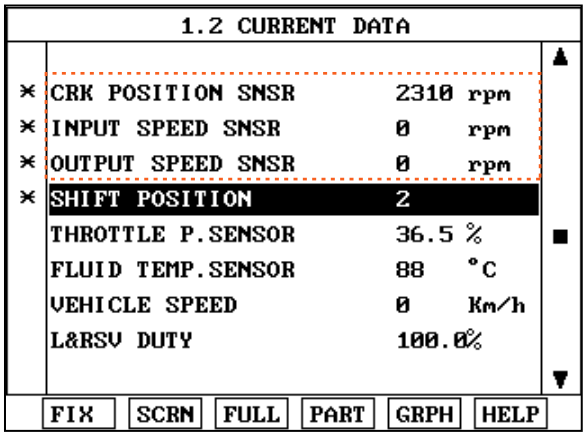
SIGNAL WAVEFORM EDCC28DE

Refer to DTC P0731.

MONITOR SCANTOOL DATA EFFDFCAE

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

Specification : 2000~2700 engine rpm



ELQE034A

OPERATING ELEMENT OF EACH SHIFTING RANGE

	UD/C	OD/C	REV/C	2ND/B	LR/B	OWC
P					●	
R			●		●	
N					●	
D1	●				●	○
D2	●			●		
D3	●	●				
D4		●		●		

※ Low & Reverse Brake is released When the Vehicle speed over the 5 MPH(7Km/h).

Stall test procedure in D2 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 D2

Reason for stall test

1. If there is are mechanical defaults in A/T, all slippage occurs in the torque converter.
2. Therfore, 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 of specification.
4. If wheels pin occurs, the applied brake force is not adequate. Retry using more brake force.

5. Is "STALL TEST " within specification?

YES

▶ Go to "Signal Circuit Inspection" procedure.

NO

▶ Go to "Component Inspection" procedure.

CAUTION

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

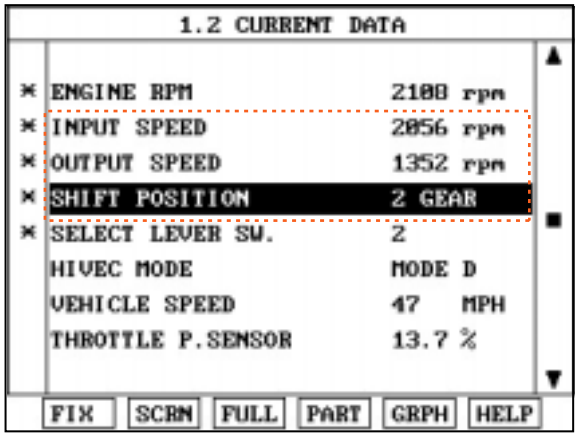
- ***Chock both rear wheel(left and right).***
- ***Pull the parking brake lever on with the brake pedal fully depressed.***
- ***The throttle should not be left fully open for more than eight second.***
- ***If carrying out the stall test two or more time, move the select lever to the "N" position and run the engine at 1,000 rpm to let the A/T fluid cool down before carrying out subsequent.***

SIGNAL CIRCUIT INSPECTION E0B60EBA

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 × GEAR RATIO) ≤ 200 RPM



ELQE035A

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

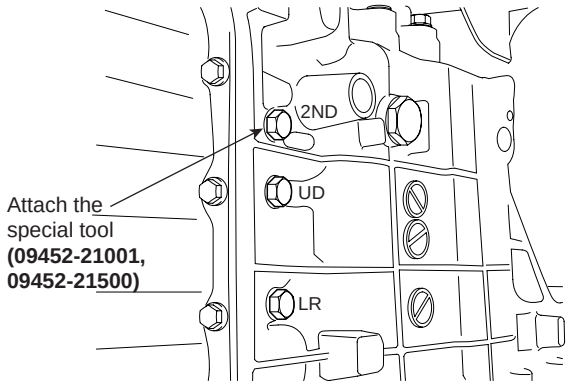
YES

▶ Go to "Component Inspection" procedure.

NO

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

COMPONENT INSPECTION E8751A29



LKIF200B

1. Connect Oil pressure gauge to "UD" and "2ND" port.
2. Engine "ON".
3. Drive a car with gear position 2 in "SPORTS MODE".

4. Compare it with referance data as below.

Specification : shown below

Measurement condition			Standard hydraulic pressure kPa (psi)					
Selector lever position	Shift position	Engine speed (rpm)	Under drive clutch pressure	Reverse clutch pressure	Overdrive clutch pressure	Low and reverse brake pressure	Second brake pressure	Torque converter pressure
P	-	2,500	-	-	-	310-390 (45-56)	-	250-350 (36-56)
R	Reverse	2,500	-	1,270-1,770 (185-256)	-	1,270-1,770 (185-256)	-	500-700 (185-256)
N	2,500	-	-	-	-	310-390 (45-56)	-	250-390 (36-56)
D	1st gear	2,500	1,010-1,050 (146-152)	-	-	1,010-1,050 (146-152)	-	500-700 (73-101)
	2nd gear	2,500	1,010-1,050 (146-152)	-	-	-	1,010-1,050 (146-152)	500-700 (73-101)
	3rd gear	2,500	590-690 (85-100)	-	590-690 (85-100)	-	-	450-650 (65-94)
	4th gear	2,500	-	-	590-690 (85-100)	-	590-690 (85-100)	450-650 (65-94)

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

5. Is oil pressure value within specification?

YES

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

NO

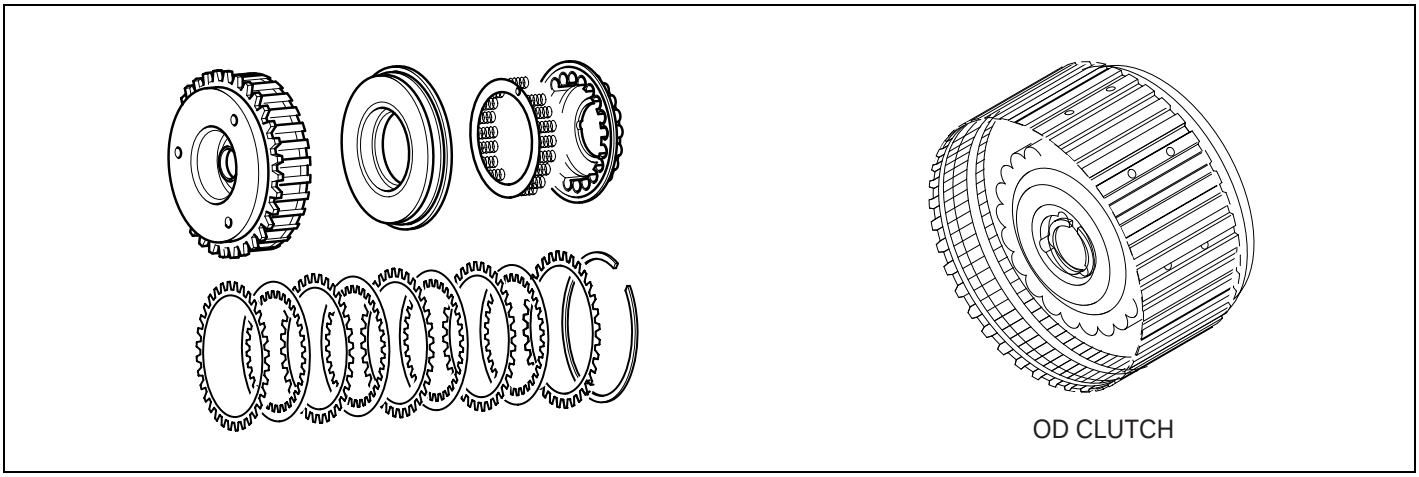
▶ Replace AUTO TRANSAXLE (BODY CONTROL VALVE faulty) as necessary and Go to "Verification Vehicle Repair " procedure.

VERIFICATION OF VEHICLE REPAIR EDB6AF91

Refer to DTC P0731.

DTC P0733 GEAR 3 INCORRECT RATIO

COMPONENT LOCATION E2442D04



BKQE008A

GENERAL DESCRIPTION E4622B8F

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 E1715DAD

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 malfuctioning rather than an electrical issue.

DTC DETECTING CONDITION E1E98E7A

[2.7 GSL]/ [2.0 DSL]/ [2.0 GSL]

Item	Detecting Condition & Fail Safe	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 ＞350rpm • Shift stage 3rd. gear • Input speed ＞0rpm • A/T oil temp sensor voltage ＜4.5V • Voltage of Battery ＞10V • TRANSAXLE RANGE SWITCH is normal	
Threshold value	• | input speed/3rd gear ratio - output speed| ≥ 200rpm /3rd. gear ratio	
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)	

SCHEMATIC DIAGRAM E4FA0BBC

Refer to DTC P0731.

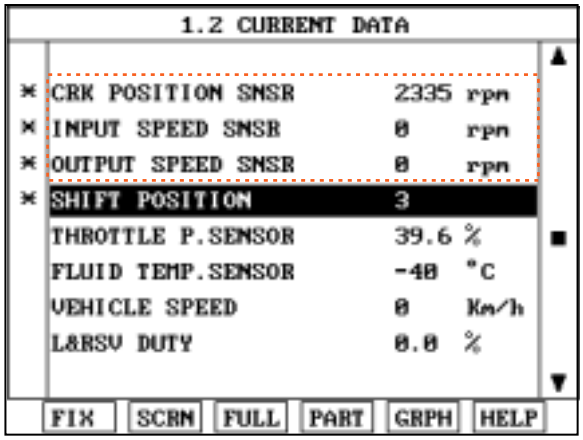
SIGNAL WAVEFORM E63E9AB7

Refer to DTC P0731.

MONITOR SCANTOOL DATA EFB06D6A

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

Specification : 2000~2700 engine rpm



ELQE036A

OPERATING ELEMENT OF EACH SHIFTING RANGE

	UD/C	OD/C	REV/C	2ND/B	LR/B	OWC
P					●	
R			●		●	
N					●	
D1	●				●	○
D2	●			●		
D3	●	●				
D4		●		●		

※ Low & Reverse Brake is released When the Vehicle speed over the 5 MPH(7Km/h).

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 3rd gear operating parts can be detected by stall test in D3

Reason for stall test

1. If there is no mechanical defaults in A/T, all slippage occurs in torque converter.
2. Therfore, 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 out of specification.
4. If output speed revolution is output. It means that the foot brake force is not applied fully. Retesting using greater braking force is required.

5. Is "STALL TEST " within specification?

YES

▶ Go to "Signal Circuit Inspection" procedure.

NO

▶ Go to "Component Inspection" procedure.

CAUTION

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

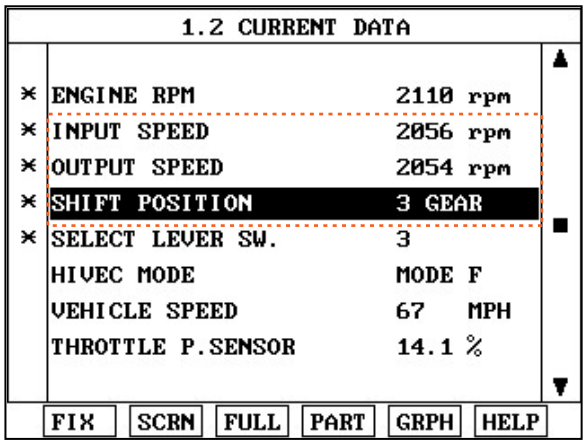
- ***Chock both rear wheel(left and right).***
- ***Pull the parking brake lever on with the brake pedal fully depressed.***
- ***The throttle should not be left fully open for more than eight seconds.***
- ***If carrying out the stall test two or more times, move the select lever to the "N" position and run the engine at 1,000 rpm to let the A/T fluid cool down before carrying out subsequent tests.***

SIGNAL CIRCUIT INSPECTION EBA77BB1

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 × GEAR RATIO) ≤ 200 RPM



ELQE037A

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

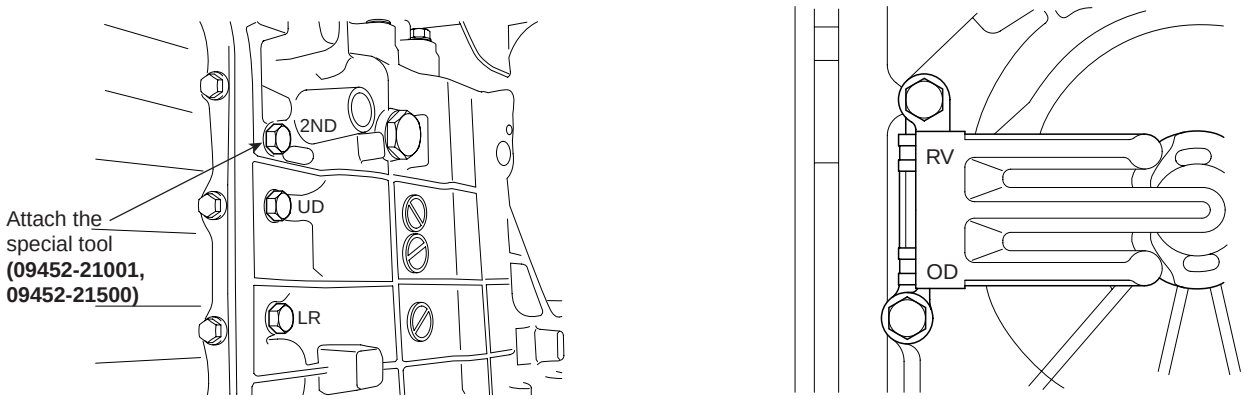
YES

▶ Go to "Component Inspection" procedure.

NO

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

COMPONENT INSPECTION EABBEDD5



BKQE009A

1. Connect Oil pressure gauge to "UD" and "OD" port.
2. Engine "ON".
3. Drive a car with gear position 3 in fail mode.

4. Compare it with referance data as below.

Specification : shown below

Measurement condition			Standard hydraulic pressure kPa (psi)					
Selector lever position	Shift position	Engine speed (rpm)	Under drive clutch pressure	Reverse clutch pressure	Overdrive clutch pressure	Low and reverse brake pressure	Second brake pressure	Torque converter pressure
P	-	2,500	-	-	-	310-390 (45-56)	-	250-350 (36-56)
R	Reverse	2,500	-	1,270-1,770 (185-256)	-	1,270-1,770 (185-256)	-	500-700 (185-256)
N	2,500	-	-	-	-	310-390 (45-56)	-	250-390 (36-56)
D	1st gear	2,500	1,010-1,050 (146-152)	-	-	1,010-1,050 (146-152)	-	500-700 (73-101)
	2nd gear	2,500	1,010-1,050 (146-152)	-	-	-	1,010-1,050 (146-152)	500-700 (73-101)
	3rd gear	2,500	590-690 (85-100)	-	590-690 (85-100)	-	-	450-650 (65-94)
	4th gear	2,500	-	-	590-690 (85-100)	-	590-690 (85-100)	450-650 (65-94)

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

5. Is oil pressure value within specification?

YES

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

NO

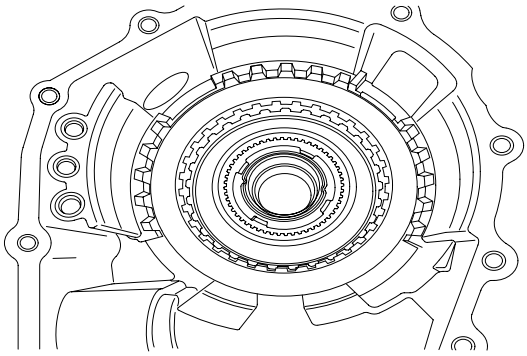
▶ Replace AUTO TRANSAXLE (BODY CONTROL VALVE faulty) as necessary and Go to "Verification Vehicle Repair " procedure.

VERIFICATION OF VEHICLE REPAIR E9E93F78

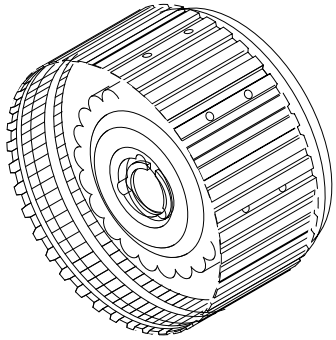
Refer to DTC P0731.

DTC P0734 GEAR 4 INCORRECT RATIO

COMPONENT LOCATION E41A5297



2ND BRAKE



OD CLUTCH

BKQE010A

GENERAL DESCRIPTION EAAEFF3D

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 0,712 rpm.

DTC DESCRIPTION E98D72DD

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 malfuctioning rather than an electrical issue.

DTC DETECTING CONDITION ECD2D27E

[2.7 GSL]/ [2.0 DSL]/ [2.0 GSL]

Item	Detecting Condition & Fail Safe	Possible cause
DTC Strategy	• 4th gear incorrect ratio	• Faulty Input speed sensor • Faulty output speed sensor • Faulty UD clutch or 2nd brake
Enable Conditions	• Engine speed ＞450rpm • Output speed ＞900rpm • Shift stage 4th. gear • Input speed ＞0rpm • A/T oil temp sensor voltage ＜4.5V • Voltage of Battery ＞10V • TRANSAXLE RANGE SWITCH is normal	
Threshold value	• ｜input speed/4th gear ratio - output speed|≥ 200rpm /4th. gear ratio	
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)	

SCHEMATIC DIAGRAM E30858D1

Refer to DTC P0731.

SIGNAL WAVEFORM E2D5C6CF

Refer to DTC P0731.

MONITOR SCANTOOL DATA E1DAEE96

※ It is difficult to "STALL TEST" in 4th gear, therefore Go to "W/Harness Inspection" procedure.

OPERATING ELEMENT OF EACH SHIFTING RANGE

	UD/C	OD/C	REV/C	2ND/B	LR/B	OWC
P					●	
R			●		●	
N					●	
D1	●				●	○
D2	●			●		
D3	●	●				
D4		●		●		

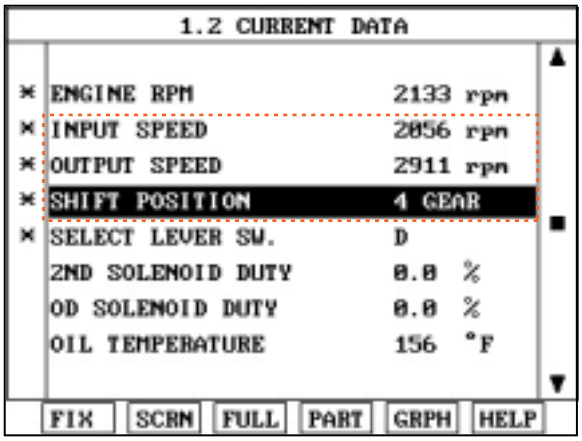
※ Low & Reverse Brake is released When the Vehicle speed over the 5 MPH(7Km/h).

SIGNAL CIRCUIT INSPECTION E441C9EE

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 × GEAR RATIO) ≤ 200 RPM



ELQE038A

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

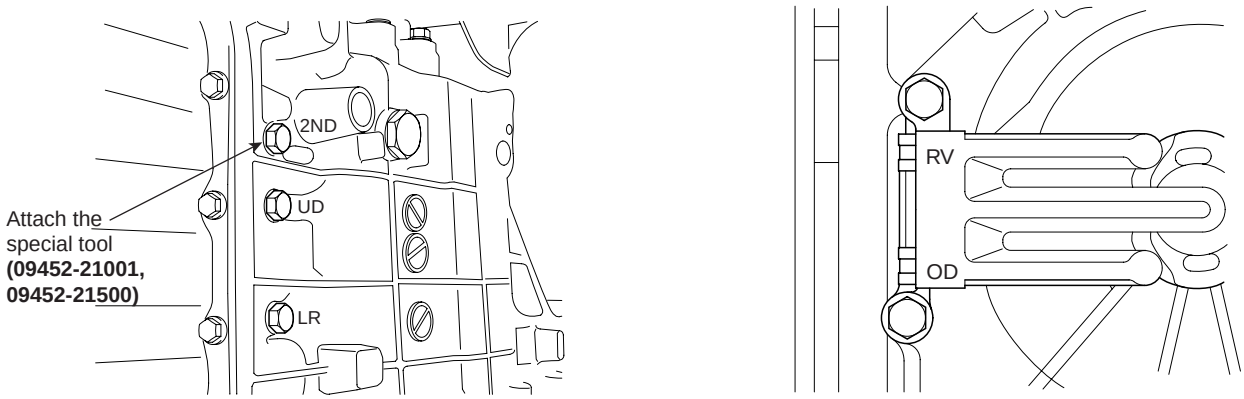
YES

▶ Go to "Component Inspection" procedure.

NO

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

COMPONENT INSPECTION EB62BBCA



BKQE009A

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 referance data as below.

Specification : shown below

Measurement condition			Standard hydraulic pressure kPa (psi)					
Selector lever position	Shift position	Engine speed (rpm)	Under drive clutch pressure	Reverse clutch pressure	Overdrive clutch pressure	Low and reverse brake pressure	Second brake pressure	Torque converter pressure
P	-	2,500	-	-	-	310-390 (45-56)	-	250-350 (36-56)
R	Reverse	2,500	-	1,270-1,770 (185-256)	-	1,270-1,770 (185-256)	-	500-700 (185-256)
N	2,500	-	-	-	-	310-390 (45-56)	-	250-390 (36-56)
D	1st gear	2,500	1,010-1,050 (146-152)	-	-	1,010-1,050 (146-152)	-	500-700 (73-101)
	2nd gear	2,500	1,010-1,050 (146-152)	-	-	-	1,010-1,050 (146-152)	500-700 (73-101)
	3rd gear	2,500	590-690 (85-100)	-	590-690 (85-100)	-	-	450-650 (65-94)
	4th gear	2,500	-	-	590-690 (85-100)	-	590-690 (85-100)	450-650 (65-94)

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

5. Is oil pressure value within specification?

YES

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

NO

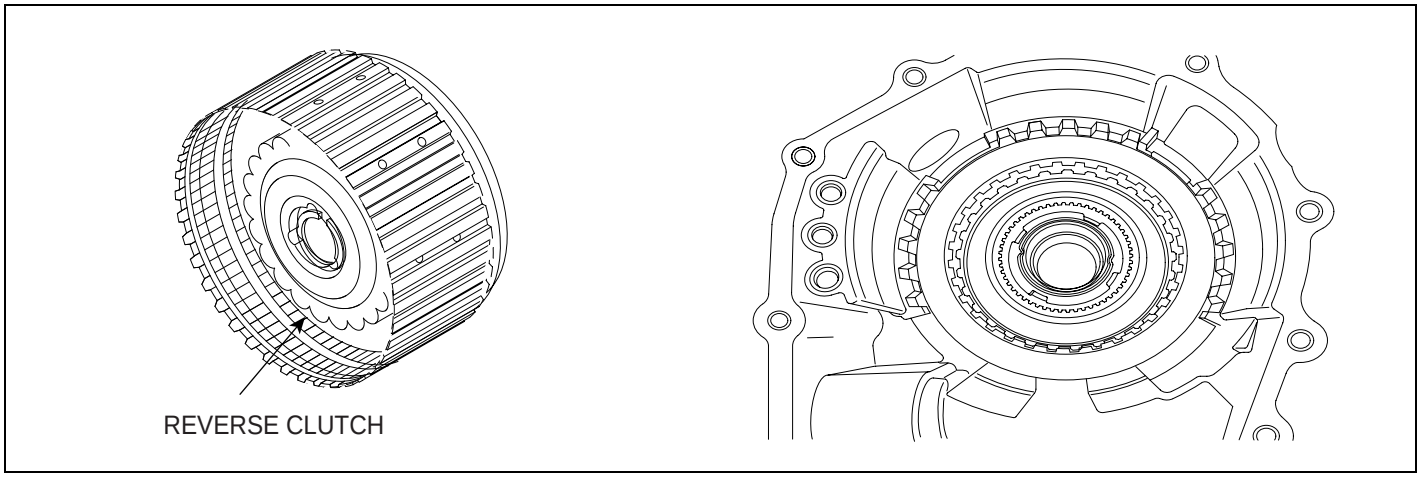
▶ Replace AUTO TRANSAXLE (BODY CONTROL VALVE faulty) as necessary and Go to "Verification Vehicle Repair " procedure.

VERIFICATION OF VEHICLE REPAIR E92B018D

Refer to DTC P0731.

DTC P0736 REVERSE GEAR INCORRECT RATIO

COMPONENT LOCATION EF1BEEE7



BKQE012A

GENERAL DESCRIPTION EF2A5BC7

The value of the input shaft speed should be equal to the value of the output shaft speed, when multiplied by the reverse gear ratio, while the transaxle is engaged in the reverse gear. For example, if the output speed is 1,000 rpm and the reverse gear ratio is 2.480, then the input speed is 2,480 rpm.

DTC DESCRIPTION E7F57DD3

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 reverse gear ratio, while the transaxle is engaged in reverse gear. This malfunction is mainly caused by mechanical troubles such as control valve sticking or solenoid valve malfuctioning rather than an electrical issue.

DTC DETECTING CONDITION E4AA0727

[2.7 GSL]/ [2.0 DSL]/ [2.0 GSL]

Item	Detecting Condition & Fail Safe	Possible cause
DTC Strategy	• Reverse gear incorrect ratio	• Faulty Input speed sensor • Faulty output speed sensor • Faulty RVS clutch or L/R brak
Enable Conditions	• Engine speed ＞450rpm • Output speed ＞900rpm • Shift stage Rev. gear • Input speed ＞0rpm • A/T oil temp sensor voltage ＜4.5V • Voltage of Battery ＞10V • TRANSAXLE RANGE SWITCH is normal	
Threshold value	• ｜input speed/Rev gear ratio - output speed|≥ 200rpm /Rev. gear ratio	
Diagnostic Time	• More than 1sec	
Fail Safe	• Locked into 3rd gear. (If diagnosis code P0736 is output four times, the transaxle is locked into 3rd gear)	

SCHEMATIC DIAGRAM E1D64C7B

Refer to DTC P0731.

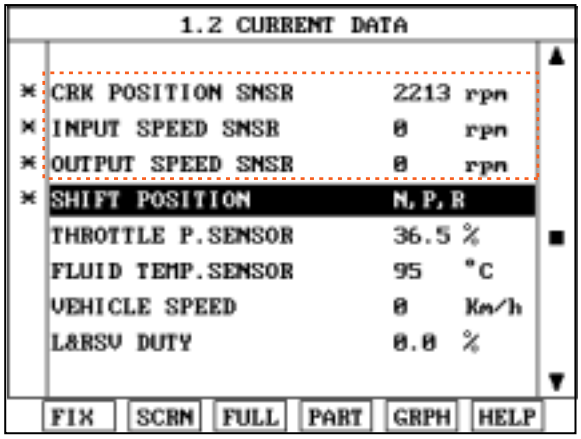
SIGNAL WAVEFORM E0D6B17A

Refer to DTC P0731.

MONITOR SCANTOOL DATA EAB7561B

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

Specification : 2000~2700 engine rpm



ELQE039A

OPERATING ELEMENT OF EACH SHIFTING RANGE

	UD/C	OD/C	REV/C	2ND/B	LR/B	OWC
P					●	
R			●		●	
N					●	
D1	●				●	○
D2	●			●		
D3	●	●				
D4		●		●		

※ Low & Reverse Brake is released When the Vehicle speed over the 5 MPH(7Km/h).

Stall test procedure in Reverse and reason

Procedure

1. Warm up the engine
2. After positioning the select lever in "R" range, Depress the foot brake pedal fully after that, depress the accelerator pedal to the maximum

   * The slippage of REVERSE clutch and L/R brake can be detected by stall test in R range

Reason for stall test

1. If there is no mechanical defaults in A/T, all slippage occurs in the torque converter.
2. Therfore, engine revolution is output, but input and output speed revolution must be "zero" due to wheel's lock.
3. If reverse clutch and L/R brake system(reverse gear operating parts) has faults, input speed revolution will be out of specification.
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

- ***Do not let anybody stand in front of or behind the vehicle while this test is being carried out.***
- ***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 : 80~100 ℃.***
  - ***Engine coolant temperature : 80~100 ℃.***

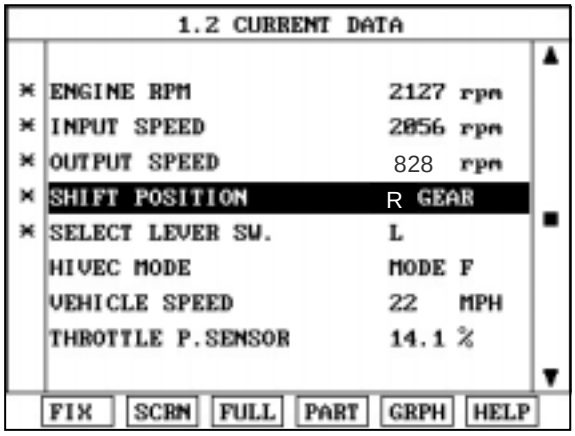
- ***Chock both rear wheel(left and right).***
- ***Pull the parking brake lever on with the brake pedal fully depressed.***
- ***The throttle should not be left fully open for more than eight seconds.***
- ***If carrying out the stall test two or more time, move the select lever to the "N" position and run the engine at 1,000 rpm to let the A/T fluid cool down before carrying out subsequent tests.***

SIGNAL CIRCUIT INSPECTION E7D590C7

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 "R" gear.

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



ELQE040A

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

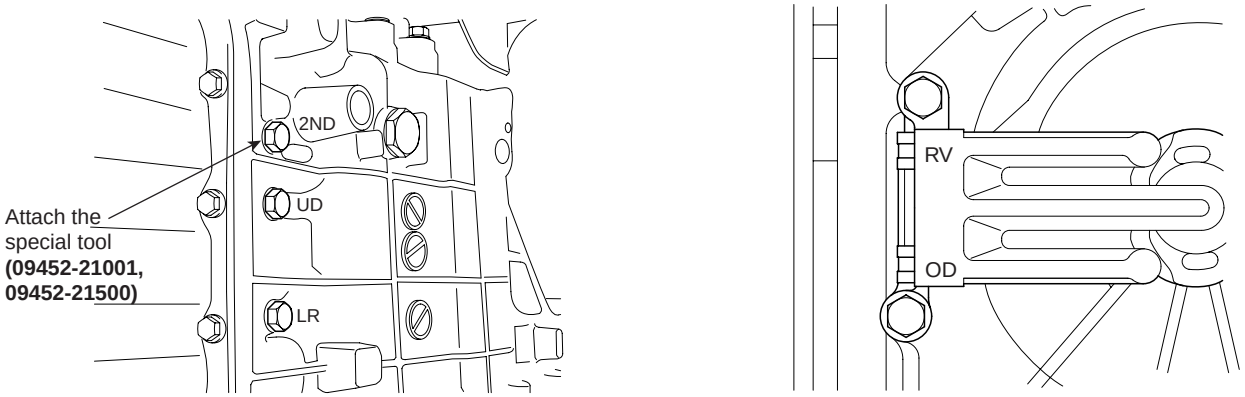
YES

▶ Go to "Component Inspection" procedure.

NO

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

COMPONENT INSPECTION E943C18E



BKQE009A

1. Connect Oil pressure gauge to "RVS" and "LR" port.
2. Engine "ON".
3. Drive a car with gear position R.

4. Compare it with referance data as below.

Specification : shown below

Measurement condition			Standard hydraulic pressure kPa (psi)					
Selector lever position	Shift position	Engine speed (rpm)	Under drive clutch pressure	Reverse clutch pressure	Overdrive clutch pressure	Low and reverse brake pressure	Second brake pressure	Torque converter pressure
P	-	2,500	-	-	-	310-390 (45-56)	-	250-350 (36-56)
R	Reverse	2,500	-	1,270-1,770 (185-256)	-	1,270-1,770 (185-256)	-	500-700 (185-256)
N	2,500	-	-	-	-	310-390 (45-56)	-	250-390 (36-56)
D	1st gear	2,500	1,010-1,050 (146-152)	-	-	1,010-1,050 (146-152)	-	500-700 (73-101)
	2nd gear	2,500	1,010-1,050 (146-152)	-	-	-	1,010-1,050 (146-152)	500-700 (73-101)
	3rd gear	2,500	590-690 (85-100)	-	590-690 (85-100)	-	-	450-650 (65-94)
	4th gear	2,500	-	-	590-690 (85-100)	-	590-690 (85-100)	450-650 (65-94)

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

5. Is oil pressure value within specification?

YES

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

NO

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

VERIFICATION OF VEHICLE REPAIR EE10DDC7

Refer to DTC P0731.

DTC P0741 TORQUE CONVERTER CLUTCH CIRCUIT - STUCK OFF

GENERAL DESCRIPTION ECBEF54A

The TCM(PCM) 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 TCM(PCM) 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 E63A16D9

The TCM(PCM) 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 TCM(PCM) increases the duty ratio by appling more hyraulic pressure. When slip rpm does not drop under some value with 100% duty ratio, the TCM(PCM) determines that the Torque Converter Clutch is stuck OFF and sets this code.

DTC DETECTING CONDITION EE126AE0

[2.7 GSL]/ [2.0 DSL]

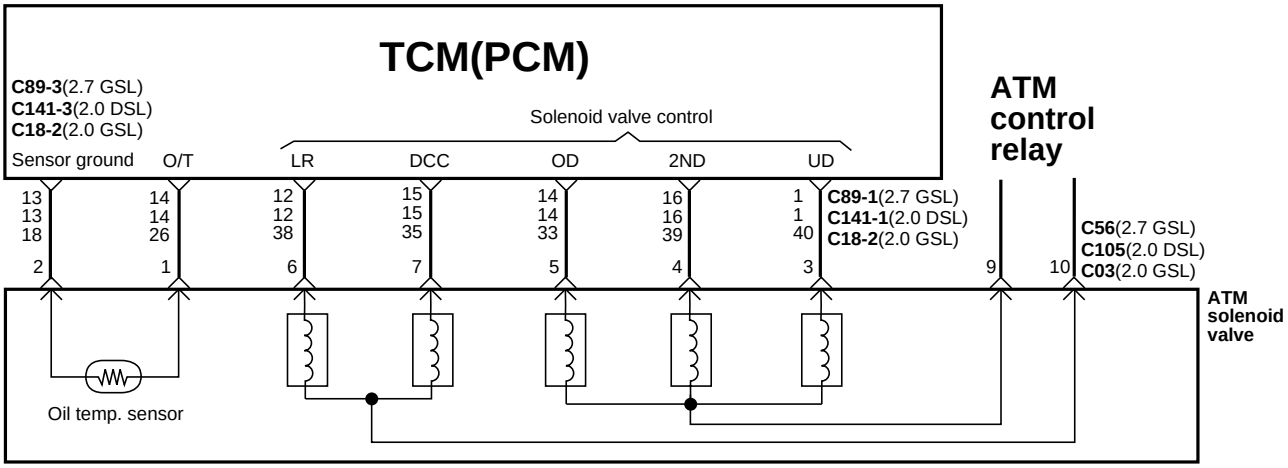
Item	Detecting Condition & Fail Safe	Possible cause
DTC Strategy	• Stuck "ON"	※ TORQUE CONVERTER(DAMPER) CLUTCH : TCC • Faulty TCC or oil pressure system • Faulty TCC solenoid valve • Faulty body control valve • Faulty TCM(PCM)
Enable Conditions	• Throttle position ＞1.5V • Output speed ＞1000rpm • Solenoid status OFF • A/T range switch D,SP • Time after TCC release ＞5secs	
Threshold value	• (rationality-low) Calculated slip (engine speed-input speed)＜5rpm or (rationality-high) Calculated slip ＞-5rpm	
Diagnostic Time	• More than 5sec	
Fail Safe	• Damper clutch abnormal system (If diagnosis code P0741 is output four times, TORQUE CONVERTER(DAMPER) CLUTCH is not controlled by TCM(PCM))	

[2.0 GSL]

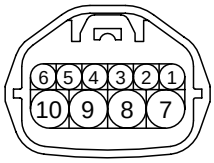
Item	Detecting Condition & Fail Safe	Possible cause
DTC Strategy	• Stuck "OFF"	※ TORQUE CONVERTER(DAMPER) CLUTCH : TCC • Faulty TCC or oil pressure system • Faulty TCC solenoid valve • Faulty body control valve • Faulty TCM(PCM)
Enable Conditions	• During the connect control	
Threshold value	• Detect 2 times the Lock-up clutch control duty=100% for 2sec	
Diagnostic Time	• 1 event	
Fail Safe	• Damper clutch abnormal system (If diagnosis code P0741 is output four times, TORQUE CONVERTER(DAMPER) CLUTCH is not controlled by TCM(PCM))	

SCHEMATIC DIAGRAM E2ACFAE7

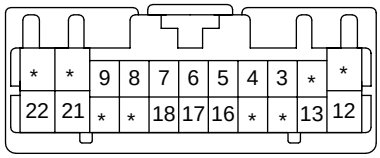
[Circuit Diagram]



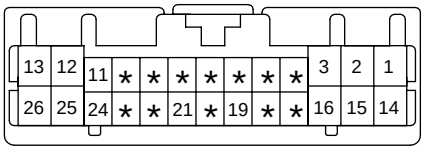
[Harness Connector]



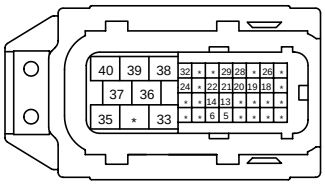
C56(2.7 GSL)
C105(2.0 DSL)
C03(2.0 GSL)



C89-3(2.7 GSL)
C141-3(2.0 DSL)



C89-1(2.7 GSL)
C141-1(2.0 DSL)



C18-2(2.0 GSL)

[Connection Information]

Terminal	Connection	Function
1	C89-1/C141-1 No.14, C18-2 No.26	Oil temp. sensor signal
2	C89-3/C141-3 No.13, C18-2 No.18	Sensor ground
3	C89-1/C141-1 No.1, C18-2 No.40	UD solenoid signal
4	C89-1/C141-1 No.16, C18-2 No.39	2ND solenoid signal
5	C89-1/C141-1 No.14, C18-2 No.33	OD solenoid signal
6	C89-1/141-1 No.12, C18-2 No.38	LR solenoid signal
7	C89-1/141-1 No.15, C18-2 No.35	DCC solenoid signal
9	JC14/JC104 No.23, JC04 No.23	ATM control relay
10	JC14/JC104 No.23, JC104 No.23	ATM control relay

LKIF210A

MONITOR SCANTOOL DATA E7D2AD6B

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

Specification : TCC SLIP＜160RPM(In condition that TCC SOL. DUTY ＞ 80%)

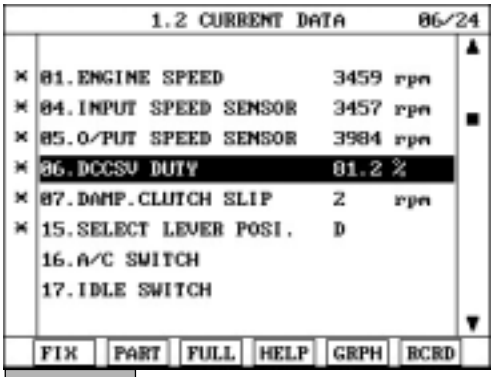


FIG.1)

FIG.1) : Normal status

ELQE041A

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

NO

▶ Go to "Component Inspection" procedure.

COMPONENT INSPECTION E1ECB3B2

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) Can you hear operating tone for using TCC SOLENOID VALVE Actuator Testing Function?

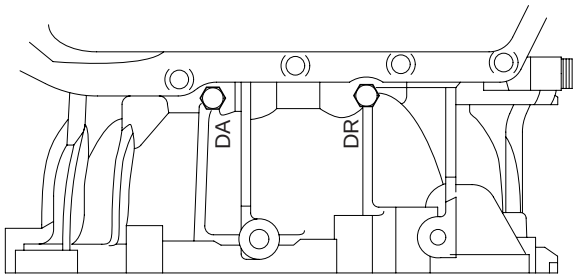
   YES

   ▶ Go to "CHECK OIL PRESSURE" as below.

   NO

   ▶ Replace "TCC SOLENOID VALVE" as necessary and Go to "Verification Vehicle Repair" procedure.

2. CHECK OIL PRESSURE



LKIF210B

   1) Connect Oil pressure gauge to "DA" 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. 6.1kg/cm²

6) Is oil pressure value within specification?

YES

▶ Repair TORQUE CONVERTER CLUTCH(REPLACE Torque Converter) as necessary and Go to "Verification Vehicle Repair " procedure.

NO

▶ Replace A/T ass'y (possible to BODY CONTROL VALVE faulty) as necessary and Go to "Verification Vehicle Repair " procedure.

VERIFICATION OF VEHICLE REPAIR E7FD27E6

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 P0742 TORQUE CONVERTER CLUTCH CIRCUIT - STUCK ON

GENERAL DESCRIPTION E81027A5

Refer to DTC P0741.

DTC DESCRIPTION EA8BA0B4

The TCM(PCM) 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(PCM) applies 0% duty ratio value, then the TCM(PCM) determines that the Torque Converter Clutch is stuck ON and sets this code.

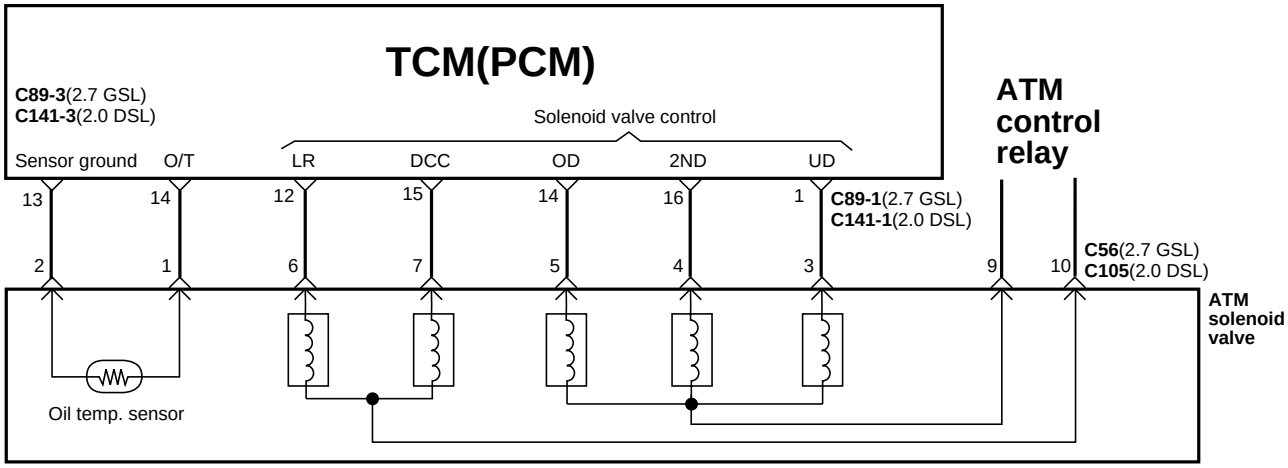
DTC DETECTING CONDITION EDF39AF0

[2.7 GSL]/ [2.0 DSL]

Item	Detecting Condition & Fail Safe	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 ＞1.5V • Output speed ＞1000rpm • Solenoid status OFF • A/T range switch D,SP • Time after TCC release ＞5secs	
Threshold value	• (rationality-low) Calculated slip (engine speed-input speed)＜5rpm or (rationality-high) Calculated slip ＞-5rpm	
Diagnostic Time	• More than 5sec	
Fail Safe	• Damper clutch abnormal system (If diagnosis code P0741 is output four times, TORQUE CONVERTER(DAMPER) CLUTCH is not controlled by TCM(PCM))	

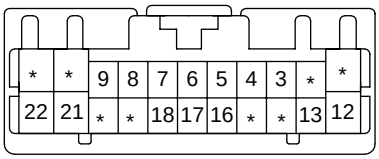
SCHEMATIC DIAGRAM E6DB2AFB

[Circuit Diagram]

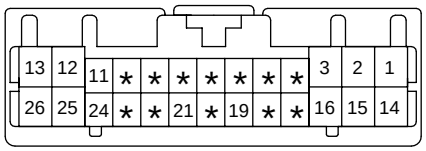


[Harness Connector]

C56(2.7 GSL)
C105(2.0 DSL)



C89-3(2.7 GSL)
C141-3(2.0 DSL)



C89-1(2.7 GSL)
C141-1(2.0 DSL)

[Connection Information]

Terminal	Connection	Function
1	C89-1/C141-1 No.14	Oil temp. sensor signal
2	C89-3/C141-3 No.13	Sensor ground
3	C89-1/C141-1 No.1	UD solenoid signal
4	C89-1/C141-1 No.16	2ND solenoid signal
5	C89-1/C141-1 No.14	OD solenoid signal
6	C89-1/141-1 No.12	LR solenoid signal
7	C89-1/141-1 No.15	DCC solenoid signal
9	JC14/JC104 No.23	ATM control relay
10	JC14/JC104 No.23	ATM control relay

LKIF220A

MONITOR SCANTOOL DATA EBFFA8F1

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

Specification : TCC SLIP > 5RPM

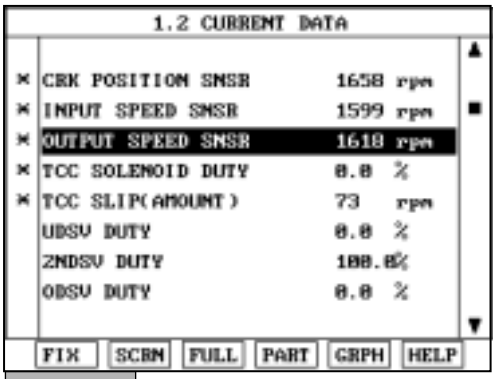


FIG.1)

FIG.1) : Normal status

ELQE042A

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

NO

▶ Go to "Component Inspection" procedure.

COMPONENT INSPECTION E72FC6C1

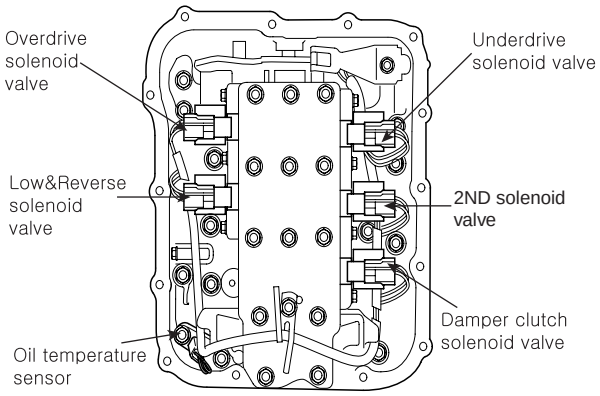
Refer to DTC P0741.

VERIFICATION OF VEHICLE REPAIR EE0B2FFC

Refer to DTC P0741.

DTC P0743 TORQUE CONVERTER CLUTCH CIRCUIT - ELECTRICAL

COMPONENT LOCATION EBAAA419



BKQE013A

GENERAL DESCRIPTION EE37DF71

Refer to DTC P0741.

DTC DESCRIPTION ECE8AAAA

The TCM(PCM) 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 TCM(PCM) judges that DCCSV circuit is malfunctioning and sets this code.

DTC DETECTING CONDITION EACB4A88

[2.7 GSL]/ [2.0 DSL]

Item	Detecting Condition & Fail Safe	Possible cause
DTC Strategy	• Check voltage range	※ TORQUE CONVERTER(DAMPER) CLUTCH : TCC • Open or short in circuit • Faulty TCC SOLENOID VALVE • Faulty TCM(PCM)
Enable Conditions	• Solenoid status Either solid ON or OFF • Voltage of Battery ＞10V	
Threshold value	• Voltage ＜3V	
Diagnostic Time	• more than 320 ms	
Fail Safe	• Locked in 3 rd gear.(Control relay off)	

[2.0 GSL]

Item	Detecting Condition & Fail Safe	Possible cause
DTC Strategy	• Check voltage range	※ TORQUE CONVERTER(DAMPER) CLUTCH : TCC • Open or short in circuit • Faulty TCC SOLENOID VALVE • Faulty TCM(PCM)
Enable Conditions	• 16V ＞ Voltage Battery ＞10V • In gear state(no gear shifting) 500msec is passed from turn on the relay	
Threshold value	• Feedback voltage from DCC control solenoide ＞ Vb-2V and DCC control duty is 100% • Feedback voltage from DCC control solenoide ≤ 5.5V and DCC control duty is 0%	
Diagnostic Time	• More than 500 ms	
Fail Safe	• Locked in 3rd gear.(Control relay off)	

SPECIFICATION EE9E704A

Solenoid Valve for Pressure Control

- Sensor type : Normal open 3-way
- Operating temperature : -22~266°F(-30°C 130°C)
- Frequency :
  - LR, 2ND, UD, OD, RED : 61.27Hz (at the ATF temp. -20°C above)
  - DCC : 30.64Hz

- Internal resistance : 2.7~3.4Ω (68°F or 20°C)
- Surge voltage : 56 V

SCHEMATIC DIAGRAM EDABEB99

Refer to DTC P0741.

MONITOR SCANTOOL DATA EC22C6A8

1. Connect scantool to data link connector(DLC)
2. Engine "ON".
3. Monitor the "TCC SOL. VALVE" parameter on the scantool
4. Sellect "D RANGE" and Operate "TCC SOLENOID DUTY" more than 85%

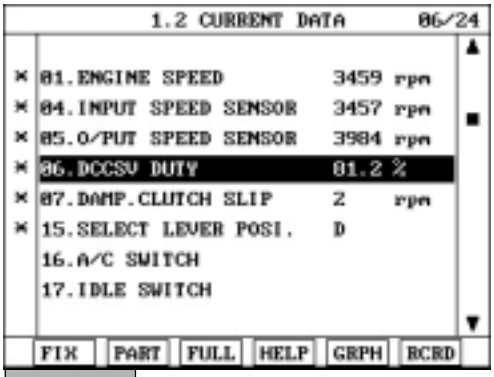


FIG.1)

FIG.1) : Normal status

ELQE041A

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 Vehicle Repair" procedure.

NO

▶ Go to "Terminal & Connector Inspection " procedure.

TERMINAL & CONNECTOR INSPECTION E3ACB9F7

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.

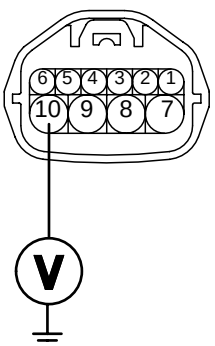
NO

▶ Go to "Power Supply Circuit Inspection" procedure.

POWER SUPPLY CIRCUIT INSPECTION E77908BD

1. Disconnect "A/T SOLENOID VALVE" connector.
2. Measure voltage between teminal"10" of the sensor harness connector and chassis ground.
3. Turn ignition switch OFF → ON

Specification: 12V is measured only for approx. 0.5sec



ATM SOLENOID VALVE

C56(2.7 GSL)
C105(2.0 DSL)
C03(2.0 GSL)

3.UD solenoid valve
4.2ND solenoid valve
5.OD solenoid valve
6.LR solenoid valve
7.TCC solenoid valve
9.A/T battery
10.A/T battery

LKIF230B

4. Is voltage within specifications?

YES

▶ Go to "Signal circuit inspection" procedure.

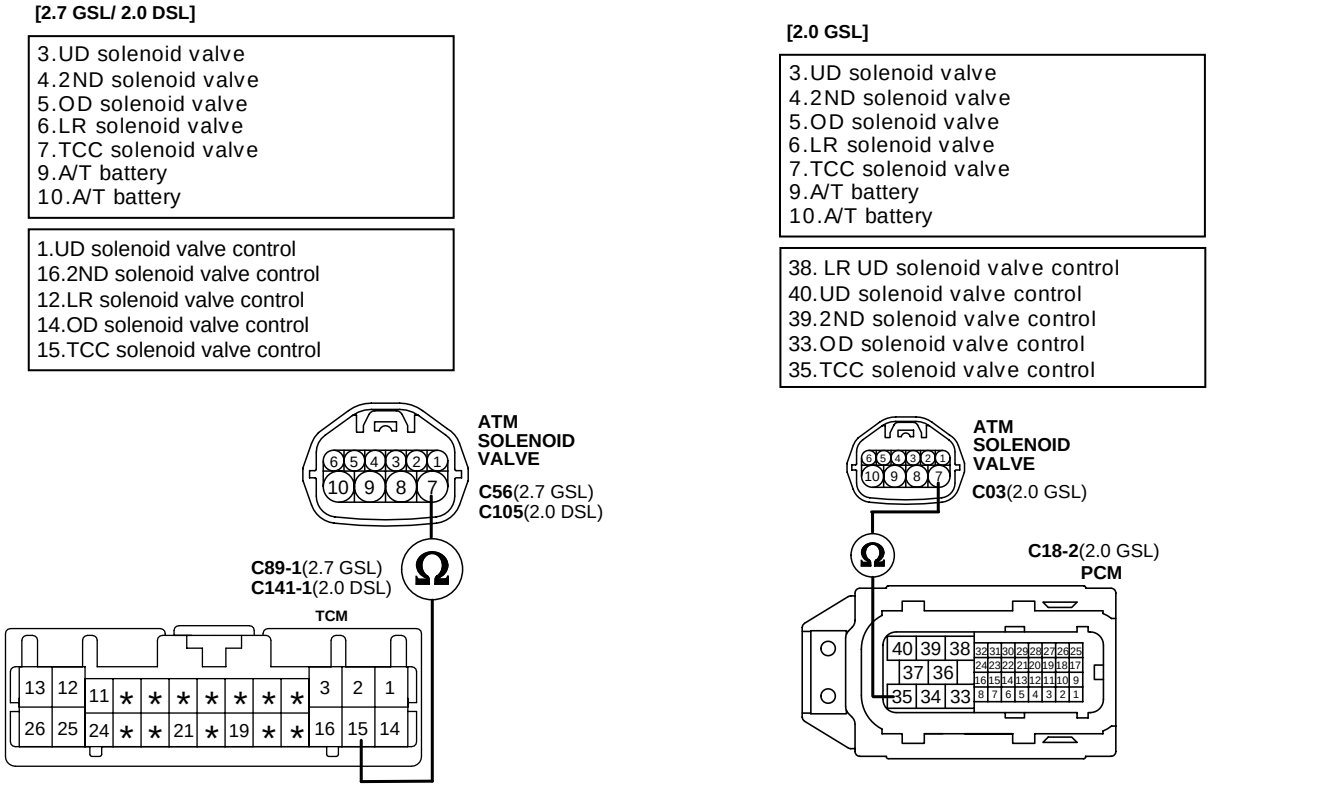
NO

▶ Check that A/T-30A Fuse in engine room junction is installed or not blown.
▶ Check for open in harness. Repair as necessary and Go to "Verification Vehicle Repair" procedure.

SIGNAL CIRCUIT INSPECTION EFAEBDEA

1. Check signal circuit open inspection.
   1) Ignition "OFF".
   2) Disconnect "A/T SOLENOID VALVE" connector and "TCM(PCM)" connector.
   3) Measure resistance between terminal "7" of the ATM SOLENOID VALVE harness connector and terminal "15/35" of the TCM(PCM) harness connector.

Specification: approx. 0 Ω



LKIF230C

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 Vehicle Repair" procedure.

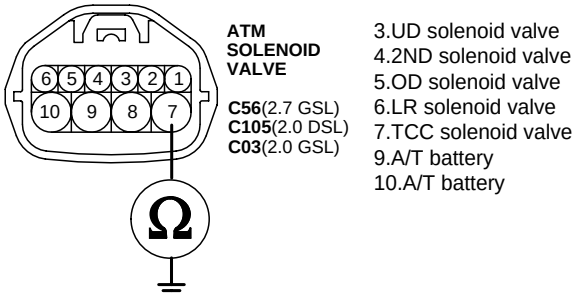
2. Check signal circuit short inspection

1) Ignition "OFF".

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

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

Specification: Infinite



LKIF230D

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 Vehicle Repair" procedure.

COMPONENT INSPECTION E1C7B4AC

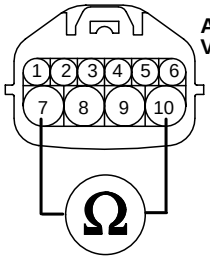
1. CHECK SOLENOID VELVE

1) Ignition "OFF".

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

3) Measure resistance between terminal "7" and terminal "10" of the ATM SOLENOID VALVE harness connector.

Specification: Approximately 2.7~3.4 Ω (20°C)



ATM SOLENOID VALVE

C56(2.7 GSL)
C105(2.0 DSL)
C03(2.0 GSL)
component side

3.UD solenoid valve
4.2ND solenoid valve
5.OD solenoid valve
6.LR solenoid valve
7.TCC solenoid valve
9.A/T battery
10.A/T battery

LKIF230E

4) Is resistance within specification?

YES

▶ Go to "CHECK TCM(PCM)" as below.

NO

▶ Replace TCC SOLENOID VALVE as necessary and go to "Verification Vehicle Repair" procedure.

2. CHECK TCM(PCM)

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 TCC SOLENOID VALVE Actuator Testing Function?

YES

▶ Go to "Verification Vehicle Repair" procedure.

NO

▶ Replace TCM(PCM) as necessary and Go to "Verification Vehicle Repair" procedure

ACTUATOR TEST CONDITION

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

VERIFICATION OF VEHICLE REPAIR EB7BDBAF

Refer to DTC P0741.

DTC P0750 SHIFT CONTROL SOLENOID VALVE A CIRCUIT MALFUNCTION

COMPONENT LOCATION ED5E3EA4

Refer to DTC P0743.

GENERAL DESCRIPTION E3E74E07

The Automatic Transmission changes the gear position of the transmission by utilizing a combination of Clutches and Brakes, which are controlled by solenoid valves. The HIVEC Automatic Transmission consists of a: LR (Low and Reverse Brake), 2ND (2nd Brake), UD (Under Drive Clutch), OD (Over Drive Clutch), REV (Reverse Clutch), and a RED (Reduction Brake, only for 5 speed transmissions). The LR Brake is engaged in the 1st gear and reverse gear positions.

DTC DESCRIPTION E8A1AAE2

The TCM(PCM) 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 TCM(PCM) judges that the Low and Reverse control solenoid circuit is malfunctioning and sets this code.

DTC DETECTING CONDITION EC89A9A4

[2.7 GSL]/ [2.0 DSL]

Item	Detecting Condition & Fail Safe	Possible cause
DTC Strategy	• Check voltage range	• Open or short in circuit • Faulty LR SOLENOID VALVE • Faulty TCM(PCM)
Enable Conditions	• Solenoid status Either solid ON or OFF • Voltage of Battery ＞10V	
Threshold value	• Voltage ＜3V	
Diagnostic Time	• More than 320 ms	
Fail Safe	• Locked in 3rd gear.(Control relay off)	

[2.0 GSL]

Item	Detecting Condition & Fail Safe	Possible cause
DTC Strategy	• Check voltage range	• Open or short in circuit • Faulty LR SOLENOID VALVE • Faulty TCM(PCM)
Enable Conditions	• 16V ＞ Voltage Battery ＞10V • In gear state(no gear shifting) 500msec is passed from turn on the relay	
Threshold value	• Feedback voltage from LR control solenoide ＞ Vb-2V and LR control duty is 0% • Feedback voltage from LR control solenoide ≤ 5.5V and LR control duty is 100%	
Diagnostic Time	• More than 320 ms	
Fail Safe	• Locked in 3rd gear.(Control relay off)	

SPECIFICATION E2DF41ED

Refer to DTC P0743.

SCHEMATIC DIAGRAM EC08CBEB

Refer to DTC P0741.

MONITOR SCANTOOL DATA EB2A0BDF

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

Specification: 1st → 0%, 2nd → 100%

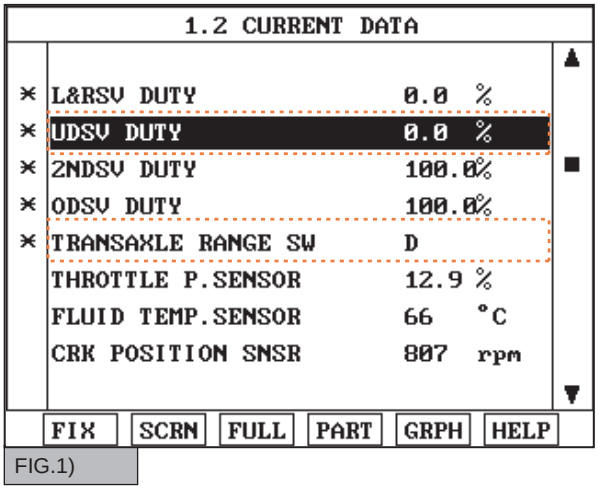


FIG.1)

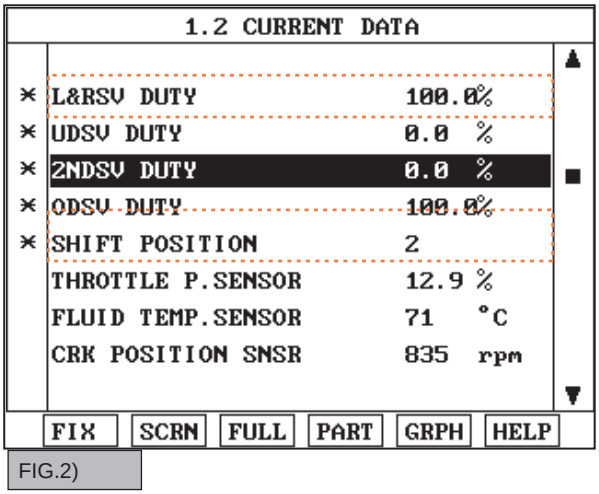


FIG.2)

FIG. 1) 1st gear
FIG. 2) 2nd gear

ELQE045A

5. Does "LR 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 Vehicle Repair" procedure.

NO

▶ Go to "Terminal & Connector Inspection " procedure.

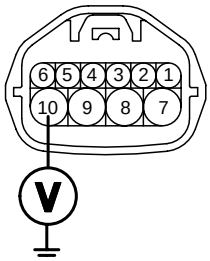
TERMINAL & CONNECTOR INSPECTION E2AFA5AF

Refer to DTC P0743.

POWER SUPPLY CIRCUIT INSPECTION E99D5BB3

1. Disconnect "A/T SOLENOID VALVE" connector.
2. Measure voltage between terminal"10" of the sensor harness connector and chassis ground.
3. Turn ignition switch OFF → ON.

Specification: 12V is measured only for approx. 0.5sec



ATM SOLENOID VALVE

C56(2.7 GSL)
C105(2.0 DSL)
C03(2.0 GSL)

3.UD solenoid valve
4.2ND solenoid valve
5.OD solenoid valve
6.LR solenoid valve
7.TCC solenoid valve
9.A/T battery
10.A/T battery

LKIF240A

4. Is voltage within specifications?

YES

▶ Go to "Signal circuit inspection" procedure.

NO

▶ Check that A/T-20A Fuse in engine room junction is installed or not blown.
▶ Check for open in harness. Repair as necessary and Go to "Verification Vehicle Repair" procedure.

SIGNAL CIRCUIT INSPECTION E6B61E59

1. Check signal circuit open inspection
   1) Ignition "OFF".
   2) Disconnect "A/T SOLENOID VALVE" connector and "TCM(PCM)" connector.
   3) Measure resistance between terminal "6" of the ATM SOLENOID VALVE harness connector and terminal "12/38" of the TCM(PCM) harness connector

Specification: approx. 0 Ω

[2.7 GSL/ 2.0 DSL]

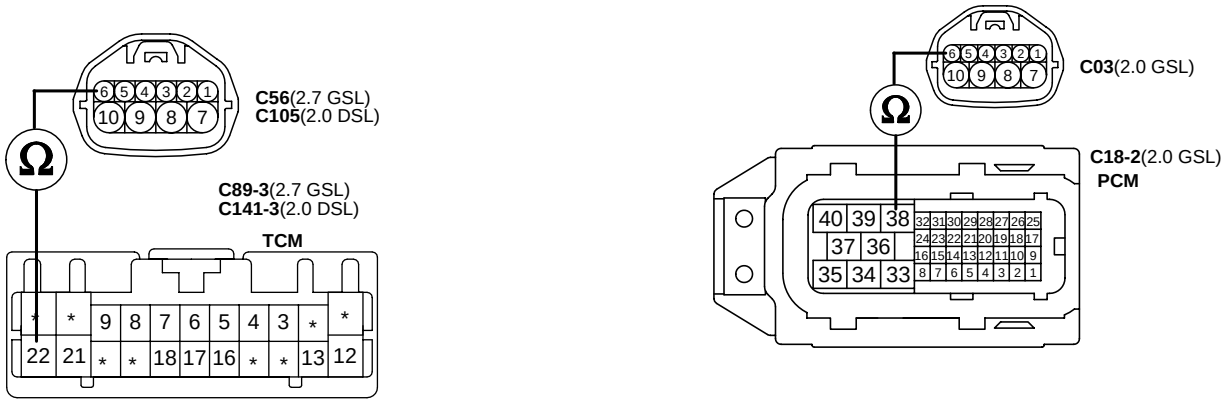
3.UD solenoid valve
4.2ND solenoid valve
5.OD solenoid valve
6.LR solenoid valve
7.TCC solenoid valve
9.A/T battery
10.A/T battery

1.UD solenoid valve control
16.2ND solenoid valve control
12.LR solenoid valve control
14.OD solenoid valve control
15.TCC solenoid valve control

[2.0 GSL]

3.UD solenoid valve
4.2ND solenoid valve
5.OD solenoid valve
6.LR solenoid valve
7.TCC solenoid valve
9.A/T battery
10.A/T battery

38.LR solenoid valve control
40. LR solenoid valve control
39. LR solenoid valve control
33. LR solenoid valve control
35. LR solenoid valve control



LKIF240B

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 Vehicle Repair" procedure.

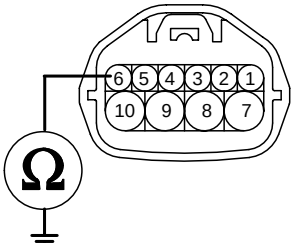
2. Check signal circuit short inspection

1) Ignition "OFF".

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

3) Measure resistance between terminal "6" of the ATM SOLENOID VALVE harness and chassis ground.

Specification: Infinite



3.UD solenoid valve
4.2ND solenoid valve
5.OD solenoid valve
6.LR solenoid valve
7.TCC solenoid valve
9.A/T battery
10.A/T battery

LKIF240C

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 Vehicle Repair" procedure.

COMPONENT INSPECTION EE7A61C9

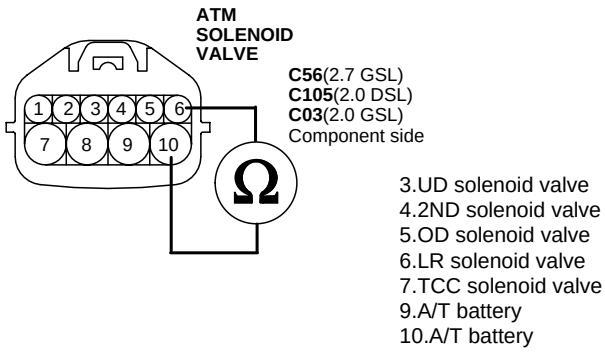
1. CHECK SOLENOID VELVE

1) Ignition "OFF".

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

3) Measure resistance between terminal "6" and terminal "10" of the ATM SOLENOID VALVE harness connector.

Specification: Approximately 2.7~3.4 Ω (20°C)



LKIF240D

4) Is resistance within specification?

YES

▶ Go to "CHECK TCM(PCM)" as below.

NO

▶ Replace LR SOLENOID VALVE as necessary and go to "Verification Vehicle Repair" procedure.

2. CHECK TCM(PCM)

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 LR SOLENOID VALVE Actuator Testing Function?

YES

▶ Go to "Verification Vehicle Repair" procedure.

NO

▶ Replace TCM(PCM) as necessary and Go to "Verification Vehicle Repair" procedure.

ACTUATOR TEST CONDITION

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

VERIFICATION OF VEHICLE REPAIR E488A146

Refer to DTC P0741.

DTC P0755 SHIFT CONTROL SOLENOID VALVE B CIRCUIT MALFUNCTION

COMPONENT LOCATION E1560EDD

Refer to DTC P0743.

GENERAL DESCRIPTION EBC8249B

Refer to DTC P0750.

DTC DESCRIPTION E87F7C11

Refer to DTC P0750.

DTC DETECTING CONDITION E13D86E3

[2.7 GSL]/ [2.0 DSL]

Item	Detecting Condition & Fail Safe	Possible cause
DTC Strategy	• Check voltage range	• Open or short in circuit • Faulty UD SOLENOID VALVE • Faulty TCM(PCM)
Enable Conditions	• Solenoid status Either solid ON or OFF • Voltage of Battery ＞10V	
Threshold value	• Voltage ＜3V	
Diagnostic Time	• More than 320 ms	
Fail Safe	• Locked in 3rd gear.(Control relay off)	

[2.0 GSL]

Item	Detecting Condition & Fail Safe	Possible cause
DTC Strategy	• Check voltage range	• Open or short in circuit • Faulty UD SOLENOID VALVE • Faulty TCM(PCM)
Enable Conditions	• 16V ＞ Voltage Battery ＞10V • In gear state(no gear shifting) 500msec is passed from turn on the relay	
Threshold value	• Feedback voltage from UD control solenoide ＞ Vb-2V and UD control duty is 0% • Feedback voltage from UD control solenoide ≤ 5.5V and UD control duty is 100%	
Diagnostic Time	• more than 320 ms	
Fail Safe	• Locked in 3rd gear.(Control relay off)	

SPECIFICATION ED0EEE4D

Refer to DTC P0743.

SCHEMATIC DIAGRAM EC8C75E2

Refer to DTC P0741.

MONITOR SCANTOOL DATA E5B179DE

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

Specification: P/N → 100%, D → 0.0%

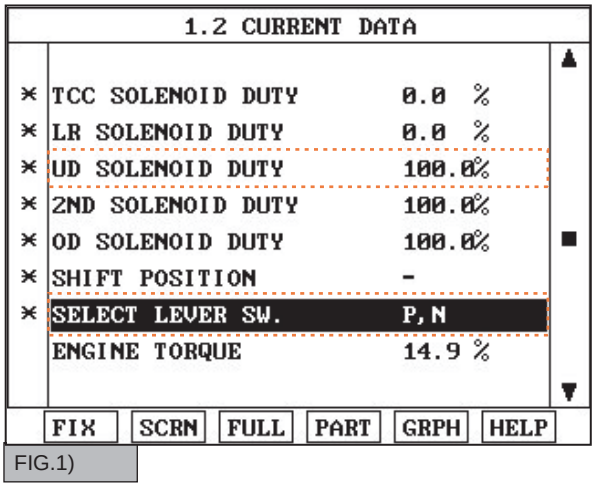


FIG.1)

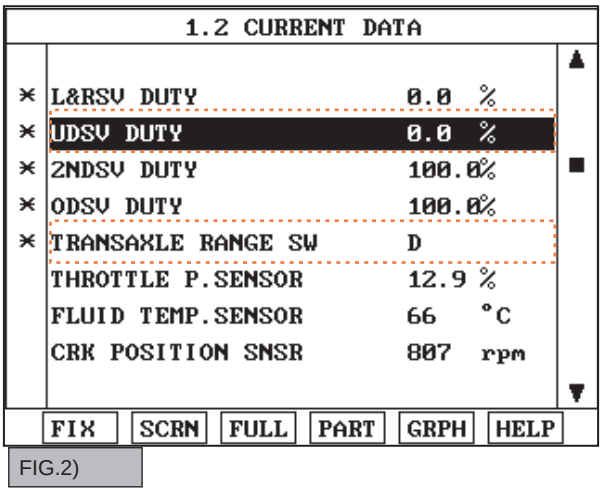


FIG.2)

FIG. 1) P/N Range
FIG. 2) D Range

ELQE046A

5. Does "UD 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 Vehicle Repair" procedure.

NO

▶ Go to "Terminal & Connector Inspection " procedure.

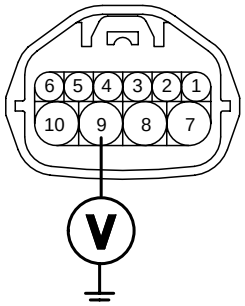
TERMINAL & CONNECTOR INSPECTION EEA90A2B

Refer to DTC P0743.

POWER SUPPLY CIRCUIT INSPECTION EADEBA4F

1. Disconnect "A/T SOLENOID VALVE" connector.
2. Measure voltage between terminal "9" of the sensor harness connector and chassis ground.
3. Turn ignition switch OFF → ON

Specification: 12V is measured only for approx. 0.5sec



ATM SOLENOID VALVE

C56(2.7 GSL)
C105(2.0 DSL)
C03(2.0 GSL)

3.UD solenoid valve
4.2ND solenoid valve
5.OD solenoid valve
6.LR solenoid valve
7.TCC solenoid valve
9.A/T battery
10.A/T battery

LKIF250A

4. Is voltage within specifications?

YES

▶ Go to "Signal circuit inspection" procedure.

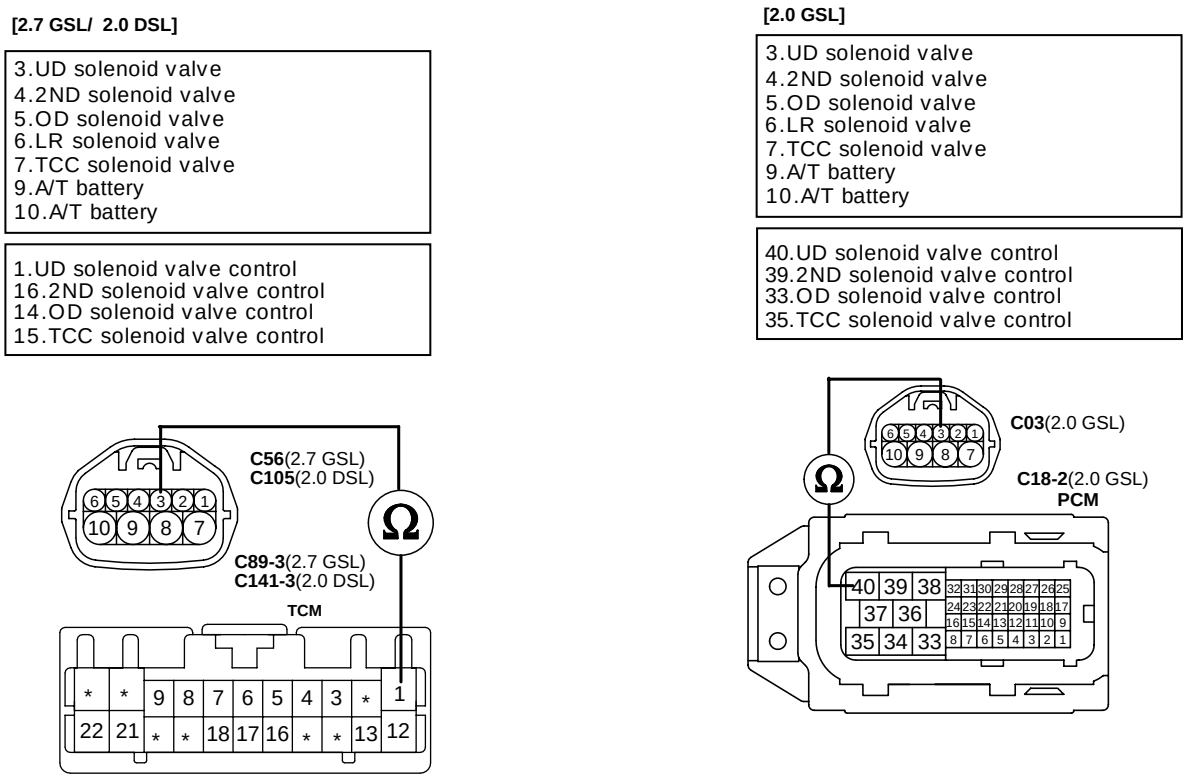
NO

▶ Check that A/T-30A Fuse in engine room junction is installed or not blown.
▶ Check for open in harness. Repair as necessary and Go to "Verification Vehicle Repair" procedure.

SIGNAL CIRCUIT INSPECTION E3ADB6D1

1. Check signal circuit open inspection
   1) Ignition "OFF".
   2) Disconnect "A/T SOLENOID VALVE" connector and "TCM(PCM)" connector
   3) Measure resistance between terminal "3" of the ATM SOLENOID VALVE harness connector and terminal "1/40" of the TCM(PCM) harness connector

Specification: approx. 0 Ω



LKIF250B

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 Vehicle Repair" procedure.

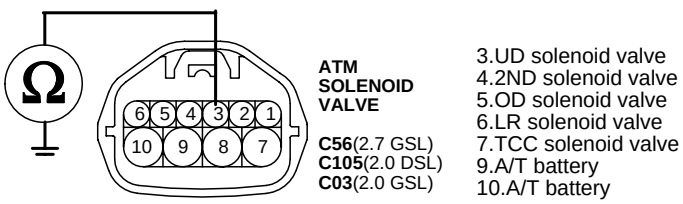
2. Check signal circuit short inspection

1) Ignition "OFF".

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

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

Specification: Infinite



LKIF250C

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 Vehicle Repair" procedure.

COMPONENT INSPECTION E21AA9A2

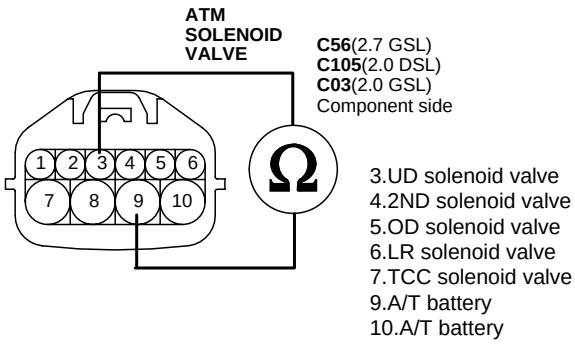
1. CHECK SOLENOID VELVE

   1) Ignition "OFF".

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

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

Specification: Approximately 2.7~3.4 Ω (20°C)



LKIF250D

   4) Is resistance within specification?

YES

▶ Go to "CHECK TCM(PCM)" as below.

NO

▶ Replace UD SOLENOID VALVE as necessary and go to "Verification Vehicle Repair" procedure.

2. CHECK TCM(PCM)

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 UD SOLENOID VALVE Actuator Testing Function?

YES

▶ Go to "Verification Vehicle Repair" procedure.

NO

▶ Replace TCM(PCM) as necessary and Go to "Verification Vehicle Repair" procedure.

ACTUATOR TEST CONDITION

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

VERIFICATION OF VEHICLE REPAIR E00A5937

Refer to DTC P0741.

DTC P0760 SHIFT CONTROL SOLENOID VALVE C CIRCUIT MALFUNCTION

COMPONENT LOCATION E2FDEE38

Refer to DTC P0743.

GENERAL DESCRIPTION EABE463A

Refer to DTC P0750.

DTC DESCRIPTION ED62EB04

Refer to DTC P0750.

DTC DETECTING CONDITION E2D6DC04

Item	Detecting Condition & Fail Safe	Possible cause
DTC Strategy	• Check voltage range	• Open or short in circuit • Faulty 2nd SOLENOID VALVE • Faulty TCM(PCM)
Enable Conditions	• Solenoid status Either solid ON or OFF • Voltage of Battery ＞10V	
Threshold value	• Voltage ＜3V	
Diagnostic Time	• More than 320 ms	
Fail Safe	• Locked in 3rd gear.(Control relay off)	

[2.0 GSL]

Item	Detecting Condition & Fail Safe	Possible cause
DTC Strategy	• Check voltage range	• Open or short in circuit • Faulty 2nd SOLENOID VALVE • Faulty TCM(PCM)
Enable Conditions	• 16V ＞ Voltage Battery ＞10V • In gear state(no gear shifting) 500msec is passed from turn on the relay	
Threshold value	• Feedback voltage from 2nd control solenoide ＞ Vb-2V and 2nd control duty is 0% • Feedback voltage from 2nd control solenoide ≤ 5.5V and 2nd control duty is 100%	
Diagnostic Time	• more than 320 ms	
Fail Safe	• Locked in 3rd gear.(Control relay off)	

SPECIFICATION EE1CEEC3

Refer to DTC P0743.

SCHEMATIC DIAGRAM E697CAF2

Refer to DTC P0741.

MONITOR SCANTOOL DATA ED5ABFC3

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

Specification: 1st gear → 100%, 2nd gear → 0.0%

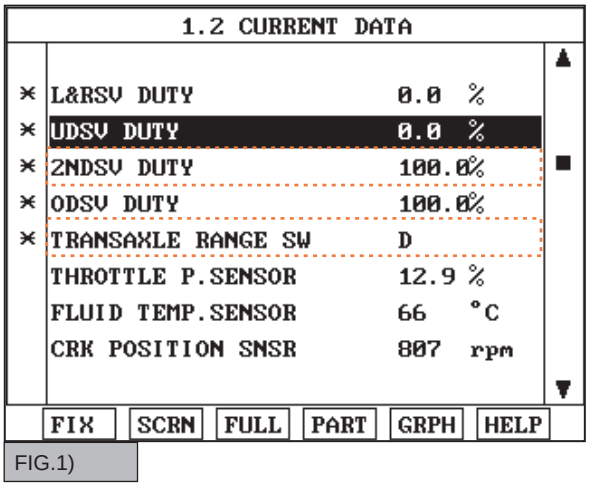


FIG.1)

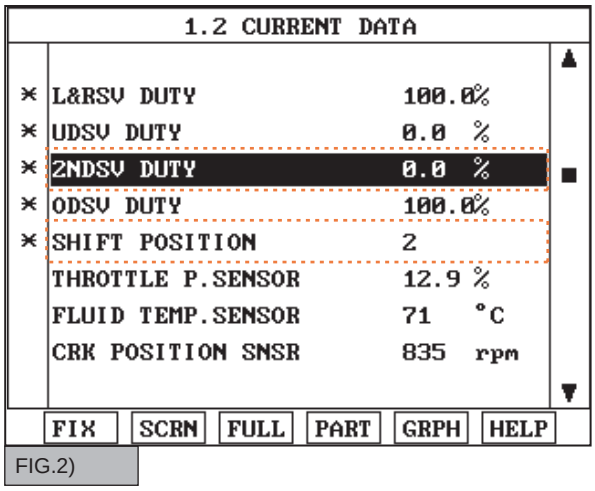


FIG.2)

FIG. 1) 1st gear
FIG. 2) 2nd gear

ELQE047A

5. Does "2nd 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 Vehicle Repair" procedure.

NO

▶ Go to "Terminal & Connector Inspection " procedure.

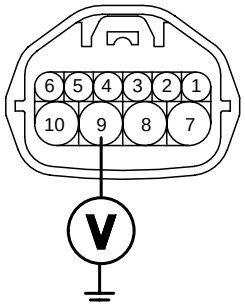
TERMINAL & CONNECTOR INSPECTION ECDD7D64

Refer to DTC P0743.

POWER SUPPLY CIRCUIT INSPECTION E147B644

1. Disconnect "A/T SOLENOID VALVE" connector.
2. Measure voltage between terminal "9" of the sensor harness connector and chassis ground.
3. Turn ignition switch OFF → ON

Specification : 12V is measured only for approx. 0.5sec



ATM SOLENOID VALVE

C56(2.7 GSL)
C105(2.0 DSL)
C03(2.0 GSL)

3.UD solenoid valve
4.2ND solenoid valve
5.OD solenoid valve
6.LR solenoid valve
7.TCC solenoid valve
9.A/T battery
10.A/T battery

LKIF250A

4. Is voltage within specifications?

YES

▶ Go to "Signal circuit inspection" procedure.

NO

▶ Check that A/T-30A Fuse in engine room junction is installed or not blown.
▶ Check for open in harness. Repair as necessary and Go to "Verification Vehicle Repair" procedure.

SIGNAL CIRCUIT INSPECTION EEBFE132

1. Check signal circuit open inspection
   1) Ignition "OFF".
   2) Disconnect "A/T SOLENOID VALVE" connector and "TCM(PCM)" connector
   3) Measure resistance between terminal "4" of the ATM SOLENOID VALVE harness connector and terminal "16/39" of the TCM(PCM) harness connector

Specification: approx. 0 Ω

[2.7 GSL/ 2.0 DSL]

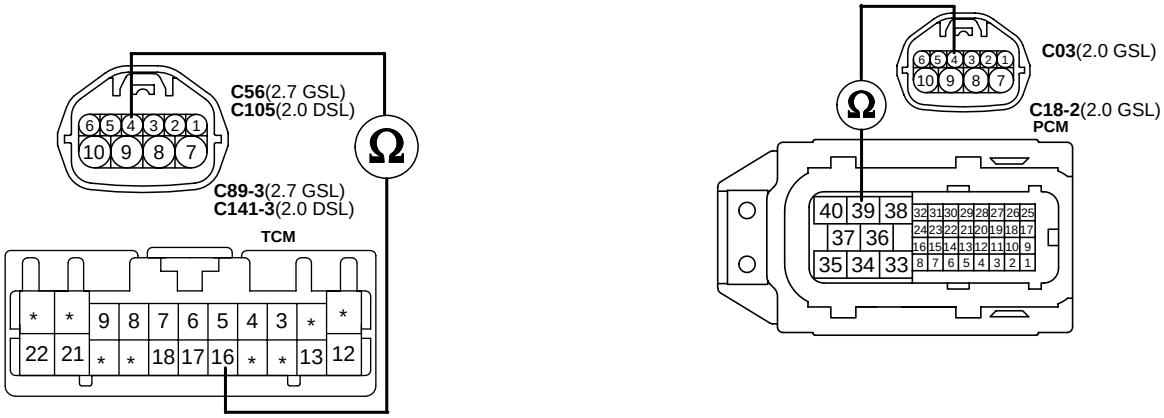
3.UD solenoid valve
4.2ND solenoid valve
5.OD solenoid valve
6.LR solenoid valve
7.TCC solenoid valve
9.A/T battery
10.A/T battery

1.UD solenoid valve control
16.2ND solenoid valve control
14.OD solenoid valve control
15.TCC solenoid valve control

[2.0 GSL]

3.UD solenoid valve
4.2ND solenoid valve
5.OD solenoid valve
6.LR solenoid valve
7.TCC solenoid valve
9.A/T battery
10.A/T battery

40.UD solenoid valve control
39.2ND solenoid valve control
33.OD solenoid valve control
35.TCC solenoid valve control



LKIF260A

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 Vehicle Repair" procedure.

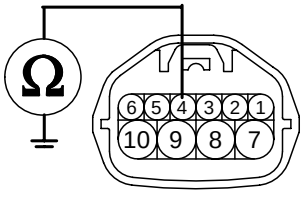
2. Check signal circuit short inspection

1) Ignition "OFF".

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

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

Specification: Infinite



ATM SOLENOID VALVE

C56(2.7 GSL)
C105(2.0 DSL)
C03(2.0 GSL)

3.UD solenoid valve
4.2ND solenoid valve
5.OD solenoid valve
6.LR solenoid valve
7.TCC solenoid valve
9.A/T battery
10.A/T battery

LKIF260B

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 Vehicle Repair" procedure.

COMPONENT INSPECTION E4D34B5B

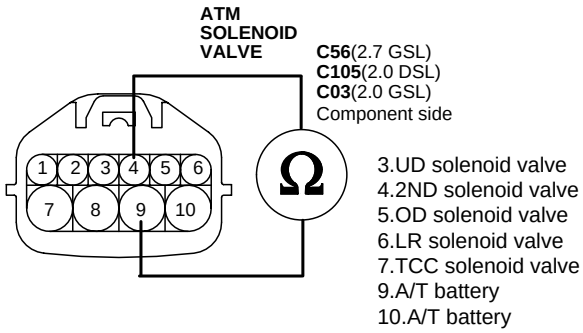
1. CHECK SOLENOID VELVE

   1) Ignition "OFF".

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

   3) Measure resistance between terminal "4" and terminal "9" of the ATM SOLENOID VALVE harness connector.

Specification: Approximately 2.7~3.4 Ω (20°C)



LKIF260C

   4) Is resistance within specification?

YES

▶ Go to "CHECK TCM(PCM)" as below.

NO

▶ Replace 2nd SOLENOID VALVE as necessary and go to "Verification Vehicle Repair" procedure.

2. CHECK TCM(PCM)

   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 2nd SOLENOID VALVE Actuator Testing Function?

      YES

      ▶ Go to "Verification Vehicle Repair" procedure.

      NO

      ▶ Replace TCM(PCM) and Go to "Verification Vehicle Repair" procedure.

      ACTUATOR TEST CONDITION

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

VERIFICATION OF VEHICLE REPAIR EF2743CC

Refer to DTC P0741.

DTC P0765 SHIFT CONTROL SOLENOID VALVE D CIRCUIT MALFUNCTION

COMPONENT LOCATION EBD7DEA5

Refer to DTC P0743.

GENERAL DESCRIPTION EDC5A22E

Refer to DTC P0750.

DTC DESCRIPTION E2E4B72F

Refer to DTC P0750.

DTC DETECTING CONDITION EE0FFA74

[2.7 GSL]/ [2.0 DSL]

Item	Detecting Condition & Fail Safe	Possible cause
DTC Strategy	• Check voltage range	• Open or short in circuit • Faulty OD SOLENOID VALVE • Faulty TCM(PCM)
Enable Conditions	• Solenoid status Either solid ON or OFF • Voltage of Battery ＞10V	
Threshold value	• Voltage ＜3V	
Diagnostic Time	• More than 320 ms	
Fail Safe	• Locked in 3rd gear.(Control relay off)	

[2.0 GSL]

Item		Detecting Condition & Fail Safe	Possible cause
DTC Strategy		• Check voltage range	• Open or short in circuit • Faulty OD SOLENOID VALVE • Faulty TCM(PCM)
Enable Conditions	**Case1**	• 16V ＞ Voltage Battery ＞10V	
	Case2	• Voltage Battery ＞10V • OIL TEMP. ≥ -23.5°C • 2nd gear and not under the down shifting • Ne ≥ 450rpm • No ＞ 100rpm • Nt ＞ 0rpm • Inhibitor switch is normal and after 2sec is passed from IG ON	
Threshold value	**Case1**	• Feedback voltage from 2nd control solenoide＞Vb-2V and 2nd control duty is 0% • Feedback voltage from 2nd control solenoide≤5.5V and 2nd control duty is 100%	
	Case2	• ｜input speed/3rd gear ratio - output speed ｜≤ 50rpm	
Diagnostic Time		• More than 320 ms	
Fail Safe		• Locked in 3 rd gear.(Control relay off)	

SPECIFICATION ECADF89C

Refer to DTC P0743.

SCHEMATIC DIAGRAM E9CE8EF9

Refer to DTC P0741.

MONITOR SCANTOOL DATA E7461C54

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

Specification: 2nd gear → 100%, 3rd gear → 0.0%

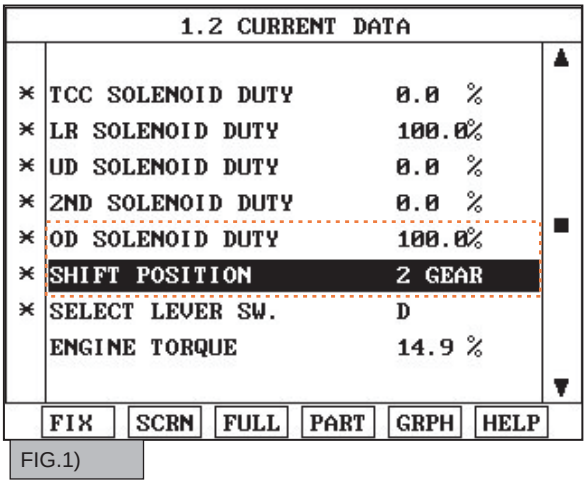


FIG.1)

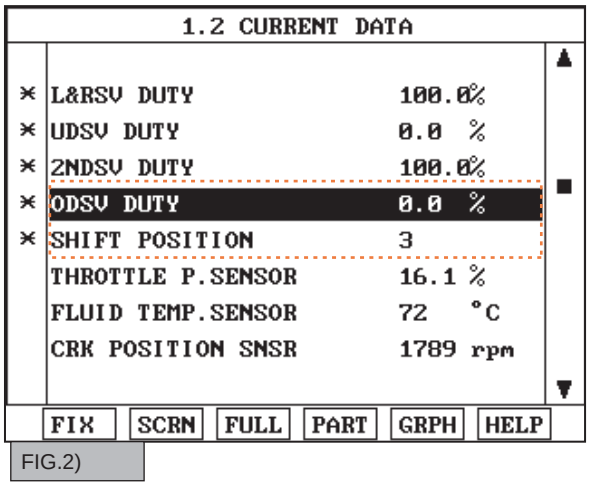


FIG.2)

FIG. 1) 2nd gear
FIG. 2) 3rd gear

ELQE048A

Does "OD 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 Vehicle Repair" procedure.

NO

▶ Go to "Terminal & Connector Inspection " procedure.

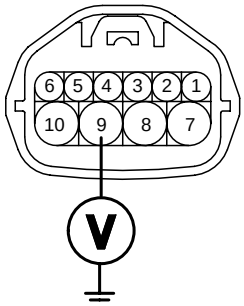
TERMINAL & CONNECTOR INSPECTION EFCD2D8F

Refer to DTC P0743.

POWER SUPPLY CIRCUIT INSPECTION EE4A46BC

1. Disconnect "A/T SOLENOID VALVE" connector.
2. Measure voltage between terminal "9" of the sensor harness connector and chassis ground.
3. Turn ignition switch OFF → ON.

Specification : 12V is measured only for approx. 0.5sec



ATM SOLENOID VALVE

C56(2.7 GSL)
C105(2.0 DSL)
C03(2.0 GSL)

3.UD solenoid valve
4.2ND solenoid valve
5.OD solenoid valve
6.LR solenoid valve
7.TCC solenoid valve
9.A/T battery
10.A/T battery

LKIF250A

Is voltage within specifications?

YES

▶ Go to "Signal circuit inspection" procedure.

NO

▶ Check that A/T-30A Fuse in engine room junction is installed or not blown.
▶ Check for open in harness. Repair as necessary and Go to "Verification Vehicle Repair" procedure.

SIGNAL CIRCUIT INSPECTION E93AC6BD

1. Check signal circuit open inspection

   1) Ignition "OFF".

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

   3) Measure resistance between terminal "5" of the ATM SOLENOID VALVE harness connector and terminal "14/33" of the PCM/TCM harness connector

Specification: approx. 0 Ω

[2.7 GSL/ 2.0 DSL]

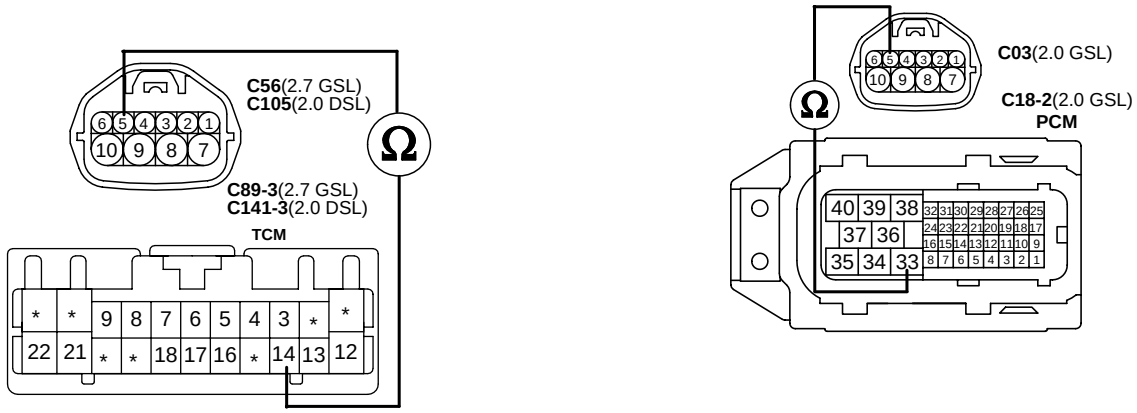
3.UD solenoid valve
4.2ND solenoid valve
5.OD solenoid valve
6.LR solenoid valve
7.TCC solenoid valve
9.A/T battery
10.A/T battery

1.UD solenoid valve control
16.2ND solenoid valve control
14.OD solenoid valve control
15.TCC solenoid valve control

[2.0 GSL]

3.UD solenoid valve
4.2ND solenoid valve
5.OD solenoid valve
6.LR solenoid valve
7.TCC solenoid valve
9.A/T battery
10.A/T battery

40.UD solenoid valve control
39.2ND solenoid valve control
33.OD solenoid valve control
35.TCC solenoid valve control



LKIF270A

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 Vehicle Repair" procedure.

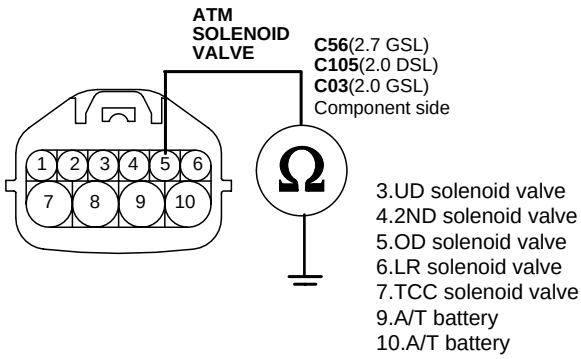
2. Check signal circuit short inspection

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

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

   3) Measure resistance between terminal "5" of the ATM SOLENOID VALVE harness and chassis ground.

Specification: Infinite



LKIF270B

   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 Vehicle Repair" procedure.

COMPONENT INSPECTION EEEFD865

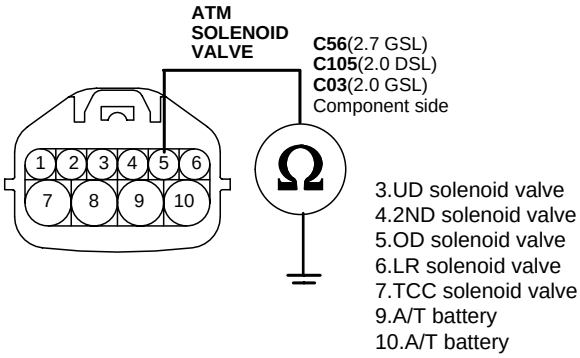
1. CHECK SOLENOID VELVE

   1) Ignition "OFF".

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

   3) Measure resistance between terminal "5" and terminal "9" of the ATM SOLENOID VALVE harness connector.

Specification: Approximately 2.7~3.4 Ω (20°C)



LKIF270C

   4) Is resistance within specification?

YES

▶ Go to "CHECK TCM(PCM)" as below.

NO

▶ Replace OD SOLENOID VALVE as necessary and go to "Verification Vehicle Repair" procedure.

2. CHECK TCM(PCM)

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

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

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

   4) Can you hear operating sound for OD SOLENOID VALVE Actuator Testing Function?

   YES

   ▶ Go to "Verification Vehicle Repair" procedure.

   NO

   ▶ Replace TCM(PCM) and Go to "Verification Vehicle Repair" procedure.

   ACTUATOR TEST CONDITION

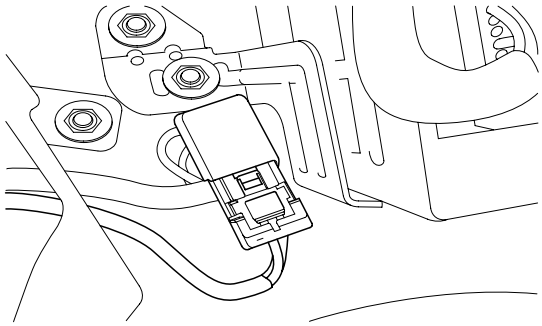
   1. IG SWITCH ON
   2. TRANSAXLE RANGE SWITCH is normal
   3. P RANGE
   4. Vehicle Speed 0km/h
   5. Throttle position sensor < 1V
   6. IDLE SWITCH ON
   7. ENGINE RPM 0

VERIFICATION OF VEHICLE REPAIR ECF7AC15

Refer to DTC P0741.

DTC P0885 A/T RELAY CIRCUIT MALFUNCTION

COMPONENT LOCATION ECDC4256



BKQE024A

GENERAL DESCRIPTION EAE2F92D

The HIVEC Automaic Transmission supplies the power to the solenoid valves by way of a control relay. When the TCM(PCM) sets the relay to ON, the relay operates and the battery power is supplied to all the sonenoid valves. When the TCM(PCM) sets the relay to OFF, all solenoid valve power is shut off and the transmission is held in the 3rd gear position. (Fail Safe Mode)

DTC DESCRIPTION E404D6D0

The TCM(PCM) checks the A/T control relay signal by monitoring the contol signal. If, after the iginiton key is turned on, an unexpected voltage value, which is quite a bit lower than battery voltage is detected, the TCM(PCM) sets this code.

DTC DETECTING CONDITION EEB3D9B6

[2.7 GSL]/ [2.0 DSL]

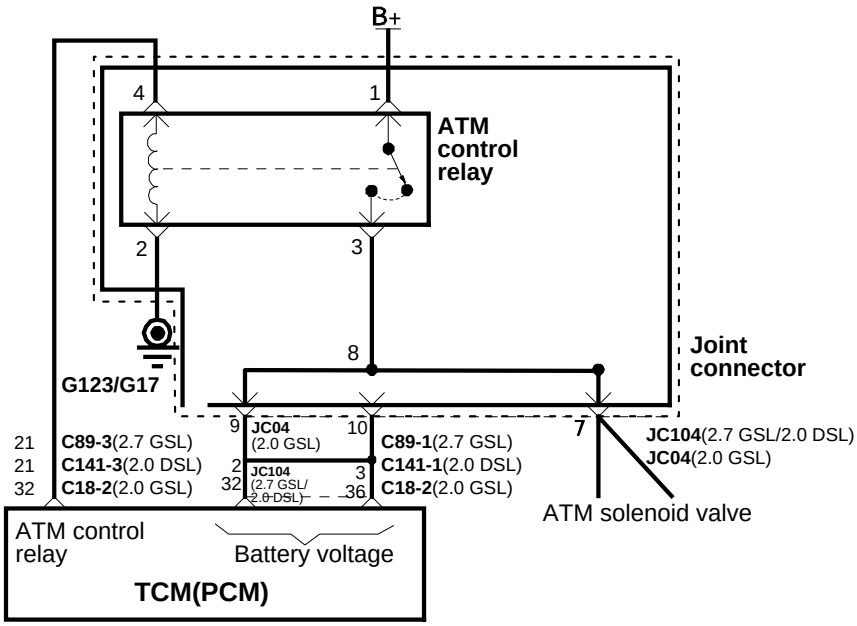
Item	Detecting Condition & Fail Safe	Possible cause
DTC Strategy	• Check voltage range	• Open or short in circuit • Faulty A/T control relay • Faulty TCM(PCM)
Enable Conditions	• Voltage of Battery ＞9V • Time after TCM(PCM) turns on ＞0.5sec	
Threshold value	• Voltage ＜7V	
Diagnostic Time	• 0.1sec	
Fail Safe	• Locked in 3rd gear.(Control relay off)	

[2.0 GSL]

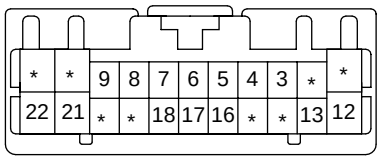
Item	Detecting Condition & Fail Safe	Possible cause
DTC Strategy	• Check voltage range	• Open or short in circuit • Faulty A/T control relay • Faulty TCM(PCM)
Enable Conditions	• 22V ＞ Voltage Battery ＞9V • Time after TCM(PCM) turns on ＞0.5sec	
Threshold value	• Voltage ＜ 7V orVoltage ＞ 24.5V	
Diagnostic Time	• 0.1sec	
Fail Safe	• Locked in 3rd gear.(Control relay off)	

SCHEMATIC DIAGRAM ED497EC7

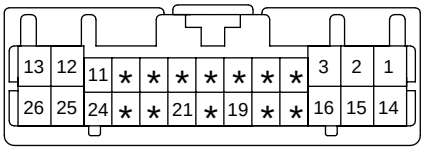
[Circuit Diagram]



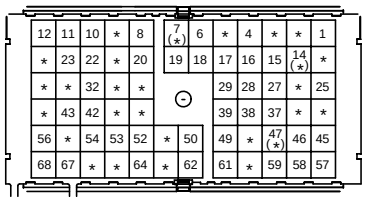
[Harness Connector]



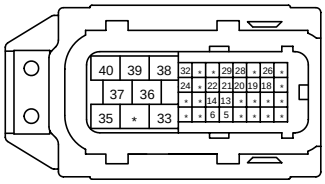
C89-3(2.7 GSL)
C141-3(2.0 DSL)



C89-1(2.7 GSL)
C141-1(2.0 DSL)



JC104(2.7 GSL/2.0 DSL)
JC04(2.0 GSL)



C18-2(2.0 GSL)

[Connection Information]

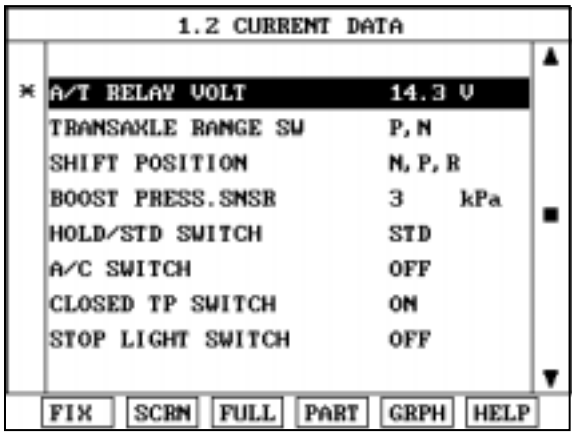
Terminal	Connection	Function
1	-	Hot at all times
2	G123/G17	Ground
3	89-1/C141-1 No.2 or 3, C18-2 No.36	Joint connector
4	89-3/C141-3 No.21, C18-2 No.32	ATM control relay signal

LKIF280A

MONITOR SCANTOOL DATA EE239AA7

1. Connect scantool to data link connector(DLC).
2. Ignition "ON" & Engine "OFF".
3. Monitor the "A/T CON. RELAY VOLT" parameter on the scantool.

Specification : Approx. B+



ELQE049A

4. Is A/T RELAY VOLT 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 Vehicle Repair" procedure.

NO

▶ Go to "Terminal & Connector Inspection" procedure.

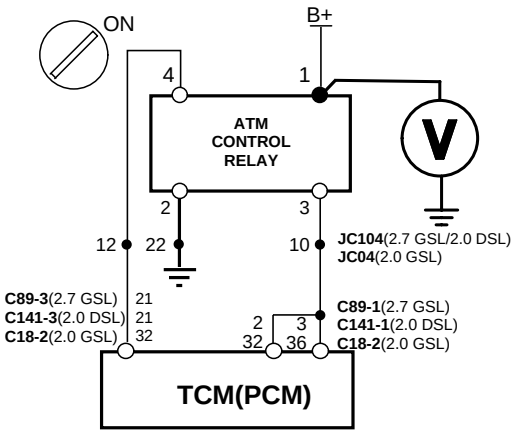
TERMINAL & CONNECTOR INSPECTION EFE1AAEA

Refer to DTC P0743.

POWER SUPPLY CIRCUIT INSPECTION E98AFAFE

1. Ignition "ON" & Engine "OFF".
2. Disconnect the "A/T CONTROL RELAY" connector.
3. Measure the voltage between terminal "1" of the "A/T CONTROL RELAY" harness connector and chassis ground.

Specification : Approx. B+



1.Battery
2.Ground
3.Supplying Power to solenoid valve
4.A/T control relay

LKIF280B

4. Is voltage within specifications?

YES

▶ Go to "Signal circuit inspection" procedure.

NO

▶ Check that A/T-30A Fuse in engine room junction is installed or not blown.
▶ Check for Open in harness. Repair as necessary and Go to "Verification Vehicle Repair" procedure.

SIGNAL CIRCUIT INSPECTION E650A98F

1. CHECK A/T control relay harness

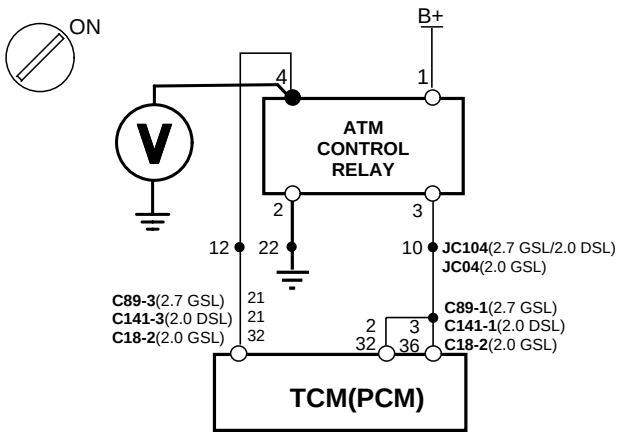
   1) Ignition "OFF".

   2) Disconnect the "A/T CONTROL RELAY" connector.

   3) Measure the voltage between terminal "4" of the "A/T CONTROL RELAY" harness connector and chassis ground.

   4) Turn ignition switch OFF → ON.

Specification: 12V is measured only for approx. 0.5sec



1.Battery
2.Ground
3.Supplying Power to solenoid valve
4.A/T control relay

LKIF280C

5) Is voltage within specifications?

YES

▶ Go to "Check Supplying Power to solenoid valve" procedure.

NO

▶ Check for open in harness. Repair as necessary and Go to "Verification Vehicle Repair" procedure
▶ If signal circuit is OK, Substitute with a known-good TCM(PCM) and check for proper operation. If the problem is corrected, replace TCM(PCM) and then go to "Verification of Vehicle Repair" procedure.

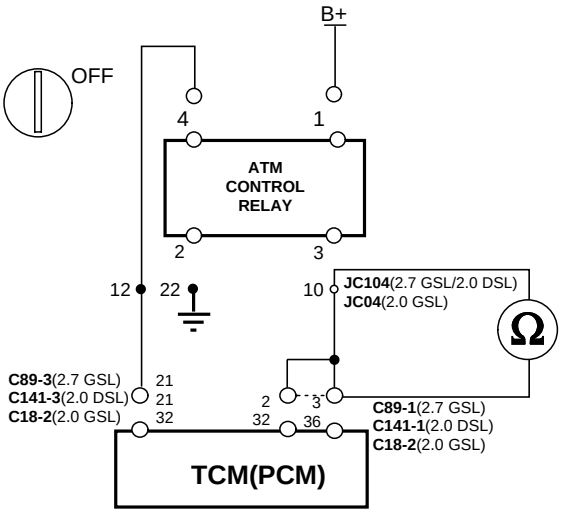
2. CHECK Supplying Power to solenoid valve harness

1) Ignition "OFF".

2) Disonnect the "A/T CONTROL RELAY" and TCM(PCM) connector.

3) Measure the resistance between terminal "3" of the "A/T CONTROL RELAY" harness connector and terminal "2 or 3/ 32 or 36" of the TCM(PCM) harness connector

Specification : Approx. 0 Ω



1.Battery
2.Ground
3.Supplying Power to solenoid valve
4.A/T control relay

LKIF280D

4) Is resistance within specifications?

YES

▶ Go to "Ground circuit inspection" procedure.

NO

▶ Check for Open in JC104/ JC04 joint connector.
▶ Check for open in harness. Repair as necessary and Go to "Verification Vehicle Repair" procedure.

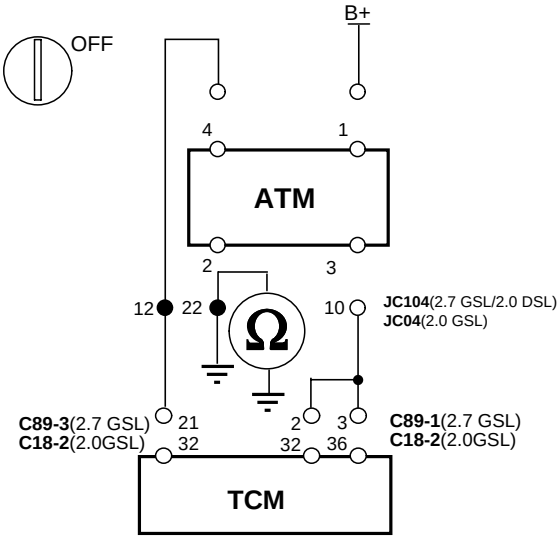
GROUND CIRCUIT INSPECTION E8FEABC5

1. Ignition "OFF".

2. Connect the "A/T CONTROL RELAY" connector.

3. Measure the resistance between terminal "2" of the "A/T CONTROL RELAY" harness connector and chassis ground.

Specification : Approx. 0 Ω



1.Battery
2.Ground
3.Supplying Power to solenoid valve
4.A/T control relay

LKIF280E

4. Is resistance within specifications?

YES

▶ Go to "Component inspection" procedure.

NO

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

COMPONENT INSPECTION EF2F6EF0

1. Ignition "OFF".
2. Remove "A/T CONTROL RELAY"
3. Measure the resistance between each teminal of the sensor.

Specification : Shown below

Item	Termianl No.	
Resistance	1(red) - 3(pink)	INFINITE
	2(black) - 4(pink)	
supply(B+) to number 4 and supply (B-) to number 2.	1(red) - 3(pink)	0 Ω

4. Is resistance with in specification?

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

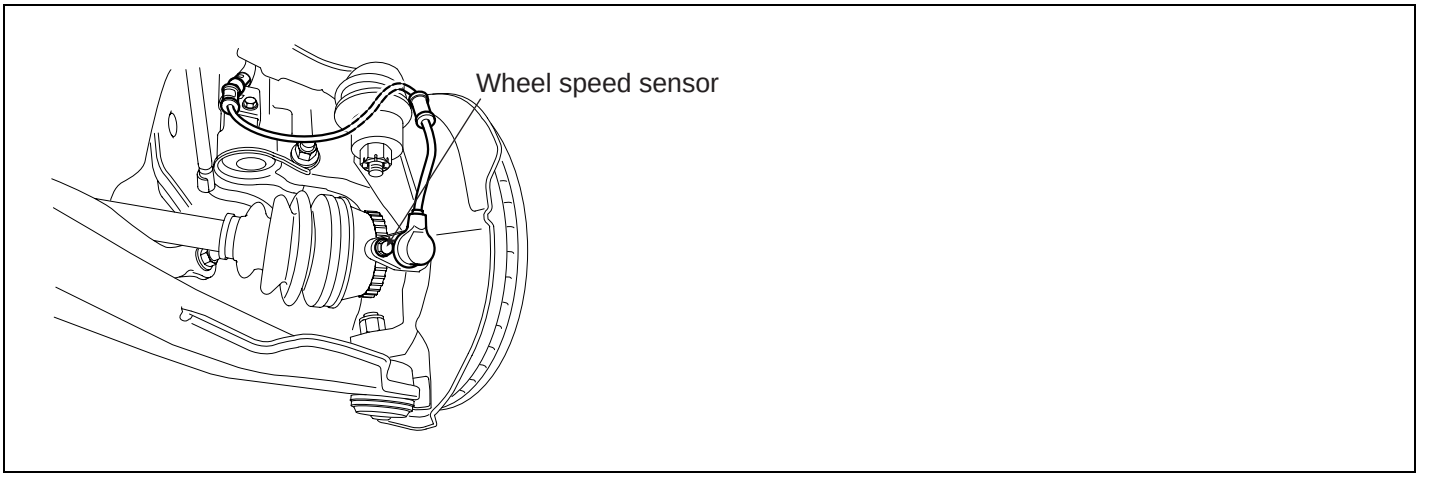
▶ Replace ATM CONTROL RELAY and then go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR E4DBF3DA

Refer to DTC P0741.

DTC P1500 VEHICLE SPEED SENSOR

COMPONENT LOCATION EDC9F3DE



ELQE501E

GENERAL DESCRIPTION E7ACA025

The vehicle speed sensor outputs pulse-signals according to the revolutions of the output shaft of the transmission. The TCM(PCM) determines the vehicle speed by counting the frequency of the pulses. This value is mainly used, by the TCM(PCM), as comparison data for determining malfunctions of the output speed sensor.

DTC DESCRIPTION EEC7AAC9

The TCM(PCM) calculates the vehicle speed based on the frequency of the pulses. If the calculated value from this sensor does not agree with the value determined by the OUTPUT SPEED SENSOR(PGB) , the TCM(PCM) sets this code.

DTC DETECTING CONDITION E069F9E1

[2.7 GSL]/ [2.0 DSL]/ [2.0 GSL]

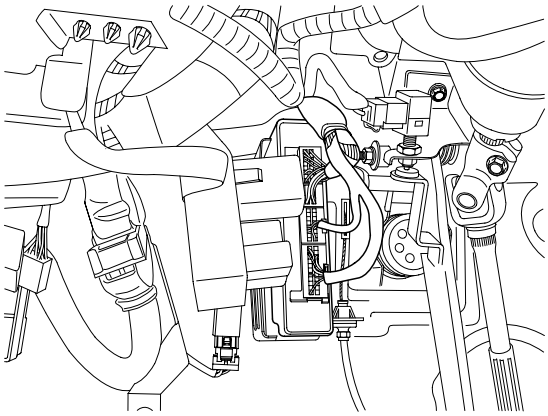
Item		Detecting Condition & Fail Safe	Possible cause
Case 1	DTC Strategy	• Plausibility check	• Open or short in harness • Contact resistance in connectors • Faulty wheel speed sensor
	Enable Conditions	• Engine speed ＞2100rpm • Engine load ＞250 mg/rev • Coolant temperature ＞ 60°C(140°F) • 10V< Battery voltage ＜16V • No fuel shut-off	
	Threshold value	• Vehicle speed=0 with high engine speed and engine load	
	Diagnostic Time	• 60 seconds	
Case 2	DTC Strategy	• Electrical check	
	Enable Conditions	• Vehicle speed ＞0 • 10V< Battery voltage ＜16V	
	Threshold value	• TCM(PCM) detects abnormal input voltage of the signal circuit	
	Diagnostic Time	• 10 seconds	

REFER TO ECM DAIGNOSIS PROCEDURE.

ELQE501F

DTC U0001 CAN COMMUNICATION BUS OFF

COMPONENT LOCATION EBD56A56



KKQE001D

GENERAL DESCRIPTION EBED751A

The TCM can either receive data from the Engine Control Module or ABS control module, or it can send data to the ECM andABSCM by using CAN communication. The CAN communicaton is one of the vehicle communications method, which is now widelyused to transfer the vehicle data.

DTC DESCRIPTION E5F25D4B

When the TCM cannot read the data from the ECM through the CAN-BUS line, the TCM sets this code.
CAN-BUS circuit malfunctioning or ECM can be a posssible cause of this DTC.

DTC DETECTING CONDITION E96DBCD2

[2.7 GSL]/ [2.0 DSL]

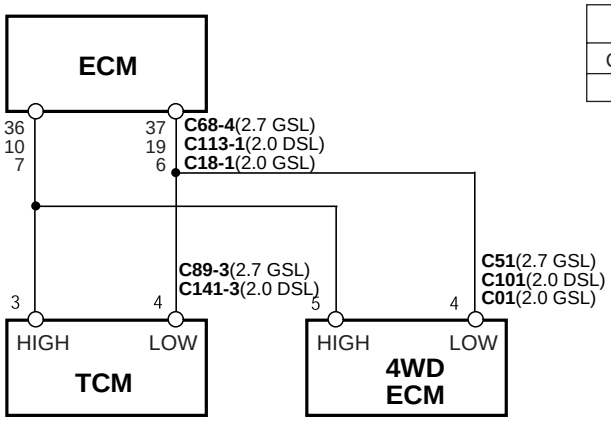
Item	Detecting Condition & Fail Safe	Possible cause
DTC Strategy	• Check voltage range	• Open or Short in CAN communication harness • Faulty ECM • Faulty TCM
Enable Conditions	• IG switch ON • No actuator test • No FAIL SAFE status of 3rd gear holding • No FAIL in PG-A,B • Power voltage ≥ 10V is detected for a series of 0.5 sec • Engine STOP	
Threshold value	• In case of no ECU information	
Diagnostic Time	• 1.5 Sec	
Fail Safe	• INTELLIGENT SHIFT and is inhibited • Learning for oil pressure control is inhibited • Torque Retard requirement is inhibited • Direct connection control of TCC is inhibited	

[2.0 GSL]

Item	Detecting Condition & Fail Safe	Possible cause
DTC Strategy	• Check communication	• Open or Short in CAN communication harness • Faulty ECM • Faulty TCM
Enable Conditions	• Nt ≥ 1000rpm and 5000msec passed from IG "on"	
Threshold value	• CAN message transfer error	
Diagnostic Time	• 0.5 sec	
Fail Safe	• INTELLIGENT SHIFT is inhibited • Learning for oil pressure control is inhibited • Torque Retard requirement is inhibited • Direct connection control of TCC is inhibited	

SCHEMATIC DIAGRAM EFEBACBC

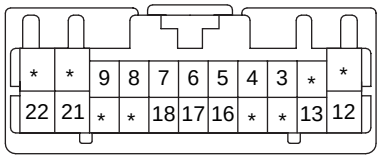
[Circuit Diagram]



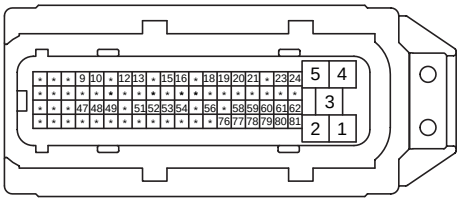
[Connection Information]

Terminal	Connection	Function
C113-1 No.10	C89-3/C141-3 No.3	CAN Communication(HIGH)
C113-1 No.9	C89-3/C141-3 No.4	CAN Communication(LOW)

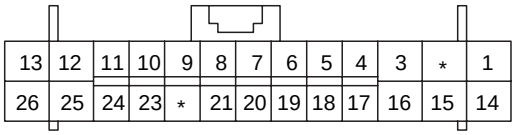
[Harness Connector]



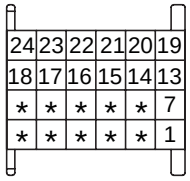
C89-3(2.7 GSL)
C141-3(2.0 DSL)



C113-1(2.0 DSL)



C51(2.7 GSL)
C101(2.0 DSL)
C01(2.0 GSL)



C68-4(2.7 GSL)

6	7	8	9	10	11	*	*	14	*	*	17	18	*	*	21	22	23	24	5	4
*	26	27	*	29	30	31	32	*	*	*	*	37	38	39	*	*	42	43	3	
*	45	*	47	48	*	50	51	52	*	54	55	56	*	58	59	60	61	62		
*	64	65	66	67	68	69	70	71	72	73	*	75	76	77	78	*	80	81	2	1

C18-1(2.0 GSL)

LKIF290A

MONITOR SCANTOOL DATA E7A74CA3

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.
4. Compare it with reference data as below.

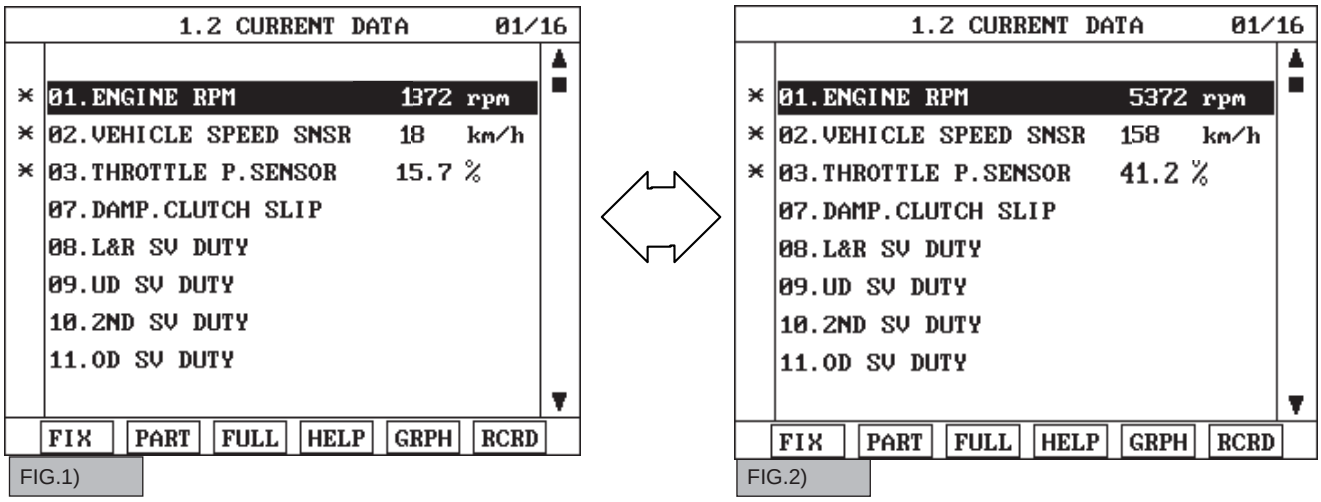


FIG.1) Low-speed
FIG.2) High-speed

EKQE621A

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

YES

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

NO

▶ Go to "Terminal & Connector Inspection" procedure.

TERMINAL & CONNECTOR INSPECTION ED9ECF16

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

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

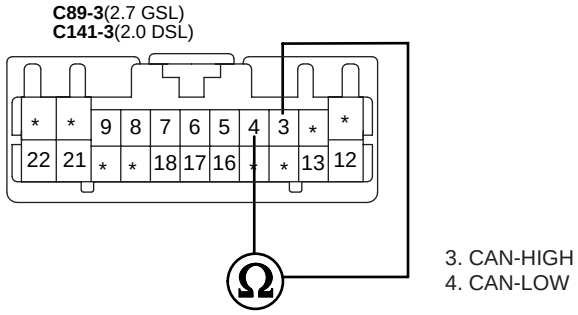
NO

▶ Go to "Signal circuit inspection" procedure.

SIGNAL CIRCUIT INSPECTION E0B57813

1. Ignition "ON" & Engine "OFF".
2. Disconnect the "TCM" connector.
3. Measure resistance between terminal "3" and "4" of the "TCM" harness connector.

Specification : approx. 60 Ω



LKIF290B

4. Is measured resistance within specifications?

YES

▶ Substitute with a known-good TCM and check for proper operation. If the problem is corrected, replace 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 Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR EACFAD44

Refer to DTC P0741.

DTC U0100 CAN - NO ID FROM ECU

COMPONENT LOCATION EDDA3B5D

Refer to DTC U0001.

GENERAL DESCRIPTION ED7EEE43

Refer to DTC U0001.

DTC DESCRIPTION EC1CA398

Refer to DTC U0001.

DTC DETECTING CONDITION EB65CF31

[2.7 GSL]/ [2.0 DSL]

Item	Detecting Condition & Fail Safe	Possible cause
DTC Strategy	• Check voltage range	• Open or Short in CAN communication harness • Faulty ECM • Faulty TCM
Enable Conditions	• IG switch ON • No actuator test • No FAIL SAFE status of 3rd gear holding • No FAIL in PG-A,B • Power voltage ≥ 10V is detected for a series of 0.5 sec • Engine STOP	
Threshold value	• In case of no ECU information	
Diagnostic Time	• 1.5 Sec	
Fail Safe	• INTELLIGENT SHIFT and is inhibited • Learning for oil pressure control is inhibited • Torque Retard requirement is inhibited • Direct connection control of TCC is inhibited	

[2.0 GSL]

Item	Detecting Condition & Fail Safe	Possible cause
DTC Strategy	• Check communication	• Open or Short in CAN communication harness • Faulty ECM • Faulty TCM
Enable Conditions	• Nt ≥ 1000rpm and 5000msec passed from IG "on"	
Threshold value	• No message from ems	
Diagnostic Time	• 1.5 sec	
Fail Safe	• INTELLIGENT SHIFT is inhibited • Learning for oil pressure control is inhibited • Torque Retard requirement is inhibited • Direct connection control of TCC is inhibited	

SCHEMATIC DIAGRAM E9AFFBC1

Refer to DTC U0001.

MONITOR SCANTOOL DATA E77CBB84

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.
4. Compare it with referance data as below.

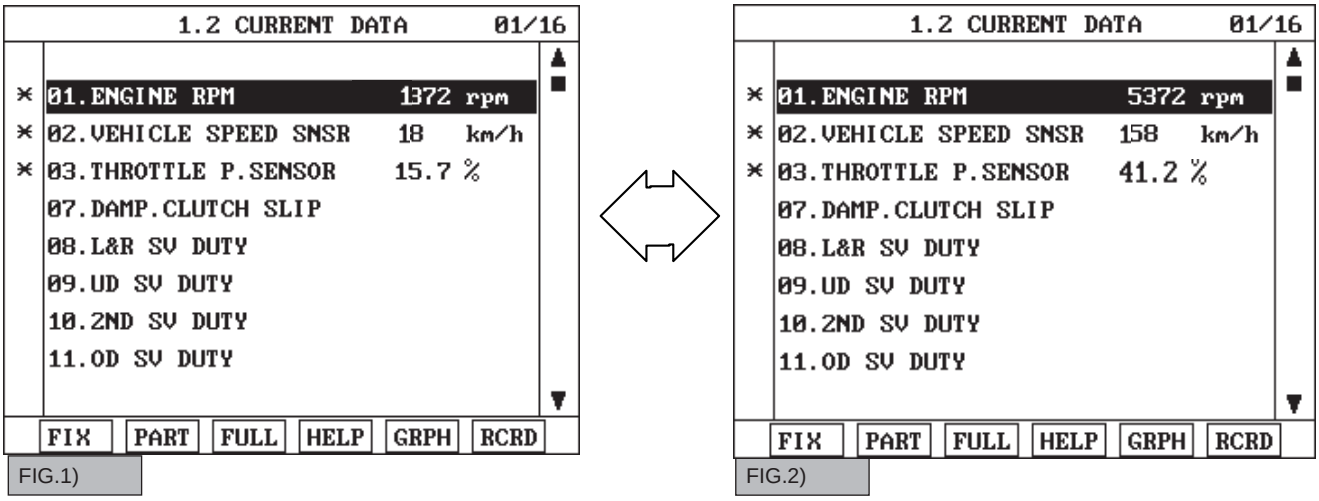


FIG.1) Low-speed
FIG.2) High-speed

EKQE621A

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

YES

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

NO

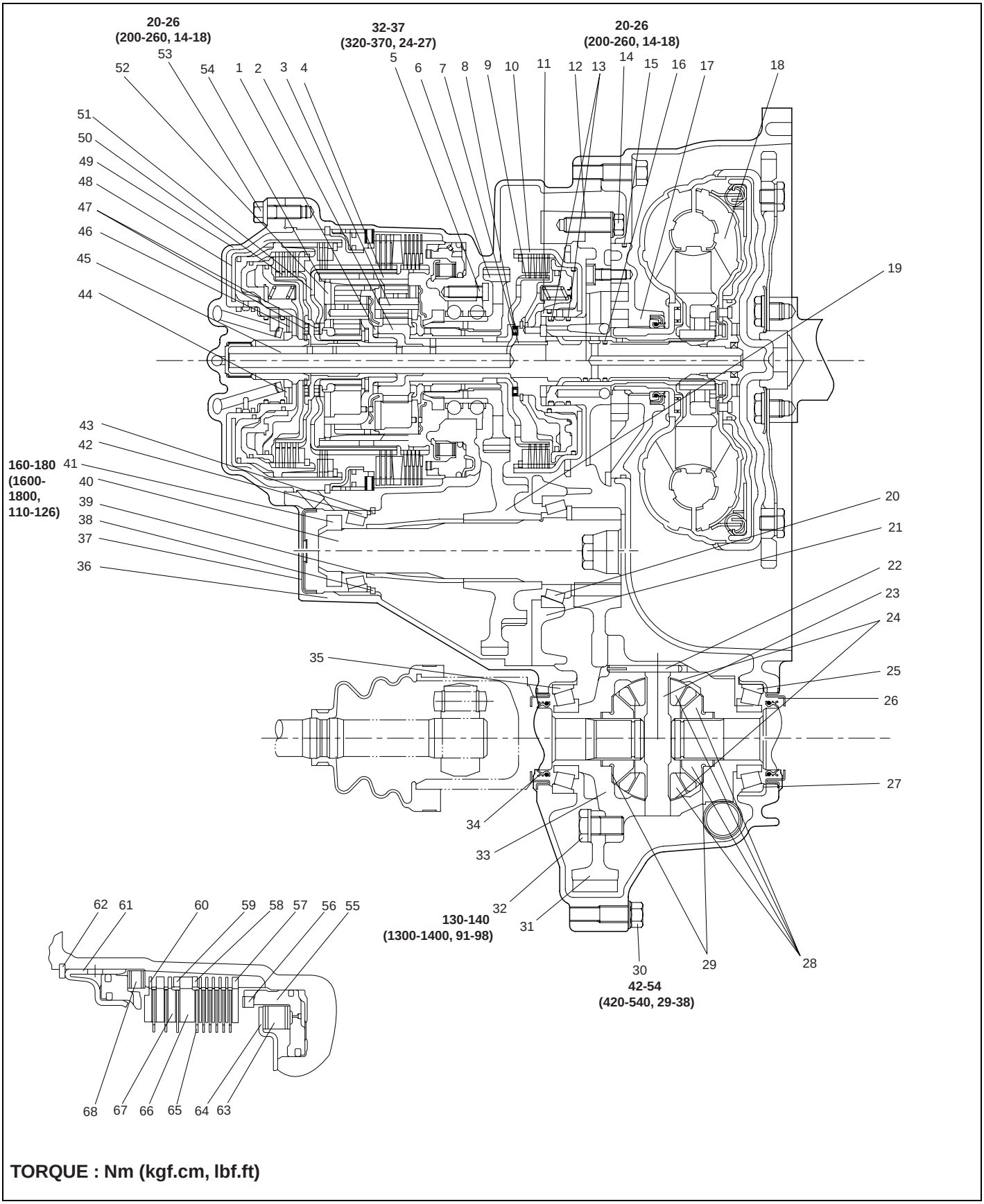
▶ Substitute with a known-good TCM and check for proper operation.
If the problem is corrected, replace TCM as necessary and then go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR EDFCF9D9

Refer to DTC P0741.

AUTOMATIC TRANSAXLE

COMPONENTS (1) E3F929AD



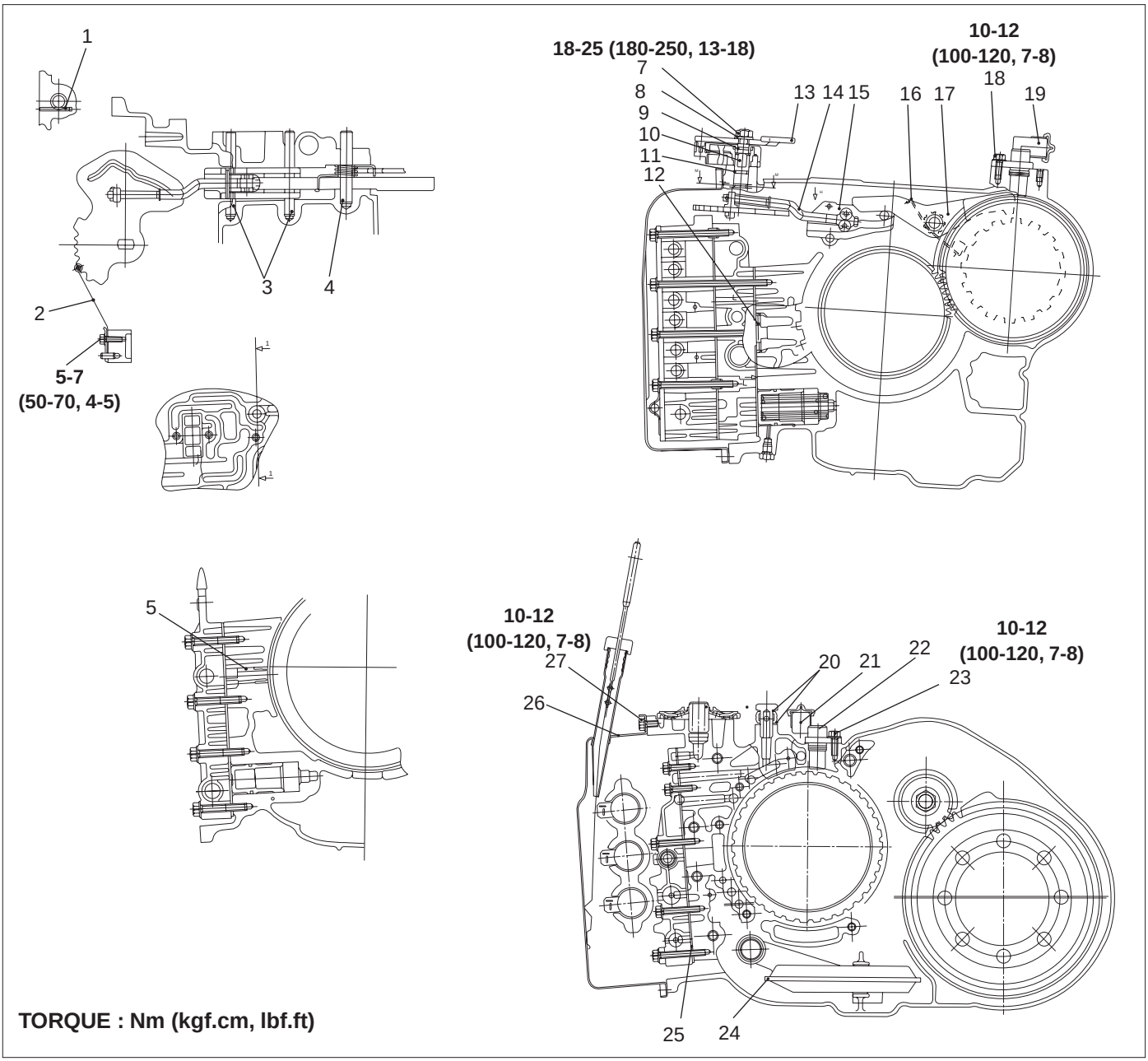
TORQUE : Nm (kgf.cm, lbf.ft)

LKIF006A

1. Thrust bearing
2. Underdrive sun gear
3. Output carrier
4. Low and reverse annulus gear
5. Bolt
6. Transfer drive gear
7. Snap ring
8. Thrust bearing
9. Underdrive clutch hub
10 . Underdrive clutch
11. Thrust washer
12. Oil pump gasket
13. Seal ring
14. Flange bolt
15. O-ring
16. Seal ring
17. Oil pump
18. Torque converter
19. Transfer driven gear
20. Taper roller bearing
21. Bearing retainer
22. Lock pin
23. Pinion shaft
24. Washer
25. Taper roller bearing
26. Oil seal
27. Differential spacer
28. Differential gear
29. Differential spacer set
30. Flange bolt
31. Differential drive gear
32. Fly wheel bolt
33. Differential case
34. Oil seal
35. Transmission case
36. One-way Clutch Inner Race
37. Sealing cap
38. Output spacer set
39. Collar
40. Output shaft
41. Locking pin
42. Roller bearing
43. Snap ring
44. Thrust race
45. Input shaft
46. Thrust bearing
47. Thrust bearing
48. Return & O/D clutch
49. Rear cover
50. O/D clutch hub
51. Return sun gear
52. Output carrier
53. Flange bolt
54. Snap ring
55. Low and reverse brake piston
56. Wave spring
57. Brake pressure plate
58. Snap ring
59. Snap ring set
60. Brake pressure plate
61. 2nd brake retainer
62. Snap ring
63. 2nd brake return spring
64. Brake disc
65. Brake reaction plate
66. Brake plate
67. Brake spring retainer
68. Low and reverse return spring

LKIF006B

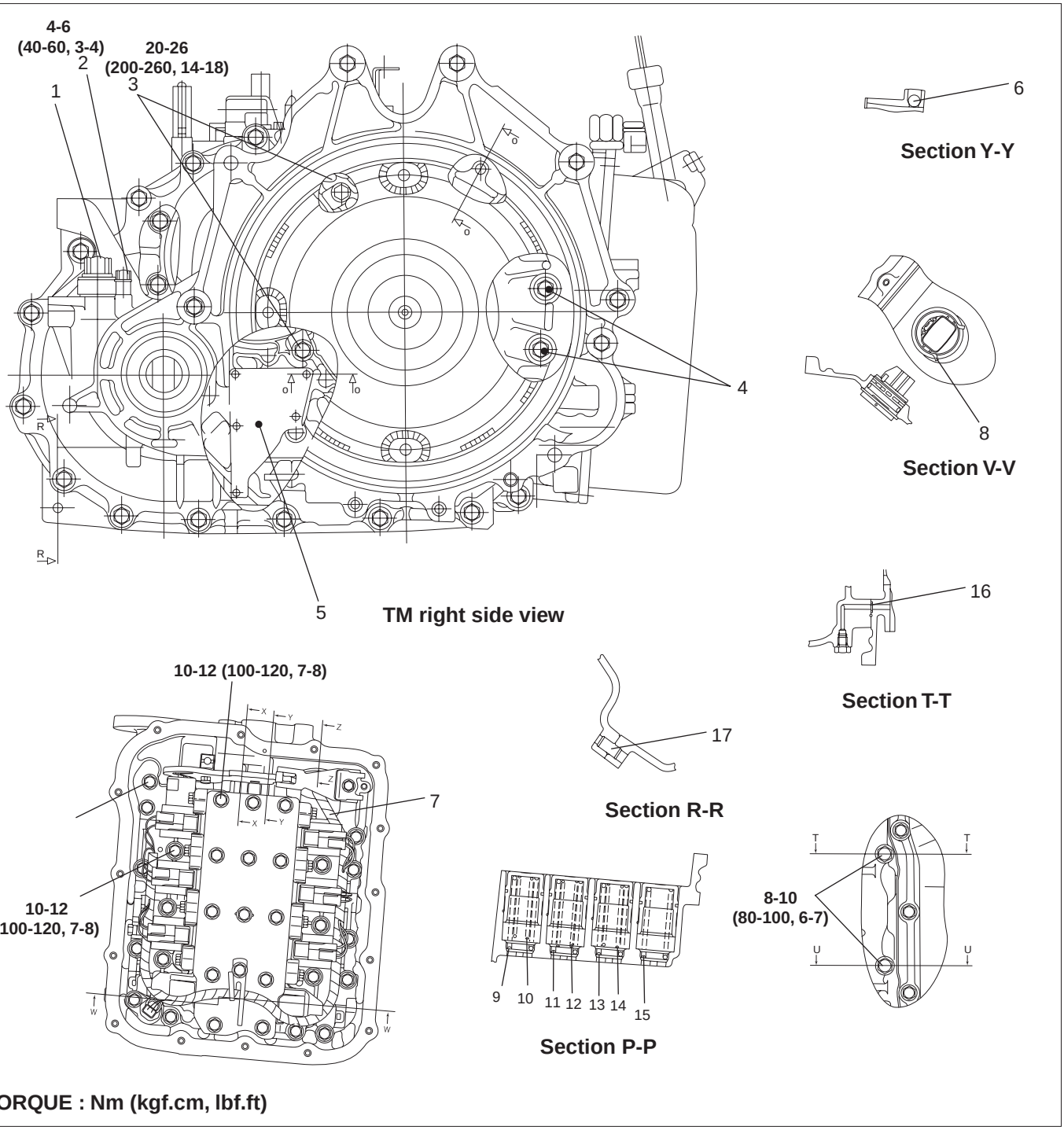
COMPONENTS (2)



1. Roller
2. Detent spring
3. Parking roller shaft
4. Parking spring shaft
5. Oil seal
6. 2nd brake retainer
7. Flange nut
8. Spring washer
9. Oil ring
10. Manual control shaft
11. Oil ring
12. Oil strainer
13. Manual control lever
14. Parking roller rod
15. Parking roller shaft
16. Parking sprag
17. Parking sprag shaft
18. Flange bolt
19. Output speed sensor
20. Eye bolt
21. Gasket
22. Input speed sensor
23. Flange bolt
24. Oil filter
25. Valve body gasket
26. Valve body
27. Flange bolt

LKIF006C

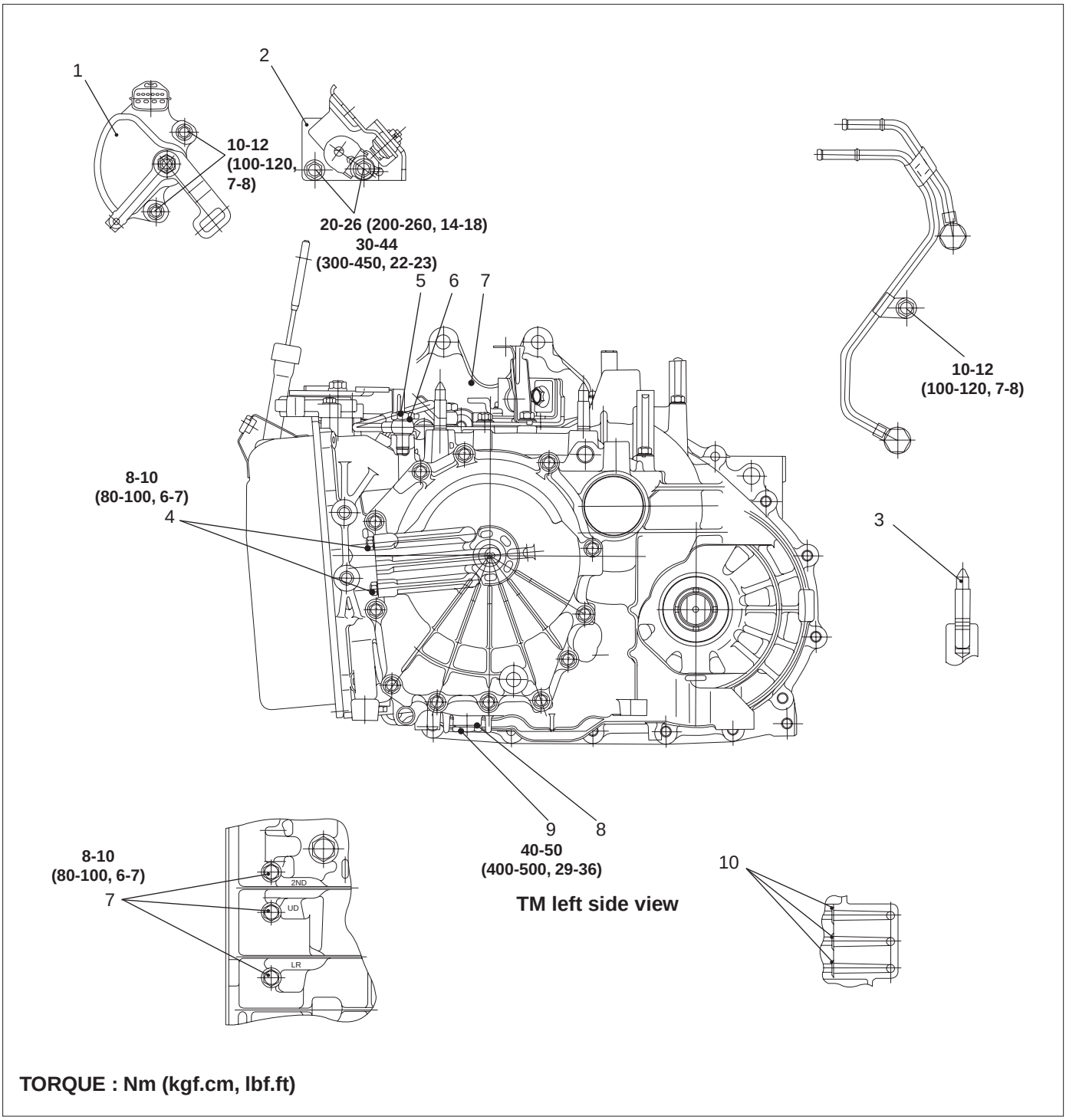
COMPONENTS (3)



1. Vehicle speed sensor
2. Washer
3. Seal bolt
4. Flange bolt
5. Oil guide
6. Steel ball
7. Harness
8. Snap ring
9. Coil spring
10. Coil spring
11. Coil spring
12. Coil spring
13. Coil spring
14. Coil spring
15. Coil spring
16. O-ring
17. Dowel pin

LKIF006D

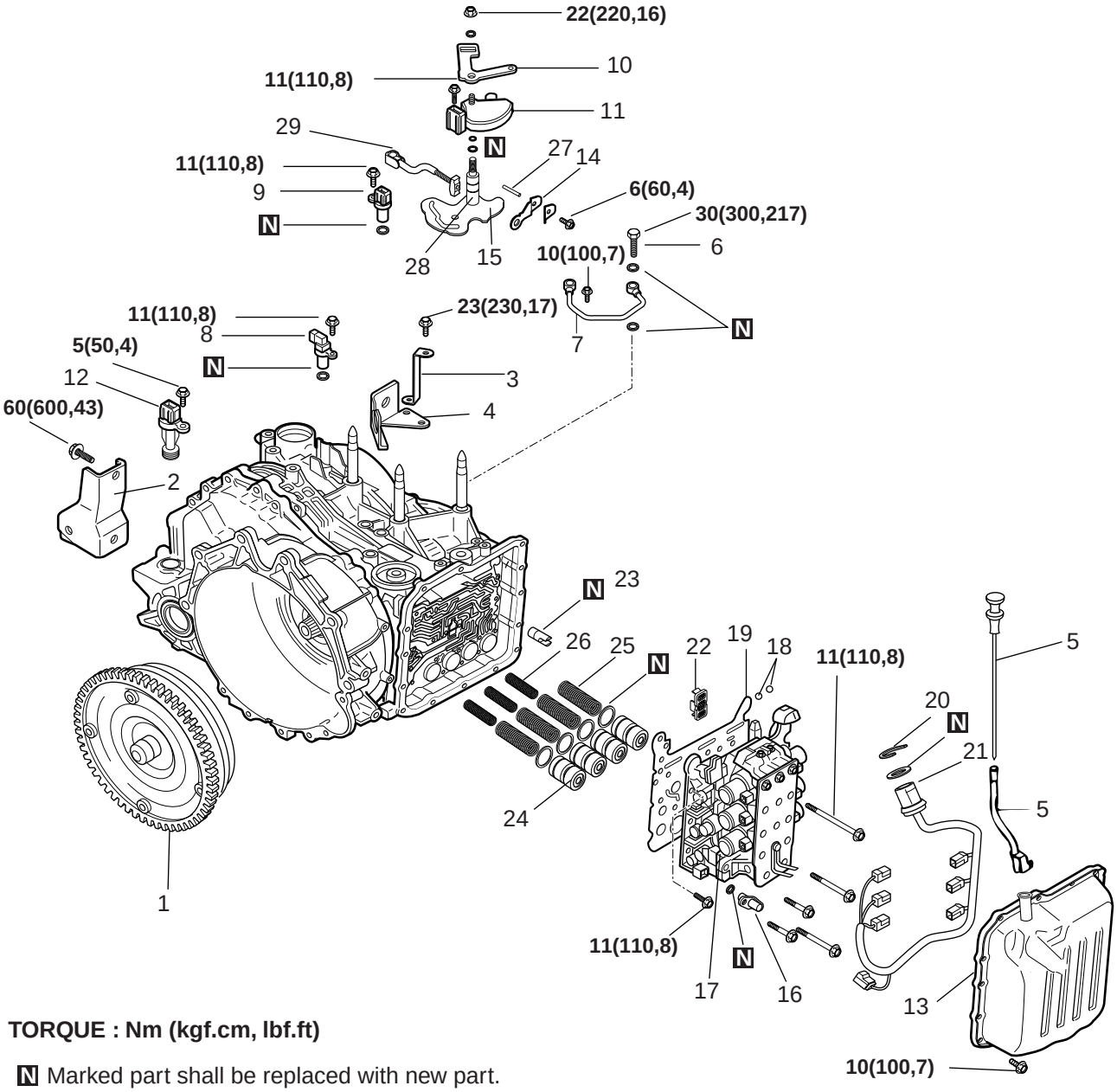
COMPONENTS (4)



1. Inhibitor switch
2. Control cable bracket
3. Stud
4. Pressure check plug
5. Eye bolt
6. Gasket
7. Converter housing
8. Gasket
9. Magnet plug
10. Accumulator piston

LKIF006E

COMPONENTS (5)

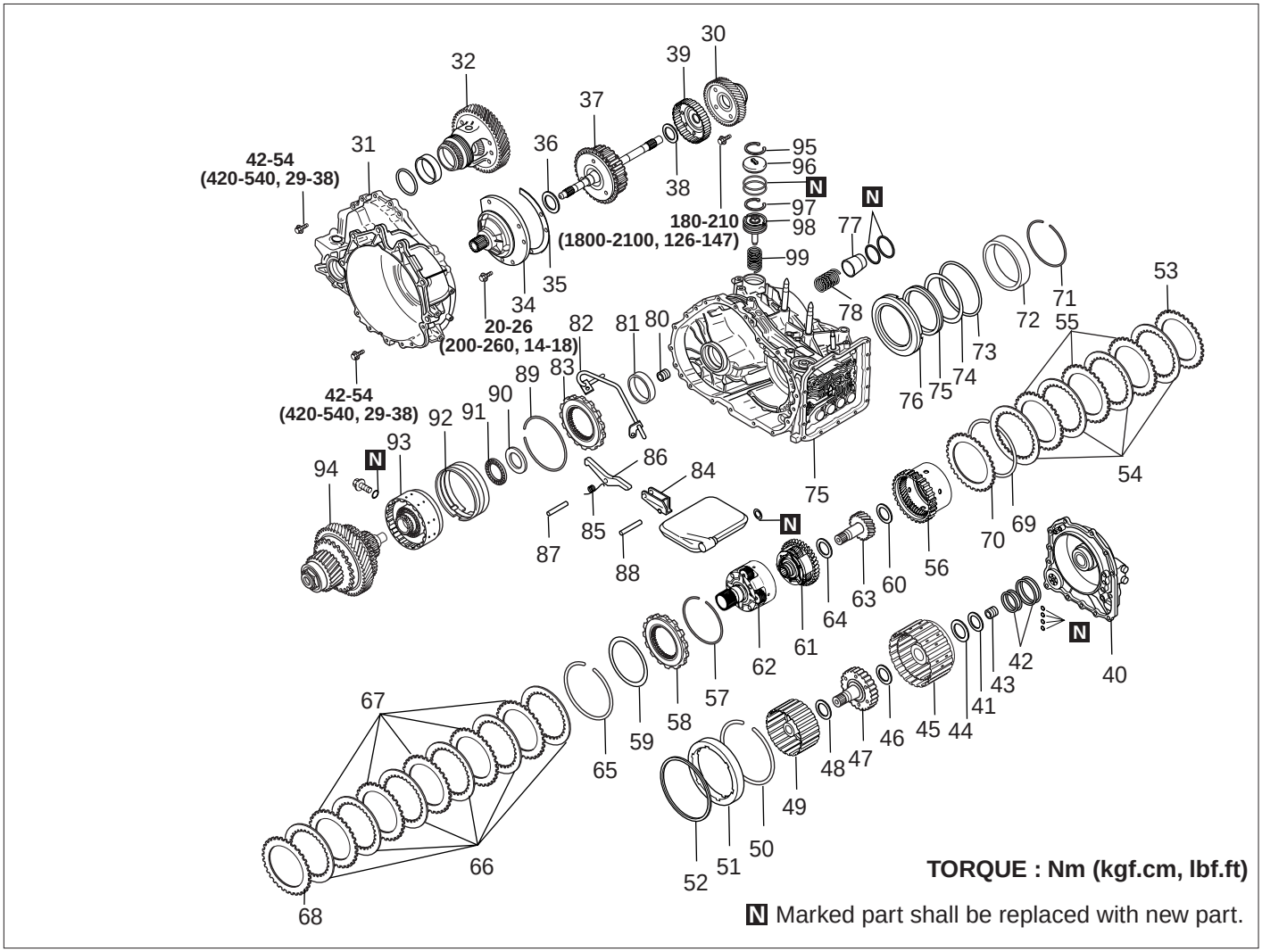


TORQUE : Nm (kgf.cm, lbf.ft)

N Marked part shall be replaced with new part.

1. Torque converter
2. Roll stopper bracket
3. Harness bracket
4. Shift cable bracket
5. Oil level gauge
6. Eye bolt
7. Oil cooler feed tube
8. Output speed sensor
9. Input speed sensor
10. Manual control lever
11. Inhibitor switch
12. Speedometer gear
13. Valve body cover
14. Detent spring
15. Manual control shaft assembly
16. Oil temperture sensor
17. Valve body
18. Steel ball
19. Gasket
20. Snap ring
21. Solenoid valve harness
22. Strainer
23. 2nd brake retainer oil seal
24. Accumulator piston
25. Accumulator spring
26. Accumulator spring
27. Manual control lever shaft roller
28. Manual control lever shaft
29. Parking roller rod

LKIF006F

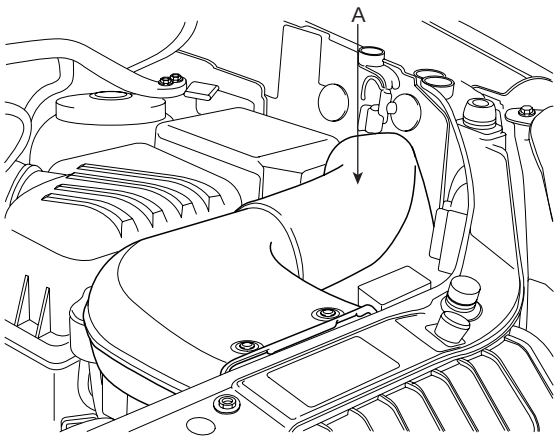


30. Transfer drive gear set
31. Converter housing
32. Differential
33. Oil filter
34. Oil pump
35. Gasket
36. Thrust washer #1
37. Underdrive clutch & input shaft
38. Thrust bearing #2
39. Underdrive clutch hub
40. Rear cover
41. Thrust race #8
42. Seal ring
43. Input shaft rear bearing
44. Thrust bearing #7
45. Reverse & overdrive clutch
46. Thrust bearing #6
47. Overdrive clutch hub
48. Thrust bearing #5
49. Planet carrier reverse sun gear
50. Snap ring
51. 2nd brake piston
52. Return spring
53. Pressure plate
54. 2nd brake disc
55. 2nd brake plate
56. Low & reverse annulus gear
57. Snap ring
58. One-way clutch 1
59. Stopper plate
60. Thrust bearing #4
61. Overdrive planetary carrier
62. Output planetary carrier
63. Underdrive sun gear
64. Thrust bearing #3
65. Snap ring
66. LR brake disc
67. LR brake plate
68. Pressure plate
69. Snap ring
70. Reaction plate
71. Snap ring
72. Inner race
73. Wave spring
74. Spring retainer
75. Return spring
76. LR brake piston
77. Accumulator piston
78. Spring
79. Transaxle case
80. Needle bearing
81. Outer race
82. Pipe
83. One-way clutch 2
84. Parking roller support
85. Hole spring
86. Parking ball spring
87. Parking ball shaft
88. Parking roller support shaft
89. Snap ring
90. Thrust race
91. Thrust bearing
92. Reduction brake band
93. Direct clutch
94. Direct planetary carrier
95. Snap ring
96. Reduction brake band
97. Snap ring
98. Reduction brake piston
99. Reduction brake spring

LKIF006G

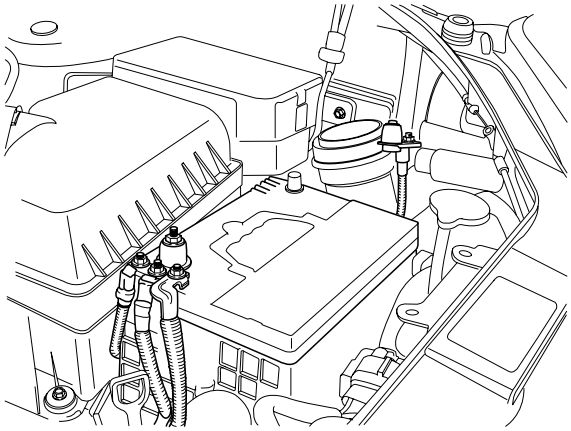
REMOVAL EE60E84B

1. Remove the air duct(A).



LKIF007A

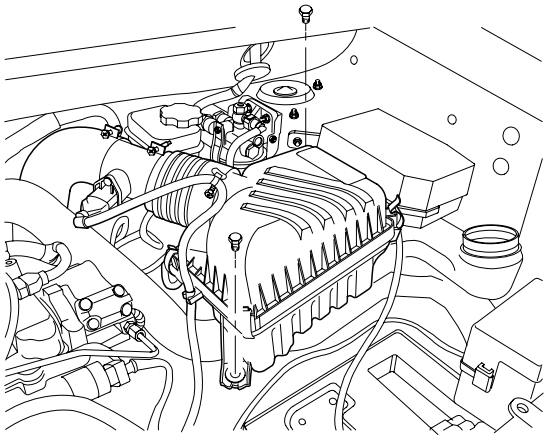
2. Remove the battery.



LKIF007B

3. Remove the battery tray.

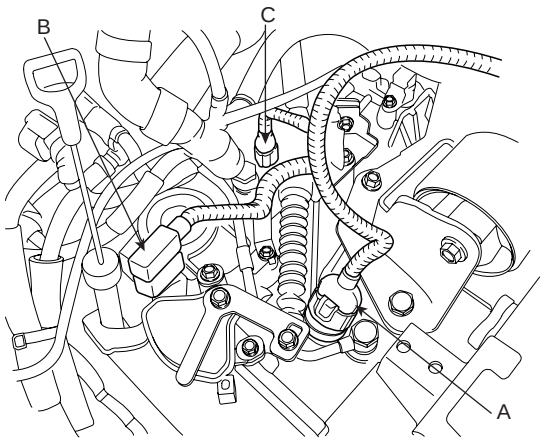
4. Remove the air cleaner assembly.



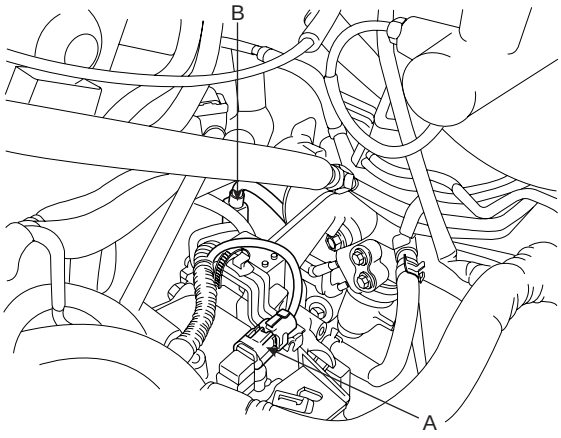
LKIF007C

5. Remove the intercooler inlet pipe.

6. Disconnect the connectors relevant to the transaxle.



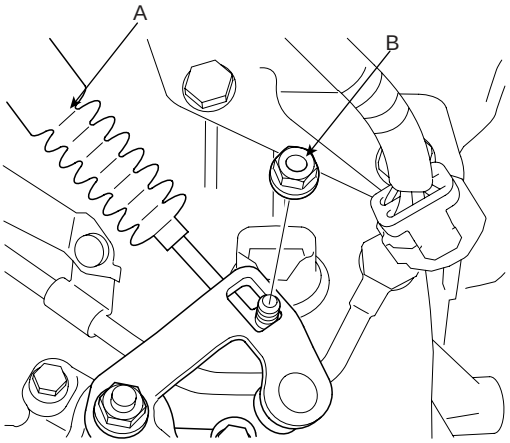
LKIF007D



LKIF007E

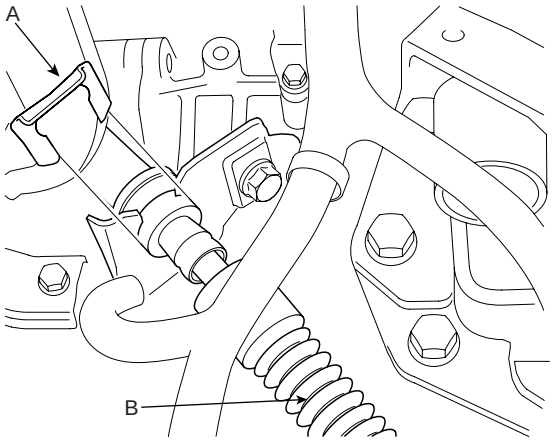
7. Disconnect the ground earth wire.

8. Remove the bolt(B) which mounts the clutch release cylinder(A) to the inhibiter switch.



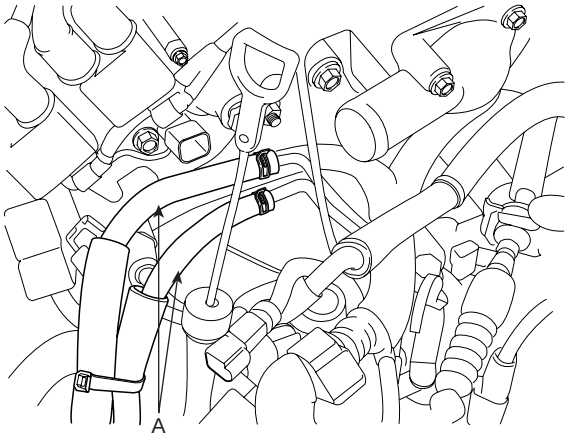
LKIF007F

9. Detach the clutch release cylinder(B) clip(A).



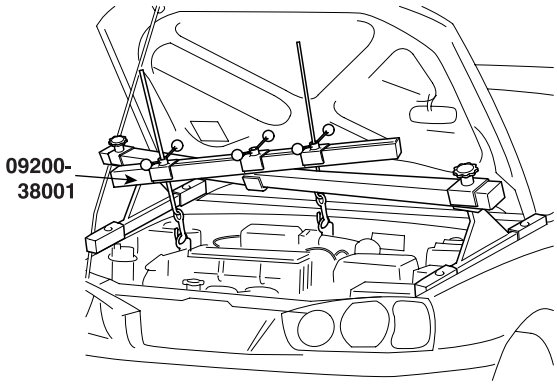
LKIF007G

10. Detach the hoses(A), loosening the oil cooler hose clamps.



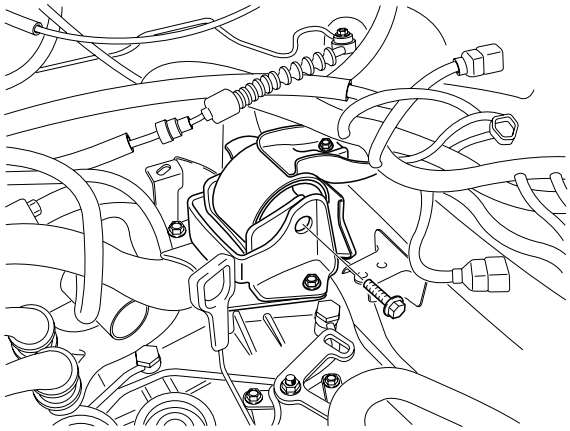
LKIF007H

11. Using SST(09200-38001), support the engine.

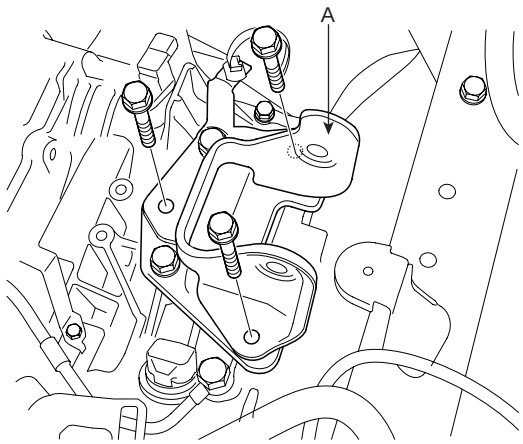


LKIF007I

12. Remove the trasaxle mounting bracket(A) bolts.

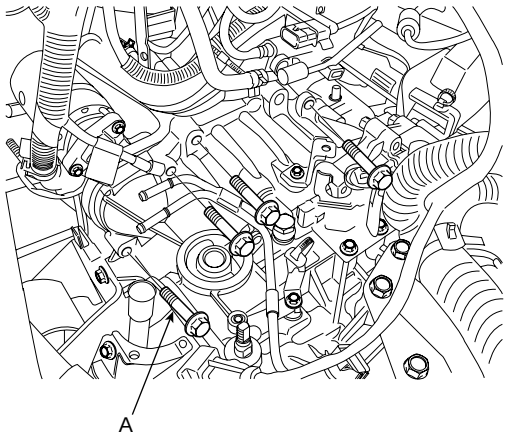


LKIF007J



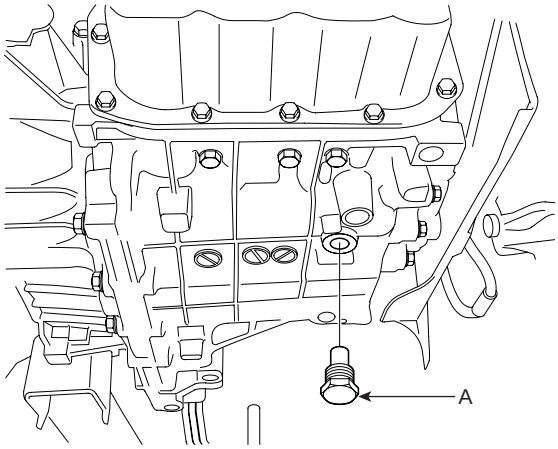
LKIF007K

13. Remove the transaxle upper mounting bolts(A).



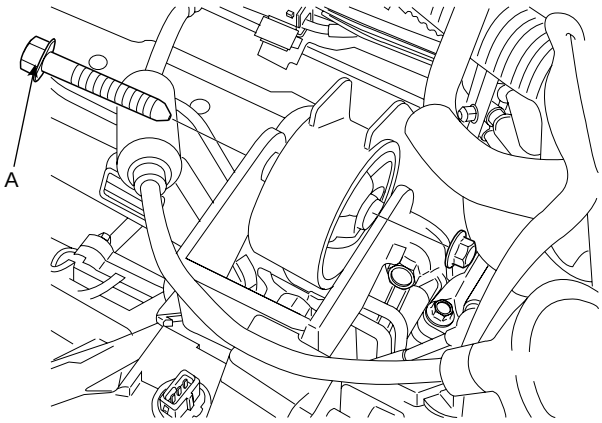
LKIF007L

14. Remove the bolts which mount the transaxle to the front sub frame.
15. Lift up the vehicle.
16. After removing the oil drain plug(A), Drain the fluid.



LKIF007M

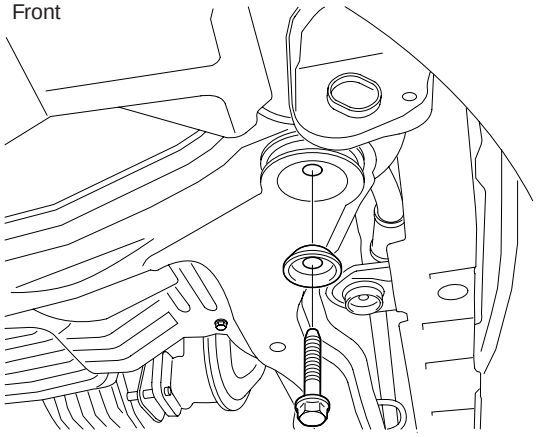
17. Support the transaxle with a jack.
18. Remove the steering column bolt(See 'ST' group).
19. Remove the driveshafts (See 'DS' group-'DRIVE-SHAFT').
20. Remove the bolt(A) which mounts the transaxle to the rear sub-frame.



LKIF007N

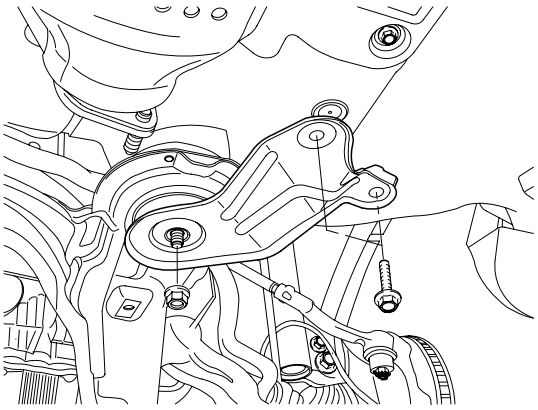
21. Remove the sub-frame. If it is a 4 wheel drive vehicle(4WD), remove the propeller shaft first(See 'DS' group-'PROPELLER SHAFT').

■ Front



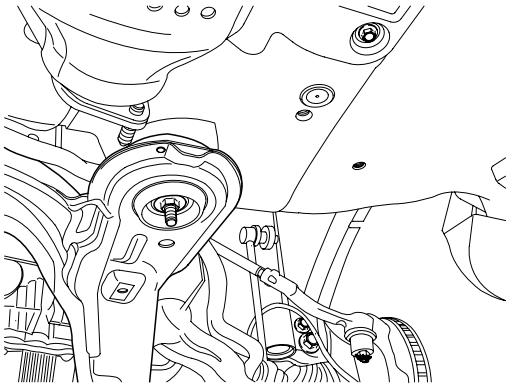
LKIF007O

■ Rear



LKIF007P

■ Rear



LKIF007Q

22. Remove the transaxle lower mounting bolts.

23. Remove the transaxle assembly.

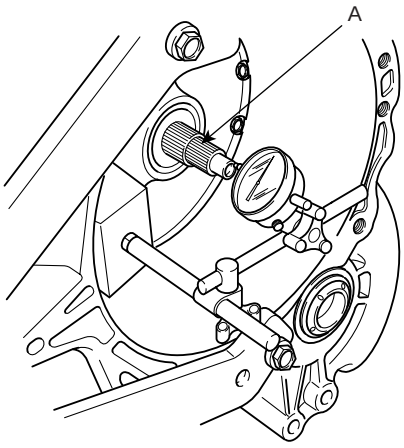
DISASSEMBLY E86ECC9B

CAUTION

- ***Because the automatic transmission is manufactured from high-precision parts, sufficient care must be taken not to scratch or damage these parts during disassembly and reassembly.***
- ***The working area should be convered with a rubber mat to keep it clean at all times.***
- ***Do not wear any cloth gloves and do not use any rags during disassembly. Use nylon cloth or paper towels if you need to use something.***
- ***Parts which have been disassembled should all be cleaned. Metal parts can be cleaned with normal detergent but they should be dried completely using compressed air.***
- ***Clutch discs, plastic thrust plates and rubber parts should be cleaned with automatic transmission fluid (ATF) so that they do not become dirty.***
- ***If the transmission body has been damaged, disassemble and clean the cooler system also.***

1. Remove the torque converter and set aside.

2. Measure the input shaft(A) end play.



BKGE004A

3. Remove the left and right roll stopper brackets.

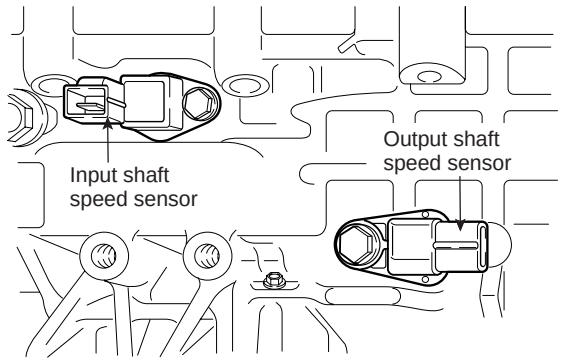
4. Remove the wiring harness bracket.

5. Remove the control cable support bracket.

6. Remove the dipstick.

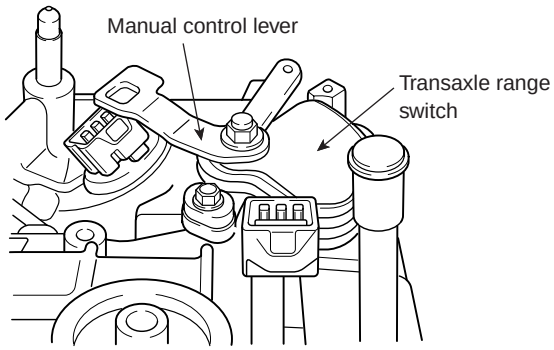
7. Remove the oil cooler feed tube, gasket, and eye bolt.

8. Remove the input shaft speed sensor and the output shaft speed sensor.



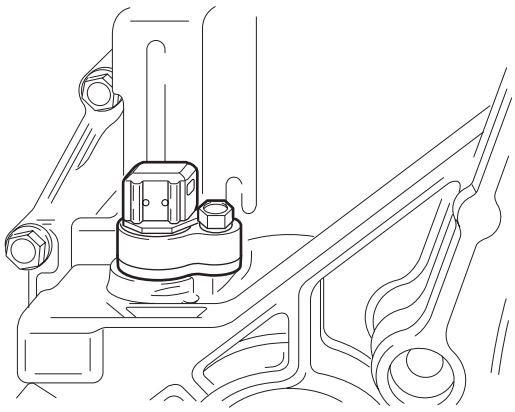
BK1A052B

9. Remove the manual control lever, then remove the transaxle range switch.



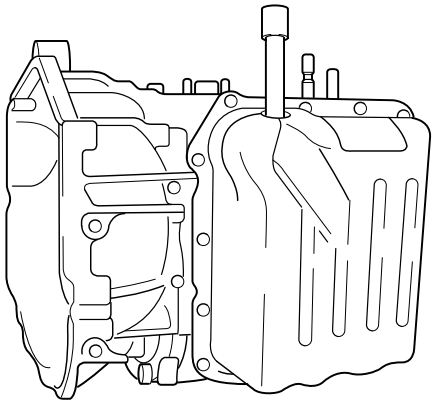
BK1A052C

10. Remove the vehicle speed sensor.



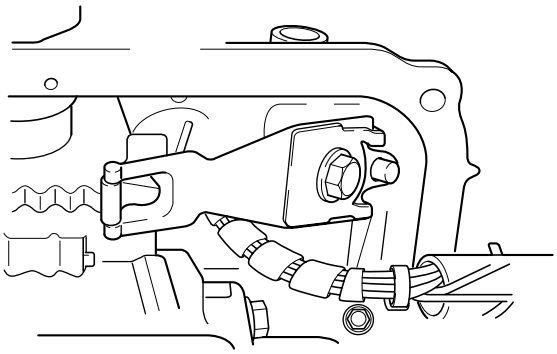
BK1A052D

11. Remove the valve body cover.



BK1A052E

12. Remove the manual control shaft detent.

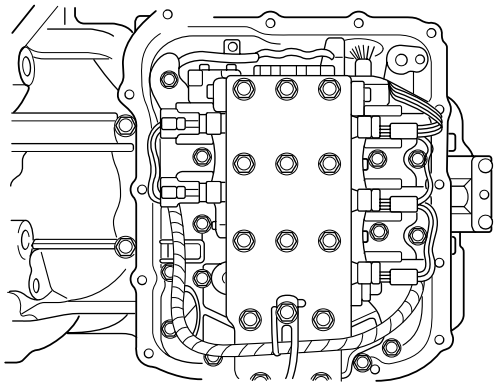


BK1A052F

13. Disconnect the harness connectors of the valve body.

CAUTION

To prevent damage to transaxle components make sure that the manual control lever and the park/neutral switch have been removed before attempting to remove the valve body.

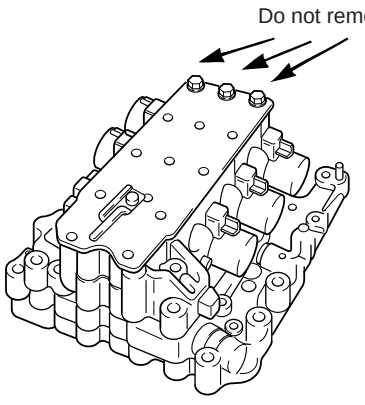


BK1A052G

NOTE

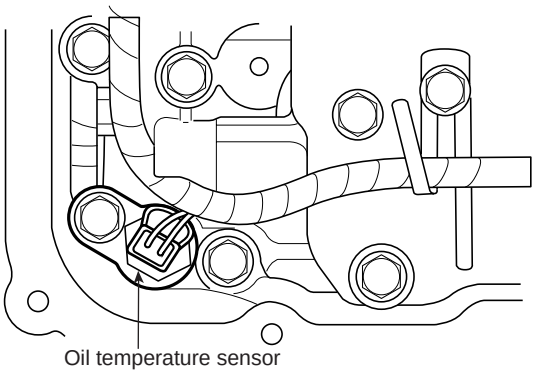
The valve body mounting bolts are different lengths. Note the locations of the bolts to aid in assembly.

14. Remove 28 of the valve body mounting bolts. Do not remove the bolts shown in the illustration at this time.



BK1A052H

15. Remove the oil temperature sensor.

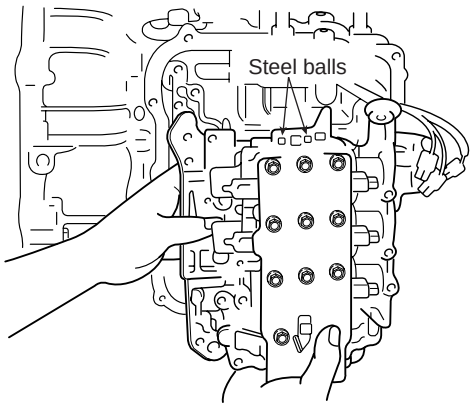


BKGE004C

16. Remove the valve body, gasket, and the 2 steel balls.

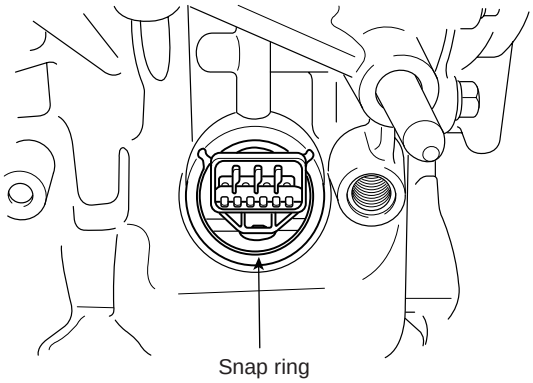
NOTE

Make sure not to lose the 2 steel balls.



BK1A052I

17. Remove the solenoid valve wiring harness snap ring.



BKGE004B

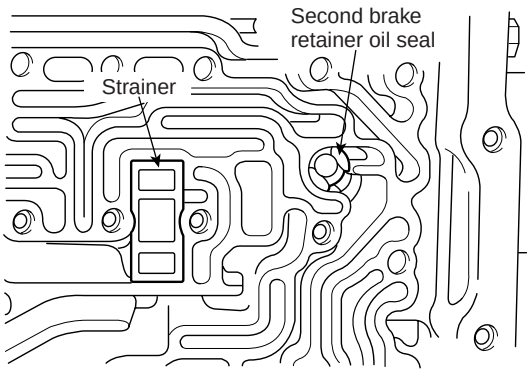
18. Remove the solenoid valve harness.

19. Remove the strainer.

20. Remove the second brake retainer oil seal.

CAUTION

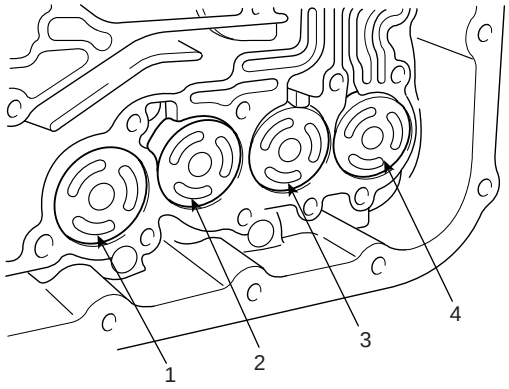
The second brake retainer oil seal must be removed before removing the transaxle powertrain components from the case or damage to the seal will occur.



BK1A052K

21. Remove the 4 accumulator pistons, the 4 large springs, and the 3 small springs.

Number	Functional Name
1	Low-Reverse Brake
2	Underdrive Clutch
3	Second Brake
4	Overdrive Clutch

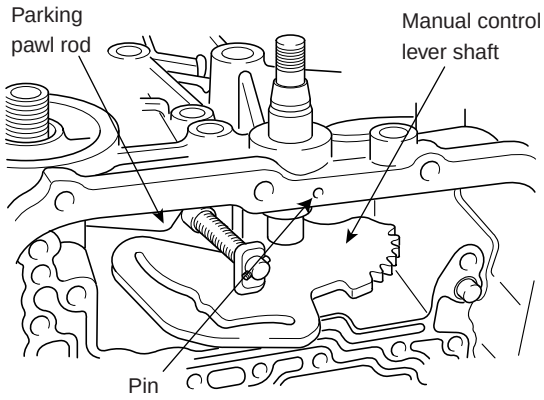


BK1A052L

22. Remove the manual control lever shaft pin (roller).

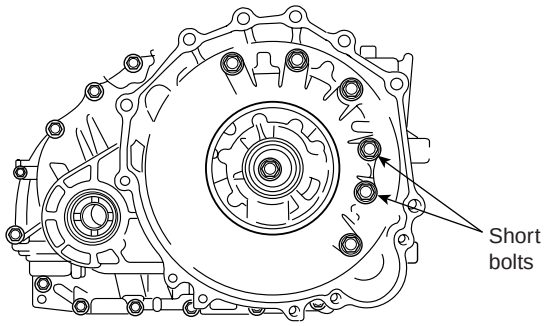
23. Remove the manual control lever shaft.

24. Remove the parking pawl rod.



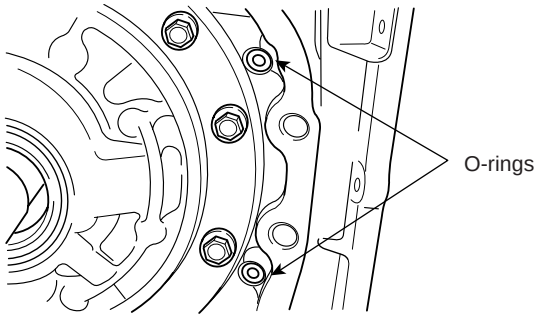
BK1A052M

25. Remove the torque converter housing and 18 mounting bolts. Tap the housing off with a non-metallic hammer.



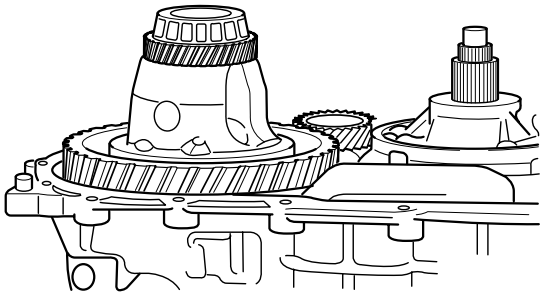
BK1A052N

26. Remove the 2 O-rings from the case.



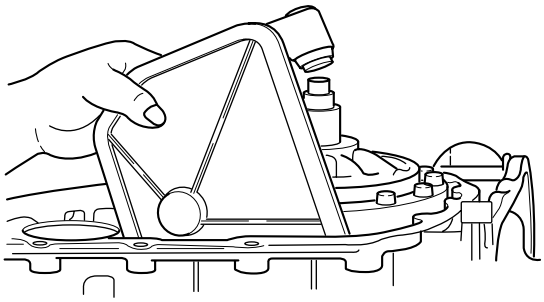
BK1A052O

27. Remove the differential.



BK1A052P

28. Remove the main oil filter.

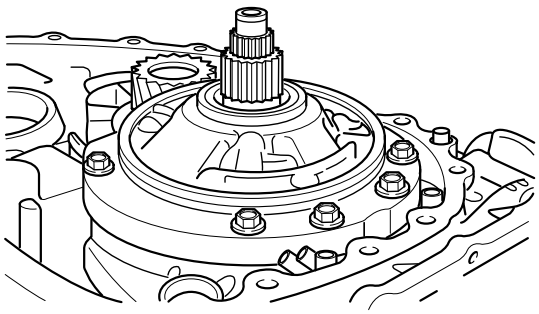


BK1A052Q

29. Remove oil pump mounting bolts.

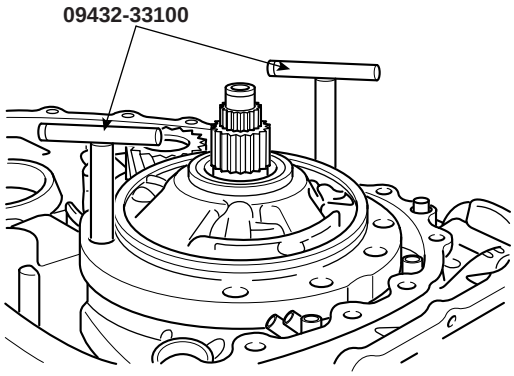
CAUTION

The oil pump is not serviceable, it must be replaced as a pump assembly. Do not disassemble the pump as improper alignment during assembly will cause pump failure and could cause damage to the transaxle.



BK1A052R

30. Install the special tool (09452-33100), as shown in the illustration.

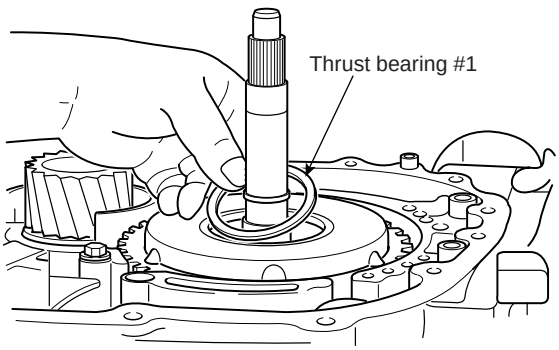


BK1A052S

31. Remove the oil pump by turning special tool screws clockwise.

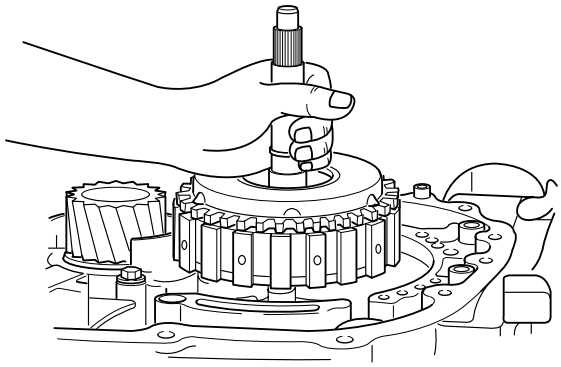
32. Remove the oil pump gasket.

33. Remove thrust bearing #1.



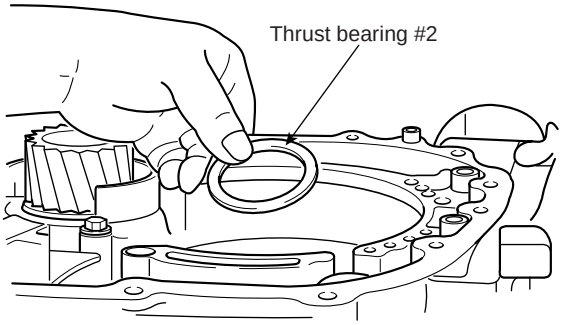
BK1A052T

34. Grasp the input shaft, then pull out the underdrive clutch and input shaft as an assembly.



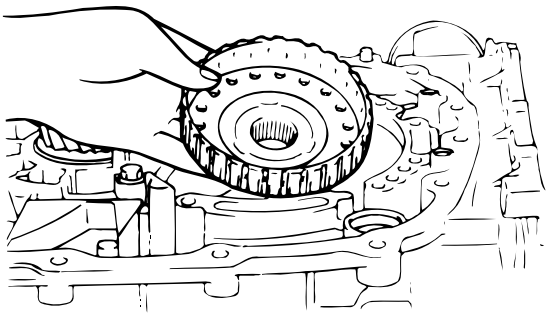
BK1A052U

35. Remove thrust bearing #2.



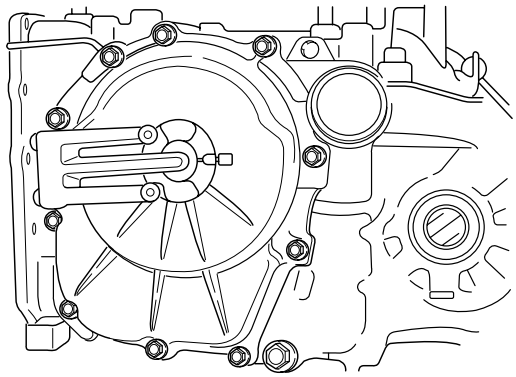
BK1A052V

36. Remove the underdrive clutch hub.



BK1A052W

37. Remove the rear cover and mounting bolts.



BK1A052X

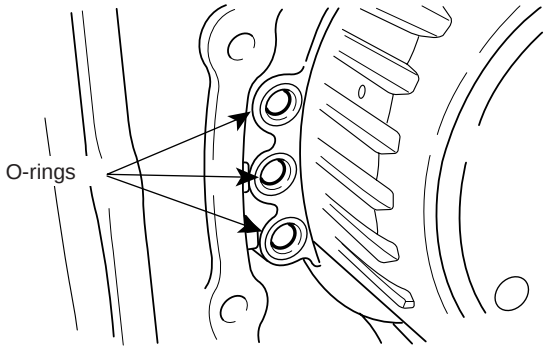
38. Remove the thrust race #8.

39. Remove the 4 seal rings.

NOTE

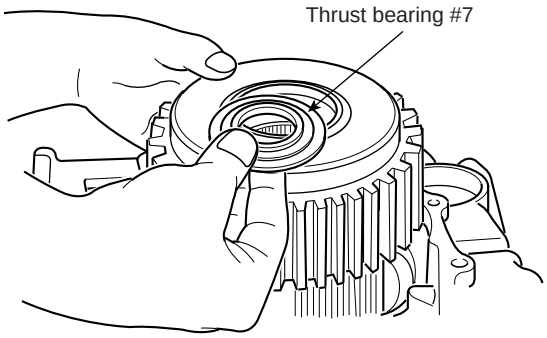
Do not remove the input shaft rear bearing unless directed to do so by the instructor.
Once this bearing has been removed, it MUST be replaced.

40. Remove the 3 O-rings.



BK1A052Y

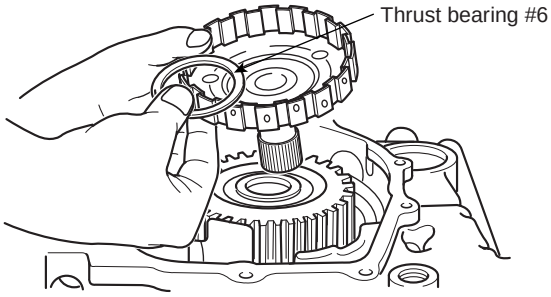
41. Remove thrust bearing #7.



BK1A052Z

42. Remove the reverse and overdrive clutch.

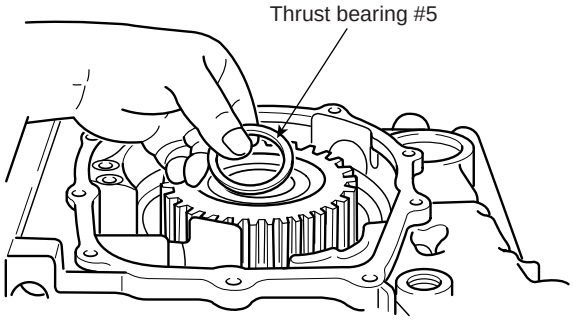
43. Remove thrust bearing #6.



LK1D074A

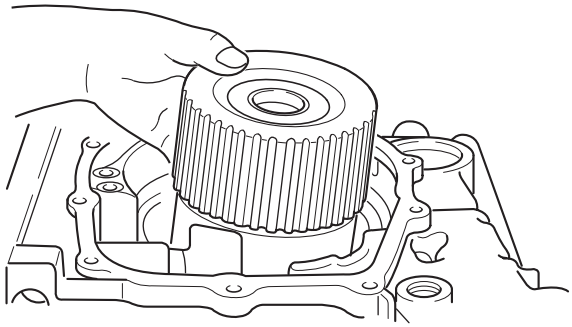
44. Remove the overdrive clutch hub.

45. Remove thrust bearing #5.



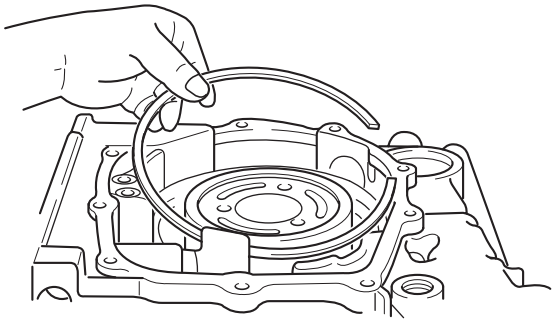
LK1D074B

46. Remove the planetary reverse sun gear.



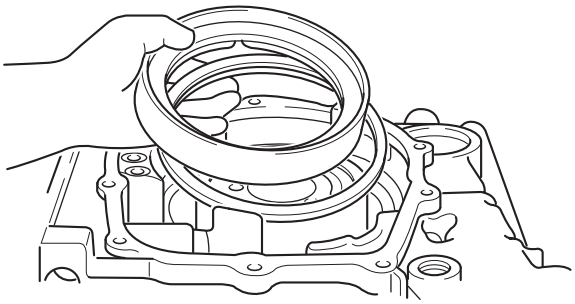
LK1D074C

47. Remove the second brake piston snap ring.



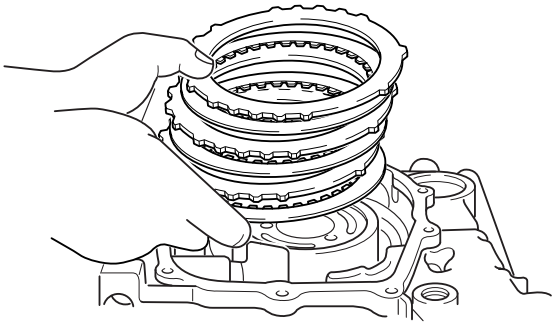
BK1A074D

48. Remove the second brake piston and return spring.



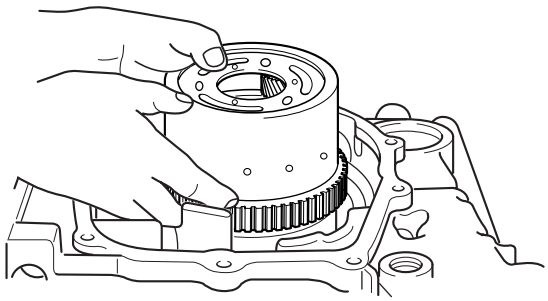
BK1A074E

49. Remove the second brake pressure plate, 3 brake discs, and 2 brake plates.



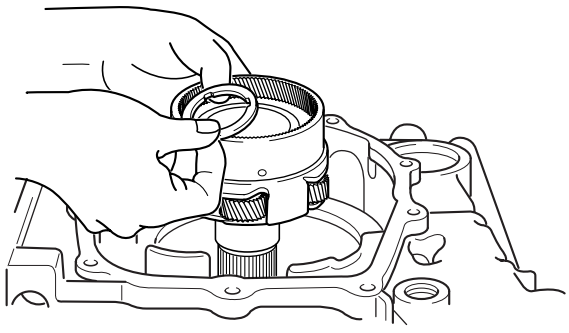
BK1A074F

50. Remove the overdrive planetary carrier.



BK1A074G

51. Remove thrust bearing #4.

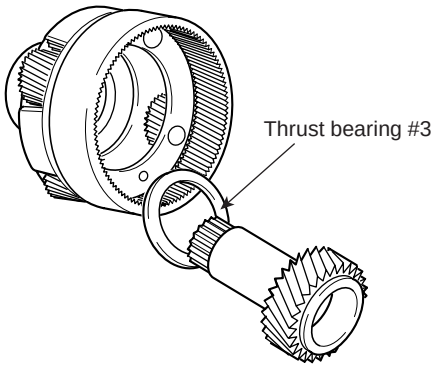


BK1A074H

52. Remove the output planetary carrier.

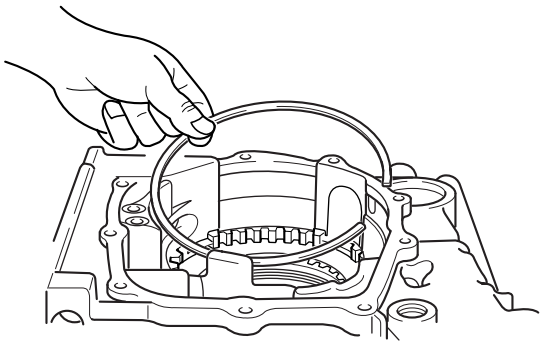
53. Remove the underdrive sun gear.

54. Remove thrust bearing #3.



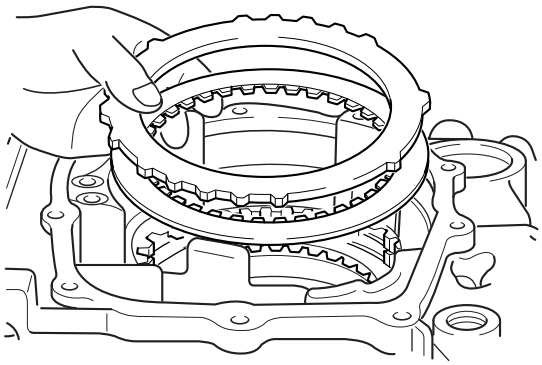
BK1A074I

55. Remove the low and reverse reaction plate snap ring.



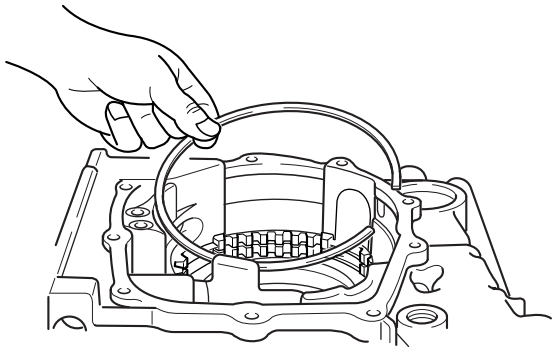
BK1A074J

56. Remove the low and reverse reaction plate and brake disc.



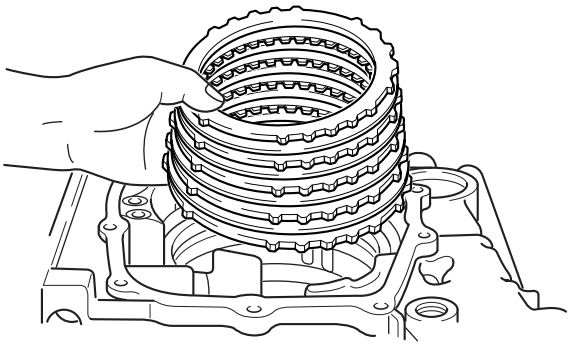
BK1A074K

57. Remove the low and reverse brake snap ring.



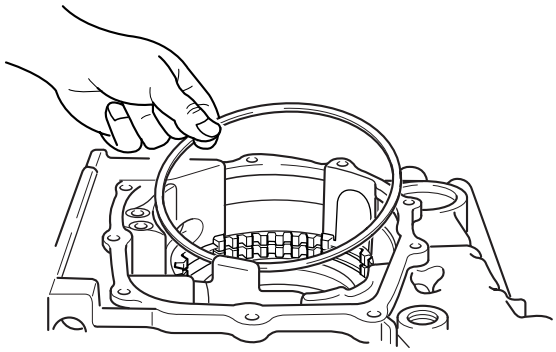
BK1A074L

58. Remove the low and reverse 6 brake discs, 5 brake plates, and brake pressure plate.



BK1A074M

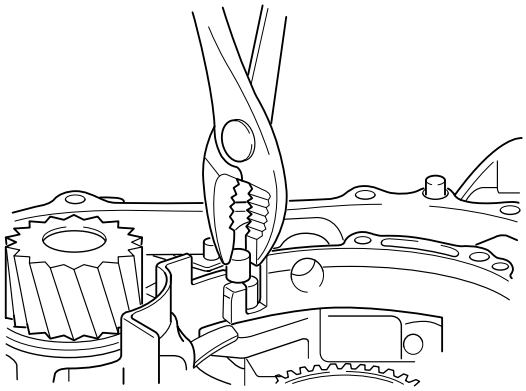
59. Remove the wave spring.



BK1A074N

60. Remove the parking pawl shaft.

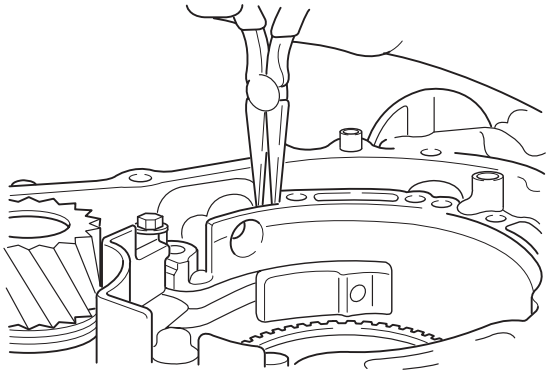
61. Remove the spacer.



BK1A074O

62. Remove the parking pawl spring. Note the orientation of the spring to aid in reassembly.

63. Remove the 2 parking roller support shafts.

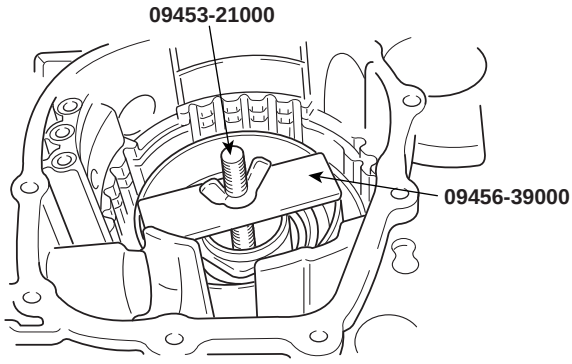


BK1A074P

64. Remove the parking pawl case.

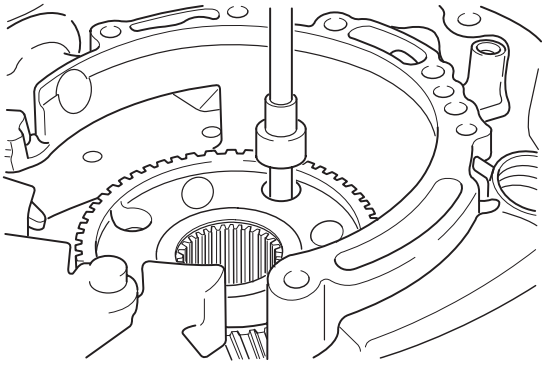
65. Remove the parking roller support.

66. Remove the snap ring.



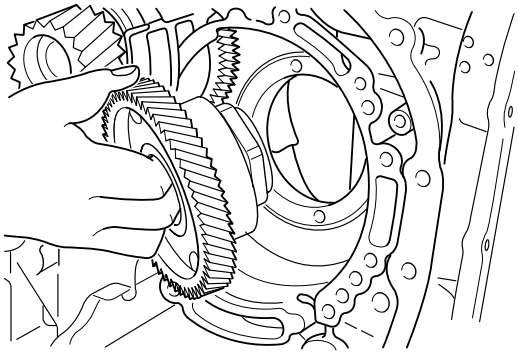
BK1A074Q

67. Remove the spring retainer.
68. Remove the return spring.
69. Remove the low and reverse brake piston. Use compressed air directed into the valve body passage.
70. Remove the 7 transfer gear mounting bolts.



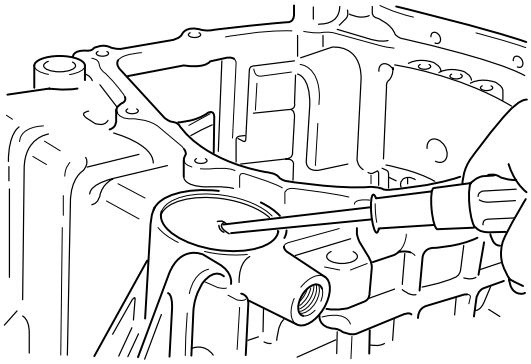
LK1D074R

71. Remove the transfer drive gear.



BK1A074S

72. Remove the plastic cap, if present.

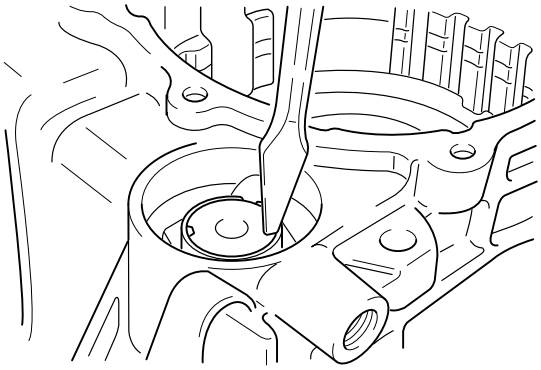


BK1A074T

73. Straighten the locking tab of the output shaft locking nut, if bent.

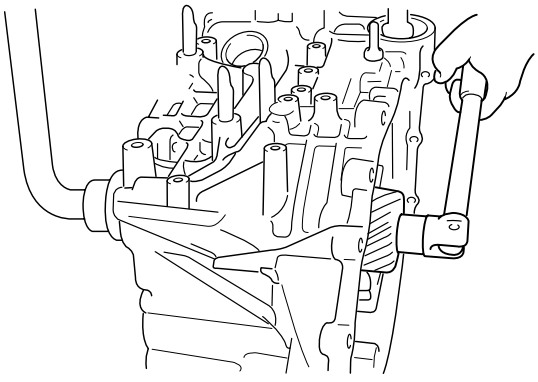
NOTE

The output shaft locking nut is left-hand thread.



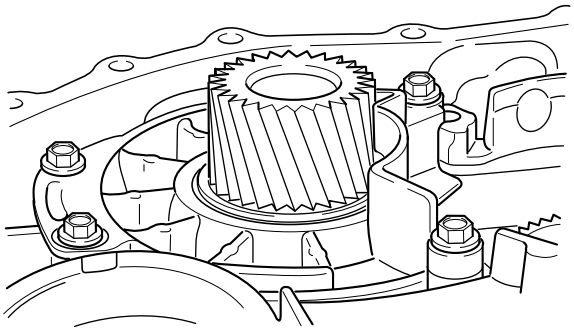
BK1A074U

74. Remove the output shaft locking nut.



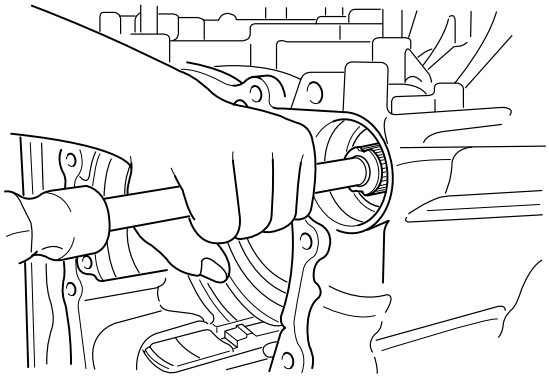
BK1A074V

75. Remove the output shaft bearing retainer mounting bolts.



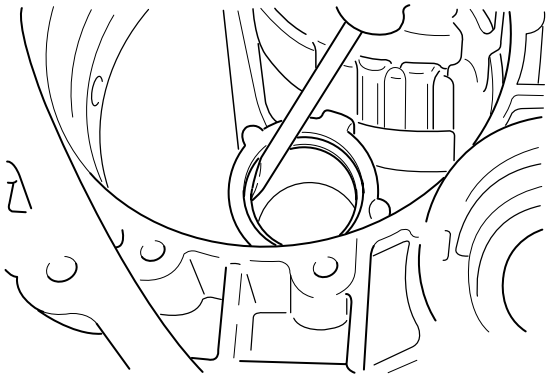
BK1A074W

76. Tap out the output shaft, tapered roller bearing, and the collar from the back side.



BK1A074X

77. Tap out the bearing outer race and spacer using a suitable driver.



BK1A074Y

78. Remove the snap ring.

79. Remove the differential bearing outer race and spacer from the torque converter housing.

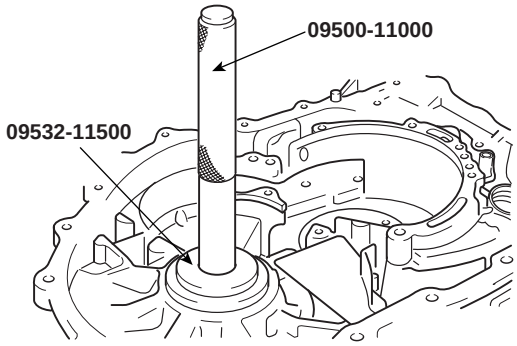
80. Remove the differential bearing outer race from the transaxle case.

REASSEMBLY EA7472C2

CAUTION

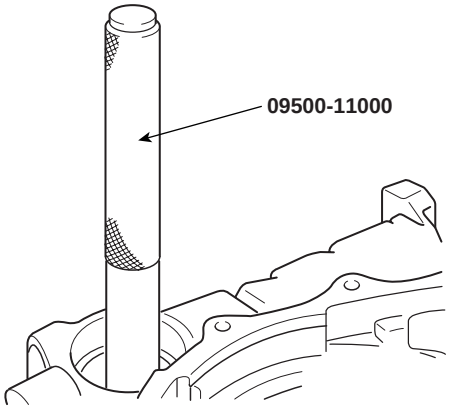
- ***Never reuse the gasket, O-ring, oil seal, etc. Always replace with a new one when reassembling.***
- ***Never use grease other than blue petrolatum jelly and white Vaseline.***
- ***Apply ATF to friction components, rotating parts, and sliding parts before installation. Immerse a new clutch disc or brake disc in ATF for at least two hours before assembling them.***
- ***Never apply sealant or adhesive to gaskets.***
- ***When replacing a bushing, replace the assembly which it belongs to.***
- ***Never use any cloth gloves or any rags during reassembly.***
  Use nylon cloth or paper towels if you need to use something. Change the oil in the cooler system.

1. Tap the differential bearing outer race into the transaxle case using special tools tools (09500-11000 and 09532-11500).



BK1A053A

2. Tap the output shaft bearing outer race into the transaxle case using special tool (09500-11000).

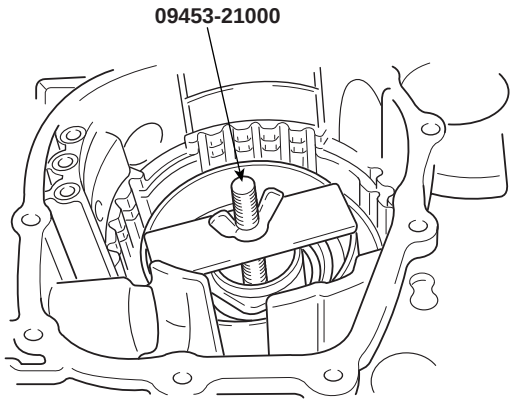


BK1A053B

3. Install the spacer and the snap ring.

4. Install the low and reverse brake piston, return spring, and spring retainer.

5. Install the snap ring using special tools (09453-21000). To be sure that you have the correct snap ring, measure the thickness and compare it to the chart in the general parts of the service manual.

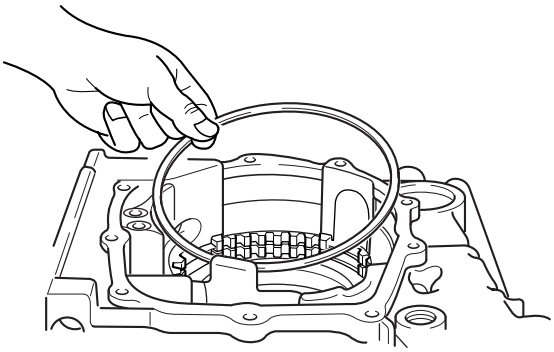


BK1A053C

6. Install the wave spring.

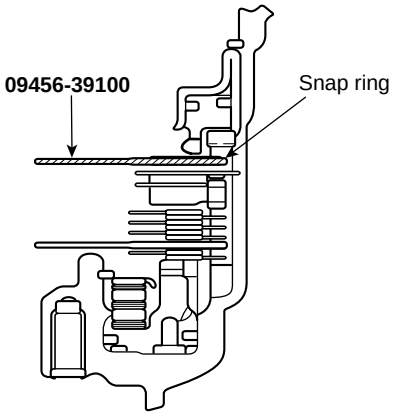
NOTE

In steps 7 through 9, you will determine the actual clearance between the low and reverse brake discs and plates when the clutch is released.



BK1A074N

7. Replace the pressure plate of the low and reverse brake, then install the brake discs, 5 brake plates and the snap ring.

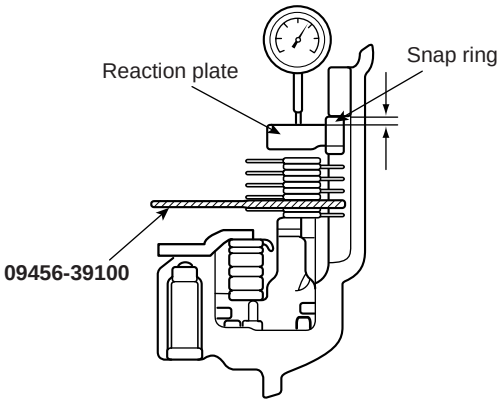


BK1A053D

8. Install the low and reverse reaction plate and the old snap ring.

9. With a dial indicator installed, move the special tool up and down to measure the end play.

Standard value :
0-0.16 mm (0-0.0063 in.)



BK1A042A

If the end play is incorrect, measure the old snap rig, then select the proper snap rig from the chart shown in the service manual and recheck the clearance.

10. Remove the special tool.

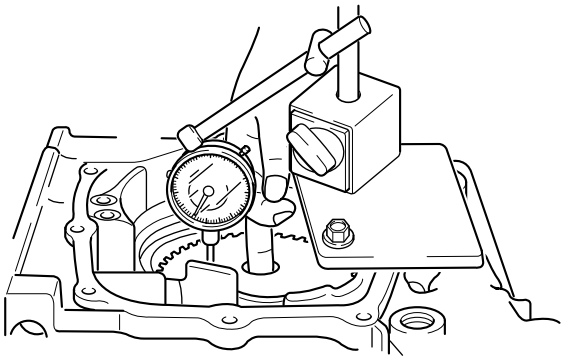
NOTE

In steps 11 through 16, you will determine the actual clearance between the second brake discs and plates when the clutch is released.

11. Install the 3 second brake discs and 2 plates.

12. Install the second brake return spring, second brake piston, and snap ring.

13. Install a dial indicator as shown in the illustration.



BK1A053F

14. Move up and down, while observing the end play.

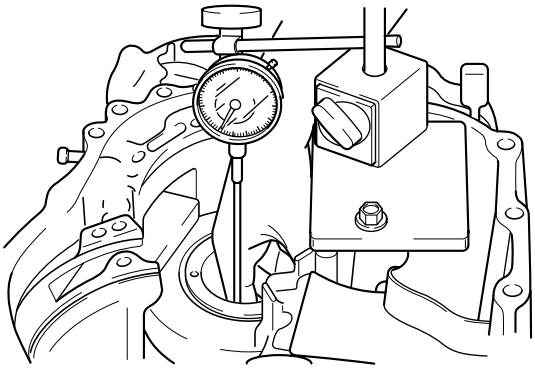
15. To determine the proper thickness of the second brake pressure plate.

Standard value :
0.79-1.25 mm (0.0311-0.0492 in.)

16. If the standard value is incorrect, select a pressure plate of the proper thickness from the chart in the general parts of the service manual and recheck the clearance.

NOTE

In steps 18 through 21, you will determine the actual clearance between the low-reverse brake discs and plates when the clutch is released.



BK1A053G

17. Install the special tool in place of the low/reverse brake pressure plate.

18. Install the 6 brake discs, 5 brake plates and snap ring.

19. Turn the transaxle upside down, install a dial indicator, as shown in the illustration.

20. Move the special tool up and down while observing the end play.

21. To determine the proper thickness of the low/reverse brake pressure plate.

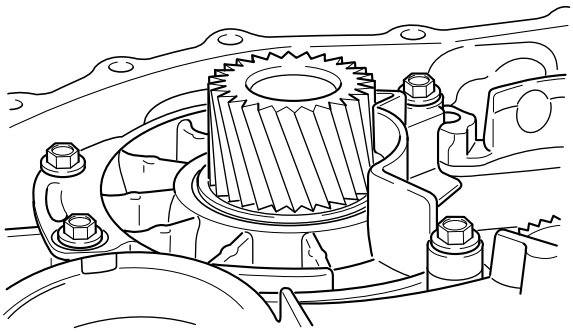
Standard value :
1.65-2.11 mm (0.0650-0.0830 in.)

22. If the standard value is incorrect, select a pressure plate of the proper thickness from the chart in the general parts of the service manual and recheck the clearance.

23. Remove the special tool.

24. Install the output shaft.

25. Install the output bearing retainer mounting bolts. Tighten the bolts to 23 Nm (230 kg·cm, 17 lb·ft) of torque.

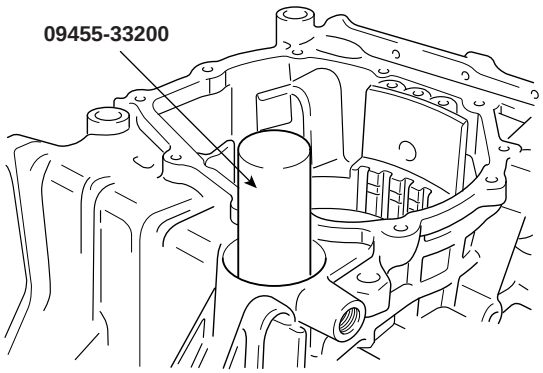


BK1A074W

26. Install the output shaft collar and tapered roller bearing using special tool (09455-33200).

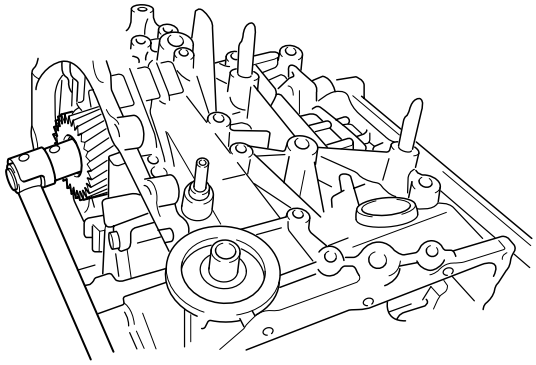
NOTE

The output shaft locking nut is left-hand thread.



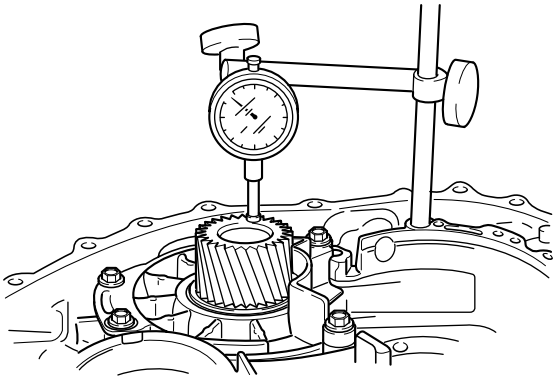
BK1A053H

27. Apply ATF and install the locking nut and tighten to 123 lb ft. Loosen the nut one full turn, then retighten the nut to 123 lb ft and stake the nut.



BK1A053I

28. Install a dial indicator as shown in the illustration.



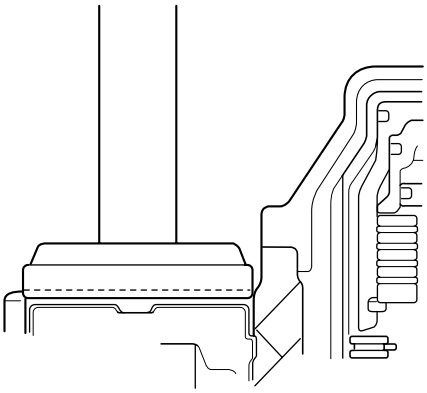
BK1A053J

29. Move the output shaft in and out to measure the end lay.

Standard value : 0.01-0.09 mm (0.0004-0.0035 in.)

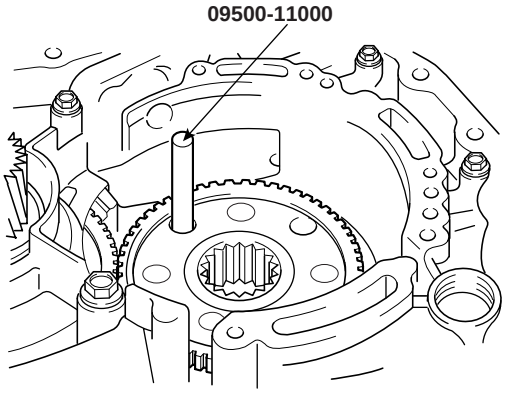
30. If the standard value is incorrect, use this formula to select the correct spacer from the chart in the service manual.

31. Install the output shaft protective cap.



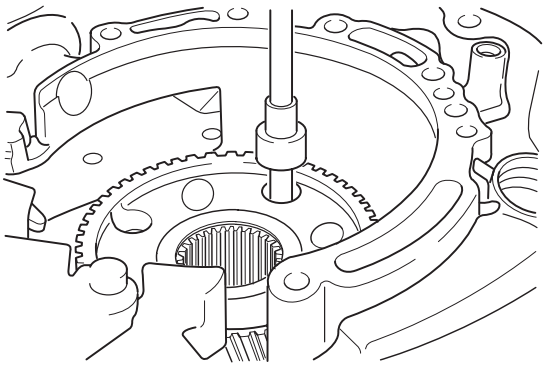
BK1A053K

32. Install the transfer drive gear using special tool (09500-11000).



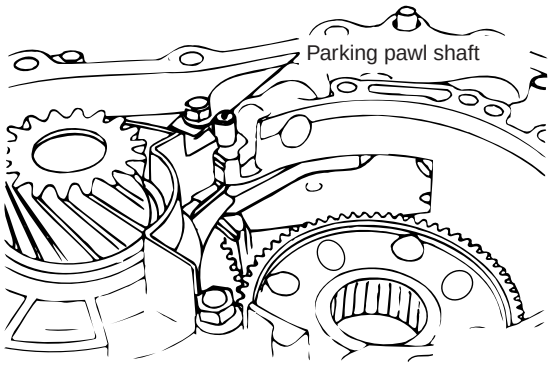
BK1A053L

33. Install the 7 transfer gear mounting bolts. Tighten the bolts to 19 Nm (190 kg·cm, 14 lb·ft).



LK1D074R

34. Install the parking pawl, spacer and spring, then install the parking pawl shaft.

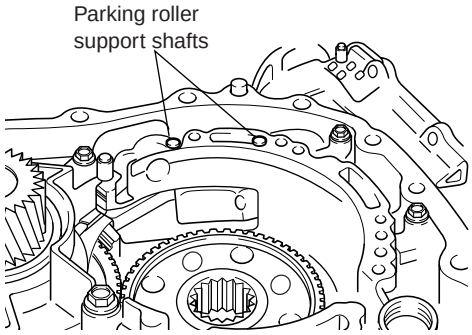


BK1A053M

35. Install the parking roller support, then the two parking roller support shafts.

CAUTION

Be sure to install the thrust bearing in the proper direction.

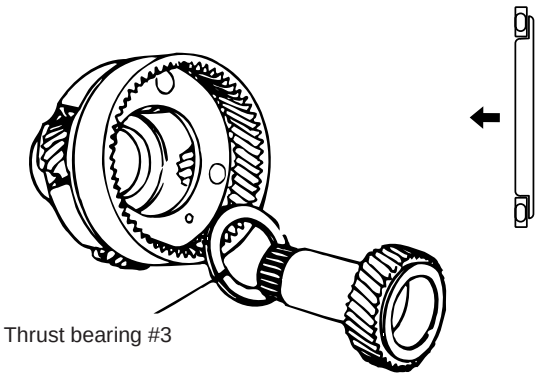


LK1D053N

36. Install the underdrive sun gear and thrust bearing #3 to the output planetary carrier.

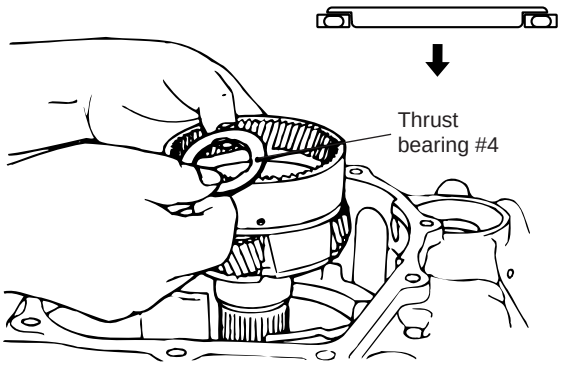
CAUTION

Be sure to install the thrust bearing in the proper direction.



BK1A053O

37. Install the output planetary carrier and thrust bearing #4.

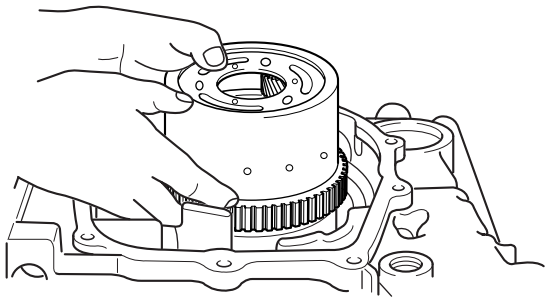


BK1A053P

38. Install the overdrive planetary carrier.

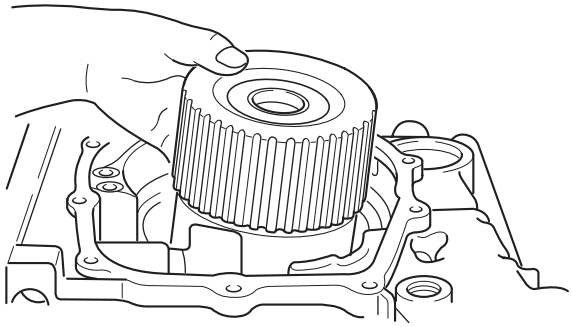
NOTE

Rotating the output shaft will help align the clutch teeth and help the carrier seat.



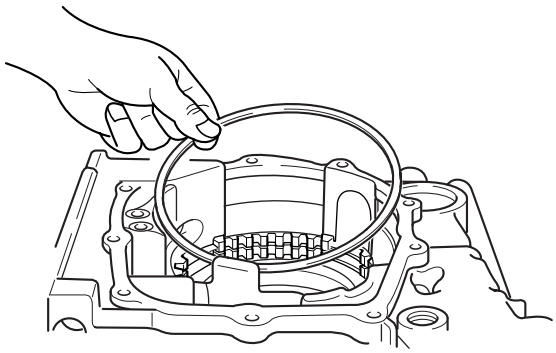
BK1A074G

39. Install the reverse planetary sun gear.



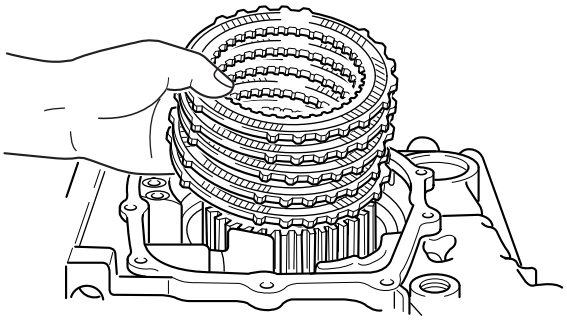
LK1D074C

40. Install the wave spring.



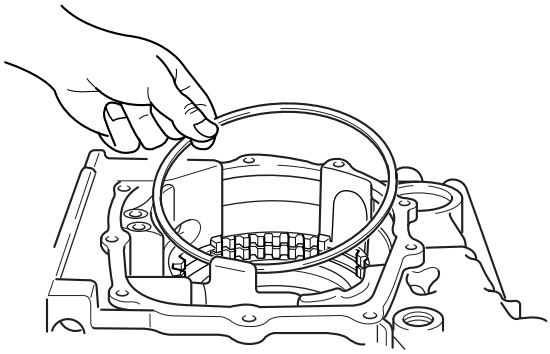
BK1A074N

41. Install the low/reverse pressure plate, 6 brake discs, and 5 brake plates.



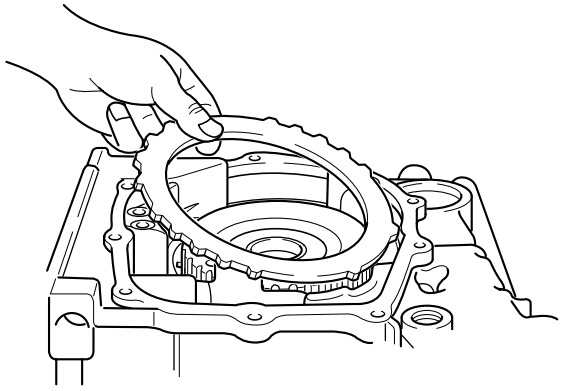
BK1A053Q

42. Install the snap ring.



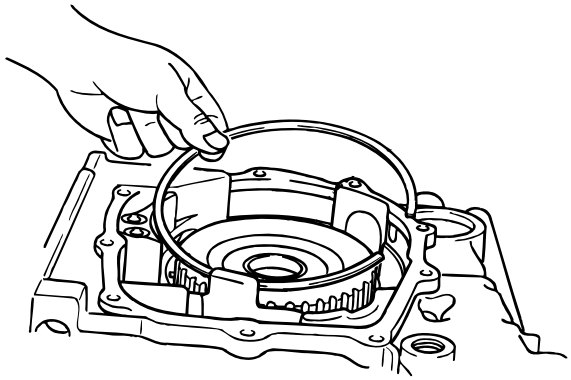
BK1A053R

43. Install the reaction plate.



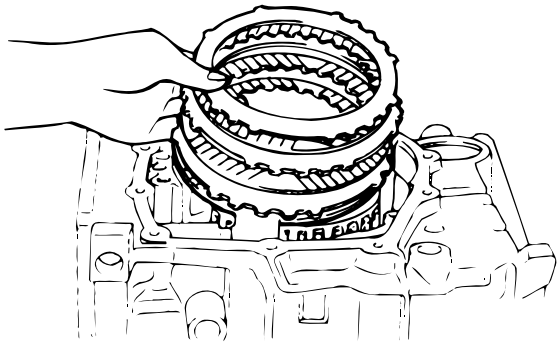
BK1A053S

44. Install the snap ring.



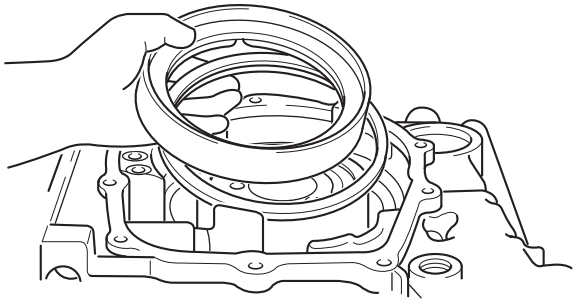
BK1A053T

45. Install the second brake pressure plate, 3 brake discs, and 2 brake plates.



BK1A053U

46. Install the return spring and second brake piston.

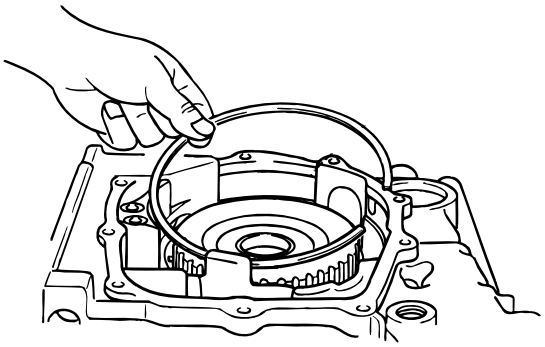


BK1A074E

47. Install the snap ring.

CAUTION

Be sure to install the thrust bearing in the proper direction.

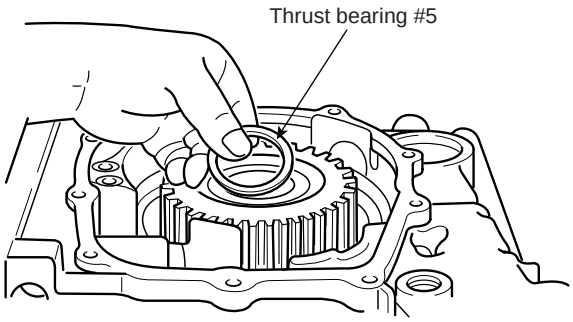


BK1A053V

48. Install thrust bearing #5.

CAUTION

Be sure to install the thrust bearing in the proper direction.

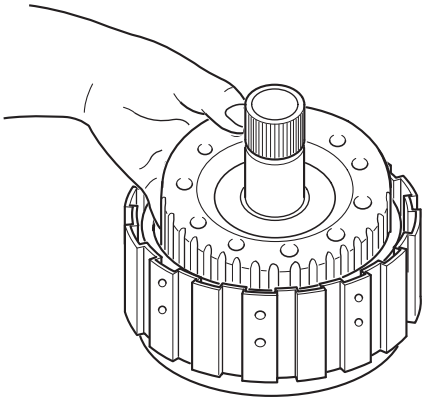


LK1D074B

49. Install the overdrive clutch hub and thrust bearing #6 to the reverse and overdrive clutch.

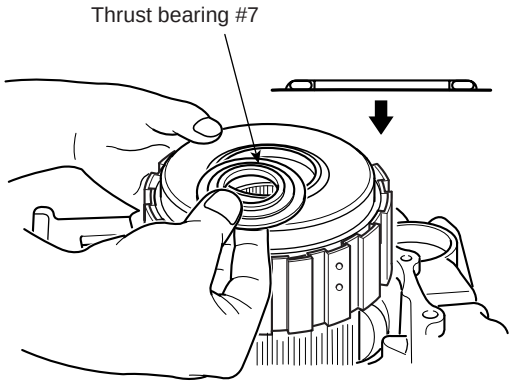
CAUTION

Be sure to install the thrust bearing in the proper direction.



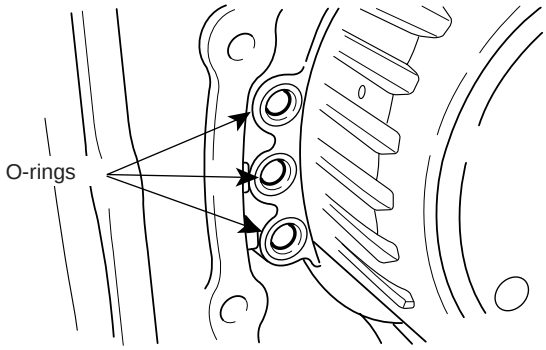
BK1A053W

50. Install the reverse and overdrive clutch and thrust bearing #7.



BK1A053X

51. Install the three O-rings.

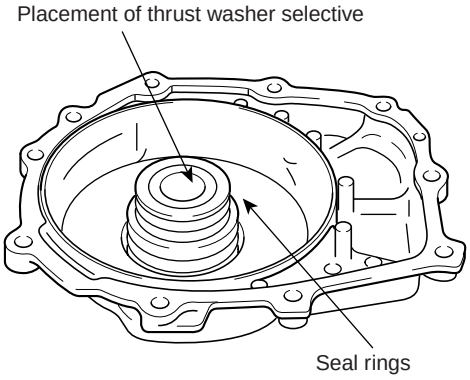


BK1A052Y

52. Install the 3 seal rings into the rear cover.

NOTE

The cover should be clean and dry for step 56. It is only being installed to measure the underdrive sun gear end play.

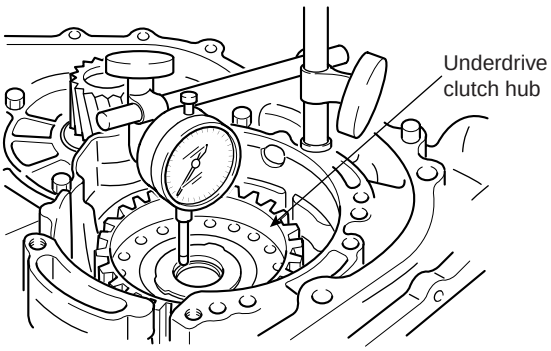


BK1A053Y

53. Install the used thrust race #8 and rear cover.

54. Using a dial indicator, measure the end play of the underdrive sun gear.

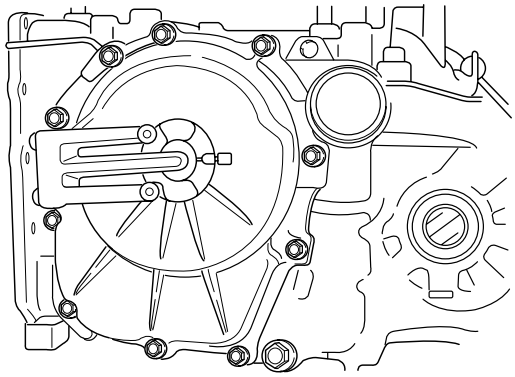
Standard value : 0.25-0.45 mm (0.0098-0.0177 in.)



BK1A053Z

55. If the end play exceeds the standard value, measure the used race with a micrometer and select the proper size from the chart in the service manual.

56. Reinstall the rear cover and mounting bolts. Tighten the mounting bolts to 23 Nm (230 kg·cm, 17 lb·ft).

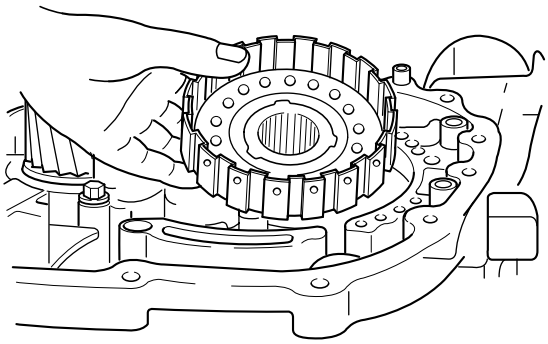


BK1A052X

57. Install the underdrive clutch hub.

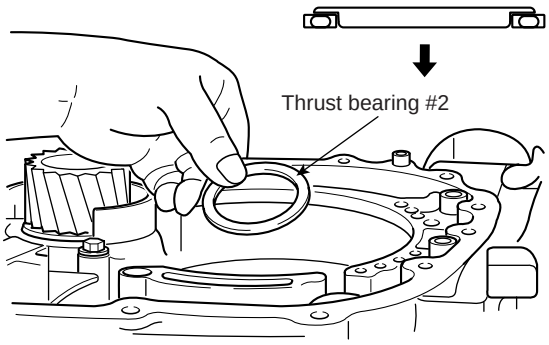
CAUTION

Be sure to install the thrust bearing in the proper direction.



HEW45140

58. Install thrust bearing #2.

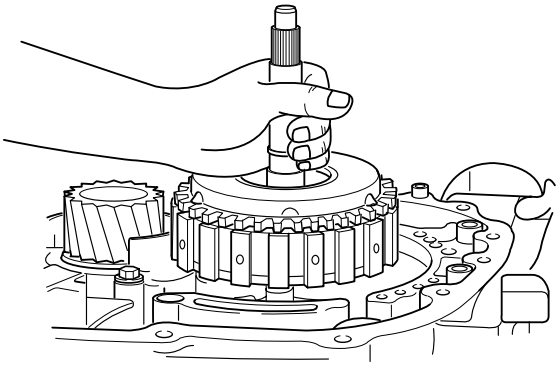


BK1A075A

59. Grasp the input shaft and lower the underdrive clutch into position.

NOTE

Looking into the hole where the input speed sensor mounts to the case will help you ensure that the underdrive clutch is fully seated.

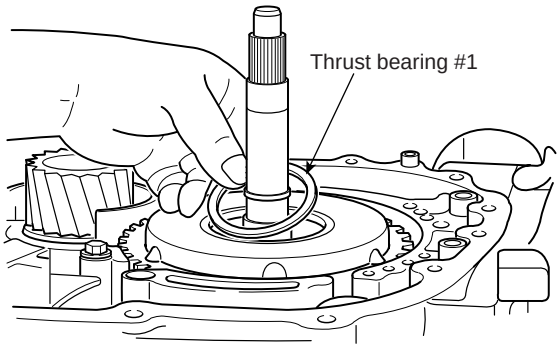


BK1A052U

60. Install the used thrust bearing #1.

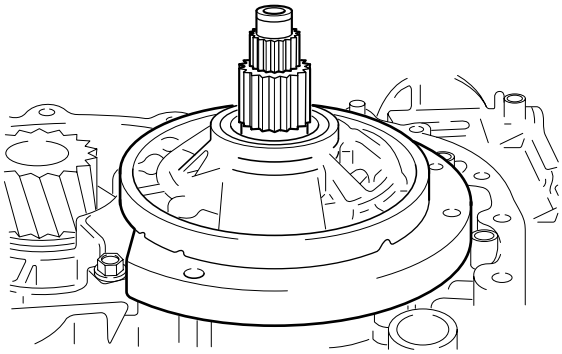
CAUTION

Be sure to use a new oil pump gasket.



BK1A052T

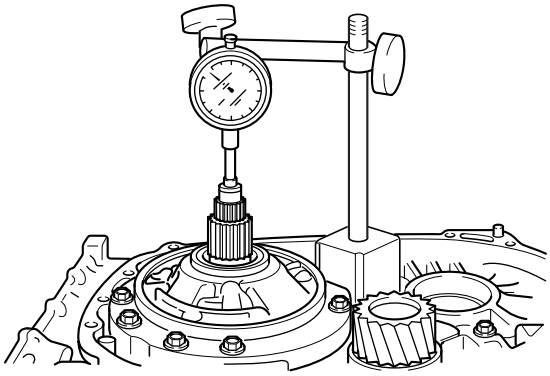
61. Install the oil pump, a new gasket, and the oil pump mounting bolts.



BK1A075B

62. Using a dial indicator, measure the end play of the input shaft.

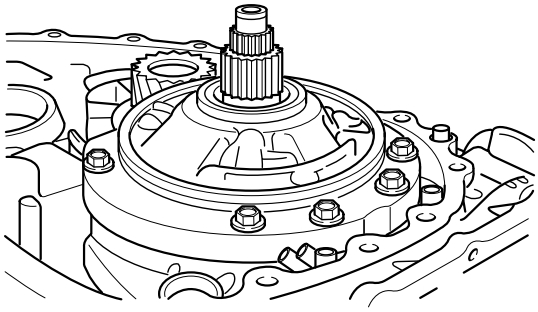
Standard value : 0.70-1.20 mm (0.0276-0.0472 in.)



BK1A075C

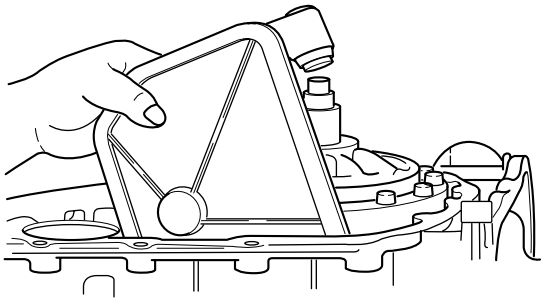
63. If the end play exceeds the standard value, measure the used race with a micrometer and select the proper size from the chart in the service manual.

64. Reinstall the oil pump and mounting bolts. Tighten the mounting bolts to 23 Nm (230 kg·cm, 17 lb·ft).



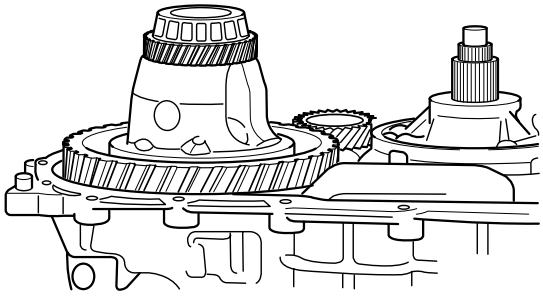
BK1A052R

65. Install the oil internal filter.



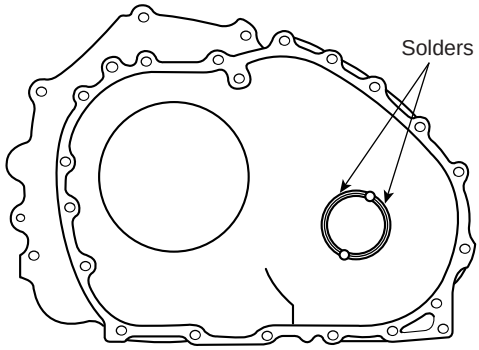
BK1A052Q

66. Install the differential.



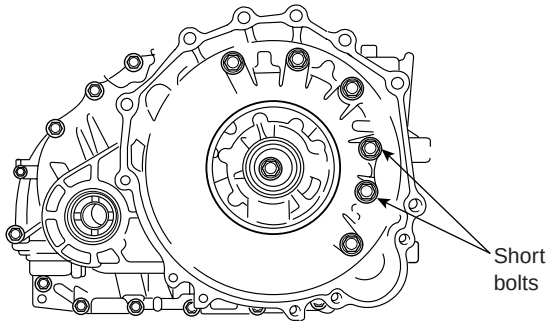
BK1A052P

67. Place two strips of solder, approximately 10 mm (0.39 in.) long and 3 mm (0.12 in.) thick, on the torque converter housing.



BK1A075D

68. Install the torque converter housing and mounting bolts. Tighten the bolts to 47 Nm (470 kg·cm, 35 lb·ft) of torque.



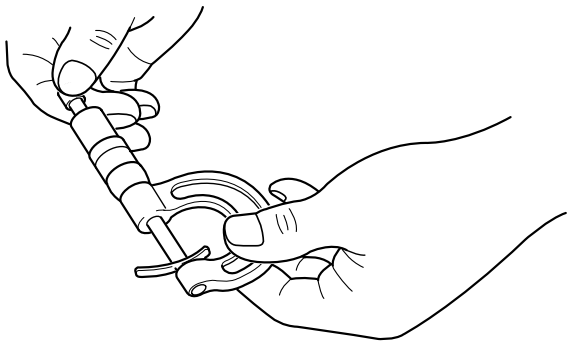
BK1A075E

69. Remove the torque converter housing, the bolts and the solder.

70. Using a micrometer, measure the thickness of the pressed solder.

71. Select a spacer that will give the following clearance.

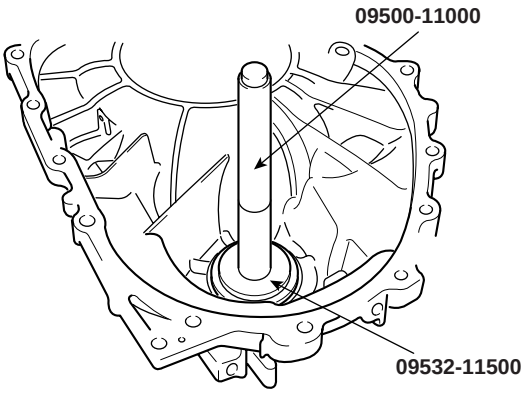
Standard value :
0.045 mm (0.0018 in.)-0.105 mm (0.0041 in.)



BK1A075F

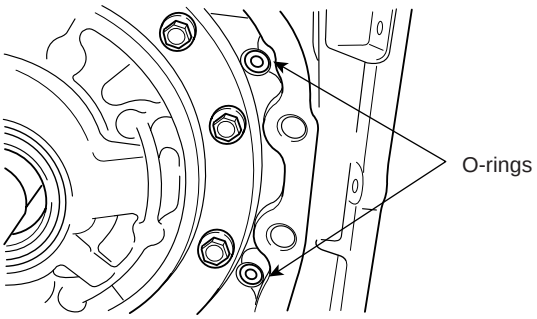
72. Install the differential spacer selected in the previous step in the torque converter housing.

73. Use special tools 09532-11500 and 09500-11000 to press in the differential bearing outer race.



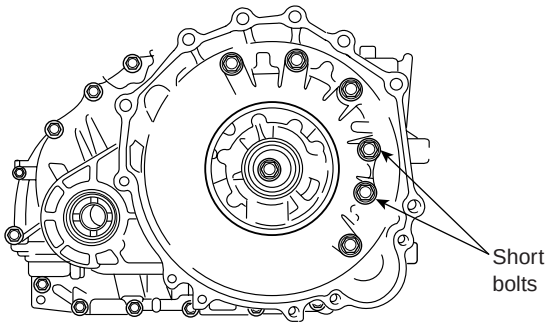
BK1A075G

74. Install the two O-rings.



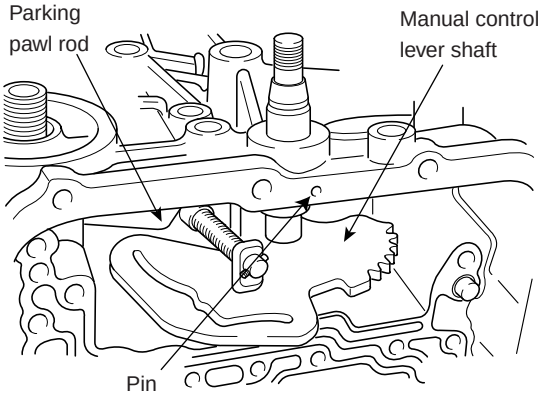
BK1A052O

75. Install the torque converter housing and mounting bolts. Tighten the bolts to 47 Nm (470 kg·cm, 35 lbs·ft) of torque.



BK1A075E

76. Install the manual control lever shaft and parking pawl.

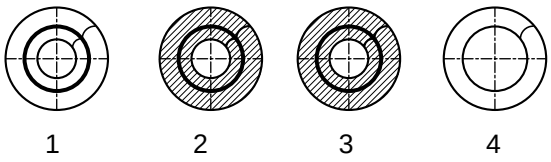


BK1A052M

77. Install the manual control shaft roller.

78. Install the three small springs and three larger springs into the accumulator pistons. The accumulator springs are identified in the illustration and in the chart below.

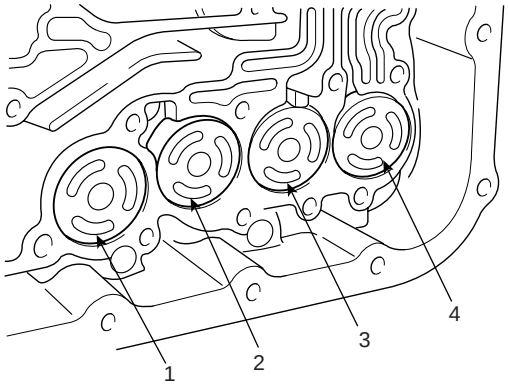
Number	Function Name
1	Low&Reverse Brake
2	Underdrive Clutch
3	Second Brake
4	Overdrive Clutch



BK1A075H

79. Install the accumulators with the springs according to the illustration and the chart below. The accumulators should be flush with the transaxle case.

Number	Function Name	Color
1	Low&Reverse Brake	None
2	Underdrive Clutch	Yellow
3	Second Brake	Blue
4	Overdrive Clutch	None

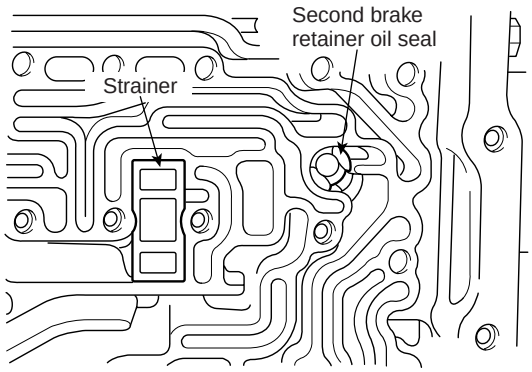


BK1A052L

80. Install the strainer and the second brake retainer oil seal.

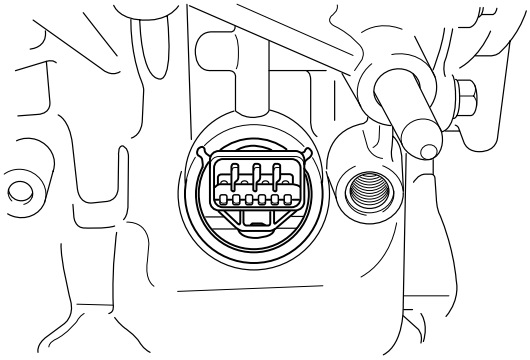
NOTE

The oil seal orientation in the illustration.



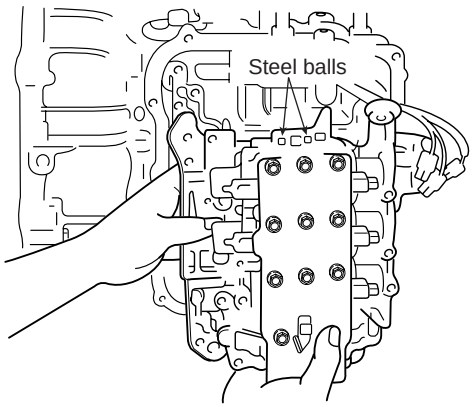
BK1A052K

81. Install the solenoid wiring harness, then install the snap ring in its groove.



BK1A052J

82. Install the valve body, gasket, and two steel balls.



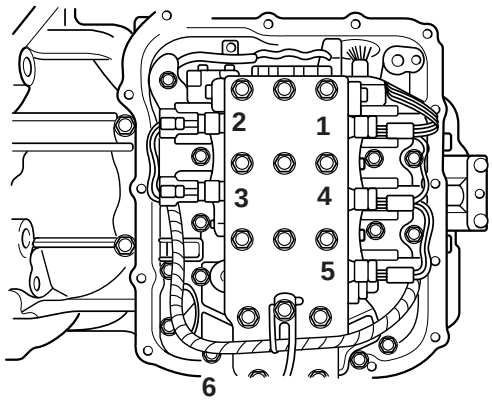
BK1A052I

83. Install the oil temperature sensor. Tighten the mounting bolt to 11 Nm (110 kg·cm, 8 lb·ft).

84. Install 28 valve body mounting bolts. Tighten all valve body mounting bolts to 11 Nm (110 kg·cm, 8 lb·ft).

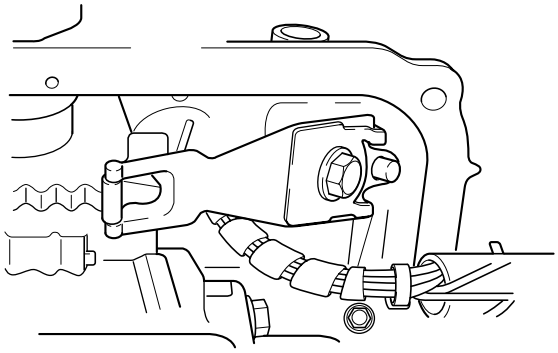
85. Connect the solenoid wiring and temperature sensor connectors according to the illustration and the chart below.

No.	Part to be connected	Wire color	Connector housing color
1	Underdrive solenoid valve	White, Red, Red	Black
2	Overdrive solenoid valve	Orange, Red	Black
3	Low-Reverse solenoid valve	Brown, Yellow	Milky White
4	Second solenoid valve	Green, Red, Red	Milky White
5	Damper clutch control solenoid valve	Blue, Yellow, Yellow	Black
6	Oil temp. sensor	Black, Red	Black



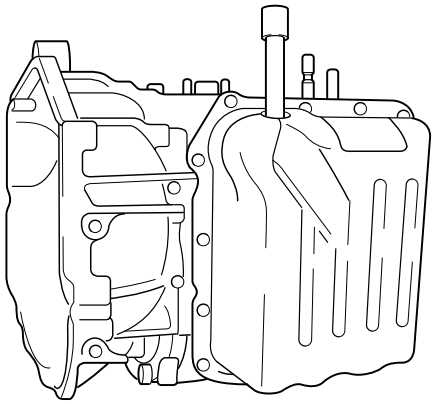
BK1C650A

86. Install the manual control shaft detent. Tighten the nut to 6 Nm (60 kg·cm, 4.4 lb·ft) of torque.



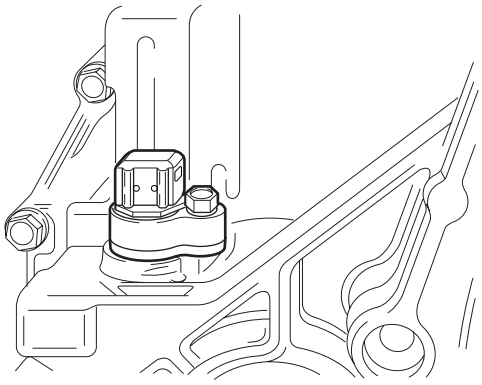
BK1A052F

87. Install the valve body cover and mounting bolts. Tighten the mounting bolts to 9 Nm (90 kg·cm, 7 lb·ft) of torque.



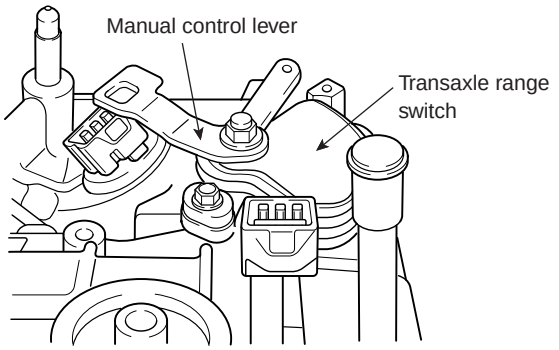
BK1A052E

88. Install the vehicle speed sensor and mounting bolt. Tighten the mounting bolt to 5 Nm (50 kg·cm, 4 lb·ft) of torque.



BK1C650B

89. Install the park/neutral position switch. Tighten the mounting bolt to 11 Nm (110 kg·cm, 8 lb·ft) of torque.



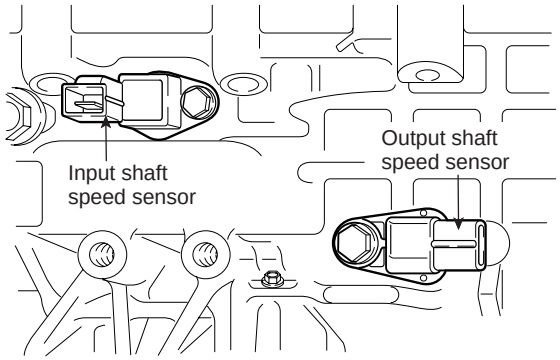
BK1A052C

90. Install the manual control lever. Tighten the mounting nut to 22 Nm (220 kg·cm, 16 lb·ft) of torque.

91. Install the input and output shaft speed sensors. Tighten the mounting bolts to 11 Nm (110 kg·cm, 8 lb·ft) of torque.

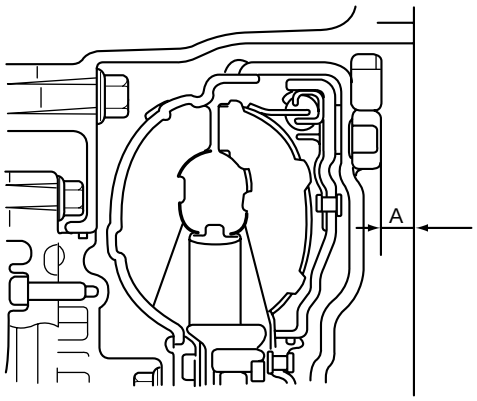
CAUTION

Make sure that you are installing the correct oil filter. While the engine oil filter and the transaxle oil filter locksimilar, their filtering action is different. Installing the wrong oil filter could cause damage to the transaxle. Transaxle oil filters are identified as A/T ONLY.



BK1A052B

92. Install the cooler feed tube with a new gasket and the eye bolt. Tighten the eye bolt to 30 Nm (300 kg·cm, 22 lb·ft) of torque.



BK1C650C

93. Install the dipstick.

94. Install the control cable bracket. Tighten the mounting bolt to 23 Nm (230 kg·cm, 17 lb·ft).

95. Install the wiring harness bracket. Tighten the mounting bolt to 23 Nm (230 kg·cm, 17 lb·ft).

96. Install the two roll stopper brackets. Tighten the mounting bolts to 69 Nm (690 kg·cm, 51 lb·ft).

97. Install the torque convertor and secure it so that dimension A.
Meets the reference value.

Reference value : approx. 12.2 mm (0.480 in.)

CAUTION

Apply ATF to the oil pump drive hub before installing the torque converter. Be careful not to damage the oil pump seal.

INSTALLATION E2B2A06C

1. Attach the torque converter on the transaxle side and mount the transaxle assembly onto the engine.

   CAUTION

   If the torque converter is mounted first on the engine, the oil seal on the transaxle may be damaged. Therefore, be sure to first assemble the torque converter to the transaxle.

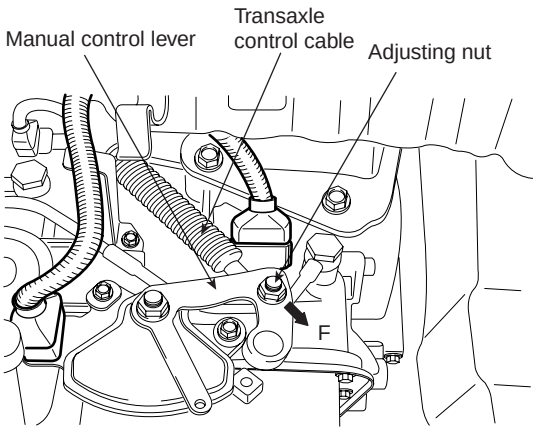
2. Install the transaxle control cable and adjust as follows.

   1) Move the shift lever and the transaxle range switch to the "N" position, and install the control cable.

   2) When connecting the control cable to the transaxle mounting bracket, install the clip until it contacts the control cable.

   3) Remove any free-play in the control cable by adjusting nut and then check to see that the selector lever moves smoothly.

   4) Check to see that the control cable has been adjusted correctly.

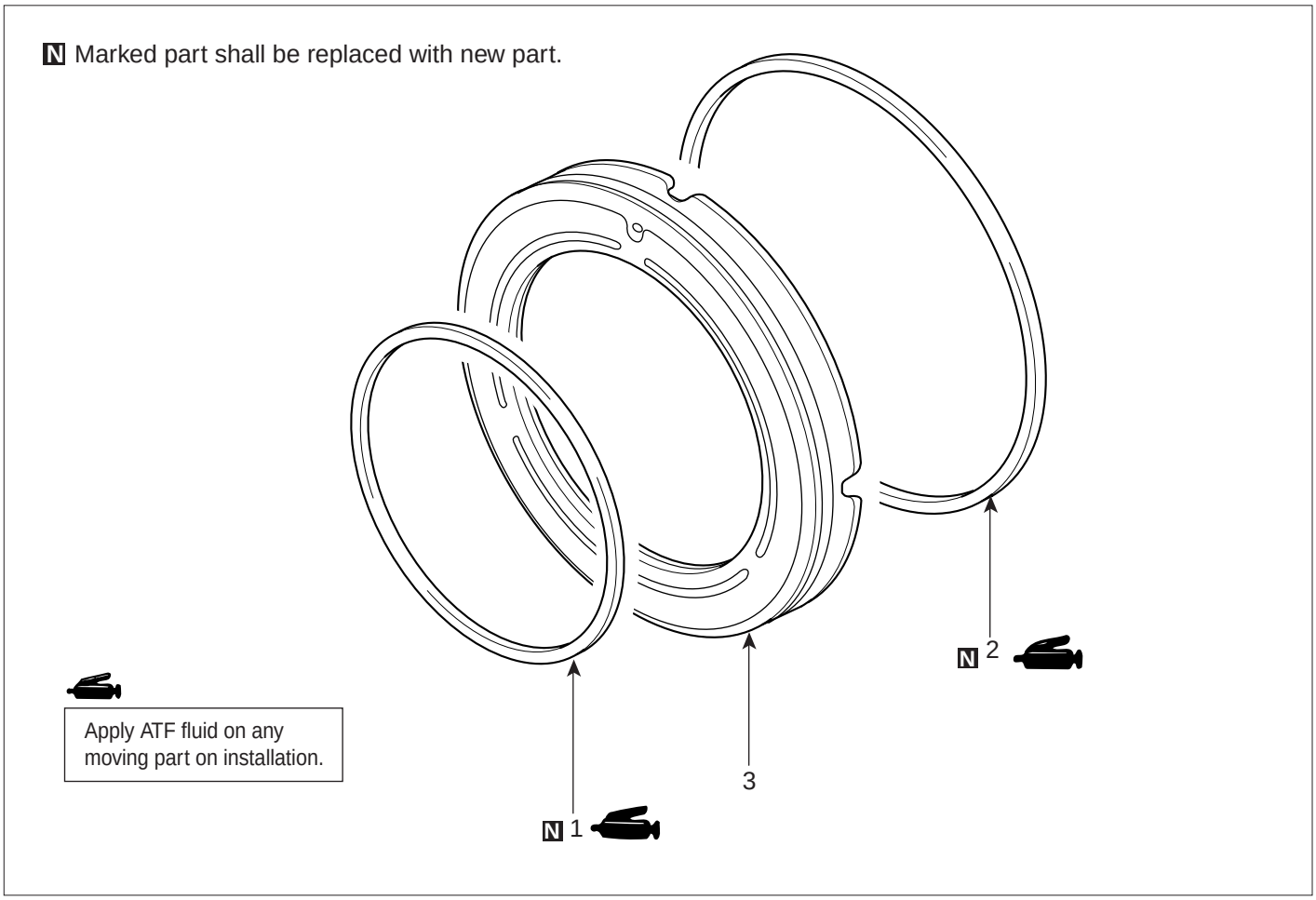


BKGE001A

3. Installation is the reverse of removal.

LOW REVERSE BRAKE

COMPONENTS E61F7DA7



Disassembly procedure

1. D-ring
2. D-ring
3. Low and reverse brake piston

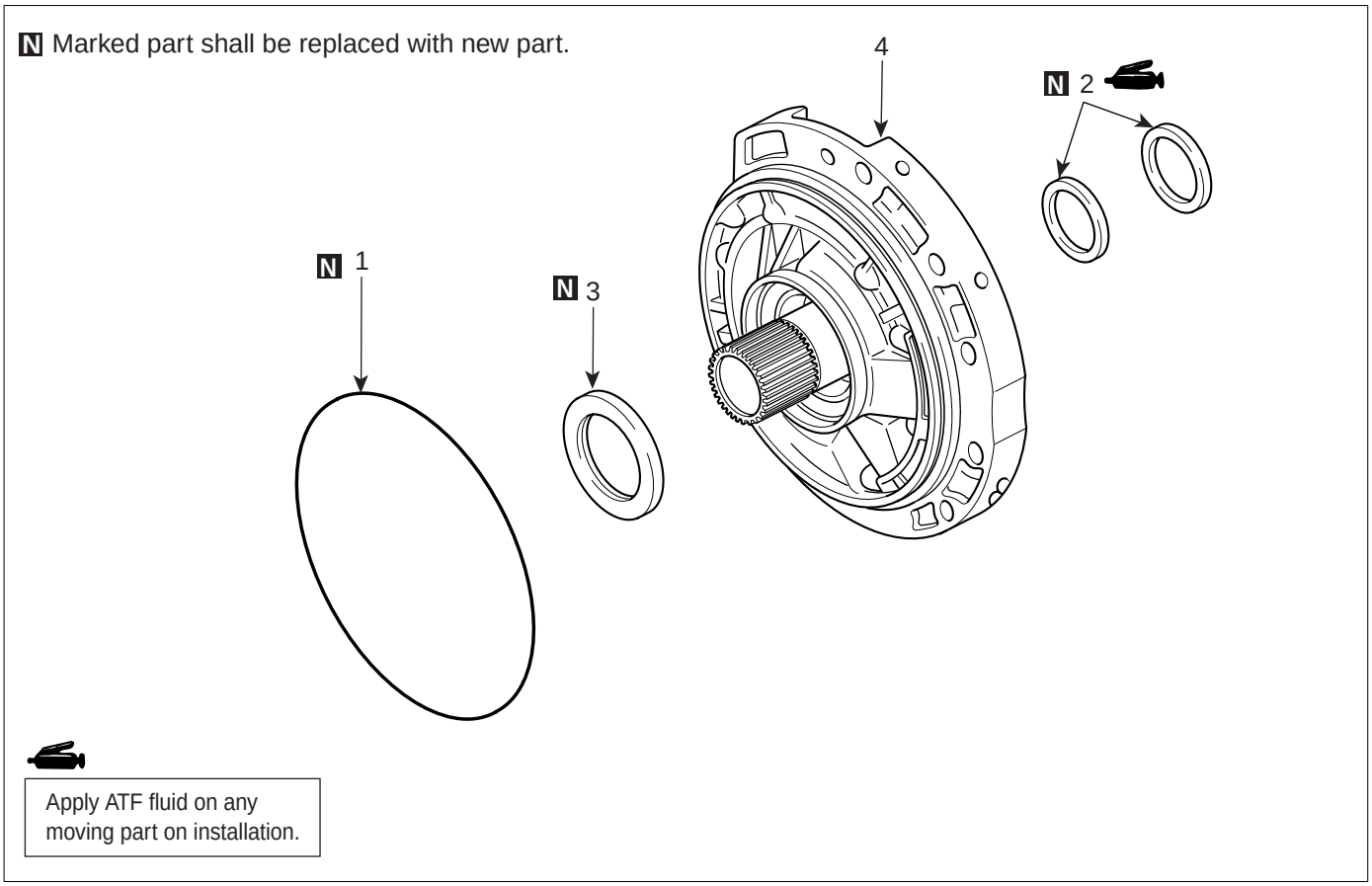
BKGE005A

REASSEMBLY E40B8ECF

Apply ATF or white Vaseline on the O-ring and install it caring not to damage it.

OIL PUMP (A/T)

COMPONENTS ECD10D0A



Disassembly steps

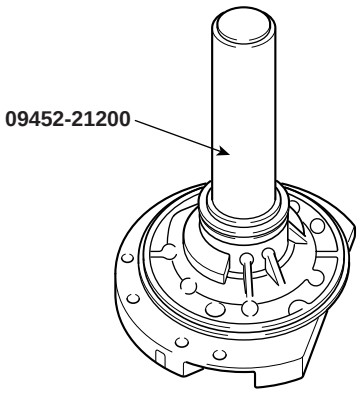
1. O-ring
2. Seal ring
3. Oil seal
4. Oil pump assembly

BKGE005B

REASSEMBLY E6BCF750

OIL SEAL REPLACEMENT

1. Using the special tool (09452-21200), install the oil seal to the pump housing.

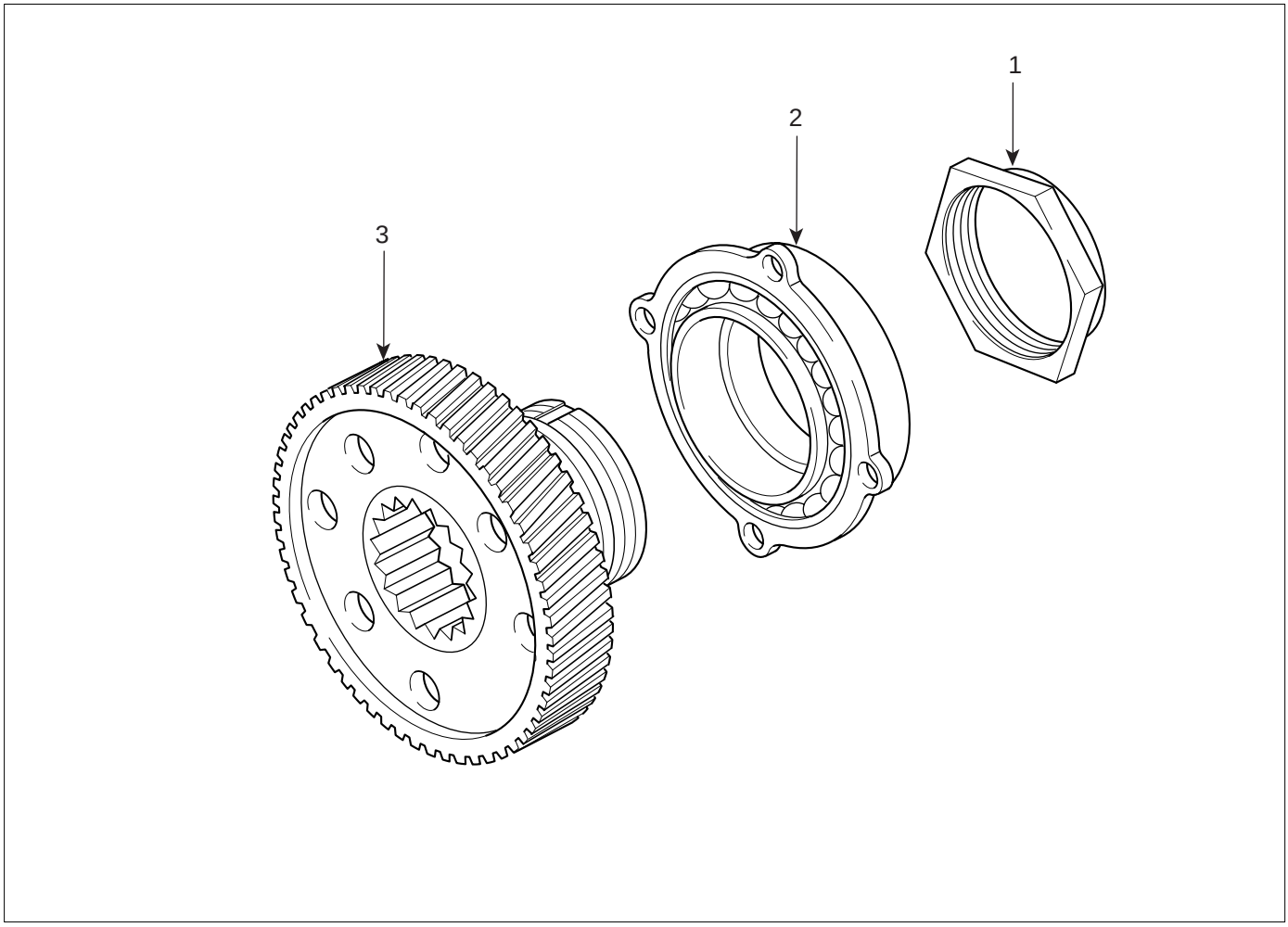


BK1A064A

2. Apply a thin coat of automatic transaxle fluid to the lip of the oil seal before installation.

TRANSFER DRIVE GEAR

COMPONENTS EA320510

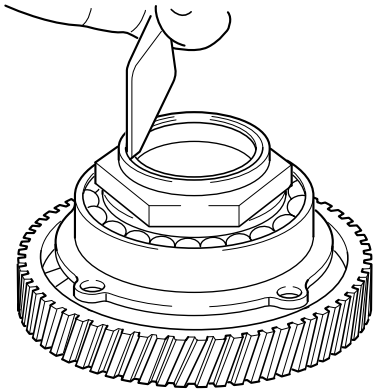


1. Locking nut
2. Transfer drive gear bearing
3. Transfer drive gear

BKGE005C

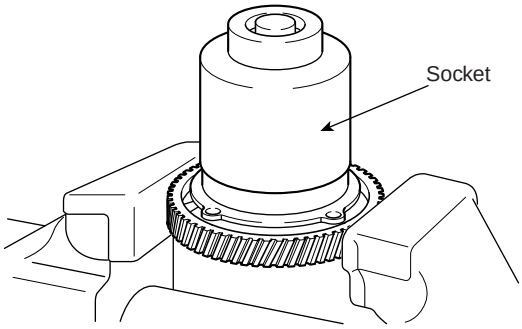
DISASSEMBLY E4F9D2E8

1. Loosen the locking nut caulking.



BK1A068A

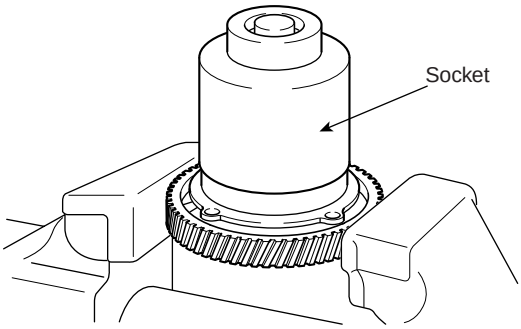
2. Remove the lock by using socket.



BK1A068B

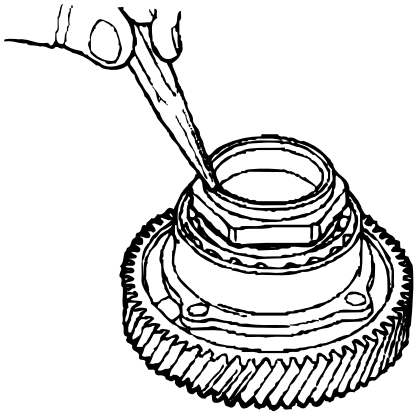
REASSEMBLY EAC95BB8

1. Apply ATF to the new locking nut and tighten to the specified torque. And loosen 1 turn and tighten to the specified torque again.



BK1A068B

2. Caulk the locking nut by using punch.

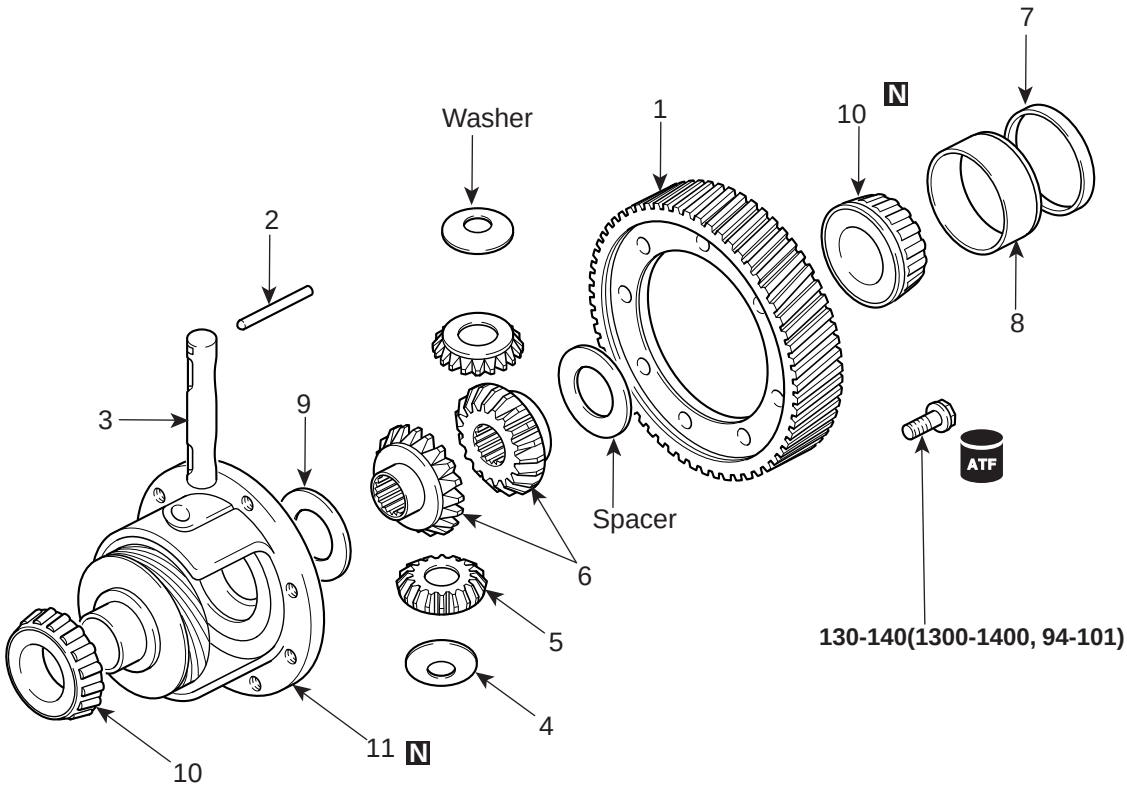


BK1A069A

DIFFERENTIAL

COMPONENTS EBC55DED

N Marked part shall be replaced with new part.



Apply ATF fluid on any moving part on installation.

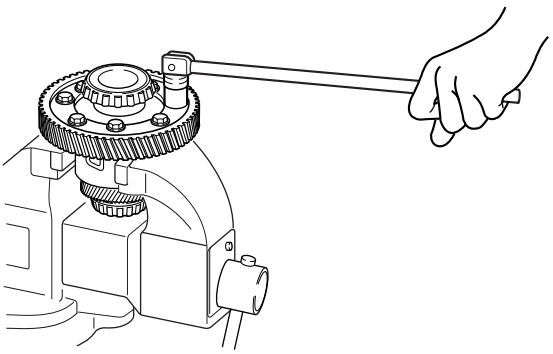
TORQUE : Nm (kgf.cm, lbf.ft)

1. Differential drive gear
2. Lock pin
3. Pinion shaft
4. Washer
5. Pinion gear
6. Side gear
7. Spacer
8. Outer race
9. Spacer
10. Taper roller bearing
11. Differential case

BKGE005E

DISASSEMBLY ED595FB2

1. Clamp the differential case in a vise.
2. Remove the differential drive retaining bolts and remove the differential drive gea from the case.

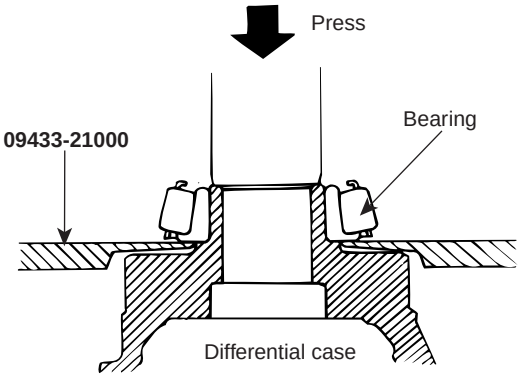


BK1A071A

3. Remove the taper bearing using the special tool (09433-21000).

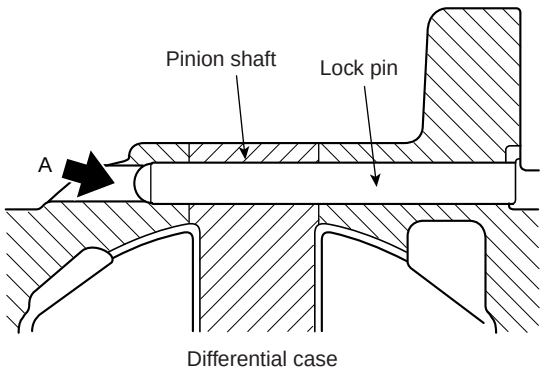
CAUTION

Do not reuse the bearing removed from the shaft.



BK1A071B

4. Drive out the lock pin from the hole A using a punch.

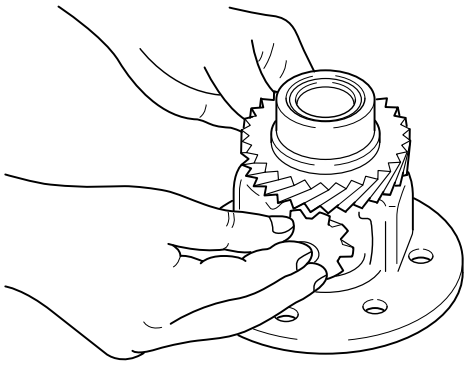


BK1A071C

5. Drive out the pinion shaft.

REASSEMBLY E2A0CD6B

1. Install the spacer on the back of the side gear and then install the gear in the differential case.



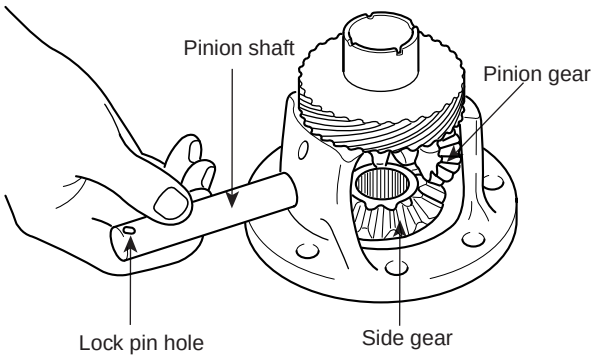
BK1A072A

CAUTION

- ***When installing a new side gear, use a spacer of medium thickness [0.83-0.92 mm (0.33-0.036 in)].***
- ***Do not reuse the lock pin.***
- ***The lock pin head must be sunk below the flange surface of the differential case.***

2. Set the washer on the back of each pinion and insert the two pinions to specified position while engaging them with the side gears by turning them.

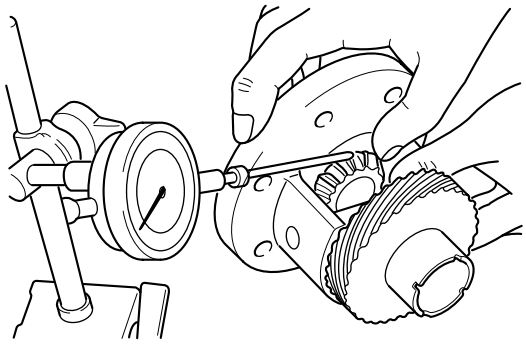
3. Insert the pinion shaft.



BK1A072B

4. Measure the backlash between the side gears and pinions.

Standard value : 0.025-0.150 mm (0.001-0.006 in) 0.025-0.0150 mm (0.001-0.006 in)



BK1A072C

5. If the backlash is out of specification, disassemble and install the correct spacer, reassemble and remeasure.

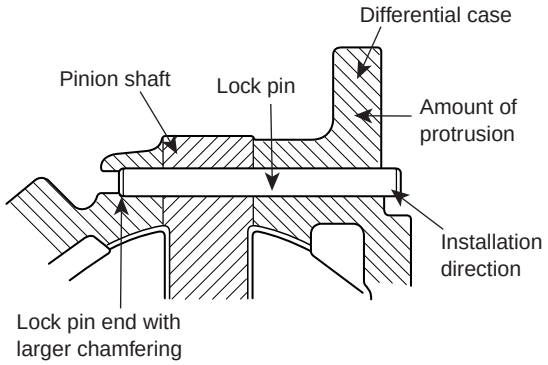
CAUTION

Adjust the backlash of both side gears to the same specification.

6. Align the pinion shaft lock pin hole with the case lock pin hole and insert the lock pin.

CAUTION

- ***Do not reuse the lock pin.***
- ***The lock pin head must not protrude more than 3 mm (0.0118 in) gear in the differential case.***

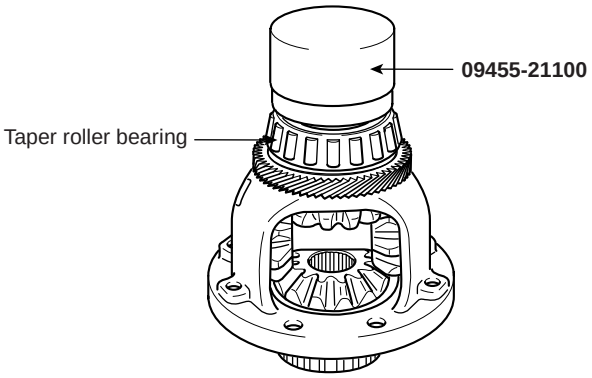


BK1A072D

7. Install the tapered roller bearing on both sides of the differential case using the special tool (09455-21100).

CAUTION

When press-fitting the bearing, press on the inner race only.

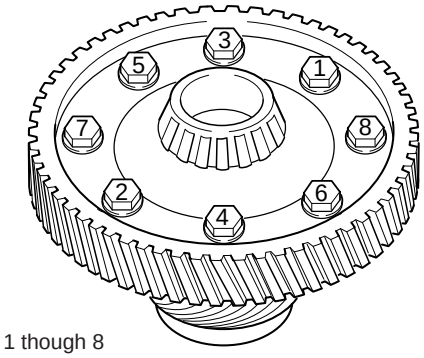


BKGE005F

8. Apply specified sealant to the entire threads of the bolts. Tighten to specifications using the sequence shown in the illustration.

CAUTION

If a bolt is reused, remove the old sealant from the threads.

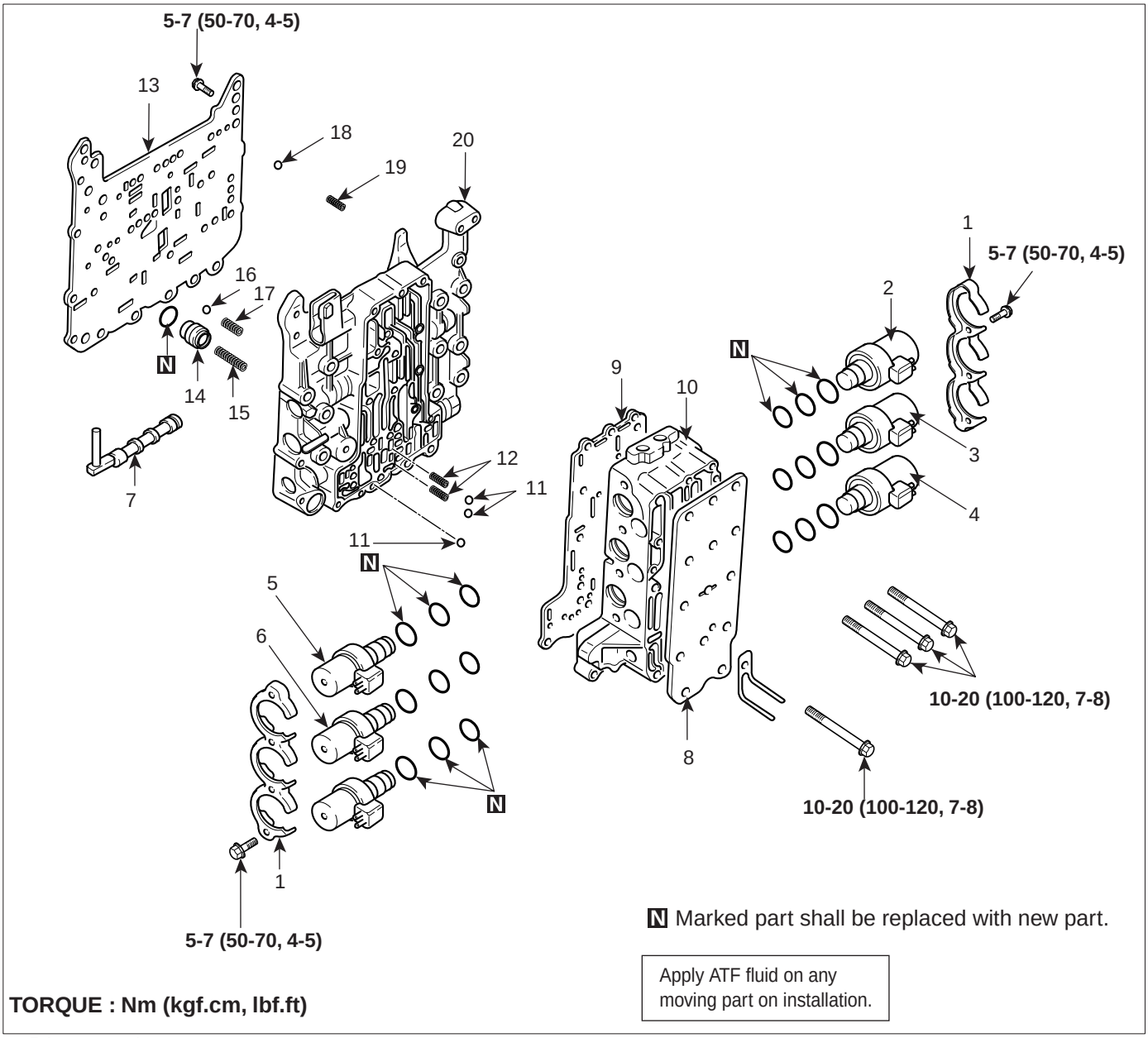


1 though 8
indicate tightening seouence

BK1A072F

VALVE BODY

COMPONENTS EBBB58F5

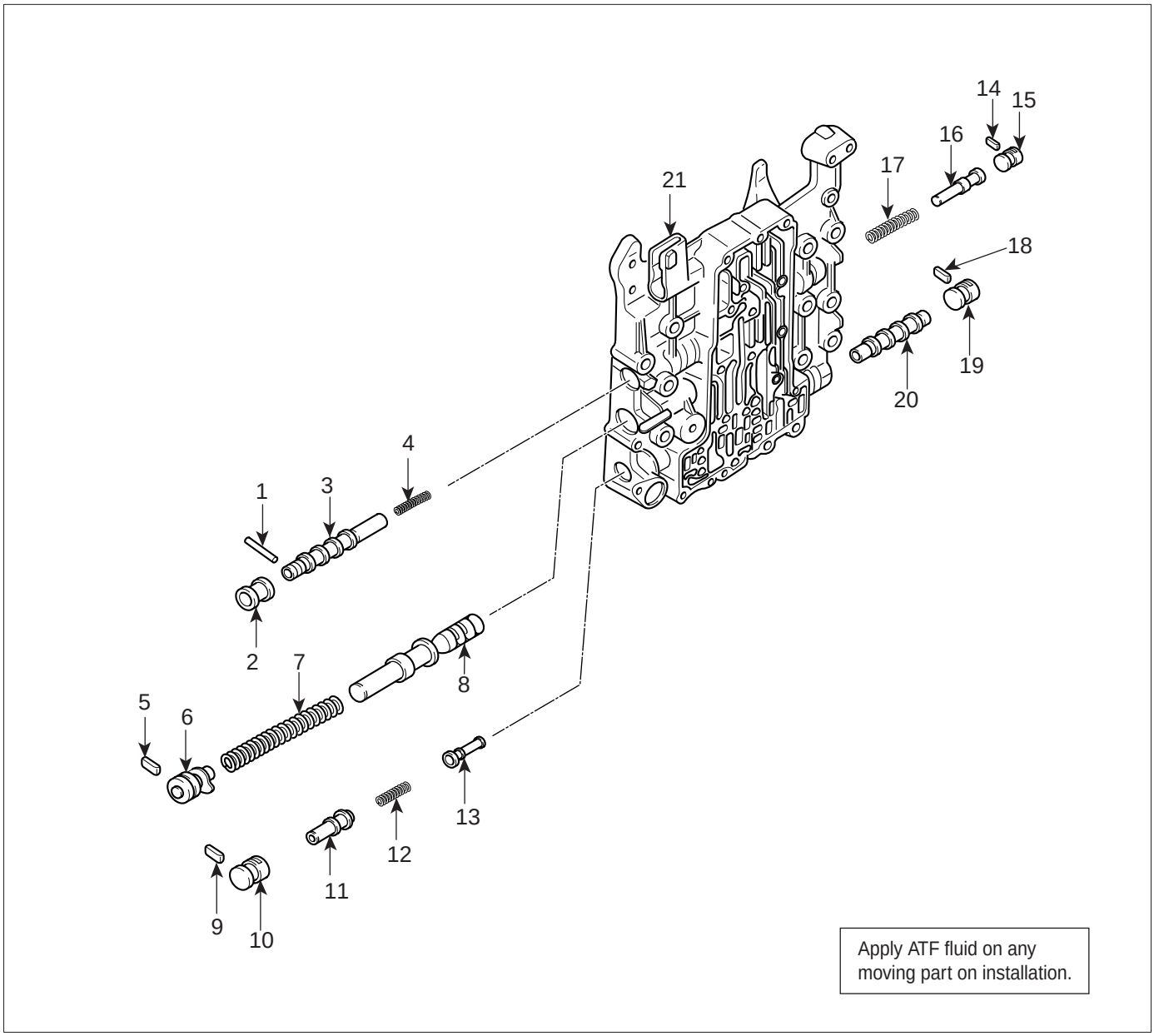


Disassembly steps

1. Solenoid valve support
2. UD clutch solenoid valve
3. 2nd brke solenoid valve
4. Damper clutch control solenoid valve
5. OD clutch solenoid valve
6. Low and reverse brake solenoid valve
7. Manual valve
8. Cover
9. Plate
10. Outside valve body assembly
11. Still ball (Orfice check ball)
12. Spring
13. Plate
14. Damping valve
15. Damping valve spring
16. Steel ball (line relief)
17. Spring
18. Steel ball (Orfice check ball)
19. Spring
20. Inside valve body assembly

BKGE005G

INSIDE VALVE BODY

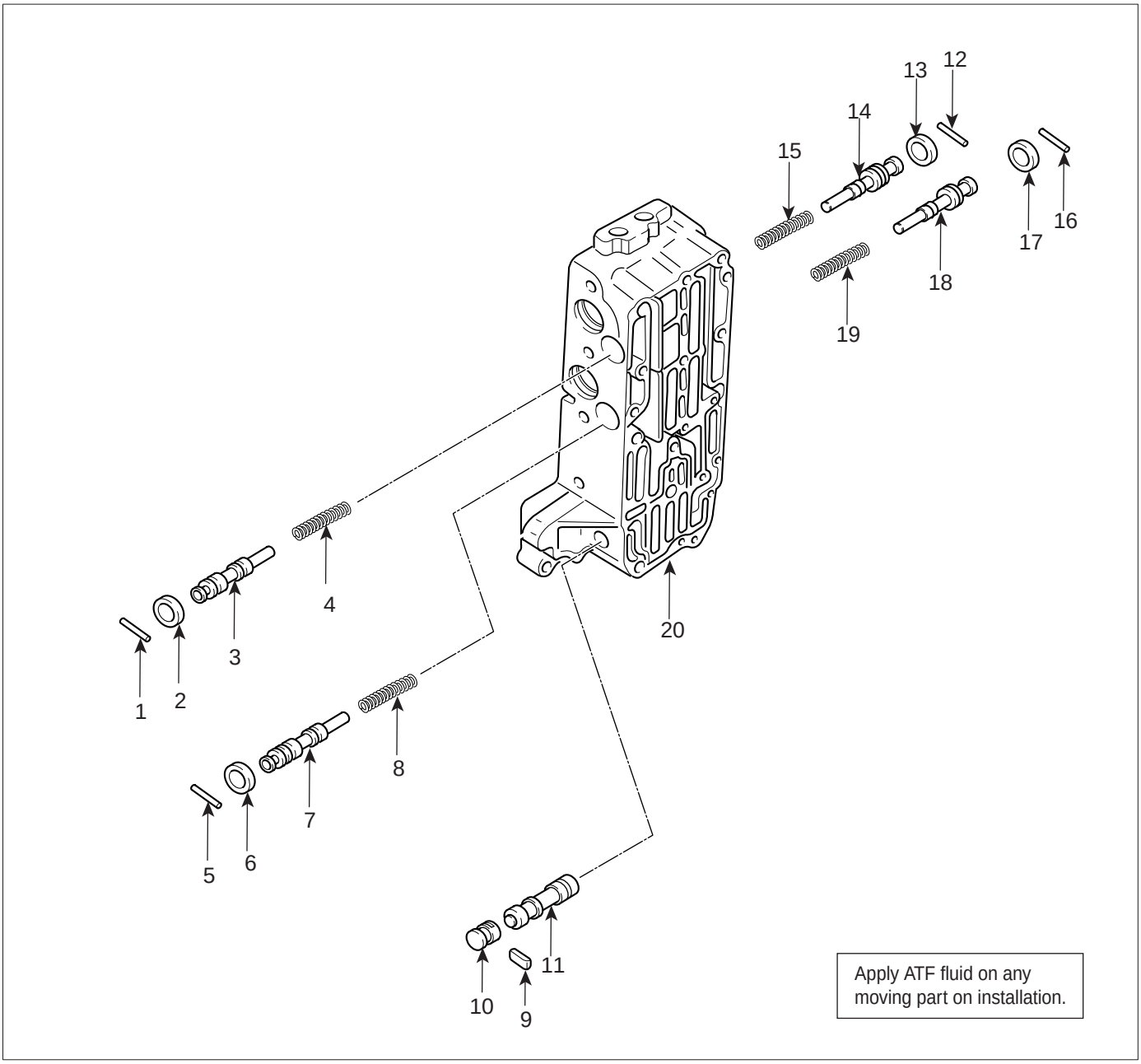


Disassembly

1. Roller
2. Damper clutch control valve sleeve
3. Damper clutch control valve
4. Damper clutch control valve spring
5. Plate
6. Screw
7. Regulator valve spring
8. Regulator valve
9. Plate
10. Fail-safe valve A sleeve
11. Fail-safe valve A2
12. Fail-safe valve A sprint
13. Fail-safe valve A1
14. Plate
15. Plug
16. Torque converter valve
17. Torque converter valve spring
18. Plate
19. Fail-safe valve B sleeve
20. Fail-safe valve
21. Inside valve body

BKGE005H

OUTSIDE VALVE BODY



Disassembly

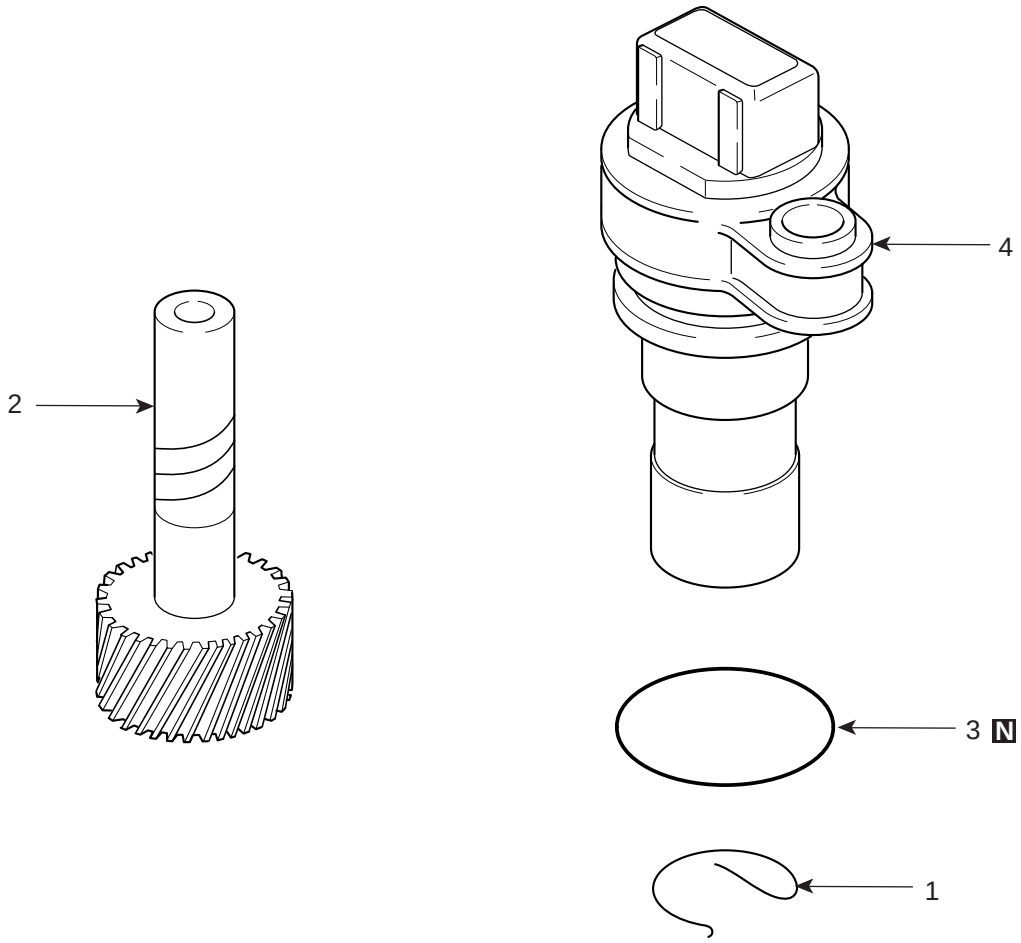
1. Roller
2. Overdrive pressure control valve sleeve
3. Overdrive pressure control valve
4. Overdrive pressure control valve spring
5. Roller
6. Low-reverse pressure control valve sleeve
7. Low-reverse pressure control valve
8. Low-reverse pressure control valve spring
9. Plate
10. Plug
11. Switching valve
12. Roller
13. Underdrive pressure control valve sleeve
14. Underdrive pressure control valve
15. Underdrive pressure control valve spring
16. Roller
17. Second pressure control valve sleeve
18. Second pressure control valve
19. Second pressure control valve spring
20. Outside valve body

BKGE005I

SPEEDOMETER CABLE

COMPONENTS E06EBA9E

[N] Marked part shall be replaced with new part.



Apply ATF fluid on any moving part on installation.

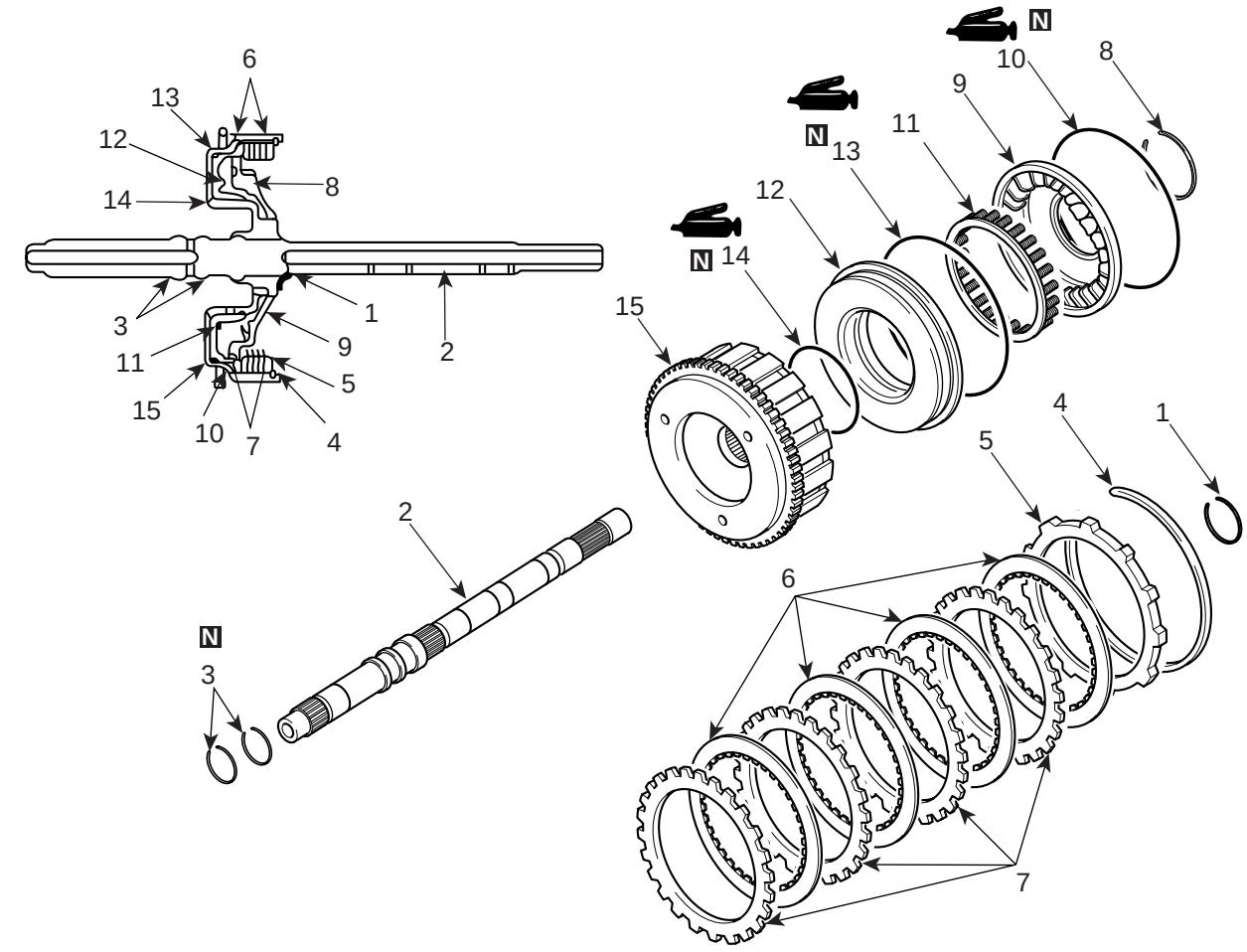
1. E-clip
2. Speedometer driven gear
3. O-ring
4. Sleeve

BKGE005N

UNDERDRIVE CLUTCH

COMPONENTS E1198EAD

N Marked part shall be replaced with new part.



Apply ATF fluid on any moving part on installation.

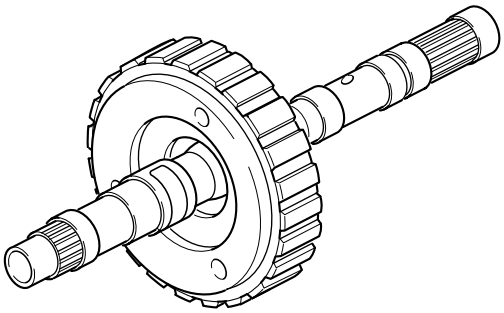
Disassembly steps

1. Snap ring
2. Input shaft
3. Seal ring
4. Snap ring
5. Clutch reaction plate
6. Clutch disc
7. Clutch plate
8. Snap ring
9. Spring retainer
10. D-ring
11. Return spring
12. Underdrive clutch piston
13. D-ring
14. D-ring
15. Underdrive clutch retainer

BKGE005J

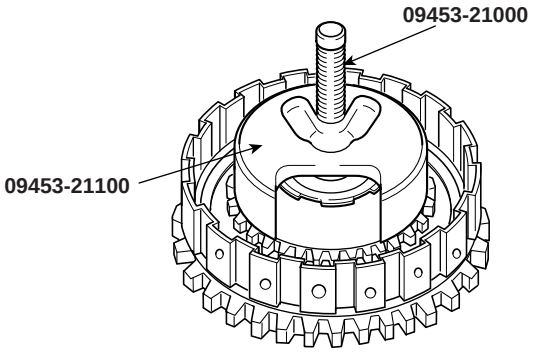
DISASSEMBLY EFB2CEEF

1. Remove the input shaft snap ring.
2. Remove the input shaft.
3. Remove the 2 seal rings.
4. Remove the clutch reaction plate snap ring.
5. Remove the clutch reaction plate.
6. Remove the 4 clutch discs and 4 clutch plates.



BK1A058A

7. Compress the clutch return springs using special tools, 09453-24000 and 09453-21000 then remove the clutch spring retainer snap ring.

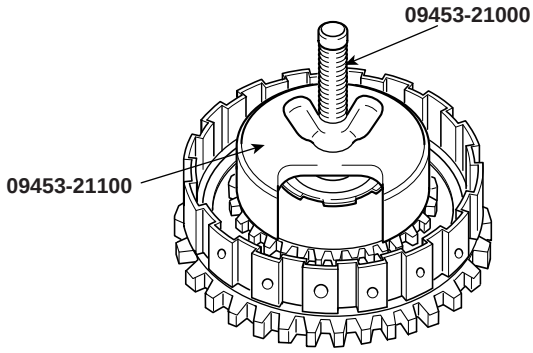


BK1A058B

8. Remove the clutch spring retainer.
9. Remove the D-ring seal.
10. Remove the clutch return spring.
11. Remove the underdrive clutch piston using compressed air.
12. Remove the 2 D-ring seals.

REASSEMBLY E6689C80

1. Install the 2 D-ring seals.
2. Install the underdrive clutch piston.
3. Install the clutch return spring.
4. Install the D-ring seal.
5. Install the clutch spring retainer.
6. Compress the clutch return springs using special tools, 09453-21100 and 09453-21000, then install the clutch spring retainer snap ring.

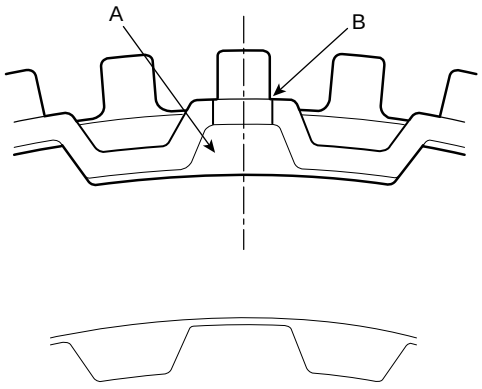


BK1A058B

CAUTION

Dip each clutch disc in ATF before assembling.

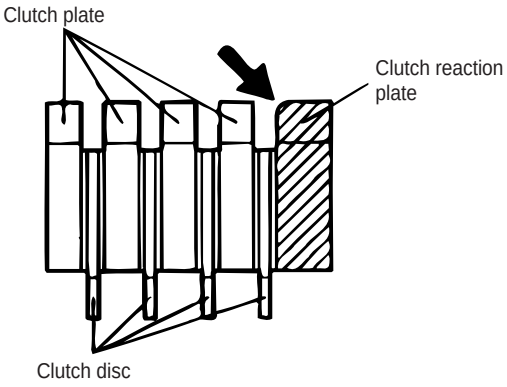
7. Align the spaces between the teeth (A) on the clutch plates, clutch discs, and reaction plate to the outer circumference hole (B) in the underdrive clutch retainer.



BK1A059A

8. Install the 4 clutch discs and the 4 clutch plates.
9. Install the clutch reaction plate with the shear droop toward the clutch disc.

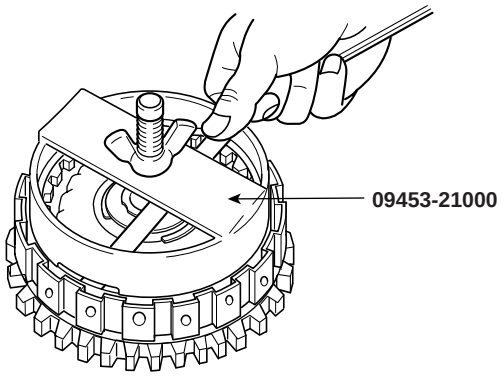
10. Install the clutch reaction plate snap ring.



BKGE005K

11. Install special tools, MD998924 and MB991628, as shown, then check the clearance between the snap ring and the reaction plate using a feeler gauge.

Standard value : 1.6-1.8 mm (0.0630-0.0709 in)

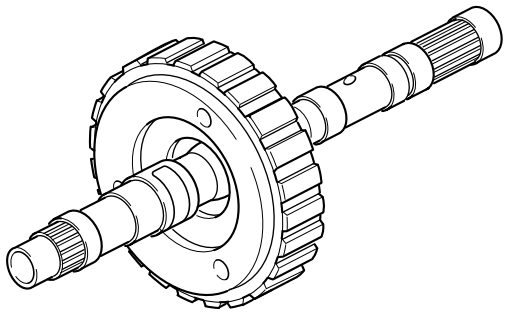


BK1A059B

12. If the clearance is correct, measure the old snap ring, then select the correct size from the chart in the service manual.

13. Install the seal rings.

14. Install the input shaft.



BK1A058A

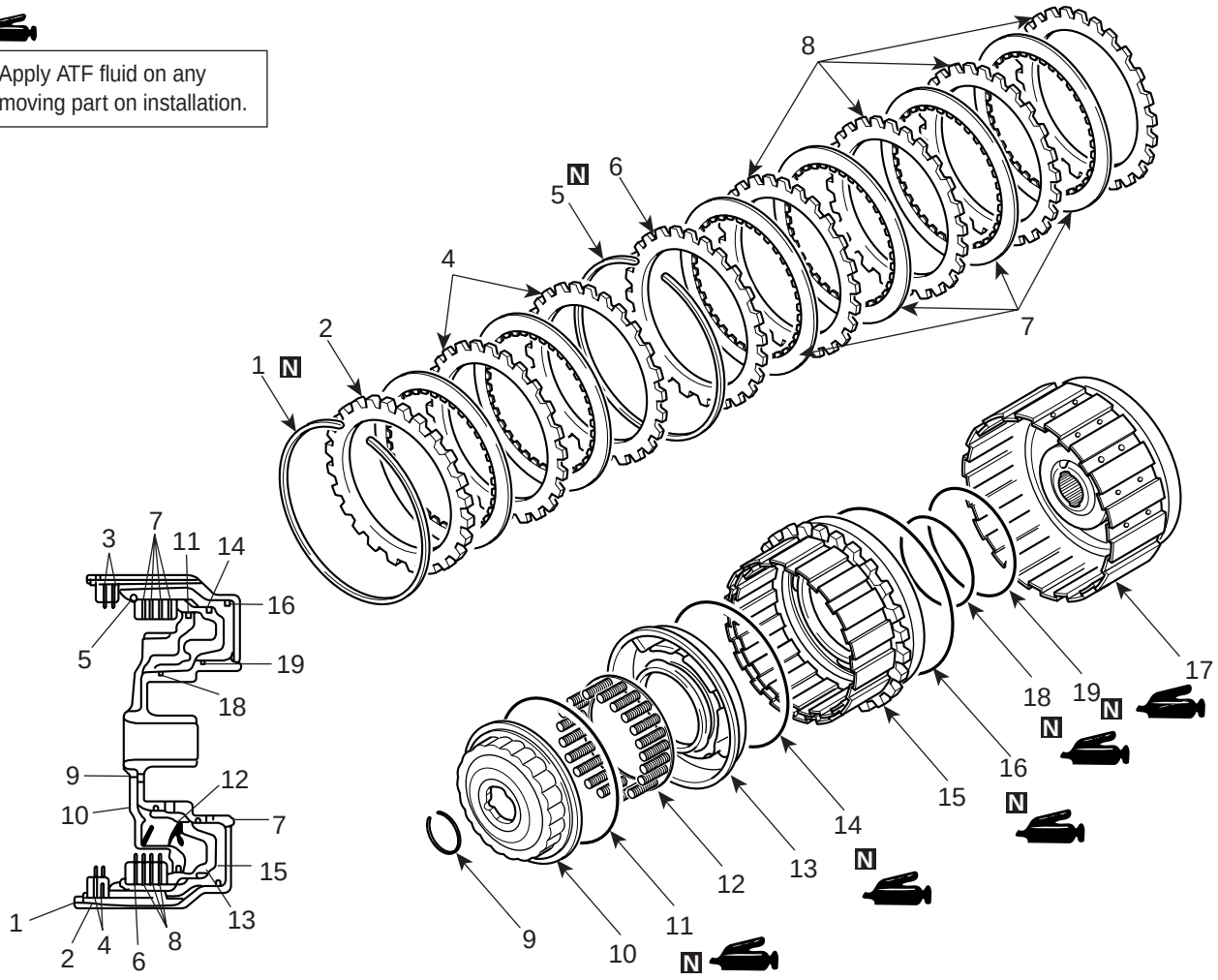
15. Install the input shaft snap ring.

REVERSE AND OVERDRIVE CLUTCH

COMPONENTS EFFACB7A

N Marked part shall be replaced with new part.

Apply ATF fluid on any moving part on installation.



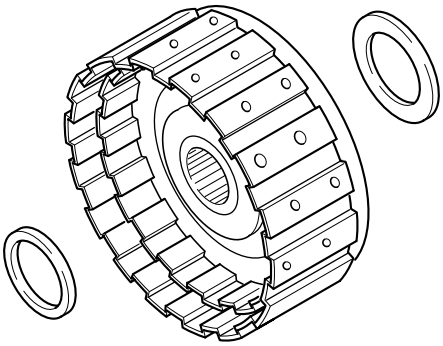
Disassembly steps

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. Reverse clutch retainer
18. D-ring
19. D-ring

BKGE005L

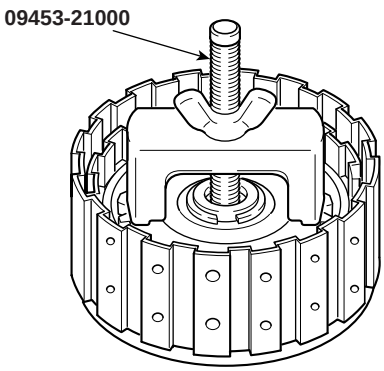
DISASSEMBLY E4F1E4EF

1. Remove the overdrive clutch reaction plate snap ring.



BK1A061A

2. Remove the overdrive clutch reaction plate.
3. Remove the 2 overdrive clutch discs and 2 plates.
4. Remove the reverse clutch reaction plate snap ring.
5. Remove the reverse clutch reaction plate.
6. Remove the 4 reverse clutch discs and 4 plates.
7. Compress the clutch return springs using special tools, 09453-21000 then remove the clutch spring retainer snap ring.

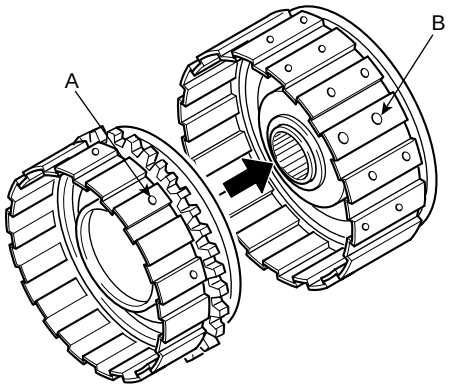


BK1A061B

8. Remove the clutch spring retainer.
9. Remove the D-ring seal.
10. Remove the clutch return spring.
11. Remove the overdrive clutch piston using compressed air.
12. Remove the D-ring seal.
13. Remove the Reverse clutch piston.
14. Remove the 3 D-ring seals.

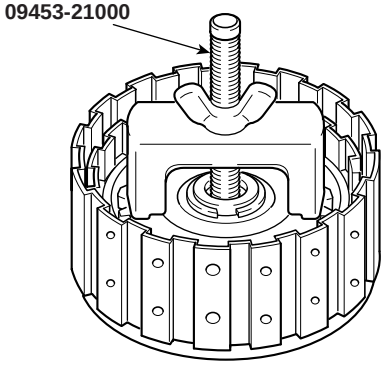
REASSEMBLY E802DFBB

1. Install the 3 D-ring seals.
2. Align the outer circumference holes (A and B) on the reverse piston and the reverse piston retainer before assembly.



BK1A062A

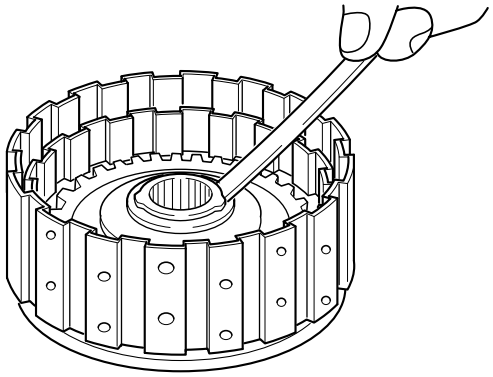
3. Install the Reverse clutch piston.
4. Install the D-ring seal.
5. Install the overdrive clutch piston.
6. Install the clutch return spring.
7. Install the D-ring seal.
8. Install the clutch spring retainer.
9. Compress the clutch return springs using special tools, 09453-21000 then install the clutch spring retainer snap ring.



BK1A061B

10. Check the clearance between the snap ring and the return spring retainer

Standard value :
0.01-0.09 mm (0.0004-0.0035 in)



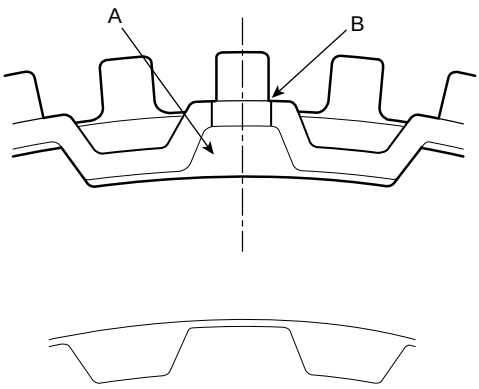
BK1A062B

11. If the clearance is incorrect, measure the old snap ring, then select the correct size from the chart in the service manual.

CAUTION

Dip each clutch disc in ATF before assembling.

12. Align the spaces between the teeth (A) on the clutch plates, clutch discs, and reaction plate to the outer circumference hole (B) in the reverse clutch retainer.



BK1A062C

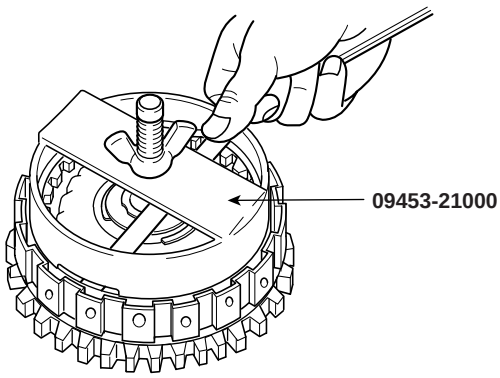
13. Install the 4 reverse clutch discs and 4 plates.

14. Install the reverse clutch reaction plate.

15. Install the reverse clutch reaction plate snap ring.

16. Install special tools, 09453-21000 as shown, then check the clearance between the snap ring and the reaction plate using a feeler gauge.

Standard value :
1.6-1.8 mm (0.0630-0.0709 in)



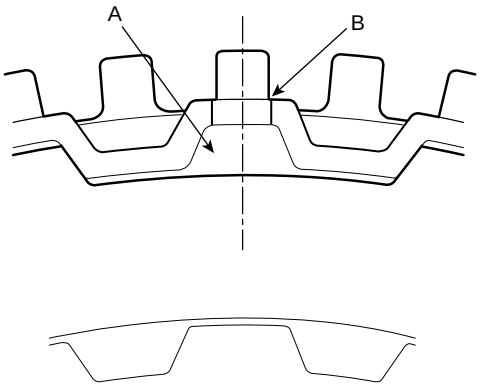
BK1A059B

17. If the clearance is incorrect, measure the old snap ring, then select the correct size from the chart in the service manual.

WARNING

Dip each clutch disc in ATF before assembling.

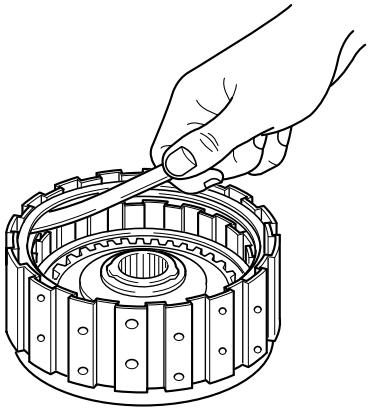
18. Align the spaces between the teeth (A) on the clutch plates, clutch discs, and reaction plate to the outer circumference hole (B) in the overdrive clutch retainer.



BK1A062C

19. Install the 2 overdrive clutch discs and 2 plates.
20. Install the overdrive clutch reaction plate.
21. Install the overdrive clutch reaction plate snap ring.
22. Check the clearance between the snap ring and the clutch reaction plate.

Standard value : 1.5-1.7 mm (0.0590-0.0670 in)



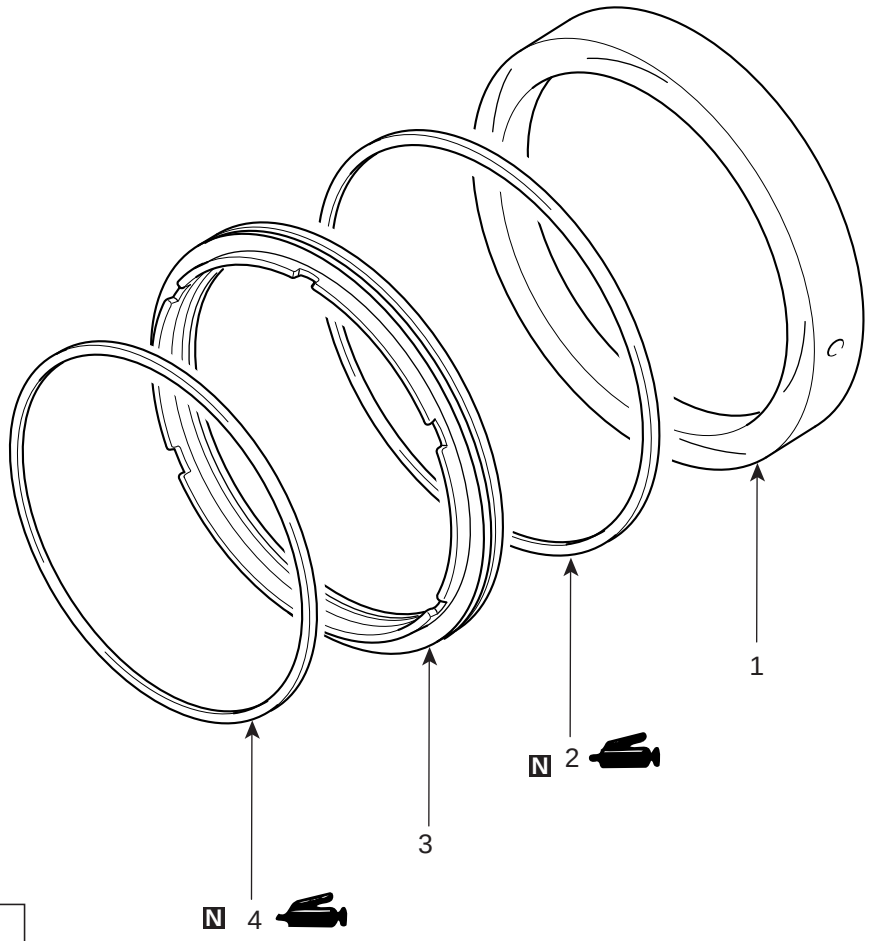
BK1A062D

23. If the clearance is incorrect, measure the old snap ring, then select the correct size from the chart in the service manual.

SECOND COAST BRAKE

COMPONENTS EB77D8B3

N Marked part shall be replaced with new part.



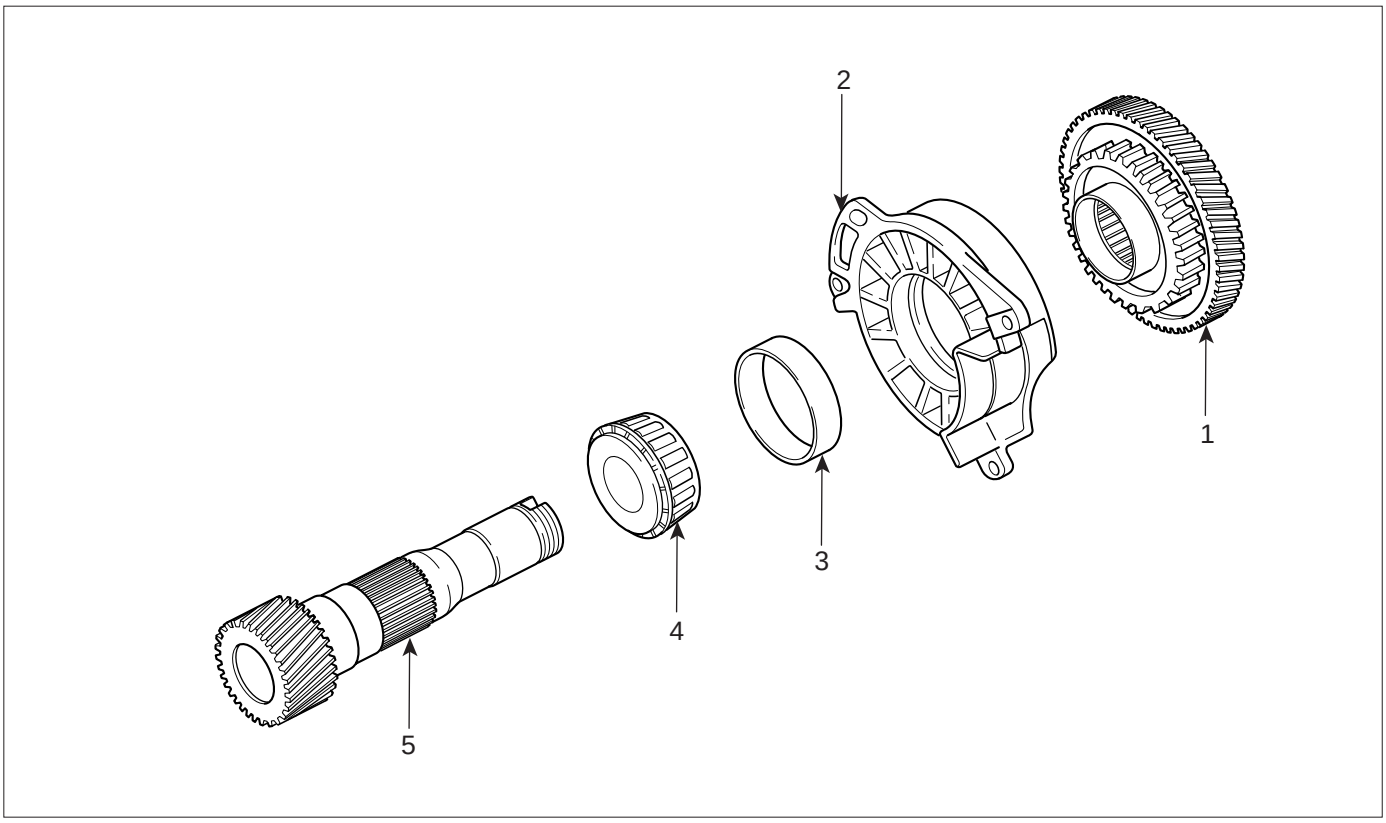
Apply ATF fluid on any moving part on installation.

Disassembly procedure
1. Second brake retainer
2. O-ring
3. Second brake piston
4. O-ring

BKGE005M

OUTPUT SHAFT

COMPONENTS E023C4F0



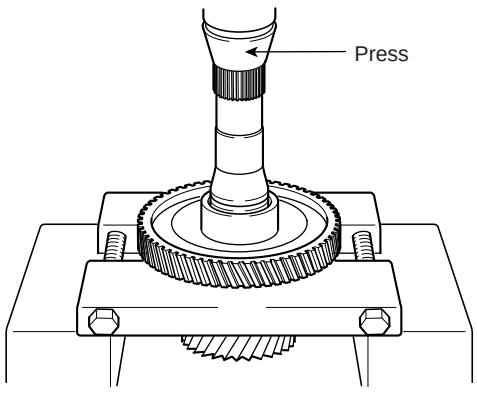
Disassembly steps

1. T/F driven gear
2. Bearing retainer
3. Outer race
4. Taper roller bearing
5. Output shaft

BKGE005D

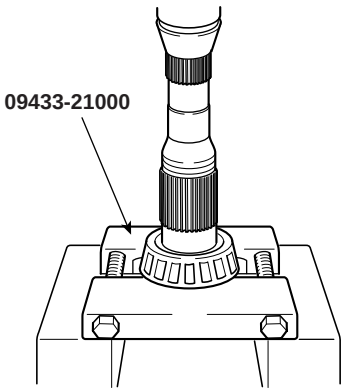
REASSEMBLY E08D96E5

1. Remove the transfer driven gear by press.



BK1A066A

2. Remove the taper roller bearing.

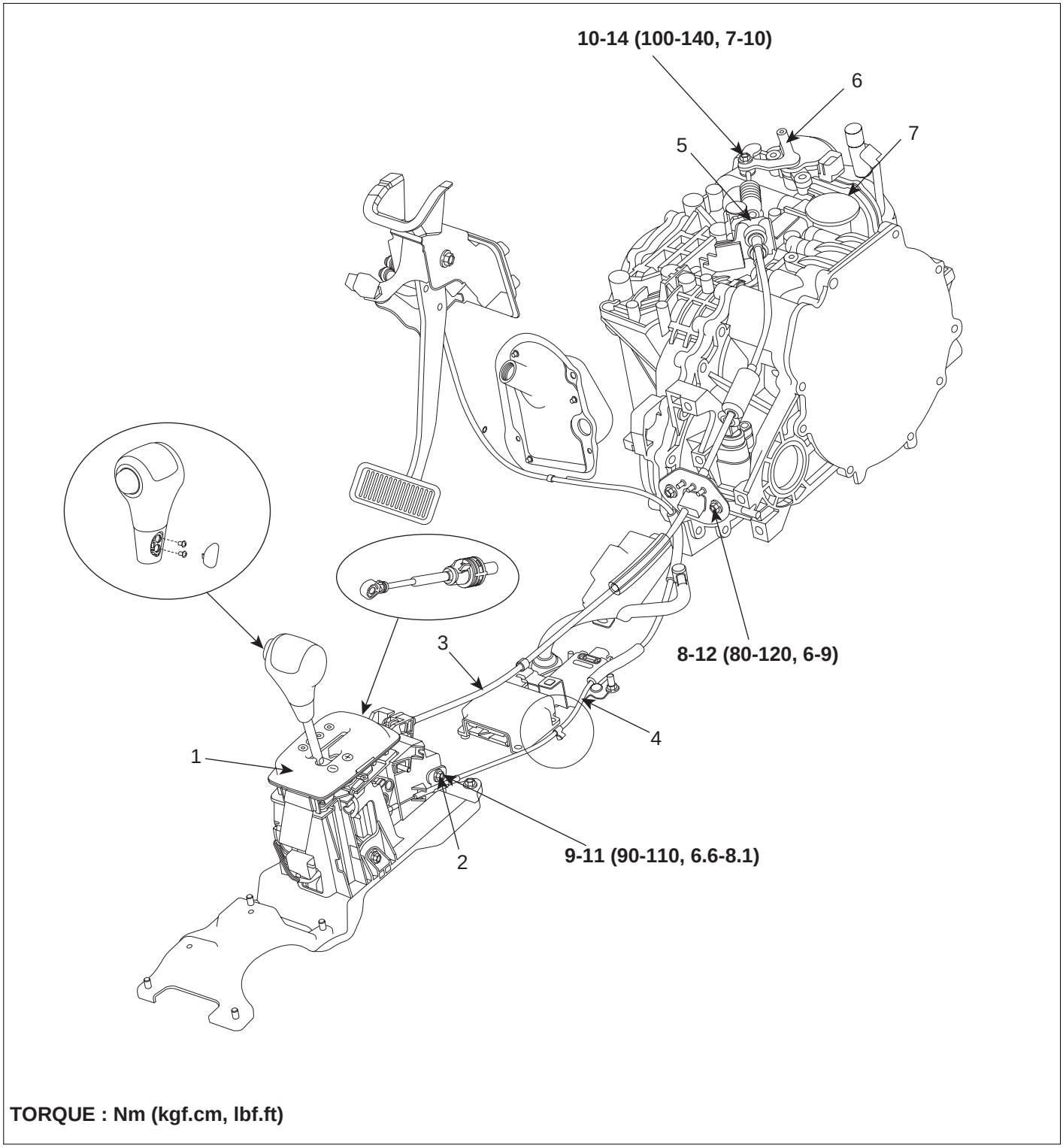


BK1A066B

AUTOMATIC TRANSAXLE CONTROL SYSTEM

SHIFT LEVER

COMPONENTS EDAFC41A



TORQUE : Nm (kgf.cm, lbf.ft)

1. Shift lever assembly
2. Shift lock cable nut
3. AT cable
4. Shift lock cable
5. Pin
6. Shift lever (AT side)
7. Automatic transaxle

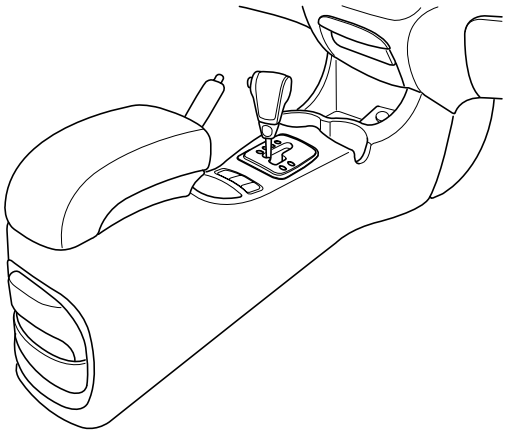
LKIF008A

REMOVAL E87FA6EF

1. Remove the shift lever knob(A).

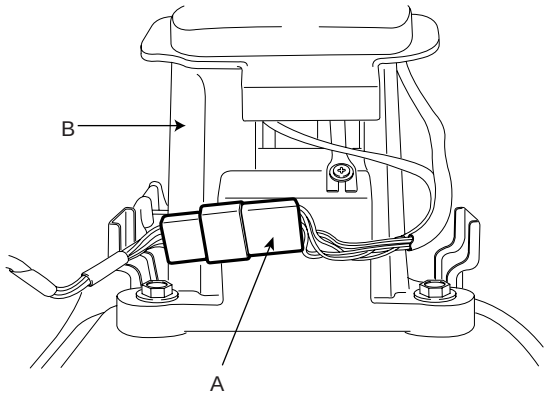
LKIF008B

2. Disconnect the three connectors.
3. Remove the console cover. (Screw:10EA, Fastener:4EA)



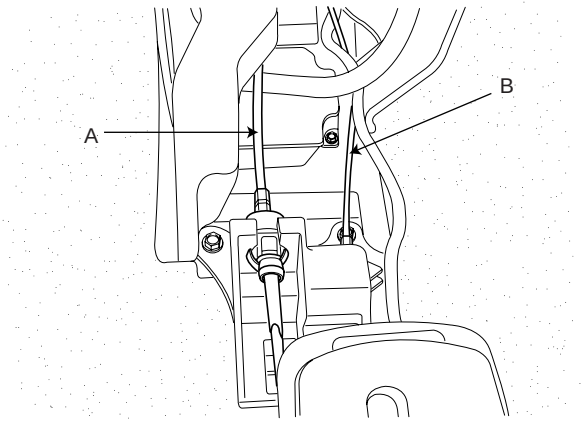
LKIF008C

4. Remove the sports mode connector(A) from the shift lever(B).



LKIF008D

5. Remove the control cable(A) and shift lock cable(B).



LKIF008E

6. Remove the shift lever assembly. (Bolt:4EA)

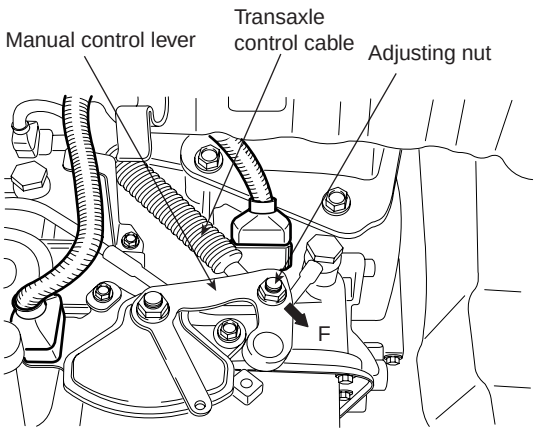
INSPECTION EDD836E7

1. Adjusting method for T/M control cable

   1) Set room side lever and T/M side lever to "N" position.

   2) Connect room side lever and shift cable.

   3) Connect T/M side lever to cable in a following orders.
      a. Push cable lightly to "F" direction shown to eliminate FREE PLAY of cable.
      b. Tighten adjusting nut.

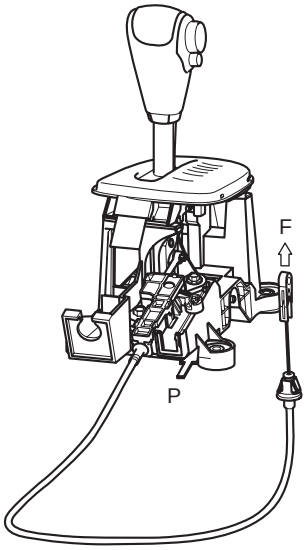


BKGE001A

   4) After adjusting according to (2)-(4). Check to be sure that this part operates surely at each range of T/M side corresponding to each position of room lever.

2. Checking item of shift lock

   1) With shift lever at "P" position and brake pedal not depressed. Push button cannot be operated at the positions except "P".



BKGE006C

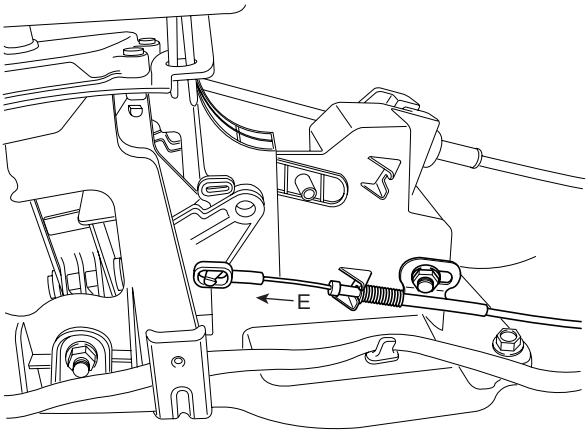
   2) With IG key at the position other than "LOCK"(may be at "ACC") and brake pedal stroke 15-25mm (0.59-0.98 in) (with shift lever at "P" position). Push button can be operated and shift lever can be shifted smoothly to other from "P".

   3) With brake pedal not depressed. Shift lever can be shifted smoothly to "P" position from other positions.

   4) Brake pedal must be operated smoothly without catching at all positions.

ADJUSTING PROCEDURE FOR "P" SHIFT LOCK CABLE

1. Check that each lock cam is shown below.



AKIE005E

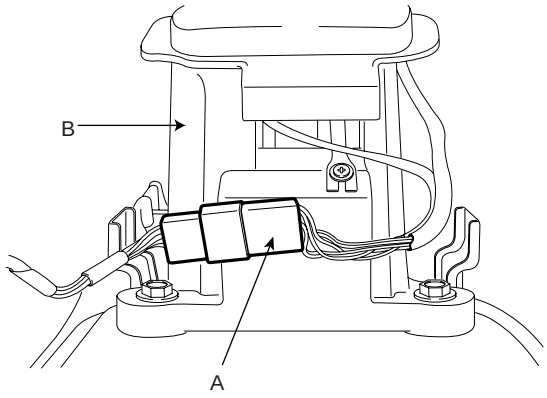
2. Install shift lock cable in position. In this case, shift lock cable must be fixed to brake pedal in position.
3. Temporarily install shift lock cable to A/T lever assy. Securely insert cable end into fixing point of shift lock cam.
4. Doing the work of 3. slightly pull outer casing of shift lock cable to direction "E" to stretch cable. In this case, shift lock cam must not move.
5. After checking portion of cable end touches cable fixing pin of shift lock cam. Fix outer casing with a nut.
6. Check the installation condition of the shift lock cam.

INSTALLATION EB24FE41

1. Install the shift lever assembly. (Bolt:4EA)

TORQUE :
18-25Nm (180-250kgf.cm, 13.3-18.4lbf.ft)

2. Install the cable.
3. Connect the sports mode connector.



LKIF008D

4. Inspect the shift lock. (Refer to shift lock inspection)
5. Connect the three connectors.
6. Install the console cover. (Screw:10EA, Fastener:4EA)
7. Install the shift lever knob.