Automatic Transaxle (A5HF1)

GENERAL

S P E C I F I C A T I O N   EC8A7AA4

Automatic transaxle type		A5HF1
Recommanded transaxle oil		Diamond ATF SP III or SK ATF SP III
Oil quantity		10.9 Liter (Only for the reference)
Oil inspection and supplement		Every one year or every 24,000 km
Replacement	Private use (Normal use)	No service required
	Private use (Severe use)	Every 48,000 Km in severe use(1~4)
	Business use	1. Driving on rough road(bumpy road, gravel road, snowy road, unpaved road etc.) 2. Driving on mountain road, ascent/descent 3. Repetition of short distance driving 4. More than 50% operation in heavy city traffic during hot weather above 32°C 5. Police, Taxi. Commercial type operation
Engine type		3.3 DOHC
Gear ratio	1st	3.789
	2nd	2.064
	3rd	1.421
	4th	1.034
	5th	0.728
	Reverse	3.808
	Final reduction gear ratio	3.333

SERVICE STANDARD

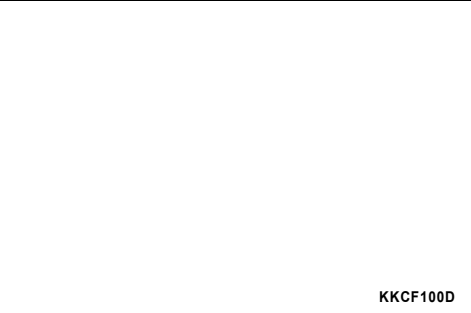| ITEM	VALUE (mm/inch)
Input shaft end play	0.7-1.45 / 0.0276-0.0571
Low & Reverse brake pressure plate end play	1.65-2.11 / 0.0650-0.0831
Reaction plate snap end play	0-0.16 / 0-0.0063
2ND brake pressure plate end play	1.09-1.55 / 0.0429-0.0610
Underdrive sun gear end play	0.25-0.45 / 0.0098-0.0177
Differential bearing spacer end play	0.045-0.105 / 0.0018-0.0041
Underdrive clutch snap ring end play	1.6-1.8 / 0.0630-0.0709
Direct clutch reaction plate snap ring end play	0.6-0.8 / 0.0236-0.0315
Reverse clutch snap ring end play	0-0.09 / 0-0.0035
Overdrive clutch snap ring end play	1.0-1.2 / 0.0394-0.0472
Reverse clutch reaction plate snap ring end play	1.5-1.7 / 0.0591-0.0669

TIGHTENING TORQUE
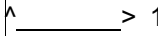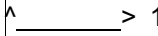
ITEM	Nm	Kgf.cm	lb-ft
Transfer drive gear	31.4-36.3	320.0-370.0	23.1-26.8
Rear cover	19.6-25.5	200.0-260.0	14.5-18.8
Anchor plug	83.4-112.8	850.0-1150.0	61.5-83.2
Oil pump pipe	9.8-11.8	100.0-120.0	7.2-8.7
Oil pump	19.6-25.5	200.0-260.0	14.5-18.8
Torque converter housing	42.0-54.0	428.0-551.0	31.0-39.9
Valve body	9.8-11.8	100.0-120.0	7.2-8.7
VFS reservoir	9.8-11.8	100.0-120.0	7.2-8.7
Detent spring	4.9-6.9	50.0-70.0	3.6-5.1
Valve body cover	9.8-11.8	100.0-120.0	7.2-8.7
Vehicle speed sensor	3.9-5.9	40.0-60.0	2.9-4.3
Inhibiter switch	9.8-11.8	100.0-120.0	7.2-8.7
Manual control lever	17.7-24.5	180.0-250.0	13.0-18.1
Input/Output speed sensors	9.8-11.8	100.0-120.0	7.2-8.7
Reduction brake piston rod fixing nut	14.7-24.5	150.0-250.0	10.8-18.1
Sub frame bracket	88.3-107.9	900.0-1100.0	65.1-79.6
Valve body inside seperating plate	4.9-6.9	50.0-70.0	3.6-5.1
Valve body cover seperating plate	9.8-11.8	100.0-120.0	7.2-8.7
Direct planetary carrier lock nut	156.9-176.5	1600.0-1800.0	115.7-130.2

SEALANTS

Rear cover liquid gasket	Specified sealant
Rear cover liquid gasket	
Torque converter housing liquid gasket	Threebond 1281B or LOCTITE FMD-546
Valve body liquid gasket	

SPECIAL TOOLS   E97C0A27

Tool (Number and name)	Illustration	Use
09453-3A110 Spring compressor	KKCF100A	- Removal and installation of one way clutch inner race snap ring
09431-39000 Oil seal installer	KKCF100B	- Installation of differential bearing output race
09456-39100 Clearance dummy plate	KKCF100C	- Installation of brake pressure plate
09454-3A110 Reduction socket	KKCF100D	- Adjustment of reduction brake piston rod
09452-21200 Oil pump oil seal installer	KKCF100E	- Installation of oil seal in a oil pump

Tool (Number and name)	Illustration	Use
09453-24000 Snap ring compressor	^_____> 1 KKCF100F	- Removal and installation of under drive clutch snap ring
09453-4C400 Spring compressor	KKCF100G	- Removal and installation of direct clutch snap ring - Removal and installation of reverse & over drive clutch spring retainer snap ring
09215-3C000 Oil fan remover	KKCF100H	- Removal of valve body cover
09455-21100 Bearing installer	KKCF100I	- Installation of the ball bearing and the transfer drive gear
09457-22000 Removing plate	KKCF100J	- Removal of the differential bearing, the transfer shaft bearing and drive gear bearing.

AUTOMATIC TRANSAXLE SYSTEM

INSPECTION CHART FOR DIAGNOSIS

TROUBLE CODES (DTC)　E880B496

No.	Code	Item	MIL	Remark
1	P0707	Transaxle range switch circuit - LOW input	ON	ATa-10
2	P0708	Transaxle range switch circuit - HIGH input	ON	ATa-16
3	P0711	Transaxle Fluid Temperature Sensor Rationality	ON	ATa-19
4	P0712	Fluid(Oil) Temperature Sensor Circuit - Low	ON	ATa-24
5	P0713	Fluid(Oil) Temperature Sensor Circuit - High	ON	ATa-27
6	P0717	Input Speed Sensor Circuit - No Signal	ON	ATa-29
7	P0722	Output Speed Sensor Circuit - No Signal	ON	ATa-37
8	P0731	Gear 1 Incorrect Ratio	ON	ATa-43
9	P0732	Gear 2 Incorrect Ratio	ON	ATa-51
10	P0733	Gear 3 Incorrect Ratio	ON	ATa-59
11	P0734	Gear 4 Incorrect Ratio	ON	ATa-67
12	P0735	Gear 5 Incorrect Ratio	ON	ATa-74
13	P0736	Reverse Gear Incorrect Ratio	ON	ATa-81
14	P0741	Torque Converter Clutch Circuit - Stuck off	ON	ATa-89
15	P0742	Torque Converter Clutch Circuit - Stuck on	ON	ATa-93
16	P0743	Torque Converter Clutch Circuit - Electrical	ON	ATa-94
17	P0746	Pressure Control Solenoid Valve A - Performance or Stuck Off	OFF	ATa-100
18	P0748	Pressure Control Solenoid Valve A - Electrical	OFF	ATa-106
19	P0750	Shift Control Solenoid Valve A Circuit Malfunction (LR)	ON	ATa-108
20	P0755	Shift Control Solenoid Valve B Circuit Malfunction (UD)	ON	ATa-114
21	P0760	Shift Control Solenoid Valve C Circuit Malfunction (2ND)	ON	ATa-120
22	P0765	Shift Control Solenoid Valve D Circuit Malfunction (OD)	ON	ATa-126
23	P0770	Shift Control Solenoid Valve E Circuit Malfunction (RED)	ON	ATa-131
24	P0885	A/T Relay Circuit Malfunction	ON	ATa-136
25	P0890	AT Relay - Low Circuit	ON	ATa-139
26	P0891	AT Relay - open Circuit	ON	ATa-144

INPUT/OUTPUT SIGNAL VOLTAGE CHECK SHEET
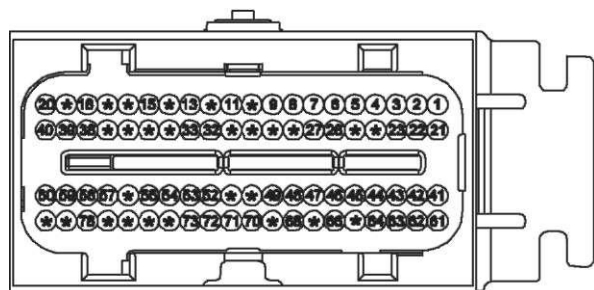
C208-A   **C208-B**
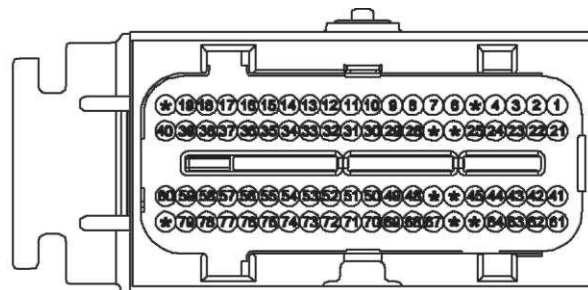
KKCF022A

PIN No.	Check item	Condition	Input/Output value		Remarks
			Type	Level	
A01	2nd CAN_HI	-	-	-	-
A02	2nd CANJ.O	-	-	-	-
A03	P Range Selection	P Position Otherwise	DC Voltage	V BAT Max. 1.0V	
A04	R Range Selection	R Position Otherwise	DC Voltage	V BAT Max. 1.0V	
A05	N Range Selection	N Position Otherwise	DC Voltage	V BAT Max. 1.0V	
A06	D Range Selection	D Position Otherwise	DC Voltage	V BAT Max. 1.0V	
A07	Select Position	-	DC Voltage	V BAT Max. 1.0V	
A08	Up Position	-	DC Voltage	V BAT Max. 1.0V	
A09	Down Position	-	DC Voltage	V BAT Max. 1.0V	
A12	N.A	-	-	-	
A14	N.A	-	-	-	
A19	N.A	-	-	-	
A20	A/T Control Relay	Relay On Relay Off	DC Voltage	V BAT Max. 1.0V Vpeak : Max. 70V Resistance : 680 Ohm	
		W/H Open		DTC Spec : P0890	
A27	Diagnosis "K"	Communicated with GST	Pulse	At transmitting HI : V BAT* 80% t LO : VBAT * 20% l AT receiving HI : V BAT* 70% t LO : V_BAT*30% i	V BAT : 13.2V
A31	N.A	-	-	-	

PIN No.	Check item	Condition	Input/Output value		Remarks
			Type	Level	
A32	A/C Pressure Analog	-	-	-	-
A34	N.A	-	-	-	
A36	N.A	-	-	-	
A37	N.A	-	-	-	
A41	CANJHI	Recessive Dominant	Pulse	2.0 - 3.0 V 2.75 - 4.5 V	
A42	CAN_LO	Recessive Dominant	Pulse	2.0 - 3.0 V 0.5 - 2.25 V	
A60	A/T PWR Source	IG Off IG On IG. Key On IG. Key Off Idle Key Off from Idle Fuse 1/2/3 Removal Condition W/H Open	DC Voltage	Max. 0.5 V VBAT MAX. +/- 75V (ECU GND) MAX. +/- 75V (ECU GND) MAX. +/- 75V (ECU GND) MAX. +/- 75V (ECU GND) MAX. +/- 75V (ECU GND) DTC Spec : P0888	
A73	Shift Position Signal(To Cluster)	Running 1 gear 2 gear 3 gear 4 gear 5 gear	Pulse Duty T t t T	HI : V BAT LO : Max. 1.0V Freq.: 50±2Hz (Reference) 12.5±2% 27.5±2% 42.5±2% 57.5±2% 72.5±2%	Sports mode
B03	UD Solenoid	Shifting W/H Open	Pulse	HI : V BAT LO : Max. 1.0V Vpeak : Max. 70V DTC Spec : P0755	
B05	N.A	-	-	-	
B06	Oil temperature sensorATM	Idle	Analog	0.5V - 4.5V	16Hz
B09	Output speed sensor	30kph W/H Open	Pulse	HI : Min. 4.0V LO : Max. 1.0V DTC Spec : P0722	
B10	Input speed sensor	Idle W/H Open	Pulse	HI : Min. 4.0V LO : Max. 1.0V DTC Spec : P0717	630Hz
B20	N.A	-	-	-	
B22	LR Solenoid	Shifting W/H Open	Pulse	HI : V BAT LO : Max. 1.0V Vpeak : Max. 70V DTC Spec : P0750	
B26	N.A	-	-	-	

PIN No.	Check item	Condition	Input/Output value		Remarks
			Type	Level	
B27	N.A	-	-	-	
B33	GND_Sensor	Idle	DC Voltage	Max. 50 mV	WTS & OTS_ATM
		W/H Open		DTC Spec : P0118/1115	
B42	OD Solenoid	Shifting	Pulse	HI : V BAT LO : Max. 1.0V Vpeak : Max. 70V	
		W/H Open		DTC Spec : P0765	
B43	DCC solenoid	LockUp on	Pulse	HI : V BAT LO : Max. 1.0V Vpeak : Max. 70V	
		W/H Open		DTC Spec : P0743	
B44	RED Solenoid	Shifting	Pulse	HI : V BAT LO : Max. 1.0V Vpeak : Max. 70V	
		W/H Open		DTC Spec : P0770	
B45	2ND Solenoid	Shifting	Pulse	HI : V BAT LO : Max. 1.0V Vpeak : Max. 70V	
		W/H Open		DTC Spec : P0760	
B46	N.A	-	-	-	
B47	N.A	-	-	-	
B59	Variable Solenoid (-)	Idle	Pulse	HI : V BAT LO : Max. 1.0V Vpeak : Max. 70V	600Hz
		W/H Open		DTC Spec : P0748	
B65	N.A	-	-	-	
B66	N.A	-	-	-	
B75	Variable Solenoid (+)	Idle	Pulse	HI : V BAT LO : Max. 1.0V Vpeak : Max. 70V	
		W/H Open		DTC Spec : P0748	
B80	N.A	-	-	-	

DTC P0707 TRANSAXLE RANGE SWITCH - LOW INPUT

COMPONENT LOCATION   EE12AB70
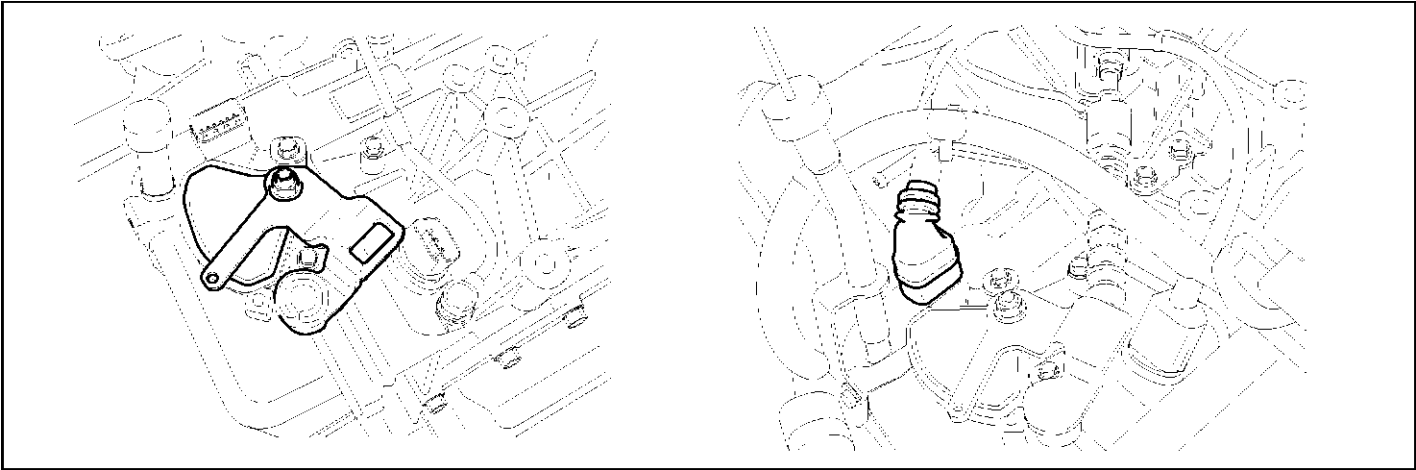
KKCF200A

GENERAL DESCRIPTION   E,EI,,66

Transaxle range switch sends information of the shift lever position to the PCM by using 12V(the battery voltage). By detecting the position of the transaxle range, to start the engine is possible only when the gear position is in the parking or neutral position and the back up lamp is on only in reverse position.

DTC DESCRIPTION   E5C88206

The PCM sets this code when the transaxle range switch has no output signal for more than 30 seconds.

DTC DETECTING CONDITION   E3A3B668

Item	Detecting Condition & Fail Safe	Possible cause
DTC Strategy	• Check for no signal	• Open or short in circuit
Enable Conditions	• Engine state=Run • PRNDL Diag disabling fault present flag=FALSE • Battery Voltage > 11V and < 16 V • Throttle position^ 3%	• Faulty TRANSAXLE RANGE SWITCH • Faulty PCM
Threshold value	• No signal detected	
Diagnostic Time	• More than 30sec	
Fail Safe	• If there are no or multiple signals from the transaxle range switch, the PCM will continue to control with the signal which is detected just before DTC occurs.	

SPECIFICATION E3AF2FE4

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

MONITOR SCANTOOL DATA EA558662

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.

1.2 CURRENT DATA	
-	*TBANSAHLE RANGE SU
	~~P^ N \ /N" — f p *
P, N	R D R
	NOT FIXED
FIX	Z(−) Z(+)

ELQE006A

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

   YES

   • Fault is intermittent caused by poor contact in the sensor's and/or PCM's connector or was repaired and 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   EA47,,CE

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   ECFO,,A3

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+

Transaxle range switch connector (Female)

1.D Range
3. P Range
4. N Range
7. R Range
8. Power supply IG1
9. Starting circuit (To starter)
10. Starting circuit (From ignition SW)
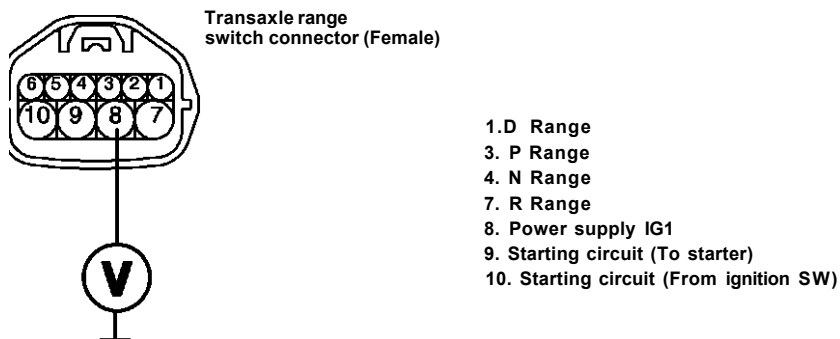
EKRF700B

   4) Is voltage within specifications?

   • Go to "Signal circuit inspection" procedure.

   NO

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

SIGNAL CIRCUIT INSPECTION   E9AC18AF

1. Ignition "OFF".
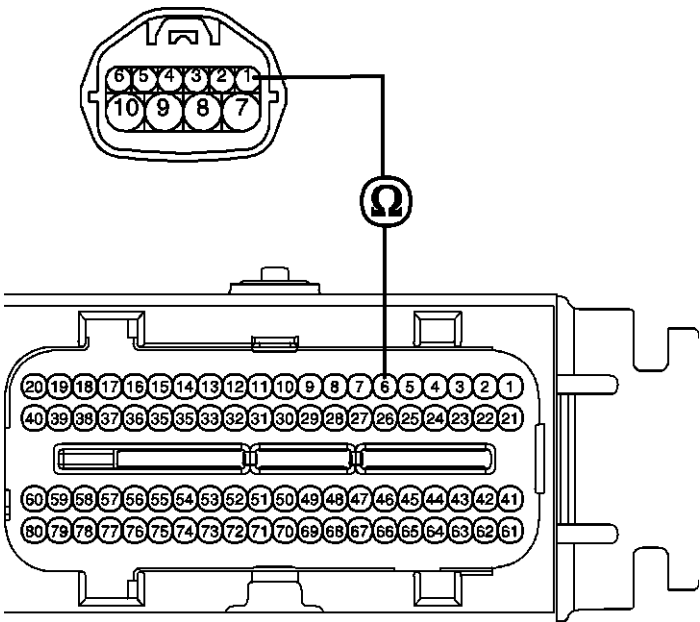
2. Disconnect "TRANSAXLE RANGE SWITCH" and "PCM" connector.

3. Measure resistance between each teminal of the sensor harness connector and PCM harness connector as below.

   Specification : Shown below

Pin No of "TRANSAXLE RANGE SWITCH"	No.1	No.3	No.4	No.7
Pin No of "PCM" harness	A-No.6	A-No.3	A-No.5	A-No.4
Specification	0£3		0£3	

1.D Range
3. P Range
4. N Range
7. R Range
8. Power supply IG1
9. Starting circuit (To starter)
10. Starting circuit (From ignition SW)

3. P Range
4. R Range
5. N Range
6. D Range

EKRF700C

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   EOCBBAIF

1. Ignition "OFF".

2. Remove "TRANSAXLE RANGE SWITCH".

3. Measure the resistance between each terminal of the sensor.

Specification : approx. 0 £2

0 M 3   4 » M

● s ') Component side

Transaxle range switch

1.D Range
3. P Range
4. N Range
7. R Range
8. Power supply IG1
9. Starting circuit (To starter)
10. Starting circuit (From ignition SW)

MS)

EKRF700D

[RANGE SWITCH continuity check table]

Range	Terminal Number									
	1	2	3	4	5	6	7	8	9	10
P									O	O
R							O	o		
N				L J				L J	a	O
D										

EKRF700E

4. Is resistance within specifications?

 YES

 • Substitute with a known-good PCM and check for proper operation. If the problem is corrected, replace PCM as necessary and then go to "Verification of vehicle repair" procedure.

 NO

 • Replace "TRANSAXLE RANGE SWITCH" as necessary and go to "Verification vehicle repair" procedure.

VERIFICATION OF VEHICLE REPAIR   E,2BE,C7

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 P0708 TRANSAXLE RANGE SWITCH - <u>HIGH INPUT</u>

COMPONENT LOCATION   E8AB907F

Refer to DTC P0707.

GENERAL DESCRIPTION   ED363FEF

Refer to DTC P0707.

DTC DESCRIPTION   E732F0C2

The PCM sets this code when the transaxle range switch has two or more output signals for more than 30 seconds.

DTC DETECTING CONDITION   E6EA259C

Item	Detecting Condition & Fail Safe	Possible cause
DTC Strategy	• Check for No signal	• Open or short in TRANSAXLE RANGE SWITCH
Enable Conditions	• Engine state=Run • Battery Voltage > 11V and < 16V	• Faulty TRANSAXLE RANGE SWITCH
Threshold value	• Multiple signal	• Faulty PCM
Diagnostic Time	• More than 30sec	
Fail Safe	• If there are no or multiple signals from the transaxle range switch, the PCM will continue to control with the signal which is detected just before DTC occurs.	

SPECIFICATION   E0E4DC9F

Refer to DTC P0707.

MONITOR SCANTOOL DATA   EDAD0F1A

Refer to DTC P0707.

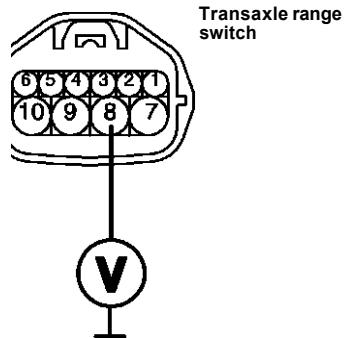## TERMINAL & CONNECTOR INSPECTION   E73AFBA,

Refer to DTC P0707.

POWER SUPPLY CIRCUIT INSPECTION   EAUISCF

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+

Transaxle range switch

1. D Range
3. P Range
4. N Range
7. R Range
8. Power supply IG1
9. Starting circuit (To starter)
10. Starting circuit (From ignition SW)

4)   Is voltage within specifications?

• Go to "Signal circuit inspection" procedure.

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

SIGNAL CIRCUIT INSPECTION   E4492542

1.   Ignition "OFF".

2.   Disconnect "TRANSAXLE RANGE SWITCH" and "PCM" connector.

3.   Measure resistance between each terminals of the sensor harness to check for short.

 Specification : Infinite

Transaxle range switch

1. D Range
3. P Range
4. N Range
7. R Range
8. Power supply IG1
9. Starting circuit (To starter)
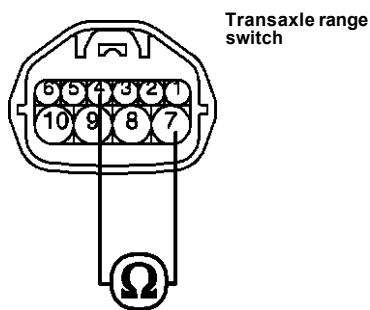10. Starting circuit (From ignition SW)

4.   Is resistance within specifications?

• Go to "Component inspection" procedure.

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

COMPONENT INSPECTION   E6376DE6

Refer to DTC P0707.

VERIFICATION OF VEHICLE REPAIR   E A,,FD,

Refer to DTC P0707.

DTC P0711 TRANSAXLE FLUID TEMPERATURE SENSOR RATIONALITY

COMPONENT LOCATION   E6BCABB5
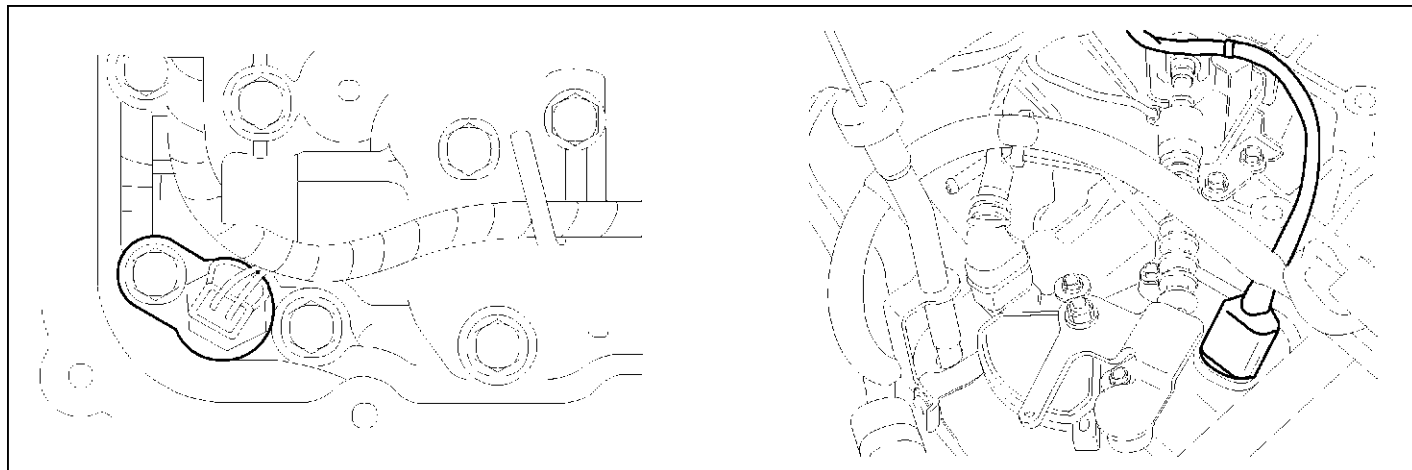
KKCF202A

GENERAL DESCRIPTION   E30A2CBC

The oil temperature sensor is installed in the valve body and uses a thermistor that resistance changes by temperature change. PCM offers 5V as a reference voltage and the output voltage changes according to the ATF's temperature. The oil temperature sensor signal is important information in detecting torque converter clutch operation or non-operation area, the oil temperature sensor's variable controlling and oil pressure's controlling at shifting.

DTC DESCRIPTION   EE7C5BD7

PCM displays this code if it detects the condition below for more than 1 second. PCM regards that the ATF's oil temperature is 85°C(185°F) since this code is sensed.

DTC DETECTING CONDITION   E69EB1BF

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	• Intake air temperature(IAT) > -25°C(-13°F) • Engine state=Run • No errors in relative sensors • Engine should be cool enough	
	Case 2	• Intake air temperature(IAT) > -25°C(-13°F) • Engine state=Run • No errors in relative sensors • Engine should be cool enough	
Threshold value	Case 1	• Temperature difference between TM oil temp and coolant temp > 20°C(68°F) • TM oil temp > coolant temp	
	Case 2	• Temperature difference between TM oil temp and coolant temp > 20°C(68°F) • TM oil temp > coolant temp • Absolute value of temperature difference between minimum IAT and coolant temp at key on < 10°C(50°F) • Absolute value of temperature difference between maximum IAT and coolant temp at key on < 10°C(50°F)	
Diagnostic Time		• 1 second	
Fail Safe		• Fluid temperature is regarded as 85°C(185°F)	

SPECIFICATION   EB6873B5

Temp.[°C(°F)]	Resistance^)	Temp.[°C(°F)]	Resistance(kS)
-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		

TERMINAL & CONNECTOR INSPECTION   EBFCFTFO

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   EDCODECE

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 SEN-SOR".

 Specification : Refer to "Reference data"

[REFERENCE DATA]

Temp.[°C(°F)]	Resistance(kS)	Temp.[°C(°F)]	Resistance^)
-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		

Component side

1 TRANSMISSION FLUID
   TEMPERATURE SENSOR
2. Sensor ground

EKRF702A
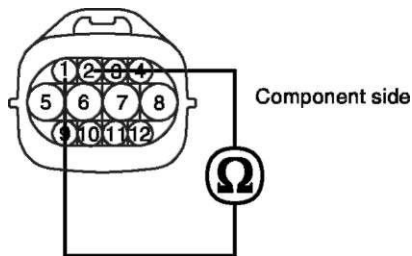
4)   Is resistance within specifications?

   YES

   • Go to "CHECK PCM" as below.

   NO

   • Replace "TRANSAXLE FLUID TEMPERATURE SENSOR" as necessary and go to "Verification vehicle re-
   pair" procedure.

2.   CHECK PCM

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

2)   Connect "TRANSAXLE FLUID TEMPERATURE SENSOR" connector.

3)   Install scantool and select a SIMU-SCAN.

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

1.7 SIMU-SCAN		1.7 SIMU-SCAN	
12. BED SO DUTV 0.0 % 13.011, TEMPEBATUEE **284** *F 14. GEAE POSITION N, P, B 15. SELECT LEVER POSI. P, N	• T	12. BED SO DUTV 0.0 >. 13.011 TEMPEEATUEE **212** "F 14. GEAE POSITION N,P,E 15. SELECT LEUER POSI. P, N	• T
SIMULATION OF UOLTAGE 2.09 V (CH B ONLV)		SIMULATION OF UOLTAGE 3.22 V (CH B ONLV)	
METB	SIML + FIK	METB	SIML + FIK
FIG.1)		FIG. 2)	

FIG.1) INPUT 2.09V   140°C(284"F)
FIG.2) INPUT 3.22V -»• 100°C(212°F)

% The values are subject to change according to vehicle model

                                                                                        EKRF702B

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

   • Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deteriora-
   tion, or damage. Repair or replace as necessary and then go to "Verification of vehicle repair" procedure.

   NO

   • Substitute with a known-good PCM and check for proper operation. If the problem is corrected, replace PCM
   as necessary and then go to "Verification of vehicle repair" procedure.

VERIFICATION OF VEHICLE REPAIR   EED4DIB,

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 P0712 FLUID(OIL) TEMPERATURE SENSOR CIRCUIT - LOW

COMPONENT LOCATION EID,A,A4

Refer to DTC P0711.

GENERAL DESCRIPTION E5BDFB78

Refer to DTC P0711.

DTC DESCRIPTION E251AE90

PCM displays this code if it detects the condition below for more than 10 seconds. PCM recognizes that the oil temperature is 85°C(185°F) since this code is sensed.

DTC DETECTING CONDITION E3A8FFFD

Item	Detecting Condition & Fail Safe	Possible cause
DTC Strategy	• Check for ground short	• Sensor signal circuit is short to ground
Enable Conditions	• Engine state=Run	• Faulty sensor
Threshold value	• Temperature Input A/D value < 1.4%	• Faulty PCM
Diagnostic Time	• More than 10 seconds	
Fail Safe	• Fluid temperature is regarded as 85°C(185°F)	

SPECIFICATION EE60A991

Refer to DTC P0711.

MONITOR SCANTOOL DATA   EEDF18BA

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

```
         1.2 CURRENT DATA     13/24
                                      A
 K  13. OIL TEMPERATURE      147
    14. GEAB POSITION
    15. SELECT LEVEE POSI.
    16. A/C SWITCH
    17. IDLE SWITCH                   •
    13. BRAKE SWITCH
    19. SPOBTS MODE SELECT
    20. SPOBTS MODE UP SW

   FIX | |PART| |FULL| |HELP| |GBPH  |BCBB
```
FIG.1)

```
        1.2 CUBBENT DATA     13/24            1.2 CUBBENT DATA        13/24

 13.OIL TEMPEEATUBE                     13. OIL TEMPERATURE
 14. GEAE POSITION                      14. GEAK POSITION
 15. 31                                 15. SI
 16. A      signal circuit open         18. A/ signal circuit short to ground
 17.1                                   17. II
 18. BhFiKE snrrcfT                      18. BI      1 1 IJI I
 19.SPOBTS MODE SELECT                   19. SPOBTS MODE SELECT
 2B.SPOBTS MODE UP SW                    20. SPOBTS MODE UP SW

   FIK   PAST  FULL  HELP  GBPH  ECED     FIK    PART  FULL  HELP  GRPH  RCRD
 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?

 • Fault is intermittent caused by poor contact in the sensor's and/or PCM's connector or was repaired and 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   EDDSDEBE

Refer to DTC P0711.

SIGNAL CIRCUIT INSPECTION   EE2A7AEE

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
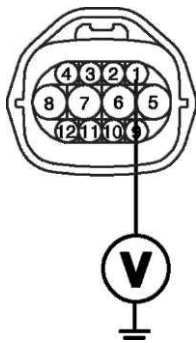
1 TRANSMISSION FLUID
  TEMPERATURE SENSOR
2.Sensor ground

EKRF703A

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   E026604F

Refer to DTC P0711.

VERIFICATION OF VEHICLE REPAIR   E,7DA,IF

Refer to DTC P0711.

DTC P0713 FLUID(OIL) TEMPERATURE SENSOR CIRCUIT - HIGH

COMPONENT LOCATION   E9844194

Refer to DTC P0711.

GENERAL DESCRIPTION   E68A7FFE

Refer to DTC P0711.

DTC DESCRIPTION   E1837D5B

Refer to DTC P0711.

DTC DETECTING CONDITION   ECBF9CB9

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	• Intake air temperature(IAT) > -25°C(-13°F) • Engine state=Run • No errors in relative sensors	
Threshold value	• Temperature Input A/D value > 98% • No rise in oil temperature after enough time passed	
Diagnostic Time	• More than 1 sec	
Fail Safe	• Fluid temperature is regarded as 85°C(185°F)	

SPECIFICATION   E8DE74AE

Refer to DTC P0711.

MONITOR SCANTOOL DATA   E7,FAAIB

Refer to DTC P0712.

TERMINAL & CONNECTOR INSPECTION   E,,EB2EE

Refer to DTC P0711.

SIGNAL CIRCUIT INSPECTION   E8D34AC4

Refer to DTC P0712.

GROUND CIRCUIT INSPECTION   EDFABBB4

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 £3

ATM
SOLENOID
VALVE

1 TRANSMISSION FLUID
  TEMPERATURE SENSOR
2.Sensor ground
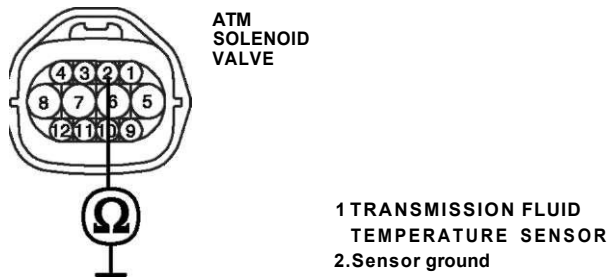
EKRF704A

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   E7C8C8FF

Refer to DTC P0711.

VERIFICATION OF VEHICLE REPAIR   EOIBED,D

Refer to DTC P0711.

DTC P0717   INPUT SPEED SENSOR CIRCUIT - NO SIGNAL

COMPONENT LOCATION   EID,,A55

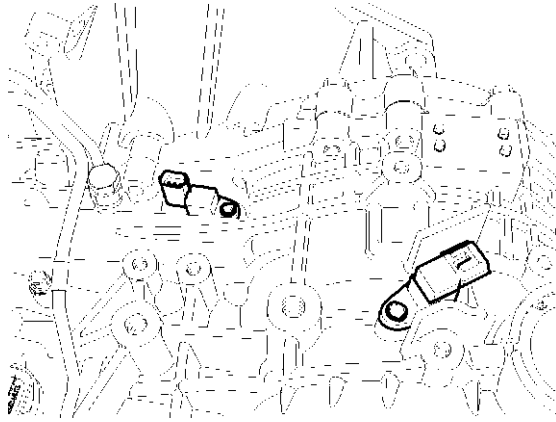## GENERAL DESCRIPTION   E974CAE2

The input(turbine) speed sensor outputs pulse-signals according to the revolutions of the input shaft of the transmission. The 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   EAEDEE4C

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

DTC DETECTING CONDITION   E,,IF,F6

Item	Detecting Condition & Fail Safe	Possible cause
DTC Strategy	• Speed rationality check	• Signal circuit is open or short
Enable Conditions	• Engine state=Run • Vehicle Speed > 30km/h • Engine RPM at current gear 1 or 2 or Non conditional VRPM when gear is not 1 or 2 > 1000rpm • Battery voltage > 11V and < 16 V • AT oil temp. > -23°C(-9.4°F) • No error in speed sensors	• Sensor power circuit is open • Sensor ground circuit is open • Faulty INPUT SPEED SENSOR • Faulty PCM
Threshold value	• No signal	
Diagnostic Time	• More than 1sec	
Fail Safe	• The gear shift position is recognized as follows. 'P' range -» realization as 'N' range 'R' range -» realization as 'R range 'N' range -» realization as 'N' range 'D' range -» realization as 3 range SPT mode -» CAN shift 2-3 range	

SPECIFICATION   E72A1E2B

Input shaft & Output shaft speed sensor

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

Input shaft speed sensor

3

UD clutch retainer

DIR Carrier plate

Output shaft speed sensor

1 : Ground
2: Sensor signal
3 : IG1 (B+)
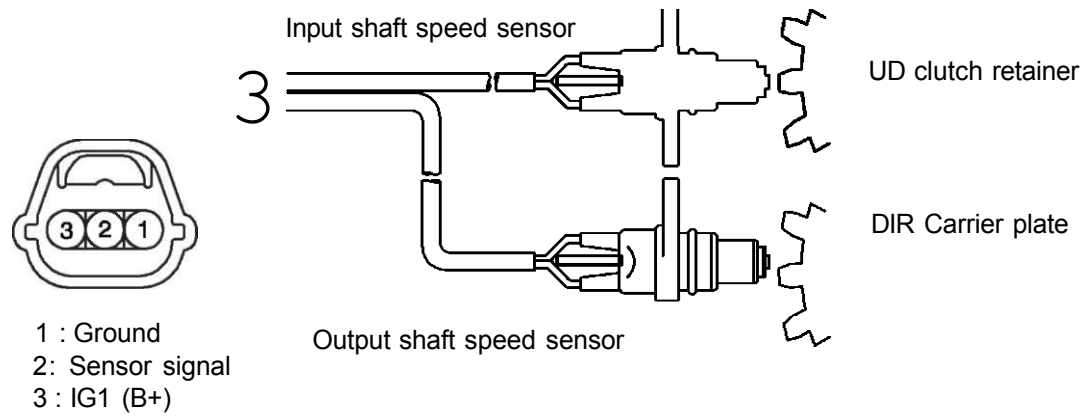
EKRF705A

Air gap (mm)	Input shaft speed sensor	1.3
	Output shaft speed sensor	0.85
Insulation Resistance	Input shaft speed sensor	over 1MQ
	Output shaft speed sensor	over 1Mfl
Peak-Peak Voltage	High	more than 4.8V
	Low	less than 0.8V

Air gap

Mould cover

Connector

Terminal

O-ring

Magnet

Circuit parts

Hall IC
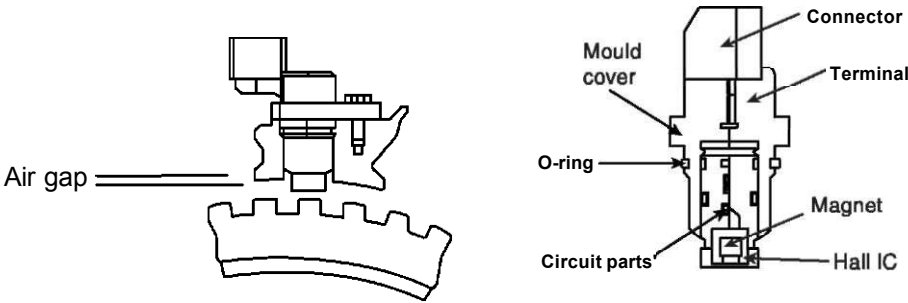
EKRF705B

SIGNAL WAVEFORM   E2E6BC3C

1U   E E 1"

M Y'h -IV ft   Ho Trig
r 1\

V n

....-„.....,.....,.,„„.,

FIG.1)   FIG.2)
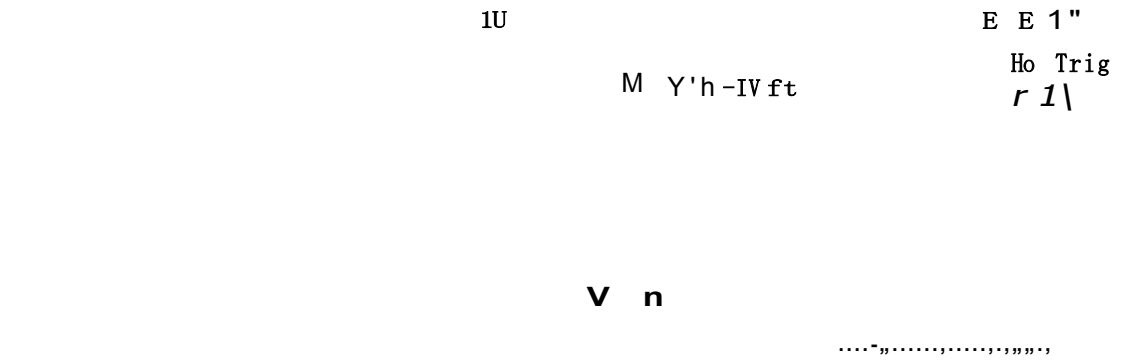
FIG.1) Idling
FIG.2) Accelerating

EKRF705C

MONITOR SCANTOOL DATA   EC883903

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

2. Engine "ON" .

3. Monitor the "INPUT SPEED SENSOR" parameter on the scantool

4. Driving at speed of over 30 Km/h(19 mph).

Specification : Increasing Gradually

1.2 CURRENT DATA			1.2 CURRENT DATA	
CRK POSITION SNSR	9B3 rpn		CRM POSITION SNSH	2082 rpn
INPUT SPEED SNSH			INPUT SPEED SNSH	1957 rpn
OUTPUT SPEED SNSR	321		OUTPUT SPEED SNSR	2152 rpn
UEHICLE SPEED	8	**3**	UEHICLE SPEED	72 Knˆli
SHIFT POSITION	1		SHIFT POSITION	4
TCC SLIP(AMOUNT]	49 rpm		TCC SLIP(AMOUNT]	105 rpn
AˆT RELAV UOLT	14.3 W		A/T RELAV UOLT	14.3 U
THANSAHLE RANGE SU	D		TRANSAKLE RANGE SU	D

SCRN FULL PAET GRPH HELP   FIK SCHN FULL PAET GRPH HELP

FIG.1)   FIG.2)

FIG.1) Idling
FIG.2) Accelerating

ELQE018A

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

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

    • Go to "Terminal & connector inspection" procedure.

TERMINAL & CONNECTOR INSPECTION   EB,CBD,C

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?

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

    • Go to "Signal circuit inspection" procedure.

SIGNAL CIRCUIT INSPECTION   E68F9B70

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

Input speed sensor

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

EKRF705D
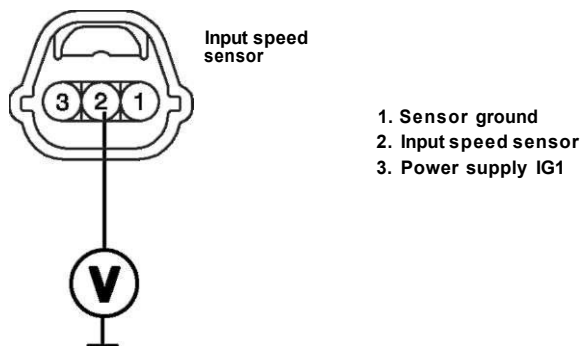
4.   Is voltage within specification?

   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" of the "Component inspection" procedure.

POWER SUPPLY CIRCUIT INSPECTION   EaaoFic

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+

Input speed sensor

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

EKRF705E

4.   Is voltage within specification ?

   • Go to "Ground circuit inspection" procedure.

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

GROUND CIRCUIT INSPECTION   EECA50DE

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

Input speed
sensor

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

EKRF705F

4. Is resistance within specification ?

YES

• Go to "Component inspection" procedure.

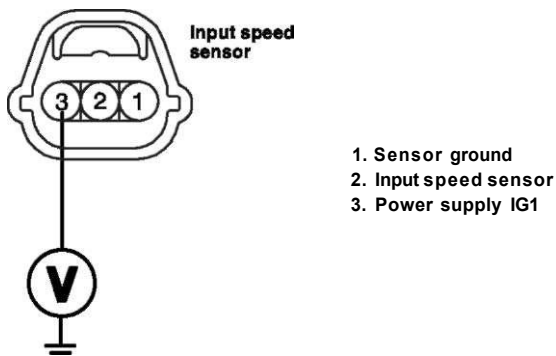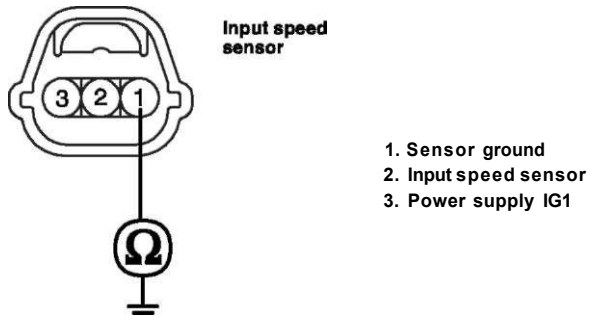**NO**

• 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" of the "Component inspection" procedure.

COMPONENT INSPECTION   EBFC3C32

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"

Input speed
sensor

Component side   1. Sensor ground
                      2. Input speed sensor
                      3. Power supply IG1
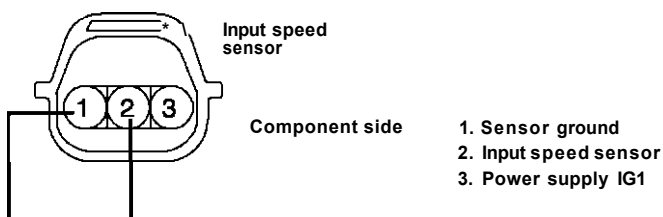
EKRF705G

4) Is resistance within specifications?

[REFERENCE **DATA]**

Air gap (mm)	Input shaft speed sensor	1.3
	Output shaft speed sensor	0.85
Insulation Resistance	Input shaft speed sensor	over 1Mfl
	Output shaft speed sensor	over 1Mfl
Peak-Peak Voltage	High	more than 4.8V
	Low	less than 0.8V

YES

• Go to "CHECK PCM" as below.

NO

• Replace "INPUT SPEED SENSOR" as necessary and go to "Verification vehicle repair" procedure.

2. CHECK PCM

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

2) Connect "INPUT SPEED SENSOR" connector.

3) Install scantool and select a SIMU-SCAN.

4) Simulate frequency to INPUT SPEED SENSOR signal circuit.

1.7 SIMU-SCAN		1.7 SIMU-SCAN	
04. INPUT SPEED SENSOE 150 i-pn 05. O/PUT SPEED SENSOE B r$_p$m 06. DCCSU DUTV 8.0 % 07. DAMP.CLUTCH SLIP -150 rpn	*k* • T	04. INPUT SPEED SENSOE 251 rpn 05. O/PUT SPEED SENSOE 0 rpn 06. DCCSU DUTY 0.B *X* 07. DAMP.CLUTCH SLIP -251 rpn	i • T
SIMULATION OF FEEQUENCY FREQUENCE DUTY **t** CH **B** ONLY)		SIMULATION OF FEEQUENCY FEEQUENCY DUTY (CH B ONLY)	
METE	SIML SLCT + - FIK	METB	SIML SLCT + - FIK

FIG.1)   FIG. 2)

FIG.1) INPUT 150Hz -» 150rpm
FIG.2) INPUT 250Hz -> 251 rpm

EKRF705H

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 and check for proper operation. If the problem is corrected, replace PCM as necessary and then go to "Verification of vehicle repair" procedure.

VERIFICATION OF VEHICLE REPAIR   EC4ADBOB

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. Is resistance within specification ?

   • Go to the applicable troubleshooting procedure.

   NO

   • System performing to specification at this time.

DTC P0722 OUTPUT SPEED SENSOR CIRCUIT - NO SIGNAL

COMPONENT LOCATION   E71ACE52

Refer to DTC P0717.

GENERAL DESCRIPTION   EEDDEE8D

The output speed sensor calculates the number of rotations of the transfer drive gear, which means that the sensor calculates the frequency of electric signal that is occurred at the transfer drive gear's rotating. The signal is inputted to the PCM and is used as the main signal which decides the optimum gear position with TPS signal.

DTC DESCRIPTION   EC340BCC

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

DTC DETECTING CONDITION   E6C435A9

Item	Detecting Condition & Fail Safe	Possible cause
DTC Strategy	• Speed rationality check	• Signal circuit is open or short
Enable Conditions	• Engine state=Run • Vehicle Speed > 30km/h • Engine RPM at current gear 1 or 2 or Non conditional VRPM when gear is not 1 or 2 > 1000rpm • Battery voltage > 11V and < 16 V • AT oil temp. £ -23°C(-9.4°F) • No error in speed sensors	• Sensor power circuit is open • Sensor ground circuit is open • Faulty OUTPUT SPEED SENSOR • Faulty PCM
Threshold value	• Vehicle speed calculated from TM output speed sensor < 50% * the vehicle speed from vehicle speed sensor	
Diagnostic Time	• More than 1sec	
Fail Safe	• Not in shifting process: The output speed sensor value have been received by calculation from the input speed sensor signal. • In shifting process: Instead of the output speed sensor signal, the vehicle speed sensor signal is used.	

SPECIFICATION   E14AEBDB

Refer to DTC P0717.

SIGNAL WAVEFORM   E2CEFF7B

Refer to DTC P0717.

MONITOR SCANTOOL DATA   E82AB8CD

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

2. Engine "ON".

3. Monitor the "OUTPUT SPEED SENSOR" parameter on the scantool.

4. Driving at speed of over 30 Km/h(19 mph).

   Specification : Increasing Gradually

```
┌─────────────────────────────────┐          ┌─────────────────────────────────┐
│       1.2 CUBHEMI  DATA         │          │       1.Z CUBBENT  DATA          │
├──┬──────────────────────────┬───┤          ├──┬──────────────────────────┬───┤
│X │CRK POSITION SNSH    1146 rpn│          │X │CRK POSITION SNSB    1684 rpn│
│X │INPUT  SPEED SNSE    1143 rpn│ •        │X │INPUT  SPEED SNSE    1664 rpn│ •
│X │OUTPUT SPEED SNSH    4B8  rpn│          │X │OUTPUT SPEED SNSB    2247 rpn│
│X │OEHICLE SPEED        11   Kn/h│   0      │X │OEHICLE SPEED        7B   Kn/h│
│X │SHIFT  POSITION      1       │          │X │SHIFT  POSITION      4       │
│  │TCC SLIP(AMOUNT 1    49  rpn │          │  │TCC SLIP(AMOUNT 1    84  rpn │
│  │A/T BELAY UOLT       14.2 U  │          │  │A/T BELAY UOLT       14.2 O  │
│  │TBANSAXLE BANCE SU   D       │          │  │TBANSAXLE BANCE SU   D       │
├──┴──────────────────────────┴───┤          ├──┴──────────────────────────┴───┤
│ FIK  SCEN  FULL  PAST  GBPH HELP│          │ FIK  SCEN  FULL  PAST  GBPH HELP│
└─────────────────────────────────┘          └─────────────────────────────────┘
  FIG.1)                                        FIG.2)
```

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

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

   • Fault is intermittent caused by poor contact in the sensor's and/or PCM's connector or was repaired and 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.

   • Go to "Terminal & connector inspection" procedure.

TERMINAL & CONNECTOR INSPECTION   ECIBASBA

Refer to DTC P0717.

SIGNAL CIRCUIT INSPECTION   E0CDAF6A

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

Output speed sensor

1. Sensor ground
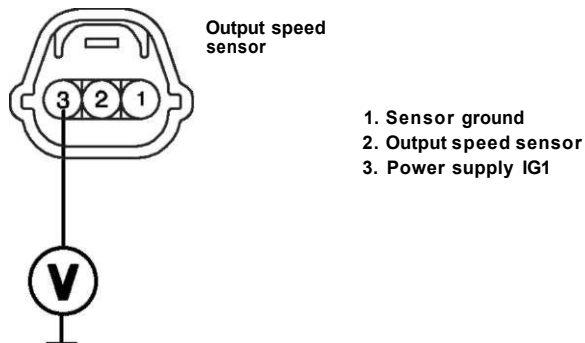2. Output speed sensor
3. Power supply IG1
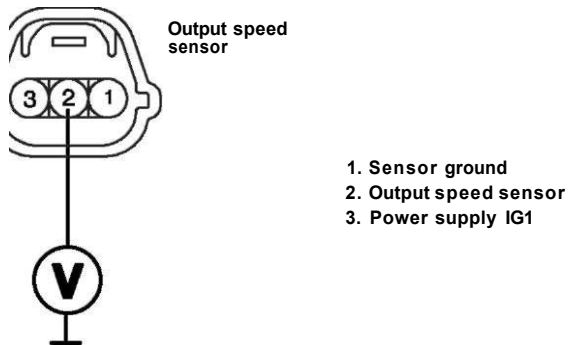
EKRF706A

4. Is voltage within specification?

    • Go to "Power supply circuit inspection" procedure.

    • 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" of the "Component inspection" procedure.

POWER SUPPLY CIRCUIT INSPECTION   E2AFEADD

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+

Output speed sensor

1. Sensor ground
2. Output speed sensor
3. Power supply IG1
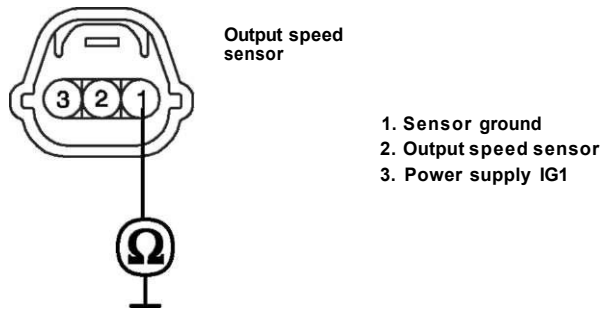
EKRF706B

4. Is voltage within specification?

    • Go to "Ground circuit inspection" procedure.

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

GROUND CIRCUIT INSPECTION   EC5DB45A

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

Output speed sensor

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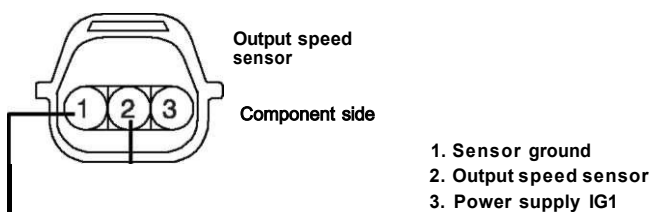2. Output speed sensor
3. Power supply IG1

EKRF706C

4. Is resistance within specification?

• Go to "Component inspection" procedure.

• 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" of the "Component inspection" procedure.

COMPONENT INSPECTION   ECAFOBID

1. Check "OUTPUT SPEED SENSOR"

1) Ignition "OFF".

2) Disconnect the "OUTPUT SPEED SENSOR" connector.

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

Specification : Refer to "Reference data"

Output speed sensor

Component side

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

EKRF706D

4)   Is resistance within specifications?

[REFERENCE **DATA]**

Air gap (mm)	Input shaft speed sensor	1.3
	Output shaft speed sensor	0.85
Insulation Resistance	Input shaft speed sensor	over 1Mfl
	Output shaft speed sensor	over 1MQ
Peak-Peak Voltage	High	more than 4.8V
	Low	less than 0.8V

• Go to "CHECK PCM" as below.

• Replace "OUTPUT SPEED SENSOR" as necessary and go to "Verification vehicle repair" procedure.

2.   CHECK PCM

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

2)   Connect "OUTPUT SPEED SENSOR" connector.

3)   Install scantool and select a SIMU-SCAN.

4)   Simulate frequency to OUTPUT SPEED SENSOR signal circuit.

```
        1.7 SIMU-SCAN                              1.7 SIMU-SCAN

 05.O/PUT SPEED SENSOE   150  rpn       05.O/PUT SPEED SENSOR   251  rpn
 06. DCCSO DUTV          0.0 A          06. DCCSO DUTV          0.0 A
 07.  DAMP.CLUTCH SLIP    O   rpn       07.  DAMP.CLUTCH SLIP    O   rpn
 08. LSB SO DUTV         0.0 %          08. LSB SO DUTV         100.0%

      SIMULATION OF FREQUENCY               SIMULATION OF FREQUENCY
   FREQUENCY         DUTV                FREQUENCY         DUTV

   84 Hz       5B %                      139 Hz       5B %
       ( CH B ONLY )                          ( CH B ONLY )
  METE  SIML  SLCT       — FIK          METE  SIML  SLCT       — FIK
```
FIG.1)   FIG.2)

FIG. 1) OUTPUT 84Hz → · 150rpm
FIG. 2) OUTPUT 139Hz → 251 rpm

EKRF706E

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.
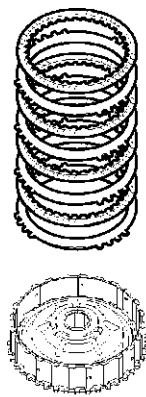
   NO

   • Substitute with a known-good PCM and check for proper operation. If the problem is corrected, replace PCM as necessary and then go to "Verification of vehicle repair" procedure.
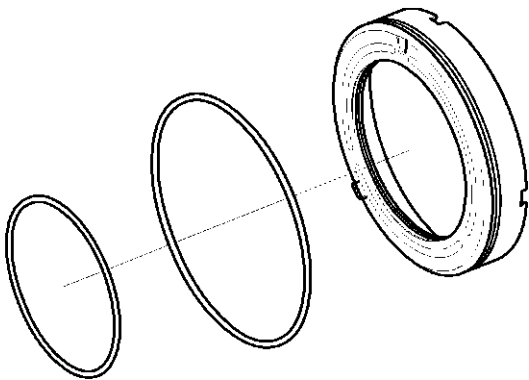
VERIFICATION OF VEHICLE REPAIR   ESE2BFBA

Refer to DTC P0717.

DTC P0731   GEAR 1 INCORRECT RATIO

COMPONENT LOCATION   EF38FCAF

UD clutch

L&R brake

EKRF707A

GENERAL DESCRIPTION   EE59C7FC

The input shaft speed in gear 1 range should be the similar to the value that is what the gear 1 ratio and the output shaft speed are multipled. For example, if the output shaft speed is 1,000 rpm and the gear 1 ratio is 3.789, the input shaft speed may be about 3,789 rpm.

DTC DESCRIPTION   EE5CAE1B

This code is displayed if the input shaft speed does not conform with the value which is what the output shaft speed and the gear 1 ratio are multipled. This is more probably caused by a mechanical defect of adherence of control valves or a breakdown of solenoid controlled valves etc. than a electrical defect.

DTC DETECTING CONDITION   E6F8FCB3

Item	Detecting Condition & Fail Safe	Possible cause
DTC Strategy	• 1st gear incorrect ratio	• Faulty input speed sensor
Enable Conditions	• Engine state=Run • Battery Voltage > 11V and < 16 V • TM oil temperature > -23°C(-9.4°F) • Engine speed > 450rpm • TM output speed > 150rpm • TM Input speeds Orpm • Current gear= 1st • Gear shifting is completed • No PRNDL fail • No error in speed sensors	• Faulty output speed sensor • Faulty UD clutch or LR brake or Oneway clutch
Threshold value	• | Measured input speed - calculated input speed | > 200 rpm	
Diagnostic Time	• More than 1sec	
Fail Safe	• Locked into 3rd gear.	

SIGNAL WAVEFORM

E E ! 2″

Ho Trig .

B

FIG.1)

A: **INPUT SPEED SENSOR**
B : **OUTPUT SPEED SENSOR**

EKRF707B

MONITOR SCANTOOL DATA   ECC92C0F

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 : 2700-2900 engine rpm

```
            1. Z CURREMT DATA

  * CRK POSITION SNSR       2329 rpn
    INPUT SPEED SNSR        B    rpn
    OUTPUT SPEED SNSR       O    rpn
    SHIFT POSITION          1
    THROTTLE P. SENSOR      39.2 %
    FLUID  TEHP.SENSOR      86   °C
    UEHICLE SPEED           0    Km/h
    LKRSO DUTV              0.0  %


    FIX   SCEN  FULL  PART  GRPH  HELP
```

ELQE032A

OPERATING ELEMENT OF EACH SHIFTING RANGE

Range		UD clutch	OD clutch	2ND brake	LR brake	REV clutch	RED clutch	DIR clutch	o w e	OWC1
P		-	-	-	0	-	0	-	-	-
R		-	-	-	0	0	0	-	-	-
N		-	-	-	0	-	0	-	-	-
D	1st	0	-	-	0	-	0	-	0	0
	2nd	0	-	0	-	-	0	-	0	-
	3rd	0	0	-	-	-	0	-	0	-
	4th	-	0	0	-	-	0	-	0	-
	5th	-	0	0	-	-	-	0	-	-

UD/C : Underdrive clutch
OD/C : Overdrive clutch
2ND/B : 2ND brake
LR/B : Low & Reverse brake
REV/C: Reverse clutch
RED/B: Reduction brake
DIR/C: Direct clutch
OWC : One way clutch for sub gear shifting
OWC1 : One way clutch for main gear shifting

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, 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 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.

A   *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° C (176°F~ 212°F).*
- *Engine coolant temperature : 80~100°C (176°F~ 212°F).*

- *Check both rear wheelfleft 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 "AT position and run the engine at 1,000 rpm to let the A/T fluid cool down before carrying out subsequent.*

SIGNAL CIRCUIT INSPECTION   ECDDF9EE

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

            −1.2 CUBBENT DATA

    ENGINE BPH   2127 rpn
    TNPUT"SPEED""   2056 rpn
    OUTPUT SPEED   730 rpn
    SHIFT POSITION   1 GEAE
    SELECT LEOEB SU.   L
    HIUEC NODE   NODE F
    UEHICLE SPEED   22 NPH
    THBOTTLE P. SENSOB   14.1 X

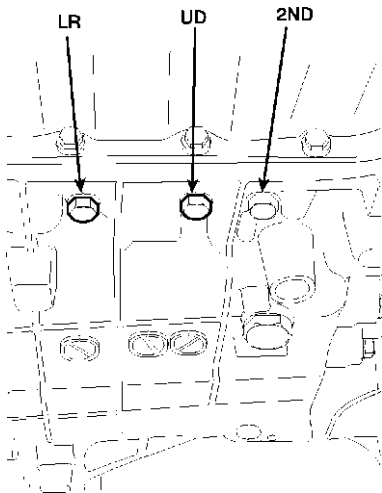   FIX   SCBN FULL PAKT GEPH HELP

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

- Go to "Component inspection" procedure.

   NO

- Check for electrical niose of circuitin INPUT & OUTPUT SPEED SENSOR or Replace INPUT & OUTPUT SPEED SENSOR. Repair as necessary and Go to "Verification vehicle repair" procedure.

COMPONENT INSPECTION   EBBBA290

KKCF206E

1. Connect oil pressure gauge to "UD" and "L/R" ports.

2. Engine "ON".

3. Drive a car with gear position 1 in "SPORTS MODE".

4. Compare it with reference data as below.

Specification : shown below

    *1 Each case of increasing and decreasing speed.
    * 2 Only for 5 speed A/T.

Manual valve position	VFS current [mA]	RPM	Operation (Duty rate %)						Oil pressure MPa {kgf/cm²}	
			LR	2ND	UD	OD	DCC	RED*²	UD CLUTCH	LR BRAKE
D	200	2500	0	100	0	100	0	0	1.03±0.02 {10.5±0.2}	1.03±0.02 {10.5±0.2}
			100	0	0	100	0	0	1.03±0.02 {10.5±0.2}	-
R	250		0	100	100	100	0	0	-	1.55±0.25 {15.8±2.5}

Manual valve position (Oil pressure)	VFS current [mA]	RPM	Operation (Duty rate %)						Oil pressure MPa {kgf/cm^2}		
			LR	2ND	UD	OD	DCC	RED*^{2}	4000	1500 (Decreasing)	600 (Decreasing)
D (LR)	200	600—4500¬600	0	100	0	100	0	0	MAX. 1.11 {MAX. 11.3}	-	MIN. 0.55 {MIN. 5.6}
D(UD)			0	100	0	100	0	0	MAX. 1.11 {MAX. 11.3}	-	MIN. 0.55 {MIN. 5.6}
D(UD)			100	0	0	100	0	0	MAX. 1.11 {MAX. 11.3}	-	MIN. 0.55 {MIN. 5.6}
R(LR)	250		0	100	100	100	0	0	MAX. 1.96 {MAX. 20.0}	MIN. 1.14*^{1} {MIN. 11.6}	MIN. 0.55*^{1} {MIN. 5.6}

Manual valve position (Oil pressure)	VFS current [mA]	RPM	Operation (Duty rate %)						Oil pressure MPa {kgf/cm^2}		
			LR	2ND	UD	OD	DCC	RED*^{2}	VFS current 200mA	VFS current: 600mA	VFS current: 1100mA
D (UD)	200¬1100—200	2500	100	100	0	0	100	0	1.03±0.02 {10.5±0.2}	0.69±0.03 {7.0±0.3}	0.36±0.03 {3.7±0.3}

Manual valve position	VFS current [mA]	RPM	Operation (Duty rate %)						ELEMENT	P (MPa)
			LR	2ND	UD	OD	DCC	RED*²		
D	200	2500	0	100	0	100	0	0	LR	1.03±0.02
			60	T	T	T	T	T		0.45±0.04
			75	T	T	T	T	T		0.19±0.04
			100	T	T	T	T	T		0
			100	0	0	100	T	0	2ND	1.03±0.02
			T	60	T	T	T	T		0.50±0.05
			T	75	T	T	T	T		0.20±0.05
			T	100	T	T	T	T		0
			100	100	0	0	T	0	OD	1.02±0.02
			T	T	T	60	T	T		0.46±0.04
			T	T	T	75	T	T		0.19±0.04
			T	T	T	100	T	T		0
			100	100	0	0	T	0	UD	1.03±0.02
			T	T	60	T	T	T		0.44±0.05
			T	T	75	T	T	T		0.18±0.04
			T	T	100	T	T	T		0
			100	0	100	0	T	0T	RED	1.03±0.02
			T	T	T	T	T	60		0.49±0.04
			T	T	T	T	T	75		0.24±0.04
			T	T	T	T	T	100		0
			100T	0	100	0	T	100	DIR	0
			75	T	T	T	T	T		0.25±0.04
			60	T	T	T	T	T		0.51 ±0.04
			0	T	T	T	T	T		1.03±0.02

Each case of increasing (0—'100%) and decreasing (100—'0%) of duty rate to be satisfied.(Except the mark •)

Manual valve position (Oil pressure)	VFS current [mA]	RPM	Operation (Duty rate %)						Damper Apply Pressure ^ (MPa)	Damper Release Pressure (MPa)
			LR	2ND	UD	OD	DCC	RED*²		
D	200	2500	100	100	0	0	0	0	0.25-0.45	0.50-0.70
			T	T	T	T	50	T	0.20-0.45	0
			T	T	T	T	100	T	0.96-1.04	0
	900		100	100	0	0	0	0	0.12-0.22	0.25-0.45
			T	T	T	T	100	T	MIN. 0.29	0

^ Each case of increasing and decreasing of DCC solenoid duty rate to be satisfied.
# 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   E,IADF27

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.
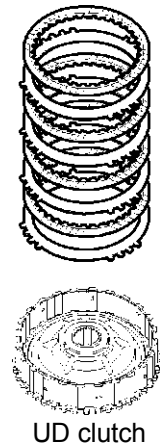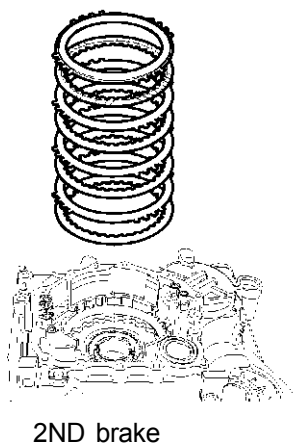
4.   Are any DTCs present ?

•   Go to the applicable troubleshooting procedure.

NO

• System performing to specification at this time.

DTC P0732   GEAR 2 INCORRECT RATIO

COMPONENT LOCATION   ECCD9F36

2ND brake

UD clutch

EKRF708A

GENERAL DESCRIPTION   E2EDE933

The input shaft speed in gear 2 range should be the similar to the value that is what the gear 2 ratio and the output shaft speed are multipled. For example, if the output shaft speed is 1,000 rpm and the gear 2 ratio is 2.064, the input shaft speed may be about 2,064 rpm.

DTC DESCRIPTION   EDE4AF60

This code is displayed if the input shaft speed does not conform with the value which is what the output shaft speed and the gear 2 ratio are multipled. This is mainer caused by a mechanical defect of adherence of control valves or a breakdown of solenoid controlled valves etc. than a electrical defect.

DTC DETECTING CONDITION   EF3FF3F0

Item	Detecting Condition & Fail Safe	Possible cause
DTC Strategy	• 2nd gear incorrect ratio	• Faulty input speed sensor
Enable Conditions	• Engine state= Run • Battery Voltage > 11V and < 16 V • TM oil temperature > -23°C(-9.4°F) • Engine speed > 450rpm • TM output speed > 300rpm • TM Input speed * 0rpm • Current gear= 2nd • Gear shifting is completed • No PRNDL fail • No error in speed sensors	• Faulty output speed sensor • Faulty UD clutch or 2nd brake
Threshold value	• | Measured input speed - calculated input speed | > 200 rpm	
Diagnostic Time	• More than 1sec	
Fail Safe	• Locked into 3 rd gear.	

SIGNAL WAVEFORM EF3CB309

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1.

FIG.1)

A: **INPUT SPEED SENSOR**
B : **OUTPUT SPEED SENSOR**

MONITOR SCANTOOL DATA E8715A46

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 : 2700-2900 engine rpm

```
        1.2 CURRENT DATA

CRK POSITION SNSB         231B rpn
 INPUT SPEED SNSR         B    rpn |
OUTPUT SPEED SNSH         B    rpn J
SHIFT POSITION
THROTTLE P.SENSOB         3&5 %
FLUID  TEMP.SENSOB        B8   "C
UEHICLE SPEED
LftRSU DUTV              100.0%


FIK   SCRN  FULL  PABT  GRPH  HELP
```

ELQE034A

OPERATING ELEMENT OF EACH SHIFTING RANGE

Range		UD clutch	OD clutch	2ND brake	LR brake	REV clutch	RED clutch	DIR clutch	o w e	OWC1
P		-	-	-	0	-	0	-	-	-
R		-	-	-	0	0	0	-	-	-
N		-	-	-	0	-	0	-	-	-
D	1st	0	-	-	0	-	0	-	0	0
	2nd	0	-	0	-	-	0	-	0	-
	3rd	0	0	-	-	-	0	-	0	-
	4th	-	0	0	-	-	0	-	0	-
	5th	-	0	0	-	-	-	0	-	-

UD/C : Underdrive clutch
OD/C : Overdrive clutch
2ND/B : 2ND brake
LR/B : Low & Reverse brake
REV/C: Reverse clutch
RED/B: Reduction brake
DIR/C: Direct clutch
OWC : One way clutch for sub gear shifting
OWC1 : One way clutch for main gear shifting

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.

A   *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° C (176°F- 212°F).*
- *Engine coolant temperature : 80–100° C (176°F- 212°F).*

• *Check both rear wheelfleft 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   E4FI,,IF

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

```
           1.2 CURRENT DATA

    ENGINE BP 11           2188 rpn
    INPUT SPEED            2056 rpn
    OUTPUT SPEED          1352 rpn
    SHIFT POSITION         2 GEAR
    SELECT LEUER SU.       2
    HIUEC MODE            MODE D
    UEHICLE SPEED          47  MPH
    THROTTLE P.SENSOR      13.7 %


    FIX   SCEN  FULL  PART  GEPH  HELP
```
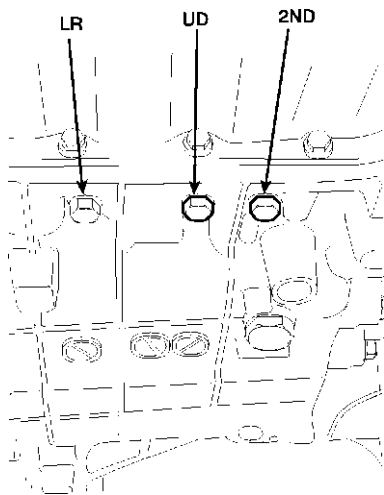
5. Are "INPUT & OUTPUT SPEED SENSOR" within specifications?

• 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   E7D830FB

1.   Connect oil pressure gauge to "UD" and "2nd" ports.

2.   Engine "ON".

3.   Drive a car with gear position 2 in "SPORTS MODE".

4.   Compare it with reference data as below.

 Specification : shown below

   *1 Each case of increasing and decreasing speed.
   * 2 Only for 5 speed A/T.

Manual valve position	VFS current [mA]	RPM	Operation (Duty rate %)						Oil pressure MPa {kgf/cm²}	
			LR	2ND	UD	OD	DCC	RED*²	UD CLUTCH	LR BRAKE
D	200	2500	0	100	0	100	0	0	1.03±0.02 {10.5±0.2}	1.03±0.02 {10.5±0.2}
			100	0	0	100	0	0	1.03±0.02 {10.5±0.2}	-
R	250		0	100	100	100	0	0	-	1.55±0.25 {15.8±2.5}

Manual valve position (Oil pressure)	VFS current [mA]	RPM	Operation (Duty rate %)						Oil pressure MPa {kgf/cm^2}		
			LR	2ND	UD	OD	DCC	RED*^{2}	4000	1500 (Decreasing)	600 (Decreasing)
D (LR)	200	600—4500¬600	0	100	0	100	0	0	MAX. 1.11 {MAX. 11.3}	-	MIN. 0.55 {MIN. 5.6}
D(UD)			0	100	0	100	0	0	MAX. 1.11 {MAX. 11.3}	-	MIN. 0.55 {MIN. 5.6}
D(UD)			100	0	0	100	0	0	MAX. 1.11 {MAX. 11.3}	-	MIN. 0.55 {MIN. 5.6}
R (LR)	250		0	100	100	100	0	0	MAX. 1.96 {MAX. 20.0}	MIN. 1.14*^{1} {MIN. 11.6}	MIN. 0.55*^{1} {MIN. 5.6}

Manual valve position (Oil pressure)	VFS current [mA]	RPM	Operation (Duty rate %)						Oil pressure MPa {kgf/cm^2}		
			LR	2ND	UD	OD	DCC	RED*^{2}	VFS current 200mA	VFS current: 600mA	VFS current: 1100mA
D (UD)	200¬1100—200	2500	100	100	0	0	100	0	1.03±0.02 {10.5±0.2}	0.69±0.03 {7.0±0.3}	0.36±0.03 {3.7±0.3}

Manual valve position	VFS current [mA]	RPM	Operation (Duty rate %)						ELEMENT	P (MPa)
			LR	2ND	UD	OD	DCC	RED*2		
D	200	2500	0	100	0	100	0	0	LR	1.03±0.02
			60	T	T	T	T	T		0.45±0.04
			75	T	T	T	T	T		0.19±0.04
			100	T	T	T	T	T		0
			100	0	0	100	T	0	2ND	1.03±0.02
			T	60	T	T	T	T		0.50±0.05
			T	75	T	T	T	T		0.20±0.05
			T	100	T	T	T	T		0
			100	100	0	0	T	0	OD	1.02±0.02
			T	T	T	60	T	T		0.46±0.04
			T	T	T	75	T	T		0.19±0.04
			T	T	T	100	T	T		0
			100	100	0	0	T	0	UD	1.03±0.02
			T	T	60	T	T	T		0.44±0.05
			T	T	75	T	T	T		0.18±0.04
			T	T	100	T	T	T		0
			100	0	100	0	T	0T	RED	1.03±0.02
			T	T	T	T	T	60		0.49±0.04
			T	T	T	T	T	75		0.24±0.04
			T	T	T	T	T	100		0
			100T	0	100	0	T	100	DIR	0
			75	T	T	T	T	T		0.25±0.04
			60	T	T	T	T	T		0.51 ±0.04
			0	T	T	T	T	T		1.03±0.02

Each case of increasing (0—'100%) and decreasing (100—'0%) of duty rate to be satisfied.(Except the mark •)

Manual valve position (Oil pressure)	VFS current [mA]	RPM	Operation (Duty rate %)						Damper Apply Pressure ^ (MPa)	Damper Release Pressure (MPa)
			LR	2ND	UD	OD	DCC	RED*²		
D	200	2500	100	100	0	0	0	0	0.25-0.45	0.50-0.70
			T	T	T	T	50	T	0.20-0.45	0
			T	T	T	T	100	T	0.96-1.04	0
	900		100	100	0	0	0	0	0.12-0.22	0.25-0.45
			T	T	T	T	100	T	MIN. 0.29	0

^ Each case of increasing and decreasing of DCC solenoid duty rate to be satisfied.

• 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   EOBCXMSS

Refer to DTC P0731.

DTC P0733 GEAR 3 INCORRECT RATIO

COMPONENT LOCATION   E689ABCE
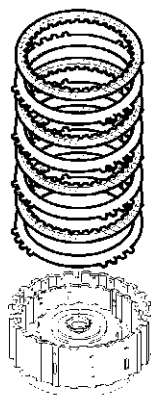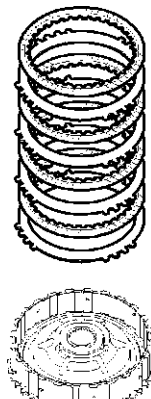
OD clutch   UD clutch

EKRF709A

GENERAL DESCRIPTION   ED66CF30

The input shaft speed in gear 3 range should be the similar to the value that is what the gear 3 ratio and the output shaft speed are multipled. For example, if the output shaft speed is 1,000 rpm and the gear 3 ratio is 1.421, the input shaft speed will be about 1,421 rpm.
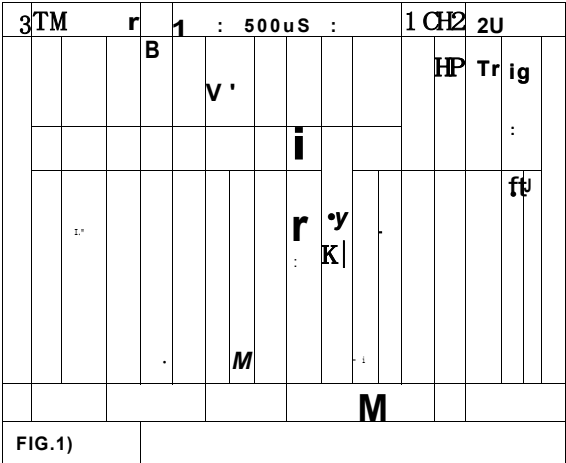
DTC DESCRIPTION   EF7D2E95

This code is displayed if the input shaft speed does not conform with the value which is what the output shaft speed and the gear 3 ratio are multipled. This is most likely caused by a mechanical defect of adherence of control valves or a breakdown of solenoid controlled valves etc. than a electrical defect.

DTC DETECTING CONDITION   EBD63CAD

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 state=Run • Battery Voltage > 11V and < 16 V • TM oil temperature > -23°C(-9.4°F) • Engine speed > 450rpm • TM output speed > 300rpm • TM Input speeds 0rpm • Current gear=3rd • Gear shifting is completed • No PRNDL fail • No error in speed sensors	
Threshold value	• | Measured input speed - calculated input speed | > 200 rpm	
Diagnostic Time	• More than 1sec	
Fail Safe	• Locked into 3rd gear.	

SIGNAL WAVEFORM   E2C21893

FIG.1)

A: INPUT SPEED SENSOR
B : OUTPUT SPEED SENSOR

EKRF709B

MONITOR SCANTOOL DATA   EBFEBOEA

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 : 2700-2900 engine rpm

i . 2 CUBBENT DATA

CEK POSITION SNSE	2335	rpn
INPUT SPEED SNSB	O	rpn
OUTPUT SPEED SNSB	O	rpn
SHIFT POSITION		
THROTTLE P. SENSOR	39. b	%
FLUID TENP. SENSOR	−40	″C
UEHICLE SPEED	O	Kn/h
LfiRSU DUTV	0.0	%

FIK SCBN FULL PABT GRPH HELP

ELQE036A

OPERATING ELEMENT OF EACH SHIFTING RANGE

Range		UD clutch	OD clutch	2ND brake	LR brake	REV clutch	RED clutch	DIR clutch	o w e	OWC1
P		-	-	-	0	-	0	-	-	-
R		-	-	-	0	0	0	-	-	-
N		-	-	-	0	-	0	-	-	-
D	1st	0	-	-	0	-	0	-	0	0
	2nd	0	-	0	-	-	0	-	0	-
	3rd	0	0	-	-	-	0	-	0	-
	4th	-	0	0	-	-	0	-	0	-
	5th	-	0	0	-	-	-	0	-	-

UD/C : Underdrive clutch
OD/C : Overdrive clutch
2ND/B : 2ND brake
LR/B : Low & Reverse brake
REV/C: Reverse clutch
RED/B: Reduction brake
DIR/C: Direct clutch
OWC : One way clutch for sub gear shifting
OWC1 : One way clutch for main gear shifting

Stall test procedure in D3 and reason
Procedure
1. Warm up the engine
2. Set 3rd gear hold by disconnecting the solenoid valve connector. Fully depress the brake pedal, then place the transaxle gear lever into "D" range. Press and hold the accelerator pedal to the floor for no more than eight seconds while observing the engine, input speed,
    and output speed RPM values.

    * The slippage of 3rd gear operating parts can be detected by stall test in D3.

Reason for stall test
1. If there are 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.

A   *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° C (176°F- 212°F).*
- *Engine coolant temperature : 80–100° C (176°F- 212°F).*

- *Check both rear wheelfleft 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   EDD9EFE2

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

1.2 CUB REN I DATA

ENGINE EPN	2116 rpn
YNPUT″SPEED″'	2B56 rpn
OUTPUT SPEED	2654 rpn
SHIFT POSITION	3 GEAE
SELECT LEUEE SU.	3
HIUEC MODE	MODE F
UEHICLE SPEED	£7 MPH
THEOTTLE P. SENSOE	14.1 %

FIK   SCBN   FULL   PART   GRPH   HELP

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   EAE620AD
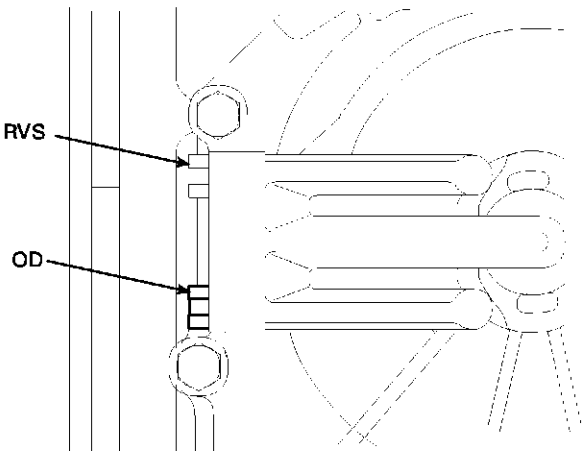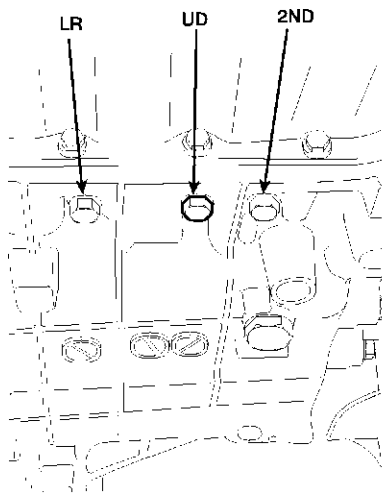
1. Connect Oil pressure gauge to "UD" and "OD" ports.

2. Engine "ON".

3. Drive a car with gear position 3 in "SPORTS MODE".

4. Compare it with reference data as below.

Specification : shown below

*1 Each case of increasing and decreasing speed.
* 2 Only for 5 speed A/T.

Manual valve position	VFS current [mA]	RPM	Operation (Duty rate %)						Oil pressure MPa {kgf/cm²}	
			LR	2ND	UD	OD	DCC	RED*²	UD CLUTCH	LR BRAKE
D	200	2500	0	100	0	100	0	0	1.03±0.02 {10.5±0.2}	1.03±0.02 {10.5±0.2}
			100	0	0	100	0	0	1.03±0.02 {10.5±0.2}	-
R	250		0	100	100	100	0	0	-	1.55±0.25 {15.8±2.5}

Manual valve position (Oil pressure)	VFS current [mA]	RPM	Operation (Duty rate %)						Oil pressure MPa {kgf/cm^2}		
			LR	2ND	UD	OD	DCC	RED*^{2}	4000	1500 (Decreasing)	600 (Decreasing)
D (LR)	200	600—4500¬600	0	100	0	100	0	0	MAX. 1.11 {MAX. 11.3}	-	MIN. 0.55 {MIN. 5.6}
D(UD)			0	100	0	100	0	0	MAX. 1.11 {MAX. 11.3}	-	MIN. 0.55 {MIN. 5.6}
D(UD)			100	0	0	100	0	0	MAX. 1.11 {MAX. 11.3}	-	MIN. 0.55 {MIN. 5.6}
R (LR)	250		0	100	100	100	0	0	MAX. 1.96 {MAX. 20.0}	MIN. 1.14*^{1} {MIN. 11.6}	MIN. 0.55*^{1} {MIN. 5.6}

Manual valve position (Oil pressure)	VFS current [mA]	RPM	Operation (Duty rate %)						Oil pressure MPa {kgf/cm^2}		
			LR	2ND	UD	OD	DCC	RED*^{2}	VFS current 200mA	VFS current: 600mA	VFS current: 1100mA
D (UD)	200¬1100—200	2500	100	100	0	0	100	0	1.03±0.02 {10.5±0.2}	0.69±0.03 {7.0±0.3}	0.36±0.03 {3.7±0.3}

Manual valve position	VFS current [mA]	RPM	Operation (Duty rate %)						ELEMENT	P (MPa)
			LR	2ND	UD	OD	DCC	RED*²		
D	200	2500	0	100	0	100	0	0	LR	1.03±0.02
			60	T	T	T	T	T		0.45±0.04
			75	T	T	T	T	T		0.19±0.04
			100	T	T	T	T	T		0
			100	0	0	100	T	0	2ND	1.03±0.02
			T	60	T	T	T	T		0.50±0.05
			T	75	T	T	T	T		0.20±0.05
			T	100	T	T	T	T		0
			100	100	0	0	T	0	OD	1.02±0.02
			T	T	T	60	T	T		0.46±0.04
			T	T	T	75	T	T		0.19±0.04
			T	T	T	100	T	T		0
			100	100	0	0	T	0	UD	1.03±0.02
			T	T	60	T	T	T		0.44±0.05
			T	T	75	T	T	T		0.18±0.04
			T	T	100	T	T	T		0
			100	0	100	0	T	0T	RED	1.03±0.02
			T	T	T	T	T	60		0.49±0.04
			T	T	T	T	T	75		0.24±0.04
			T	T	T	T	T	100		0
			100T	0	100	0	T	100	DIR	0
			75	T	T	T	T	T		0.25±0.04
			60	T	T	T	T	T		0.51 ±0.04
			0	T	T	T	T	T		1.03±0.02

Each case of increasing (0—'100%) and decreasing (100—'0%) of duty rate to be satisfied.(Except the mark •)

Manual valve position (Oil pressure)	VFS current [mA]	RPM	Operation (Duty rate %)						Damper Apply Pressure ^ (MPa)	Damper Release Pressure (MPa)
			LR	2ND	UD	OD	DCC	RED*²		
D	200	2500	100	100	0	0	0	0	0.25-0.45	0.50-0.70
			T	T	T	T	50	T	0.20-0.45	0
			T	T	T	T	100	T	0.96-1.04	0
	900		100	100	0	0	0	0	0.12-0.22	0.25-0.45
			T	T	T	T	100	T	MIN. 0.29	0

^ Each case of increasing and decreasing of DCC solenoid duty rate to be satisfied.
• 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   EBCCBESE

Refer to DTC P0731.

DTC P0734 GEAR 4 INCORRECT RATIO

COMPONENT LOCATION   E1FBE479

Direct clutch   OD clutch
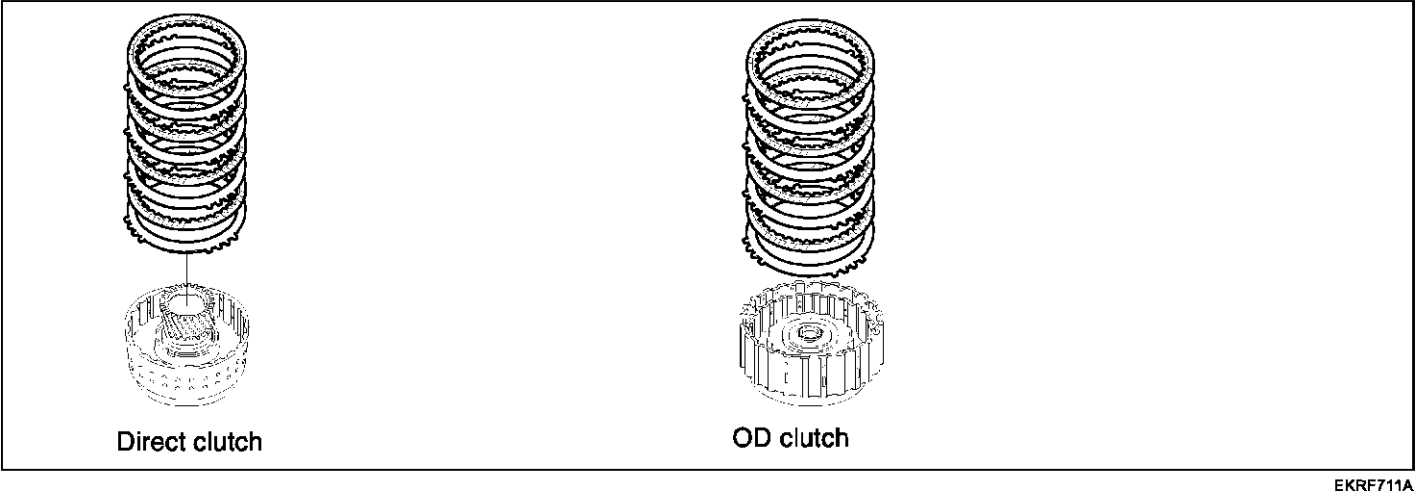
EKRF711A

GENERAL DESCRIPTION   EIBDSCBO

The input shaft speed in gear 4 range should be the similar to the value that is what the gear 4 ratio and the output shaft speed are multipled. For example, if the output shaft speed is 1,000 rpm and the gear 4 ratio is 1.034, the input shaft speed may be about 1,034 rpm.

DTC DESCRIPTION   E77B8CD7

This code is displayed if the input shaft speed does not conform with the value which is what the output shaft speed and the gear 4 ratio are multipled. This is most likely caused by a mechanical defect of adherence of control valves or a breakdown of solenoid controlled valves etc. than a electrical defect.

DTC DETECTING CONDITION   EA53AA79

Item	Detecting Condition & Fail Safe	Possible cause
DTC Strategy	• 4th gear incorrect ratio	• Faulty input speed sensor
Enable Conditions	• Engine state=Run • Battery Voltage > 11V and < 16 V • TM oil temperature > -23°C(-9.4°F) • Engine speed > 450rpm • TM output speed > 300rpm • TM Input speed* Orpm • Current gear=4th • Gear shifting is completed • No PRNDL fail • No error in speed sensors	• Faulty output speed sensor • Faulty direct clutch or OD clutch
Threshold value	• | Measured input speed - calculated input speed | > 200 rpm	
Diagnostic Time	• More than 1sec	
Fail Safe	• Locked into 3rd gear.	

SIGNAL WAVEFORM EF46CCBC

FIG.1)

A: INPUT SPEED SENSOR
B : OUTPUT SPEED SENSOR

EKRF710B

MONITOR SCANTOOL DATA   E4EE52C0

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

OPERATING ELEMENT OF EACH SHIFTING RANGE

Range		UD clutch	OD clutch	2ND brake	LR brake	REV clutch	RED clutch	DIR clutch	o w e	OWC1
P		-	-	-	0	-	0	-	-	-
R		-	-	-	0	0	0	-	-	-
N		-	-	-	0	-	0	-	-	-
D	1st	0	-	-	0	-	0	-	0	0
	2nd	0	-	0	-	-	0	-	0	-
	3rd	0	0	-	-	-	0	-	0	-
	4th	-	0	0	-	-	0	-	0	-
	5th	-	0	0	-	-	-	0	-	-

UD/C : Underdrive clutch
OD/C : Overdrive clutch
2ND/B : 2ND brake
LR/B : Low & Reverse brake
REV/C: Reverse clutch
RED/B: Reduction brake
DIR/C: Direct clutch
OWC : One way clutch for sub gear shifting
OWC1 : One way clutch for main gear shifting

SIGNAL CIRCUIT INSPECTION   E5EC4F3C

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 while driving the vehicle on a level road.

 Specification : INPUT SPEED - (OUTPUT SPEED * GEAR RATIO) ^ 200 RPM

```
        1. 2 CURRENT  DATA
                                       A
  ENGINE  RPM              2133  rpn
"I INPUT  SPEED            2856  rpn
*  OUTPUT  SPEED           2911  rpn
   SHIFT  POSITION         4 GEAR
a  SELECT  LEVEE  SU.      D
   2ND  SOLENOID  DUTV     0. 0
   OD  SOLENOID  DUT¥      0. 0  %
   OIL  TEMPERATURE        156   "F

   FIK    SCRN   FULL   PART   GBPH   HELP
```

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　　E8A99606
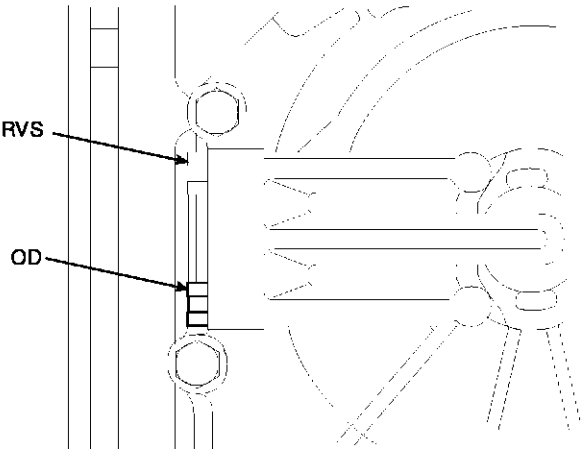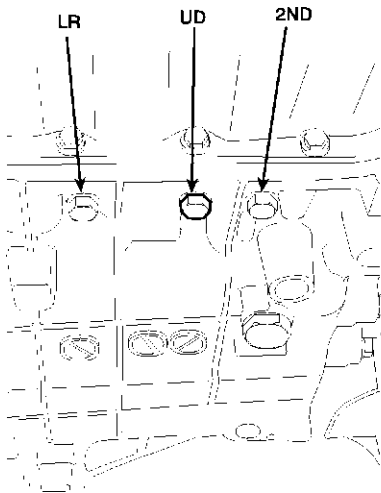
KKCF209D

1. Connect oil pressure gauge to "UD" and "OD" ports.

2. Engine "ON".

3. Drive a car with gear position "4".

4. Compare it with reference data as below.

   Specification : shown below

   *1 Each case of increasing and decreasing speed.
   * 2 Only for 5 speed A/T.

Manual valve position	VFS current [mA]	RPM	Operation (Duty rate %)						Oil pressure MPa {kgf/cm^2}	
			LR	2ND	UD	OD	DCC	RED*^{2}	UD CLUTCH	LR BRAKE
D	200	2500	0	100	0	100	0	0	1.03±0.02 {10.5±0.2}	1.03±0.02 {10.5±0.2}
			100	0	0	100	0	0	1.03±0.02 {10.5±0.2}	-
R	250		0	100	100	100	0	0	-	1.55±0.25 {15.8±2.5}

Man-ual valve posi-tion (Oil pres-sure)	VFS current [mA]	RPM	Operation (Duty rate %)						Oil pressure MPa {kgf/cm²}		
			LR	2ND	UD	OD	DCC	RED*²	4000	1500 (Decreas-ing)	600 (Decreas-ing)
D (LR)	200	600—4500¬600	0	100	0	100	0	0	MAX. 1.11 {MAX. 11.3}	-	MIN. 0.55 {MIN. 5.6}
D(UD)			0	100	0	100	0	0	MAX. 1.11 {MAX. 11.3}	-	MIN. 0.55 {MIN. 5.6}
D(UD)			100	0	0	100	0	0	MAX. 1.11 {MAX. 11.3}	-	MIN. 0.55 {MIN. 5.6}
R (LR)	250		0	100	100	100	0	0	MAX. 1.96 {MAX. 20.0}	MIN. 1.14*¹ {MIN. 11.6}	MIN. 0.55*¹ {MIN. 5.6}

Man-ual valve posi-tion (Oil pres-sure)	VFS current [mA]	RPM	Operation (Duty rate %)						Oil pressure MPa {kgf/cm²}		
			LR	2ND	UD	OD	DCC	RED*²	VFS current 200mA	VFS current: 600mA	VFS current: 1100mA
D (UD)	200—1100—200	2500	100	100	0	0	100	0	1.03±0.02 {10.5±0.2}	0.69±0.03 {7.0±0.3}	0.36±0.03 {3.7±0.3}

Manual valve position	VFS current [mA]	RPM	Operation (Duty rate %)						ELEMENT	P (MPa)
			LR	2ND	UD	OD	DCC	RED*2		
D	200	2500	0	100	0	100	0	0	LR	1.03±0.02
			60	T	T	T	T	T		0.45±0.04
			75	T	T	T	T	T		0.19±0.04
			100	T	T	T	T	T		0
			100	0	0	100	T	0	2ND	1.03±0.02
			T	60	T	T	T	T		0.50±0.05
			T	75	T	T	T	T		0.20±0.05
			T	100	T	T	T	T		0
			100	100	0	0	T	0	OD	1.02±0.02
			T	T	T	60	T	T		0.46±0.04
			T	T	T	75	T	T		0.19±0.04
			T	T	T	100	T	T		0
			100	100	0	0	T	0	UD	1.03±0.02
			T	T	60	T	T	T		0.44±0.05
			T	T	75	T	T	T		0.18±0.04
			T	T	100	T	T	T		0
			100	0	100	0	T	0T	RED	1.03±0.02
			T	T	T	T	T	60		0.49±0.04
			T	T	T	T	T	75		0.24±0.04
			T	T	T	T	T	100		0
			100T	0	100	0	T	100	DIR	0
			75	T	T	T	T	T		0.25±0.04
			60	T	T	T	T	T		0.51 ±0.04
			0	T	T	T	T	T		1.03±0.02

Each case of increasing (0-M00%) and decreasing (100—'0%) of duty rate to be satisfied.(Except the mark T)

Manual valve position (Oil pressure)	VFS current [mA]	RPM	Operation (Duty rate %)						Damper Apply Pressure % (MPa)	Damper Release Pressure (MPa)
			LR	2ND	UD	OD	DCC	RED*2		
D	200	2500	100	100	0	0	0	0	0.25-0.45	0.50-0.70
			T	T	T	T	50	T	0.20-0.45	0
			T	T	T	T	100	T	0.96-1.04	0
	900		100	100	0	0	0	0	0.12-0.22	0.25-0.45
			T	T	T	T	100	T	MIN. 0.29	0

^ Each case of increasing and decreasing of DCC solenoid duty rate to be satisfied.
• 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 E,BCFFF,

Refer to DTC P0731.

DTC P0735 GEAR 5 INCORRECT RATIO

COMPONENT LOCATION   E6FCF649
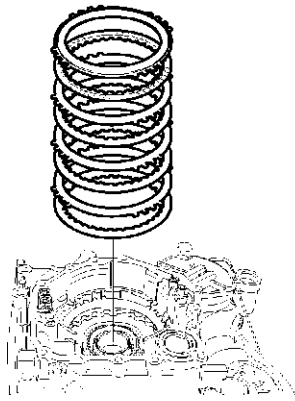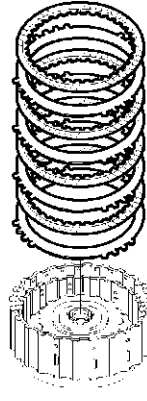
2ND brake   OD clutch

EKRF710A

GENERAL DESCRIPTION   EECE25D9

The input shaft speed in gear 5 range should be the similar to the value that is what the gear 5 ratio and the output shaft speed are multipled. For example, if the output shaft speed is 1,000 rpm and the gear 5 ratio is 0.728, the input shaft speed may be about 728 rpm.

DTC DESCRIPTION   E0B9763A

This code is displayed if the input shaft speed does not conform with the value which is what the output shaft speed and the gear 5 ratio are multipled. This is most likely caused by a mechanical defect of adherence of control valves or a breakdown of solenoid controlled valves etc. than a electrical defect.

DTC DETECTING CONDITION   ECA59778

Item	Detecting Condition & Fail Safe	Possible cause
DTC Strategy	• 5th gear incorrect ratio	• Faulty input speed sensor
Enable Conditions	• Engine state=Run • Battery Voltage > 11V and < 16 V • TM oil temperature > -23°C(-9.4°F) • Engine speed > 450rpm • TM output speed > 300rpm • TM Input speed* Orpm • Current gear=5th • Gear shifting is completed • No PRNDL fail • No error in speed sensors	• Faulty output speed sensor • Faulty 2nd brake or OD clutch
Threshold value	• | Measured input speed - calculated input speed > 200 rpm	
Diagnostic Time	• More than 1sec	
Fail Safe	• Locked into 3rd gear.	

SIGNAL WAVEFORM   EF4EBDC6

FIG.1)

A: INPUT SPEED SENSOR
B : OUTPUT SPEED SENSOR

MONITOR SCANTOOL DATA   EC488C72

*K It is difficult to "STALL TEST" in 5th gear, therefore Go to "W/Harness inspection" procedure.

OPERATING ELEMENT OF EACH SHIFTING RANGE

Range		UD clutch	OD clutch	2ND brake	LR brake	REV clutch	RED clutch	DIR clutch	o w e	OWC1
P		-	-	-	0	-	0	-	-	-
R		-	-	-	0	0	0	-	-	-
N		-	-	-	0	-	0	-	-	-
D	1st	0	-	-	0	-	0	-	0	0
	2nd	0	-	0	-	-	0	-	0	-
	3rd	0	0	-	-	-	0	-	0	-
	4th	-	0	0	-	-	0	-	0	-
	5th	-	0	0	-	-	-	0	-	-

UD/C : Underdrive clutch
OD/C : Overdrive clutch
2ND/B : 2ND brake
LR/B : Low & Reverse brake
REV/C: Reverse clutch
RED/B: Reduction brake
DIR/C: Direct clutch
OWC : One way clutch for sub gear shifting
OWC1 : One way clutch for main gear shifting

SIGNAL CIRCUIT INSPECTION   E_cOBCI3

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 5th gear while driving the vehicle on a level road.

   Specification : INPUT SPEED - (OUTPUT SPEED * GEAR RATIO) < 200 RPM

```
        1.2 CUBBEMT  DATA
                                     1
 x ENGINE  EPM          2127 rpn
 x  INPUT SPEED         2056 rpn
 x OUTPUT SPEED         2914 rpn
 x SHIFT POSITION       5  SEAB
 x SELECT LEUEB SU.     L              •
   HIOEC NODE           NODE F
   UEHICLE SPEED        22   NPH
   THBOTTLE P. SENSOB   14.1 %
                                     T
   FIX   SCBN  FULL  FABT  GBPH  HELP
```

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

   • Go to "Component inspection" procedure.

   • Check for electrical niose of circuitin INPUT & OUTPUT SPEED SENSOR or Replace INPUT & OUTPUT SPEED SENSOR. Repair as necessary and Go to "Verification vehicle repair" procedure.

COMPONENT INSPECTION   E37F3AC2
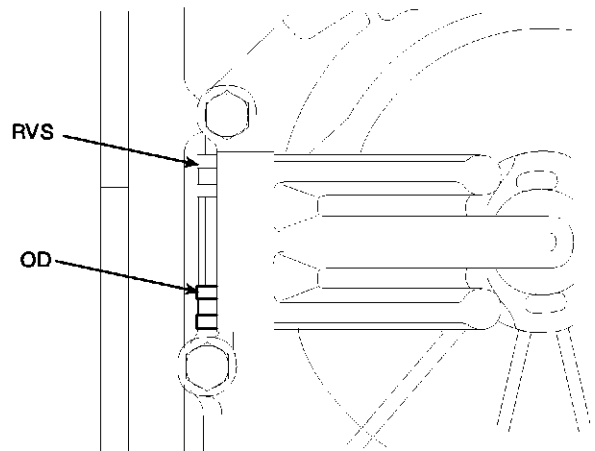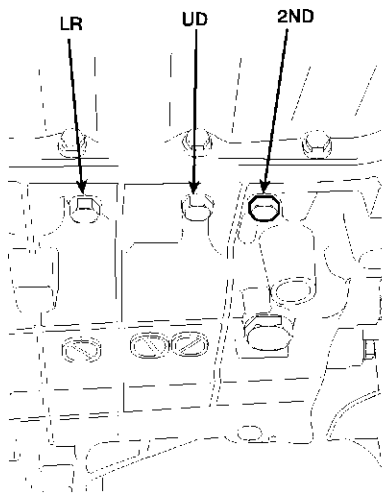
KKCF210D

1.   Connect oil pressure gauge to "2nd" and "OD" ports.

2.   Engine "ON".

3.   Drive a car with gear position "5".

4.   Compare it with reference data as below.

 Specification : shown below

     *1 Each case of increasing and decreasing speed.
     * 2 Only for 5 speed A/T.

Manual valve position	VFS current [mA]	RPM	Operation (Duty rate %)						Oil pressure MPa {kgf/cm^2}	
			LR	2ND	UD	OD	DCC	RED*^{2}	UD CLUTCH	LR BRAKE
D	200	2500	0	100	0	100	0	0	1.03±0.02 {10.5±0.2}	1.03±0.02 {10.5±0.2}
			100	0	0	100	0	0	1.03±0.02 {10.5±0.2}	-
R	250		0	100	100	100	0	0	-	1.55±0.25 {15.8±2.5}

Manual valve position (Oil pressure)	VFS current [mA]	RPM	Operation (Duty rate %)						Oil pressure MPa {kgf/cm^2}		
			LR	2ND	UD	OD	DCC	RED*^{2}	4000	1500 (Decreasing)	600 (Decreasing)
D (LR)	200	600— 4500¬ 600	0	100	0	100	0	0	MAX. 1.11 {MAX. 11.3}	-	MIN. 0.55 {MIN. 5.6}
D(UD)			0	100	0	100	0	0	MAX. 1.11 {MAX. 11.3}	-	MIN. 0.55 {MIN. 5.6}
D(UD)			100	0	0	100	0	0	MAX. 1.11 {MAX. 11.3}	-	MIN. 0.55 {MIN. 5.6}
R (LR)	250		0	100	100	100	0	0	MAX. 1.96 {MAX. 20.0}	MIN. 1.14*^{1} {MIN. 11.6}	MIN. 0.55*^{1} {MIN. 5.6}

Manual valve position (Oil pressure)	VFS current [mA]	RPM	Operation (Duty rate %)						Oil pressure MPa {kgf/cm^2}		
			LR	2ND	UD	OD	DCC	RED*^{2}	VFS current 200mA	VFS current: 600mA	VFS current: 1100mA
D (UD)	200¬ 1100— 200	2500	100	100	0	0	100	0	1.03±0.02 {10.5±0.2}	0.69±0.03 {7.0±0.3}	0.36±0.03 {3.7±0.3}

Manual valve position	VFS current [mA]	RPM	Operation (Duty rate %)						ELEMENT	P (MPa)
			LR	2ND	UD	OD	DCC	RED*²		
D	200	2500	0	100	0	100	0	0	LR	1.03±0.02
			60	T	T	T	T	T		0.45±0.04
			75	T	T	T	T	T		0.19±0.04
			100	T	T	T	T	T		0
			100	0	0	100	T	0	2ND	1.03±0.02
			T	60	T	T	T	T		0.50±0.05
			T	75	T	T	T	T		0.20±0.05
			T	100	T	T	T	T		0
			100	100	0	0	T	0	OD	1.02±0.02
			T	T	T	60	T	T		0.46±0.04
			T	T	T	75	T	T		0.19±0.04
			T	T	T	100	T	T		0
			100	100	0	0	T	0	UD	1.03±0.02
			T	T	60	T	T	T		0.44±0.05
			T	T	75	T	T	T		0.18±0.04
			T	T	100	T	T	T		0
			100	0	100	0	T	0T	RED	1.03±0.02
			T	T	T	T	T	60		0.49±0.04
			T	T	T	T	T	75		0.24±0.04
			T	T	T	T	T	100		0
			100T	0	100	0	T	100	DIR	0
			75	T	T	T	T	T		0.25±0.04
			60	T	T	T	T	T		0.51±0.04
			0	T	T	T	T	T		1.03±0.02

Each case of increasing (0—'100%) and decreasing (100—'0%) of duty rate to be satisfied.(Except the mark •)

Manual valve position (Oil pressure)	VFS current [mA]	RPM	Operation (Duty rate %)						Damper Apply Pressure ^ (MPa)	Damper Release Pressure (MPa)
			LR	2ND	UD	OD	DCC	RED*²		
D	200	2500	100	100	0	0	0	0	0.25-0.45	0.50-0.70
			T	T	T	T	50	T	0.20-0.45	0
			T	T	T	T	100	T	0.96-1.04	0
	900		100	100	0	0	0	0	0.12-0.22	0.25-0.45
			T	T	T	T	100	T	MIN. 0.29	0

^ Each case of increasing and decreasing of DCC solenoid duty rate to be satisfied.
• 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

Refer to DTC P0731.

DTC P0736 REVERSE GEAR INCORRECT RATIO

COMPONENT LOCATION   EAADA1A0

Revers clutch

L&R brake
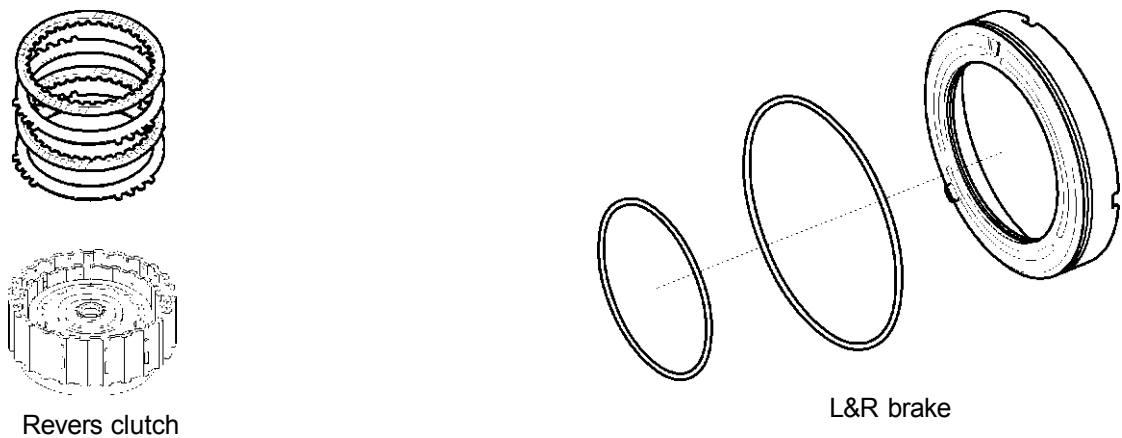
GENERAL DESCRIPTION   E7,AF,I,

The input shaft speed in gear reverse range should be the similar to the value that is what the gear reverse ratio and the output shaft speed are multipled. For example, if the output shaft speed is 1,000 rpm and the gear reverse ratio is 3.808, the input shaft speed may be about 3,808 rpm.

DTC DESCRIPTION   EDE97EFA

This code is displayed if the input shaft speed does not conform with the value which is what the output shaft speed and the gear reverse ratio are multipled. This is most likely caused by a mechanical defect of adherence of control valves or a breakdown of solenoid controlled valves etc. than a electrical defect.

DTC DETECTING CONDITION   ECA6DD1A

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 brake
Enable Conditions	• Engine state=Run • Battery Voltage > 11V and < 16 V • TM oil temperature > -23°C(-9.4°F) • Engine speed > 450rpm • TM output speed > 100rpm • TM Input speed* Orpm • Current gear=reverse • Gear shifting is completed • No PRNDL fail • No error in speed sensors	
Threshold value	• | Measured input speed - calculated input speed | > 200 rpm	
Diagnostic Time	• More than 1sec	
Fail Safe	• Locked into 3rd gear.	

SIGNAL WAVEFORM EDFAC41F

5 3 1 2u   - fiHHuE :   2U

Ho Trig

2-

1   ****'–   W–[1]

FIG.1)

A: INPUT SPEED SENSOR
B : OUTPUT SPEED SENSOR

MONITOR SCANTOOL DATA EA287E8E

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 : 2700-2900 engine rpm

```
          1.2 CURRENT DrtTf1

HjCH1i POSITION SNSR      2213 rpn
«|INPUT  SPEED SNSH       0    rpn
   OUTPUT SPEED SNSR      .il......  "P"
   SHIFT  POSITION        Nj P, R
   THBOTTLE P. SENSOR     36.5 X
   FLUID  TENP.SENSOR     95   *C
   UEHICLE SPEED          0    Kn/h
   LSKSU DUTV             0.0  k


   FIK   SCRN  FULL  PAST  GBPH  HELP
```

ELQE039A

OPERATING ELEMENT OF EACH SHIFTING RANGE

Range		UD clutch	OD clutch	2ND brake	LR brake	REV clutch	RED clutch	DIR clutch	o w e	OWC1
P		-	-	-	0	-	0	-	-	-
R		-	-	-	0	0	0	-	-	-
N		-	-	-	0	-	0	-	-	-
D	1st	0	-	-	0	-	0	-	0	0
	2nd	0	-	0	-	-	0	-	0	-
	3rd	0	0	-	-	-	0	-	0	-
	4th	-	0	0	-	-	0	-	0	-
	5th	-	0	0	-	-	-	0	-	-

UD/C : Underdrive clutch
OD/C : Overdrive clutch
2ND/B : 2ND brake
LR/B : Low & Reverse brake
REV/C: Reverse clutch
RED/B: Reduction brake
DIR/C: Direct clutch
OWC : One way clutch for sub gear shifting
OWC1 : One way clutch for main gear shifting

Stall test procedure in Reverse and reason
Procedure
1. Warm up the engine
2. Fully depress the brake pedal, then place the transaxle gear lever into "R" range. Press and hold the accelerator pedal to the floor for no more than eight seconds while observing the engine, input speed, and output speed RPM values.

    * 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°C (176~212°F).
Engine coolant temperature : 80~100°C (176~212°F).

* *Check both rear wheelfleft 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   EF23F50A

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

```
┌─────────────────────────────────────────┬───┐
│         1.2 CURRENT  DATA                 │ 1 │
├─────────────────────────────────────────┤   │
│                                           │   │
│   ENGINE  BPH              2127 rpn       │   │
│    INPUT  SPEED            2056 rpn       │   │
│ κ │OUTPUT SPEED             828  rpn       │   │
│ x │SHIFT POSITION          R nEAB         │   │
│ x │SELECT  LEVEE SU.       L               │ • │
│   HIUEC NODE               NODE F         │   │
│   VEHICLE SPEED            22   NPH        │   │
│   THROTTLE P. SENSOB       14.1 X         │   │
│                                           │ T │
└─────────────────────────────────────────┴───┘
  FIX    SCF.N   FULL   POST   GF.PH   HELP
```

ELQE040A

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

   • 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   EBCE1412
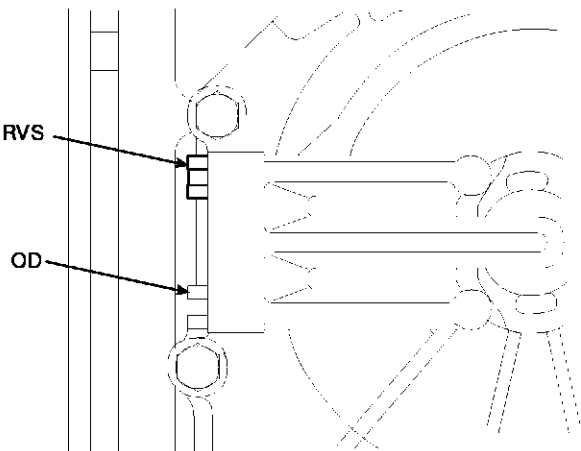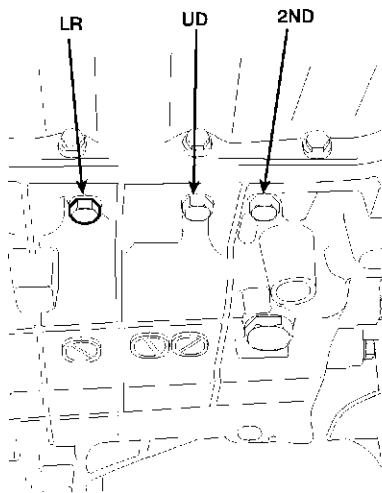
KKCF211E

1. Connect oil pressure gauge to "RVS" and "L/R" ports.

2. Engine "ON".

3. Drive a car with gear position R.

4. Compare it with reference data as below.

 Specification : shown below

*1 Each case of increasing and decreasing speed.
* 2 Only for 5 speed A/T.

Manual valve position	VFS current [mA]	RPM	Operation (Duty rate %)						Oil pressure MPa {kgf/cm²}	
			LR	2ND	UD	OD	DCC	RED*²	UD CLUTCH	LR BRAKE
D	200	2500	0	100	0	100	0	0	1.03±0.02 {10.5±0.2}	1.03±0.02 {10.5±0.2}
			100	0	0	100	0	0	1.03±0.02 {10.5±0.2}	-
R	250		0	100	100	100	0	0	-	1.55±0.25 {15.8±2.5}

Manual valve position (Oil pressure)	VFS current [mA]	RPM	Operation (Duty rate %)						Oil pressure MPa {kgf/cm^2}		
			LR	2ND	UD	OD	DCC	RED*^{2}	4000	1500 (Decreasing)	600 (Decreasing)
D (LR)	200	600—4500¬600	0	100	0	100	0	0	MAX. 1.11 {MAX. 11.3}	-	MIN. 0.55 {MIN. 5.6}
D(UD)			0	100	0	100	0	0	MAX. 1.11 {MAX. 11.3}	-	MIN. 0.55 {MIN. 5.6}
D(UD)			100	0	0	100	0	0	MAX. 1.11 {MAX. 11.3}	-	MIN. 0.55 {MIN. 5.6}
R (LR)	250		0	100	100	100	0	0	MAX. 1.96 {MAX. 20.0}	MIN. 1.14*^{1} {MIN. 11.6}	MIN. 0.55*^{1} {MIN. 5.6}

Manual valve position (Oil pressure)	VFS current [mA]	RPM	Operation (Duty rate %)						Oil pressure MPa {kgf/cm^2}		
			LR	2ND	UD	OD	DCC	RED*^{2}	VFS current 200mA	VFS current: 600mA	VFS current: 1100mA
D (UD)	200¬1100—200	2500	100	100	0	0	100	0	1.03±0.02 {10.5±0.2}	0.69±0.03 {7.0±0.3}	0.36±0.03 {3.7±0.3}

Manual valve position	VFS current [mA]	RPM	Operation (Duty rate %)						ELEMENT	P (MPa)
			LR	2ND	UD	OD	DCC	RED*²		
D	200	2500	0	100	0	100	0	0	LR	1.03±0.02
			60	T	T	T	T	T		0.45±0.04
			75	T	T	T	T	T		0.19±0.04
			100	T	T	T	T	T		0
			100	0	0	100	T	0	2ND	1.03±0.02
			T	60	T	T	T	T		0.50±0.05
			T	75	T	T	T	T		0.20±0.05
			T	100	T	T	T	T		0
			100	100	0	0	T	0	OD	1.02±0.02
			T	T	T	60	T	T		0.46±0.04
			T	T	T	75	T	T		0.19±0.04
			T	T	T	100	T	T		0
			100	100	0	0	T	0	UD	1.03±0.02
			T	T	60	T	T	T		0.44±0.05
			T	T	75	T	T	T		0.18±0.04
			T	T	100	T	T	T		0
			100	0	100	0	T	0T	RED	1.03±0.02
			T	T	T	T	T	60		0.49±0.04
			T	T	T	T	T	75		0.24±0.04
			T	T	T	T	T	100		0
			100T	0	100	0	T	100	DIR	0
			75	T	T	T	T	T		0.25±0.04
			60	T	T	T	T	T		0.51 ±0.04
			0	T	T	T	T	T		1.03±0.02

Each case of increasing (0—'100%) and decreasing (100—'0%) of duty rate to be satisfied.(Except the mark •)

Manual valve position (Oil pressure)	VFS current [mA]	RPM	Operation (Duty rate %)						Damper Apply Pressure ^ (MPa)	Damper Release Pressure (MPa)
			LR	2ND	UD	OD	DCC	RED*²		
D	200	2500	100	100	0	0	0	0	0.25-0.45	0.50-0.70
			T	T	T	T	50	T	0.20-0.45	0
			T	T	T	T	100	T	0.96-1.04	0
	900		100	100	0	0	0	0	0.12-0.22	0.25-0.45
			T	T	T	T	100	T	MIN. 0.29	0

^ Each case of increasing and decreasing of DCC solenoid duty rate to be satisfied.
• 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   E,,I617。

Refer to DTC P0731.

DTC P0741   TORQUE CONVERTER CLUTCH CIRCUIT - STUCK OFF

GENERAL DESCRIPTION   EFFF8BF5

The PCM controls the locking or unlocking of the Torque Converter Clutch (or Damper Clutch) by appling hydraulic pressure. The main purpose of the TCC control is to save fuel by decreasing the hydraulic load inside the torque converter. The PCM outputs duty pulses to control the torque converter clutch control solenoid valve and hydraulic pressure is applied to the torque converter according to the torque converter clutch duty ratio value. When the duty ratio is high, high pressure is applied and the torque converter clutch is locked. The normal operating range of the torque converter clutch control duty ratio value is from 30%(unlocked) to 85%(locked).

DTC DESCRIPTION   E8E5E59F

The PCM increases the duty ratio to engage the torque converter clutch, monitoring the slip rpms (difference beteween engine speed and turbine speed). To decrease the slip of the torque converter clutch, the PCM applies more hydraulic pressure by increasing the duty ratio. When the slip rpm does not drop down below the specification with 100% duty ratio, the PCM determines that the torque converter clutch is stuck OFF and sets this code.

DTC DETECTING CONDITION   ECECF4AA

Item	Detecting Condition & Fail Safe	Possible cause
DTC Strategy	• Stuck "OFF"	* TORQUE CON-VERTER(DAMPER) CLUTCH : TCC • Faulty TCC or oil pressure system • Faulty TCC solenoid valve • Faulty body control valve • Faulty PCM
Enable Conditions	• TCC Duty cycled 0 or TCC Abnormal slip counters ^ 4	
Threshold value	• TCC slip counter > 4 counts	
Diagnostic Time	• 1 second	
Fail Safe	• Stop the torque converter clutch control	

MONITOR SCANTOOL DATA   E87D6A25

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%)

```
      1.2 CUBBENT DATA      06/24

 81.ENGINE SPEED          3459 rpn
 04.INPUT SPEED SENSOR    3457 rpn
 05.0/PUT SPEED SENSOE    3984 rpn
 B6.DCCSU DUTV
 B7.DAMP.CLUTCH SLIP
 15.SELECT LEUEH POSI.
 16.A/C SUITCH
 17.IDLE SWITCH


 FIK  ||Pf1BI||FULL||HELP|[GBPH]|ECED
```

FIG. 1)

FIG. 1) : **Normal status**

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

   • Fault is intermittent caused by poor contact in the sensor's and/or PCM's connector or was repaired and 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.

   • Go to "Component inspection" procedure.

COMPONENT INSPECTION   EA18BAD6

1.   CHECK TORQUE CONVERTER CLUTCH SOLENOID VALVE

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

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

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

   4)   Can you hear operating tone for using TCC SOLENOID VALVE actuator testing function?

      • Go to "CHECK OIL PRESSURE" as below.

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

2.   CHECK OIL PRESSURE
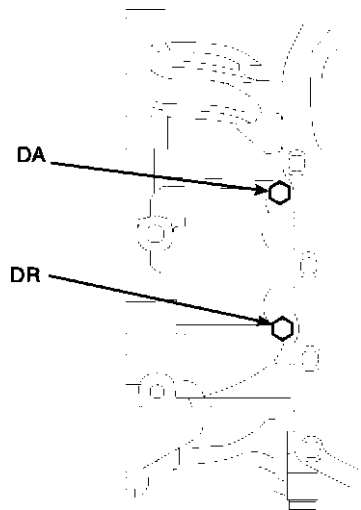
KKCF212B

1)   Connect oil pressure gauge to "DA" and "DR" ports.

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

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

4)   Select the "D" range and accelerate engine speed to 2500 rpm.

5)   Measure oil pressure.

Specification :

Manual valve position	VFS cur-rent(mA)	RPM	Operation (Duty rate %)						Damper Apply Pres-sure &(M Pa)	Damper Release Pressure (MPa)
			LR	2ND	UD	OD	DCC	RED*		
D	200	2500	100	100	0	0	0	0	0.25-0.45	0.50-0.70
			t	T	T	T	50	T	0.20-0.45	0
			t	T	T	T	100	T	0.96-1.04	0
	900		100	100	0	0	0	0	0.12-0.22	0.25-0.45
			t	T	T	T	100	T	MIN. 0.29	0

^ Each case of increasing and decreasing of DCC solenoid duty rate to be satisfied.

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 assembly (or valve body assembly) as necessary and go to "Verification vehicle repair" procedure.

VERIFICATION OF VEHICLE REPAIR   EMFEASA

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 ?

• Go to the applicable troubleshooting procedure.

NO

• System performing to specification at this time.

DTC P0742 TORQUE CONVERTER CLUTCH CIRCUIT - STUCK ON

GENERAL DESCRIPTION   EBBE12CB

Refer to DTC P0741.

DTC DESCRIPTION   EBA8C5FD

The PCM sets this code when the absolute value of RPM difference between engine speed and input shaft speed is less than 20 RPM.

DTC DETECTING CONDITION   EB7BA778

Item	Detecting Condition & Fail Safe	Possible cause
DTC Strategy	• Stuck "ON"	* TORQUE CON-VERTER(DAMPER) CLUTCH : TCC
Enable Conditions	• Engine state=Run • Throttle position sensor value ^ 20% • TM output speed > 500 rpm • Manifold air pressure > 60 kPa • Current gear =1 or 2 or 3 or 4 or 5	• Faulty TCC or oil pressure system • Faulty TCC solenoid valve • Faulty body control valve • Faulty PCM
Threshold value	• Absolute value of RPM difference between engine and TM input speeds 20 rpm	
Diagnostic Time	• 1 second	
Fail Safe	• Stop the torque converter clutch control	

MONITOR SCANTOOL DATA   E95BD09B

Refer to DTC P0741.

COMPONENT INSPECTION   E0AA65DC

Refer to DTC P0741.

VERIFICATION OF VEHICLE REPAIR   EBEDACES

Refer to DTC P0741.

DTC P0743 TORQUE CONVERTER CLUTCH CIRCUIT - ELECTRICAL

COMPONENT LOCATION   E5E8A9EB
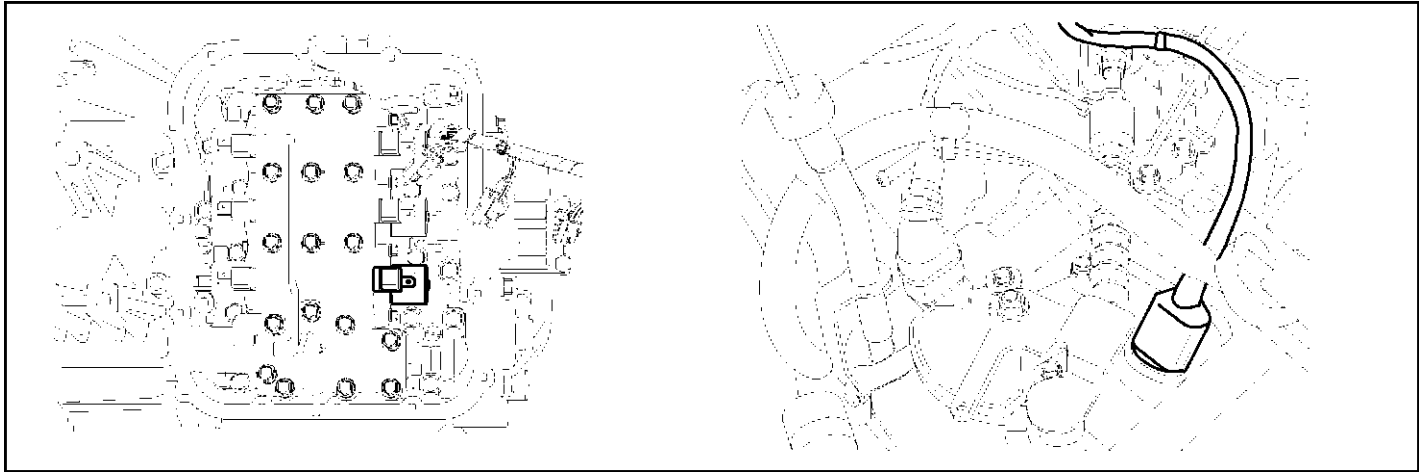
KKCF213A

GENERAL DESCRIPTION   E527CC47

Refer to DTC P0741.

DTC DESCRIPTION   E7FEDB1F

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

DTC DETECTING CONDITION   EAAFAEAD

Item	Detecting Condition & Fail Safe	Possible cause
DTC Strategy	• Check voltage range	* TORQUE CON-VERTER(DAMPER) CLUTCH : TCC • Open or short in circuit • Faulty TCC SOLENOID VALVE • Faulty PCM
Enable Conditions	• Engine state=Run • Engine runtime > 0.5 sees • Battery voltage > 11V and 16 V • Transmission relay state : Relay on • Gear shifting is completed	
Threshold value	• When the PCM detects electric or electronic abnormalness such as short circuit or out of range voltage.	
Diagnostic Time	• More than 5 seconds	
Fail Safe	• Locked in 3rd gear.(Control relay off)	

SPECIFICATION   E0D7F194

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
  - VFS : 600 ± 20Hzs

- Internal resistance :
  - 2.6-3.4Q (68°F or 20°C) - LR, 2ND, UD, OD, RED, DCC
  - 4.0-4.7Q (68°F or 20°C) - VFS

- Surge voltage : 56 V(except VFS)

MONITOR SCANTOOL DATA   E188BEB1

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%

```
        1.2 CUREEMI DHlfi       86/24

  81. ENGINE SPEED          3459 rpn
  04. INPUT SPEED SENSOE     3457 rpn
  05. O/PUT SPEED SENSOE     3984 rpn
  B6. DCCSO DUTU
  07. DAMP. CLUTCH SLIP           rpn
  15. SELECT LEUEE POSI.
  16. A/C SWITCH
  17. IDLE SWITCH


  FIK | Pf1ET||FULL||HELP||GRPH| ECED
```
  FIG.1)

FIG.1) : Normal status

ELQE041A

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

- Fault is intermittent caused by poor contact in the sensor's and/or PCM's connector or was repaired and 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   EBBIBDAE

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   ESSCSOSD

1. Disconnect "A/T SOLENOID VALVE" connector.

2. Measure voltage between teminal "6" of the sensor harness connector and chassis ground.

3. Turn ignition switch OFF -» ON

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

SOLENOID VALVE

3.UD solenoid valve
4.2ND solenoid valve
5. A/T battery
6. A/T battery
7. V F S solenoid valve(+)
8. V F S solenoid valve(-)
9. T C C solenoid valve
11. LR solenoid valve
12.0D solenoid valve
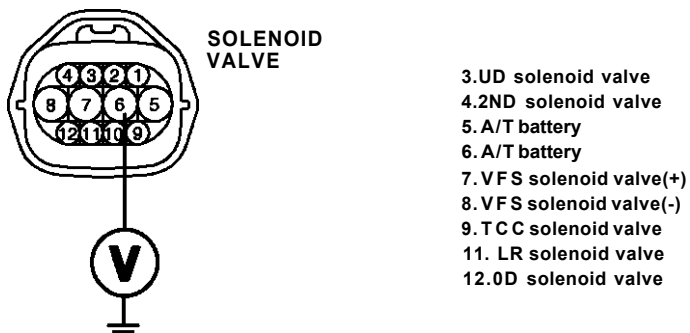
EKRF713A

4. Is voltage within specifications?

   YES

   • Go to "Signal circuit inspection" procedure.

   NO

   • Check that A/T-20A fuse in engine room junction is installed or not blown.
   • Check for open in harness. Repair as necessary and go to "Verification vehicle repair" procedure.

SIGNAL CIRCUIT INSPECTION E9BD89DA

1. Check signal circuit open inspection.

   1) Ignition "OFF".

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

   3) Measure resistance between terminal "9" of the ATM SOLENOID VALVE harness connector and terminal "43" of the PCM harness connector B.

 Specification: approx. 0 £2

ATM SOLENOID VALVE

3. UD solenoid valve
4. 2ND solenoid valve
5. A/T battery
6. A/T battery
7. VFS solenoid valve(+)
8. VFS solenoid valve(-)
9. TCC solenoid valve
11. LR solenoid valve
12. 0D solenoid valve

3. UD solenoid valve
22. LR solenoid valve
42. OD solenoid valve
43. DCC solenoid valve
45. 2ND solenoid valve
59. VFS solenoid valve(-)
75. VFS solenoid valve(+)

(B r

X51l50X49l48X*x*xi5xj5^3^1
X71l70l69l68fc7T?)(*^4^2*

r
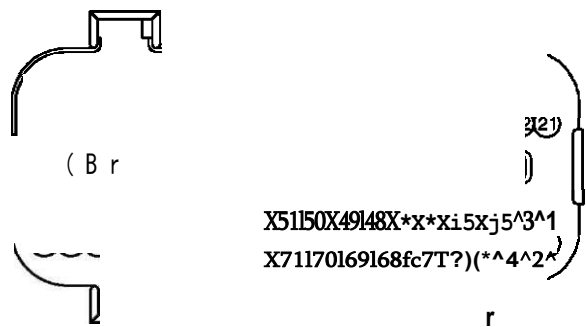
EKRF713B

   4) Is resistance within specifications?

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

   • 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" connector.

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

   Specification: Infinite

ATM
SOLENOID
VALVE

3.UD solenoid valve
4.2ND solenoid valve
5. ATT battery
6. A/T battery
7. VFS solenoid valve(+)
8. VFS solenoid valve(-)
9. T C C solenoid valve
11. LR solenoid valve
12.0D solenoid valve

EKRF713C

   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   E386A86C

1. CHECK SOLENOID VELVE

   1) Ignition "OFF".

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

   3) Measure resistance between terminal "9" and terminal "6" of the ATM SOLENOID VALVE harness connector.

   Specification: Approximately 2.6-3.4 **Q** [20°C(68°F)]

ATM
SOLENOID
VALVE

Component side
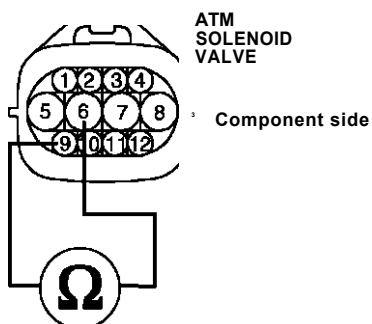
3.UD solenoid valve
4.2ND solenoid valve
5. A/T battery
6. A/T battery
7. V F S solenoid valve(+)
8. V F S solenoid valve(-)
9. T C C solenoid valve
11. LR solenoid valve
12.0D solenoid valve

EKRF713D

4) Is resistance within specification?

YES

• Go to "CHECK PCM" as below.

NO

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

2. CHECK PCM

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

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

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

4) Can you hear operating sound for TCC SOLENOID VALVE actuator testing function?

• Go to "Verification vehicle repair" procedure.

NO

• Replace PCM as necessary and go to "Verification vehicle repair" procedure.

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

VERIFICATION OF VEHICLE REPAIR   E^IEE

Refer to DTC P0741.

DTC P0746 PRESSURE CONTROL SOLENOID VALVE A - PERFORMANCE OR STUCK OFF

COMPONENT LOCATION   EE186281

Control

Supply

Exhaust
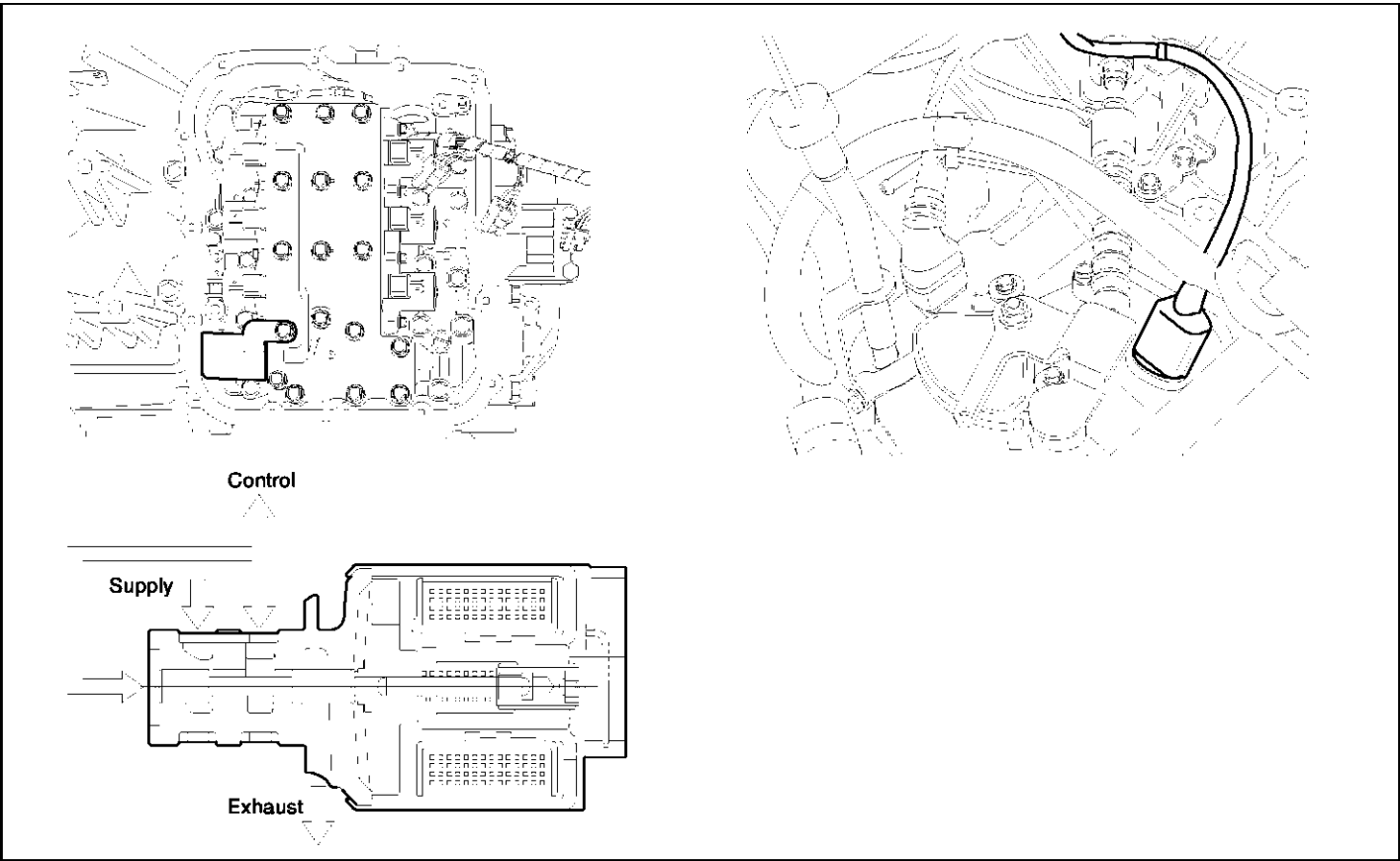
EKRF714A

GENERAL DESCRIPTION   EAC2A883

In order to control the optimum line pressure and improve the efficiency of power according to the maximum efficiency of an oil pump, VFS (Variable Force Solenoid) valve has been added in the valve body hydraulic circuit.

VFS(Variable Force Solenoid): It can be said as a linear solenoid and makes detailed spool contorl available with the closer duty(600 ± 20Hz) than PWM(Pulse Width Modulation-60Hz). PWM repeats ON/OFF signals and decides the operation flux according to the 'ON' time. But, VFS decides the operation flux according to the degree that the spool jams water course.

DTC DETECTING CONDITION   EDC78BDA

Item	Detecting Condition & Fail Safe	Possible cause
DTC Strategy	• Check oil pressure and feedback current value	• Open or short in circuit • Faulty VFS SOLENOID VALVE • Faulty PCM
Enable Conditions	• Engine state=Run • VFS is enabled	
Threshold value	• Current operating state of VFS: Locked off until reset	
Diagnostic Time	• More than 1 second	
Fail Safe	• Stop the VFS control	

SPECIFICATION EFA68D86

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
  - VFS : 600 ± 20Hz

- Internal resistance :
  - 2.6-3.4Q (68°F or 20°C) - LR, 2ND, UD, OD, RED, DCC
  - 4.0-4.7Q (68°F or 20°C) - VFS

- Surge voltage : 56 V(except VFS)

Type: 3 way VFS valve for hydraulic control
Dither Frequency : 600±20 Hz
Sweep time : 20 sec

VFS CONTROL PRESSURS

Input Current(mA)	Control Pressure (No line pressure)			
	Increasing Current			Decreasing Current
	MAX. (Kgf/cm²) [Kpa]	MIN.(Kgf/cm²) [Kpa]	A (Kgf/cm²) [Kpa]	MIN.(Kgf/cm²) [Kpa]
100	6.52 [639]	5.87 [575]	[64]	
200	6.23 [611]	5.70 [559]	[52]	5.43 [532]
300	5.76 [564]	5.24 [514]	[50]	4.49 [484]
400	5.08 [498]	4.59 [450]	[48]	4.30 [421]
500	4.24 [416]	3.78 [370]	[46]	3.52 [345]
700	2.29 [224]	1.82 [178]	[46]	1.51 [148]
800	1.41 [138]	0.09 [88]	[50]	0.58 [57]
900	0.65 [64]	0.14 [14]	[50]	0 [0]
1,000	0.24 [24]	0 [0]	[24]	
1,100	0.24 [24]	0 [0]	[24]	

Test condition
Ps : Supply Pressure (Ps = 7.1 ±0.3 KGf/cm²)
Pc : Control Pressure
Pex : Exhaust Pressure (Atmosphere pressure)
ATF : DIAMOND ATF SP-III
ATF temperature : 30±3°C (86°F)
- Coil resistance : 4.35±35Q
- Dither freauency : 600±20Hz

In case of VFS solenoid valve, the relation between duty and oil pressure can't be expressed.

TERMINAL & CONNECTOR INSPECTION ESSFLC.
Refer to DTC P0743.

POWER SUPPLY CIRCUIT INSPECTION   E,CCBF4E

1. Disconnect "A/T SOLENOID VALVE" connector.

2. Measure voltage between teminal "7" 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**

3.UD solenoid valve
4.2ND solenoid valve
5. A/T battery
6. A/T battery
7. V F S solenoid valve(+)
8. V F S solenoid valve(-)
9. T C C solenoid valve
11. LR solenoid valve
12. 0D solenoid valve

EKRF714B

4. Is voltage within specifications?

   YES

   • Go to "Signal circuit inspection" procedure.

   NO

   • Check that A/T-20A fuse in engine room junction is installed or not blown.
   • Check for open in harness. Repair as necessary and go to "Verification vehicle repair" procedure.

SIGNAL CIRCUIT INSPECTION   EA2I,2,,

1. Check signal circuit open inspection.

   1)   Ignition "OFF".

   2)   Disconnect "ATM SOLENOID VALVE" connector and "PCM" connector.

   3)   Measure resistance between terminal "8" of the ATM SOLENOID VALVE harness connector and terminal "59" of the PCM harness connector.

Specification: approx. 0 £3

ATM SOLENOID VALVE

3. UD solenoid valve
4. 2ND solenoid valve
5. A/T battery
6. A/T battery
7. VFS solenoid valve(+)
8. VFS solenoid valve(-)
9. TCC solenoid valve
11. LR solenoid valve
12. 0D solenoid valve

3. UD solenoid valve
22. LR solenoid valve
42. OD solenoid valve
43. DCC solenoid valve
45. 2ND solenoid valve
59. VFS solenoid valve(-)
75. VFS solenoid valve(+)

JOL

r

4)   Is resistance within specifications?

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

    • 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 "ATM SOLENOID VALVE" connector and "PCM" connector

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

Specification: Infinite

ATM SOLENOID VALVE

3. UD solenoid valve
4. 2ND solenoid valve
5. A/T battery
6. A/T battery
7. VFS solenoid valve(+)
8. VFS solenoid valve(-)
9. TCC solenoid valve
11. LR solenoid valve
12. 0D solenoid valve

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   ECB2DBA3

1.   CHECK SOLENOID VELVE

   1)   Ignition "OFF".

   2)   Disconnect "ATM SOLENOID VALVE" connector.

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

Specification: Approximately 4.0-4.7 Q [20°C(68°F)]

ATM
SOLENOID
VALVE

Component side

3. UD solenoid valve
4. 2ND solenoid valve
5. A/T battery
6. A/T battery
7. VFS solenoid valve(+)
8. VFS solenoid valve(-)
9. TCC solenoid valve
11. LR solenoid valve
12. 0D solenoid valve
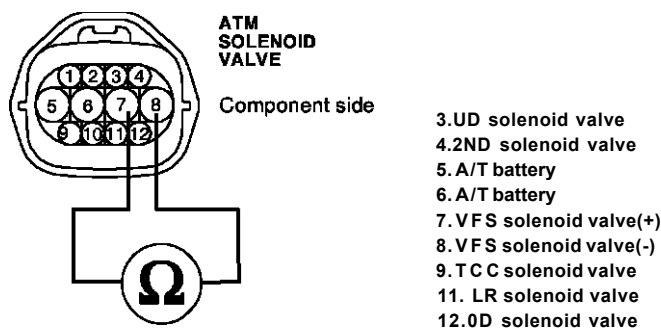
EKRF714E

4)   Is resistance within specification?

   • Go to "CHECK PCM" as below.

      NO

   • Replace VFS SOLENOID VALVE as necessary and go to "Verification vehicle repair" procedure.

2. CHECK PCM

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

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

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

   4) Can you hear operating sound for VFS SOLENOID VALVE actuator testing function?

      YES

      • Go to "Verification vehicle repair" procedure.

      NO

      • Replace PCM as necessary and go to "Verification vehicle repair" procedure.

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

VERIFICATION OF VEHICLE REPAIR   E67,E,AB

Refer to DTC P0741.

DTC P0748 PRESSURE CONTROL SOLENOID VALVE A - ELECTRICAL

COMPONENT LOCATION   E27EEDCB

Refer to DTC P0746.

GENERAL DESCRIPTION   EBECFADC

Refer to DTC P0746.

DTC DESCRIPTION   EEB9D3AD

PCM inspects VFS by monitoring the feedback signal from the solenoid controlled valves. When such malfunction as case that, for example, low voltage should be inputted but High voltage is inputted and vice versa), PCM decides that VFS is malfunctioning and gives this code.

DTC DETECTING CONDITION   E864DF61

Item	Detecting Condition & Fail Safe	Possible cause
DTC Strategy	• Check oil pressure and feedback current value	• Open or short in circuit • Faulty VFS SOLENOID VALVE • Faulty PCM
Enable Conditions	• Engine state=Run • Engine runtime > 0.5 sees • Battery voltage > 11V and 16V • Transmission relay state : Relay on • Gear shifting is completed	
Threshold value	• When the PCM detects electric or electronic abnormalness such as short circuit or out of range voltage	
Diagnostic Time	• More than 5 seconds	
Fail Safe	• Stop the VFS control	

SPECIFICATION   E60B905C

Refer to DTC P0746.

TERMINAL & CONNECTOR INSPECTION   EBSADDSS

Refer to DTC P0743.

POWER SUPPLY CIRCUIT INSPECTION   EE,DBA2,

Refer to DTC P0746.

SIGNAL CIRCUIT INSPECTION   EFSACMO

Refer to DTC P0746.

COMPONENT INSPECTION   EDAE9A6B

Refer to DTC P0746.

VERIFICATION OF VEHICLE REPAIR   E,CB,AF7

Refer to DTC P0741.

DTC P0750 SHIFT CONTROL SOLENOID VALVE A CIRCUIT MALFUNCTION

COMPONENT LOCATION   EF0B7B7A
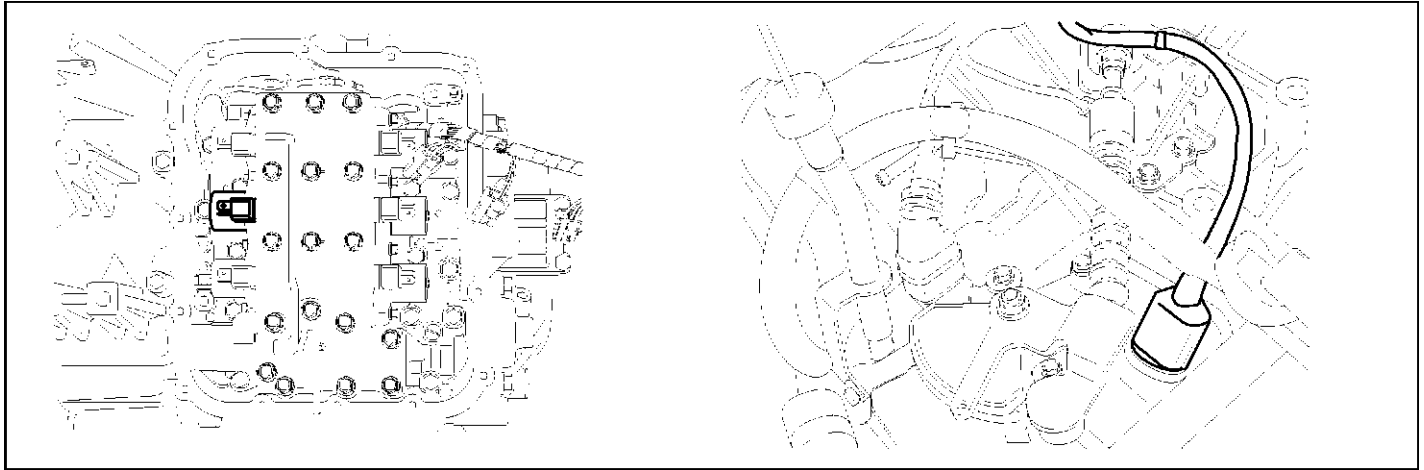
KKCF213G

GENERAL DESCRIPTION   EFC922A2

The Automatic transmission changes the gear position of the transmission by utilizing a combination of clutches and brakes, which are controlled by solenoid valves. This 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 P/R/N gear positions.

DTC DESCRIPTION   EACF22CC

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

DTC DETECTING CONDITION   EADFAAAD

Item	Detecting Condition & Fail Safe	Possible cause
DTC Strategy	• Check voltage range	• Open or short in circuit
Enable Conditions	• Engine state=Run • Engine runtime > 0.5 sees • Battery voltage > 11V and 16 V • Transmission relay state : Relay on • Gear shifting is completed	• Faulty LR SOLENOID VALVE • Faulty PCM
Threshold value	• When the PCM detects electric or electronic abnormalness such as short circuit or out of range voltage.	
Diagnostic Time	• More than 5 seconds	
Fail Safe	• Locked in 3rd gear.(Control relay off)	

SPECIFICATION   E2726877

Refer to DTC P0743.

MONITOR SCANTOOL DATA   EA251635

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%

```
       1.2 CUBKENT DATA                          1.2 CURRENT DATA

   LftHSU DUTV          0.0  %              LfiRSU DUTV          100.0%
   UDSO DUIV            0.0   A             UDSO DUTV            0.0  *
   2NDSU DUTV           100 0%              2NDSO DUTY           0.0  X
   ODSU DUTV            100 ,0&             OTjQU 3UT
   TRANSAXLE RANGE SW   D                   SHIFT POSITION       2
   THROTTLE F. SENSOR   12.9 %              THROTTLE P. SENSOR   12.9 X
   FLUID  TENP. SENSOR  66   "C             FLUID  TENP. SENSOR  71  ° C
   CRK POSITION SNSR    B07  rpi*           CEK POSITION SNSR    B35 rpn


     FIH   SCRN  FULL  PART  GRPH  HELP       FIX   SCRN  FULL  PART  GRPH  HELP
```
FIG.1)   **FIG.2)**

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

ELQE045A

Does "LR SOLENOID DUTY " follow the reference data?

• Fault is intermittent caused by poor contact in the sensor's and/or PCM's connector or was repaired and 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.

• Go to "Terminal & connector inspection " procedure.

TERMINAL & CONNECTOR INSPECTION   E,FE,IC6

Refer to DTC P0743.

POWER SUPPLY CIRCUIT INSPECTION   EOFFODEC

1. Disconnect "ATM SOLENOID VALVE" connector.

2. Measure voltage between terminal "6" 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
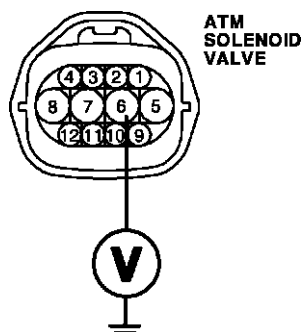
3. UD solenoid valve
4. 2ND solenoid valve
5. A/T battery
6. A/T battery
7. VFS solenoid valve(+)
8. VFS solenoid valve(-)
9. DCC solenoid valve
11. LR solenoid valve
12. OD solenoid valve

EKRF716A

4. Is voltage within specifications?

   YES

   • Go to "Signal circuit inspection" procedure.

   NO

   • Check that A/T-20A fuse in engine room junction is installed or not blown.
   • Check for open in harness. Repair as necessary and go to "Verification vehicle repair" procedure.

SIGNAL CIRCUIT INSPECTION E35478FC

1. Check signal circuit open inspection

    1) Ignition "OFF".

    2) Disconnect "ATM SOLENOID VALVE" connector and "PCM" connector.

    3) Measure resistance between terminal "11" of the ATM SOLENOID VALVE harness connector and terminal "22" of the PCM harness connector B.

    Specification: approx. 0 Ω

    ATM
    SOLENOID
    VALVE

    3.UD solenoid valve
    4.2ND solenoid valve
    5.A/T battery
    6.A/T battery
    7.VFS solenoid valve(+)
    8.VFS solenoid valve(-)
    9.DCC solenoid valve
    11. LR solenoid valve
    12.0D solenoid valve

    3.UD solenoid valve
    22.LR solenoid valve
    42.0D solenoid valve
    43.DCC solenoid valve
    45.2ND solenoid valve
    59.VFS solenoid valve(-)
    75.VFS solenoid valve(+)

    JOL

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    4) Is resistance within specifications?

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

        • 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 "ATM SOLENOID VALVE" connector and "PCM" connector.

    3) Measure resistance between terminal "11" of the ATM SOLENOID VALVE harness and chassis ground.

    Specification: Infinite

ATM SOLENOID VALVE

3.UD solenoid valve
4.2ND solenoid valve
5. A/T battery
6. A/T battery
7. V F S solenoid valve(+)
8. V F S solenoid valve(-)
9. D C C solenoid valve
11. LR solenoid valve
12.0D solenoid valve

EKRF716C

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   ECED888A

1.   CHECK SOLENOID VELVE

1)   Ignition "OFF".

2)   Disconnect "ATM SOLENOID VALVE" connector.

3)   Measure resistance between terminal "11" and terminal "6" of the ATM SOLENOID VALVE harness connector.

Specification: Approximately 2.6-3.4 *Q* [20°C(68°F)]

ATM SOLENOID VALVE

Component side
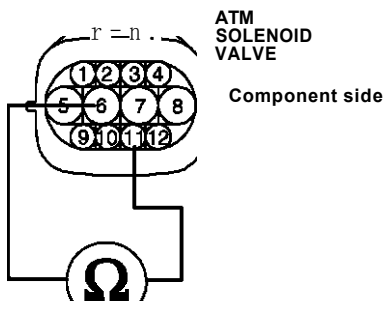
3.UD solenoid valve
4.2ND solenoid valve
5. A/T battery
6. A/T battery
7. V F S solenoid valve(+)
8. V F S solenoid valve(-)
9. D C C solenoid valve
11. LR solenoid valve
12.0D solenoid valve

EKRF716D

4)   Is resistance within specification?

YES

• Go to "CHECK PCM" as below.

NO

• Replace LR SOLENOID VALVE as necessary and go to "Verification vehicle repair" procedure.

2.   CHECK PCM

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

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

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

4)   Can you hear operating sound for LR SOLENOID VALVE actuator testing function?

• Go to "Verification vehicle repair" procedure.

NO

• Replace PCM as necessary and go to "Verification vehicle repair" procedure.

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

VERIFICATION OF VEHICLE REPAIR   EF,,D26B

Refer to DTC P0741.

DTC P0755 SHIFT CONTROL SOLENOID VALVE B CIRCUIT MALFUNCTION

COMPONENT LOCATION   EEEEFA6A
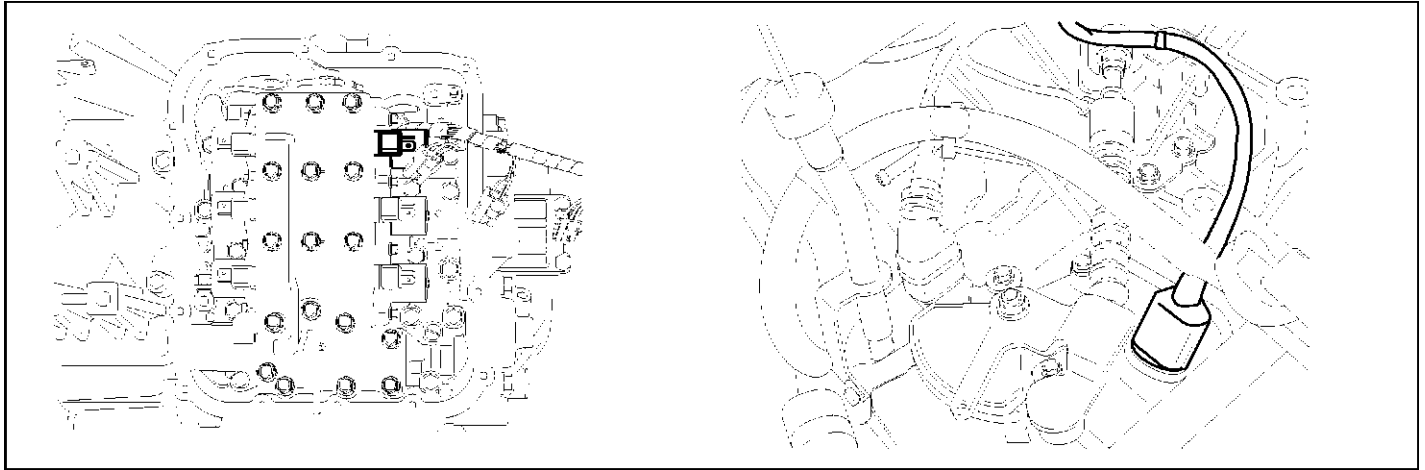
KKCF213H

GENERAL DESCRIPTION   E5BE6978

The Automatic transmission changes the gear position of the transmission by utilizing a combination of clutches and brakes, which are controlled by solenoid valves. This 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 UD clutch is engaged in the 1 st/2nd/3rd/4th gear positions.

DTC DESCRIPTION   EE614343

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

DTC DETECTING CONDITION   E8C5E236

Item	Detecting Condition & Fail Safe	Possible cause
DTC Strategy	• Check voltage range	• Open or short in circuit
Enable Conditions	• Engine state=Run • Engine runtime > 0.5 sees • Battery voltage > 11V and 16 V • Transmission relay state : Relay on • Gear shifting is completed	• Faulty UD SOLENOID VALVE • Faulty PCM
Threshold value	• When the PCM detects electric or electronic abnormalness such as short circuit or out of range voltage.	
Diagnostic Time	• More than 5 seconds	
Fail Safe	• Locked in 3rd gear.(Control relay off)	

SPECIFICATION   E4DAE0FC

Refer to DTC P0743.

MONITOR SCANTOOL DATA   EC8F5C8F

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%

1.2 CUBHENT DATA			1. Z CUBRENT DATA	
ICC SOLENOID DUTV	B.0 %		LfiRSU DUTV	0.0 4
LB SOLENOID DUTV	B.0 X		UDSU DUTV	
UD SOLENOID DUTV	100.0%		2NDSU DUTV	100.0%
2ND SOLENOID DUTV	100.0%		ODSU_DUTV___	_100._0fe
OD SOLENOID DUTV	100.0%		TBANSAXLE RANGE SU	D
SHIFT POSITION			THROTTLE P.SENSOR	12.9 4
SELECT LEUER SW.			FLUID TENP.SENSOR	66 °C
ENGINE TORQUE	14.9 X		CBK POSITION SNSR	807 rpn

FIX SCRN FULL PABT GBPH HELP	FIX SCBN FULL PART GRPH HELP
FIG.1)	**FIG.2)**

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

ELQE046A

 Does "UD SOLENOID DUTY " follow the reference data?

 • Fault is intermittent caused by poor contact in the sensor's and/or PCM's connector or was repaired and 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   EDA52D,O

Refer to DTC P0743.

POWER SUPPLY CIRCUIT INSPECTION   EBDEFDFS

1. Disconnect "ATM SOLENOID VALVE" connector.

2. Measure voltage between terminal "5" 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

3.UD solenoid valve
4.2ND solenoid valve
5.A/T battery
6.A/T battery
7.VFS solenoid valve(+)
8.VFS solenoid valve(-)
9.DCC solenoid valve
11. LR solenoid valve
12.0D solenoid valve

EKRF717A

4. Is voltage within specifications?

   YES

   • Go to "Signal circuit inspection" procedure.

   NO

   • Check that A/T-20A fuse in engine room junction is installed or not blown.
   • Check for open in harness. Repair as necessary and go to "Verification vehicle repair" procedure.

SIGNAL CIRCUIT INSPECTION   E00E052A

1. Check signal circuit open inspection

    1) Ignition "OFF".

    2) Disconnect "ATM SOLENOID VALVE" connector and "PCM" connector.

    3) Measure resistance between terminal "3" of the ATM SOLENOID VALVE harness connector and terminal "3" of the PCM harness connector B.
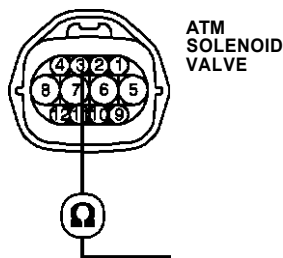
 Specification: approx. 0 £2

ATM
SOLENOID
VALVE

3. UD solenoid valve
4. 2ND solenoid valve
5. A/T battery
6. A/T battery
7. VFS solenoid valve(+)
8. VFS solenoid valve(-)
9. DCC solenoid valve
11. LR solenoid valve
12. 0D solenoid valve

3. UD solenoid valve
22. LR solenoid valve
42. 0D solenoid valve
43. DCC solenoid valve
45. 2ND solenoid valve
59. VFS solenoid valve(-)
75. VFS solenoid valve(+)

(B r
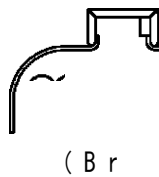
X51l50X49l48X*x*xi5)^3^2^
X71l70l69l68fc7T?)f^Q^2^

r

    4) Is resistance within specifications?

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

    • 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 "ATM SOLENOID VALVE" connector and "PCM" connector.

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

    Specification: Infinite

ATM SOLENOID VALVE

3. UD solenoid valve
4. 2ND solenoid valve
5. A/T battery
6. A/T battery
7. V F S solenoid valve(+)
8. V F S solenoid valve(-)
9. D C C solenoid valve
11. LR solenoid valve
12. 0D solenoid valve

    4) Is resistance within specifications?

        • Go to "Component inspection" procedure.

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

COMPONENT INSPECTION   E739B43B

1. CHECK SOLENOID VELVE

    1) Ignition "OFF".

    2) Disconnect "ATM SOLENOID VALVE" connector.

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

    Specification: Approximately 2.6-3.4 Q [20°C(68°F)]

ATM SOLENOID VALVE

Component side

3. UD solenoid valve
4. 2ND solenoid valve
5. A/T battery
6. A/T battery
7. V F S solenoid valve(+)
8. V F S solenoid valve(-)
9. D C C solenoid valve
11. LR solenoid valve
12. 0D solenoid valve

4) Is resistance within specification?

YES
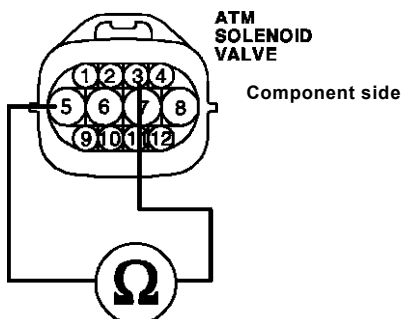
• Go to "CHECK PCM" as below.

NO

• Replace UD SOLENOID VALVE as necessary and go to "Verification vehicle repair" procedure.

2. CHECK PCM

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

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

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

4) Can you hear operating sound for UD SOLENOID VALVE actuator testing function?

• Go to "Verification vehicle repair" procedure.

NO

• Replace PCM as necessary and go to "Verification vehicle repair" procedure.

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

VERIFICATION OF VEHICLE REPAIR   EB7A,ID4

Refer to DTC P0741.

DTC P0760 SHIFT CONTROL SOLENOID VALVE C CIRCUIT MALFUNCTION

COMPONENT LOCATION   ECDAEODE
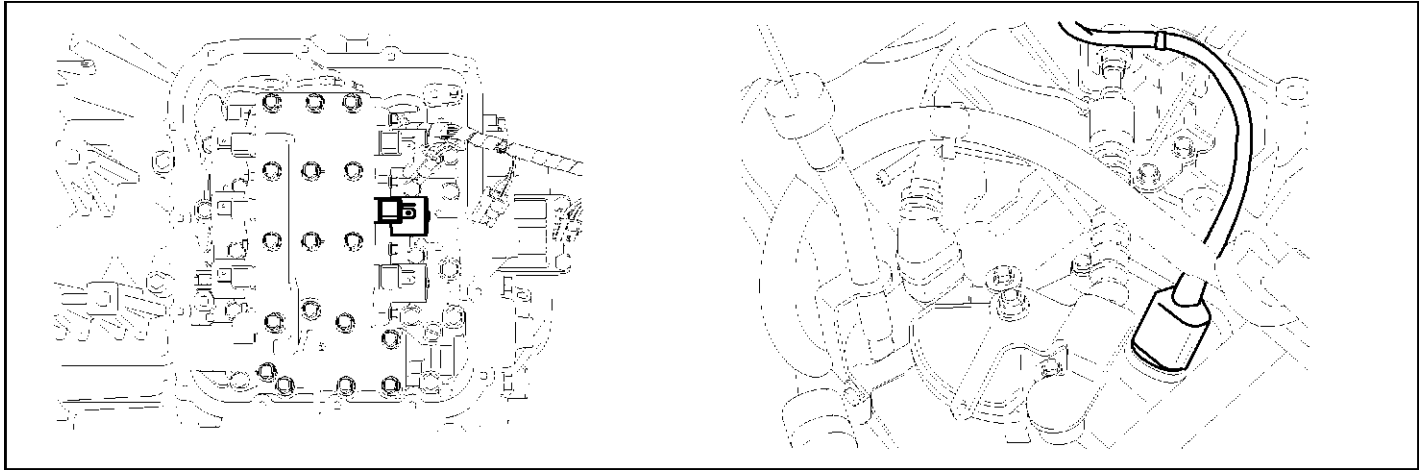
KKCF213I

GENERAL DESCRIPTION   EUACW

The Automatic transmission changes the gear position of the transmission by utilizing a combination of clutches and brakes, which are controlled by solenoid valves. This 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 2ND brake is engaged in the 2nd and 5th gear positions.

DTC DESCRIPTION   EF34EC69

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

DTC DETECTING CONDITION   E10CE0BA

Item	Detecting Condition & Fail Safe	Possible cause
DTC Strategy	• Check voltage range	• Open or short in circuit • Faulty 2nd SOLENOID VALVE • Faulty PCM
Enable Conditions	• Engine state=Run • Engine runtime > 0.5 sees • Battery voltage > 11V and 16 V • Transmission relay state : Relay on • Gear shifting is completed	
Threshold value	• When the PCM detects electric or electronic abnormalness such as short circuit or out of range voltage.	
Diagnostic Time	• More than 5 seconds	
Fail Safe	• Locked in 3rd gear.(Control relay off)	

SPECIFICATION   EEDF6EB3

Refer to DTC P0743.

MONITOR SCANTOOL DATA   E401BBA2

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%

```
          1. 2 CUBRENI DATA

   LSRSU DUTV              B. B  4
   UDSO DUTV              0. O  %
   2HDSU_DUTV              10?. -. ?ˆ...
   ODSU_DUTV___          ..JBEifik...
   iMy?^t?..?fiᴹ·ᴳE..?y.___£_____
   THBOTTLE P. SENSOR     12. 9 %
   FLUID  TENP. SENSOR    66  ° C
   CBK POSITION SNSR      807  rpm


   FIX    SCBN   FULL  PART  GBPH  HELP
```

FIG.1)

```
          1. 2 CURRENT  DATA

   LfiRSU DUTV              100. 0%
   UDSU DUTV              0. O  4
a  2NDSU DUTV             0. O  4          .
   ODSO DUTV              100. 0%
   SHIFT  POSITION         2
   THROTTLE P. SENSOB     12. 9 4
   FLUID  TENP. SENSOR    71  ″C
   CBK POSITION SNSB      835 rpm


   FIX    SCBN   FULL  PART  GRPH  HELP
```

FIG.2)

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

ELQE047A

Does "2nd SOLENOID DUTY " follow the reference data?

• Fault is intermittent caused by poor contact in the sensor's and/or PCM's connector or was repaired and 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.

• Go to "Terminal & connector inspection " procedure.

TERMINAL & CONNECTOR INSPECTION   EBDAZDCF

Refer to DTC P0743.

POWER SUPPLY CIRCUIT INSPECTION   E,76A,7C

1. Disconnect "ATM SOLENOID VALVE" connector.

2. Measure voltage between terminal "5" 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

3. UD solenoid valve
4. 2ND solenoid valve
5. A/T battery
6. A/T battery
7. VFS solenoid valve(+)
8. VFS solenoid valve(-)
9. DCC solenoid valve
11. LR solenoid valve
12. 0D solenoid valve

EKRF717A

4. Is voltage within specifications?

   YES

   • Go to "Signal circuit inspection" procedure.

   NO

   • Check that A/T-20A fuse in engine room junction is installed or not blown.
   • Check for open in harness. Repair as necessary and go to "Verification vehicle repair" procedure.

SIGNAL CIRCUIT INSPECTION   E223396A

1.   Check signal circuit open inspection

   1)   Ignition "OFF".

   2)   Disconnect "ATM SOLENOID VALVE" connector and "PCM" connector.

   3)   Measure resistance between terminal "4" of the ATM SOLENOID VALVE harness connector and terminal "45" of the PCM harness connector B.

   Specification: approx. 0 £2

3. UD solenoid valve
4. 2ND solenoid valve
5. A/T battery
6. A/T battery
7. VFS solenoid valve(+)
8. VFS solenoid valve(-)
9. DCC solenoid valve
11. LR solenoid valve
12. 0D solenoid valve

3. UD solenoid valve
22. LR solenoid valve
42. 0D solenoid valve
43. DCC solenoid valve
45. 2ND solenoid valve
59. VFS solenoid valve(-)
75. VFS solenoid valve(+)
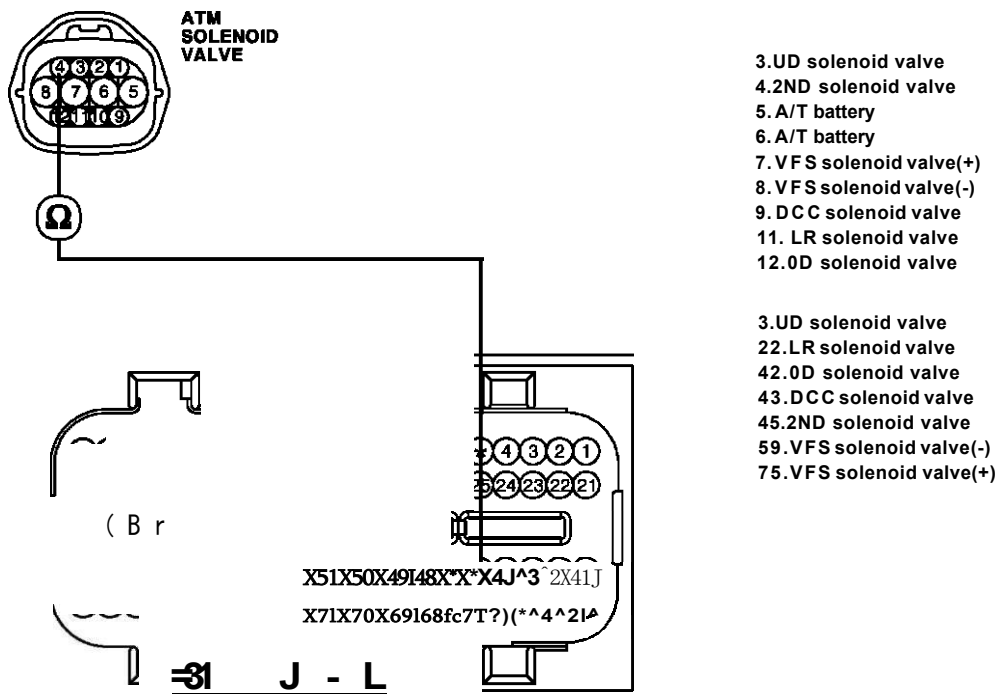
EKRF718A

   4)   Is resistance within specifications?

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

      • 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 "ATM SOLENOID VALVE" connector and "PCM" connector.

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

Specification: Infinite

ATM
SOLENOID
VALVE

3. UD solenoid valve
4. 2ND solenoid valve
5. A/T battery
6. A/T battery
7. V F S solenoid valve(+)
8. V F S solenoid valve(-)
9. D C C solenoid valve
11. LR solenoid valve
12. 0D solenoid valve

EKRF718B

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   EOOFFDBB

1. CHECK SOLENOID VELVE

1) Ignition "OFF".

2) Disconnect "ATM SOLENOID VALVE" connector.

3) Measure resistance between terminal "4" and terminal "5" of the ATM SOLENOID VALVE harness connector.

Specification: Approximately 2.6-3.4 Q [20°C(68°F)]

ATM
SOLENOID
VALVE

Component side
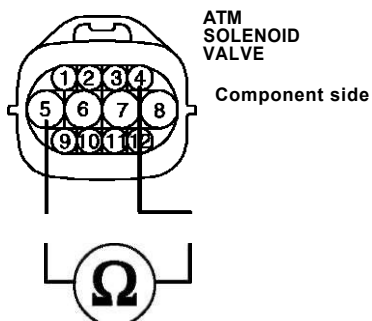
3. UD solenoid valve
4. 2ND solenoid valve
5. A/T battery
6. A/T battery
7. V F S solenoid valve(+)
8. V F S solenoid valve(-)
9. D C C solenoid valve
11. LR solenoid valve
12. 0D solenoid valve

EKRF718C

4) Is resistance within specification?

YES

• Go to "CHECK PCM" as below.

NO

• Replace 2nd SOLENOID VALVE as necessary and go to "Verification vehicle repair" procedure.

2. CHECK PCM

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

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

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

4) Can you hear operating sound for 2nd SOLENOID VALVE actuator testing function?

• Go to "Verification vehicle repair" procedure.

NO

• Replace PCM as necessary and go to "Verification vehicle repair" procedure.

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

VERIFICATION OF VEHICLE REPAIR   EBABESBE

Refer to DTC P0741.

DTC P0765 SHIFT CONTROL SOLENOID VALVE D CIRCUIT MALFUNCTION

COMPONENT LOCATION   E6CCAC16
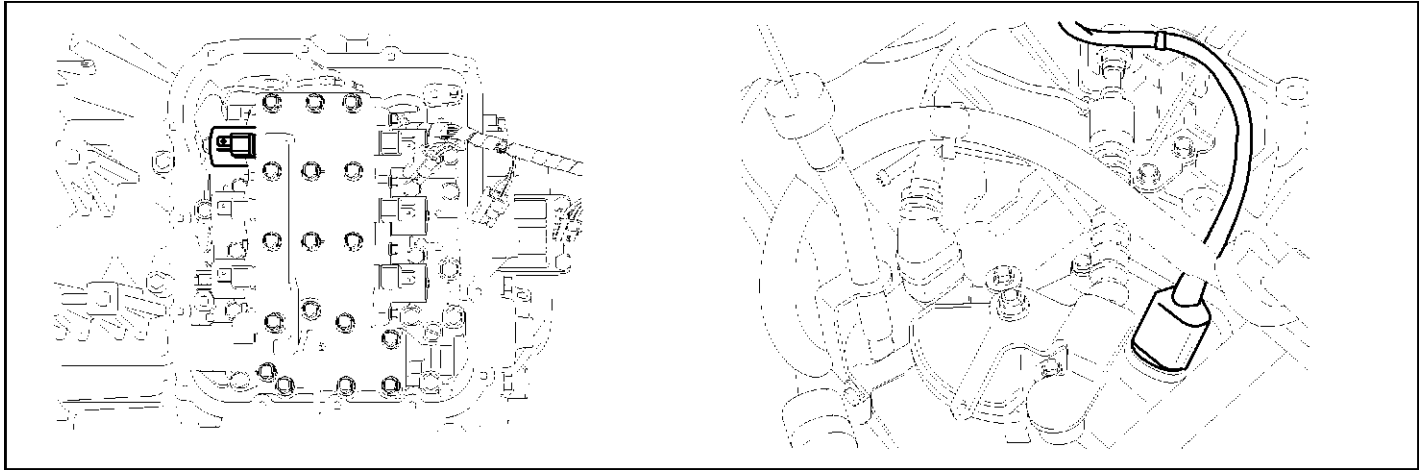
KKCF213J

GENERAL DESCRIPTION   EE446DA1

The Automatic transmission changes the gear position of the transmission by utilizing a combination of clutches and brakes, which are controlled by solenoid valves. This 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 OD clutch is engaged in the 3rd/4th/5th gear positions.

DTC DESCRIPTION   E01063D7

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

DTC DETECTING CONDITION   ECCC479F

Item	Detecting Condition & Fail Safe	Possible cause
DTC Strategy	• Check voltage range	• Open or short in circuit
Enable Conditions	• Engine state=Run • Engine runtime > 0.5 sees • Battery voltage > 11V and 16 V • Transmission relay state : Relay on • Gear shifting is completed	• Faulty OD SOLENOID VALVE • Faulty PCM
Threshold value	• When the PCM detects electric or electronic abnormalness such as short circuit or out of range voltage.	
Diagnostic Time	• More than 5 seconds	
Fail Safe	• Locked in 3rd gear.(Control relay off)	

SPECIFICATION   EA9ADFFF

Refer to DTC P0743.

MONITOR SCANTOOL DATA   ED2570A8

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%

1. 2 CURRENT DATA

	TCC SOLENOID DUTV	0.0 %
*	LR SOLENOID DUTV	100.0%
x	UD SOLENOID DUTV	0.0 %
x	2ND SOLENOID DUTV	0.0 %
x	OD SOLENOID DUTV	100.0%
x	SHIFT POSITION	2 GEAE
x	SELECT LEUER SU.	D
	ENGINE TORQUE	14.9 X

    FIX   SCRN   FULL   PART   GBPH   HELP

FIG.1)

1. 2 CURRENT DATA

LfiRS0 DUTM	100.0%
UDSU DUTV	0.0 "4
ODSU DUTV	0.0 %
ISHIFT POSITION	3
THROTTLE P. SENSOR	16.1 %
FLUID TEMP. SENSOR	72 "C
CRK POSITION SNSR	1789 rp《

    FIX   SCRN   FULL   PART   GRPH   HELP

FIG.2)

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

 Does "OD SOLENOID DUTY " follow the reference data?

 • Fault is intermittent caused by poor contact in the sensor's and/or PCM's connector or was repaired and 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.

 • Go to "Terminal & connector inspection " procedure.

TERMINAL & CONNECTOR INSPECTION   EDSDB™

Refer to DTC P0743.

POWER SUPPLY CIRCUIT INSPECTION   EOCI6,,D

Refer to DTC P0755.

SIGNAL CIRCUIT INSPECTION   EEDB6DC3

1.   Check signal circuit open inspection

    1)   Ignition "OFF".

2)   Disconnect "ATM SOLENOID VALVE" connector and "PCM" connector.

3)   Measure resistance between terminal "12" of the ATM SOLENOID VALVE harness connector and terminal "42" of the PCM harness connector B.
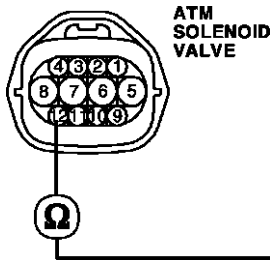
Specification: approx. 0 £2

ATM SOLENOID VALVE

3. UD solenoid valve
4. 2ND solenoid valve
5. A/T battery
6. A/T battery
7. VFS solenoid valve(+)
8. VFS solenoid valve(-)
9. DCC solenoid valve
11. LR solenoid valve
12. 0D solenoid valve

3. UD solenoid valve
22. LR solenoid valve
42. 0D solenoid valve
43. DCC solenoid valve
45. 2ND solenoid valve
59. VFS solenoid valve(-)
75. VFS solenoid valve(+)

EKRF719B

4)   Is resistance within specifications?

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

• 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 "ATM SOLENOID VALVE" connector and "PCM" connector.

3)   Measure resistance between terminal "12" of the ATM SOLENOID VALVE harness and chassis ground.

Specification: Infinite

ATM
SOLENOID
VALVE

3. UD solenoid valve
4. 2ND solenoid valve
5. A/T battery
6. A/T battery
7. VFS solenoid valve(+)
8. VFS solenoid valve(-)
9. DCC solenoid valve
11. LR solenoid valve
12. 0D solenoid valve

EKRF719C

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   EF84AD47

1.   CHECK SOLENOID VELVE

   1)   Ignition "OFF".

   2)   Disconnect "ATM SOLENOID VALVE" connector.

   3)   Measure resistance between terminal "12" and terminal "5" of the ATM SOLENOID VALVE harness connector.

 Specification: Approximately 2.6-3.4 £3 [20°C(68°F)]

ATM
SOLENOID
VALVE

Component side
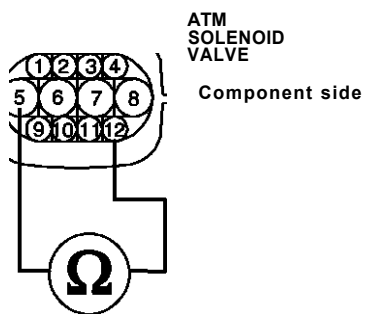
3. UD solenoid valve
4. 2ND solenoid valve
5. A/T battery
6. A/T battery
7. VFS solenoid valve(+)
8. VFS solenoid valve(-)
9. DCC solenoid valve
11. LR solenoid valve
12. 0D solenoid valve

4)   Is resistance within specification?

   • Go to "CHECK PCM" as below.

   NO

   • Replace OD SOLENOID VALVE as necessary and go to "Verification vehicle repair" procedure.

2. CHECK PCM

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

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

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

    4) Can you hear operating sound for OD SOLENOID VALVE actuator testing function?

       YES

     • Go to "Verification vehicle repair" procedure.

          NO

     • Replace PCM as necessary and go to "Verification vehicle repair" procedure.

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

VERIFICATION OF VEHICLE REPAIR   E,BO7,67

Refer to DTC P0741.

DTC P0770 SHIFT CONTROL SOLENOID VALVE E CIRCUIT MALFUNCTION

COMPONENT LOCATION EFEE94C2
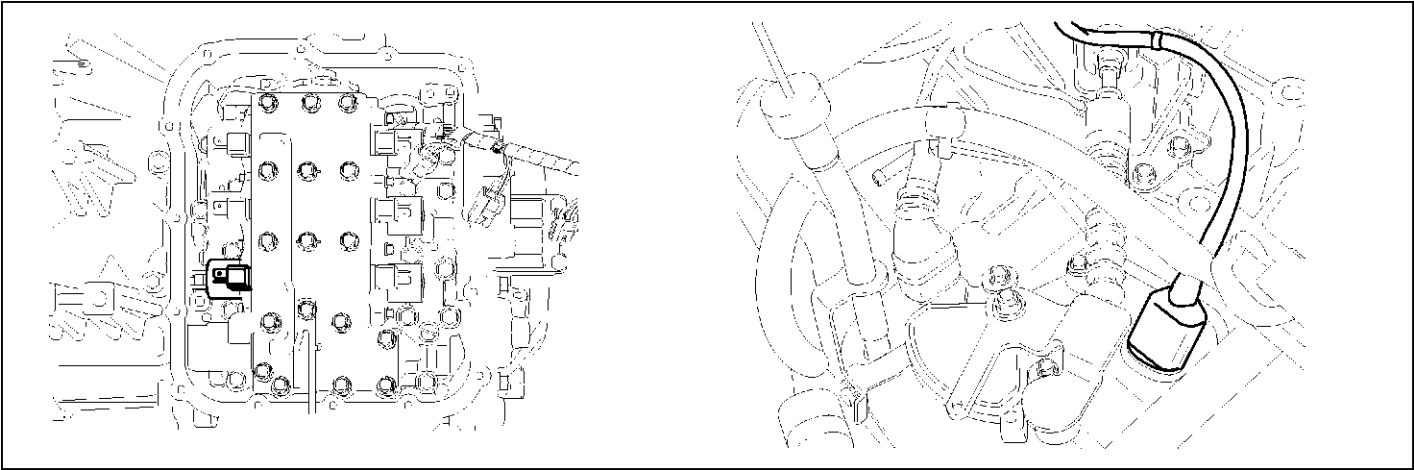
KKCF213K

GENERAL DESCRIPTION EEB21C02

The Automatic transmission changes the gear position of the transmission by utilizing a combination of clutches and brakes, which are controlled by solenoid valves. This 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 RED clutch is engaged in the P/R/N/1 st/2nd/3rd gear positions.

DTC DESCRIPTION EC9FFFD4

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

DTC DETECTING CONDITION E5DDA986

Item	Detecting Condition & Fail Safe	Possible cause
DTC Strategy	• Check voltage range	• Open or short in circuit
Enable Conditions	• Engine state=Run • Engine runtime > 0.5 sees • Battery voltage > 11V and 16 V • Transmission relay state : Relay on • Gear shifting is completed	• Faulty RED SOLENOID VALVE • Faulty PCM
Threshold value	• When the PCM detects electric or electronic abnormalness such as short circuit or out of range voltage.	
Diagnostic Time	• More than 5 seconds	
Fail Safe	• Locked in 3rd gear.(Control relay off)	

SPECIFICATION EAD2BC11

Refer to DTC P0743.

MONITOR SCANTOOL DATA   ED7AF1EE

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

2. Engine "ON".

3. Monitor the "RED SOL. VALVE" parameter on the scantool.

4. Shift gear position 3nd to 4th.

 Specification: 3rd gear — 0%, 4th gear — 100%

    Does "RED SOLENOID DUTY " follow the reference data?

    YES

    • Fault is intermittent caused by poor contact in the sensor's and/or PCM's connector or was repaired and 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   E^UCEA

Refer to DTC P0743.

POWER SUPPLY CIRCUIT INSPECTION   EOC54DD,

Refer to DTC P0750.

SIGNAL CIRCUIT INSPECTION   EFBFF4A0

1. Check signal circuit open inspection

    1) Ignition "OFF".

    2) Disconnect "ATM SOLENOID VALVE" connector and "PCM" connector.

    3) Measure resistance between terminal "10" of the ATM SOLENOID VALVE harness connector and terminal "44" of the PCM harness connector B.

 Specification: approx. 0 **£3**

ATM
SOLENOID
VALVE

3. UD solenoid valve
4. 2ND solenoid valve
5. A/T battery
6. A/T battery
7. VFS solenoid valve(+)
8. VFS solenoid valve(-)
9. DCC solenoid valve
10. RED solenoid valve
11. LR solenoid valve
12. 0D solenoid valve

3. UD solenoid valve
22. LR solenoid valve
42. 0D solenoid valve
43. DCC solenoid valve
44. RED solenoid valve
45. 2ND solenoid valve
59. VFS solenoid valve(-)
75. VFS solenoid valve(+)

4)   Is resistance within specifications?

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

   • 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 "ATM SOLENOID VALVE" connector and "PCM" connector.

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

 Specification: Infinite

ATM
SOLENOID
VALVE

3. UD solenoid valve
4. 2ND solenoid valve
5. A/T battery
6. A/T battery
7. VFS solenoid valve(+)
8. VFS solenoid valve(-)
9. DCC solenoid valve
10. RED solenoid valve
11. LR solenoid valve
12. 0D solenoid valve

EKRF720C

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   EF6DE69A

1.   CHECK SOLENOID VELVE

   1)   Ignition "OFF".

   2)   Disconnect "ATM SOLENOID VALVE" connector.

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

Specification: Approximately 2.6-3.4 Q [20°C(68°F)]

ATM
SOLENOID
VALVE

Component side

1.
2.
3. ³ ᵘ ° solenoid valve
4. 2ND solenoid valve
5. A/T battery
6. A/T battery
7. VFS solenoid valve(+)
8. VFS solenoid valve(-)
9. DCC solenoid valve
10. RED solenoid valve
11. LR solenoid valve
12. 0D solenoid valve
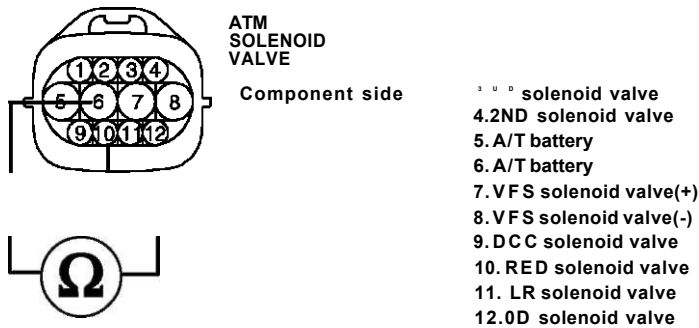
EKRF720D

4)   Is resistance within specification?

   YES

   • Go to "CHECK PCM" as below.

      NO

   • Replace RED SOLENOID VALVE as necessary and go to "Verification vehicle repair" procedure.

2. CHECK PCM

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

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

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

4) Can you hear operating sound for RED SOLENOID VALVE actuator testing function?

  YES

• Go to "Verification vehicle repair" procedure.

  NO

• Replace PCM as necessary and go to "Verification vehicle repair" procedure.

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

VERIFICATION OF VEHICLE REPAIR   EFCDBB,,

Refer to DTC P0741.

DTC P0885 A/T RELAY CIRCUIT MALFUNCTION

COMPONENT LOCATION   EB271BEA
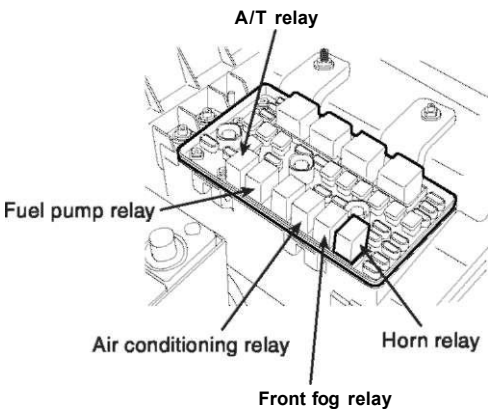
EKRF721F

GENERAL DESCRIPTION   EEF3DE40

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

DTC DESCRIPTION   EA3659D6

The PCM checks the A/T control relay signal by monitoring the control signal. If, after the igniton key is turned on, an unexpected voltage value, which is quite a bit lower than battery voltage, is detected, the PCM sets this code.
This code can also be set when the battery power fuse in the ignition switch has been shorted.

DTC DETECTING CONDITION   EF43ED8D

Item	Detecting Condition & Fail Safe	Possible cause
DTC Strategy	• Check voltage range	• Open or short in circuit
Enable Conditions	• Engine state=Run • Engine runtime > 0.5 sees • Battery voltage > 11V and 16 V • Transmission relay state : Relay on • Gear shifting is completed	• Faulty A/T control relay • Faulty PCM
Threshold value	• PCM detects abnormally low voltage	
Diagnostic Time	• 2.375 second	
Fail Safe	• Locked in 3rd gear.(Control relay off)	

MONITOR SCANTOOL DATA   ECAD5F88

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+

         1.2 CURRENT DATA

   A^T HELAV UOLT   14.3 0
   TRANSAXLE RANGE SU   P, N
   SHIFT POSITION   N, P, R
   BOOST PRESS.SNSR   3   kPa
   HOLD/STD SWITCH   STD
   A/C SWITCH   OFF
   CLOSED TP SWITCH   ON
   STOP LIGHT SWITCH   OFF

   FIX   SCRN   FULL   PART   GRPH   HELP

4. Is A/T RELAY VOLT within specifications?

 • Fault is intermittent caused by poor contact in the sensor's and/or PCM's connector or was repaired and 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.

 • Go to "Terminal & connector inspection" procedure.

TERMINAL & CONNECTOR INSPECTION   EBB4,,BD

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

 • Replace the PCM.

VERIFICATION OF VEHICLE REPAIR EIBE7D,,

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 P0890 AT RELAY - LOW CIRCUIT

COMPONENT LOCATION   ED011A75

Refer to DTC P0885.

GENERAL DESCRIPTION   E3A6CF11

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

DTC DESCRIPTION   E42E054A

The PCM checks the A/T control relay signal by monitoring the control signal. If, the voltage applied to A/T solenoids is lower than 0.5V, the PCM sets this code.

DTC DETECTING CONDITION   EBEA54F8

Item	Detecting Condition & Fail Safe	Possible cause
DTC Strategy	• Check voltage range	• Open or short in circuit • Faulty A/T control relay • Faulty PCM
Enable Conditions	• Engine state * Power off relay or engine shutdown process • Battery voltage > 11V and < 16V • A/T power relay is enabled • No TCM power relay diag fail	
Threshold value	• Voltage applied to A/T solenoids < = 0.5 V	
Diagnostic Time	• 2 seconds	
Fail Safe	• Locked in 3rd gear.(Control relay off)	

MONITOR SCANTOOL DATA   EEF3E39C

Refer to DTC P0885.

TERMINAL & CONNECTOR INSPECTION   E,FDCCAO

Refer to DTC P0885.

POWER SUPPLY CIRCUIT INSPECTION   EA,FFB4,

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

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

3. Measure the voltage between the power terminal of the "A/T CONTROL RELAY" in the engine room relay box and chassis ground.

Specification : Approx. B+

^jl   Relay box side
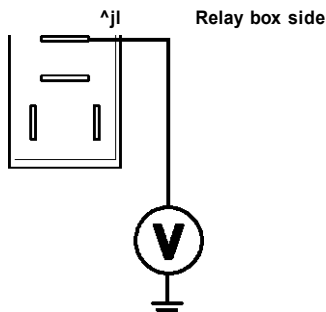
EKRF721B

4. Is voltage within specifications?

    YES

    • Go to "Signal circuit inspection" procedure.

       NO

    • Check that A/T-20A fuse in engine room junction is installed or not blown.
    • Check for Open in harness. Repair as necessary and go to "Verification vehicle repair" procedure.

SIGNAL CIRCUIT INSPECTION   EDBFCD5B

1. CHECK A/T control relay harness

    1) Ignition "OFF".

    2) Disconnect the "ATM CONTROL RELAY" connector.

    3) Measure the voltage between terminal "60" of the "PCM" harness connector A and chassis ground.

    4) Turn ignition switch OFF -» ON.

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

5) Is voltage within specifications?

• Go to "Check supplying power to solenoid valve" procedure.

• 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 and check for proper operation. If the problem is corrected, replace PCM and then go to "Verification of vehicle repair" procedure.

2. CHECK supplying power to solenoid valve harness

1) Ignition "OFF".

2) Disonnect the "ATM CONTROL RELAY" and PCM connector.

3) Measure the resistance between the terminal shown below of the "A/T CONTROL RELAY" in the engine room relay box and terminal "20" of the PCM harness connector A.

Specification : Approx. 0 **£3**

Relay box side

1
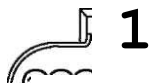
20.Battery voltage

3£   3E

4) Is resistance within specifications?

• Go to "Ground circuit inspection" procedure.

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

GROUND CIRCUIT INSPECTION   E8ED4B45

1. Ignition "OFF".

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

3. Measure the resistance between the terminal shown below of the "A/T CONTROL RELAY" in the engine room relay box and chassis ground.

   Specification : Approx. 0 **£3**

Relay box side
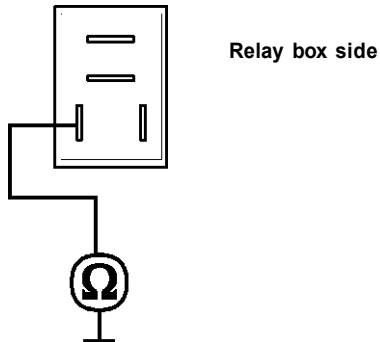
EKRF721E

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   E5FD68F0

1. Ignition "OFF".

2. Remove "A/T CONTROL RELAY"

3. Measure the resistance between each terminal of the sensor.

   Specification: °° except between those two terminals below

AT relay component side
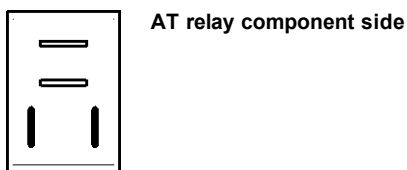
EKRF721G

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   EDSEIDTS

Refer to DTC P0885.

DTC P0891 AT RELAY - OPEN CIRCUIT

COMPONENT LOCATION   EF9C2B4C

Refer to DTC P0890.

GENERAL DESCRIPTION   E75AE183

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

DTC DESCRIPTION   E75B8DC5

The PCM checks the A/T control relay signal by monitoring the control signal. If, the voltage applied to A/T solenoids is higher than 20V, the PCM sets this code.

DTC DETECTING CONDITION   EDAE6676

Item	Detecting Condition & Fail Safe	Possible cause
DTC Strategy	• Check voltage range	• Open or short in circuit
Enable Conditions	• Engine state + Power off relay or engine shutdown process • Engine runtime > 0.5 sees • Battery voltage > 11V and 16 V • Transmission relay state : Relay on • Gear shifting is completed	• Faulty A/T control relay • Faulty PCM
Threshold value	• Voltage applied to A/T solenoids > = 20 V	
Diagnostic Time	• 2 seconds	
Fail Safe	• Locked in 3rd gear.(Control relay off)	

MONITOR SCANTOOL DATA   E0244AE5

Refer to DTC P0890.

TERMINAL & CONNECTOR INSPECTION   EDIDB,5A

Refer to DTC P0890.

POWER SUPPLY CIRCUIT INSPECTION   ECOBUFI

Refer to DTC P0890.

SIGNAL CIRCUIT INSPECTION   E4004A6C

Refer to DTC P0890.

GROUND CIRCUIT INSPECTION   E3B90CD5

Refer to DTC P0890.

COMPONENT INSPECTION   EA91F2BD

Refer to DTC P0890.

VERIFICATION OF VEHICLE REPAIR   EEAE,7E,

Refer to DTC P0890.

AUTOMATIC TRANSAXLE

COMPONENTS(I)   E22DC9E6
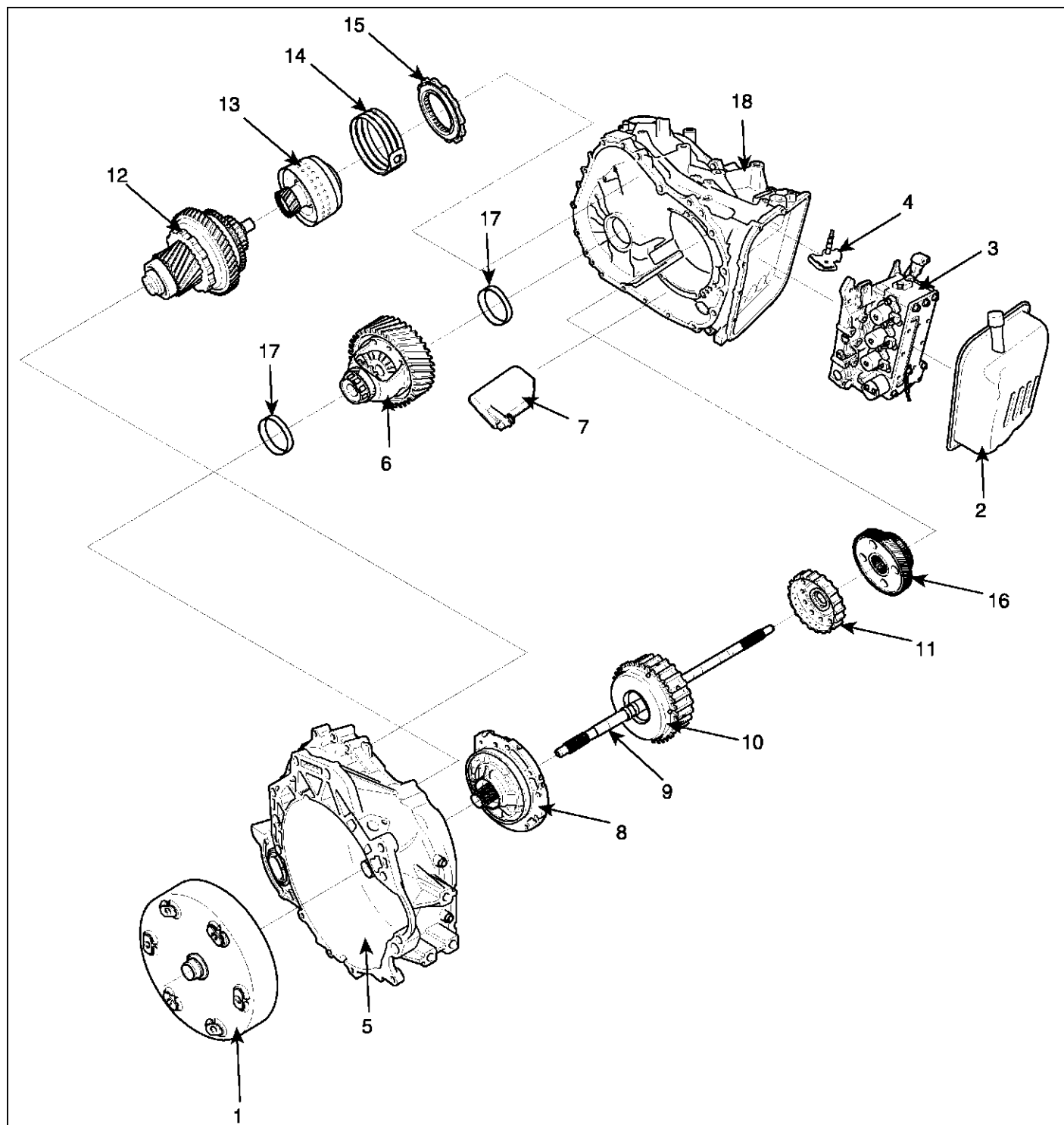
1. Torque converter	7. Main oil filter	13. Direct clutch assembly
2. Valve body cover	8. Oil pump	14. Reduction brake bend
3. Valve body assembly	9. Input shaft	15. One way clutch
4. Manual control shaft assembly	10. Underdrive clutch assembly	16. Transfer drive gear
5. Converter housing	11. Underdrive clutch hub	17. Differential bearing race
6. Differential assembly	12. Direct planetary carrier assembly	18. Transaxle case

EKRF500A

COMPONENTS**(2)**
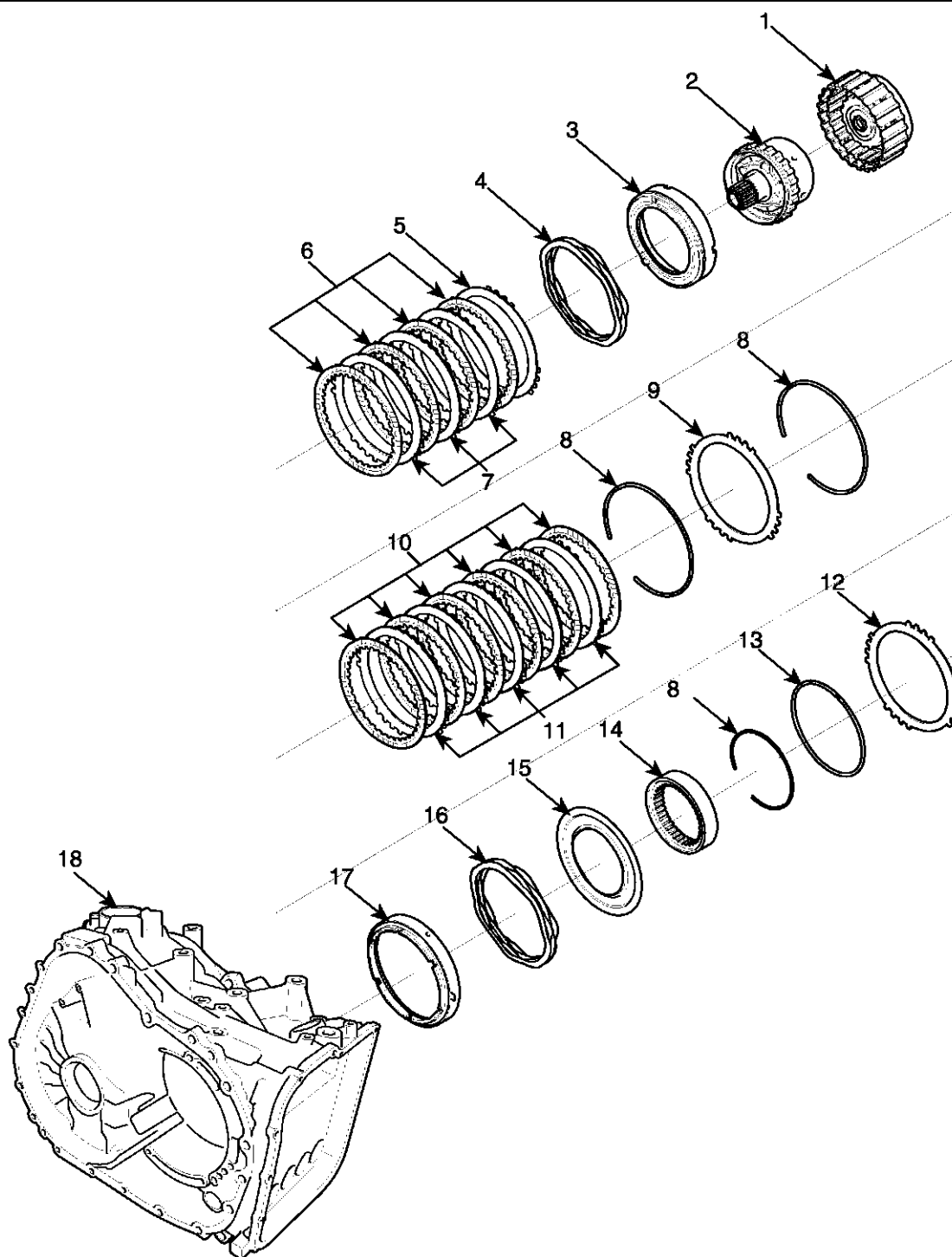
1. Reverse sun gear
2. Planetary gear assembly
3. 2nd brake retainer
4. 2nd brake return spring
5. 2nd brake pressure plate
6. 2nd brake discs

7. 2nd brake plates
8. Snap ring
9. Brake reaction plate
10. Brake discs
11. Brake plates
12. Low&Reverse brake pressure plate

13. Wave spring
14. Oneway clutch inner race
15. Brake spring retainer
16. Low&Reverse brake return spring
17. Low&Reverse brake piston
18. Transaxle case

EKRF500B

REMOVAL E4DEAFF0

  A   *CAUTION*

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

  ЦjJJ *NOTE*

- *Mark all wiring and hoses to avoid misconnection.*
- *Turn the crankshaft pulley so that the No. 1 piston is at top dead center. (See "EM" group)*

1. Disconnect the negative terminal from the battery.

2. Remove the engine cover.

3. Remove the air duct.

4. Remove the intake air hose and air cleaner assembly.

   1) Disconnect the AFS connector.

   2) Disconnect the breather hose from air cleaner hose.

   3) Disconnect the PCM connectors. (See FL group)

   4) Remove the intake air hose and air cleaner (A).
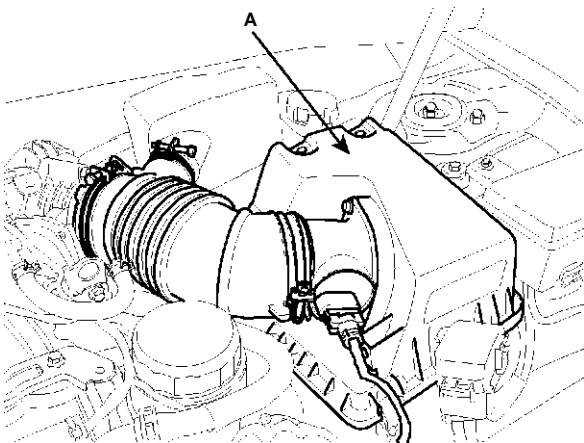
KKCF015Q

5. Remove the front wheels.

6. Remove the under cover(A).
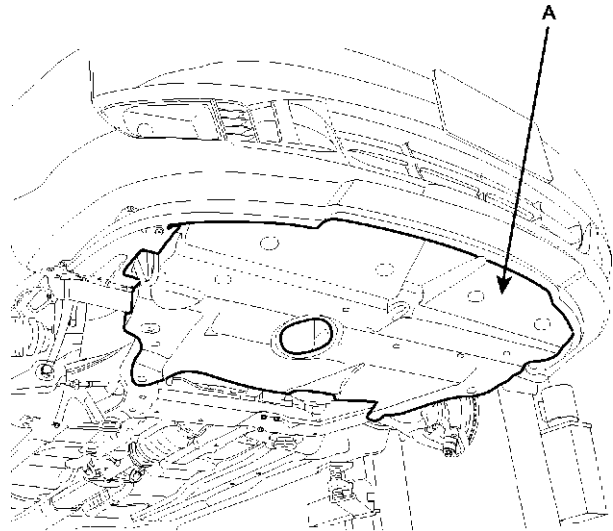
KMRE009H

7. Drain the engine coolant and remove the radiator cap to speed up draining.

8. Remove the upper radiator hose and the lower radiator hose(A).
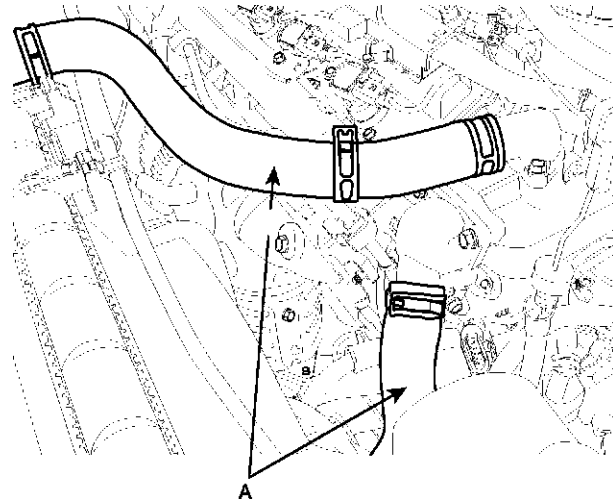
KKCF014H

9. Remove transaxle oil cooler hose(A).

10. Remove engine wiring.

1) Disconnect RH oxygen sensor connector(A).
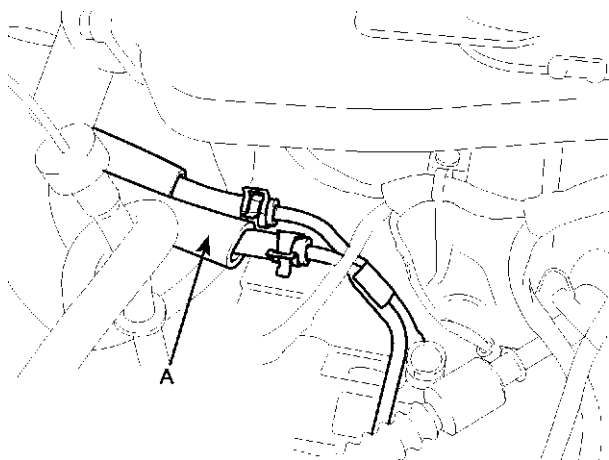
KKCF014L

2) Disconnect LH front oxygen sensor connector^).
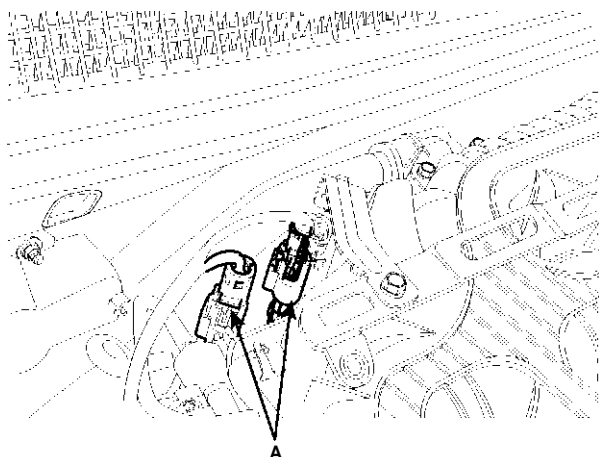
KKCF014Q

3) Disconnect LH rear oxygen sensor connector(A) and CPS connector(B).
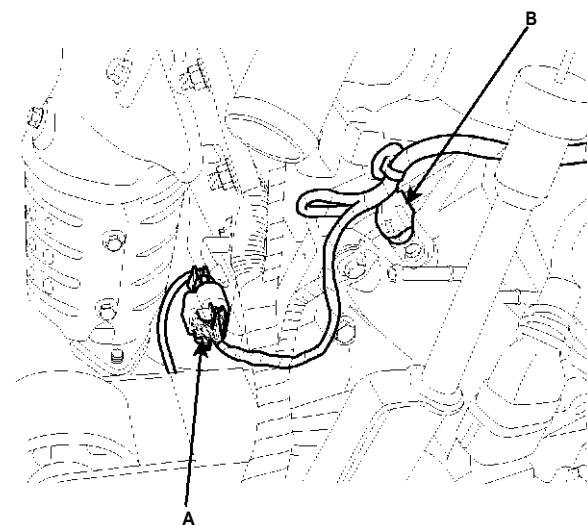
KKCF014Y

11. Disconnect the transaxle wire harness connector and remove transaxle control cable.
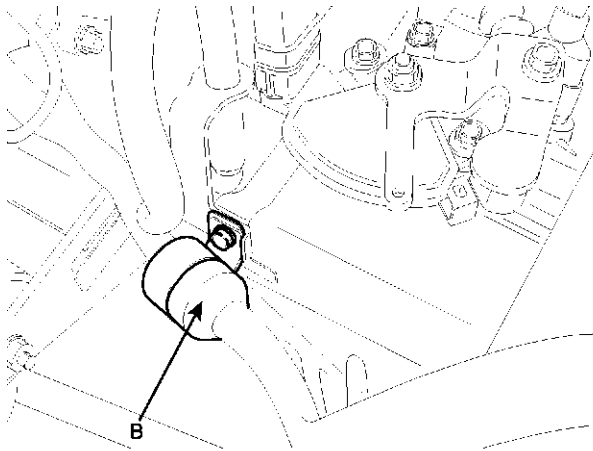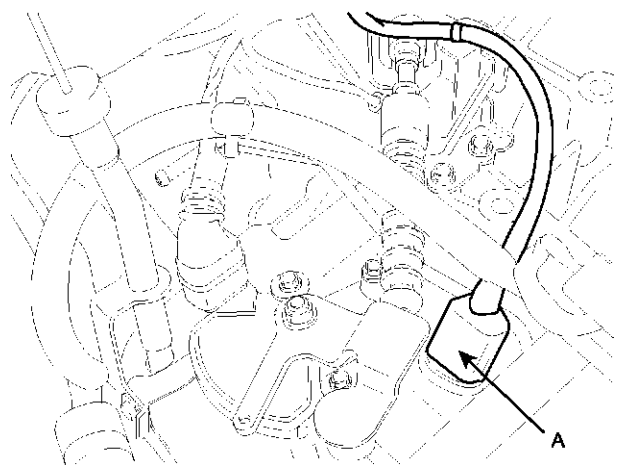
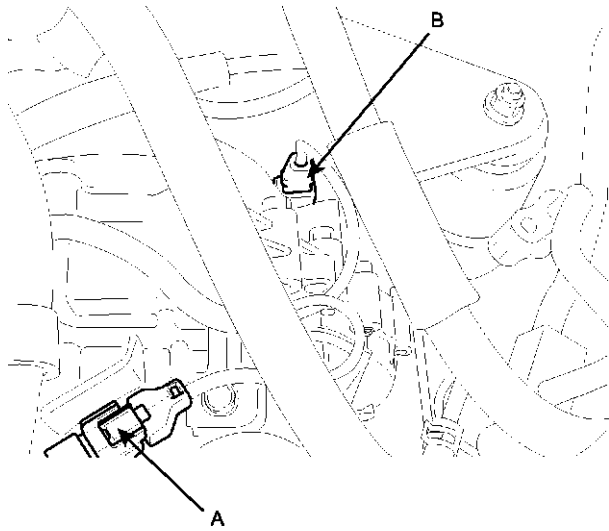   1) Remove the wiring brackets(A, B).

KKCF014Z

KKCF015A

2) Remove the inhibiter switch connector(A) and shift cable(B).
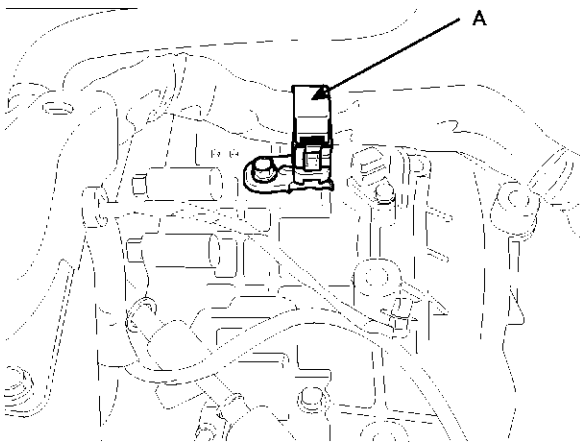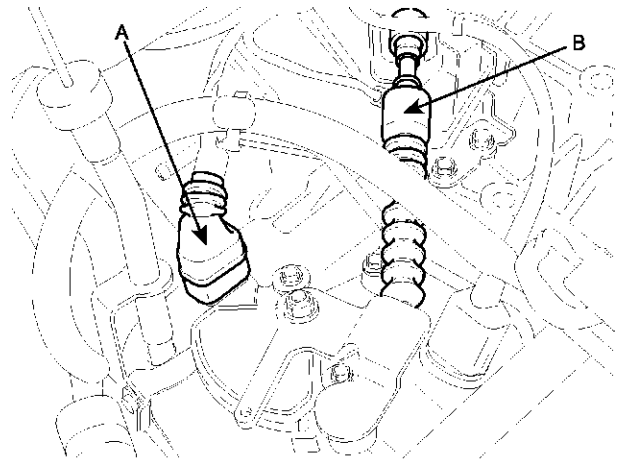
KKCF015B

3) Remove the solenoid valve connector(A).

KKCF015C

4) Remove the input speed sensor, output speed sensor(A) and vehicle speed sensor connector^).

KKCF015D

12. Disconnect EPS connector.

13. Remove power steering pump hose(A).
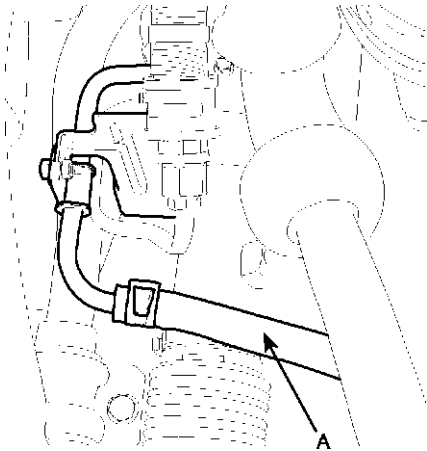
KKCF015R

14. Using the SST(09200-38001), hold the engine and transaxle assembly safely.

15. Drain transaxle oil.

16. Remove lower arm ball joint. (See 'DS' group)

17. Remove tie rod end ball joint. (See 'DS' group)

18. Remove stabilizer bar link. (See 'SS' group)

19. After removing a split pin and nut from the steering bar tie rod, disconnect it. (Refer to 'ST'-group)

20. Remove front roll stopper mounting bolt.

21. Remove rear roll stopper mounting bolt.

22. Remove steering u-joint mounting (See 'ST' group)

23. Remove front exhaust pipe.

24. Supporting the cross member(A) with a jack, remove the stays(B) with the mounting bolts.
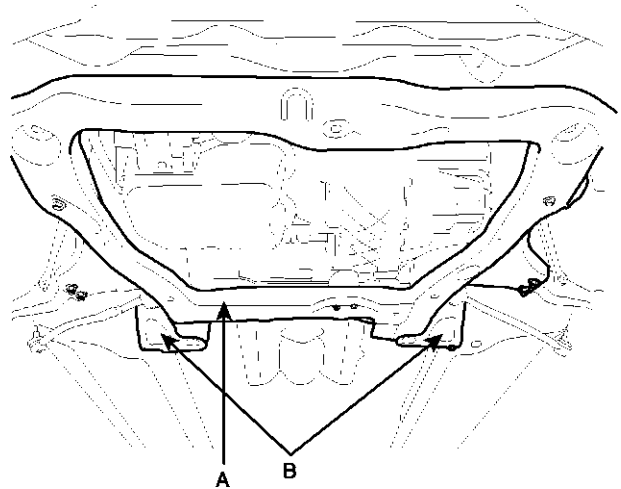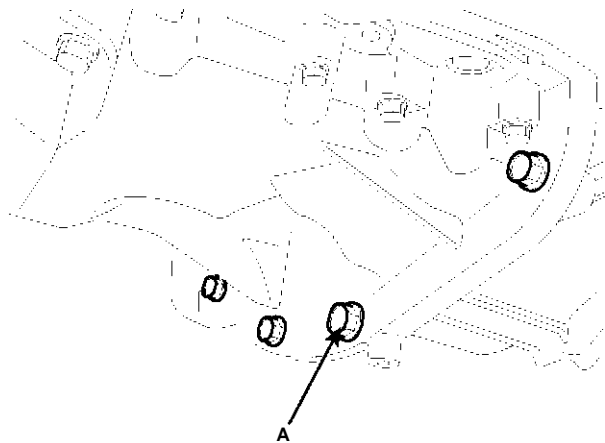

KKCF015S

25. Remove the cross member.

26. Remove drive shaft from transaxle. (See 'DS' group)

27. Install a jack for supporting the transaxle assembly.

28. Remove the transaxle mounting bolts(A, B, C).
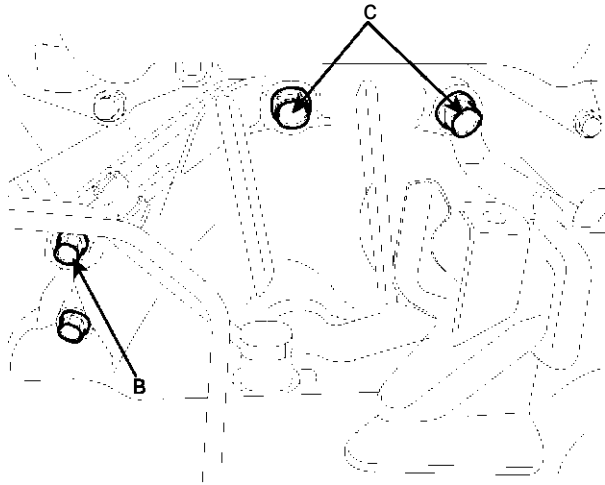
KKCF015L

KKCF015M

29. Lower the vehicle and remove the transaxle mounting bracket.

30. Jack up the vehicle and disassemble the transaxle assembly.

INSTALLATION   ECFE24EA

Installation is in the reverse order of removal.
Perform the following :
  • Adjust the shift cable.
  • Adjust the throttle cable.
  • Refill the engine with engine oil.
  • Refill the transaxle with fluid.
  • Refill the radiator with engine coolant.
  • Bleed air from the cooling system with the heater valve open.
  • Clean the battery posts and cable terminals with sandpaper, assemble them, and apply grease to prevent corrosion.
  • Inspect for fuel leakage.

After assembling the fuel line, turn on the ignition switch (do not operate the starter) so that the fuel pump runs for approximately two seconds and fuel line pressurizes.
Repeat this operation two or three times, then check for fuel leakage at any point in the fuel line.