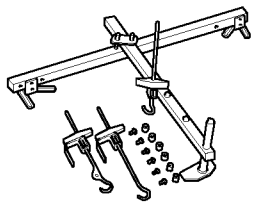
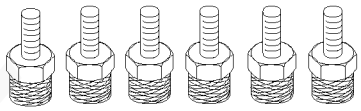
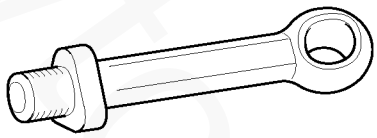
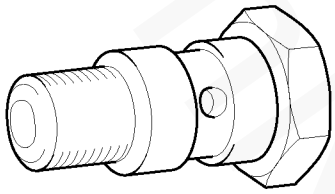
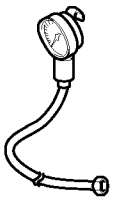
Automatic Transaxle (F4A42)

GENERAL

SPECIFICATIONS EFD75B9C

Item	F4A42-1	F4A42-2
Torque converter type	3-element, 1-stage, 2-phase type	
Transaxle type	4-speed forward, 1-speed reverse	
Engine displacement	2.0 DOHC	2.7 DOHC
Gear ratio 1st 2nd 3rd 4th	 2.842 1.529 1.000 0.712	 2.842 1.529 1.000 0.712
Reverse	2.480	2.480
Final gear ratio	4.407	4.402

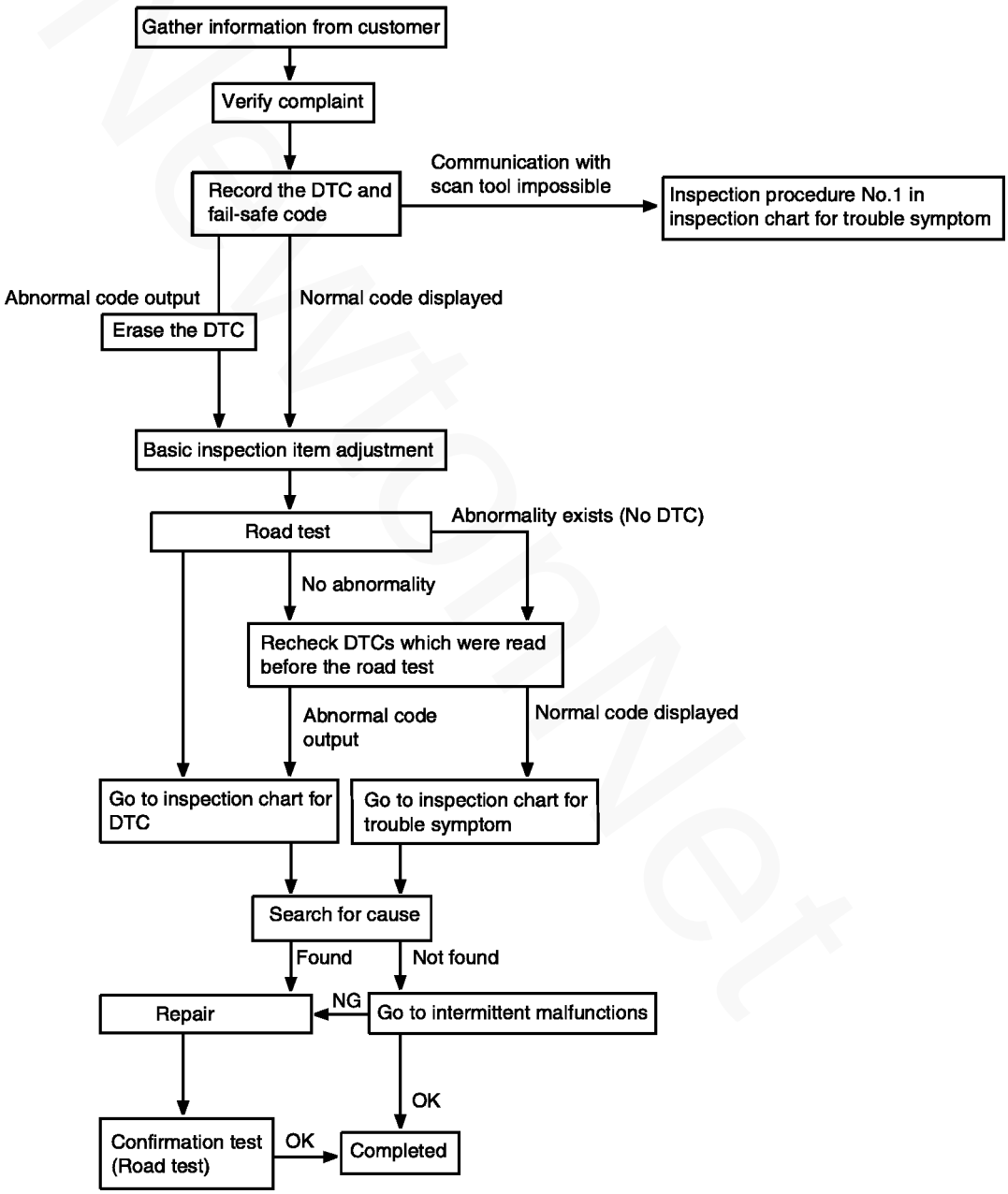
SPECIAL TOOLS EEFB1ACB

Tool (Number and name)	Illustration	Use
Engine support fixture J28467-B	 J284670B	Removal and installation of transaxle assembly
Engine support adapters J28467-125	 J2846712	Use with J28467-B
09452-21001 Oil pressure gauge adapter	 EKAA006A	Measurement of the oil pressure. (use with 09452-21500 and 09452-21002)
09452-21002 Oil pressure gauge adapter	 EKAA006B	Measurement of the oil pressure. use with 09452-21500 and 09452-21001)
09452-21500 Oil pressure gauge	 EKAA006C	Measurement of the oil pressure. (use with 09452-21001 and 09452-21002)

AUTOMATIC TRANSAXLE SYSTEM

TROUBLESHOOTING E53FEBC0

(F4A42 MODEL)



EKA9007D

DIAGNOSIS FUNCTION

1. Connect the Hi Scan Pro to the connector for diagnosis.

2. Read the output diagnostic trouble codes. Then follow the remedy procedures according to the "DIAGNOSTIC TROUBLE CODE DESCRIPTION" on the following pages.

   NOTE
   - *A maximum of 8 diagnostic trouble codes (in the sequence of occurrence) can be stored in the Random Access Memory (RAM) incorporated within the control module.*
   - *The same diagnostic trouble code can be stored one time only.*
   - *If the number of stored diagnostic trouble codes or diagnostic trouble patterns exceeds 8, already stored diagnostic trouble codes will be erased in sequence, beginning with the oldest.*
   - *Do not disconnect the battery until all diagnostic trouble codes or diagnostic trouble patterns have been read out, because all stored diagnostic trouble codes or diagnostic trouble patterns will be cancelled when the battery is disconnected.*

3. If the fail-safe system is activated and the transaxle is locked in third gear, the diagnostic trouble code in the Fail-safe code description will be stored in the RAM. Three of these diagnostic trouble codes can be stored.

4. The cancellation will occur if, with the transaxle locked in third gear, the ignition key is turned to the OFF position, but the diagnostic trouble code is stored in the RAM.

5. Memorization.
   - Up to 8 diagnosis items and 3 fail-safe items can be memorized.
   - If the memory capacity is exceeded, diagnosis and fail-safe items in the memory are overwritten, starting with the oldest.
   - No code can be memorized more than once.

6. Diagnosis Code Deletion.

   1) Automatic Deletion
   All diagnosis codes are deleted from memory the 200 th time the ATF temperature reaches 50°C after memorization of the most recent diagnosis code.

   2) Forced Deletion
   Memorized diagnosis codes can be deleted using the scan-tool, provided the following conditions are satisfied :
   - The ignition switch is ON
   - There is no detection pulse from the crank angle sensor
   - There is no detection pulse from the output shaft speed sensor
   - There is no detection pulse from the vehicle speed sensor
   - The fail-safe function is not operational

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	Stop lamp 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) 600~925 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 (Each condition should be maintained for 10 seconds or more)	(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% (5) 100%	Underdrive solenoid valve
			(2) 100%, (4) 100%, (3) 0% (5) 0%	Second solenoid valve
			(2) 100%, (4) 0%, (3) 100% (5) 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
			(3) 0% (5) Approx. 70~90%	Damper clutch control solenoid valve
			(3) Approx. 100~300rpm (5) Approx. 0~10rpm	
7	Selector lever position : D (Carry out on a flat and straight road)	1. Accelerate to 4th gear at a throttle position sensor output of 1.5V (accelerator opening angle of 30 %). 2. Gently decelerate to a standstill. 3. Accelerate to 4th gear at a throttle position sensor output of 2.5 V (accelerator opening angle of 50%). 4. While driving at 60 km/h in 4th gear, shif down to 3rd gear. 5. While driving at 40 km/h in 3rd gear, shift down to 2nd gear. 6. 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

INSPECTION CHART FOR THROUBLE 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** is not functioning.		• Malfunction of diagnosis line • Malfunction of connector • Malfunction of the TCM
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 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

Trouble symptom		Probable cause
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.	• 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
	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 upshifting or downshifting 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, 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 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
	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

Trouble symptom		Probable cause
Does not shift	**No diagnosis codes** If shifting does not occur while driving and no diagnosis codes are set, the cause is probably a malfunction of the transaxle range switch, or TCM	• Malfunction of the transaxle range • Malfunction of the TCM
Malfunction while driving	**Poor a acceleration** If acceleration is poor even if downshifting occurs while driving, the cause is probably a malfunction of the engine system, brake or clutch.	• Malfunction of the engine system • Malfunction of the brake of clutch
	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
	Whine noise Whine noise during accelerating or decelerating from driving speeds of 40~60kph or 60~80kph.	• Malfunction of the automatic transaxle cable • Malfunction of the mass damper • Malfunction of the transfer drive gear/driven gear
Transaxle range switch system The cause is probably a malfunction of the inhibitor switch circuit, ignition switch circuit or a defective TCM.		• Malfunction of the transaxle range switch • Malfunction of the ignition switch • Malfunction of connector • Malfunction of the TCM
Idle position switch system The cause is probably a defective idle position switch circuit, or a defective TCM.		• Malfunction of the idle position switch • Malfunction of connector • Malfunction of the TCM
Triple pressure switch system The cause is probably a defective triple pressure switch circuit or a defective TCM.		• Malfunction of the triple pressure switch • Malfunction of connector • Malfunction of A/C system • Malfunction of the TCM
Vehicle speed sensor system The cause is probably a defective vehicle speed sensor circuit or a defective TCM.		• Malfunction of the vehicle speed sensor • Malfunction of connector • Malfunction of the TCM

ELEMENTS IN USE IN EACH GEAR

Operating element / Selector lever position		Underdrive clutch (UD)	Reverse clutch (REV)	Overdrive clutch (OD)	Low-and reverse brake (LR)	Second brake (2nd)	One way clutch (OWC)
P	Parking	-	-	-	O	-	-
R	Reverse	-	O	-	O	-	-
N	Neutral	-	-	-	O	-	-
D	1st	O	-	-	O	-	O
	2nd	O	-	-	-	O	-
	3rd	O	-	O	-	-	-
	4th	-	-	O	-	O	-
3	1st	O	-	-	O	-	O
	2nd	O	-	-	-	O	-
	3rd	O	-	O	-	-	-
2	1st	O	-	-	O	-	O
	2nd	O	-	-	-	O	-
L	1st	O	-	-	O	-	O

OPERATING ELEMENTS AND THEIR FUNCTION

Operating element	Code	Function
Underdrive clutch	UD	Connects input shaft and underdrive sun gear
Reverse clutch	REV	Connects input shaft and reverse sun gear
Overdrive clutch	OD	Connects input shaft and overdrive planetary carrier
Low & reverse brake	LR	Locks low & reverse annulus gear and overdrive planetary carrier
Second brake	2ND	Locks reverse sun gear

SERVICE ADJUSTMENT PROCEDURE E73F5727

AUTOMATIC TRANSAXLE FLUID CHECK

1. Drive the vehicle until the fluid temperature rises to the normal temperature (70~80°C).
2. Park the vehicle on a level surface.
3. Move the selector lever through all positions to fill the torque converter and the hydraulic circuits with fluid, and then move the selector lever to the N position.
4. After wiping off any dirt around the oil level gauge, reinsert and remove 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 lower than this, add more fluid until the level reaches the HOT mark.
   Automatic transaxle fluid : DIAMOND ATF SP-III., SK ATF SP-III.

   NOTE

   If the fluid level is low, the oil pump will draw in air along with the fluid, which will cause bubbles to form inside the hydraulic circuit. This will in turn cause the hydraulic pressure to drop, which will result in late shifting and slipping of the clutches and brakes. If there is too much fluid, the gears can churn it up into foam and cause the same conditions that can occur with low fluid levels. In either case, air bubbles can cause overheating and oxidation of the fluid which can interfere with normal valve, clutch, and brake operation. Foaming can also result in fluid escaping from the transaxle vent, in which case it may be mistaken for a leak.

6. Insert the oil level gauge securely.
7. The fluid and the oil filters should always be replaced when overhauling the transaxle or after the vehicle has been driven under severe conditions. The replacement procedures are given below. Furthermore, the oil filters are special filters which are only to be used for the automatic transaxle.

   NOTE

   When new, automatic transmission fluid should be red. The red dye is added so distinguish it from engine oil or antifreeze. As the vehicle is driven the transmission fluid will begin to look darker. The color may eventually appear light brown
   Also, the dye, which is not an indicator of fluid quality, is not permanent
   Therefore, further investigation of the automatic transaxle is required if,
   - *the fluid is dark brown or black.*
   - *the fluid smells burnt.*
   - *metal particles can be seen or felt on the dipstick.*

AUTOMATIC TRANSAXLE FLUID REPLACEMENT

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

1. Remove the drain plug from the bottom of the transaxle case to drain the fluid.
2. Install the drain plug and gasket, and tighten to the specified torque.

Tightening torque : 32 Nm (320 kgf·cm, 23 lbf·ft)

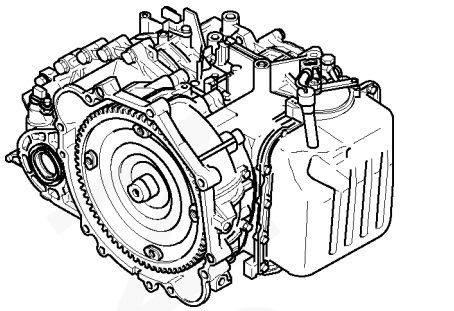
3. Pour the new fluid in through the oil filler tube.

   CAUTION

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

4. Repeat the procedure in step 1 if too much fluid was added.
5. Reconnect the hose that was disconnected in step 1 above, and firmly replace the oil level gauge.
6. Start the engine and run it at idle for 1-2 minutes.
7. Move the select lever through all positions, and then move it to the N position.
8. Drive the vehicle 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.

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



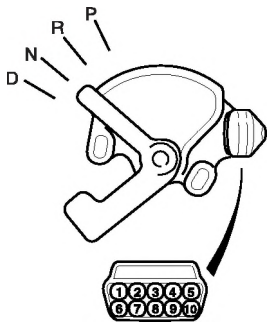
EKAC009E

EKA9059A

TRANSAXLE RANGE SWITCH CONTINUITY CHECK

Items	Terminal No.									
	6	5	4	3	2	1	10	9	8	7
P				○			○	○	○	
R									○	○
N			○				○	○	○	
D						○			○	

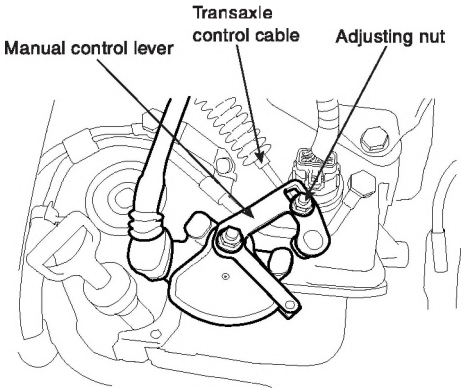
EKJA008A



EKJA008B

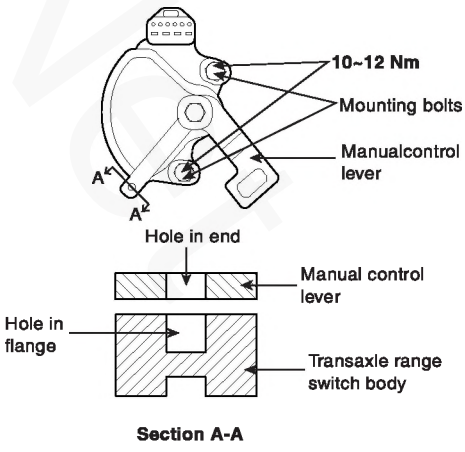
TRANSAXLE RANGE SWITCH AND CONTROL CABLE ADJUSTMENT

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



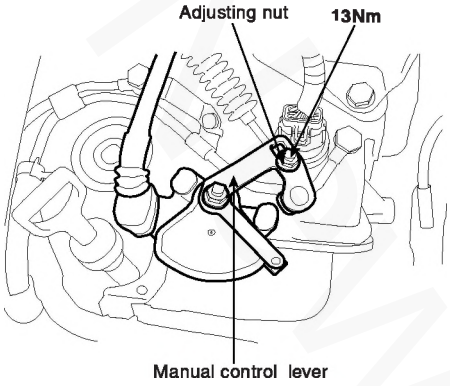
EKA9002C

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. Be careful at this time that the position of the switch body does not change.



EKKA008A

6. Gently pull the transaxle control cable in the direction of the arrow, then tighten the adjusting nut.
7. Check that the selector lever is in the "N" position.
8. Check that each range on the transaxle side operates and functions correctly for each position of the selector lever.



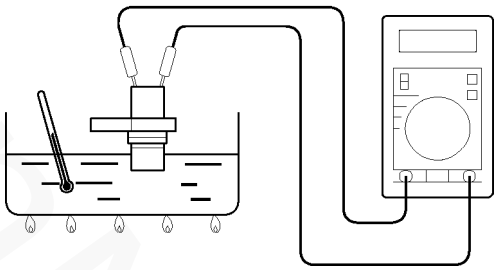
EKA9003B

A/T CONTROL COMPONENT CHECK

1. THROTTLE POSITION SENSOR CHECK
   The TPS is a variable resistor type that rotates with the throttle body shaft to sense the throttle valve angle. As the throttle shaft rotates, the output voltage of the TPS changes. The ECM detects the throttle valve opening based on voltage change. (Refer to FL-section).
2. OIL TEMPERATURE SENSOR CHECK
   1) Remove the oil temperature sensor.
   2) Measure the resistance between terminals 1 and 2 of the oil temperature sensor connector.

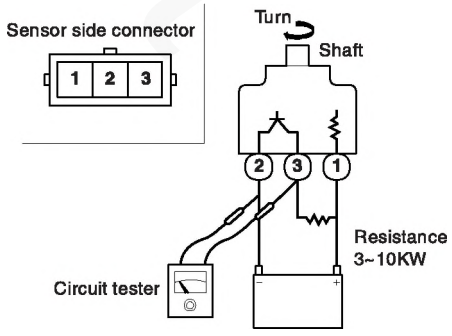
STANDARD VALUE

Oil temperature (°C)	Resistance (KΩ)
0	16.7 ~ 20.5
100	0.57 ~ 0.69



EKA9004A

3. VEHICLE SPEED SENSOR CHECK
   1) Remove the vehicle speed sensor and connect a 3~10 KΩ resistance as shown in the illustration.
   2) Turn the shaft of the vehicle speed sensor and check that there is voltage between terminals 2-3 (1 turn=4 pulses).



EKA9004B

4. A/T CONTROL RELAY CHECK

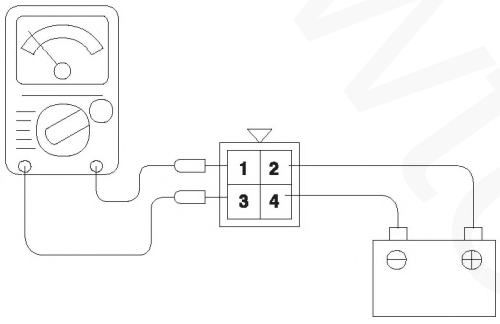
1) Remove the A/T control relay.

2) Use jumper wires to connect A/T control relay terminal 2 to the battery (+) terminal and terminal 4 to the battery (-) terminal.

3) Check the continuity between terminal 1 and terminal 3 of the A/T control relay when the jumper wires are connected and disconnected from the battery.

4) If there is a problem, replace the A/T control relay.

Jumper wire	Continuity between terminal No.1
Connected	Continuity
Disconnected	No continuity

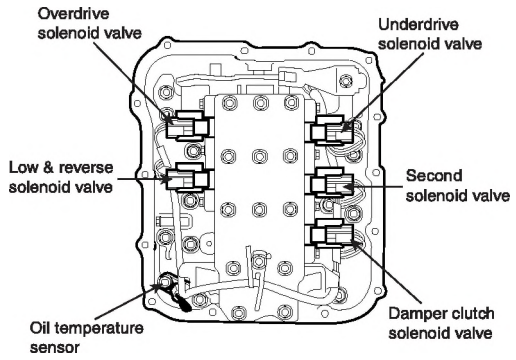


EKJA008C

5. SOLENOID VALVE CHECK

1) Remove the valve body cover.

2) Disconnect the connectors of each solenoid valve.

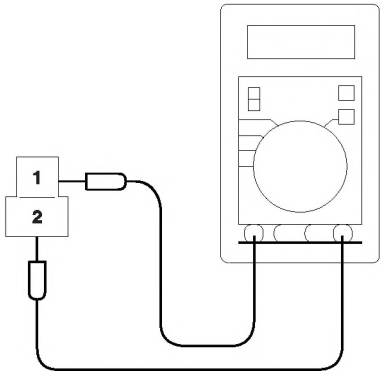


EKA9005C

3) Measure the resistance between terminals 1 and 2 of each solenoid valve.

STANDARD VALUE

Name	Resistance
Damper clutch solenoid valve	2.7 ~ 3.4Ω (at 20°C)
Low and reverse solenoid valve	
Second solenoid valve	
Underdrive solenoid valve	
Overdrive solenoid valve	



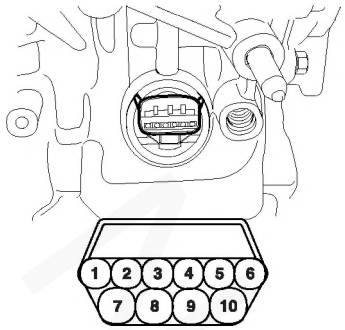
EKA9005D

4) If the resistance is outside the standard value, replace the solenoid valve.

NOTE

Resistance of the solenoid valve connector.

Terminal No.	Name	Resistance
7 & 10	Damper clutch solenoid valve	2.7 ~ 3.4Ω (at 20°C)
10 & 6	Low and reverse solenoid valve	
9 & 4	Second solenoid valve	
9 & 3	Underdrive solenoid valve	
9 & 5	Overdrive solenoid valve	



EKA9017B

TEST PROCEDURE EC52EDF6

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 transaxle 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. Chock both rear wheels (left and right).
3. Apply the parking brake lever 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.

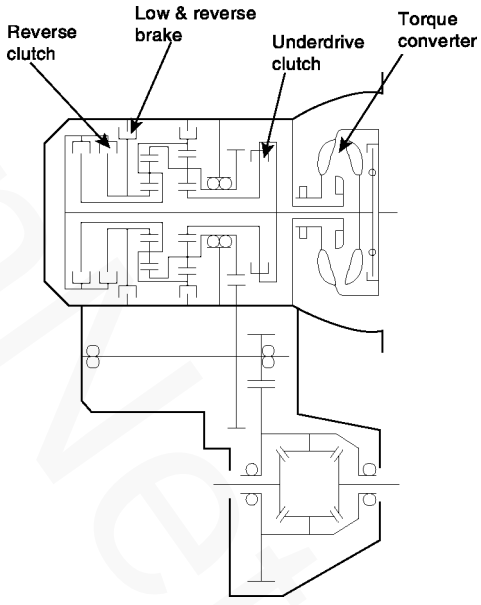
⚠ ***CAUTION***

a. The throttle should not be left fully open for more than eight seconds.
b. 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 rpm to let the automatic transaxle fluid cool down before carrying out subsequent tests.
c. Move the selector lever to the R position and carry out the same test again.

Standard value stall speed : 2,100 ~ 2,900 rpm

TORQUE CONVERTER STALL TEST JUDGEMENT RESULTS

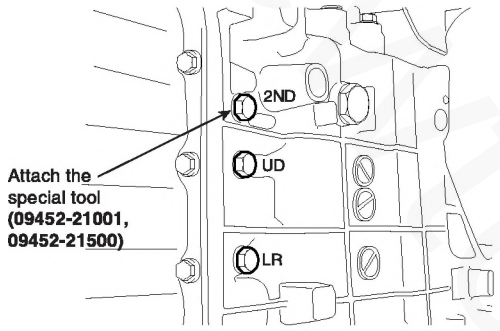
1. Stall speed is too high in both D and R ranges
   - Low line pressure
   - Low & reverse brake slippage
2. Stall speed is too high in D range only
   - Underdrive clutch slippage
3. Stall speed is too high in R range only
   - Reverse clutch slippage
4. Stall speed too low in both D and R ranges
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



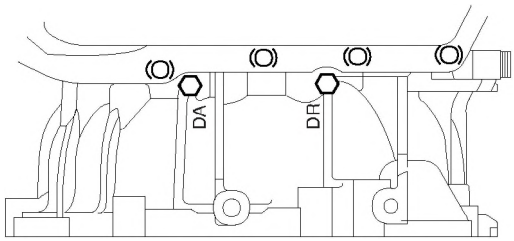
EKA9006A

HYDRAULIC PRESSURE TEST

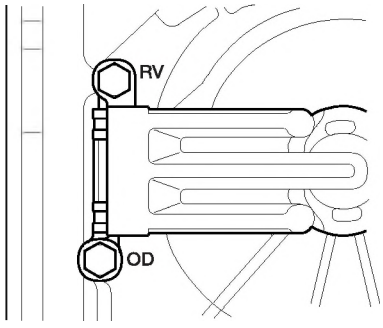
1. Warm up the engine until the automatic transaxle fluid temperature is 80-100°C.
2. Jack up the vehicle so that the wheels are free to turn.
3. Connect the special tool (oil pressure gauge) to each pressure discharge port.
4. Measure the hydraulic pressure at each port under the conditions given in 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.



EKA9007A



EKA9007B



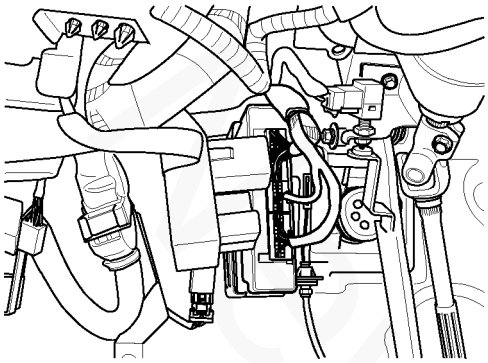
EKA9007C

STANDARD HYDRAULIC PRESSURE TEST

Measurement condition			Standard hydraulic pressure kPa/(psi)							
Selector lever position	Shift position	Engine speed (rpm)	Under drive clutch pressure (UD)	Reverse clutch pressure (REV)	Over-drive clutch pressure (OD)	Low and reverse brake pressure (LR)	Second brake pressure (2ND)	Direct clutch pressure	Damper clutch release pressure (DR)	Reduction brake pressure
P	-	2,500	-	-	-	260 ~ 340 (38 ~ 49)	-	-	220 ~ 360 (31 ~ 52)	260 ~ 340 (38 ~ 49)
R	Reverse	2,500	-	1,270 ~ 1,770 (185 ~ 256)	-	1,270 ~ 1,770 (185 ~ 256)	-	-	500 ~ 700 (73 ~ 101)	1,270 ~ 1,770 (185 ~ 256)
N	Neutral	-	-	-	-	260 ~ 340 (38 ~ 49)	-	-	220 ~ 360 (31 ~ 52)	260 ~ 340 (38 ~ 49)
D	1st gear	2,500	1,010 ~ 1,050 (147 ~ 152)	-	-	1,010 ~ 1,050 (147 ~ 152)	-	-	500 ~ 700 (73 ~ 101)	1,010 ~ 1,050 (147 ~ 152)
	2nd gear	2,500	1,010 ~ 1,050 (147 ~ 152)	-	-	-	1,010 ~ 1,050 (147 ~ 152)	-	500 ~ 700 (73 ~ 101)	1,010 ~ 1,050 (147 ~ 152)
	3rd gear	2,500	780 ~ 880 (113 ~ 128)	-	780 ~ 880 (113 ~ 128)	-	-	-	450 ~ 650 (65 ~ 94)	780 ~ 880 (113 ~ 128)
	4th gear	2,500	780 ~ 880 (113 ~ 128)	-	780 ~ 880 (113 ~ 128)	-	-	780 ~ 880 (113 ~ 128)	450 ~ 650 (65 ~ 94)	-
	5th gear	2,500	-	-	780 ~ 880 (113 ~ 128)	-	780 ~ 880 (113 ~ 128)	780 ~ 880 (113 ~ 128)	450 ~ 650 (65 ~ 94)	-

DTC P0560 BACK-UP LINE FOR POWER

COMPONENT LOCATION E85AA3A1



KKQE001D

GENERAL DESCRIPTION E56BC01C

TCM 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 EEB05337

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

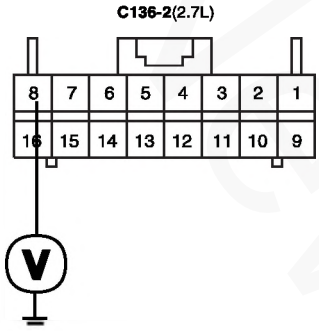
DTC DETECTING CONDITION E20771F9

Item	Detecting Condition & Fail Safe	Possible cause
DTC Strategy	• Check Voltage range	• Faulty TCM • 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 E5D60902

1. Ignition "ON" & Engine "OFF".
2. Disonnect the "C136-2" of TCM connector.
3. Measure the voltage between terminal "8" of the "C136-2" of TCM harness connector and chassis ground.

Specification : Approx. B+



EKOF001A

4. Is voltage within specifications?

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 Component Inspection procedure.

NO

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

COMPONENT INSPECTION EF703ABA

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

NO

▶ Go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR E60B29BE

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

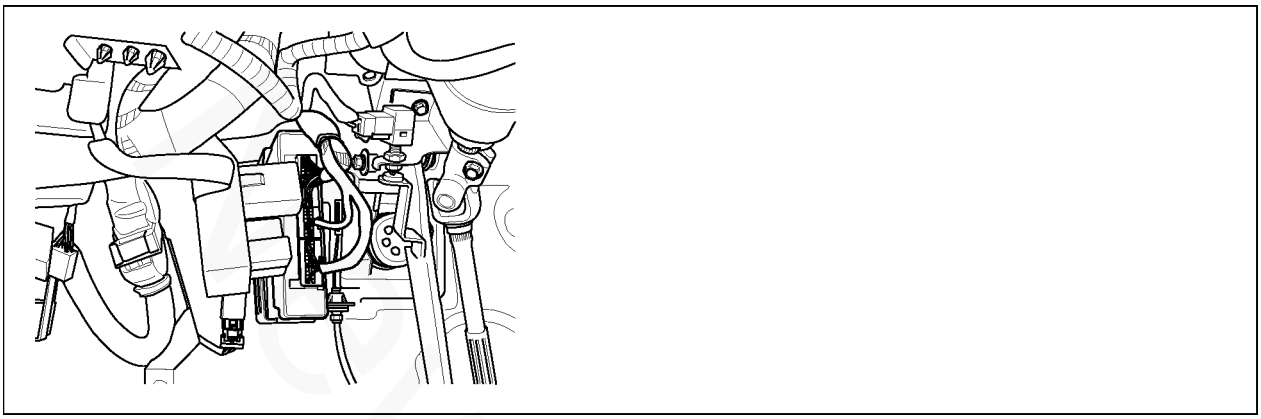
▶ Go to the applicable troubleshooting procedure.

NO

▶ System performing to specification at this time.

DTC P0605 EEPROM ABNORMAL

COMPONENT LOCATION E7C3E8BA



KKQE001D

GENERAL DESCRIPTION E660E5ED

Refer to DTC P0560.

DTC DETECTING CONDITION E081EC2C

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

COMPONENT INSPECTION E32AF27E

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 and check for proper operation. If the problem is corrected, replace TCM 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's connector or was repaired and TCM 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

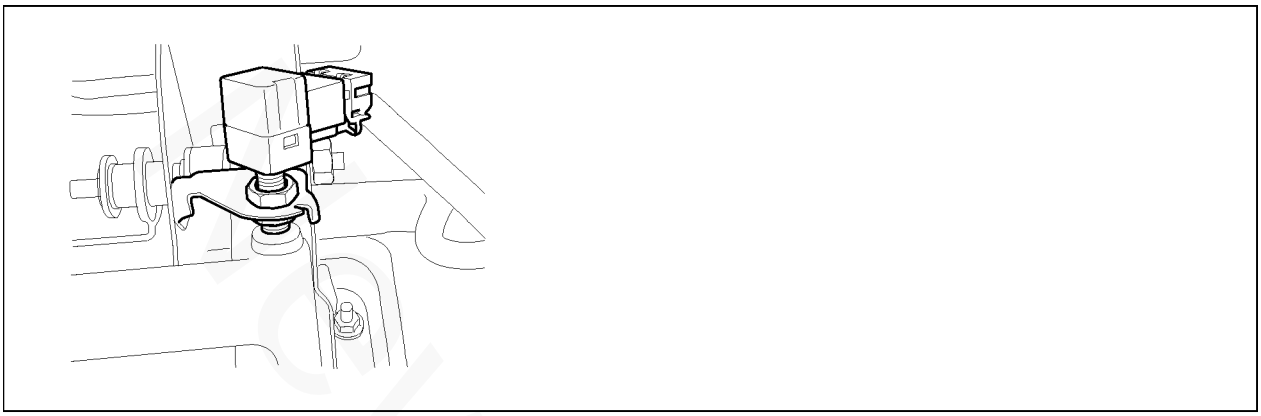
3. IG "ON" ↔ IG "OFF"(2~3 TIMES), AFTER ERASE

VERIFICATION OF VEHICLE REPAIR EA495875

Refer to DTC P0560.

DTC P0703 BRAKE S/W MALFUNCTION

COMPONENT LOCATION E0EF58DA



EKKE148A

GENERAL DESCRIPTION ECBA8599

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.

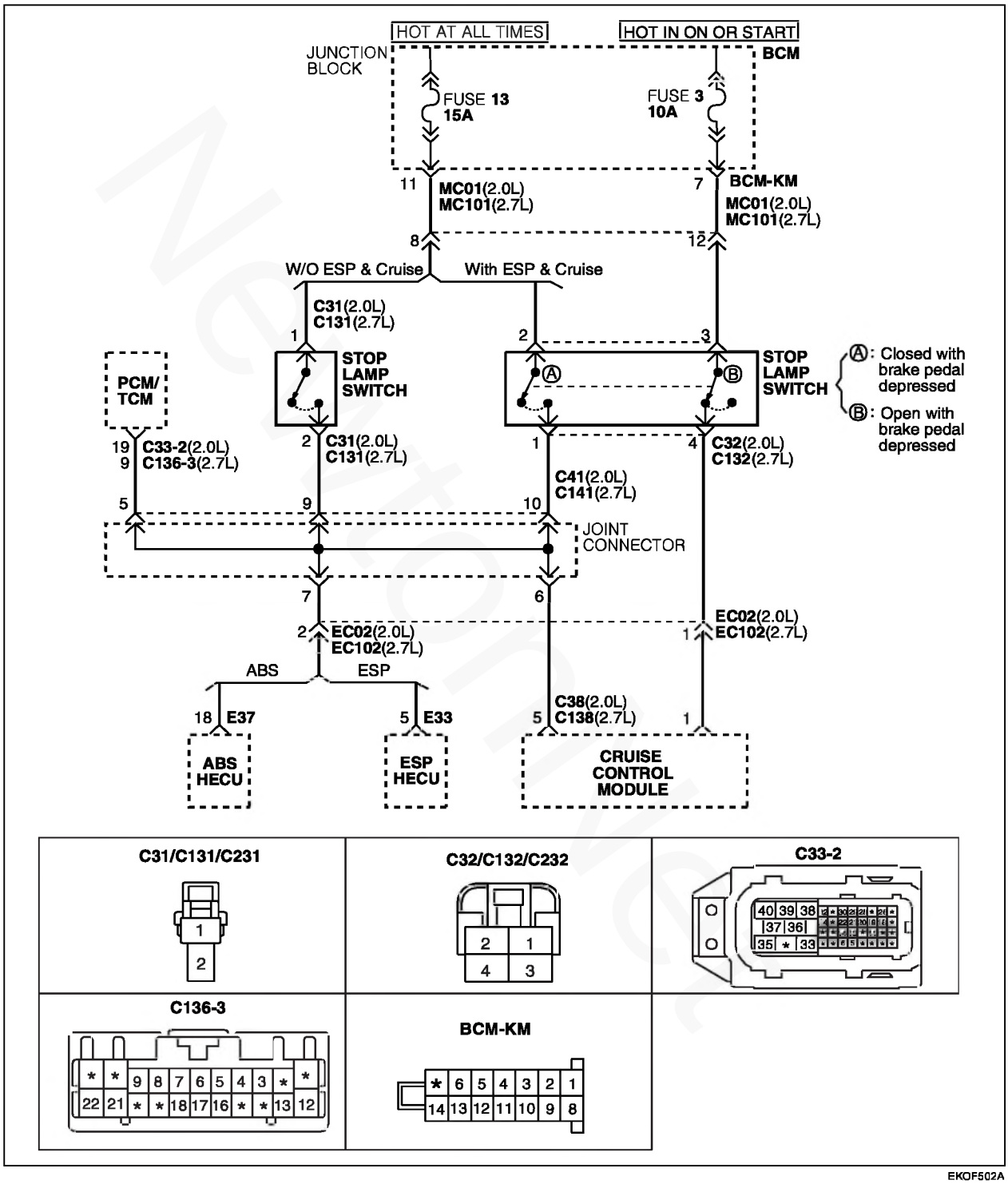
DTC DESCRIPTION E5E2BCEA

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 E027128C

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	

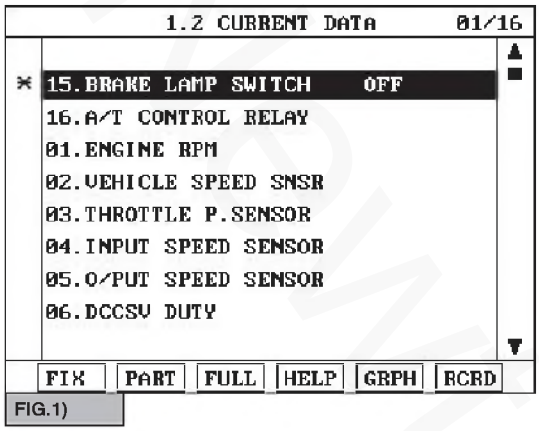
SCHEMATIC DIAGRAM E64116F1



EKOF502A

MONITOR SCANTOOL DATA E8F8DE91

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.



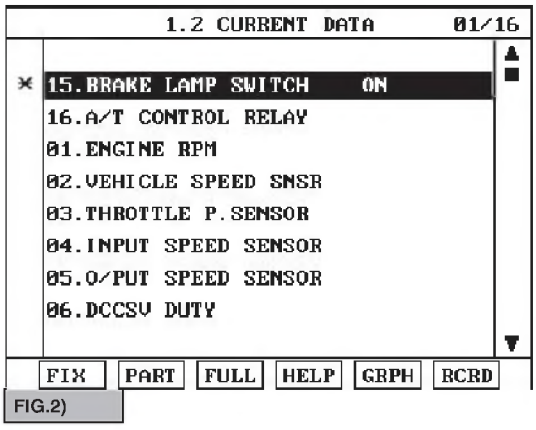


FIG1) Release foot brake status.
FIG2) Depress foot brake status.

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 "TERMINAL & CONNECTOR INSPECTION" procedure.

TERMINAL & CONNECTOR INSPECTION E80346C0

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.

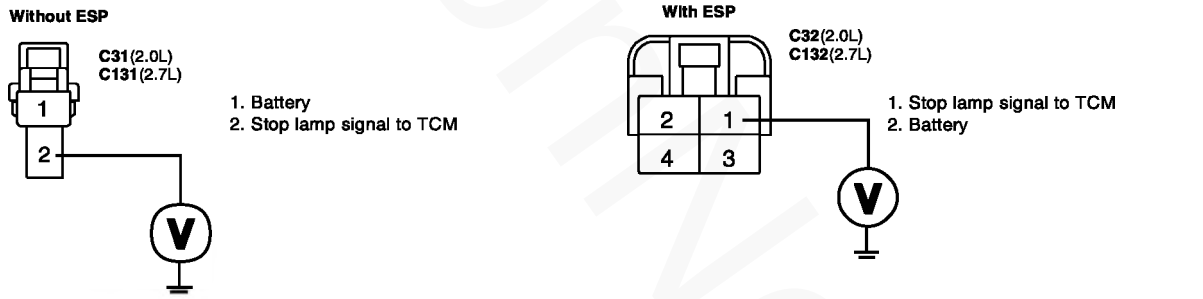
NO

▶ Go to "Signal circuit inspection" procedure.

SIGNAL CIRCUIT INSPECTION ED8473AB

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

Specification : 0V



EKOF502B

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 ECE892FD

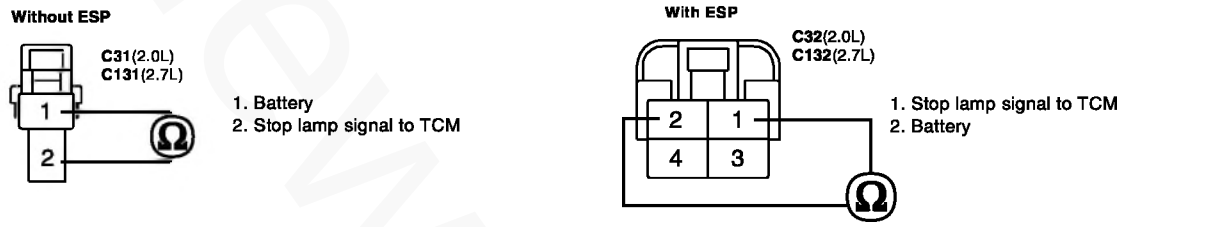
1. Check "STOP LAMP SWITCH".

   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



EKOF502C

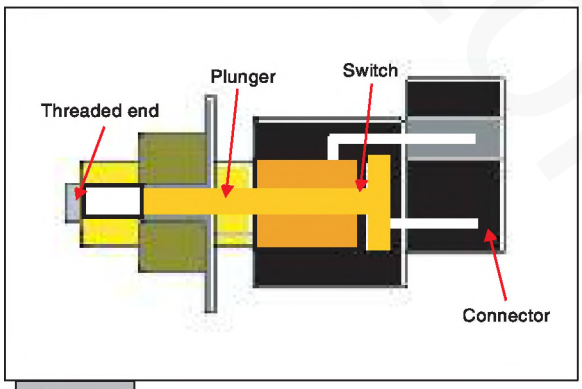


FIG.1)

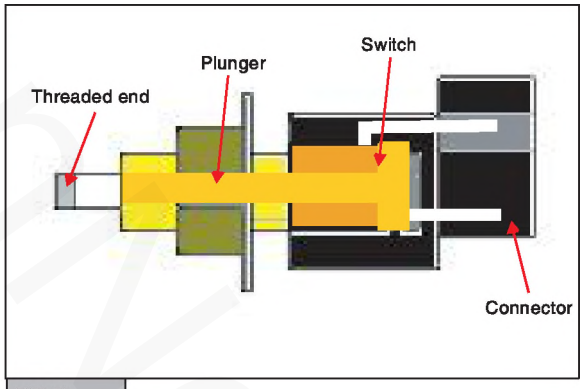


FIG.2)

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)

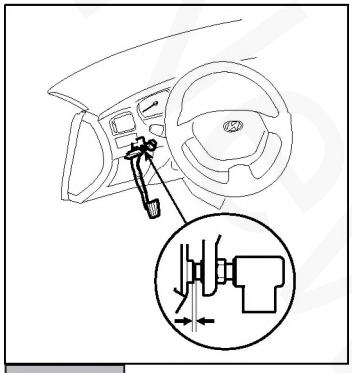


FIG.1)

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

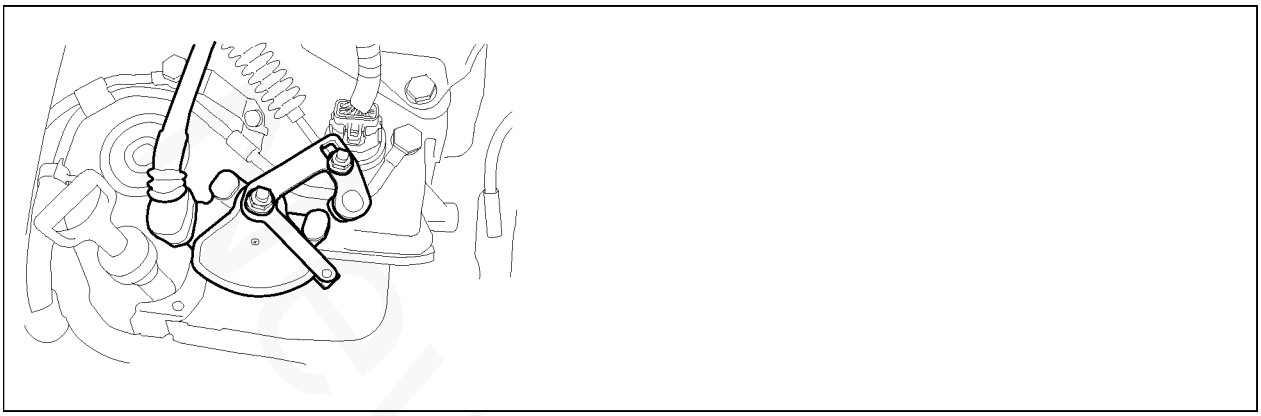
▶ Substitute with a known-good TCM/PCM and check for proper operation. If the problem is corrected, replace TCM/PCM as necessary and go to "Verification Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR E1DC157C

Refer to DTC P0560.

DTC P0707 TRANSAXLE RANGE SWITCH - LOW INPUT

COMPONENT LOCATION ED6808B0



EKKE108A

GENERAL DESCRIPTION EF5EB3A8

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 EE17C0F4

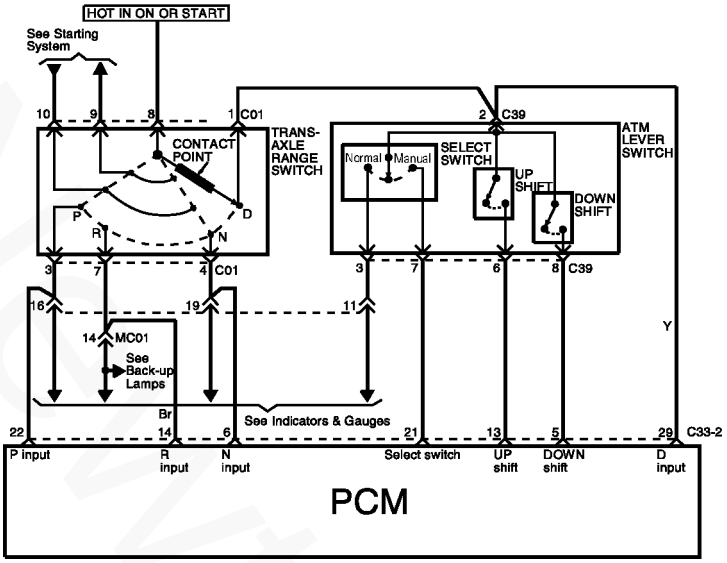
The TCM(PCM) sets this code when the Transaxle Range Switch has no output signal for more than 30 seconds.

DTC DETECTING CONDITION E15A117A

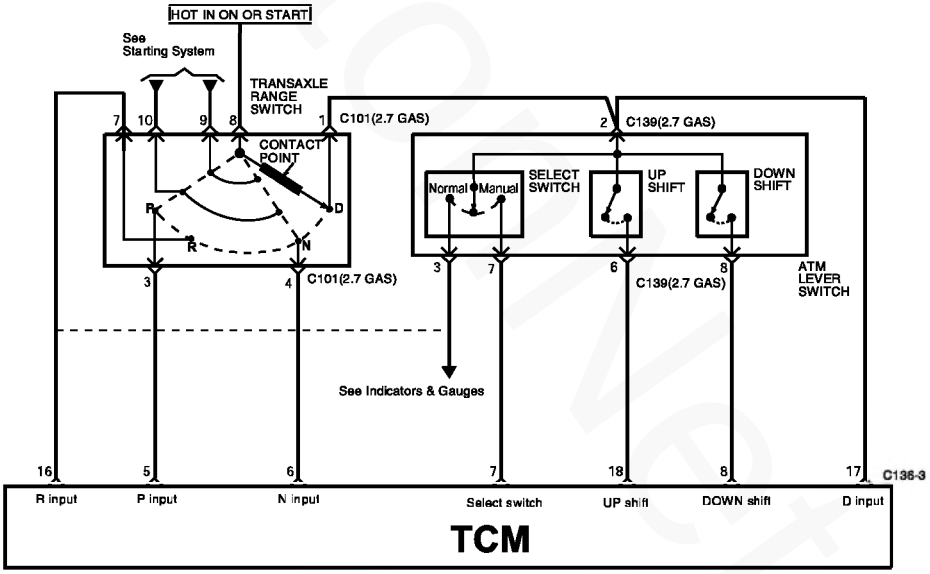
Item	Detecting Condition & Fail Safe	Possible cause
DTC Strategy	• Check for No signal	• Open or short in circuit • Faulty TRANSAXLE RANGE SWITCH • Faulty TCM(PCM)
Enable Conditions	• Ne ≥ 400rpm and TPS ≥ 10%	
Threshold value	• No signal detected	
Diagnostic Time	• More than 30sec	
Fail Safe	• Recognition 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)	

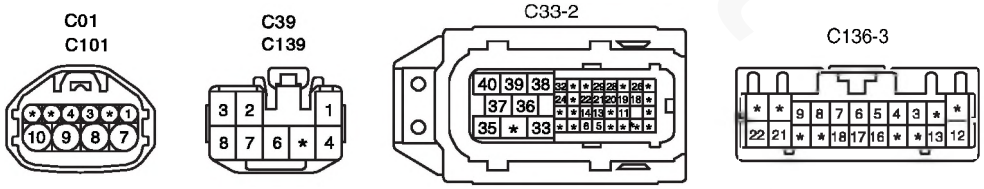
SCHEMATIC DIAGRAM E68D5BFA

<2.0L Gasoline>



<2.7L Gasoline>

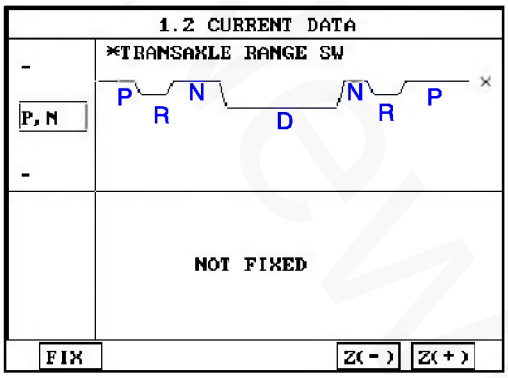




EKOF003A

MONITOR SCANTOOL DATA EDBD3894

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 E475601E

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 "Power Supply circuit inspection" procedure.

POWER SUPPLY CIRCUIT INSPECTION EB7D4BEE

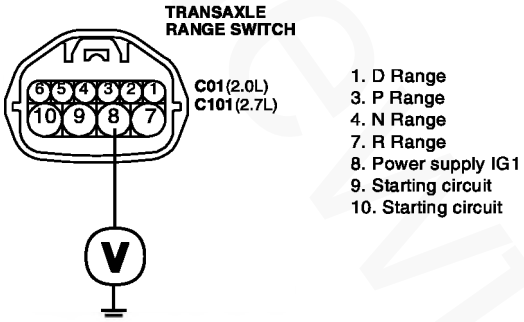
1. CHECK POWER TO RANGE SWITCH

   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+



EKOF003B

   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 EA4C8EBC

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 :

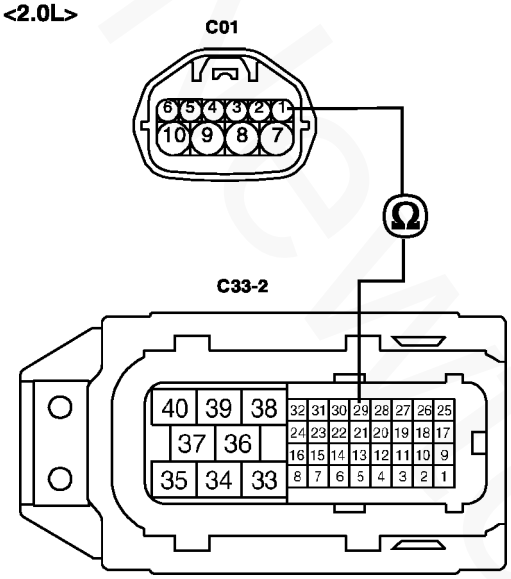
< **2.0L** >

Pin No of "TRANSAXLE RANGE SWITCH"	C01 No1	C01 No3	C01 No4	C01 No7
Pin No of "TCM(PCM)" harness	C33-2 No29	C33-2 No22	C33-2 No6	C33-2 No14
Specification	0Ω	0Ω	0Ω	0Ω

< **2.7L** >

Pin No of "TRANSAXLE RANGE SWITCH"	C101 No1	C101 No3	C101 No4	C101 No7
Pin No of "TCM(PCM)" harness	C136-3 No17	C136-3 No5	C136-3 No6	C136-3 No16
Specification	0Ω	0Ω	0Ω	0Ω

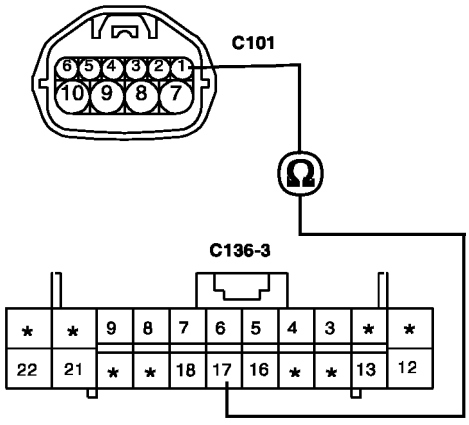
<2.0L>



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

<2.7L>



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

EKOF003C

4. Is resistance within specifications?

YES

▶ Go to "Component inspection" procedure.

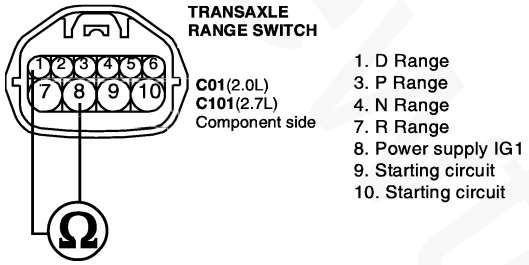
NO

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

COMPONENT INSPECTION E17B04EE

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

Specification : approx. 0 Ω



EKOF003D

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

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

EKOF003E

4. Is resistance within specifications?

YES

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

NO

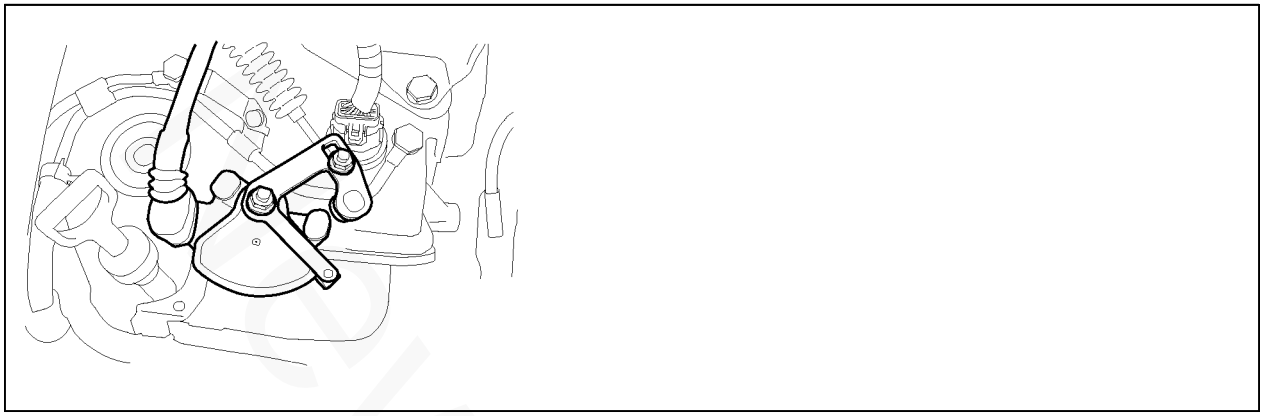
▶ Replace "TRANSAXLE RANGE SWITCH" as necessary and Go to "Verification Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR EEA47EE3

Refer to DTC P0560.

DTC P0708 TRANSAXLE RANGE SWITCH - HIGH INPUT

COMPONENT LOCATION EABAA8DF



EKKE108A

GENERAL DESCRIPTION E9D24013

Refer to DTC P0707.

DTC DESCRIPTION E62DFB79

Refer to DTC P0707.

DTC DETECTING CONDITION E7C2A1AF

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 PCM
Enable Conditions	• Always	
Threshold value	• Multiple signal	
Diagnostic Time	• More than 0.5 sec	
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.	

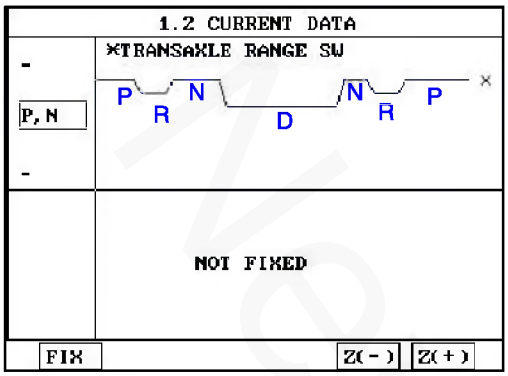
SCHEMATIC DIAGRAM E72647BC

Refer to DTC P0707.

MONITOR SCANTOOL DATA EB050FA5

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 EFDFDB1D

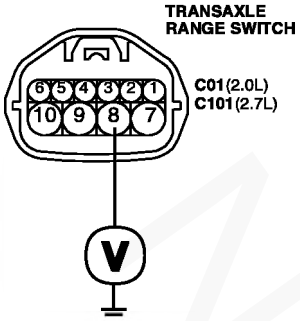
Refer to DTC P0707.

POWER SUPPLY CIRCUIT INSPECTION EDB3C3EB

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

Specification :

TERMINAL	1	3	4	7	8	9	10
SPECIFICATION	0V	12V(PULL UP)	12V(PULL UP)	0V	12V	0V	0V



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

EKOF003B

4. Is voltage within specifications?

YES

▶ Go to "Signal circuit inspection" procedure.

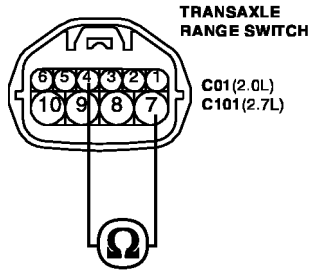
NO

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

SIGNAL CIRCUIT INSPECTION E27FE90D

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



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

EKOF004B

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 EA4774CE

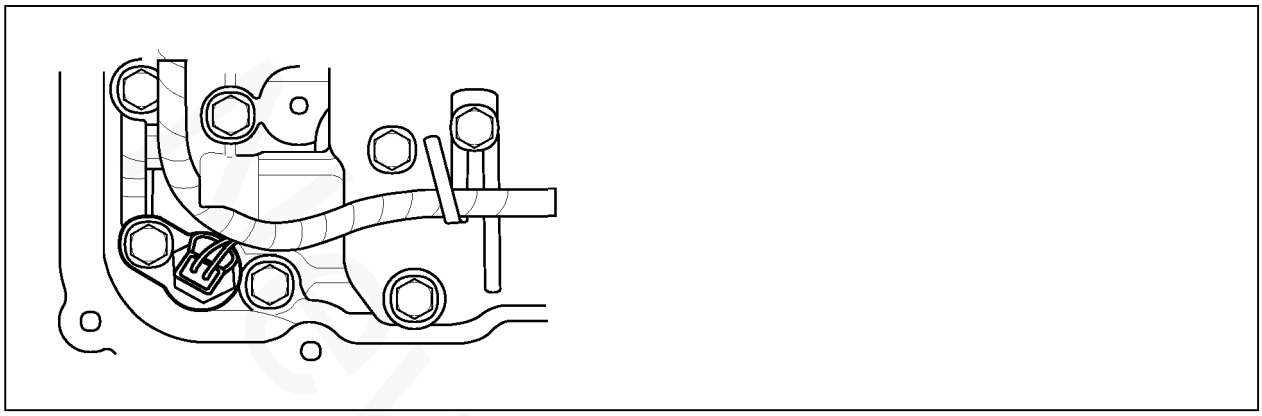
Refer to DTC P0707.

VERIFICATION OF VEHICLE REPAIR E977C25A

Refer to DTC P0560.

DTC P0711 TRANSAXLE FLUID TEMPERATURE SENSOR RATIONALITY

COMPONENT LOCATION EE518085



ELQE043A

GENERAL DESCRIPTION EDAE3CF6

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

DTC DESCRIPTION EE6EFE6A

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

DTC DETECTING CONDITION ECFC51C7

[2.0L]

Item		Detecting Condition & Fail Safe	Possible cause
DTC Strategy		• Check rationality	• Sensor signal circuit is short to ground • Faulty sensor • Faulty 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 • Other OTS related error is not detected • -7°C < A/T oil temp. at start-up and ambient temp. < 50°C OR A/T oil temp. at start-up < 30°C In condition that Oil TEMP is not changed more than 2°C	
	Case 2	• OTS output at IG-OFF≥ 50°C • The engine coolant temperature at IG-OFF≥ 73.5°C • The engine coolant temperature have decreased over 34°C from IG-OFF of the previous driving • Intake air temperature < 35°C In condition that OTS TEMP is not changed morethan 2°C.	
	Case 3	• No ≥ 1000rpm, Ne ≥ 1000rpm for 5min cumulative • 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	

[2.7L]

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)	

SPECIFICATION E0BAFCB2

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

MONITOR SCANTOOL DATA EFE17BFD

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

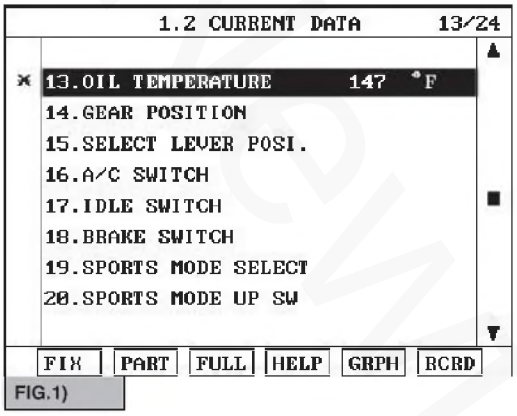


FIG.1)

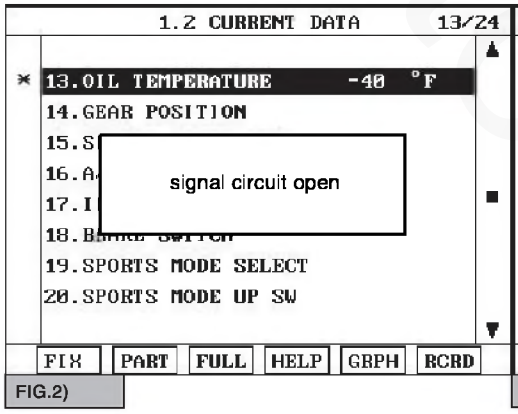


FIG.2)

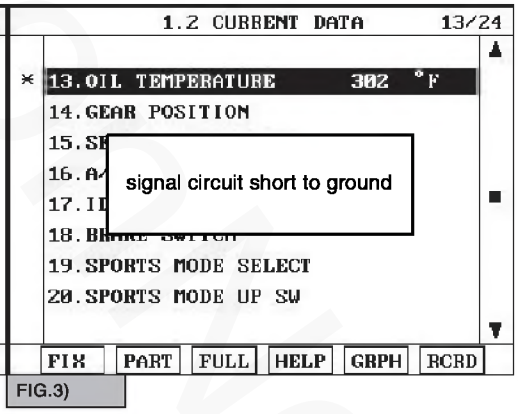


FIG.3)

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 "TERMINAL & CONNECTOR INSPECTION" procedure.

TERMINAL & CONNECTOR INSPECTION E9559BCF

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.

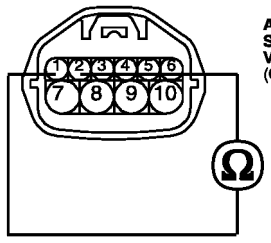
NO

▶ Go to "Component inspection" procedure.

COMPONENT INSPECTION EACAD285

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"



ATM SOLENOID VALVE (Component side)

1.TRANSMISSION FLUID TEMPERATURE SENSOR
2.Sensor ground

EKOF005A

[REFERENCE DATA]

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

4) Is resistance within specifications?

YES

▶ Go to "CHECK PCM/TCM " as below.

NO

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

2. CHECK TCM

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.

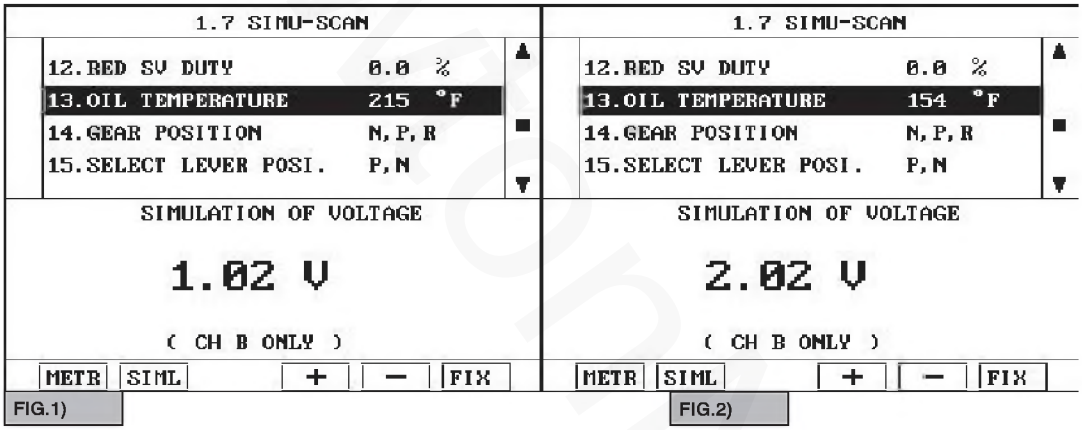


FIG.1) INPUT 1.02V → 215°F
FIG.2) INPUT 2.02V → 154°F

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

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

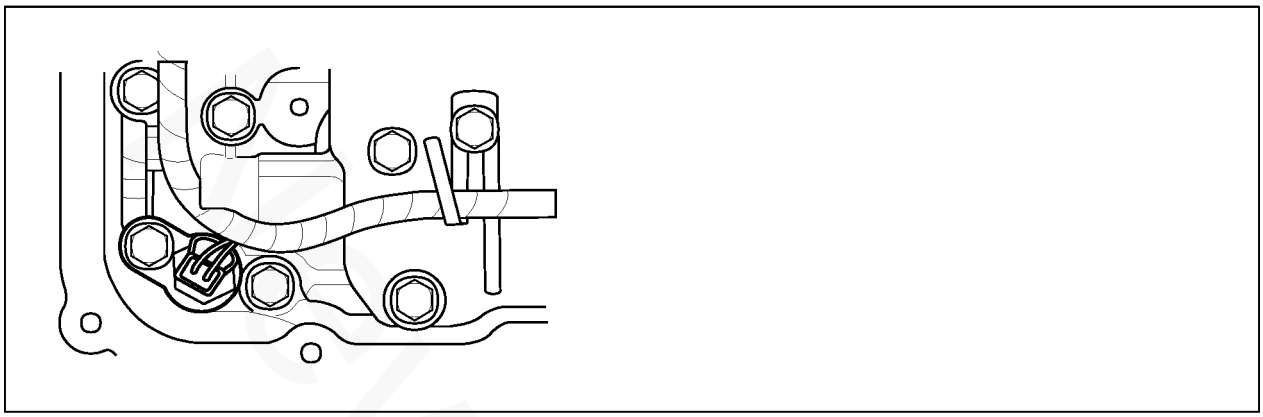
▶ Substitute with a known-good PCM/TCM and check for proper operation. If the problem is corrected, replace PCM/TCM as necessary and then go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR EA11FI315

Refer to DTC P0560.

DTC P0712 FLUID(OIL) TEMPERATURE SENSOR CIRCUIT - LOW

COMPONENT LOCATION E65EF967



ELQE043A

GENERAL DESCRIPTION E5A9E11C

Refer to DTC P0711.

DTC DESCRIPTION E8F829E9

Refer to DTC P0711.

DTC DETECTING CONDITION E7C607BD

[2.0L]

Item	Detecting Condition & Fail Safe	Possible cause
DTC Strategy	• Check for Voltage range	• Sensor signal circuit is short to ground • Faulty sensor • Faulty 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	

[2.7L]

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)	

SPECIFICATION EE4469B6

Refer to DTC P0711.

MONITOR SCANTOOL DATA EFCDD6B1

Refer to DTC P0711.

TERMINAL & CONNECTOR INSPECTION E70141DB

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.

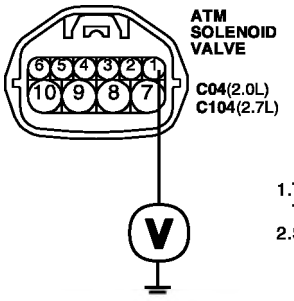
NO

▶ Go to "Signal circuit inspection" procedure.

SIGNAL CIRCUIT INSPECTION E9A139B4

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

EKOF005B

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 E0AFC479

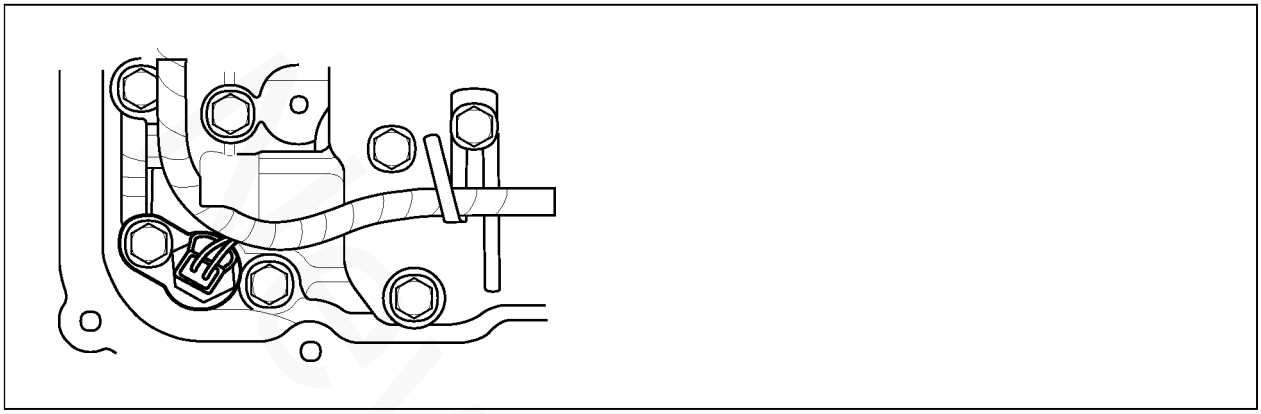
Refer to DTC P0711.

VERIFICATION OF VEHICLE REPAIR E628E699

Refer to DTC P0560.

DTC P0713 FLUID(OIL) TEMPERATURE SENSOR CIRCUIT - HIGH

COMPONENT LOCATION E8274A08



ELQE043A

GENERAL DESCRIPTION E3E17A5E

Refer to DTC P0711.

DTC DESCRIPTION E7EA3A9F

Refer to DTC P0711.

DTC DETECTING CONDITION EBFE7953

[2.0L]

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 ≥ 4.9V	
Diagnostic Time	• More than 1sec	
Fail Safe	• Learning control and Intelligent shift are inhibited • Fluid temperature is regarded as 80°C(176°F)	

[2.7L]

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)	

SPECIFICATION ECFF1A3F

Refer to DTC P0711.

MONITOR SCANTOOL DATA E44E8984

Refer to DTC P0711.

TERMINAL & CONNECTOR INSPECTION E4D4DAAF

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.

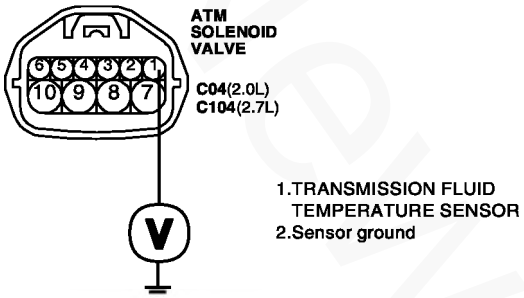
NO

▶ Go to "Signal circuit inspection" procedure.

SIGNAL CIRCUIT INSPECTION EE47F3F4

1. Ignition "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



EKOF005B

4. Is voltage within specifications?

YES

▶ Go to "Ground circuit inspection" procedure.

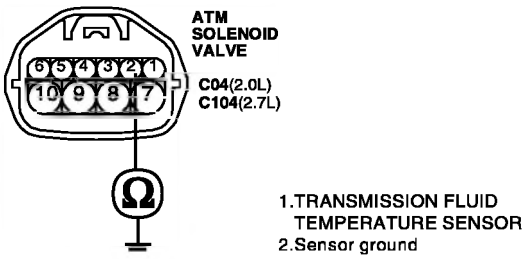
NO

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

GROUND CIRCUIT INSPECTION EA5EEF12

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



EKOF005D

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 EAE90048

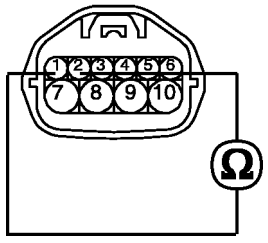
1. CHECK "TRANSAXLE FLUID TEMPERATURE SENSOR"

   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"



ATM SOLENOID VALVE (Component side)

1.TRANSMISSION FLUID TEMPERATURE SENSOR
2.Sensor ground

EKOF005C

[REFERENCE DATA]

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

   4) Is resistance within specifications?

YES

▶ Go to "CHECK PCM/TCM " as below.

NO

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

2. CHECK TCM

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 OIL TEMPERATURE SENSOR signal circuit.

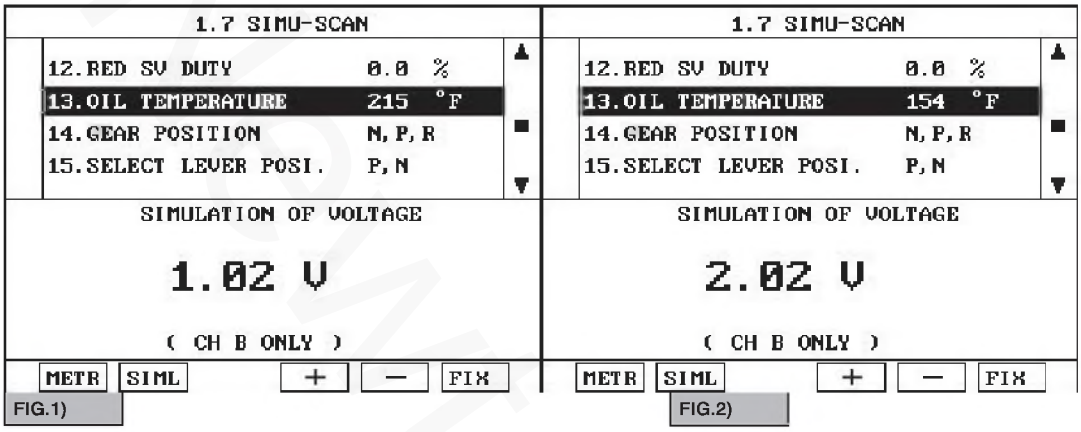


FIG.1) INPUT 1.02V → 215°F
FIG.2) INPUT 2.02V → 154°F

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

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

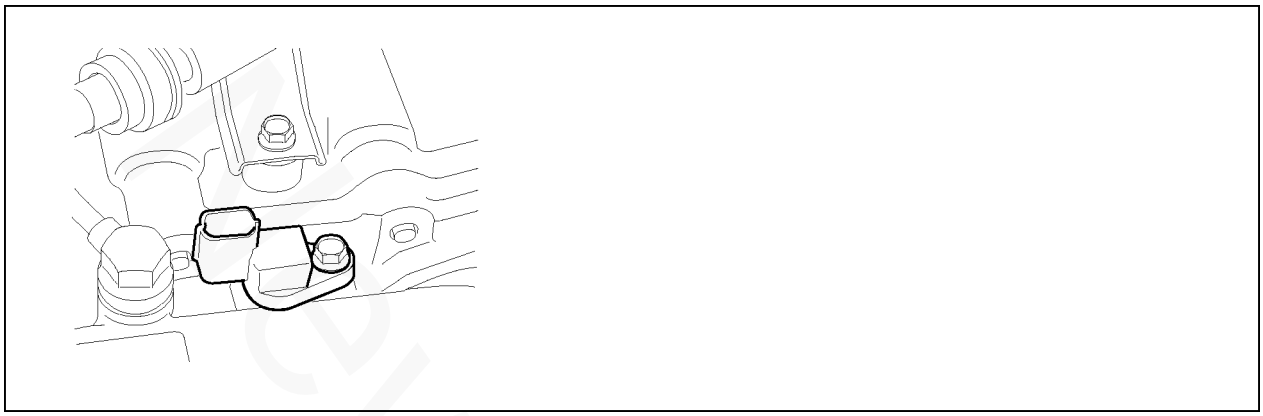
▶ Substitute with a known-good PCM/TCM and check for proper operation. If the problem is corrected, replace PCM/TCM as necessary and then go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR EAACBD5F

Refer to DTC P0560.

DTC P0715 INPUT SPEED SENSOR CIRCUIT

COMPONENT LOCATION ED9AC529



BKQE004A

GENERAL DESCRIPTION EDB33347

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

DTC DESCRIPTION EAFC99B9

The TCM 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 if this code is detected.

DTC DETECTING CONDITION E6E7389B

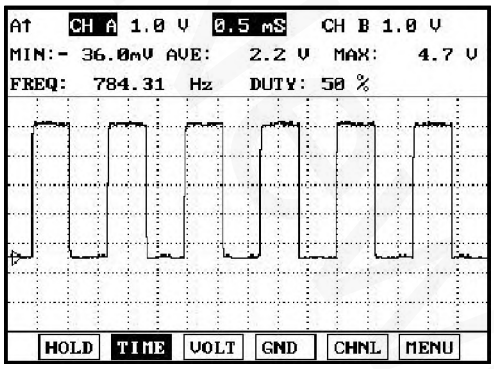
Item	Detecting Condition & Fail Safe	Possible cause
DTC Strategy	• Speed rationality check	• Signal circuit is open or short • Sensor power circuit is open • Sensor ground circuit is open • Faulty INPUT SPEED SENSOR • Faulty TCM(PCM)
Enable Conditions	• Vehicle speed is over 19 Mile/h(30 Km/h) in D,3,2,L(A/T range swhitch) and SP(SPORTS MODE) • But do not check the DTC in below condition - A/T oil temp sensor voltage > 4.5 V - Engine 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 E8C4C0FE

Input shaft & Output shaft speed sensor

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

SIGNAL WAVEFORM EB90CED4



ELQE020A

MONITOR SCANTOOL DATA EDFA484F

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 19 Mile/h(30 Km/h).

Specification : Increasing Gradually

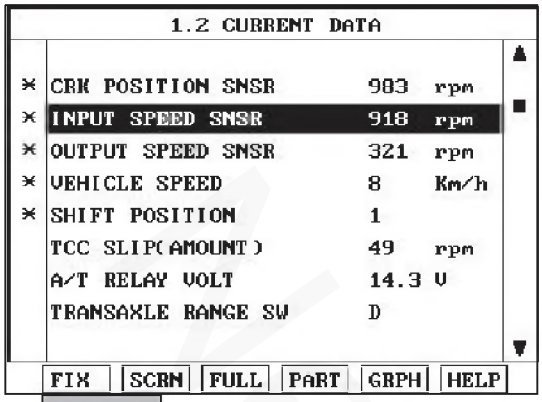


FIG.1)

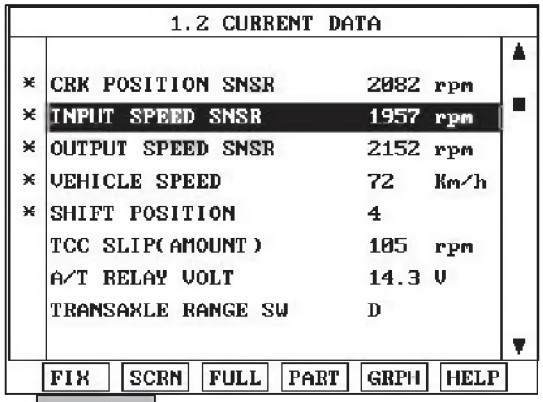


FIG.2)

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 "Terminal & Connector inspection" procedure.

TERMINAL & CONNECTOR INSPECTION EBB9CCCF

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

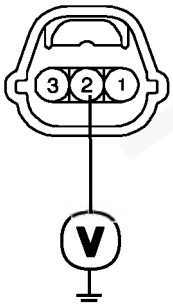
▶ Go to "Signal Supply circuit inspection" procedure.

SIGNAL CIRCUIT INSPECTION E08B23B9

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



C102-1(2.7L)

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

EKOF005E

4. Is voltage within specification?

YES

▶ Go to "Power Supply circuit Inspection" procedure.

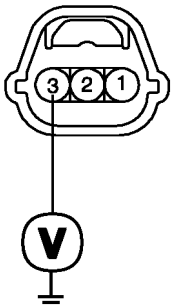
NO

▶ 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 PCM/TCM" of the "Component Inspection" procedure.

POWER SUPPLY CIRCUIT INSPECTION E95A2290

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+



C102-1(2.7L)

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

EKOF005F

4. Is voltage within specification ?

YES

▶ Go to "Ground circuit inspection" procedure.

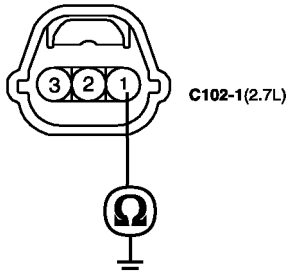
NO

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

GROUND CIRCUIT INSPECTION ED42990D

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



C102-1(2.7L)

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

EKOF005G

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 PCM/TCM" of the "Component Inspection" procedure.

COMPONENT INSPECTION E2BDCA98

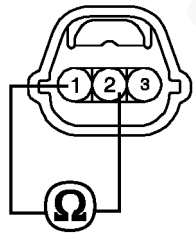
1. Check "INPUT SPEED SENSOR"

   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"



EKOF005H

   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	Input sensor	Above 4 MΩ
	Output sensor	Above 4 MΩ
Voltage	High	4.8 ~ 5.2V
	Low	Below 0.8V

YES

▶ Go to "CHECK PCM/TCM " as below.

NO

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

2. CHECK PCM/TCM

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

2) Connect "INPUT SPEED SENSOR" connector.

3) Install scantool and select a SIMU-SCAN.

4) Simulate frequency to INPUT SPEED SENSOR signal circuit.

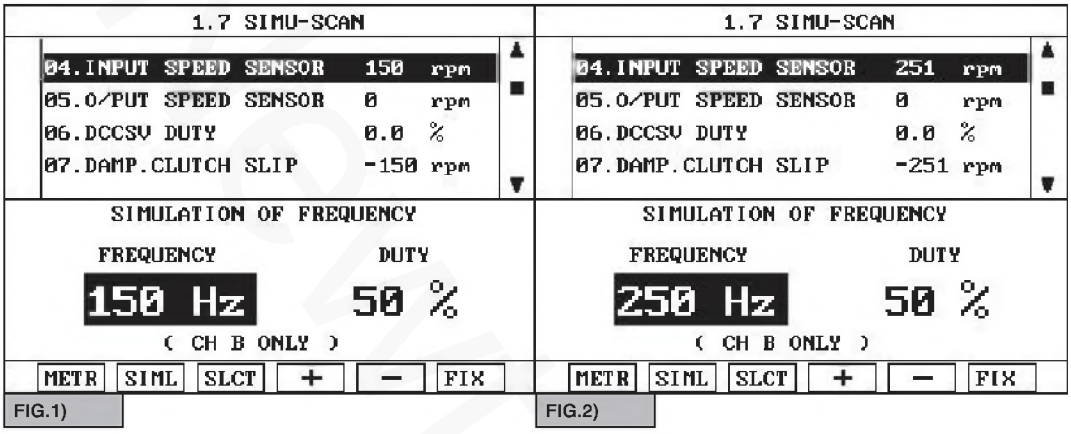


FIG.1) INPUT 150Hz → 150rpm
FIG.2) INPUT 250Hz → 250rpm

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

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

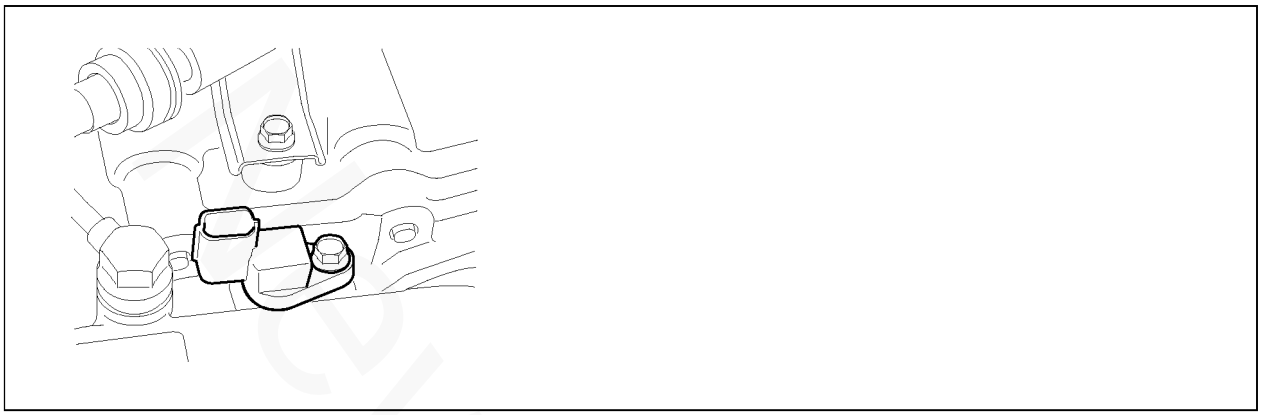
▶ Substitute with a known-good PCM/TCM and check for proper operation. If the problem is corrected, replace PCM/TCM as necessary and then go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR ECE43E2B

Refer to DTC P0560.

DTC P0717 INPUT SPEED SENSOR CIRCUIT - NO SIGNAL

COMPONENT LOCATION E7A90BF2



BKQE004A

GENERAL DESCRIPTION E900EADB

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 EE9E2ACC

Refer to DTC P0715.

DTC DETECTING CONDITION E72FD23E

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 E14E6162

Refer to DTC P0715.

SIGNAL WAVEFORM EAD70FE0

Refer to DTC P0715.

MONITOR SCANTOOL DATA E75AF7FA

Refer to DTC P0715.

TERMINAL & CONNECTOR INSPECTION EFFA8DBF

Refer to DTC P0715.

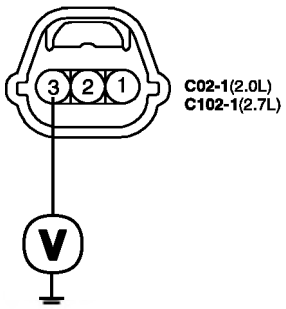
SIGNAL CIRCUIT INSPECTION E04B2D62

Refer to DTC P0715.

POWER SUPPLY CIRCUIT INSPECTION E05CB819

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+



C02-1(2.0L)
C102-1(2.7L)

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

EKOF006B

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 E3E4ED2B

Refer to DTC P0715.

COMPONENT INSPECTION E1B62CA6

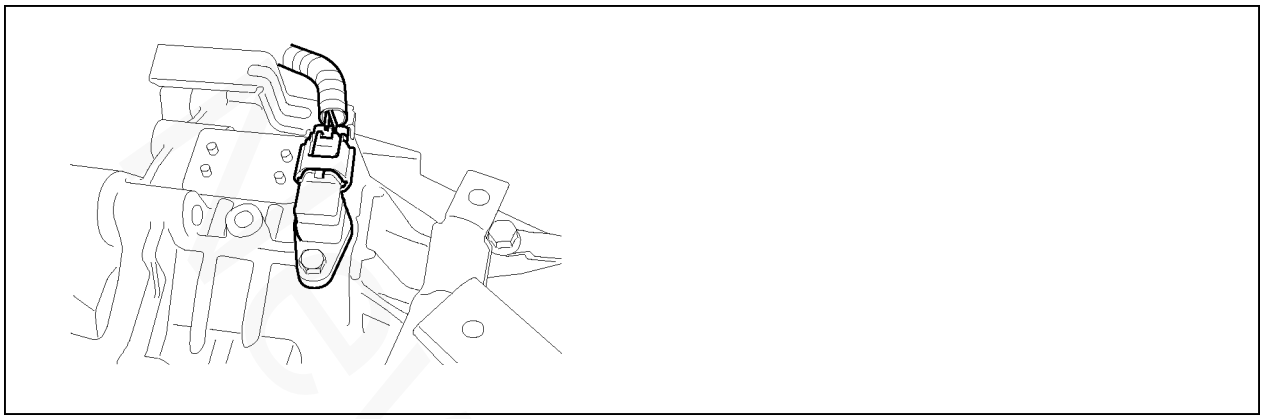
Refer to DTC P0715.

VERIFICATION OF VEHICLE REPAIR EA3D7D1D

Refer to DTC P0560.

DTC P0720 OUTPUT SPEED SENSOR CIRCUIT

COMPONENT LOCATION E56F8ED0



BKQE005A

GENERAL DESCRIPTION EC8A28C6

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 E3F92066

The TCM sets this code if the calculated value of the pulse-signal is noticeably different from the value calculated, using the Vehicle Speed Sensor output, when the vehicle is running faster than 30 km/h. The TCM will initiate the fail safe function if this code is detected.

DTC DETECTING CONDITION E619D0B4

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) 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 - Engine 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 • Apply an electric current to Solenoide valve • Manual shifting is possibe (2 nd › 3 rd ,3 rd › 2 nd)	

SPECIFICATION E2ED7F85

Refer to DTC P0715.

SIGNAL WAVEFORM E0F5CB30

Refer to DTC P0715.

MONITOR SCANTOOL DATA EEAD1DF3

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 19 Mile/h(30 Km/h).

Specification : Increasing Gradually

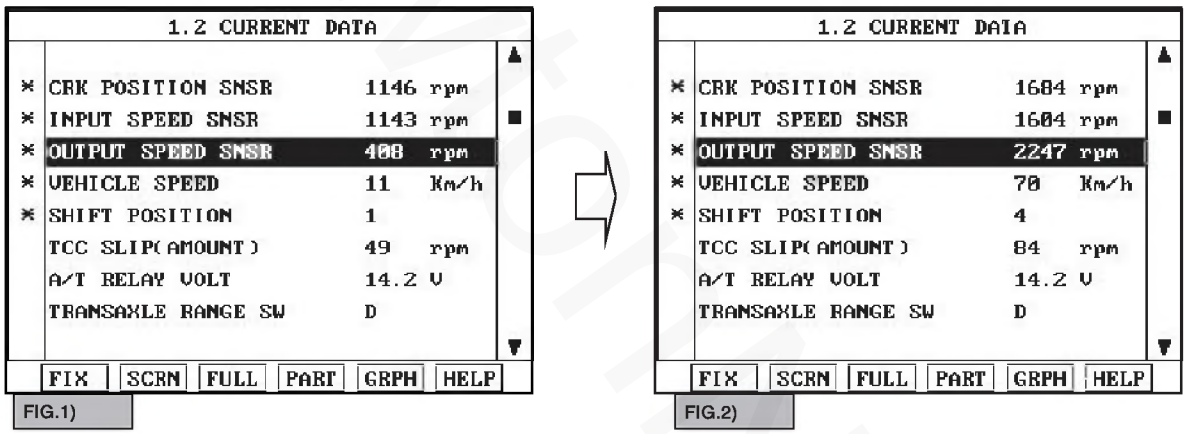


FIG.1) Low-speed
FIG.2) High-speed

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 "Terminal & Connector inspection" procedure.

TERMINAL & CONNECTOR INSPECTION E8F7A0BA

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.

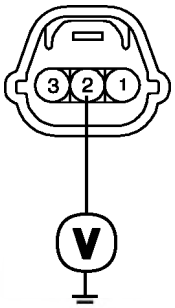
NO

▶ Go to "Signal circuit inspection" procedure.

SIGNAL CIRCUIT INSPECTION E1AFA6A7

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



C102-2(2.7L)

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

EKOF006E

4. Is voltage within specification?

YES

▶ Go to "Power Supply circuit Inspection" procedure.

NO

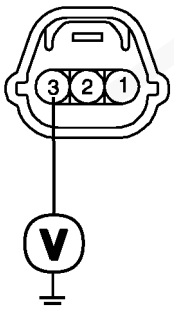
▶ Check for open or short in harness. Repair as necessary and Go to "Verification Vehicle Repair" procedure
▶ If signal circuit in harness is OK, Go to "Check PCM/TCM" of the "Component Inspection" procedure.

POWER SUPPLY CIRCUIT INSPECTION EC55FA81

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+



C102-2(2.7L)

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

EKOF006F

4. Is voltage within specification?

YES

▶ Go to "Ground circuit inspection" procedure.

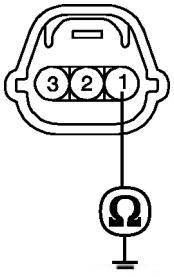
NO

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

GROUND CIRCUIT INSPECTION E7EFA966

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



C102-2(2.7L)

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

EKOF006G

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 PCM/TCM" of the "Component Inspection" procedure.

COMPONENT INSPECTION EDDCD7CF

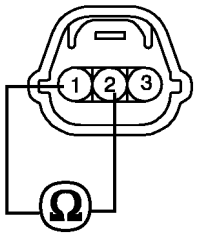
1. Check "OUTPUT SPEED SENSOR"

   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"



Component side

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

EKOF006H

   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	Input sensor	Above 4 MΩ
	Output sensor	Above 4 MΩ
Voltage	High	4.8 ~ 5.2V
	Low	Below 0.8V

YES

▶ Go to "CHECK PCM/TCM " as below.

NO

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

2. CHECK PCM/TCM

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

2) Connect "OUTPUT SPEED SENSOR" connector.

3) Install scantool and select a SIMU-SCAN.

4) Simulate frequency to OUTPUT SPEED SENSOR signal circuit.

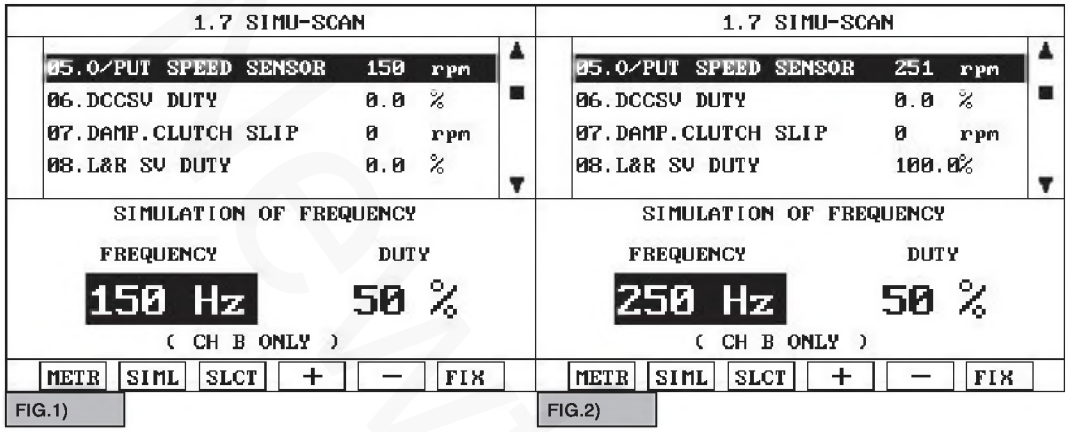


FIG.1) OUTPUT 150Hz → 150rpm
FIG.2) OUTPUT 250Hz → 250rpm

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

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

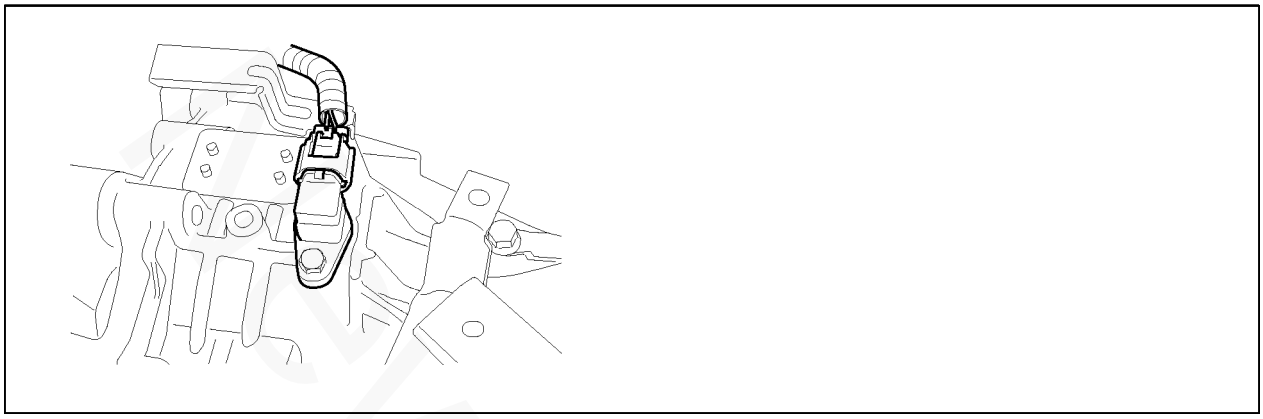
▶ Substitute with a known-good PCM/TCM and check for proper operation. If the problem is corrected, replace PCM/TCM as necessary and then go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR EF2E85C1

Refer to DTC P0560.

DTC P0721 OUTPUT SPEED SENSOR CIRCUIT RANGE/PERFORMANCE

COMPONENT LOCATION E5155666



BKQE005A

GENERAL DESCRIPTION E9EBB507

Refer to DTC P0720.

DTC DESCRIPTION EB24F56D

Refer to DTC P0720.

DTC DETECTING CONDITION E88922F3

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 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 EA2BE8E5

Refer to DTC P0715.

SIGNAL WAVEFORM E7EFF21F

Refer to DTC P0715.

MONITOR SCANTOOL DATA EA6DFD54

Refer to DTC P0720.

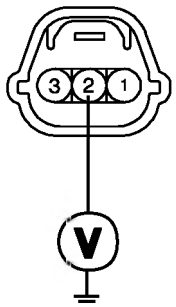
TERMINAL & CONNECTOR INSPECTION E569A2FB

Refer to DTC P0720.

SIGNAL CIRCUIT INSPECTION EDE0D7CC

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



C02-2(2.0L)
C102-2(2.7L)

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

EKQF007A

4. Is voltage within specification?

YES

- Go to "Power Supply circuit Inspection" procedure.

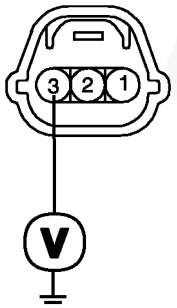
NO

- 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 EE1AB347

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+



C02-2(2.0L)
C102-2(2.7L)

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

EKOF007B

4. Is voltage within specification?

YES

▶ Go to "Ground circuit inspection" procedure.

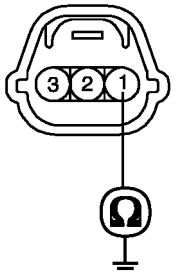
NO

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

GROUND CIRCUIT INSPECTION E66BD3EC

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



C02-2(2.0L)
C102-2(2.7L)

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

EKOF007C

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 EF87BC4C

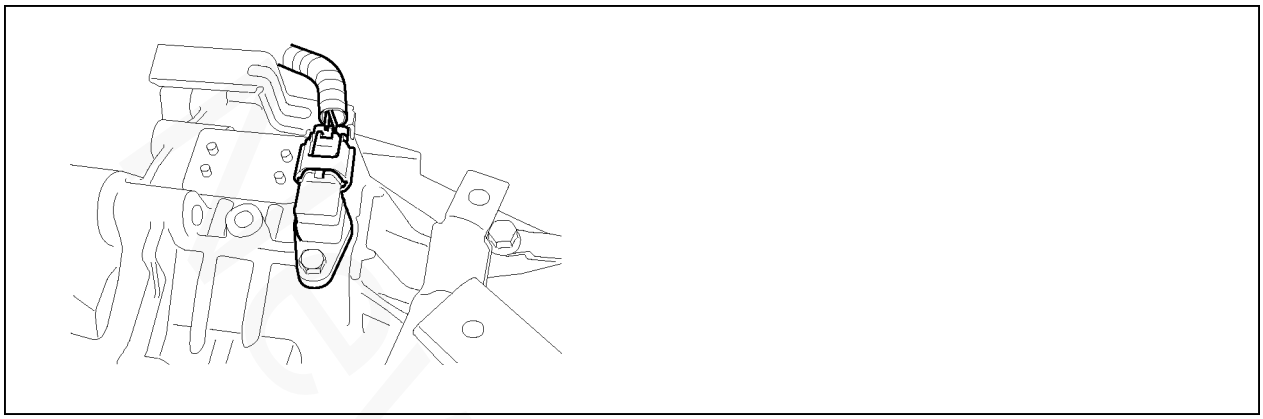
Refer to DTC P0720.

VERIFICATION OF VEHICLE REPAIR EA4FEC78

Refer to DTC P0560.

DTC P0722 OUTPUT SPEED SENSOR CIRCUIT - NO SIGNAL

COMPONENT LOCATION E1F674E2



BKQE005A

GENERAL DESCRIPTION E44164D3

Refer to DTC P0720.

DTC DESCRIPTION EA7FA935

Refer to DTC P0720.

DTC DETECTING CONDITION E2DF0970

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 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 E10578FB

Refer to DTC P0715.

SIGNAL WAVEFORM E3D5FFDF

Refer to DTC P0715.

MONITOR SCANTOOL DATA E5EA2EBC

Refer to DTC P0720.

TERMINAL & CONNECTOR INSPECTION EEF0BF0C

Refer to DTC P0720.

SIGNAL CIRCUIT INSPECTION E341C450

Refer to DTC P0721.

POWER SUPPLY CIRCUIT INSPECTION E67D0E14

Refer to DTC P0721.

GROUND CIRCUIT INSPECTION E6BFA101

Refer to DTC P0721.

COMPONENT INSPECTION E12C40DD

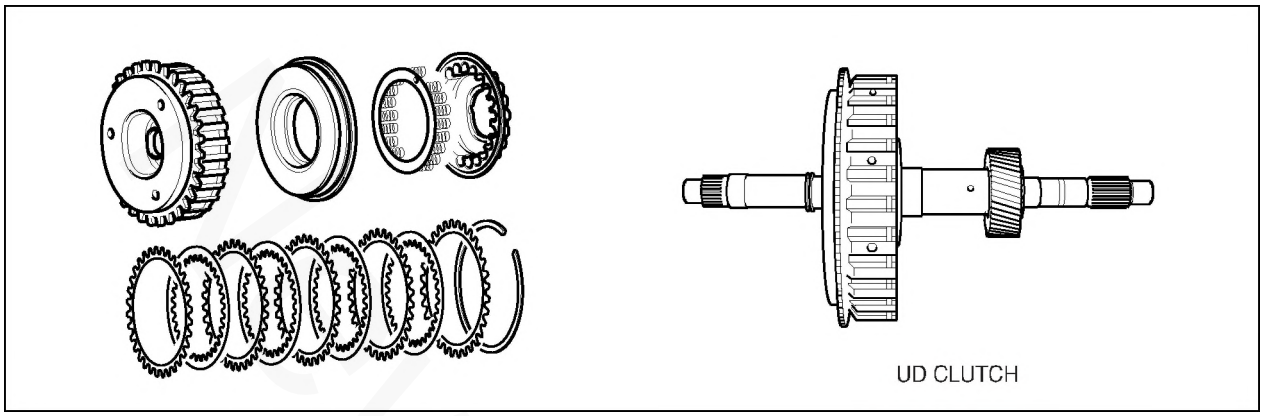
Refer to DTC P0720.

VERIFICATION OF VEHICLE REPAIR E7BBDF20

Refer to DTC P0560.

DTC P0731 GEAR 1 INCORRECT RATIO

COMPONENT LOCATION E1421F45



BKQE006A

GENERAL DESCRIPTION E5D0B2F5

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 E323F0FE

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 E2AD4ACA

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 output ≥ -23°C • Voltage of Battery > 10V • Time after shift changing finish > 2secs • A/T range switch: Only one signal	
Threshold value	• Output speed < (input 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)	

SIGNAL WAVEFORM E615DCD3

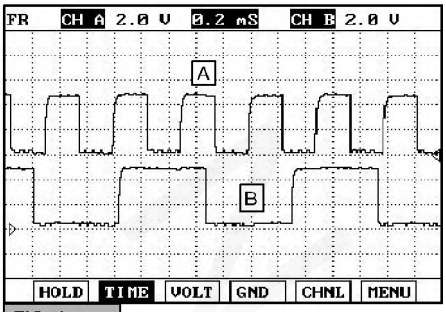


FIG.1)

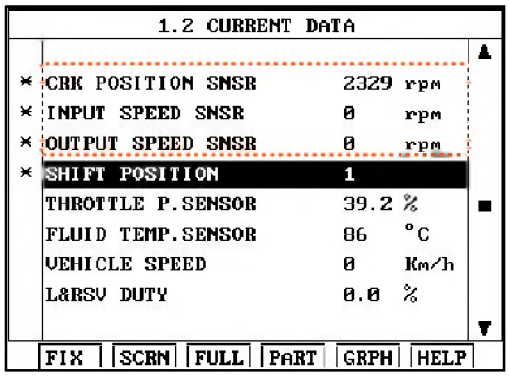
A : INPUT SPEED SENSOR
B : OUTPUT SPEED SENSOR

ELQE031A

MONITOR SCANTOOL DATA E9D1F0D8

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***

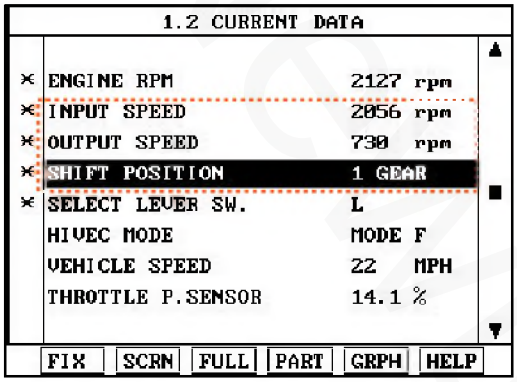
- ***Do not let anybody stand in front of or behind the vehicle while this test is being carried out.***
- ***Check the A/T fluid level and temperature and the engine coolant temperature.***
  - ***Fluid level : At the hot mark on the oil level gauge.***
  - ***Fluid temperature : 176 °F~ 212 °F (80~100 °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 EB848CCE

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?

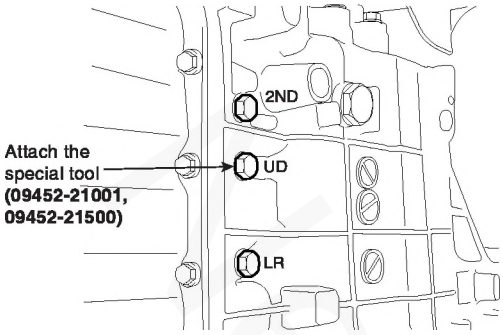
YES

▶ 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 E468C6EC



EKKD053A

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" procedure.

NO

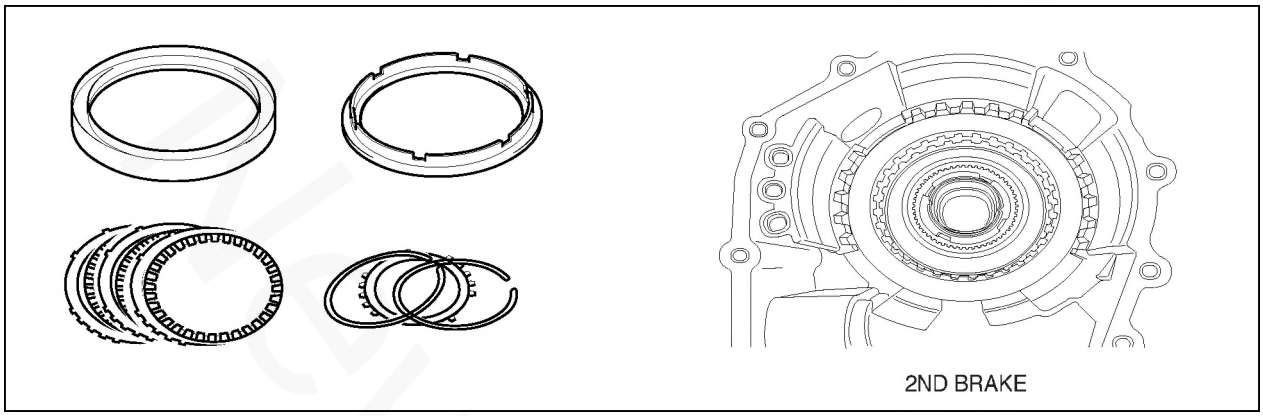
▶ Replace AUTO TRANSAXLE (BODY CONTROL VALVE faulty) as necessary and Go to "Verification Vehicle Repair " procedure.

VERIFICATION OF VEHICLE REPAIR EFDA5EFA

Refer to DTC P0560.

DTC P0732 GEAR 2 INCORRECT RATIO

COMPONENT LOCATION EEB686B9



BKQE007A

GENERAL DESCRIPTION E1A8749F

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 E096CBA2

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 EC4928D5

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 > 500rpm • Shift stage 2nd. gear • Input speed > 0rpm • A/T oil temp output ≥ -23℃ • Voltage of Battery > 10V • Time after shift changing finish > 2secs • A/T range switch: Only one signal	
Threshold value	• Output speed > (input speed+200rpm)/2nd. gear ratio OR output speed < (input 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)	

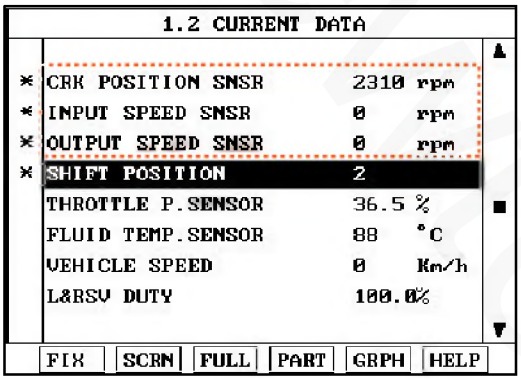
SIGNAL WAVEFORM E0EFFECC

Refer to DTC P0731.

MONITOR SCANTOOL DATA E0BED0A1

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).***

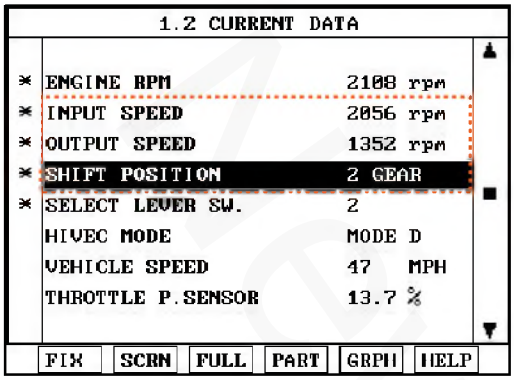
- ***Chock both rear wheel(left and right).***
- ***Pull the parking brake lever on with the brake pedal fully depressed.***
- ***The throttle should not be left fully open for more than eight second.***
- ***If carrying out the stall test two or more time, move the select lever to the "N" position and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

SIGNAL CIRCUIT INSPECTION E929A9A6

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?

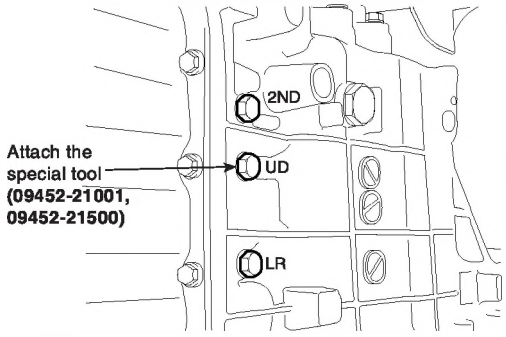
YES

▶ 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 E62CF87A



EKKD053A

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" procedure.

NO

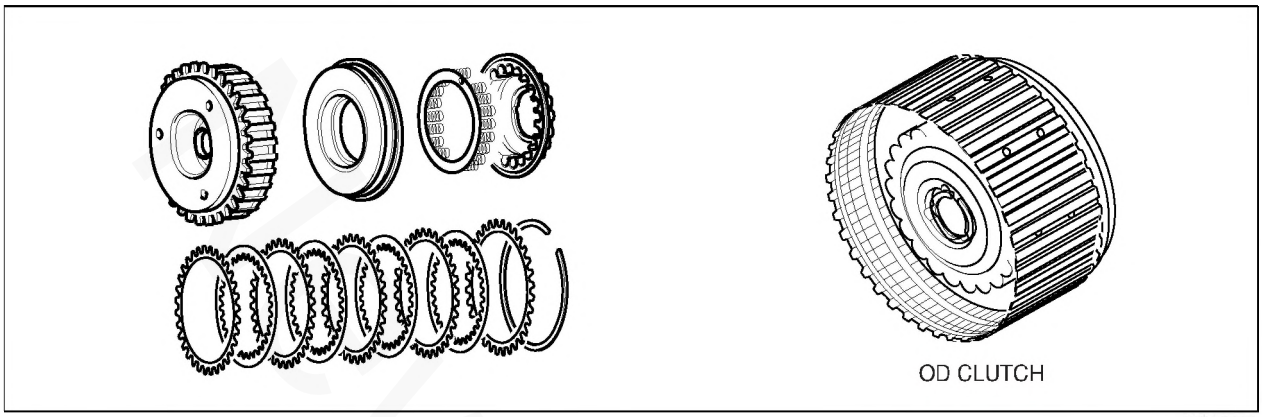
▶ Replace AUTO TRANSAXLE (BODY CONTROL VALVE faulty) as necessary and Go to "Verification Vehicle Repair " procedure.

VERIFICATION OF VEHICLE REPAIR E96CAF6C

Refer to DTC P0560.

DTC P0733 GEAR 3 INCORRECT RATIO

COMPONENT LOCATION E81CE23D



BKQE008A

GENERAL DESCRIPTION EDBF3B4A

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 E1BF7CC6

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 EB2DE13F

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 > 900rpm • Shift stage 3rd. gear • Input speed > 0rpm • A/T oil temp output ≥ -23℃ • Voltage of Battery > 10V • Time after shift changing finish > 2secs • A/T range switch: Only one signal	
Threshold value	• Output speed > (input speed+200rpm)/3rd. gear ratio OR output speed < (input 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)	

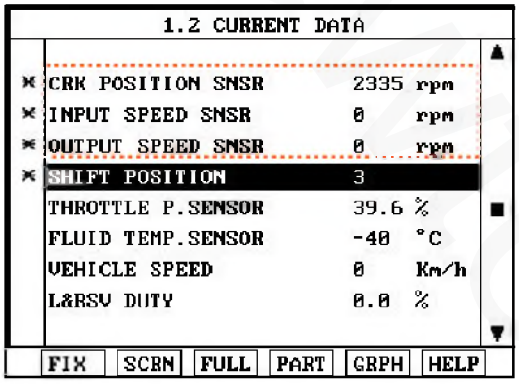
SIGNAL WAVEFORM ED8D641E

Refer to DTC P0731.

MONITOR SCANTOOL DATA EFBCB361

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).***

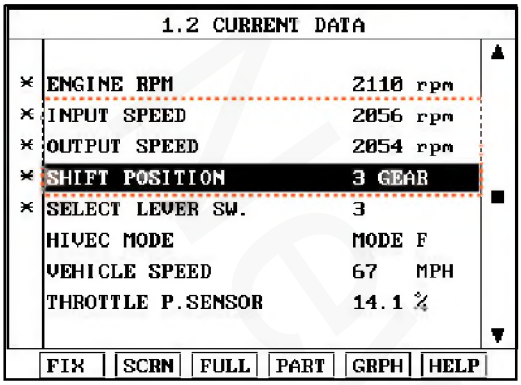
- ***Chock both rear wheel(left and right).***
- ***Pull the parking brake lever on with the brake pedal fully depressed.***
- ***The throttle should not be left fully open for more than eight seconds.***
- ***If carrying out the stall test two or more times, move the select lever to the "N" position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

SIGNAL CIRCUIT INSPECTION EC0EB16F

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?

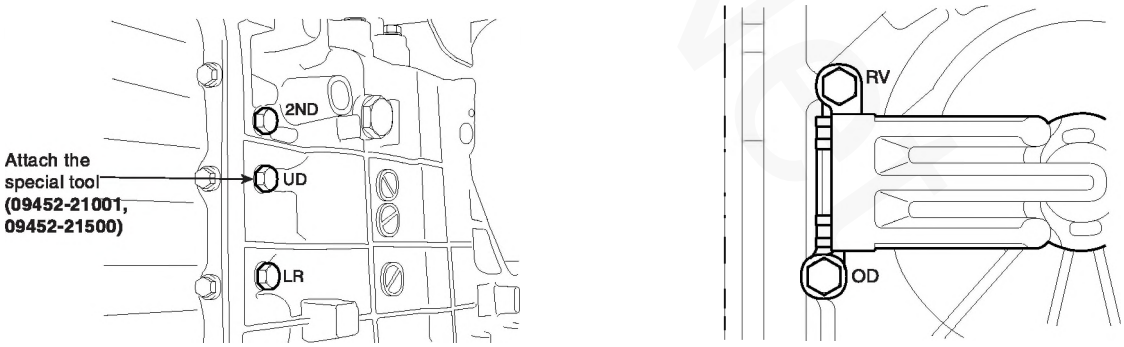
YES

▶ 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 E54C62A8



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" procedure.

NO

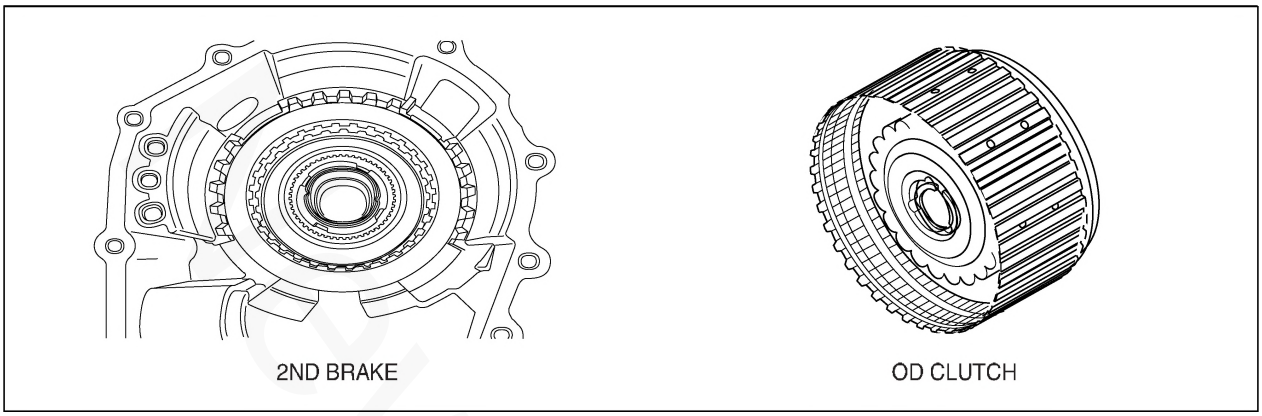
▶ Replace AUTO TRANSAXLE (BODY CONTROL VALVE faulty) as necessary and Go to "Verification Vehicle Repair " procedure.

VERIFICATION OF VEHICLE REPAIR EEDFC7BC

Refer to DTC P0560.

DTC P0734 GEAR 4 INCORRECT RATIO

COMPONENT LOCATION EF70CBFF



BKQE010A

GENERAL DESCRIPTION E81D5EF6

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

DTC DESCRIPTION E538CBB4

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 E20227C4

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 output ≥ -23℃ • Voltage of Battery > 10V • Time after shift changing finish > 2secs • A/T range switch: Only one signal	
Threshold value	• output speed > (input speed+200rpm)/4th. gear ratio OR output speed < (input 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)	

SIGNAL WAVEFORM EF8B215A

Refer to DTC P0731.

MONITOR SCANTOOL DATA E004DB2E

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

OPERATING ELEMENT OF EACH SHIFTING RANGE

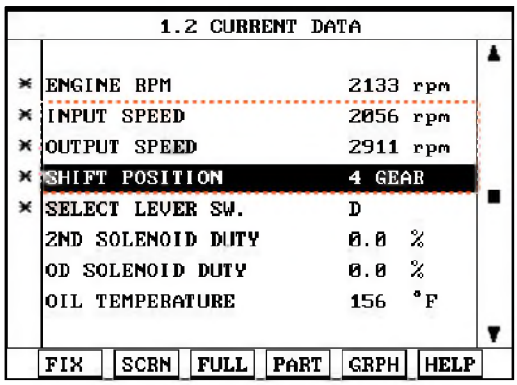
	UD/C	OD/C	REV/C	2ND/B	LR/B	OWC
P					●	
R			●		●	
N					●	
D1	●				●	○
D2	●			●		
D3	●	●				
D4		●		●		

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

SIGNAL CIRCUIT INSPECTION E897CDE8

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 E5245408

EKOF007E

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" procedure.

NO

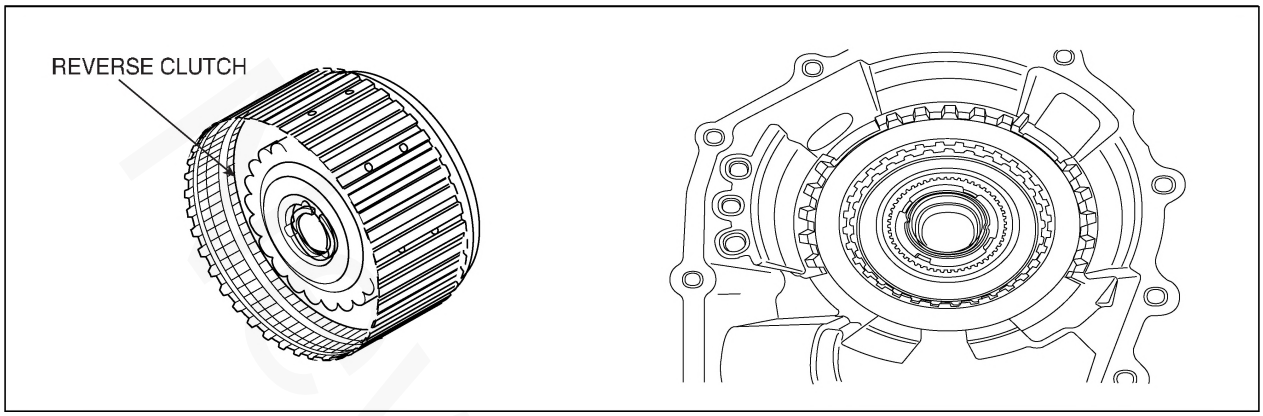
▶ Replace AUTO TRANSAXLE (BODY CONTROL VALVE faulty) as necessary and Go to "Verification Vehicle Repair " procedure.

VERIFICATION OF VEHICLE REPAIR E1CEE0EF

Refer to DTC P0560.

DTC P0736 REVERSE GEAR INCORRECT RATIO

COMPONENT LOCATION E09ECDB6



BKQE012A

GENERAL DESCRIPTION EE1F4D82

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 E173CE3C

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 E795162D

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 > 100rpm • Shift stage Rev. gear • Input speed > 0rpm • A/T oil temp output ≥ -23℃ • Voltage of Battery > 10V • Time after shift changing finish > 2secs • A/T range switch: Only one signal	
Threshold value	• Output speed > (input speed+200rpm)/Rev. gear ratio OR output speed < (input 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)	

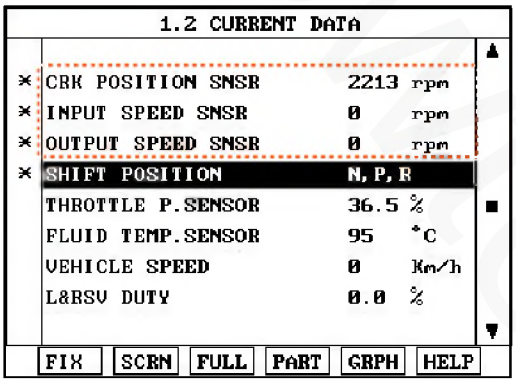
SIGNAL WAVEFORM ECFBEC82

Refer to DTC P0731.

MONITOR SCANTOOL DATA EEEC4467

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 ℃.***

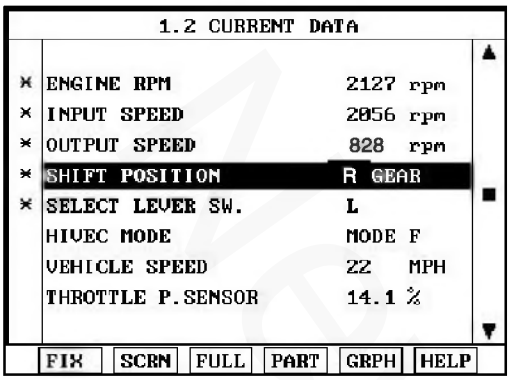
- ***Chock both rear wheel(left and right).***
- ***Pull the parking brake lever on with the brake pedal fully depressed.***
- ***The throttle should not be left fully open for more than eight seconds.***
- ***If carrying out the stall test two or more time, move the select lever to the "N" position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

SIGNAL CIRCUIT INSPECTION E0DC9FED

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 E76C5E92

EKOF007F

1. Connect Oil pressure gauge to "RV" 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" procedure.

NO

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

VERIFICATION OF VEHICLE REPAIR EAB60F6E

Refer to DTC P0560.

DTC P0741 TORQUE CONVERTER CLUTCH CIRCUIT - STUCK OFF

GENERAL DESCRIPTION EF781BCE

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

DTC DESCRIPTION EE0F54F4

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

DTC DETECTING CONDITION ED24A875

[2.0L]

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))	

[2.7L]

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))	

MONITOR SCANTOOL DATA ECE73067

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%)

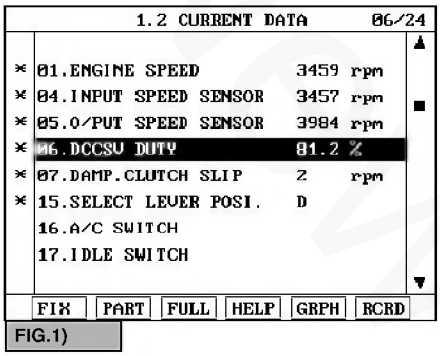


FIG.1) : Normal status

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 E9670B9D

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 sound for using TCC SOLENOID VALVE Actuator Testing Function?

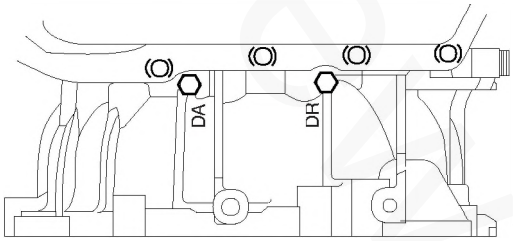
YES

▶ 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



EKKD051A

1) Connect Oil pressure gauge to "DA" port.
2) Engine "ON".
3) After connecting Scantool and monitor the "TCC SOLENIOD VALVE DUTY" parameter on the Scantool data list.
4) Operate vehicle with 3rd or 4th gear and operate the "TCC SOLENIOD VALVE DUTY" more than 85%.

Specification : Oil pressure guage approx 735.4960KPa(7.5kg/cm²)-(In condition that TCC SOL. DUTY > 85%)

5) 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 EBF2758E

Refer to DTC P0560.

DTC P0742 TORQUE CONVERTER CLUTCH CIRCUIT - STUCK ON

GENERAL DESCRIPTION ED83D3CF

Refer to DTC P0741.

DTC DESCRIPTION EBFF5EBA

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

DTC DETECTING CONDITION EB724954

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))	

MONITOR SCANTOOL DATA ED388BB7

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

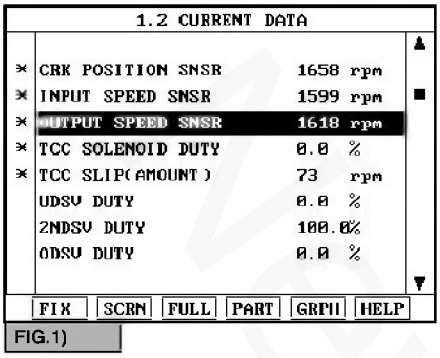


FIG.1)

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 EBE280D9

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 sound for using TCC SOLENOID VALVE Actuator Testing Function?

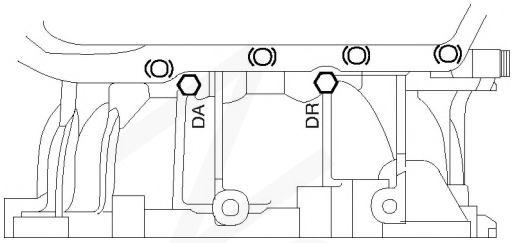
      YES

      ▶ 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



EKKD051A

1) Connect Oil pressure gauge to "DR" port.
2) Ignition "ON" & Engine "OFF".
3) After connecting Scantool and monitor the "TCC SOLENIOD VALVE DUTY" parameter on the Scantool data list.
4) Select 1st gear and accelerate Engine speed to 2500 rpm.
5) Measure oil pressure.

Specification : approx. 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

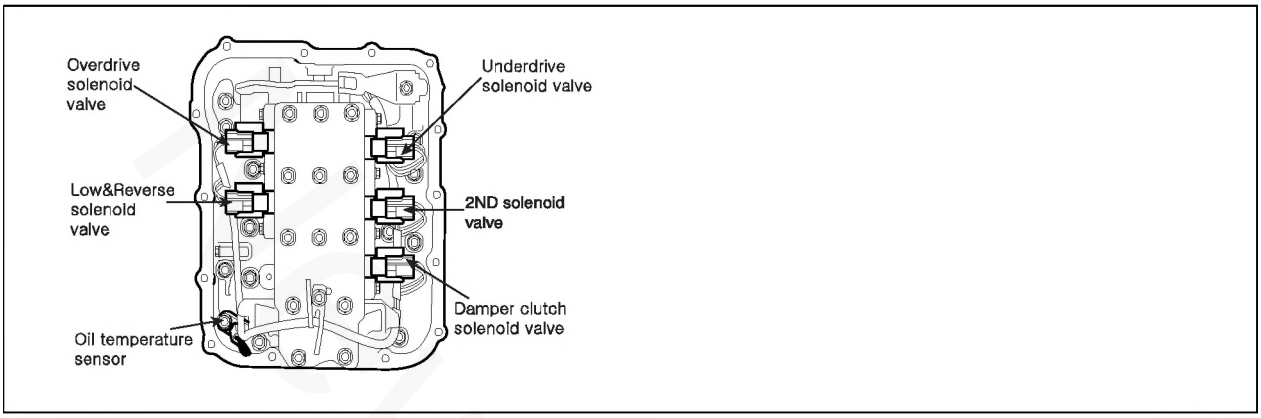
▶ Replace A/T ass'y (possible to BODY CONTROL VALVE faulty) as necessary and Go to "Verification Vehicle Repair " procedure.

VERIFICATION OF VEHICLE REPAIR E382C01A

Refer to DTC P0560.

DTC P0743 TORQUE CONVERTER CLUTCH CIRCUIT - ELECTRICAL

COMPONENT LOCATION ECBAFFD7



BKQE013A

GENERAL DESCRIPTION EFB3316A

Refer to DTC P0741.

DTC DESCRIPTION E95EA735

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 E6DD6509

[2.0L]

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	• 10V < Voltage Battery < 16V • In gear state(no gear shifting) 500msec is passed from turn on the relay	
Threshold value	• Feedback voltage from DCC control solenoide > Voltage Battery-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 0.3 sec	
Fail Safe	• Locked in 3rd gear.(Control relay off)	

[2.7L]

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)	

SPECIFICATION ED6CB889

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
    ※ KM series : 35Hz
- Internal resistance : 2.7~3.4Ω (68°F or 20°C)
- Surge voltage : 56 V

MONITOR SCANTOOL DATA EA7BDE56

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%

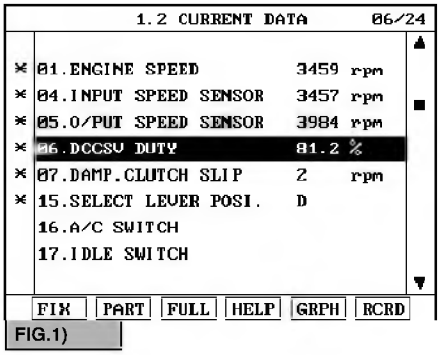


FIG.1) : Normal status

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 EB84AE32

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.

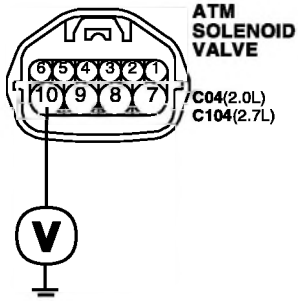
NO

▶ Go to "Power Supply Circuit Inspection" procedure.

POWER SUPPLY CIRCUIT INSPECTION E3A785A9

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



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

EKOF008A

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 E509EA6D

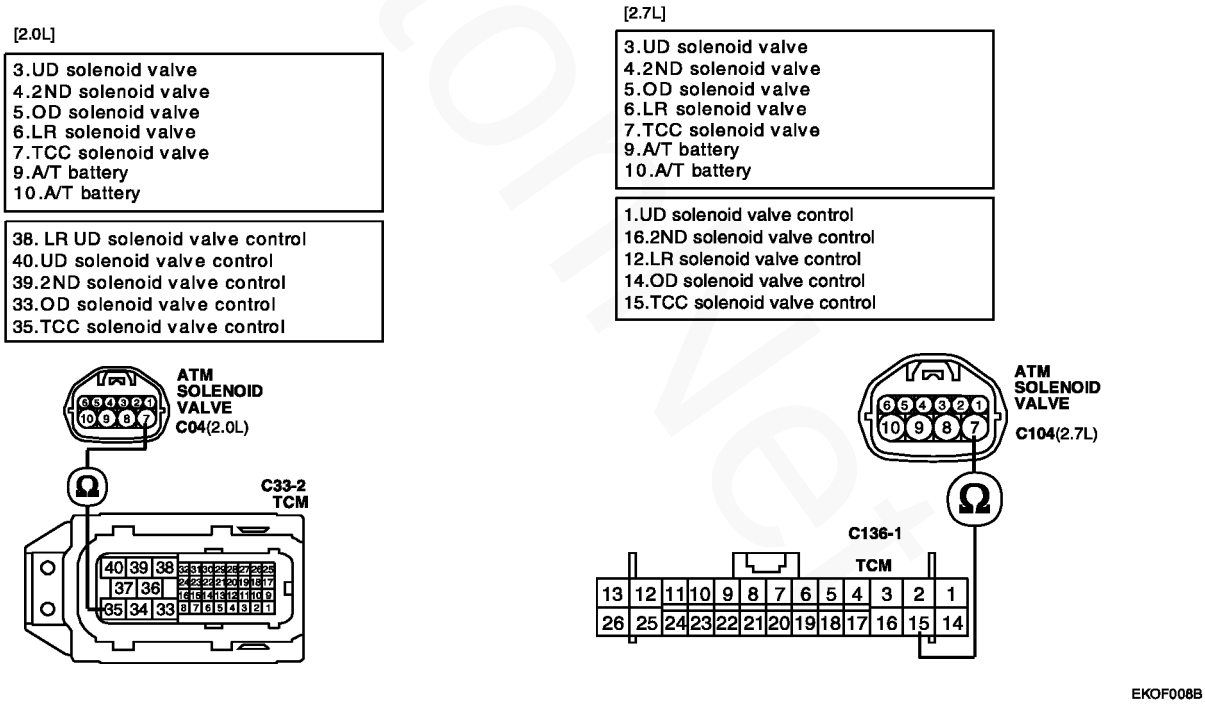
1. Check signal circuit open inspection.

   1) Ignition "OFF".

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

   3) Measure resistance between terminal "7" of the ATM SOLENOID VALVE harness connector and terminal "15" of the TCM harness connector.

Specification: approx. 0 Ω



EKOF008B

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.

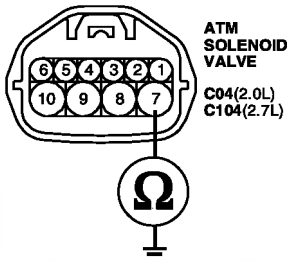
2. Check signal circuit short inspection

1) Ignition "OFF".

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

3) Measure resistance between terminal "7" 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

EKOF008C

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 E6CEE8AA

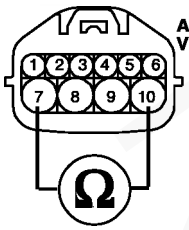
1. CHECK SOLENOID VELVE

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)



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

EKOF008D

4) Is resistance within specification?

YES

▶ Go to "CHECK PCM/TCM" as below.

NO

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

2. CHECK PCM/TCM

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

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

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

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

YES

▶ Go to "Verification Vehicle Repair" procedure.

NO

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

ACTUATOR TEST CONDITION

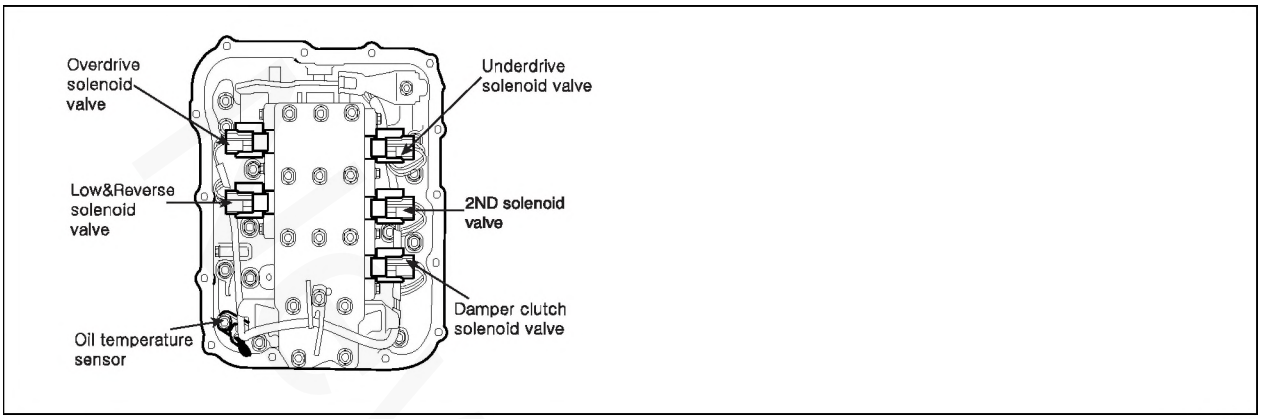
1. IG SWITCH ON
2. TRANSAXLE RANGE SWITCH is normal
3. P RANGE
4. Vehicle Speed 0km/h
5. Throttle position sensor < 1V
6. IDLE SWITCH ON
7. ENGINE RPM 0

VERIFICATION OF VEHICLE REPAIR E209896E

Refer to DTC P0560.

DTC P0750 SHIFT CONTROL SOLENOID VALVE A CIRCUIT MALFUNCTION

COMPONENT LOCATION E1C181F7



BKQE013A

GENERAL DESCRIPTION EA7823EF

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 E2CD7361

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

DTC DETECTING CONDITION ECFF4EC6

[2.0L]

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 0.3s	
Fail Safe	• Locked in 3rd gear.(Control relay off)	

[2.7L]

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)	

SPECIFICATION ECF6DB8B

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

MONITOR SCANTOOL DATA EAF6FF03

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%

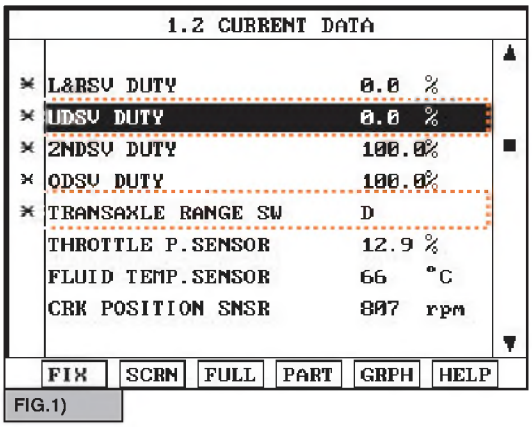


FIG.1)

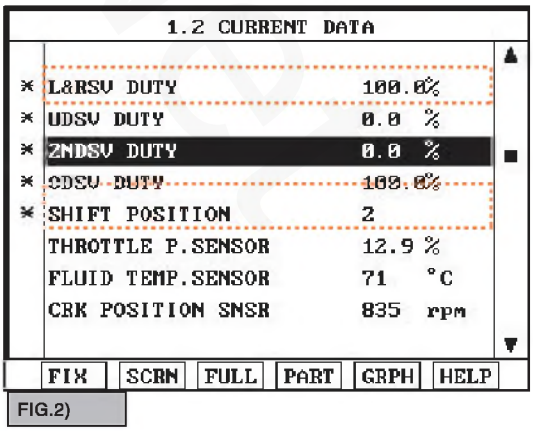


FIG.2)

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 EBBE52DE

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.

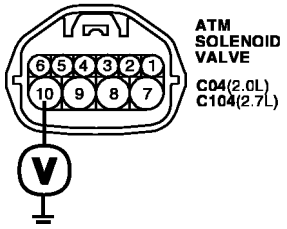
NO

▶ Go to "Power Supply Circuit Inspection" procedure.

POWER SUPPLY CIRCUIT INSPECTION E37EEA2B

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



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

EKOF009A

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 E3F94B5D

1. Check signal circuit open inspection

   1) Ignition "OFF".

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

   3) Measure resistance between terminal "6" of the ATM SOLENOID VALVE harness connector and terminal "12" of the PCM/TCM harness connector

Specification: approx. 0 Ω

[2.7L Gasoline]

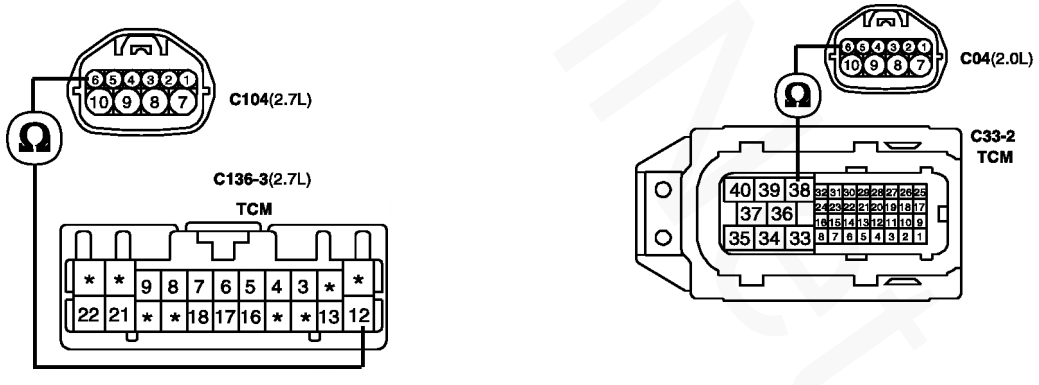
3.UD solenoid valve 4.2ND solenoid valve 5.OD solenoid valve 6.LR solenoid valve 7.TCC solenoid valve 9.A/T battery 10.A/T battery

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

[2.0L Gasoline]

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



EKOF009B

   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.

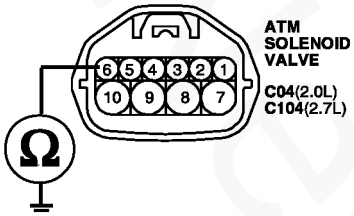
2. Check signal circuit short inspection

   1) Ignition "OFF".

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

EKOF009C

   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 E2C335F5

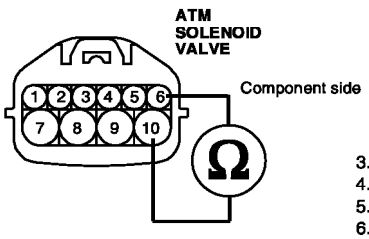
1. CHECK SOLENOID VELVE

   1) Ignition "OFF".

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

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

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



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

EKOF009D

4) Is resistance within specification?

YES

▶ Go to "CHECK PCM/TCM" as below.

NO

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

2. CHECK PCM/TCM

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

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

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

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

YES

▶ Go to "Verification Vehicle Repair" procedure.

NO

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

ACTUATOR TEST CONDITION

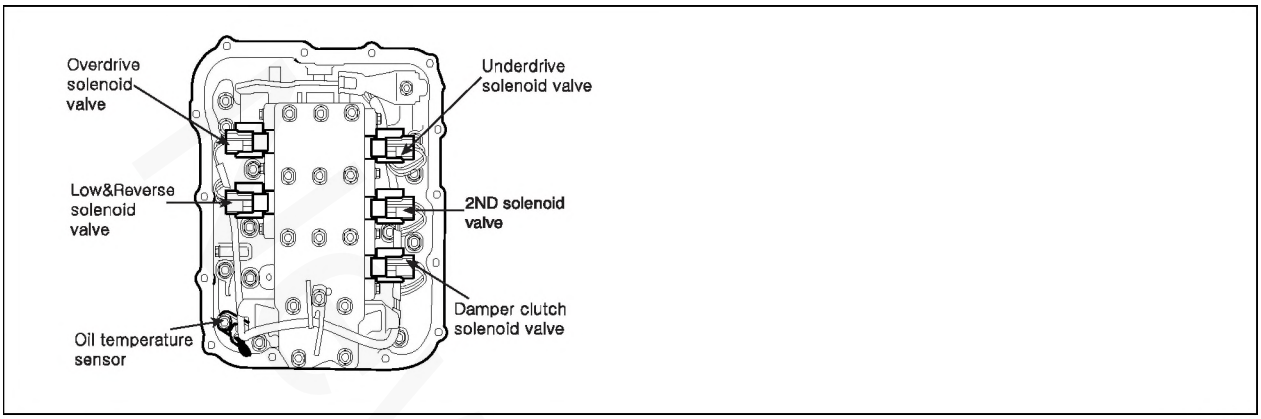
1. IG SWITCH ON
2. TRANSAXLE RANGE SWITCH is normal
3. P RANGE
4. Vehicle Speed 0km/h
5. Throttle position sensor < 1V
6. IDLE SWITCH ON
7. ENGINE RPM 0

VERIFICATION OF VEHICLE REPAIR E7F6FAEC

Refer to DTC P0560.

DTC P0755 SHIFT CONTROL SOLENOID VALVE B CIRCUIT MALFUNCTION

COMPONENT LOCATION ECD8DFFC



BKQE013A

GENERAL DESCRIPTION EA47FA24

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 EC2176FE

Refer to DTC P0750.

DTC DETECTING CONDITION E22AA3D5

[2.0L]

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 0.3s	
Fail Safe	• Locked in 3rd gear.(Control relay off)	

[2.7L]

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)	

SPECIFICATION E0D8C5EF

Refer to DTC P0750.

MONITOR SCANTOOL DATA EC3D8C7A

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%

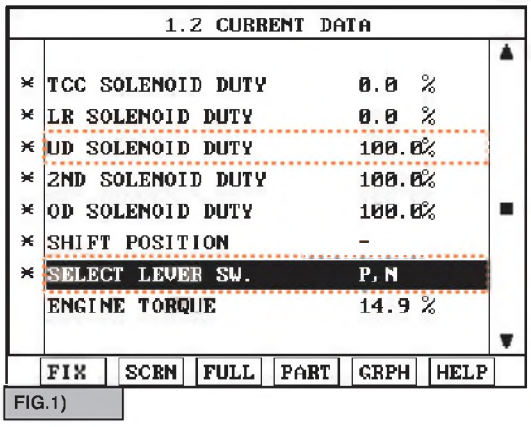


FIG.1)

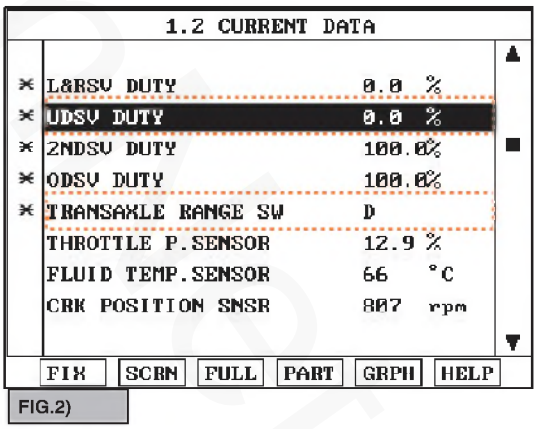


FIG.2)

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.

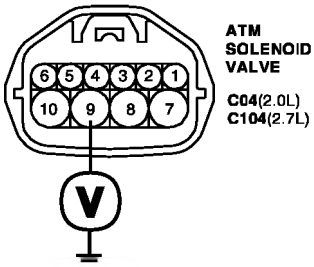
TERMINAL & CONNECTOR INSPECTION ECBC9106

Refer to DTC P0750.

POWER SUPPLY CIRCUIT INSPECTION EF7B799D

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

C04(2.0L)
C104(2.7L)

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

EKOF009E

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 EDFE1438

1. Check signal circuit open inspection

   1) Ignition "OFF".

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

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

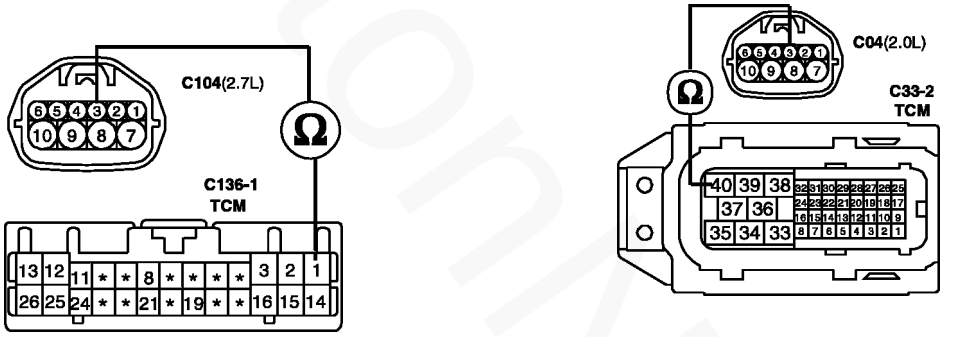
Specification: approx. 0 Ω

[2.7L Gasoline]

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

[2.0L Gasoline]

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



EKOF009F

   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.

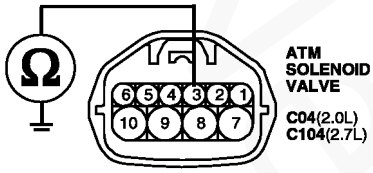
2. Check signal circuit short inspection

   1) Ignition "OFF".

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

   3) Measure resistance between terminal "3" 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

EKOF009G

   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 E1FB2037

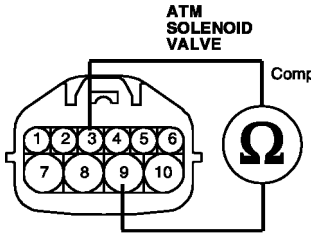
1. CHECK SOLENOID VELVE

   1) Ignition "OFF".

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

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

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



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

EKOF009H

4) Is resistance within specification?

YES

▶ Go to "CHECK PCM/TCM" as below.

NO

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

2. CHECK PCM/TCM

1) Connect scantool to data link connector(DLC)

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

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

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

YES

▶ Go to "Verification Vehicle Repair" procedure.

NO

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

ACTUATOR TEST CONDITION

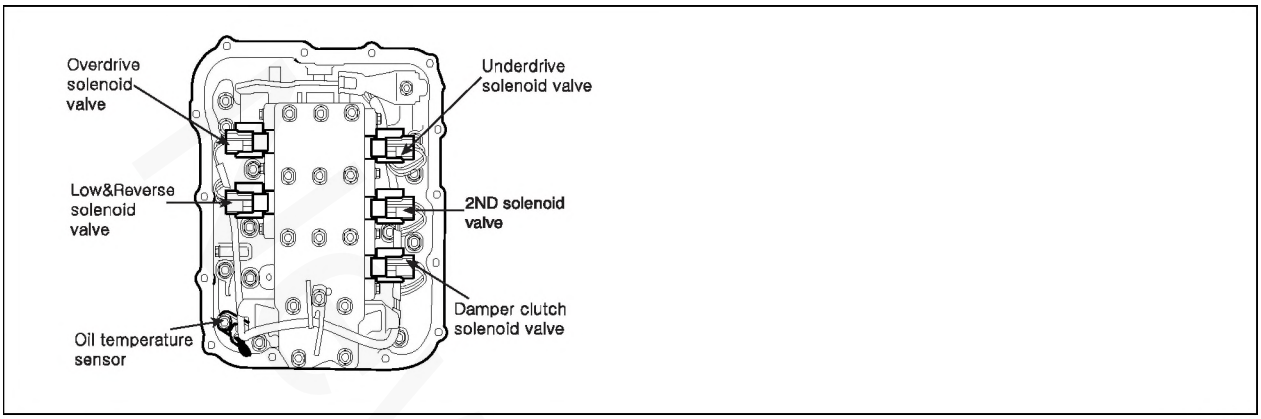
1. IG SWITCH ON
2. TRANSAXLE RANGE SWITCH is normal
3. P RANGE
4. Vehicle Speed 0km/h
5. Throttle position sensor < 1V
6. IDLE SWITCH ON
7. ENGINE RPM 0

VERIFICATION OF VEHICLE REPAIR EE70BCDF

Refer to DTC P0560.

DTC P0760 SHIFT CONTROL SOLENOID VALVE C CIRCUIT MALFUNCTION

COMPONENT LOCATION E632D90E



BKQE013A

GENERAL DESCRIPTION ED3ADF2F

The Automatic Transmission changes the gear position of the transmission 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 RED (Reduction Brake, only for 5 speed transmissions). The 2ND Brake is engaged in the 2nd gear and 4th gear positions.

DTC DESCRIPTION EBEA6BE9

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

DTC DETECTING CONDITION EF4ED764

[2.0L]

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 0.3s	
Fail Safe	• Locked in 3rd gear.(Control relay off)	

[2.7L]

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)	

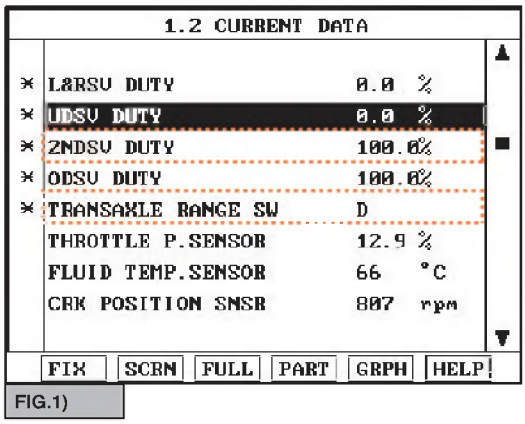
SPECIFICATION E79DA29A

Refer to DTC P0750.

MONITOR SCANTOOL DATA E4FA2FC9

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%



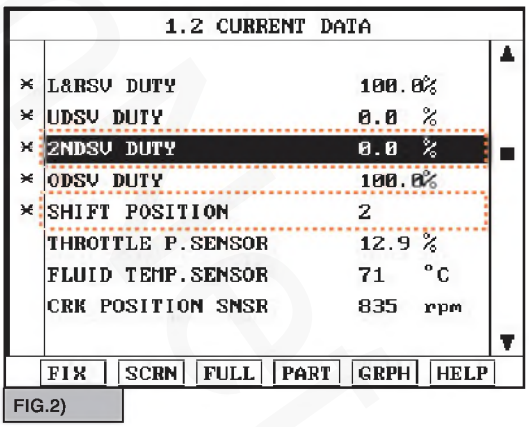


FIG. 1) 1st gear
FIG. 2) 2nd gear

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 EDB558B8

Refer to DTC P0750.

POWER SUPPLY CIRCUIT INSPECTION E30E3D30

Refer to DTC P0755.

SIGNAL CIRCUIT INSPECTION EDB4CD56

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

Specification: approx. 0 Ω

[2.7L Gasoline]

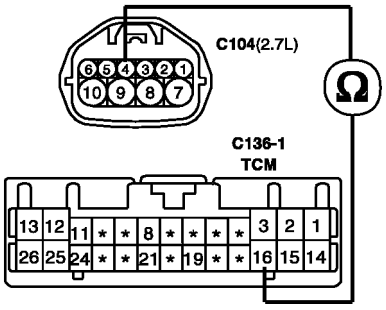
3.UD solenoid valve 4.2ND solenoid valve 5.OD solenoid valve 6.LR solenoid valve 7.TCC solenoid valve 9.A/T battery 10.A/T battery

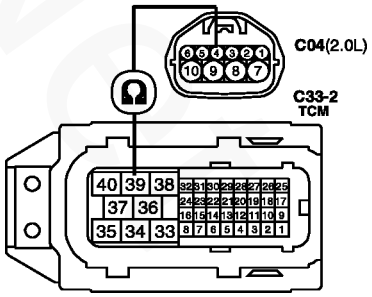
1.UD solenoid valve control 16.2ND solenoid valve control 14.OD solenoid valve control 15.TCC solenoid valve control

[2.0L Gasoline]

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





EKOF009I

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.

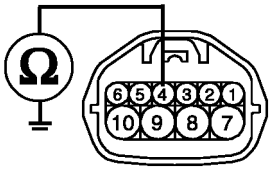
2. Check signal circuit short inspection

1) Ignition "OFF".

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

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

Specification: Infinite



ATM SOLENOID VALVE

C04(2.0L)
C104(2.7L)

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

EKOF009J

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 ECA08CAF

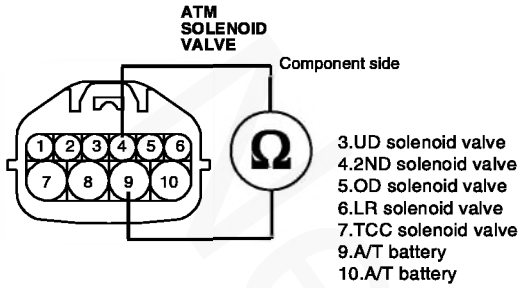
1. CHECK SOLENOID VELVE

1) Ignition "OFF".

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

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

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



EKOF009K

4) Is resistance within specification?

YES

▶ Go to "CHECK PCM/TCM" as below.

NO

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

2. CHECK PCM/TCM

1) Connect scantool to data link connector(DLC)

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

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

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

YES

▶ Go to "Verification Vehicle Repair" procedure.

NO

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

ACTUATOR TEST CONDITION

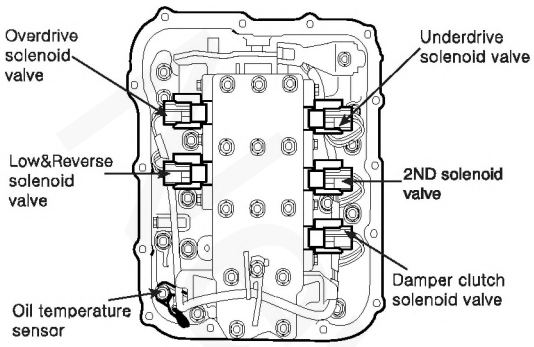
1. IG SWITCH ON
2. TRANSAXLE RANGE SWITCH is normal
3. P RANGE
4. Vehicle Speed 0km/h
5. Throttle position sensor < 1V
6. IDLE SWITCH ON
7. ENGINE RPM 0

VERIFICATION OF VEHICLE REPAIR E71DA6FA

Refer to DTC P0560.

DTC P0765 SHIFT CONTROL SOLENOID VALVE D CIRCUIT MALFUNCTION

COMPONENT LOCATION EF042F75



BKQE013A

GENERAL DESCRIPTION E4FD6BD3

The Automatic Transmission changes the gear position of the transmission 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 RED (Reduction Brake, only for 5 speed transmissions). The OD Clutch is engaged in the 3rd gear and 4th gear positions.

DTC DESCRIPTION EA3719FE

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

DTC DETECTING CONDITION E38C6FBE

[2.0L]

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 • In gear state(no gear shifting) 500msec is passed from turn on the relay	
	Case2	• Voltage Battery > 10V • OIL TEMP. ≥ -23°C • 2nd gear and not under the down shifting • Engine speed ≥ 450rpm • Output speed > 500rpm • Input speed > 0rpm • Time after shift changing finish > 2secs	
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	• Output speed > (input speed-50rpm) / 3rd. gear ratio AND Output speed < (input speed-50rpm) / 3rd. gear ratio	
Diagnostic Time	**Case1**	• More than 0.3s	
	Case2	• More than 1 sec	
Fail Safe		• Locked in 3 rd gear.(Control relay off)	

[2.7L]

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)	

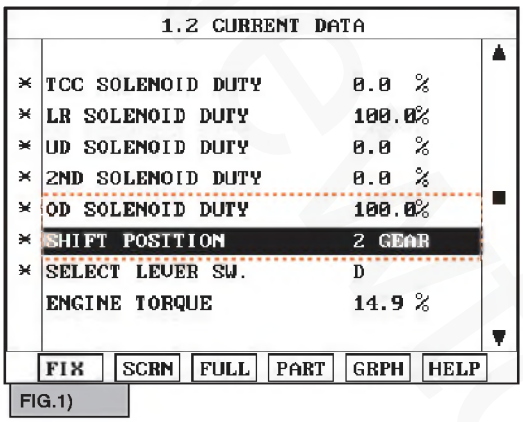
SPECIFICATION EC0705F5

Refer to DTC P0750.

MONITOR SCANTOOL DATA E0745EA2

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%



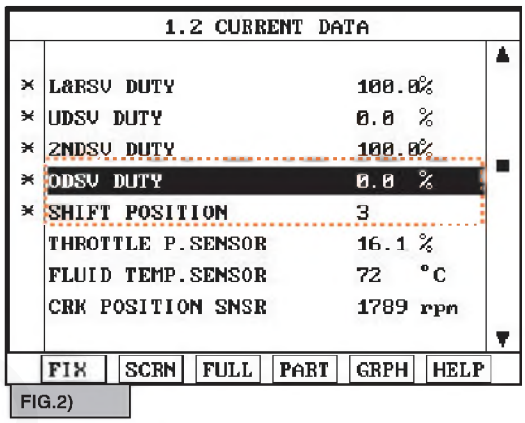


FIG. 1) 2nd gear
FIG. 2) 3rd gear

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 E13BF397

Refer to DTC P0750.

POWER SUPPLY CIRCUIT INSPECTION EDE57B62

Refer to DTC P0755.

SIGNAL CIRCUIT INSPECTION ED3B6A78

1. Check signal circuit open inspection

1) Ignition "OFF".

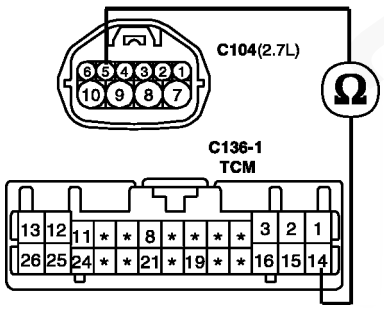
2) Disconnect "A/T SOLENOID VALVE" connector and "PCM/TCM" connector.

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

Specification: approx. 0 Ω

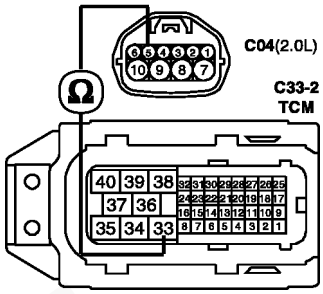
[2.7L Gasoline]

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



[2.0L Gasoline]

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



EKOF009L

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.

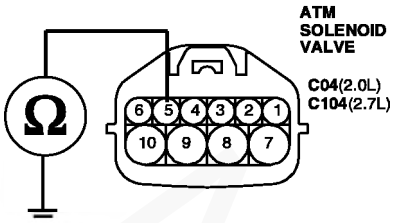
2. Check signal circuit short inspection

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

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

3) Measure resistance between terminal "5" 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

EKOF009M

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 EA5C5BCB

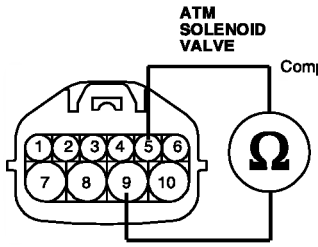
1. CHECK SOLENOID VELVE

1) Ignition "OFF".

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

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

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



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

EKOF009N

4) Is resistance within specification?

YES

▶ Go to "CHECK PCM/TCM" as below.

NO

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

2. CHECK PCM/TCM

   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 LR SOLENOID VALVE Actuator Testing Function?

   YES

   ▶ Go to "Verification Vehicle Repair" procedure.

   NO

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

   ACTUATOR TEST CONDITION

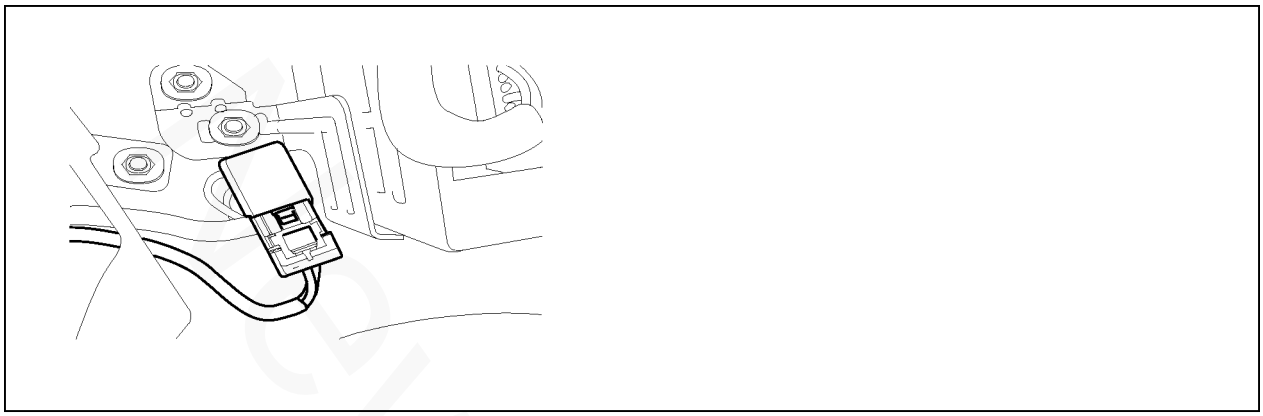
   1. IG SWITCH ON
   2. TRANSAXLE RANGE SWITCH is normal
   3. P RANGE
   4. Vehicle Speed 0km/h
   5. Throttle position sensor < 1V
   6. IDLE SWITCH ON
   7. ENGINE RPM 0

VERIFICATION OF VEHICLE REPAIR E47E89A8

Refer to DTC P0560.

DTC P0885 A/T RELAY CIRCUIT MALFUNCTION

COMPONENT LOCATION EEA6CFFE



BKQE024A

GENERAL DESCRIPTION E6D1EEA8

The HIVEC Automaic Transmission supplies the power to the solenoid valves by way of a control relay. When the TCM sets the relay to ON, the relay operates and the battery power is supplied to all the sonenoid valves. When the TCM 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 EF11DF02

The TCM 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 sets this code.

DTC DETECTING CONDITION E2ABA4AA

[2.0L]

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 > Ignition key input voltage > 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)	

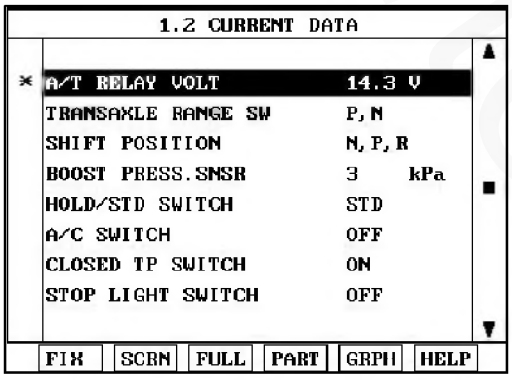
[2.7L]

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)	

MONITOR SCANTOOL DATA E4BE0CAA

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.

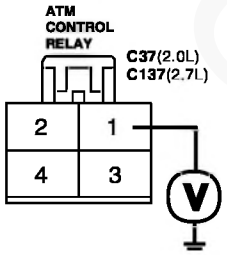
TERMINAL & CONNECTOR INSPECTION ED9A2BC6

Refer to DTC P0750.

POWER SUPPLY CIRCUIT INSPECTION E1BDFFE8

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

EKOF009O

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 E6FE9916

1. CHECK A/T control relay harness

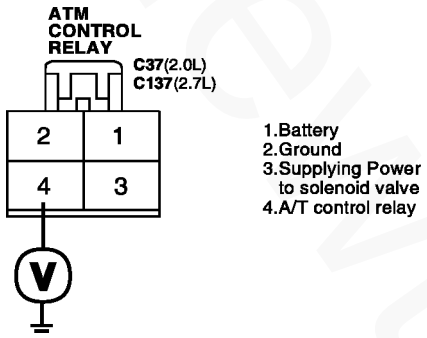
   1) Ignition "OFF".

   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



EKOF009P

   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 PCM/TCM and check for proper operation. If the problem is corrected, replace PCM/TCM 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 PCM/TCM connector.

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

Specification : Approx. 0 Ω

[2.7L Gasoline]

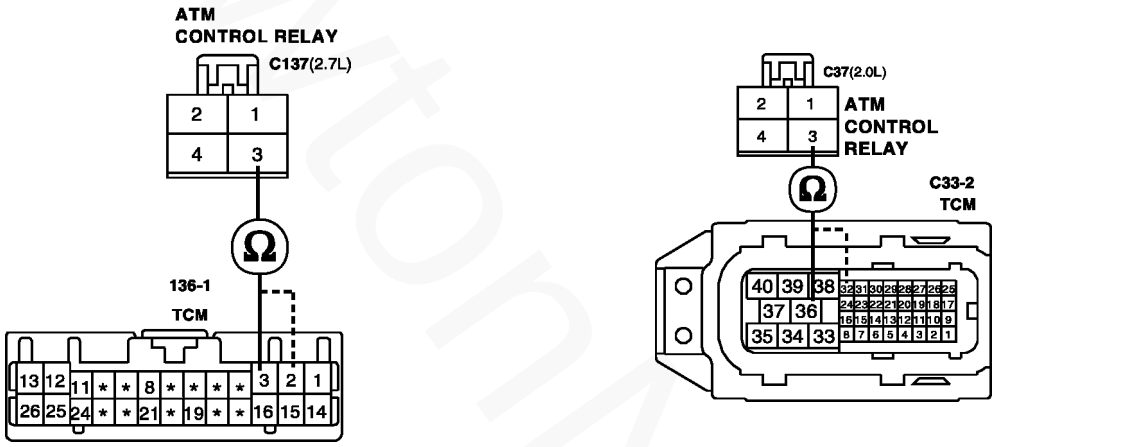
1.Battery
2.Ground
3.Supplying Power to solenoid valve
4.A/T control relay

2.Battery voltage
3.Battery voltage

[2.0L Gasoline]

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

36.Battery voltage



EKOF009Q

4) Is resistance within specifications?

YES

▶ Go to "Ground circuit inspection" procedure.

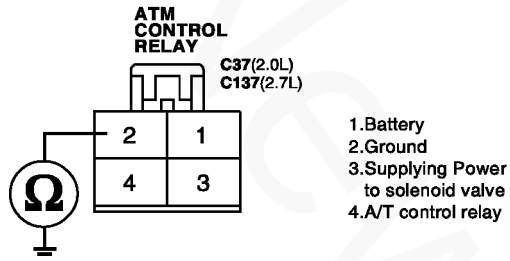
NO

▶ Check for Open in C-41 joint connector .
▶ Check for open in harness. Repair as necessary and Go to "Verification Vehicle Repair" procedure.

GROUND CIRCUIT INSPECTION E3ECDE5E

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



EKOF009R

4. Is resistance within specifications?

YES

▶ Go to "Component inspection" procedure.

NO

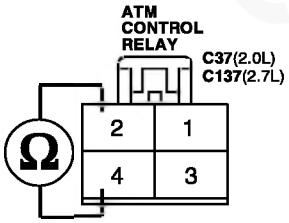
▶ Check for open in harness. Repair as necessary and Go to "Verification Vehicle Repair" procedure.

COMPONENT INSPECTION E0D3479E

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

Specification:

Item	Terminal 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



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

EKOF009S

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

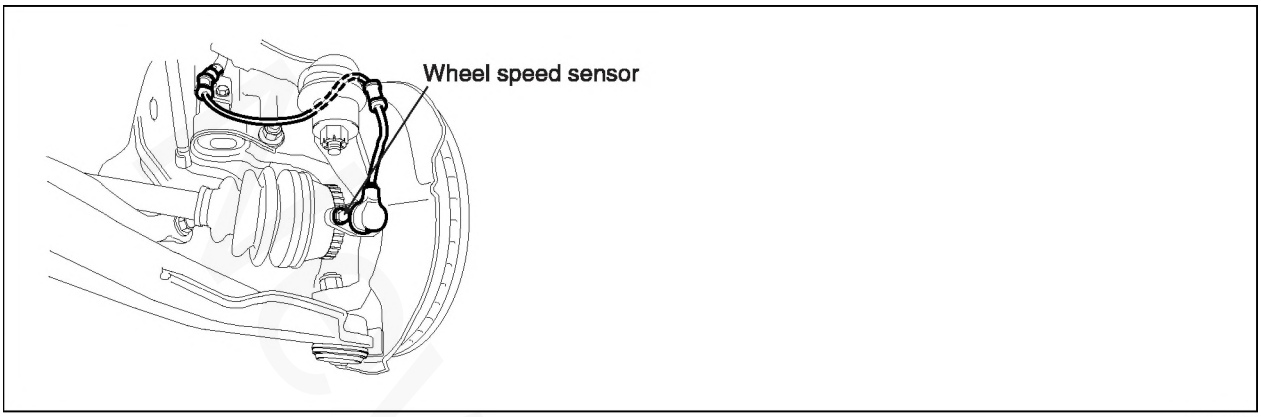
▶ Replace ATM CONTROL RELAY and then go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR E983CDDE

Refer to DTC P0560.

DTC P1500 VEHICLE SPEED SENSOR

COMPONENT LOCATION E15A5513



ELQE501E

GENERAL DESCRIPTION EFA49682

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

DTC DESCRIPTION E0AE3FAE

The TCM 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 sets this code.

DTC DETECTING CONDITION E3BC5B2D

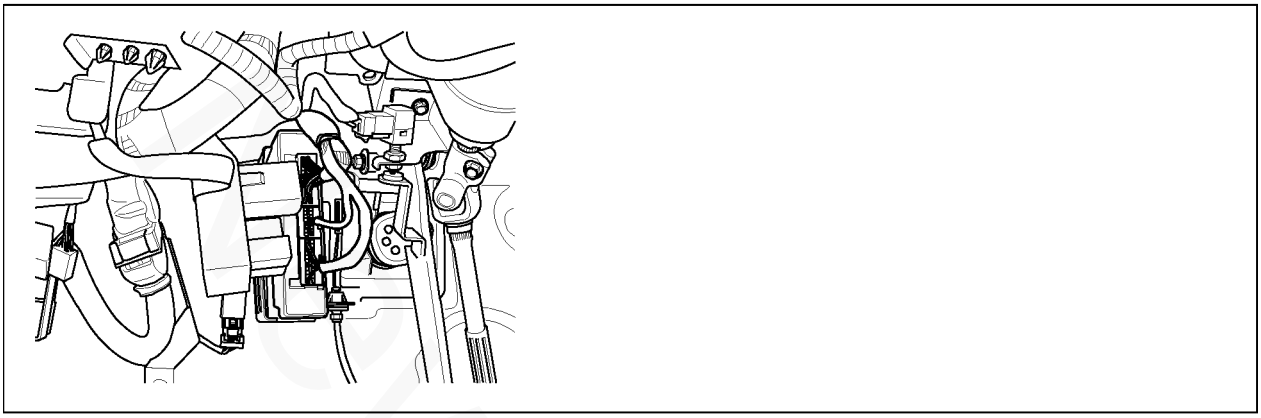
Item		Detecting Condition & Fail Safe	Possible cause
Case 1	DTC Strategy	• Plausibility check	• Open or short in harness • Contact resistance in connectors • Faulty wheel speed sensor
	Enable Conditions	• Engine speed > 2100rpm • Engine load > 250 mg/rev • Coolant temperature > 60°C(140°F) • 10V < Battery 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	• 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 EB48FD1D



KKQE001D

GENERAL DESCRIPTION EDDCE1F1

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

DTC DESCRIPTION EAB0BA6A

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 E044D5CB

Item	Detecting Condition & Fail Safe	Possible cause
DTC Strategy	• Check communication	• Open or Short in CAN communication harness • Faulty ECM • Faulty TCM
Enable Conditions	• Input speed ≥ 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	

MONITOR SCANTOOL DATA E0B3320A

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.

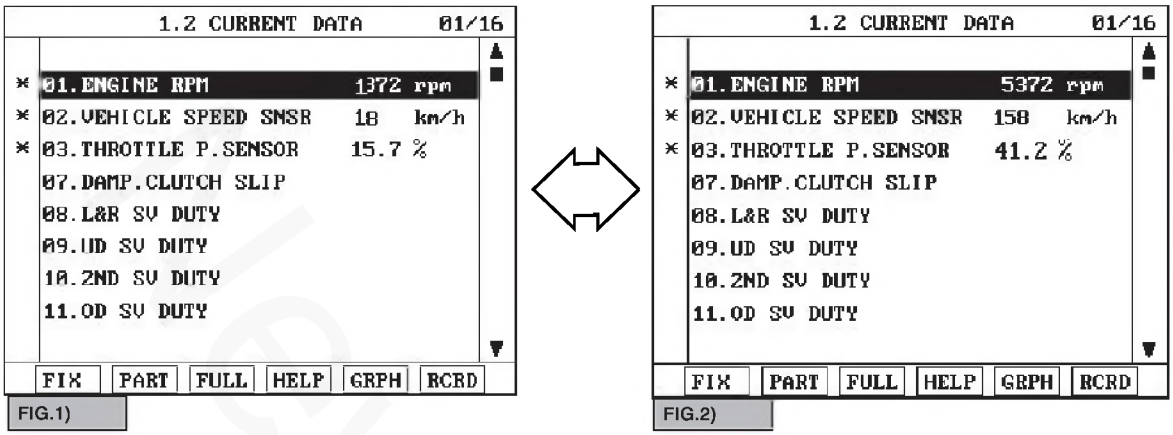


FIG.1) Low-speed
FIG.2) High-speed

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 PCM/TCM's connector or was repaired and PCM/TCM memory was not cleared. And go to Verification of Vehicle Repair procedure.

NO

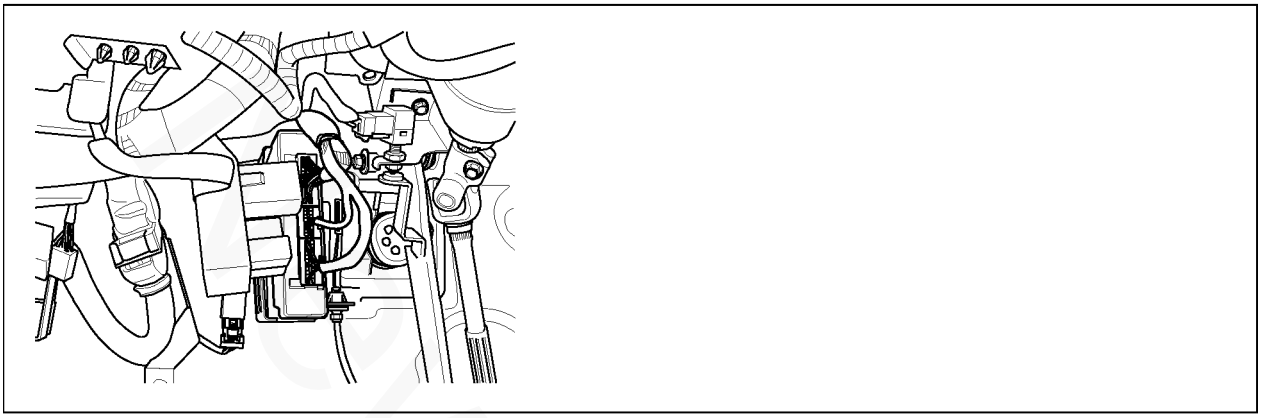
▶ Substitute with a known-good PCM/TCM and check for proper operation. If the problem is corrected, replace PCM/TCM as necessary and then go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR EFC0A6B7

Refer to DTC P0560.

DTC U0100 CAN-TIME OUT ECU

COMPONENT LOCATION E0DEF87C



KKQE001D

GENERAL DESCRIPTION EBB4FD11

Refer to DTC U0001.

DTC DESCRIPTION EDC9EECE

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

DTC DETECTING CONDITION E50BFDA7

Item	Detecting Condition & Fail Safe	Possible cause
DTC Strategy	• Check communication	• Open or Short in CAN communication harness • Faulty ECM • Faulty TCM
Enable Conditions	• Input speed ≥ 1000rpm and 5000msec passed from IG "on"	
Threshold value	• No message from ECM.	
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	

MONITOR SCANTOOL DATA E678173E

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.

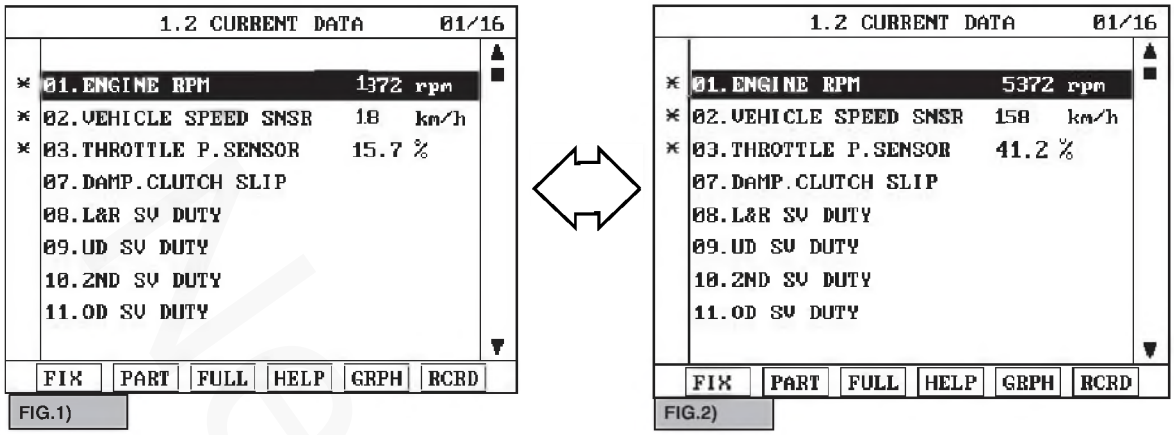


FIG.1) Low-speed
FIG.2) High-speed

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(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 E22A267C

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.

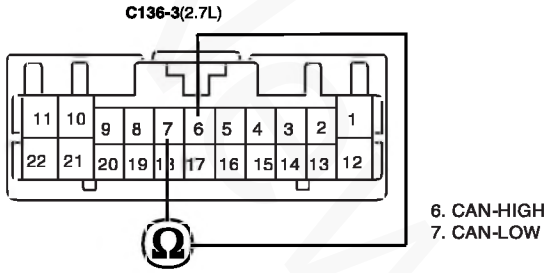
NO

▶ Go to "Signal circuit inspection" procedure.

SIGNAL CIRCUIT INSPECTION ED75A839

1. Ignition "ON" & Engine "OFF".
2. Disconnect the "PCM/TCM" connector.
3. Measure resistance between terminal "6" and "7" of the "PCM/TCM" harness connector.

Specification : approx. 60 Ω



EKOF009T

4. Is measured resistance within specifications?

YES

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

NO

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

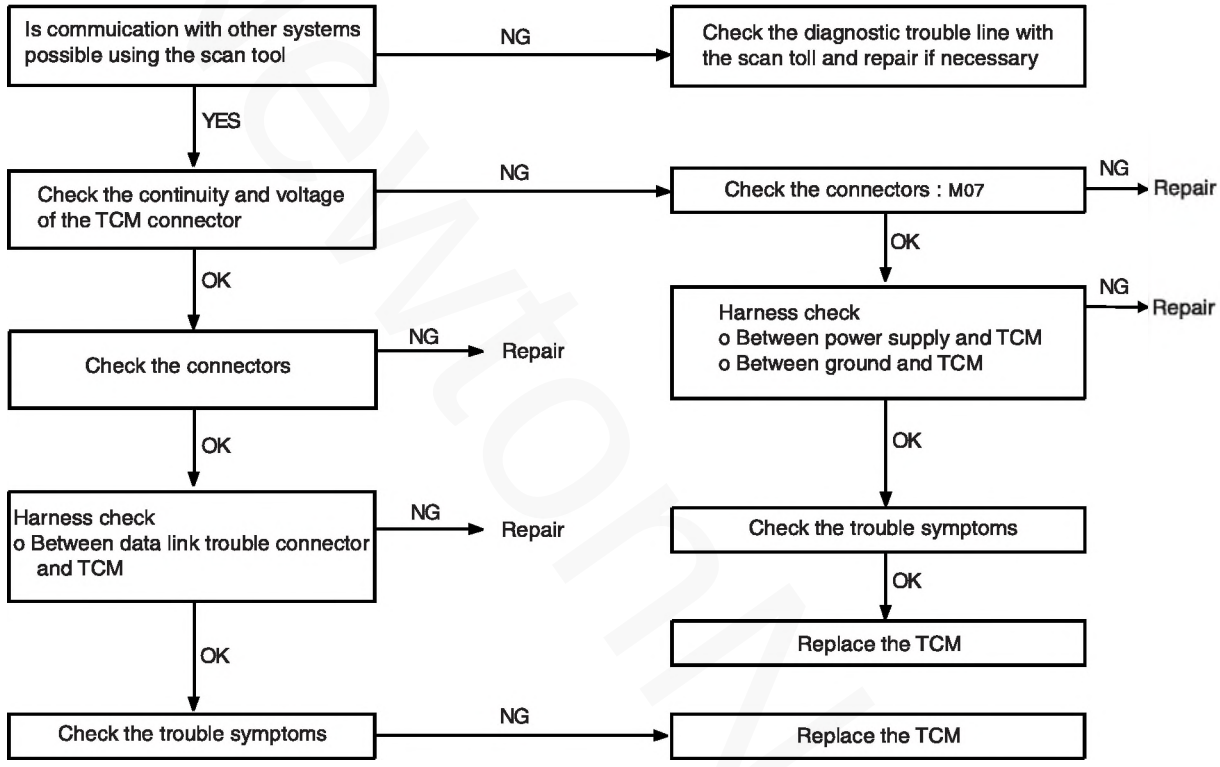
VERIFICATION OF VEHICLE REPAIR EFFAAC7F

Refer to DTC P0560.

INSPECTION PROCESS FOR TROUBLE SYMPTOMS EEA6D626

INSPECTION PROCEDURE 1

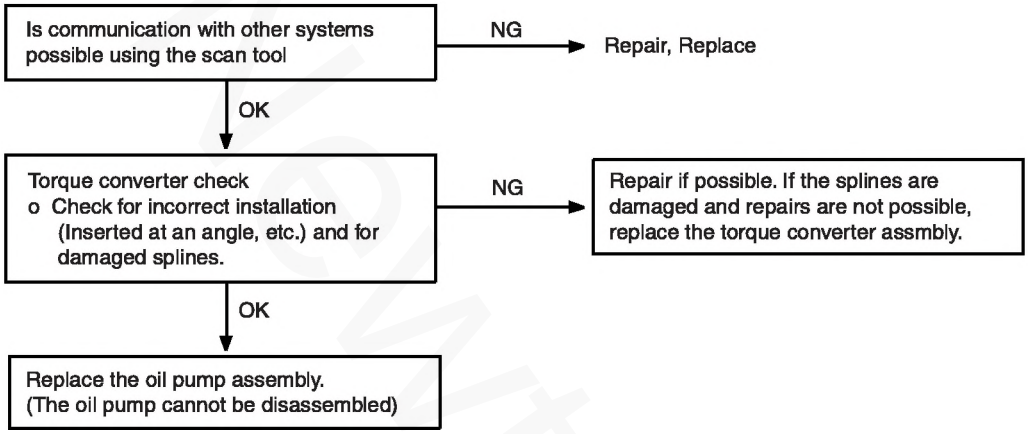
Communication with the scan tool	Possible cause
If communication with the scan tool is not possible, the cause may be a defective diagnostic trouble line or the TCM is not functioning.	• Malfunction of diagnostic trouble line • Malfunction of connector • Malfunction of the TCM



EKKA011A

INSPECTION PROCEDURE 2

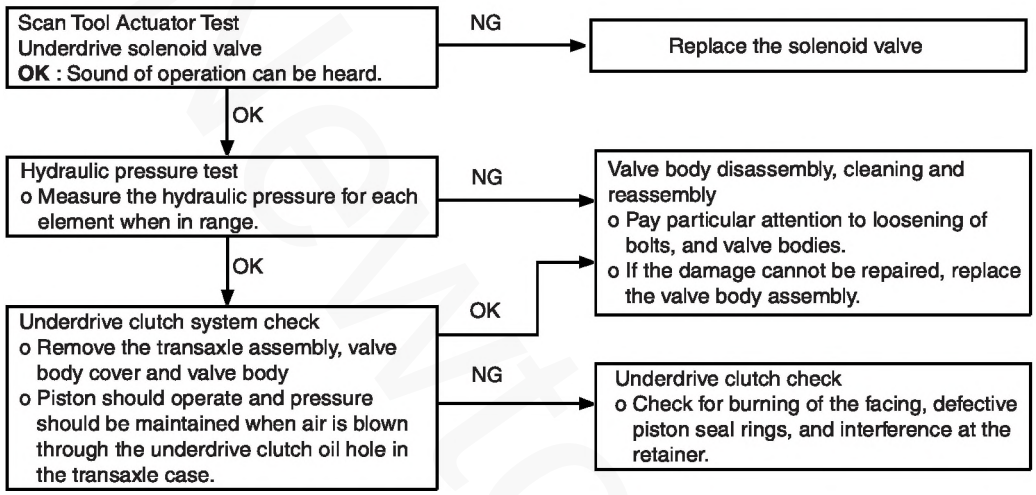
Starting impossible	Possible cause
Starting is not possible when the selector lever is in P or N range. In such cases, the cause may be a defective engine system, torque converter or oil pump.	• Malfunction of the engine system • Malfunction of the torque converter • Malfunction of the oil pump



EKAA011B

INSPECTION PROCEDURE 3

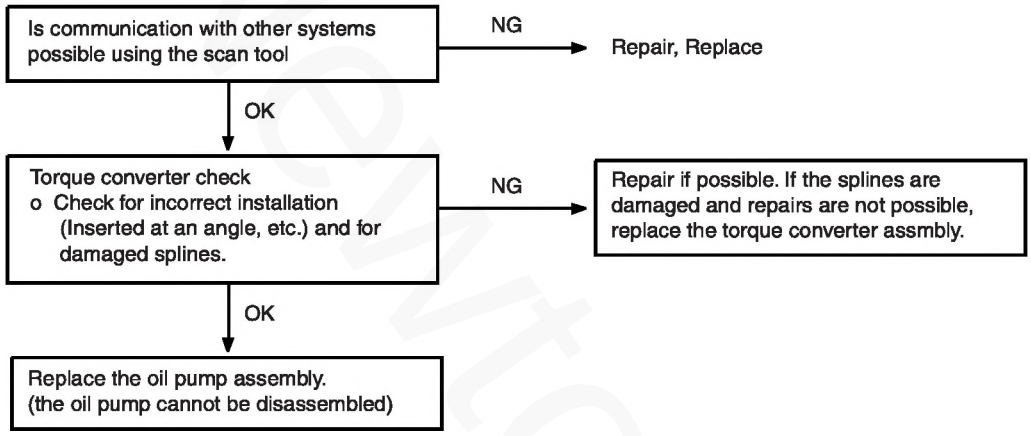
Does not move	Possible cause
If the vehicle does not move forward when the selector lever is shifted from N to D range while the engine is idling, the cause may be abnormal line pressure or a malfunction of the underdrive clutch or valve body.	• Abnormal line pressure • Malfunction of the underdrive solenoid valve • Malfunction of the underdrive clutch • Malfunction of the valve body



EKAA011C

INSPECTION PROCEDURE 4

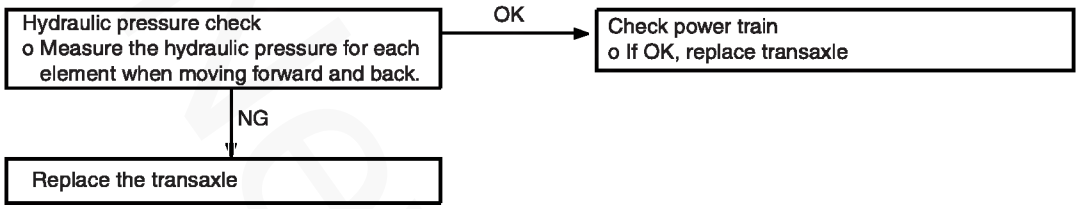
Does not reverse	Possible cause
If the vehicle does not reverse when the selector lever is shifted from N to R range while the engine is idling, the cause may be abnormal pressure in the reverse clutch or low and reverse brake or a malfunction of the reverse clutch, low and reverse brake or valve body.	• Abnormal reverse clutch pressure • Abnormal low and reverse brake pressure • Malfunction of the low and reverse solenoid valve • Malfunction of the reverse clutch • Malfunction of the low and reverse brake • Malfunction of the valve body



EKAA011D

INSPECTION PROCEDURE 5

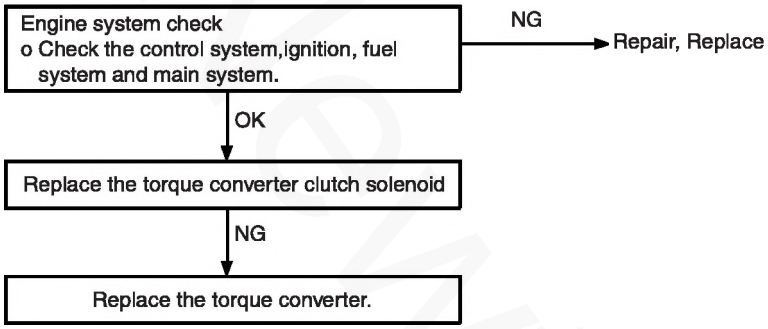
Does not move (forward or reverse)	Possible cause
If the vehicle does not move forward or reverse when the selector lever is shifted to any position while the engine is idling, the cause may be abnormal line pressure, or a malfunction of the power train, oil pump or valve body.	• Abonormal line pressure • Malfunction of the underdrive solenoid valve • Malfunction of the underdrive clutch • Malfunction of the valve body



EKAA011E

INSPECTION PROCEDURE 6

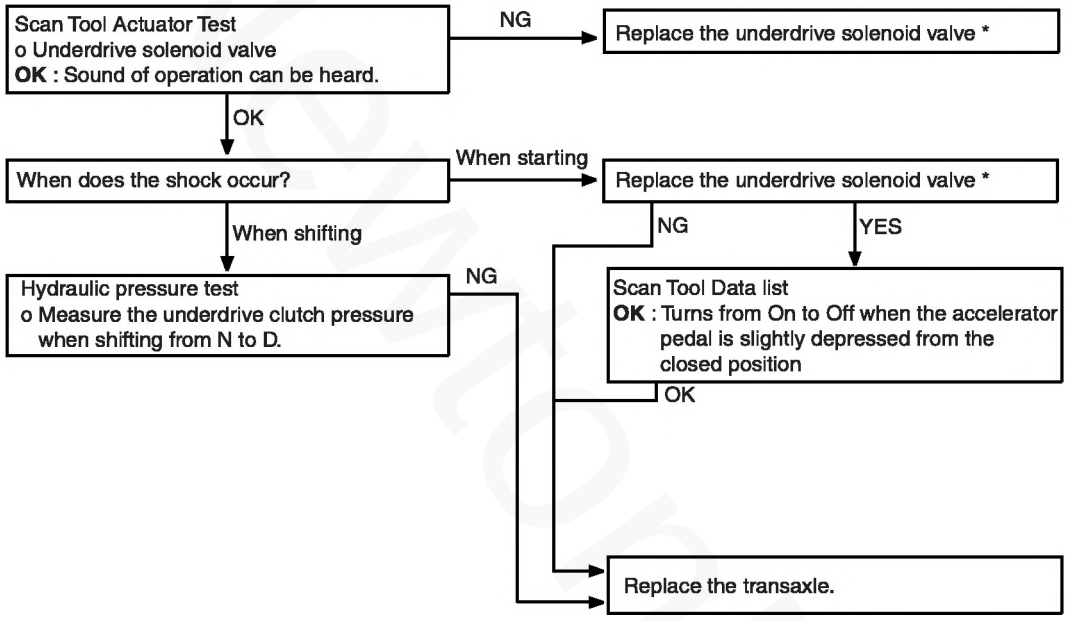
Engine stalling when shifting	Possible cause
If the engine stalls when the selector lever is shifted from N to D or R range while the engine is idling, the cause may be a malfunction of the engine system, torque converter clutch soledoid, valve body or torque converter (torque converter clutch malfunction).	• Malfunction of the engine system • Malfunction of the torque converter clutch solenoid • Malfunction of the valve body • Malfunction of the torque converter (Malfunction of the torque converter clutch)



EKAA011F

INSPECTION PROCEDURE 7

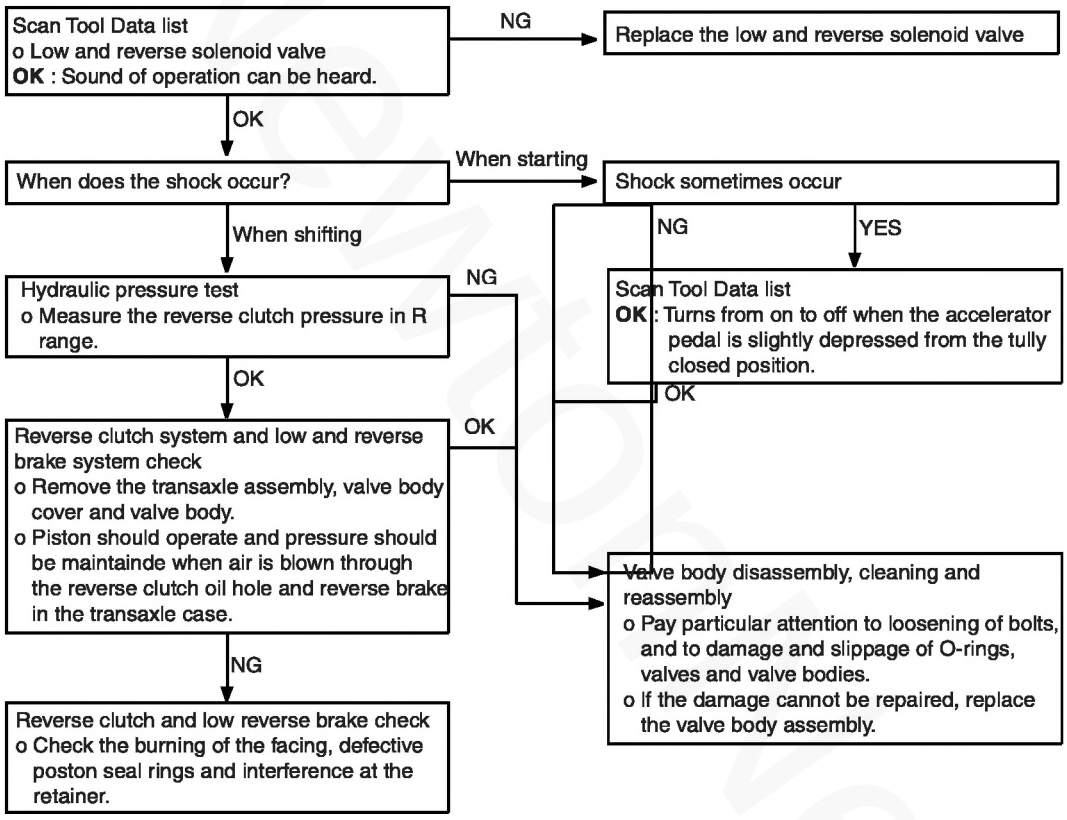
Shocks when changing from N to D and range time lag	Possible cause
If abnormal shocks or a time lag of 2 second or more occurs when the selector lever is shifted from N to D range while the engine is idling, the cause may be abnormal underdrive clutch pressure or a malfunction of the underdrive clutch, valve body or closed throttle position switch.	• Abnormal line pressure • Malfunction of the underdrive solenoid valve • Malfunction of the underdrive clutch • Malfunction of the valve body • Malfunction of the closed throttle position switch



EJAA011G

INSPECTION PROCEDURE 8

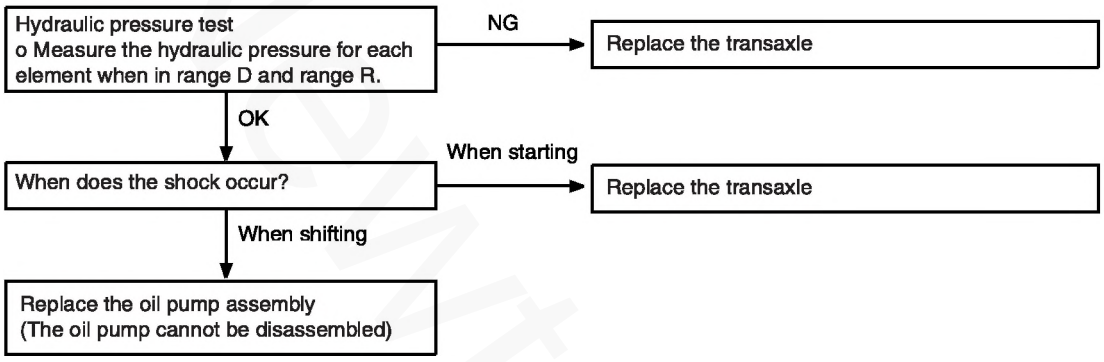
Shock when changing from N to R and large time lag	Possible cause
If abnormal shocks or a time lag of 2 seconds or more occurs when the selector lever is shifted from N to R range while the engine is idling, the cause may be abnormal reverse clutch pressure or low and reverse brake pressure, or a malfunction or the reverse clutch, low and reverse brake, valve body.	• 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



EKAA011H

INSPECTION PROCEDURE 9

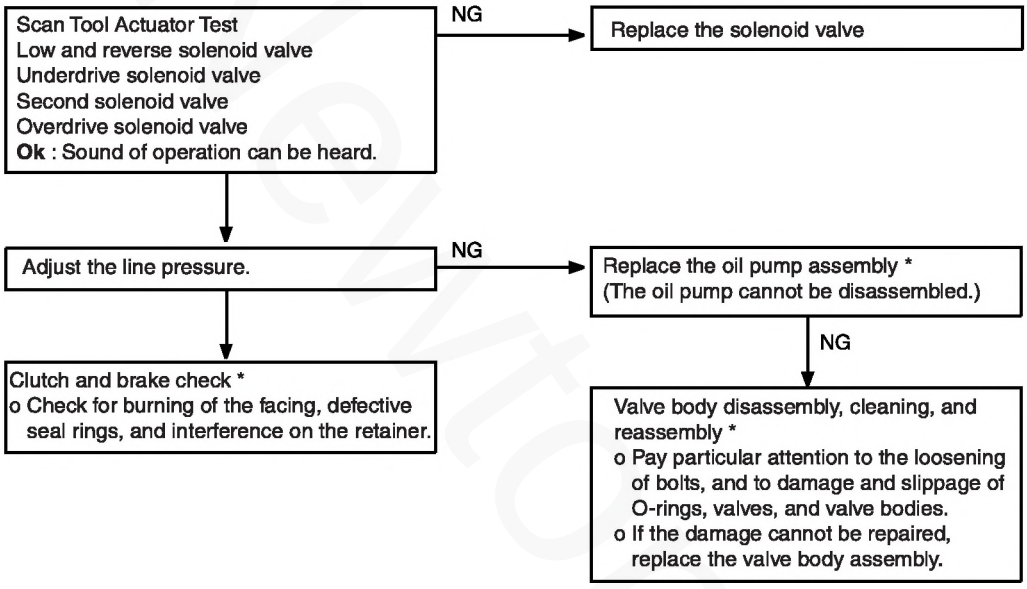
Shocks when changine from N to D, N to R and large time lag	Possible cause
If abnormal shocks or a time lag of 2 seconds or more occurs when the selector lever is shifted from N to D, N to R range while the engine is idling, the cause may be abnormal line pressure or a malfunction of the oil pump or valve body.	• Abnormal line pressure • Malfunction of the oil pump • Malfunction of the valve body



EKAA011I

INSPECTION PROCEDURE 10

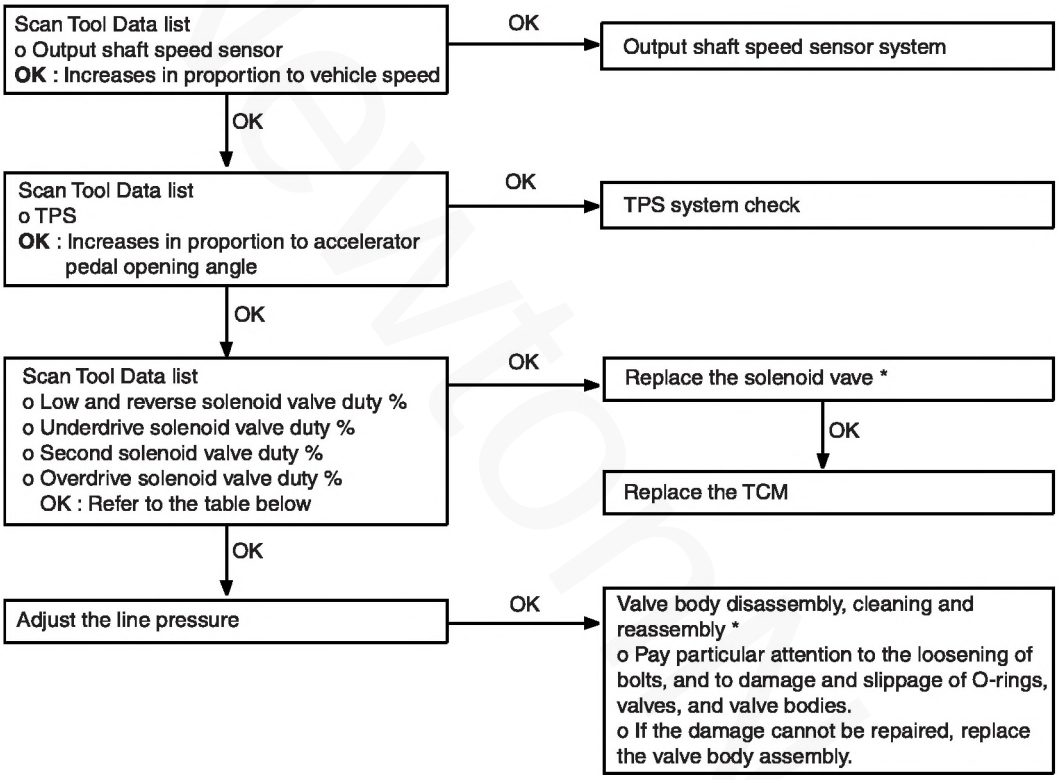
Shocks and running up	Possible cause
If shocks occur when driving due to upshifting or downshifting and the transaxle speed becomes higher than the engine speed, the cause may be abnormal line pressure or a malfunction of a solenoid valve, oil pump, valve body or of a brake or clutch.	• Abnormal line pressure • Malfunction of each solenoid valve • Malfunction of the oil pump • Malfunction of the valve body • Malfunction of each brake or each clutch



EJAA011J

INSPECTION PROCEDURE 11

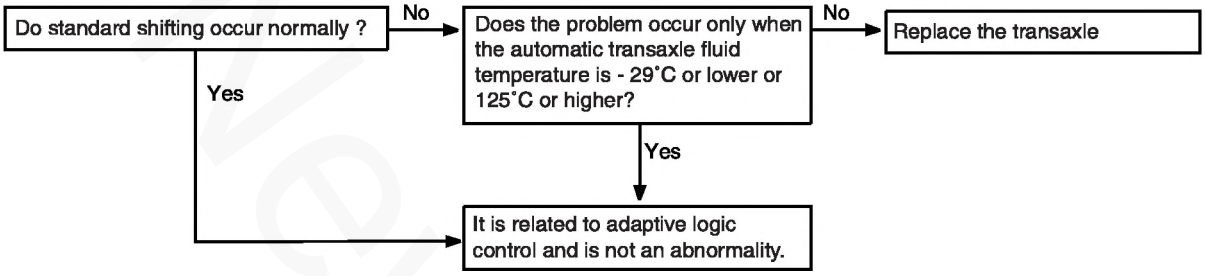
All points (Displaced shifting points)	Possible cause
If all shift points are displaced while driving, the cause may be a malfunction of the output shaft speed sensor, TPS or a solenoid valve.	• Malfunction of the output shaft speed sensor • Malfunction of the throttle position sensor • Malfunction of each solenoid valve • Abnormal line pressure • Malfunction of the valve body • Malfunction of the TCM



EJAA011K

INSPECTION PROCEDURE 12

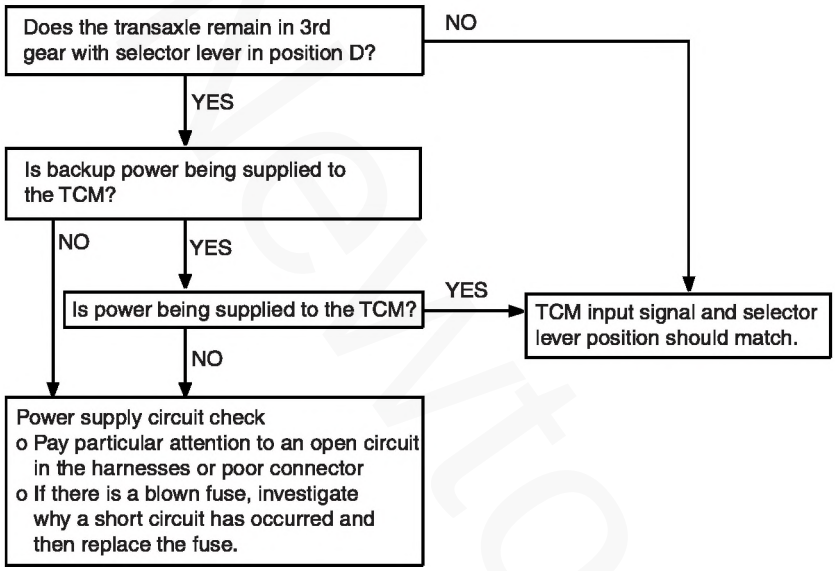
Some points (Displaced shifting points)	Possible cause
If some of the shift points are displaced while driving, the cause may be a malfunction of the valve body, or it is related to control and is not an abnormality.	• Malfunction of the valve body



EKAA011L

INSPECTION PROCEDURE 13

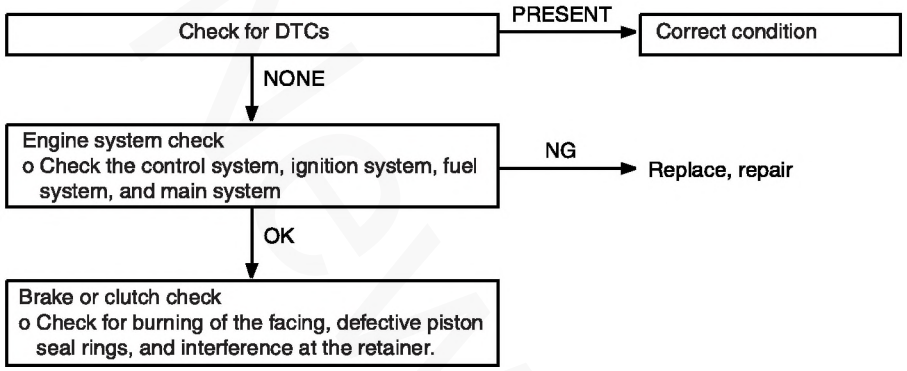
No diagnostic trouble codes (Does not shift)	Possible cause
If shifting does not occur while driving and no diagnostic trouble codes are given, the cause may be a malfunction of the Park/Neutral position switch, or TCM.	• Malfunction of the Park/Neutral position switch • Malfunction of the TCM



EKAA011M

INSPECTION PROCEDURE 14

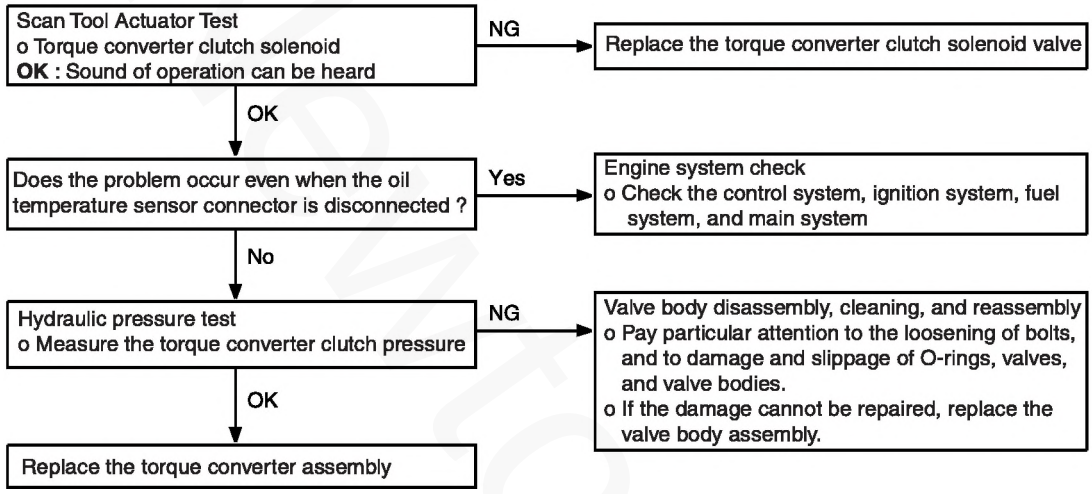
Poor acceleration	Possible cause
If acceleration is poor even if downshifting occurs while driving, the cause may be a malfunction of the engine system or of a brake or clutch.	• Malfunction of the engine system • Malfunction of the brake or clutch



EKAA011N

INSPECTION PROCEDURE 15

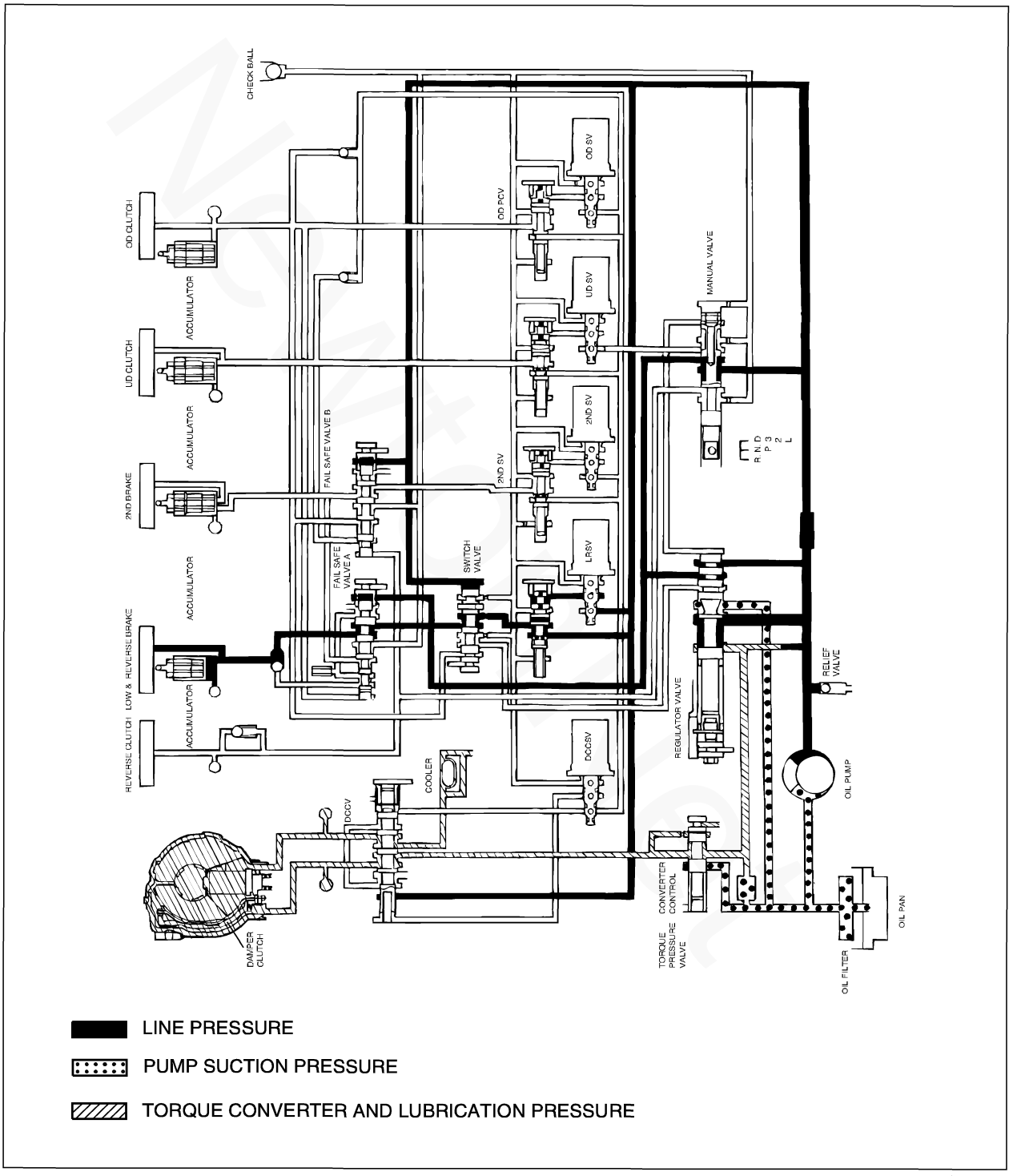
Vibration	Possible cause
If vibration occurs when driving at constant speed or when accelerating in top range, the cause may be abnormal torque converter clutch pressure or a malfunction of the engine system, torque converter clutch solenoid, torque converter or valve body.	• Abnormal torque converter clutch pressure • Malfunction of the engine system • Malfunction of the torque converter clutch solenoid • Malfunction of the torque converter • Malfunction of the valve body



EKAA011O

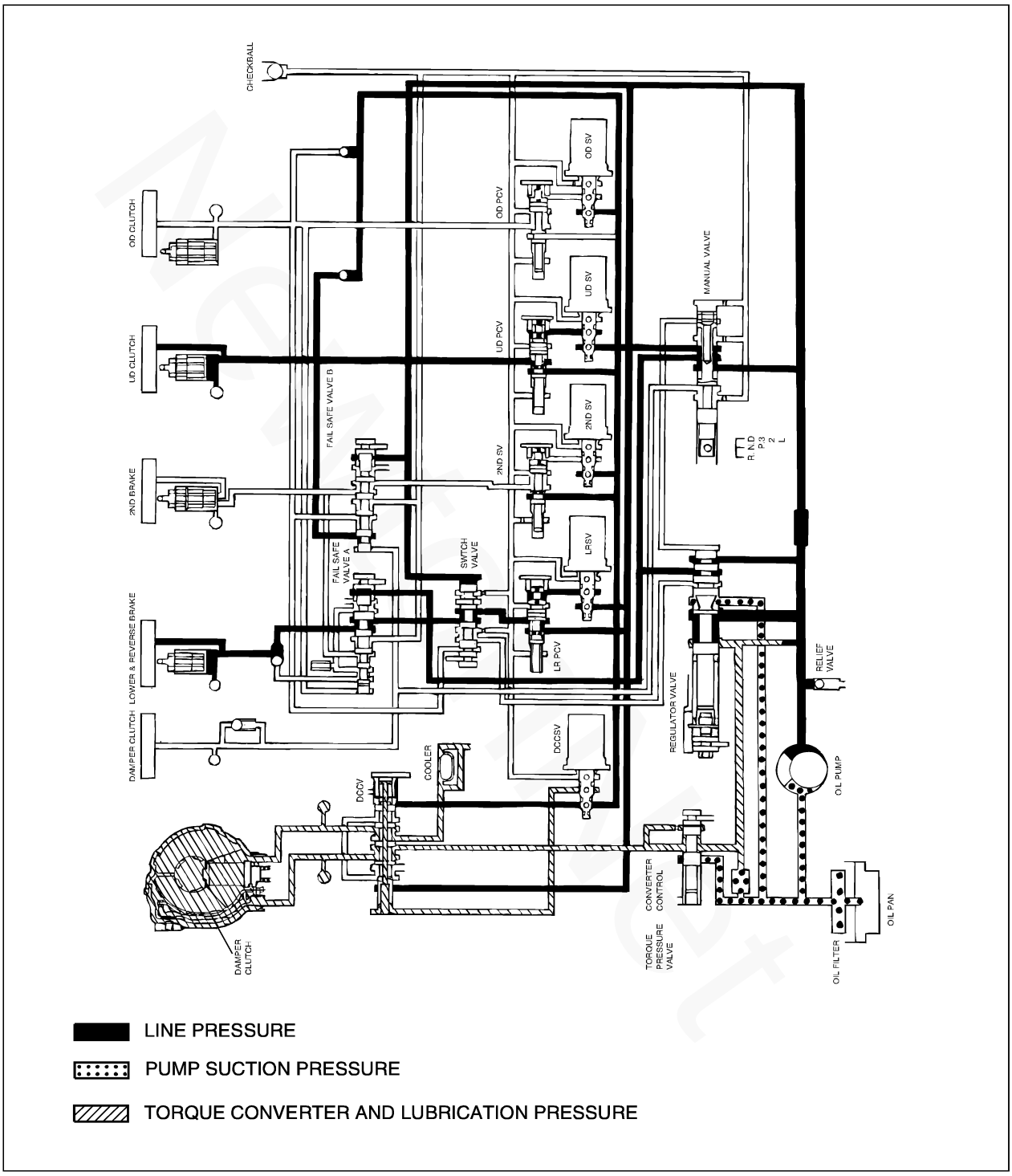
AUTOMATIC TRANSAXLE HYDRAULIC CIRCUIT E775E2BD

PARK & NEUTRAL



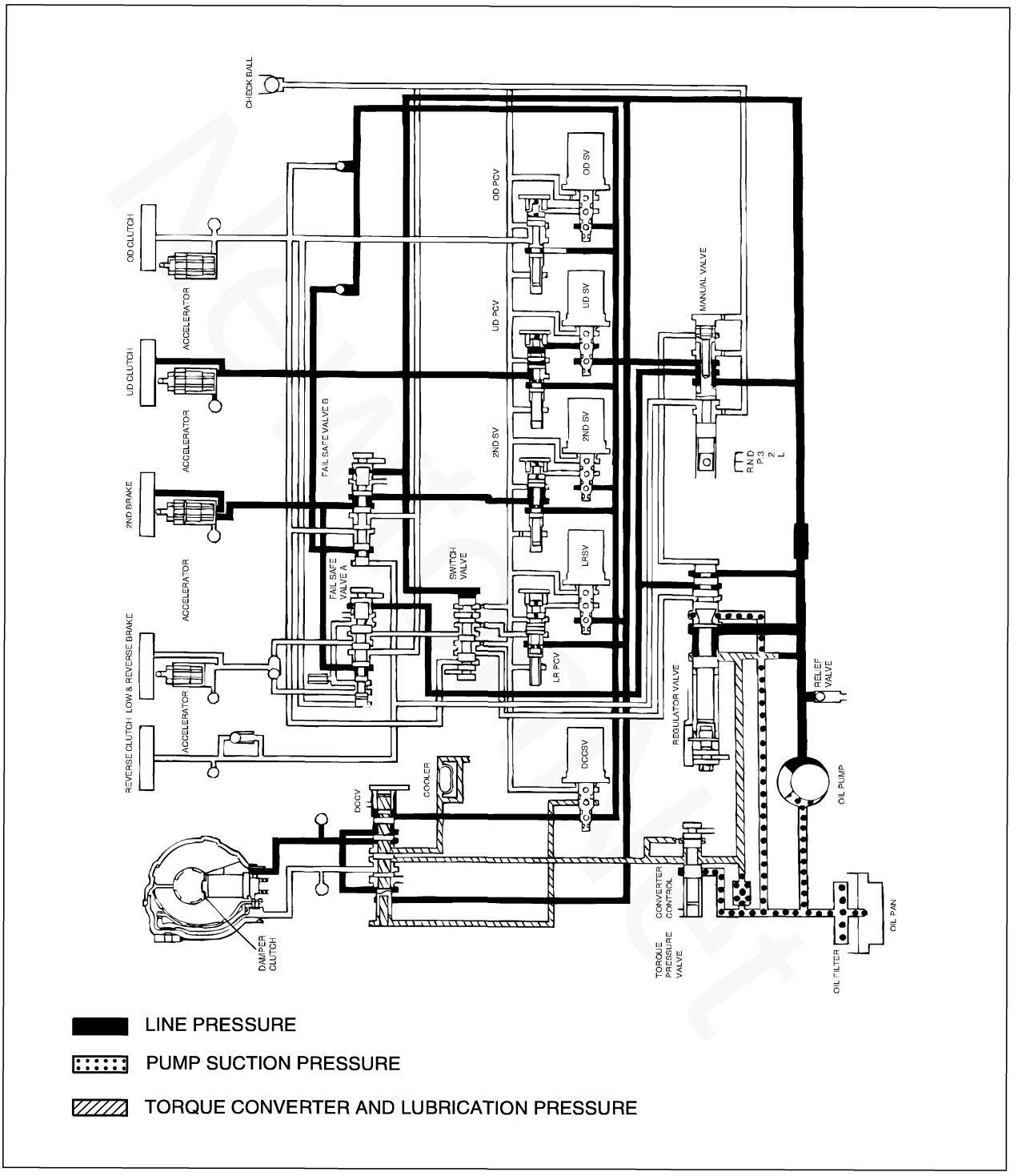
EKA9050A

FIRST



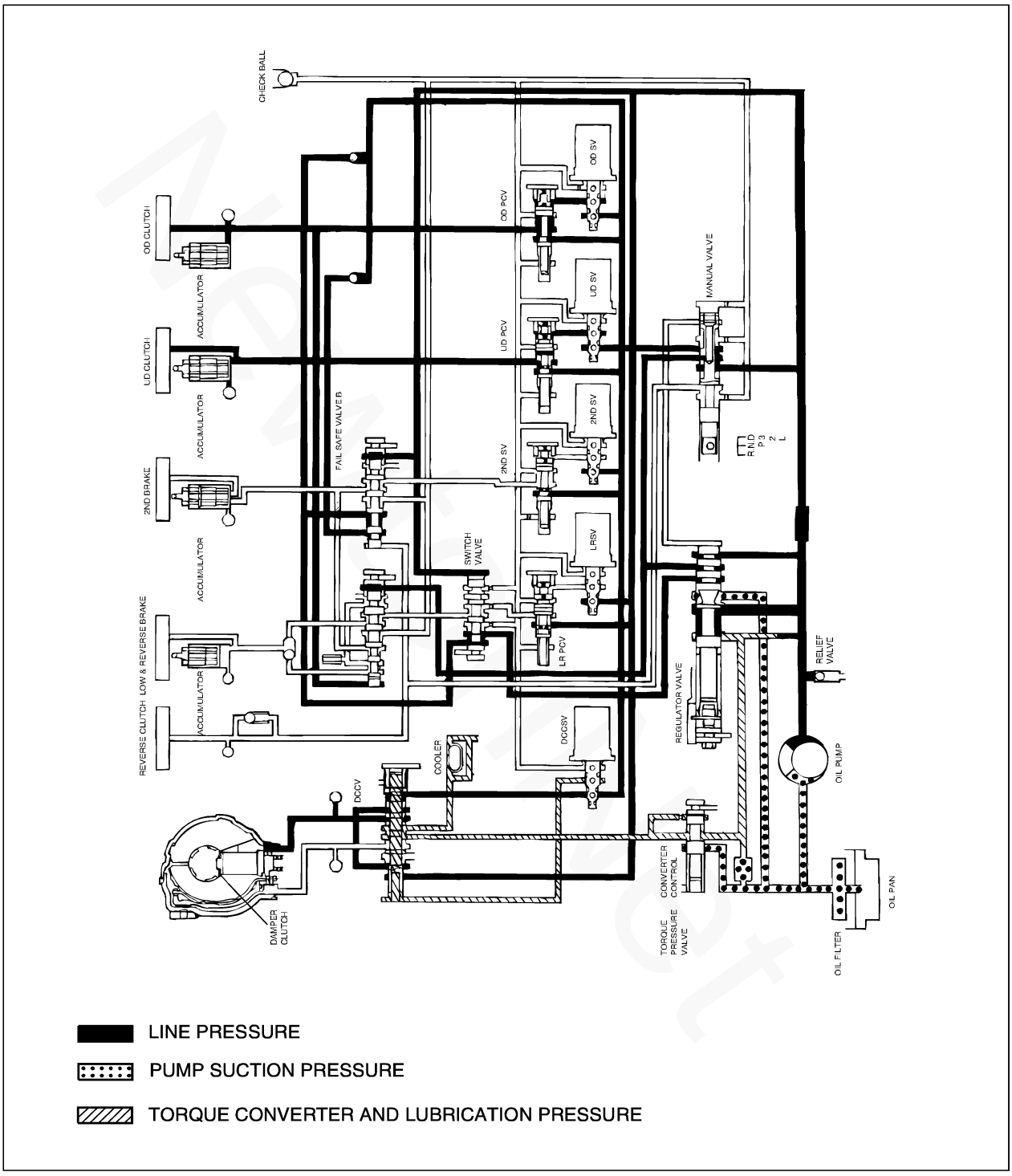
EKA9050B

SECOND



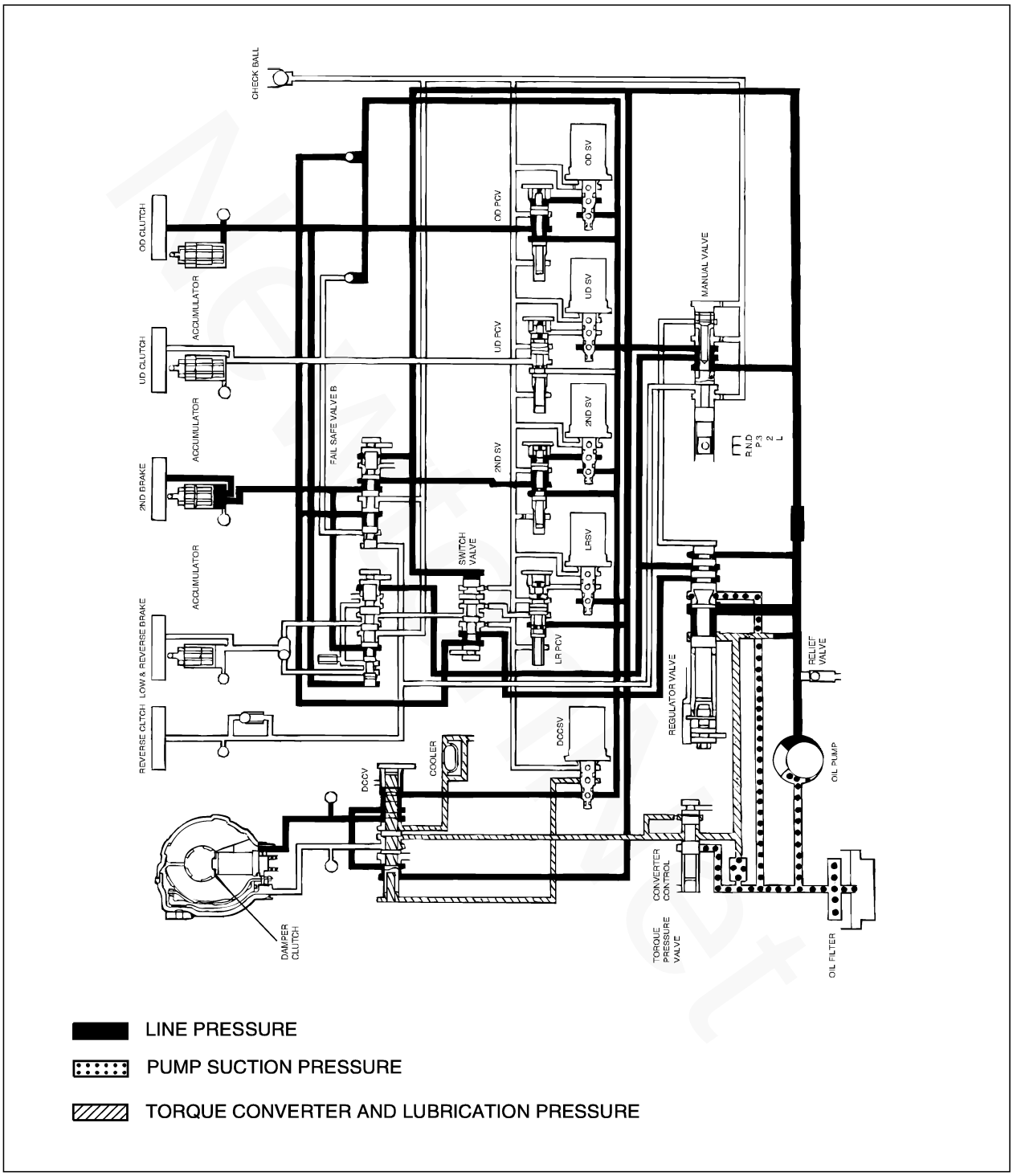
EKA9050C

THIRD



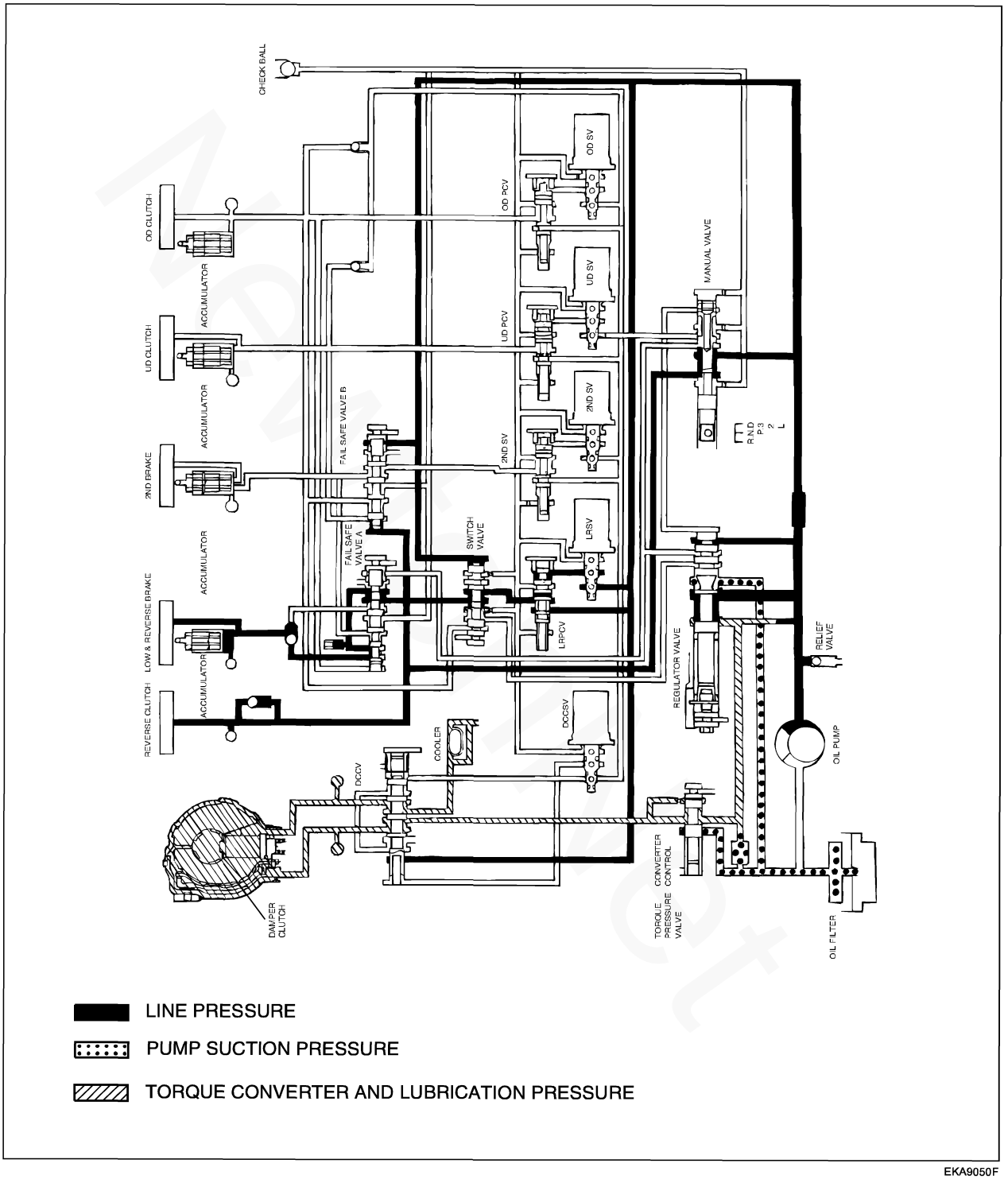
EKA9050D

FOURTH



EKA9050E

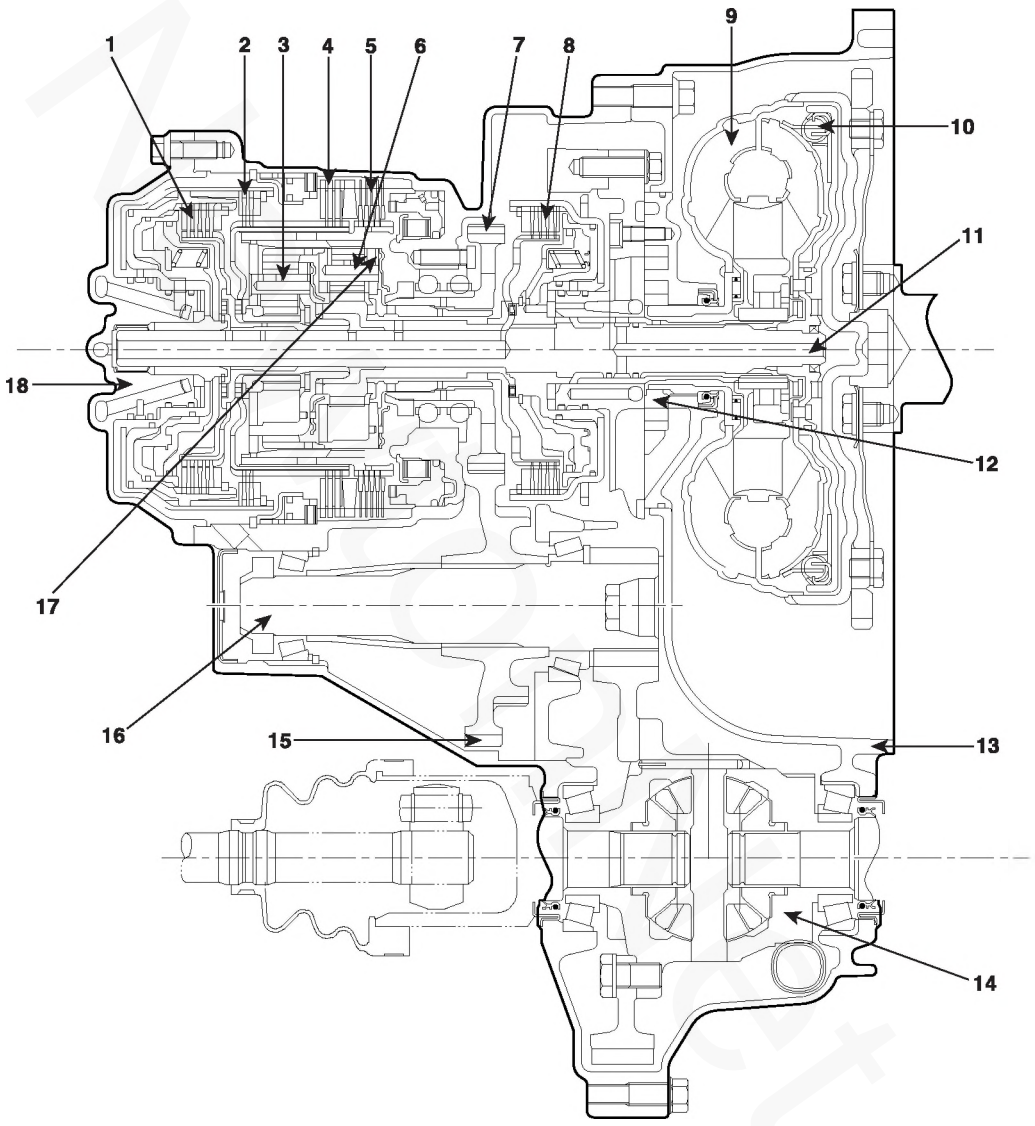
REVERSE



EKA9050F

AUTOMATIC TRANSAXLE

COMPONENTS E8E4A9EC

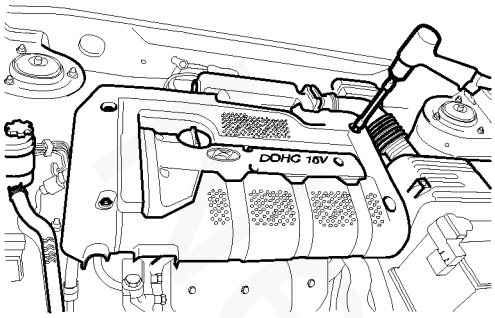


1. Overdrive clutch
2. Reverse clutch
3. Overdrive planetary gear set
4. Second brake
5. Low-reverse
6. Output planetary gear set
7. Transfer drive gear
8. Underdrive clutch
9. Torque converter
10. Torque converter clutch
11. Input shaft
12. Oil pump
13. Converter housing
14. Differential
15. Transfer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

EKJA024A

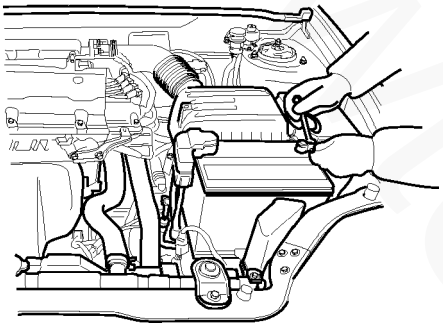
REMOVAL ECAB6E6C

1. Remove the engine cover.



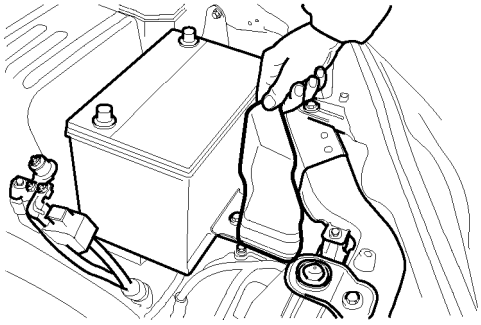
KMOB001A

2. Remove the battery terminal.



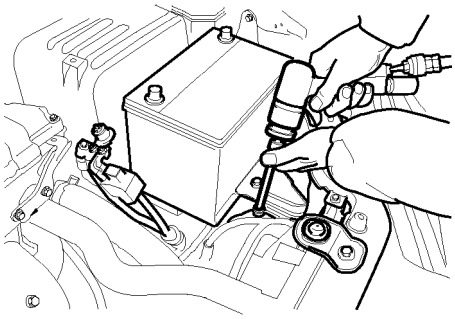
KMOB002A

3. Remove the air duct.



KMOB003A

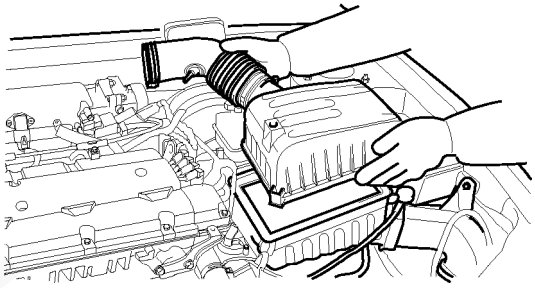
4. Remove the battery tray.



KMOB004A

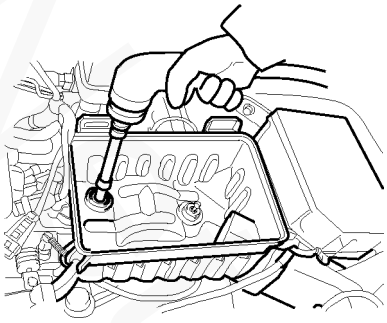
5. Remove the air cleaner.

1) Upper



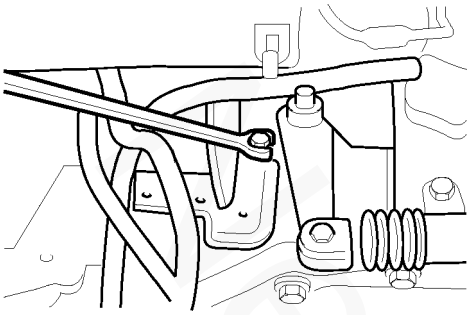
KMOB005A

2) Lower



KMOB006A

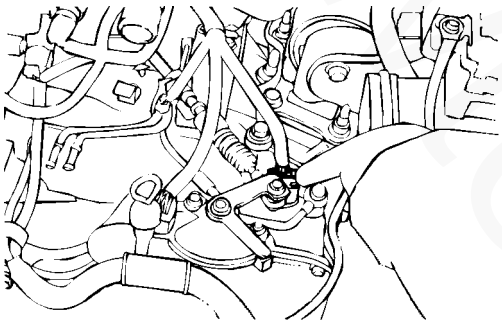
6. After removing the CKP sensor, O2 sensor and oil pressure switch wiring bracket, separate the connectors.



KMOB008A

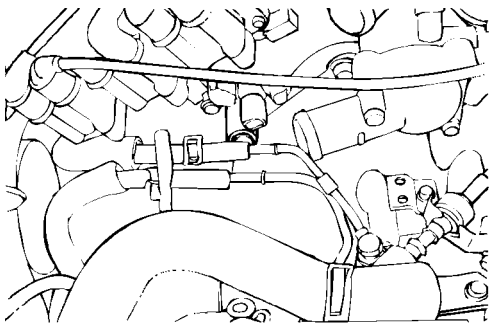
7. Remove the speedometer sensor connector.

8. Remove the transaxle range switch.



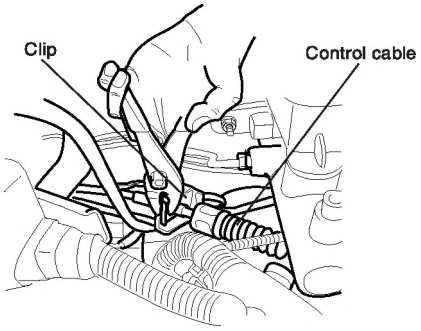
EKAC009B

9. Remove the oil cooler hose.



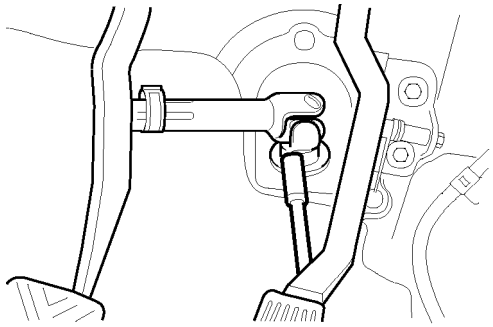
EKAC009C

10. Remove the clip(transaxle side) of the shift cable.



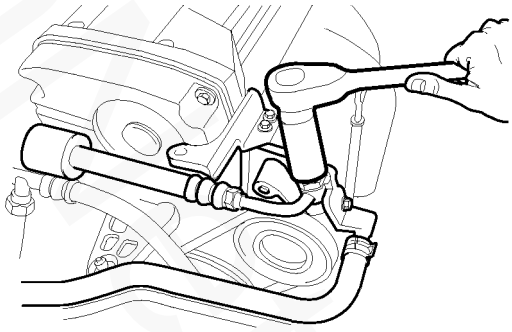
KMOB014A

11. Separate the steering column shaft joint.



KMOB016A

12. Separate the power steering oil pump hose.

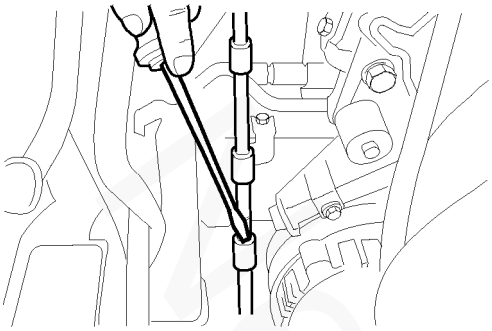


KMOB017A

NOTE

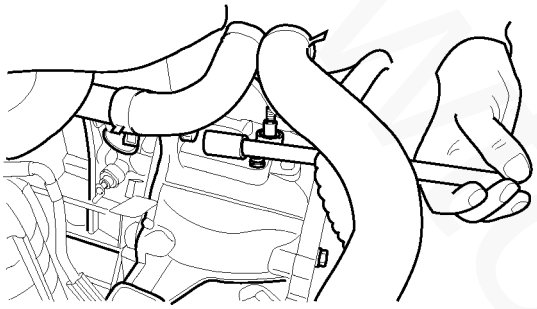
Be careful not to leak after separating.

13. Separate the hose after removing the clip of the power steering return hose.



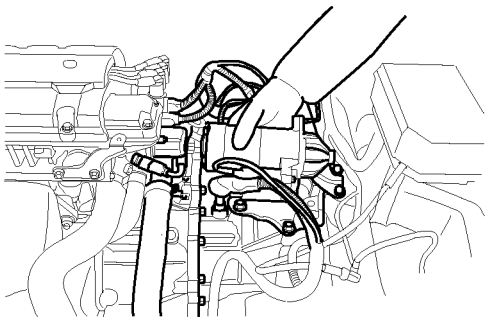
KMOB018A

14. Remove the upper connecting transaxle bolt.



KMOB020A

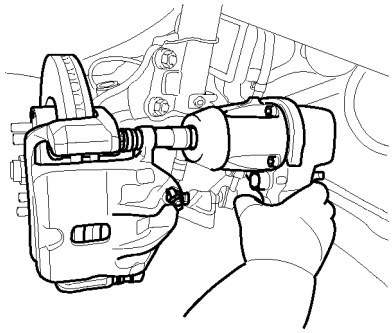
15. Separate the start motor.



KMOB021A

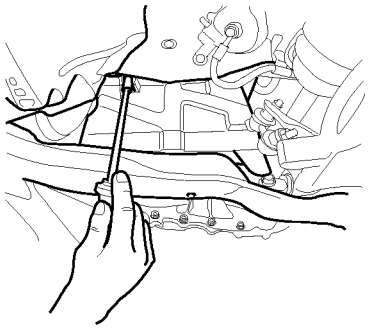
16. Install the engine support fixture.

17. After removing the tire, remove the caliper.



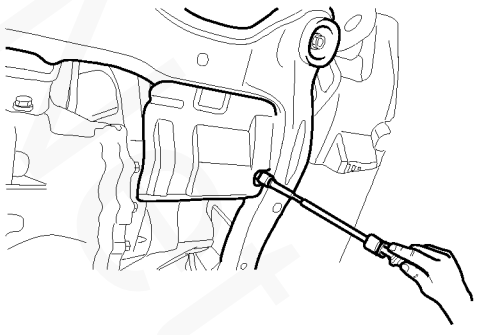
KMOB024A

18. Remove the transaxle side cover.



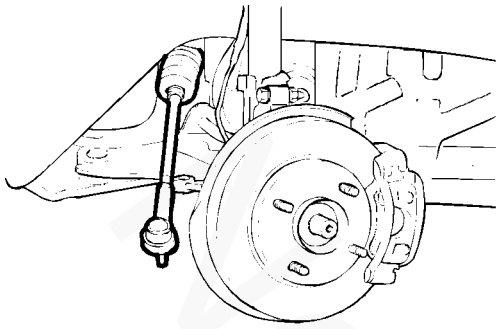
KMOB023A

19. Remove the transaxle under cover.



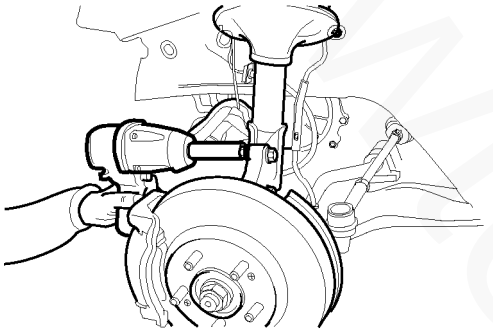
KMOB025A

20. Separate the tie rod end.



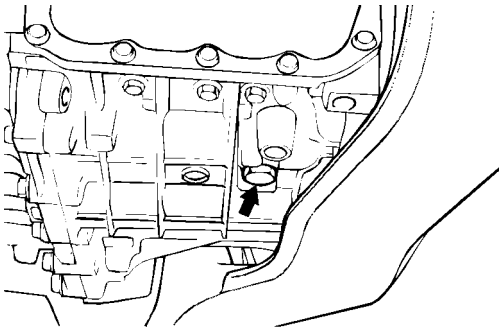
KPKA032A

21. Remove the wheel speed sensor and the knuckle mounting bolt.



KMOB026A

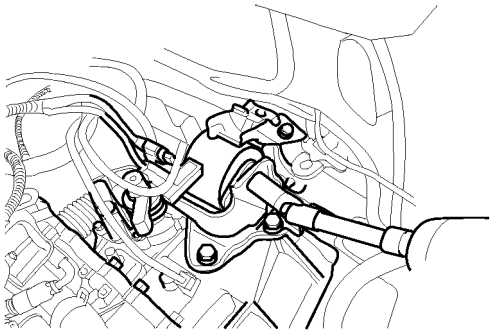
22. Drain the oil.



EKA9009A

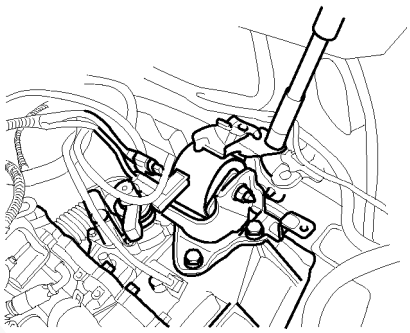
23. Remove the transaxle mounting bracket.

1) Insulator bolt



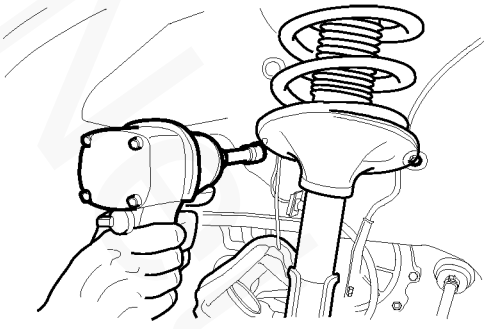
KMOB028A

2) Body mounting bolt (Upper)



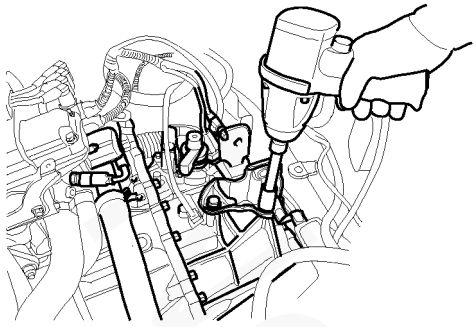
KMOB028B

3) Body mounting bolt (Side)



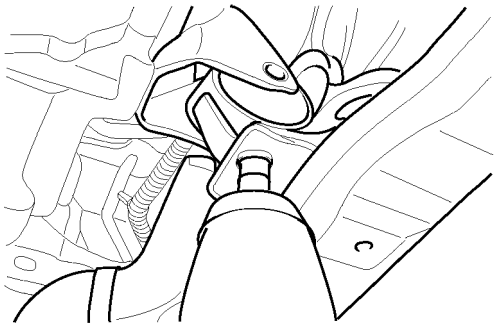
KMOB028C

4) Transaxle side mounting bolt



KMOB028D

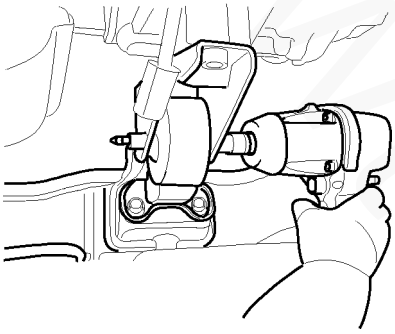
3) Stopper bolt (Lower)



KMOB029C

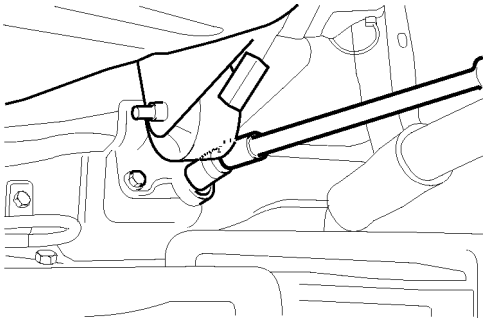
24. Remove the front roll stopper.

1) Insulator bolt



KMOB029A

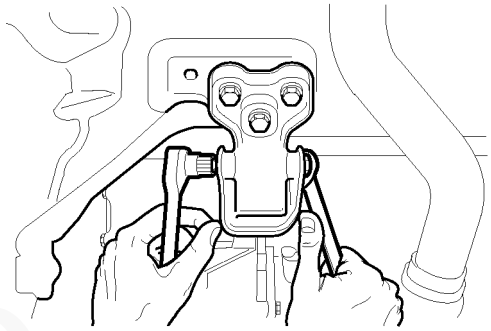
2) Stopper bolt (Upper)



KMOB029B

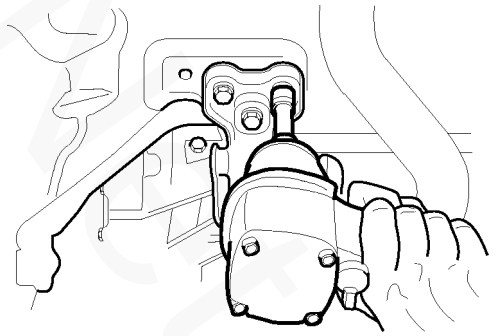
25. Remove the rear roll stopper.

1) Insulator bolt



KMOB030A

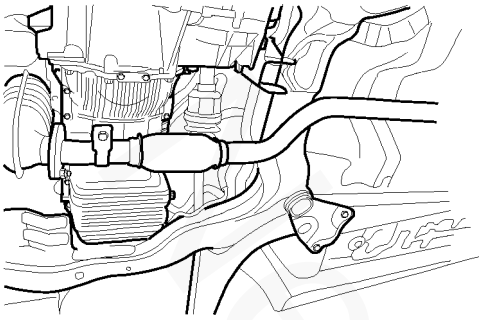
2) Stopper bolt



KMOB030B

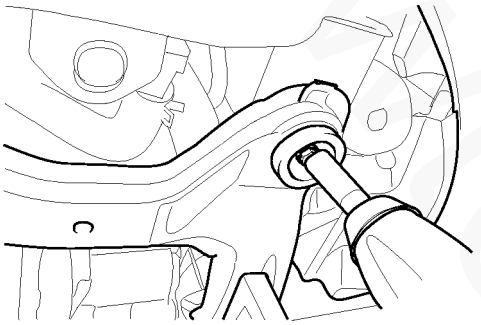
26. Remove the drive shaft.

27. Remove the front muffler.



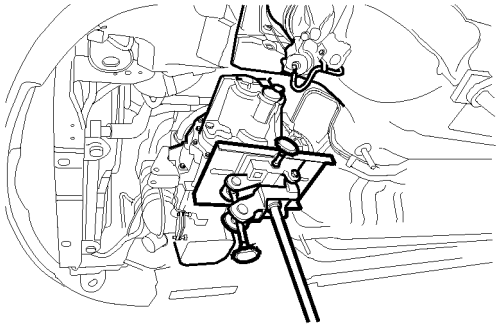
KMOB031A

28. Remove the sub frame mounting bolt.



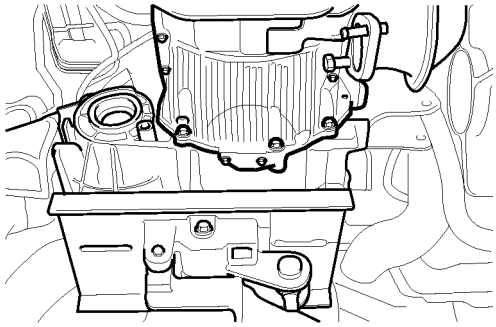
KMOB032A

29. Install the jack under the transaxle assembly.



KMOB033A

30. Remove the transaxle lower mounting bolt to the engine.



KMOB034A

31. Remove the transaxle assembly.

INSTALLATION E6B6FF5F

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, first be sure to 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.

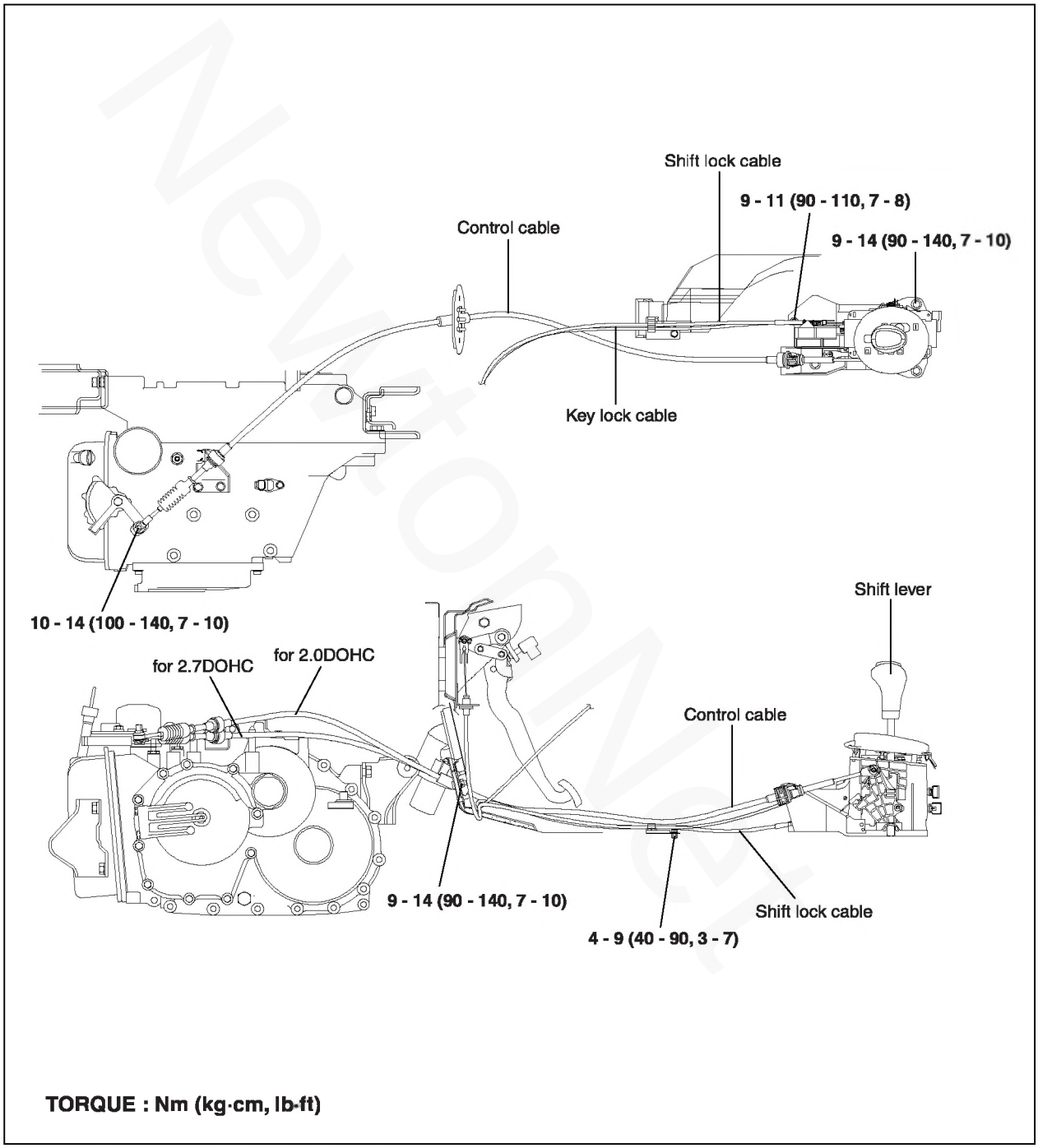
   2) When connecting the control cable to the transaxle mounting bracket, install the clip until it contacts to the control cable.

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

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

AUTOMATIC TRANSAXLE SHIFT CONTROL

COMPONENTS E3E8FADC



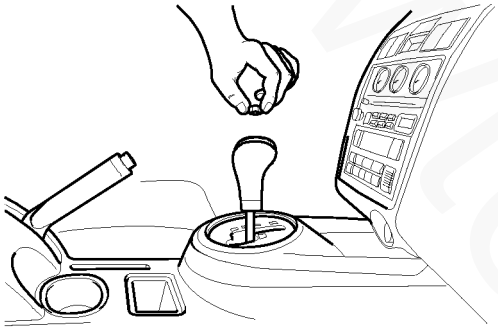
EKOB001B

REMOVAL ED9E9BB6

1. Remove the push button, the spring and the cap.

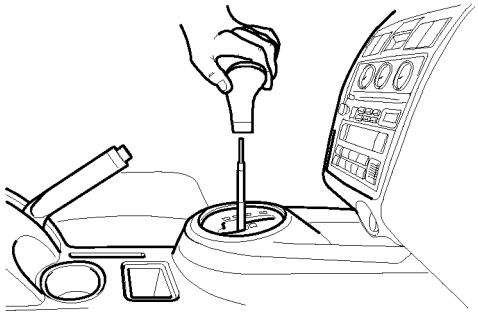
KKOB0385

2. Remove the knob mounting nut.



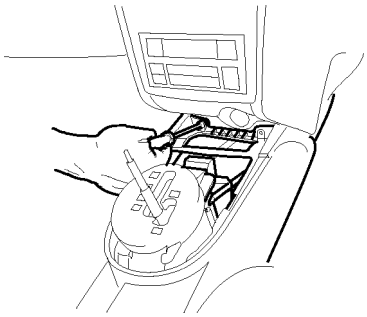
KKOB0386

3. Remove the shift knob.



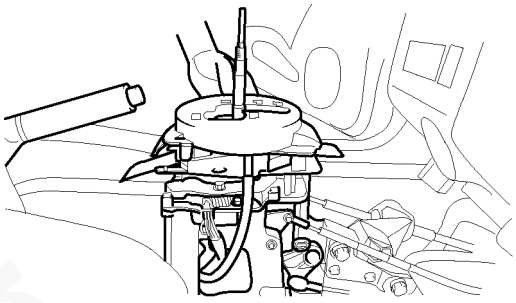
KKOB0387

4. Remove the console upper cover.
5. Remove the console assembly.



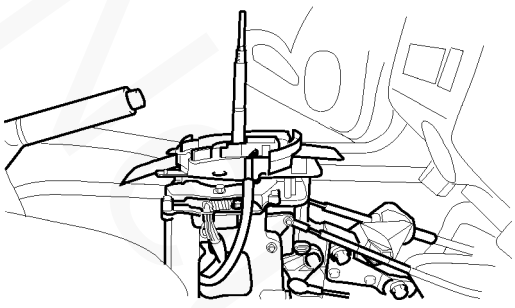
KKOB0403

6. Remove the indicator panel.



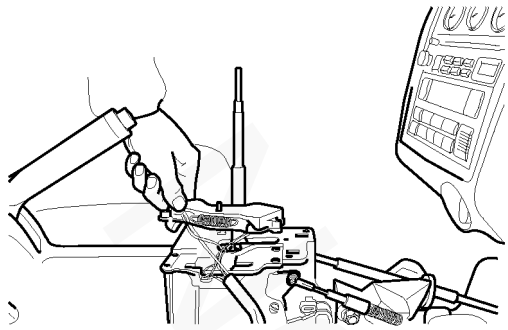
KKOB0389

7. Remove the indicator lower cover.



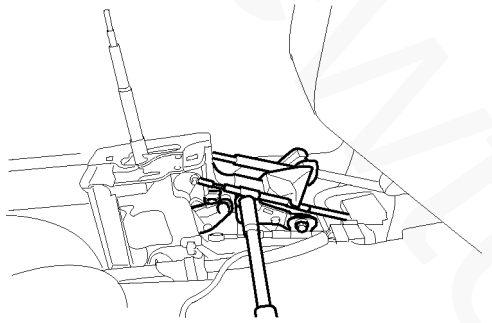
KKOB0390

8. Remove the indicator plate.



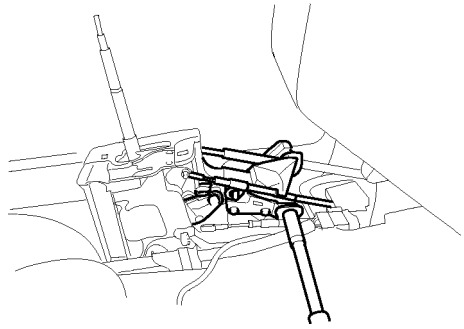
KKOB0393

9. Remove the key lock cable nut.



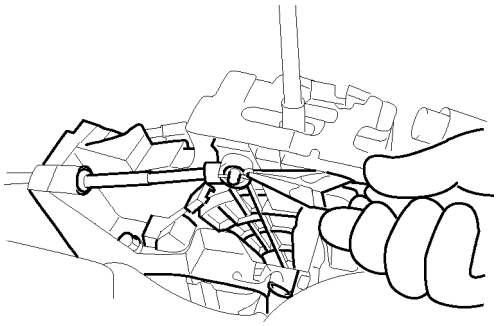
KKOB0396

10. Remove the shift lock cable nut.



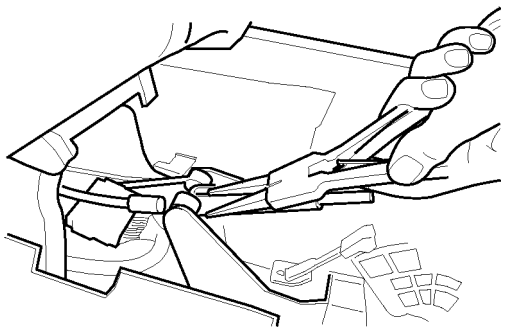
KKOB0397

11. Remove the control cable snap pin.



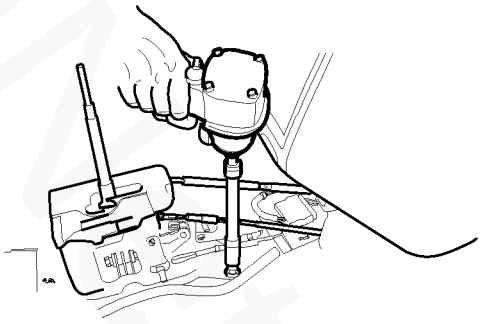
KKOB0398

12. Remove the control cable clip and the control cable.



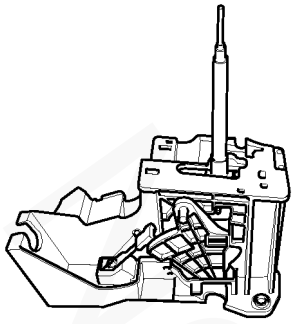
KKOB0399

13. Remove the shift lever bracket bolt.



KKOB0400

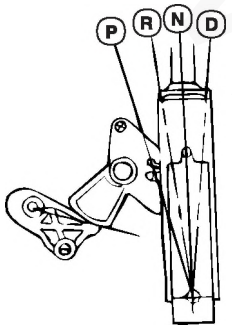
14. Remove the shift lever.



KKOB0402

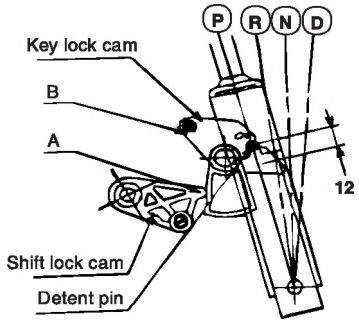
INSTALLATION EFFBFD76

PROCEDURE TO INSTALL THE LOCK CAM



EKB9037A

1. Move A/T lever to "P" position to set the key lock cam and the shift lock cam as shown in the figure.
   1) Check that the key lock cam is located at "B" by the detent pin.
   2) Check that the shift lock cam is located at "A".

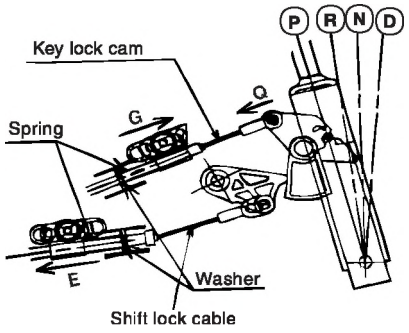


EKB9037B

2. Check that the key cylinder is at "LOCK".

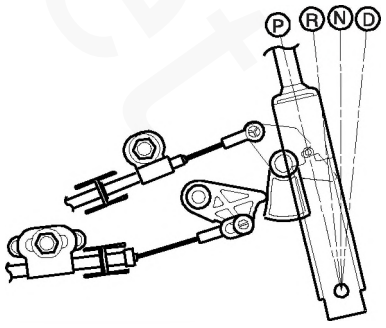
PROCEDURE FOR ADJUSTING SHIFT LOCK AND KEY LOCK CABLE

1. Check that each lock cam is as shown in the figure.
2. Install the shift lock and key lock cable in position. In this case, the shift lock cable must be fixed to the brake pedal and the key lock cable must be fixed to the key cylinder.
3. Temporarily install each cable to the A/T lever assembly as shown in the figure. Securely insert the cable end into the fixing pin of each cam.



EKB9037C

4. Slightly pull the shift lock cable in the direction "E".
5. After checking that the portion of the cable end touches the cable fixing pin, fix with the self-tapping bolt.
6. Slightly push the key lock cam to direction "Q".
7. Slightly pull the key lock cable in the direction "G" to stretch the cable. Then fix the cable with the self-tapping bolt.
8. Check that the key lock and the shift lock cable are secure.



EKOC063A

PROCEDURE FOR CHECKING THE SHIFT LOCK

1. When the brake pedal is not depressed, the push button of the shift lever at "P" position must not be operable. (Shift lever cannot be shifted at the other positions from "P".)

2. When the brake pedal stroke is 15~22mm (with shift lever at "P" position), the push button should be operable without catching and the shift lever should shift smoothly to other positions.

3. When the brake pedal is not depressed, the shift lever should shift smoothly to "P" position from all heading other positions.

4. The brake pedal must operate smoothly without catching.

5. When the ignition key is at the "LOCK" position, although rake pedal is depressed, the push button should be operable.

6. The Ignition key must not be able to be turned to the "LOCK" position except in the "P" position.

7. If the shift lever is shifted to the "P" position, the ignition key must turn to the "LOCK" position smoothly.