Transaxle / Transmission

GENERAL

SPECIFICATION (M/T) ECAE9AA9

Item	M5GF1	
TYPE	Forward 5 speed Reverse 1 speed	
ENGINE	2.0L DSL	2.0L GSL
GEAR RATIO		
1st	3.636	←
2nd	2.056	←
3rd	1.296	1.333
4th	0.943	1.061
5th	0.698	0.821
Reverse	3.455	←
Final Reduction Gear Ratio	4.333	4.533

SPECIFICATION (A/T)

Item		F4A42		
Torque converter type		3-element, 1-stage, 2-phase type		
Transaxle type		4-speed forward, 1-speed reverse		
Engine displacement		2.0L DSL	2.0L GSL	2.7 GSL
Gear ratio	1st	2.842	←	←
	2nd	1.529	←	←
	3rd	1	←	←
	4th	0.712	←	←
	Reverse	2.48	←	←
Final gear ratio	2WD	4.042	4.626	4.042
	4WD	↑	↑	↑

TIGHTENING TORQUE (M/T)

Item	Nm	kgf·cm	lb·ft
Oil drain plug	35~45	350~450	25.3~32.5
Select lever knob	4.5~7.5	45~75	3.3~5.4
Console upper cover	9~14	90~140	6.4~10.1
Facia vracket mounting	9~14	90~140	6.5~10.1
Facia vracket mounting 2	7~11	70~110	5.1~7.9
Shift cable	8~12	80~120	5.7~8.68
Transaxle support bracket	60~80	600~800	43.4~57.9
Input speed sensor	10~12	100~120	7.2~8.7
Output speed sensor	10~12	100~120	7.2~8.7
Shift lever switch	10~12	100~120	7.2~8.7
Shift arm	20~27	200~270	14.5~19.6
Select lever	20~27	200~270	14.5~19.6
Reamer bolt	43~50	430~500	31.1~36.2
Side cover bolt	8~10	80~100	5.8~7.2
Relese bearing sleeve mounting	6~8	60~80	4.3~5.8

Item	Nm	kgf·cm	lb·ft
Driven gear sleeve assy	3~5	30~50	2.2~3.6
Differential drive gear bolt(4WD)	130~140	1300~1400	94.1~101.2
Differential drive gear bolt(LSD)	130~140	1300~1400	94.1~101.2
Release folk shaft lever mounting	27~40	270~400	19.5~28.9
Transmission hanger mounting	15~22	150~220	10.8~15.9
Cylinder & hose assy	15~22	150~220	10.8~15.9
1st gear switch	13	130	9.4
Back-up lamp switch	30~35	300~350	21.7~25.3
Transmission stud mounting	15~20	150~200	10.8~14.5
Control housing stopper bracket mounting bolt	10~12	100~120	7.2~8.7
Control housing reamer bolt	31~35	310~350	22.4~25.3
Seal plug	30~42	300~420	21.7~30.4

TIGHTENING TORQUE (A/T)

ITEM	Nm	kgf·cm	lb·ft
Wiring harness bracket	20 ~ 26	200 ~ 260	14.8 ~ 19.1
Control cable bracket bolt	20 ~ 26	200 ~ 260	14.8 ~ 19.2
Eye bolt	27 ~ 33	270 ~ 330	19.9 ~ 24.3
Oil cooler feed tube	10 ~ 12	100 ~120	7.4 ~ 8.9
Oil filter	11 ~ 13	110 ~ 130	8.1 ~ 9.6
Input shaft speed sensor	10 ~ 12	100 ~ 120	7.4 ~ 8.9
Output shaft speed sensor	10 ~ 12	100 ~ 120	7.4 ~ 8.9
Manual control lever	18 ~ 25	180 ~ 250	13.3 ~ 18.4
Transaxle range switch	10 ~ 12	100 ~ 120	7.4 ~ 8.9
Speedometer gear	4 ~ 6	40 ~ 60	3.0 ~ 4.4
Valve body cover	8 ~ 10	80 ~ 100	5.9 ~ 7.4
Valve body mounting bolt	10 ~ 12	100 ~ 120	7.4 ~ 8.9
Oil temperature sensor	10 ~ 12	100 ~ 120	7.4 ~ 8.9
Manual control shaft detent	5 ~ 7	50 ~ 70	3.7 ~ 5.2
Rear cover	20 ~ 26	200 ~ 260	14.8 ~ 19.2
Torque converter housing	42 ~ 54	420 ~ 540	31.0 ~ 39.8
Oil pump	20 ~ 26	200 ~ 260	14.8 ~ 19.2
Transfer drive gear	16 ~ 22	160 ~ 220	11.8 ~ 16.2
Output shaft lock nut	16 ~ 18	160 ~ 180	11.8 ~ 13.3
Output shaft bearing retainer	20 ~ 26	200 ~ 260	14.8 ~ 19.2
Oil filler plug	29 ~ 34	290 ~ 340	21.4 ~ 25.1
Oil drain plug	29 ~ 34	290 ~ 340	21.4 ~ 25.1
Transfer drive gear lock nut	180 ~ 210	1800 ~ 2100	132.8 ~ 154.9
Differential drive gear to subframe bolts	130 ~ 140	1300 ~ 1400	95.9 ~ 103.3
Valve body	10 ~ 12	100 ~ 120	7.4 ~ 8.9
Solenoid valve support	5 ~ 7	50 ~ 70	3.7 ~ 5.2
Plate	5 ~ 7	50 ~ 70	3.7 ~ 5.2

ITEM	Nm	kgf·cm	lb·ft
Pressure check plug	8 ~ 10	80 ~ 100	5.9 ~ 7.4
Front roll stopper bracket to subframe bolts	40 ~ 55	400 ~ 550	29.5 ~ 40.6
Front roll stopper insulator bolt and nut	50 ~ 65	500 ~ 650	36.9 ~ 47.9
Front roll stopper bracket to transaxle bolts	60 ~ 80	600 ~ 800	44.3 ~ 59.0
Rear roll stopper bracket	40 ~ 55	400 ~ 550	29.5 ~ 40.6
Rear roll stopper insulator bolt and nut	50 ~ 65	500 ~ 650	36.9 ~ 47.9
Rear roll stopper bracket to transaxle bolts	60 ~ 80	600 ~ 800	44.3 ~ 59.0
Transaxle mounting sub bracket nut	60 ~ 80	600 ~ 800	44.3 ~ 59.0
Transaxle mounting bracket bolts	40 ~ 55	400 ~ 550	29.5 ~ 40.6
Transaxle mounting insulator bolt	90 ~ 110	900 ~ 1100	66.4 ~ 81.1

LUBRICANTS (M/T)

Item	Lubricant	Quantity
Transmission Oil	HYUNDAI GENUINE PARTS MTF 75W/90(API-GL4)	2.1L
Transaxle input shaft spline	CASMOLY-L9508	as required
Transaxle oil seal	MOLYTEX grease EP-2	as required
Transaxle clutch housing case	THREE BOND 1216	as required
Transaxle rear cover case	THERE BOND 1303	as required
Clutch release folk shaft bushing	CASMOLY-L9508	1g
Differential drive gear bolt	THREE BOND 2471	as required
Rear axle oil	SAE 80W/90(API-GL5)-SHELL SPIRAX OR equivalent	0.75L
Transfer case	SAE 80W/90(API-GL5)-SHELL SPIRAX OR equivalent	0.8L

LUBRICANT (A/T)

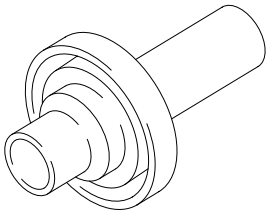
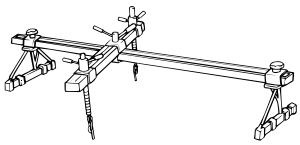
Item	Specified lubricant	Quantity
Transmission oil	Diamond ATF SP-III	7.8ℓ

SEALANT (A/T)

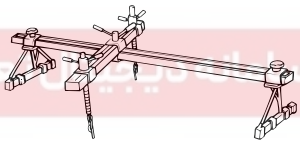
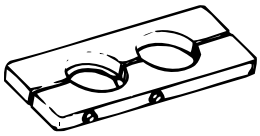
Item	Specified Sealant
Rear cover Torque converter housing Valve body cover	Three Bond - TB 1281B or LOCTITE - FMD - 546
Transmission case side cover	Three Bond - TB 1389 or LOCTITE - 518
Side cover	Three Bond - TB 1389 or LOCTITE - 518/587

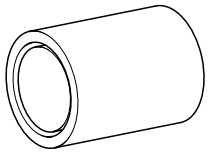
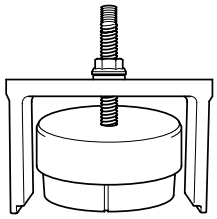
SPECIAL TOOLS EDEE9E1E

M/T

TOOL(number and name)	Illustration	Use
Oil seal installer 09431 - 39000	 D3139000	Installation of differential oil seal Use with (09500 - 11000)
Engine support fixture 09200 - 38001	 D0038001	Removal and installation of transaxle.

A/T

TOOL(number and name)	Illustration	Use
09200 - 38001 Engine support fixture	 D0038001	Removal and installation of transaxle.
09432 - 33200 Bearing removing plate	 D3233200	Removal of 4WD coupling flange oil seal

TOOL(number and name)	Illustration	Use
09478 - 26000 Flange oil seal installer	 EKJA006A	Installation of 4WD coupling flange oil seal
09478 - 26100 Back plate remover	 EKJD506Z	Removal of 4WD coupling back plate

TROUBLESHOOTING E67512BB

Symptom	Suspect area	Remedy
Vibration, noise	Loose or damaged transaxle and engine mounts	Tighten or replace mounts
	Inadequate shaft end play	Correct end play
	Worn or damaged gears	Replace gear
	Inadequate grade of oil	Replace with specified oil
	Low oil level	Replenish
	Inadequate engine idle speed	Adjust idle speed
Oil leakage	Broken or damaged, oil seal or O-ring	Replace oil seal or O-ring
Hard shift	Faulty control cable	Replace control cable
	Poor contact or wear of synchronizer ring and gear cone	Correct or replace
	Weakened synchronizer spring	Replace synchronizer spring
	Inadequate grade of oil	Replace with specified oil
	Grease in flywheel	Inspect and replace flywheel
Jumps out of gear	Worn gear shift fork or broken poppet spring	Replace shift fork or poppet spring
	Synchronizer hub to sleeve spline clearance too large	Replace synchronizer hub and sleeve
Rear wheel lock at starting with steering wheel full-turn	4WD ECM malfunction	Replace 4WD ECM
Rear wheel lock at starting with half-pressing clutch and acceleration pedal		

MANUAL TRANSAXLE SYSTEM

SERVICE ADJUSTMENT PROCEDURE EBAAC68E

REPLACEMENT OF TRANSAXLE GEAR OIL

1. With the vehicle parked on a level surface, remove the drain plug and drain the transaxle oil.
2. Replace the gasket with a new one and install the drain plug.

TORQUE :
35 ~ 45 Nm(350 ~ 450 kgf·cm, 25.8 ~ 33.2lb·ft)

3. Add new oil through the filler plug and, fill it to just below the plug opening.

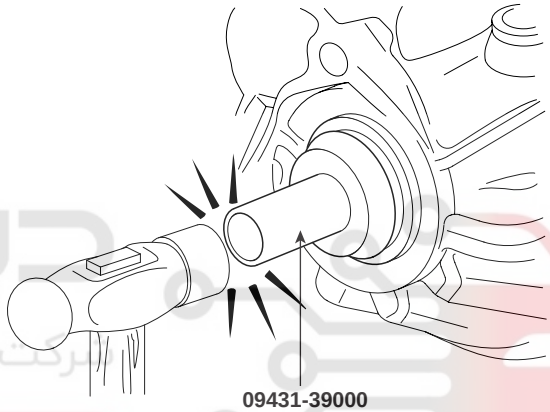
Standard value
Transaxle oil total capacity :
2.1 lit (2.2 U.S.qts., 1.8 imp.qts)

DRIVE SHAFT OIL SEAL REPLACEMENT

1. Disconnect the drive shaft from the transaxle (Refer to "DS" group).
2. Using a flat-tip screwdriver, remove the oil seal.
3. Apply a coating of gear oil to the oil seal.

   Transaxle gear oil : HYUNDAI GENUINE PARTS MTF 75W/85 API GL-4

4. Using the special tool (09431-39000), tap the drive shaft oil seal into the transaxle.

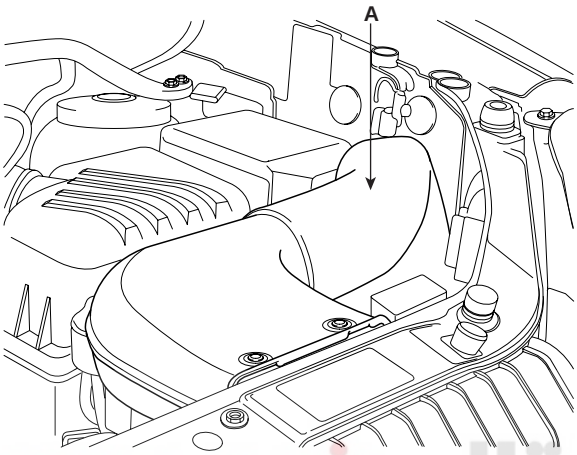


KKQE049C

MANUAL TRANSAXLE

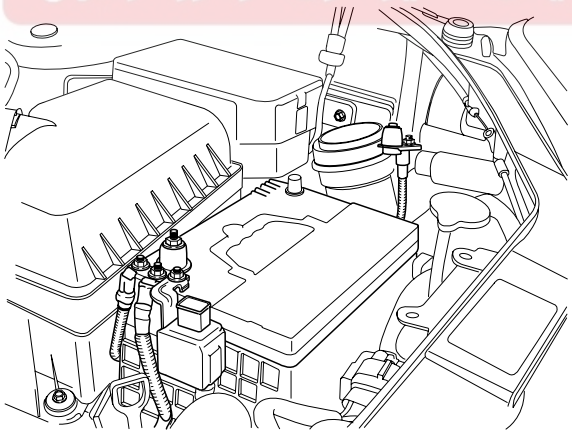
REMOVEAL E1F5DA3E

1. Remove the air duct(A) and hose assembly.



EDQF041B

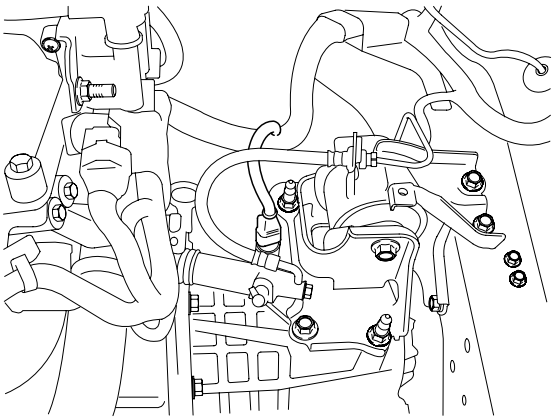
2. Remove the battery and battery tray.



EDQF040A

3. Remove the air cleaner assembly and air flow sensor.

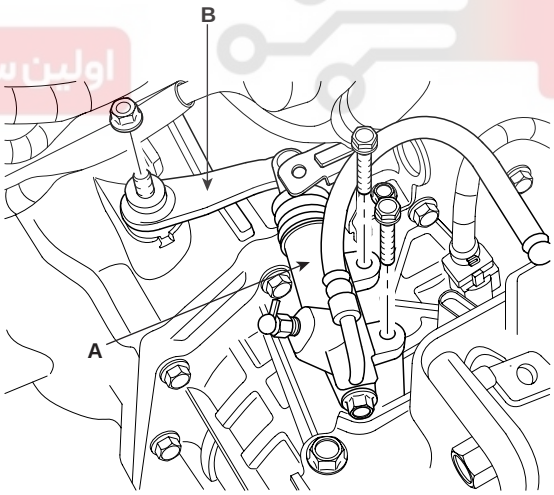
4. Remove ther back-up lamp connector and the vehicle speed sensor.



KKQE001U

5. Disconnect the connectors and the terminals.

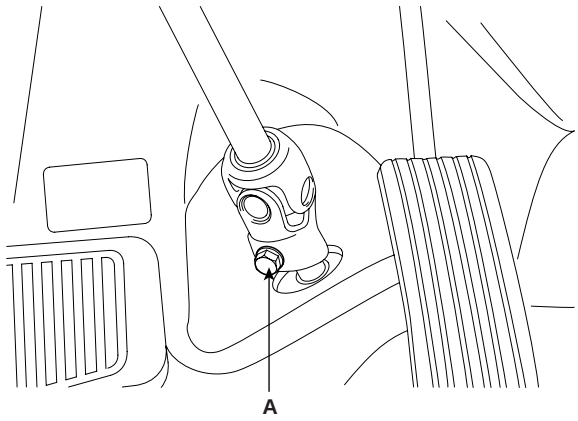
6. Remove the clutch release cylinder(A) and lever(B).



KKQE002U

7. Separate the transaxle cable from the transaxle assembly.

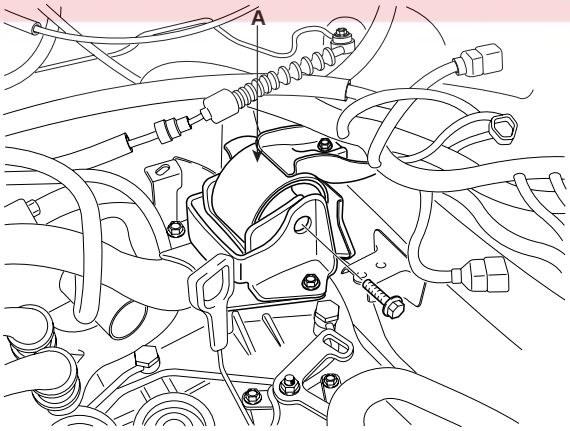
8. Disconnect the steering column shaft from the universal joint in the gear box(See 'ST' group).



ECKD616A

9. Remove the transaxle clutch housing upper mounting bolts.

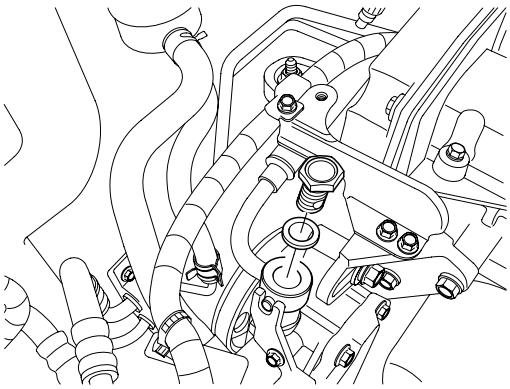
10. Remover the transaxle mounting brackets. (front, rear, left(A))



EDQF016A

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

12. Disconnect the power steering oil pressure tube from the pump. Afterwards, stuff the hole with papers.

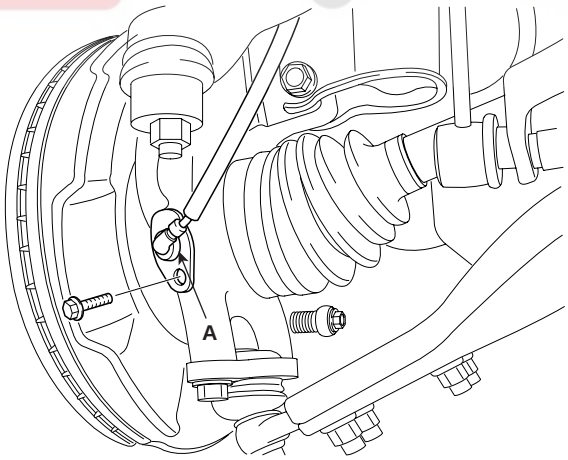


KKQE003U

13. Remove the wheel and tire.

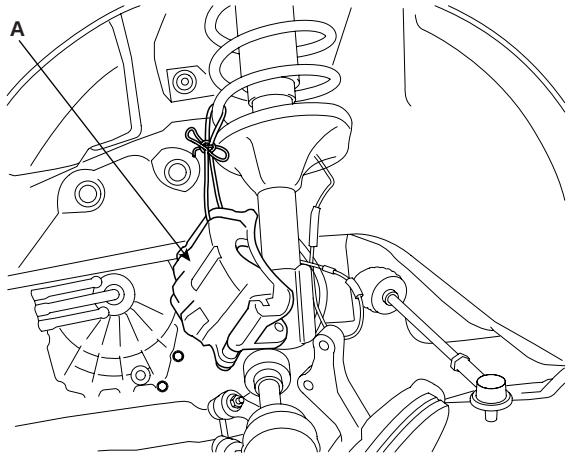
14. Disconnect the strut assembly, tie rod and stabilizer bar link from the knuckle.

15. Remove the wheel speed sensor(A).



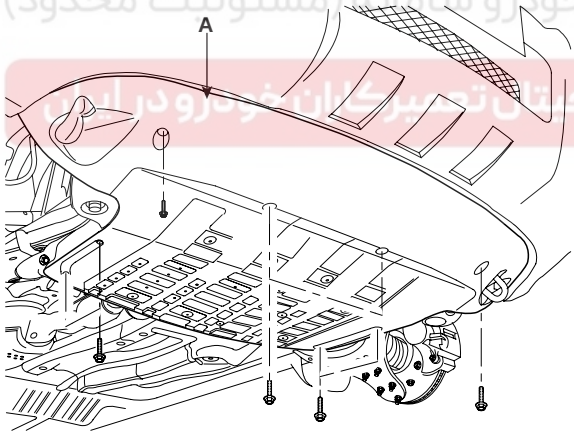
EDQF015A

16. Remove the brake caliper(A) and suspend it with a string.



ECKD612A

17. Lift up the vehicle and remove the undercover(A).

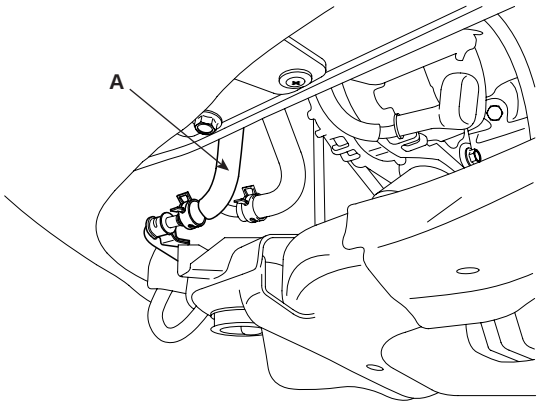


ECQF120A

18. Remove the oil drain plug and drain the fluid.

19. Remove the front muffler.

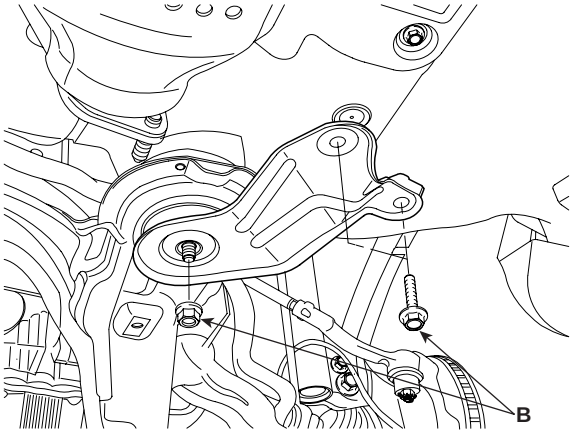
20. Disconnect the steering tube on the cross member(sub-frame). Afterwards, stuff the hole with papers.



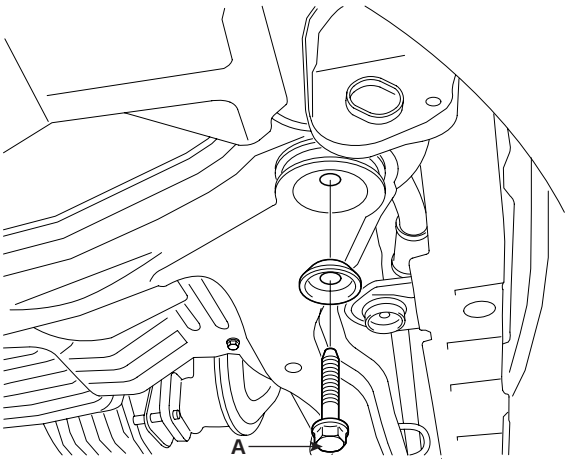
EKQE004U

21. Install a jack for the removal of a cross member(sub-frame).

22. After removing the cross member mounting bolts(A) and nuts(B), remove the cross member with the steering gear box and the stabilizer bar.

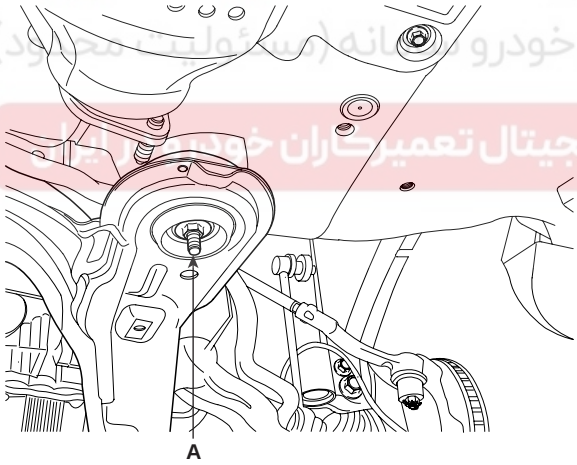


ECQF119A

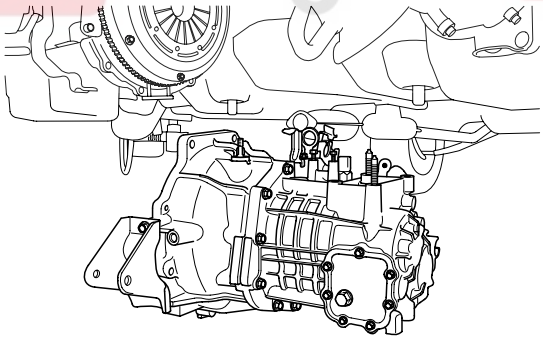


ECKD618A

23. Install a jack for the removal of a transaxle.
24. Remove the front and the rear roll stopper.
25. Remove the engine and the transaxle mounting bolts.
26. Lowering the jack slowly, remove the transaxle.



ECQF118A



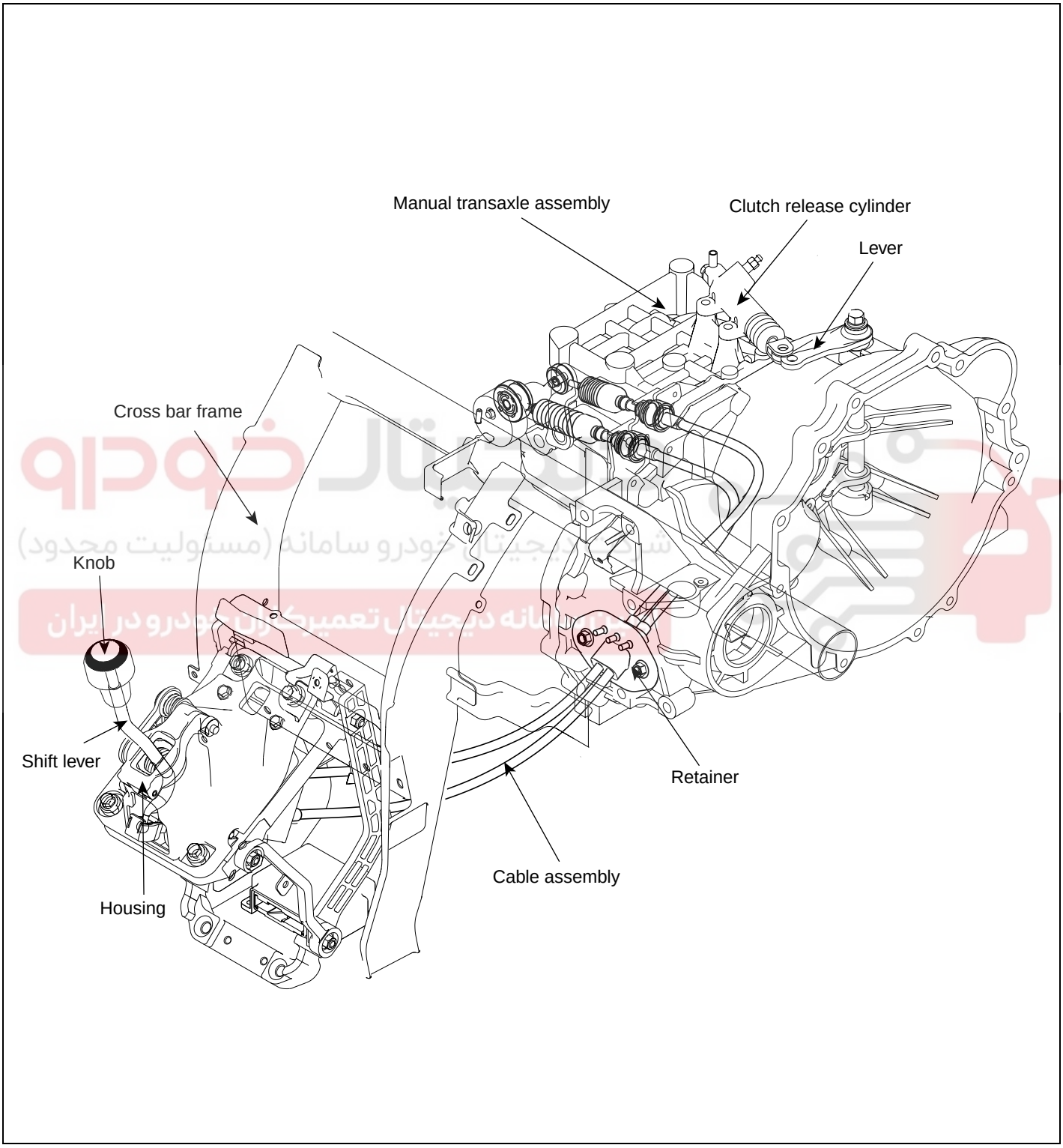
KKQE005U

INSTALLATION E77BC747

Installation is in the reverse order of removal.

MANUAL TRANSAXLE SHIFT CONTROL

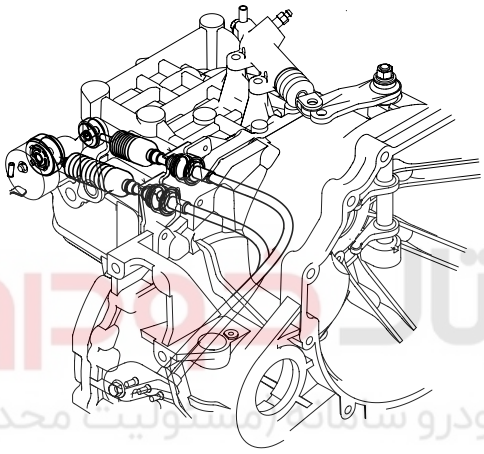
COMPONENTS EABFDD4A



EKQE001M

REMOVAL E4DC835F

1. Remove the console assembly.
2. Remove the cotter pins and clips (shift lever side).
3. Remove the shift lever assembly.
4. Remove the retainer and bolts.
5. Remove the cotter pins and clips (Transaxle side).
6. Remove the shift cable and select cable.



KKQE004M

INSPECTION ED510EED

1. Check the select cable for proper operation and for damage.
2. Check the shift cable for porper operation and for damage.
3. Check the boot for damage.
4. Check each busing for wear, abrasion, sticking, restricted movement or damage.
5. Check for a week or damaged return sping.

INSTALLATION E96C30D4

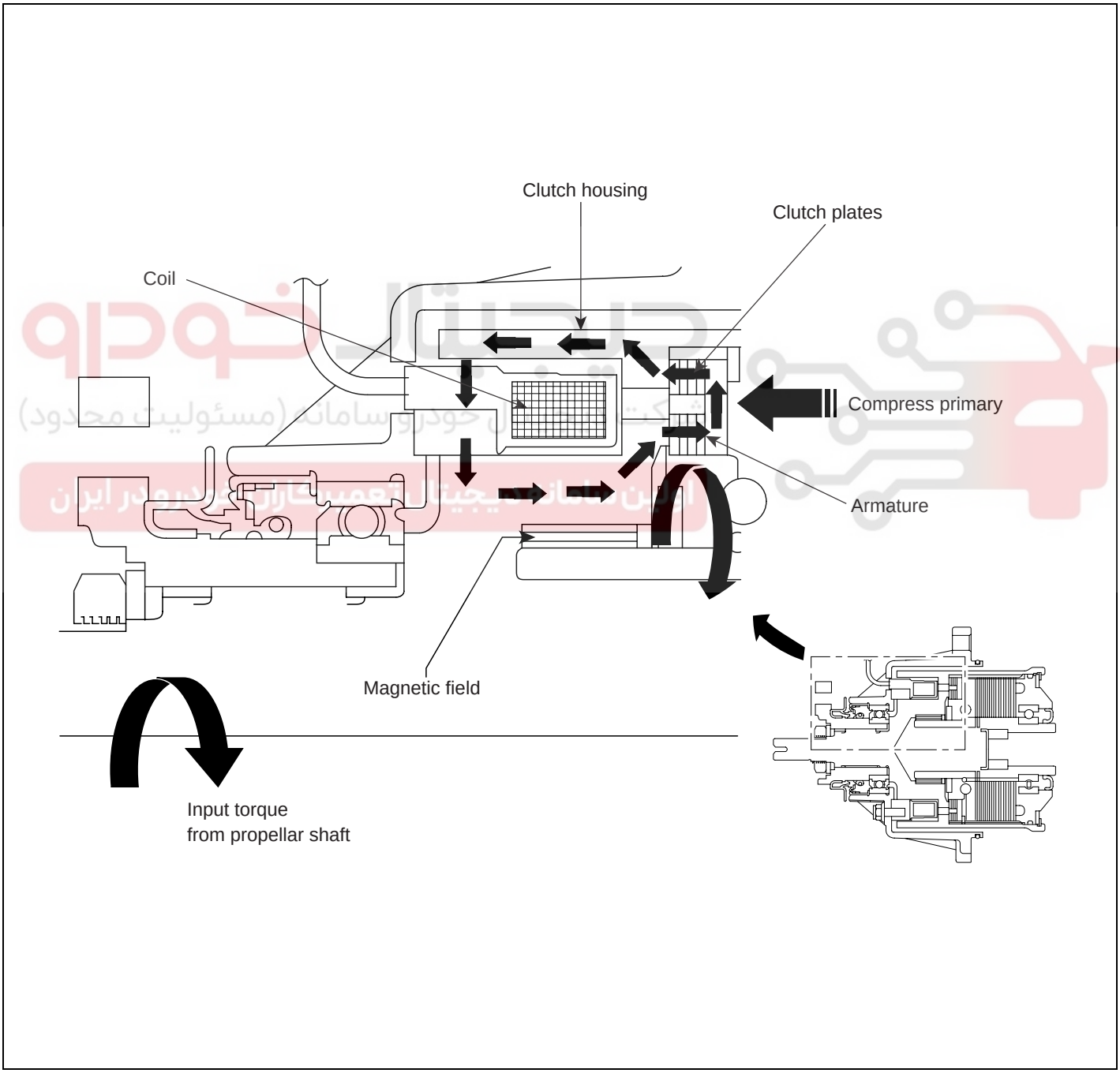
1. Install the shift lever assembly.
2. Install the shift lever and select cable.

TRANSFER CASE ASSEMBLY

POWER FLOW MECHANISM E33DFD71

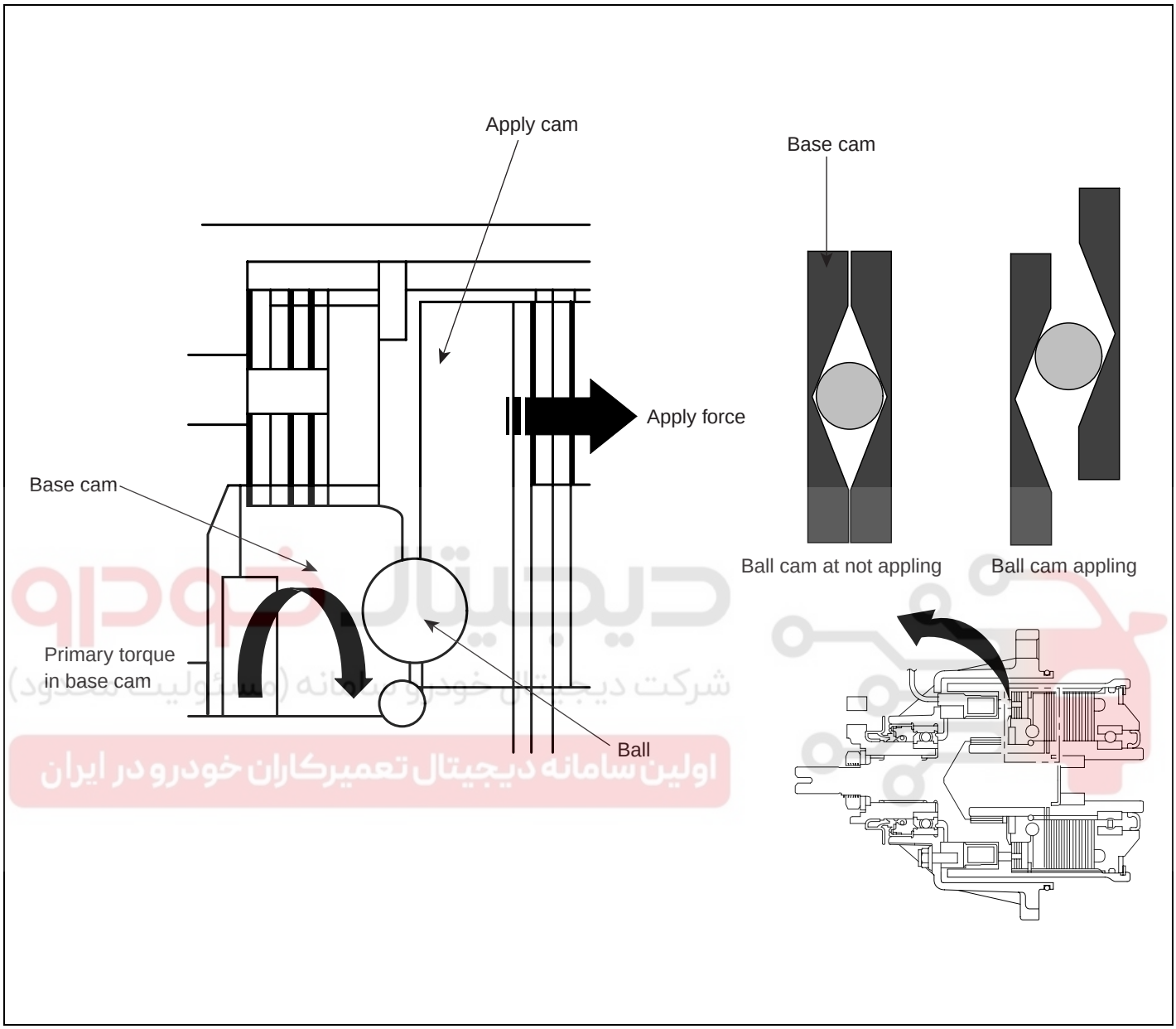
- Normal driving situation: 2WD base driving
- 4WD driving in driving situations (rapid activation, cornering etc.)

1. Inputted the informations from each sensors in vehicle
   - Input torque (Throttle position sensor)
   - Cornering situation (Steering angle sensor)
   - Vehicle speed and different wheel speed front & rear (Wheel speed sensor)
   - Braking situation (Brake signal and ABS signal)
2. Distributed the required driving force after 4WD ECU operates.
3. EMC (Electric Magnetic Clutch) operates the primary clutch.



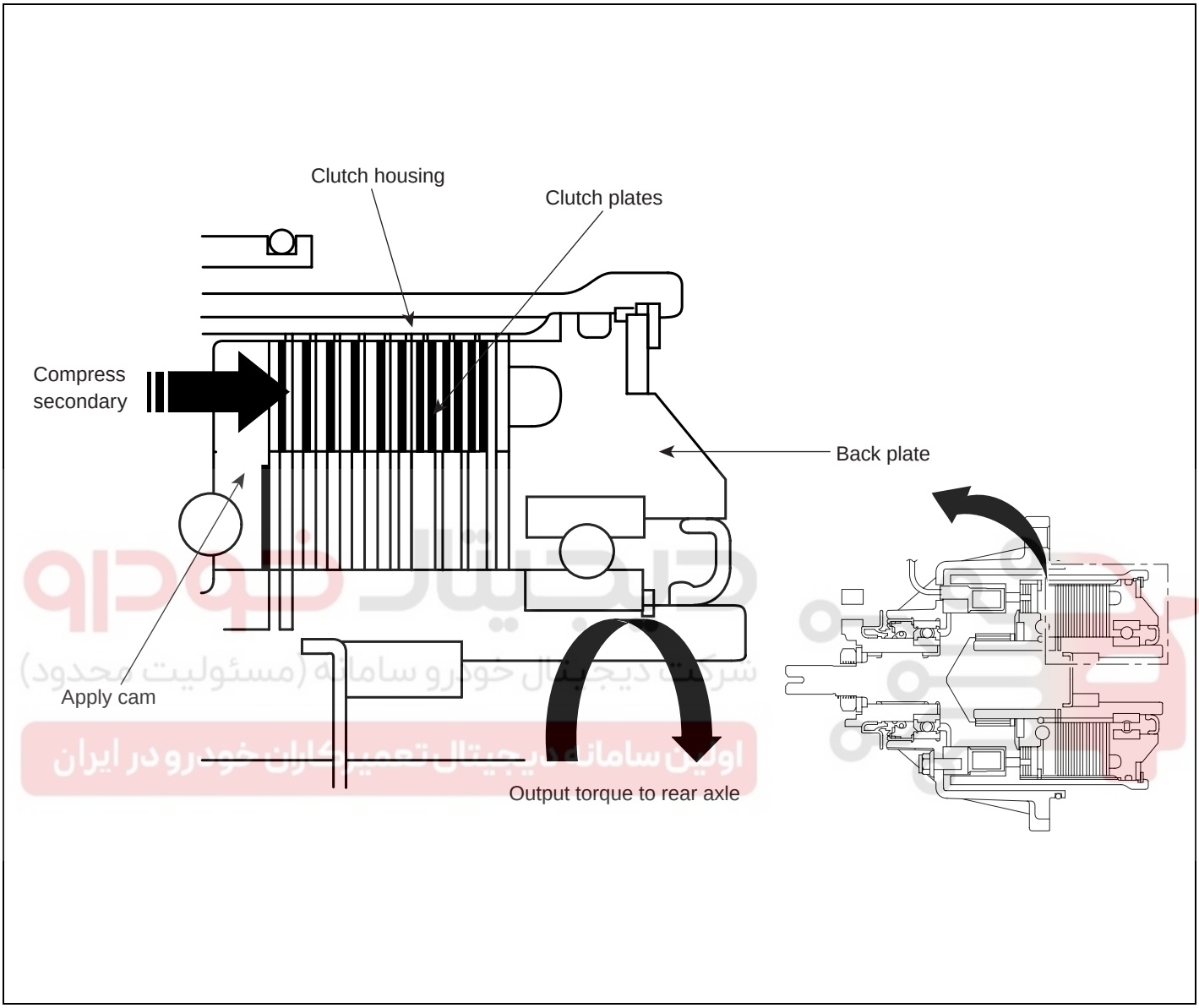
EKQE003C

4. Control the cam's opening gap by operation of primary clutch.



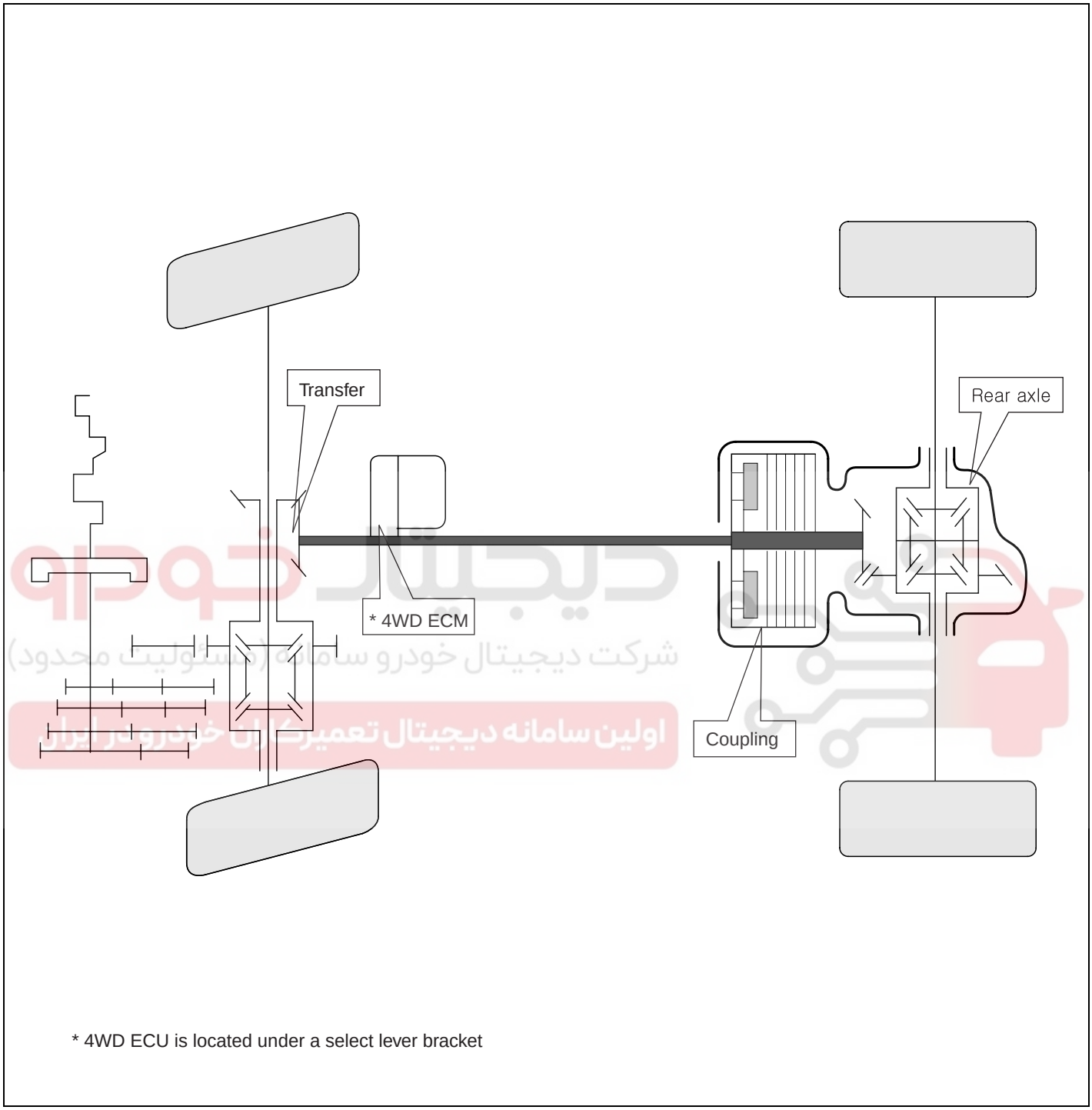
EKQE004C

5. Control the slip of inner & outer plate.
   Control variably the driving force distribution to optimize front & rear driving force.



EKQE005C

SYSTEM SCHEMATICS EE6F2BE0



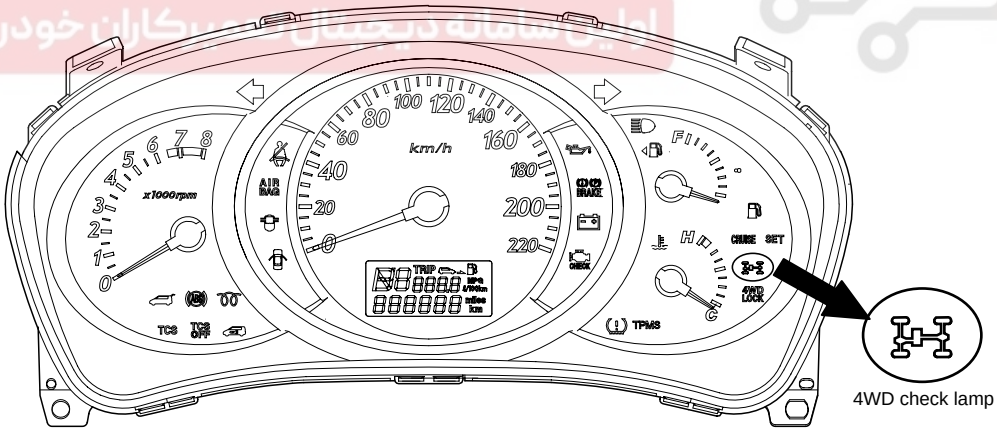
* 4WD ECU is located under a select lever bracket

EKQE001C

DTC TROUBLESHOOTING EBEF7A85

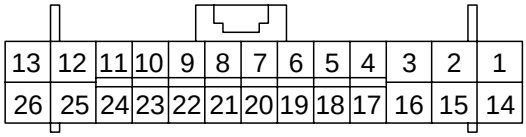
4WD ECM DTCS INDEX

DTC No.	DESCRIPTION	4WD MIL	SEE PAGE
P1716	STEERING WHEEL ANGLE SENSOR SIGNAL(CAN ERROR)	Whenever the DTCs relevant to 4WD ECM are set, 4WD MIL(*) will blink.	
P1717	STEERING WHEEL ANGLE SENSOR 1-INPUT SIGNAL		TR-32
P1718	STEERING WHEEL ANGLE SENSOR 2-INPUT SIGNAL		TR-39
P1719	STEERING WHEEL ANGLE SENSOR C-INPUT SIGNAL		TR-43
P1726	ACCELERATION PEDAL POSITION SIGNAL		TR-47
P1728	EMC OPEN/SHORTED to BATTERY		TR-53
P1729	EMC SHORTED to GROUND		TR-60
P1738	4WD ECU INVALID PART NUMBER		
P1750	WHEEL SPEED SENSOR SIGNAL(FL)		TR-62
P1751	WHEEL SPEED SENSOR SIGNAL(FR)		TR-69
P1752	WHEEL SPEED SENSOR SIGNAL(RL)		TR-76
P1753	WHEEL SPEED SENSOR SIGNAL(RR)		TR-83
P1764	CAN MI-COM OR CIRCUIT MAL.		TR-90
P1765	TCS-ITM CAN ERROR		TR-96
P1766	CAN COMMUNICATIOM BUS OFF		
P1767	ABS ACTIVE SIGNAL (CAN ERROR)		



EKQE059Z

4WD ECM PIN DESCRIPITION



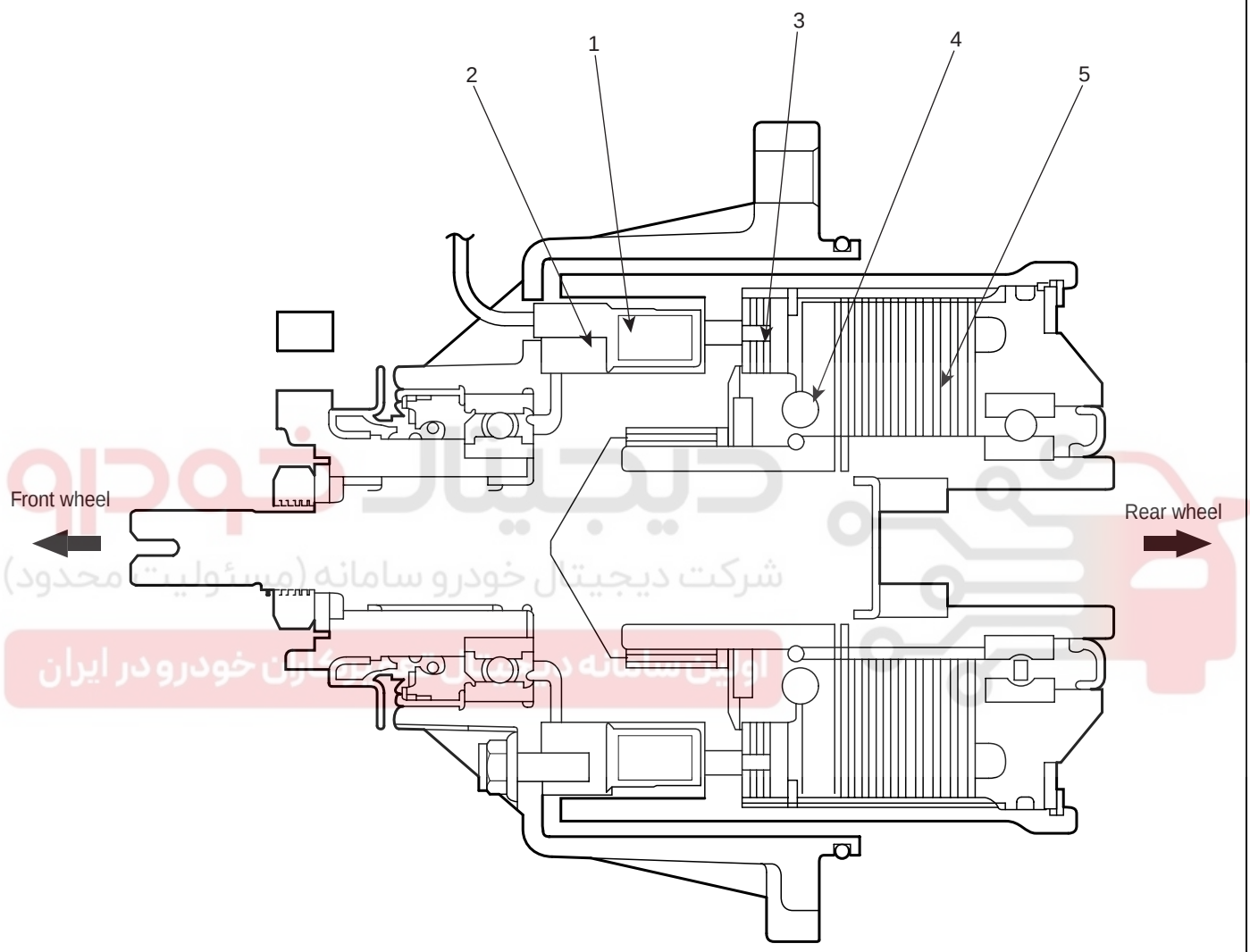
C58 (2.7L)
C158 (2.0L)
C258 (DSL)

EKQE032Z

Terminal Number		Wire Color	Description
C58 C158 C258	1	R	BATTERY INPUT
	2	-	BRAKE INPUT
	3	B	ECU GROUND
	4	G	CAN L
	5	O	CAN H
	6	L	GND RTN 4
	7	Br	GND RTN 3
	8	L	GND RTN 2
	9	Br	GND RTN1
	10	R	LOCK SWITCH INPUT
	11	L/B	STEERING REF C
	12	B/O	STEERING REF RTN
	13	B	EMC RTN
	14	W	ISO9141 K LINE
	15	R/B	IGNITION INPUT
	16	Gr/O	4WHEEL DRIVE INDICATOR
	17	O	FRONT RIGHT SPEED SENSOR
	18	R	FRONT LEFT SPEED SENSOR
	19	R	REAR LEFT SPEED SENSOR
	20	O	REAR RIGHT SPEED SENSOR
	21	Y	DIAGNOSTIC OUT
	22	-	TPS INPUT
	23	Gr/O	STEERING 1 INPUT
	24	L	STEERING 2 INPUT
	25	Gr/B	STEERING REF 5V
	26	R	EMC OUTPUT

TRANSFER CASE

COMPONENTS EFE6479D

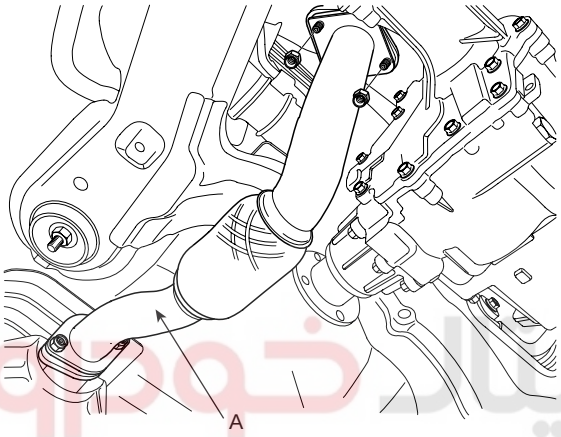


1. Coil
2. Rotor
3. Primary Clutch
4. Cam
5. Secondary clutch

EKQE002C

REMOVAL E1135DAF

1. Remove the battery (-) terminal.
2. Lift up the vehicle.
3. Remove the propellar shaft (See 'DS' froup-'PROPELLAR SHAFT')
4. Remove the front muffler(A).



KKQE012A

5. Remove the RH driveshaft (See 'DS' group-'DRIVESHAFT').
6. Looser the oil drain plug and drain the fluid.
7. After draing, re-tighten the oil drain plug.

TORQUE:
39.2 ~ 58.8 Nm (400 ~ 600 kgf·cm, 28.9 ~ 43.4 lb·ft)

8. Support the transfer assembly with a jack.
9. Remove the transfer assembly loosening the mounting bolts.

CAUTION

Remove the transfer bracket mounting bolts(2EA) together.

INSPECTION E64C17B3

CHECK FOR TRANSFER OIL

1. Check and replenish the transfer oil every 40,000km(24855 miles).

REPLACEMENT ED46F3AE

TRANSFER OIL REPLACEMENT.

1. Replace the oil every 100,000km(62137miles) in a general condition and every 40,000km(24854miles)

NOTE

1. Severe usage (marked '') is defined as*

a. Frequent driving on rough road (Bumpy road, gravel road, snowy road, unpaved road . Etc.)

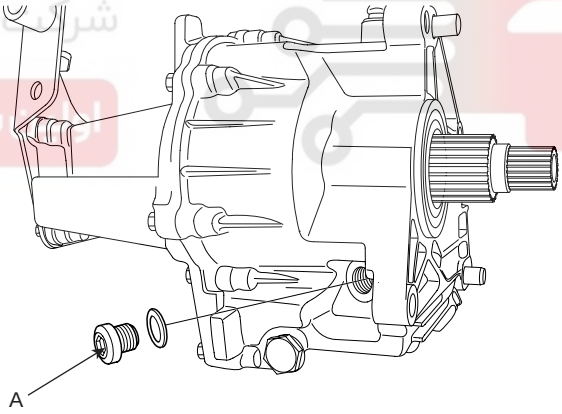
b. Frequent driving on mountain road, ascent/descent.

c. Police, taxi, commercial type operation or trailer towing. Etc.)

2. Transfer & diff carrier lubricants should be changed anytime transfer & diff carrier have been submerged in water.

INSTALLATION EAD74AAB

1. Remove the filler plug(A).



KKQE013A

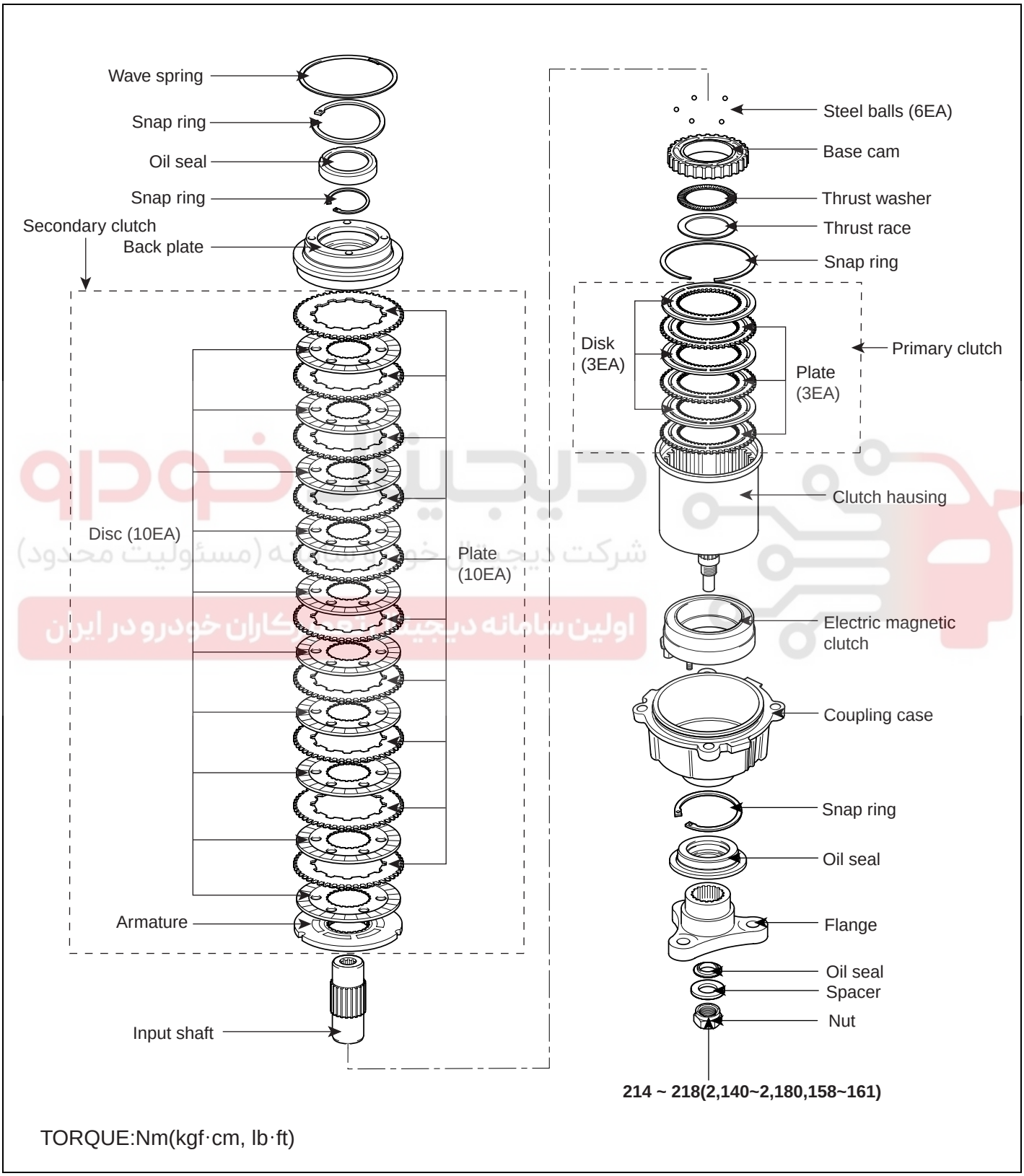
2. Refill the specification to the specified quartity.

Specification : SAE 80w/90
Quantity : 0.8L

3. Fix it in proper position with mounting bolts.

COUPLING ASSEMBLY

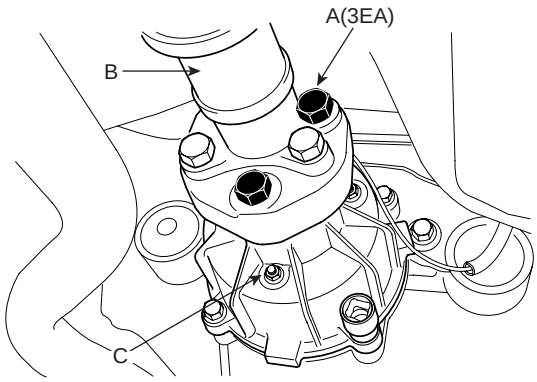
COMPONENTS ECB8052F



EKQE006C

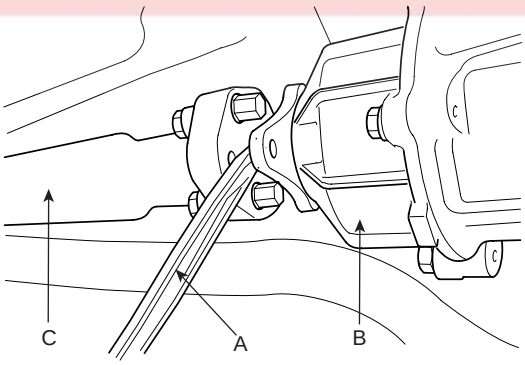
REMOVAL E7D23B3F

1. Remove the 4WD coupling bolts (A-3EA) mounted to the rear propellar shaft.

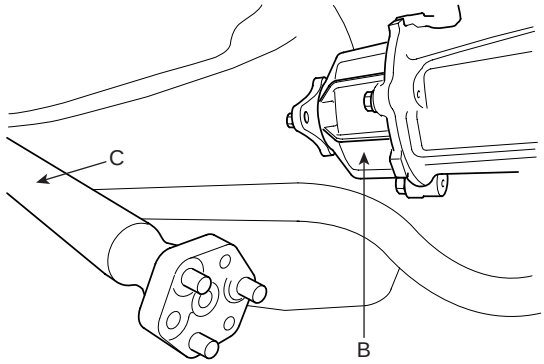


KKQE007C

2. Using a flat tool(A), separate the propellar shaft(C) from 4WD coupling(B).

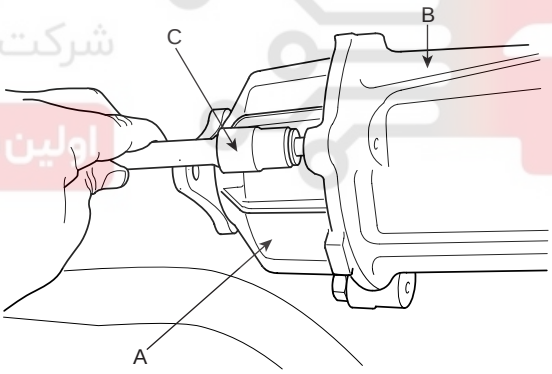


KKQE008C



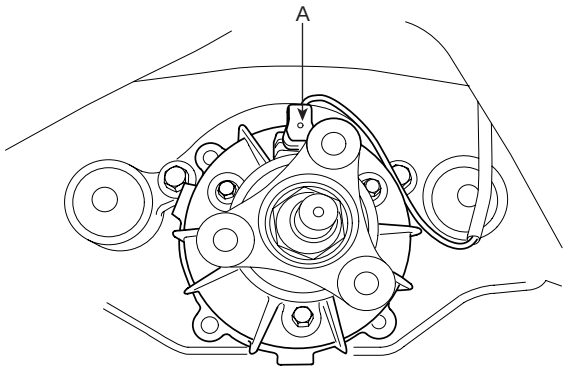
KKQE009C

3. Remove the rear axle (B-Differential carrier) bolts mounted to the 4WD coupling(A) by a socket(C).



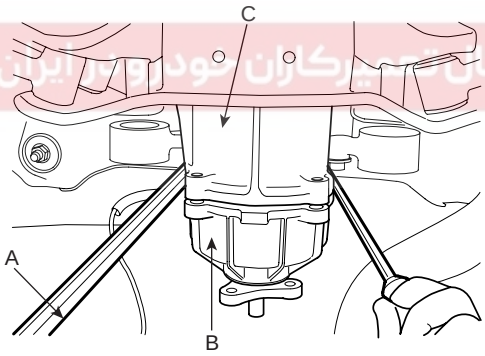
KKQE010C

4. Remove the electric magnetic clutch connector(A).



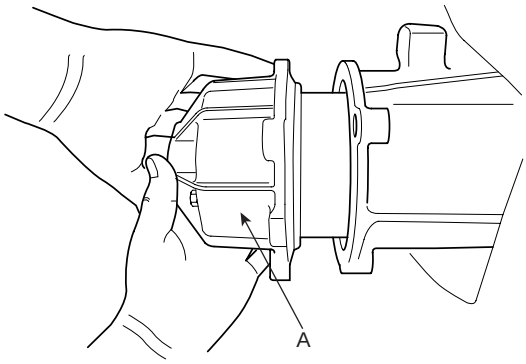
KKQE011C

5. Using a flat tool(A), separate the 4WD coupling assembly(B) from the rear differential carrier(C).



KKQE012C

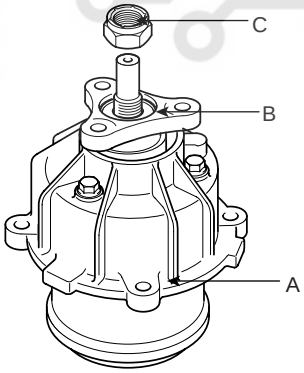
6. Remove the 4WD coupling assembly(A).



KKQE013C

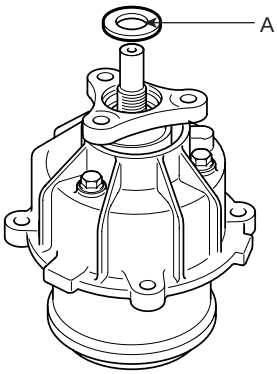
DISASSEMBLY E422EE4A

1. Remove the coupling(A) flange(B) mounting nut(C).



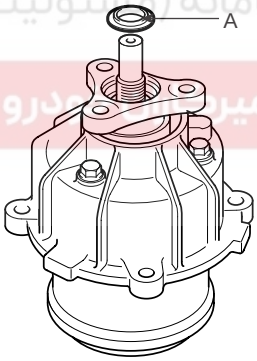
KKQE014C

2. Remove the flange spacer(A).



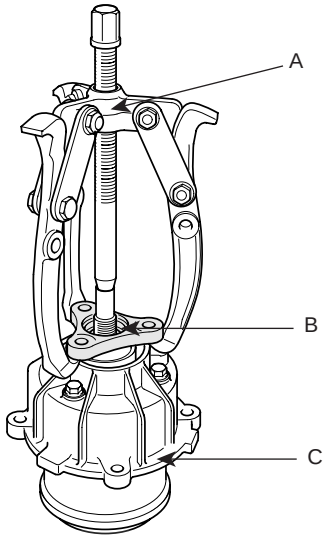
KKQE015C

3. Remove the coupling flange oil seal(A).



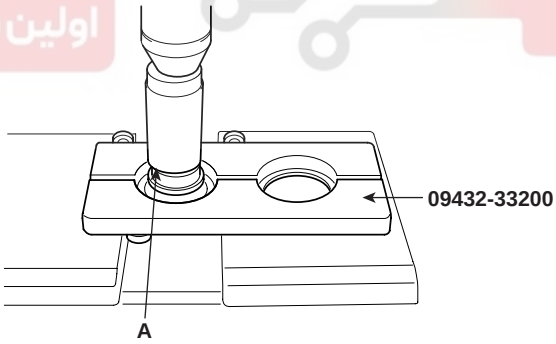
KKQE016C

4. Using a general tool, 3-way puller(A), remove the flange assembly(B) from the coupling(C).



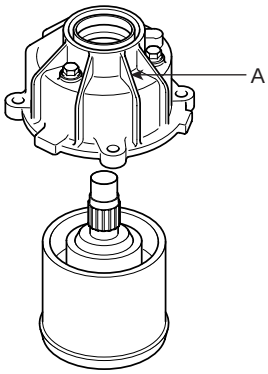
EKQE017C

5. Remove the flange oil seal(A) using special tool (09432-33200).



EKQE018C

6. Remove the coupling case assembly(A).

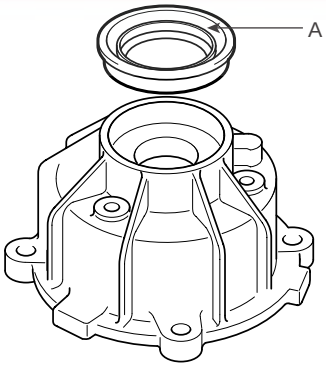


KKQE019C

1) Remove the coupling case oil seal(A)

NOTE

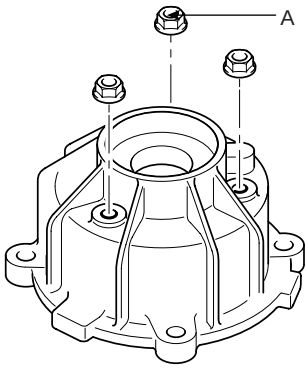
Insert the (-) driver between the oil seal and the clutch housing, then remove the oil seal



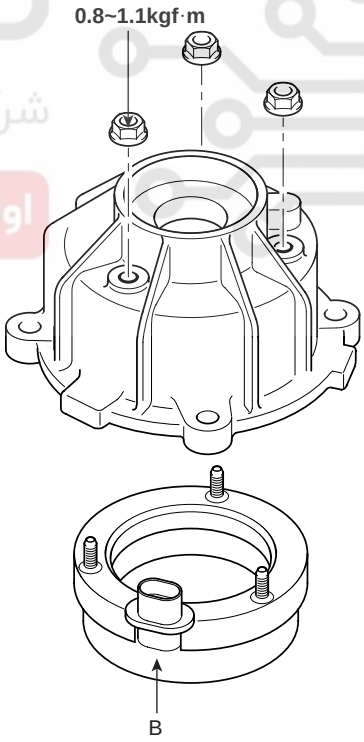
KKQE020C

2) Remove the snap ring.

3) Remove the Electric Magnetic clutch mounting nuts (A-3EA).

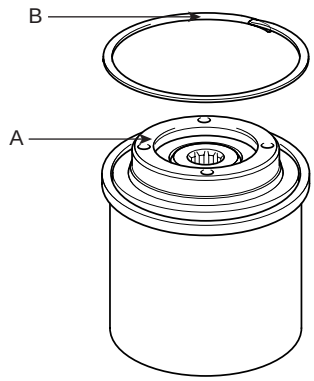


KKQE021C



KKQE022C

7. Remove the wave spring(B) for fixing the back plate(A) and the secondary clutch assembly.

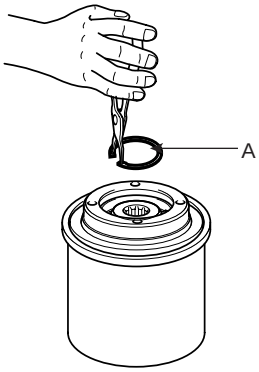


KKQE023C

8. Remove the snap ring(A).

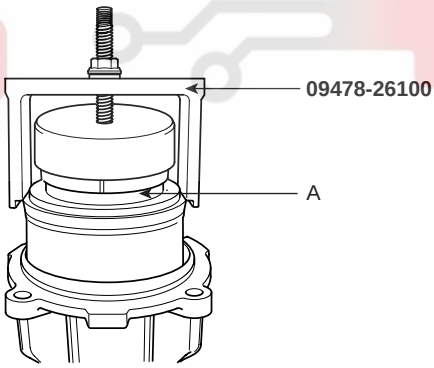
KKQE024C

9. After removing the oil seal, remove the snap ring(A).



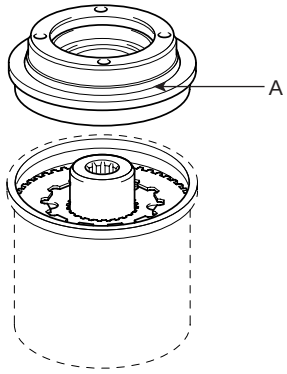
KKQE025C

10. Remove the back plate and the secondary clutch(A) assembly simultaneously using special tool (09478-26100).



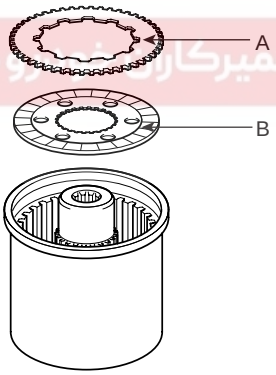
KKQE026C

1) Separate the back plate(A) from the input shaft.



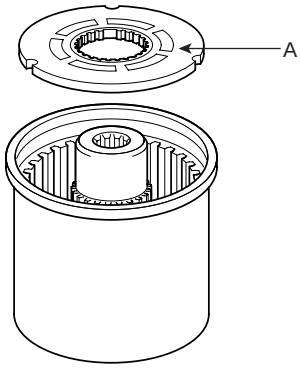
KKQE027C

2) Remove the plates (A-10EA) and the discs (B-10EA).



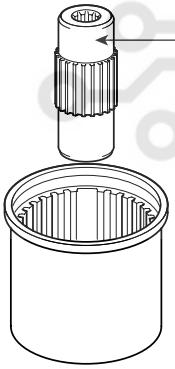
KKQE028C

3) Remove the armature(A).



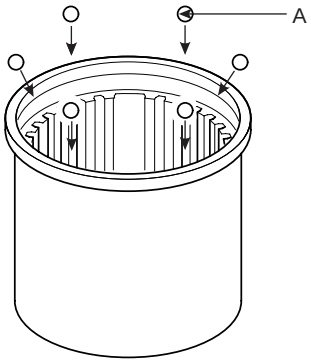
KKQE029C

4) Remove the input shaft(A).



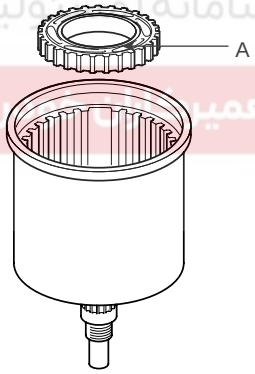
KKQE030C

11. Remove the steel balls (A-6EA) on the base cam.



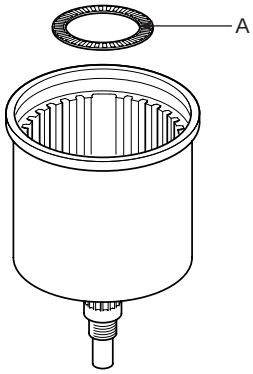
KKQE031C

12. Remove the base cam(A).



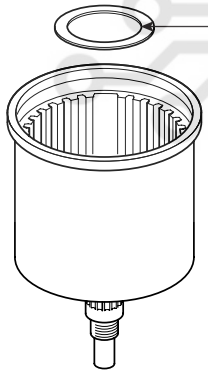
KKQE032C

13. Remove the thrust washer(A).



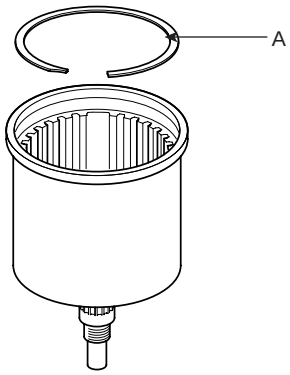
KKQE033C

14. Remove the thrust race.



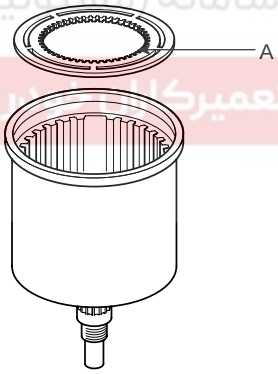
KKQE034C

15. Remove the snap ring(A).



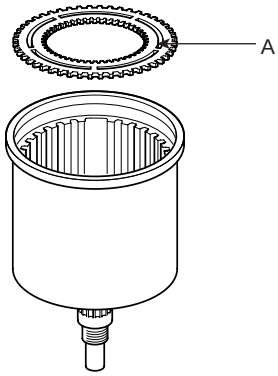
KKQE035C

16. Remove the disk(A) of the primary clutch.



KKQE036C

17. Remove the plate(A) of the primary clutch.



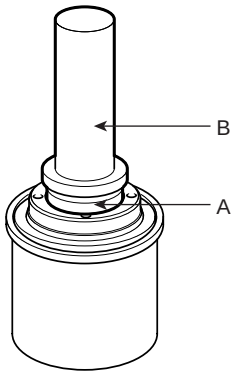
KKQE037C

NOTE

Additionally remove each 2EA discs and plates alternately.

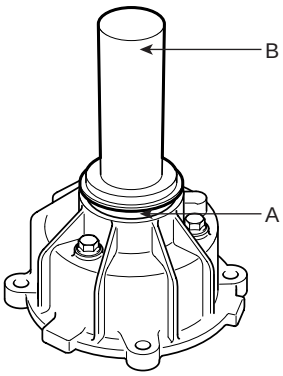
REASSEMBLY EB0E6DD6

1. When reassembling the back plate oil seal(A), reassemble it using a suitable tool(B).



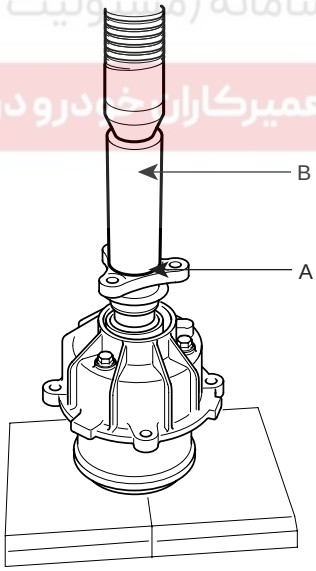
KKQE038C

2. In case of the coupling case oil seal(A), too, reassemble it using a suitable tool(B).



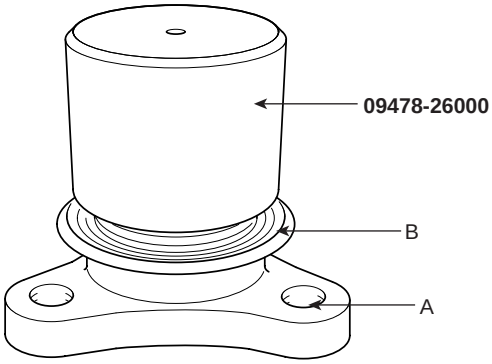
KKQE039C

3. When reassembling the 4WD coupling assembly and the flange(A), too, reassemble them using a suitable tool(B).



EKQE040C

4. Install the flange(A) oil seal(B) using special tool(09478-26000).



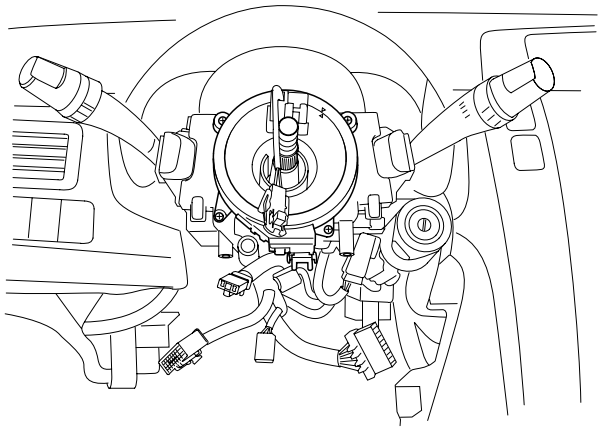
KKQE041C

INSTALLATION E26B80C3

Installation is the reverse of the removal.

DTC P1717 STEERING WHEEL ANGLE SENSOR 1-INPUT SIGNAL

COMPONENT LOCATION ED3AABD5



KRQE100E

GENERAL DESCRIPTION E42A63CE

Steering angle sensor is a hall plate between the photo-controller LED and the photo transistor. As the hole plate rotates with steering wheel rotation, electrical signal will be generated depending on whether the LED light passes through the plate to the photo-transistor or not. The signal is the steering wheel operation angular velocity and used to detect the steering wheel turning direction.

DTC DESCRIPTION EA1830D7

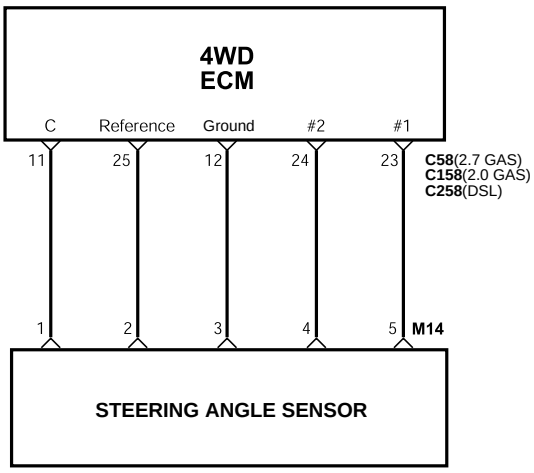
The DTC will set when the steering angle sensor #1 signal to 4WD ECM is out of range.

DTC DETECTING CONDITION E3DD4851

Item	Detecting Condition & Fail Safe	Possible Cause
DTC Strategy	● Loss of signal out of range	• Steering angle sensor, 4WD ECM connector looseness and poor terminal to wire connection. • Steering angle sensor circuit open/short. • Steering angle sensor malfunction. • 4WD ECM malfunction.
Enable Conditions	● V＜4.5 for 1.0 sec self clearing	
Threshold Value	● ＞＝4.5VDC	
Diagnostic Time	● 1 Sec.	
MIL on condition	● 0.5 Sec.	
Fail safe		

SCHEMATIC DIAGRAM E1BD5D6B

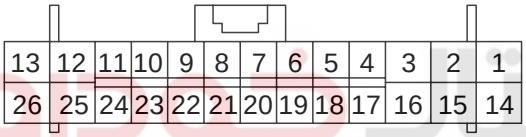
[CIRCUIT DIAGRAM]



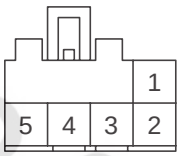
[CONNECTION INFORMATION]

Terminal	Connection	Function
1	NO.11	Steering C signal
2	NO.25	5V source
3	NO.12	Ground
4	NO.24	Steering #2 signal
5	NO.23	Steering #1 signal

[HARNESS CONNECTORS]



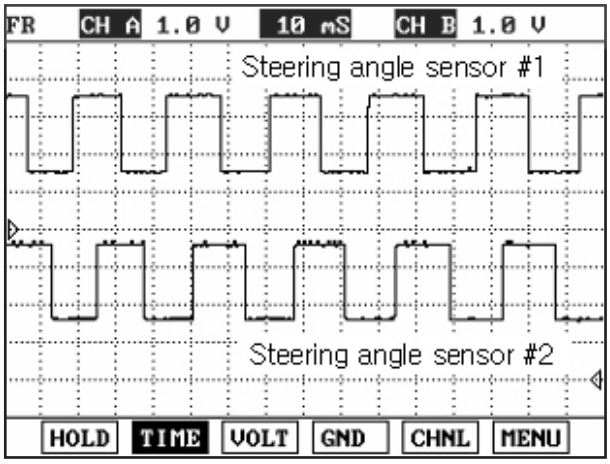
C58 or C158 or C258



M14

EKQE622A

WAVEFORM INSPECTION EEBE0BE7



[CAUTION] The above value is just for reference. The actual value may differ from it according to various engine condition.

P1717_1

TERMINAL & CONNECTOR INSPECTION EF9EFA7D

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.

   Has a problem been found?

   YES

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

   NO

   ▶ Go to the next procedure.

SIGNAL CIRCUIT INSPECTION ED708EE1

1. Steering angle sensor #1 Signal Inspection

   1) IG KEY ON, ENG ON

   2) 4WD ECM, Steering angle sensor connector : Connect.

   3) Monitor signal waveform between terminal 5 of Steering angle sensor harness connector M14 and chassis ground.

   4) Rotate the steering wheel both ways.

Specification : refer to 'Waveform Inspection'

   Is Steering angle sensor #1 Signal display near the specified value?

   YES

   ▶ This may caused by intermittent fault. Verify data changibility by shaking the harness.

   NO

   ▶ Inspect power and power supply line of Steering angle sensor #1 circuit.
   ▶ Inspect ground and ground line of Steering angle sensor #1 circuit.
   ▶ Inspect ground to short of Steering angle sensor #1 circuit.
   ▶ Inspect open or short of Steering angle sensor #1 circuit.
   ▶ Check for Steering angle sensor module and replace it as necessary.
   ▶ Check for 4WD ECM and replace it as necessary.

2. Steering angle sensor #1 short to ground Inspection

   1) IG KEY OFF, ENG OFF

   2) 4WD ECM connector and Steering angle sensor connector : Disconnect.

3) Measure resistance between terminal 5 of Steering angle sensor harness connector M14 and chassis ground.

Specification : Approx. ∞Ω

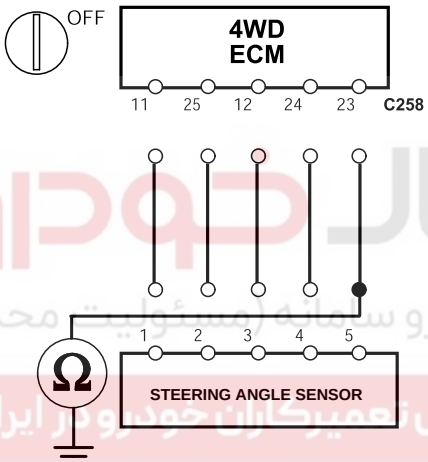
Is resistance display near the specified value?

YES

▶ Proceed next inspection procedure.

NO

▶ Repair ground to short circuit of Steering angle sensor #1 circuit.
▶ If problem is solved, go to the "Verification of Vehicle Repair"



EKQE047T

3. Steering angle sensor #1 open Inspection

1) IG KEY OFF, ENG OFF

2) 4WD ECM connector and Steering angle sensor connector : Disconnect.

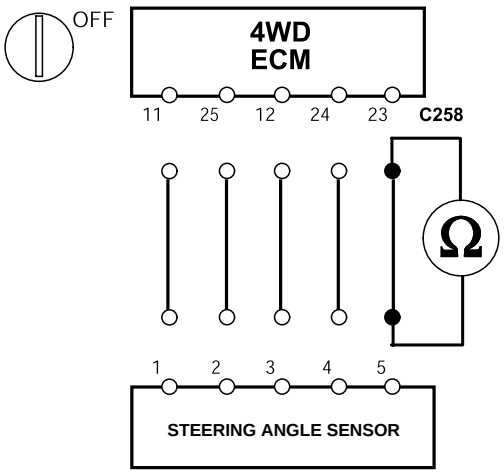
3) Measure resistance between terminal 5 of Steering angle sensor harness connector M14 and terminal 23 of 4WD ECM harness connector.
Is resistance display near the specified value?

YES

▶ Replace with normal Steering angle sensor module temporarily and check if vehicle run normally.
If trouble is disappeared, replace Steering angle sensor control module.
▶ Replace with normal 4WD ECM temporarily and check if vehicle run normally.
If trouble is disappeared, replace 4WD ECM.
▶ If problem is solved, go to the "Verification of Vehicle Repair".

NO

▶ Repair open circuit of Steering angle sensor #1 circuit.
▶ If problem is solved, go to the "Verification of Vehicle Repair".



EKQE048T

POWER SUPPLY CIRCUIT INSPECTION E004BDF0

1. Steering angle sensor voltage Inspection

   1) IG KEY ON, ENG OFF

   2) Sensor connector(M14): Disconnect.

   3) Measure voltage between terminal 2 of Steering angle sensor harness connector M14 and chassis ground.

Specification : Approx. 5V

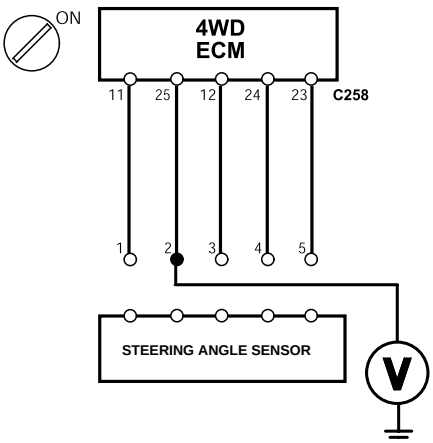
Is voltage display near the specified value?

YES

▶ Proceed next inspection procedure.

NO

▶ Inspect open or short of power supply circuit.
▶ Check if there is 5V output voltage from 4WD ECM.
▶ If problem is solved, go to the "Verification of Vehicle Repair"



EKQE044T

GROUND CIRCUIT INSPECTION E5A4EB95

1. Ground Circuit Inspection

   1) IG KEY OFF, ENG OFF

   2) Sensor connector(M14): Disconnect.

   3) Measure resistance between terminal 3 of Steering angle sensor harness connector M14 and chassis ground.

Specification : Approx. 1Ω below.

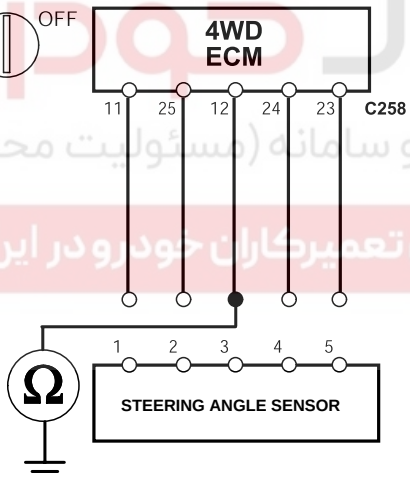
Is resistance display near the specified value?

YES

▶ Proceed next inspection procedure.

NO

▶ Repair open circuit of Steering angle sensor harness.
▶ If problem is solved, go to the "Verification of Vehicle Repair".



EKQE046T

VERIFICATION OF VEHICLE REPAIR E1ABC00D

1. IG KEY ON, ENG ON
2. Steering angle sensorl module, 4WD ECM connector : Connect.
3. Clear the DTC with a scan tool.
4. Rotate the steering wheel both ways.
5. Verify the malfunction relevent to steering angle sensor #1.
   Does the scan tool display any DTC relevent to steering angle sensor #1?

YES

▶ Go to the applicable troubleshooting procedure.

NO

▶ System OK.

DTC P1718 STEERING WHEEL ANGLE SENSOR 2-INPUT SIGNAL

COMPONENT LOCATION EC5FDE0F

Refer to DTC P1717.

GENERAL DESCRIPTION E8EB851E

Refer to DTC P1717.

DTC DESCRIPTION E39BC3BB

The DTC will set when the steering angle sensor #2 signal to 4WD ECM is out of range.

DTC DETECTING CONDITION EF8000B3

Refer to DTC P1717.

SCHEMATIC DIAGRAM E6DCFE3F

Refer to DTC P1717.

WAVEFORM INSPECTION EA9EBDCF

Refer to DTC P1717.

TERMINAL & CONNECTOR INSPECTION EDAFEB43

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.

   Has a problem been found?

   YES

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

   NO

   ▶ Go to the next procedure.

SIGNAL CIRCUIT INSPECTION E1F5C05C

1. Steering angle sensor #2 Signal Inspection
   1) IG KEY ON, ENG ON
   2) 4WD ECM, Steering angle sensor connector : Connect.
   3) Monitor signal waveform between terminal 4 of Steering angle sensor harness connector M14 and chassis ground.

4) Rotate the steering wheel both ways.

Specification : refer to 'Waveform Inspection'

Is Steering angle sensor #2 Signal display near the specified value?

YES

▶ This may caused by intermittent fault. Verify data changibility by shaking the harness.

NO

▶ Inspect power and power supply line of Steering angle sensor #2 circuit.
▶ Inspect ground and ground line of Steering angle sensor #2 circuit.
▶ Inspect ground to short of Steering angle sensor #2 circuit.
▶ Inspect open or short of Steering angle sensor #2 circuit.
▶ Check for Steering angle sensor module and replace it as necessary.
▶ Check for 4WD ECM and replace it as necessary.

2. Steering angle sensor #2 short to ground Inspection

1) IG KEY OFF, ENG OFF

2) 4WD ECM connector and Steering angle sensor connector : Disconnect.

3) Measure resistance between terminal 4 of Steering angle sensor harness connector M14 and chassis ground.

Specification : Approx. ∞Ω

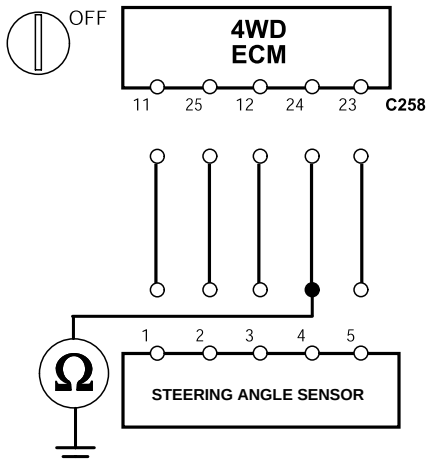
Is resistance display near the specified value?

YES

▶ Proceed next inspection procedure.

NO

▶ Repair ground to short circuit of Steering angle sensor #2 circuit.
▶ If problem is solved, go to the "Verification of Vehicle Repair"



EKQE047R

3. Steering angle sensor #2 open Inspection

1) IG KEY OFF, ENG OFF

2) 4WD ECM connector and Steering angle sensor connector : Disconnect.

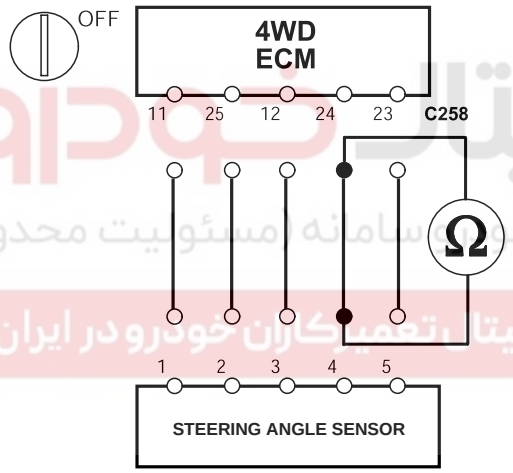
3) Measure resistance between terminal 4 of Steering angle sensor harness connector M14 and terminal 24 of 4WD ECM harness connector.
Is resistance display near the specified value?

YES

▶ Replace with normal Steering angle sensor module temporarily and check if vehicle run normally.
If trouble is disappeared, replace Steering angle sensor control module.
▶ Replace with normal 4WD ECM temporarily and check if vehicle run normally.
If trouble is disappeared, replace 4WD ECM.
▶ If problem is solved, go to the "Verification of Vehicle Repair".

NO

▶ Repair open circuit of Steering angle sensor #2 circuit.
▶ If problem is solved, go to the "Verification of Vehicle Repair".



EKQE048R

POWER SUPPLY CIRCUIT INSPECTION E442DED6

Refer to DTC P1717.

GROUND CIRCUIT INSPECTION E8769DD5

Refer to DTC P1717.

VERIFICATION OF VEHICLE REPAIR E3F64BE0

1. IG KEY ON, ENG ON
2. Steering angle sensorl module, 4WD ECM connector : Connect.
3. Clear the DTC with a scan tool.
4. Rotate the steering wheel both ways.
5. Verify the malfunction relevent to steering angle sensor #2.
   Does the scan tool display any DTC relevent to steering angle sensor #2?

YES

▶ Go to the applicable troubleshooting procedure.

NO

▶ System OK.

DTC P1719 STEERING WHEEL ANGLE SENSOR C-INPUT SIGNAL

COMPONENT LOCATION E07C10EA

Refer to DTC P1717.

GENERAL DESCRIPTION EED7A78E

Steering angle sensor is a hall plate between the photo-controller LED and the photo transistor.
As the hole plate rotates with steering wheel rotation, electrical signal will be generated depending on whether the LED light passes through the plate to the photo-transistor or not.
The signal is the steering wheel operation angular velocity and used to detect the steering wheel turning direction.
Steering angle center signal is for detecting if the steering wheel is at center or rotates.

DTC DESCRIPTION EAF13D8D

The DTC will set when the steering angle sensor center signal to 4WD ECM is out of range.

DTC DETECTING CONDITION E691F2FA

Refer to DTC P1717.

SCHEMATIC DIAGRAM EBFF5AA1

Refer to DTC P1717.

WAVEFORM INSPECTION E53D7EAC

Refer to DTC P1717.

TERMINAL & CONNECTOR INSPECTION EF6F0DAC

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.

   Has a problem been found?

   YES

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

   NO

   ▶ Go to the next procedure.

SIGNAL CIRCUIT INSPECTION ECEF5B18

1. Steering angle sensor center Signal Inspection

   1) IG KEY ON, ENG ON

   2) 4WD ECM, Steering angle sensor connector : Connect.

   3) Monitor signal waveform between terminal 1 of Steering angle sensor harness connector M14 and chassis ground.

   4) Rotate the steering wheel both ways.

Specification : refer to 'Waveform Inspection'

Is Steering angle sensor center Signal display near the specified value?

YES

▶ This may caused by intermittent fault. Verify data changibility by shaking the harness.

NO

▶ Inspect power and power supply line of Steering angle sensor center circuit.
▶ Inspect ground and ground line of Steering angle sensor center circuit.
▶ Inspect ground to short of Steering angle sensor center circuit.
▶ Inspect open or short of Steering angle sensor center circuit.
▶ Check for Steering angle sensor module and replace it as necessary.
▶ Check for 4WD ECM and replace it as necessary.

2. Steering angle sensor center signal short to ground Inspection

   1) IG KEY OFF, ENG OFF

   2) 4WD ECM connector and Steering angle sensor connector : Disconnect.

   3) Measure resistance between terminal 1 of Steering angle sensor harness connector M14 and chassis ground.

Specification : Approx. ∞Ω

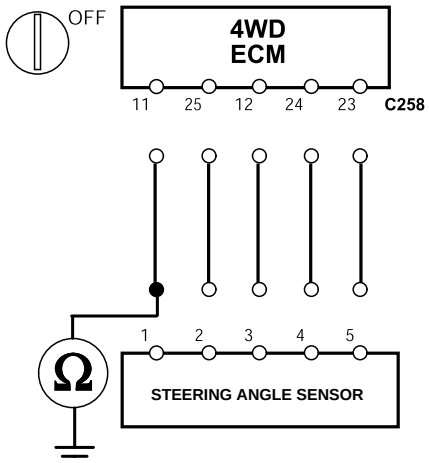
Is resistance display near the specified value?

YES

▶ Proceed next inspection procedure.

NO

▶ Repair ground to short circuit of Steering angle sensor center circuit.
▶ If problem is solved, go to the "Verification of Vehicle Repair"



EKQE047Q

3. Steering angle sensor center signal open Inspection

1) IG KEY OFF, ENG OFF

2) 4WD ECM connector and Steering angle sensor connector : Disconnect.

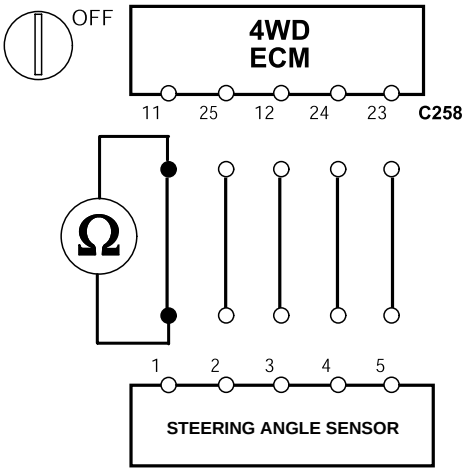
3) Measure resistance between terminal 1 of Steering angle sensor harness connector M14 and terminal 11 of 4WD ECM harness connector.
Is resistance display near the specified value?

YES

▶ Replace with normal Steering angle sensor module temporarily and check if vehicle run normally.
If trouble is disappeared, replace Steering angle sensor control module.
▶ Replace with normal 4WD ECM temporarily and check if vehicle run normally.
If trouble is disappeared, replace 4WD ECM.
▶ If problem is solved, go to the "Verification of Vehicle Repair".

NO

▶ Repair open circuit of Steering angle sensor center circuit.
▶ If problem is solved, go to the "Verification of Vehicle Repair".



EKQE048Q

POWER SUPPLY CIRCUIT INSPECTION EAE72028

Refer to DTC P1717.

GROUND CIRCUIT INSPECTION E3134F22

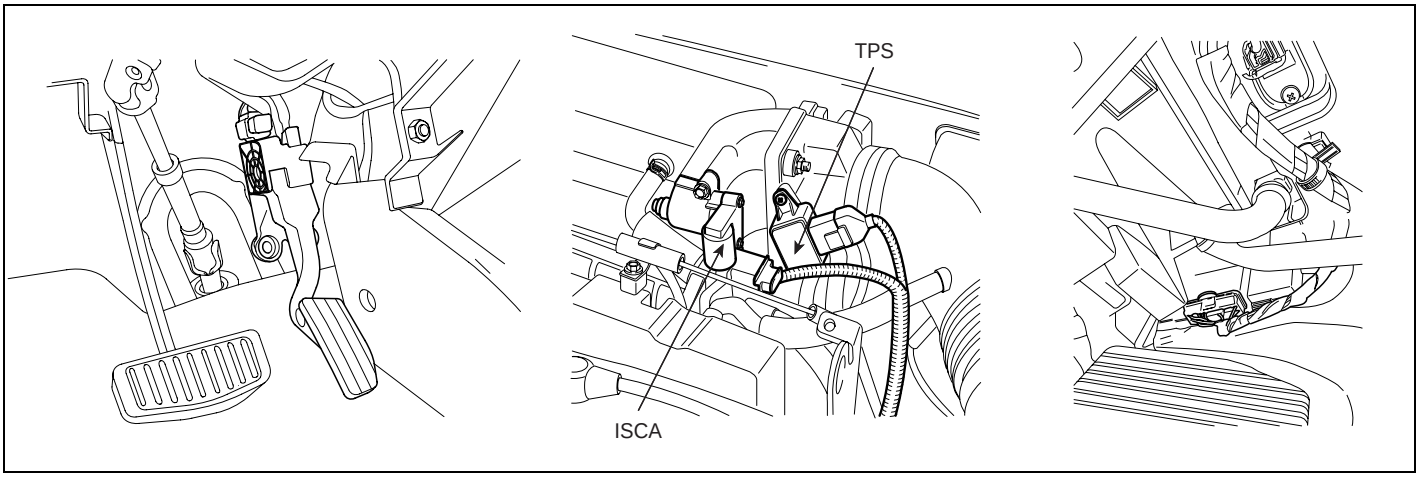
Refer to DTC P1717.

VERIFICATION OF VEHICLE REPAIR E1EC4534

Refer to DTC P1717.

DTC P1726 TPS/APS LOSS OF SIGNAL

COMPONENT LOCATION E68592C9



EGQE639A

GENERAL DESCRIPTION E85DF0CD

At diesel, there is not a Trottle Position Sensor(TPS) but an Acceleration pedal Position Sensor(APS). As a standard of judgement about a driver's acceleration degree, APS signal is used at diesel where as, TPS signal is used at 2.0L gasoline engines or 2.7L gasoline engines. On both occations, the signals are inputted to 4WD ECM from ECM(PCM: 2.0L gasoline engine) through CAN.

This signal is used as a standard signal which decides torque distribution together with a steering angle sensor signal, a wheel speed sensor signal and a brake signal.

DTC DESCRIPTION EDB9885B

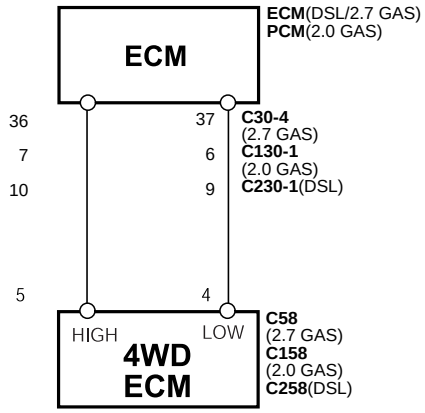
The DTC will set when there is no TPS(APS) signal or the signal is out of range.

DTC DETECTING CONDITION E9D2AD61

Item	Detecting Condition & Fail Safe	Possible Cause
DTC Strategy	● Loss of signal out of range	• ECM,TCCU connector looseness and poor terminal to wire connection. • CAN HIGH/LOW circuit open/short. • TPS faulty. • ECM malfunction. • TCCU malfunction.
Enable Conditions	● Message present 1.0 sec self clearing	
Threshold Value	● No Signal or out of range	
Diagnostic Time	● 1 Sec.	
Fail safe		

SCHEMATIC DIAGRAM E56B636D

[CIRCUIT DIAGRAM]



[CONNECTION INFORMATION]

<Diesel>

Terminal	Connection	Function
C230-1 NO.10	C258 NO.5	CAN (HIGH)
C230-1 NO.9	C258 NO.4	CAN (LOW)

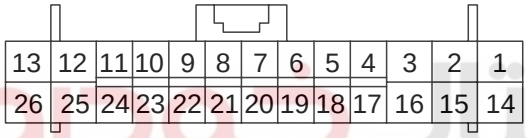
<2.7L GASOLINE>

Terminal	Connection	Function
C30-4 NO.36	C58 NO.5	CAN (HIGH)
C30-4 NO.37	C58 NO.4	CAN (LOW)

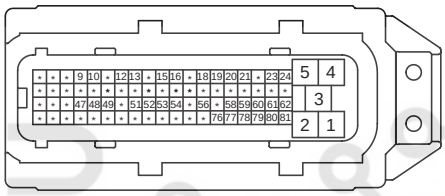
<2.0L GASOLINE>

Terminal	Connection	Function
C130-1 NO.7	C158 NO.5	CAN (HIGH)
C130-1 NO.6	C158 NO.4	CAN (LOW)

[HARNESS CONNECTORS]



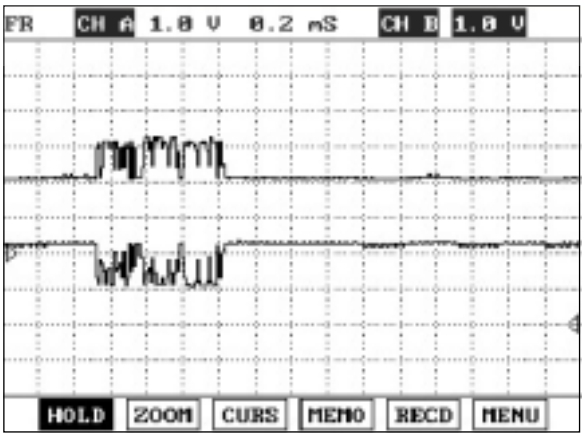
C58 or C158 or C258



C230-1

EKQE623A

WAVEFORM INSPECTION EADACA76



[CAUTION]The above value is just for reference. The actual value may differ from it according to various engine condition.

P1726_1

TERMINAL & CONNECTOR INSPECTION EC0EDEEA

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.

   Has a problem been found?

YES

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

NO

▶ Go to the next procedure.

SIGNAL CIRCUIT INSPECTION EB68D5FB

1. CAN Signal Inspection

   1) IG KEY : ON, Engine : OFF.

   2) 4WD ECM connector: connect.

   3) Monitor signal waveform between terminal 4 and 5 of 4WD ECM harness connector.

   4) Shift to N Range.

Specification : refer to 'Waveform Inspection'

Is CAN Signal display near the specified value?

YES

▶ This may caused by intermittent fault. Verify data changibility by shaking the harness.

NO

▶ Inspect ground to short of CAN Low ciruit.
▶ Inspect open or short of CAN Low circuit.
▶ Inspect ground to short of CAN High ciruit.
▶ Inspect open or short of CAN High circuit.
▶ Inspect TPS(or APS) in the ECM side.
▶ Check for ECM(or PCM) and replace it as necessary.
▶ Check for 4WD ECM and replace it as necessary.

2. CAN Low open inspection

   1) IG KEY OFF, ENG OFF

   2) ECM and 4WD ECM connector : Disconnect.

   3) Measure resistance between terminal 4 of 4WD ECM harness connector and terminal 9(or 6 or 37) of ECM harness connector.

Specification : Approx. 0Ω

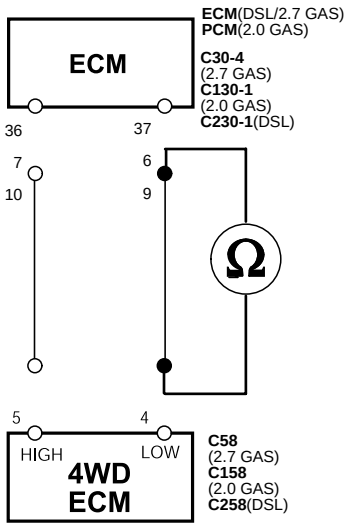
Is resistance display near the specified value?

YES

▶ Proceed next inspection procedure.

NO

▶ Repair open circuit of CAN Low comm. Line.
▶ If problem is solved, go to the "Verification of Vehicle Repair".



EKQE079T

3. CAN High open inspection

1) IG KEY OFF, ENG OFF

2) ECM and 4WD ECM connector : Disconnect.

3) Measure resistance between terminal 5 of 4WD ECM harness connector and terminal 10(or 7 or 36) of ECM harness connector.

Specification : Approx. 0Ω

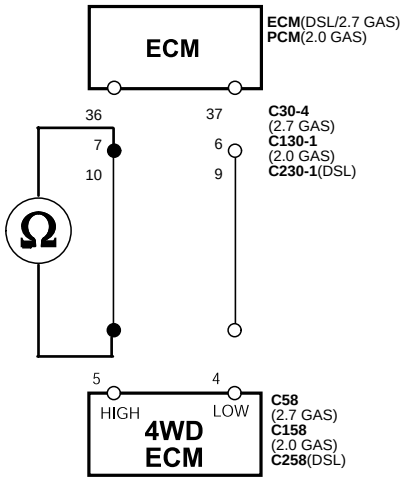
Is resistance display near the specified value?

YES

▶ Proceed next inspection procedure.

NO

▶ Repair open circuit of CAN High comm. Line.
▶ If problem is solved, go to the "Verification of Vehicle Repair".



EKQE081T

GROUND CIRCUIT INSPECTION EEEF029E

1. CAN Low circuit short to ground inspection

   1) IG KEY ON, ENG OFF

   2) ECM and 4WD ECM connector : Disconnect.

   3) Measure resistance between terminal 4 of 4WD ECM harness connector and chassis ground.

Specification : Approx. ∞Ω

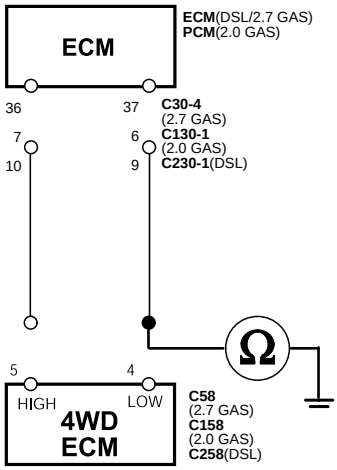
Is resistance display near the specified value?

YES

▶ Proceed next inspection procedure.

NO

▶ Repair ground to short circuit of CAN Low comm. Line.
▶ If problem is solved, go to the "Verification of Vehicle Repair".



EKQE078T

2. CAN High circuit short to ground inspection

   1) IG KEY OFF, ENG OFF

   2) ECM and 4WD ECM connector : Disconnect.

   3) Measure resistance between terminal 5 of 4WD ECM harness connector and chassis ground.

Specification : Approx. ∞Ω

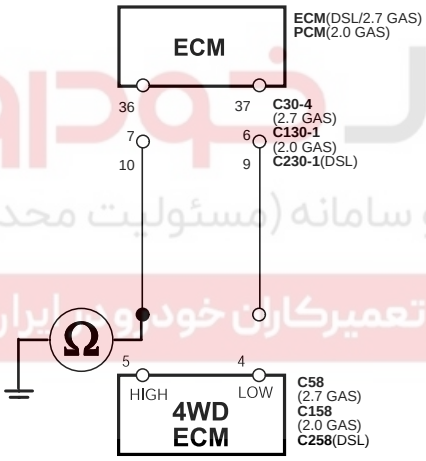
Is resistance display near the specified value?

YES

▶ Proceed next inspection procedure.

NO

▶ Repair ground to short circuit of CAN High comm. Line.
▶ If problem is solved, go to the "Verification of Vehicle Repair".



EKQE080T

VERIFICATION OF VEHICLE REPAIR EFC8A0F4

1. IG KEY ON, ENG OFF
2. ECM, 4WD ECM connector : Connect.
3. Shift to N Range.
4. Clear the DTC with a scan tool.
5. Verify the malfunction relevent to TPS(APS) signal.
   Does the scan tool display any DTC relevent to steering angle sensor center signal?

   YES

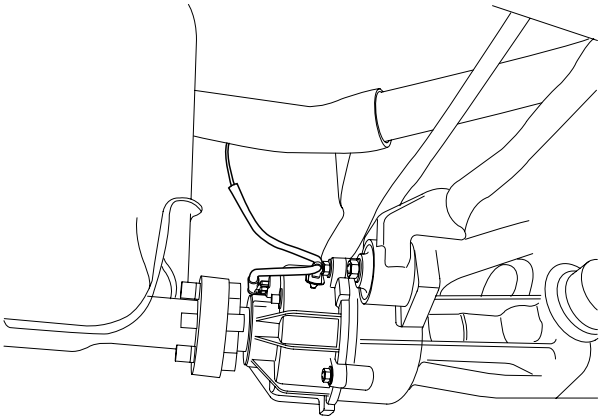
   ▶ Go to the applicable troubleshooting procedure.

   NO

   ▶ System OK.

DTC P1728 EMC OPEN/SHORTED TO BATTERY

COMPONENT LOCATION E6BB9700



KKQE015A

GENERAL DESCRIPTION E0CDB519

4WD ECM control EMC(Electric Magnet Clutch) by current and EMC distributes torque properly by using slip of multi-clutch.

DTC DESCRIPTION ED56E3B4

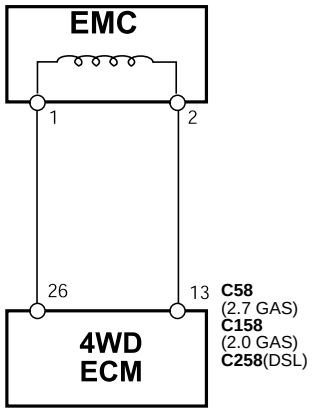
As related with EMC, this trouble code will set in case EMC output harness is open or shorted to battery.

DTC DETECTING CONDITION E153CABC

Item	Detecting Condition & Fail Safe	Possible Cause
DTC Strategy	● Short/ Open to Battery	• Power supply malfunction. • EMC, 4WD ECM connector looseness and poor terminal to wire connection. • EMC circuit open or short to battery. • EMC motor faulty. • 4WD ECM malfunction.
Enable Conditions	● Ignition cycle required	
Threshold Value	● -	
Diagnostic Time	● -	
Fail safe		

SCHEMATIC DIAGRAM ECF0D837

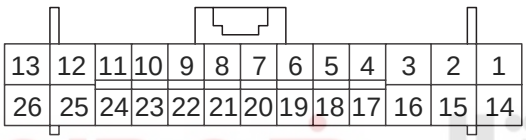
[CIRCUIT DIAGRAM]



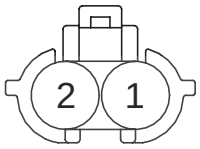
[CONNECTION INFORMATION]

Terminal	Connection	Function
1	NO.26	EMC output
2	NO.13	EMC ground

[HARNESS CONNECTORS]



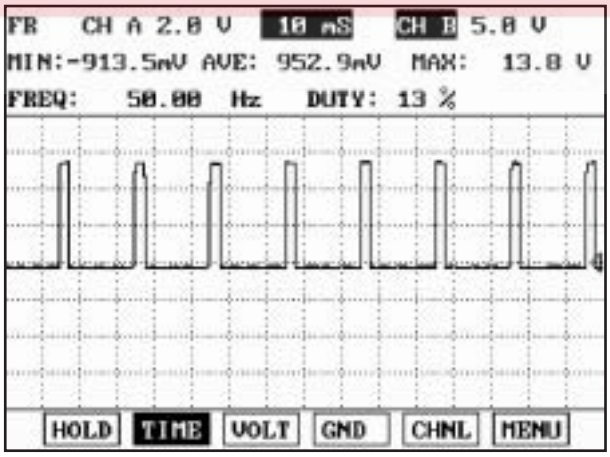
C58 or C158 or C258



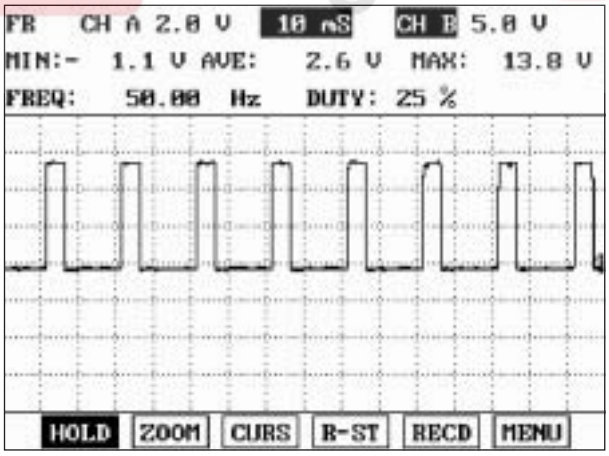
F43

EKQE624A

WAVEFORM INSPECTION E8B49DC6



[Idling]



[Throttle Valve Open]

[CAUTION] The above value is just for reference. The actual value may differ form it according to various engine condition.

EKQE642A

TERMINAL & CONNECTOR INSPECTION E3CCC34A

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.

   Has a problem been found?

   YES

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

   NO

   ▶ Go to the next procedure.

SIGNAL CIRCUIT INSPECTION E9BB1A42

1. EMC Signal Inspection

   1) IG KEY ON, ENG IDLE

   2) EMC connector : Connect.

   3) Monitor signal waveform between terminal 1 of F43 harness connector and chassis ground.

   4) Shift to N Range.

Specification : refer to 'Waveform Inspection'

   Is EMC Signal display near the specified value?

   YES

   ▶ This may caused by intermittent fault. Verify data changibility by shaking the harness.

   NO

   Keep 0V continuously.
   ▶ Inspect open or short in EMC output line.
   ▶ Check for 4WD ECM and replace it as necessary.

   Keep B+ continuously
   ▶ Inspect open or short in EMC component inspection.

2. EMC output line open inspection

   1) IG KEY OFF, ENG OFF

   2) Electric Magnet Valve Clutch connector and 4WD ECM connector: Disconnect.

3) Measure resistance between terminal 1 of Electric Magnet Valve Clutch harness connector and terminal 26 of 4WD ECM harness connector.

Specification : Approx. 0Ω

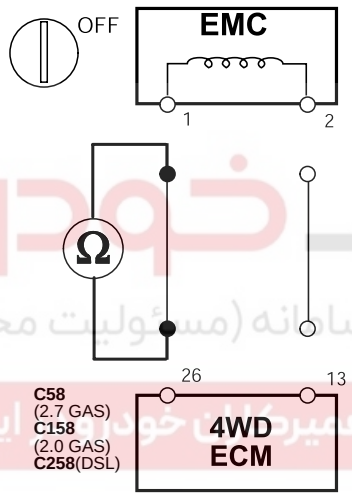
Is resistance display near the specified value?

YES

▶ Proceed next inspection procedure.

NO

▶ Repair open circuit of EMC output harness.
▶ If problem is solved, go to the "Verification of Vehicle Repair".



EKQE055T

3. EMC ground line open inspection

1) IG KEY OFF, ENG OFF

2) Electric Magnet Valve Clutch connector and 4WD ECM connector: Disconnect.

3) Measure resistance between terminal 2 of Electric Magnet Valve Clutch harness connector and terminal 13 of 4WD ECM harness connector M79.

Specification : Approx. 0Ω

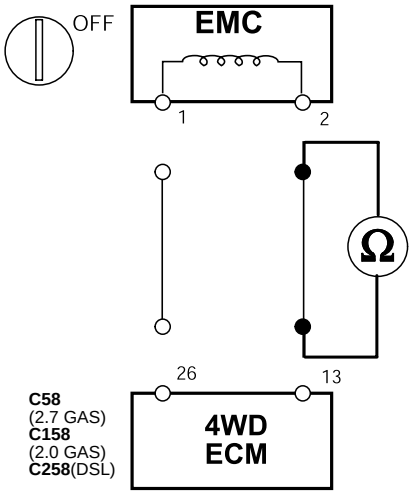
Is resistance display near the specified value?

YES

▶ Go to " Component inspection " procedure.

NO

▶ Repair open circuit of EMC ground harness.
▶ If problem is solved, go to the "Verification of Vehicle Repair".



EKQE056T

GROUND CIRCUIT INSPECTION E616AEDF

1. EMC output line short to ground inspection

   1) IG KEY OFF, ENG OFF

   2) Electric Magnet Valve Clutch connector : Disconnect.

   3) Measure resistance between terminal 1 of Electric Magnet Valve Clutch harness connector and chassis ground.

Specification : Approx. ∞Ω

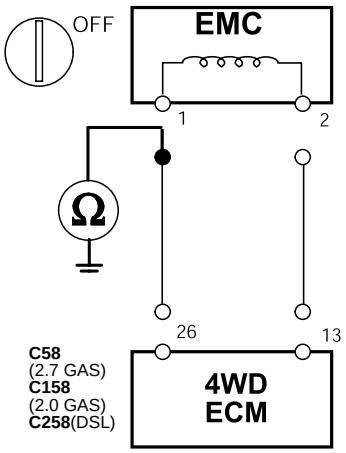
Is resistance display near the specified value?

YES

▶ Proceed next inspection procedure.

NO

▶ Repair ground to short circuit of EMC output harness.
▶ If problem is solved, go to the "Verification of Vehicle Repair".



EKQE054T

COMPONENT INSPECTION EA3935DE

1. IG KEY : OFF, Engine : OFF
2. Electric Magnet Valve Clutch connector : Disconnect.
3. Measure resistance between 1 & 2.

Specification : Approx. 1.8 ~ 2.2 Ω

NOTE

The above value is just for reference. The data from vehicle may differ from it according as various vehicle condition. This inspection is for checking open or short of EMC coil.

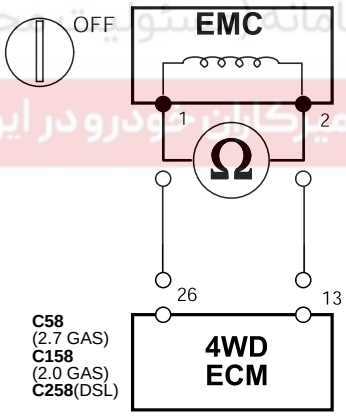
Is resistance display near the specified value?

YES

▶ Replace with normal 4WD ECM temporarily and check if vehicle run normally.
If trouble is disappeared, replace 4WD ECM.
▶ If problem is solved, go to the "Verification of Vehicle Repair".

NO

▶ Replace EMC coil.



EKQE057T

VERIFICATION OF VEHICLE REPAIR EF20F5D9

1. IG KEY ON, ENG ON
2. Electric Magnet Valve Clutch connector and 4WD ECM connector: Disconnect.
3. Shift to N Range.
4. Check EMC output signal and verify the malfunction.
   Does the scan tool display any DTC relevent to EMC signal?

   YES

   ▶ Go to the applicable troubleshooting procedure.

   NO

   ▶ System OK.

DTC P1729 EMC SHORTED TO GROUND

COMPONENT LOCATION ED1EDBDF

Refer to DTC P1728.

GENERAL DESCRIPTION E8DCEADB

Refer to DTC P1728.

DTC DESCRIPTION EB9F1FEB

Refer to DTC P1728.

DTC DETECTING CONDITION EEAFDD7D

Refer to DTC P1728.

SCHEMATIC DIAGRAM E4F63386

Refer to DTC P1728.

WAVEFORM INSPECTION EA7AB0FC

Refer to DTC P1728.

TERMINAL & CONNECTOR INSPECTION E50C589B

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.

   Has a problem been found?

   YES

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

   NO

   ▶ Go to the next procedure.

SIGNAL CIRCUIT INSPECTION E01CA5A7

Refer to DTC P1728.

GROUND CIRCUIT INSPECTION E27C03AC

Refer to DTC P1728.

COMPONENT INSPECTION EFD8F010

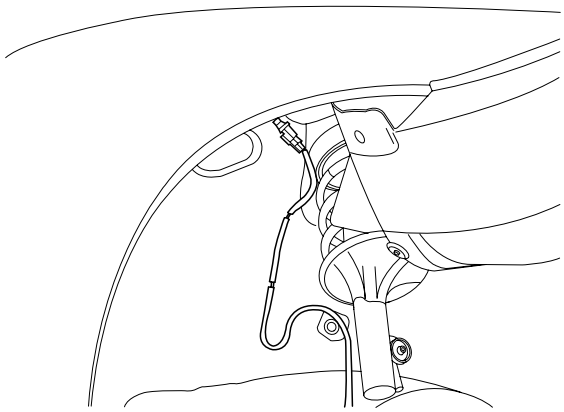
Refer to DTC P1728.

VERIFICATION OF VEHICLE REPAIR E3F12F19

Refer to DTC P1728.

DTC P1750 WHEEL SPEED SENSOR SIGNAL(FL)

COMPONENT LOCATION E8927524



KKQE016A

GENERAL DESCRIPTION ECFF4B3C

When the tone wheel rotates adjacent to the sensor pole piece, an alternating current signal is generated in the coil with a frequency proportioning to the wheel speed.

This signal which is generated from the wheel speed sensor is inputted to the 4WD ECM.

DTC DESCRIPTION E73D5ACE

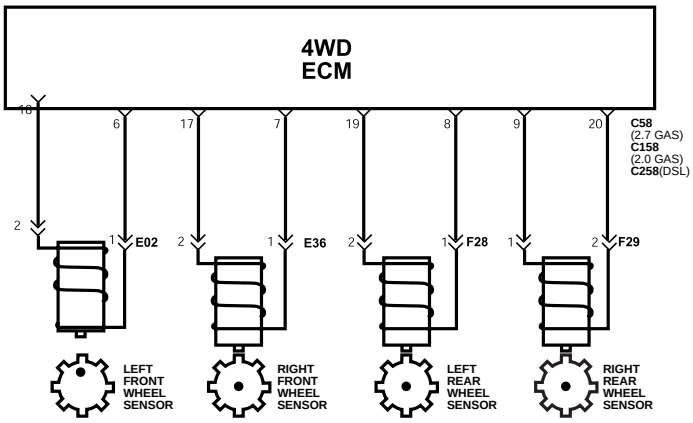
The DTC will set when there is no wheel speed sensor signal.

DTC DETECTING CONDITION ED9768C0

Item	Detecting Condition & Fail Safe	Possible Cause
DTC Strategy	● Loss of signal	• Wheel speed sensor, 4WD ECM connector looseness and poor terminal to wire connection. • Wheel speed circuit open or short to battery. • Wheel speed sensor airgap. • Wheel speed faulty. • 4WD ECM malfunction.
Enable Conditions	● Fault cleared ignition cycle	
Threshold Value	● Speed defference 30kph	
Diagnostic Time	● 30 Secs.	
Fail safe	● -	

SCHEMATIC DIAGRAM EAA7155C

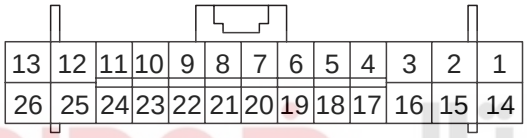
[CIRCUIT DIAGRAM]



[CONNECTION INFORMATION]

Terminal	Connection	Function
1	NO.6	Wheel speed input
2	NO.18	Wheel speed input

[HARNESS CONNECTORS]

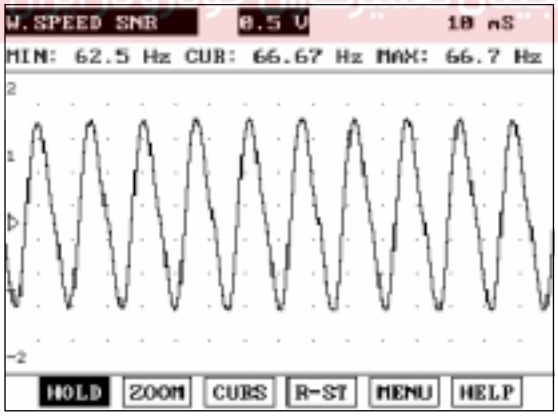


C58 or C158 or C258

E02

EKQE625A

WAVEFORM INSPECTION EBE7A3D2



[CAUTION]The above value is just for reference. The actual value may differ from it according to various engine condition.

EKQE643A

TERMINAL & CONNECTOR INSPECTION E94B906F

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.

   Has a problem been found?

   YES

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

   NO

   ▶ Go to the next procedure.

SIGNAL CIRCUIT INSPECTION E3EDB86E

1. FLSS(Front Left Speed Sensor) Signal Inspection

   1) IG KEY ON, ENG ON

   2) 4WD ECM connector : Connect.

   3) Monitor signal waveform between terminal 18 of 4WD ECM harness connector and chassis ground.

   4) Start and drive vehicle in gear and maintain vehicle speed is approx.10km/h or less(6mph or less).

Specification : refer to 'Waveform Inspection'

   Is FLSS Signal display near the specified value?

   YES

   ▶ This may caused by intermittent fault. Verify data changibility by shaking the harness.

   NO

   ▶ Inspect ground to short of FLSS circuit.
   ▶ Inspect open or short of FLSS circuit.
   ▶ Check for FLSS and replace it as necessary.
   ▶ Check for 4WD ECM and replace it as necessary.

2. FLSS open inspection

   1) IG KEY OFF, ENG OFF

   2) 4WD ECM connector and FLSS connector : Disconnect.

3) Measure resistance between terminal 18 of 4WD ECM harness connector and terminal 2 of FLSS harness connector.

Specification : Approx. 0Ω

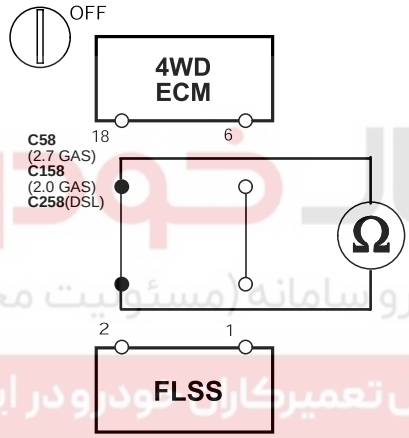
Is resistance display near the specified value?

YES

▶ Proceed next inspection procedure.

NO

▶ Repair open circuit of FLSS circuit.
▶ If problem is solved, go to the "Verification of Vehicle Repair".



EKQE062T

3. FLSS ground circuit open inspection

1) IG KEY OFF, ENG OFF

2) 4WD ECM connector and FLSS connector : Disconnect.

3) Measure resistance between terminal 6 of 4WD ECM harness connector and terminal 1 of FLSS harness connector.

Specification : Approx. 0Ω

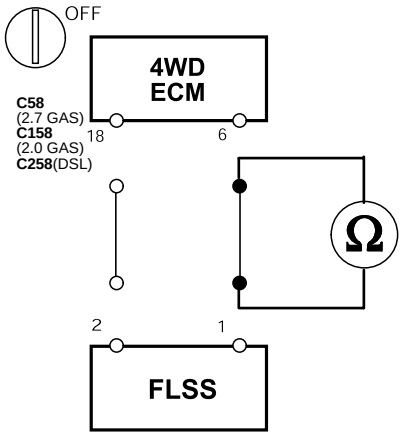
Is resistance display near the specified value?

YES

▶ Proceed next inspection procedure.

NO

▶ Repair open circuit of FLSS circuit.
▶ If problem is solved, go to the "Verification of Vehicle Repair".



EKQE063T

GROUND CIRCUIT INSPECTION E98D85EB

1. FLSS short to ground inspection

   1) IG KEY OFF, ENG OFF

   2) 4WD ECM connector and FLSS connector : Disconnect.

   3) Measure resistance between terminal 18 of 4WD ECM harness connector and chassis ground.

Specification : Approx. ∞Ω

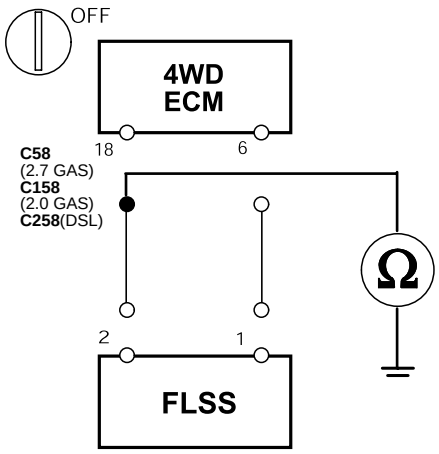
Is resistance display near the specified value?

YES

▶ Proceed next inspection procedure.

NO

▶ Repair ground to short circuit of FLSS circuit.
▶ If problem is solved, go to the "Verification of Vehicle Repair".



EKQE061T

COMPONENT INSPECTION E5835BE2

1. IG KEY : OFF, Engine : OFF
2. 4WD ECM connector and FLSS connector : Disconnect.
3. Measure resistance between terminal 1 & 2 of FLSS harness connector.

Specification : Approx. 1.1 ± 0.05 kΩ

NOTE

The above value is just for reference. The data from vehicle may differ from it according as various vehicle condition. This inspection is for checking open or short of FLSS.

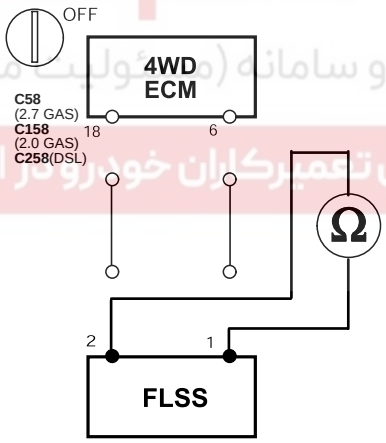
Is resistance display near the specified value?

YES

▶ Proceed next inspection procedure.

NO

▶ Replace the front left speed sensor.
▶ If problem is solved, go to the "Verification of Vehicle Repair".



EKQE064T

VISUAL/PHYSICAL INSPECTION EEB96085

1. FLSS Air Gap Inspection

   1) IG KEY : OFF, Engine : OFF.

   2) 4WD ECM connector and FLSS connector : Disconnect.

   3) Measure air gap between wheel speed sensor and rotor.

Specification : Front Air-gap : 0.3~0.9mm (0.0118 ~ 0.0354 inch)

Is the air gap in the range of the specified value?

YES

▶ Replace with normal 4WD ECM temporarily and check if vehicle run normally.
If trouble is disappeared, replace 4WD ECM.
▶ If problem is solved, go to the "Verification of Vehicle Repair".

NO

▶ Adjust the air gap.
▶ If problem is solved, go to the "Verification of Vehicle Repair".

VERIFICATION OF VEHICLE REPAIR E2D3FFF4

1. IG KEY ON, ENG ON
2. 4WD ECM connector and FLSS connector : Connect.
3. Clear the DTC with a scan tool.
4. Start and drive vehicle in gear and maintain vehicle speed is approx. 10km/h or less(6mph or less).
5. Check FLSS signal signal and verify the malfunction.
   Does the scan tool display any DTC relevent to FLSS signal?

YES

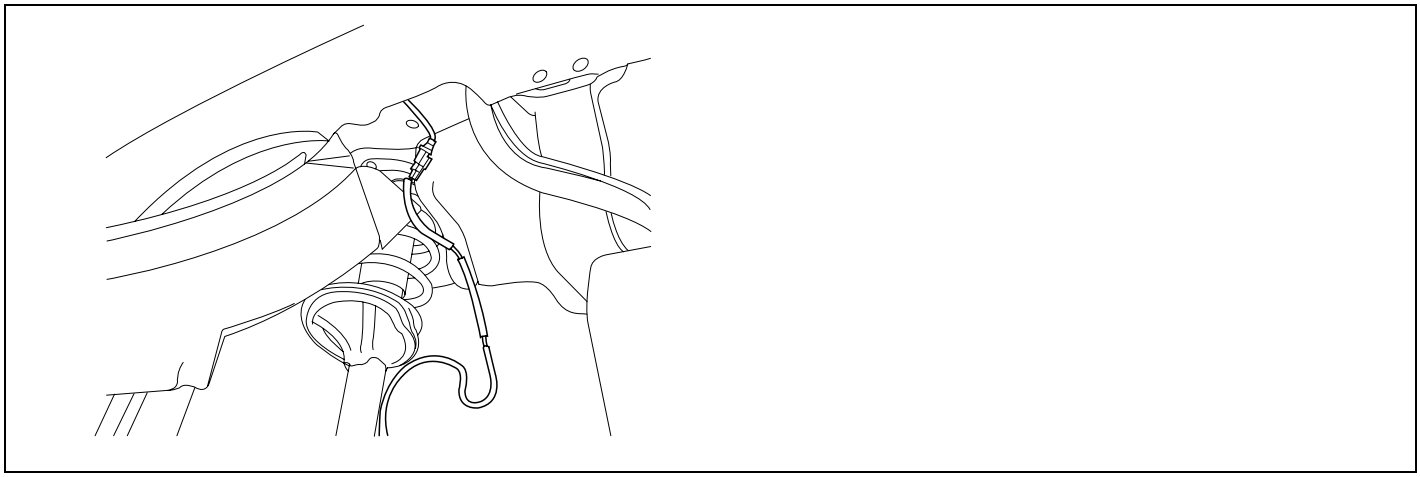
Go to the applicable troubleshooting procedure.

NO

▶ System OK.

DTC P1751 WHEEL SPEED SENSOR SIGNAL(FR)

COMPONENT LOCATION E763C699



KKQE017A

GENERAL DESCRIPTION EBDABC0A

Refer to DTC P1750.

DTC DESCRIPTION E0350AA6

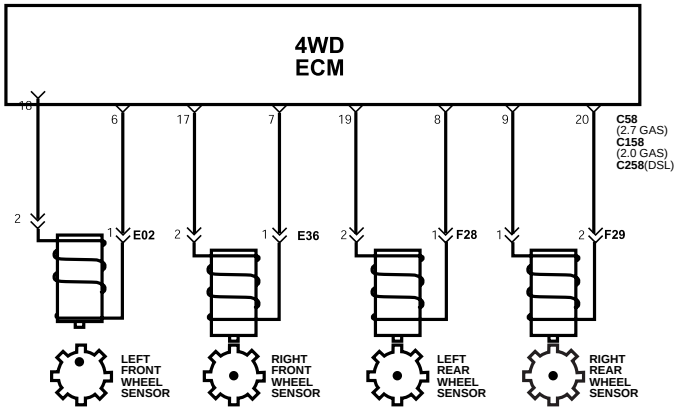
Refer to DTC P1750.

DTC DETECTING CONDITION EC68C8B5

Refer to DTC P1750.

SCHEMATIC DIAGRAM EFEFF5BA

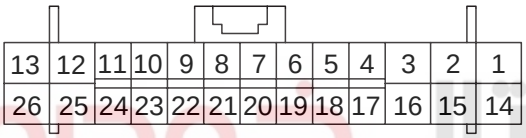
[CIRCUIT DIAGRAM]



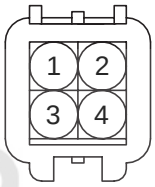
[CONNECTION INFORMATION]

Terminal	Connection	Function
1	NO.7	Wheel speed input
2	NO.17	Wheel speed input

[HARNESS CONNECTORS]



C58 or C158 or C258



E36

EKQE626A

WAVEFORM INSPECTION E57DD3C0

Refer to DTC P1750.

TERMINAL & CONNECTOR INSPECTION E8BBE03C

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.

   Has a problem been found?

   YES

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

   NO

   ▶ Go to the next procedure.

SIGNAL CIRCUIT INSPECTION EBCE084B

1. FRSS(Front Right Speed Sensor) Signal Inspection

   1) IG KEY ON, ENG ON

   2) 4WD ECM connector : Connect.

   3) Monitor signal waveform between terminal 17 of 4WD ECM harness connector and chassis ground.

   4) Start and drive vehicle in gear and maintain vehicle speed is approx. 10km/h or less(6mph or less).

Specification : refer to 'Waveform Inspection'

Is FRSS Signal display near the specified value?

YES

▶ This may caused by intermittent fault. Verify data changibility by shaking the harness.

NO

▶ Inspect ground to short of FRSS circuit.
▶ Inspect open or short of FRSS circuit.
▶ Check for FRSS and replace it as necessary.
▶ Check for 4WD ECM and replace it as necessary.

2. FRSS open inspection

   1) IG KEY OFF, ENG OFF

   2) 4WD ECM connector and FRSS connector : Disconnect.

   3) Measure resistance between terminal 17 of 4WD ECM harness connector and terminal 2 of FRSS harness connector.

Specification : Approx. 0Ω

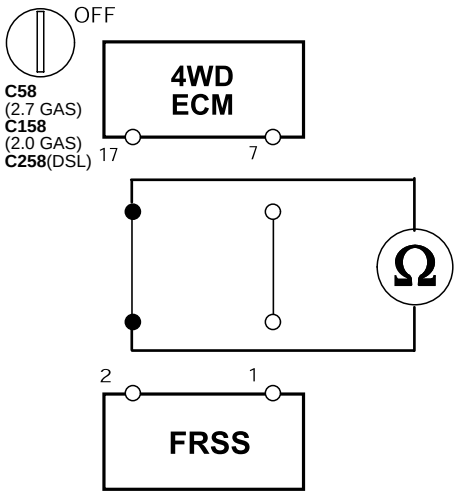
Is resistance display near the specified value?

YES

▶ Proceed next inspection procedure.

NO

▶ Repair open circuit of FRSS circuit.
▶ If problem is solved, go to the "Verification of Vehicle Repair".



EKQE066T

3. FRSS ground circuit open inspection

1) IG KEY OFF, ENG OFF

2) 4WD ECM connector and FRSS connector : Disconnect.

3) Measure resistance between terminal 7 of 4WD ECM harness connector and terminal 1 of FRSS harness connector.

Specification : Approx. 0Ω

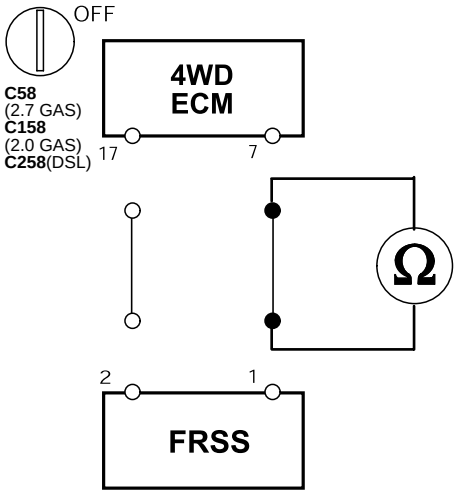
Is resistance display near the specified value?

YES

▶ Proceed next inspection procedure.

NO

▶ Repair open circuit of FRSS circuit.
▶ If problem is solved, go to the "Verification of Vehicle Repair".



EKQE067T

GROUND CIRCUIT INSPECTION EE57D6CE

1. FRSS short to ground inspection

   1) IG KEY OFF, ENG OFF

   2) 4WD ECM connector and FRSS connector : Disconnect.

   3) Measure resistance between terminal 17 of 4WD ECM harness connector and chassis ground.

Specification : Approx. ∞Ω

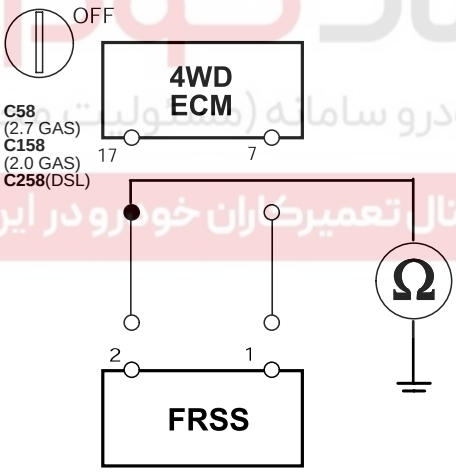
Is resistance display near the specified value?

YES

▶ Proceed next inspection procedure.

NO

▶ Repair ground to short circuit of FRSS circuit.
▶ If problem is solved, go to the "Verification of Vehicle Repair".



EKQE065T

COMPONENT INSPECTION E3542C58

1. IG KEY : OFF, Engine : OFF
2. 4WD ECM connector and FRSS connector : Disconnect.
3. Measure resistance between terminal 1 & 2 of FRSS harness connector.

Specification : Approx. 1.1 ± 0.05 kΩ

NOTE

The above value is just for reference. The data from vehicle may differ from it according as various vehicle condition. This inspection is for checking open or short of FRSS.

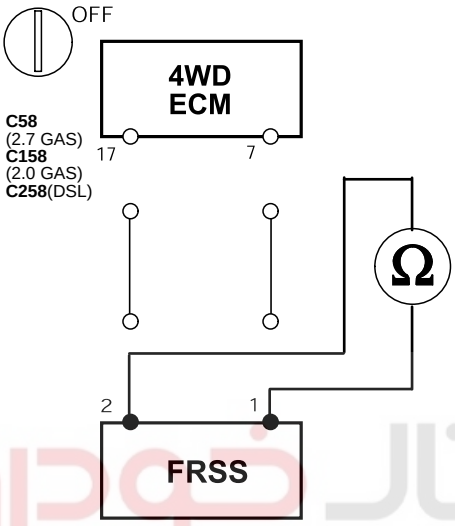
Is resistance display near the specified value?

YES

▶ Proceed next inspection procedure.

NO

▶ Replace the front left speed sensor.
▶ If problem is solved, go to the "Verification of Vehicle Repair".



EKQE068T

VISUAL/PHYSICAL INSPECTION EA3FAAD4

1. FRSS Air Gap Inspection

   1) IG KEY : OFF, Engine : OFF.

   2) 4WD ECM connector and FRSS connector : Disconnect.

   3) Measure air gap between wheel speed sensor and rotor.

Specification : Front Air-gap : 0.3~0.9mm (0.0118 ~ 0.0354 inch)

Is the air gap in the range of the specified value?

YES

▶ Replace with normal TCCU temporarily and check if vehicle run normally.
If trouble is disappeared, replace TCCU.
▶ If problem is solved, go to the "Verification of Vehicle Repair".

NO

▶ Adjust the air gap.
▶ If problem is solved, go to the "Verification of Vehicle Repair".

VERIFICATION OF VEHICLE REPAIR E45BCEE3

1. IG KEY ON, ENG ON
2. 4WD ECM connector and FRSS connector : Connect.
3. Clear the DTC with a scan tool.
4. Start and drive vehicle in gear and maintain vehicle speed is approx. 10km/h or less(6mph or less).
5. Check FRSS signal signal and verify the malfunction.
   Does the scan tool display any DTC relevent to FRSS signal?

   YES

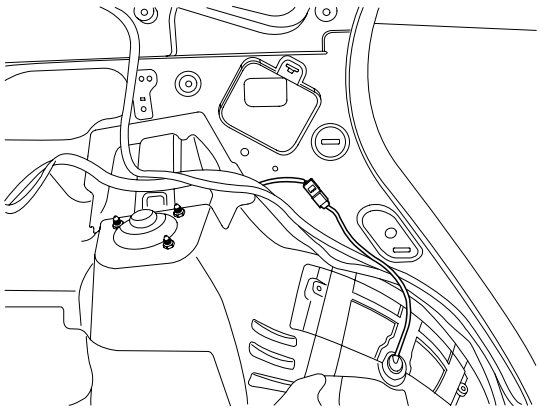
   Go to the applicable troubleshooting procedure.

   NO

   ▶ System OK.

DTC P1752 WHEEL SPEED SENSOR SIGNAL(RL)

COMPONENT LOCATION E0E2FD78



KKQE018A

GENERAL DESCRIPTION EDD9E28F

Refer to DTC P1750.

DTC DESCRIPTION E916FAF1

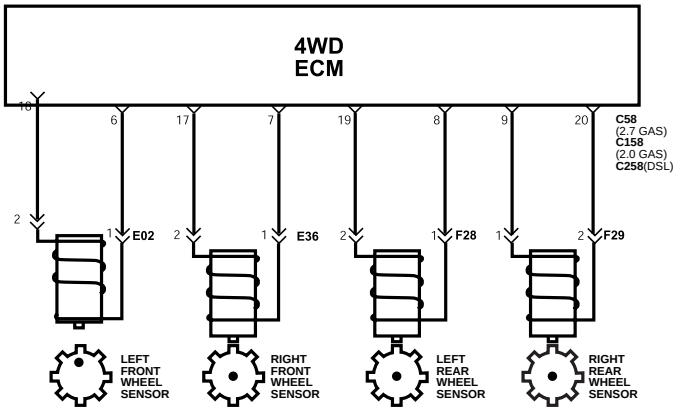
Refer to DTC P1750.

DTC DETECTING CONDITION EB301890

Refer to DTC P1750.

SCHEMATIC DIAGRAM EEDA65FD

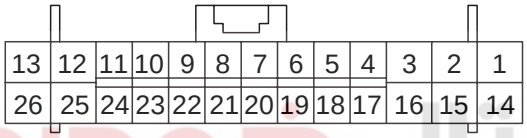
[CIRCUIT DIAGRAM]



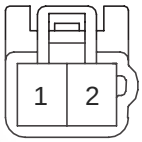
[CONNECTION INFORMATION]

Terminal	Connection	Function
1	NO.8	Wheel speed input
2	NO.19	Wheel speed input

[HARNESS CONNECTORS]



C58 or C158 or C258



F28

EKQE627A

WAVEFORM INSPECTION EC4E33AD

Refer to DTC P1750.

TERMINAL & CONNECTOR INSPECTION E7FC511F

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.

   Has a problem been found?

   YES

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

   NO

   ▶ Go to the next procedure.

SIGNAL CIRCUIT INSPECTION E5DD5E2A

1. RLSS(Rear Left Speed Sensor) Signal Inspection

   1) IG KEY ON, ENG ON

   2) 4WD ECM connector : Connect.

   3) Monitor signal waveform between terminal 19 of 4WD ECM harness connector and chassis ground.

   4) Start and drive vehicle in gear and maintain vehicle speed is approx. 10km/h or less(6mph or less).

Specification : refer to 'Waveform Inspection'

Is RLSS Signal display near the specified value?

YES

▶ This may caused by intermittent fault. Verify data changibility by shaking the harness.

NO

▶ Inspect ground to short of RLSS circuit.
▶ Inspect open or short of RLSS circuit.
▶ Check for RLSS and replace it as necessary.
▶ Check for 4WD ECM and replace it as necessary.

2. RLSS open inspection

   1) IG KEY OFF, ENG OFF

   2) 4WD ECM connector and RLSS connector : Disconnect.

   3) Measure resistance between terminal 19 of 4WD ECM harness connector and terminal 2 of RLSS harness connector.

Specification : Approx. 0Ω

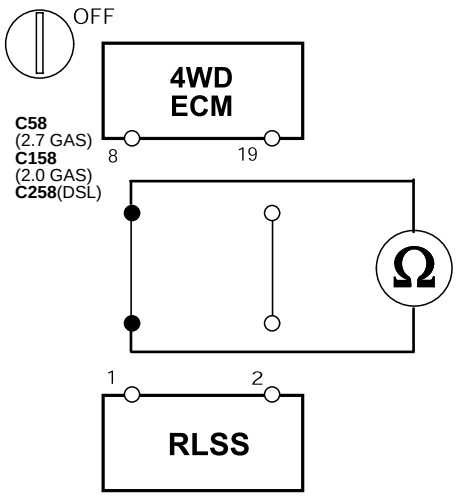
Is resistance display near the specified value?

YES

▶ Proceed next inspection procedure.

NO

▶ Repair open circuit of RLSS circuit.
▶ If problem is solved, go to the "Verification of Vehicle Repair".



EKQE070T

3. RLSS ground circuit open inspection

1) IG KEY OFF, ENG OFF

2) 4WD ECM connector and RLSS connector : Disconnect.

3) Measure resistance between terminal 8 of 4WD ECM harness connector and terminal 1 of RLSS harness connector.

Specification : Approx. 0Ω

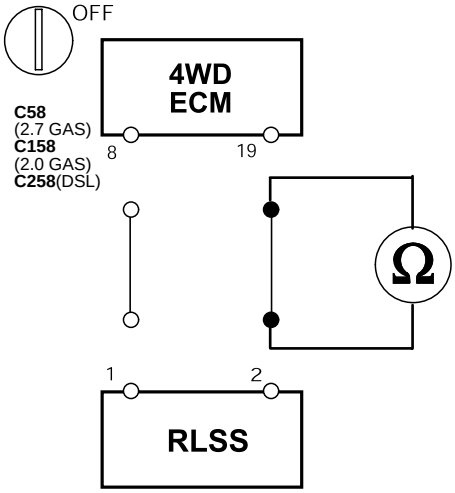
Is resistance display near the specified value?

YES

▶ Proceed next inspection procedure.

NO

▶ Repair open circuit of RLSS circuit.
▶ If problem is solved, go to the "Verification of Vehicle Repair".



EKQE071T

GROUND CIRCUIT INSPECTION E06DADBD

1. RLSS short to ground inspection

   1) IG KEY OFF, ENG OFF

   2) 4WD ECM connector and RLSS connector : Disconnect.

   3) Measure resistance between terminal 19 of 4WD ECM harness connector and chassis ground.

Specification : Approx. ∞Ω

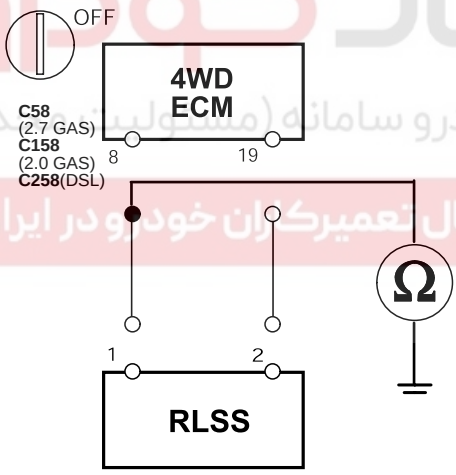
Is resistance display near the specified value?

YES

▶ Proceed next inspection procedure.

NO

▶ Repair ground to short circuit of RLSS circuit.
▶ If problem is solved, go to the "Verification of Vehicle Repair".



EKQE069T

COMPONENT INSPECTION E225AC33

1. IG KEY : OFF, Engine : OFF
2. 4WD ECM connector and RLSS connector : Disconnect.
3. Measure resistance between terminal 1 & 2 of RLSS harness connector.

Specification : Approx. 1.1 ± 0.05 kΩ

NOTE

The above value is just for reference. The data from vehicle may differ from it according as various vehicle condition. This inspection is for checking open or short of RLSS.

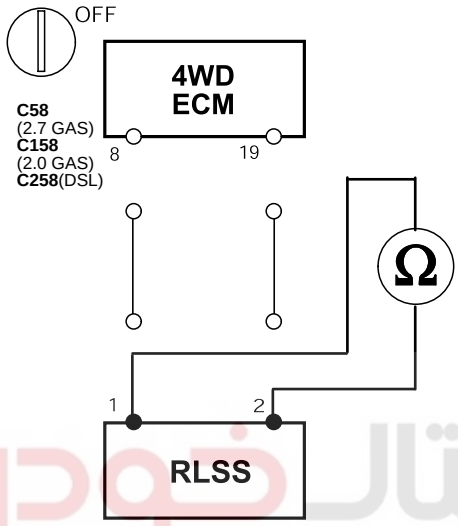
Is resistance display near the specified value?

YES

▶ Proceed next inspection procedure.

NO

▶ Replace the front left speed sensor.
▶ If problem is solved, go to the "Verification of Vehicle Repair".



EKQE072T

VISUAL/PHYSICAL INSPECTION EF0A9ACF

1. RLSS Air Gap Inspection

   1) IG KEY : OFF, Engine : OFF.

   2) 4WD ECM connector and RLSS connector : Disconnect.

   3) Measure air gap between wheel speed sensor and rotor.

Specification : Front Air-gap : 0.3~0.9mm (0.0118 ~ 0.0354 inch)

Is the air gap in the range of the specified value?

YES

▶ Replace with normal TCCU temporarily and check if vehicle run normally.
If trouble is disappeared, replace TCCU.
▶ If problem is solved, go to the "Verification of Vehicle Repair".

NO

▶ Adjust the air gap.
▶ If problem is solved, go to the "Verification of Vehicle Repair".

VERIFICATION OF VEHICLE REPAIR E3332FCF

1. IG KEY ON, ENG ON
2. 4WD ECM connector and RLSS connector : Connect.
3. Clear the DTC with a scan tool.
4. Start and drive vehicle in gear and maintain vehicle speed is approx. 10km/h or less(6mph or less).
5. Check RLSS signal signal and verify the malfunction.
   Does the scan tool display any DTC relevent to RLSS signal?

   YES

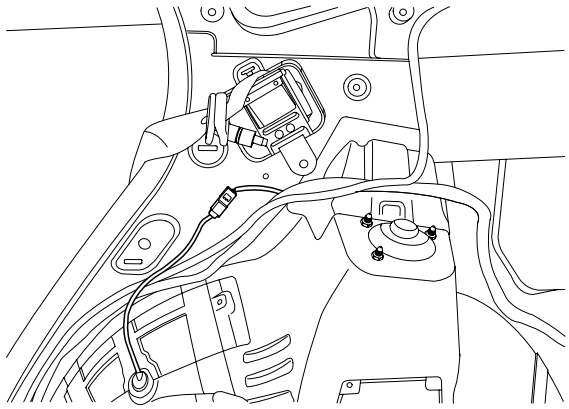
   Go to the applicable troubleshooting procedure.

   NO

   ▶ System OK.

DTC P1753 WHEEL SPEED SENSOR SIGNAL(RR)

COMPONENT LOCATION E8C47D53



KKQE019A

GENERAL DESCRIPTION ECCA435C

Refer to DTC P1750.

DTC DESCRIPTION EE886A66

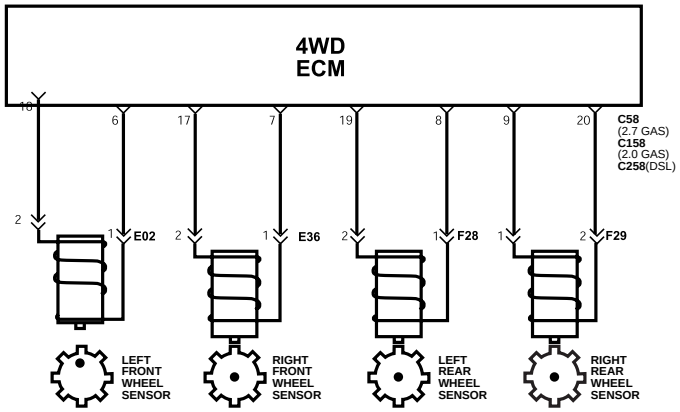
Refer to DTC P1750.

DTC DETECTING CONDITION EDC96E79

Refer to DTC P1750.

SCHEMATIC DIAGRAM EA5915E3

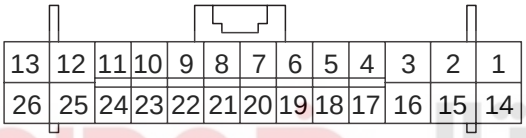
[CIRCUIT DIAGRAM]



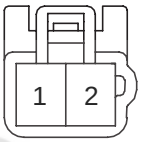
[CONNECTION INFORMATION]

Terminal	Connection	Function
1	NO.9	Wheel speed input
2	NO.20	Wheel speed input

[HARNESS CONNECTORS]



C58 or C158 or C258



F29

EKQE628A

WAVEFORM INSPECTION EB19A3EA

Refer to DTC P1750.

TERMINAL & CONNECTOR INSPECTION E3641CE4

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.

   Has a problem been found?

   YES

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

   NO

   ▶ Go to the next procedure.

SIGNAL CIRCUIT INSPECTION EE9740E3

1. RRSS(Rear Right Speed Sensor) Signal Inspection

   1) IG KEY ON, ENG ON

   2) 4WD ECM connector : Connect.

   3) Monitor signal waveform between terminal 20 of 4WD ECM harness connector and chassis ground.

   4) Start and drive vehicle in gear and maintain vehicle speed is approx. 10km/h or less(6mph or less).

Specification : refer to 'Waveform Inspection'

Is RRSS Signal display near the specified value?

YES

▶ This may caused by intermittent fault. Verify data changibility by shaking the harness.

NO

▶ Inspect ground to short of RRSS circuit.
▶ Inspect open or short of RRSS circuit.
▶ Check for RRSS and replace it as necessary.
▶ Check for 4WD ECM and replace it as necessary.

2. RRSS open inspection

   1) IG KEY OFF, ENG OFF

   2) 4WD ECM connector and RRSS connector : Disconnect.

   3) Measure resistance between terminal 20 of 4WD ECM harness connector and terminal 2 of RRSS harness connector.

Specification : Approx. 0Ω

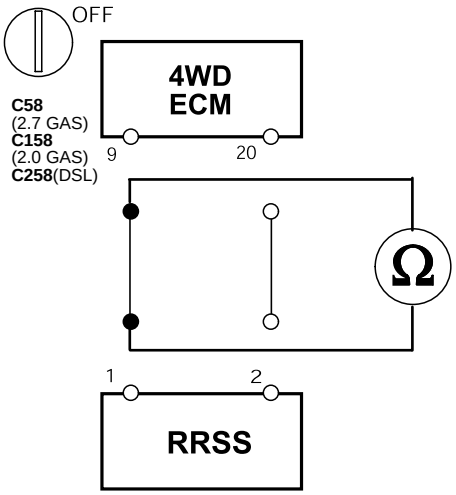
Is resistance display near the specified value?

YES

▶ Proceed next inspection procedure.

NO

▶ Repair open circuit of RRSS circuit.
▶ If problem is solved, go to the "Verification of Vehicle Repair".



EKQE074T

3. RRSS ground circuit open inspection

1) IG KEY OFF, ENG OFF

2) 4WD ECM connector and RRSS connector : Disconnect.

3) Measure resistance between terminal 9 of 4WD ECM harness connector and terminal 1 of RRSS harness connector.

Specification : Approx. 0Ω

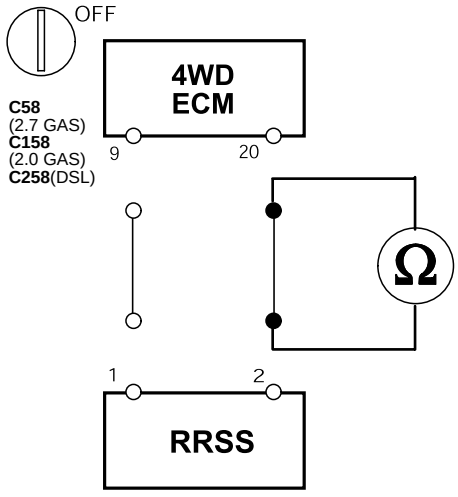
Is resistance display near the specified value?

YES

▶ Proceed next inspection procedure.

NO

▶ Repair open circuit of RRSS circuit.
▶ If problem is solved, go to the "Verification of Vehicle Repair".



EKQE075T

GROUND CIRCUIT INSPECTION EBA89FE8

1. RRSS short to ground inspection

   1) IG KEY OFF, ENG OFF

   2) 4WD ECM connector and RRSS connector : Disconnect.

   3) Measure resistance between terminal 20 of 4WD ECM harness connector and chassis ground.

Specification : Approx. ∞Ω

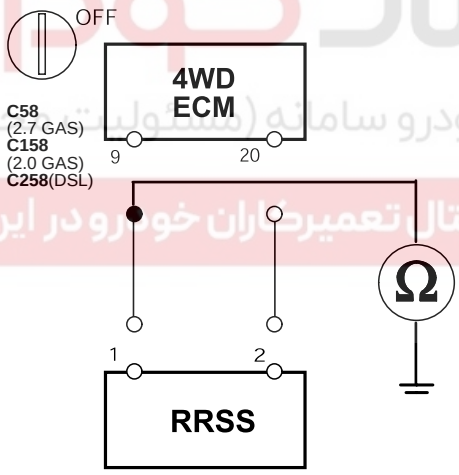
Is resistance display near the specified value?

YES

▶ Proceed next inspection procedure.

NO

▶ Repair ground to short circuit of RRSS circuit.
▶ If problem is solved, go to the "Verification of Vehicle Repair".



EKQE073T

COMPONENT INSPECTION E9AD65FF

1. IG KEY : OFF, Engine : OFF
2. 4WD ECM connector and RRSS connector : Disconnect.
3. Measure resistance between terminal 1 & 2 of RRSS harness connector.

Specification : Approx. 1.1 ± 0.05 kΩ

NOTE

The above value is just for reference. The data from vehicle may differ from it according as various vehicle condition. This inspection is for checking open or short of RRSS.

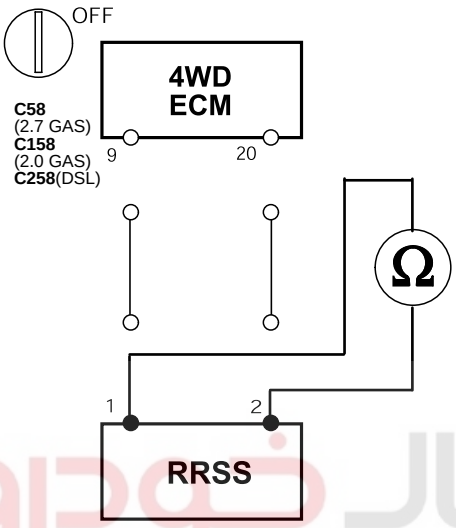
Is resistance display near the specified value?

YES

▶ Proceed next inspection procedure.

NO

▶ Replace the front left speed sensor.
▶ If problem is solved, go to the "Verification of Vehicle Repair".



EKQE076T

VISUAL/PHYSICAL INSPECTION E24B8391

1. RRSS Air Gap Inspection

   1) IG KEY : OFF, Engine : OFF.

   2) 4WD ECM connector and RRSS connector : Disconnect.

   3) Measure air gap between wheel speed sensor and rotor.

Specification : Front Air-gap : 0.3~0.9mm (0.0118 ~ 0.0354 inch)

Is the air gap in the range of the specified value?

YES

▶ Replace with normal TCCU temporarily and check if vehicle run normally.
If trouble is disappeared, replace TCCU.
▶ If problem is solved, go to the "Verification of Vehicle Repair".

NO

▶ Adjust the air gap.
▶ If problem is solved, go to the "Verification of Vehicle Repair".

VERIFICATION OF VEHICLE REPAIR E6EDA190

1. IG KEY ON, ENG ON
2. 4WD ECM connector and RRSS connector : Connect.
3. Clear the DTC with a scan tool.
4. Start and drive vehicle in gear and maintain vehicle speed is approx. 10km/h or less(6mph or less).
5. Check RRSS signal signal and verify the malfunction.
   Does the scan tool display any DTC relevent to RRSS signal?

   YES

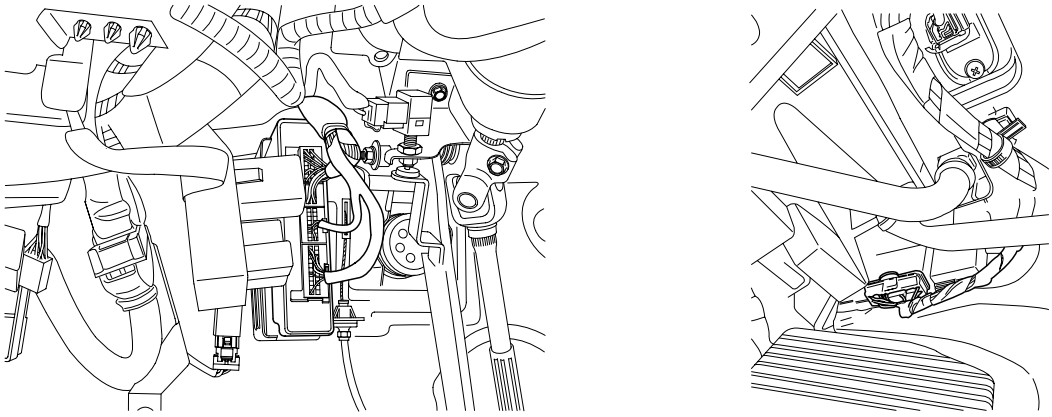
   Go to the applicable troubleshooting procedure.

   NO

   ▶ System OK.

DTC P1764 TCU CAN MI-COM MALFUNCTION

COMPONENT LOCATION E18DD8AD



EKQE640A

GENERAL DESCRIPTION E783CD16

A communication line exists between the Engine Control Module(ECM) and the Transaxle Control Module(TCM). The communication is through a Control Area Network(CAN). Without CAN communication, an independent pin and wiring is needed to receive a sensor information from a ECM. The more information to be communicated, the more wirings is required. In case of CAN communication type, all the information need to be communicated among control modules such as ECM and TCM use CAN lines.

DTC DESCRIPTION ECDE2BBB

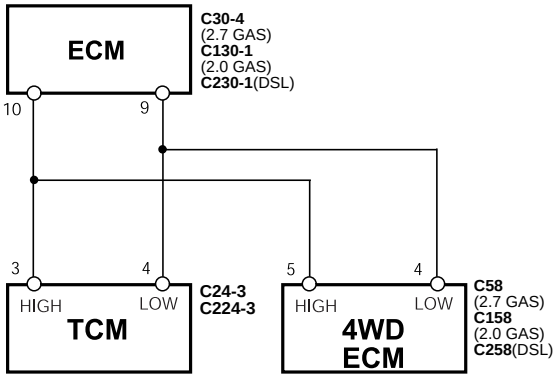
After clearing the DTC, check the malfunction of TCM and 4WD ECM, if the DTC sets again. This code may set if there is no signal to 4WD ECM.

DTC DETECTING CONDITION EF8ADABA

Item	Detecting Condition & Fail Safe	Possible Cause
DTC Strategy	● ECU-ITM Communication Line, or ECU side malfunction	• ECM, 4WD ECM connector looseness and poor terminal to wire connection. • CAN HIGH/LOW circuit open/short. • ECM malfunction. • 4WD ECM malfunction.
Enable Conditions	● IG SW ON ● No actuator test ● No holding ● No fail in input/output speed sensors ● Battery voltage ≥ 10V ● Engine speed > Approx. 260 rpm	
Threshold Value	● Loss of Signal	
Diagnostic Time	● 1 Sec.	
Fail safe	● COMMUNICATION : STOP TCM transmitting ● LOGIC : NO INTELLIGENT SHIFT, NO hydraulic control learning, NO TORQUE RETARD	

SCHEMATIC DIAGRAM ECF10F3D

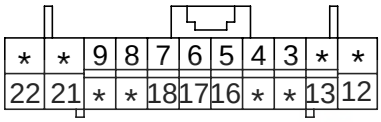
[CIRCUIT DIAGRAM]



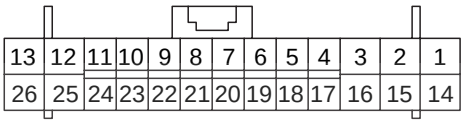
[CONNECTION INFORMATION]

Terminal	Connection	Function
NO.10	NO.3	CAN (HIGH)
	NO.5	
NO.9	NO.4	CAN (LOW)
	NO.4	

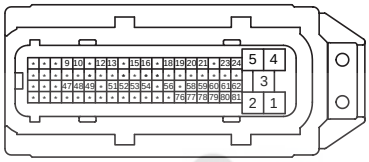
[HARNESS CONNECTORS]



TCM C24-3 or C224-3



4WD ECM C58 or C158 or C258

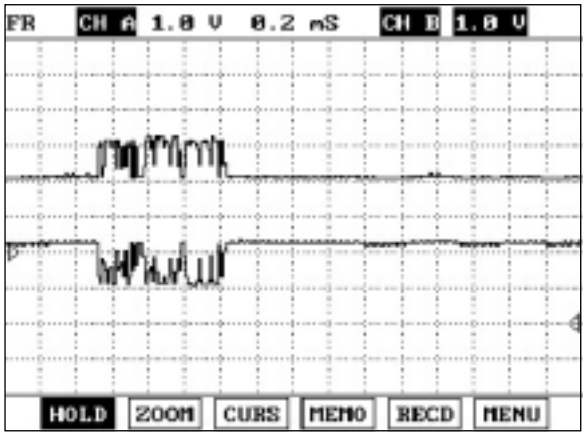


ECM C230-1 or C30-4

EKQE629A

WAVEFORM INSPECTION EFF8E546

1. IG KEY ON, ENG ON
2. TCM or 4WD ECM connector : Connect.
3. Monitor signal waveform between terminal 3 & 4 of TCM harness connector and chassis ground.



[CAUTION]The above value is just for reference. The actual value may differ from it according to various engine condition.

P1726_1

MONITOR SCANTOOL DATA E235FCC9

When the DTCs related to CAN communication set, use the sensor data(TCM side) to check for the ECM & TCM's communication conditon. Check the data such as the engine RPM and the throttle position sensor at idle in order to inspect the signal between ECM and TCM.

TERMINAL & CONNECTOR INSPECTION EE69B148

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.

   Has a problem been found?

   YES

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

   NO

   ▶ Go to the next procedure.

COMPONENT INSPECTION EBEFEFD3

1. TCM component inspection
   1) IG KEY OFF, ENG OFF
   2) Measure resistance between the terminal 3 and 4 with the specification below.

Specification: Without TCS, 4WD system
※ ECM connector and TCM connector: Connect -＞ 60Ω ± 1Ω
※ ECM connector: Disconnect and TCM connector: Connect -＞120Ω ± 2Ω
※ ECM connector: Connect and TCM connector: Disconnect -＞120Ω ± 2Ω

Specification: With TCS, 4WD system
※ ECM connector and TCM connector: Connect -＞120Ω ± 2Ω

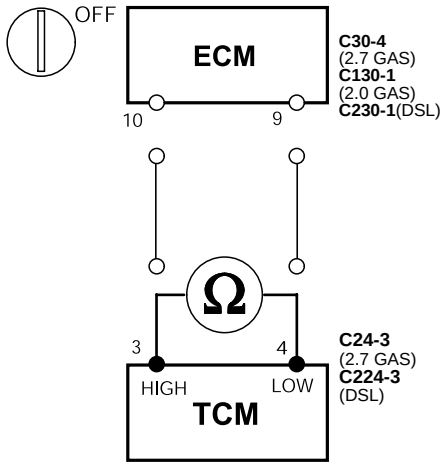
Is resistance display near the specified value?

YES

▶ Check if ECM-TCM communication line is short to ground.

NO

▶ Check if ECM-TCM communication line is open.



EKQE024T

2. ECM waveform inspection

1) IG KEY OFF, ENG OFF

2) TCM connector: Disconnect.

3) Connect the terminal 3 and 4 of TCM connector to a scan tool.

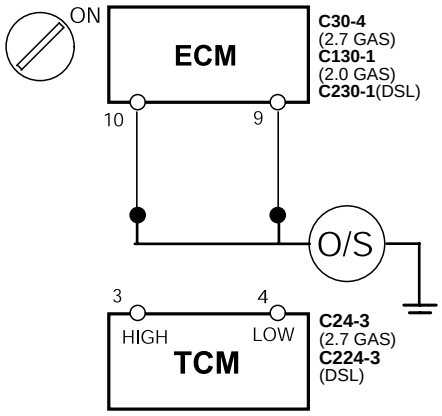
4) IG KEY ON
Is CAN Signal display near the specified value?

YES

▶ Inspect TCM waveform.

NO

▶ ECM communication signal malfunction - replace ECM.
▶ After checking 4WD ECM circuit, if any malfunctino is detected, replace 4WD ECM.



EKQE027T

3. TCM waveform inspection

1) IG KEY OFF, ENG OFF

2) ECM connector: Disconnect.

3) Connect the terminal 9 and 10 of ECM connector to a scan tool.

4) IG KEY ON
Is CAN Signal display near the specified value?

YES

▶ TCM is in a normal condition.

NO

▶ TCM communication signal malfunction - replace TCM.
▶ After checking 4WD ECM circuit, if any malfunctino is detected, replace 4WD ECM.

SIGNAL CIRCUIT INSPECTION EE7EC6DC

1. ECM-TCM communication line open inspection

1) IG KEY OFF, ENG OFF

2) ECM connector and TCM connector: Disconnect.

3) Measure resistance between terminals 10 of the ECM harness connector and 3 of the TCM harness connector.
Measure resistance between terminals 9 of the ECM harness connector and 4 of the TCM harness connector.

Specification : Approx. 0Ω

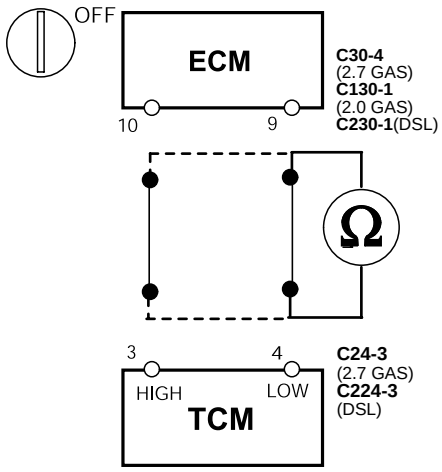
Is resistance display near the specified value?

YES

▶ Check if ECM-TCM communication line is short.

NO

▶ Repair open circuit of CAN Low comm. Line.



EKQE025T

GROUND CIRCUIT INSPECTION ECD12370

1. ECM-TCM communication line short to ground inspection

   1) IG KEY OFF, ENG OFF

   2) TCM connector, ECM connector, 4WD ECM connector and TCS(or ESP) connector: Disconnect.

   3) Measure resistance between terminal 4 of TCM harness connector and chassis ground.

   4) Measure resistance between terminal 3 of TCM harness connector and chassis ground.

Specification : Approx. ∞Ω

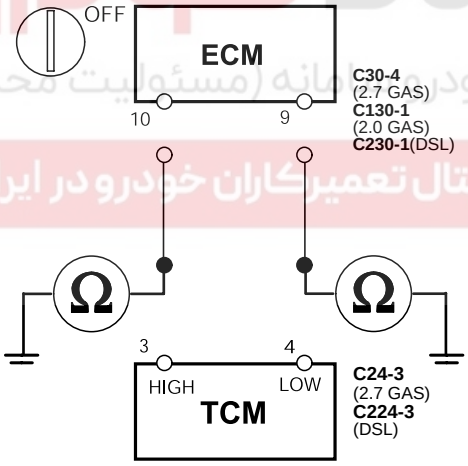
Is resistance display near the specified value?

YES

▶ Go to the "Component inspection".

NO

▶ Repair ground to short circuit of CAN Low comm. Line.
▶ If problem is solved, go to the "Verification of Vehicle Repair".



EKQE026T

DTC P1765 TORQUE REDUCTION ABNORMAL

COMPONENT LOCATION E8E4DA79

EKQE641A

GENERAL DESCRIPTION E49DAE8C

Without TCS(Traction Control System), 4WD ECM recieves the signal directly from the wheel speed sensors. With TCS, 4WD ECM receives the signal through CAN communication line from TCS module which gets the wheel speed sensor signal from the sensors.

DTC DESCRIPTION E6551D81

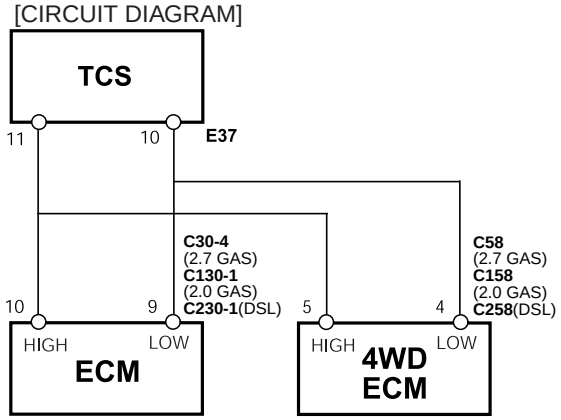
This DTC is about TCS module - ECM Communication Line and will set when there are no signals from the wheel speed sensors to 4WD ECM.

DTC DETECTING CONDITION EB3FFCFE

Item	Detecting Condition & Fail Safe	Possible Cause
DTC Strategy	● TCS-ITM Communication Line, or ECU side malfunction	• ABS MODULE, 4WD ECM connector looseness and poor terminal to wire connection. • Wheel sensor comm line circuit open/short. • Wheel sensor malfunction. • TCS MODULE malfunction. • 4WD ECM malfunction.
Enable Conditions	● Message present 1.0 sec self clearing	
Threshold Value	● No Signal	
Diagnostic Time	● 1 Sec.	
Fail safe		

SCHEMATIC DIAGRAM E75B3AFD

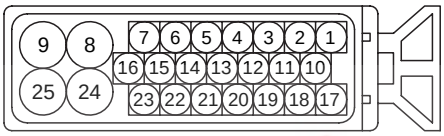
[CIRCUIT DIAGRAM]



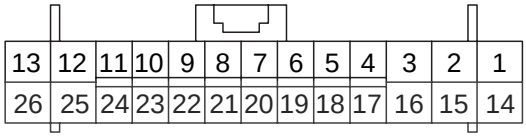
[CONNECTION INFORMATION]

Terminal	Connection	Function
NO.10	E37 NO.11	CAN (HIGH)
	NO.5	
NO.9	E37 NO.10	CAN (LOW)
	NO.4	

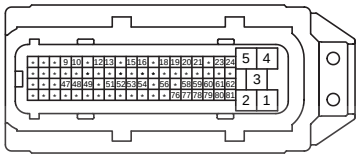
[HARNESS CONNECTORS]



E37



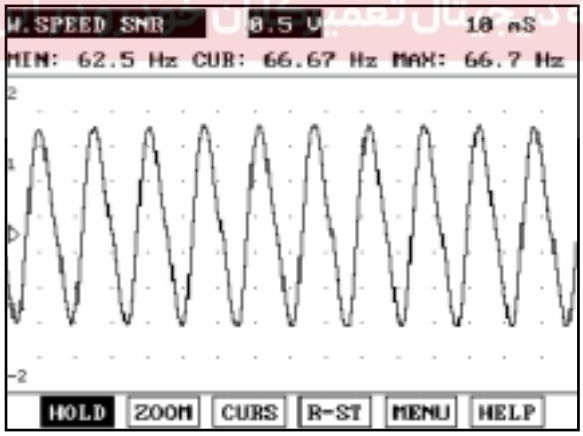
C58 or C158 or C258

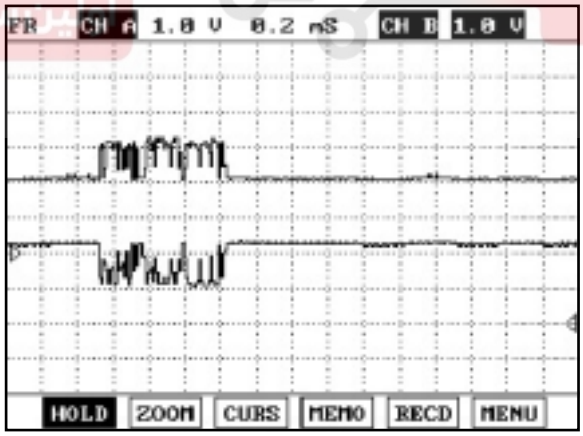


ECM C230-1 or C30-4

EKQE630A

WAVEFORM INSPECTION E2E3EF0A





EKQE644A

TERMINAL & CONNECTOR INSPECTION EED05511

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.

   Has a problem been found?

   YES

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

NO

▶ Go to the next procedure.

GROUND CIRCUIT INSPECTION EA176C14

1. Short to ground inspection

   1) IG KEY OFF, ENG OFF

   2) 4WD ECM connector and TCS module: Disconnect.

   3) Measure resistance between terminal 4 or 5 of 4WD ECM harness connector and chassis ground.

Specification : Approx. ∞Ω

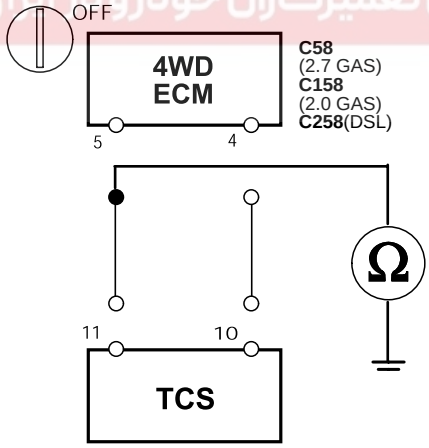
Is resistance display near the specified value?

YES

▶ Proceed next inspection procedure.

NO

▶ Repair ground to short circuit.
▶ If problem is solved, go to the "Verification of Vehicle Repair".



EKQE084T

SIGNAL CIRCUIT INSPECTION EFE87A2E

1. IG KEY OFF, ENG OFF
2. 4WD ECM connector and TCS module: Disconnect.
3. Measure resistance between terminal 5 of 4WD ECM harness connector and terminal 11 of TCS control module harness connector.
4. Measure resistance between terminal 4 of 4WD ECM harness connector and terminal 10 of TCS control module harness connector.

Specification : Approx. ∞Ω

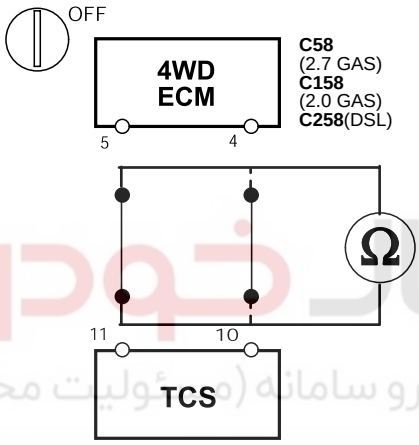
Is resistance display near the specified value?

YES

▶ Replace with normal TCS control module temporarily and check if vehicle run normally.
If trouble is disappeared, replace TCS control module.
▶ If problem is solved, go to the "Verification of Vehicle Repair".

NO

▶ Repair open circuit.
▶ If problem is solved, go to the "Verification of Vehicle Repair".



EKQE085T

VERIFICATION OF VEHICLE REPAIR EC88B8C1

1. IG KEY ON, ENG ON
2. TCS module connector and 4WD ECM connector: Connect.
3. Clear the DTCs with a scan tool.
4. Start and drive vehicle in gear and maintain vehicle speed is approx. 10km/h or less(6mph or less).
5. Check TCS signals and verify the malfunction.
   Does the scan tool display any DTC relevent to this signal?

YES

▶ Go to the applicable troubleshooting procedure.

NO

▶ System OK.

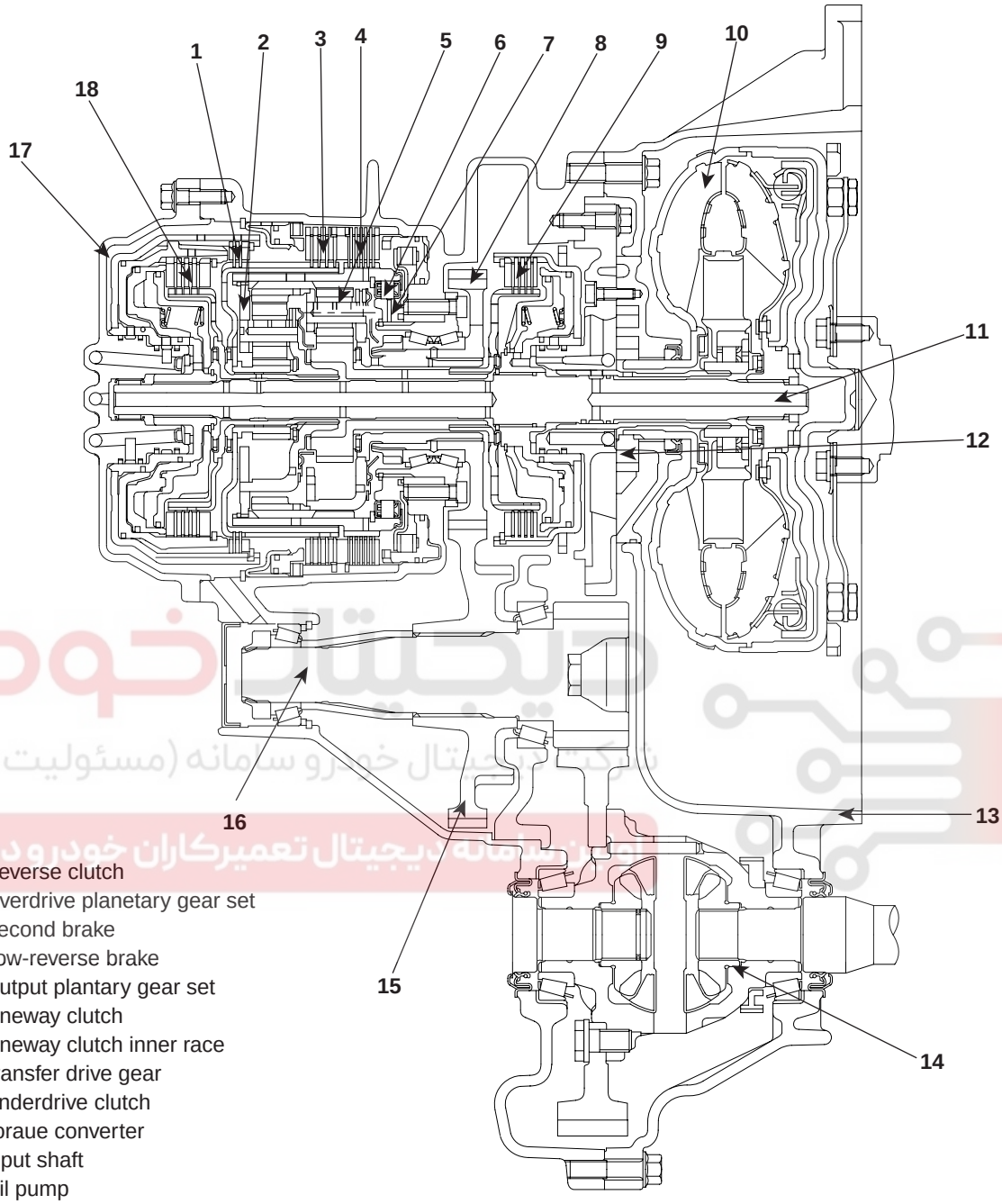
AUTOMATIC TRANSAXLE SYSTEM

DESCRIPTION ED4F16CF

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

TORQUE CONVERTER AND SHAFT

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



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

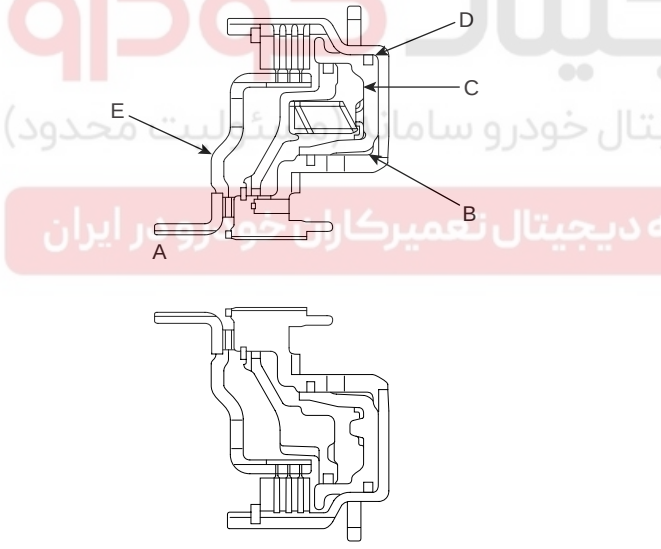
EKAD008S

CLUTCHES

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

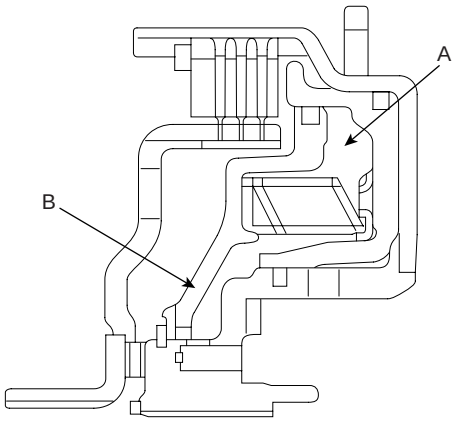
UNDERDRIVE CLUTCH

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



KKQE052C

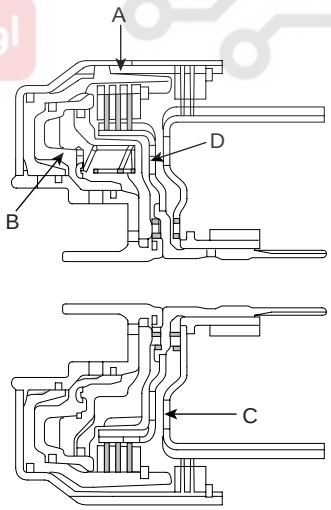
At high speed, fluid remaining in the piston pressure chamber is subjected to centrifugal force and attempts to push the piston.
However, fluid in the balance fluid chamber(A) (the space between the piston and return spring retainer(B)) is also subjected to centrifugal force.
Thus, the hydraulic pressure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



KKQE053C

REVERSE CLUTCH AND OVERDRIVE CLUTCH

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



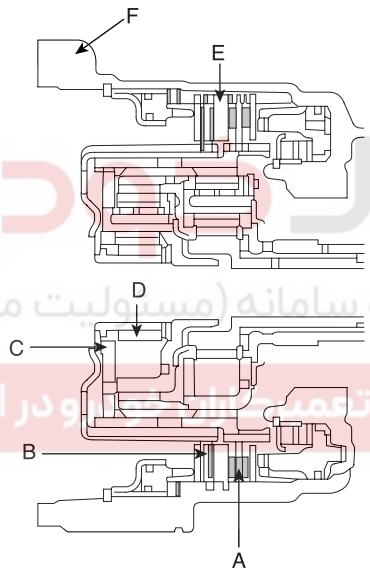
KKQE054C

BRAKES

The gear changing mechanism utilizes two multi-disc brakes.

LOW-REVERSE BRAKE AND SECOND BRAKE

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



EKQE055C

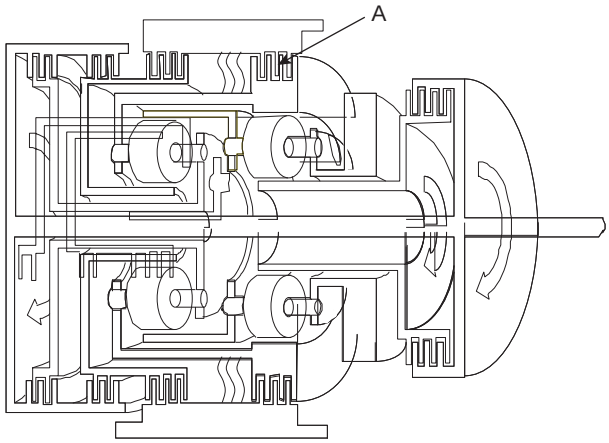
POWER TRAIN

P POSITION

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

N POSITION

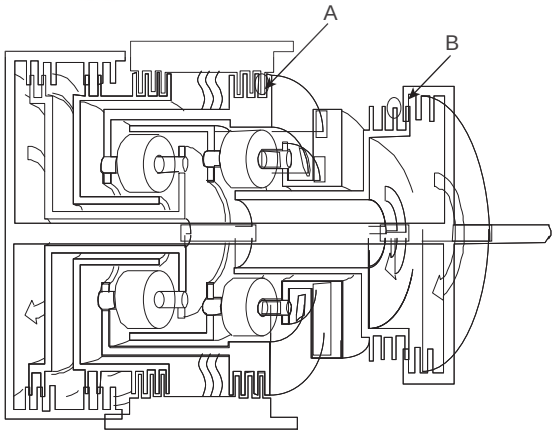
Hydraulic pressure is applied to the LR brake(A) and the RED brake, so power is not transmitted from the input shaft to the UD clutch or OD clutch.



EKQE001B

1ST GEAR POWER FLOW

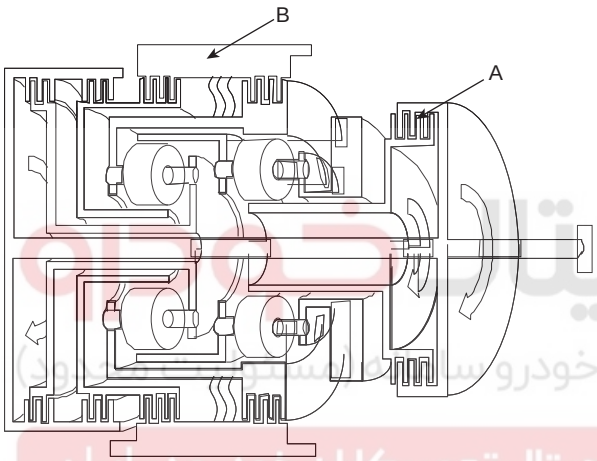
Hydraulic pressure is applied to the UD clutch(B) the LR brake(A) and the one way clutch(OWC), then the UD clutch transmits driving force from the input shaft to the UD sun gear, and the LR brake locks the LR annulus gear to the case.The UD sun gear of the planetary gear drives the output pinion gear,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



EKQE002B

2ND GEAR POWER FLOW

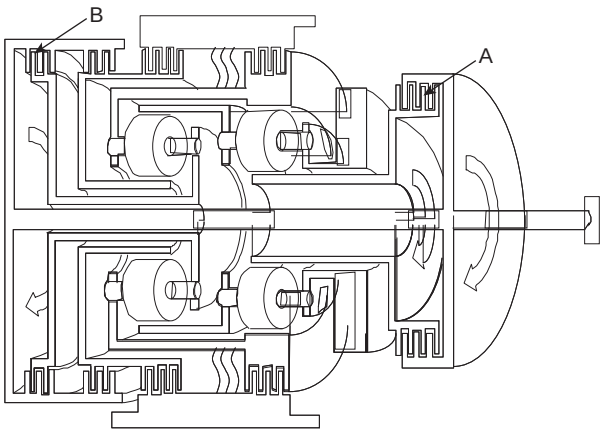
Hydraulic pressure is applied to the UD clutch(A) the 2nd brake(B) and the one way clutch(OWC), then the UD clutch transmits driving force from the input shaft to the UD sun gear, and the 2nd brake locks the reverse sun gear to the case.The UD sun gear of the planetary gear drives the output pinion gear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



EKQE003B

3RD GEAR POWER FLOW

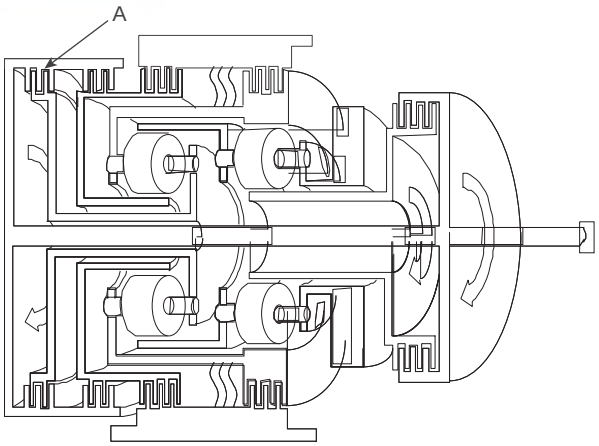
Hydraulic pressure is applied to the UD clutch(A) and the OD clutch(B), then the UD clutch transmits driving force from the input shaft to the UD sun gear, and the OD clutch transmits driving force from the input shaft to the overdrive planetary carrier and low-reverse annulus gear.The UD sun gear of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



EKQE004B

4TH GEAR POWER FLOW

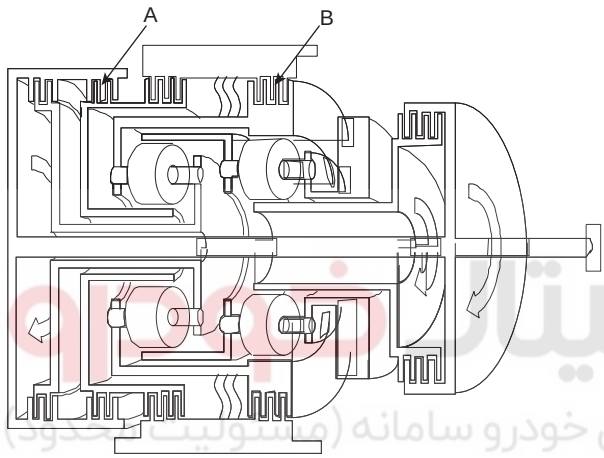
Hydraulic pressure is applied to the OD clutch(A) and the 2nd brake(B), then the OD clutch transmits driving force from the input shaft to the OD planetary carrier and LR annulus gear, and the 2nd brake locks the reverse sun gear to the case.The OD clutch drives the OD carrier, and the OD carrier drives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



EKQE005B

REV GEAR POWER FLOW

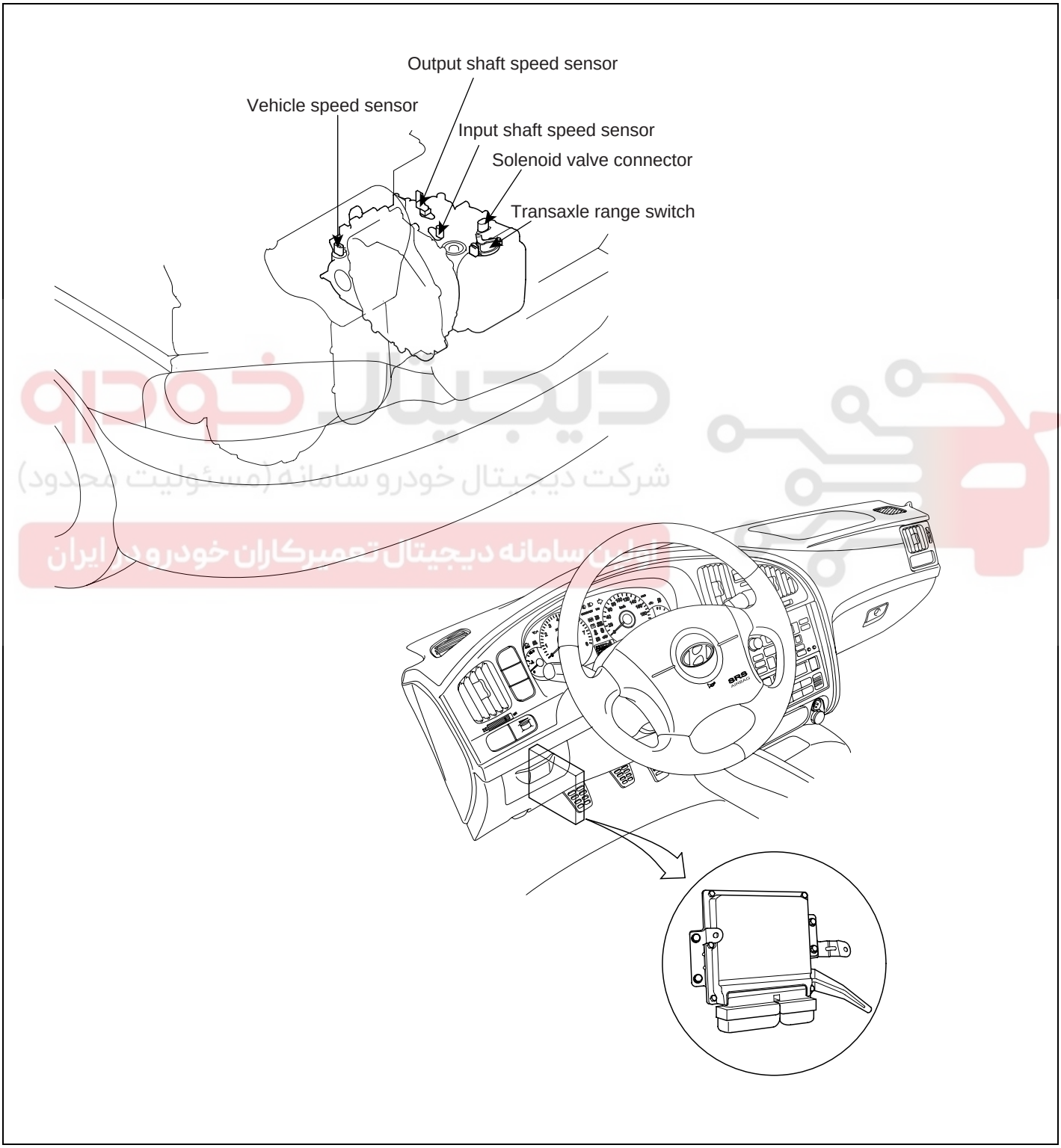
Hydraulic pressure is applied to the reverse clutch(A) and the LR brake(B), then the reverse clutch transmits driving force from the input shaft to the reverse sun gear, and the LR brake locks the LR annulus gear and OD planetary carrier to the case.The reverse clutch drives the reverse sun gear, and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



EKQE006B

ELECTRONIC CONTROL

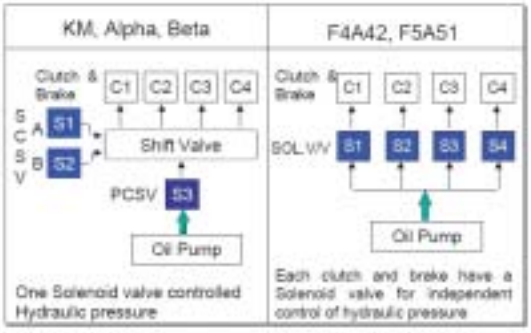
The electronic control system consists if the transmission control module (TCM), sensors and solenoid valves. Shifting is electronically controlled for comfortable drivine under all conditions.
The TCM is located below the dashboard. However, in the ß-engine vegicles, there is not TCM but PCM.



EKQE056C

CLUTCH TO CLUTCH SHIFT CONTROL

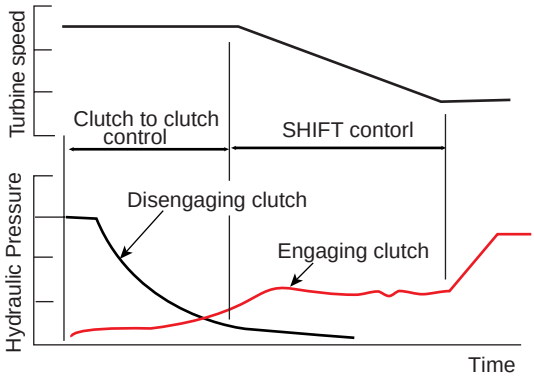
As can be seen in the solenoid valve layout below,there are major differences between the previous A/T and New A/T.



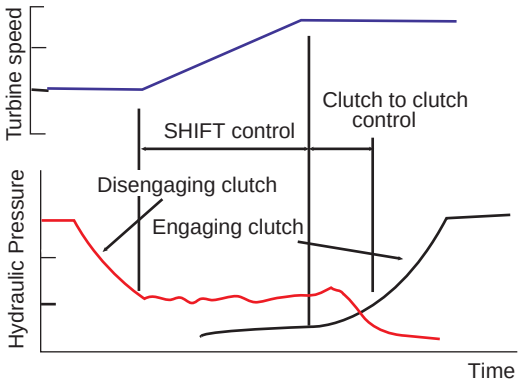
EKQE00B1

In previous A/T, there were only two solenoid valves to enable shift andone solenoid valve to control hydraulic pressure which resulted ininaccurate shift and rough ride.

In the new A/T which is adopted for the EF and XG-Car, there aresolenoid valves for each clutch & brake which enable control of both thedisengaging and engaging clutch simultaneously for independentcontrol. This system provides a much smoother shift and comfortableride as well as preventing Engine run-up or clutch interlock. In additionto advanced shift feeling, the 1st gear is selected at the creep state foreliminating the shift shock during 2nd gear → 1st gear.



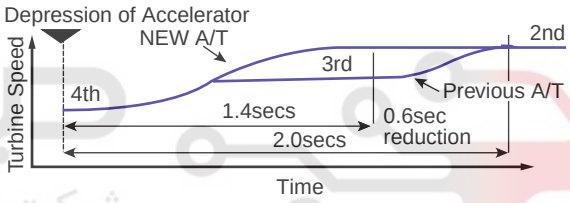
EKQE00B2



EKQE00B3

SKIP SHIFT CONTROL

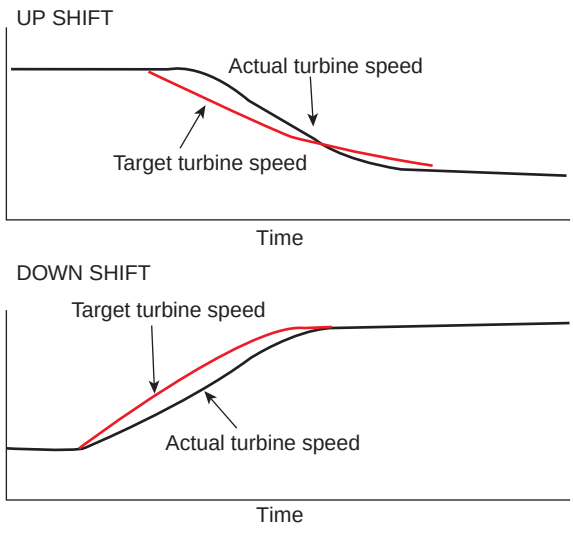
Skip Shift is made possible in the nes A/T.
4→ 2, 3→ 1 (4 A/T)
5→ 2, 5→ 3, 3→ 1 (5A/T)
Reduction in shifting time (approx 0.6 second).



EKQE008B

FEEDBACK SHIFT CONTROL

The turbine speed is monitored and controlled during shifting tosatisfy target turbine speed which is accomplished by feedbackcontrol of solenoid valve duty value. Therefore the compensation oftorque for the outworn engine or A/T is possible. This has resultedin the ability to control the change in torque during shifting andproduce smooth shift and better shift feeling. Feedback shift controlis also applicable in N→D and N→R.



EKQE009B

HYDRAULIC CONTROL

VALVE BODY

To prevent damage to transaxlecomponents make sure that themanual control lever and the park /neutral switch have been removedbefore attempting to remove thevalve body.
Be careful not to lose two steelballs on the valve body whenremoving and installing the valvebody.
The valve body mounting bolts have different lengths. Note the locationsof the bolts to aid in assembly.

OPERATION OF EACH VALVE

Torque converter pressure control valve : The function of this valve is to maintain a constant pressurewithin the torque converter.
Damper clutch control valve : Its function is to control the hydraulic pressure that acts on theDamper Clutch.
Manual valve :The position of the manual valve is determined by the selectorlever and applies or cuts line pressure to different valves.
Pressure control valve & Solenoid valve : The pressure control valve prevents a rapid decrease in hydraulicpressure when the clutch becomes disengaged. It also reducesthe sharp increase in input shaft speed during clutch to clutchcontrol.
Switch valve : When the OD clutch is applied, the hydraulic pressure is appliedto the regulator valve via the switch valve. Hence, the linepressure is reduced at 3rd and 4th gear.
Fail Safe Valve-A : During fail safe mode, this valve releases the pressure in the LRBrake.
Fail Safe Valve-B : During fail safe mode, this valve cuts the pressure from the 2ndpressure control valve to 2nd brake.
Fail Safe Valve-C : 5A/T-F5A51 onlyDuring fail safe mode, this valve cuts the pressure from switchvalve to direct clutch.

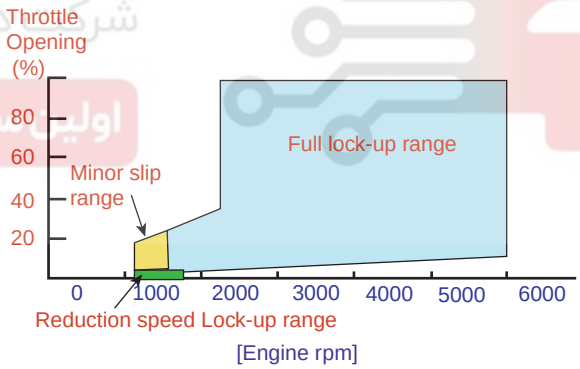
DAMPER CLUTCH CONTROL

The Lock-up clutch is designed in a torque converter for the fuel economy.The lock-up clutch works in low speed range as minor slip.And it operates in high speed range as Full lock-up. Low fuel consumption andsilence can be obtained with combination of Partial lock-up and Full lock-up control.The damper clutch is operated in 3rd and 4th gear in 4-speed ATA, 4th and 5th gearin 5ATA.In addition, Lock-up control is adapted in order to improve the fuel economy, whenreducing vehicle speed too.

DAMPER CLUTCH OPERATING RANGE

As all the conditions below are satisfied, it locked up. The cross point of throttleopening and turbine rpm is within shadowed area.

- D range (more than 2’ nd speed), but damper clutch operating in 2’ nd speed, theATF temperature must be higher than 125 ℃.
- The TCM does not control under N → D or N → R.
- Oil temperature is above 50℃ under full lock-up.
- Oil temperature is above 70℃ under minor slip.
- The system is not under Fail - Safe (3’ rd gear hold) condition.



EKQE010B

Uphill (above 5%) longer than 1.5sec. : Reducing speed Lock-upDuring this control, the vehicle is running uphill (less than 2.5%) for 1sec., thepartial lock-up control is functioned again.

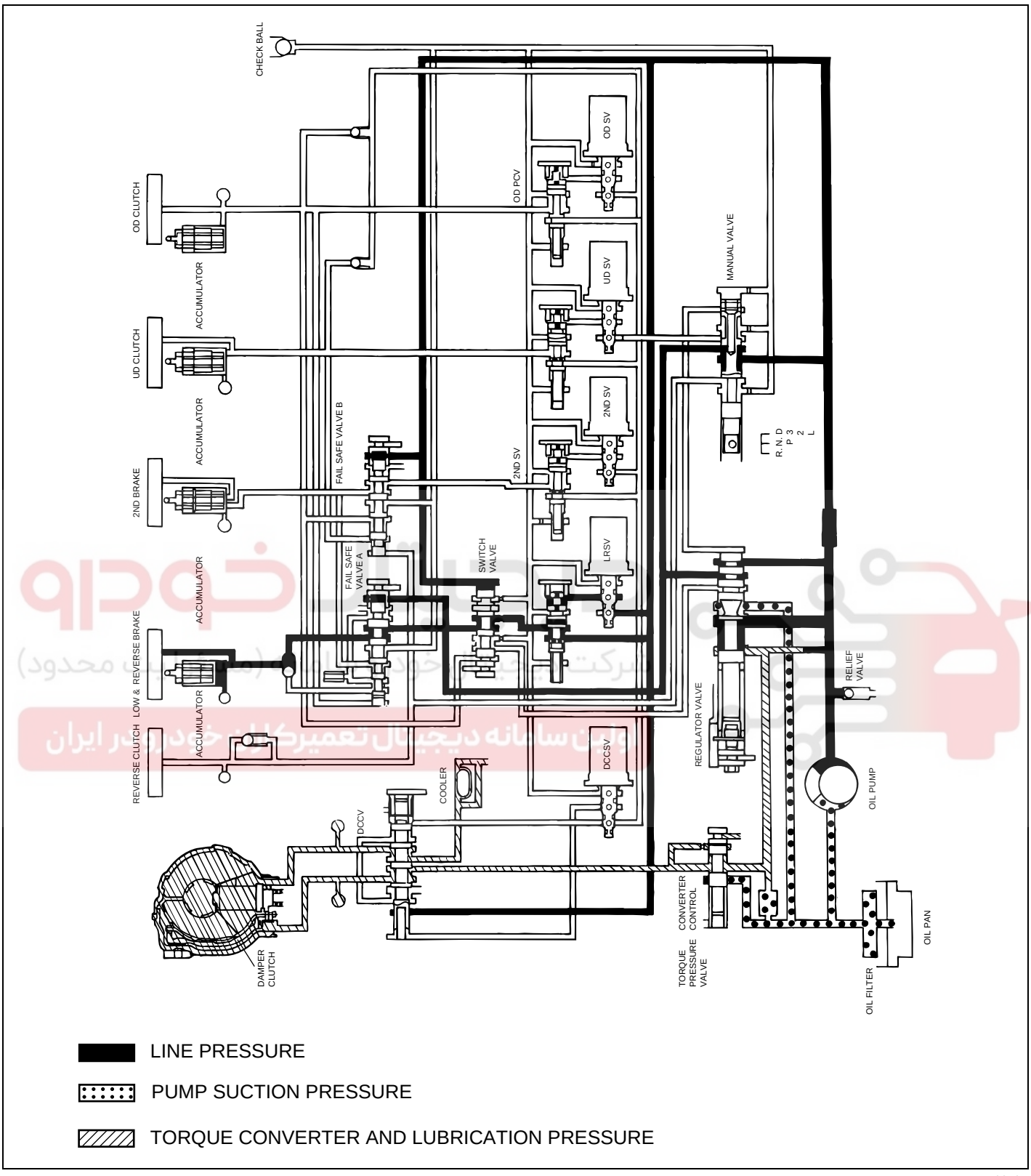
HYDRAULIC FLOW

P AND N POSITION

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

- The LR solenoid valve is turned off, and the LR pressure solenoid valve is moved to the left side.
- The 2nd solenoid valve is turned on, and the 2nd pressure solenoid valve remains in the right side.
- he UD solenoid valve is turned on, and the UD pressure solenoid valve remains in the right side.
- The OD solenoid valve is turned on, and the OD pressure solenoid valve remains in the right side.

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



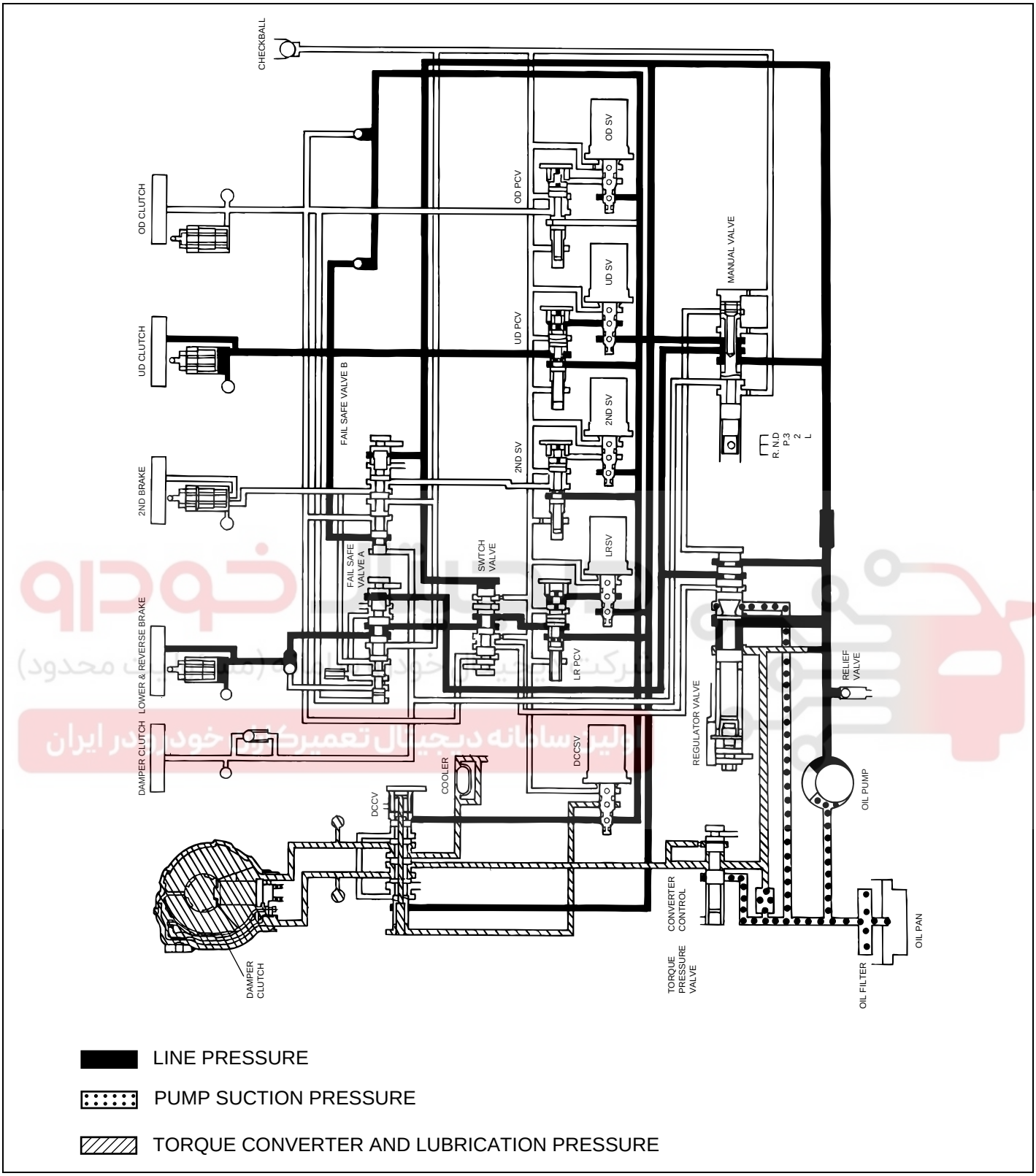
EKA9050A

D POSITION : 1ST GEAR

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

- The LR solenoid valve is turned off, and the LR pressure solenoid valve is moved to the left side.
- The 2nd solenoid valve is turned on, and the 2nd pressure solenoid valve remains in the right side.
- The UD solenoid valve is turned off, and the UD pressure solenoid valve is moved to the left side.
- The OD solenoid valve is turned on, and the OD pressure solenoid valve remains in the right side.

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



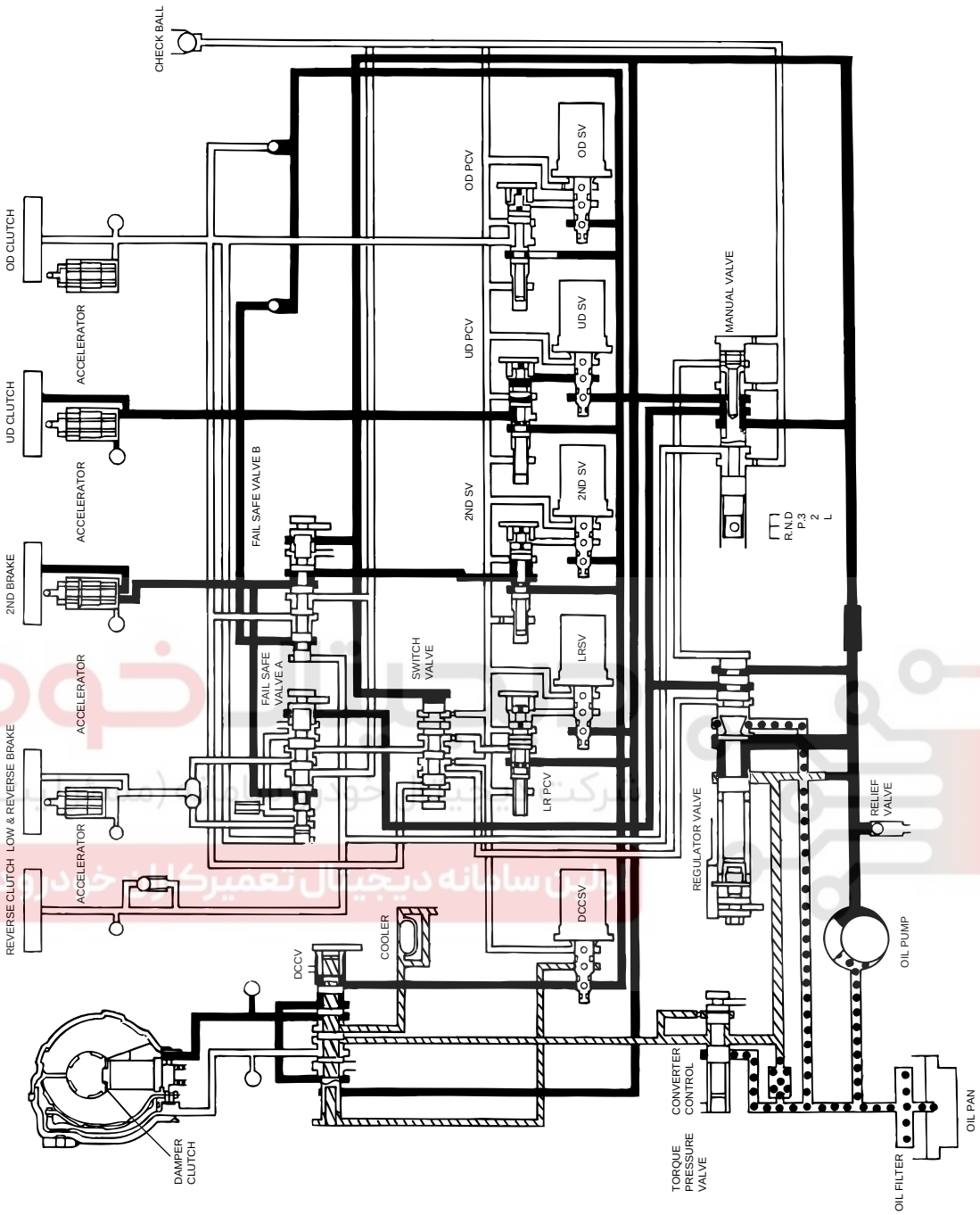
EKA9050B

D POSITION : 2ND GEAR

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

- The LR solenoid valve is turned on, and the LR pressure solenoid valve remains in the right side.
- The 2nd solenoid valve is turned off, and the 2nd pressure solenoid valve is moved to the left side.
- The UD solenoid valve is turned off, and the UD pressure solenoid valve is moved to the left side.
- The OD solenoid valve is turned on, and the OD pressure solenoid valve remains in the right side.

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



LINE PRESSURE

PUMP SUCTION PRESSURE

TORQUE CONVERTER AND LUBRICATION PRESSURE

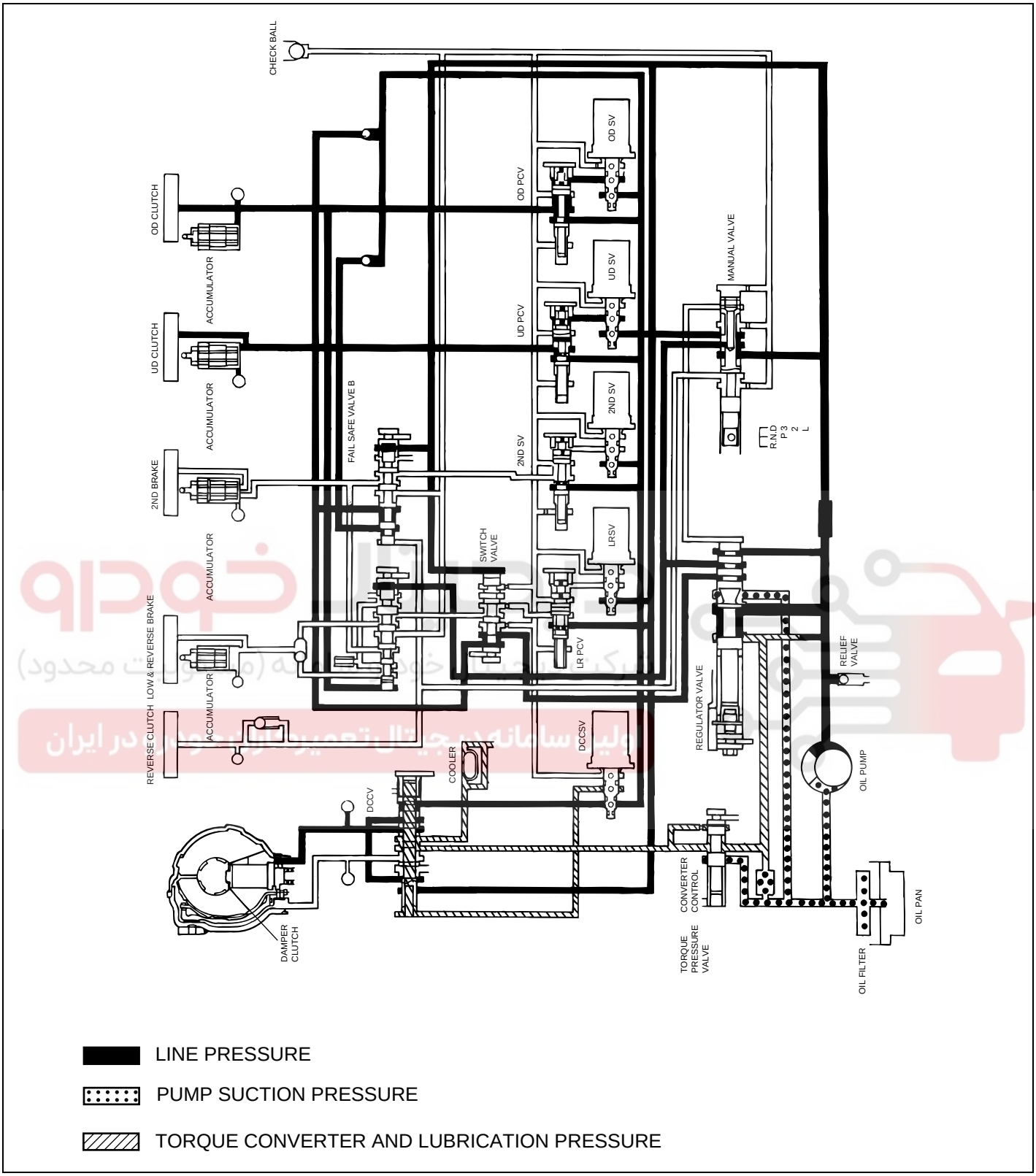
EKA9050C

D POSITION : 3RD GEAR

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

- The LR solenoid valve is turned on, and the LR pressure solenoid valve remains in the right side.
- he 2nd solenoid valve is turned on, and the 2nd pressure solenoid valve remains in the right side.
- The UD solenoid valve is turned off, and the UD pressure solenoid valve is moved to the left side.
- The OD solenoid valve is turned off, and the OD pressure solenoid valve is moved to the left side.

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



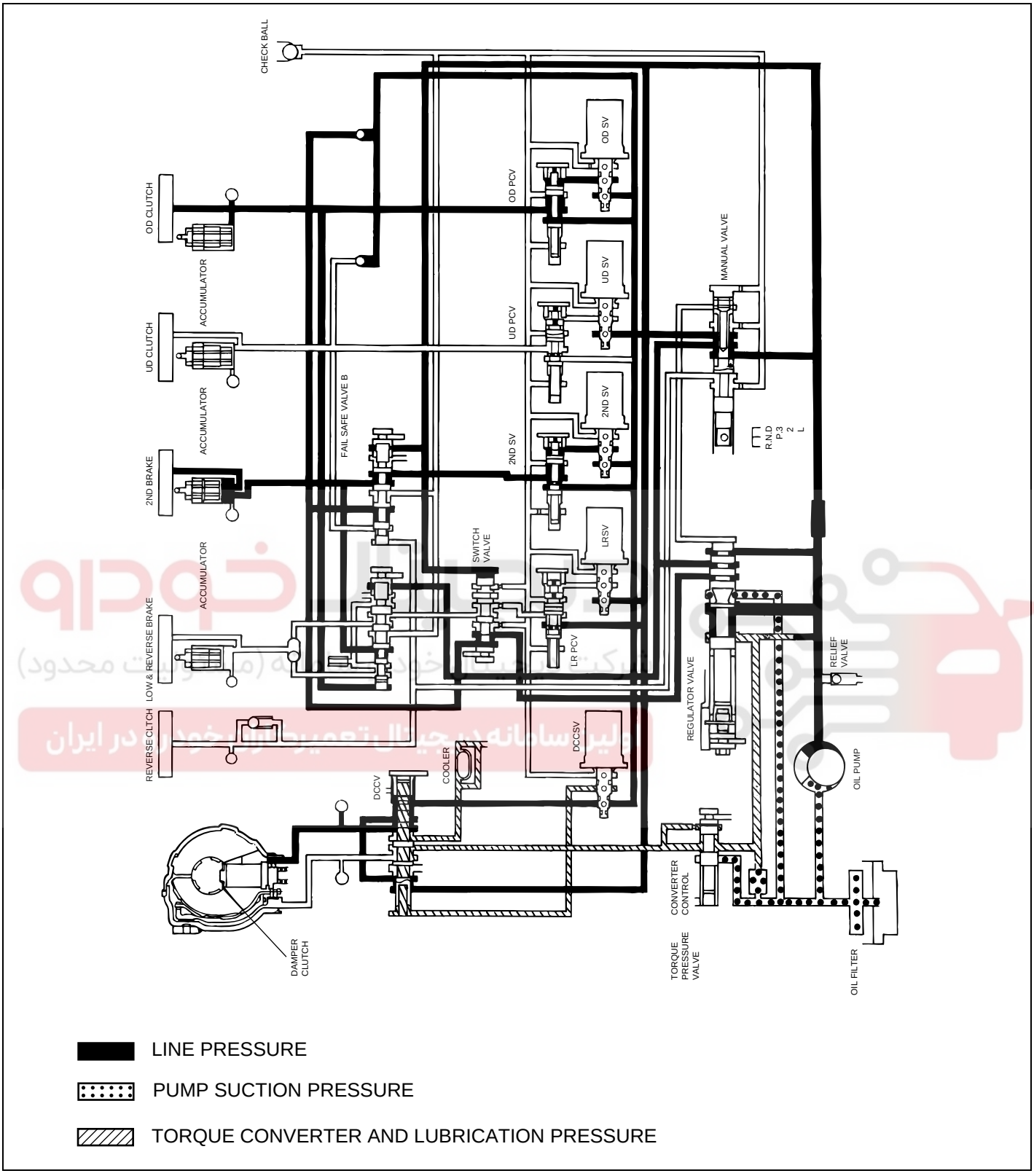
EKA9050D

D POSITION : 4TH GEAR

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

- The LR solenoid valve is turned on, and the LR pressure solenoid valve remains in the right side.
- The 2nd solenoid valve is turned off, and the 2nd pressure solenoid valve is moved to the left side.
- The UD solenoid valve is turned on, and the UD pressure solenoid valve remains in the right side.
- The OD solenoid valve is turned off, and the OD pressure solenoid valve is moved to the left side.

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



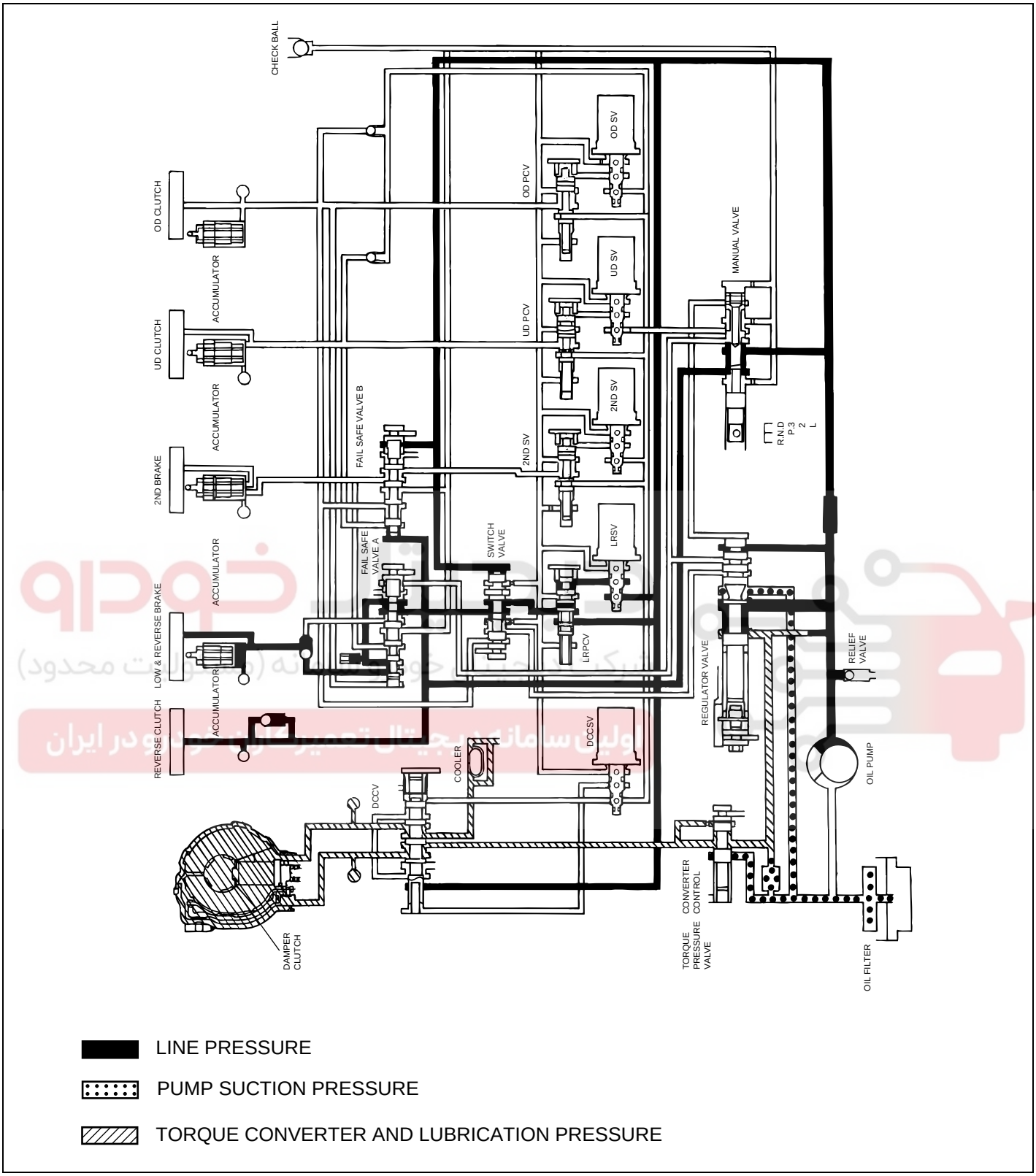
EKA9050E

REVERSE POSITION

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

- The LR solenoid valve is turned off, and the LR pressure solenoid valve is moved to the left side.
- The 2nd solenoid valve is turned on, and the 2nd pressure solenoid valve remains in the right side.
- The UD solenoid valve is turned on, and the UD pressure solenoid valve remains in the right side.
- The OD solenoid valve is turned on, and the OD pressure solenoid valve remains in the right side.

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



EKA9050F

SERVICE ADJUSTMENT PROCEDURE E3B2A345

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

NOTE

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

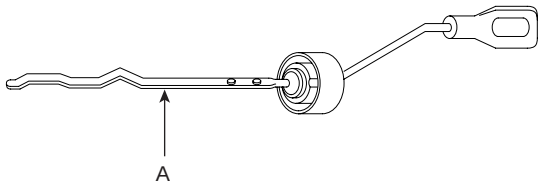
5. Check that the fluid level is at the HOT mark on the oil level gauge. If the fluid level is low, automatic transaxle fluid until the level reaches the "HOT" mark.

Atuto transaxle fluid:
DIAMOND ATF SP-III, SK ATF SP-III

NOTE

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

6. Insert the oil level gauge(A) securely.



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NOTE

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

AUTOMATIC TRANSAXLE FLUID

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

1. Disconnect the hose, which connects the transmission and the oil cooler which is within the radiator only in 2.0L engine(2.7L-the oil cooler is sperated).
2. Start the engine and let the fluid drain out.

Running conditions : "N" range with engine idling.

CAUTION

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

3. Romove the drain plug from the bottom of the transmission case to drain the fluid.
4. Install the drain plug via the fasket, and tighten it the specified torque.

Tightening torque :
29 ~ 34Nm (290 ~ 340 kgf·cm, 21.4 ~ 25.1 lb·ft)

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

CAUTION

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

6. Repeat the procedure in step (2).

NOTE

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

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

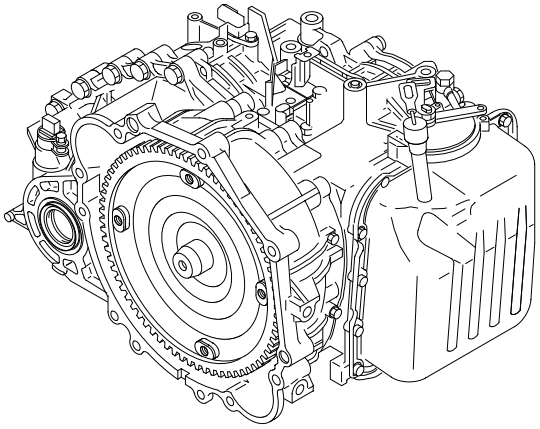
8. Reconnect the hose, which was disconnected in step (1) above, and firmly replace the oil level gauge.(In case of this "replace", this means after wiping off any dirt around the oil level gauge, insert it into the filler tube.)

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

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

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

12. Firmly insert the oil level gauge(A) into the oil filler tube.



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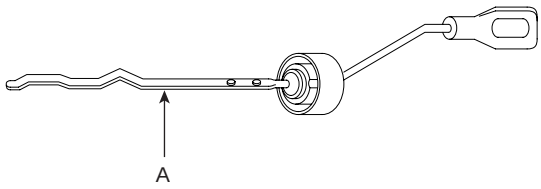


KKQE101C

OIL TEMPERATURE SENSOR

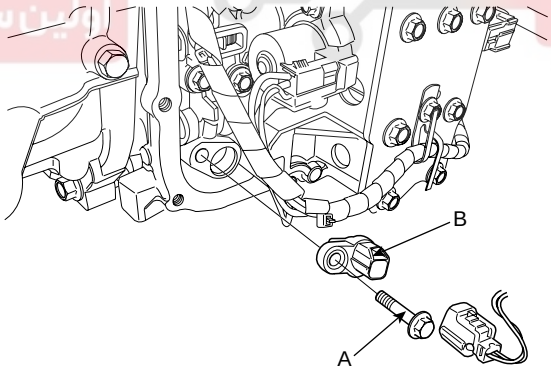
REPLACEMENT

1. Remove the automatic transaxle assembly.

2. Remove the valve body cover(refer to the overhaul manual).

3. Dissconnect the oil temperature sensor connector.

4. Remove the oil temperature sensor(B), lossening the mounting bolt(A).



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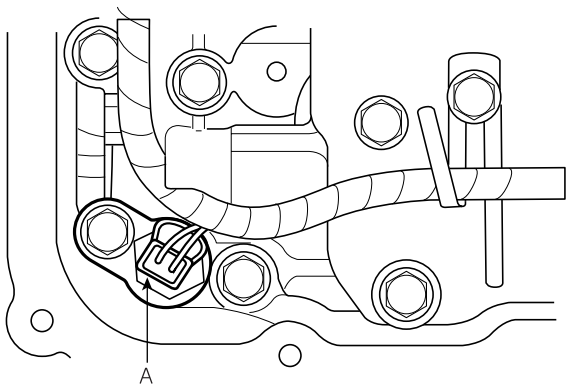
5. Replace the sensor with the new one and reassemble the rest parts.

INSPECTION

1. Remove the oil temperature sensor(A).



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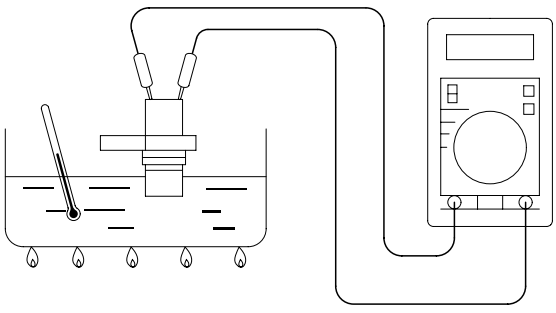
2. Measure the resistance between the terminal 1 and 2 of the sensor connector.

Temp.(°C)	Resistance(KΩ)
0	16.7 ~ 20.5
100	0.57 ~ 0.69



EKKD043A

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

TROUBLESHOOTING E7DD4AD4

CHECK FOR DTCS WITH A SCAN TOOL

1. When there is an abnormality in driving, follow the instruction below.
2. Connect the data link connector(DLC) to a scan tool(refer to the scan tool manual for details).
3. Turn or the ignition switch, power or the scan tool and choose '01.HYUNDAI VEHICLE DIAGNOSIS' on the 'INITIAL SCREEN'.
4. Select the vehicle model and system.
5. When the fault is detected, the relevant DTC will set.
6. If there is a fuel and emissions DTCs, first check the fuel and emission system as indicated by the DTC
7. Clear the DTC and data in the CLEAR MENU.
8. Drive the vehicle for seveual minites under the same conditions as those indicated by the data, and then recheck for a DTC.
   If the A/T DTC returns, go to the DTC troubleshooting index. If the DTC does not return, there was an intermittent problem within the circuit. Make surt all pins and terminals in the circuit art tight.

INSPECTION CHART FOR THROUBLE SYMPTOMS

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

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

Trouble symptom		Probable cause
Malfunction while driving	**Vibration** If vibration occurs when driving at constant speed or when accelerating and deceleration in top range, the cause is probably abnormal damper clutch pressure or a malfunction of the engine system, damper clutch control solenoid valve, torque converter or valve body.	- Abnormal damper clutch pressure - Malfunction of the engine system - Malfunction of the damper clutch control solenoid valve - Malfunction of the torque converter - Malfunction of the valve body
Transaxle range switch system The cause is probably a malfunction of the inhibitor switch circuit, ignition switch circuit or a defective TCM.		- Malfunction of the transaxle range switch - Malfunction of the ignition switch - Malfunction of connector - Malfunction of the TCM
Idle position switch system The cause is probably a defective idle position switch circuit, or a defective TCM.		- Malfunction of the triple pressure switch - Malfunction of connector - Malfunction of the TCM
Triple pressure switch system The cause is probably a defective dual pressure switch circuit or a defective TCM.		- Malfunction of the triple pressure switch - Malfunction of connector - Malfunction of A/C system - Malfunction of the TCM
Vehicle speed sensor system The cause is probably a defective vehicle speed sensor circuit or a defective TCM.		- Malfunction of the vehicle speed sensor - Malfunction of connector - Malfunction of the TCM

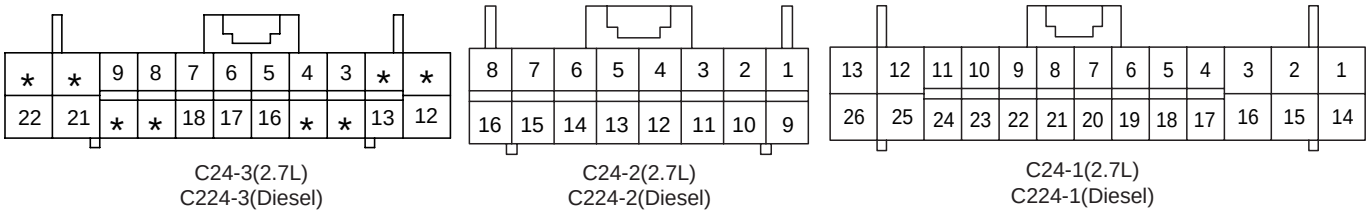
DTC TROBLESHOOTING INDEX

TCM DTCS

DTC No.	DESCRIPTION	MIL *	SEE PAGE
0703	BRAKE SWITCH CIRCUIT	OFF	TR-140
0707	TRANS.RANGE SNSR-LOW	OFF	TR-145
0708	TRANS.RANGE SNSR-HIGH	OFF	TR-151
0712	FLUID TEMP.SNSR CIRCUIT-LOW	OFF	TR-153
0713	FLUID TEMP.SNSR CIRCUIT-HIGH	OFF	TR-159
0715	INPUT SPEED SNSR CIRCUIT	OFF	TR-161
0720	OUTPUT SPEED SNSR CIRCUIT	OFF	TR-168
0731	GEAR 1 INCORRECT RATIO	OFF	TR-175
0732	GEAR 2 INCORRECT RATIO	OFF	TR-180
0733	GEAR 3 INCORRECT RATIO	OFF	TR-184
0734	GEAR 4 INCORRECT RATIO	OFF	TR-188
0736	REVERSE INCORRECT RATIO	OFF	TR-190
0741	Torque Converter Clutch Circuit STOCK OFF	OFF	TR-194
0742	Torque Converter Clutch Circuit STOCK ON	OFF	TR-197
0743	DCC Solenoid - Open or ground short (Torque Converter Clutch Circuit Electrical)	OFF	TR-200
0750	LR Solenoid - Open or ground short(SCSV "A" CIRCUIT MAL.)	OFF	TR-206
0755	UD Solenoid - Open or ground short(SCSV "B" CIRCUIT MAL.)	OFF	TR-212
0760	2ND Solenoid - Open or ground short(SCSV "C" CIRCUIT MAL.)	OFF	TR-217
0765	OD Solenoid - Open or ground short(SCSV "D" CIRCUIT MAL.)	OFF	TR-222
0885	A/T RELAY CIRCUIT MAL	OFF	TR-227
1500	VEHICLE SPEED SNSR CIRCUIT	OFF	TR-234
1603	CAN COMMUNICATION BUS OFF	OFF	TR-238
1604	NO ID From ECU	OFF	TR-241
1764	CAN MI-COM OR CIRCUIT MAL.	OFF	TR-242

*: Malfunction Indication Lamp(MIL) will not be turned ON or blinked by only TCM DTCs. If MIL is on or blinking, check the fuel or emission system.

TCM PIN DESCRIPITION



C24-3(2.7L)
C224-3(Diesel)

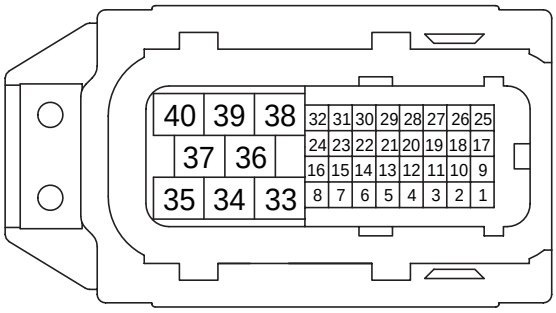
C24-2(2.7L)
C224-2(Diesel)

C24-1(2.7L)
C224-1(Diesel)

KKQE023Z

Terminal NO.		Wire Color	PIN Description
C130-2	1	G	SOLENOID VALVE(UD)
	2	P	POWER 1(SOLENOID VALVE)
	3	P	POWER 2(SOLENOID VALVE
	4	-	-
	5	-	-
	6	-	-
	7	-	-
	8	-	AUTO CRUISE
	9	-	-
	10	-	-
	11	O	POWER(IG.1)
	12	B	EARTH FOR POWER
	13	B	EARTH FOR POWER
	14	Br	SOLENOID VALVE(OD)
	15	R/W	SOLENOID VALVE(DCC)
	16	W	SOLENOID VALVE(2ND)
	17	-	-
	18	-	-
	19	P	POWER FOR FLASH ROM
	20	-	-
	21	G/O	SHIFT POSITION SIGNAL
	22	-	-
	23	-	-
	24	O	POWER(IG.1)
	25	B	EARTH FOR POWER
	26	B	EARTH FOR POWER

Terminal NO.		Wire Color	PIN Description
C24-2 C224-2	1	W	SENSOR-INPUT SPEED
	2	W	SENSOR-OUTPUT SPEED
	3	-	-
	4	-	-
	5	-	-
	6	-	-
	7	-	-
	8	R/O	POWER FOR S-RAM
	9	-	-
	10	-	-
	11	-	-
	12	-	-
	13	Br	EARTH FOR SENSOR
	14	Gr	OIL TEMPERATURE SENSOR
	15	-	-
	16	-	-
C24-3 C244-3	1	-	-
	2	-	-
	3	O	CAN-'HIGH'
	4	G	CAN-'LOW'
	5	L	INHIBITOR SW.(P)
	6	P	INHIBITOR SW.(N)
	7	Y	SPT SELECT SW.
	8	W/B	SPT DOWN SW.
	9	W/B	STOP LAMP SW.
	10	-	-
	11	-	-
	12	P	SOLENOID VALVE(LR/DIR)
	13	G/B	K-LINE
	14	-	-
	15	-	-
	16	Br	INHIBITOR SW.(R)
	17	Y	INHIBITOR SW.(D)
	18	R/B	SPT UP SW.
	19	-	-
	20	-	-
	21	P	A/T CONTROL RELAY
	22	B	EARTH FOR SIGNAL



C130-2(2.0L)

EKQE101T

Terminal NO.		Wire Color	PIN Description
C130-2	1	-	-
	2	-	-
	3	-	-
	4	-	-
	5	W/B	Sports down switch
	6	P	Inhibiter switch(N)
	7	-	-
	8	-	-
	9	-	-
	10	-	-
	11	W	Auto cruise
	12	-	-
	13	R/B	Sports up switch
	14	Br	Inhibiter switch(R)
	15	-	-
	16	-	-
	17	-	-
	18	Br	Sensor ground
	19	W/B	Stop switch
	20	W	Output speed sensor
	21	Y	Sports select switch
	22	L	Inhibiter switch(P)
	23	-	-
	24	G/O	Shift signal(PWM)
	25	-	-
	26	Gr	Oil temperature sensor
	27	-	-
	28	W	Input speed sensor

Terminal NO.		Wire Color	PIN Description
C130-2	29	Y	Inhibiter switch(D)
	30	-	-
	31	-	-
	32	P	A/T relay
	33	B	Solenoid valve(OD)
	34	-	-
	35	R/B	Solenoid valve(DCC)
	36	P	Power source(SOL.)
	37	B	Ground1
	38	L	Solenoid valve(LR)
	39	W	Solenoid valve(2ND)
	40	G	Solenoid valve(UD)

ROAD TEST

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

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

TORQUE CONVERTER STALL TEST

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

CAUTION

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

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

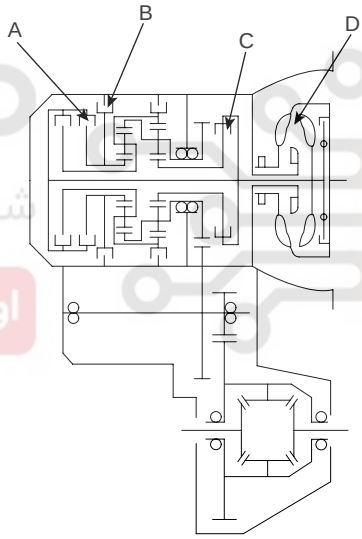
CAUTION

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

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

TORAUE CONVERTER STALL TEST CONCLUSION

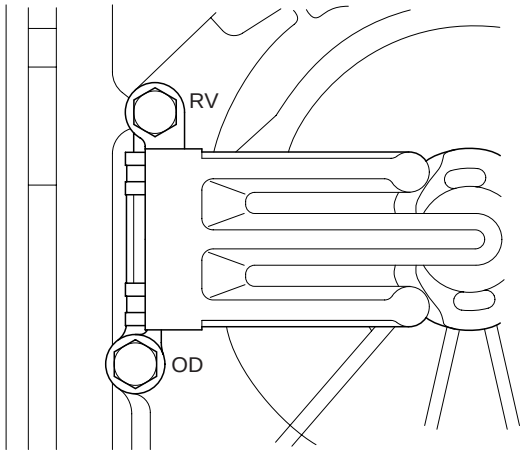
1. Stall speed is too high in both "D" and "R" ranges
   - Low line pressure
   - Low & reverse brake(B) slippage
2. Stall speed is to high in "D" range only
   - Underdrive clutch(C) slippage
3. Stall speed is too high in "R" range only
   - Reverse clutch(A) slippage
4. Stall speed too low in both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



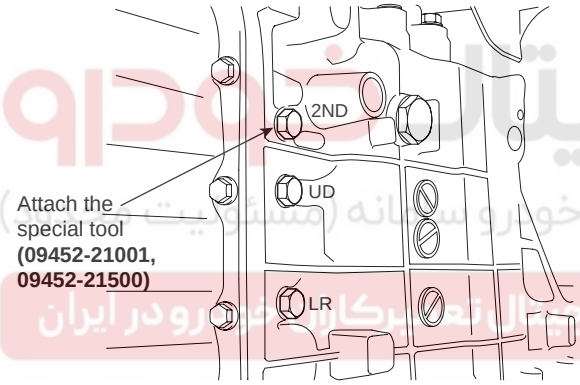
EKKD050A

HYDRAULIC PRESSURE TEST

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



EKKD052A



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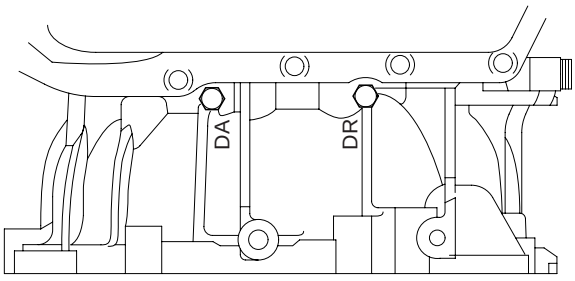
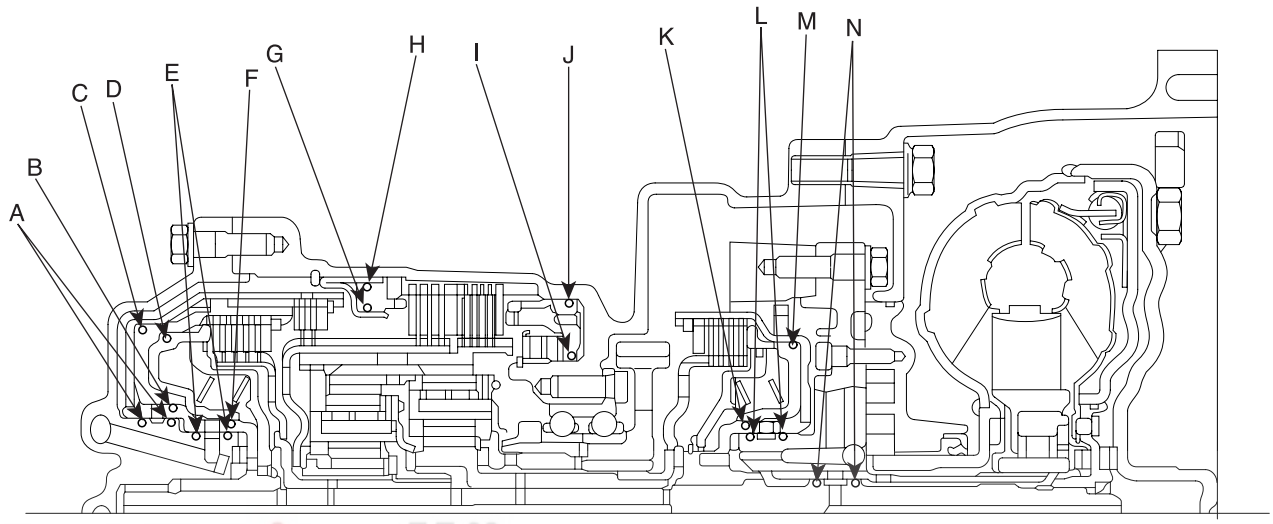


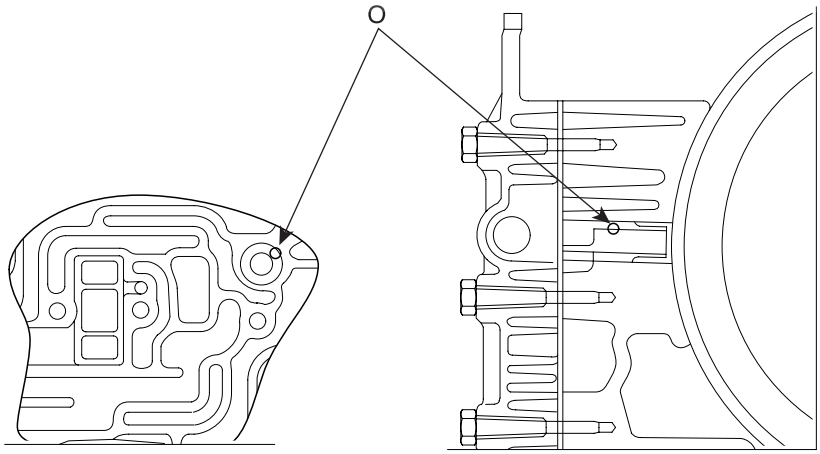
EKKD051A

STANDARD HYDRAULIC PRESSURE TEST

Measurement condition			Standard hydraulic pressure kPa (psi)						
Selector lever position	**Shift position**	**Engine speed (rpm)**	**Under-drive clutch pressure (UD)**	**Reverse clutch pressure (REV)**	**Over-drive clutch pressure (OD)**	**Low and reverse brake pressure (LR)**	**Second brake pressure (2ND)**	**Damper clutch apply pressure (DA)**	**Damper clutch release pressure (DR)**
P	-	2,500	-	-	-	260 ~ 340	-	-	220 ~ 360
R	Reverse	2,500	-	1,270 ~ 1,770	-	1,270 ~ 1,770	-	-	500 ~ 700
N	Neutral	2,500	-	-	-	260 ~ 340	-	-	220 ~ 360
D	1st gear	2,500	1,010 ~ 1,050	-	-	1,010 ~ 1,050	-	-	500 ~ 700
	2nd gear	2,500	1,010 ~ 1,050	-	-	-	1,010 ~ 1,050	-	500 ~ 700
	3rd gear	2,500	780 ~ 880	-	780 ~ 880	-	-	More than 750	450 ~ 650
	4th gear	2,500	-	-	780 ~ 880	-	780 ~ 880	More than 750	450 ~ 650

OIL SEAL LOCATION





F4A4201

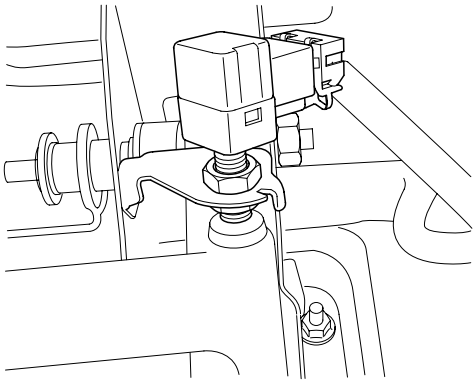
HYDRAULIC PRESSURE TEST DIAGNOSIS TABLE

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

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

DTC P0703 BRAKE S/W MALFUNCTION

COMPONENT LOCATION EB0A7CEB



EKKE148A

GENERAL DESCRIPTION E534AAEB

The brake switch is connected with the brake pedal and its signal is transmitted to the ECM/TCM.
This signal is used as a kind of safety equipment in order to detect a malfunction of a acceleration pedal.

The brake switch is composed of two switches for reliability. One switch detects the other's malfunction.

DTC DESCRIPTION E0C45FED

TCM senses the operation of brake with this electrical signal and uses the signal for HIVEC learning function.

DTC DETECTING CONDITION EECBB6F7

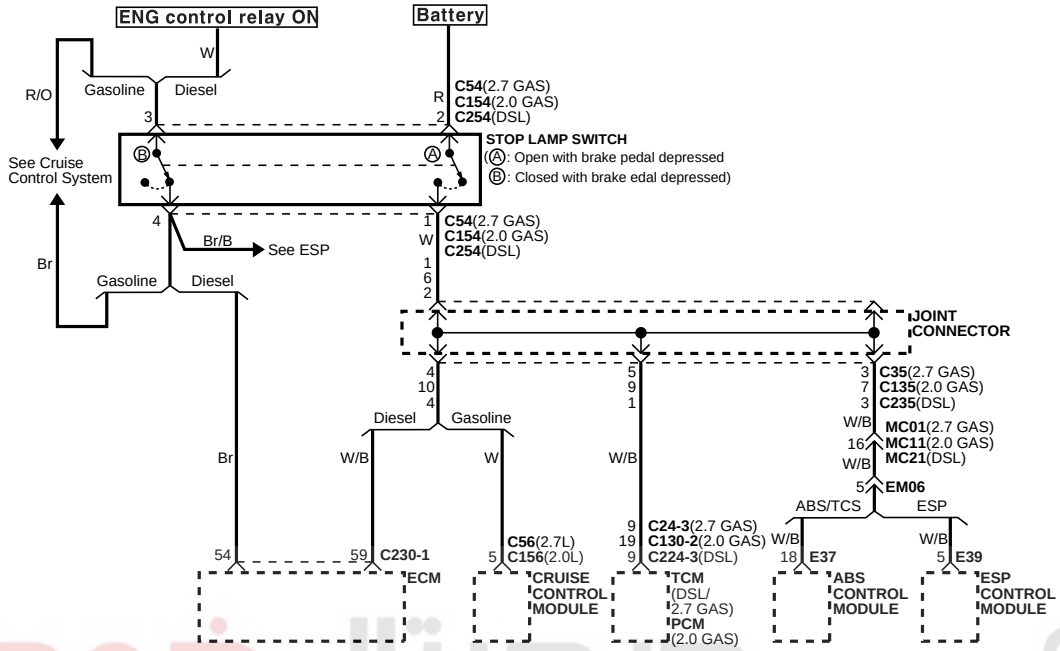
Item	Detecting Condition & Fail Safe	Possible cause
DTC Strategy	● Voltage monitering	● Brake switch components ● Brake pedal hight ● Brake switch circuit
Enable Conditions	● Engine RUN	
Threshold value	● Output speed sensor≥ 240rpm(At driving a vehicle with 6Km/h speed), BRAKE SW ON for more than 5minutes.	
Diagnostic Time	● Continuous 5 minutes	
Fail Safe	● Prohibit INTELLIGENT-SHIFT until IG-KEY OFF	

SPECIFICATION E4A5139C

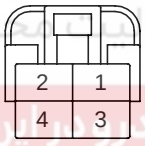
BRAKE	VALUE
Working	ON
NOT Working	OFF

SCHEMATIC DIAGRAM EEC9CA0B

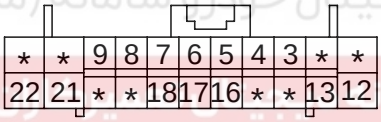
[CIRCUIT DIAGRAM]



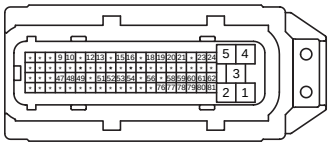
[HARNESS CONNECTORS]



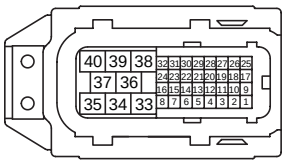
C54(2.7 GAS)
C154(2.0 GAS)
C254(DSL)



C24-3(2.7 GAS)
C130-2(2.0 GAS)
C224-3(DSL)



C230-1



C130-2

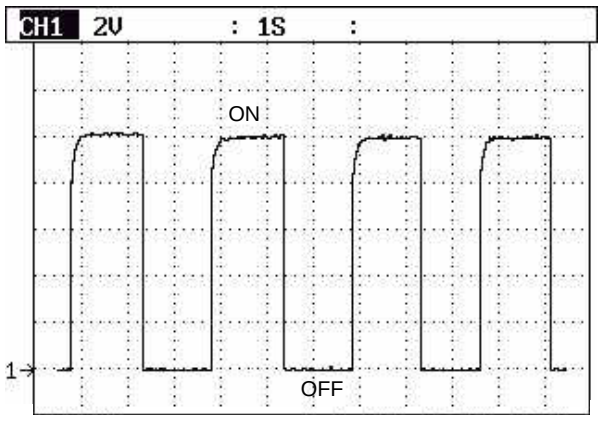
[CONNECTION INFORMATION]

Terminal	Connection	Function
NO.1	C230-1 NO.59	Diesel (ECM)
	C56 NO.5	2.0L (Cruise control)
	C156 NO.5	2.7L (Cruise control)
	C224-3 NO.9	Diesel (TCM)
	C24-3 NO.9	2.7L (TCM)
	C24-3 NO.19	2.0L (PCM)
	E37 NO.18	ABS control module
	E39 NO.5	ESP control module
NO.2	-	Battery
NO.3	-	ENG control relay ON
NO.4	C230-1 NO.54	Diesel (ECM)

EKQE601A

WAVEFORM INSPECTION EB5008A7

1. IG KEY ON, ENG ON
2. Stop lamp switch connector: Connect
3. Monitor signal waveform between terminal 1 of stop lamp switch connector and chassis ground, operating the brake pedal.



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

BRAKE PEDAL ON : HIGH

BRAKE PEDAL OFF : LOW

P0703_3

MONITOR SCANTOOL DATA EF4E6DAE

When the DTC P0703 sets, check the service data of the brake switch.
Operating the brake pedal, check if there is a change of ON/OFF signal.

TERMINAL & CONNECTOR INSPECTION E2FC83B0

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.

Has a problem been found?

YES

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

NO

▶ Go to the next procedure.

POWER SUPPLY CIRCUIT INSPECTION EDBEBAB9

1. Power Supply Circuit Inspection
   1) IG KEY ON, ENG OFF
   2) Stop lamp switch connector: Disconnect
   3) Measure voltage between terminal 2 of stop lamp switch harness connector and chassis ground

Specification : 11.5V~12.5V

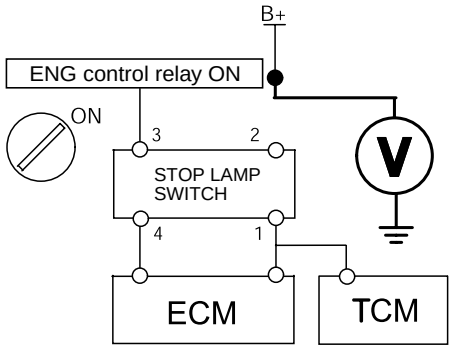
Does the voltage display near the specified value?

YES

▶ Proceed next inspection procedure.

NO

▶ Repair open or short circuit between battery (+) and the terminal 2 of the stop lamp switch.



EKQE003T

SIGNAL CIRCUIT INSPECTION EACEEF34

1. Signal circuit inspection

   1) Battery (-) terminal: Disconnect

   2) Stop lamp switch connector: Disconnect

   3) TCM connector: Disconnect

   4) Measure resistance between terminal 1 of stop lamp switch connector and TCM connector.

Specification : Approx. 0Ω

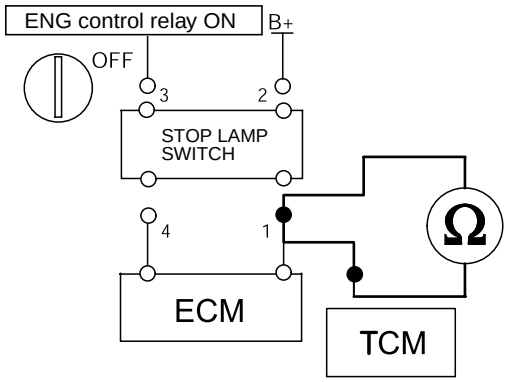
Is resistance display near the specified value?

YES

▶ Proceed next inspection procedure.

NO

▶ Repair open circuit between the terminal 1 of the stop lamp switch and the TCM connector.



EKQE004T

COMPONENT INSPECTION E7B5C63C

1. IG KEY OFF, ENG OFF
2. Stop lamp switch connector: Disconnect
3. Measure resistance between terminal 1 and 2 of stop lamp switch connector.

Specification :

BRAKE PEDAL ON	BRAKE PEDAL OFF
Approx. ∞Ω	Approx. 0Ω

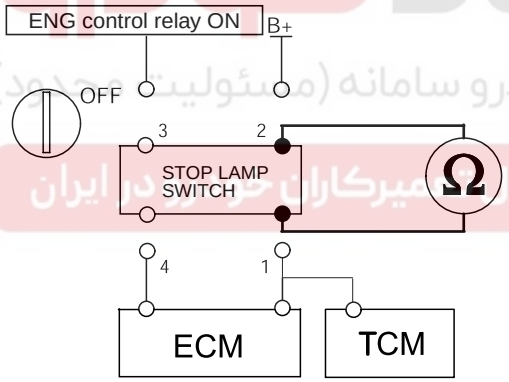
Is resistance display near the specified value?

YES

▶ System OK.

NO

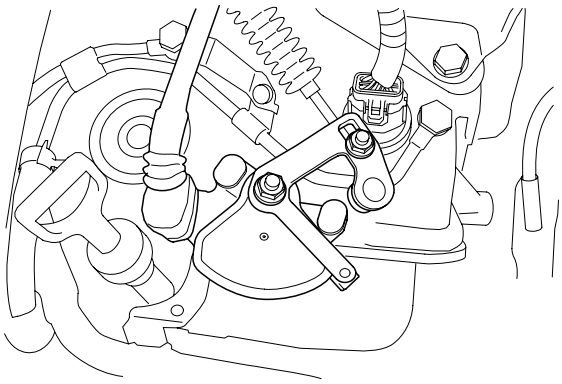
▶ After checking the brake pedal height and installation, if there is no trouble, replace it.



EKQE005T

DTC P0707 TRANSAXLE RANGE SENSOR - LOW

COMPONENT LOCATION EC0F23CA



EKKE108A

DTC DESCRIPTION E83BD05A

Starting engine is possible only in parking and neutral state. Select lever position signal is transmitted to TCM in order to control the select range.

DTC DETECTING CONDITION E3CCA8DD

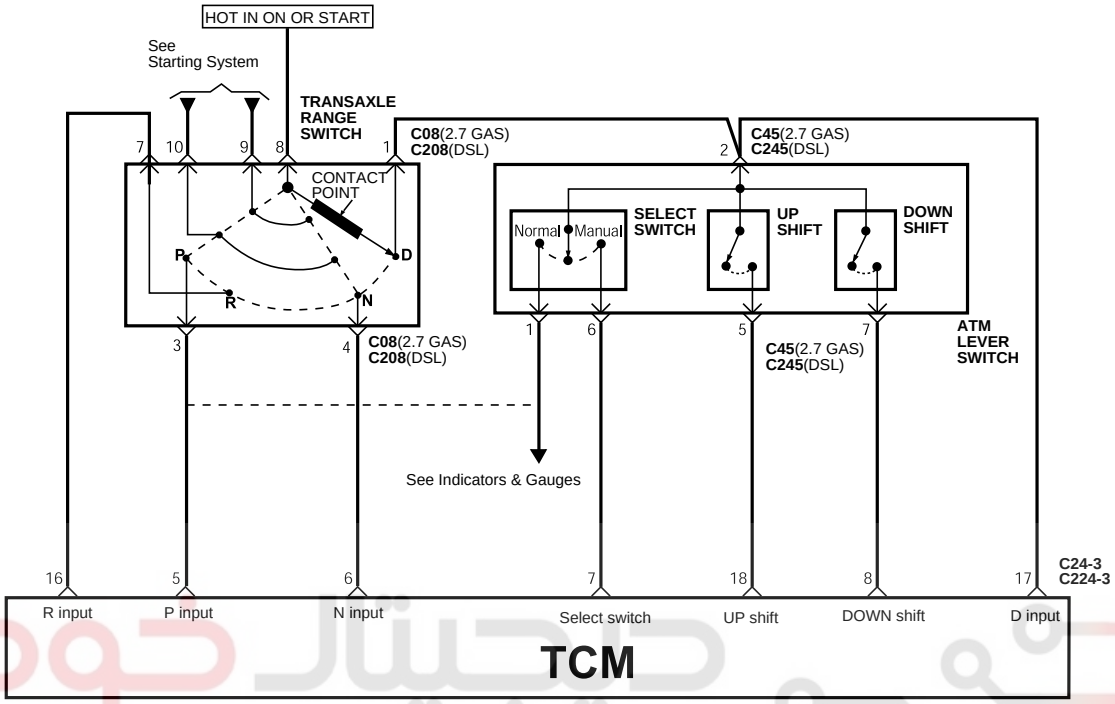
Item	Detecting Condition & Fail Safe	Possible cause
DTC Strategy	● -	
Enable Conditions	● -	
Threshold value	● A situation without the signal of INHIBITOR SW continuance over the 30 seconds	
Diagnostic Time	● Over the 30 seconds continuously	
Fail Safe	● The system is controlled with the signal just before the detecting condition and after returning, is continuously done with the signal just after reversion.	

SPECIFICATION EF30EDD5

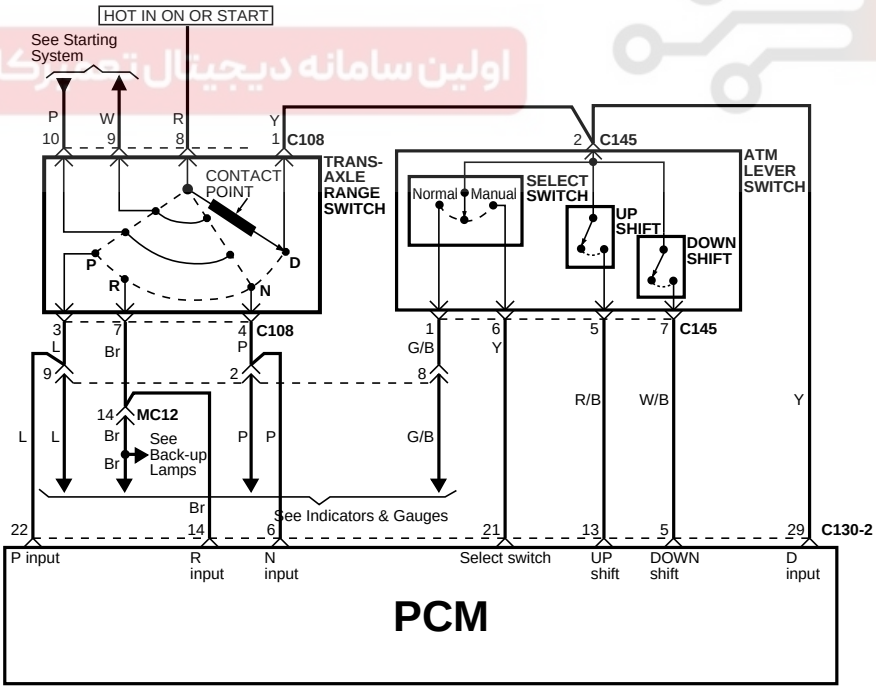
Condition		Reference
∗IG KEY : ON ro Engine stop	Select lever : P	P,N
	Select lever : R	R
	Select lever : N	P,N
	Select lever : D	D

SCHEMATIC DIAGRAM EBF7F36F

<Diesel/2.7L Gasoline>



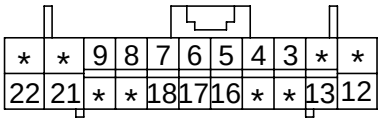
<2.0L Gasoline>



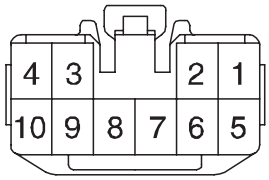
EKQE602A

[HARNESS CONNECTORS]

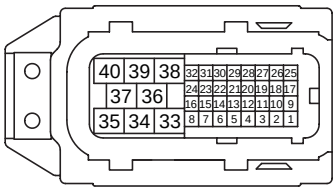
C08/C208 or C108



C24-3/C224-3



C45/C245 or C145



C130-2

[CONNECTION INFORMATION]

Select lever / Terminal No.	P	R	N	D	Terminal
1				O	TCM (No.17) PCM (No.29)
2	O				TCM (No.5) PCM (No.22)
3			O		TCM (No.6) PCM (No.6)
4		O			TCM (No.16) PCM (No.14)
8	O		O	O	IGNITION
9	O		O		Starting motor
10	O		O		Ignition (start)

EKQE603A

MONITOR SCANTOOL DATA EEA12A7E

We must look into the select lever switch (an inhibitor switch) data when P0707 sets. We confirm whether the situation of the switch is changed as the change of the lever.

TERMINAL & CONNECTOR INSPECTION EB21E882

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.

Has a problem been found?

YES

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

NO

▶ Go to the next procedure.

POWER SUPPLY CIRCUIT INSPECTION EE1F4D82

1. Power Supply Circuit Inspection
   1) IG KEY ON, ENG OFF
   2) Select lever switch connector: Disconnect
   3) Measure voltage between terminal 8 of select lever switch harness connector and chassis ground

Specification : 11.5V~12.5V

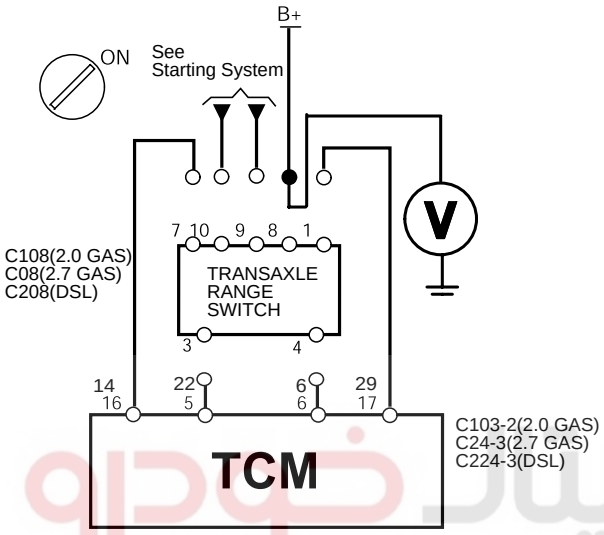
Is voltage display near the specified value?

YES

▶ Check the ground circuit.

NO

▶Inspect open/short circuit between battery (+) and the terminal 2 of the select lever switch connector.



EKQE006T

SIGNAL CIRCUIT INSPECTION E1DD63F6

1. Signal Circuit Inspection

   1) IG KEY ON

   2) TCM(or PCM) connector : Disconnect

   3) Check the voltage signal, changing the select lever.

   4) Measure voltage between signal terminals of select lever switch harness connector and chassis ground.

Specification : 11.5V~12.5V

NOTE

The signal voltages should be measured in its ranges. If the voltage is measured more than 1 times or is not measured when shifting, inspect the shift control cable and proceed next inspection procedure.

Is voltage display near the specified value?

YES

▶ Proceed next inspection procedure.

NO

▶ Go to the "Component Inspection".

5) Battery (-) termianl connector: Disconnect

6) Inhibiter switch connector: Disconnect

7) Measure resistance between the range terminals of select switch harness connector and the ones of TCM(or PCM) harness connector.

Specification : Approx. 1Ω below.

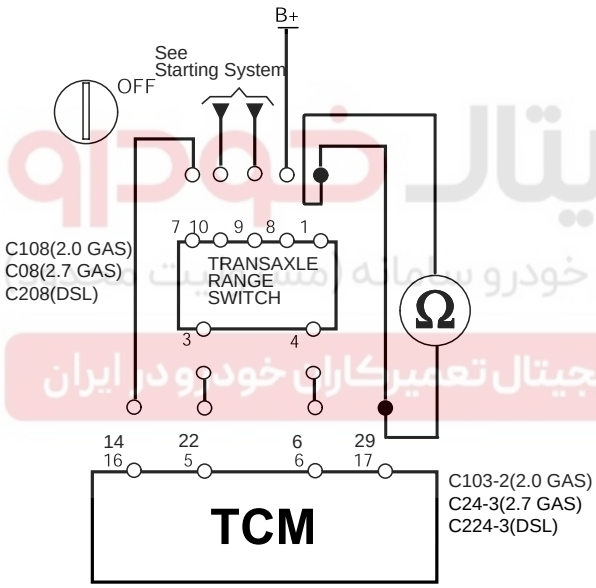
Is resistance display near the specified value?

YES

▶ Go to the "Component Inspection".

NO

▶ Repair or replace the signal wire of each range signal line.



EKQE008T

COMPONENT INSPECTION E2A09B3F

1. IG KEY OFF, ENG OFF
2. Disconnect the connectors.
3. Check the terminals with a transaxle range switch continuity check chart.
4. Measure resistance between the power supply terminal of the inhibiter switch harness connector and each range terminal.

Specification: refer to 'Connection' in 'Schematic Diagram'.

NOTE

The signals should be flowed only in its ranges. If not, replace the inhibiter switch.

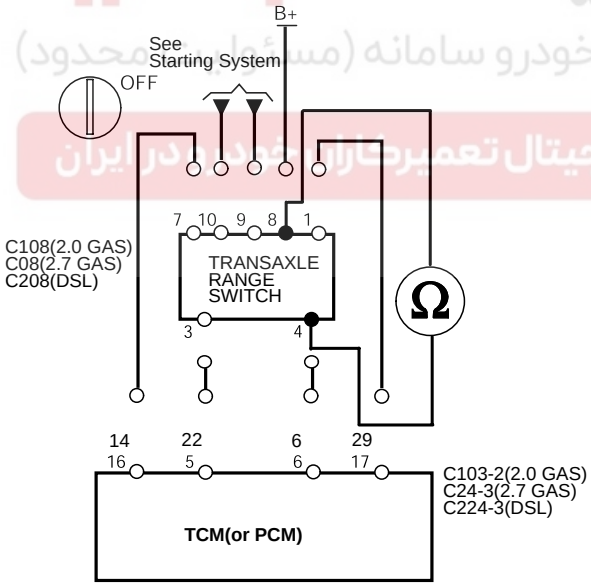
Does the switch work properly?

YES

▶ Select lever switch OK

NO

▶ Replace the select lever switch.



EKQE009T

DTC P0708 TRANSAXLE RANGE SENSOR - HIGH

COMPONENT LOCATION E8A149CC

Refer to DTC P0707

DTC DESCRIPTION E0E1C7C1

Starting engine is possible only in parking and neutral state. Select lever position signal is transmitted to TCM in order to control the select range.

DTC DETECTING CONDITION E75D3C57

Item	Detecting Condition & Fail Safe	Possible cause
DTC Strategy	● -	
Enable Conditions	● -	
Threshold value	● A situation with the two or more signals of INHIBITOR SW continuance over the 30 seconds	
Diagnostic Time	● Over the 30 seconds continuously	
Fail Safe	● The system is controlled with the signal just before the detecting condition and after returning, is continuously done with the signal just after reversion.	

SPECIFICATION EA8FDBDE

Refer to DTC P0707

SCHEMATIC DIAGRAM EDFF1F61

Refer to DTC P0707

MONITOR SCANTOOL DATA EB86F66B

We must look into the select lever switch (an inhibitor switch) data when P0708 sets. We confirm whether the situation of the switch is changed as the change of the lever.

TERMINAL & CONNECTOR INSPECTION E5C3ACE5

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.

   Has a problem been found?

   YES

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

   NO

   ▶ Go to the next procedure.

POWER SUPPLY CIRCUIT INSPECTION E3FCA1F7

Refer to DTC P0707

SIGNAL CIRCUIT INSPECTION E8045982

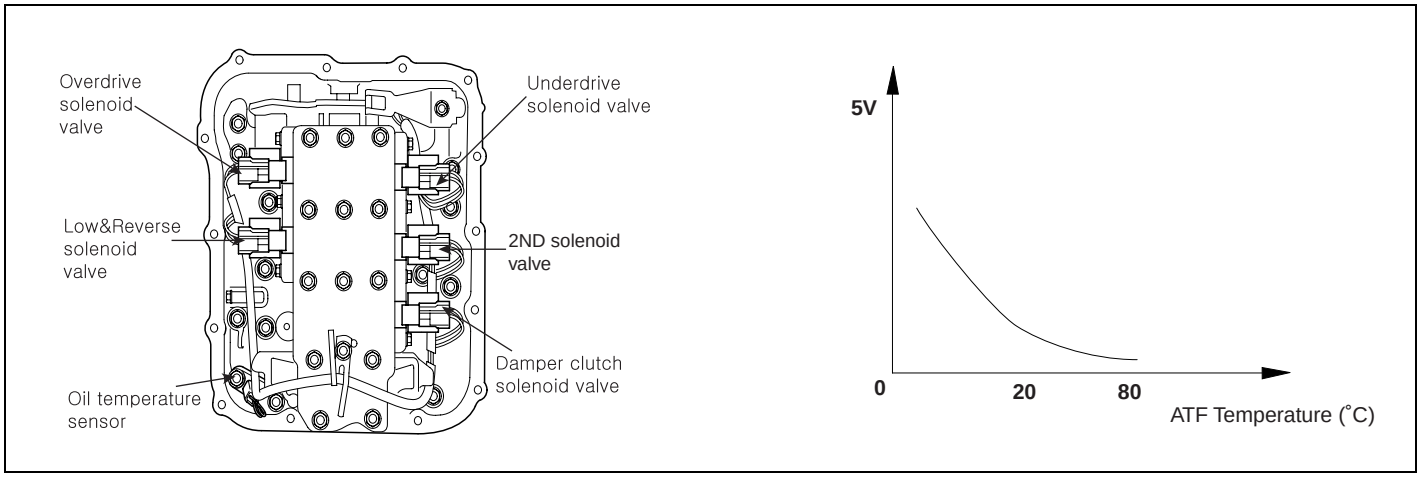
Refer to DTC P0707

COMPONENT INSPECTION E06CD7FF

Refer to DTC P0707

DTC P0712 FLUID(OIL) TEMPERATURE SENSOR CIRCUIT - LOW

COMPONENT LOCATION EEC8440D



EKQE634A

GENERAL DESCRIPTION E172EB0C

Measuring the ATF(Automatic Transaxle Fluid) temperature with a thermistor, use the signal as hydraulic control information when detecting damper clutch working condition, variable control with oil temperature and shifting.

DTC DESCRIPTION E6FBB9AF

When the signal voltage from an oil temperature is lower than 0.49V for 1 second, this code will set.

DTC DETECTING CONDITION EBEFFEB0

Item	Detecting Condition & Fail Safe	Possible cause
DTC Strategy	● Voltage monitering	● Oil temperature sensor circuit ● Oil temperature sensor component
Enable Conditions	● -	
Threshold value	● Output signal ≤ 0.49V	
Diagnostic Time	● for 1 second	
Fail Safe	● No learning, No INTELLIGENT-SHIFT until IG KEY OFF and set the oil termperature 80˚C.	

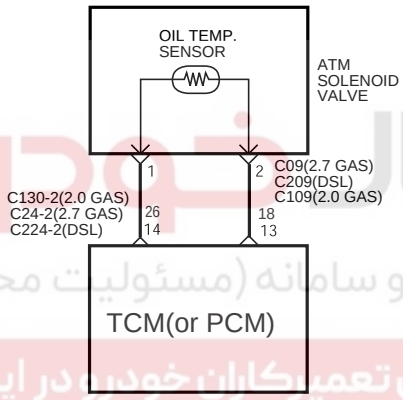
SPECIFICATION ED2EACBB

(The above value is just for reference. The actual value may differ from it according to various engine condition.)

Temp.(°C)	Resistance(kΩ)	Temp.(°C)	Resistance(kΩ)
-40	139.5	80	1.08
-20	47.7	100	0.63 ± 0.06
0	18.6 ± 1.86	120	0.38
20	8.1	140	0.25
40	3.8	160	0.16
60	1.98		

SCHEMATIC DIAGRAM EF5A4BBB

[CIRCUIT DIAGRAM]

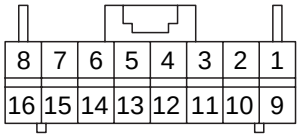


[CONNECTION INFORMATION]

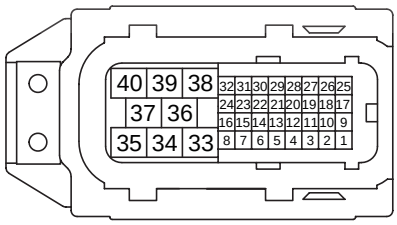
Terminal	Connection	Function
1	NO.59 or NO.26	Sensor signal
2	NO.13 or NO.18	Sensor ground

[HARNESS CONNECTORS]

C09/C109/C209



C24-2/C224-2

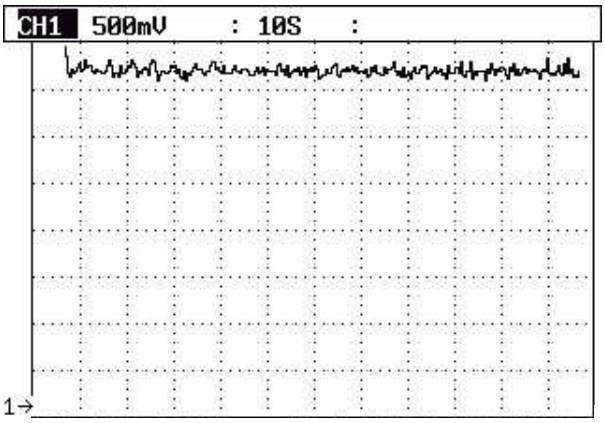


C130-2

EKQE605A

WAVEFORM INSPECTION E5D0FF36

1. IG KEY ON, ENG RUN
2. Oil temperature sensor connector(ATM solenoid valve connector): Connect
3. Monitor the waveform of the oil temerature sensor(terminal 1).



The waveform goes down as the temperature of the ATF goes up.

Generally, after starting the engine, as the temperature goes up, the waveform will go down.

P0712_5

MONITOR SCANTOOL DATA EA67674E

When the DTC relevent to oil temperature sensor sets, it is helpful to see the service data before checking for component or circuit.

Monitor the oil temperature after starting the engine. Check that the temperature goes up slowly as the engine is getting warmer and warmer.

If the temperature is set as 80°C, it means that the oil temperature sensor fails.

TERMINAL & CONNECTOR INSPECTION E8CBD4D3

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.

   Has a problem been found?

   YES

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

   NO

   ▶ Go to the next procedure.

POWER SUPPLY CIRCUIT INSPECTION EBDD8152

1. Power Supply Circiut Inspection

   1) IG KEY ON, ENG OFF

   2) Oil temperature sensor: Disconnect

   3) Measure voltage between terminal 1 of oil temperature sensor connector and chassis ground

Specification : 4.5V~5.5V

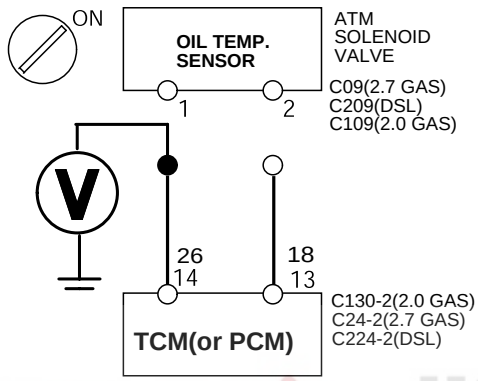
Is voltage display near the specified value?

YES

▶ Go to the "Component Inspection".

NO

▶ Proceed next inspection procedure.



EKQE011T

2. Sensor signal open circuit inspection

   1) IG KEY OFF, ENG OFF

   2) Oil temperature sensor connector and ECM(or PCM) connector: Disconnect

Specification : Approx. 1Ω below.

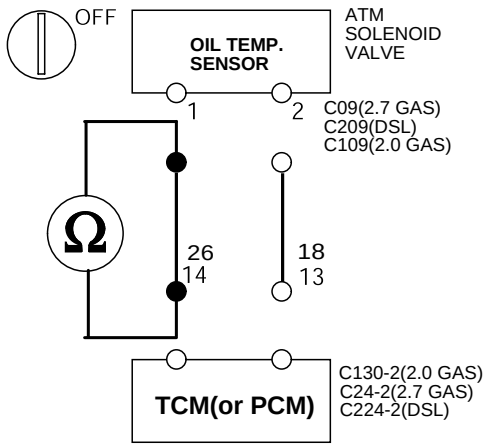
Is resistance display near the specified value?

YES

▶ Proceed next inspection procedure

NO

▶ Repair open circuit between the terminal 1 of the oil temperature sensor connector and the terminal 14(or 26) of the ECM(or PCM) connector.



EKQE013T

SIGNAL CIRCUIT INSPECTION EE76C9D7

1. Sensor signal short circuit inspection

   1) IG KEY OFF, ENG OFF

   2) Oil temperature sensor connector and ECM(or PCM) connector: Disconnect

   3) Measure resistance between terminal 1 of oil temperature sensor harness connector and chassis ground .

Specification : Approx. ∞Ω

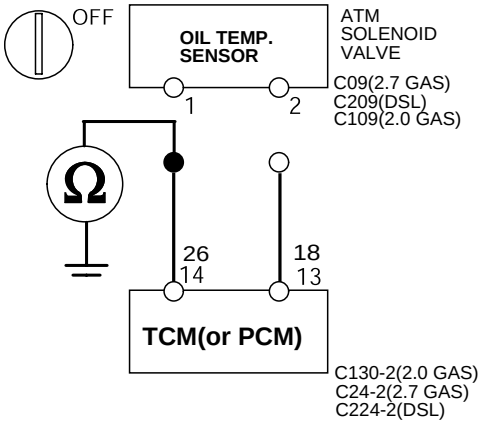
Is resistance display near the specified value?

YES

▶ Go to the "Component inspection".

NO

▶ Repair short circuit between the terminal 1 of the oil temperature sensor connector and chassis ground.



EKQE012T

COMPONENT INSPECTION E3E3AEEE

1. IG KEY OFF, ENG OFF
2. Oil temperature sensor connector : Disconnect
3. Measure resistance between terminal 1 and 2 of oil temperature sensor harness connector.

Specification : Resistance specification for temperature

Is resistance display near the specified value?

YES

▶ Oil temperature sensor OK

NO

▶ Replace the oil temperature sensor.

DTC P0713 FLUID(OIL) TEMPERATURE SENSOR CIRCUIT - HIGH

COMPONENT LOCATION ED10B47A

Refer to DTC P0712

GENERAL DESCRIPTION E0435B7F

Refer to DTC P0712

DTC DESCRIPTION E5DC098C

When the signal voltage from an oil temperature after 10 minute engine running is higher than 4.57V for 1 second or this code is memorized after ignition key on, this code will set.

DTC DETECTING CONDITION E1DA7E95

Item	Detecting Condition & Fail Safe	Possible cause
DTC Strategy	● Voltage monitering	● Oil temperature sensor circuit ● Oil temperature sensor component
Enable Conditions	● 10 minute engine running ● when the code is memorized after ignition key on	
Threshold value	● Output signal ≥ 4.57V	
Diagnostic Time	● for 1 second	
Fail Safe	● No learning, No INTELLIGENT-SHIFT until IG KEY OFF and set the oil termperature 80°C.	

SPECIFICATION E8B5DCAA

Refer to DTC P0712

SCHEMATIC DIAGRAM EBDF91AA

Refer to DTC P0712

WAVEFORM INSPECTION EE6FC915

Refer to DTC P0712

MONITOR SCANTOOL DATA EF39C7BB

Refer to DTC P0712

TERMINAL & CONNECTOR INSPECTION E6AC2428

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.

   Has a problem been found?

   YES

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

   NO

   ▶ Go to the next procedure.

POWER SUPPLY CIRCUIT INSPECTION EAC7D237

Refer to DTC P0712

SIGNAL CIRCUIT INSPECTION ED4719C2

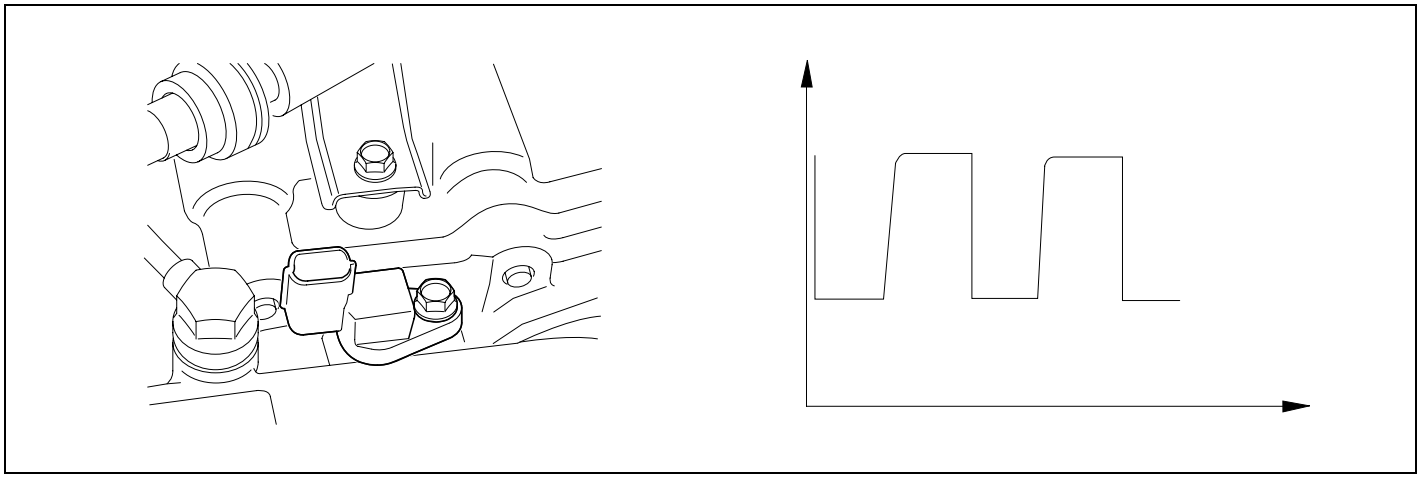
Refer to DTC P0712

COMPONENT INSPECTION E2CC8ECB

Refer to DTC P0712

DTC P0715 INPUT SPEED SENSOR CIRCUIT

COMPONENT LOCATION E581944D



EKQE635A

GENERAL DESCRIPTION E3420BD8

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

DTC DESCRIPTION E8D25F6B

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

DTC DETECTING CONDITION E0B2DE60

Item	Detecting Condition & Fail Safe	Possible cause
DTC Strategy	● Speed rationality check	● Signal circuit is open or short. ● Sensor power circuit is open ● Sensor ground circuit is open ● Faulty INPUT SPEED SENSOR ● Faulty PCM/TCM
Enable Conditions	● Vehicle speed is over 19 Mile/h(30 Km/h) in D,3,2,L(A/T range swhitch) and SP(SPORTS MODE) ● But do not check the DTC in below condition - A/T oil temp sensor voltage ＞4.5 V - Eng revolution ＜ 2600 rpm (In 1st or 2nd gear)	
Threshold value	● no signal	
Diagnostic Time	● more than 1sec	
Fail Safe	● Locked into 3rd or 2nd gear. ● Manual shifting is possibe (2 nd → 3 rd ,3 rd → 2 nd)	

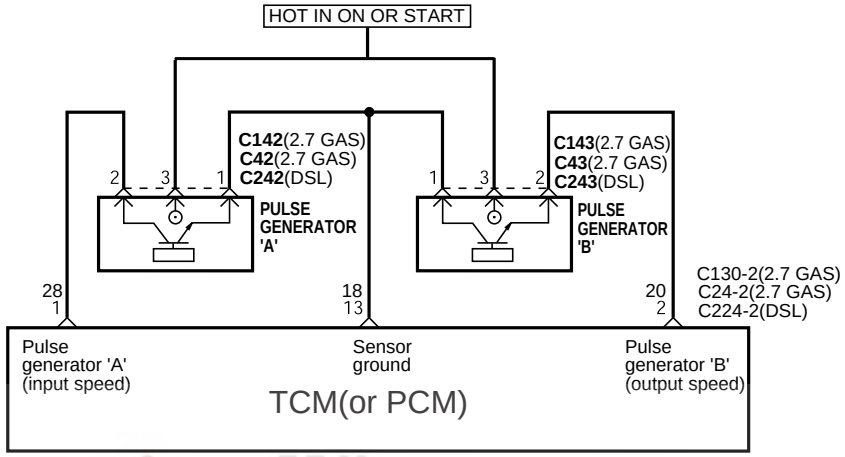
SPECIFICATION EEAE3CEE

Input shaft & Output shaft speed sensor

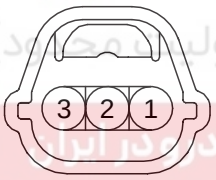
- Type : Hall sensor
- Current consumption : 22mA(MAX)
- sensor body and sensor connector have been unified as one.

SCHEMATIC DIAGRAM EABAE2ED

[CIRCUIT DIAGRAM]

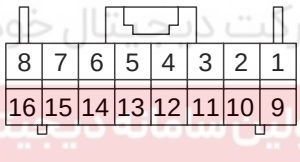


[HARNESS CONNECTORS]

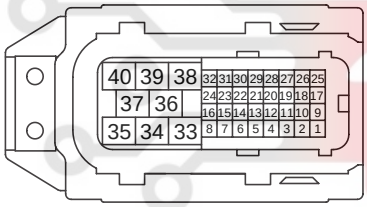


C42/C142/C24

C43/C143/C24



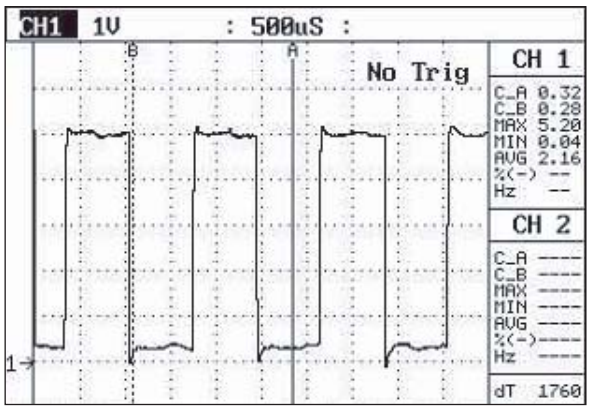
C24-2/C244-2



C130-2

EKQE607A

SIGNAL WAVEFORM & DATA E64AB9F0



If the pulse waveform(0.8V~2.8V) is detected, it is normal.

And, there should not have strong noises.

C0715_6

MONITOR SCANTOOL DATA EB38F6F1

1. Connect scantool to data link connector(DLC)

2. Engine "ON" .

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

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

Specification : Increasing Gradually

FIG.1

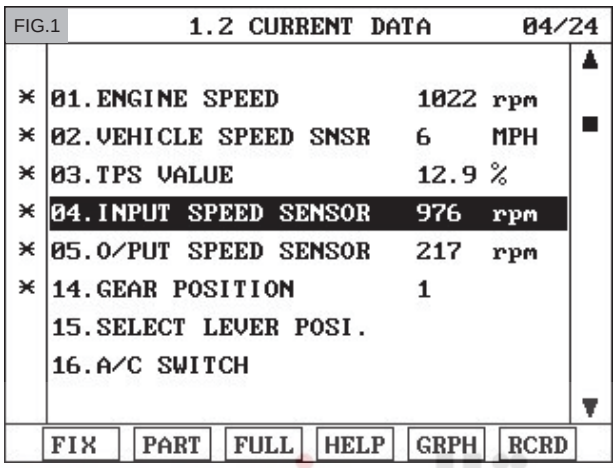


FIG.2

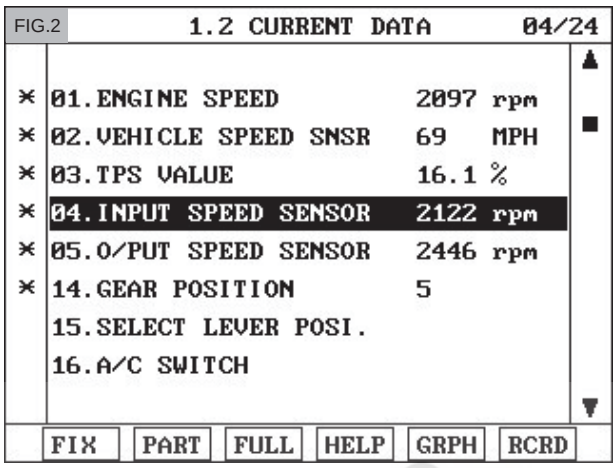


FIG.1) Idling
FIG.2) Accelerating

EKQE608A

Does "input speed sensor " follow the referance data?

YES

▶ Fault is intermittent caused by poor contact in the sensor's and/or TCM(PCM)'s connector or was repaired and TCM(PCM) memory was not cleared. Throughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration or

NO

▶ Go to "W/Harness Inspection" procedure

TERMINAL & CONNECTOR INSPECTION E5E4A494

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.

   Has a problem been found?

   YES

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

   NO

   ▶ Go to the next procedure.

SIGNAL CIRCUIT INSPECTION EFA83203

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

Is voltage within specification ?

YES

▶ Go to "Power circuit Inspection" procedure

NO

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

EKQE017T

POWER SUPPLY CIRCUIT INSPECTION ECB9F9A7

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+

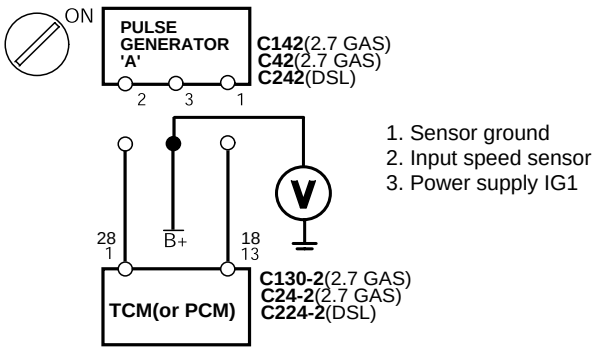
Is voltage within specification ?

YES

▶ Go to "Ground circuit inspection" procedure

NO

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



EKQE015T

GROUND CIRCUIT INSPECTION EAADDE1F

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

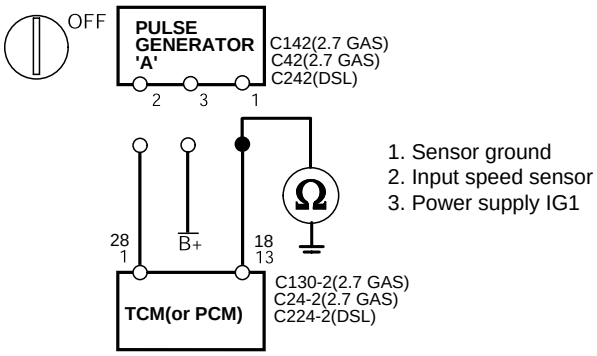
Is resistance within specification ?

YES

▶ Go to "Component Inspection" procedure

NO

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



EKQE016T

COMPONENT INSPECTION EE90CCB4

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"

[REFERENCE DATA]

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

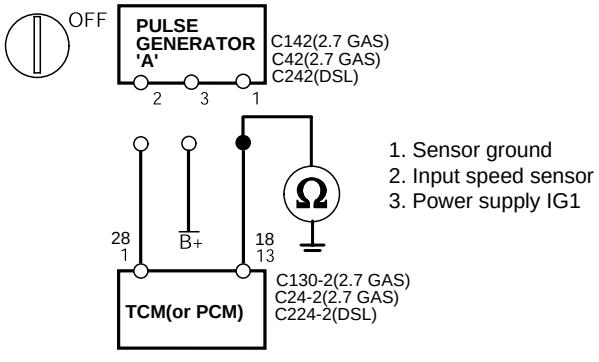
Is resistance within specification?

YES

▶ Go to "CHECK PCM/TCM " as below

NO

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



EKQE016T

2. CHECK PCM/TCM

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

2) Connect "INPUT SPEED SENSOR" connector.

3) Install scantool and slect a SIMU-SCAN,

4) Simulate frequency to INPUT SPEED SENSOR signal circuit.

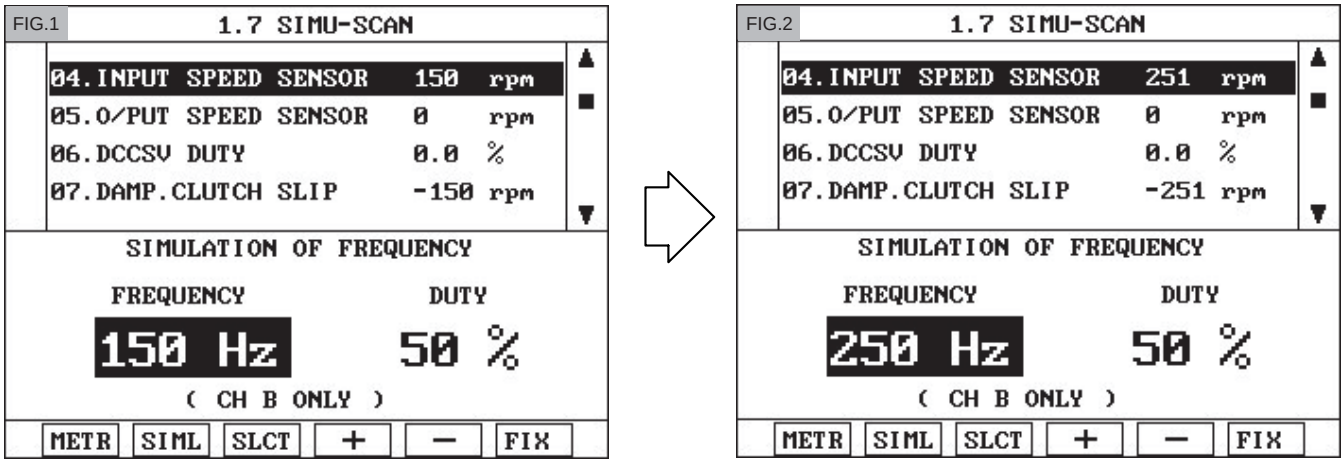


FIG.1) INPUT 150Hz → 150rpm
FIG.2) INPUT 250Hz → 250rpm

EKQE606A

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

YES

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

NO

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

VERIFICATION OF VEHICLE REPAIR E123EBB3

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.

   Is resistance within specification ?

   YES

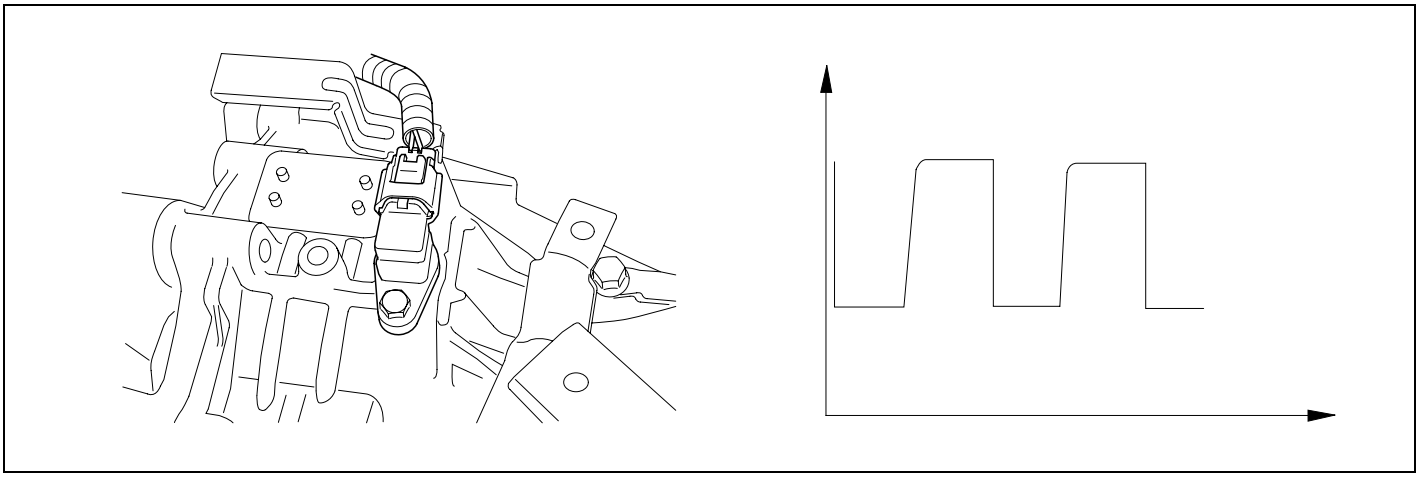
   ▶ Go to the applicable troubleshooting procedure.

   NO

   ▶ System performing to specification at this time.

DTC P0720 OUTPUT SPEED SENSOR CIRCUIT

COMPONENT LOCATION E734BF3F



EKQE636A

GENERAL DESCRIPTION E32AA648

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

DTC DESCRIPTION EDEFACCB

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

DTC DETECTING CONDITION E0AB425A

Item	Detecting Condition & Fail Safe	Possible cause
DTC Strategy	● Speed rationality check	● Signal circuit is open or short. ● Sensor power circuit is open ● Sensor ground circuit is open ● Faulty OUTPUT SPEED SENSOR ● Faulty PCM
Enable Conditions	● Vehicle speed is over 19 Mile/h(30 Km/h) in D,3,2,L(A/T range swhitch) and SP(SPORTS MODE) ● But do not check the DTC in below condition - A/T oil temp sensor voltage ＞4.5 V - Eng revolution ＜ 2600 rpm (In 1st or 2nd gear)	
Threshold value	● If the output from the output speed sensor is continuously 50% lower than the value calculated by vehicle speed sensor.	
Diagnostic Time	● more than 1sec	
Fail Safe	● Locked into 3rd or 2nd gear. ● Apply an electric current to Solenoide valve ● Manual shifting is possibe (2 nd → 3 rd ,3 rd → 2 nd)	

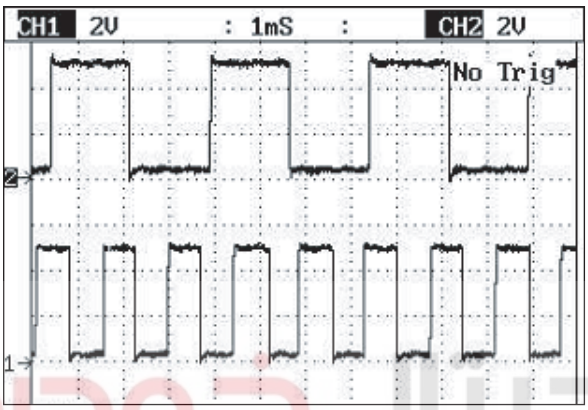
SPECIFICATION E9FBA242

Refer to DTC P0715

SCHEMATIC DIAGRAM EDEAEF4B

Refer to DTC P0715

SIGNAL WAVEFORM & DATA E254DEDF



If the pulse waveform(0.8V~2.8V) is detected, it is normal.

And, there should not have strong noises.

C0720_1

MONITOR SCANTOOL DATA EDF8F4DF

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

Specification : Increasing Gradually

FIG.1

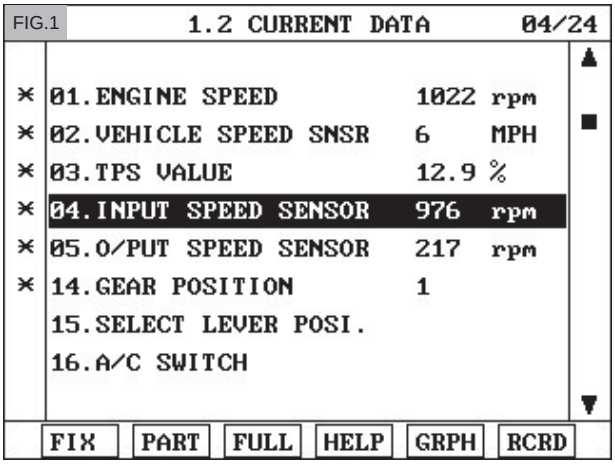


FIG.2

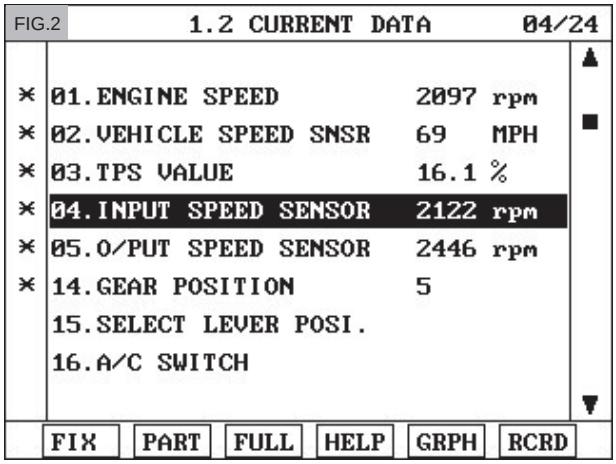


FIG.1) Low-speed
FIG.2) High-speed

EKQE610A

Does "output speed sensor " follow the referance data?

YES

▶ Fault is intermittent caused by poor contact in the sensor's and/or TCM(PCM)'s connector or was repaired and TCM(PCM) memory was not cleared. Throughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration or

NO

▶ Go to "W/Harness Inspection" procedure

TERMINAL & CONNECTOR INSPECTION EA9FC26B

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.

Has a problem been found?

YES

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

NO

▶ Go to the next procedure.

SIGNAL CIRCUIT INSPECTION EE9DB973

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

Specification : approx. 5V

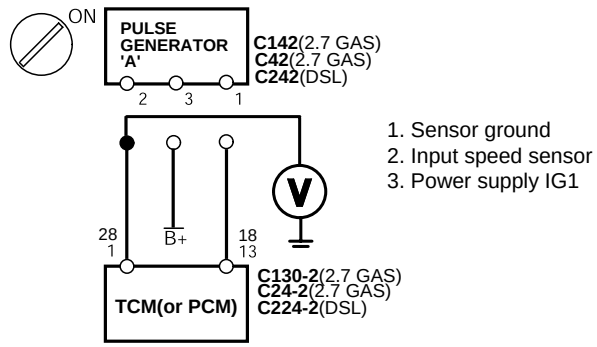
Is voltage within specification ?

YES

▶ Go to "Power circuit Inspection" procedure

NO

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



EKQE017T

POWER SUPPLY CIRCUIT INSPECTION E0CBC78E

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+

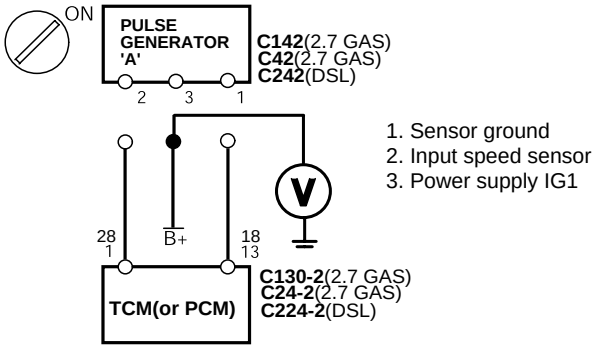
Is voltage within specification ?

YES

▶ Go to "Ground circuit inspection" procedure

NO

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



EKQE015T

GROUND CIRCUIT INSPECTION ECDD648D

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

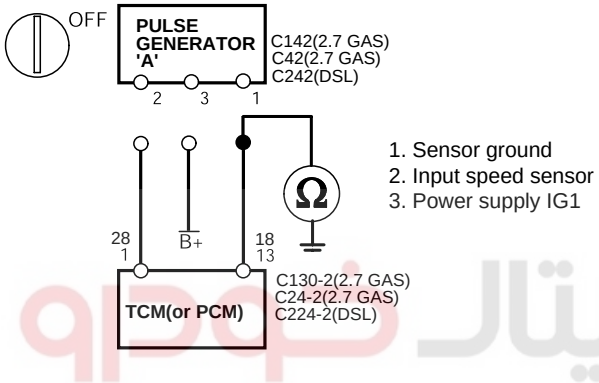
Is resistance within specification ?

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 is OK, Go to "Check PCM/TCM" of the "Component Inspection" procedure



EKQE016T

COMPONENT INSPECTION EF7612F0

1. Check "OUTPUT SPEED SENSOR"

   1) Ignition "OFF" .

   2) Disconnect the "OUTPUT SPEED SENSOR" connector

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

Specification : Refer to DTC P0715

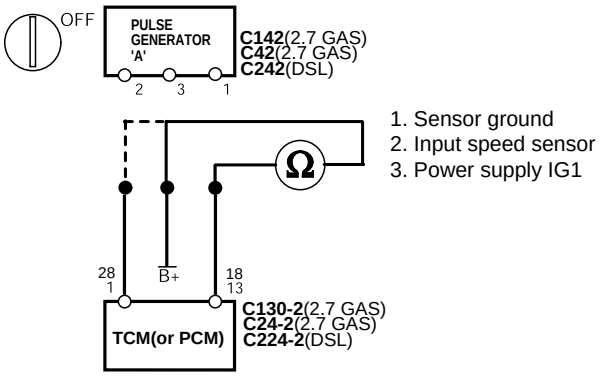
Is resistance within specification?

YES

▶ Go to "CHECK PCM/TCM " as below

NO

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



EKQE116T

2. CHECK PCM/TCM

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

2) Connect "OUTPUT SPEED SENSOR" connector.

3) Install scantool and slect a SIMU-SCAN,

4) Simulate frequency to OUTPUT SPEED SENSOR signal circuit.

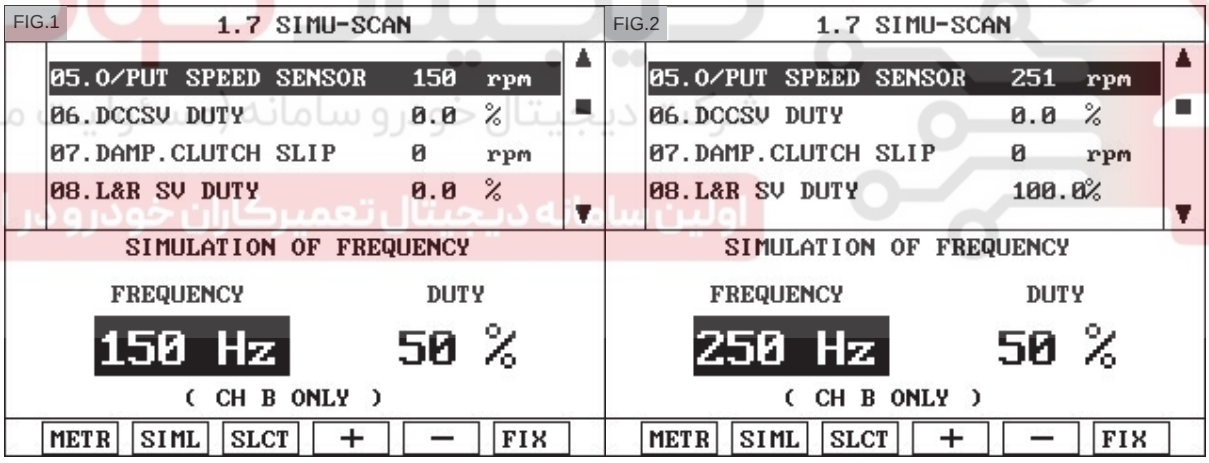


FIG.1) INPUT 150Hz → 150rpm
FIG.2) INPUT 250Hz → 250rpm

EKQE611A

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

YES

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

NO

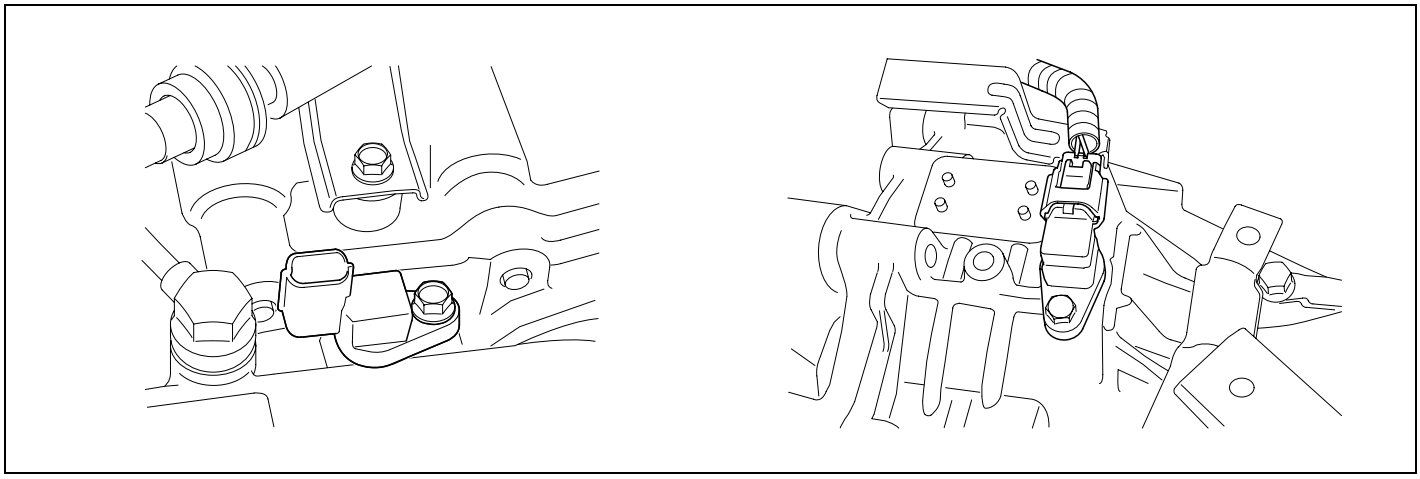
▶ Substitute with a known-good PCM/TCM and check for proper operation. If the problem is corrected, replace PCM/TCM as necessary and then go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR E5E38FAA

Refer to DTC P0715

DTC P0731 GEAR 1 INCORRECT RATIO

COMPONENT LOCATION EF1007A4



EKQE637A

GENERAL DESCRIPTION E6710CA6

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

DTC DESCRIPTION E1F1DB21

This code is set if the value of input shaft speed is not equal to the value of the output shaft, when multiplied by the 1st gear ratio, while the transaxle is engaged in 1st gear. This malfunction is mainly caused by mechanical troubles.

DTC DETECTING CONDITION E3DB5A2F

Item	Detecting Condition & Fail Safe	Possible cause
DTC Strategy	● 1st gear incorrect ratio	● Faulty Input speed sensor ● Faulty output speed sensor ● Faulty UD clutch or LR brake or Oneway clutch
Enable Conditions	● Engine speed ＞450rpm ● Output speed ＞350rpm ● Shift stage 1st. gear ● Input speed ＞0rpm ● A/T oil temp sensor voltage ＜4.5V ● Voltage of Battery ＞10V ● TRANSAXLE RANGE SWITCH is normal	
Threshold value	● | input speed/1st gear ratio - output speed|≥ 200rpm /1st. gear ratio	
Diagnostic Time	● more than 1sec	
Fail Safe	● Locked into 3 rd gear.(If diagnosis code P0731 is output four times, the transaxle is locked into 3rd gear)	

MONITOR SCANTOOL DATA EAB64EBC

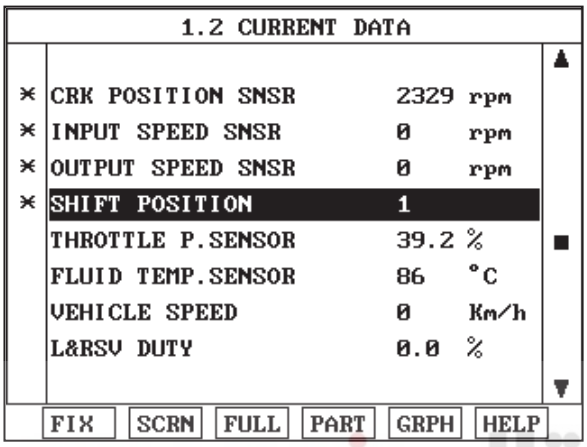
1. Connect scantool to data link connector(DLC)

2. Engine "ON".

3. Monitor the "ENGINE SPEED, INPUT SPEED SENSOR, OUTPUT SPEED SENSOR, GEAR POSITION" parameter on the scantool

4. Perform the "STALL TEST" with gear position "1"

Specification : 2000~2700 engine rpm



C0731_1

OPERATING ELEMENT OF EACH SHIFTING RANGE

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

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

Stall test procedure in D1 and reason

Procedure

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

   * The slippage of 1st gear operating parts can be detected by stall test in D

Reason for stall test

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

Does "STALL TEST " within specification?

YES

▶ Go to "W/Harness Inspection" procedure

NO

▶ Go to "Component inspection" procedure

CAUTION

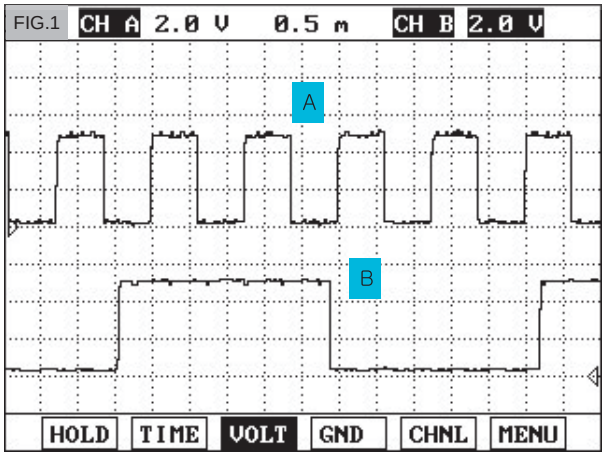
- ***Do not let anybody stand in front of or behind the vehicle while this test is being carried out.***
- ***Check the A/T fluid level and temperature and the engine coolant temperature.***
  - ***Fluid level : At the hot mark on the oil level gauge.***
  - ***Fluid temperature : 176 °F~ 212 °F (80~100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

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

SIGNAL CIRCUIT INSPECTION ECDF74C3

1. Connect Scantool
2. Engine "ON" .
3. Monitor signal waveform of the "INPUT & OUTPUT SPEED SENSOR" after shifting to D1 range

FIG.1



A : INPUT SPEED SENSOR
B : OUTPUT SPEED SENSOR

C0731_3

Does "INPUT & OUTPUT SPEED SENSOR" follow the referance data?

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 EA6A2BCF

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

Specification : shown below

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

＊L brake applied 0-3 mph only in D1

Is oil pressure value within specification?

YES

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

NO

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

VERIFICATION OF VEHICLE REPAIR ED6799D9

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.

   Are any DTCs present ?

   YES

   ▶ Go to the applicable troubleshooting procedure.

   NO

   ▶ System performing to specification at this time.

DTC P0732 GEAR 2 INCORRECT RATIO

COMPONENT LOCATION E9AC175B

Refer to DTC P0731

GENERAL DESCRIPTION E76C1C6C

The value of the input shaft speed should be equal to the value of the output shaft speed, when multiplied by the 2nd gear ratio, while the transaxle is engaged in the 2nd gear. For example, if the output speed is 1000 rpm and the 2nd gear ratio is 1.529, then the input speed is 1,529 rpm.

DTC DESCRIPTION E2ED6BEF

This code is set if the value of input shaft speed is not equal to the value of the output shaft, when multiplied by the 2nd gear ratio, while the transaxle is engaged in 2nd gear. This malfunction is mainly caused by mechanical troubles.

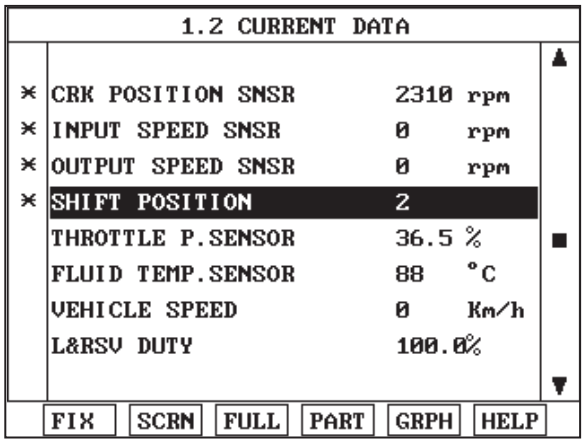
DTC DETECTING CONDITION E4CDDF76

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

MONITOR SCANTOOL DATA EA295EE2

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

Specification : 2000~2700 engine rpm



C0732_1

OPERATING ELEMENT OF EACH SHIFTING RANGE

Refer to DTC P0731

Stall test procedure in D2 and reason

Procedure

1. Warm up the engine
2. After positioning the select lever in "D" or "ON" of the HOLD SW (Operate UP SHIFT in case of "SPORTS MODE"),depress the foot brake pedal fully after that, depress the accelerator pedal to the maximum

   * The slippage of 2nd gear operating parts can be detected by stall test in D2

Reason for stall test

1. If there is no mechanical defaults in A/T, every slippage occur in torque converter.
2. 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.
4. If oupput speed revolution is output. It means that the foot brake force is not applied fully. Remeasuring is required.

Does "STALL TEST " within specification?

YES

▶ Go to "W/Harness Inspection" procedure

NO

▶ Go to "Component inspection" procedure

CAUTION

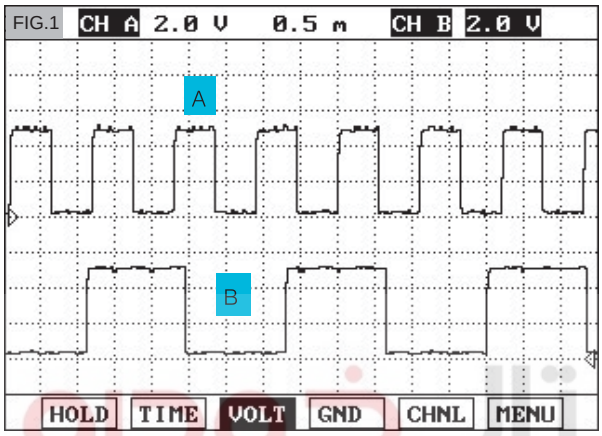
- ***Do not let anybody stand in front of or behind the vehicle while this test is being carried out.***
- ***Check the A/T fluid level and temperature and the engine coolant temperature.***
  - ***Fluid level : At the hot mark on the oil level gauge.***
  - ***Fluid temperature : 176 °F~ 212 °F (80~100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

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

● ***If carrying out the stall test two or more time, move the select lever to the "N" position and run the engine at 1,000 rpm to let the A/T fluid cool down before carrying out subsequent.***

SIGNAL CIRCUIT INSPECTION E543FCF1

1. Connect Scantool
2. Engine "ON" .
3. Monitor signal waveform of the "INPUT & OUTPUT SPEED SENSOR" after shifting to D2 range



A : INPUT SPEED SENSOR
B : OUTPUT SPEED SENSOR

C0732_3

Does "INPUT & OUTPUT SPEED SENSOR" follow the referance data?

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 E0D33B96

1. Connect Oil pressure guage to "UD" and "2ND" port.
2. Engine "ON".
3. Drive a car with gear position 2 in "SPORTS MODE".
4. Compare it with referance data as below

Specification : Refer to DTC P0731

Is oil pressure value within specification?

YES

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

NO

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

VERIFICATION OF VEHICLE REPAIR ED5AA90E

Refer to DTC P0731

DTC P0733 GEAR 3 INCORRECT RATIO

COMPONENT LOCATION EFAEBEA0

Refer to DTC P0731

GENERAL DESCRIPTION E3BAD519

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

DTC DESCRIPTION E84AABBC

This code is set if the value of input shaft speed is not equal to the value of the output shaft, when multiplied by the 3rd gear ratio, while the transaxle is engaged in 3rd gear. This malfunction is mainly caused by mechanical troubles.

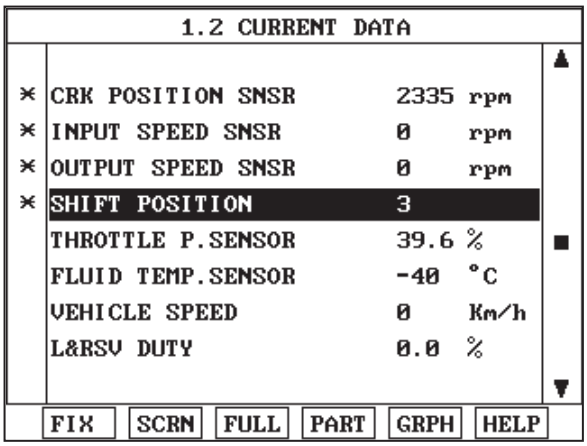
DTC DETECTING CONDITION EC38E9B4

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 brake
Enable Conditions	● Engine speed ＞450rpm ● Output speed ＞900rpm ● Shift stage 3rd. gear ● Input speed ＞0rpm ● A/T oil temp sensor voltage ＜4.5V ● Voltage of Battery ＞10V ● TRANSAXLE RANGE SWITCH is normal	
Threshold value	●	input speed/3rd gear ratio - output speed	≥ 200rpm /3rd. gear ratio	
Diagnostic Time	● more than 1sec	
Fail Safe	● Locked into 3 rd gear.(If diagnosis code P0733 is output four times, the transaxle is locked into 3rd gear)	

MONITOR SCANTOOL DATA E11B6E3A

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"
5. Compare it with referance data as below

Specification : 2000~2700 engine rpm



C0733_1

OPERATING ELEMENT OF EACH SHIFTING RANGE

Refer to DTC P0731

Stall test procedure in D3 and reason

Procedure

1. Warm up the engine
2. After making 3rd gear hold by disconnecting the solenoid connector, and Then depress the foot brake pedal fully After that, step on the accelerator pedal to the maximum

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

Reason for stall test

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

Does "STALL TEST " within specification?

YES

▶ Go to "W/Harness Inspection" procedure

NO

▶ Go to "Component inspection" procedure

CAUTION

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

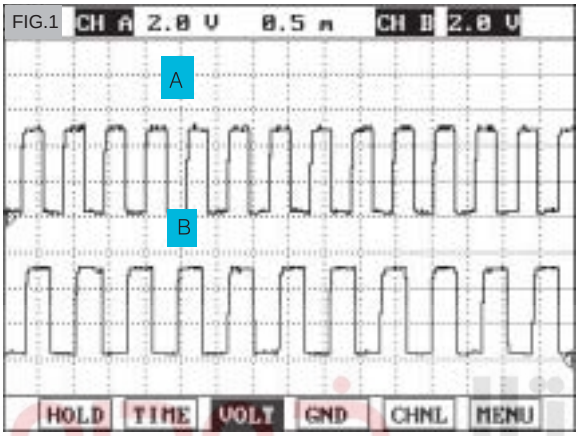
- ***Chock both rear wheel(left and right).***
- ***Pull the parking brake lever on with the brake pedal fully depressed.***
- ***The throttle should not be left fully open for more than eight second.***

● ***If carrying out the stall test two or more time, move the select lever to the "N" position and run the engine at 1,000 rpm to let the A/T fluid cool down before carrying out subsequent.***

SIGNAL CIRCUIT INSPECTION ED4DFC3F

1. Connect Scantool
2. Engine "ON" .
3. Monitor signal waveform of the "INPUT & OUTPUT SPEED SENSOR" after shifting to D3 range

FIG.1



A : INPUT SPEED SENSOR
B : OUTPUT SPEED SENSOR

C0733_2

Does "INPUT & OUTPUT SPEED SENSOR" follow the referance data?

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 EADECB4C

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

Specification : Refer to DTC P0731

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 E7C4A954

Refer to DTC P0731

DTC P0734 GEAR 4 INCORRECT RATIO

COMPONENT LOCATION E090BED7

Refer to DTC P0731

GENERAL DESCRIPTION E4246CD6

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

DTC DESCRIPTION E934AB61

This code is set if the value of input shaft speed is not equal to the value of the output shaft, when multiplied by the 4th gear ratio, while the transaxle is engaged in 4th gear. This malfunction is mainly caused by mechanical troubles.

DTC DETECTING CONDITION E52B897B

Item	Detecting Condition & Fail Safe	Possible cause
DTC Strategy	● 4th gear incorrect ratio	● Faulty Input speed sensor ● Faulty output speed sensor ● Faulty UD clutch or 2nd brake
Enable Conditions	● Engine speed ＞450rpm ● Output speed ＞900rpm ● Shift stage 4th. gear ● Input speed ＞0rpm ● A/T oil temp sensor voltage ＜4.5V ● Voltage of Battery ＞10V ● TRANSAXLE RANGE SWITCH is normal	
Threshold value	●	input speed/4th gear ratio - output speed	≥ 200rpm /4th. gear ratio	
Diagnostic Time	● more than 1sec	
Fail Safe	● Locked into 3 rd gear.(If diagnosis code P0734 is output four times, the transaxle is locked into 3rd gear)	

MONITOR SCANTOOL DATA EBA6E688

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

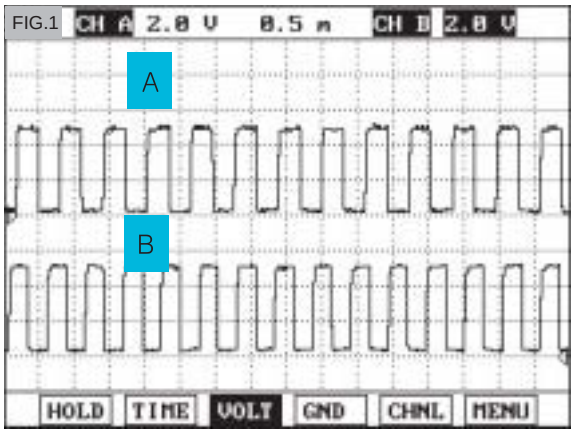
OPERATING ELEMENT OF EACH SHIFTING RANGE

Refer to DTC P0731

SIGNAL CIRCUIT INSPECTION EDB90C87

1. Connect Scantool
2. Engine "ON" .
3. Monitor signal waveform of the "INPUT & OUTPUT SPEED SENSOR" after shifting to D4 range

FIG.1



A : INPUT SPEED SENSOR
B : OUTPUT SPEED SENSOR

C0734_1

Does "INPUT & OUTPUT SPEED SENSOR" follow the referance data?

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 EA40D2FB

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

Specification : Refer to DTC P0731

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 EC0050F9

Refer to DTC P0731

DTC P0736 REVERSE GEAR INCORRECT RATIO

COMPONENT LOCATION E08CC70D

Refer to DTC P0731

GENERAL DESCRIPTION EC1E7CAC

The value of the input shaft speed should be equal to the value of the output shaft speed, when multiplied by the reverse gear ratio, while the transaxle is engaged in the reverse gear.

DTC DESCRIPTION EFBF2B1F

This code is set if the value of input shaft speed is not equal to the value of the output shaft, when multiplied by the reverse gear ratio, while the transaxle is engaged in reverse gear. This malfunction is mainly caused by mechanical troubles.

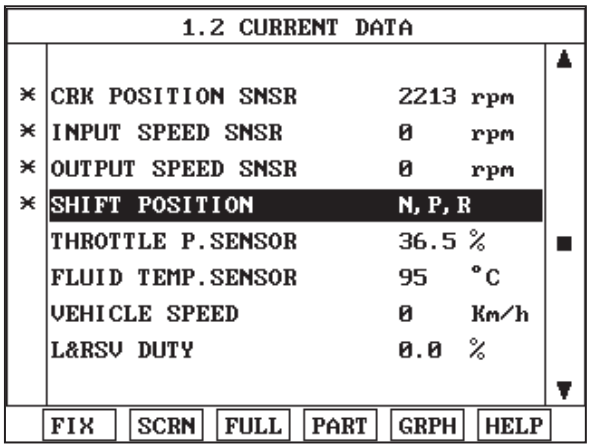
DTC DETECTING CONDITION E5B59920

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 speed ＞450rpm ● Output speed ＞900rpm ● Shift stage Rev. gear ● Input speed ＞0rpm ● A/T oil temp sensor voltage ＜4.5V ● Voltage of Battery ＞10V ● TRANSAXLE RANGE SWITCH is normal	
Threshold value	●	input speed/Rev. gear ratio - output speed	≥ 200rpm /rev. gear ratio	
Diagnostic Time	● more than 1sec	
Fail Safe	● Locked into 3 rd gear.(If diagnosis code P0736 is output four times, the transaxle is locked into 3rd gear)	

MONITOR SCANTOOL DATA E8620EB3

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

Specification : 2000~2700 engine rpm



C0736_1

OPERATING ELEMENT OF EACH SHIFTING RANGE

Refer to DTC P0731

Stall test procedure in Reverse and reason

Procedure

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

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

Reason for stall test

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

Does "STALL TEST " within specification?

YES

▶ Go to "W/Harness 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.***
  - ***Engine coolant temperature : 80~100 °C.***

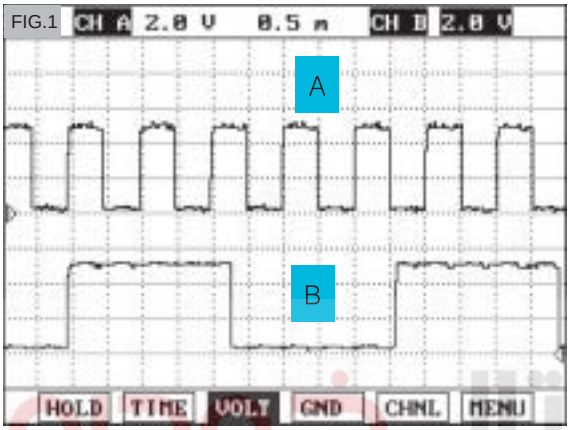
- ***Chock both rear wheel(left and right).***
- ***Pull the parking brake lever on with the brake pedal fully depressed.***
- ***The throttle should not be left fully open for more than eight second.***

● ***If carrying out the stall test two or more time, move the select lever to the "N" position and run the engine at 1,000 rpm to let the A/T fluid cool down before carrying out subsequent.***

SIGNAL CIRCUIT INSPECTION E6BB14CD

1. Connect Scantool
2. Engine "ON" .
3. Monitor signal waveform of the "INPUT & OUTPUT SPEED SENSOR" after shifting to R range

FIG.1



A : INPUT SPEED SENSOR

B : OUTPUT SPEED SENSOR

C0736_2

Does "INPUT & OUTPUT SPEED SENSOR" follow the referance data?

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 E23CD140

1. Connect Oil pressure guage to "RVS" and "LR" port.
2. Engine "ON".
3. Drive a car with gear position R
4. Compare it with referance data as below

Specification : Refer to DTC P0731

Is oil pressure value within specification?

YES

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

NO

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

VERIFICATION OF VEHICLE REPAIR E49CD9CE

Refer to DTC P0731

DTC P0741 TORQUE CONVERTER CLUTCH CIRCUIT - STUCK OFF

GENERAL DESCRIPTION EAE74753

The PCM/TCM controls the locking and unlocking of the Torque Converter Clutch (or Damper Clutch), to the input shaft of the transmission, by appling hydraulic pressure. The main purpose of T/C clutch control is to save fuel by decreasing the hydraulic load.

DTC DESCRIPTION E5A1EC62

The PCM/TCM increases the duty ratio to engage the Damper Clutch by monitoring slip rpms (difference vlaue beteween engine speed and turbine speed). To decrease the slip of the Damper Clutch, the PCM/TCM increases the duty ratio by appling more hyraulic load.

DTC DETECTING CONDITION E0A132EE

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 bady control valve ● Faulty PCM/TCM
Enable Conditions	● A/T range switch D,SP(sports mode) ● Solenoid valve stetus is 100% duty	
Threshold value	●Calculated slip (engine speed-input speed) ＞ 160rpm(need to verify Threshold value)	
Diagnostic Time	● more than 4sec	
Fail Safe	●Damper clutch abnormal system (If diagnosis code P0741 is output four times, TORQUE CONVERTER(DEMPER) CLUTCH is not controlled by PCM/TCM)	

MONITOR SCANTOOL DATA EA8F1254

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

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

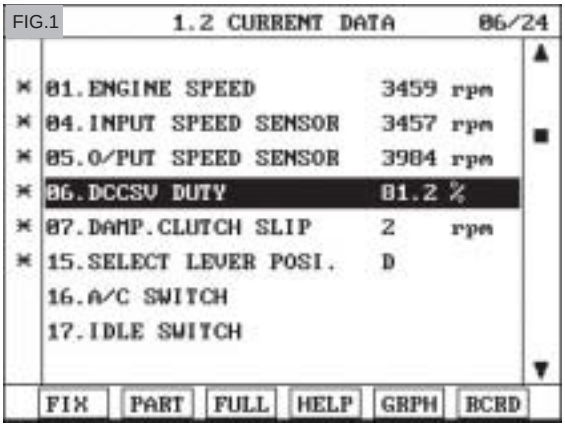


FIG.1 : Normal status

C0741_1

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

YES

▶ Fault is intermittent caused by poor contact in the sensor's and/or TCM(PCM)'s connector or was repaired and TCM(PCM) memory was not cleared. Throughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration or

NO

▶ Go to "Component Inspection" procedure

COMPONENT INSPECTION EBB62AD8

1. CHECK TORQUE CONVERTER CLUTCH SOLENOID VALVE

   1) Connect scantool to data link connector(DLC)

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

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

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

      YES

      ▶ Go to "CHECK OIL PRESSURE" as below.

      NO

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

2. CHECK OIL PRESSURE

   1) Connect Oil pressure guage to "DA" port.

   2) Engine "ON".

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

   4) Operate vehicle with 3rd or 4th gear and operate the "TCC SOLENIOD VALVE DUTY" more than 85%.

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

Is oil pressure value within specification?

YES

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

NO

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

VERIFICATION OF VEHICLE REPAIR EED0D767

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.

Are any DTCs present ?

YES

▶ Go to the applicable troubleshooting procedure.

NO

▶ System performing to specification at this time.

DTC P0742 TORQUE CONVERTER CLUTCH CIRCUIT - STUCK ON

GENERAL DESCRIPTION EB6A0DE1

The PCM TCM controls the locking and unlocking of the Torque Converter Clutch (or Damper Clutch), to the input shaft of the transmission, by appling hydraulic pressure. The main purpose of T/C clutch control is to save fuel by decreasing the hydraulic load.

DTC DESCRIPTION EE67E2EB

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

DTC DETECTING CONDITION E54B6988

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

MONITOR SCANTOOL DATA E96DFE97

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

Specification : TCC SLIP>5RPM

FIG.1

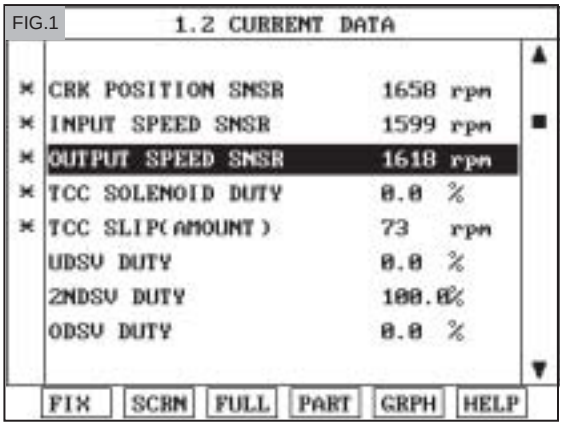


FIG.1 : Normal status

C0742_1

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

YES

▶ Fault is intermittent caused by poor contact in the sensor's and/or TCM(PCM)'s connector or was repaired and TCM(PCM) memory was not cleared. Throughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration or

NO

▶ Go to "Component Inspection" procedure

COMPONENT INSPECTION E4ED5C0B

1. CHECK TORQUE CONVERTER CLUTCH SOLENOID VALVE

   1) Connect scantool to data link connector(DLC)

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

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

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

      YES

      ▶ Go to "CHECK OIL PRESSURE" as below.

      NO

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

2. CHECK OIL PRESSURE

1) Connect Oil pressure guage to "DR" port.

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

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

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

5) Measure oil pressure

Specification : approx. 6.1kg/cm²

Is oil pressure value within specification?

YES

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

NO

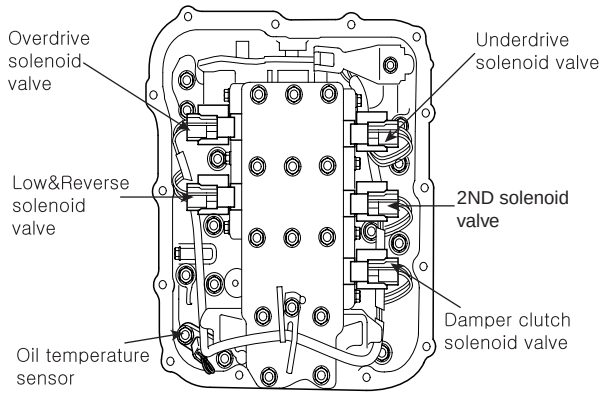
▶ Replace A/T ass'y (possible to BODY CONTROL VALVE faulty) as necessary and Go to "Verification Vehicle Repair " procedure.

VERIFICATION OF VEHICLE REPAIR E0E31202

Refer to DTC P0741

DTC P0743 TORQUE CONVERTER CLUTCH CIRCUIT - ELECTRICAL

COMPONENT LOCATION EC203AAD



EKKE151B

GENERAL DESCRIPTION E743EEBC

The PCM/TCM controls the locking and unlocking of the Torque Converter Clutch (or Damper Clutch), to the input shaft of the transmission, by appling hydraulic pressure. The main purpose of T/C clutch control is to save fuel by decreasing the hydraulic load.

DTC DESCRIPTION E2D4BD2F

The PCM/TCM checks the Damper Clutch Control Signal by monitoring the feedback signal from the solenoid valve drive circuit.

DTC DETECTING CONDITION E85AF2B0

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/TCM
Enable Conditions	● Solenoid status Either solid On or OFF ● Voltage of Battery ＞10V	
Threshold value	● Voltage ＜3V	
Diagnostic Time	● more than 320 ms	
Fail Safe	● Locked in 3 rd gear.(Control relay off)	

SPECIFICATION E5B57936

Solenoid Valve for Pressure Control

● Sensor type : Normal open 3-way
● Operating temperature : -22~266°F(-30°C 130°C)
● Frequency :
- LR, 2ND, UD, OD, RED : 61.27Hz (at the ATF temp. -20°C above)
- DCC : 30.64Hz
※ KM series : 35Hz

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

MONITOR SCANTOOL DATA EFD8AE45

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

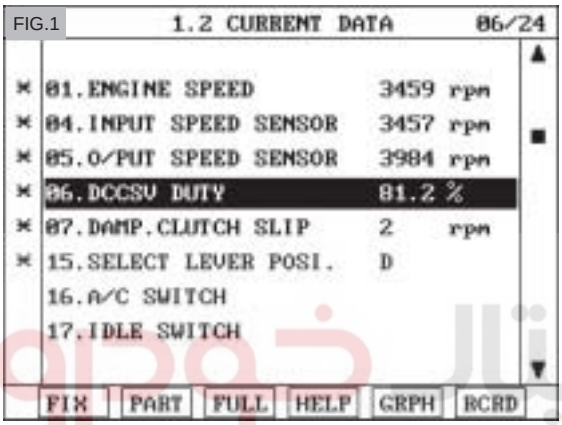


FIG.1 : Normal status

C0743_1

Does "TCC SOLENOID DUTY " follow the referance data?

YES

▶ Fault is intermittent caused by poor contact in the sensor's and/or TCM(PCM)'s connector or was repaired and TCM(PCM) memory was not cleared. Throughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration or

NO

▶ Go to "W/Harness Inspection " procedure

TERMINAL & CONNECTOR INSPECTION ED7954D0

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.

   Has a problem been found?

YES

▶ Repair as necessary and then go to "Verification of Vehicle Repair" procedure

NO

▶ Go to "Power Circuit Inspection" procedure

POWER SUPPLY CIRCUIT INSPECTION EADDBBDA

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

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

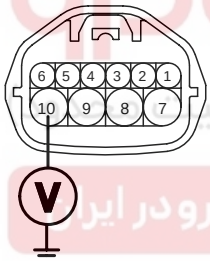
Is voltage within specifications?

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



ATM SOLENOID VALVE

C109(2.0 GAS)
C09(2.7 GAS)
C209(DSL)

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

EKQE040T

SIGNAL CIRCUIT INSPECTION E41CC963

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

Specification: approx. 0 Ω

Is resistance within specifications?

YES

▶ Go to "Check signal circuit short Inspection" procedure

NO

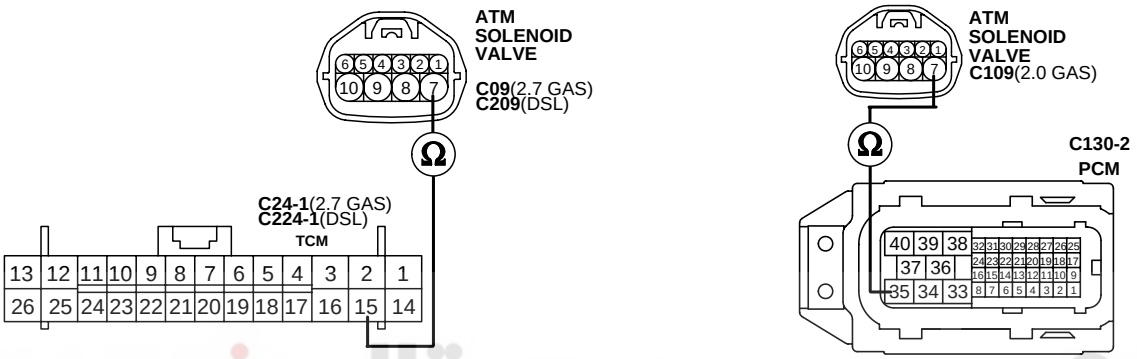
▶ Check for open in harness. Repair as necessary and Go to "Verification Vehicle Repair" procedure

[2.7L Gasoline or DIESEL]

3.UD solenoid valve 4.2ND solenoid valve 5.OD solenoid valve 6.LR solenoid valve 7.TCC solenoid valve 9.A/T battery 10.A/T battery
1.UD solenoid valve control 16.2ND solenoid valve control 14.OD solenoid valve control 15.TCC solenoid valve control

[2.0L Gasoline]

3.UD solenoid valve 4.2ND solenoid valve 5.OD solenoid valve 6.LR solenoid valve 7.TCC solenoid valve 9.A/T battery 10.A/T battery
40.UD solenoid valve control 39.2ND solenoid valve control 33.OD solenoid valve control 35.TCC solenoid valve control



EKQE612A

2. Check signal circuit short inspection

1) Ignition "OFF".

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

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

Specification: Infinite

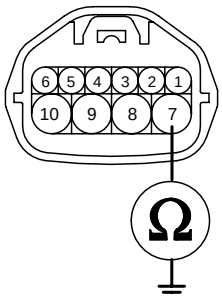
Is resistance within specifications?

YES

▶ Go to "Component Inspection" procedure

NO

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



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

EKQE043T

COMPONENT INSPECTION EE4E7EE2

1. CHECK SOLENOID VELVE

   1) Ignition "OFF".

   2) Disconnect "A/T SOLENOID VALVE" connector

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

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

Is resistance within specification?

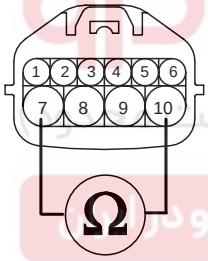
YES

▶ Go to "CHECK PCM/TCM" as below

NO

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

ATM SOLENOID VALVE (component side)



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

EKQE039T

2. CHECK PCM/TCM

   1) Connect scantool to data link connector(DLC)

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

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

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

   YES

   ▶ Go to "Verification Vehicle Repair" procedure

   NO

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

ACTUATOR TEST CONDITION

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

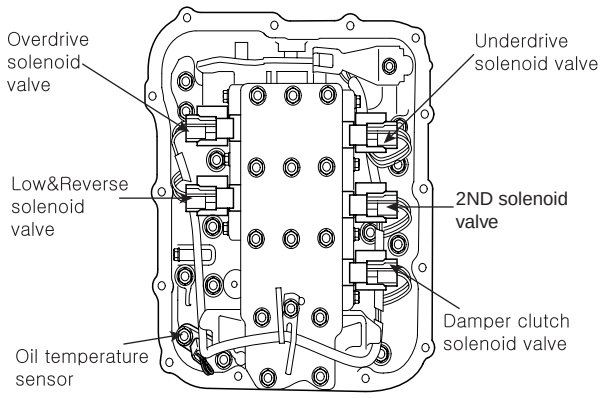
6. IDLE SWITCH ON
7. ENGINE RPM 0

VERIFICATION OF VEHICLE REPAIR EBDEBD7E

Refer to DTC P0741

DTC P0750 SHIFT CONTROL SOLENOID VALVE A CIRCUIT MALFUNCTION

COMPONENT LOCATION E9C4F288



EKKE151B

GENERAL DESCRIPTION E291AAFA

The Automatic Transmission changes the gear position of the transmission by utilizing a combination of Clutches and Brakes, which are controlled by solenoid valves.

DTC DESCRIPTION E0DBB7FC

The TCM checks the Low and Reverse Control Signal by monitoring the feedback signal from the solenoid valve drive circuit.

DTC DETECTING CONDITION E56BE40E

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

SPECIFICATION E72B62A5

Solenoid Valve for Pressure Control

● Sensor type : Normal open 3-way
● Operating temperature : -22~266°F(-30°C 130°C)
● Frequency :
- LR, 2ND, UD, OD, RED : 61.27Hz (at the ATF temp. -20°C above)
- DCC : 30.64Hz
※ KM series : 35Hz
● Internal resistance : 2.7~3.4Ω (68°F or 20°C)

● Surge voltage : 56 V

MONITOR SCANTOOL DATA ECA6D911

1. Connect scantool to data link connector(DLC)
2. Engine "ON".
3. Monitor the "LR SOL. VALVE" parameter on the scantool
4. Select "R" range and monitor "LR SOLENOID DUTY" is 0%

Specification: 1st → 0%, 2nd → 100%

FIG.1

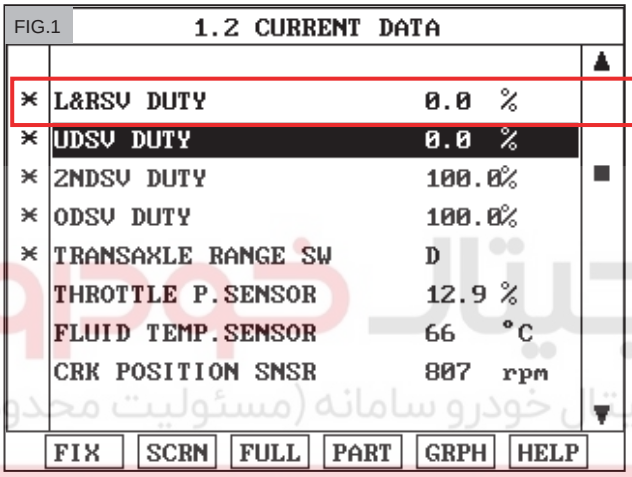


FIG.2

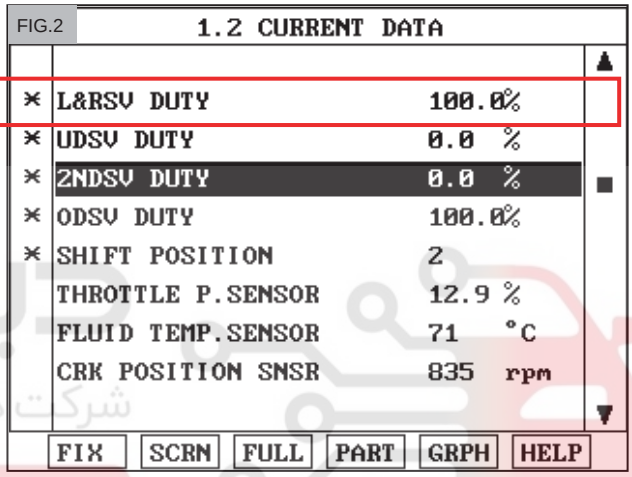


FIG 1) 1st gear
FIG 2) 2nd gear

EKQE613A

Does "LR SOLENOID DUTY " follow the referance data?

YES

▶ Fault is intermittent caused by poor contact in the sensor's and/or TCM(PCM)'s connector or was repaired and TCM(PCM) memory was not cleared. Throughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration or

NO

▶ Go to "W/Harness Inspection " procedure

TERMINAL & CONNECTOR INSPECTION EFB08E1A

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.

Has a problem been found?

YES

▶ Repair as necessary and then go to "Verification of Vehicle Repair" procedure

NO

▶ Go to "Power Circuit Inspection" procedure

POWER SUPPLY CIRCUIT INSPECTION EC4035B5

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

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

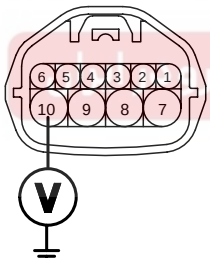
Is voltage within specifications?

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



ATM SOLENOID VALVE
C109(2.0 GAS)
C09(2.7 GAS)
C209(DSL)

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

EKQE040T

SIGNAL CIRCUIT INSPECTION EFCE0BBD

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

Specification: approx. 0 Ω

Is resistance within specifications?

YES

▶ Go to "Check signal circuit short Inspection" procedure

NO

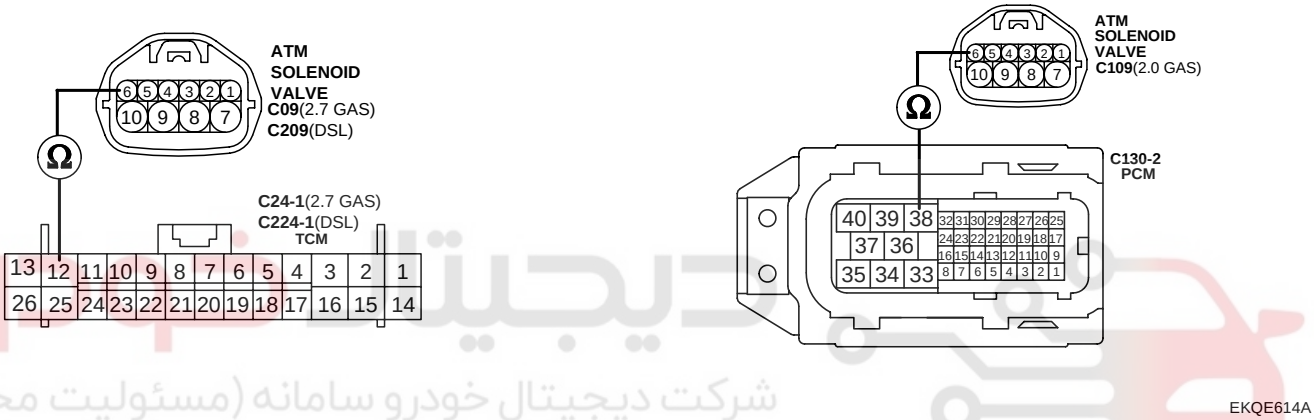
▶ Check for open in harness. Repair as necessary and Go to "Verification Vehicle Repair" procedure

[2.7L Gasoline or DIESEL]

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

[2.0L Gasoline]

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



2. Check signal circuit short inspection

1) Ignition "OFF".

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

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

Specification: Infinite

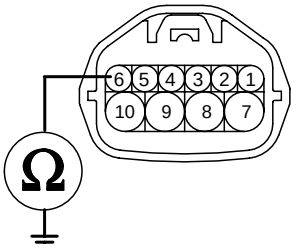
Is resistance within specifications?

YES

▶ Go to "Component Inspection" procedure

NO

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



ATM SOLENOID VALVE

C109(2.0 GAS)
C09(2.7 GAS)
C209(DSL)

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

EKQE036T

COMPONENT INSPECTION E28C20C9

1. CHECK SOLENOID VELVE

   1) Ignition "OFF".

   2) Disconnect "A/T SOLENOID VALVE" connector

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

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

Is resistance within specification?

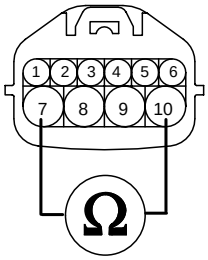
YES

▶ Go to "CHECK PCM/TCM" as below

NO

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

ATM SOLENOID VALVE (component side)



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

EKQE039T

2. CHECK PCM/TCM

   1) Connect scantool to data link connector(DLC)

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

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

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

   YES

   ▶ Go to "Verification Vehicle Repair" procedure

NO

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

ACTUATOR TEST CONDITION

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

VERIFICATION OF VEHICLE REPAIR E04527C1

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.

   Are any DTCs present ?

YES

▶ Go to the applicable troubleshooting procedure.

NO

▶ System performing to specification at this time.

DTC P0755 SHIFT CONTROL SOLENOID VALVE B CIRCUIT MALFUNCTION

COMPONENT LOCATION EDD6EC56

Refer to DTC P0750

GENERAL DESCRIPTION EEB6725C

Refer to DTC P0750

DTC DESCRIPTION EDFA69DF

Refer to DTC P0750

DTC DETECTING CONDITION E9BC976F

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

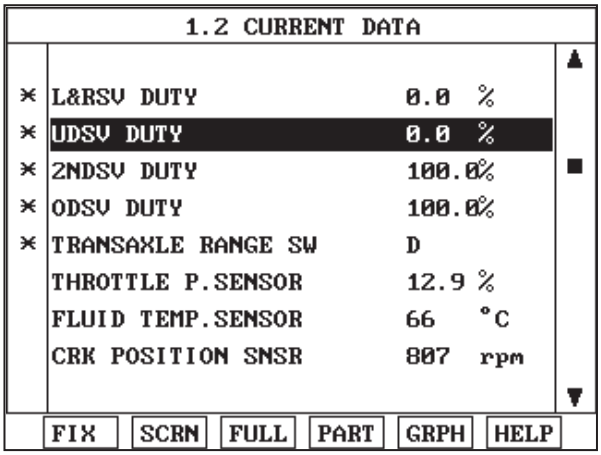
SPECIFICATION E43C44EC

Refer to DTC P0750

MONITOR SCANTOOL DATA E0211BE3

1. Connect scantool to data link connector(DLC)
2. Engine "ON".
3. Monitor the "UD SOL. VALVE" parameter on the scantool
4. Select "D" range and monitor "UD SOLENOID DUTY" is 0%

Specification: P/N → 100%, D → 0.0%



C0755_1

Does "UD SOLENOID DUTY " follow the referance data?

YES

▶ Fault is intermittent caused by poor contact in the sensor's and/or TCM(PCM)'s connector or was repaired and TCM(PCM) memory was not cleared. Throughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration or

NO

▶ Go to "W/Harness Inspection " procedure

TERMINAL & CONNECTOR INSPECTION ECE8308E

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.

Has a problem been found?

YES

▶ Repair as necessary and then go to "Verification of Vehicle Repair" procedure

NO

▶ Go to "Power Circuit Inspection" procedure

POWER SUPPLY CIRCUIT INSPECTION E7A1DE9D

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

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

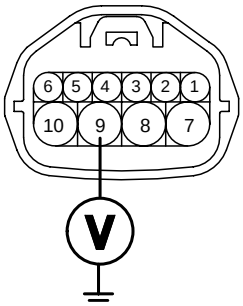
Is voltage within specifications?

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



ATM SOLENOID VALVE

C109(2.0 GAS)
C09(2.7 GAS)
C209(DSL)

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

EKQE034T

SIGNAL CIRCUIT INSPECTION E2A2A590

1. Check signal circuit open inspection

   1) Ignition "OFF".

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

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

Specification: approx. 0 Ω

Is resistance within specifications?

YES

▶ Go to "Check signal circuit short Inspection" procedure

NO

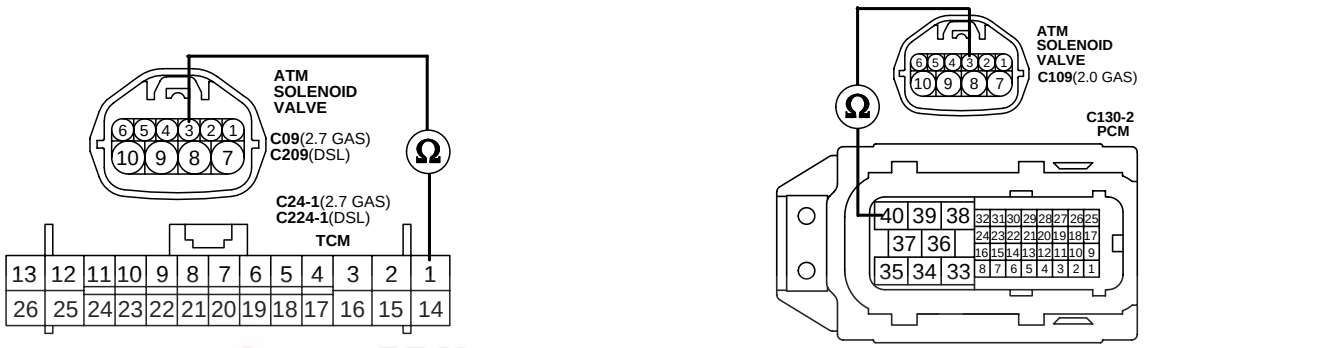
▶ Check for open in harness. Repair as necessary and Go to "Verification Vehicle Repair" procedure

[2.7L Gasoline or DIESEL]

3.UD solenoid valve 4.2ND solenoid valve 5.OD solenoid valve 6.LR solenoid valve 7.TCC solenoid valve 9.A/T battery 10.A/T battery
1.UD solenoid valve control 16.2ND solenoid valve control 14.OD solenoid valve control 15.TCC solenoid valve control

[2.0L Gasoline]

3.UD solenoid valve 4.2ND solenoid valve 5.OD solenoid valve 6.LR solenoid valve 7.TCC solenoid valve 9.A/T battery 10.A/T battery
40.UD solenoid valve control 39.2ND solenoid valve control 33.OD solenoid valve control 35.TCC solenoid valve control



EKQE631A

2. Check signal circuit short inspection

1) Ignition "OFF".

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

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

Specification: Infinite

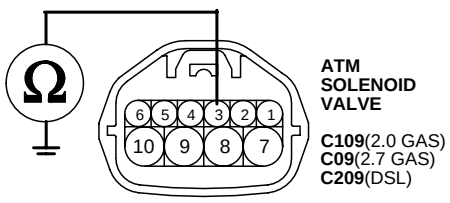
Is resistance within specifications?

YES

▶ Go to "Component Inspection" procedure

NO

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



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

EKQE031T

COMPONENT INSPECTION EFAFFB0A

1. CHECK SOLENOID VELVE

1) Ignition "OFF".

2) Disconnect "A/T SOLENOID VALVE" connector

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

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

Is resistance within specification?

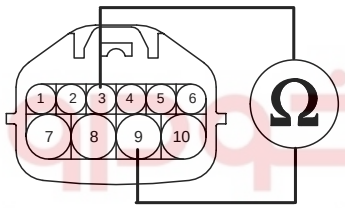
YES

▶ Go to "CHECK PCM/TCM" as below

NO

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

ATM SOLENOID VALVE (component side)



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

EKQE030T

2. CHECK PCM/TCM

1) Connect scantool to data link connector(DLC)

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

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

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

YES

▶ Go to "Verification Vehicle Repair" procedure

NO

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

ACTUATOR TEST CONDITION

Refer to DTC P0750

VERIFICATION OF VEHICLE REPAIR E5837FA7

Refer to DTC P0750

DTC P0760 SHIFT CONTROL SOLENOID VALVE C CIRCUIT MALFUNCTION

COMPONENT LOCATION EF17A7B6

Refer to DTC P0750

GENERAL DESCRIPTION EC2E5C21

Refer to DTC P0750

DTC DESCRIPTION E02CB23B

Refer to DTC P0750

DTC DETECTING CONDITION E3DBC03C

Item	Detecting Condition & Fail Safe	Possible cause
DTC Strategy	● Check voltage range	※ TORQUE CON-VERTER(DAMPER) CLUTCH : TCC ● Open or short in circuit ● Faulty 2nd SOLENOID VALVE ● Faulty PCM/TCM
Enable Conditions	● Solenoid status Either solid On or OFF ● Voltage of Battery ＞10V	
Threshold value	● Voltage ＜3V	
Diagnostic Time	● more than 320 ms	
Fail Safe	● Locked in 3 rd gear.(Control relay off)	

SPECIFICATION E7FDE74C

Refer to DTC P0750

MONITOR SCANTOOL DATA E305B5CF

1. Connect scantool to data link connector(DLC)
2. Engine "ON".
3. Monitor the "2nd SOL. VALVE" parameter on the scantool
4. Operate vehicle with 2ND gear and monitor "2ND SOLENOID DUTY" is 0%

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

FIG.1

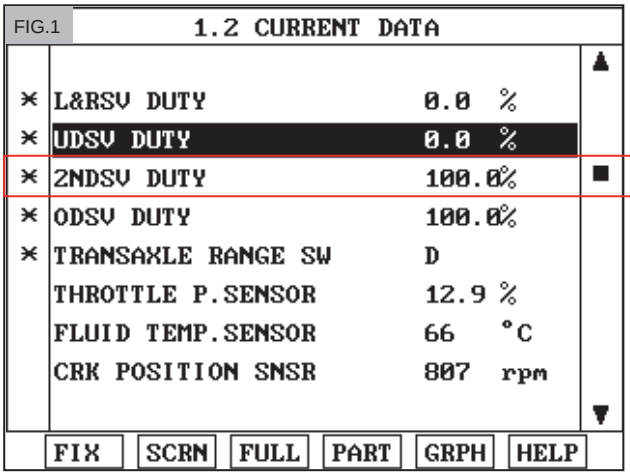


FIG.2

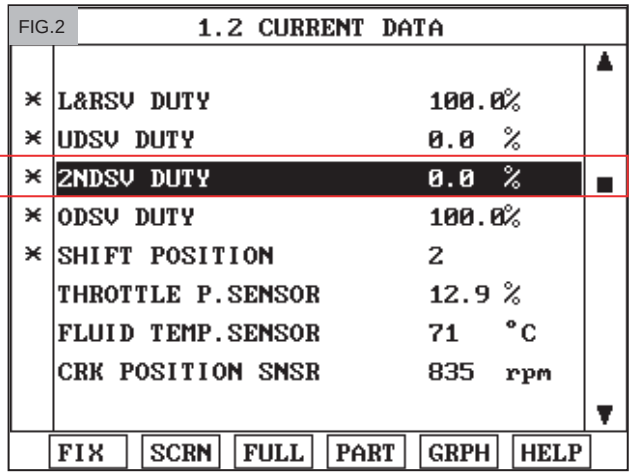


FIG 1) 1st gear
FIG 2) 2nd gear

EKQE632A

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

YES

▶ Fault is intermittent caused by poor contact in the sensor's and/or TCM(PCM)'s connector or was repaired and TCM(PCM) memory was not cleared. Throughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration or

NO

▶ Go to "W/Harness Inspection " procedure

TERMINAL & CONNECTOR INSPECTION E902FBD9

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.

   Has a problem been found?

   YES

   ▶ Repair as necessary and then go to "Verification of Vehicle Repair" procedure

   NO

   ▶ Go to "Power Circuit Inspection" procedure

POWER SUPPLY CIRCUIT INSPECTION ED7E8F6D

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

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

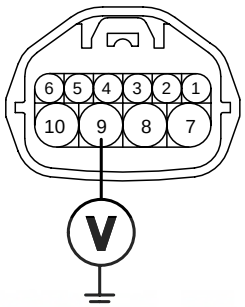
Is voltage within specifications?

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



ATM SOLENOID VALVE

C109(2.0 GAS)
C09(2.7 GAS)
C209(DSL)

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

EKQE034T

SIGNAL CIRCUIT INSPECTION EA0AAEEC

1. Check signal circuit open inspection

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

Specification: approx. 0 Ω

Is resistance within specifications?

YES

▶ Go to "Check signal circuit short Inspection" procedure

NO

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

[2.7L Gasoline or DIESEL]

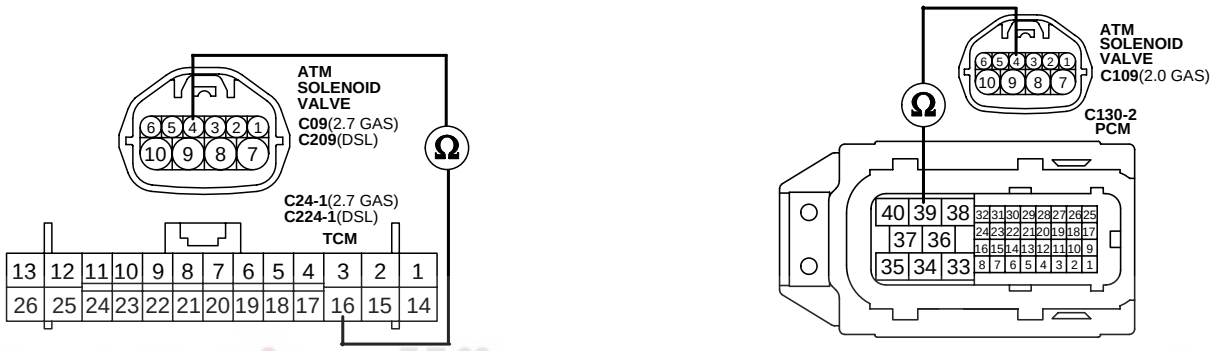
3.UD solenoid valve 4.2ND solenoid valve 5.OD solenoid valve 6.LR solenoid valve 7.TCC solenoid valve 9.A/T battery 10.A/T battery

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

[2.0L Gasoline]

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

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



EKQE615A

2. Check signal circuit short inspection

1) Ignition "OFF".

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

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

Specification: Infinite

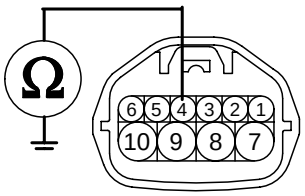
Is resistance within specifications?

YES

▶ Go to "Component Inspection" procedure

NO

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



ATM SOLENOID VALVE
C109(2.0 GAS)
C09(2.7 GAS)
C209(DSL)

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

EKQE021T

COMPONENT INSPECTION E99B775D

1. CHECK SOLENOID VELVE

   1) Ignition "OFF".

   2) Disconnect "A/T SOLENOID VALVE" connector

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

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

Is resistance within specification?

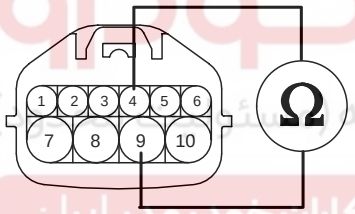
YES

▶ Go to "CHECK PCM/TCM" as below

NO

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

ATM SOLENOID VALVE (component side)



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

EKQE020T

2. CHECK PCM/TCM

   1) Connect scantool to data link connector(DLC)

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

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

   Can you hear operating sound for 2NDSOLENOID VALVE Actuator Testing Function ?

   YES

   ▶ Go to "Verification Vehicle Repair" procedure

   NO

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

   ACTUATOR TEST CONDITION

   Refer to DTC P0750

VERIFICATION OF VEHICLE REPAIR E15B75D3

Refer to DTC P0750

DTC P0765 SHIFT CONTROL SOLENOID VALVE D CIRCUIT MALFUNCTION

COMPONENT LOCATION E8B5D26F

Refer to DTC P0750

GENERAL DESCRIPTION EBD9F07F

Refer to DTC P0750

DTC DESCRIPTION EE79C7EC

Refer to DTC P0750

DTC DETECTING CONDITION ECEEADF4

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

SPECIFICATION E61CB2F7

Refer to DTC P0750

MONITOR SCANTOOL DATA E474B9AF

1. Connect scantool to data link connector(DLC)
2. Engine "ON".
3. Monitor the "OD SOL. VALVE" parameter on the scantool
4. Operate vehicle with 3rd gear and monitor "OD SOLENOID DUTY" is 0%

Specification: 1st gear → 100%, 3nd gear → 0.0%

FIG.1

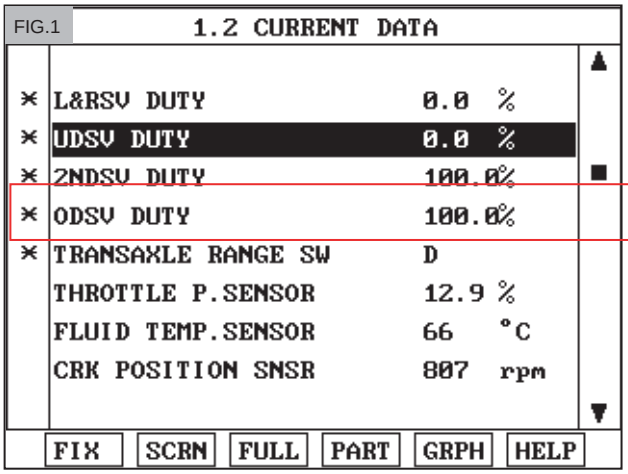


FIG.2

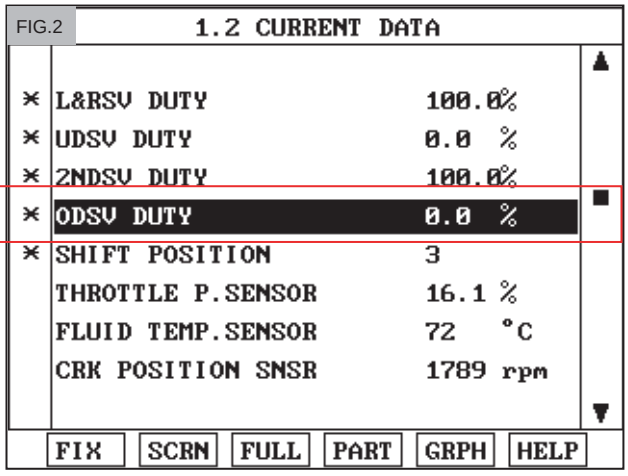


FIG 1) 1st gear
FIG 2) 3rd gear

EKQE616A

Does "OD SOLENOID DUTY " follow the referance data?

YES

▶ Fault is intermittent caused by poor contact in the sensor's and/or TCM(PCM)'s connector or was repaired and TCM(PCM) memory was not cleared. Throughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration or

NO

▶ Go to "W/Harness Inspection " procedure

TERMINAL & CONNECTOR INSPECTION E9F5EE04

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.

Has a problem been found?

YES

▶ Repair as necessary and then go to "Verification of Vehicle Repair" procedure

NO

▶ Go to "Power Circuit Inspection" procedure

POWER SUPPLY CIRCUIT INSPECTION E1C58D1A

1. Disconnect "A/T SOLENOID VALVE" connector.
2. Measure voltage between teminal"5" of the sensor harness connector and chassis ground.
3. Turn ignition switch OFF → ON

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

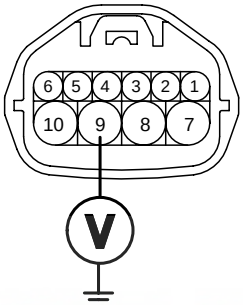
Is voltage within specifications?

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



ATM SOLENOID VALVE

C109(2.0 GAS)
C09(2.7 GAS)
C209(DSL)

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

EKQE034T

SIGNAL CIRCUIT INSPECTION EFBFE2B7

1. Check signal circuit open inspection

1) Ignition "OFF".
2) Disconnect "A/T SOLENOID VALVE" connector and "PCM/TCM" connector
3) Measure resistance between terminal "5" of the ATM SOLENOID VALVE harness connector and terminal "14" of the PCM/TCM harness connector

Specification: approx. 0 Ω

Is resistance within specifications?

YES

▶ Go to "Check signal circuit short Inspection" procedure

NO

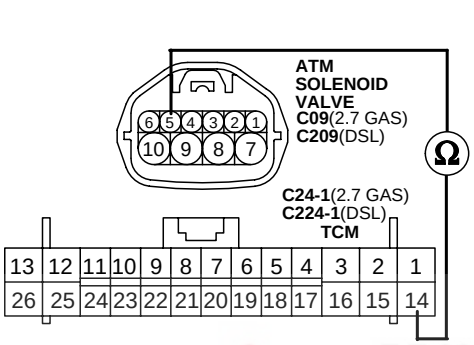
▶ Check for open in harness. Repair as necessary and Go to "Verification Vehicle Repair" procedure

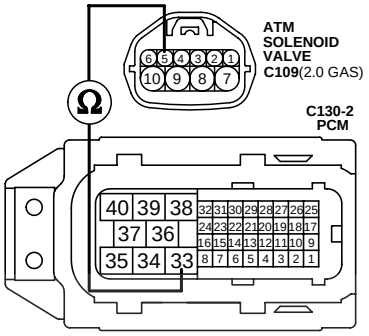
[2.7L Gasoline or DIESEL]

3.UD solenoid valve 4.2ND solenoid valve 5.OD solenoid valve 6.LR solenoid valve 7.TCC solenoid valve 9.A/T battery 10.A/T battery
1.UD solenoid valve control 16.2ND solenoid valve control 14.OD solenoid valve control 15.TCC solenoid valve control

[2.0L Gasoline]

3.UD solenoid valve 4.2ND solenoid valve 5.OD solenoid valve 6.LR solenoid valve 7.TCC solenoid valve 9.A/T battery 10.A/T battery
40.UD solenoid valve control 39.2ND solenoid valve control 33.OD solenoid valve control 35.TCC solenoid valve control





EKQE617A

2. Check signal circuit short inspection

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

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

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

Specification: Infinite

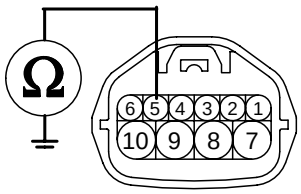
Is resistance within specifications?

YES

▶ Go to "Component Inspection" procedure

NO

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



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

EKQE023T

COMPONENT INSPECTION E2DB0026

1. CHECK SOLENOID VELVE

1) Ignition "OFF".

2) Disconnect "A/T SOLENOID VALVE" connector

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

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

Is resistance within specification?

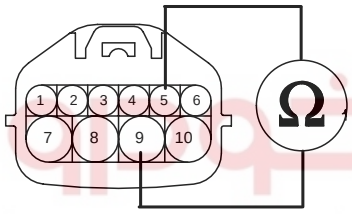
YES

▶ Go to "CHECK PCM/TCM" as below

NO

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

ATM SOLENOID VALVE
(component side)



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

EKQE049T

2. CHECK PCM/TCM

1) Connect scantool to data link connector(DLC)

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

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

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

YES

▶ Go to "Verification Vehicle Repair" procedure

NO

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

ACTUATOR TEST CONDITION

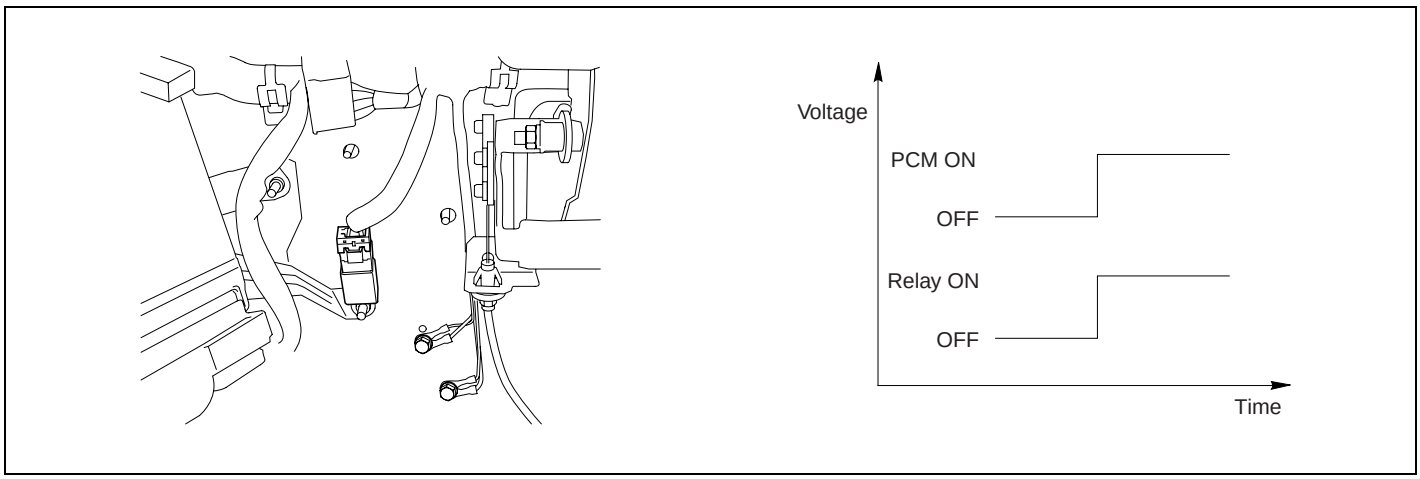
Refer to DTC P0750

VERIFICATION OF VEHICLE REPAIR E76CD7B1

Refer to DTC P0750

DTC P0885 A/T RELAY CIRCUIT MALFUNCTION

COMPONENT LOCATION EC502DCB



EKQE638A

GENERAL DESCRIPTION EEA7324D

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

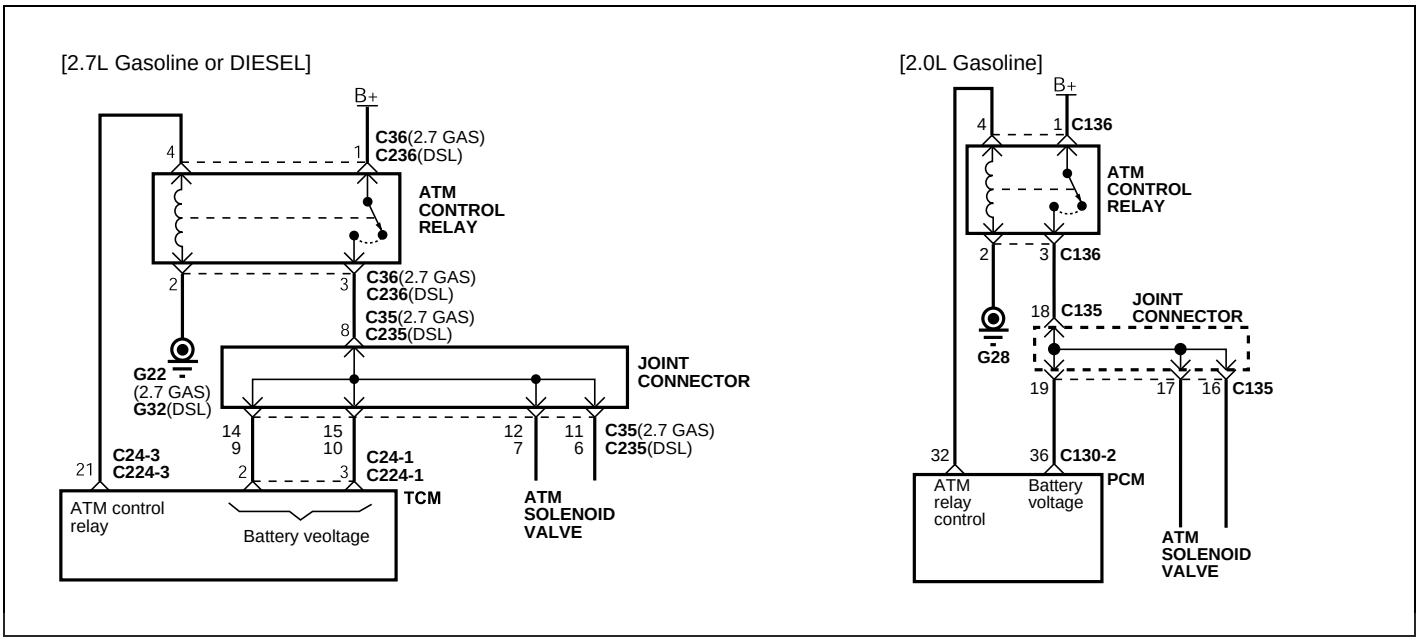
DTC DESCRIPTION EAB0604C

The TCM checks the A/T control relay signal by monitoring the contol 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 TCM sets this code.

DTC DETECTING CONDITION E541175F

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

SCHEMATIC DIAGRAM EBCF8D69

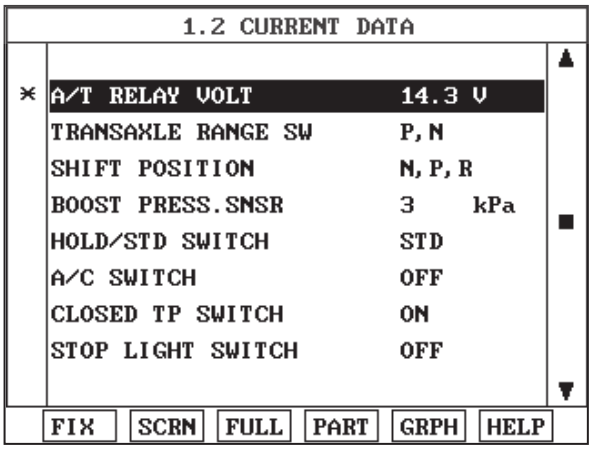


EKQE618A

MONITOR SCANTOOL DATA E912EBED

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+



C0885_1

Is A/T RELAY VOLT within specifications?

YES

▶ Fault is intermittent caused by poor contact in the sensor's and/or TCM(PCM)'s connector or was repaired and TCM(PCM) memory was not cleared. Throughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration or

NO

▶ Go to "W/Harness Inspection" procedure

TERMINAL & CONNECTOR INSPECTION EB4600EC

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.

   Has a problem been found?

YES

▶ Repair as necessary and then go to "Verification of Vehicle Repair" procedure

NO

▶ Go to "Power circuit inspection" procedure

POWER SUPPLY CIRCUIT INSPECTION EED66E89

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

Specification : Approx. B+

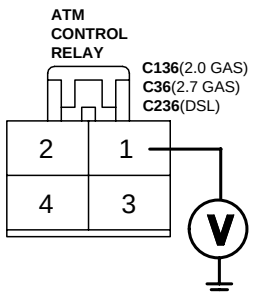
Is voltage within specifications?

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



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

EKQE052T

SIGNAL CIRCUIT INSPECTION E44C248F

1. CHECK A/T control relay harness

1) Ignition "OFF".

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

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

4) Turn ignition switch OFF → ON

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

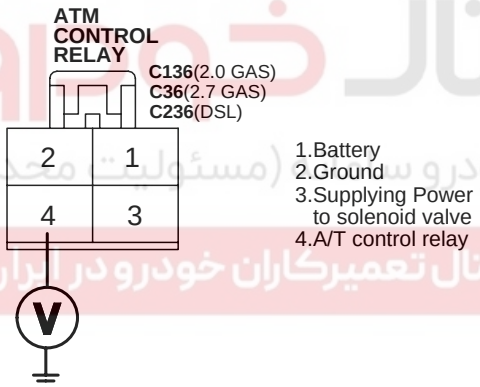
Is voltage within specifications?

YES

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

NO

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



EKQE059T

2. CHECK Supplying Power to solenoid valve harness

1) Ignition "OFF".

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

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

Specification : Approx. 0 Ω

Is resistance within specifications?

YES

▶ Go to "Ground circuit inspection" procedure

NO

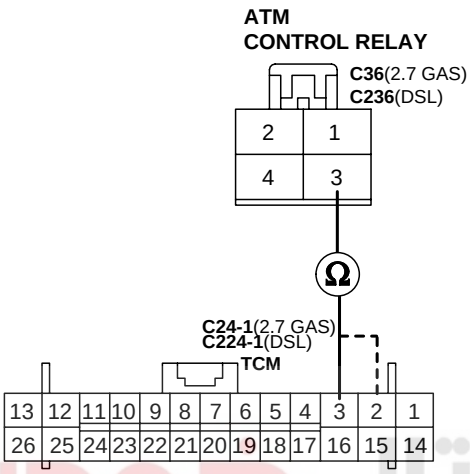
▶ Check for Open in C-41 joint connector
▶ Check for open in harness. Repair as necessary and Go to "Verification Vehicle Repair" procedure

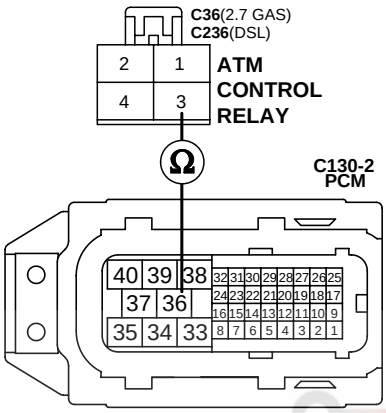
[2.7L Gasoline or DIESEL]

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

[2.0L Gasoline]

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





EKQE633A

GROUND CIRCUIT INSPECTION EEFA4292

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

Specification : Approx. 0 Ω

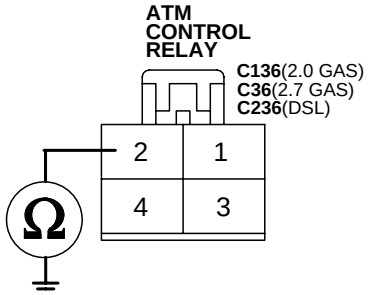
Is resistance within specifications?

YES

▶ Go to "Component inspection" procedure

NO

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



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

EKQE087T

COMPONENT INSPECTION E1BCE091

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

Specification:

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

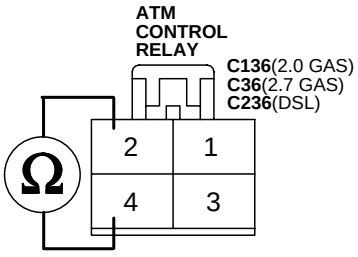
Is resistance with in specification?

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.



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

EKQE083T

VERIFICATION OF VEHICLE REPAIR E63C27A6

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.

   Are any DTCs present ?

   YES

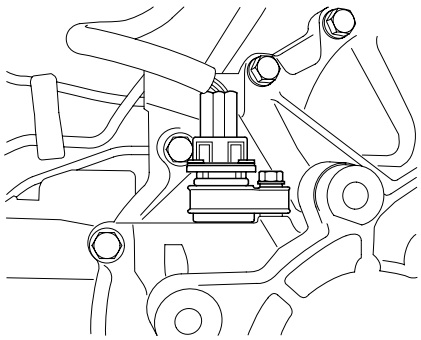
   ▶ Go to the applicable troubleshooting procedure.

   NO

   ▶ System performing to specification at this time.

DTC P1500 VEHICLE SPEED SENSOR

COMPONENT LOCATION E222FDAE



EFKD136A

GENERAL DESCRIPTION EF0D8B2C

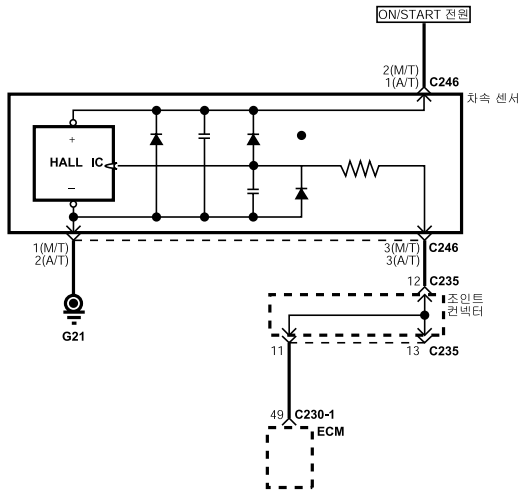
A vehicle speed sensor informs the ECM whether the vehicle is moving or not as well as whether the vehicle speed is high or not.
The ECM controls injection, ignition, shifting and torque converter clutch timing with this sensor signal.

DTC DETECTING CONDITION EC3FBABB

Item	Detecting Condition & Fail Safe	Possible Cause
DTC Strategy	● -	• Vehicle speed sensor circuit. • Vehicle speed sensor.
Enable Conditions	● Vehicle speed from the sensor ＞= 30㎞/h	
Threshold Value	● No Signal	
Diagnostic Time	● More than 30 seconds	
Fail safe	● -	

SCHEMATIC DIAGRAM EFC06E3E

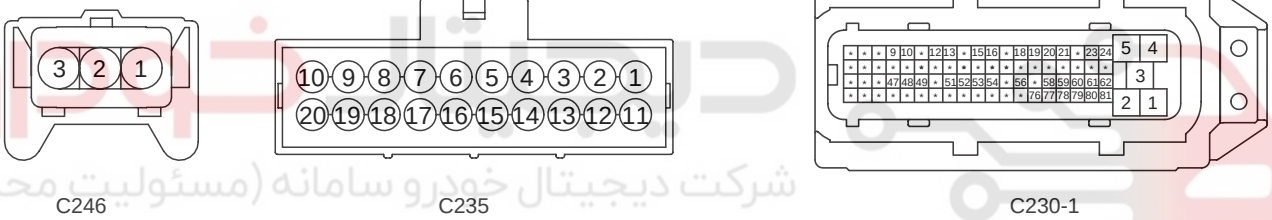
[CIRCUIT DIAGRAM]



[CONNECTION INFORMATION] (A/T)

Terminal	Connection	Function
1	C233 NO. 2	Joint connector - power
2	G21	Ground
3	C235 NO.12	Joint connector - ECM

[HARNESS CONNECTORS]



C246 C235 C230-1

EKQE619A

WAVEFORM INSPECTION ECC73447

1. IG KEY ON, Engine RUN
2. Vehicle sensor connector: Connect.
3. Monitor the vehicle speed sensor signal from the terminal 3.
4. Does "CAN BUS LINE DATA " follow the referance data?

MONITOR SCANTOOL DATA E7845BCA

1. Service data mode: check for vehicle speed sensor data while the engine speed varies.
2. Measure the data during driving or rotating the wheels with a lifted up state.

TERMINAL & CONNECTOR INSPECTION EB17F0CF

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.

   Has a problem been found?

YES

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

NO

▶ Go to the next procedure.

POWER SUPPLY CIRCUIT INSPECTION EE2ECED4

1. Power supply circuit inspection

   1) Vehicle speed sensor connector: Disconnect.

   2) IG KEY ON, ENG OFF.

   3) Measure the voltage of the termianl 1.

Specification : Approx. B+

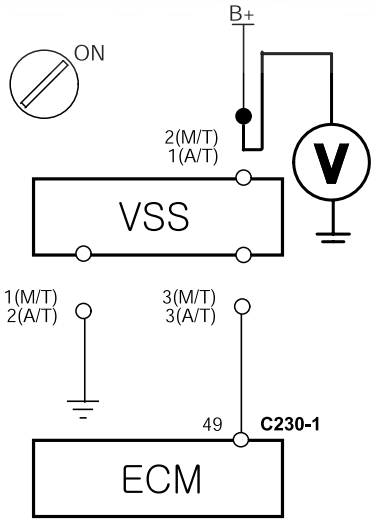
Is voltage within specifications?

YES

▶ Go to "Ground circuit inspection" procedure.

NO

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



KKQE029T

GROUND CIRCUIT INSPECTION E32DA5DD

1. Ground circuit inspection

   1) IG KEY OFF

   2) Vehicle speed sensor connector: Disconnect.

   3) Measure resistance between terminal ground of vehicle speed sensor harness connector and terminal ground of PCM(or TCM) connector.

Specification : Approx. 0Ω

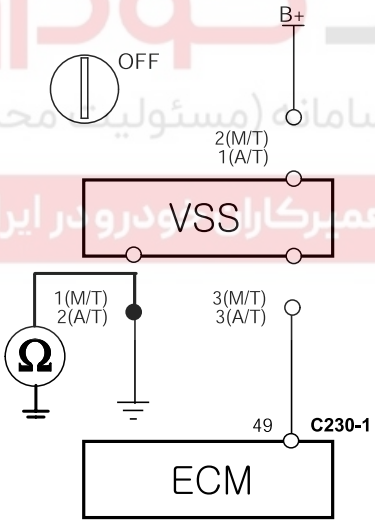
Is resistance within specifications?

YES

▶ Check for the signal circuit.

NO

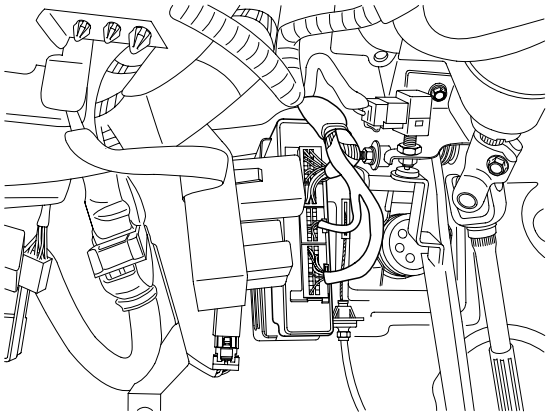
▶ Check for Open or short in harness. Repair as necessary.



KKQE030T

DTC P1603 CAN COMMUNICATION BUS OFF

COMPONENT LOCATION E6EBB268



KKQE001D

GENERAL DESCRIPTION E4B3BF70

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

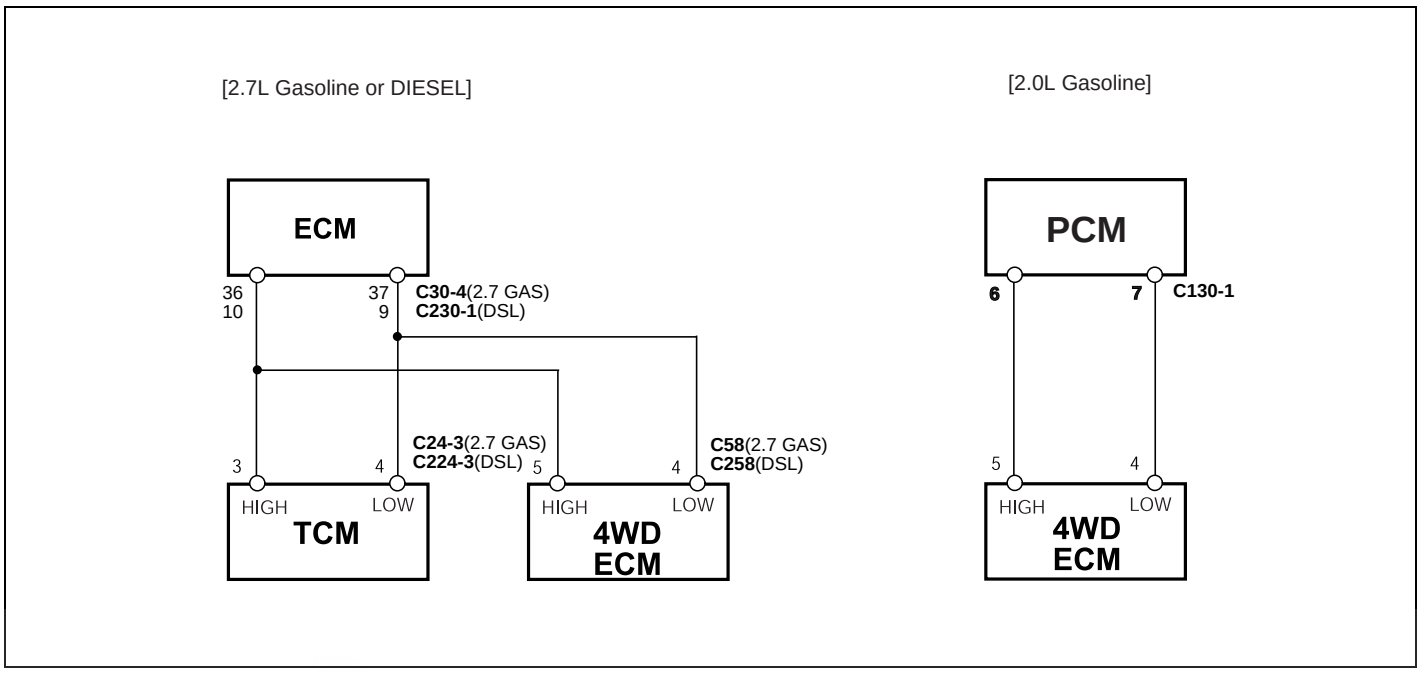
DTC DESCRIPTION E9CC7EE5

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

DTC DETECTING CONDITION E1037D8B

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

SCHEMATIC DIAGRAM EF7EDBFF



EKQE620A

MONITOR SCANTOOL DATA E20A9AF7

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

FIG.1

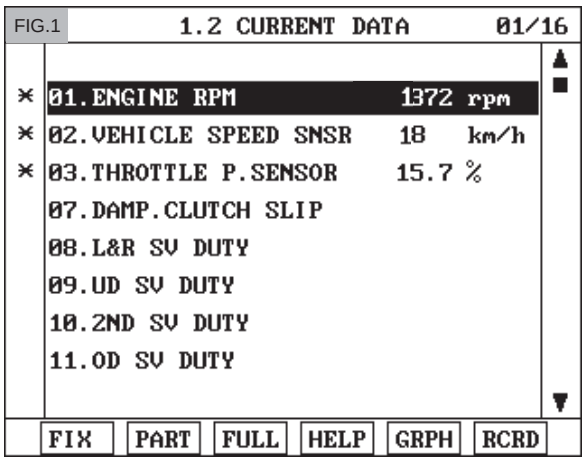


FIG.2

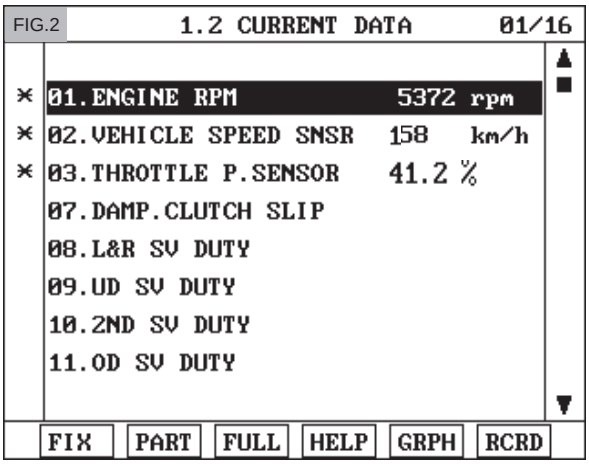


FIG.1) Low-speed
FIG.2) High-speed

EKQE621A

Does "CAN BUS LINE DATA " follow the referance data?

YES

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

NO

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

VERIFICATION OF VEHICLE REPAIR E7B1CE0B

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 P1604 NO ID FROM ECM

COMPONENT LOCATION ECA8A512

Refer to DTC P1603.

GENERAL DESCRIPTION E655BBBD

Refer to DTC P1603.

DTC DESCRIPTION ECBDC92E

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

DTC DETECTING CONDITION EF27F7CB

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

MONITOR SCANTOOL DATA EB9E85C0

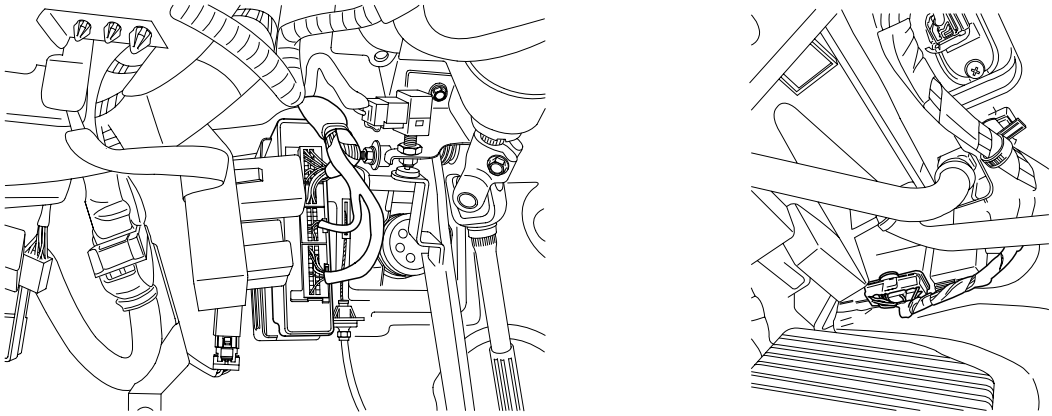
Refer to DTC P1603.

VERIFICATION OF VEHICLE REPAIR EFE1E246

Refer to DTC P1603.

DTC P1764 TCU CAN MI-COM MALFUNCTION

COMPONENT LOCATION E2F40A55



EKQE640A

GENERAL DESCRIPTION E8AD5E50

A communication line exists between the Engine Control Module(ECM) and the Transaxle Control Module(TCM). The communication is through a Control Area Network(CAN). Without CAN communication, an independent pin and wiring is needed to receive a sensor information from a ECM. The more information to be communicated, the more wirings is required. In case of CAN communication type, all the information need to be communicated among control modules such as ECM and TCM use CAN lines.

DTC DESCRIPTION E4A22C6A

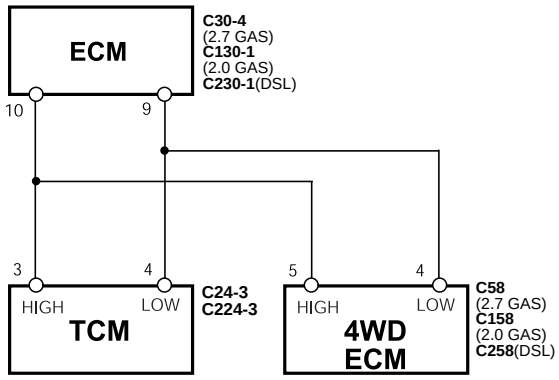
After clearing the DTC, check the malfunction of TCM and 4WD ECM, if the DTC sets again. This code may set if there is no signal to 4WD ECM.

DTC DETECTING CONDITION EE4F4BE3

Item	Detecting Condition & Fail Safe	Possible Cause
DTC Strategy	● ECU-ITM Communication Line, or ECU side malfunction	• ECM, 4WD ECM connector looseness and poor terminal to wire connection. • CAN HIGH/LOW circuit open/short. • ECM malfunction. • 4WD ECM malfunction.
Enable Conditions	● IG SW ON ● No actuator test ● No holding ● No fail in input/output speed sensors ● Battery voltage ≥ 10V ● Engine speed > Approx. 260 rpm	
Threshold Value	● Loss of Signal	
Diagnostic Time	● 1 Sec.	
Fail safe	● COMMUNICATION : STOP TCM transmitting ● LOGIC : NO INTELLIGENT SHIFT, NO hydraulic control learning, NO TORQUE RETARD	

SCHEMATIC DIAGRAM E17BEAE2

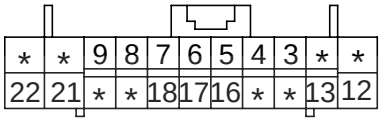
[CIRCUIT DIAGRAM]



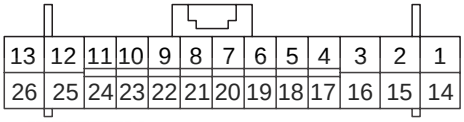
[CONNECTION INFORMATION]

Terminal	Connection	Function
NO.10	NO.3	CAN (HIGH)
	NO.5	
NO.9	NO.4	CAN (LOW)
	NO.4	

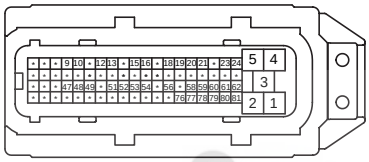
[HARNESS CONNECTORS]



TCM C24-3 or C224-3



4WD ECM C58 or C158 or C258

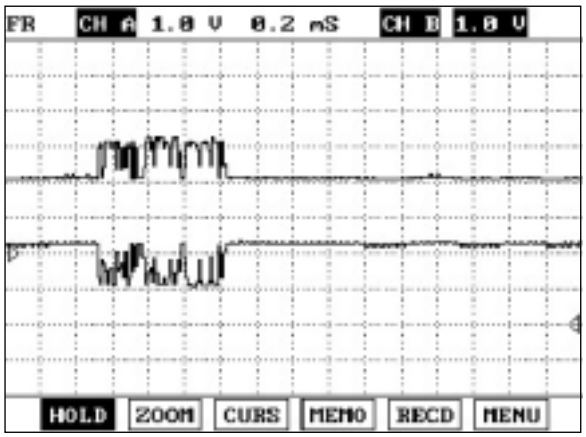


ECM C230-1 or C30-4

EKQE629A

WAVEFORM INSPECTION EAE7D8A8

1. IG KEY ON, ENG ON
2. TCM or 4WD ECM connector : Connect.
3. Monitor signal waveform between terminal 3 & 4 of TCM harness connector and chassis ground.



[CAUTION]The above value is just for reference. The actual value may differ from it according to various engine condition.

P1726_1

MONITOR SCANTOOL DATA E6DCBDBF

When the DTCs related to CAN communication set, use the sensor data(TCM side) to check for the ECM & TCM's communication conditon. Check the data such as the engine RPM and the throttle position sensor at idle in order to inspect the signal between ECM and TCM.

TERMINAL & CONNECTOR INSPECTION EBC81C25

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.

Has a problem been found?

YES

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

NO

▶ Go to the next procedure.

COMPONENT INSPECTION E7E2CAB4

1. TCM component inspection

1) IG KEY OFF, ENG OFF

2) Measure resistance between the terminal 3 and 4 with the specification below.

Specification: Without TCS, 4WD system
※ ECM connector and TCM connector: Connect -＞ 60Ω ± 1Ω
※ ECM connector: Disconnect and TCM connector: Connect -＞120Ω ± 2Ω
※ ECM connector: Connect and TCM connector: Disconnect -＞120Ω ± 2Ω

Specification: With TCS, 4WD system
※ ECM connector and TCM connector: Connect -＞120Ω ± 2Ω

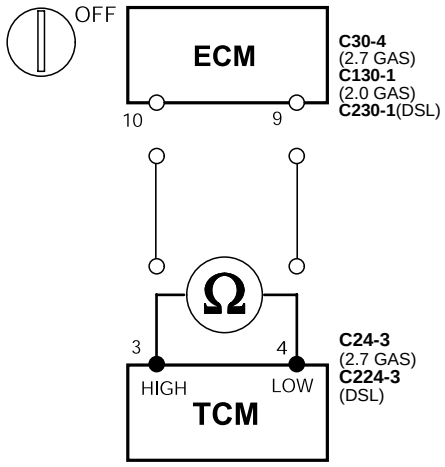
Is resistance display near the specified value?

YES

▶ Check if ECM-TCM communication line is short to ground.

NO

▶ Check if ECM-TCM communication line is open.



EKQE024T

2. ECM waveform inspection

1) IG KEY OFF, ENG OFF

2) TCM connector: Disconnect.

3) Connect the terminal 3 and 4 of TCM connector to a scan tool.

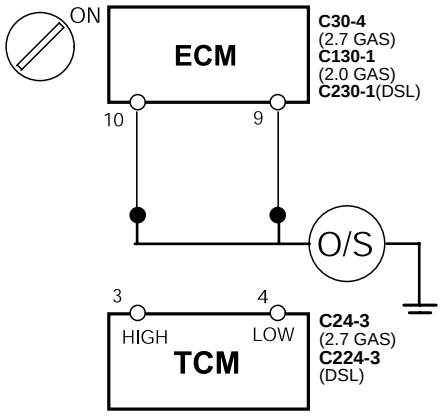
4) IG KEY ON
Is CAN Signal display near the specified value?

YES

▶ Inspect TCM waveform.

NO

▶ ECM communication signal malfunction - replace ECM.
▶ After checking 4WD ECM circuit, if any malfunctino is detected, replace 4WD ECM.



EKQE027T

3. TCM waveform inspection

1) IG KEY OFF, ENG OFF

2) ECM connector: Disconnect.

3) Connect the terminal 9 and 10 of ECM connector to a scan tool.

4) IG KEY ON
Is CAN Signal display near the specified value?

YES

▶ TCM is in a normal condition.

NO

▶ TCM communication signal malfunction - replace TCM.
▶ After checking 4WD ECM circuit, if any malfunctino is detected, replace 4WD ECM.

SIGNAL CIRCUIT INSPECTION E272FF39

1. ECM-TCM communication line open inspection

1) IG KEY OFF, ENG OFF

2) ECM connector and TCM connector: Disconnect.

3) Measure resistance between terminals 10 of the ECM harness connector and 3 of the TCM harness connector.
Measure resistance between terminals 9 of the ECM harness connector and 4 of the TCM harness connector.

Specification : Approx. 0Ω

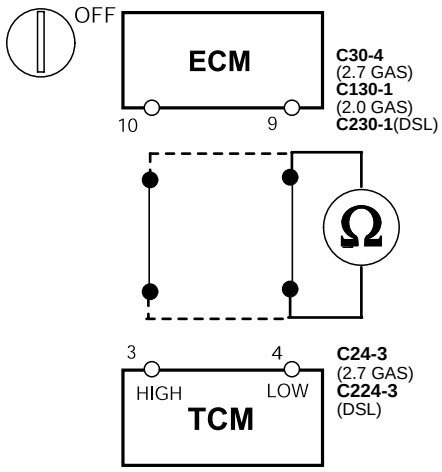
Is resistance display near the specified value?

YES

▶ Check if ECM-TCM communication line is short.

NO

▶ Repair open circuit of CAN Low comm. Line.



EKQE025T

GROUND CIRCUIT INSPECTION E87AD54A

1. ECM-TCM communication line short to ground inspection

   1) IG KEY OFF, ENG OFF

   2) TCM connector, ECM connector, 4WD ECM connector and TCS(or ESP) connector: Disconnect.

   3) Measure resistance between terminal 4 of TCM harness connector and chassis ground.

   4) Measure resistance between terminal 3 of TCM harness connector and chassis ground.

Specification : Approx. ∞Ω

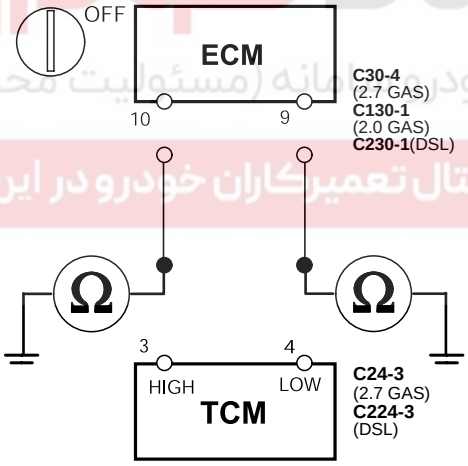
Is resistance display near the specified value?

YES

▶ Go to the "Component inspection".

NO

▶ Repair ground to short circuit of CAN Low comm. Line.
▶ If problem is solved, go to the "Verification of Vehicle Repair".

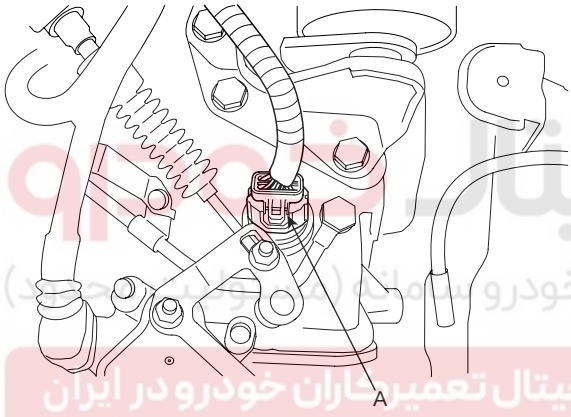


EKQE026T

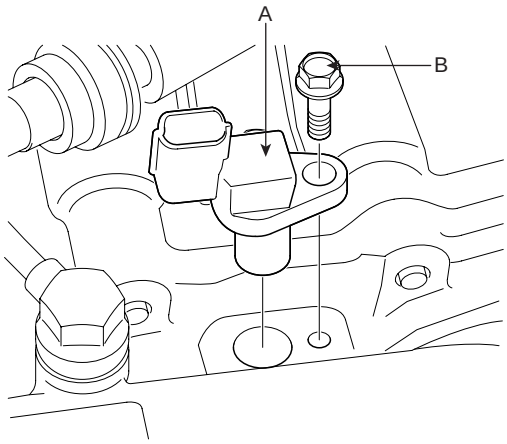
AUTOMATIC TRANSAXLE

REMOVAL E26D9F59

1. Remove the air duct.
2. Remove the battery.
3. Remove the battery tray.
4. Remove the air cleaner assemblt.
5. Rmove the intercooler inlet pipe.
6. Disconnect the connectors relevant to a transaxle.

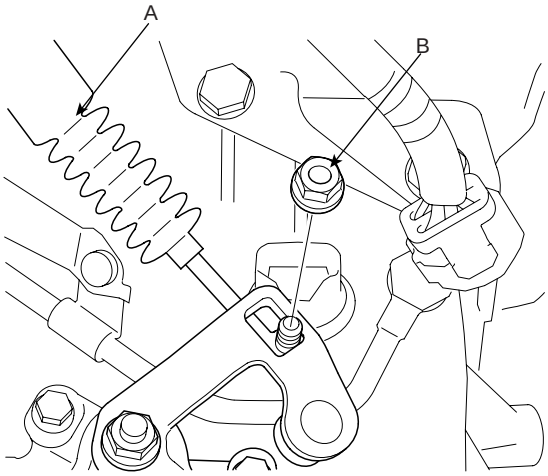


EKKD107A



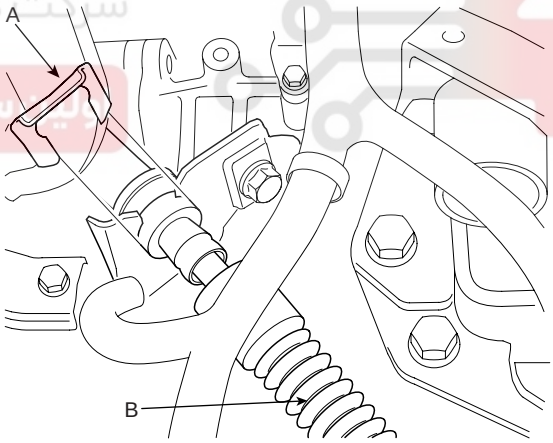
EKKD147A

7. Disconnect the ground earth wire.
8. Remove the bolt(B) which mounts the clutch release cylinder(A) to the inhibiter switch.



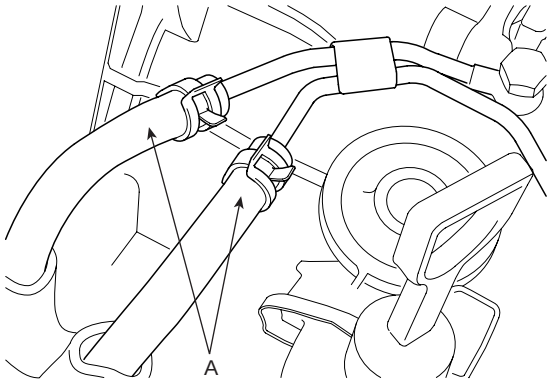
EKKD109A

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



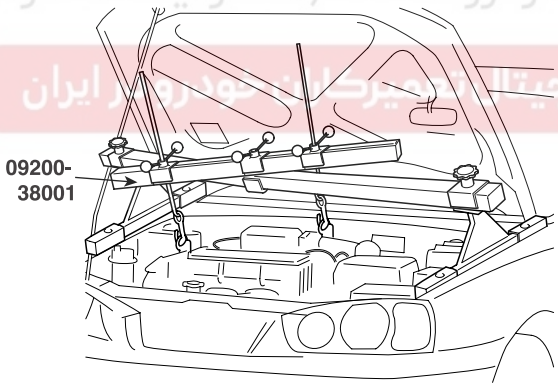
EKKD110A

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



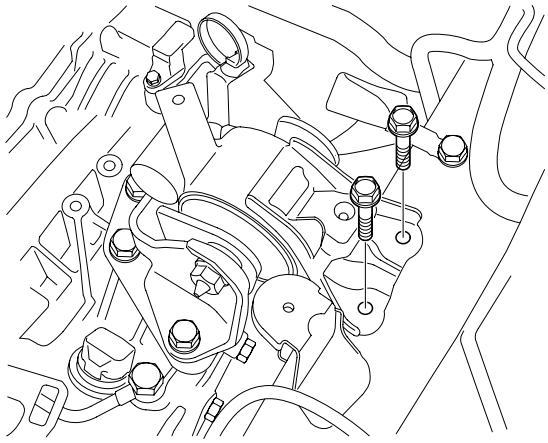
EKKD114A

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

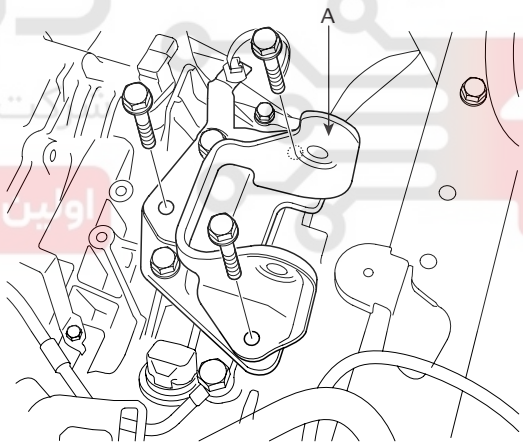


KKQE057C

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

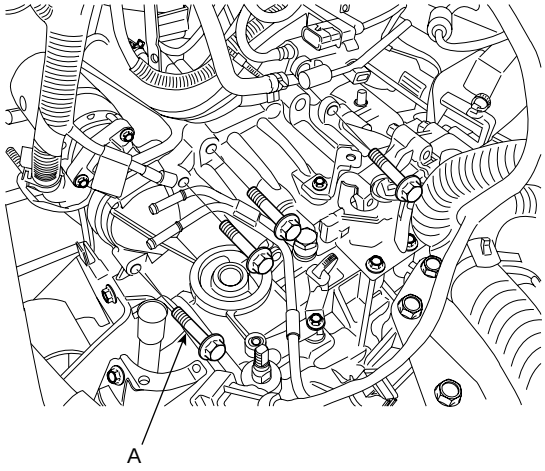


EKKD120A



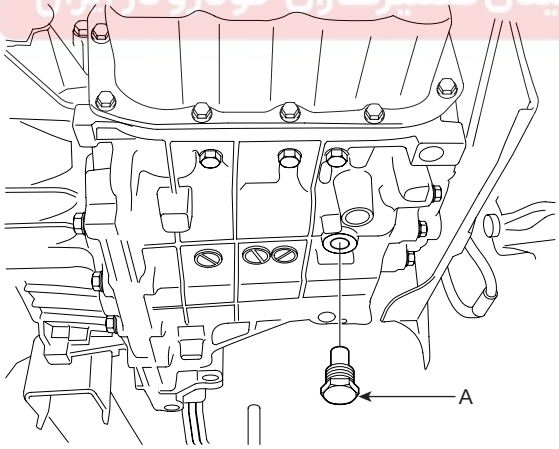
EKKD123A

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



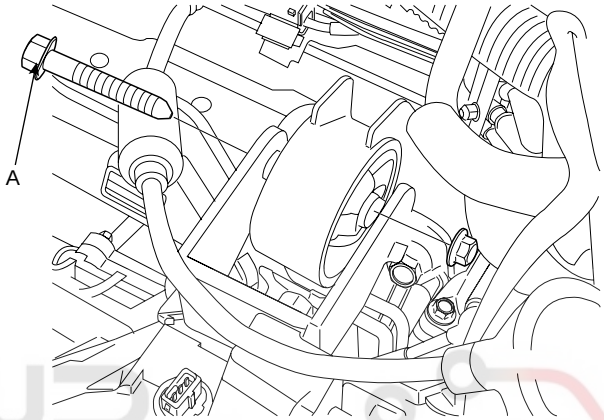
KKQE004A

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



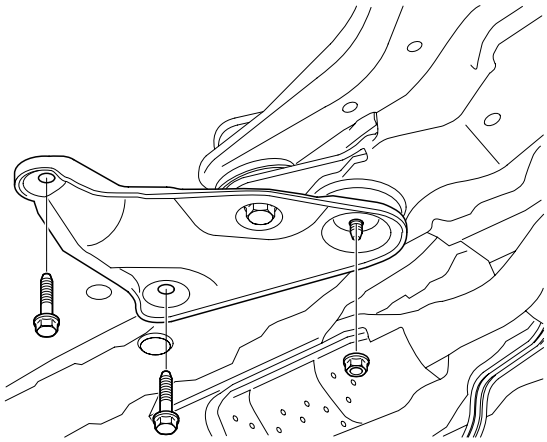
EKKD126A

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

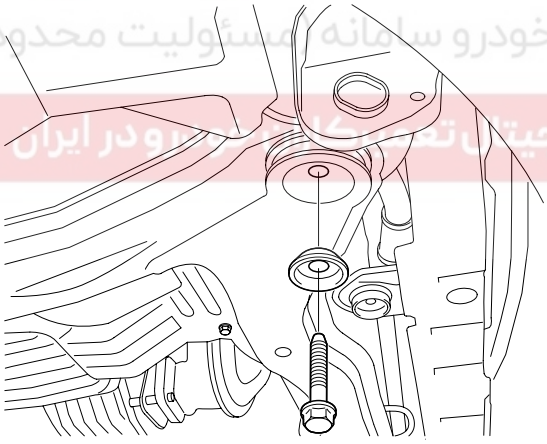


KKQE005A

21. Remove the sub-frame. If it is 4 wheel 1 drive vehile(4WD), remove the propeller shaft first(See 'DS' group-'PROPELLER SHAFT').



EKKD138A



EKKD139A

22. Remove the transaxle lower mounting bolts.

23. Remove the transaxle assembly.

INSTALLATION E8D3656F

1. Installation is in the reverse order of removal.

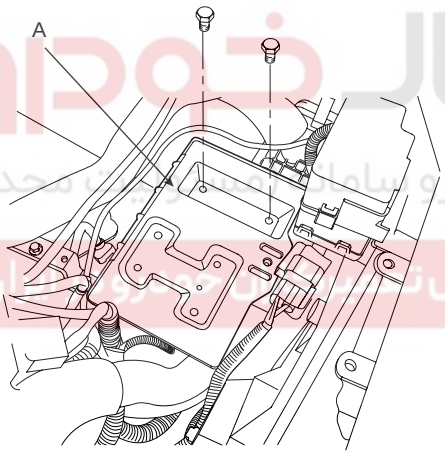
AUTOMATIC TRANSAXLE CONTROL SYSTEM

SERVICE ADJUSTMENT PROCEDURE EABEECCB

INHIDITER SWITCH

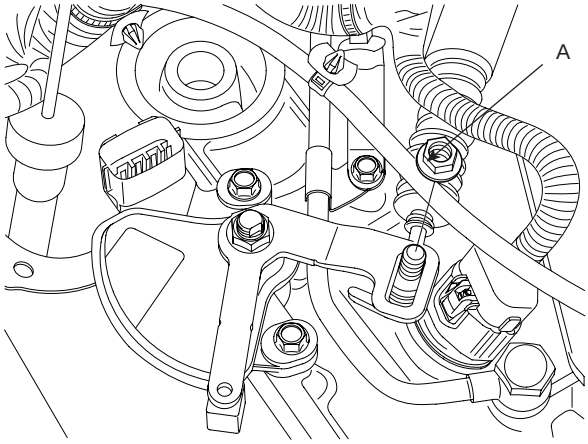
REPLACEMENT

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



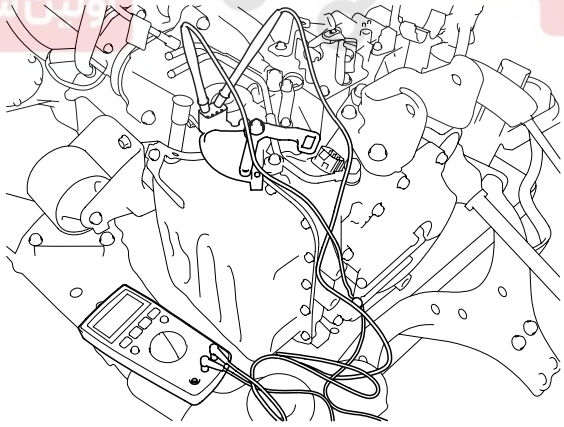
KKQE014Z

6. Remove the inhibiter switch connector.
7. Remove the shift cable mounting nut(A).



KKQE010A

8. Remove the inhibiter switch loosening the mounting bolts.
9. Refering to 'INSPECTION', check for continuity. If there is an error, replace the inhibiter switch.

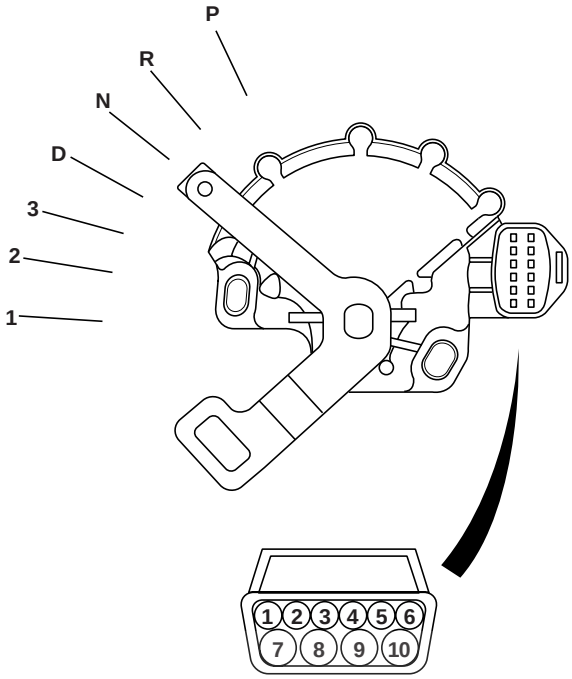


KKQE011A

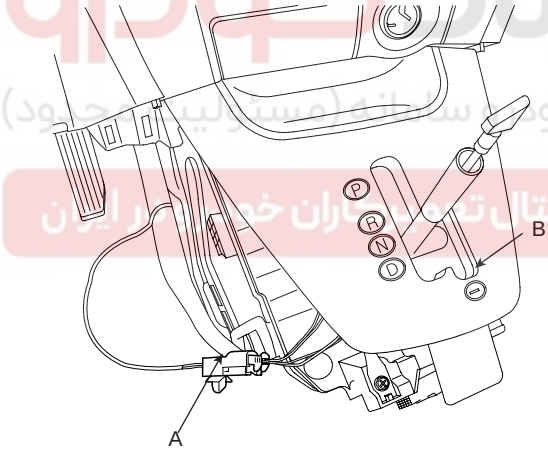
10. After tightening the shift cable mounting nut, connect the inhibiter switch.
11. Install the batterty, battery tray and the air cleaner assembly.

INSPECTION

1. Check for the starter motor when the ignition swith is at 'START' position and th shift lever at 'P' or 'N' range.
2. Check for the rear lamp when the ignition swith if it does not work porperly.
3. Check for the inhibiter switch if it does not work properly.
4. If the inhibiter switch is not fixed in a proper position, reassemble it in the right position.
5. Re-check 1 and 2 procedures.
6. Using a scan tool, confirm the DTCs.
7. Disconnect the battery (-) terminal and the inhibiter switch.
8. Check for continuity between terminals at the switch connector.



KFW9008A



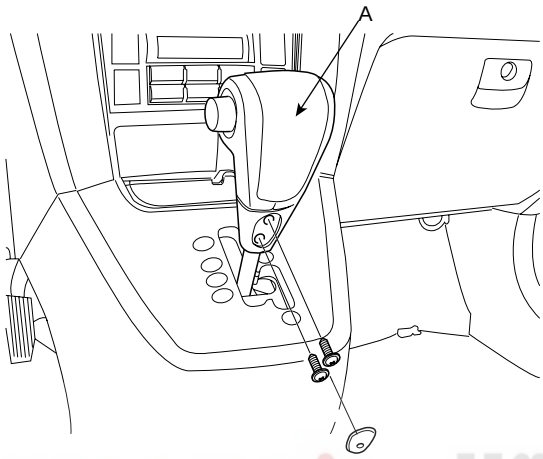
KKQE008A

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

SHIFT LEVER

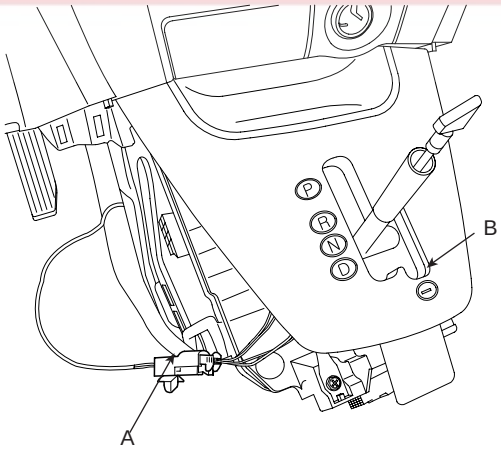
REMOVAL E5CA11DB

1. Remove the shift lever knob(A).



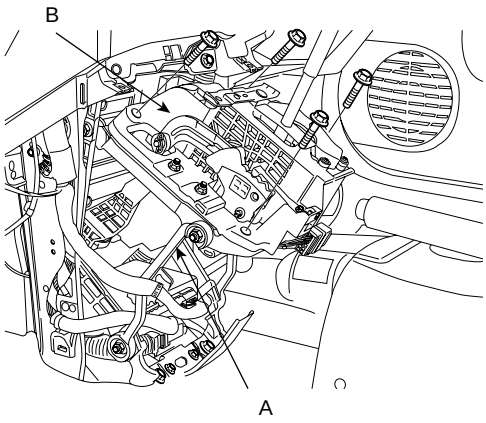
KKQE009A

2. Remove the console cover(B), disconnecting the shift lever connector(A).



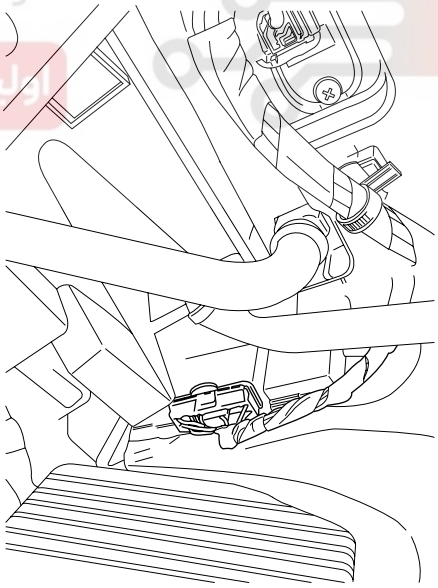
KKQE008A

3. Seperate the lever assembly(B) from the facia bracket assembly(A).



KKQE007A

4. Disconnect the cable interlinked to lever assembly.
5. In case of 4WD vehivle, discconnect the 4WD ECM connector(A).



KKQE006A

6. Remove the facia bracket assembly.

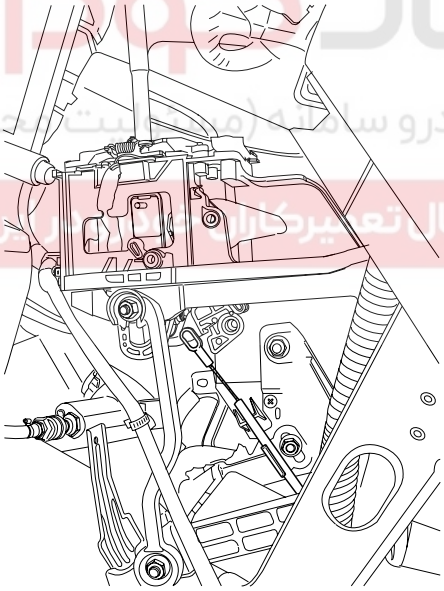
INSPECTION EDD836E7

CHECK POINTS OF SHIFT LOCK SYSTEM

1. With shift lever at P position and brake pedal not depressed. Push button cannot be operated. (Shift lever cannot be shifted to other positions from P) Push button can be operated at the positions except P.
2. With IG key at the position other than "LOCK" (May be at "ACC") and brake pedal stroke 15~25mm (With shift lever at P position). Push button can be operated and shift lever can be shifted smoothly to other from P.
3. With brake pedal not depressed. Shift lever can be shifted smoothly to "P" positions from other positions.
4. Brake pedal must be operated smoothly without catching at all positions.

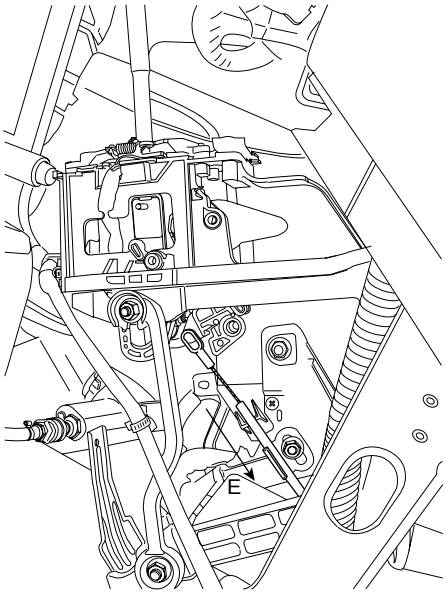
ADJUSTING PROCEDURE FOR "P" SHIFT LOCK CABLE

1. Check that each lock cam is shown below.



KKQE001A

2. Install shift lock cable in position according to this DWG. In this case, shift lock cable must be fixed to brake pedal in position.
3. Temporarily install shift lock cable to A/T lever assy as shown below. Securely insert cable end into fixing point of shift lock cam.

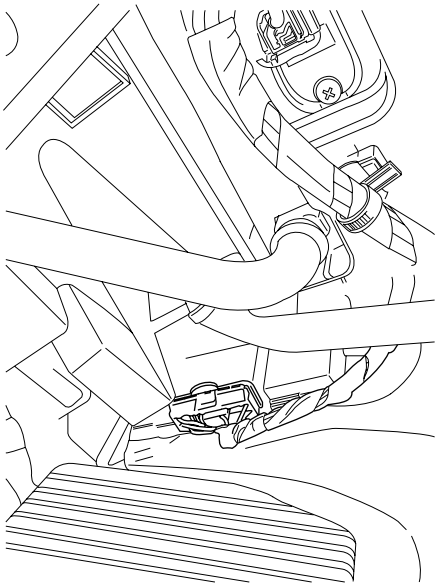


KKQE001Z

4. Doing the work of 3. slightly pull outer casing of shift lock cable to direction "E" to stretch cable. In this case, shift lock cam must not move.
5. After checking portion of cable end touches cable fixing pin of shift lock cam. Fix outer casing with a nut.
6. Check the installation condition of the shift lock cam.

INSTALLATION E05ADFDE

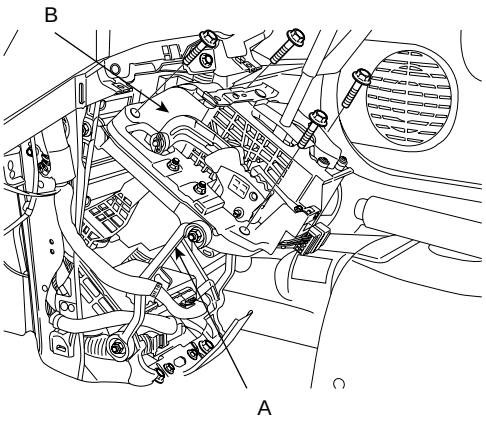
1. Install the facia bracket assembly.
2. In case of 4WD vehicle, connect the 4WD ECM connector(A).



KKQE006A

3. Connect the cable interlinked to lever assembly.

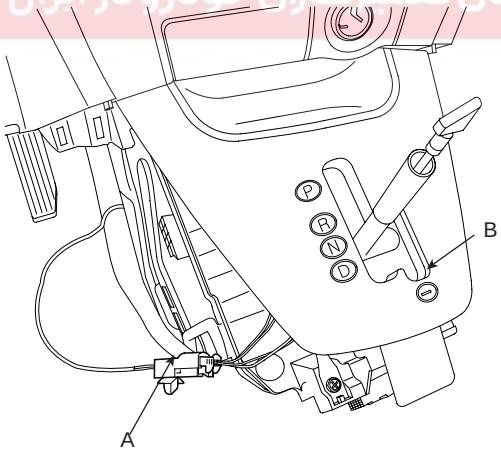
4. Install the lever assembly(B) to the facia bracket assembly(A).



KKQE007A

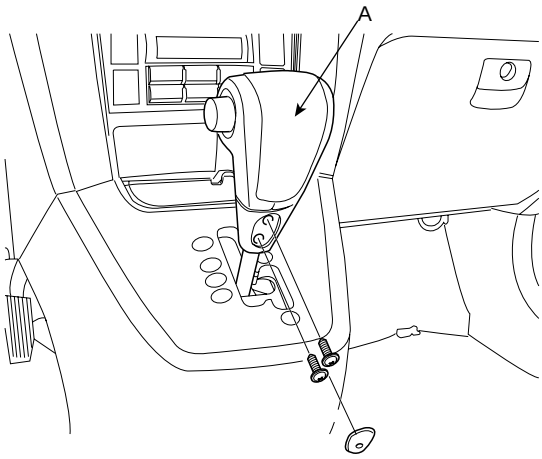
5. Install the console cover(B) fixing the shift lever connector(A) on it.

6. Install the lever conver(B) completely connecting the terminals.



KKQE008A

7. Install the shift lever knob(A).



KKQE009A