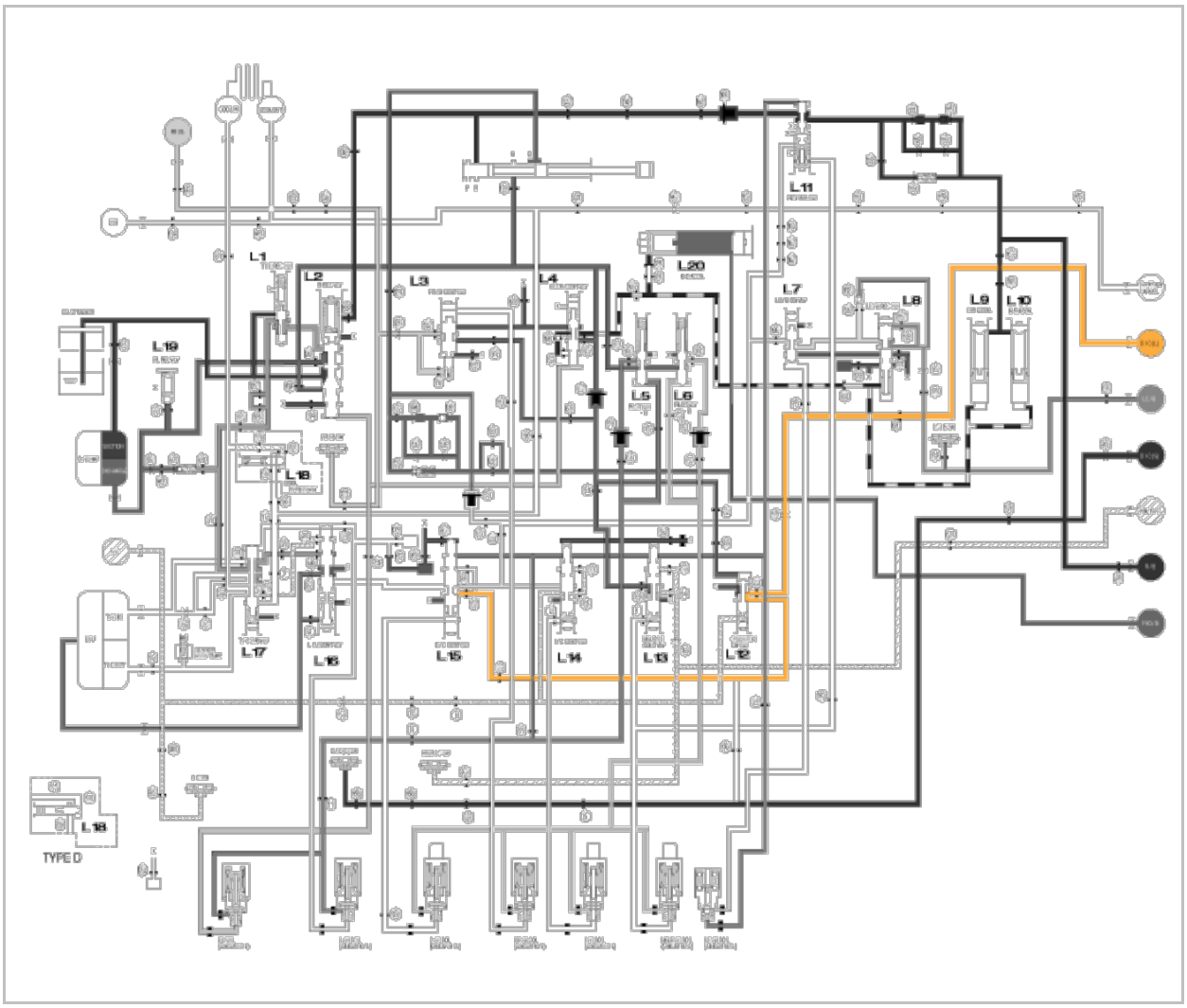
Automatic Transaxle System > General Information > Specifications (A5SR2)

SPECIFICATION

Type			A5SR1	A5SR2
Driving system			2WD/ 4WD	
T/CON	Type		3 elements, 1 stage, 2 phase	
	Identification inscription [Nominal diameter (mm)]		8 (Φ250)	8 (Φ260)
	Stall torque ratio		1.76	1.84
Transmission	Manipulating system		Remote control flow transmission (Cable method)	
	Shift position	P	Fix output axle (Engine start allowed)	
		R	Reverse	
		N	Neutral (Engine start allowed)	
		D	1↔2↔3↔4↔5	
	Gear ratio	1st	3.827	
		2nd	2.368	
		3rd	1.520	
		4th	1.000	
		5th	0.834	
		Reverse	2.613	
		Final gear ratio	3.333	
	Control method		Electronic control	
	Function	Lock-up control	Equipped	
		Operating fluid pressure control	Equipped	
		Real time feedback transmission control	Equipped	
		Transmission pattern auto change control	Equipped	
		Self-diagnosis control	Equipped	
		Fail-safe function	Equipped	
		Sports mode function	Equipped	
	Speedometer gear teeth (drive/driven)		6/14	
	Oil pump	Type	Trochoid oil pump	
		Driving system	Engine drive	
	ATF oil	The recommended	APOLLOIL ATF RED-1K or Kia Genuine Red-1	
		Quantity	10ℓ(10.57 US qt, 8.8 lmp.qt)	

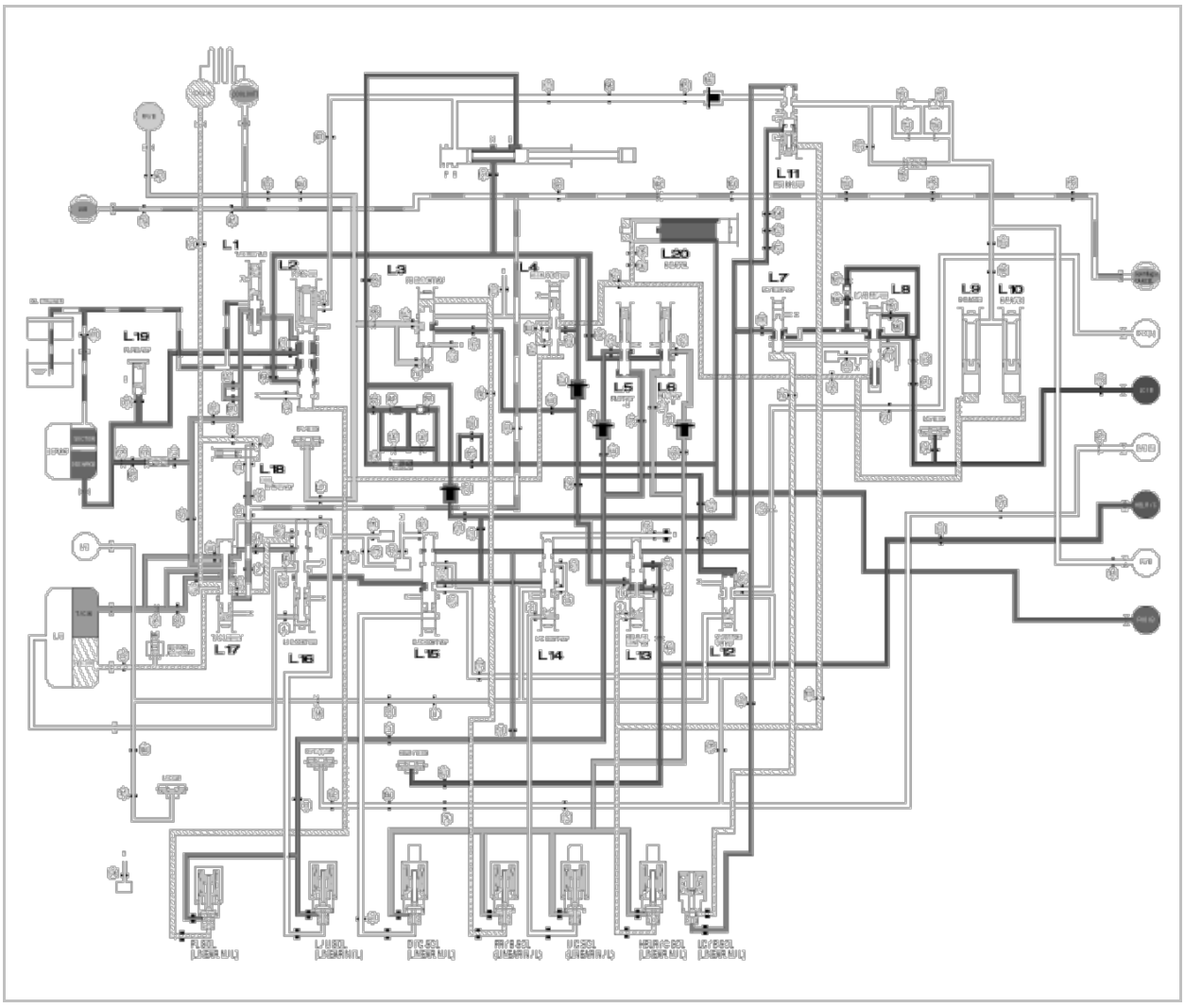
Automatic Transaxle System > Automatic Transaxle System > Flow Diagram (A5SR2)

VALVE BODY fluid pressure circuit diagram

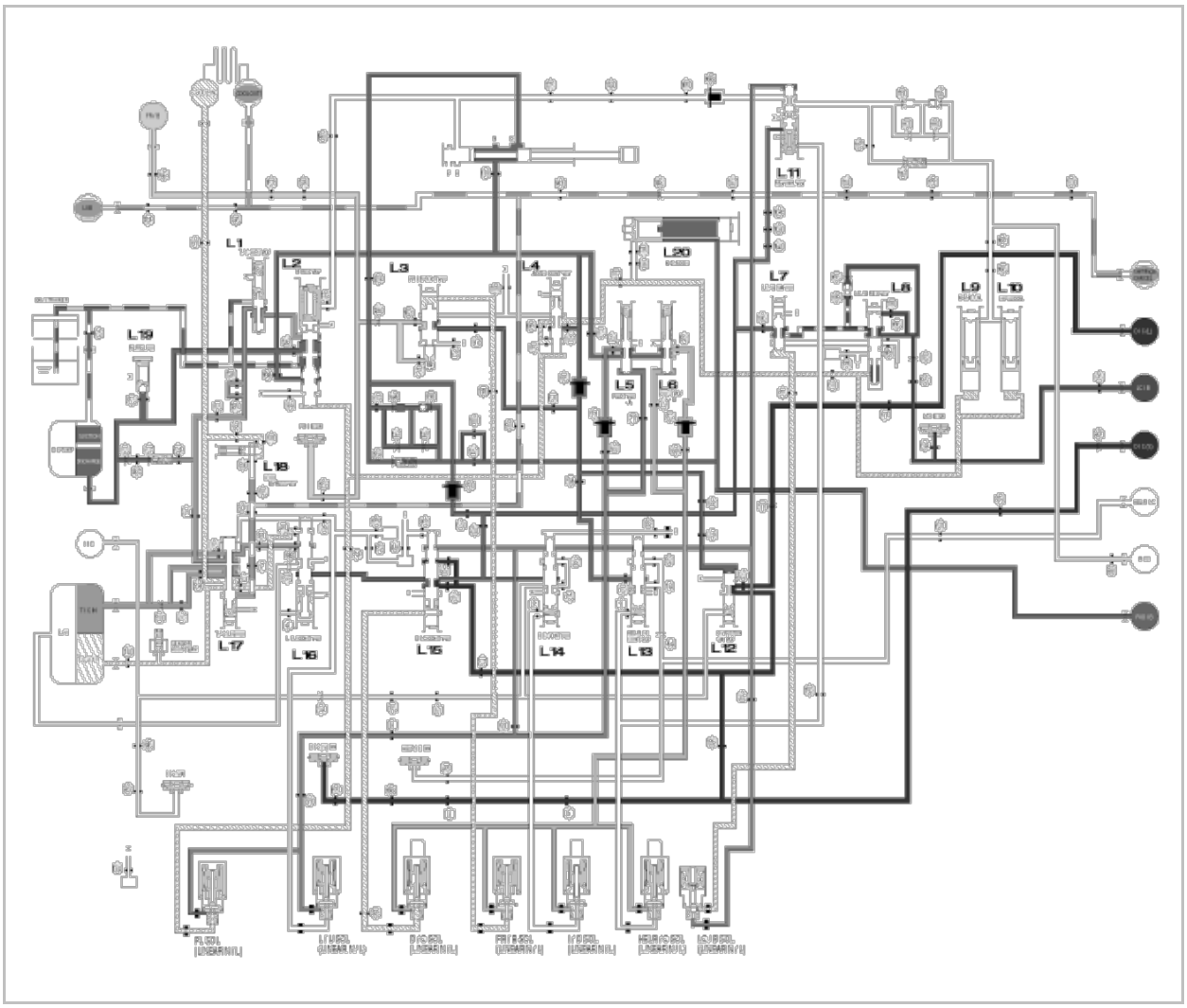


* Refer to body valves for L(number) valve name.

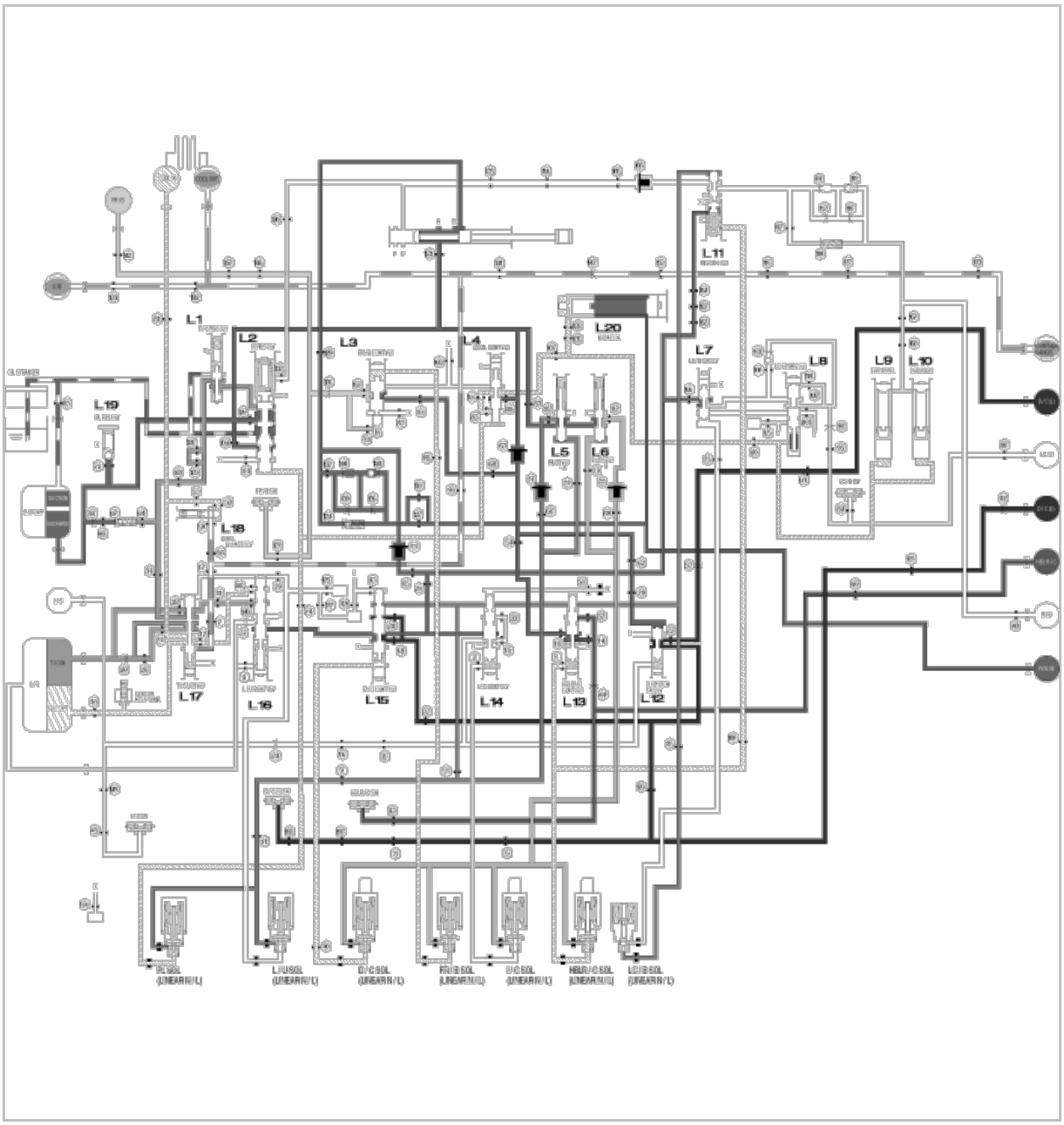
1st gear



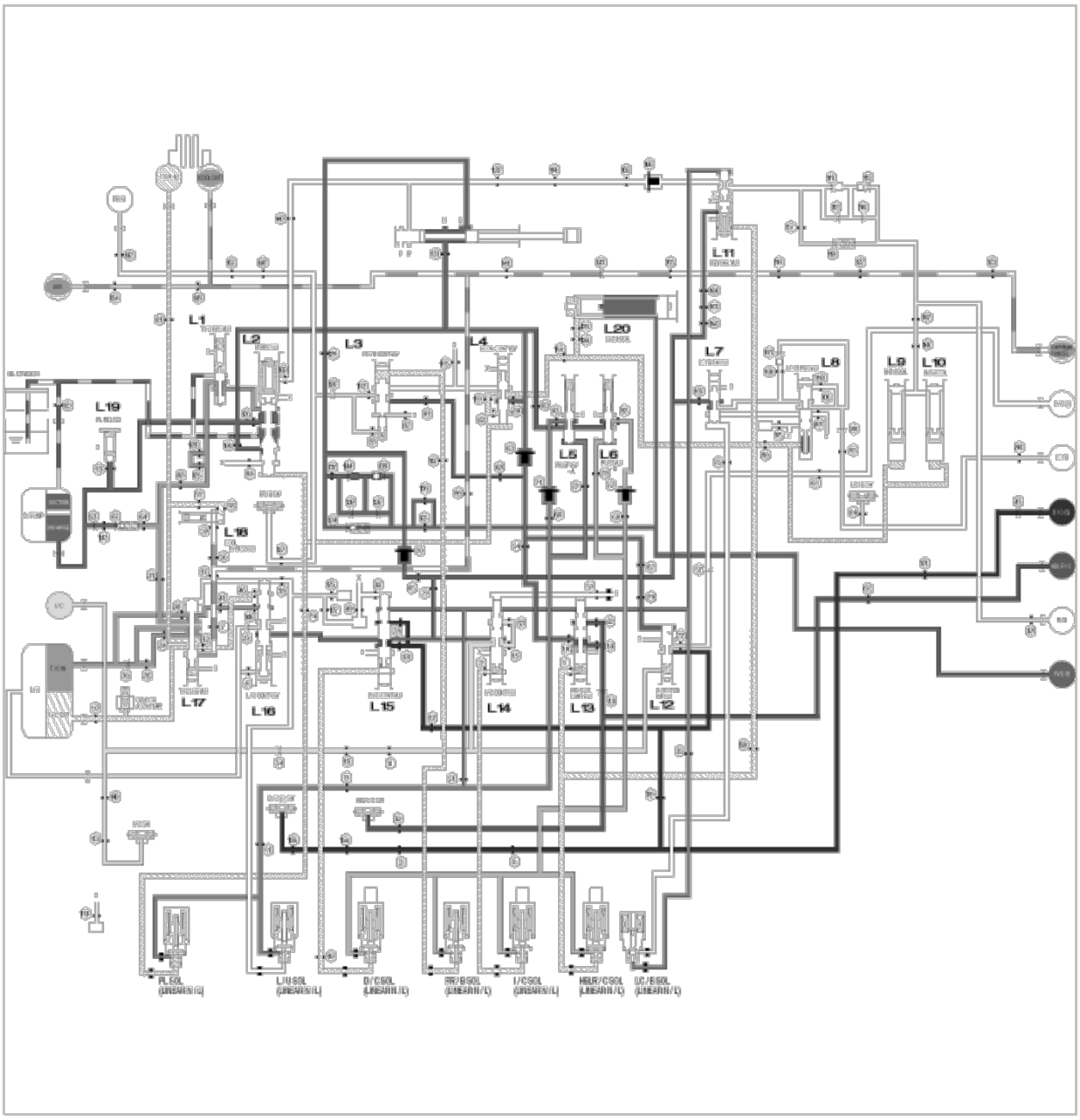
2nd gear



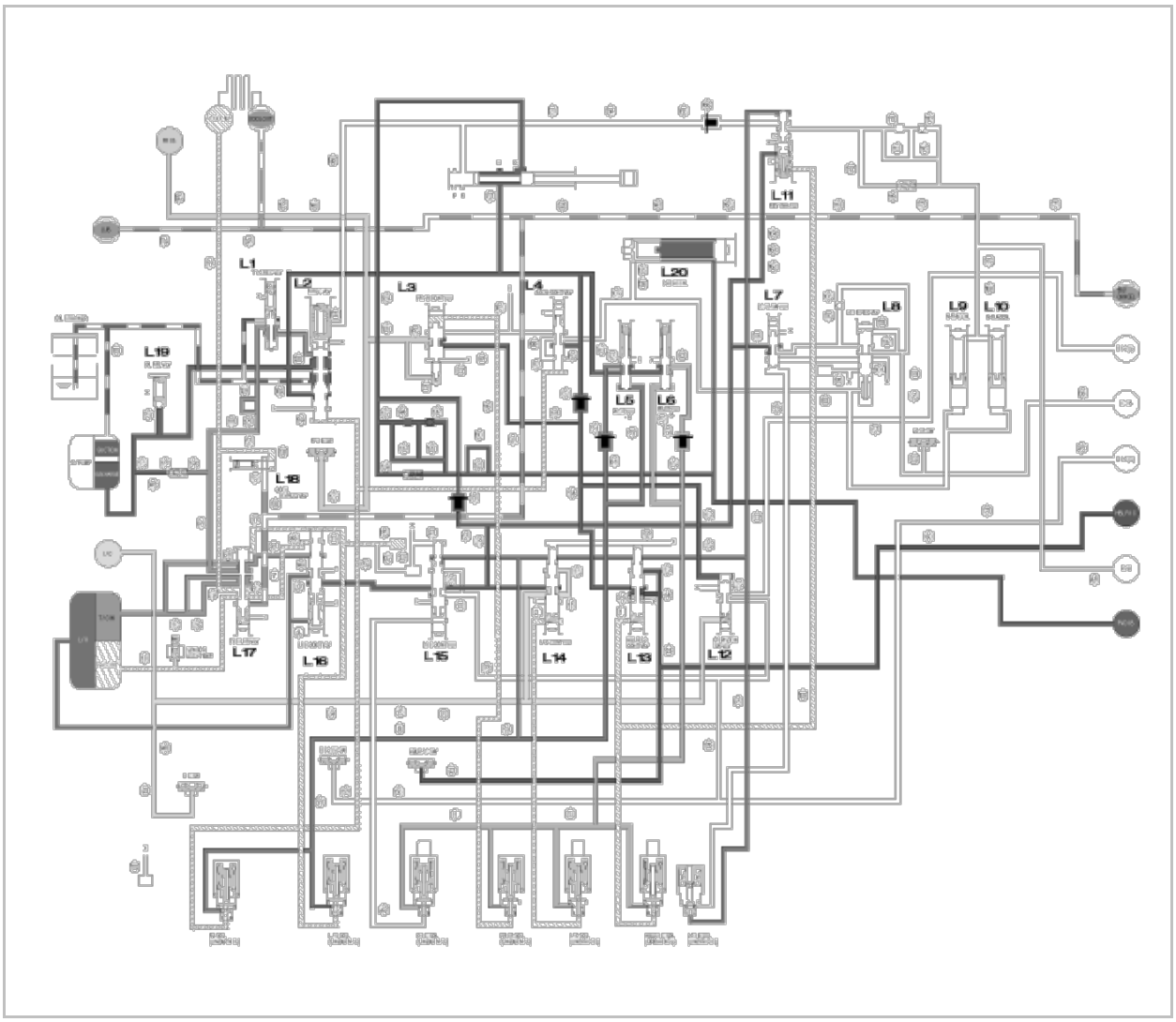
3rd gear



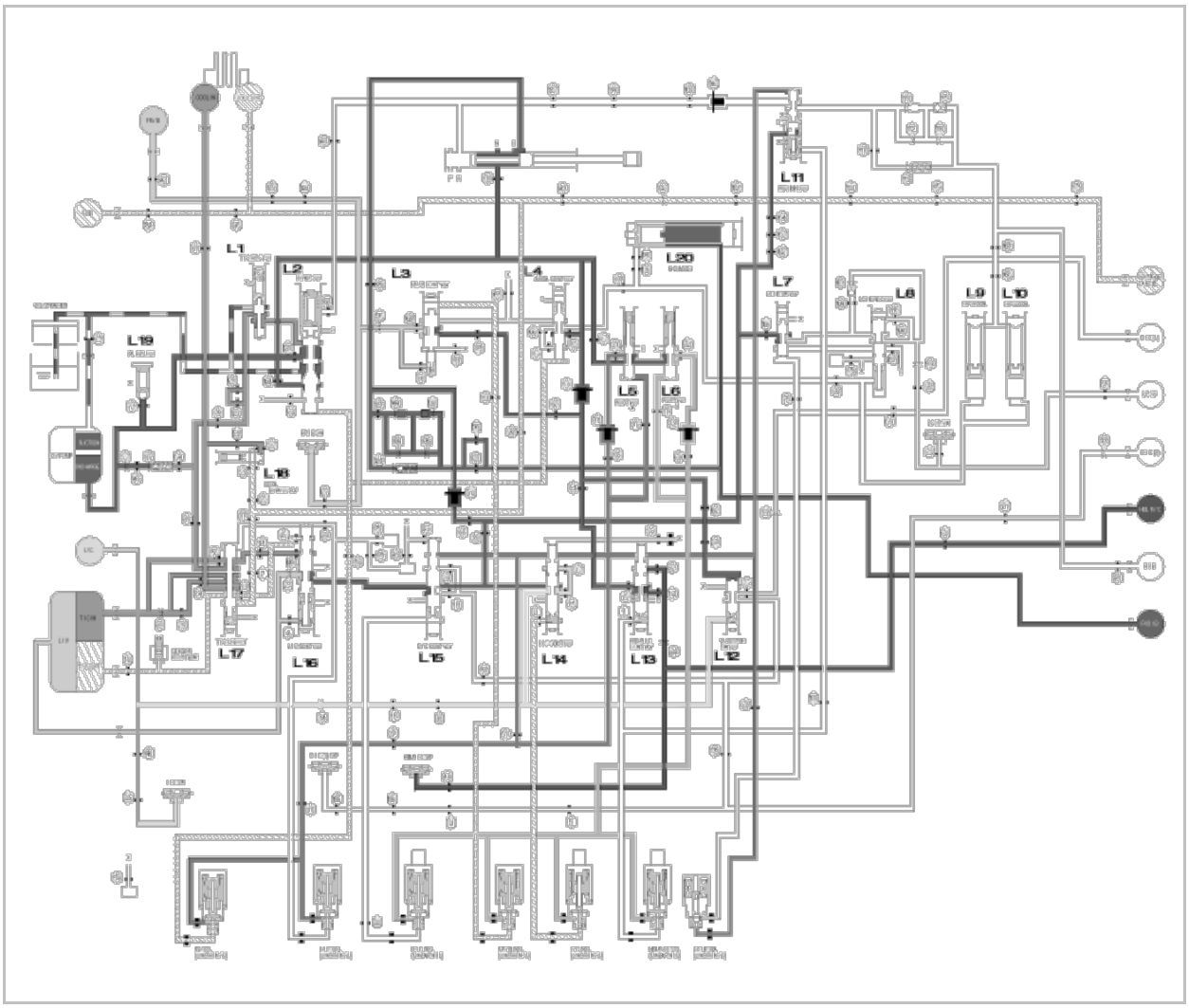
4th gear



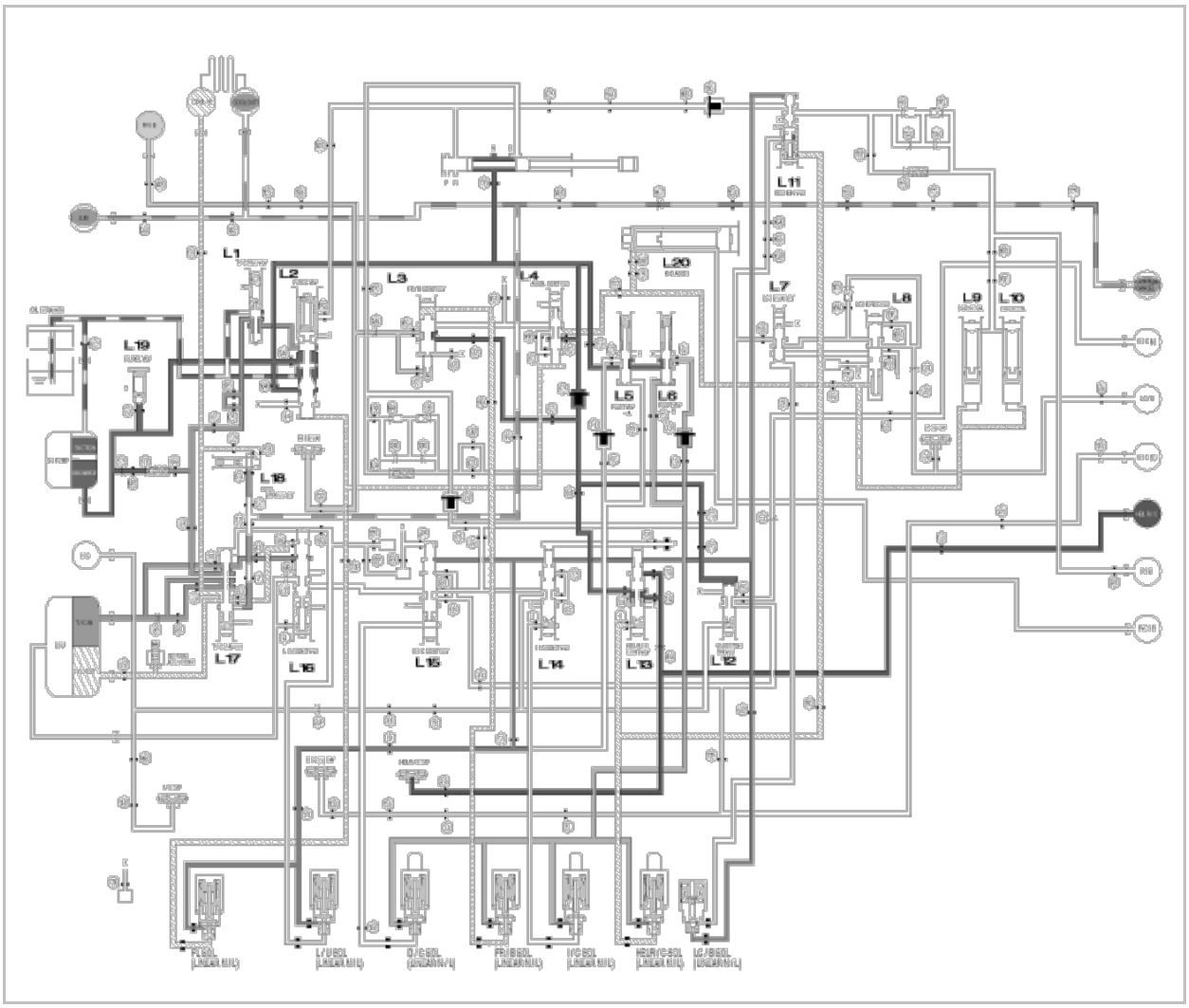
5th gear (lock-up)



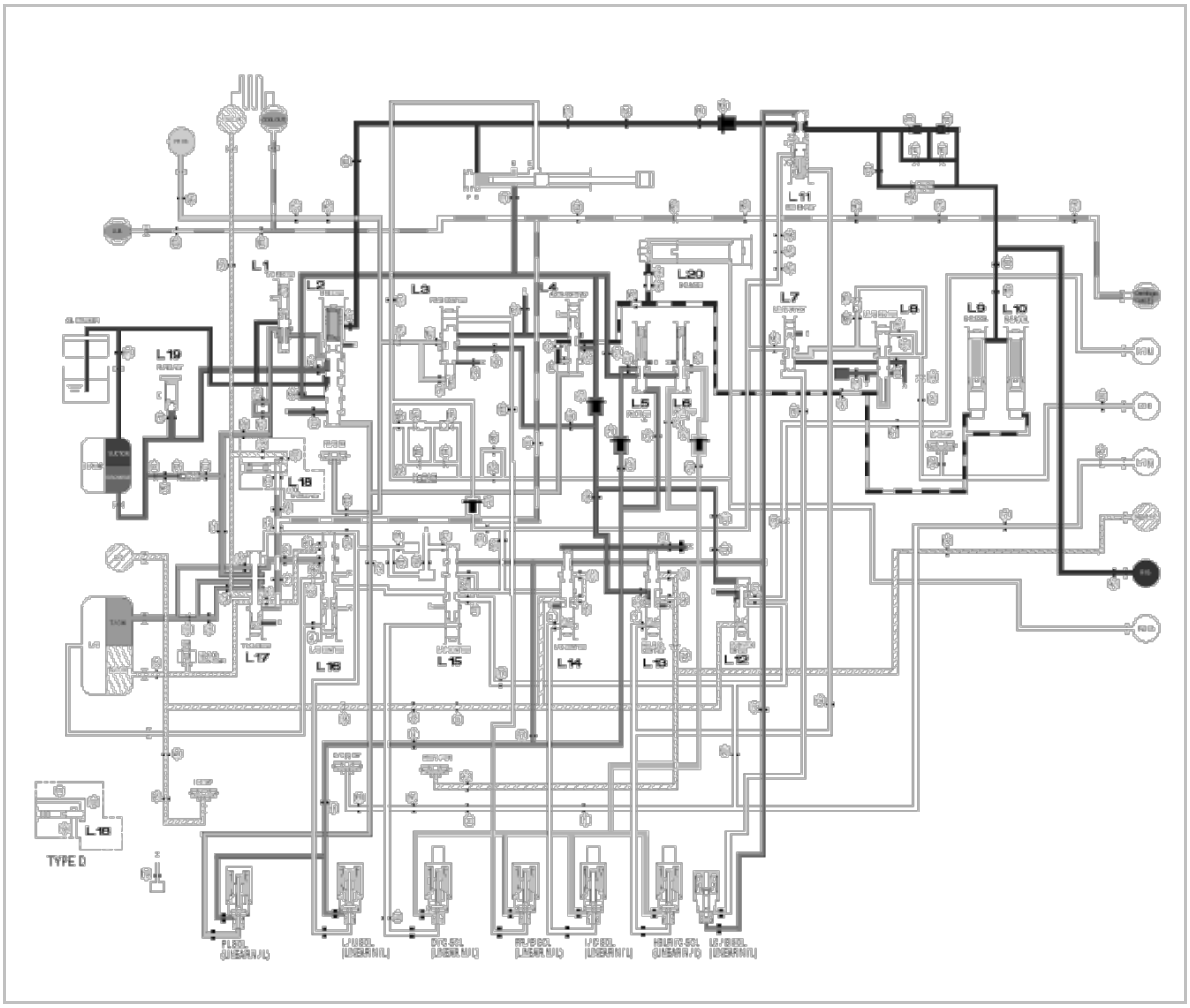
5th gear



P&N range



R range



Automatic Transaxle System > Automatic Transaxle System > Description and Operation (A5SR2)

DESCRIPTION

The A5SR1/2 is a 5-speed, electronically controlled transmission featuring sports mode shifting. The control valve assembly features an integrated electronic control unit.

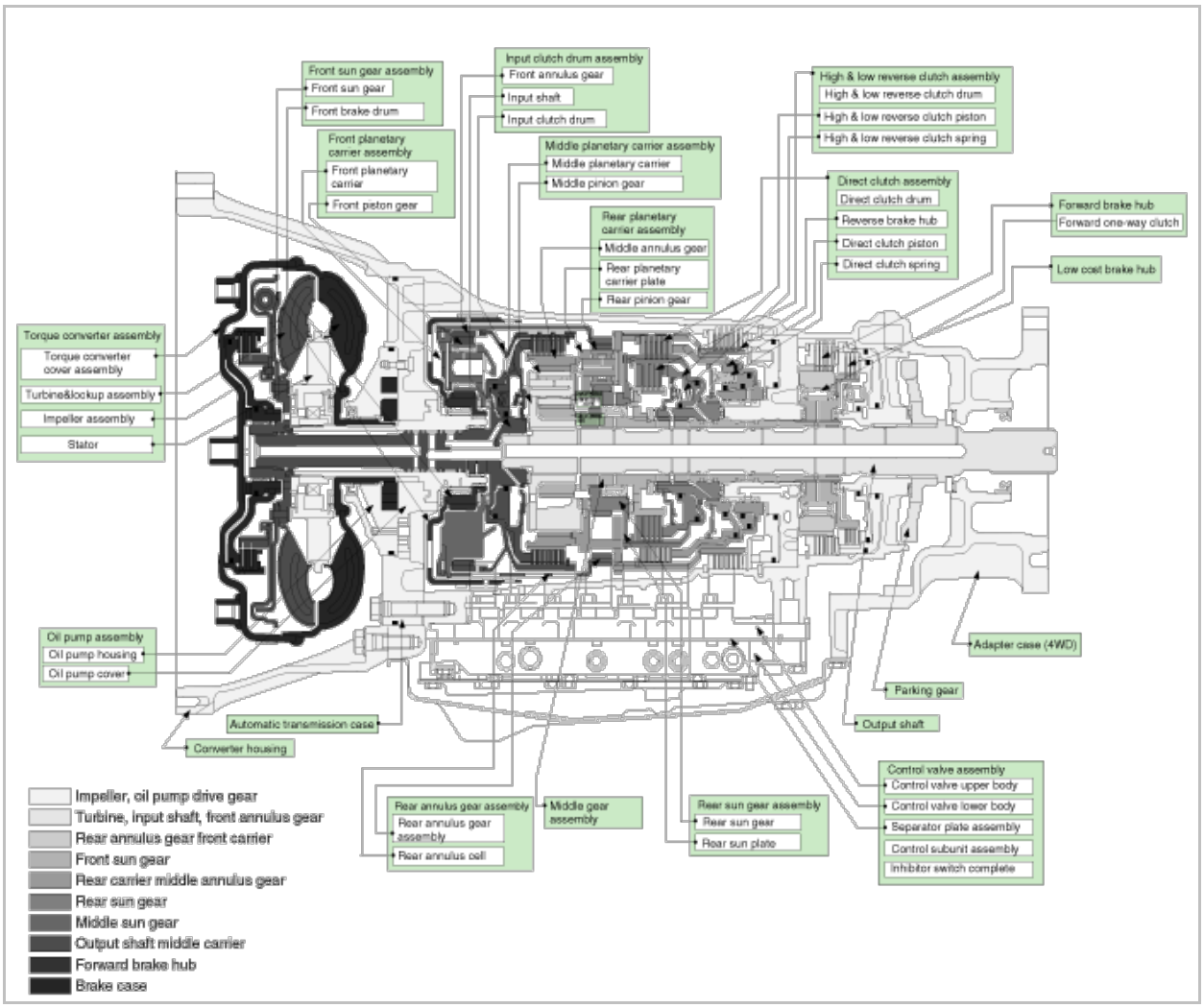
A5SR1/ 2

Item	Contents
Improved transmission feel	- Integrated control over engine and A/T (CAN communication control) system employed - Turbine sensor 1.2 employed - Real time feedback control at all phases applied
Improved driving	- Sports mode function employed - Gear ratio extension
Improved fuel consumption	- Coast lock-up employed - Full range lock-up employed (Larger lock-up zone) - E-flow torque converter employed (Improved driving efficiency) - Small transmission power train employed
Improved safety	- Transmission lock apparatus (P range maintenance apparatus affixed) employed
Improved maintenance	- Electronic system diagnosis tester (hi-scan) counterpart

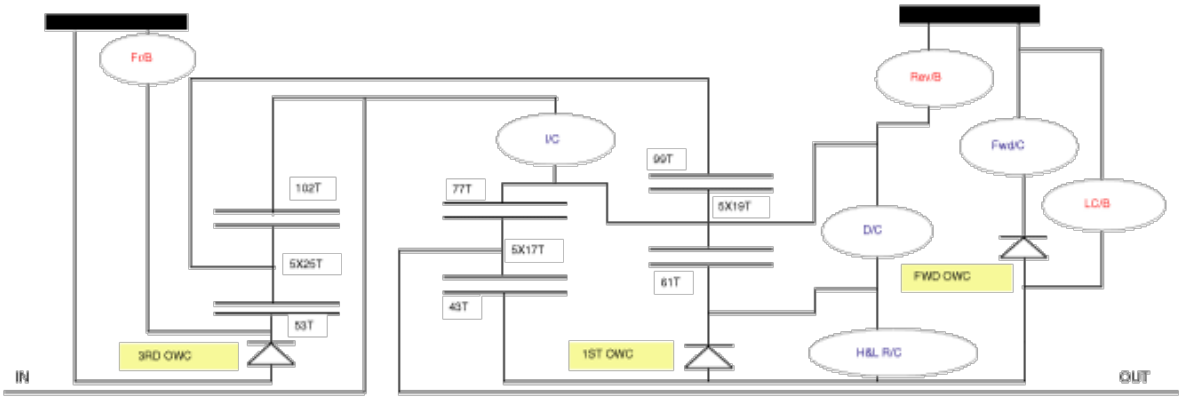
MAJOR COMPONENTS AND THEIR FUNCTIONS

Part name	Acronyms	Function
Front brake	F/B	Fastens the front sun gear
Input clutch	I/ C	Engages the input shaft, with the middle annulus gear and the front annulus gear
Direct clutch	D/C	Engages the rear planetary carrier with a rear sun gear
High & low reverse clutch	H&L R/C	Engages the middle sun gear with the rear sun gear
Reverse brake	R/B	Fastens the rear planetary carrier
Forward brake	FWD/B	Fastens the middle sun gear
Low cost brake	LC/B	Fastens the middle sun gear
1st one-way clutch	1st OWC	Allows the rear sun gear to turn freely forward relative to the mid sun gear but fastens it for reverse rotation
Forward one-way clutch	FWD OWC	Allows the mid sun gear to turn freely in the forward direction but fastens it for reverse rotation
3rd one-way clutch	3rd OWC	Allows the front sun gear to turn freely in the forward direction but fastens it for reverse rotation

COMPONENTS



OPERATION



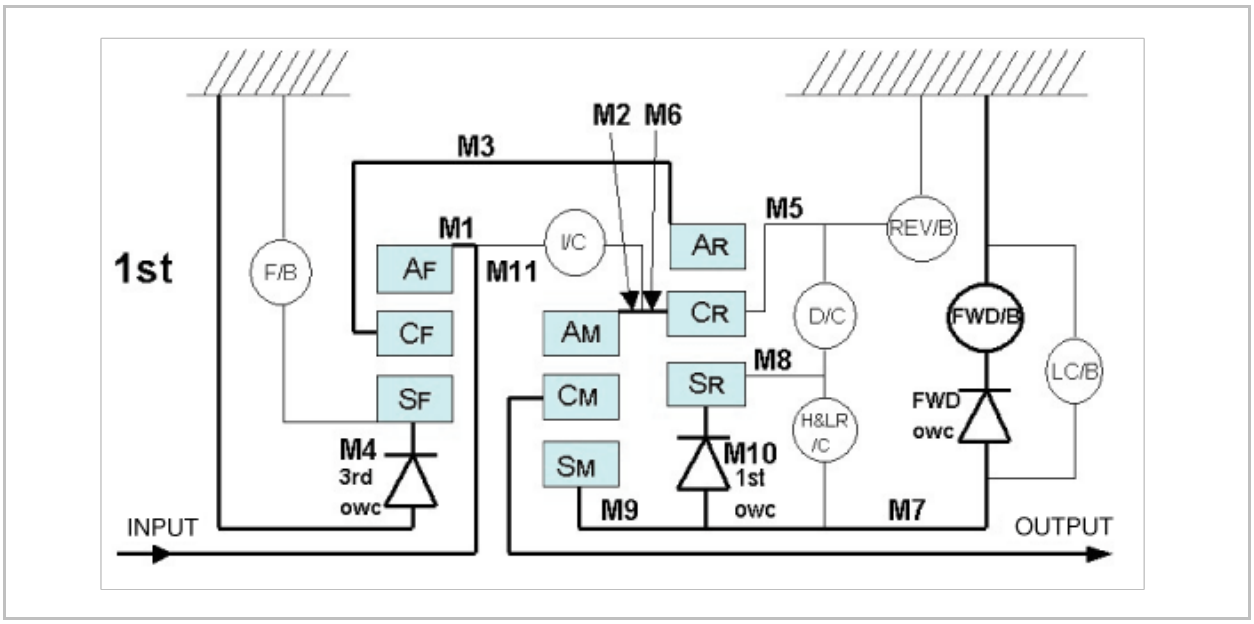
Shift Position		I/C	H&L R/C	D/C	Rev/B	Fr/B	LC/B	Fwd/B	Ratio1 OWC	Forword OWC	Ratio 2 OWC	Remarks
P			△			△						Parking position
R			0		0	0			◎		◎	Reverse position
N			△			△	△**					Neutral position
D	1st		△*			△		0	◎	◎	◎	Automatic shift 1↔2↔3 ↔4↔5
	2nd			0		△		0		◎	◎	
	3rd		0	0		0		△	◇		◎	
	4th	0	0	0				△	◇			
	5th	0	0			0		△	◇		◇	
5M	5th	0	0			0		△	◇		◇	Fix to the 5th speed
4M	4th	0	0	0				△	◇			Fix to the 4th speed
3M	3rd		0	0		0		△	◇		◎	Fix to the 3rd speed
2M	2nd			0		0	0	0		◎	◎	Fix to the 2nd speed
1M	1st		0			0	0	0	◎	◎	◎	Fix to the 1st speed

0 : Operates.
◎ : Operates during progressive acceleration.
◇ : Operates and effects power transmission while coasting.
△ : Line pressure is applied but does not affect power transmission.
△* : Operates under conditions shown in the high & low reverse clutch operating condition.
△** : Operates under conditions shown in the LC/B operating condition.
Note) Delay control is applied during D(4,3,2,1)⇒N shift.

OPERATING PRINCIPLES OF EACH RANGE

1. N range
   Since the forward and reverse brakes are released, driving force of input shaft is not transmitted to output shaft.
2. P range
   A. Since the forward and reverse brakes are released, as those in the N range, driving force of input shaft is not transmitted to output shaft.
   B. Parking pawl that is linked with select lever parking gear meshes with and fastens output shaft mechanically.
3. D, M2, M3, M4, M5 range 1st speed
   A. Fastens the front brake.
   B. The front brake and the forward one-way clutch regulate reverse rotation of the mid sun gear.
   C. The 1st one-way clutch regulates reverse rotation of the rear sun gear.

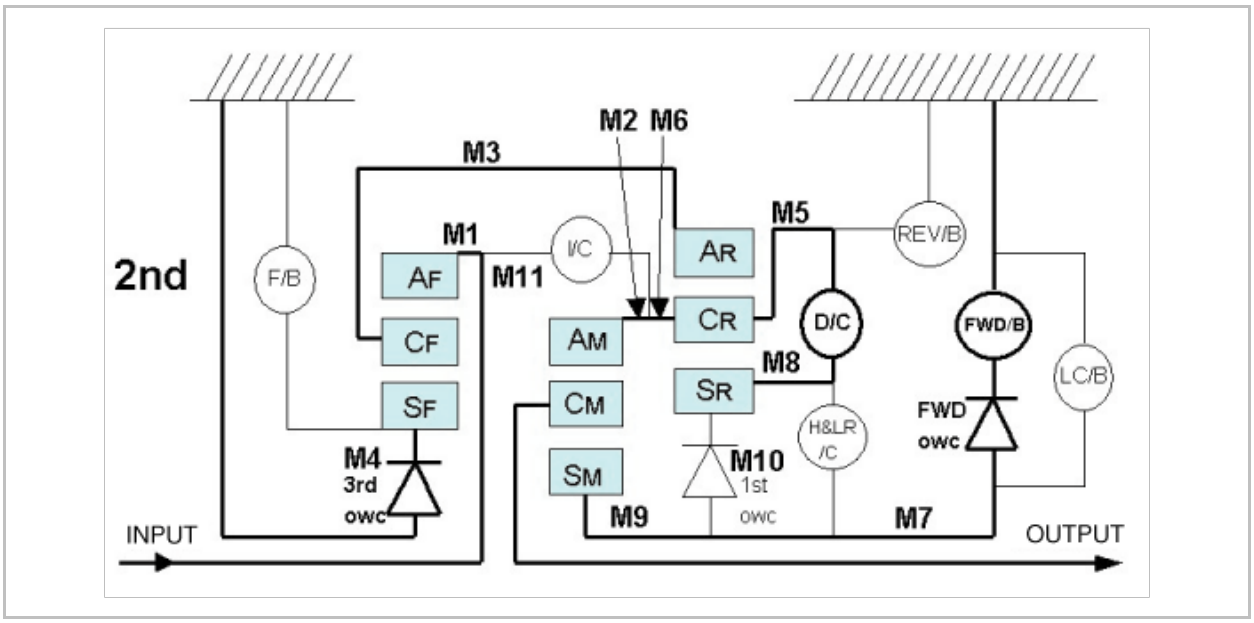
D. The 3rd one-way clutch regulates reverse rotation of the front sun gear.



*** POWER FLOW**

Input shaft→Front internal gear→Front carrier→Rear internal gear→Rear carrier→Middle internal gear→Middle carrier→Output shaft

4. D, M3, M4, M5 range ratio 2nd
   A. Fasten the front brake.
   B. The front brake and the forward one-way clutch regulate reverse rotation of the mid sun gear.
   C. The 3rd one-way clutch regulates reverse rotation of the front sun gear.

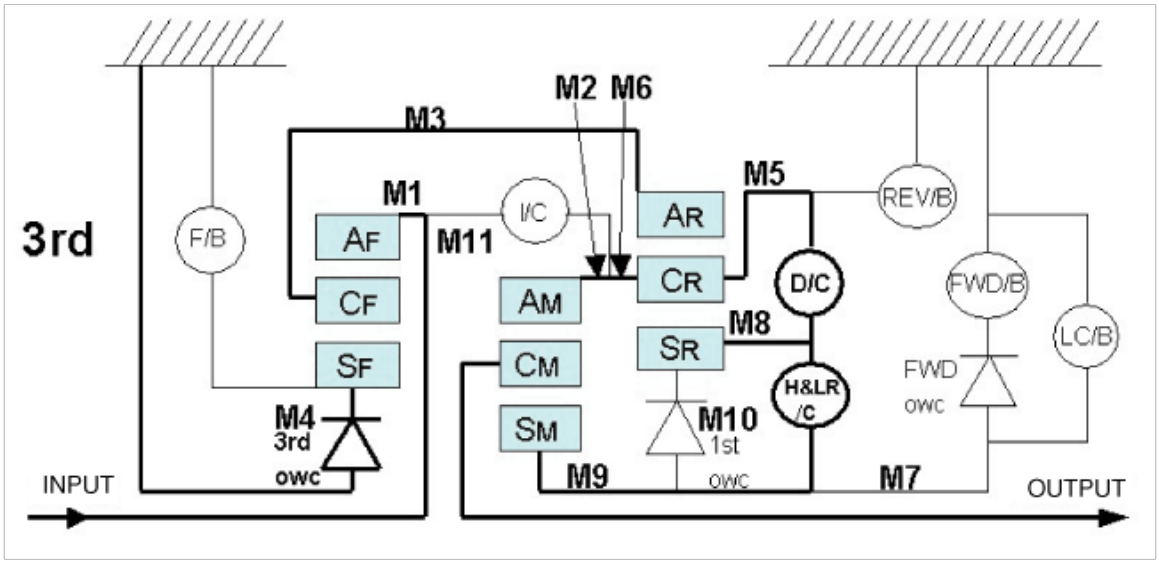


The direct clutch is coupled and the rear carrier and the rear sun gear are connected.

*** POWER FLOW**

Input shaft→Front internal gear→Front carrier→Rear internal gear→Rear carrier→Rear carrier→Middle internal gear→Middle carrier→Output shaft

5. D, M3, M4, M5 range 3rd speed
   A. Fastens the front brake.
   B. The 3rd one-way clutch regulates reverse rotation of the front sun gear.



C. The high & low reverse clutch is coupled and the middle and rear sun gears are connected.

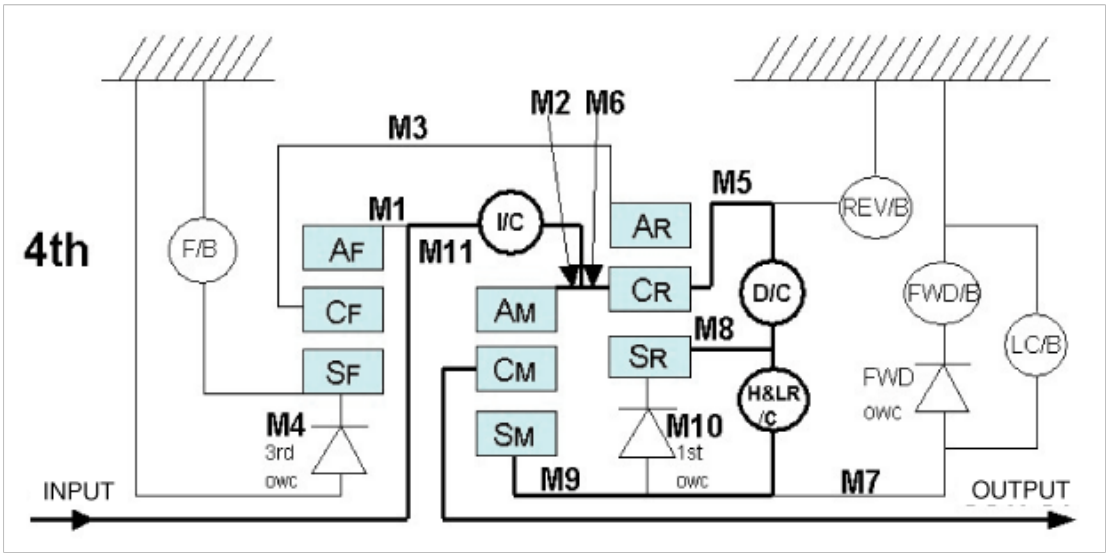
*** POWER FLOW**

Input shaft→Front internal gear→Front carrier→Rear internal gear→Rear carrier→Rear carrier→Middle internal gear→Middle carrier→Output shaft

6. D, M4, M5 range 4th speed

A. The front brake is released and sun gear turns freely forward.

B. The input clutch is coupled and the front and middle internal gears are connected.



C. Driving force is conveyed to the front internal gear, the middle internal gear, and the rear carrier and the three planetary gears rotate forward as a unit.

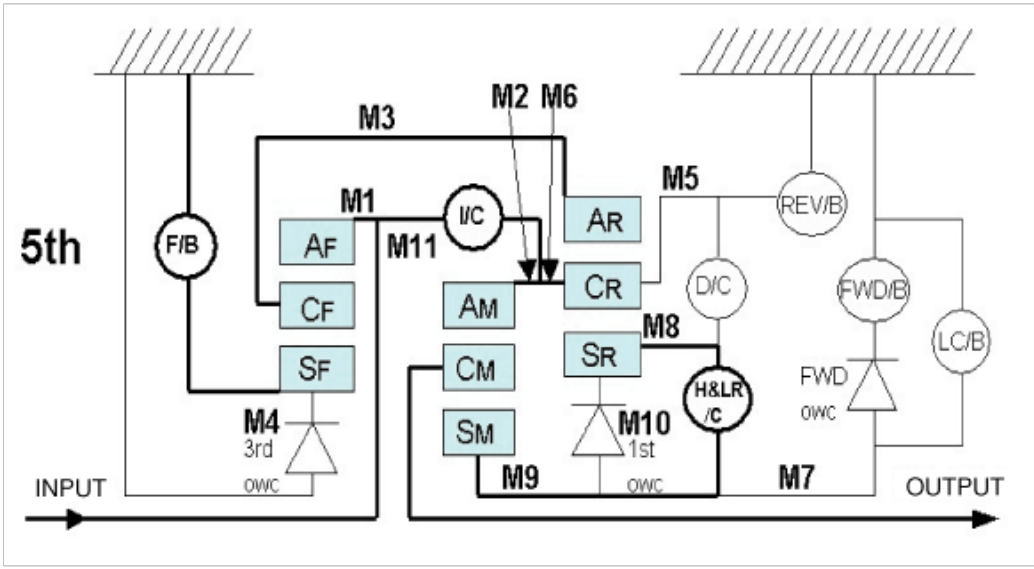
*** POWER FLOW**

Input shaft→Front internal gear→Front carrier→Rear internal gear→Rear carrier→Middle internal carrier→Middle carrier→Output shaft

7. D, M5 range 5th speed

A. The front brake fastens the front sun gear.

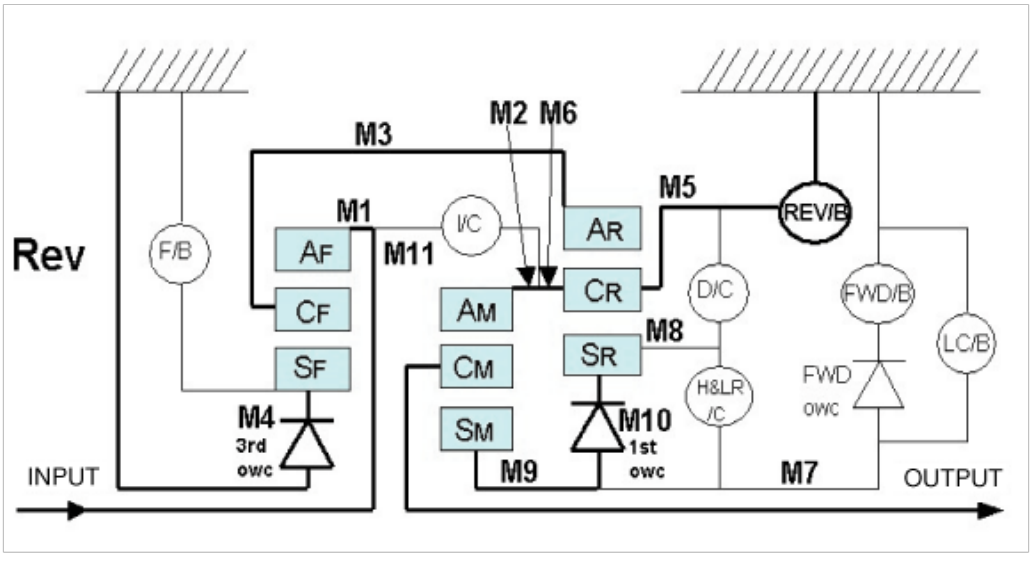
B. The direct clutch is released and the rear carrier and rear sun gear are disconnected.



*** POWER FLOW**

Input shaft→Front internal→Front carrier→Rear internal input shaft→Middle internal→Rear carrier→Rear sun gear→Middle sun carrier→Middle carrier→Output shaft

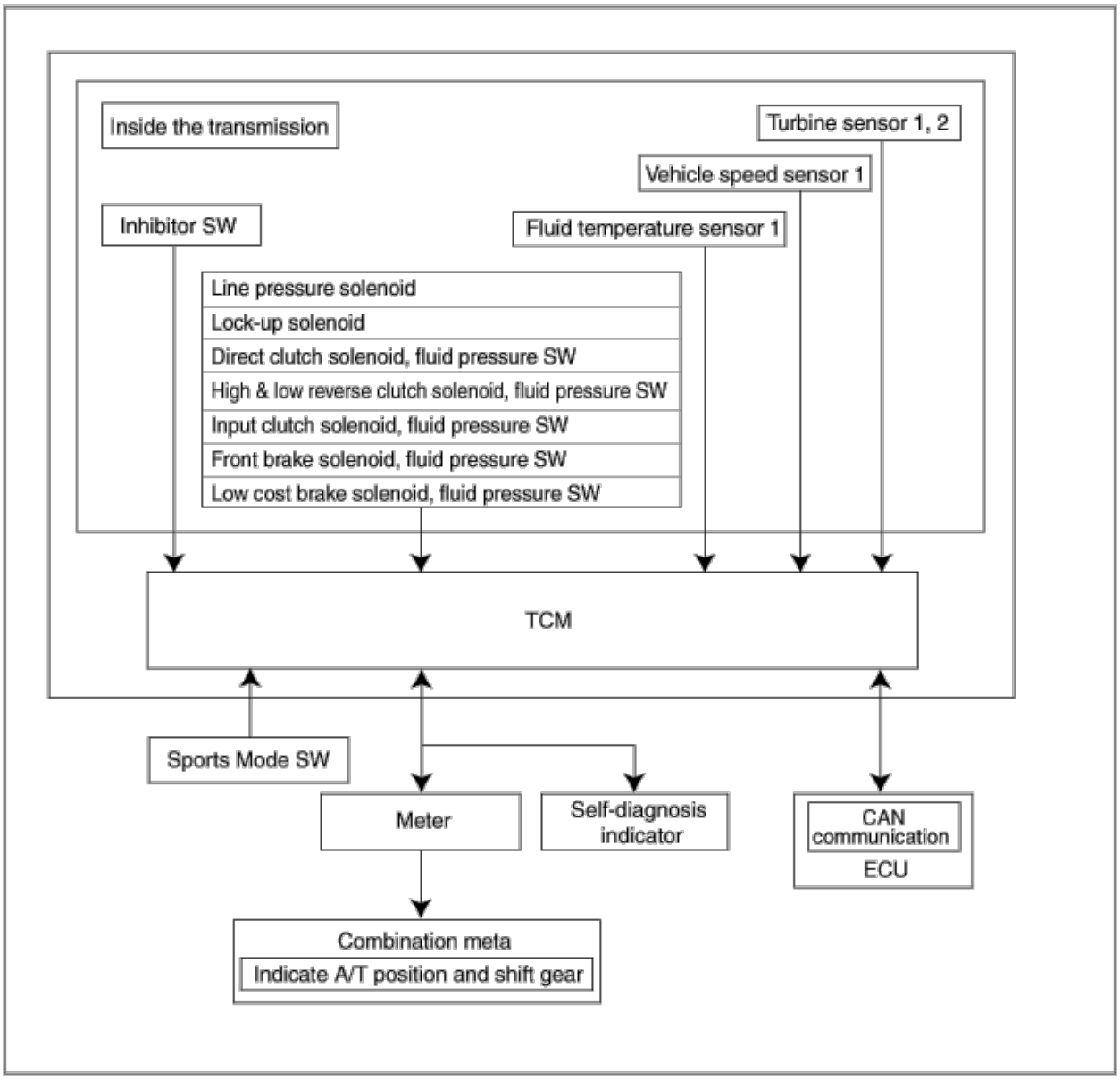
8. R range
   A. The front brake fastens the front sun gear.
   B. The high & low reverse clutch is coupled and the middle and rear sun gears are connected.
   C. The reverse brake fastens the rear carrier.



*** POWER FLOW**

Input shaft→Front internal→Front carrier→Rear internal→Rear sun gear→Middle sun gear→Middle carrier→Output shaft

CONTROL SYSTEM DIAGRAM



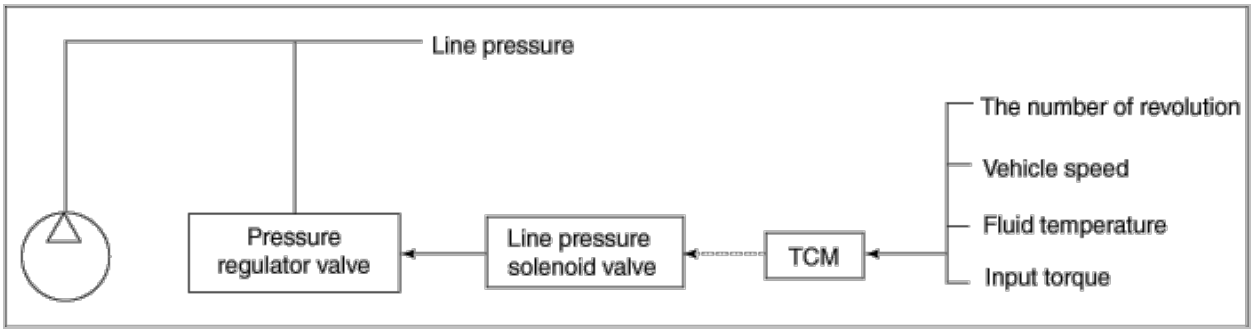
MAIN COMMUNICATION SIGNAL

Input to ECM(CAN)	Output to ECM(CAN)	Input from external sys.	Output to external sys.
-	-	A/T driving mode SW	Self-diagnosis indicator
Engine torque signal	Output revolution signal	Sports mode SW	Range signal (P, R, N, D)
Engine revolution signal	Turbine sensor signal	Up SW	Range signal
-	Torque reduction request signal	Down SW	Reverse lamp signal
Accelerator opening signal		Stop lamp SW	
		4 x 4 Low signal	

LINE PRESSURE CONTROL

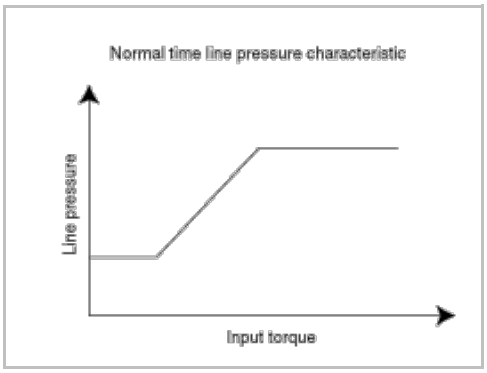
- If the engine control unit sends the input torque signal equivalent to the engine driving force to the A/T control unit (TCM), the A/T control unit (TCM) controls line pressure solenoid.
- This line pressure solenoid controls the pressure regulator valve as the signal pressure and adjusts the pressure of theoperating oil discharged from the oil pump to the line pressure most appropriate to the driving plate.

LINE PRESSURE SYSTEM DIAGRAM

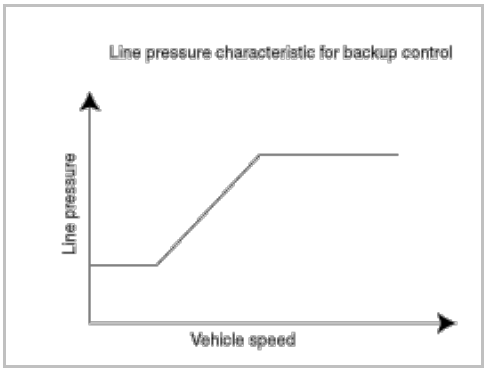


Line pressure control based on line pressure characteristic pattern of A/T control unit (TCM)

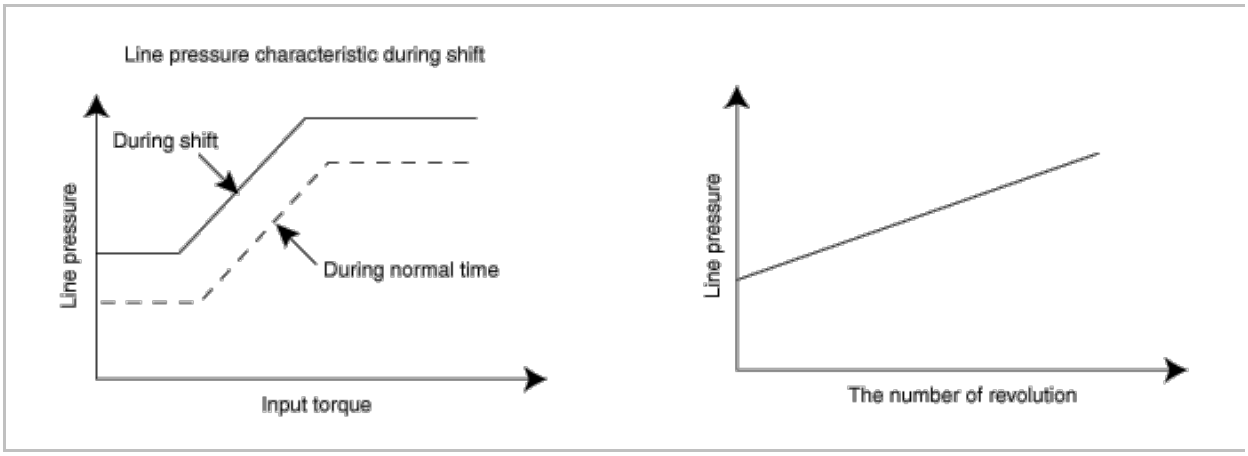
- A/T control unit (TCM) has stored in memory a number of patterns for the optimum line pressure characteristics according to driving conditions.
- In order to obtain the most appropriate line pressure characteristic to meet the current driving state, the TCM controlsthe line pressure solenoid current valve and thus controls the line pressure.
  - Normal line pressure control.
    Each clutch is adjusted to the necessary pressure to match the engine drive force.



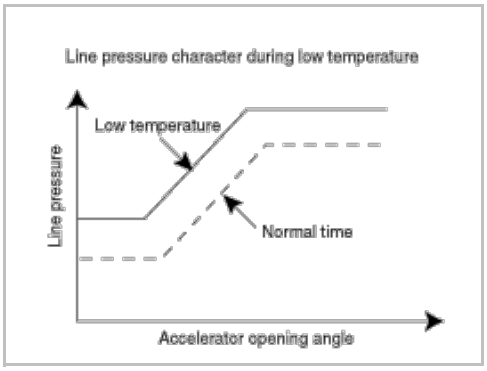
  - Back-up control (Engine brake)
    Line pressure according to speed is set during shift down by select operation while driving.



  - During shift change
    Set to line pressure that is necessary for shift change. Therefore, line pressure characteristic is set according to input torque and shift types.



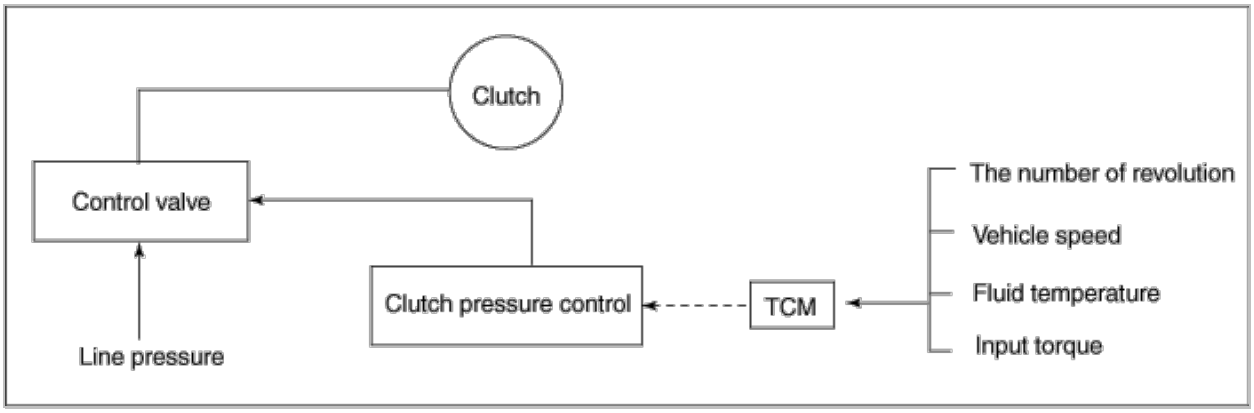
- At low fluid temperature
  When the A/T fluid temperature drops below the prescribed temperature, in order to speed up the action of each friction element, the line pressure is set higher than the normal line pressure characteristic.



Shift control

- The clutch pressure control solenoid is controlled by the signals from the switches and sensors. Thus the clutch pressure is adjusted to be appropriate to the engine load state and vehicle driving state. It becomes possible to finely control the clutch hydraulic pressure with high precision and a smoother shift change characteristic is attained.

SHIFT CONTROL SYSTEM DIAGRAM



Shift description
Controls clutches with optimum timing and fluid pressure in response to engine speed, engine torque information, and etc.

Lock-up control

Lock-up control is to enhance delivery efficiency by preventing the torque converter from slipping, engaging the lock-up piston into the torque converter.
It operates lock-up solenoid control in response to a signal from A/T control unit (TCM) and lock-up control valve behavior control, engages or releases the lock up piston of the torque converter.

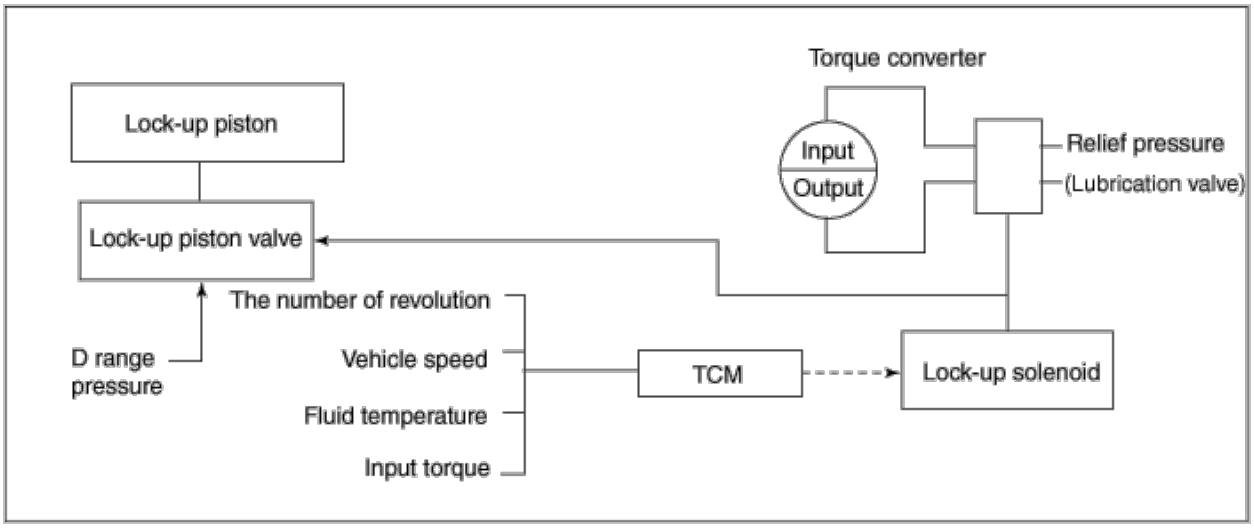
LOCK-UP OPERATING CONDITION TABLE

Select lever	D range			Sports mode	
Gear position	5	4	3	5	4
Lock-up	○	-	-	○	○
Slip lock-up	○	○	-	-	-

Lock-up control valve control

- In the lock-up control valve, there is operating fluid pressure circuit linked into the lock-up piston and lock-up solenoid operates valve shift in response to a signal from the A/T control unit.
- Operating fluid pressure circuit that is applied to the lock-up piston chamber is controlled with the release or apply sides.

LOCK-UP CONTROL SYSTEM DIAGRAM



Lock-up released

- In the lock-up control valve, there is operating fluid pressure circuit connected into the lock-up piston and lock-up solenoid operates valve shift in response to a signal from the A/T control unit.
  Therefore, the lock-up piston is not coupled.

Lock-up applied

- During the lock-up applied status, lock-up apply pressure is generated having the lock-up control valve to L/U by the lock-up solenoid.
  Therefore, press the lock-up piston to be coupled.

Smooth lock-up control

- A/T control unit (TCM) controls current value that is output to the lock-up solenoid when shifting lock-up applied state from lock-up released state.
  Therefore the lock-up clutch is temporarily set to half-clutched state when shifting the lock-up applied state to reduce the shock.

Half-clutched state

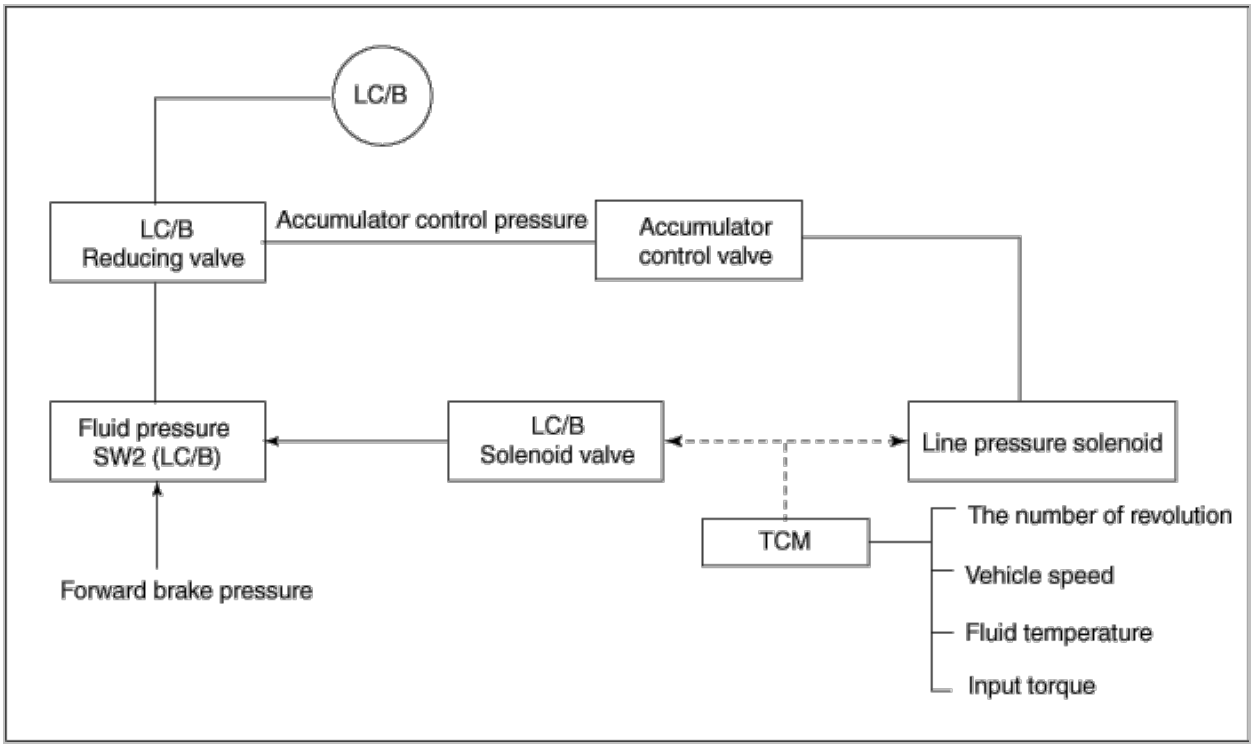
- Changes current value that is output to the lock-up solenoid from A/T control unit (TCM) to gradually increase lock-up solenoid pressure.
  In this way, the lock up apply pressure gradually rises and while the lock-up piston is put into half-clutched status, the lock-up piston operating pressure is increased and the coupling is completed smoothly.

Engine brake control

- The forward one-way clutch delivers driving force from the engine to the rear wheel but reverse driving from the wheel drive is not delivered since the one-way clutch is idling.
  Therefore low coast brake solenoid is operated to prevent the forward one-way clutch from idling so that the engine

brake is operated in the same as before.

ENGINE BRAKE CONTROL SYSTEM DIAGRAM



- The operation of the low coast brake solenoid switches the low coast brake switch valve and controls the coupling and releasing of the low coast brake.
  The low coast brake reducing valve controls the low coast brake coupling force.

CONTROL VALVE

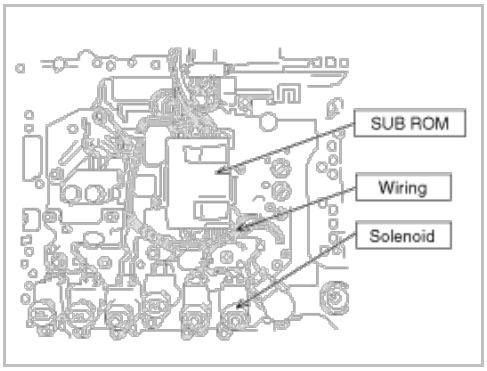
Control valve functions

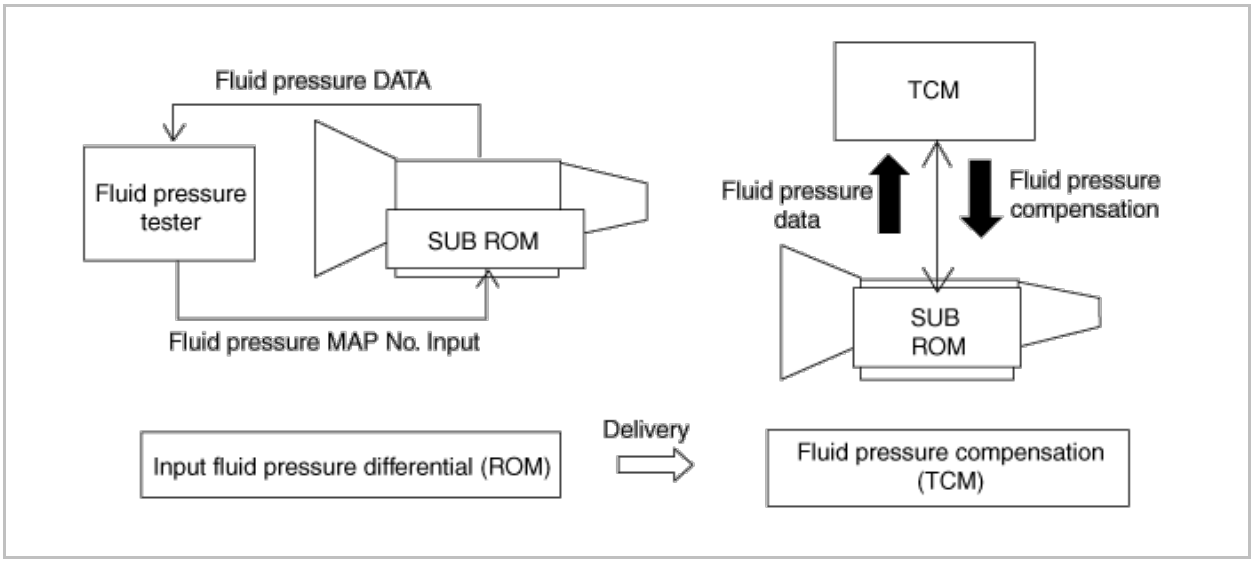
Valve name	Function
Torque converter regulator valve	Regulates line pressure to the optimum pressure (torque converter operating pressure) to prevent pressure applied to the torque converter from being excessive.
Pressure regulator valve Pressure regulator plug Pressure regulator sleeve	Regulates oil pump discharge pressure to the optimum pressure (line pressure) in response to the driving conditions.
Front brake control valve	Regulates line pressure to the optimum pressure (front brake pressure) to be applied to the front brake during the front brake apply.
Accumulator control valve	Regulates pressure applied to the accumulator piston, and the low coast reducing valve (accumulator control pressure) inresponse to the driving conditions (regulates clutch pressure at 1st, 2nd, 3rd, 5th gears).
Pilot valve A	Regulates line pressure to the regular pressure required by line pressure control, shift control, and lock-up control (pilot pressure).
Pilot valve B	Regulates line pressure to the regular pressure required by shift control (pilot pressure).
Low coast brake switching valve	Provides the low coast brake reducing valve with line pressure during engine brake operation.
Low coast brake reducing valve	Regulates line pressure to the optimum pressure to be applied to the low coast brake when the low coast brake is coupled.
N-R accumulator	Produces the stabilizing pressure for when N-R is selected.

Direct clutch piston switching valve	Operates in 4th gear and switches the direct clutch coupling capacity.
High&low reverse clutch control valve	Regulates line pressure to the optimum pressure (high&low reverse clutch pressure) to be applied to the high&low reverse clutch when the high&low reverse clutch is coupled (regulates clutch pressure in 1st, 3rd, 4th, 5th gears).
Input clutch control valve	Regulates line pressure to the optimum pressure (input clutch pressure) to be applied to the input clutch when the inputclutch is coupled (regulates clutch pressure in 4th, 5th gears).
Direct clutch control valve	Regulates line pressure to the optimum pressure (direct clutch pressure) to be applied to the direct clutch when the direct clutch is coupled (regulates clutch pressure in 2nd, 3rd, 4th gears).
Lock-up control valve Lock-up control plug Lock-up control sleeve	Switches lock-up to operating or released. Also, by performing the lock-up operation transiently, lock-up smoothly.
Torque converter lubrication valve	Operates to switch torque converter, cooling, and oil path of lubrication system during lock-up.
Cool bypass valve	Allows excess oil to by pass cooler circuit without being fed into it.
Line pressure relief valve	Discharges excess oil from line pressure circuit.
N-D accumulator	Produces the stabilizing pressure for when N-D is selected.
Manual valve	Delivers line pressure to each circuit in response to each select position. Circuit to which line pressure is not sent drain.

SUB ROM unit

1. Installing location: The valve body upper part
2. Function: To obtain A/T fluid pressure stability by compensating for solenoid&valve body unit fluid pressure differential.
3. Principle: Install additional ROM onto valve body of automatic transmission and input fluid pressure differential of solenoid &valve body so that TCM reads the input data to perform fluid pressure compensation.





4. Maintenance
   (1) When replacing with a new TCM in the vehicle
      A. TCM automatically reads SUB ROM DATA during I.G ON. At this time, shift range valve is off for about 2.5 second.
   (2) When replacing A/T (regardless of new or old ones) in the vehicle
      A. Must erase SUB ROM DATA stored in TCM.
      B. With the ignition ON (engine OFF), maintain 50% throttle opening in R range while using the TCU SUB ROM RESET mode on the scan tool.
      C. TCM reads SUB ROM DATA from a new A/T upon I.G ON again after I.G OFF.
   (3) Moving TCM from vehicle A to another vehicle B
      A. Perform the same way as in 2) above.

Automatic Transaxle System > Automatic Transaxle System > Troubleshooting (A5SR2)

TROUBLESHOOTING

DIAGNOSTIC TROUBLE CODES (INSPECTION PROCEDURE)

Check the Diagnostic Trouble Codes

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

NOTE

- A maximum of 10 diagnostic trouble codes (in the sequence of occurrence) can be stored in the Random Access Memory (RAM) incorporated within the control module.
- The same diagnostic trouble code can be stored one time only.
- If the number of stored diagnostic trouble codes or diagnostic trouble patterns exceeds 10, already stored diagnostic trouble codes will be erased in sequence, beginning with the oldest.
- If the same trouble code does not occur during 40 times continuously, memorized trouble code would be deleted automatically when the ATF temperature reaches 50°C(122°F).

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

NOTE

DTC cleaning should only be done with the scan tool.

Diagnostic trouble code table

No.	Code	Item	MIL	Remark
1	P0601	INTERNAL CONTROL MODULE MEMORY CHECK SUM ERROR	●	
2	P0641	SENSOR REFERENCE VOLTAGE "A" CIRCUIT - OPEN	●	
3	P0705	TRANSMISSION RANGE SENSOR CIRCUIT MALFUNCTION (PRND Input)	●	
4	P0711	TRANSMISSION FLUID TEMPERATURE SENSOR A RATIONALITY	●	
5	P0712	TRANSMISSION FLUID TEMPERATURE SENSOR A STUCK OFF(HIGH INPUT)	●	
6	P0713	TRANSMISSION FLUID TEMPERATURE SENSOR A STUCK ON(LOW INPUT)	●	
7	P0716	A/T INPUT SPEED SENSOR CIRCUIT - OPEN or SHORT(GND)	●	
8	P0717	A/T INPUT SPEED SENSOR CIRCUIT - NO SIGNAL	●	
9	P0721	A/T OUTPUT SPEED SENSOR CIRCUIT - OPEN or SHORT(GND)	●	
10	P0731	GEAR 1 INCORRECT RATIO	●	
11	P0732	GEAR 2 INCORRECT RATIO	●	
12	P0733	GEAR 3 INCORRECT RATIO	●	
13	P0734	GEAR 4 INCORRECT RATIO	●	
14	P0735	GEAR 5 INCORRECT RATIO	●	
15	P0741	TORQUE CONVERTER CLUTCH STUCK OFF	●	
16	P0743	TCC CONTROL SOLENOID VALVE CIRCUIT - OPEN or SHORT(GND)	●	
17	P0748	PRESSURE CONTROL SOLENOID VALVE-A CIRCUIT - OPEN or SHORT(GND)	●	
18	P0753	SHIFT SOLENOID "A(I/C SOLENOID)" CIRCUIT - OPEN or SHORT(GND)	●	
19	P0758	SHIFT SOLENOID "B(Fr/B SOLENOID)" CIRCUIT - OPEN or SHORT(GND)	●	
20	P0763	SHIFT SOLENOID "C(D/C SOLENOID)" CIRCUIT - OPEN or SHORT(GND)	●	
21	P0768	SHIFT SOLENOID "D(H amp;amp;LR/C SOLENOID)" CIRCUIT - OPEN or SHORT(GND)	●	
22	P0773	SHIFT SOLENOID "E(LC/B SOLENOID)" CIRCUIT - OPEN or SHORT(GND)	●	
23	P0819	UP AND DOWN SHIFT SWITCH TO TRANSMISSION RANGE CORRELATION	X	
24	U0001	CAN COMMUNICATION BUS	●	
25	U0100	LOST COMMUNICATION WITH PCM "A"	●	

Automatic Transaxle System > Automatic Transaxle System > Repair procedures (A5SR2)

BASIC INSPECTION ADJUSTMENT

TRANSAXLE FLUID LEVEL

INSPECTION

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

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

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

Automatic transaxle fluid :
APOLLOIL ATF RED-1K
ATF capacity: 10ℓ(10.57 US qt, 8.8 lmp.qt)

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

6. Insert the oil level gauge securely.

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

REPLACEMENT

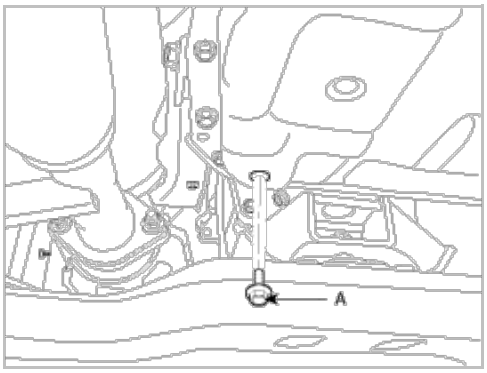
If you have a fluid changer, use this changer to replace the fluid. If you do not have a fluid replace the fluid by the following procedure.

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

Running conditions : "N" range with engine idling

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

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



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

TORQUE:
30~40Nm (3.0~4.0kgf.m, 21.7~28.9lb-ft)

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

CAUTION

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

6. Repeat the procedure in step (2).

NOTE

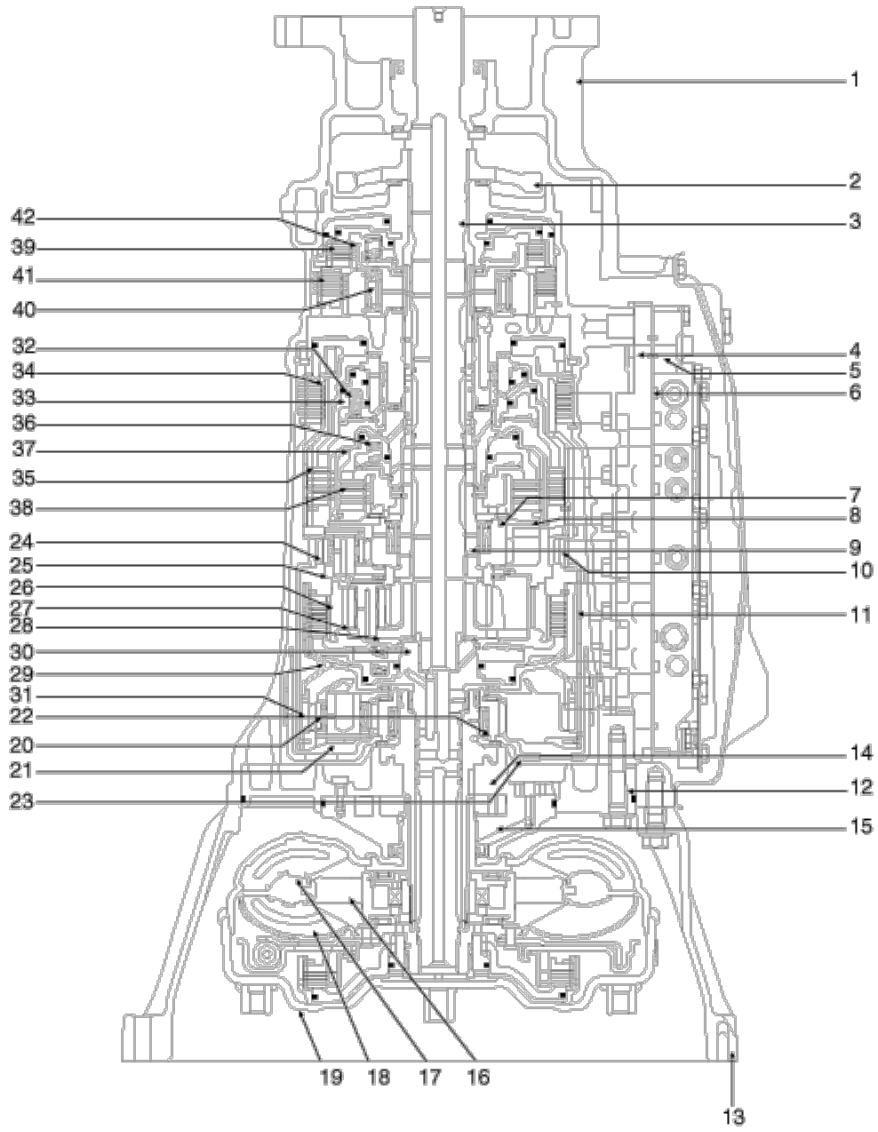
Check the old fluid for contamination. If it has been contaminated, repeat the steps (5) and (6).

7. Pour the new fluid in through the oil filler tube.
8. Reconnect the hose, which was disconnected in step (1) above, and firmly replace the oil level gauge.
   (In case of this "replace", this means after wiping off any dirt around the oil level gauge, insert it into the filler tube.)
9. Start the engine and run it at idle for 1~2 minutes.
10. Move the select lever through all positions, and then move it to the "N" or "P" position.
11. Drive the vehicle until the fluid temperature rises to the normal temperature (70~80°C(158~176°F)), and then check the fluid level again. The fluid level must be at the HOT mark.
12. Firmly insert the oil level gauge into the oil filler tube.

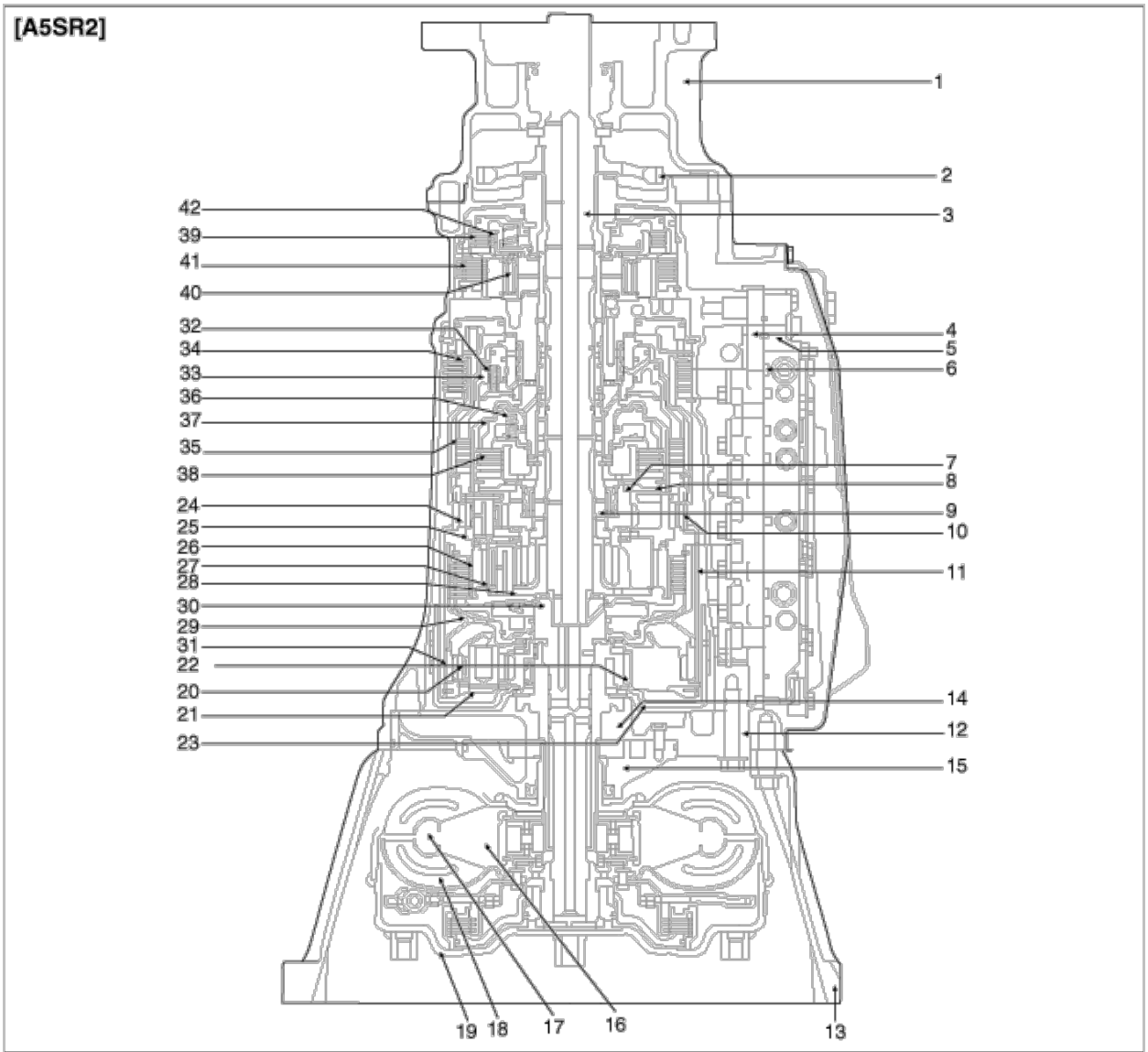
Automatic Transaxle System > Automatic Transaxle System > Automatic Transaxle > Components and Components Location (A5SR2)

COMPONENTS

[A5SR1]



1. Adapter case (4WD)
2. Parking gear
3. Output shaft
4. Control valve upper body
5. Control valve lower body
6. Separator plate assembly
7. Rear sun gear
8. Rear sun plate
9. Middle sun gear assembly
10. Rear annulus gear assembly
11. Rear annulus cell
12. Automatic transmission case
13. Converter housing
14. Oil pump cover
15. Oil pump housing
16. Stator
17. Impeller assembly
18. Turbine & lockup assembly
19. Torque converter cover assembly
20. Front pinion gear
21. Front planetary carrier
22. Front sun gear
23. Front brake drum
24. Rear pinion gear
25. Rear planetary carrier plate
26. Middle annulus gear
27. Middle pinion gear
28. Middle planetary carrier
29. Input clutch drum
30. Input shaft
31. Front annulus gear
32. Direct clutch return spring
33. Direct clutch piston
34. Reverse brake hub
35. Direct clutch assembly
36. High & low reverse clutch return spring
37. High & low reverse clutch piston
38. High & low reveres clutch assembly
39. Low coast brake clutch assembly
40. Forward one-way clutch
41. Forward brake clutch assembly
42. Low coast brake hub

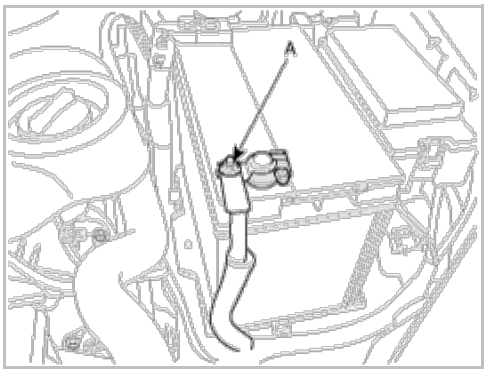


1. Adapter case (4WD)	15. Oil pump housing	29. Input clutch drum
2. Parking gear	16. Stator	30. Input shaft
3. Output shaft	17. Impeller assembly	31. Front annulus gear
4. Control valve upper body	18. Turbine & lockup assembly	32. Direct clutch return spring
5. Control valve lower body	19. Torque converter cover assembly	33. Direct clutch piston
6. Separator plate assembly	20. Front pinion gear	34. Reverse brake hub
7. Rear sun gear	21. Front planetary carrier	35. Direct clutch assembly
8. Rear sun plate	22. Front sun gear	36. High & low reverse clutch return spring
9. Middle sun gear assembly	23. Front brake drum	37. High & low reverse clutch piston
10. Rear annulus gear assembly	24. Rear pinion gear	38. High & low reveres clutch assembly
11. Rear annulus cell	25. Rear planetary carrier plate	39. Low coast brake clutch assembly
12. Automatic transmission case	26. Middle annulus gear	40. Forward one-way clutch
13. Converter housing	27. Middle pinion gear	41. Forward brake clutch assembly
14. Oil pump cover	28. Middle planetary carrier	42. Low coast brake hub

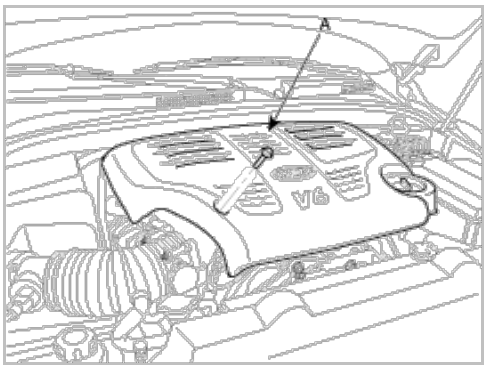
Automatic Transaxle System > Automatic Transaxle System > Automatic Transaxle > Repair procedures (A5SR2)

REMOVAL

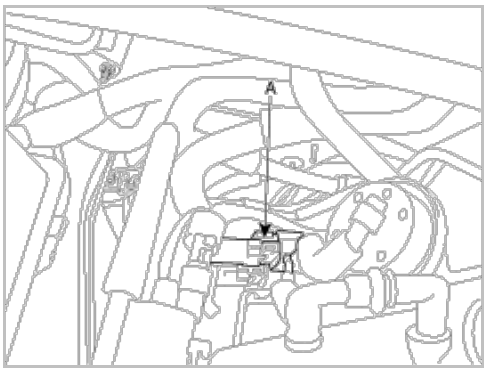
1. Remove the battery (-) terminal(A).

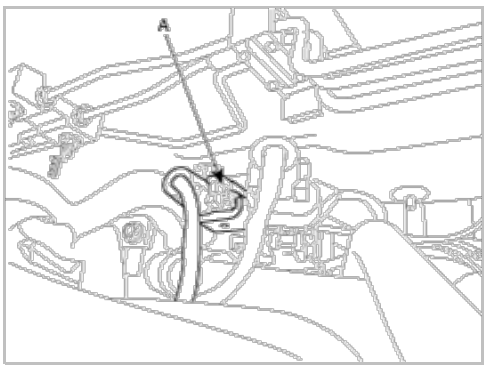


2. Remove the engine cover(A).

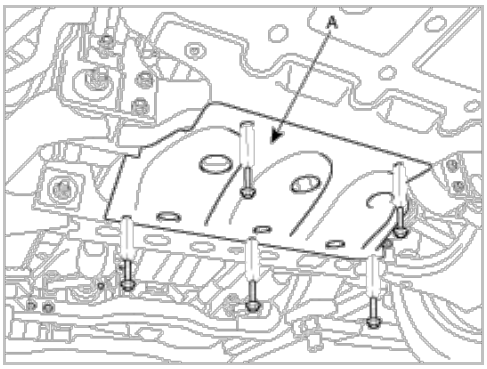


3. Remove the O2 sensor connectors(A).

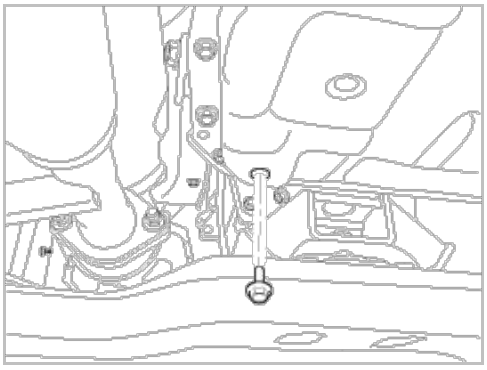




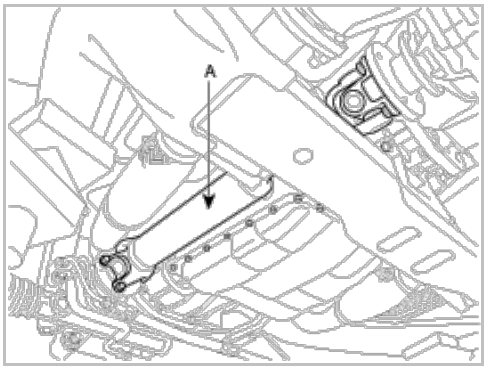
4. Remove the under cover(A).



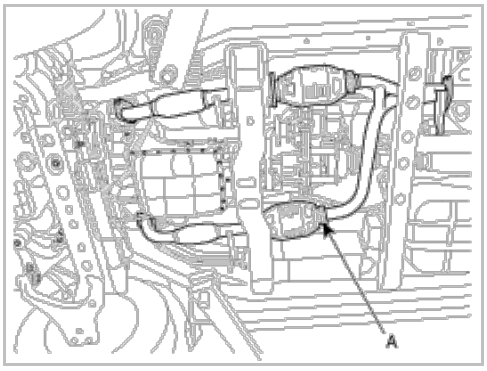
5. Drain the automatic transmission fluid.



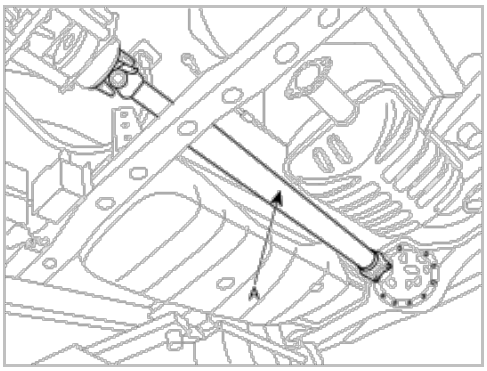
6. Remove the front propeller shaft(A). (4WD)



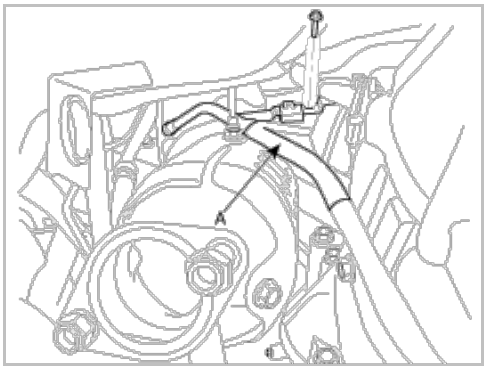
7. Remove the front muffler(A) and the heat protector.



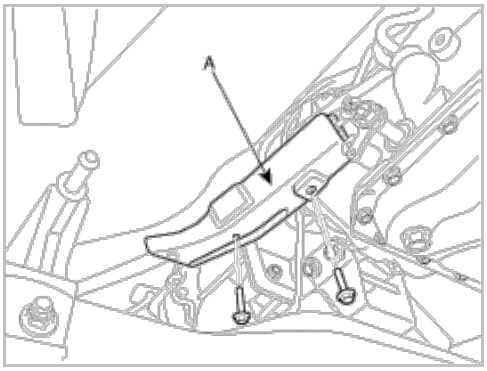
8. Remove the rear propeller shaft(A).



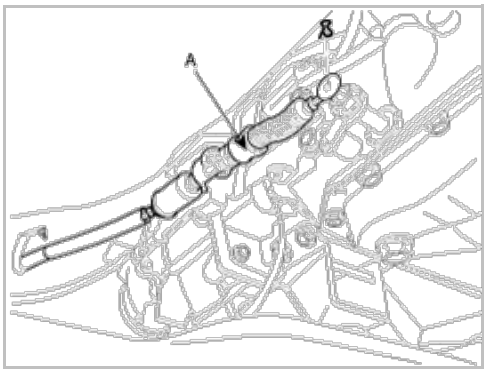
9. Remove the transmission oil level gauge(A).



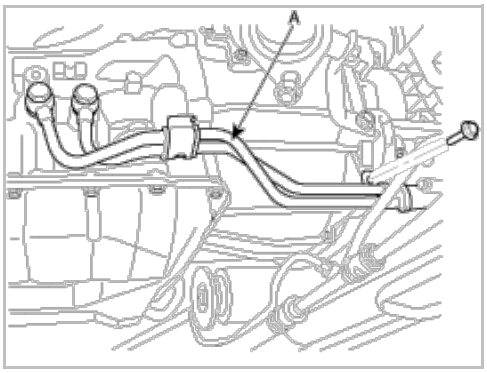
10. Remove the shift cable cover(A).



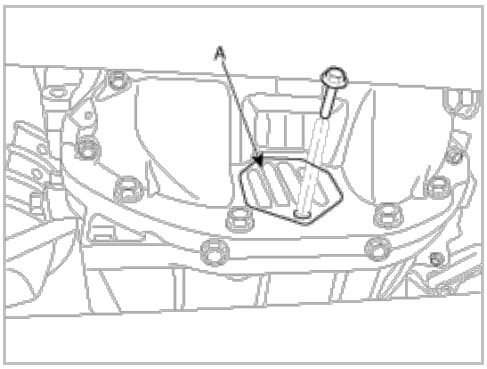
11. Remove the shift cable(A).



12. Remove the oil cooler pipes(A).

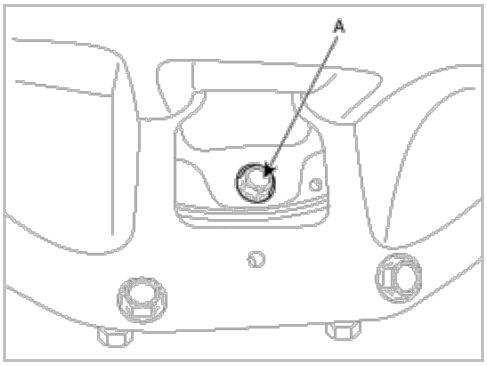


13. Remove the drive plate cover(A).

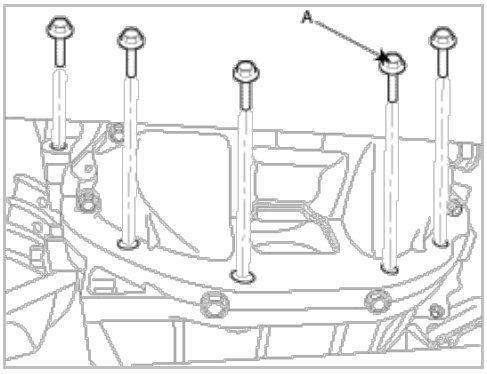


14. Remove the drive plate bolts(A).

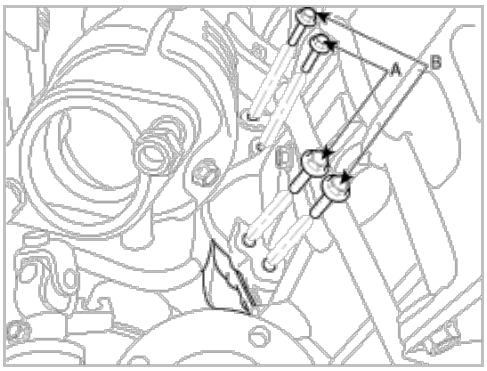
> NOTE
>
> Remove the bolts(A-6ea) while rotating the crankshaft clockwise.



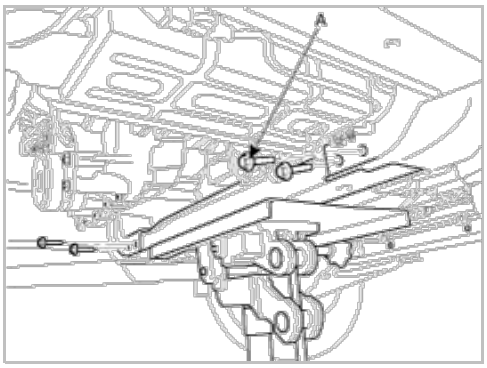
15. Remove the transmission lower mounting bolts(A).



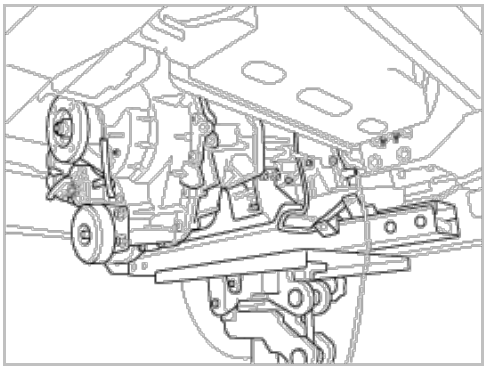
16. Remove the starter motor mounting bolts(A) and the other bolts(B).



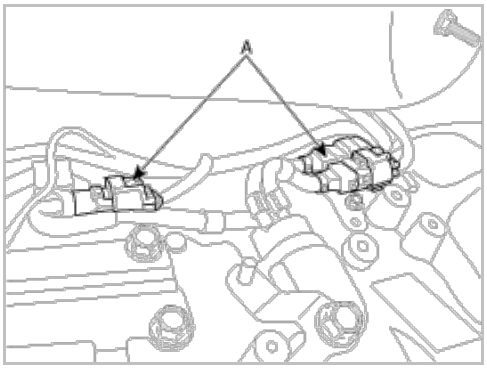
17. Remove the mounting bolts(A) while supporting the transmission with a jack.



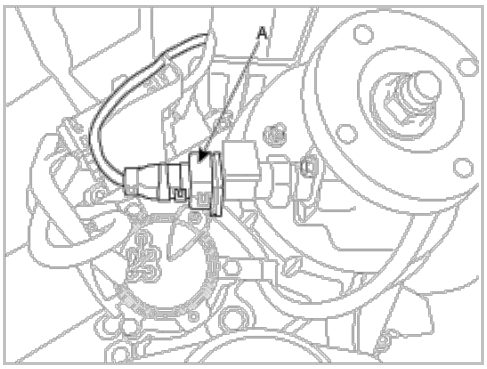
18. Lower the jack slightly to simpify removal of electrical connectors and bolts on the upper part of the transmission.



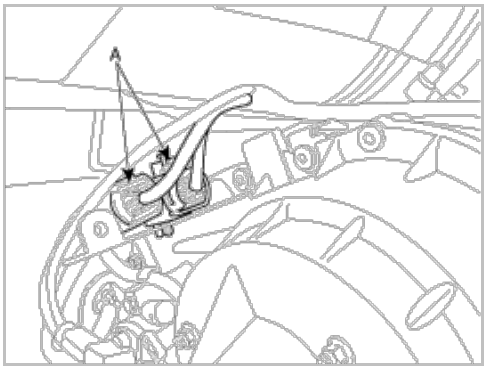
19. Disconnect the transmission wire harness connectors(A).



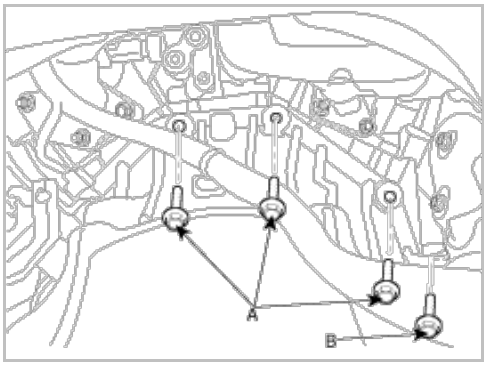
20. Remove the vehicle speed sensor connector(A).



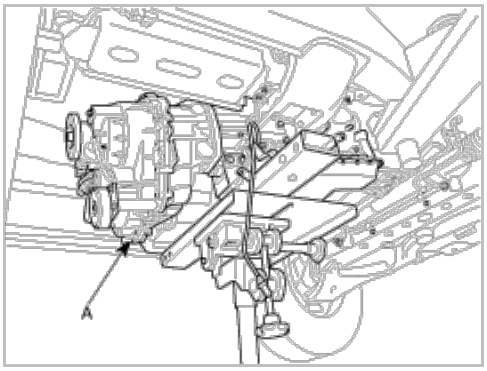
21. Remove the transfer case connectors(A). (4WD)



22. Remove the transmission upper mounting bolts(A,B).

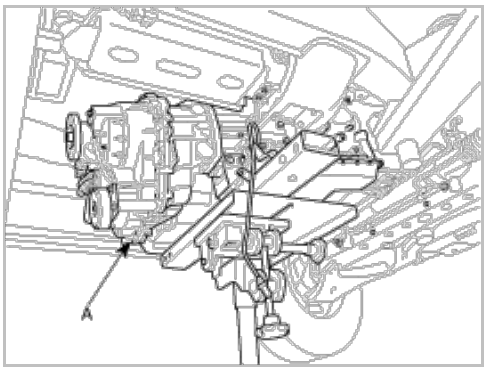


23. Remove the transmission (2WD) or transmission/transfer case assembly(4WD)(A).



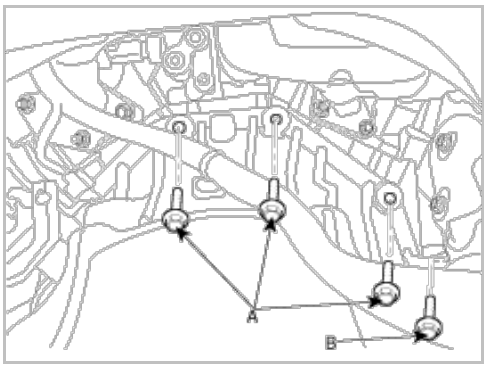
INSTALLATION

1. Using a transmission jack, install the transmission (2WD) or transmission/transfer case assembly(4WD)(A).

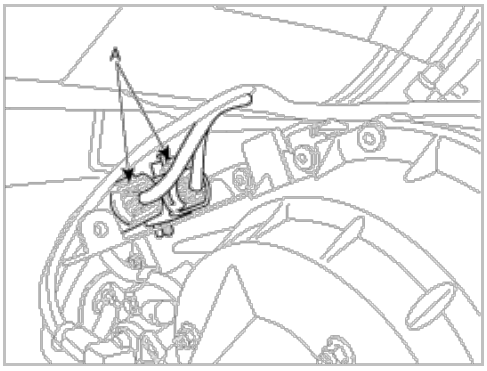


2. Tighten the transmission mounting bolts(A,B).

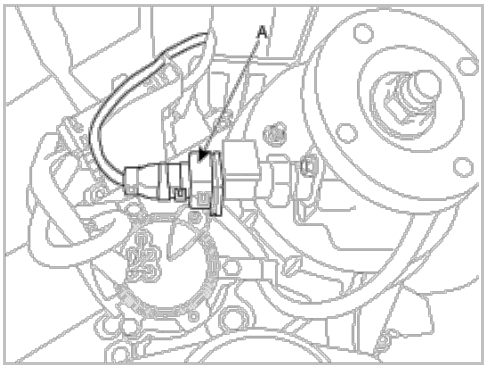
TORQUE
A : 30~42Nm (3.0~4.2kgf.m, 21.6~30.3lb-ft)
B : 78.4~98Nm (8.0~10kgf.m, 57.8~72.3lb-ft)



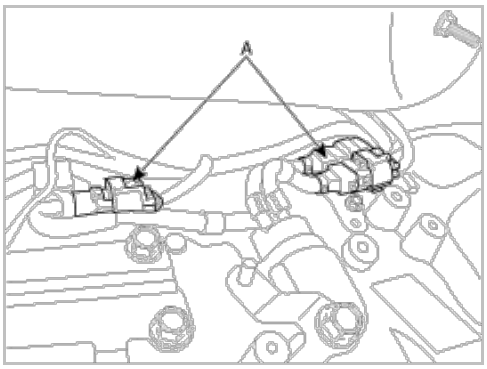
3. Install the transfer case connectors(A). (4WD)



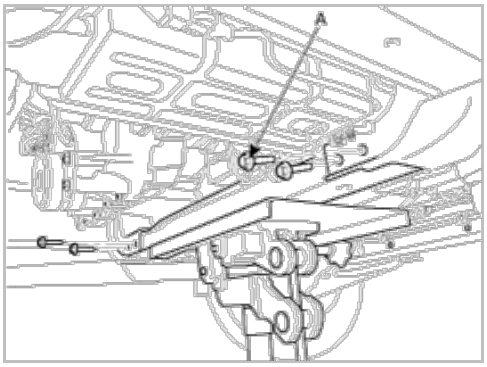
4. Install the vehicle speed sensor connector(A).



5. Connect the transmission wire harness connectors(A).

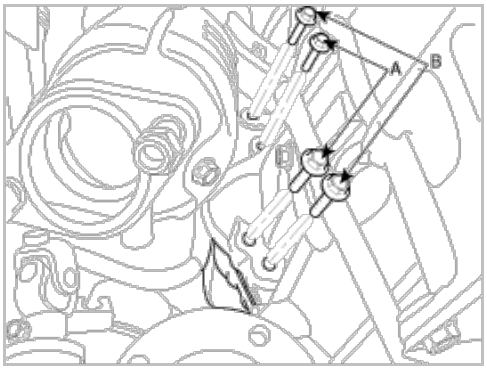


6. Install the crossmember mounting bolts(A).

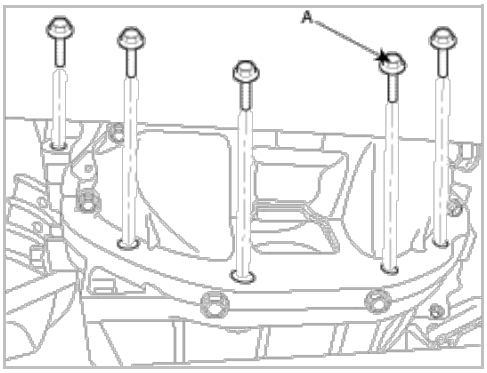


7. Install the starter motor mounting bolts(A) and the other bolts(B).

TORQUE
A: 50~65Nm(5.0~6.5kgf.m, 36.2~47.0lb-ft)
B : 34.3~46Nm (3.5~4.7kgf.m,25.3~33.9 lb-ft)



8. Install the Tighten the transaxle lower mounting bolts(A).

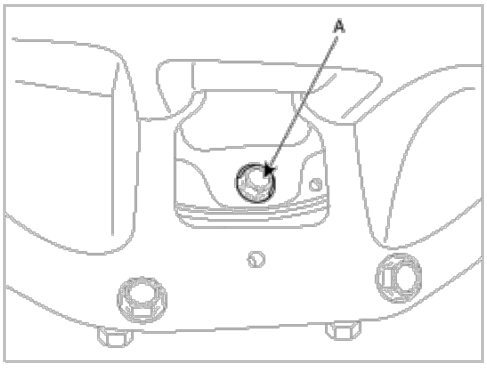


9. Install the drive plate bolts (A) by turning the timing gear.

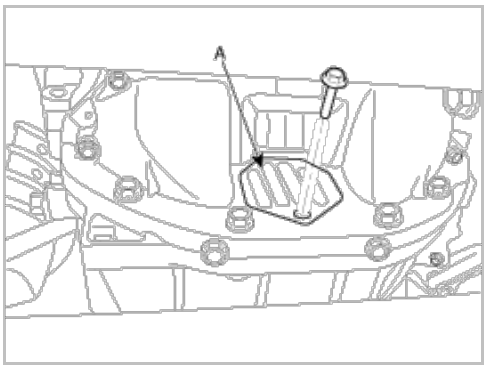
TORQUE :
34.3~41.1Nm (3.5~4.2kgf.m, 25.3~30.3lb-ft)

NOTE

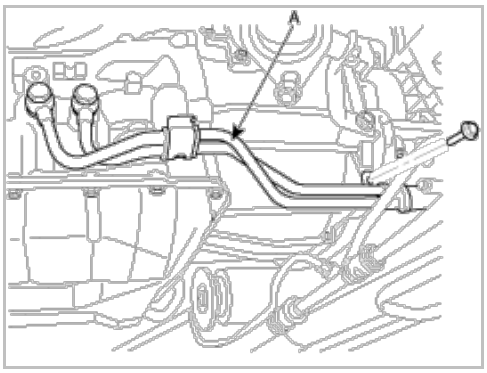
Install the bolts(A-6ea) rotating the crankshaft clockwise.



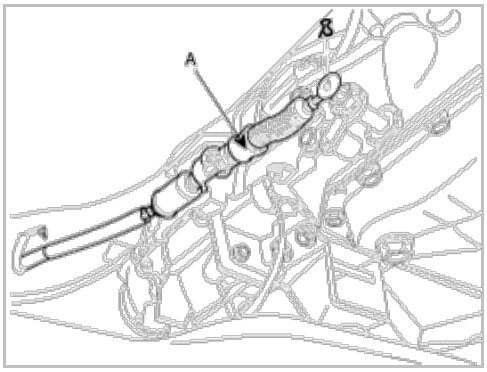
10. Install the drive plate cover(A).



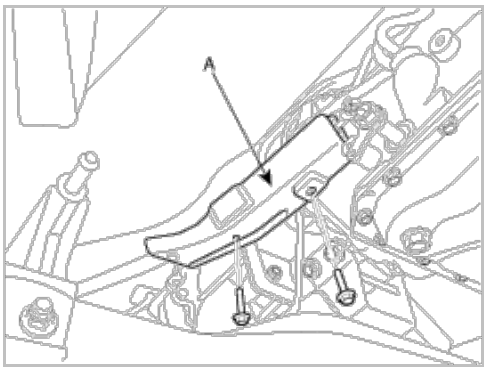
11. Install the oil cooler pipes(A).



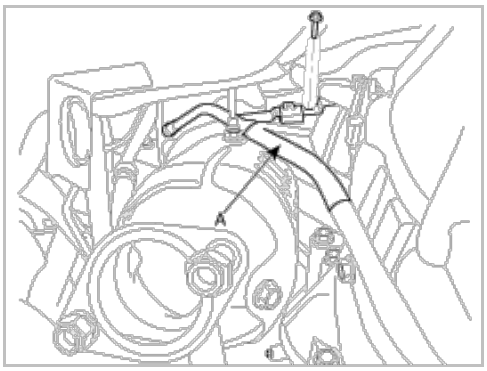
12. Install the shift cable(A).



13. Install the shift cable cover(A).

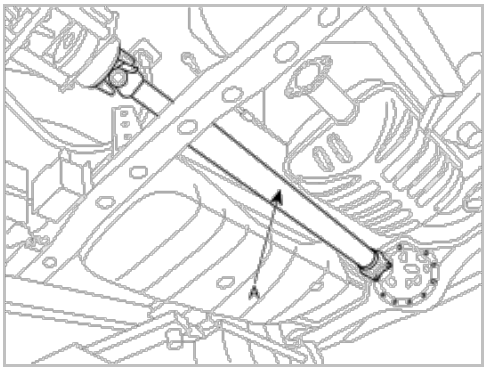


14. Install the transmission oil level gauge(A).

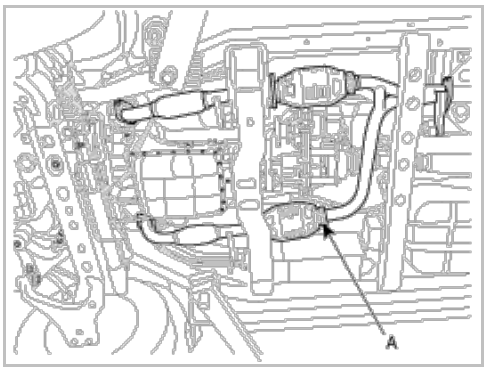


15. Install the rear propeller shaft(A).

TORQUE :
58.83~68.64Nm(6~7kgf.m, 43.39~50.63lb-ft)

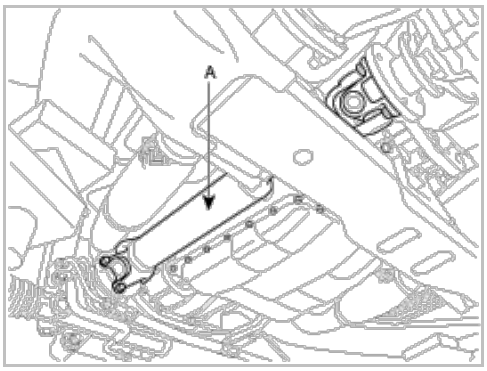


16. Install the front muffler(A) and the heat protector.

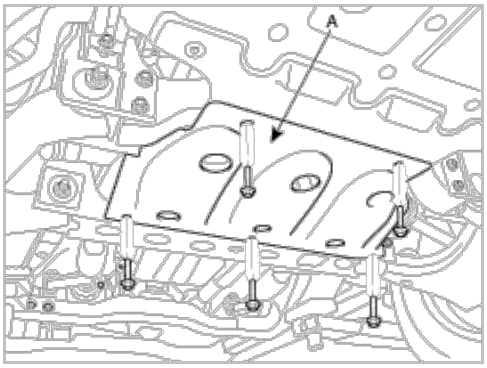


17. Install the front propeller shaft(A). (4WD)

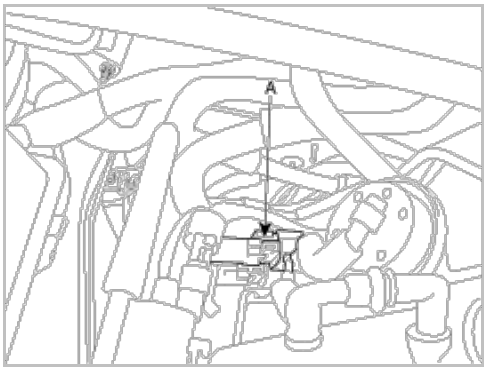
TORQUE :
58.83~68.64Nm(6~7kgf.m, 43.39~50.63lb-ft)

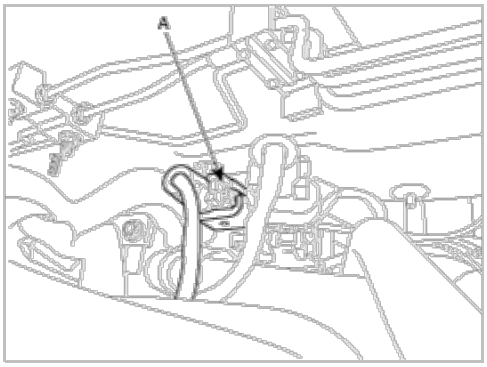


18. Refill the transmission fluid. (see 'Service adjustment procedure')
19. Install the under cover(A).

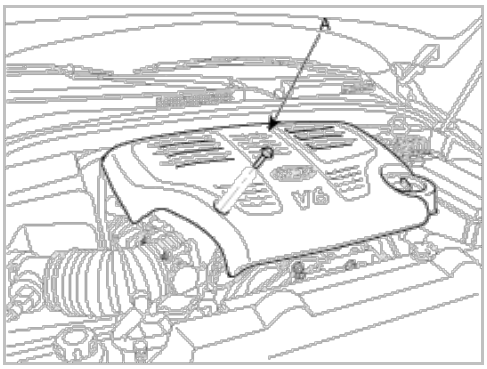


20. Install the O2 sensor connectors(A).

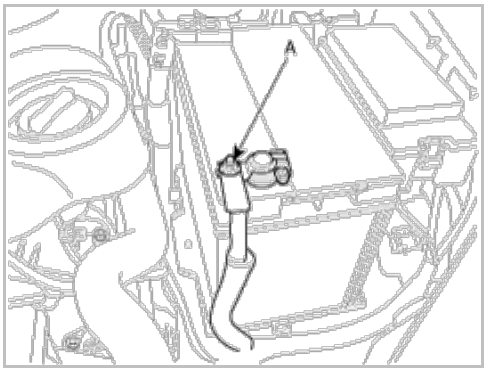




21. Install the engine cover(A).



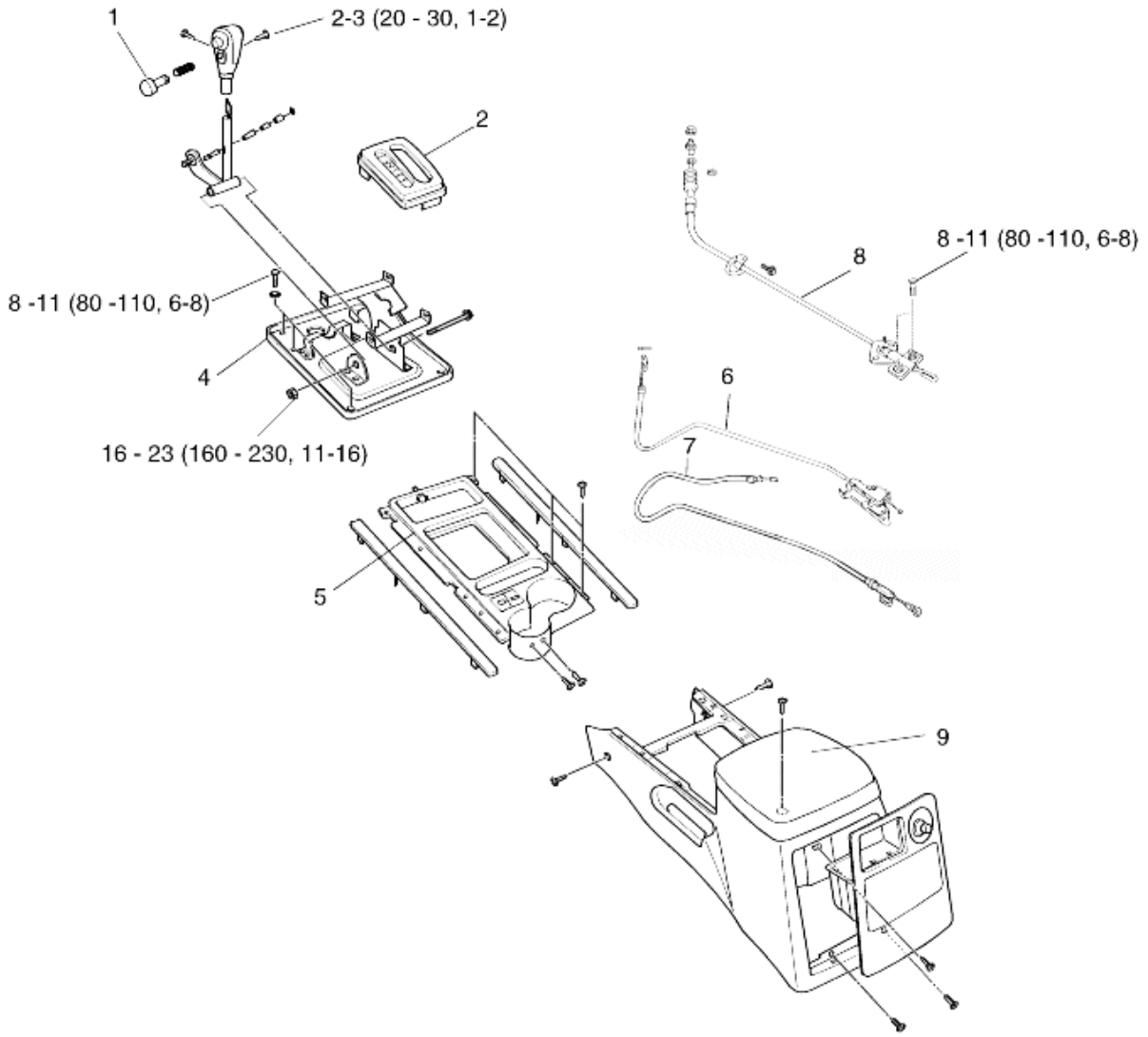
22. Install the battery (-) terminal(A).



23. Refill the transmission fluid. (See 'service adjustment procedure)

Automatic Transaxle System > Automatic Transaxle Control System > Shift Lever > Components and Components Location

COMPONENTS



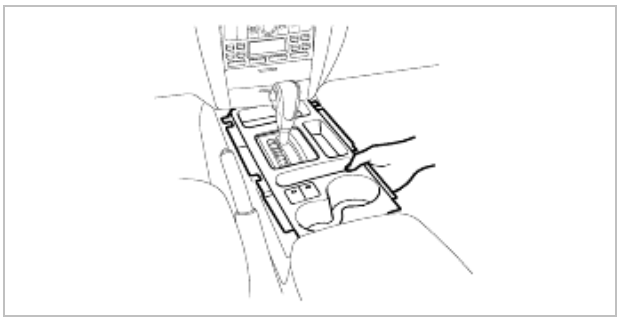
Tightening torque : N-m (kg-cm, lb-ft)

1. Push button
2. Knob
3. Control lever indicator bracket
4. Bracket
5. Console upper cover plate
6. Shift lock cable
7. Key lock cable
8. Control cable
9. Center console

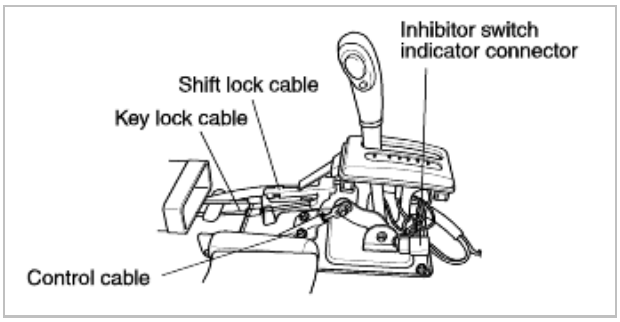
Automatic Transaxle System > Automatic Transaxle Control System > Shift Lever > Repair procedures

REMOVAL

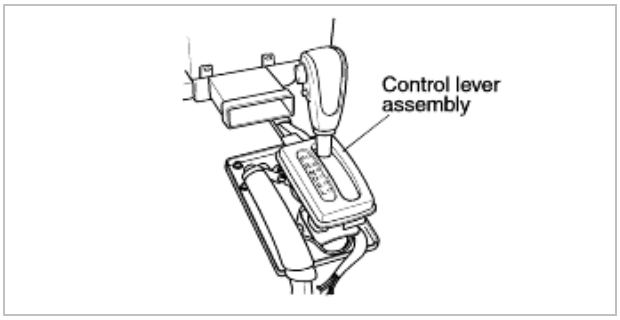
1. Remove the console upper cover plate.



2. Remove the center console assembly.
3. Remove the control cable, the shift lock cable and key lock cable.



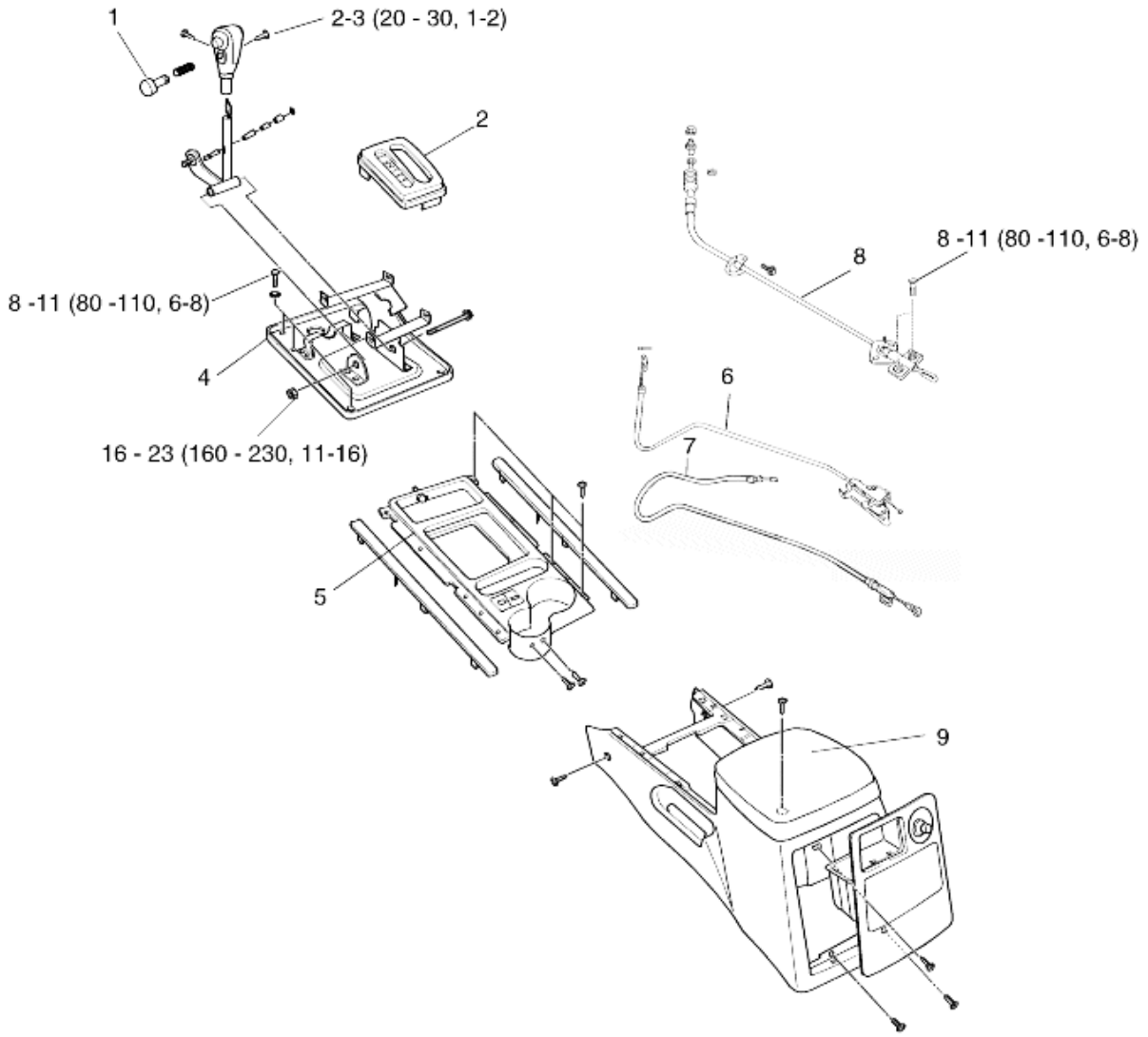
4. Disconnect the inhibitor switch indicator connector.
5. Remove the control lever assembly.



6. Remove the control lever bracket.

Automatic Transaxle System > Automatic Transaxle Control System > Shift Lock Cable > Components and Components Location

Components



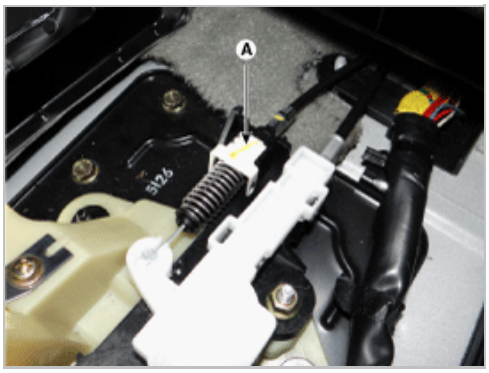
Tightening torque : N-m (kg-cm, lb-ft)

1. Push button
2. Knob
3. Control lever indicator bracket
4. Bracket
5. Console upper cover plate
6. Shift lock cable
7. Key lock cable
8. Control cable
9. Center console

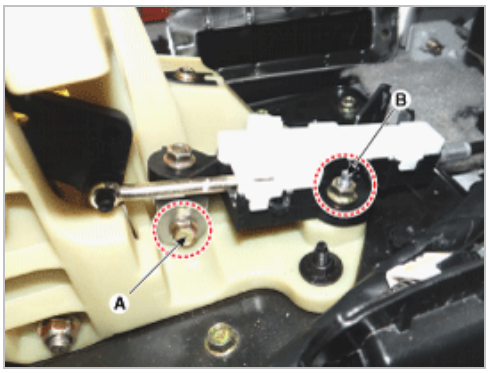
Automatic Transaxle System > Automatic Transaxle Control System > Shift Lock Cable > Repair procedures

Removal

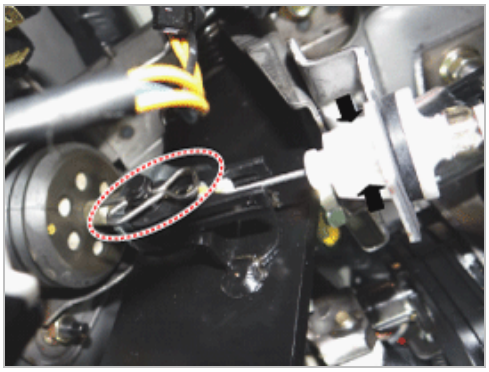
1. Remove the floor console assembly.
   (Refer to BD group - "Console")
2. Remove the key lock cable (A).



3. Loosen the bolt (A) and nut (B) and then remove the shift lock cable from the lock cam.



4. Remove the blower unit.
   (Refer to HA group - "Blower Unit")
5. Remove the pin and then remove the shift lock cable from the brake pedal.

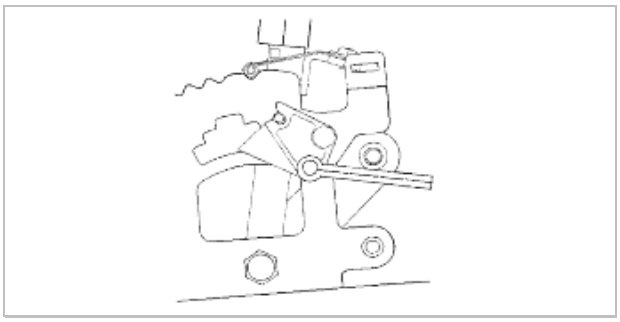


Installation

1. Install in the reverse order of removal.

NOTE

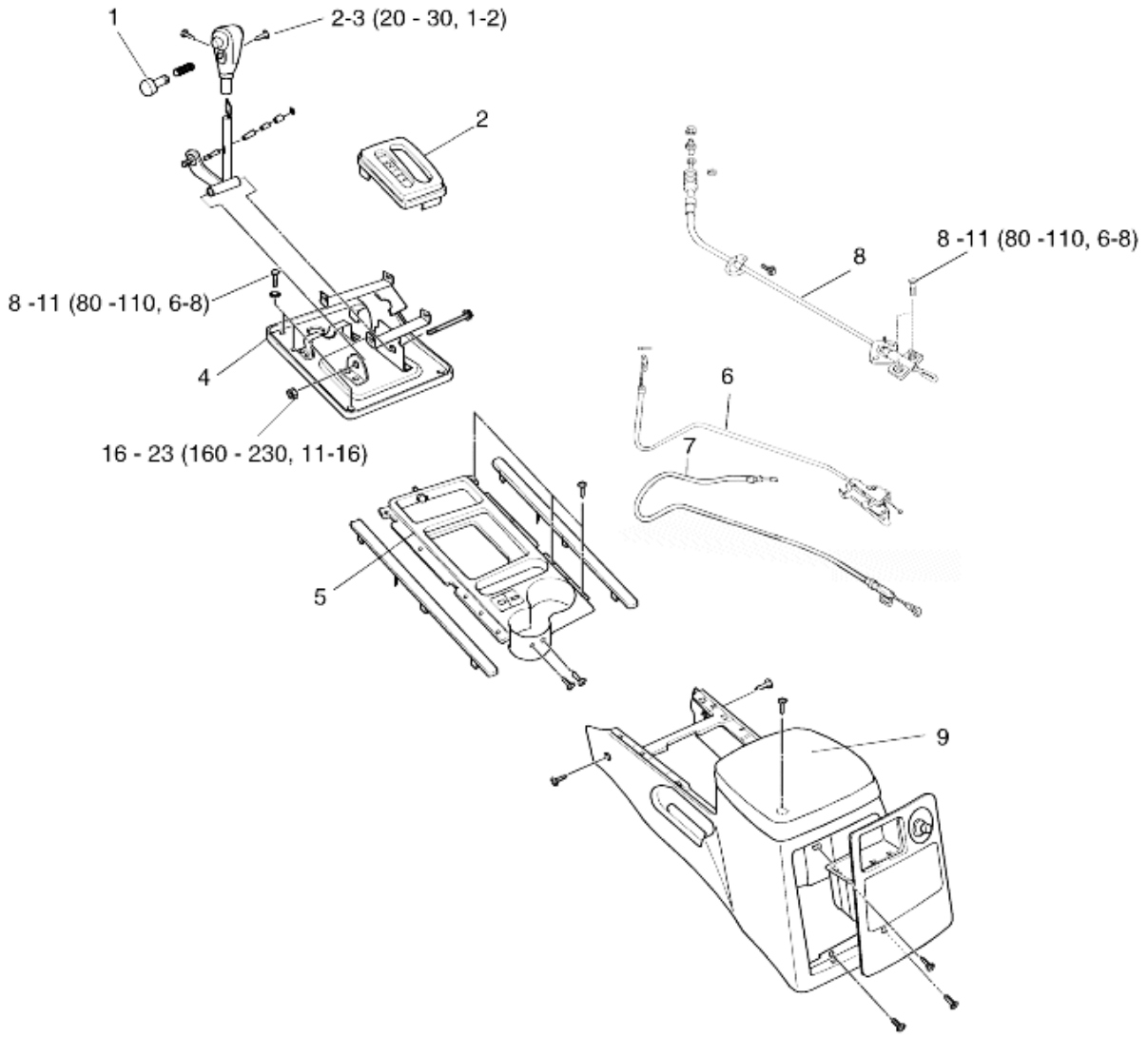
When servicing the shift lock device, follow the service instructions and procedures described below in order to operateit normally.
1. Procedure to install the lock cam.
   - Make sure to move shift lever to position "P" and install lock cam as figure.



2. Procedure for adjusting shift lock cable.
(1) Check that lock cam is located in position.
(2) Install shift lock cable in position as figure.
(3) Temporarily install shift lock cable to A/T lever assembly as shown in figure. Securely insert cable end into fixing pin of cam.
(4) After checking that a portion of cable end touches cable fixing pin of P-lock cam, fix shift lock cable to A/T lever.
3. Checking that procedure for installing the shift lock is correct.
(1) When the brake pedal is not depressed, push button of the shift lever at "P" position cannot be operated. (Shift lever cannot be shifted at the other positions from "P").Push button can be operated at the other positions except "P".
(2) When brake pedal stroke is 30 mm (with shift lever at "P" position), push button should be operated without catching and shift lever can be shifted smoothly to other from "P".
(3) When brake pedal is not depressed, shift lever should be shifted smoothly to "P" position from other positions.
(4) Brake pedal must be operated smoothly without catching at all positions.
(5) If shift lever is shifted to "P" position, ignition key must be turned to "LOCK" position smoothly.

Automatic Transaxle System > Automatic Transaxle Control System > Control cable > Components and Components Location

Components



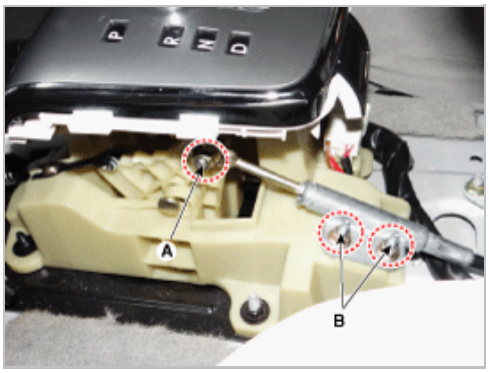
Tightening torque : N-m (kg-cm, lb-ft)

1. Push button
2. Knob
3. Control lever indicator bracket
4. Bracket
5. Console upper cover plate
6. Shift lock cable
7. Key lock cable
8. Control cable
9. Center console

Automatic Transaxle System > Automatic Transaxle Control System > Control cable > Repair procedures

Removal

1. Remove the floor console assembly.
   (Refer to Body - "Console")
2. Loosen the nuts (A, B) and then remove the control cable from the shift lever.



3. Remove the control cable retainer.
4. Remove the cover (A).

5. Remove the pin & washer (A) and then remove the cable from the cable bracket.

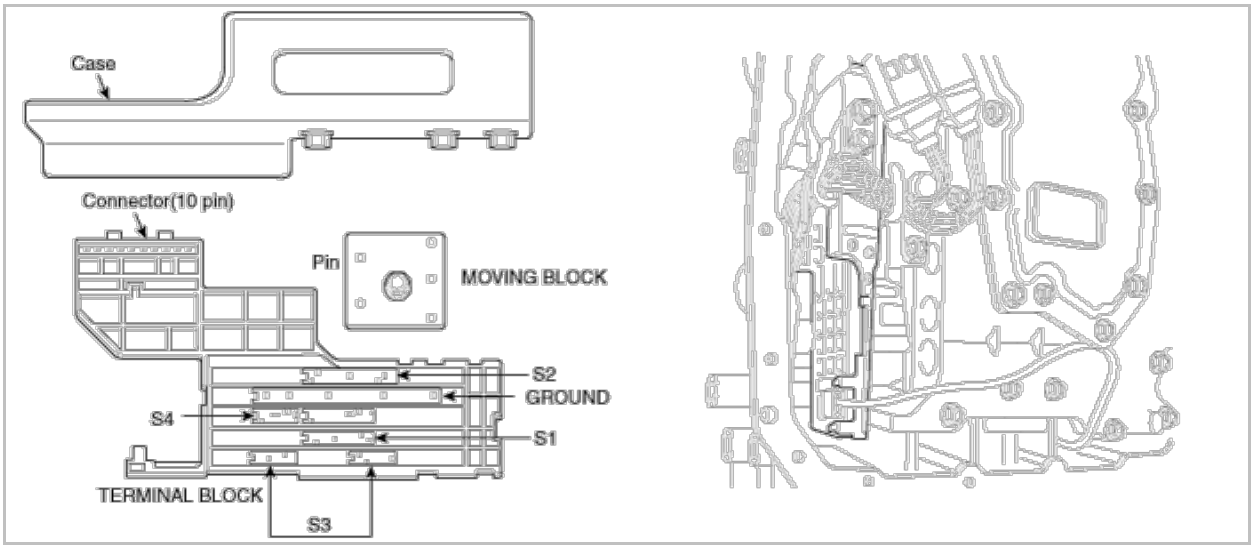
6. Remove the control cable bracket (A).

Installation

1. Install in the reverse order of removal.

Automatic Transaxle System > Troubleshooting > P0705

COMPONENT LOCATION



GENERAL DESCRIPTION

When the shift lever is in the D (Drive) position the output signal of Tansaxle Range Switch is 12V and in all other positions the voltage is 0V. The TCM judges the shift lever position by reading all signals, for the TRANSMISSION Range Switch, simultaneously.

DTC DESCRIPTION

The TCM sets this code when patterns are out of specifications.
The TRANSMISSION Range Switch has no output signal for an extended period of time.

DTC DETECTING CONDITION

Item	Detecting Condition	Possible cause
DTC Strategy	• Range decision by switch pattern	• OPEN OR SHORT IN CIRCUIT • Faulty TRANSMISSION RANGE SWITCH • Faulty TCM
Enable Conditions	• Sensor supply voltage in valid range	
Threshold value	• "INHIBITOR SWITCH" pattern check.	
Diagnostic Time	• More than 10sec	
Fail Safe	• SELECT POSITION IS REGARDED AS "D" • INDICATOR DECISION "OFF" • REVERSE LAMP SIGNAL "OFF"	

SPECIFICATION

A/T RANGE PATTERN

A/T range switch				Range swsitch	Remarks
SW1	SW2	SW3	SW4		
OFF	OFF	OFF	OFF	Pst	P start
OFF	OFF	ON	OFF	P	P
OFF	OFF	ON	ON	P-R	Intermediate
ON	OFF	ON	ON	R	R
ON	OFF	ON	OFF	N-R	Intermediate
ON	OFF	OFF	OFF	Nst	N start

ON	OFF	OFF	ON	N-D	Intermediate
ON	ON	OFF	ON	D	D
OFF	ON	OFF	ON	3	3
OFF	ON	ON	ON	2	2
OFF	ON	ON	OFF	1	1
Irregular Pattern				Other	

[OFF= 5V, ON = 0V]

Monitor Scantool Data

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

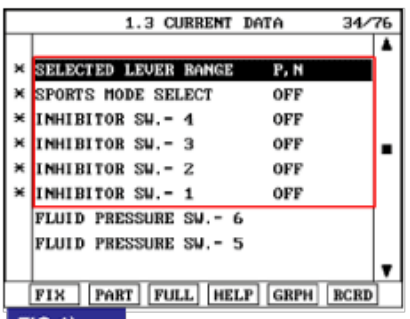


FIG.1)

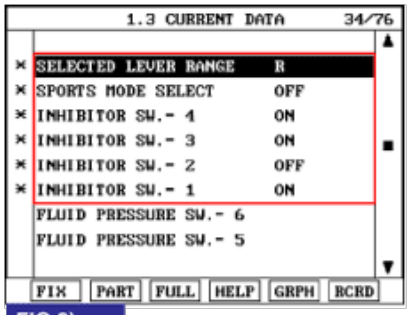


FIG.2)

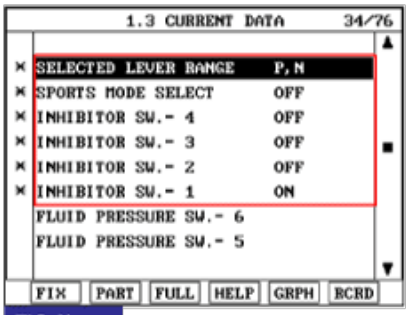


FIG.3)

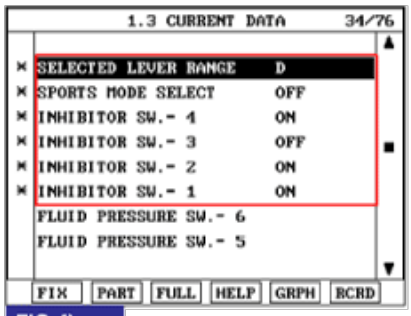


FIG.4)

FIG.5)

FIG.1) P RANGE
FIG.2) R RANGE
FIG.3) N RANGE
FIG.4) D RANGE
FIG.5) SPORTS MODE

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

YES

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

NO

▶ Go to "Terminal & connector inspection" procedure.

TERMINAL & CONNECTOR INSPECTION

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

YES

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

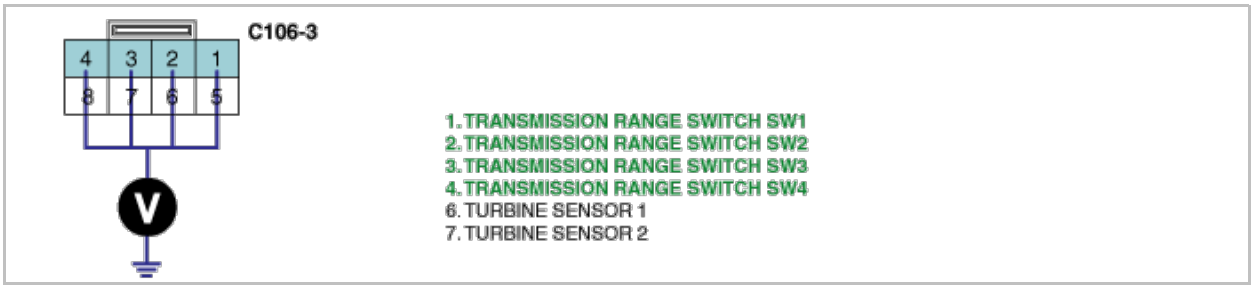
NO

▶ Go to "Signal circuit inspection" procedure.

SIGNAL CIRCUIT INSPECTION

1. Disconnect "C106-3" connector.
2. Ignition "ON" & Engine "OFF".
3. Measure voltage between each terminal "1,2,3,4" of the TCM side harness connector and chassis ground.

Specification : approx. 5V



4. Is voltage within specifications?

YES

▶ Go to "Component inspection" procedure.

NO

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

COMPONENT INSPECTION

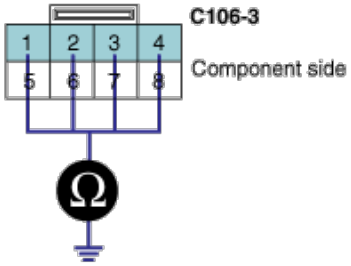
1. Ignition "OFF".
2. Disconnect "C106-3" connector.
3. Measure the resistance between each terminal of the sensor.

Specification :

PIN No.	GND	1(S1)	2(S2)	3(S3)	4(S4)	IND
P-ST	●					P
P-R(middle)	●				●	-
R	●	●		●	●	R
N-R(middle)	●	●	●		●	-
N-ST	●	●				N
N-D(middle)	●	●	●	●		-
D	●	●	●		●	D

● : SWITCH IS ON(GND LEVER)
– : RANGE INDICATOR LAMP "OFF" AND MAINTAIN PREVIOUS RANGE

[RANGE SWITCH continuity check table]



1. TRANSMISSION RANGE SWITCH SW1
2. TRANSMISSION RANGE SWITCH SW2
3. TRANSMISSION RANGE SWITCH SW3
4. TRANSMISSION RANGE SWITCH SW4
6. TURBINE SENSOR 1
7. TURBINE SENSOR 2

4. Is resistance within specifications?

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

▶ Check for open or short in harness. Repair as necessary and Go to "Verification of Vehicle Repair" procedure.
If signal circuit in harness is OK, Substitute with a known-good "TRANSMISSION RANGE SWITCH" and check for proper operation. If the problem is corrected, replace "TRANSMISSION RANGE SWITCH" as necessary and go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR

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

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

YES

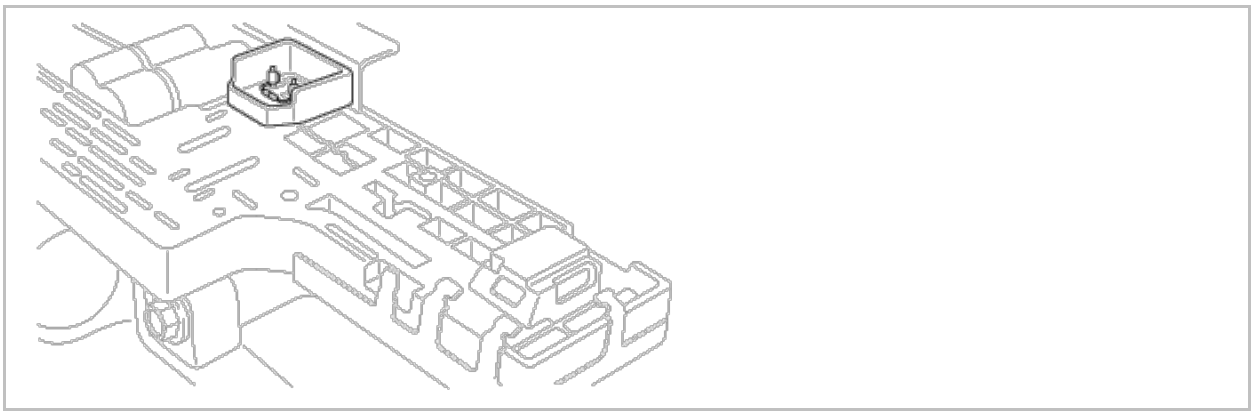
▶ Go to the applicable troubleshooting procedure.

NO

▶ System performing to specification at this time.

Automatic Transaxle System > Troubleshooting > P0711

COMPONENT LOCATION



GENERAL DESCRIPTION

The automatic transmission fluid(ATF) temperature sensor A is installed in the INHIBITOR SWITCH and fluid(ATF) temperature sensor B is installed in the valve body. Sensor B measured the temperature of the oil flowing from the torque converter. The TCM supplies a 5V reference voltage to the sensor, and the output voltage of the sensor changes when the ATF temperature varies.

DTC DESCRIPTION

This DTC is for checking sensor failure. This code is set if the temperture data from Oil Temperture sensor is fixed between -4°F and 32°F or 32°F and 68°F for 10min.

DTC DETECTING CONDITION

Item	Detecting Condition	Possible cause
DTC Strategy	• Rationality	※ ATF T/S : Automatic Transmission Fluid Temperature Sensor • OPEN OR SHORT IN CIRCUIT • Faulty ATF T/S 1 • Faulty TCM
Enable Conditions	• Always	
Threshold value	• Oil temp. at IG "ON" - Coolant temp. at IG "ON" >10°C	
Diagnostic Time	• More than 2 sec	
Fail Safe	• Fluid temperature is regarded as 80°C	

SPECIFICATION

	PIN No	TEMPERATURE (°F)	RESISTANCE (KΩ)	VOLTAGE (V)
ATF 1	C106-1 : 9 ~ GND	32	Approx. 15	Approx. 3.3
		68	Approx. 6.5	Approx. 2.7
		176	Approx. 0.9	Approx. 0.9
ATF 2	C106-2 : 1 ~ GND	32	Approx. 10.5	Approx. 3.3
		68	Approx. 4.3	Approx. 2.5
		176	Approx. 0.5	Approx. 0.7

Monitor Scantool Data

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

Specification : Increasing Gradually

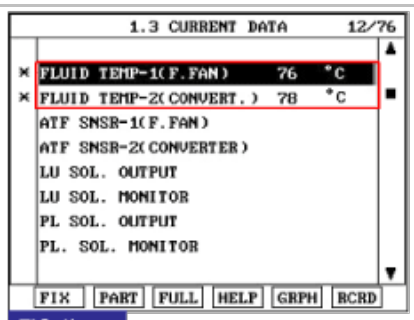


FIG.1)

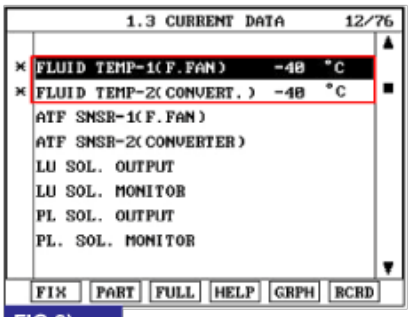


FIG.2)

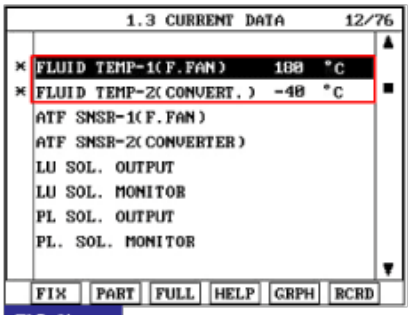


FIG.3)

FIG.1) Normal
FIG.2) Signal harness open
FIG.3) Signal harness ground short

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

YES

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

NO

▶ Go to "Terminal & connector inspection" procedure.

TERMINAL & CONNECTOR INSPECTION

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

YES

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

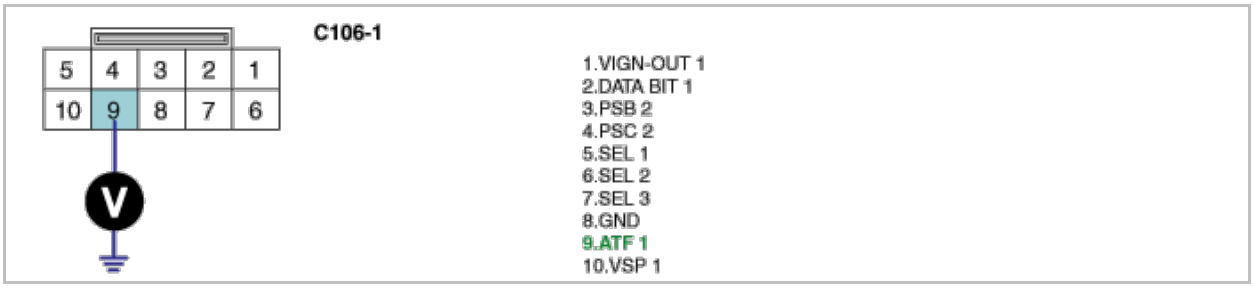
NO

▶ Go to "Signal circuit inspection" procedure.

SIGNAL CIRCUIT INSPECTION

1. Ignition "ON" & Engine "OFF".
2. Disconnect the "ATF 1[C106-1] and ATF 2[C106-2]" connector.
3. Measure the voltage between terminal "9" of the "ATF 1 [C106-1]" harness connector and chassis ground.

Specification : Approx. 5 V



4. Is voltage within specifications?

YES

▶ Go to "Component Inspection" procedure.

NO

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

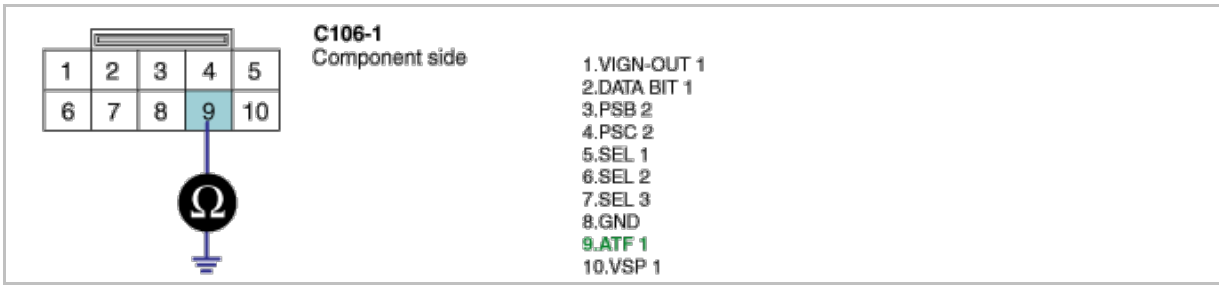
COMPONENT INSPECTION

1. CHECK "TRANSMISSION FLUID TEMPERATURE SENSOR"
   (1) Ignition "OFF" .
   (2) Disconnect the "ATF 1 [C106-1] and ATF 2 [C106-2]" connector.
   (3) Measure the rasistance between terminal "9" of the "ATF 1 [C106-1]" harness connector and chassis ground.

   Specification : Refer to " Reference data"

   [Reference data]

	PIN No	TEMPERATURE (°F)	RESISTANCE (KΩ)	VOLTAGE (V)
ATF 1	C106-1 : 9 ~ GND	32	Approx. 15	Approx. 3.3
		68	Approx. 6.5	Approx. 2.7
		176	Approx. 0.9	Approx. 0.9
ATF 2	C106-2 : 1 ~ GND	32	Approx. 10.5	Approx. 3.3
		68	Approx. 4.3	Approx. 2.5
		176	Approx. 0.5	Approx. 0.7



   (4) Is resistance within specifications?

   YES

   ▶ Go to "CHECK PCM/TCM" as below.

   NO

   ▶ Check for open or short in harness. Repair as necessary and Go to "Verification of Vehicle Repair" procedure.
   Replace "TRANSMISSION FLUID TEMPERATURE SENSOR 1" as necessary and Go to "Verification of Vehicle Repair procedure.

2. CHECK TCM
   (1) Ignition "ON" & Engine "OFF".
   (2) Disconnect the "ATF 1 [C106-1] " connector.

(3) Install scantool and access "SIMU-SCAN" mode.

(4) Simulate voltage (0→5V) to "TRANSMISSION FLUID TEMPERATURE SENSOR 1, 2" signal circuit.

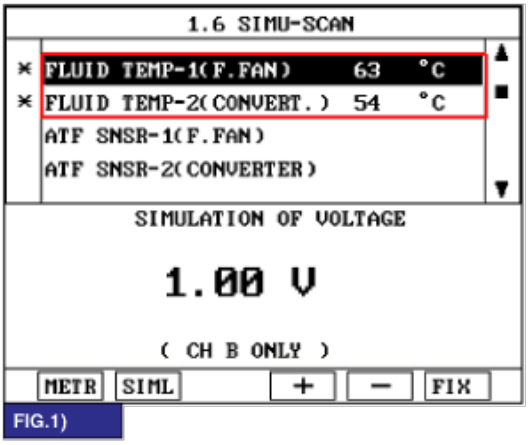


FIG.1)

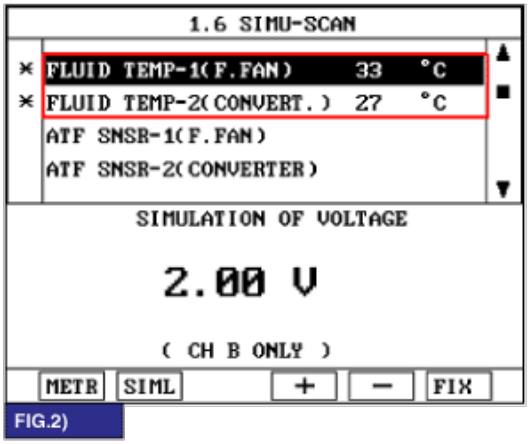


FIG.2)

FIG.1) INPUT 1.02V → 63°C
FIG.2) INPUT 2.00V → 33°C

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

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

YES

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

NO

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

VERIFICATION OF VEHICLE REPAIR

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

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

YES

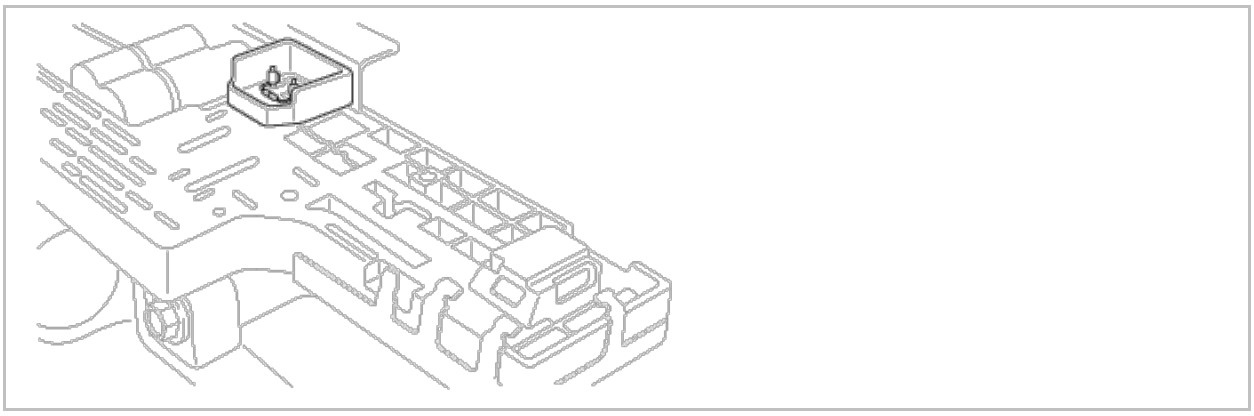
▶ Go to the applicable troubleshooting procedure.

NO

▶ System performing to specification at this time.

Automatic Transaxle System > Troubleshooting > P0712

COMPONENT LOCATION



GENERAL DESCRIPTION

The automatic transmission fluid(ATF) temperature sensor A is installed in the INHIBITOR SWITCH and fluid(ATF) temperature sensor B is installed in the valve body. Sensor B measured the temperature of the oil flowing from the torque converter. The TCM supplies a 5V reference voltage to the sensor, and the output voltage of the sensor changes when the ATF temperature varies. The automatic transmission fluid(ATF) temperature provides very important data for the TCM's control of the Torque Converter Clutch, and is also used for many other purposes.

DTC DESCRIPTION

This DTC is for checking sensor failure. This code is set if the temperture data from Oil Temperture sensor is fixed between -4°F and 32°F or 32°F and 68°F for 10min.

DTC DETECTING CONDITION

Item	Detecting Condition	Possible cause
DTC Strategy	• Check the voltage range	※ ATF T/S : Automatic Transmission Fluid Temperature Sensor • OPEN IN CIRCUIT • Faulty ATF T/S 1
Enable Conditions	• Battery voltage >10V	
Threshold value	• Input voltage < 0.05V	
Diagnostic Time	• More than 2 sec	
Fail Safe	• Fluid temperature is regarded as 80°C	

SPECIFICATION

	PIN No	TEMPERATURE (°F)	RESISTANCE (KΩ)	VOLTAGE (V)
ATF 1	C106-1 : 9 ~ GND	32	Approx. 15	Approx. 3.3
		68	Approx. 6.5	Approx. 2.7
		176	Approx. 0.9	Approx. 0.9
ATF 2	C106-2 : 1 ~ GND	32	Approx. 10.5	Approx. 3.3
		68	Approx. 4.3	Approx. 2.5
		176	Approx. 0.5	Approx. 0.7

Monitor Scantool Data

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

Specification : Increasing Gradually

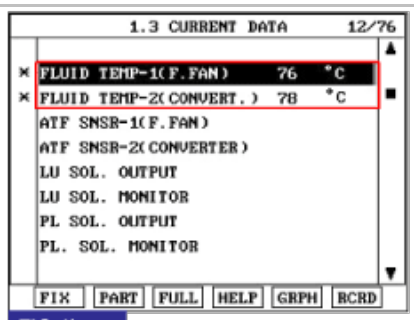


FIG.1)

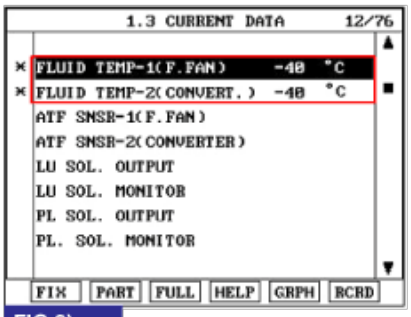


FIG.2)

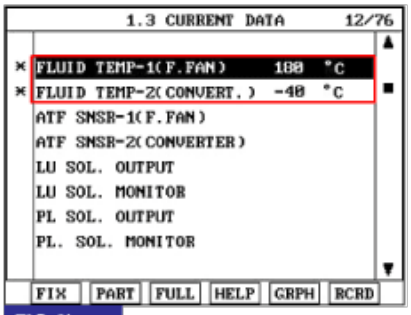


FIG.3)

FIG.1) Normal
FIG.2) Signal harness open
FIG.3) Signal harness ground short

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

YES

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

NO

▶ Go to "Terminal & connector inspection" procedure.

TERMINAL & CONNECTOR INSPECTION

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

YES

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

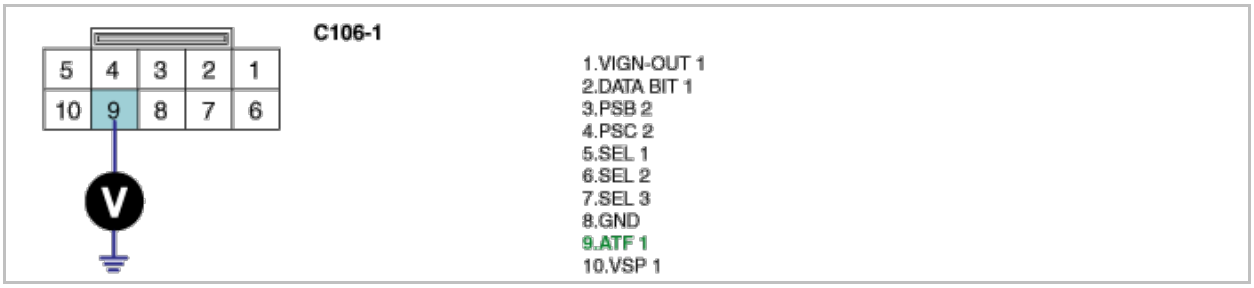
NO

▶ Go to "Signal circuit inspection" procedure.

SIGNAL CIRCUIT INSPECTION

1. Ignition "ON" & Engine "OFF".
2. Disconnect the "ATF 1[C106-1] and ATF 2[C106-2]" connector.
3. Measure the voltage between terminal "9" of the "ATF 1 [C106-1]" harness connector and chassis ground.

Specification : Approx. 5 V



4. Is voltage within specifications?

YES

▶ Go to "Component Inspection" procedure.

NO

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

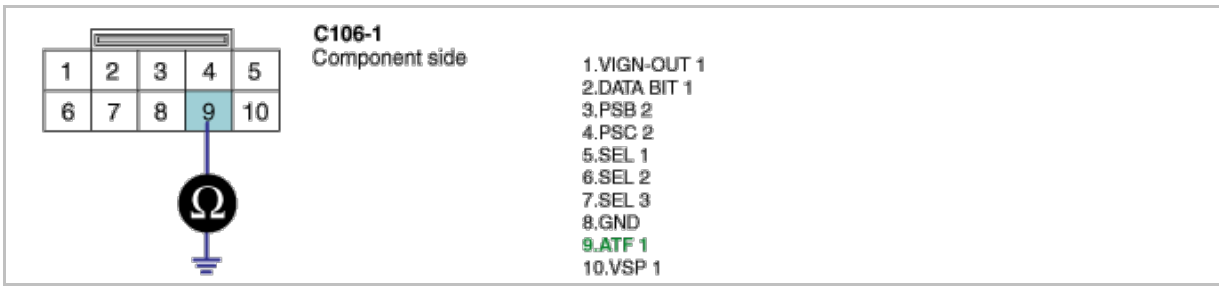
COMPONENT INSPECTION

1. CHECK "TRANSMISSION FLUID TEMPERATURE SENSOR"
   (1) Ignition "OFF" .
   (2) Disconnect the "ATF 1 [C106-1] and ATF 2 [C106-2]" connector.
   (3) Measure the rasistance between terminal "9" of the "ATF 1 [C106-1]" harness connector and chassis ground.

   Specification : Refer to " Reference data"

   [Reference data]

	PIN No	TEMPERATURE (°F)	RESISTANCE (KΩ)	VOLTAGE (V)
ATF 1	C106-1 : 9 ~ GND	32	Approx. 15	Approx. 3.3
		68	Approx. 6.5	Approx. 2.7
		176	Approx. 0.9	Approx. 0.9
ATF 2	C106-2 : 1 ~ GND	32	Approx. 10.5	Approx. 3.3
		68	Approx. 4.3	Approx. 2.5
		176	Approx. 0.5	Approx. 0.7



   (4) Is resistance within specifications?

   YES

   ▶ Go to "CHECK PCM/TCM" as below.

   NO

   ▶ Check for open or short in harness. Repair as necessary and Go to "Verification of Vehicle Repair" procedure. Replace "TRANSMISSION FLUID TEMPERATURE SENSOR 1" as necessary and Go to "Verification of Vehicle Repair procedure.

2. CHECK TCM
   (1) Ignition "ON" & Engine "OFF".
   (2) Disconnect the "ATF 1 [C106-1] " connector.

(3) Install scantool and access "SIMU-SCAN" mode.

(4) Simulate voltage (0→5V) to "TRANSMISSION FLUID TEMPERATURE SENSOR 1, 2" signal circuit.

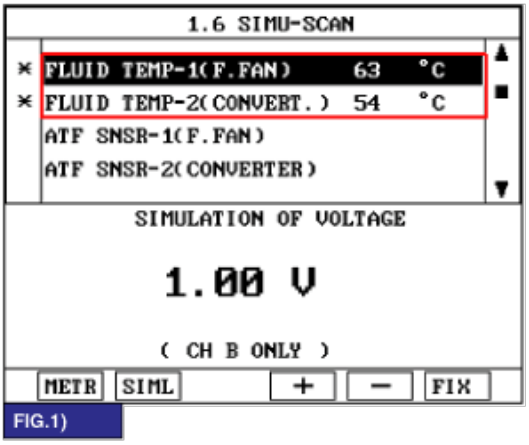


FIG.1)

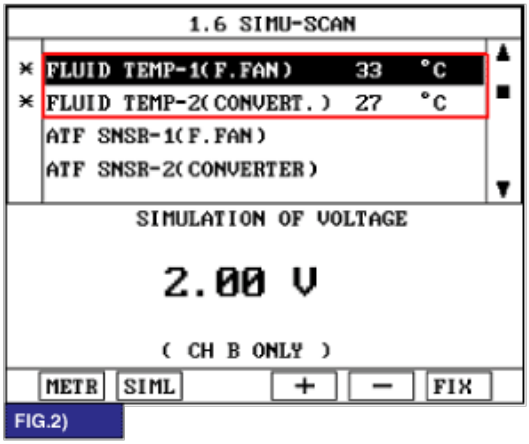


FIG.2)

FIG.1) INPUT 1.02V → 63°C
FIG.2) INPUT 2.00V → 33°C

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

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

YES

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

NO

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

VERIFICATION OF VEHICLE REPAIR

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

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

YES

▶ Go to the applicable troubleshooting procedure.

NO

▶ System performing to specification at this time.

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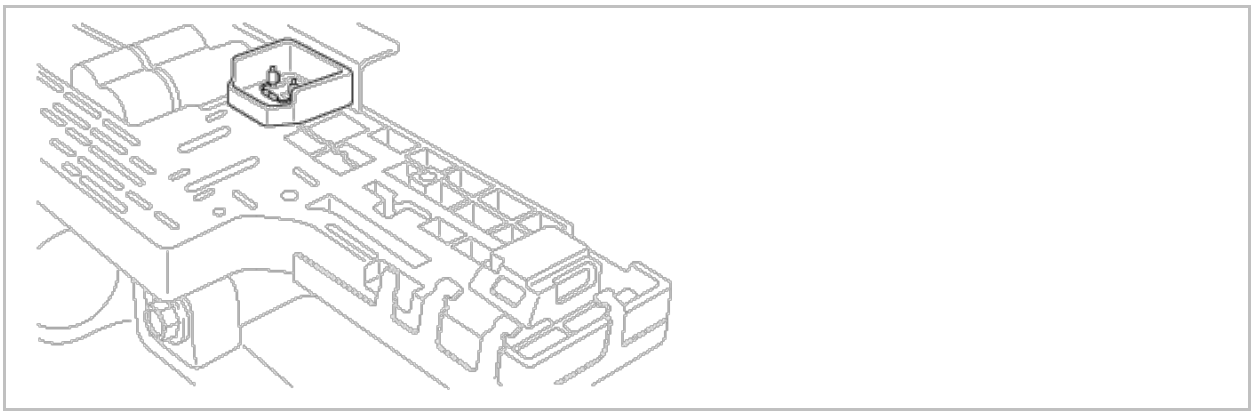
COMPONENT LOCATION



GENERAL DESCRIPTION

The automatic transmission fluid(ATF) temperature sensor A is installed in the INHIBITOR SWITCH and fluid(ATF) temperature sensor B is installed in the valve body. Sensor B measured the temperature of the oil flowing from the torque converter. The TCM supplies a 5V reference voltage to the sensor, and the output voltage of the sensor changes when the ATF temperature varies. The automatic transmission fluid(ATF) temperature provides very important data for the TCM's control of the Torque Converter Clutch, and is also used for many other purposes.

DTC DESCRIPTION

This DTC is for checking sensor failure. This code is set if the temperture data from Oil Temperture sensor is fixed between -4°F and 32°F or 32°F and 68°F for 10min.

DTC DETECTING CONDITION

Item	Detecting Condition	Possible cause
DTC Strategy	• Check the voltage range	※ ATF T/S : Automatic Transmission Fluid Temperature Sensor • OPEN OR SHORT IN CIRCUIT • Faulty ATF T/S 1 • Faulty TCM
Enable Conditions	• Oil temp. at IG "ON" ≤ -39°C • Engine speed > 1000rpm • Output speed ≥ 500rpm • Engine coolant temp. ≥ 70°C • Delay time = 160sec	
Threshold value	• Input voltage > 4.8V	
Diagnostic Time	• 10 minutes accumulative total	
Fail Safe	• Fluid temperature is regarded as 80°C	

SPECIFICATION

	PIN No	TEMPERATURE (°F)	RESISTANCE (KΩ)	VOLTAGE (V)
ATF 1	C106-1 : 9 ~ GND	32	Approx. 15	Approx. 3.3
		68	Approx. 6.5	Approx. 2.7
		176	Approx. 0.9	Approx. 0.9
ATF 2	C106-2 : 1 ~ GND	32	Approx. 10.5	Approx. 3.3
		68	Approx. 4.3	Approx. 2.5
		176	Approx. 0.5	Approx. 0.7

Monitor Scantool Data

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

Specification : Increasing Gradually

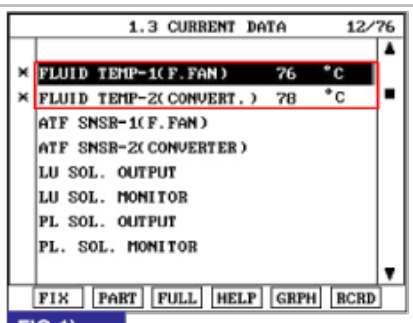


FIG.1)

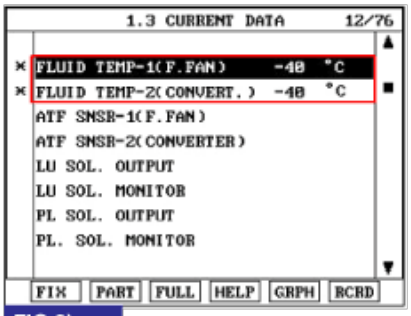


FIG.2)

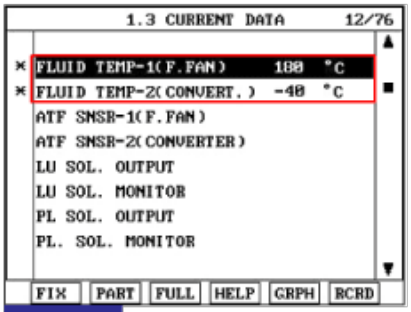


FIG.3)

FIG.1) Normal
FIG.2) Signal harness open
FIG.3) Signal harness ground short

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

YES

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

NO

▶ Go to "Terminal & connector inspection" procedure.

TERMINAL & CONNECTOR INSPECTION

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

YES

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

NO

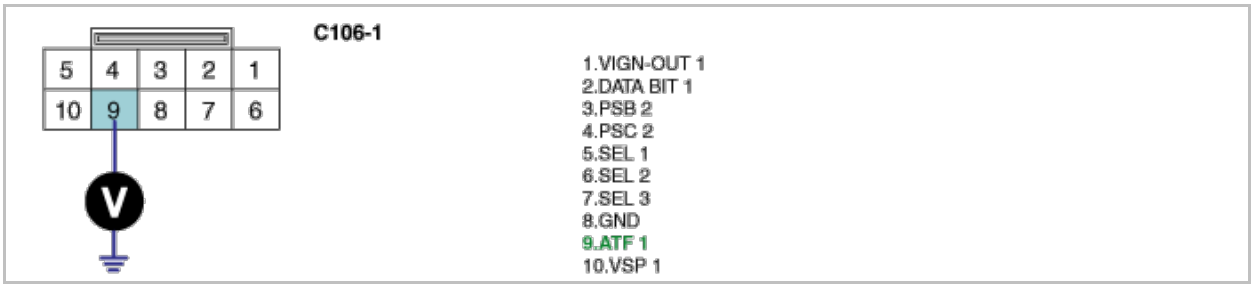
▶ Go to "Signal circuit inspection" procedure.

SIGNAL CIRCUIT INSPECTION

1. Ignition "ON" & Engine "OFF".
2. Disconnect the "ATF 1 [C106-1] and ATF 2 [C106-2]" connector.

3. Measure the voltage between terminal "9" of the "ATF 1 [C106-1]" harness connector and chassis ground.

Specification : Approx. 5 V



4. Is voltage within specifications?

YES

▶ Go to "Component Inspection" procedure.

NO

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

COMPONENT INSPECTION

1. CHECK "TRANSMISSION FLUID TEMPERATURE SENSOR"

(1) Ignition "OFF" .

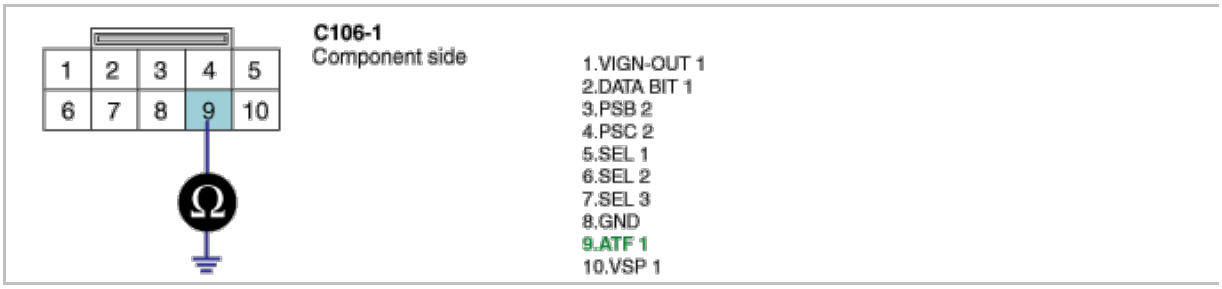
(2) Disconnect the "ATF 1 [C106-1] and ATF 2 [C106-2]" connector.

(3) Measure the rasistance between terminal "9" of the "ATF 1 [C106-1]" harness connector and chassis ground.

Specification : Refer to " Reference data"

[Reference data]

	PIN No	TEMPERATURE (°F)	RESISTANCE (KΩ)	VOLTAGE (V)
ATF 1	C106-1 : 9 ~ GND	32	Approx. 15	Approx. 3.3
		68	Approx. 6.5	Approx. 2.7
		176	Approx. 0.9	Approx. 0.9
ATF 2	C106-2 : 1 ~ GND	32	Approx. 10.5	Approx. 3.3
		68	Approx. 4.3	Approx. 2.5
		176	Approx. 0.5	Approx. 0.7



(4) Is resistance within specifications?

YES

▶ Go to "CHECK PCM/TCM" as below.

NO

▶ Check for open or short in harness. Repair as necessary and Go to "Verification of Vehicle Repair" procedure.
Replace "TRANSMISSION FLUID TEMPERATURE SENSOR 1" as necessary and Go to "Verification of Vehicle Repair procedure.

2. CHECK TCM

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

(2) Disconnect the "ATF 1 [C106-1] " connector.

(3) Install scantool and access "SIMU-SCAN" mode.

(4) Simulate voltage (0→5V) to "TRANSMISSION FLUID TEMPERATURE SENSOR 1, 2" signal circuit.

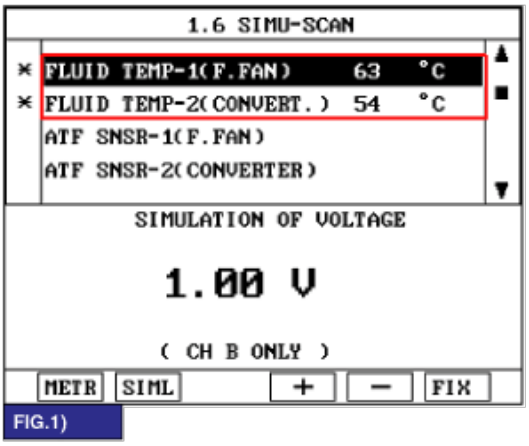


FIG.1)

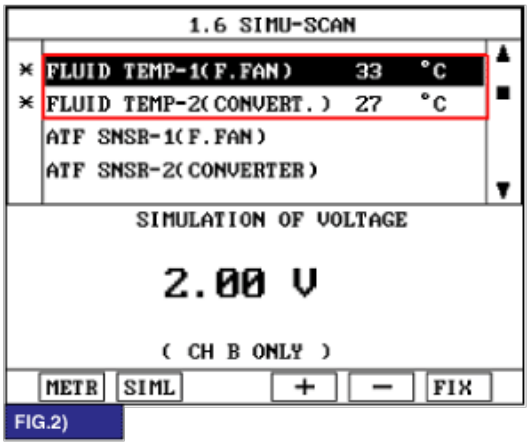


FIG.2)

FIG.1) INPUT 1.02V → 63°C
FIG.2) INPUT 2.00V → 33°C

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

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

YES

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

NO

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

VERIFICATION OF VEHICLE REPAIR

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

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

YES

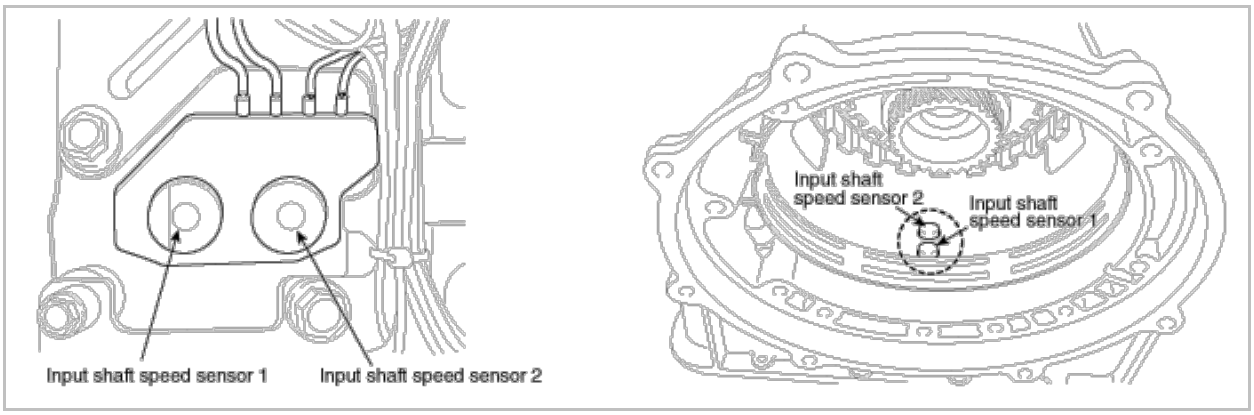
▶ Go to the applicable troubleshooting procedure.

NO

▶ System performing to specification at this time.

Automatic Transaxle System > Troubleshooting > P0716

COMPONENT LOCATION



GENERAL DESCRIPTION

The Input Sensor of RXC Auto transmission is composed of S1(Sensor1) and S2(Sensor2). S1 inputs signal to TCM only at 4th gear and S2 does at 1st, 2nd, 3rd, 4th and 5th gear. Therefore, sensing pulse frequency generated by both signals, TCM calculates Inputshaft speed and compute Turbine rotation. This value is mainly used to control the optimum fluid pressure during shifting.

DTC DESCRIPTION

The TCM sets this code if an output pulse-signal is not detected, from the INPUT SPEED SENSOR 1 or 2, when the vehicle is running faster than 5MPH(8km/h). The Fail-Safe function will be set by the TCM if this code is detected.

DTC DETECTING CONDITION

Item	Detecting Condition	Possible cause
DTC Strategy	• Speed rationality check	• Signal circuit is open or short • Sensor power circuit is open • Sensor ground circuit is open • Faulty INPUT SPEED SENSOR 1 • Faulty TCM
Enable Conditions	• Battery voltage > 10V • Output speed >200rpm • Engine speed >700 rpm • State of "TRANSMISSION" is "STATIC" • The time after the last shift was finished 500msec	
Threshold value	• Input speed1 >100rpm	
Diagnostic Time	• More than 2sec	
Fail Safe	• "Input speed" is regarded as 600rpm(Nt = 600rpm) • Shift prevention over 4th gear • Prevention of manual shift • Prevention of pressure adaptation	

Signal Waveform

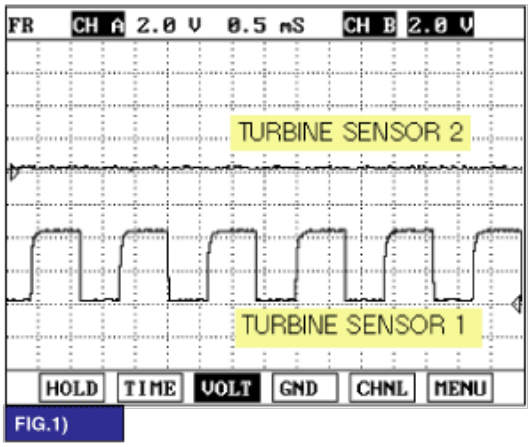


FIG.1)

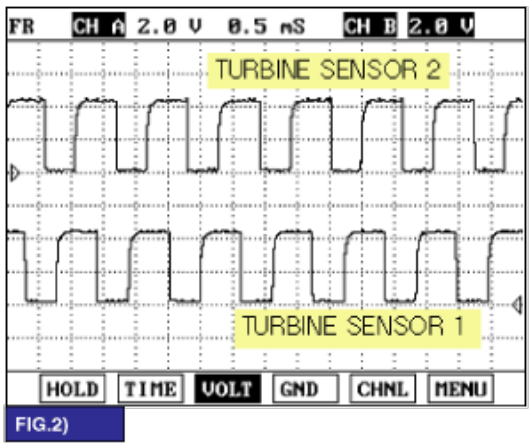


FIG.2)

FIG.1) 1GEAR
FIG.2) 4 GEAR

Caution:TURBINE SENSOR 2 CAN BE DETECTED 5V IN FIG.1

SPECIFICATION

NAME	PIN NO	Measurement condition	Spec
Turbine Sensor1	6	• 1st gear • 12.42MPH(20km/h) • Idle SW OFF	Approx. 1.1K(Hz)
Turbine Sensor2	7	• 4th gear • 31MPH(50km/h) • Idle SW OFF	

CAUTION

Scan tool data link cable is maintain to connecting condition.

Monitor Scantool Data

1. Connect scantool to data link connector(DLC).
2. Engine "ON".
3. Monitor the "INPUT SPEED SENSOR 1" parameter on the scantool.
4. Driving at speed of over 12.42MPH(20km/h) at 1gear.

Specification : Increasing Gradually

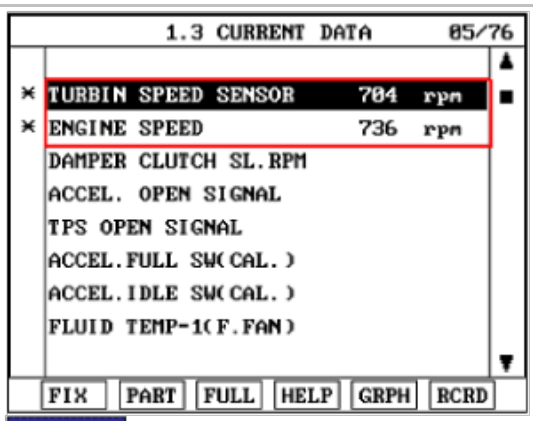


FIG.1)

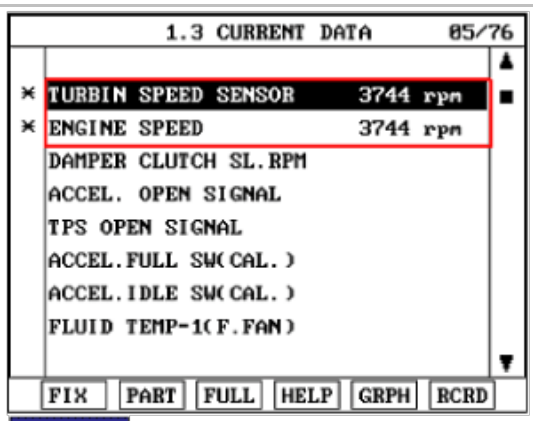


FIG.2)

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

5. Does "INPUT SPEED SENSOR" follow the reference data?

YES

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

NO

▶ Go to "Terminal & connector inspection" procedure.

TERMINAL & CONNECTOR INSPECTION

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

YES

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

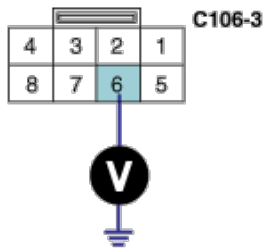
NO

▶ Go to "Signal circuit inspection" procedure.

SIGNAL CIRCUIT INSPECTION

1. Ignition "ON" & Engine "OFF".
2. Disconnect the "C106-3" connector.
3. Measure voltage between terminal "6" of the C106-3 harness connector and chassis ground.

Specification : Approx. 5 V



1. TRANSMISSION RANGE SWITCH SW1
2. TRANSMISSION RANGE SWITCH SW2
3. TRANSMISSION RANGE SWITCH SW3
4. TRANSMISSION RANGE SWITCH SW4
6. TURBINE SENSOR 1
7. TURBINE SENSOR 2

4. Is voltage within specifications?

YES

▶ Go to "Power supply circuit inspection" procedure.

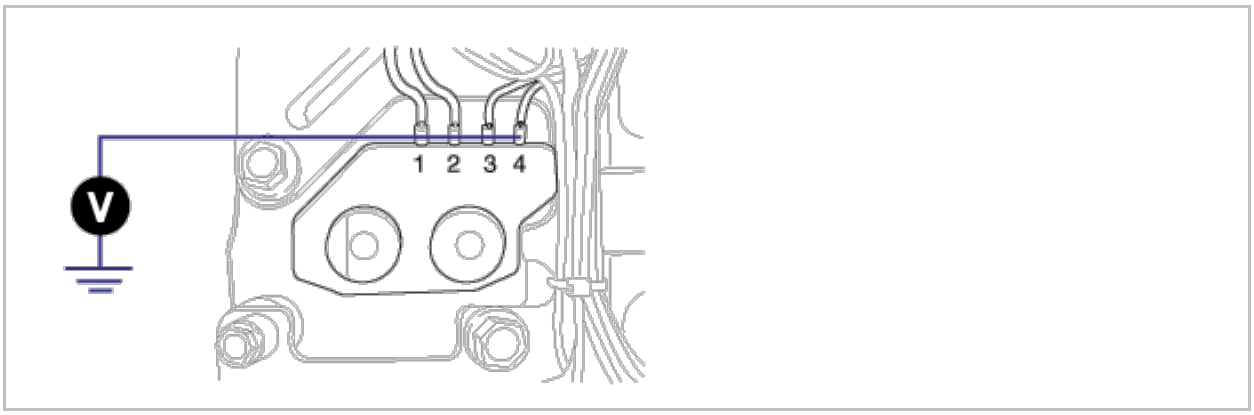
NO

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

Power supply circuit inspection

1. Remove "OIL PAN".
2. Ignition "ON", Engine "OFF".
3. Connect the "C106-3 and Shift CM" connector.
4. Measure resistance between terminal "4" of the TURBINE SENSOR harness connector and chassis ground.

Specification : approx. 12V



5. Is voltage within specifications ?

YES

▶ Go to "Ground circuit inspection" procedure.

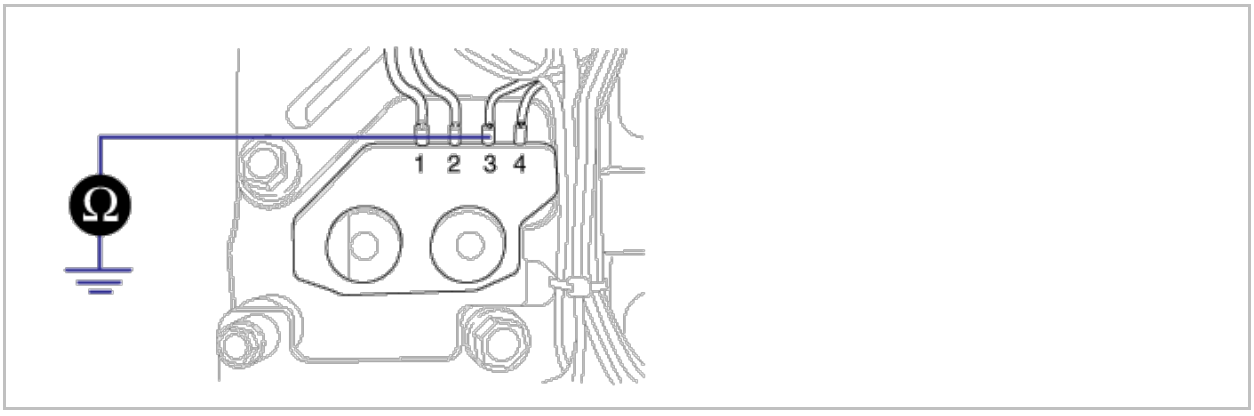
NO

▶ Check for open or short in harness. Repair as necessary and Go to "Verification of Vehicle Repair" procedure.
If power circuit in harness is OK, Substitute with a known-good Shift CM and check for proper operation. If the problem is corrected, replace Shift CM as necessary and go to "Verification of Vehicle Repair" procedure.

Ground circuit inspection

1. Remove "OIL PAN".
2. Engine "OFF".
3. Disconnect the "C106-3 and Shift CM" connector.
4. Measure resistance between terminal "3" of the INPUT SPEED SENSOR harness connector and chassis ground.

Specification : approx. 0Ω



5. Is resistance within specifications?

YES

▶ Go to "Component inspection" procedure.

NO

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

COMPONENT INSPECTION

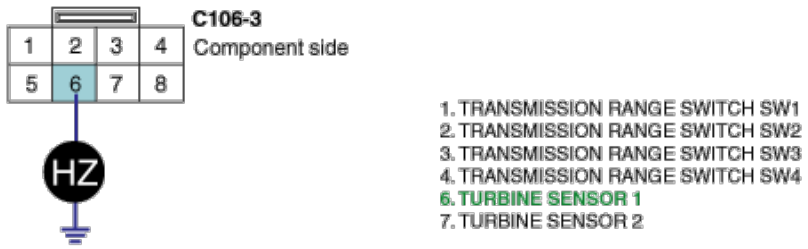
1. Check "TURBINE SENSOR 2"
   (1) Ignition "ON" & Engine "OFF".
   (2) Connect the "C106-3" connector.
   (3) Measure Frequency between terminal "6" of the C106-3 harness connector and chassis ground.

Specification :

NAME	PIN NO	Measurement condition	Spec
Turbine Sensor1	6	• 1st gear • 12.42MPH(20km/h) • Idle SW OFF	Approx. 1.1K(Hz)
Turbine Sensor2	7	• 4th gear • 31MPH(50km/h) • Idle SW OFF	

CAUTION

Scan tool data link cable is maintain to connecting condition.



   (4) Is frequency within specifications?

YES

▶ Go to "CHECK TCM " as below.

NO

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

2. CHECK TCM
   (1) Ignition "ON" & Engine "OFF".
   (2) Disconnect "C106-3" connector.
   (3) Install scantool and access "SIMU-SCAN" mode.
   (4) Simulate frequency to TURBINE SENSOR 1 signal circuit.

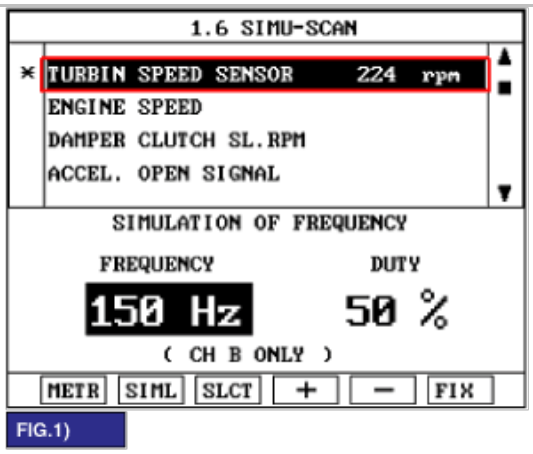


FIG.1)

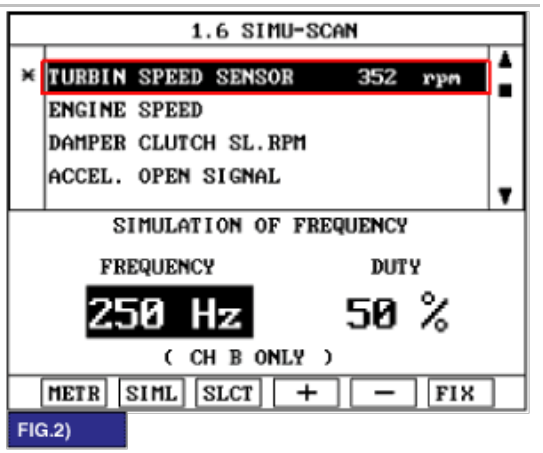


FIG.2)

FIG.1) INPUT 150HZ → 224rpm
FIG.2) INPUT 250HZ → 352rpm

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

(5) Is "TURBINE SENSOR 1" signal value changed according to simulation frequency?

YES

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

NO

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

VERIFICATION OF VEHICLE REPAIR

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

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

YES

▶ Go to the applicable troubleshooting procedure.

NO

▶ System performing to specification at this time.

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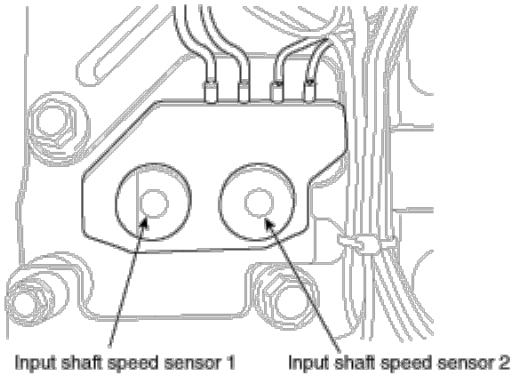
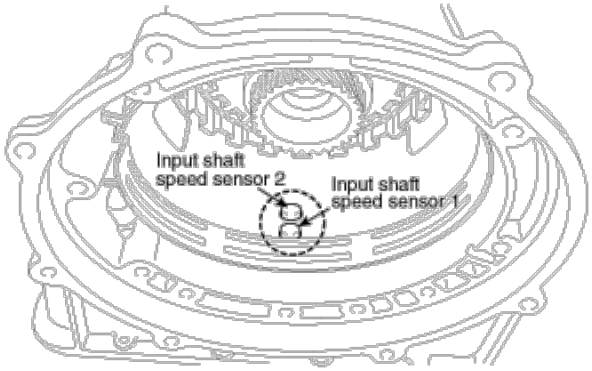
COMPONENT LOCATION





GENERAL DESCRIPTION

The Input Sensor of RXC Auto transmission is composed of S1(Sensor1) and S2(Sensor2). S1 inputs signal to TCM only at 4th gear and S2 does at 1st, 2nd, 3rd, 4th and 5th gear. Therefore, sensing pulse frequency generated by both signals, TCM calculates Inputshaft speed and compute Turbine rotation. This value is mainly used to control the optimum fluid pressure during shifting.

DTC DESCRIPTION

The TCM sets this code if an output pulse-signal is not detected, from the INPUT SPEED SENSOR 1 or 2, when the vehicle is running faster than 5MPH(8km/h). The Fail-Safe function will be set by the TCM if this code is detected.

DTC DETECTING CONDITION

Item	Detecting Condition	Possible cause
DTC Strategy	• Speed rationality check	• Signal circuit is open or short • Sensor power circuit is open • Sensor ground circuit is open • Faulty INPUT SPEED SENSOR 1 • Faulty TCM
Enable Conditions	• Battery voltage > 10V • Output speed >1000rpm • Engine speed(Only current gear is the 1st gear) >3000 rpm • Engine speed(2.3.4.5 gear) >700 rpm • Position lever = "D"	
Threshold value	• Input speed1 ≤ 100rpm	
Diagnostic Time	• More than 2sec	
Fail Safe	• "Input speed" is regarded as 600rpm(Nt = 600rpm) • Shift prevention over 4th gear • Prevention of manual shift • Prevention of pressure adaptation	

Signal Waveform

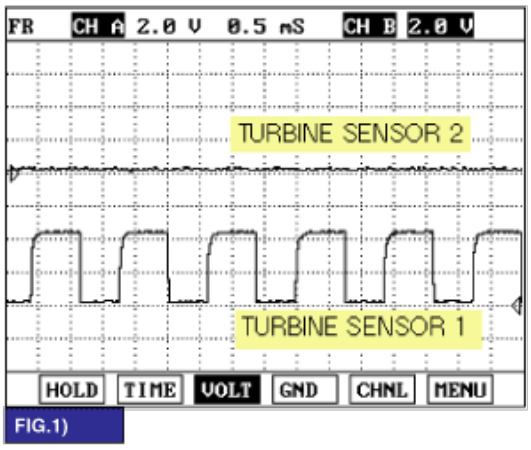


FIG.1)

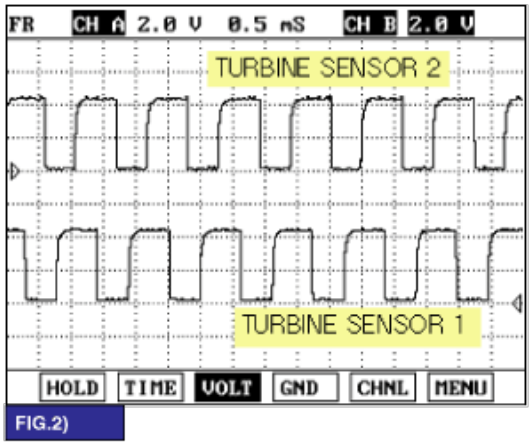


FIG.2)

FIG.1) 1GEAR
FIG.2) 4 GEAR

Caution:TURBINE SENSOR 2 CAN BE DETECTED 5V IN FIG.1

SPECIFICATION

NAME	PIN NO	Measurement condition	Spec

Turbine Sensor1	6	• 1st gear • 12.42MPH(20km/h) • Idle SW OFF	Approx. 1.1K(Hz)
Turbine Sensor2	7	• 4th gear • 31MPH(50km/h) • Idle SW OFF	

CAUTION

Scan tool data link cable is maintain to connecting condition.

Monitor Scantool Data

1. Connect scantool to data link connector(DLC).
2. Engine "ON".
3. Monitor the "INPUT SPEED SENSOR 1" parameter on the scantool.
4. Driving at speed of over 12.42MPH(20km/h) at 1gear.

Specification : Increasing Gradually

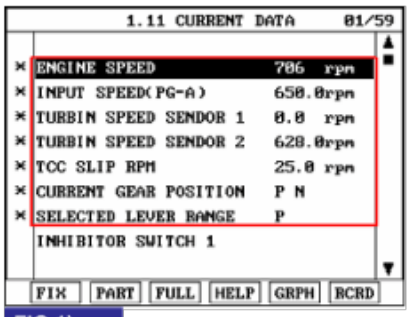


FIG.1)

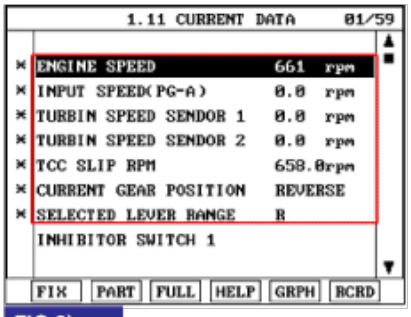


FIG.2)

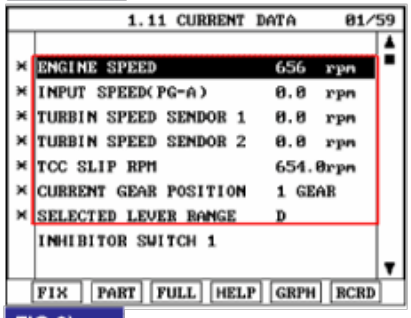


FIG.3)

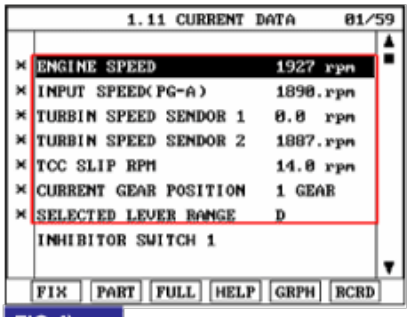


FIG.4)

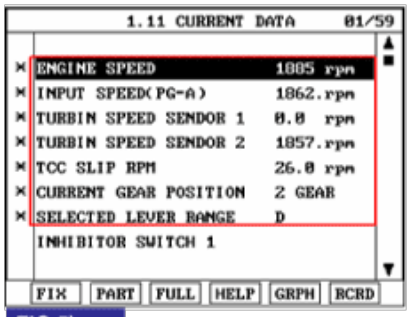


FIG.5)

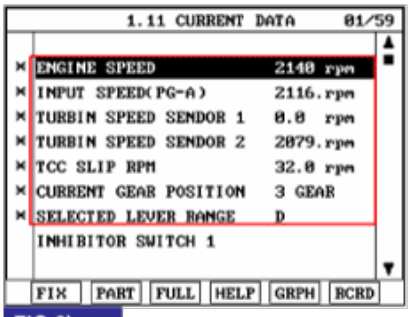


FIG.6)

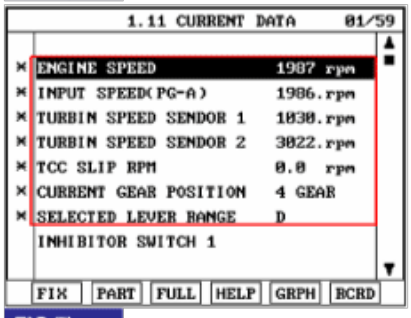


FIG.7)

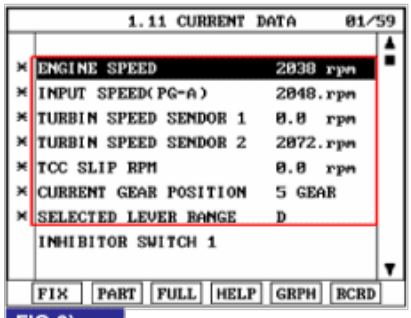


FIG.8)

FIG.1) "P,N" range
FIG.2) "R" range
FIG.3) "D" range 1st gear, vehicle speed = 0
FIG.4) "D" range 1st gear
FIG.5) "D" range 2nd gear
FIG.6) "D" range 3rd gear
FIG.7) "D" range 4th gear
FIG.8) "D" range 5th gear

5. Does "INPUT SPEED SENSOR" follow the reference data?

YES

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

NO

▶ Go to "Terminal & connector inspection" procedure.

TERMINAL & CONNECTOR INSPECTION

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

YES

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

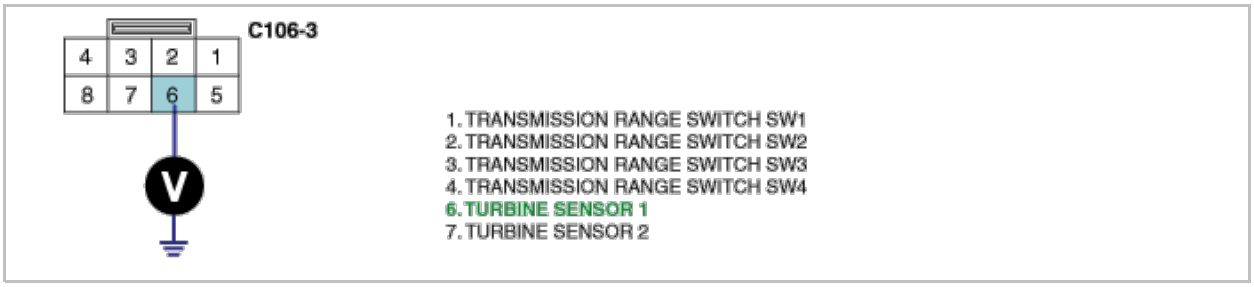
NO

▶ Go to "Signal circuit inspection" procedure.

SIGNAL CIRCUIT INSPECTION

1. Ignition "ON" & Engine "OFF".
2. Disconnect the "C106-3" connector.
3. Measure voltage between terminal "6" of the C106-3 harness connector and chassis ground.

Specification : Approx. 5 V



4. Is voltage within specifications?

YES

▶ Go to "Power supply circuit inspection" procedure.

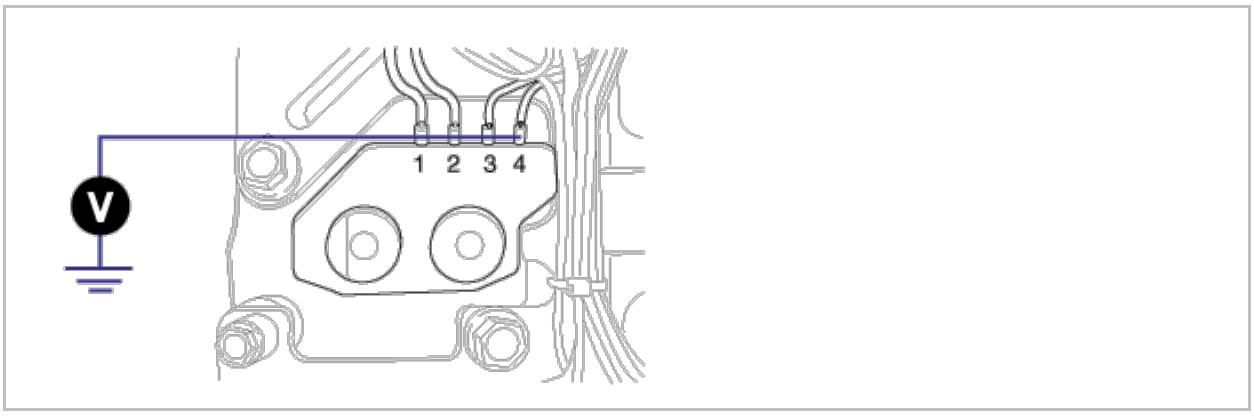
NO

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

Power supply circuit inspection

1. Remove "OIL PAN".
2. Ignition "ON", Engine "OFF".
3. Connect the "C106-3 and Shift CM" connector.
4. Measure resistance between terminal "4" of the TURBINE SENSOR harness connector and chassis ground.

Specification : approx. 12V



5. Is voltage within specifications ?

YES

▶ Go to "Ground circuit inspection" procedure.

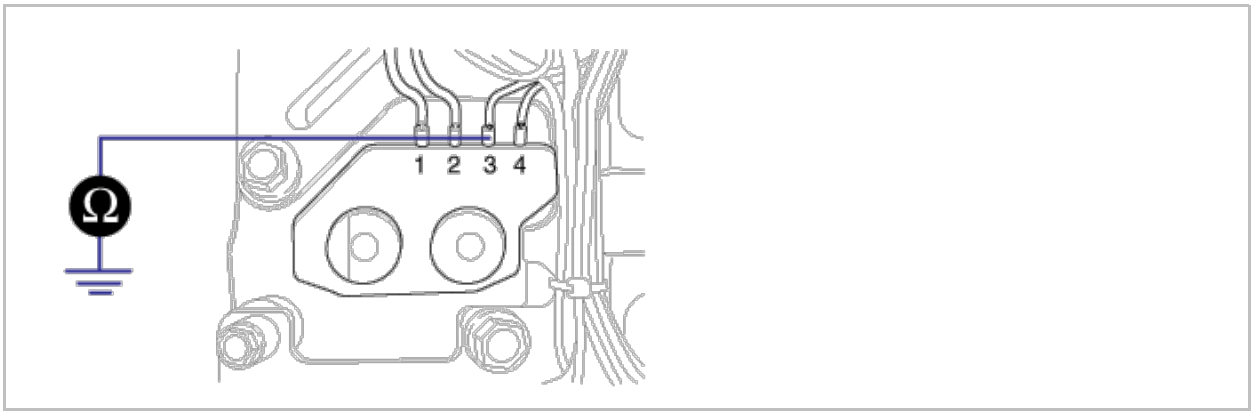
NO

▶ Check for open or short in harness. Repair as necessary and Go to "Verification of Vehicle Repair" procedure.
If power circuit in harness is OK, Substitute with a known-good Shift CM and check for proper operation. If the problem is corrected, replace Shift CM as necessary and go to "Verification of Vehicle Repair" procedure.

Ground circuit inspection

1. Remove "OIL PAN".
2. Engine "OFF".
3. Disconnect the "C106-3 and Shift CM" connector.
4. Measure resistance between terminal "3" of the INPUT SPEED SENSOR harness connector and chassis ground.

Specification : approx. 0Ω



5. Is resistance within specifications?

YES

▶ Go to "Component inspection" procedure.

NO

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

COMPONENT INSPECTION

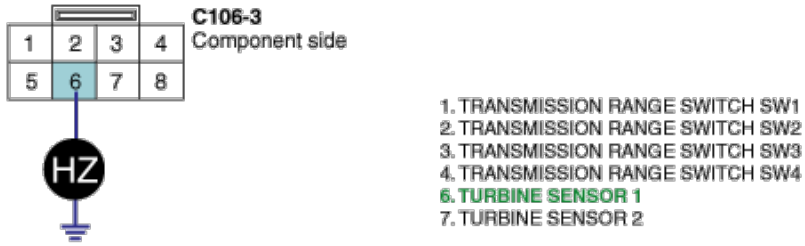
1. Check "TURBINE SENSOR 2"
   (1) Ignition "ON" & Engine "OFF".
   (2) Connect the "C106-3" connector.
   (3) Measure Frequency between terminal "6" of the C106-3 harness connector and chassis ground.

Specification :

NAME	PIN NO	Measurement condition	Spec
Turbine Sensor1	6	• 1st gear • 12.42MPH(20km/h) • Idle SW OFF	Approx. 1.1K(Hz)
Turbine Sensor2	7	• 4th gear • 31MPH(50km/h) • Idle SW OFF	

CAUTION

Scan tool data link cable is maintain to connecting condition.



(4) Is frequency within specifications?

YES

▶ Go to "CHECK TCM " as below.

NO

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

2. CHECK TCM

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

(2) Disconnect "C106-3" connector.

(3) Install scantool and access "SIMU-SCAN" mode.

(4) Simulate frequency to TURBINE SENSOR 1 signal circuit.

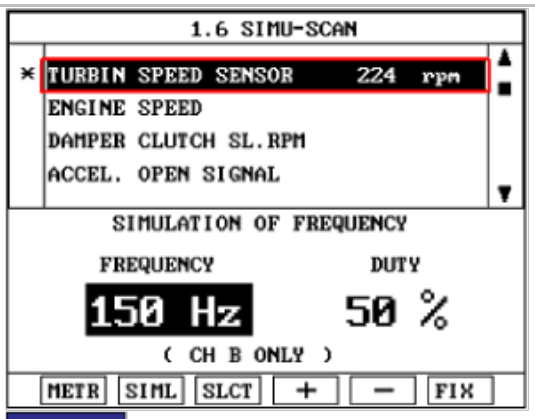


FIG.1)

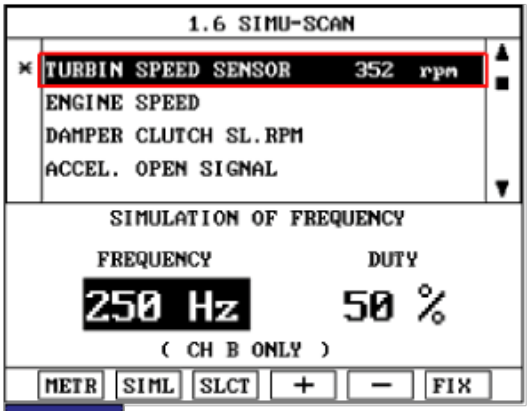


FIG.2)

FIG.1) INPUT 150HZ → 224rpm
FIG.2) INPUT 250HZ → 352rpm

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

(5) Is "TURBINE SENSOR 1" signal value changed according to simulation frequency?

YES

▶ Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or

damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

NO

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

VERIFICATION OF VEHICLE REPAIR

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

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

YES

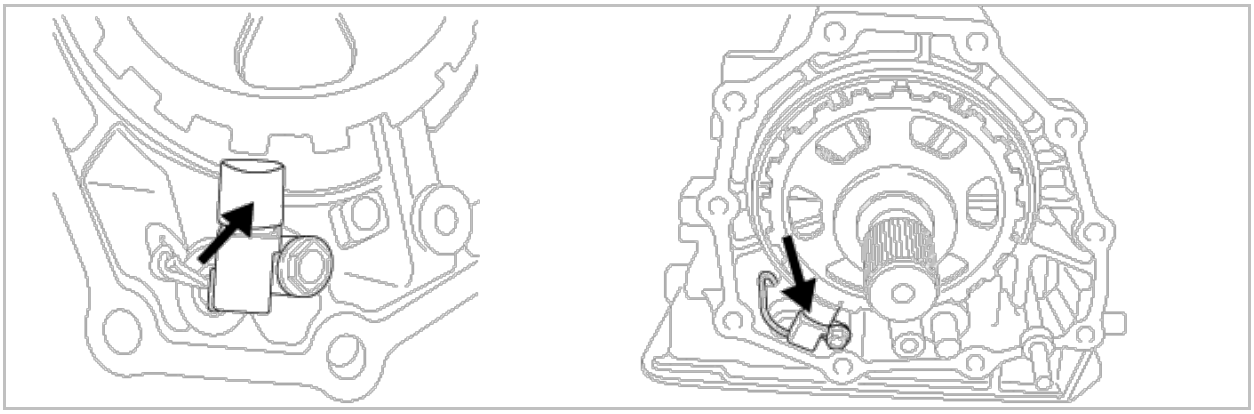
▶ Go to the applicable troubleshooting procedure.

NO

▶ System performing to specification at this time.

Automatic Transaxle System > Troubleshooting > P0721

COMPONENT LOCATION



GENERAL DESCRIPTION

The OUTPUT SPEED SENSOR outputs waveform signals according to the revolutions of the output shaft of the transmission. The Output Speed Sensor is installed in front of the Parking Gear to determine the Parking 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

The TCM sets this code if the calculated value of the signals is noticeably different from the value calculated, using the Vehicle Speed Sensor output, when the vehicle is running faster than 15.6MPH(25km/h). The TCM will initiate the fail safe function if this code is detected.

DTC DETECTING CONDITION

Item	Detecting Condition	Possible cause
DTC Strategy	• Speed rationality check	• Signal circuit is open or short • Sensor power circuit is open • Sensor ground circuit is open • Faulty OUTPUT SPEED SENSOR
Enable Conditions	• Battery voltage > 10V • Lever position = "D" • Engine speed > 3000 rpm	
Threshold value	• Output speed = 0 rpm	

Diagnostic Time	• More than 4sec	• Faulty TCM
Fail Safe	• Shift prevention over 4th gear • Prevention of manual shift • Prevention of pressure adaptation • Output speed from vehicle speed	

Signal Waveform

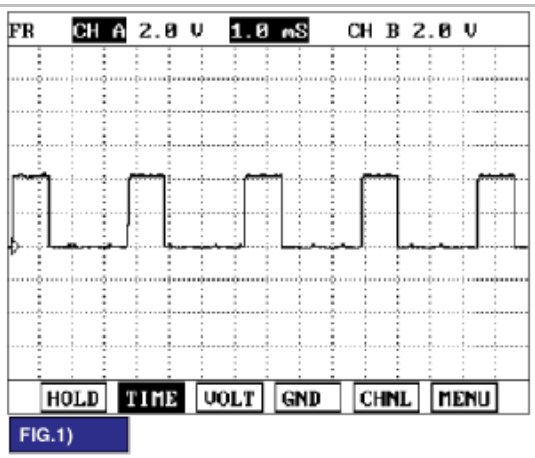


FIG.1)

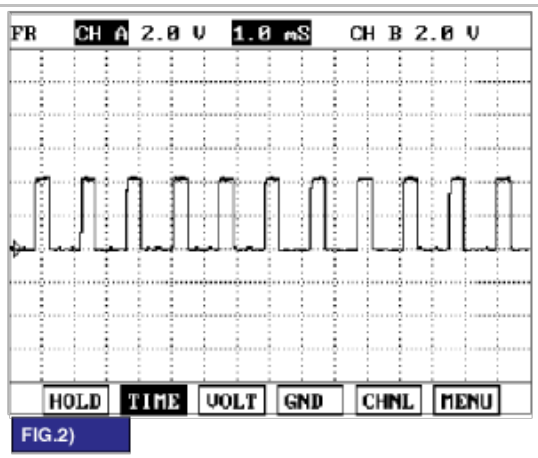


FIG.2)

FIG.1) LOW - SPEED
FIG.2) HIGH - SPEED

SPECIFICATION

NAME	PIN NO	Measurement condition	Spec
OUTPUT SPEED SENSOR	10	• 12.42MPH(20km/h)	Approx. 149(Hz)

Monitor Scantool Data

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 5km/h.

Specification : Increasing Gradually

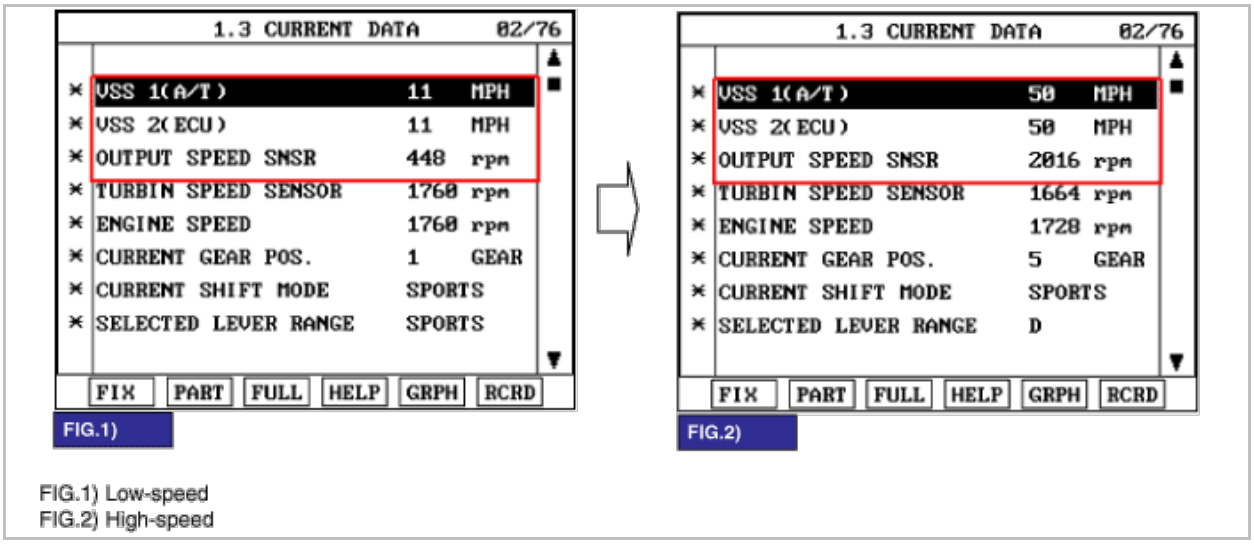


FIG.1) Low-speed
FIG.2) High-speed

5. Does "OUTPUT SPEED SENSOR" follow the reference data?

YES

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

NO

▶ Go to "Terminal & connector inspection" procedure.

TERMINAL & CONNECTOR INSPECTION

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

YES

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

NO

▶ Go to "Signal circuit inspection" procedure.

SIGNAL CIRCUIT INSPECTION

1. CHECK "OUTPUT SPEED SENSOR SIGNAL CIRCUIT 1"
   (1) Ignition "ON" & Engine "OFF".
   (2) Disconnect the "C106-1" connector.
   (3) Measure voltage between terminal "10" of the C106-1 harness connector and chassis ground.

Specification : approx. 5V

(4) Is voltage within specifications?

YES

▶ Go to "OUTPUT SPEED SENSOR SIGNAL CIRCUIT 2" as below.

NO

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

2. CHECK "OUTPUT SPEED SENSOR SIGNAL CIRCUIT 2"

(1) Remove "OIL PAN".

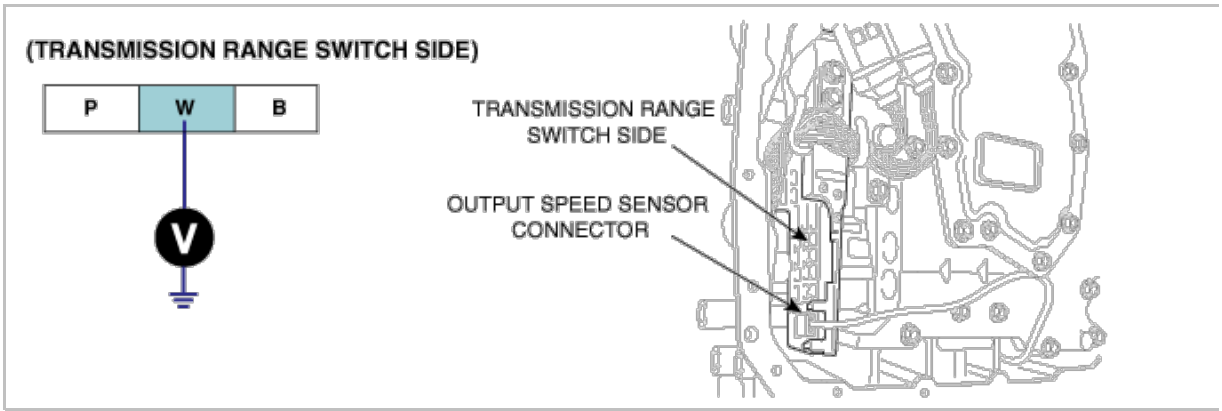
(2) Connect the "C106-1" connector.

(3) Ignition "ON" & Engine "OFF".

(4) Disconnect the "OUTPUT SPEED SENSOR" connector.

(5) Measure voltage between terminal "WHITE COLOR" of the OUTPUT SPEED SENSOR harness connector and chassis ground.

Specification : approx. 5V



(6) Is voltage within specifications?

YES

▶ Go to "Power supply circuit inspection" procedure.

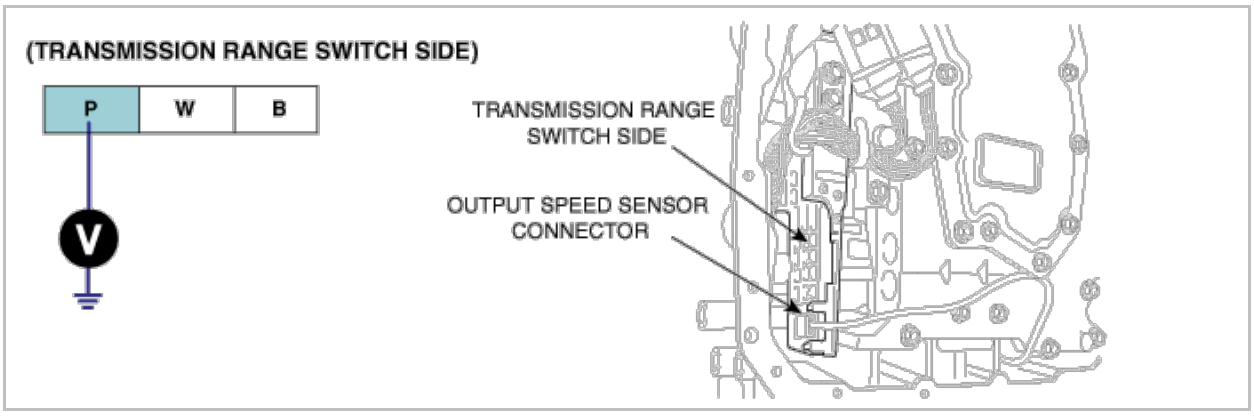
NO

▶ Check for open or short in harness(H-02[A]~TRANSMISSION RANGE SWITCH). Repair as necessary and Go to "Verification of Vehicle Repair" procedure.
If signal circuit in harness is OK, Replace "TRANSMISSION RANGE SWITCH" as necessary and Go to "Verification of Vehicle Repair" procedure.

Power supply circuit inspection

1. Remove "OIL PAN".
2. Connect the "C106-1" connector.
3. Ignition "ON" & Engine "OFF".
4. Disconnect the "OUTPUT SPEED SENSOR" connector.
5. Measure voltage between terminal "PINK COLOR" of the OUTPUT SPEED SENSOR harness connector and chassis ground.

Specification : approx. 12V



6. Is voltage within specifications?

YES

▶ Go to "Ground circuit Inspection" procedure.

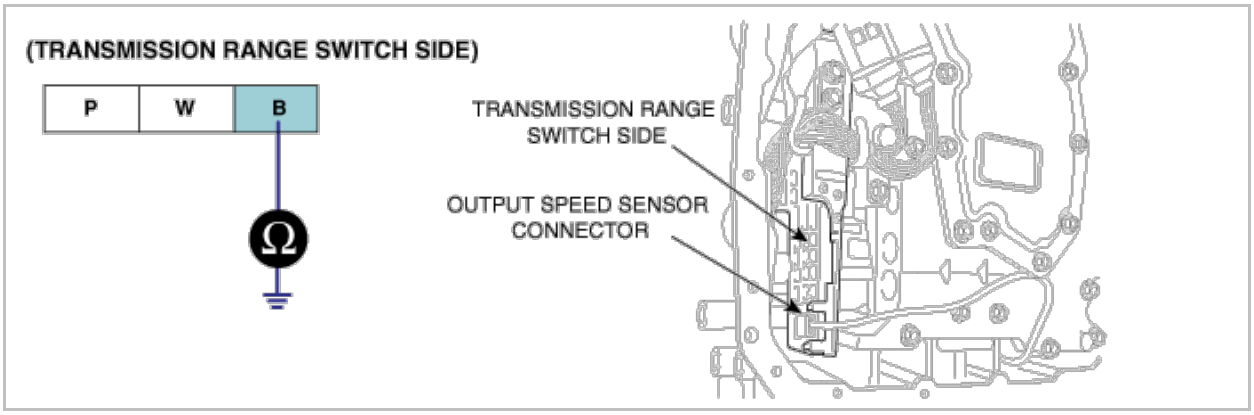
NO

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

Ground circuit inspection

1. Ignition "OFF" & Engine "OFF".
2. Remove "OIL PAN".
3. Connect the "C106-1" connector.
4. Disconnect the "OUTPUT SPEED SENSOR" connector.
5. Measure resistance between terminal "BLACK COLOR" of the OUTPUT SPEED SENSOR harness connector and chassis ground.

Specification : approx. 0Ω



6. Is resistance within specifications?

YES

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

NO

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

COMPONENT INSPECTION

CHECK TCM

1. Ignition "ON" & Engine "OFF".
2. Disconnect "C106-1" connector.
3. Install scantool and access "SIMU-SCAN" mode.

4. Simulate frequency to OUTPUT SPEED SENSOR signal circuit.

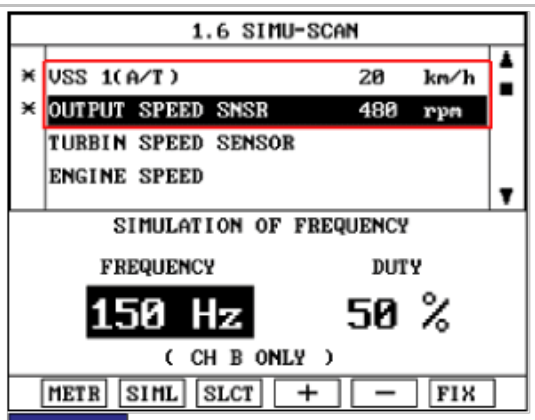


FIG.1)

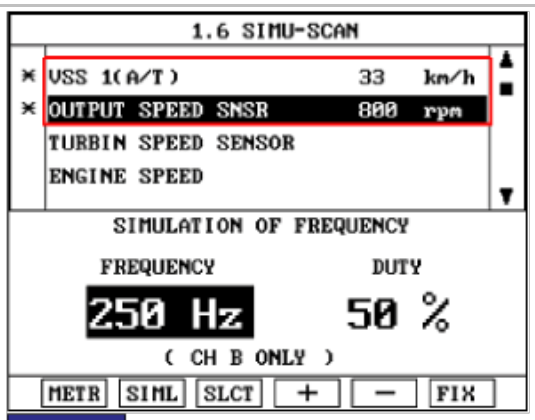


FIG.2)

FIG.1) INPUT 150HZ → 480rpm
FIG.2) INPUT 250HZ → 800rpm

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

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

YES

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

NO

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

VERIFICATION OF VEHICLE REPAIR

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

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

YES

▶ Go to the applicable troubleshooting procedure.

NO

▶ System performing to specification at this time.

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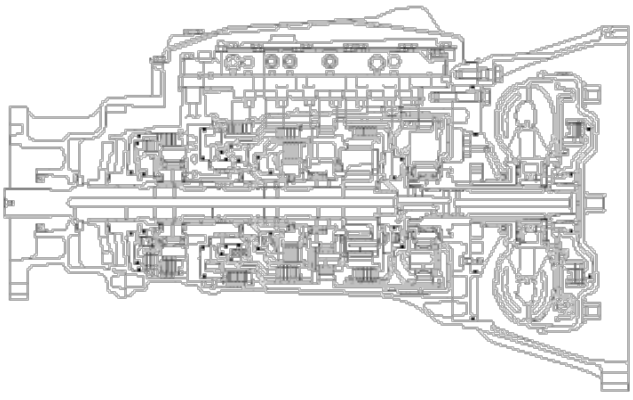
COMPONENT LOCATION



GENERAL DESCRIPTION

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 3.827, then the input speed is 3827 rpm.

DTC DESCRIPTION

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.

DTC DETECTING CONDITION

Item	Detecting Condition	Possible cause
DTC Strategy	• 1st gear incorrect ratio	• Faulty input speed sensor • Faulty output speed sensor • Faulty internal transmission
Enable Conditions	• Engine speed >600rpm • 150rpm >Output speed < 6000rpm • Lever Position = "D" • Input speed > 600rpm • A/T oil temp output ≥ -10°C • Throttle opening >15% • The time after the last shift was finish >1sec	
Threshold value	• | Input speed - output speed × 1st gear ratio | ≥200rpm	
Diagnostic Time	• More than 1sec	
Fail Safe	• 4th gear Limp-Home mode	

SIGNAL WAVEFORM

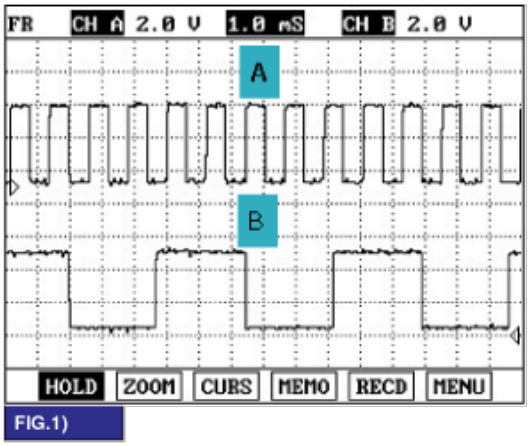


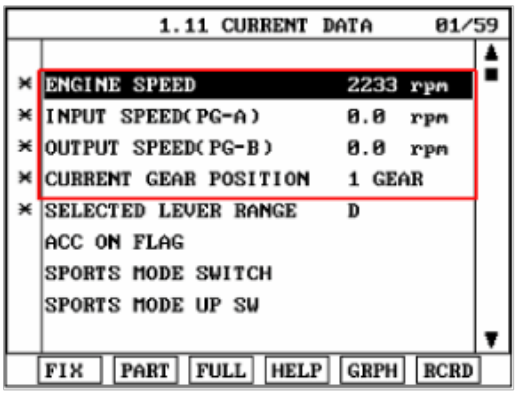
FIG.1)

A : INPUT SPEED SENSOR
B : OUTPUT SPEED SENSOR

MONITOR SCANTOOL DATA

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 : 2300 ± 200 engine rpm



OPERATING ELEMENT OF EACH SHIFTING RANGE

Shifting Position		Input clutch	High&Low Reverse Clutch	Direct clutch	Reverse Brake	Front Brake	Low Coast Brake	Forward Brake	1st OwnWayClutch	Forward OwnWayClutch	3rd OwnWayClutch
P			▲			▲					
R			●		●	●			●		●
N			▲			▲	★				
D	1st gear		★			▲		●	●	●	●
	2nd gear			●		▲		●		●	●
	3rd gear		●	●		●		▲	◆		●
	4th gear	●	●	●				▲	◆		
	5th gear	●	●			●		▲	◆		◆

● : WORKING.
◆ : PARTICIPATE IN DELIVERY TORQUE WHEN COAST DRIVING.
▲ : SUPPLING OIL PRESSURE TO ELEMENT, BUT NOT EFFECT ON OUTPUT.
★: TEMPORARY WORKING.

Stall test procedure in D1 and reason

Procedure

A. Warm up the engine

B. 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

A. If there is no mechanical defaults in A/T, all slippage occurs in the torque converter.

B. Therefore, engine revolution is output, but input and output speed revolution must be "zero" due to wheel's lock.

C. If 1st gear operating parts have faults, input speed revolution will be out of specification.

D. If output speed revolution is output. It means that the foot brake force is not applied fully. Remeasuring is required.

5. Is "STALL TEST " within specification?

YES

▶ Go to "Signal Circuit Inspection" procedure.

NO

▶ Go to "Component inspection" procedure.

CAUTION

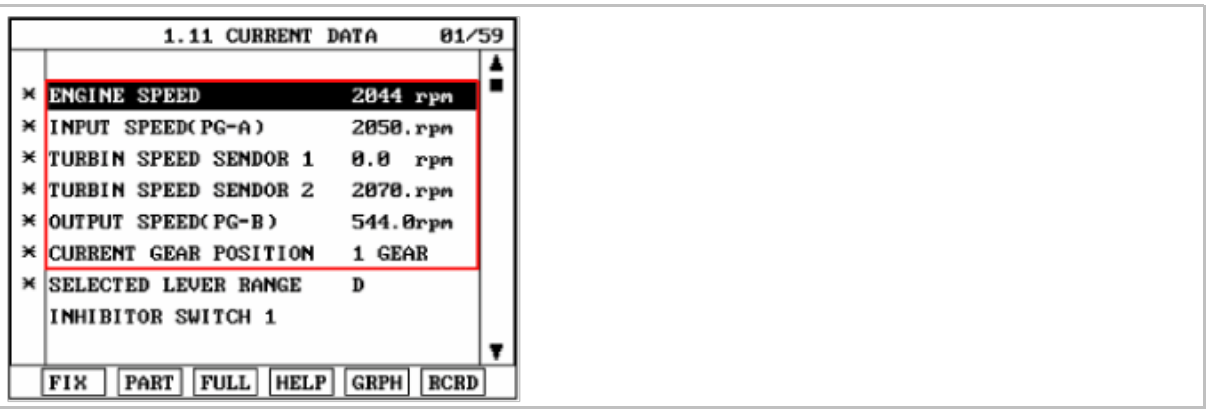
- Do not let anybody stand in front of or behind the vehicle while this test is being carried out.
- Check the A/T fluid level and temperature and the engine coolant temperature.
  - Fluid level : At the hot mark on the oil level gauge.
  - Fluid temperature : 176 °F~ 212 °F (80~100 °C).
  - Engine coolant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

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

SIGNAL CIRCUIT INSPECTION

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

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



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

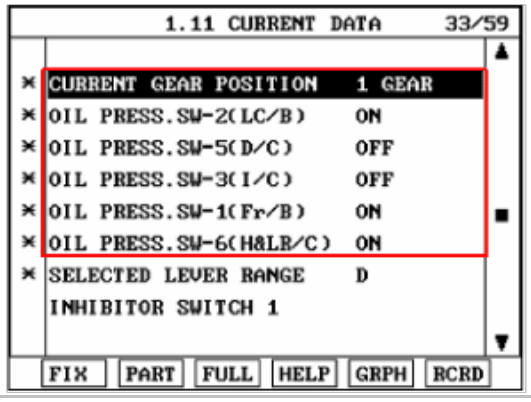
YES
▶ Go to "Component Inspection" procedure.

NO
▶ Check condition of Input & Output Speed Sensor and sensor wiring. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

COMPONENT INSPECTION

1. Connect Scantool.
2. Engine "ON".
3. Monitor the "OIL PRESSURE. S/W 1,2,3,5,6" parameter on the scantool.
4. Move select lever to "D" range and operate vehicle within 1st gear condition.

Shift position		Oil Pressure Switch				
		I/C(SW3)	H&LR/C(SW6)	H&LR/C(SW6)	FR/B(SW1)	LC/B(SW2)
P		X	O	X	O	X
R		X	O	X	O	X
N		X	O	X	O	X
D	1st gear	X	X	X	O	X
	2nd gear	X	X	O	O	X
	3rd gear	X	O	O	O	X
	4th gear	O	O	O	X	X
	5th gear	O	O	X	O	X



5. Does "OIL PRESSURE. S/W 1,2,3,5,6 " follow the reference data?

YES

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

NO

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

VERIFICATION OF VEHICLE REPAIR

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.

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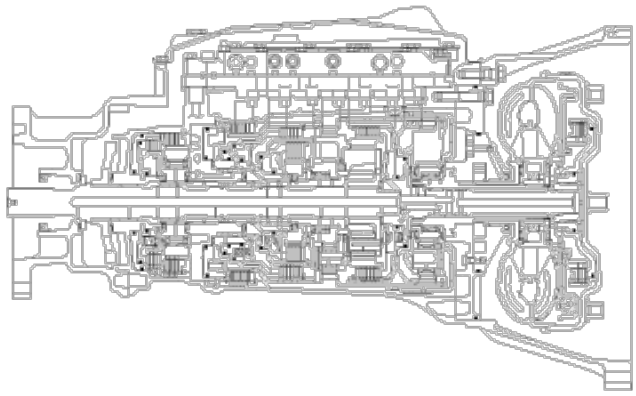
COMPONENT LOCATION



GENERAL DESCRIPTION

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 2.368, then the input speed is 2368 rpm.

DTC DESCRIPTION

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.

DTC DETECTING CONDITION

Item	Detecting Condition	Possible cause
DTC Strategy	• 2nd gear incorrect ratio	• Faulty input speed sensor • Faulty output speed sensor • Faulty internal transmission
Enable Conditions	• Engine speed >600rpm • 150rpm >Output speed < 6000rpm • Lever Position = "D" • Input speed > 600rpm • A/T oil temp output ≥ -10°C • Throttle opening >15% • The time after the last shift was finish >1sec	
Threshold value	• | Input speed - output speed × 2nd gear ratio | ≥200rpm	
Diagnostic Time	• More than 1sec	
Fail Safe	• 4th gear Limp-Home mode	

SIGNAL WAVEFORM

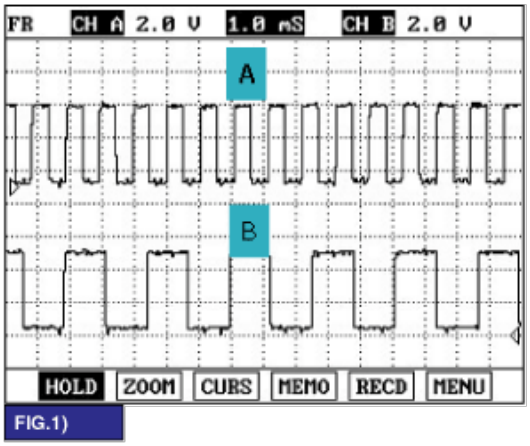


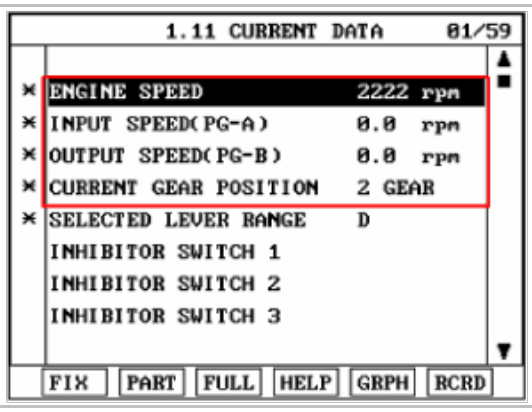
FIG.1)

A : INPUT SPEED SENSOR
B : OUTPUT SPEED SENSOR

MONITOR SCANTOOL DATA

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 : 2300 ± 200 engine rpm



OPERATING ELEMENT OF EACH SHIFTING RANGE

Shifting Position		Input clutch	High&Low Reverse Clutch	Direct clutch	Reverse Brake	Front Brake	Low Coast Brake	Forward Brake	1st OwnWayClutch	Forward OwnWayClutch	3rd OwnWayClutch
P			▲			▲					
R			●		●	●			●		●
N			▲			▲	★				
D	1st gear		★			▲		●	●	●	●
	2nd gear			●		▲		●		●	●
	3rd gear		●	●		●		▲	◆		●
	4th gear	●	●	●				▲	◆		
	5th gear	●	●			●		▲	◆		◆

● : WORKING.
◆ : PARTICIPATE IN DELIVERY TORQUE WHEN COAST DRIVING.
▲ : SUPPLING OIL PRESSURE TO ELEMENT, BUT NOT EFFECT ON OUTPUT.
★: TEMPORARY WORKING.

Stall test procedure in D2 and reason

Procedure

A. Warm up the engine

B. 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 2nd gear operating parts can be detected by stall test in D2

Reason for stall test

A. If there is no mechanical defaults in A/T, all slippage occurs in the torque converter.

B. Therefore, engine revolution is output, but input and output speed revolution must be "zero" due to wheel's lock.

C. If 2nd gear operating parts have faults, input speed revolution will be out.

D. If output speed revolution is output. It means that the foot brake force is not applied fully. Remeasuring is required.

5. Is "STALL TEST " within specification?

YES

▶ Go to "Signal Circuit Inspection" procedure.

NO

▶ Go to "Component inspection" procedure.

CAUTION

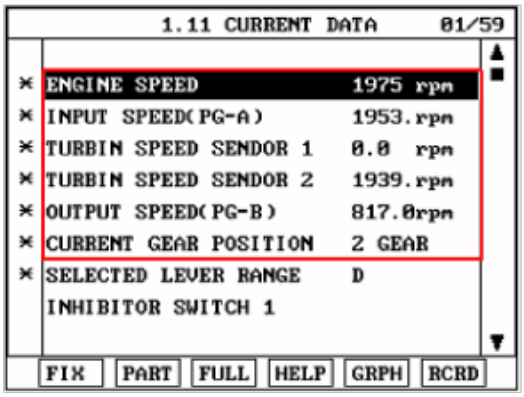
- Do not let anybody stand in front of or behind the vehicle while this test is being carried out.
- Check the A/T fluid level and temperature and the engine coolant temperature.
  - Fluid level : At the hot mark on the oil level gauge.
  - Fluid temperature : 176 °F~ 212 °F (80~100 °C).
  - Engine coolant temperature : 176 °F~ 212 °F (80~100 °C).
- Chock both rear wheels(left and right).
- Pull the parking brake lever on with the brake pedal fully depressed.
- The throttle should not be left fully open for more than eight seconds.

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

SIGNAL CIRCUIT INSPECTION

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

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



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

YES

▶ Go to "Component Inspection" procedure.

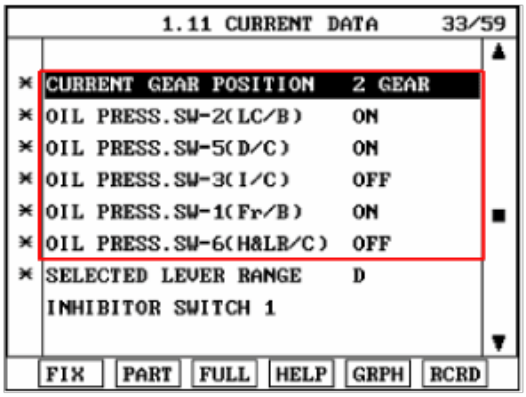
NO

▶ Check condition of Input & Output Speed Sensor and sensor wiring. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

COMPONENT INSPECTION

1. Connect Scantool.
2. Engine "ON".
3. Monitor the "OIL PRESSURE. S/W 1,2,3,5,6" parameter on the scantool.
4. Move select lever to "D" range and operate vehicle within 2nd gear condition.

Shift position		Oil Pressure Switch				
		I/C(SW3)	H&LR/C(SW6)	H&LR/C(SW6)	FR/B(SW1)	LC/B(SW2)
P		X	O	X	O	X
R		X	O	X	O	X
N		X	O	X	O	X
D	1st gear	X	X	X	O	X
	2nd gear	X	X	O	O	X
	3rd gear	X	O	O	O	X
	4th gear	O	O	O	X	X
	5th gear	O	O	X	O	X



5. Is oil pressure value within specifications?

YES

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

NO

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

VERIFICATION OF VEHICLE REPAIR

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

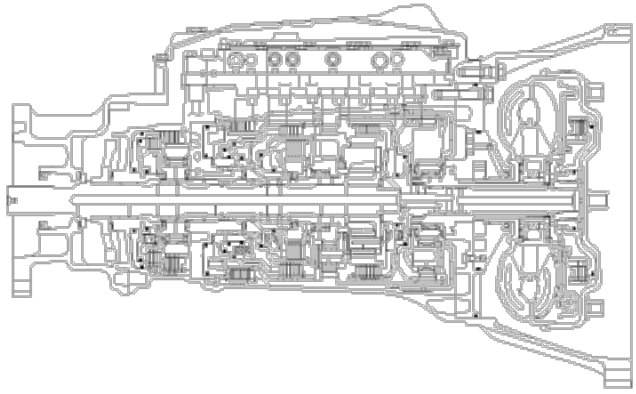
▶ Go to the applicable troubleshooting procedure.

NO

▶ System performing to specification at this time.

Automatic Transaxle System > Troubleshooting > P0733

COMPONENT LOCATION



GENERAL DESCRIPTION

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 1.520, then the input speed is 1520 rpm.

DTC DESCRIPTION

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.

DTC DETECTING CONDITION

Item	Detecting Condition	Possible cause
DTC Strategy	• 3rd gear incorrect ratio	• Faulty input speed sensor • Faulty output speed sensor • Faulty internal transmission
Enable Conditions	• Engine speed >600rpm • 150rpm >Output speed < 6000rpm • Lever Position = "D" • Input speed > 600rpm • A/T oil temp output ≥ -10°C • Throttle opening >15% • The time after the last shift was finish >1sec	
Threshold value	• | Input speed - output speed × 3rd gear ratio | ≥200rpm	
Diagnostic Time	• More than 1sec	
Fail Safe	• 4th gear Limp-Home mode	

SIGNAL WAVEFORM

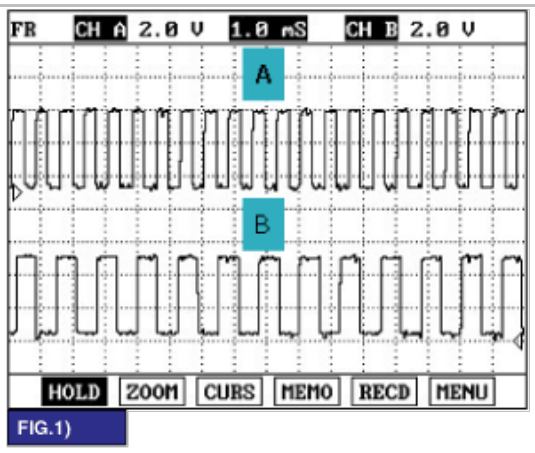


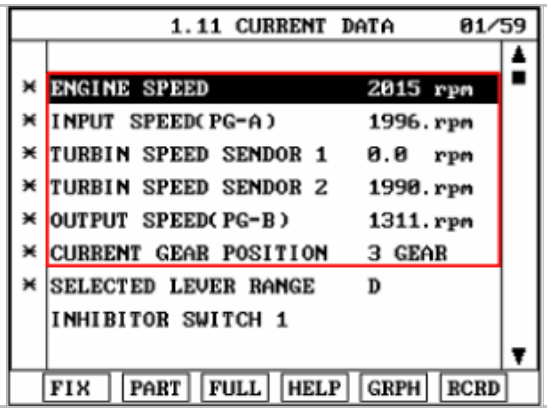
FIG.1)

A : INPUT SPEED SENSOR
B : OUTPUT SPEED SENSOR

SIGNAL CIRCUIT INSPECTION

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

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



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

YES

▶ Go to "Component Inspection" procedure.

NO

▶ Check condition of Input & Output Speed Sensor and sensor wiring. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

COMPONENT INSPECTION

1. Connect Scantool.
2. Engine "ON".
3. Monitor the "OIL PRESSURE. S/W 1,2,3,5,6" parameter on the scantool.
4. Move select lever to "D" range and operate vehicle within 3rd gear condition.

Shift position		Oil Pressure Switch				
		I/C(SW3)	H&LR/C(SW6)	H&LR/C(SW6)	FR/B(SW1)	LC/B(SW2)
P		X	O	X	O	X
R		X	O	X	O	X
N		X	O	X	O	X
D	1st gear	X	X	X	O	X
	2nd gear	X	X	O	O	X
	3rd gear	X	O	O	O	X
	4th gear	O	O	O	X	X
	5th gear	O	O	X	O	X

5. Is oil pressure value within specifications?

YES

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

NO

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

VERIFICATION OF VEHICLE REPAIR

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

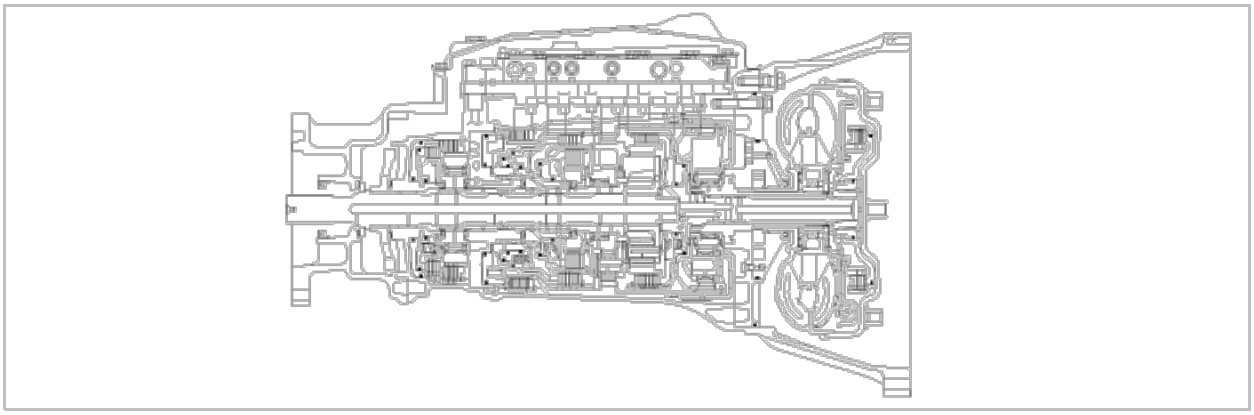
▶ Go to the applicable troubleshooting procedure.

NO

▶ System performing to specification at this time.

Automatic Transaxle System > Troubleshooting > P0734

COMPONENT LOCATION



GENERAL DESCRIPTION

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 1.000, then the input speed is 1000 rpm.

DTC DESCRIPTION

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.

DTC DETECTING CONDITION

Item	Detecting Condition	Possible cause
DTC Strategy	• 4th gear incorrect ratio	• Faulty input speed sensor • Faulty output speed sensor • Faulty internal transmission
Enable Conditions	• Engine speed >600rpm • 150rpm >Output speed < 6000rpm • Lever Position = "D" • Input speed > 600rpm • A/T oil temp output ≥ -10°C • Throttle opening >15% • The time after the last shift was finish >1sec	

Threshold value	• ㅣInput speed - output speed × 4th gear ratioㅣ ≥200rpm	
Diagnostic Time	• More than 1sec	
Fail Safe	• 4th gear Limp-Home mode	

SIGNAL WAVEFORM

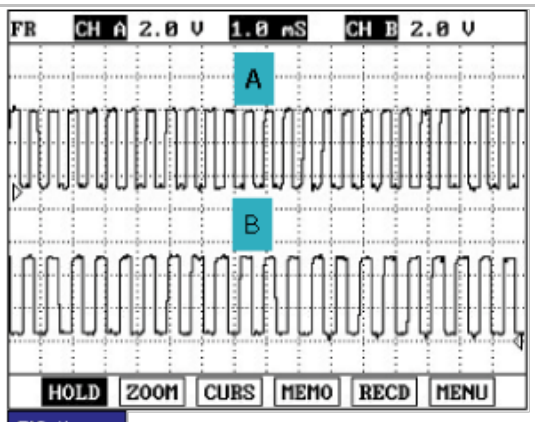


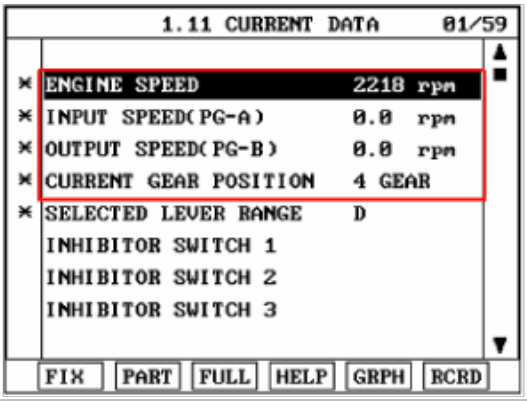
FIG.1)

A : INPUT SPEED SENSOR
B : OUTPUT SPEED SENSOR

MONITOR SCANTOOL DATA

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 "4"

Specification : 2300 ± 200 engine rpm



OPERATING ELEMENT OF EACH SHIFTING RANGE

Shifting Position		Input clutch	High&Low Reverse Clutch	Direct clutch	Reverse Brake	Front Brake	Low Coast Brake	Forward Brake	1st OwnWayClutch	Forward OwnWayClutch	3rd OwnWayClutch
P			▲			▲					
R			●		●	●			●		●
N			▲			▲	★				
D	1st gear		★			▲		●	●	●	●
	2nd gear			●		▲		●		●	●
	3rd gear		●	●		●		▲	◆		●
	4th gear	●	●	●				▲	◆		
	5th gear	●	●			●		▲	◆		◆

● : WORKING.
◆ : PARTICIPATE IN DELIVERY TORQUE WHEN COAST DRIVING.
▲ : SUPPLING OIL PRESSURE TO ELEMENT, BUT NOT EFFECT ON OUTPUT.
★: TEMPORARY WORKING.

Stall test procedure in D4 and reason

Procedure

A. Warm up the engine

B. 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 4th gear operating parts can be detected by stall test in D4

Reason for stall test

A. If there is no mechanical defaults in A/T, all slippage occurs in the torque converter.

B. Therefore, engine revolution is output, but input and output speed revolution must be "zero" due to wheel's lock.

C. If 4th gear operating parts have faults, input speed revolution will be out.

D. If output speed revolution is output. It means that the foot brake force is not applied fully. Remeasuring is required.

5. Is "STALL TEST " within specification?

YES

▶ Go to "Signal Circuit Inspection" procedure.

NO

▶ Go to "Component inspection" procedure.

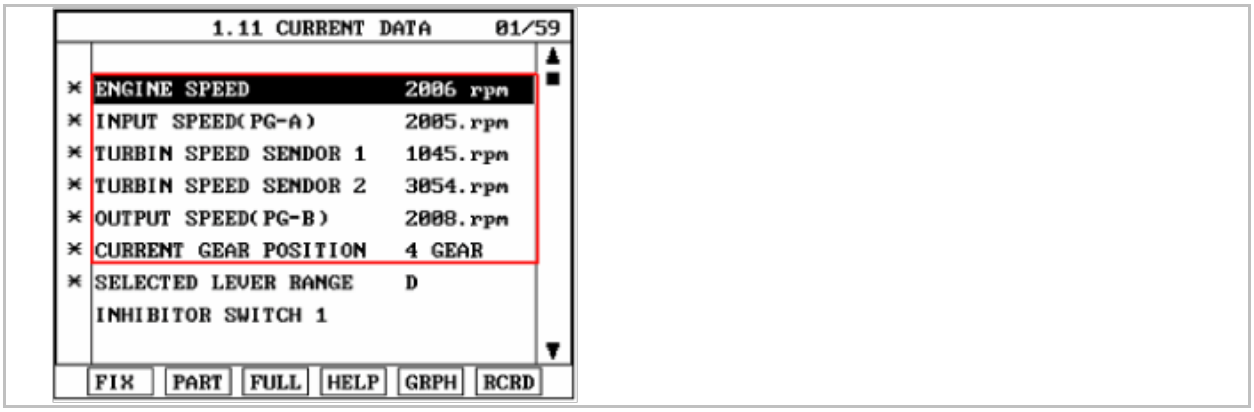
CAUTION

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

SIGNAL CIRCUIT INSPECTION

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

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



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

YES

▶ Go to "Component Inspection" procedure.

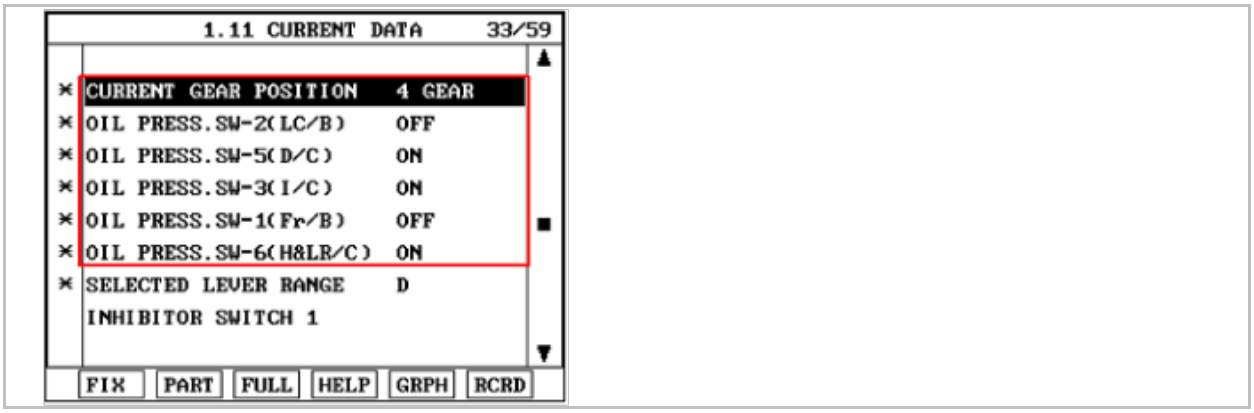
NO

▶ Check condition of Input & Output Speed Sensor and sensor wiring. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

COMPONENT INSPECTION

1. Connect Scantool.
2. Engine "ON".
3. Monitor the "OIL PRESSURE. S/W 1,2,3,5,6" parameter on the scantool.
4. Move select lever to "D" range and operate vehicle within 4th gear condition.

Shift position		Oil Pressure Switch				
		I/C(SW3)	H&LR/C(SW6)	H&LR/C(SW6)	FR/B(SW1)	LC/B(SW2)
P		X	O	X	O	X
R		X	O	X	O	X
N		X	O	X	O	X
D	1st gear	X	X	X	O	X
	2nd gear	X	X	O	O	X
	3rd gear	X	O	O	O	X
	4th gear	O	O	O	X	X
	5th gear	O	O	X	O	X



5. Is oil pressure value within specifications?

YES

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

NO

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

VERIFICATION OF VEHICLE REPAIR

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

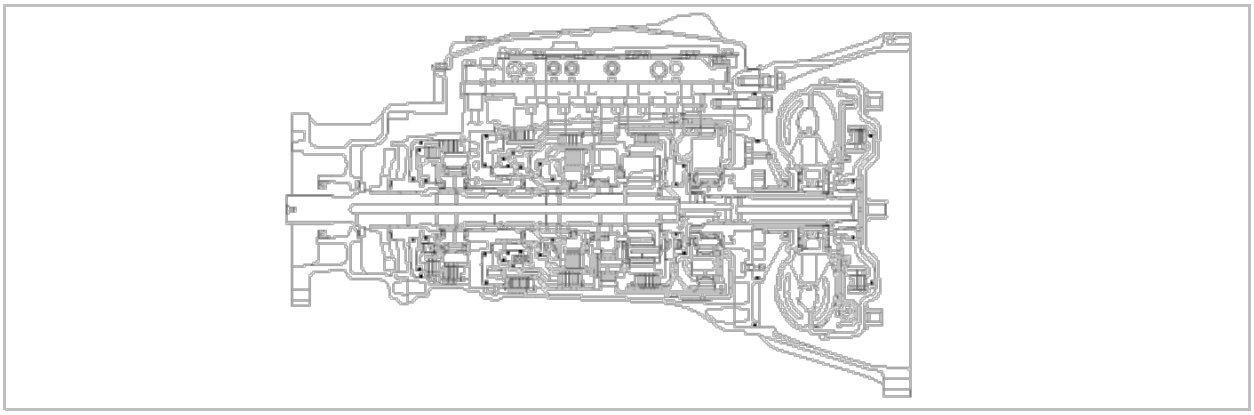
▶ Go to the applicable troubleshooting procedure.

NO

▶ System performing to specification at this time.

Automatic Transaxle System > Troubleshooting > P0735

COMPONENT LOCATION



GENERAL DESCRIPTION

The value of the input shaft speed should be equal to the value of the output shaft speed, when multiplied by the 5th gear ratio, while the transaxle is engaged in the 5th gear. For example, if the output speed is 1,000 rpm and the 5th gear ratio is 0.834, then the input speed is 834 rpm.

DTC DESCRIPTION

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 5th gear ratio, while the transaxle is engaged in 5th gear.

DTC DETECTING CONDITION

Item	Detecting Condition	Possible cause
DTC Strategy	• 5th gear incorrect ratio	• Faulty input speed sensor • Faulty output speed sensor • Faulty internal transmission
Enable Conditions	• Engine speed >600rpm • 150rpm >Output speed < 6000rpm • Lever Position = "D" • Input speed > 600rpm • A/T oil temp output ≥ -10°C • Throttle opening >15% • The time after the last shift was finish >1sec	

Threshold value	• ㅣInput speed - output speed × 5th gear ratio ㅣ ≥200rpm	
Diagnostic Time	• More than 1sec	
Fail Safe	• 4th gear Limp-Home mode	

SIGNAL WAVEFORM

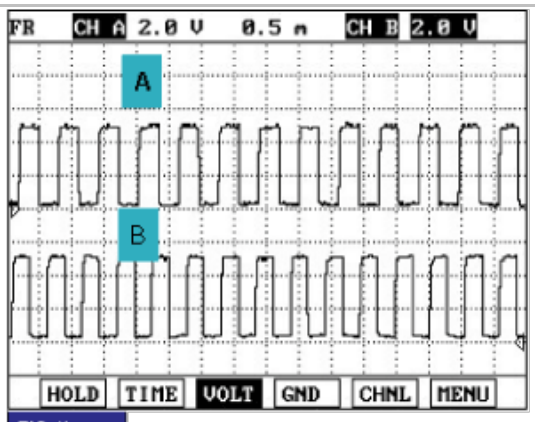


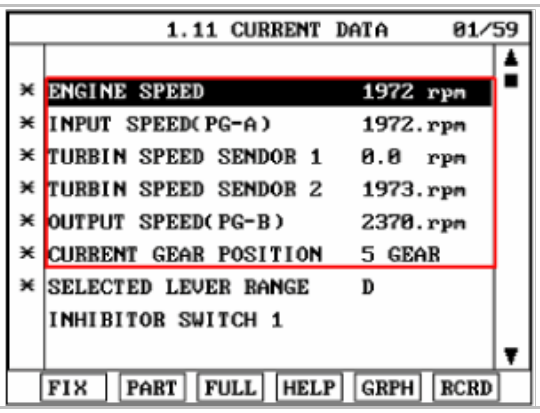
FIG.1)

A : INPUT SPEED SENSOR
B : OUTPUT SPEED SENSOR

SIGNAL CIRCUIT INSPECTION

1. Connect Scantool.
2. Engine "ON".
3. Monitor the "INPUT & OUTPUT SPEED SENSOR" parameter on the scantool.
4. Accelerate the Engine speed until about 2000 rpm in the 5th gear.

Specification : INPUT SPEED - (OUTPUT SPEED × 5th GEAR RATIO) ≤ 200 RPM



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

YES

▶ Go to "Component Inspection" procedure.

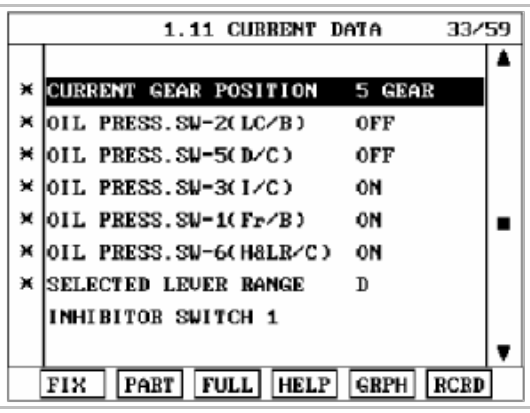
NO

▶ Check condition of Input & Output Speed Sensor and sensor wiring. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

COMPONENT INSPECTION

1. Connect Scantool.
2. Engine "ON".
3. Monitor the "OIL PRESSURE. S/W 1,2,3,5,6" parameter on the scantool.
4. Move select lever to "D" range and operate vehicle within 5th gear condition.

Shift position		Oil Pressure Switch				
		I/C(SW3)	H&LR/C(SW6)	H&LR/C(SW6)	FR/B(SW1)	LC/B(SW2)
P		X	O	X	O	X
R		X	O	X	O	X
N		X	O	X	O	X
D	1st gear	X	X	X	O	X
	2nd gear	X	X	O	O	X
	3rd gear	X	O	O	O	X
	4th gear	O	O	O	X	X
	5th gear	O	O	X	O	X



5. Is oil pressure value within specifications?

YES

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

NO

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

VERIFICATION OF VEHICLE REPAIR

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

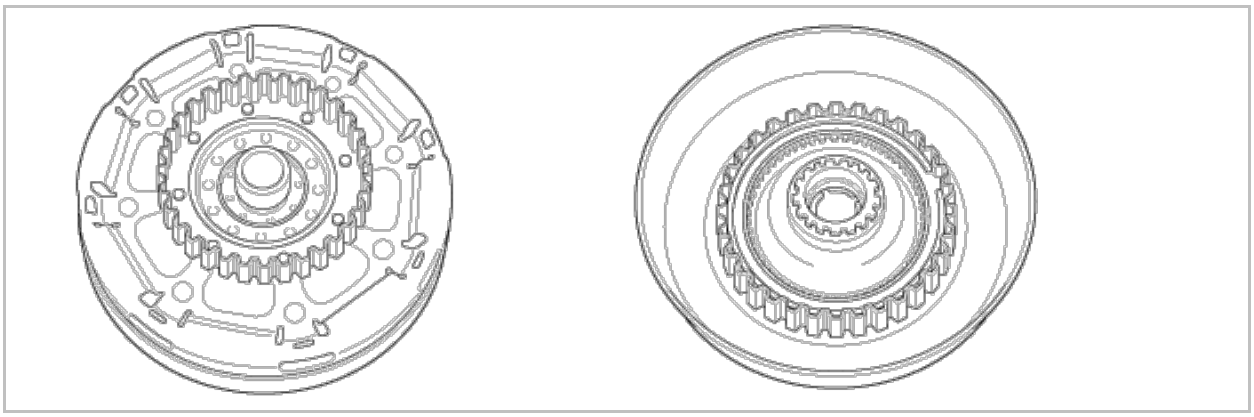
▶ Go to the applicable troubleshooting procedure.

NO

▶ System performing to specification at this time.

Automatic Transaxle System > Troubleshooting > P0741

COMPONENT LOCATION



GENERAL DESCRIPTION

The PCM/TCM controls the locking and unlocking of the Torque Converter Clutch (or Damper Clutch), to the input shaft of the transmission, by appling hydraulic pressure. The main purpose of T/C clutch control is to save fuel by decreasing the hydraulic load inside the T/C. The TCM outputs duty pulses to control the Damper Clutch Control Solenoid Valve(DCCSV) and hydraulic pressure is applied to DC according to the DCC duty ratio value.
When the duty ratio is high, high pressure is applied and the Damper Clutch is locked. The normal operating range of the Damper Clutch Control current is from 0.05A(unlocked) to 0.75A(locked).

DTC DESCRIPTION

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 TCM increases the duty ratio by appling more hyraulic pressure.
When slip rpm does not drop within specifications with 100% duty ratio, the PCM/TCM determines that the Torque Converter Clutch is stuck OFF and sets this code.

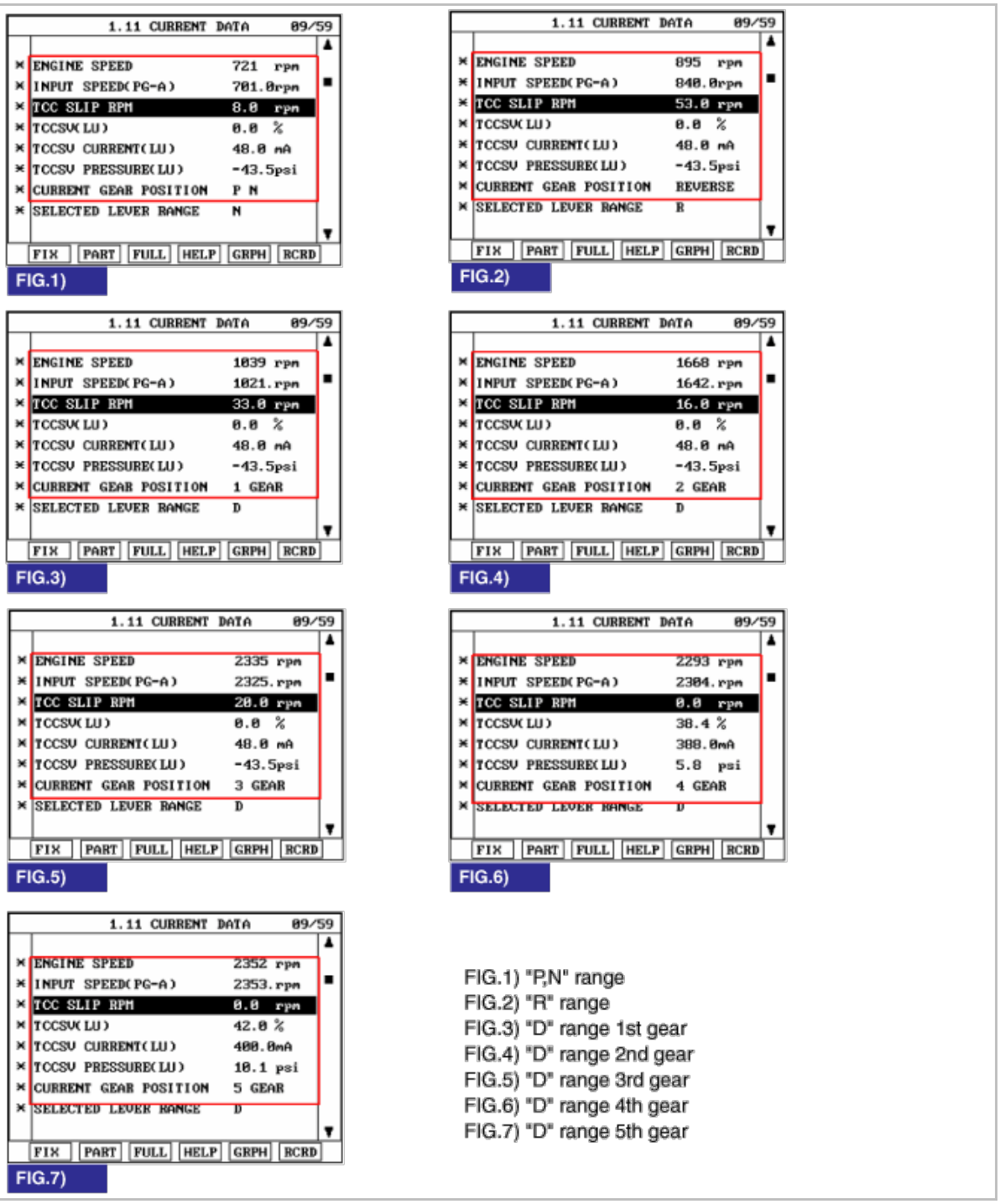
DTC DETECTING CONDITION

Item	Detecting Condition	Possible cause
DTC Strategy	• Stuck "OFF"	※ TORQUE CONVERTER(DAMPER) CLUTCH : TCC • Faulty TCC or oil pressure system • Faulty TCC solenoid valve • Faulty body control valve • Faulty TCM
Enable Conditions	• Duty of "Damper clutch solenoid valve" = 100% • Input speed > 0rpm	
Threshold value	• Calculated slip (engine speed-input speed)>100rpm	
Diagnostic Time	• More than 5sec	
Fail Safe	• Damper clutch "OFF"	

Monitor Scantool Data

1. Connect scantool to data link connector(DLC).
2. Engine "ON".
3. Select "D RANGE" and drive vehicle 5 gear.
4. Monitor the "TORQUE CONVERTER(DAMPER) CLUTCH" parameter on the scantool .

Specification : Calculated slip (engine speed-input speed) < 100rpm



5. Is "TCC SLIP(DAMPER CLUTCH SL.RPM)" within specifications?

YES

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

NO

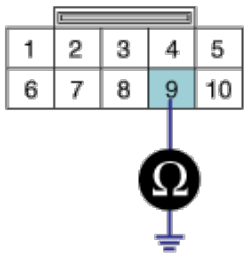
▶ Go to "Component Inspection" procedure.

COMPONENT INSPECTION

1. Disconnect "C106-2" connector.

2. Ignition "OFF".
3. Measure resistance between terminal "9" of the C106-2 harness connector and chassis ground.

Specification : approx. 3~9Ω



C106-2
Component side

1.ATF 2
2.LOW COAST BRAKE SOLENOID VALVE
3.HIGH&LOW REVERSE CLUTCH SOLENOID VALVE
4.DIRECT CLUTCH SOLENOID VALVE
6.FRONT BRAKE SOLENOID VALVE
7.INPUT CLUTCH SOLENOID VALVE
8.PCSV(LINE PRESSURE CONTROL SOLENOID VALVE)
9.TCCSV

4. Is resistance within specifications?

YES

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

NO

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

VERIFICATION OF VEHICLE REPAIR

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

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

YES

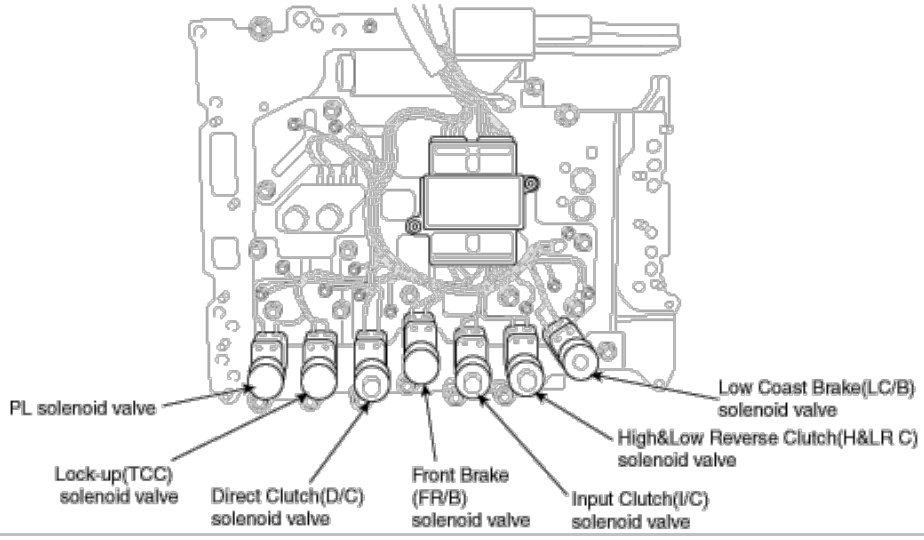
▶ Go to the applicable troubleshooting procedure.

NO

▶ System performing to specification at this time.

Automatic Transaxle System > Troubleshooting > P0743

COMPONENT LOCATION



GENERAL DESCRIPTION

The PCM/TCM controls the locking and unlocking of the Torque Converter Clutch (or Damper Clutch), to the input shaft of the transmission, by appling hydraulic pressure. The main purpose of T/C clutch control is to save fuel by decreasing the hydraulic load inside the T/C. The TCM outputs duty pulses to control the Damper Clutch Control Solenoid Valve(DCCSV) and hydraulic pressure is applied to DC according to the DCC duty ratio value. When the duty ratio is high, high pressure is applied and the Damper Clutch is locked. The normal operating range of the Damper Clutch Control current is from 0.05A(unlocked) to 0.75A(locked).

DTC DESCRIPTION

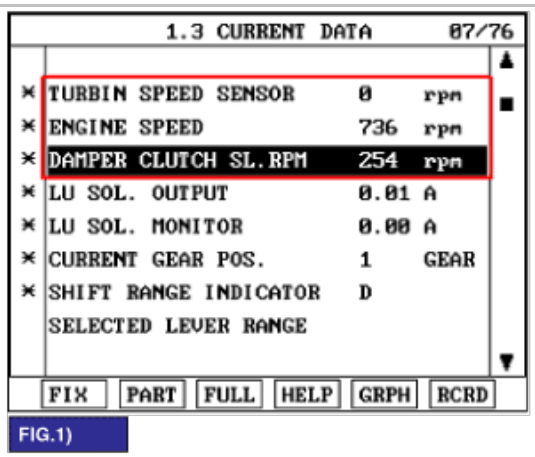
The TCM checks the Damper Clutch Control Signal by monitoring the feedback signal from the solenoid valve drive circuit. If an unexpected signal is monitored, (For example, high voltage is detected when low voltage is expected, or low voltage is detected when high voltage is expected) the TCM judges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

DTC DETECTING CONDITION

Item	Detecting Condition	Possible cause
DTC Strategy	• Check voltage range	※ TORQUE CONVERTER(DAMPER) CLUTCH : TCC • Open or short in circuit • Faulty TCC SOLENOID VALVE • Faulty PCM/TCM
Enable Conditions	• 10V < Actuator power supply voltage < 16V	
Threshold value	• Hardware "IC" check	
Diagnostic Time	• More than 0.2sec	
Fail Safe	• Lock-up control is prohibited(L/U off)	

MONITOR SCANTOOL DATA

1. Connect scantool to data link connector(DLC).
2. Engine "ON".
3. Monitor the "TCC SOL. VALVE" parameter on the scantool.
4. Select "D RANGE" and Operate the vehicle 5 gear.
5. Check "TCC SOL. VALVE" parameter value changes while driving.



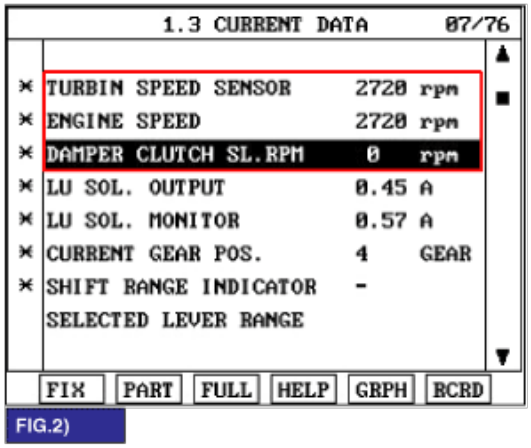


FIG.1) Not engagement status of TCC
FIG.2) Engagement status of TCC

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

YES

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

NO

▶ Go to "Terminal&connector inspection" procedure.

TERMINAL & CONNECTOR INSPECTION

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

YES

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

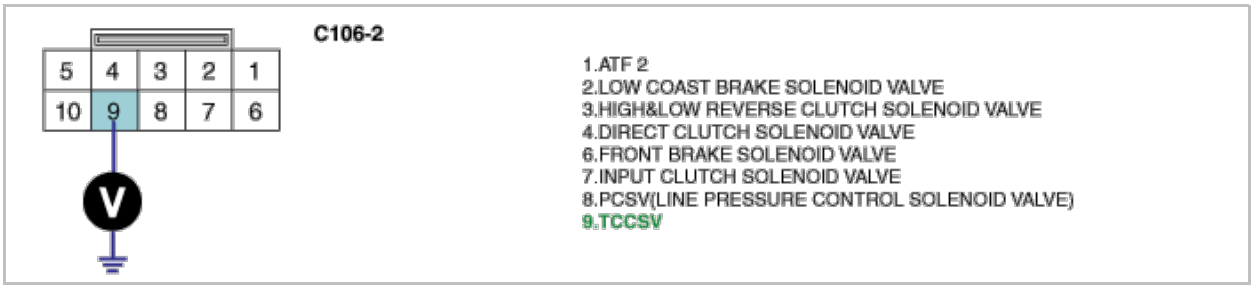
NO

▶ Go to "Signal circuit Inspection" procedure.

SIGNAL CIRCUIT INSPECTION

1. Disconnect "C106-2" connector.
2. IGNITION "ON", ENGINE "OFF".
3. Measure voltage between terminal "9" of the C106-2 harness connector and chassis ground.

Specification : approx. 5V



4. Is voltage within specifications?

YES

▶ Go to "Component inspection" procedure.

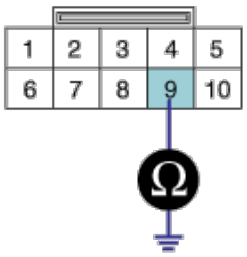
NO

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

COMPONENT INSPECTION

1. Disconnect "C106-2" connector.
2. Ignition "OFF".
3. Measure resistance between terminal "9" of the C106-2 harness connector and chassis ground.

Specification : approx. 3~9Ω



C106-2
Component side

1.ATF 2
2.LOW COAST BRAKE SOLENOID VALVE
3.HIGH&LOW REVERSE CLUTCH SOLENOID VALVE
4.DIRECT CLUTCH SOLENOID VALVE
6.FRONT BRAKE SOLENOID VALVE
7.INPUT CLUTCH SOLENOID VALVE
8.PCSV(LINE PRESSURE CONTROL SOLENOID VALVE)
9.TCCSV

4. Is resistance within specifications?

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

5. ▶ Check for open or short in harness. Repair as necessary and Go to "Verification of Vehicle Repair" procedure.
If signal circuit in harness is OK, Replace "TCC SOLENOID VALVE" as necessary and Go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR

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

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

YES

▶ Go to the applicable troubleshooting procedure.

NO

▶ System performing to specification at this time.

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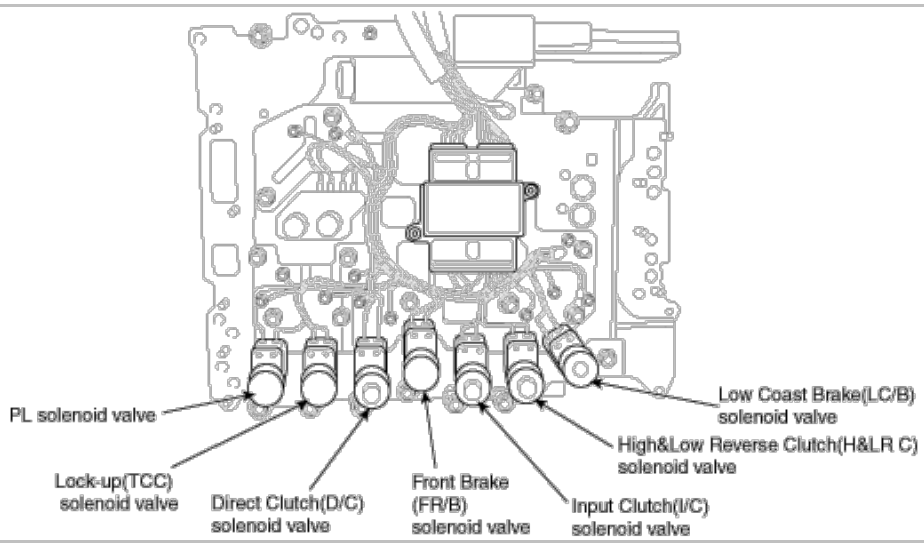
COMPONENT LOCATION



GENERAL DESCRIPTION

The line pressure solenoid valve regulates the oil pump discharge pressure to suit the driving condition in response to a signal sent from the TCM. The line pressure duty cycle valve is not consistent when the closed throttle position signal is "ON".

DTC DESCRIPTION

To confirm the line pressure duty cycle at low pressure, the accelerator (throttle) should be open until the closed throttle position signal is "OFF".

DTC DETECTING CONDITION

Item	Detecting Condition	Possible cause
DTC Strategy	• Check voltage range	※ PRESSURE CONTROL SOLENOID VALVE(LINE PRESSURE : PCSV(PL. SOL) • Open or short in circuit • Faulty PCSV • Faulty TCM
Enable Conditions	• 10V < Actuator power supply voltage < 16V	
Threshold value	• Hardware "IC" check	
Diagnostic Time	• More than 0.2sec	
Fail Safe	• Lock-up control is prohibited(L/U off)	

Signal Waveform

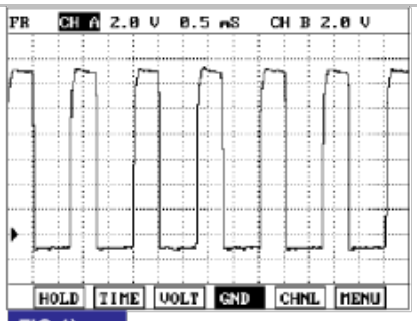


FIG.1)

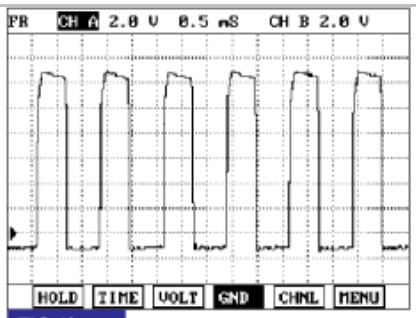


FIG.2)

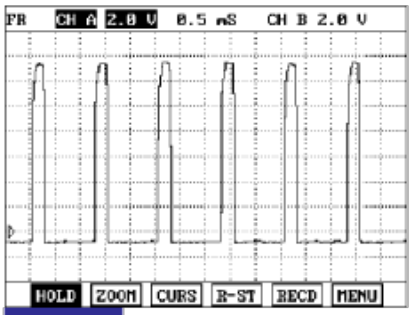


FIG.3)

FIG.1) N RANGE
FIG.2) N → D (Low pressure control)
FIG.3) STALL TEST(High pressure control)

MONITOR SCANTOOL DATA

1. Connect scantool to data link connector(DLC)
2. Engine "ON".
3. Monitor the "PCSV" parameter on the scantool.
4. Select "D RANGE" and Operate the vehicle.
5. Check "PCSV" parameter value changes while driving.

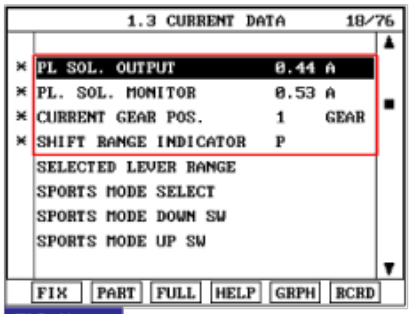


FIG.1)

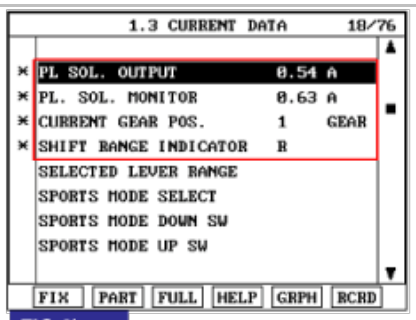


FIG.2)

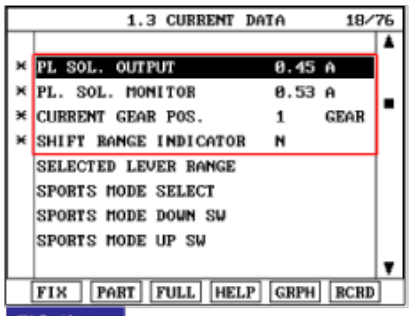


FIG.3)

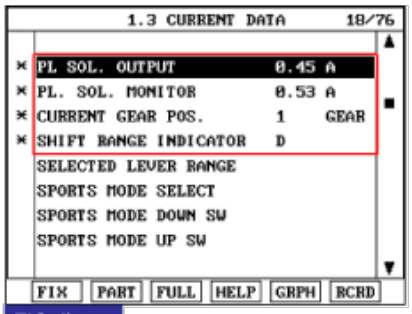


FIG.4)

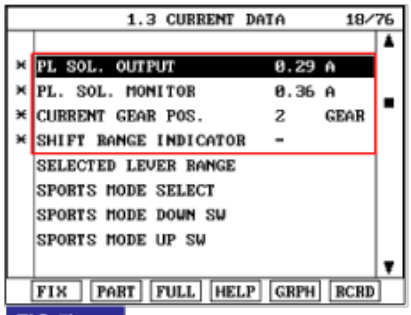


FIG.5)

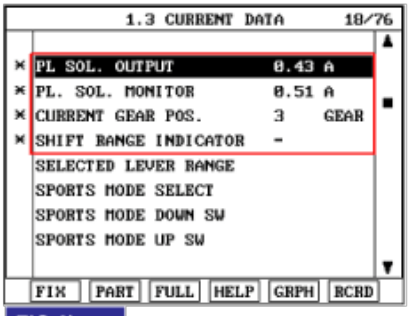


FIG.6)

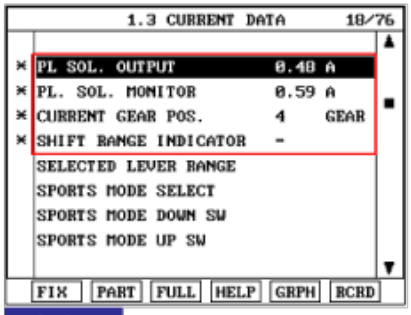


FIG.7)

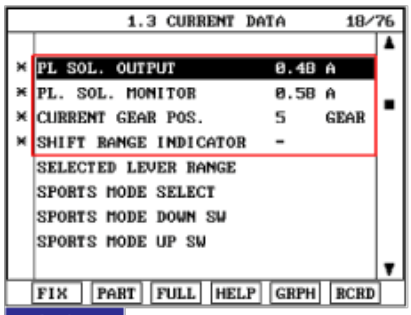


FIG.8)

FIG.1) "P" Range
FIG.2) "R" Shifting
FIG.3) "N" Range
FIG.4) "D" Range 1st gear
FIG.5) "D" Range 2nd gear
FIG.6) "D" Range 3rd gear
FIG.7) "D" Range 4th gear
FIG.8) "D" Range 5th gear

6. Does "PCSV DUTY " follow the reference data?

YES

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

NO

▶ Go to "Terminal&connector inspection " procedure.

TERMINAL & CONNECTOR INSPECTION

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

YES

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

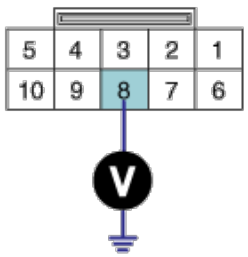
NO

▶ Go to "Signal circuit Inspection" procedure.

SIGNAL CIRCUIT INSPECTION

1. Disconnect "C106-2" connector.
2. IGNITION "ON", ENGINE "OFF"
3. Measure voltage between terminal "8" of the C106-2 harness connector and chassis ground.

Specification : approx. 5V



C106-2

1.ATF 2
2.LOW COAST BRAKE SOLENOID VALVE
3.HIGH&LOW REVERSE CLUTCH SOLENOID VALVE
4.DIRECT CLUTCH SOLENOID VALVE
6.FRONT BRAKE SOLENOID VALVE
7.INPUT CLUTCH SOLENOID VALVE
8.PCSV(LINE PRESSURE CONTROL SOLENOID VALVE)
9.TCCSV

4. Is voltage within specifications?

YES

▶ Go to "Component inspection" procedure.

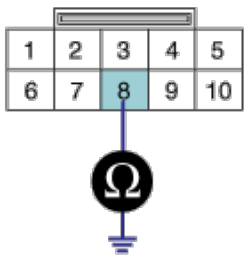
NO

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

COMPONENT INSPECTION

1. Disconnect "C106-2" connector.
2. Ignition "OFF".
3. Measure resistance between terminal "8" of the C106-2 harness connector and chassis ground.

Specification : approx. 3~9Ω



C106-2
Component side

1.ATF 2
2.LOW COAST BRAKE SOLENOID VALVE
3.HIGH&LOW REVERSE CLUTCH SOLENOID VALVE
4.DIRECT CLUTCH SOLENOID VALVE
6.FRONT BRAKE SOLENOID VALVE
7.INPUT CLUTCH SOLENOID VALVE
8.PCSV(LINE PRESSURE CONTROL SOLENOID VALVE)
9.TCCSV

4. Is resistance within specifications?

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

5. ▶ Check for open or short in harness. Repair as necessary and Go to "Verification of Vehicle Repair" procedure. If signal circuit in harness is OK, Replace "PRESSURE CONTROL SOLENOID VALVE" as necessary and Go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR

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

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

YES

▶ Go to the applicable troubleshooting procedure.

NO

▶ System performing to specification at this time.

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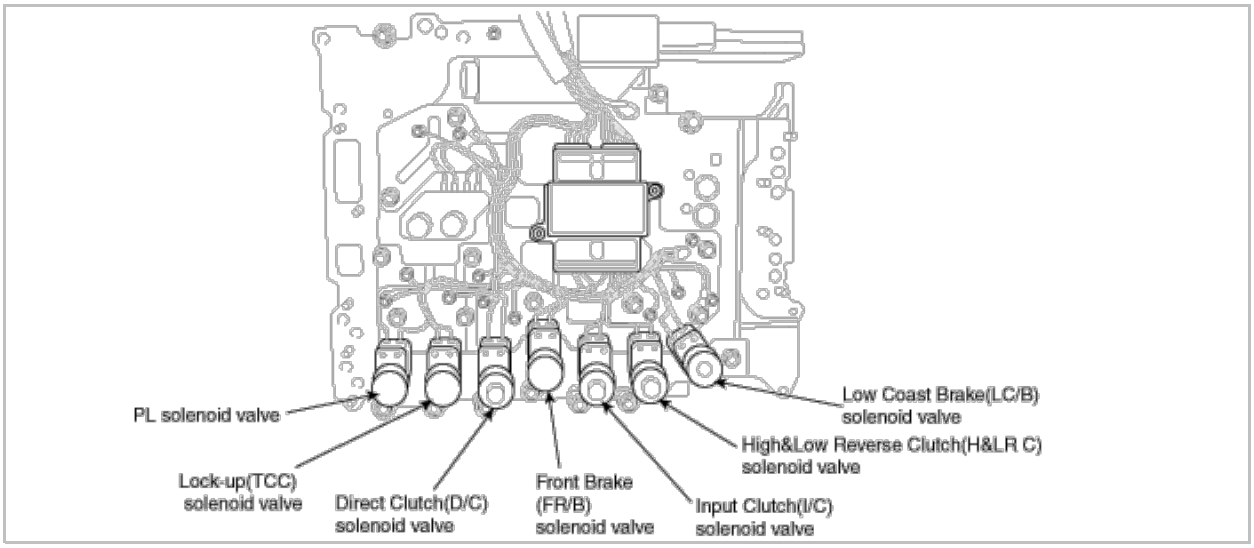
COMPONENT LOCATION



GENERAL DESCRIPTION

The Automatic Transmission changes the gear position of the transmission utilizing a combination of Clutches and Brakes, which are controlled by solenoid valves. Input clutch solenoid valve is controlled by the TCM in response to signals sent from the inhibitor switch, vehicle speed sensor and accelerator pedal position sensor (throttle position sensor). Gears will then be shifted to the optimum position.

DTC DESCRIPTION

This is not only caused by electrical malfunction (circuits open or shorted) but also by mechanical malfunction such as control valve sticking, improper solenoid valve operation.

DTC DETECTING CONDITION

Item	Detecting Condition	Possible cause
DTC Strategy	• Check voltage range	※ INPUT CLUTCH SOLENOID VALVE : I/C SOLENOID VALVE
Enable Conditions	• 10V < Actuator power supply voltage < 16V	

Threshold value	• Hardware "IC" check	• Open or short in circuit • Faulty I/C SOLENOID VALVE • Faulty TCM
Diagnostic Time	• More than 0.2sec	
Fail Safe	• Lock-up control is prohibited(L/U off)	

Signal Waveform

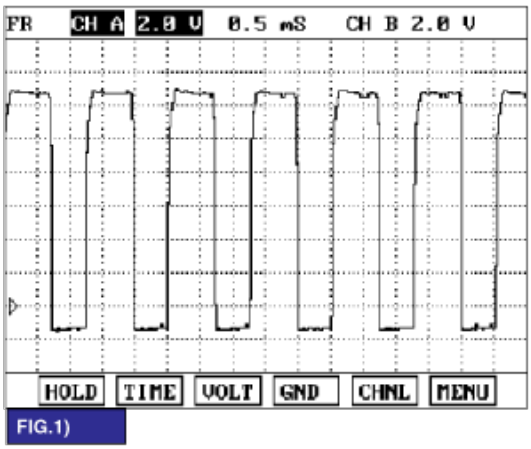


FIG.1)

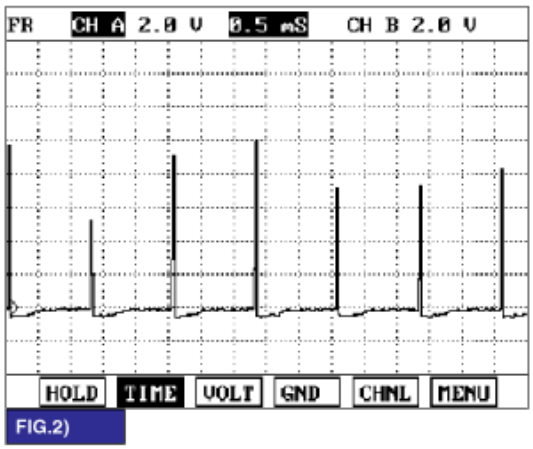


FIG.2)

FIG.1) N RANGE
FIG.2) 4 GEAR

MONITOR SCANTOOL DATA

1. Connect scantool to data link connector(DLC)
2. Engine "ON".
3. Monitor the "I/C SOLENOID" parameter on the scantool.
4. Select "D RANGE" and Operate the vehicle.
5. Check "I/C SOLENOID" parameter value changes while driving.

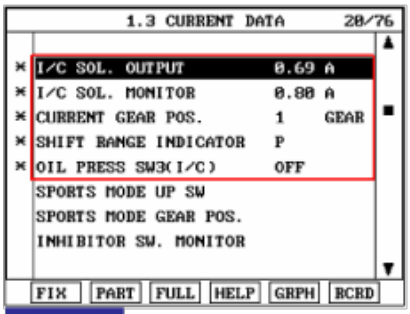


FIG.1)

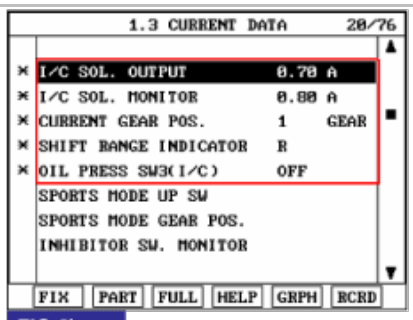


FIG.2)

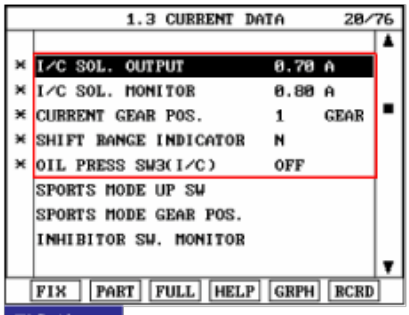


FIG.3)

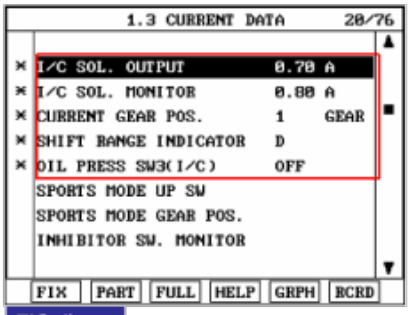


FIG.4)

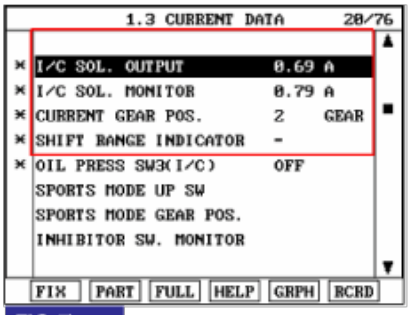


FIG.5)

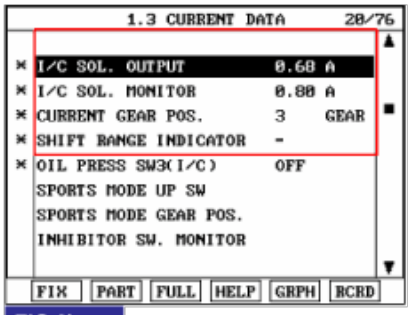


FIG.6)

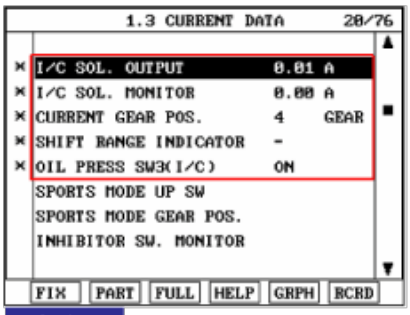


FIG.7)

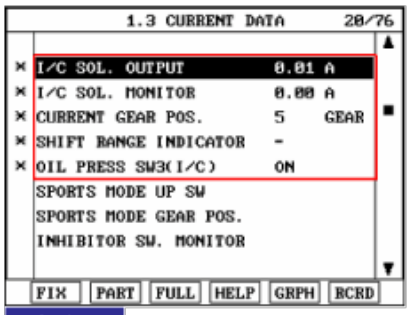


FIG.8)

FIG.1) "P" Range
FIG.2) "R" Shifting
FIG.3) "N" Range
FIG.4) "D" Range 1st gear
FIG.5) "D" Range 2nd gear
FIG.6) "D" Range 3rd gear
FIG.7) "D" Range 4th gear
FIG.8) "D" Range 5th gear

6. Does "I/C SOLENOID " follow the reference data?

YES

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

NO

▶ Go to "Terminal&connector inspection " procedure.

TERMINAL & CONNECTOR INSPECTION

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

YES

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

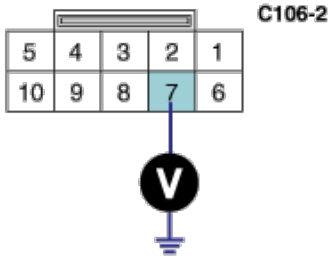
NO

▶ Go to "Signal circuit Inspection" procedure.

SIGNAL CIRCUIT INSPECTION

1. Disconnect "C106-2" connector.
2. IGNITION "ON", ENGINE "OFF"
3. Measure voltage between terminal "7" of the C106-2 harness connector and chassis ground.

Specification : Output voltage repeated between 4V and 12V



1.ATF 2
2.LOW COAST BRAKE SOLENOID VALVE
3.HIGH&LOW REVERSE CLUTCH SOLENOID VALVE
4.DIRECT CLUTCH SOLENOID VALVE
6.FRONT BRAKE SOLENOID VALVE
7.INPUT CLUTCH SOLENOID VALVE
8.PCSV(LINE PRESSURE CONTROL SOLENOID VALVE)
9.TCCSV

4. Is voltage within specifications?

YES

▶ Go to "Component inspection" procedure.

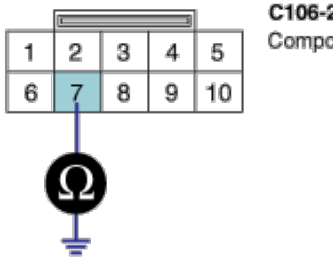
NO

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

COMPONENT INSPECTION

1. Disconnect "C106-2" connector.
2. Ignition "OFF".
3. Measure resistance between terminal "7" of the C106-2 harness connector and chassis ground.

Specification : approx. 3~9Ω



1.ATF 2
2.LOW COAST BRAKE SOLENOID VALVE
3.HIGH&LOW REVERSE CLUTCH SOLENOID VALVE
4.DIRECT CLUTCH SOLENOID VALVE
6.FRONT BRAKE SOLENOID VALVE
7.INPUT CLUTCH SOLENOID VALVE
8.PCSV(LINE PRESSURE CONTROL SOLENOID VALVE)
9.TCCSV

4. Is resistance within specifications?

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

5. ▶ Check for open or short in harness. Repair as necessary and Go to "Verification of Vehicle Repair" procedure.
   If signal circuit in harness is OK, Replace "I/C SOLENOID VALVE" as necessary and Go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR

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

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

YES

▶ Go to the applicable troubleshooting procedure.

NO

▶ System performing to specification at this time.

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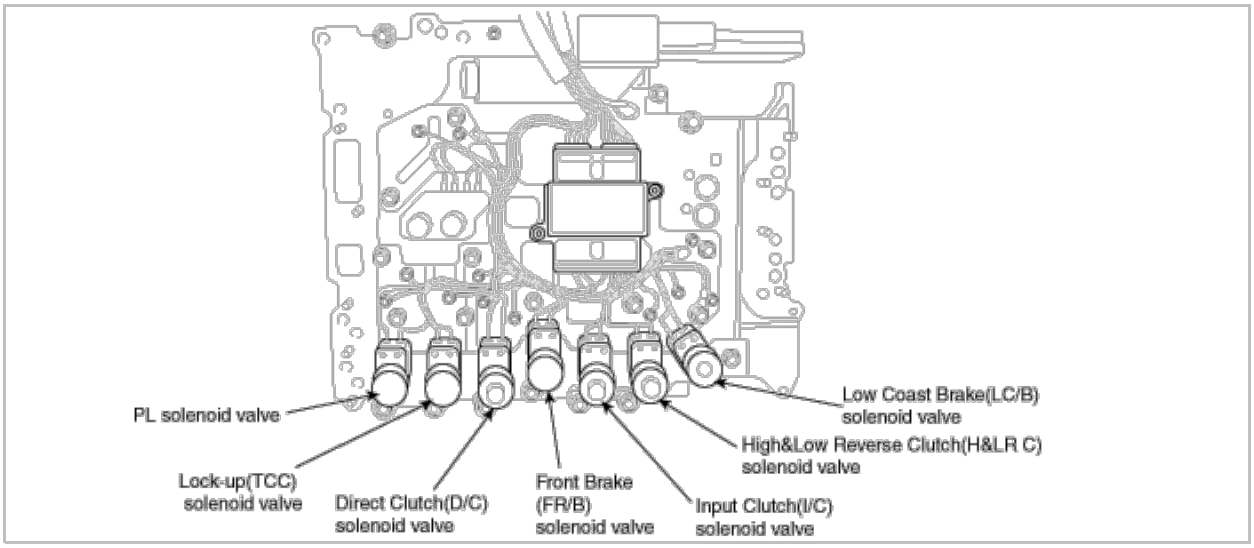
COMPONENT LOCATION



GENERAL DESCRIPTION

The Automatic Transmission changes the gear position of the transmission utilizing a combination of Clutches and Brakes, which are controlled by solenoid valves. Front brake solenoid valve is controlled by the TCM in response to signals sent from the inhibitor switch, vehicle speed sensor and accelerator pedal position sensor (throttle position sensor). Gear will then be shifted to the optimum position.

DTC DESCRIPTION

This is not only caused by electrical malfunction (circuit open or shorted) but also by mechanical malfunction such as control valve sticking, improper solenoid valve operation.

DTC DETECTING CONDITION

Item	Detecting Condition	Possible cause
DTC Strategy	• Check voltage range	※ FRONT BRAKE SOLENOID VALVE : Fr/B SOLENOID VALVE
Enable Conditions	• 10V < Actuator power supply voltage < 16V	

Threshold value	• Hardware "IC" check	• Open or short in circuit • Faulty Fr/B SOLENOID VALVE • Faulty TCM
Diagnostic Time	• More than 0.2sec	
Fail Safe	• Lock-up control is prohibited(L/U off)	

Signal Waveform

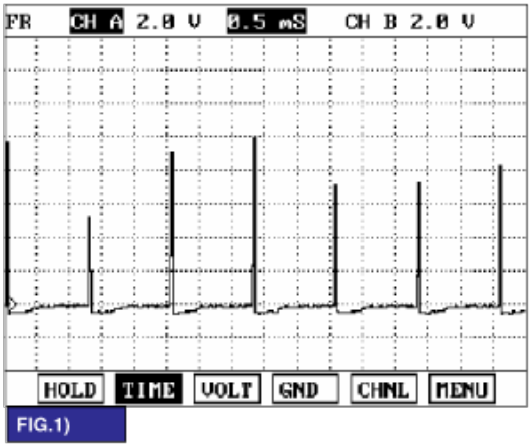


FIG.1)

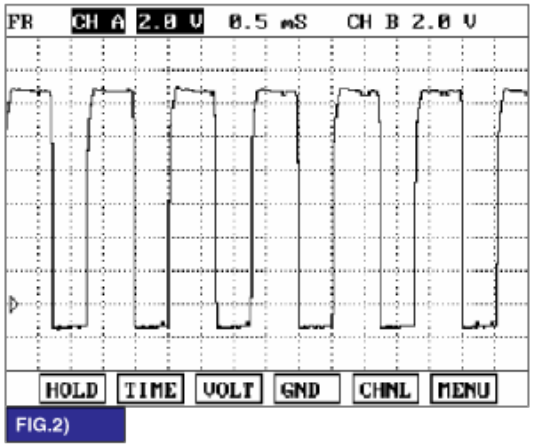


FIG.2)

FIG.1) R RANGE
FIG.2) 4 GEAR

MONITOR SCANTOOL DATA

1. Connect scantool to data link connector(DLC)
2. Engine "ON".
3. Monitor the "Fr/B SOLENOID" parameter on the scantool.
4. Select "R,D RANGE" and Operate the vehicle.
5. Check "Fr/B SOLENOID" parameter value changes while driving.

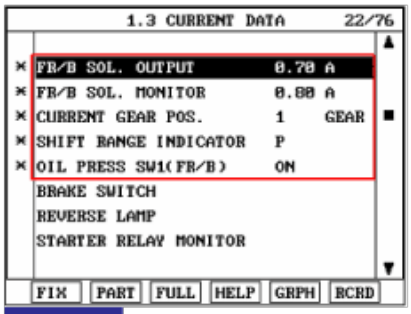


FIG.1)

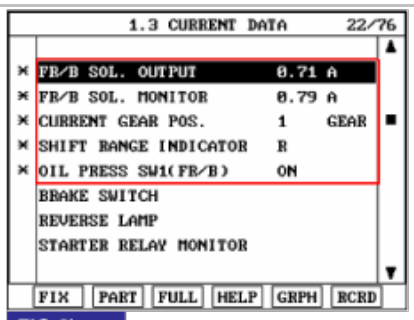


FIG.2)

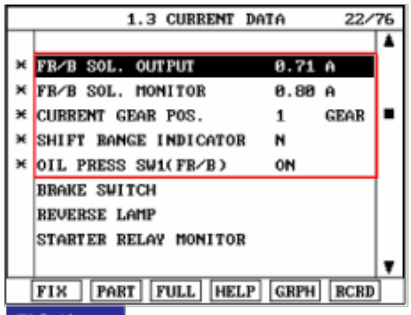


FIG.3)

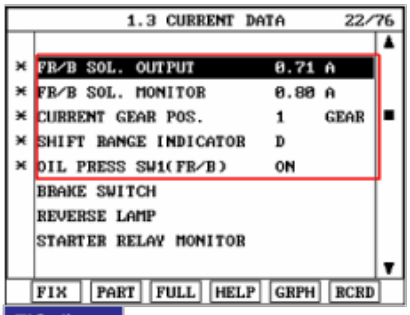


FIG.4)

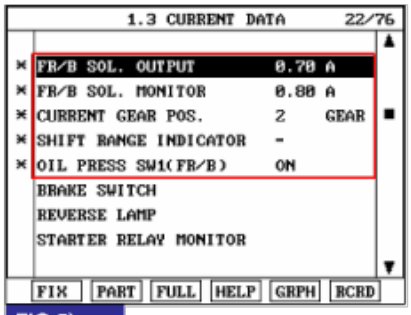


FIG.5)

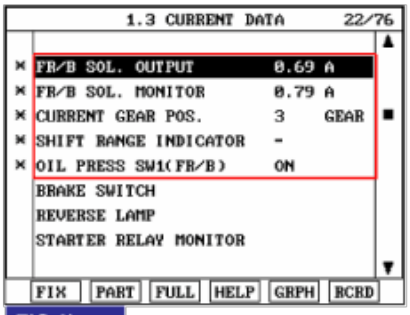


FIG.6)

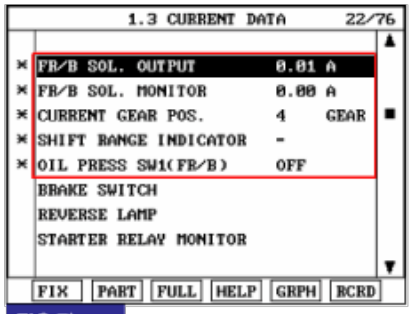


FIG.7)

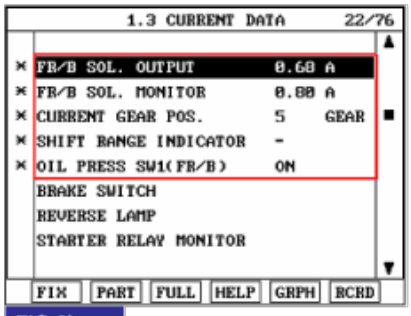


FIG.8)

FIG.1) "P" Range
FIG.2) "R" Shifting
FIG.3) "N" Range
FIG.4) "D" Range 1st gear
FIG.5) "D" Range 2nd gear
FIG.6) "D" Range 3rd gear
FIG.7) "D" Range 4th gear
FIG.8) "D" Range 5th gear

6. Does "Fr/B SOLENOID" follow the reference data?

YES

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

NO

▶ Go to "Terminal&connector inspection " procedure.

TERMINAL & CONNECTOR INSPECTION

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

YES

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

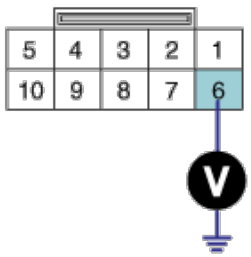
NO

▶ Go to "Signal circuit Inspection" procedure.

SIGNAL CIRCUIT INSPECTION

1. Disconnect "C106-2" connector.
2. IGNITION "ON", ENGINE "OFF"
3. Measure voltage between terminal "6" of the C106-2 harness connector and chassis ground.

Specification : approx. 5V



C106-2

1.ATF 2
2.LOW COAST BRAKE SOLENOID VALVE
3.HIGH&LOW REVERSE CLUTCH SOLENOID VALVE
4.DIRECT CLUTCH SOLENOID VALVE
6.FRONT BRAKE SOLENOID VALVE
7.INPUT CLUTCH SOLENOID VALVE
8.PCSV(LINE PRESSURE CONTROL SOLENOID VALVE)
9.TCCSV

4. Is voltage within specifications?

YES

▶ Go to "Component inspection" procedure.

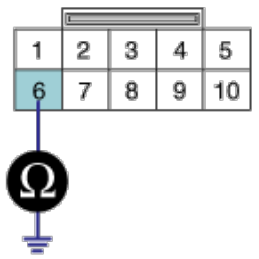
NO

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

COMPONENT INSPECTION

1. Disconnect "C106-2" connector.
2. Ignition "OFF".
3. Measure resistance between terminal "6" of the C106-2 harness connector and chassis ground.

Specification : approx. 3~9Ω



C106-2
Component side

1.ATF 2
2.LOW COAST BRAKE SOLENOID VALVE
3.HIGH&LOW REVERSE CLUTCH SOLENOID VALVE
4.DIRECT CLUTCH SOLENOID VALVE
6.FRONT BRAKE SOLENOID VALVE
7.INPUT CLUTCH SOLENOID VALVE
8.PCSV(LINE PRESSURE CONTROL SOLENOID VALVE)
9.TCCSV

4. Is resistance within specifications?

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

5. ▶ Check for open or short in harness. Repair as necessary and Go to "Verification of Vehicle Repair" procedure.
   If signal circuit in harness is OK, Replace "Fr/B SOLENOID VALVE" as necessary and Go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR

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

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

YES

▶ Go to the applicable troubleshooting procedure.

NO

▶ System performing to specification at this time.

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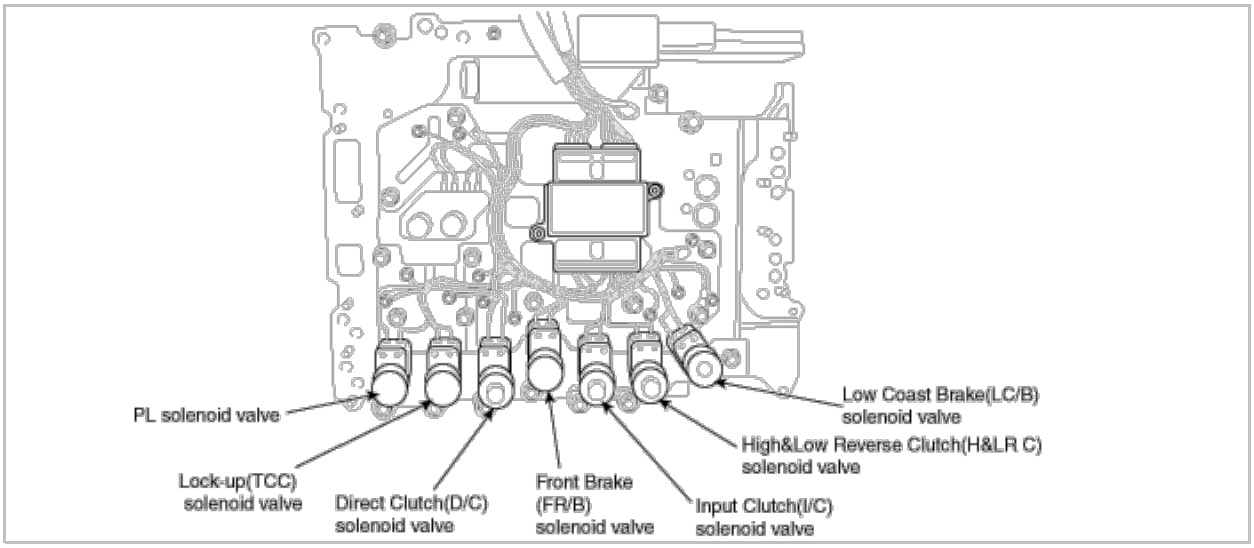
COMPONENT LOCATION



GENERAL DESCRIPTION

The Automatic Transmission changes the gear position of the transmission utilizing a combination of Clutches and Brakes, which are controlled by solenoid valves. Direct clutch solenoid valve is controlled by the TCM in response to signals sent from the inhibitor switch, vehicle speed sensor and accelerator pedal position sensor (throttle position sensor). Gears will then be shifted to the optimum position.

DTC DESCRIPTION

This is not only caused by electrical malfunction (circuits open or shorted) but also by mechanical malfunction such as control valve sticking, improper solenoid valve operation.

DTC DETECTING CONDITION

Item	Detecting Condition	Possible cause
DTC Strategy	• Check voltage range	※ DIRECT CLUTCH SOLENOID VALVE : D/C SOLENOID VALVE
Enable Conditions	• 10V < Actuator power supply voltage < 16V	

Threshold value	• Hardware "IC" check	• Open or short in circuit • Faulty D/C SOLENOID VALVE • Faulty TCM
Diagnostic Time	• More than 0.2sec	
Fail Safe	• Lock-up control is prohibited(L/U off)	

Signal Waveform

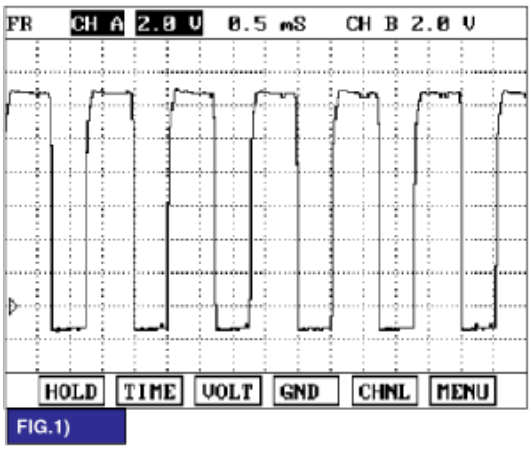


FIG.1)

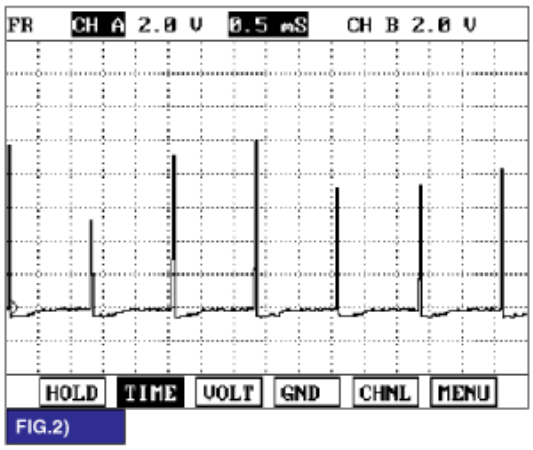


FIG.2)

FIG.1) N RANGE
FIG.2) 2 GEAR

MONITOR SCANTOOL DATA

1. Connect scantool to data link connector(DLC).
2. Engine "ON".
3. Monitor the "D/C SOLENOID" parameter on the scantool.
4. Select "D RANGE" and Operate the vehicle.
5. Check "D/C SOLENOID" parameter value changes while driving.

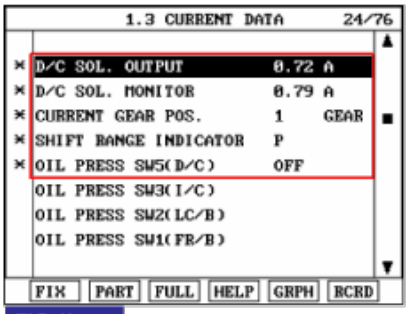


FIG.1)

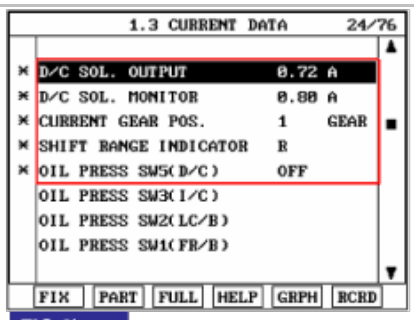


FIG.2)

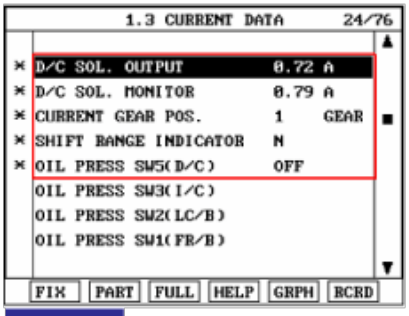


FIG.3)

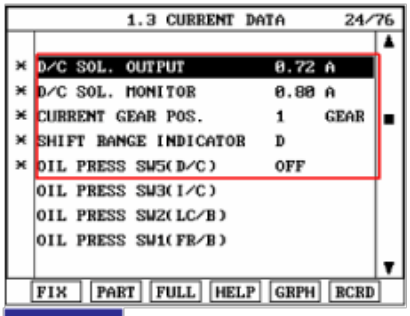


FIG.4)

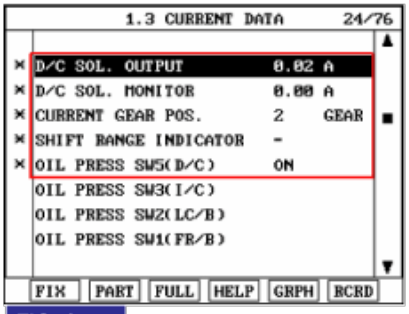


FIG.5)

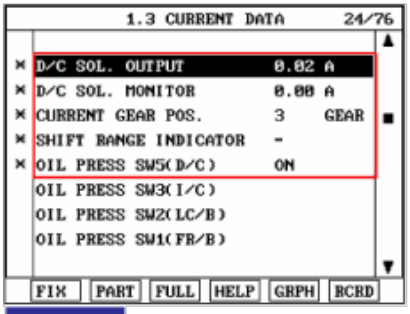


FIG.6)

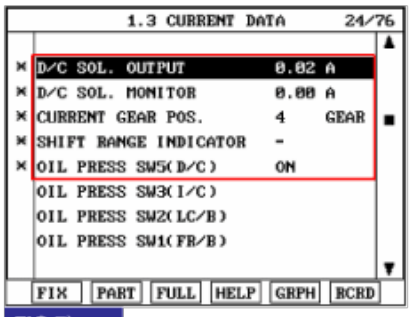


FIG.7)

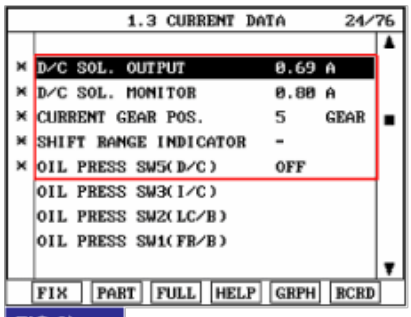


FIG.8)

FIG.1) "P" Range
FIG.2) "R" Shifting
FIG.3) "N" Range
FIG.4) "D" Range 1st gear
FIG.5) "D" Range 2nd gear
FIG.6) "D" Range 3rd gear
FIG.7) "D" Range 4th gear
FIG.8) "D" Range 5th gear

6. Does "D/C SOLENOID" follow the reference data?

YES

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

NO

▶ Go to "Terminal&connector inspection " procedure.

TERMINAL & CONNECTOR INSPECTION

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

YES

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

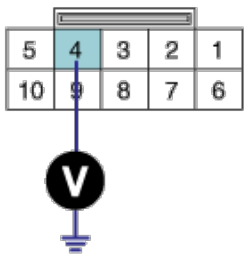
NO

▶ Go to "Signal circuit Inspection" procedure.

SIGNAL CIRCUIT INSPECTION

1. Disconnect "C106-2" connector.
2. IGNITION "ON", ENGINE "OFF"
3. Measure voltage between terminal "4" of the C106-2 harness connector and chassis ground.

Specification : approx. 5V



1.ATF 2
2.LOW COAST BRAKE SOLENOID VALVE
3.HIGH&LOW REVERSE CLUTCH SOLENOID VALVE
4.DIRECT CLUTCH SOLENOID VALVE
6.FRONT BRAKE SOLENOID VALVE
7.INPUT CLUTCH SOLENOID VALVE
8.PCSV(LINE PRESSURE CONTROL SOLENOID VALVE)
9.TCCSV

4. Is voltage within specifications?

YES

▶ Go to "Component inspection" procedure.

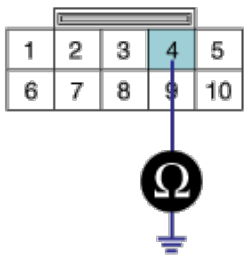
NO

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

COMPONENT INSPECTION

1. Disconnect "C106-2" connector.
2. Ignition "OFF".
3. Measure resistance between terminal "4" of the C106-2 harness connector and chassis ground.

Specification : approx. 3~9Ω



1.ATF 2
2.LOW COAST BRAKE SOLENOID VALVE
3.HIGH&LOW REVERSE CLUTCH SOLENOID VALVE
4.DIRECT CLUTCH SOLENOID VALVE
6.FRONT BRAKE SOLENOID VALVE
7.INPUT CLUTCH SOLENOID VALVE
8.PCSV(LINE PRESSURE CONTROL SOLENOID VALVE)
9.TCCSV

4. Is resistance within specifications?

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

5. ▶ Check for open or short in harness. Repair as necessary and Go to "Verification of Vehicle Repair" procedure.
   If signal circuit in harness is OK, Replace "D/C SOLENOID VALVE" as necessary and Go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR

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

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

YES

▶ Go to the applicable troubleshooting procedure.

NO

▶ System performing to specification at this time.

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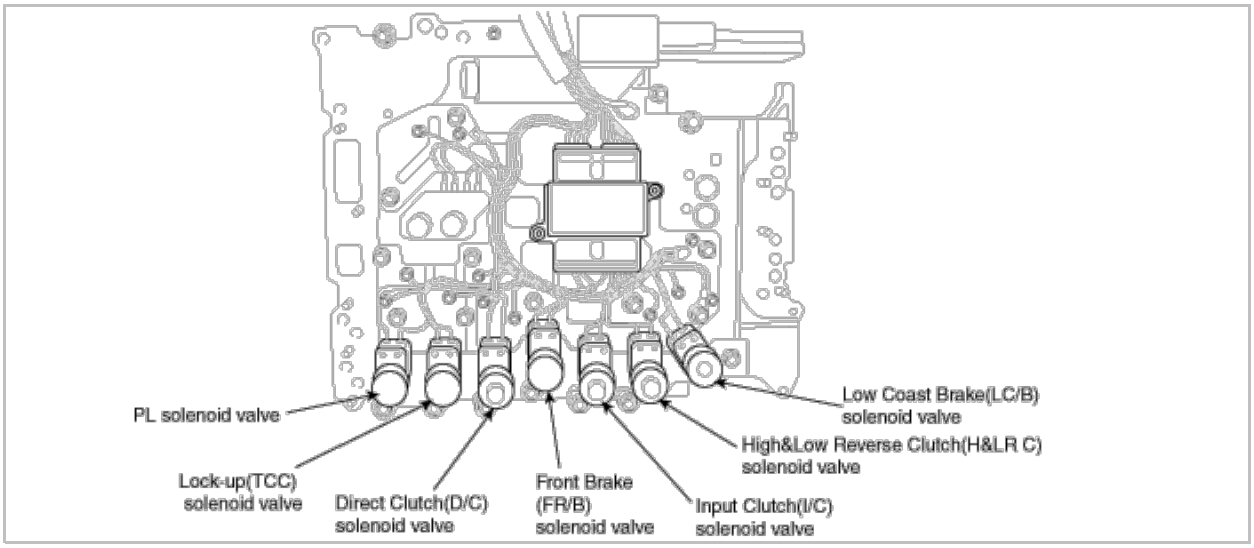
COMPONENT LOCATION



GENERAL DESCRIPTION

The Automatic Transmission changes the gear position of the transmission utilizing a combination of Clutches and Brakes, which are controlled by solenoid valves. High&low reverse clutch solenoid valve is controlled by the TCM in response to signals sent from the inhibitor switch, vehicle speed sensor and accelerator pedal position sensor (throttle position sensor). Gears will then be shifted to the optimum position.

DTC DESCRIPTION

This is not only caused by electrical malfunction (circuits open or shorted) but also by mechanical malfunction such as control valve sticking, improper solenoid valve operation.

DTC DETECTING CONDITION

Item	Detecting Condition	Possible cause
DTC Strategy	• Check voltage range	※ HIGH&LOW REVERSE CLUTCH SOLENOID VALVE: H&LR/C
Enable Conditions	• 10V < Actuator power supply voltage < 16V	

Threshold value	• Hardware "IC" check	SOLENOID VALVE • Open or short in circuit • Faulty H&LR/C SOLENOID VALVE • Faulty TCM
Diagnostic Time	• More than 0.2sec	
Fail Safe	• Lock-up control is prohibited(L/U off)	

Signal Waveform

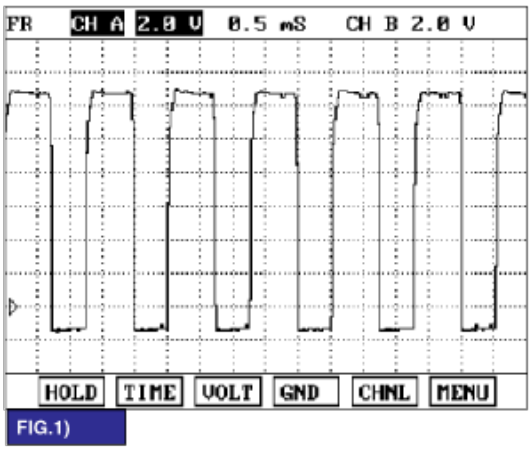


FIG.1)

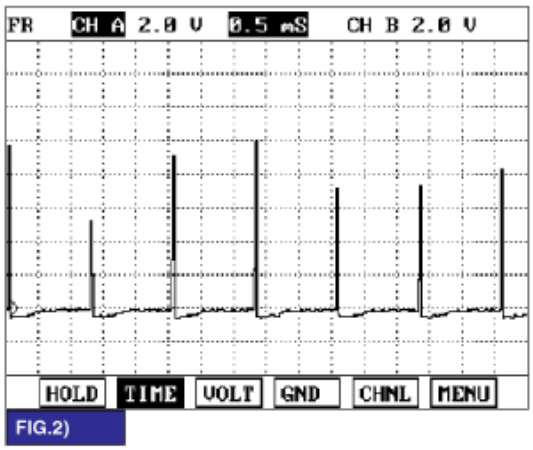


FIG.2)

FIG.1) 2 RANGE
FIG.2) 3 GEAR

MONITOR SCANTOOL DATA

1. Connect scantool to data link connector(DLC).
2. Engine "ON".
3. Monitor the "H&LR/C SOLENOID" parameter on the scantool.
4. Select "D RANGE" and Operate the vehicle.
5. Check "H&LR/C SOLENOID" parameter value changes while driving.

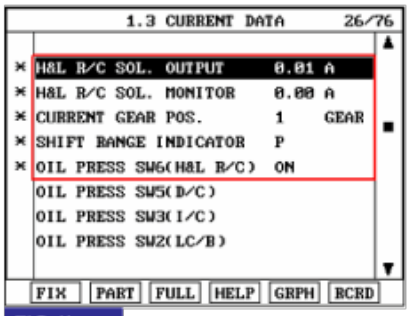


FIG.1)

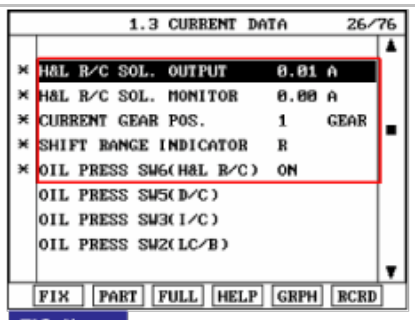


FIG.2)

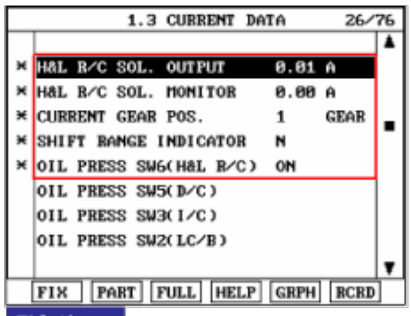


FIG.3)

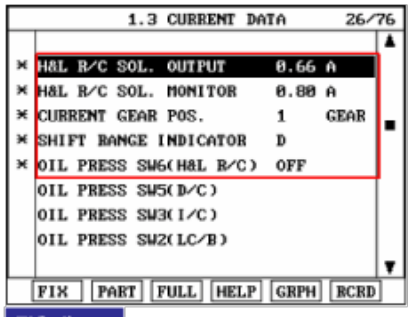


FIG.4)

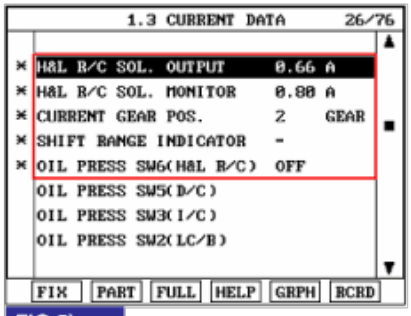


FIG.5)

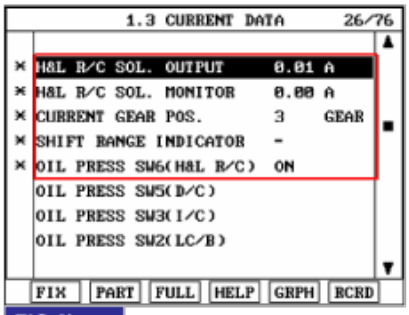


FIG.6)

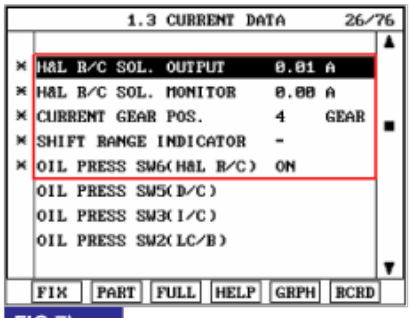


FIG.7)

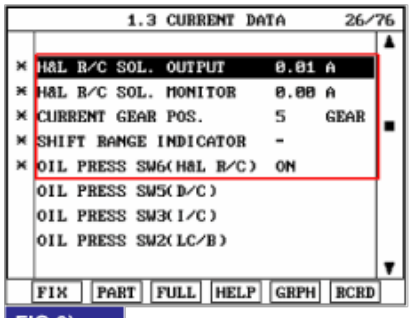


FIG.8)

FIG.1) "P" Range
FIG.2) "R" Shifting
FIG.3) "N" Range
FIG.4) "D" Range 1st gear
FIG.5) "D" Range 2nd gear
FIG.6) "D" Range 3rd gear
FIG.7) "D" Range 4th gear
FIG.8) "D" Range 5th gear

6. Does "H&LR/C SOLENOID" follow the reference data?

YES

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

NO

▶ Go to "Terminal&connector inspection " procedure.

TERMINAL & CONNECTOR INSPECTION

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

YES

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

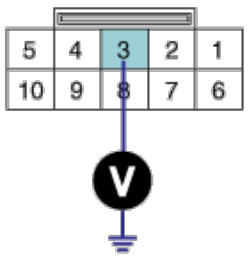
NO

▶ Go to "Signal circuit Inspection" procedure.

SIGNAL CIRCUIT INSPECTION

1. Disconnect "C106-2" connector.
2. IGNITION "ON", ENGINE "OFF"
3. Measure voltage between terminal "3" of the C106-2 harness connector and chassis ground.

Specification : Output voltage repeated between 4V and 12V



1.ATF 2
2.LOW COAST BRAKE SOLENOID VALVE
3.HIGH&LOW REVERSE CLUTCH SOLENOID VALVE
4.DIRECT CLUTCH SOLENOID VALVE
6.FRONT BRAKE SOLENOID VALVE
7.INPUT CLUTCH SOLENOID VALVE
8.PCSV(LINE PRESSURE CONTROL SOLENOID VALVE)
9.TCCSV

4. Is voltage within specifications?

YES

▶ Go to "Component inspection" procedure.

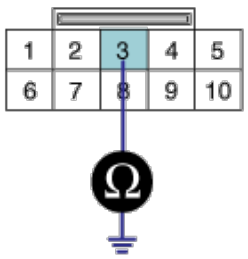
NO

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

COMPONENT INSPECTION

1. Disconnect "C106-2" connector.
2. Ignition "OFF".
3. Measure resistance between terminal "3" of the C106-2 harness connector and chassis ground.

Specification : approx. 3~9Ω



1.ATF 2
2.LOW COAST BRAKE SOLENOID VALVE
3.HIGH&LOW REVERSE CLUTCH SOLENOID VALVE
4.DIRECT CLUTCH SOLENOID VALVE
6.FRONT BRAKE SOLENOID VALVE
7.INPUT CLUTCH SOLENOID VALVE
8.PCSV(LINE PRESSURE CONTROL SOLENOID VALVE)
9.TCCSV

4. Is resistance within specifications?

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

5. ▶ Check for open or short in harness. Repair as necessary and Go to "Verification of Vehicle Repair" procedure.
   If signal circuit in harness is OK, Replace "H&LR/C SOLENOID VALVE" as necessary and Go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR

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

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

YES

▶ Go to the applicable troubleshooting procedure.

NO

▶ System performing to specification at this time.

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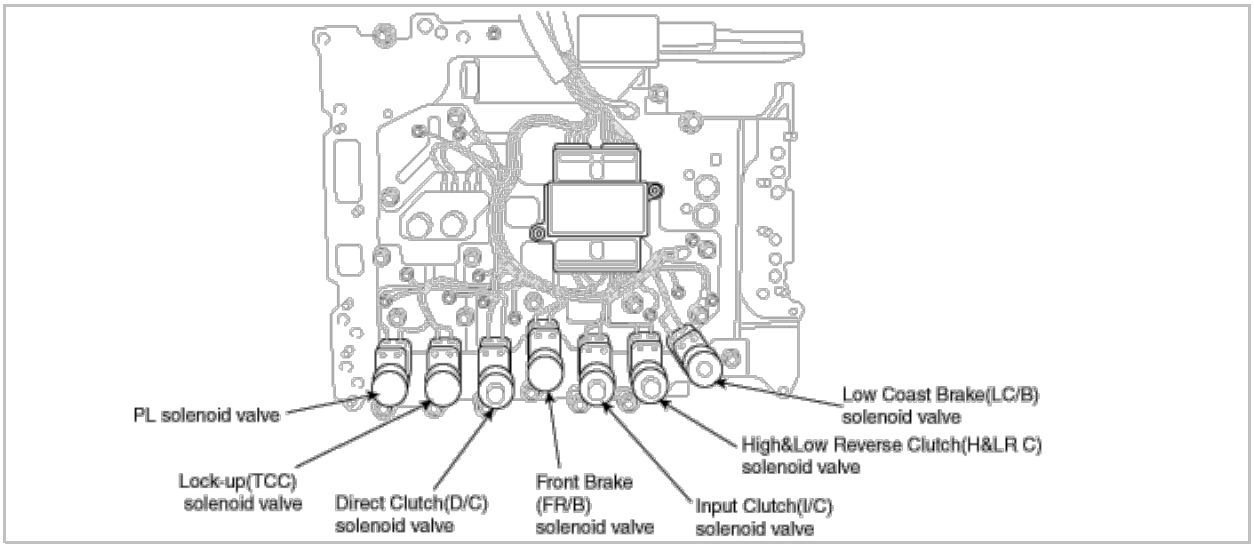
COMPONENT LOCATION



GENERAL DESCRIPTION

Low coast brake solenoid valve is turned "ON" or "OFF" by the TCM in response to signals sent from the inhibitor witch, vehicle speed sensor and accelerator pedal position sensor (throttle position sensor). Gears will then be shifted to the optimum position.

DTC DESCRIPTION

This is not only caused by electrical malfunction (circuits open or shorted) but also by mechanical malfunction such as control valve sticking, improper solenoid valve operation.

DTC DETECTING CONDITION

Item	Detecting Condition	Possible cause
DTC Strategy	• Check voltage range	※ LOW COAST BRAKE SOLENOID VALVE: LC/B SOLENOID VALVE • Open or short in circuit
Enable Conditions	• 10V < Actuator power supply voltage < 16V	
Threshold value	• Hardware "IC" check	

Diagnostic Time	• More than 0.2sec	• Faulty LC/B SOLENOID VALVE • Faulty TCM
Fail Safe	• Lock-up control is prohibited(L/U off)	

MONITOR SCANTOOL DATA

1. Connect scantool to data link connector(DLC).
2. Engine "ON".
3. Monitor the "LC/B SOLENOID" parameter on the scantool.
4. Select "D RANGE" and Operate the vehicle.
5. Check "LC/B SOLENOID" parameter value changes while driving.

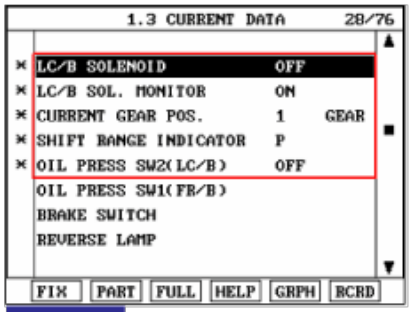


FIG.1)

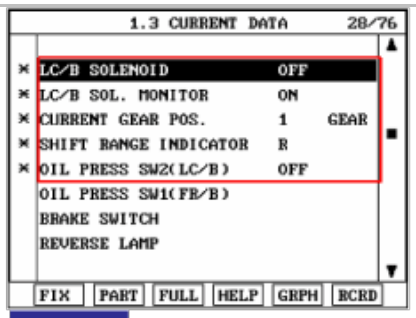


FIG.2)

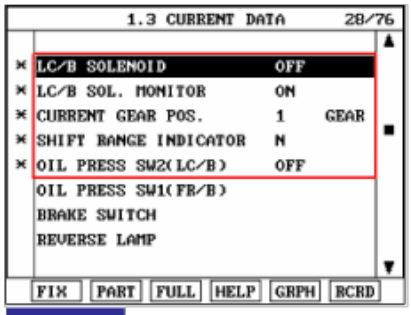


FIG.3)

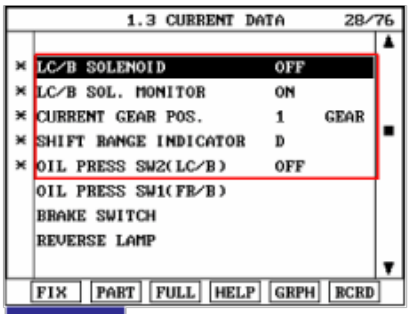


FIG.4)

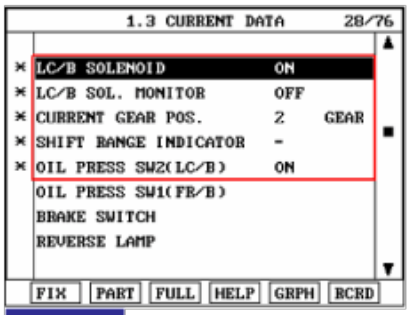


FIG.5)

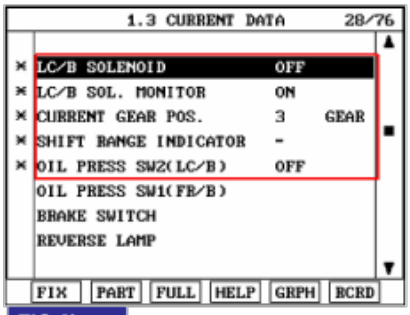


FIG.6)

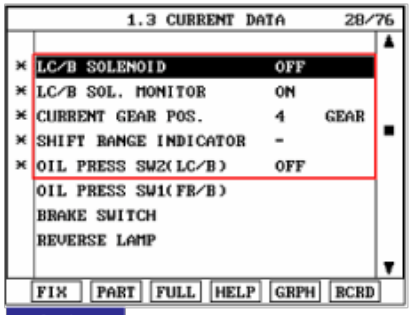


FIG.7)

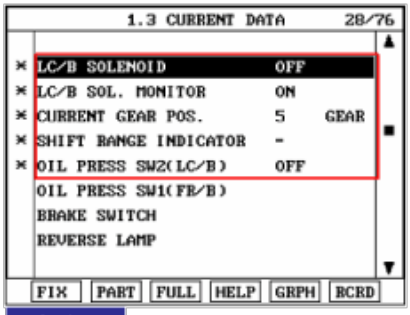


FIG.8)

FIG.1) "P" Range
FIG.2) "R" Shifting
FIG.3) "N" Range
FIG.4) "D" Range 1st gear
FIG.5) "D" Range 2nd gear
FIG.6) "D" Range 3rd gear
FIG.7) "D" Range 4th gear
FIG.8) "D" Range 5th gear

6. Does "LC/B SOLENOID" follow the reference data?

YES

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

NO

▶ Go to "Terminal&connector inspection " procedure.

TERMINAL & CONNECTOR INSPECTION

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

YES

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

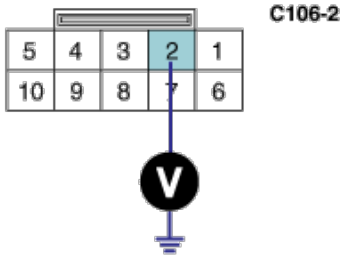
NO

▶ Go to "Signal circuit Inspection" procedure.

SIGNAL CIRCUIT INSPECTION

1. Disconnect "C106-2" connector.
2. IGNITION "ON", ENGINE "OFF"
3. Measure voltage between terminal "2" of the C106-2 harness connector and chassis ground.

Specification : approx. 12V



1.ATF 2
2.LOW COAST BRAKE SOLENOID VALVE
3.HIGH&LOW REVERSE CLUTCH SOLENOID VALVE
4.DIRECT CLUTCH SOLENOID VALVE
6.FRONT BRAKE SOLENOID VALVE
7.INPUT CLUTCH SOLENOID VALVE
8.PCSV(LINE PRESSURE CONTROL SOLENOID VALVE)
9.TCCSV

4. Is voltage within specifications?

YES

▶ Go to "Component inspection" procedure.

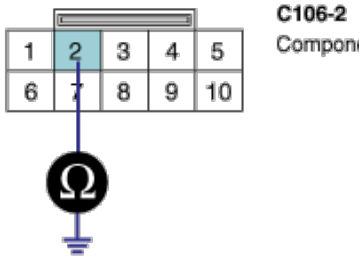
NO

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

COMPONENT INSPECTION

1. Disconnect "C106-2" connector.
2. Ignition "OFF".
3. Measure resistance between terminal "2" of the C106-2 harness connector and chassis ground.

Specification : approx. 3~9Ω



1.ATF 2
2.LOW COAST BRAKE SOLENOID VALVE
3.HIGH&LOW REVERSE CLUTCH SOLENOID VALVE
4.DIRECT CLUTCH SOLENOID VALVE
6.FRONT BRAKE SOLENOID VALVE
7.INPUT CLUTCH SOLENOID VALVE
8.PCSV(LINE PRESSURE CONTROL SOLENOID VALVE)
9.TCCSV

4. Is resistance within specifications?

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

5. ▶ Check for open or short in harness. Repair as necessary and Go to "Verification of Vehicle Repair" procedure.
   If signal circuit in harness is OK, Replace "LC/B SOLENOID VALVE" as necessary and Go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR

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

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

YES

▶ Go to the applicable troubleshooting procedure.

NO

▶ System performing to specification at this time.

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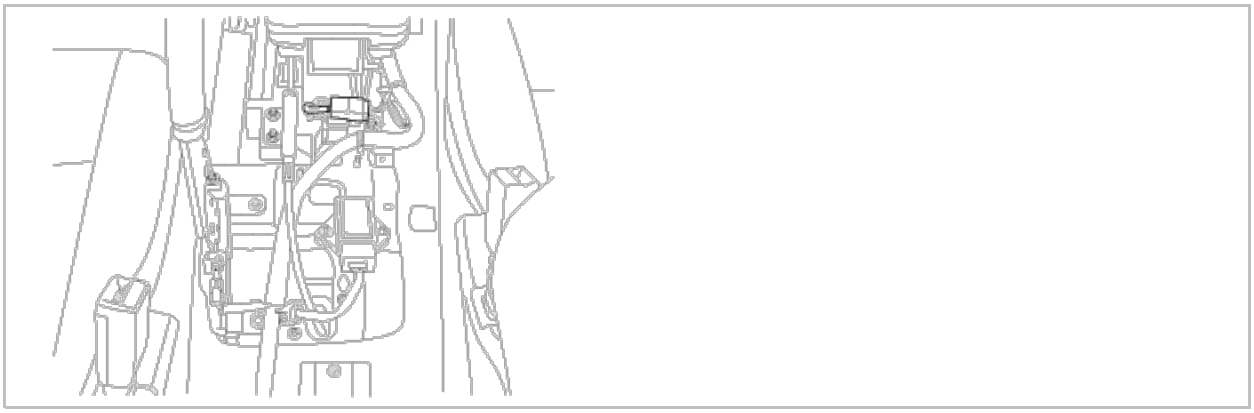
COMPONENT LOCATION



GENERAL DESCRIPTION

When the shift lever is in the D (Drive) position the output signal of Tansaxle Range Switch is 12V and in all other positions the voltage is 0V. The TCM judges the shift lever position by reading all signals, for the TRANSMISSION Range Switch, simultaneously.

DTC DESCRIPTION

The TCM sets this code when patterns are out of specifications.
The TRANSMISSION Range Switch has no output signal for an extended period of time.

DTC DETECTING CONDITION

Item	Detecting Condition	Possible cause
DTC Strategy	• Rationality	• OPEN OR SHORT IN CIRCUIT • Faulty TRANSMISSION RANGE SWITCH • Faulty TCM
Enable Conditions	• Battery voltage >10V	
Threshold value	• Abnormal input signal is detected.	
Diagnostic Time	• More than 5sec	
Fail Safe	• Prevention of manual shift	

SPECIFICATION

A/T RANGE PATTERN

A/T range switch				Range swsitch	Remarks
SW1	SW2	SW3	SW4		
OFF	OFF	OFF	OFF	Pst	P start
OFF	OFF	ON	OFF	P	P
OFF	OFF	ON	ON	P-R	Intermediate
ON	OFF	ON	ON	R	R
ON	OFF	ON	OFF	N-R	Intermediate
ON	OFF	OFF	OFF	Nst	N start
ON	OFF	OFF	ON	N-D	Intermediate
ON	ON	OFF	ON	D	D
OFF	ON	OFF	ON	3	3
OFF	ON	ON	ON	2	2
OFF	ON	ON	OFF	1	1
Irregular Pattern				Other	

[OFF= 5V, ON = 0V]

Monitor Scantool Data

1. Connect scantool to data link connector(DLC).
2. Ignition "ON" & Engine "OFF".
3. Monitor the "SPORTS MODE SELECT S/W, SPORTS MODE UP S/W, SPORTS MODE DOWN S/W " parameter on the scantool.
4. Move selector lever to "SPORTS MODE".

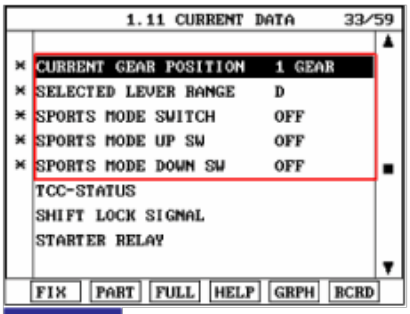


FIG.1)

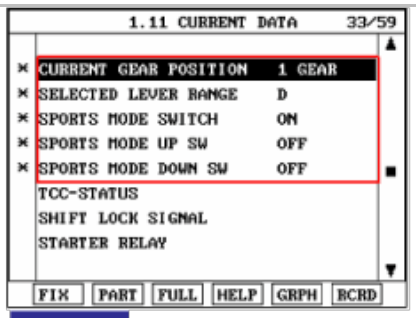


FIG.2)

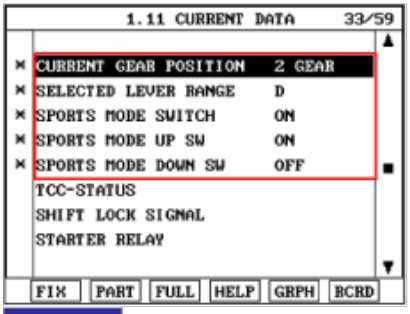


FIG.3)

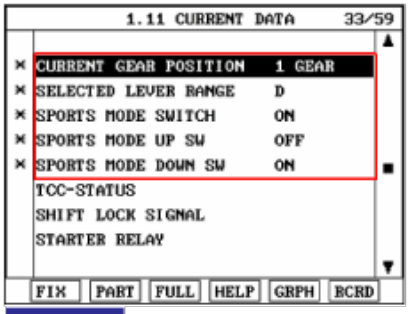


FIG.4)

FIG.1) "D" RANGE
FIG.2) "SPORTS MODE ON"
FIG.3) "UP S/W ON"
FIG.4) "DOWN S/W ON"

5. Does "SPORTS MODE SELECT S/W" follow the reference data?

YES

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

NO

▶ Go to "Terminal & connector inspection" procedure.

TERMINAL & CONNECTOR INSPECTION

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

YES

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

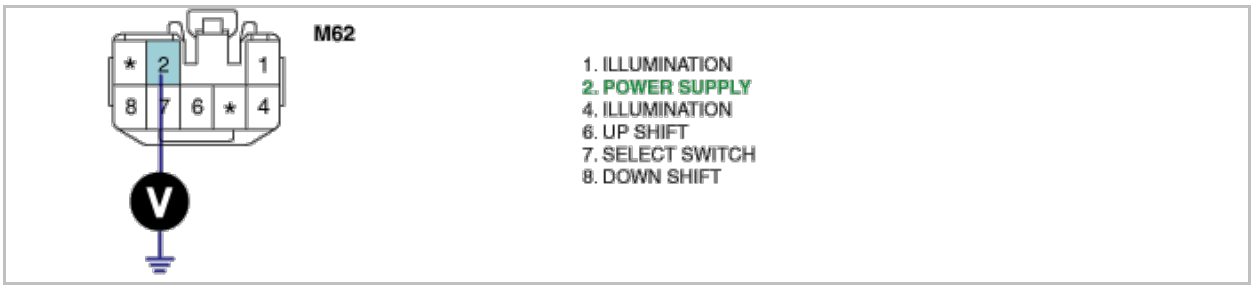
NO

▶ Go to "Power supply circuit inspection" procedure.

Power supply circuit inspection

1. Connect "M62" connector.
2. Ignition "ON" & Engine "OFF"
3. Measure voltage between terminal "2" of the "M62" connector and chassis ground.

Specification : approx. 12V



4. Is voltage within specifications?

YES

▶ Go to "Signal circuit inspection" procedure.

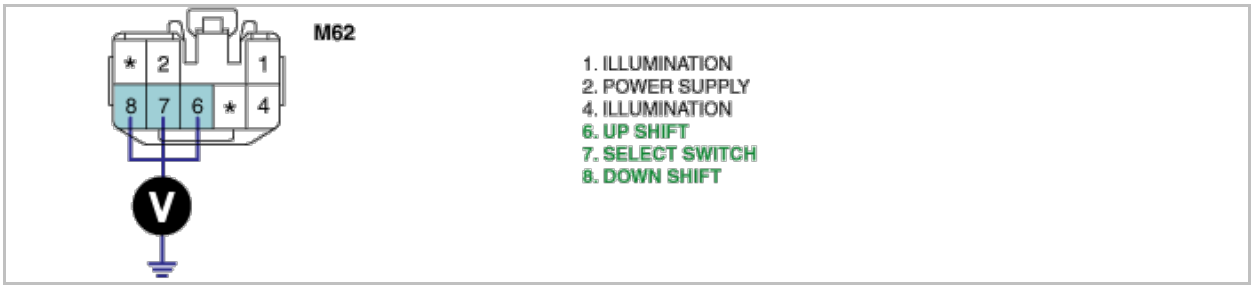
NO

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

SIGNAL CIRCUIT INSPECTION

1. Connect "M62" connector.
2. Ignition "ON" & Engine "OFF".
3. Move select lever to "SPORTS MODE" and operate select lever to up and down.
4. Measure voltage between terminal "6, 7, 8" of the "M62" connector and chassis ground

Specification : approx. 12V



5. Is voltage within specifications?

YES

▶ Go to "Component inspection" procedure.

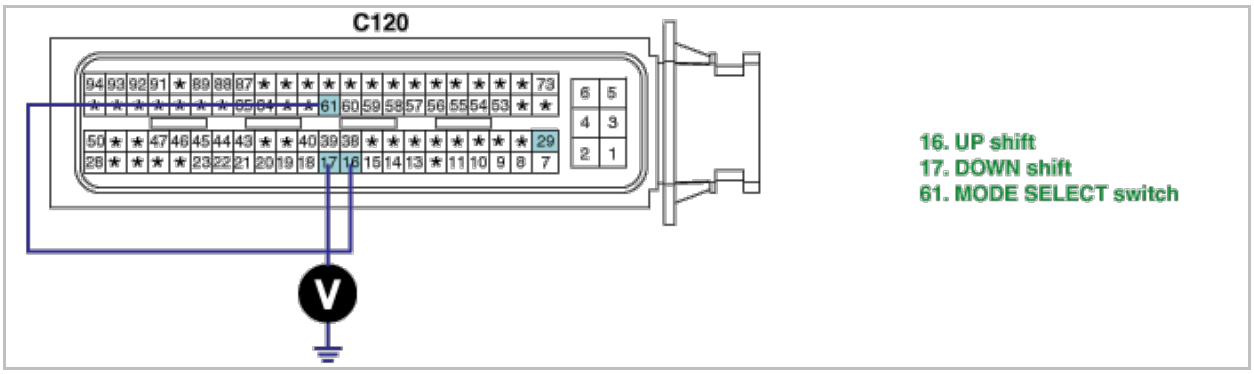
NO

▶ Substitute with a known-good "SPORTS MODE SWITCH" and check for proper operation. If the problem is corrected, replace "SPORTS MODE SWITCH" and Go to "Verification of Vehicle Repair" procedure.

COMPONENT INSPECTION

1. Connect "TCU" connector.
2. Ignition "ON" & Engine "OFF".
3. Move select lever to "SPORTS MODE" and operate select lever to up and down.
4. Measure voltage between terminal "16, 17, 61" of the "TCU" connector(C120) and chassis ground.

Specification : approx. 12V



5. Is voltage within specifications?

YES

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

NO

▶ Check for open or short between "M62" and "C120" harness . Repair as necessary and Go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR

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

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

YES

▶ Go to the applicable troubleshooting procedure.

NO

▶ System performing to specification at this time.

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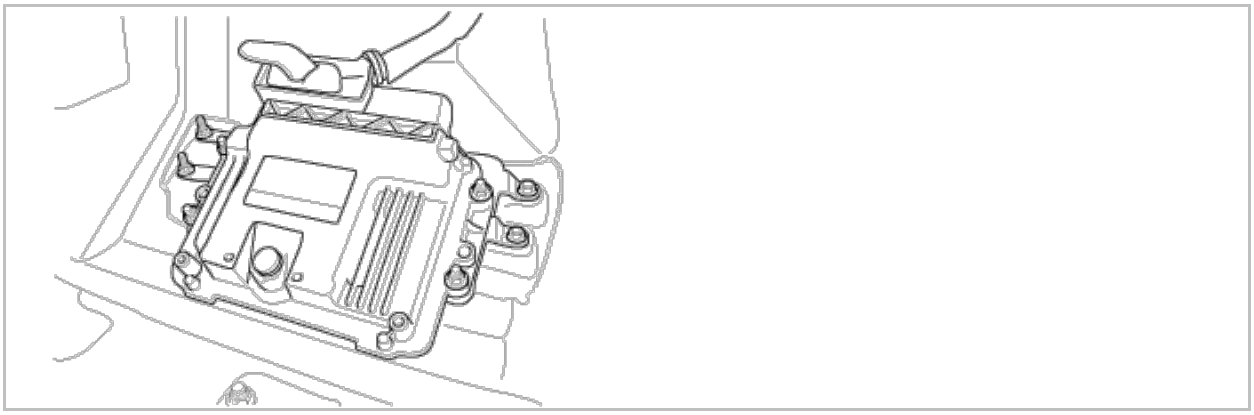
COMPONENT LOCATION



GENERAL DESCRIPTION

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.

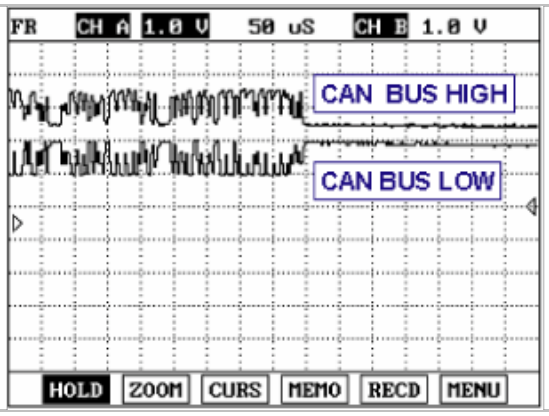
DTC DESCRIPTION

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent malfunction detection ability.
In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring.
Each control unit transmits/receives data but selectively reads required data only.

DTC DETECTING CONDITION

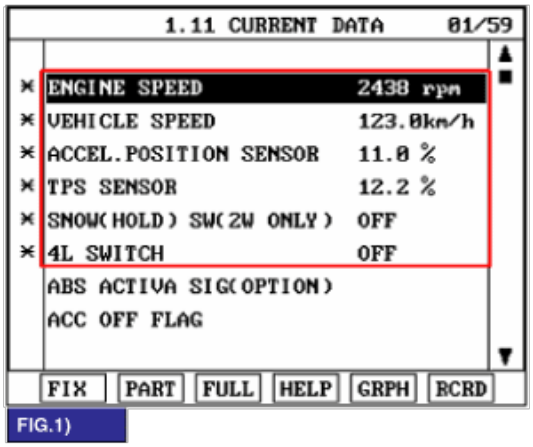
Item	Detecting Condition	Possible cause
DTC Strategy	• Check voltage range	• Open or Short in CAN communication harness • Faulty ECM • Faulty TCM
Enable Conditions	• IG "ON" • Battery voltage > 10V • Input speed > 300rpm	
Threshold value	• Lost communication	
Diagnostic Time	• More than 500msec	
Fail Safe	• Default value	

Signal Waveform



Monitor Scantool Data

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



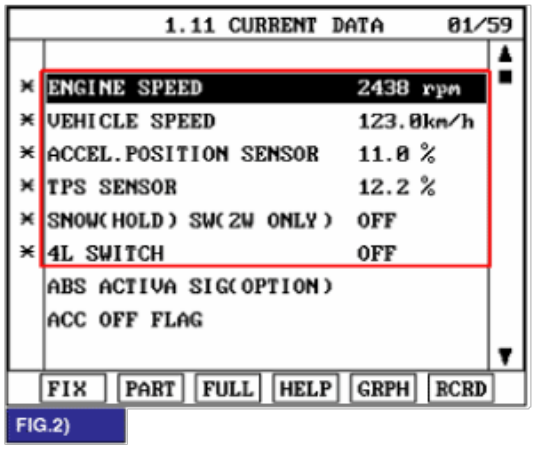


FIG.1) Low-speed
FIG.2) High-speed

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

YES

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

NO

▶ Go to "Terminal & connector inspection" procedure.

TERMINAL & CONNECTOR INSPECTION

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

YES

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

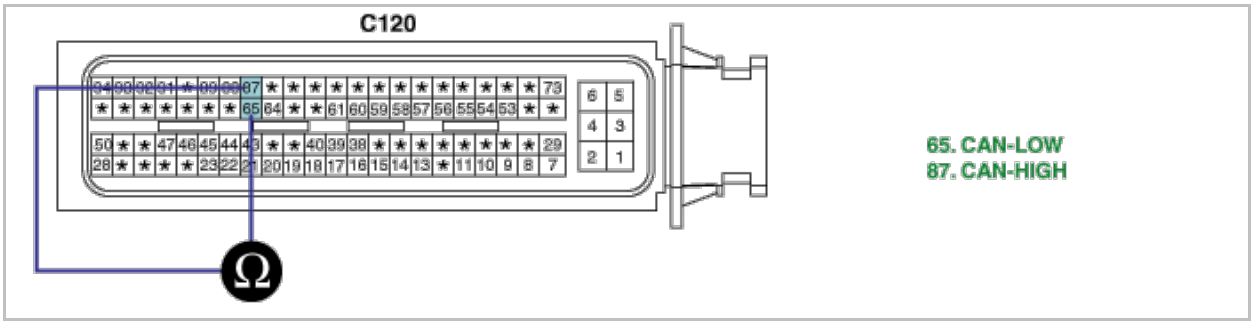
NO

▶ Go to "Signal circuit inspection" procedure.

SIGNAL CIRCUIT INSPECTION

1. Ignition "OFF".
2. Disconnect the "TCM" connector.
3. Measure resistance between terminal "65" and "87" of the "TCM" harness connector.

Specification : Approx. 120Ω



4. Is measured resistance within specifications?

YES

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

NO

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

VERIFICATION OF VEHICLE REPAIR

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

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

YES

▶ Go to the applicable troubleshooting procedure.

NO

▶ System performing to specification at this time.