SECTION : 5A1

ZF 4 HP 16 AUTOMATIC TRANSAXLE

CAUTION : Disconnect the negative battery cable before removing or installing any electrical unit or when a tool or equipment could easily come in contact with exposed electrical terminals. Disconnecting this cable will help prevent personal injury and damage to the vehicle. The ignition must also be in LOCK unless otherwise noted.

TABLE OF CONTENTS

INTRODUCTION

ZF 4HP 16 AUTOMATIC TRANSAXLE

The ZF 4 HP 16 is a four–speed automatic transaxle designed for cars with front–wheel drive and a transversely mounted engine.

The transaxle has a hydrodynamic torque converter with a controlled slip lock–up clutch.

A planetary gear train establishes the mechanical gear ratios. The integral constant ratio can be adapted to the engine's power output and the vehicle's weight. The electronic–hydraulic control makes controlled power shifts and various shift programs possible. In selector lever position "P", the output is locked mechanically.

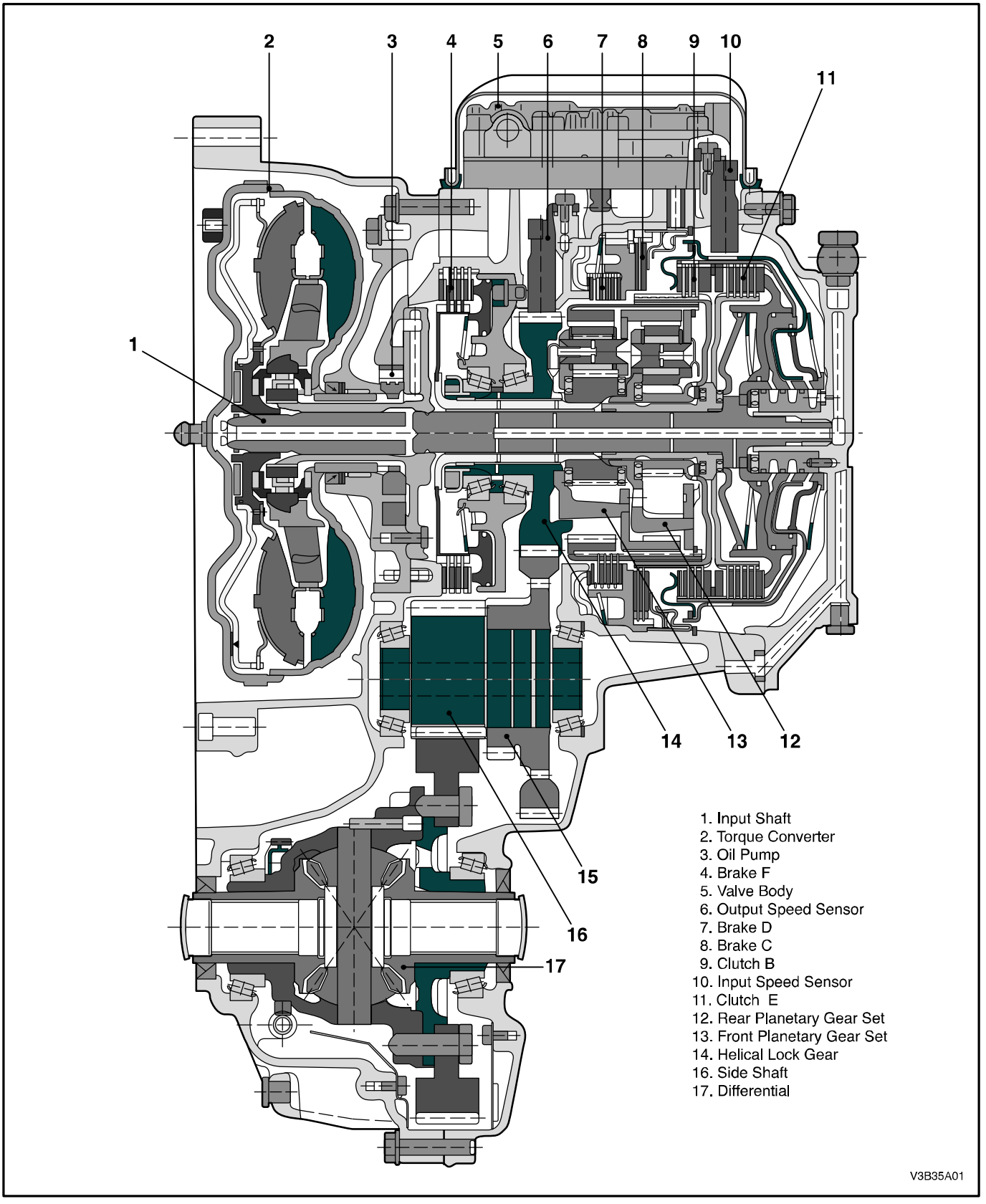
The special feature of this transaxle is that it operates without freewheels. Shifting between individual gears takes place by means of overlapping clutch engagement and release.

The advantage of overlap shifting is as follows:

– The transaxle can be of more compact design and is lighter on account of the absence of freewheels and the lower number of shift elements
– Lower drag losses, i.e. higher efficiency
– Lower peak torques acting on the components and driveline.

However, overlap shifting necessitates high–performance hardware and software, and precision engine signals.

TRANSAXLE COMPONENTS



SPECIFICATIONS

GENERAL SPECIFICATIONS

	Definition
Transaxle Type	4–speed with four–wheel drive and transverse engine
Input Torque	240 N•m (177 lb–ft)
Transaxle Weight	76kg (168 lb)
Torque Converter Capacity	9.72kg (21.4 lb)
Transaxle Fluid Type (manufacture company)	ESSO LT 71141 or TOTAL ATF H50235
Transaxle Fluid Capacity	7.3qt (6.9L)

TRANSAXLE GEAR RATIO

Gear	Ratio
First	2.719
Second	1.487
Third	1.000
Fourth	0.717
Reverse	2.529
Final	3.945:1

FLUID CAPACITY

	Litres	Quarts
Bottom Pan Removal	4	4.2
Complete Overhaul	6.9	7.3
Torque Converter Removal	2	2.1
(Measurements are approximate)		

FASTENER TIGHTENING SPECIFICATIONS

Application	N•m	Lb–Ft	Lb–In
Bearing Plate Bolts	23.5	17.5	–
Slotted Nut	220	162	–
Rear Cover Attachment Bolts	23.5	17.5	–
Baffle Plate Attachment Bolts	10	–	89
Park/Neutral Position Switch	10	–	89
Fluid Pump Connecting Bolts	10	–	89
Fluid Filter Housing Cover Attachment Bolts	10	–	89
Input Speed sensor Attachment Bolts	8	–	71
Output Speed Sensor Attachment Bolts	8	–	71
Valve Body Bolts	8	–	71
Valve Body Upper & Lower Fixing Bolts	6	–	53
Fluid Pan Connecting Bolts	6	–	53
Fluid Pan Drain Plug	45	33	–

Application	N•m	Lb–Ft	Lb–In
Fluid Level Plug	45	33	–
Line Pleasure Plugs	20	15	–
Valve Housing 1 Cover Attachment Bolts	6	–	53
Solenoid Valve Attachment Bolts	6	–	53
Pressure Control Regulator(EDS) Attachment Bolts	6	–	53
Oil Cooler Inlet Pipe Bolts	35	26	–
Oil Cooler Outlet Pipe Bolts	35	26	–
Shift Control Cable Adjuster Pinch Nut	8	–	71
Shift Control Cable Attachment Nut	8	–	71
Upper Transaxle–to–Engine Bolts	75	55	–
Selector Lever(On Transaxle Case)	15	11	–
Torque Converter Attachment Bolts	45	33	–
Shift Control Assembly Mounting Bolt, Nut	8	–	71
Lower Engine–to–Transaxle Bolts(a)	75	55	–
Lower Engine–to–Transaxle Bolt(b)	21	15	–
Lower Engine–to–Transaxle Bolts(c)	31	23	–
Rear Transaxle Mounting Bracket Bolts	62	45	–
Damping Block Connection Bolt and Nut	68	50	–
Left Transaxle Mount Bracket Cage Bolt(a)	110	81	–
Left Transaxle Mount Bracket Cage Bolt(b)	65	48	–
Left Transaxle Mount Bracket Cage Nut(c)	65	48	–
Left Transaxle Mounting Bolts	48	35	–

Range	Park/ Neutral	Reverse	D				3			2		1
Gear	**N**	**R**	**1st**	**2nd**	**3rd**	**4th**	**1st**	**2nd**	**3rd**	**1st**	**2nd**	**1st**
Solenoid Valve 1	ON	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF
Solenoid Valve 2	ON	ON	ON	OFF	OFF	OFF	ON	OFF	OFF	ON	OFF	ON
Line Pressure Control Solenoid Valve 3 (EDS 3)	OFF	OFF	OFF	ON	ON/ OFF	ON/ OFF	OFF	ON	ON/ OFF	OFF	ON	OFF
Line Pressure Control Solenoid Valve 4 (EDS 4)	ON	OFF	ON	ON	ON	OFF	ON	ON	ON	ON	ON	ON
Line Pressure Control Solenoid Valve 5 (EDS 5)	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	ON	ON	ON
Line Pressure Control Solenoid Valve 6 (EDS 6)	ON	OFF	ON	ON	ON	OFF	ON	ON	ON	ON	ON	ON
Brake B	A	A	A		A		A		A	A		A
Brake C						H						
Brake D		H										
Clutch E				A	A	A		A	A		A	
Brake F			H	H			H	H		H	H	H
Lock–up Clutch						A						

A = Applied
H = Holding
ON = The solenoid is energized.
OFF = The solenoid is de–energized.
** = Manual Second–Third gear is only available above approximately 100 km/h (62 mph).
*** = Manual First–Second gear is only available above approximately 60 km/h (37 mph).
Note : Manual First–Third gear is also possible at high vehicle speed as a safety feature.

SHIFT SPEED CHART

Up Shift Speed

MODEL	First–Second gear (±3.0 mph (4.8km/h))				Second–Third gear (±4.0 mph (6.4km/h))				Third–Fourth gear (±5.0 mph (8km/h))			
	10% TPS	**25% TPS**	**50% TPS**	**100% TPS**	**10% TPS**	**25% TPS**	**50% TPS**	**100% TPS**	**10% TPS**	**25% TPS**	**50% TPS**	**100% TPS**
1.8 DOHC mph (km/h)	9 (15)	11 (18)	18 (29)	32 (52)	18 (29)	23 (37)	34 (55)	62 (99)	25 (45)	34 (55)	47 (76)	98 (157)

Down Shift Speed

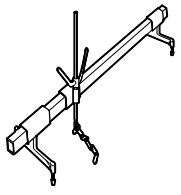
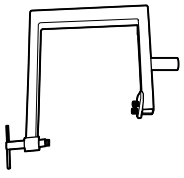
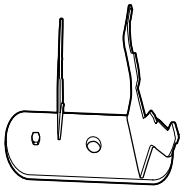
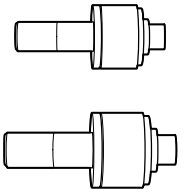
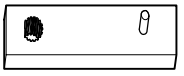
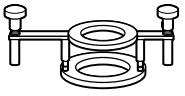
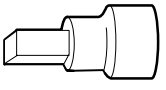
MODEL	Down Shift (±4.0 mph (6.4km/h))			Lock Up Clutch Applied (Fourth)		Lock Up Clutch Released (Fourth)	
	Fourth–Third (Coast)	Third–Second (Coast)	Second–First (Coast)	10%	25%	10%	25%
1.8 DOHC mph (km/h)	25 (41)	13 (21)	7 (11)	48 (77)	48 (77)	42 (68)	42 (68)

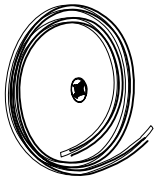
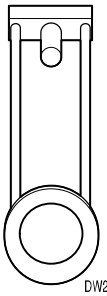
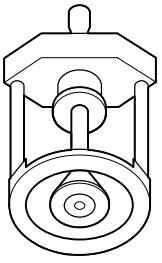
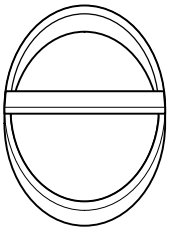
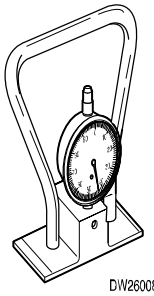
LINE PRESSURE

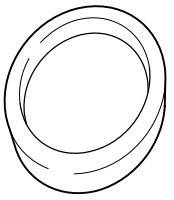
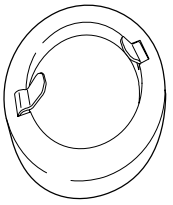
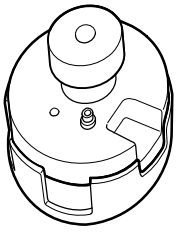
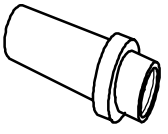
Gear Range	Solenoid	Line Pressure	B Port	E Port
Park / Neutral	ON	LOW	90~124.7 psi (6.2~8.6 bar)	
	OFF	HIGH	221.9~252.3 psi (15.3~17.4 bar)	
Reverse	ON	LOW	89.9~124.7 psi (6.2~8.6 bar)	
	OFF	HIGH	221.9~252.3 psi (15.3~17.4 bar)	
Drive	ON	LOW		90~124.7 psi (6.2~8.6 bar)
	OFF	HIGH		137.7~162.4 psi (9.5~11.2 bar)
3	ON	LOW	90~124.7 psi (6.2~8.6 bar)	90~124.7 psi (6.2~8.6 bar)
	OFF	HIGH	221.9~252.3 psi (15.3~17.4 bar)	137.7~162.4 psi (9.5~11.2 bar)
2	ON	LOW		90~124.7 psi (6.2~8.6 bar)
	OFF	HIGH		137.7~162.4 psi (9.5~11.2 bar)
1	ON	LOW	90~124.7 psi (6.2~8.6 bar)	
	OFF	HIGH	221.9~252.3 psi (15.3~17.4 bar)	

SPECIAL TOOLS

SPECIAL TOOLS TABLE

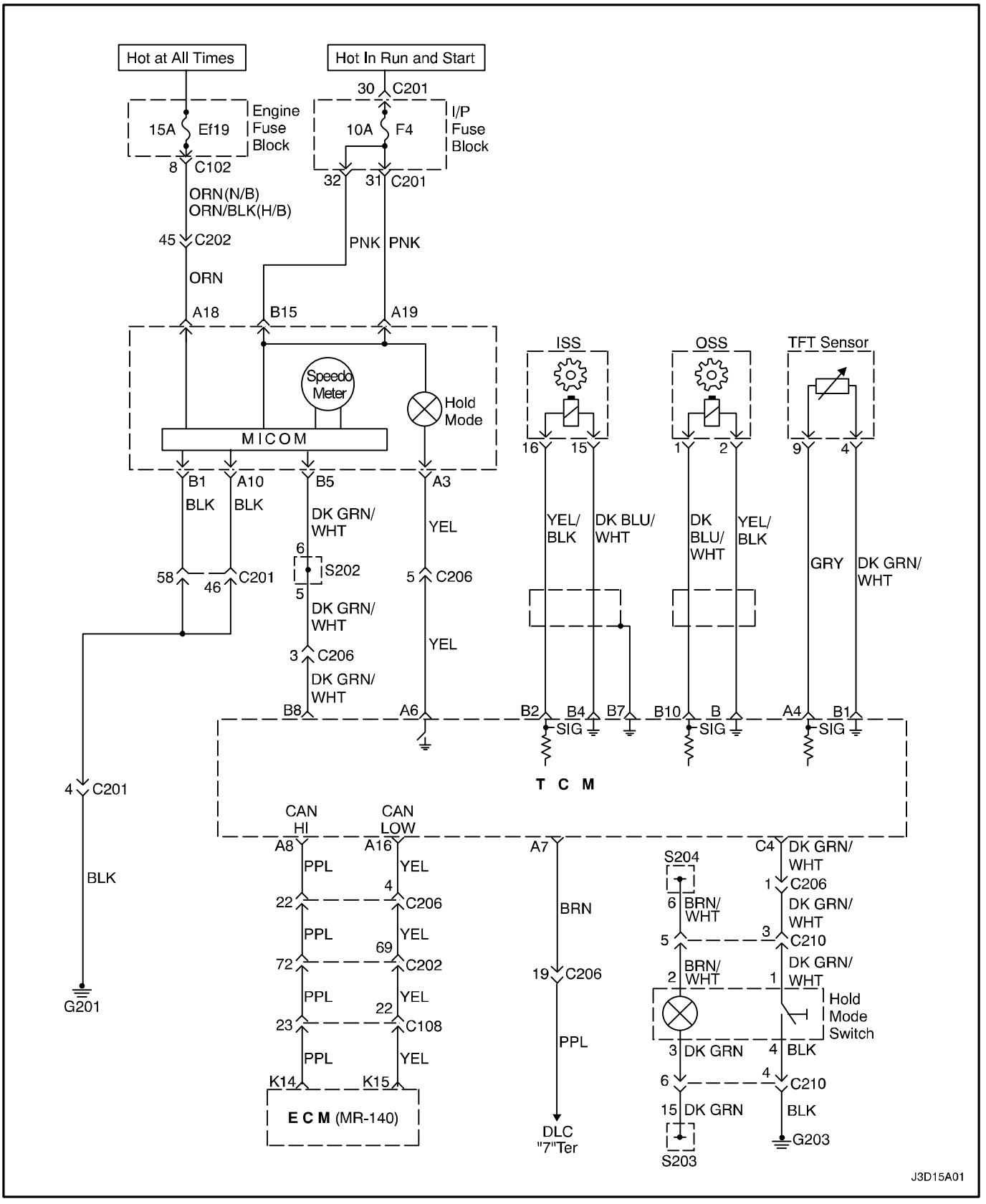
 ST100	Scan Tool
 DW110060	DW110–060 Engine Support Fixture
 DW260020	DW260–020 Transaxle Holding Fixture
 DW260010	DW260–010 Transaxle Support Fixture
 DW260030	DW260–030 Axle Seal Installer
 DW260050	DW260–050 Park/Neutral Position Switch Installer
 DW260060	DW260–060 Brake F Split Stop Ring Remover/Installer
 DW260070	DW260–070 Transaxle Fluid Plug Remover/Installer

	DW240–010 Universal Pressure Gauge Set
 DW260150	DW260–150 Clutch E Stop Ring Remove/Installer
 DW260140	DW260–140 Clutch B Stop Ring Remover/Installer
 DW260160	DW260–160 Brake C/D Snap Ring Remover/Installer
 DW260080	DW260–080 Clutch B/E Shim Setting Gauge

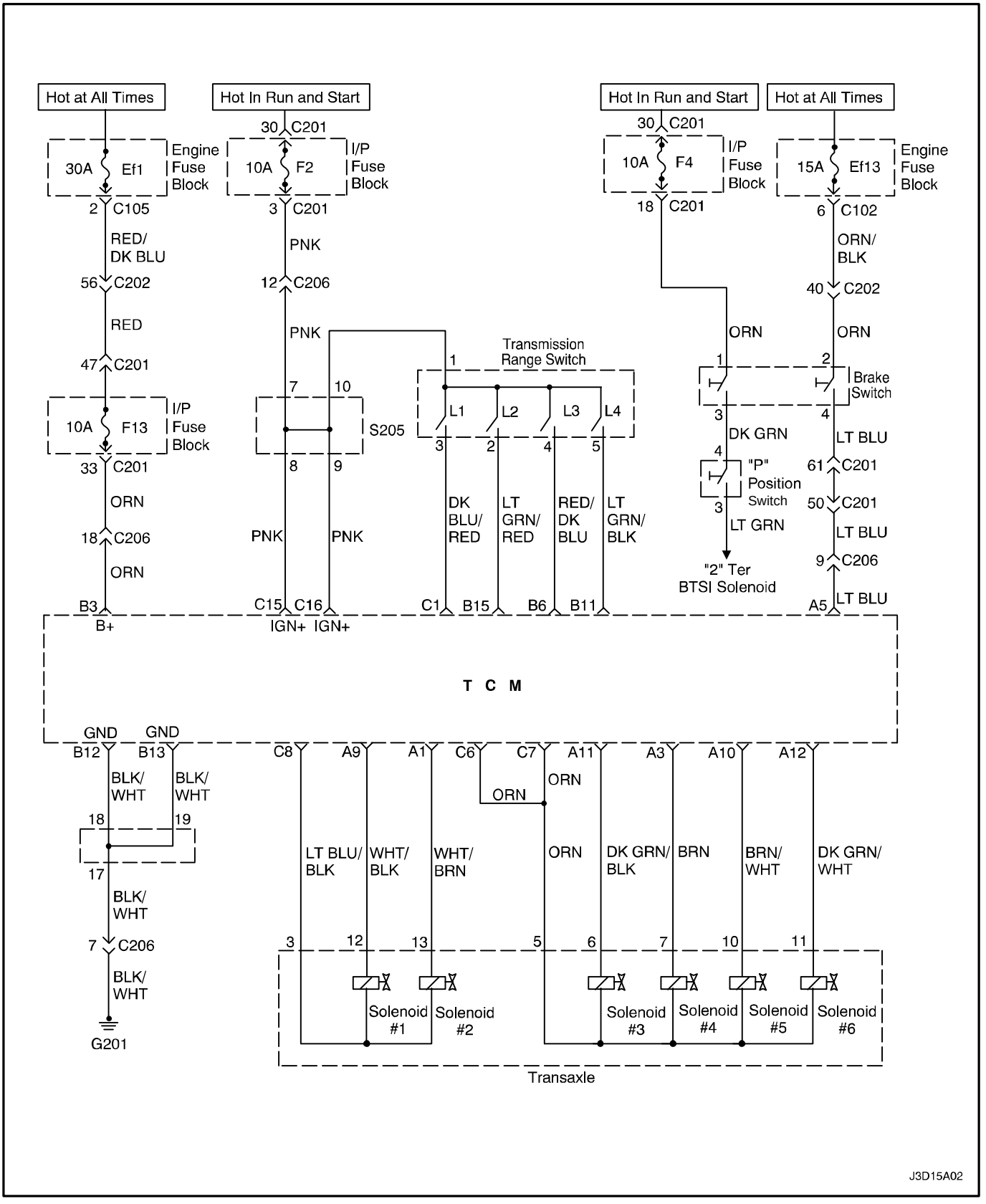
 DW260120	DW260–120 Clutch B Adjust Ring
 DW260130	DW260–130 Clutch E Adjust Ring
 DW260100	DW260–100 Clutch B/E Disc Thickness Measuring Fixture
 DW260090	DW260–090 Clutch B/E (Snap Ring Play, Installation Space) Measuring Fixture
 DW260110	DW260–110 Brake F Disc Clearance Measuring Bar

SCHEMATIC AND ROUTING DIAGRAMS

TRANSAXLE CONTROL MODULE (1 OF 2)

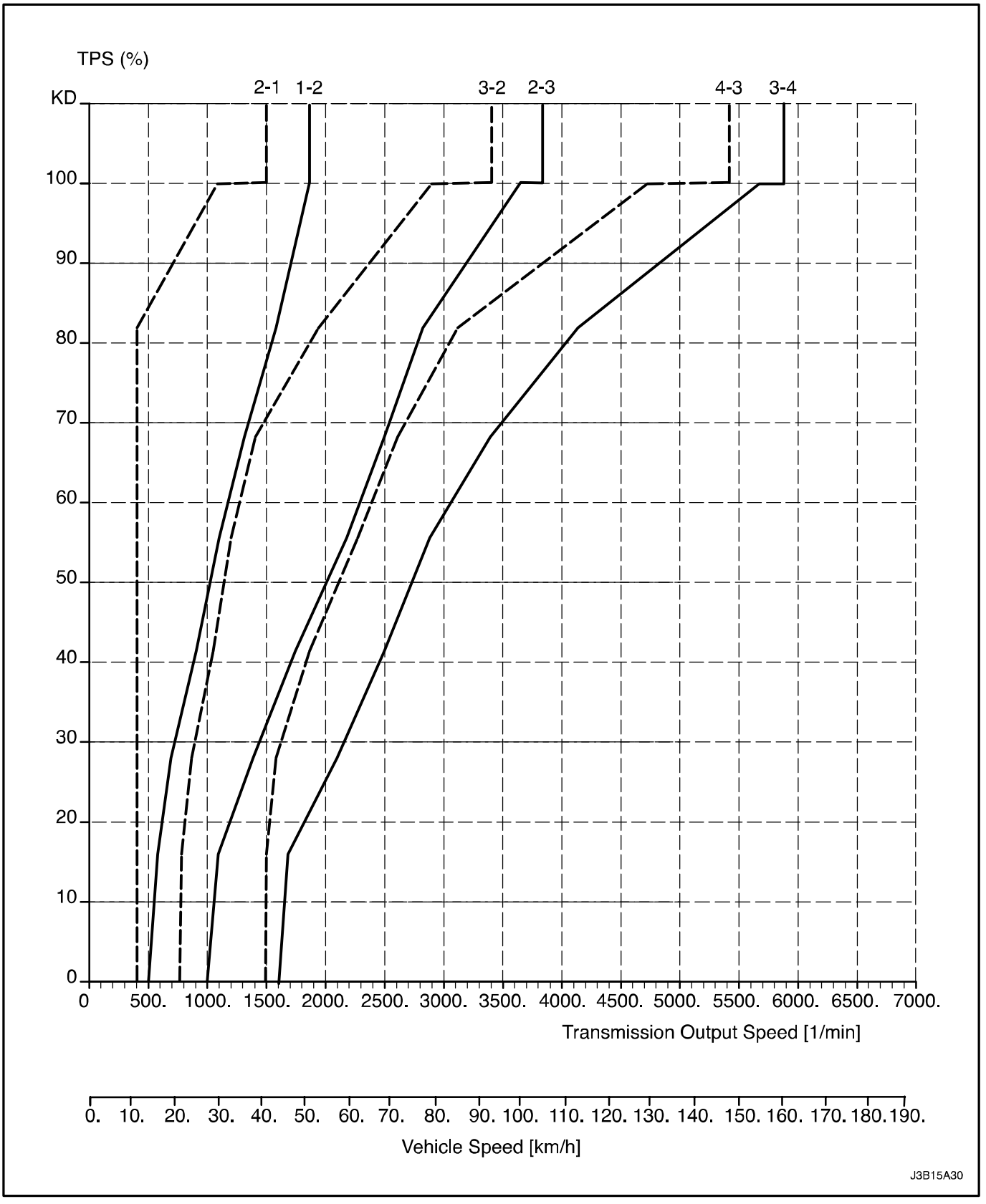


TRANSAXLE CONTROL MODULE (2 OF 2)

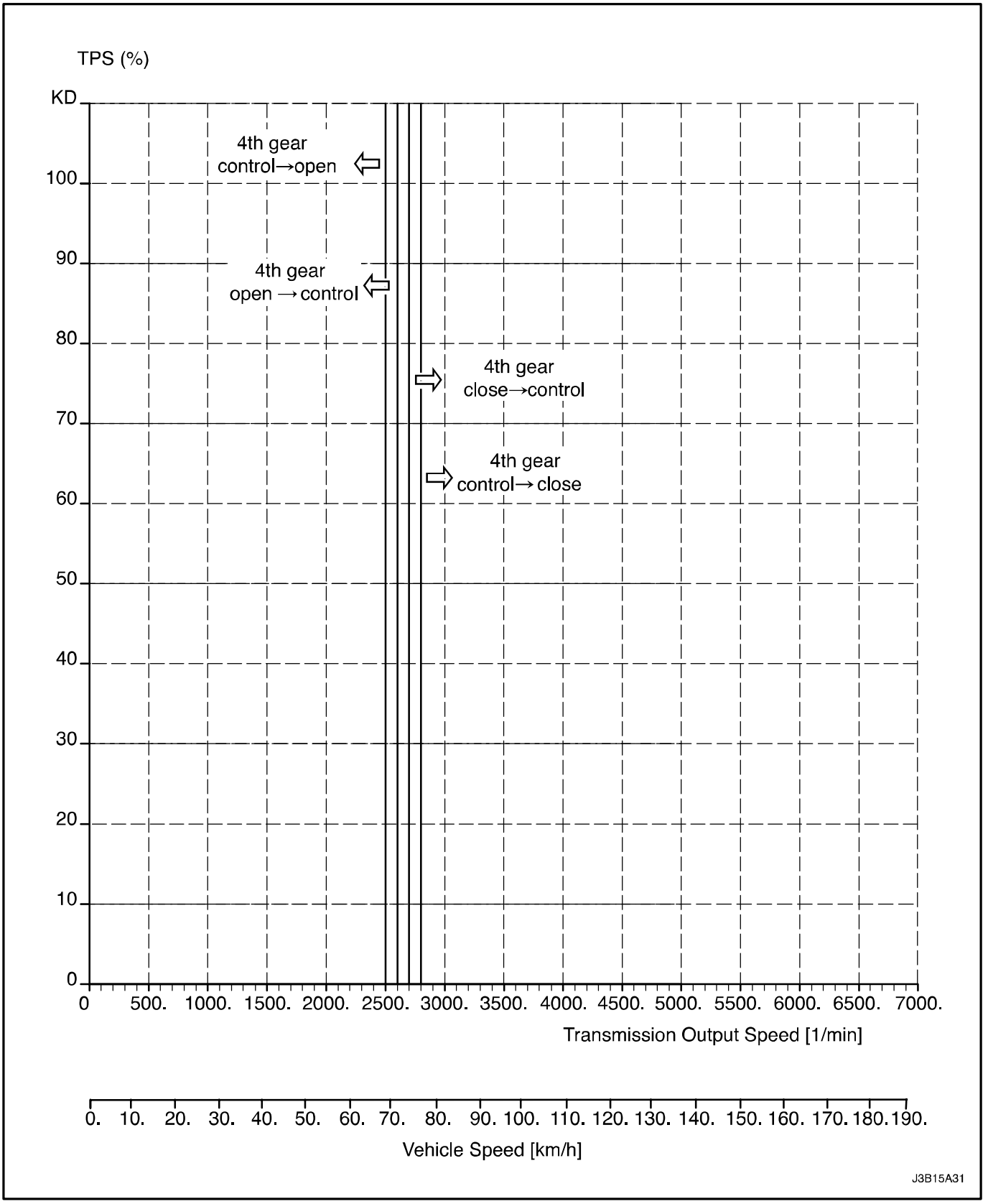


SHIFT MODE DIAGRAM

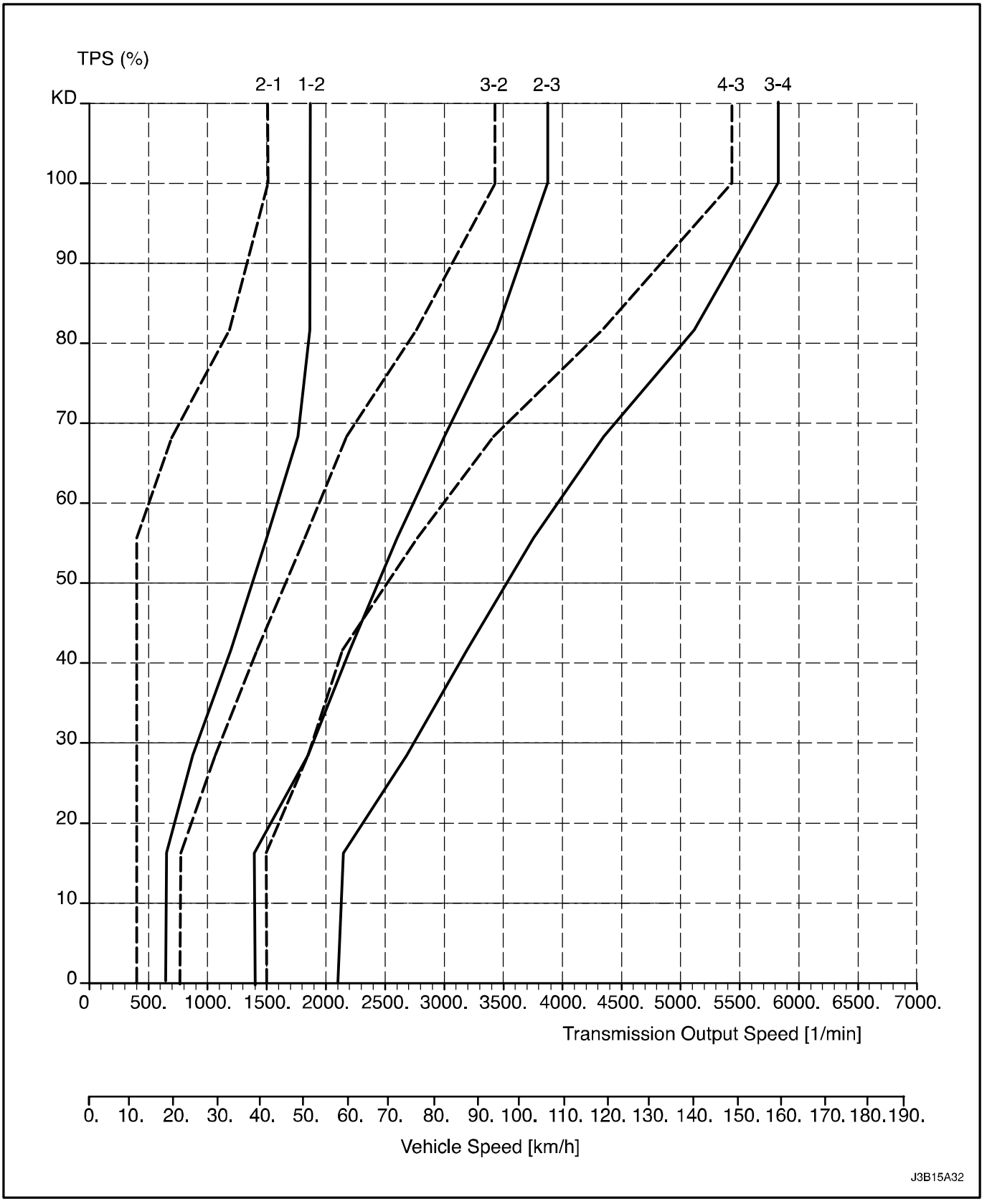
Economic Mode (1.8 DOHC)



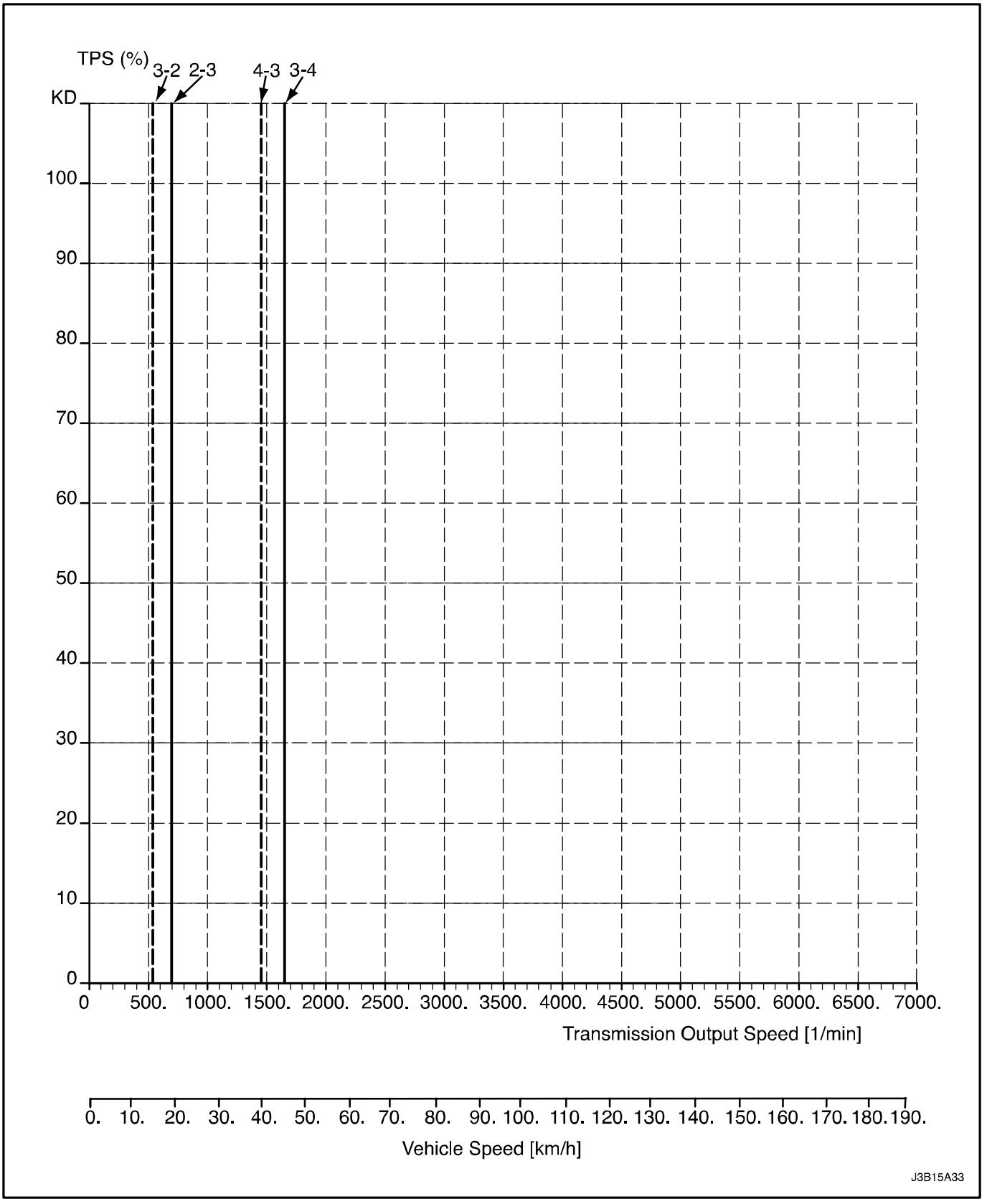
Lock–up Clutch Applied (Economic Mode ; Fourth Gear)
(1.8 DOHC)



Power Mode (1.8 DOHC)

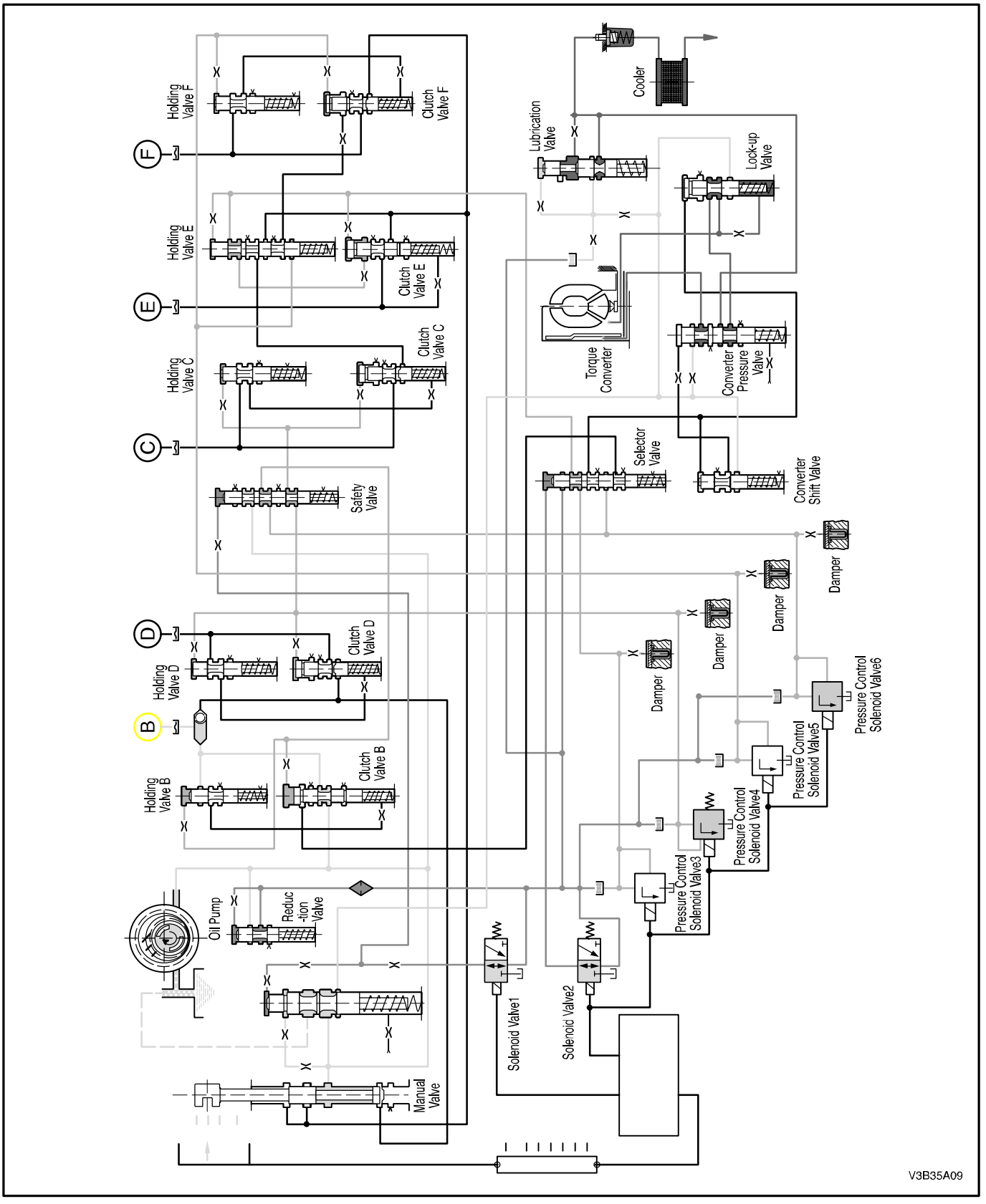


Hold Mode (1.8 DOHC)



POWER FLOW DIAGRAM

Park/Neutral



Park/Neutral

In Park or Neutral with the engine running there is no drive to the planetary gear set. Line pressure (from the oil pump) is supplied to the valve body. Only clutch B is supplied and the torque converter is released.

Control

Line Pressure Control Valve

The line pressure control valve sets the general pressure level in the valve body. When gearshifts are not taking place, the line pressure varies between two levels, depending on the turbine torque. Line pressure increase linearly by time. But it has a limit point. When pressure reaches that point, excess oil pressure drains back into the oil sump.

Reduction Valve

The reduction valve reduces the line pressure with which the downstream solenoid valves and pressure control solenoid valves (EDS) are supplied. This makes it possible to use smaller solenoid valves.

The line pressure comes from the oil pump and flows to the reduction valve. The inlet port to the reduction valve will be blocked and line pressure will be maintained at the appropriate level.

Solenoid Valve 1, 2

Solenoid Valve 1 controls the line pressure (high and low) to the clutch valves. Solenoid Valve 1 is either ON or OFF. When the solenoid is turned ON the line pressure will be low [87~116psi (6~8bar)].When the solenoid is turned OFF the line pressure will be high [232~261psi (16~18bar)].

Solenoid 2 controls the fluid flow to clutch valve E or the TCC clutch valve. When solenoid 2 is ON fluid is directed to the TCC pressure valve and if the solenoid is switched OFF fluid will flow to the inlet at clutch valve E.

The TCM monitors numerous inputs to determine the appropriate solenoid state combination and transaxle gear for the vehicle operating conditions.

In Park and Neutral solenoid valve 1 is ON. So line pressure flows to the safety valve and the line pressure control valve via the solenoid valve.

Clutch B Engaged

In Park and Neutral solenoid valves 1 and 2 are both ON. Pressure control solenoids (EDS) 4 and 6 are also turned ON.

When EDS 6 is ON, the fluid supplied from the reduction valve flows to the safety valve, clutch valve B and holding valve B. The oil that is supplied to the inlet port of the clutch valve presses on the valve spool. Line pressure then flows to the holding valve and check ball, engaging clutch B.

Lock–up Clutch (TCC)

Solenoid 2 is turned ON and the line pressure control valves spool will be depressed. Fluid will now flow through the torque converter pressure valve.

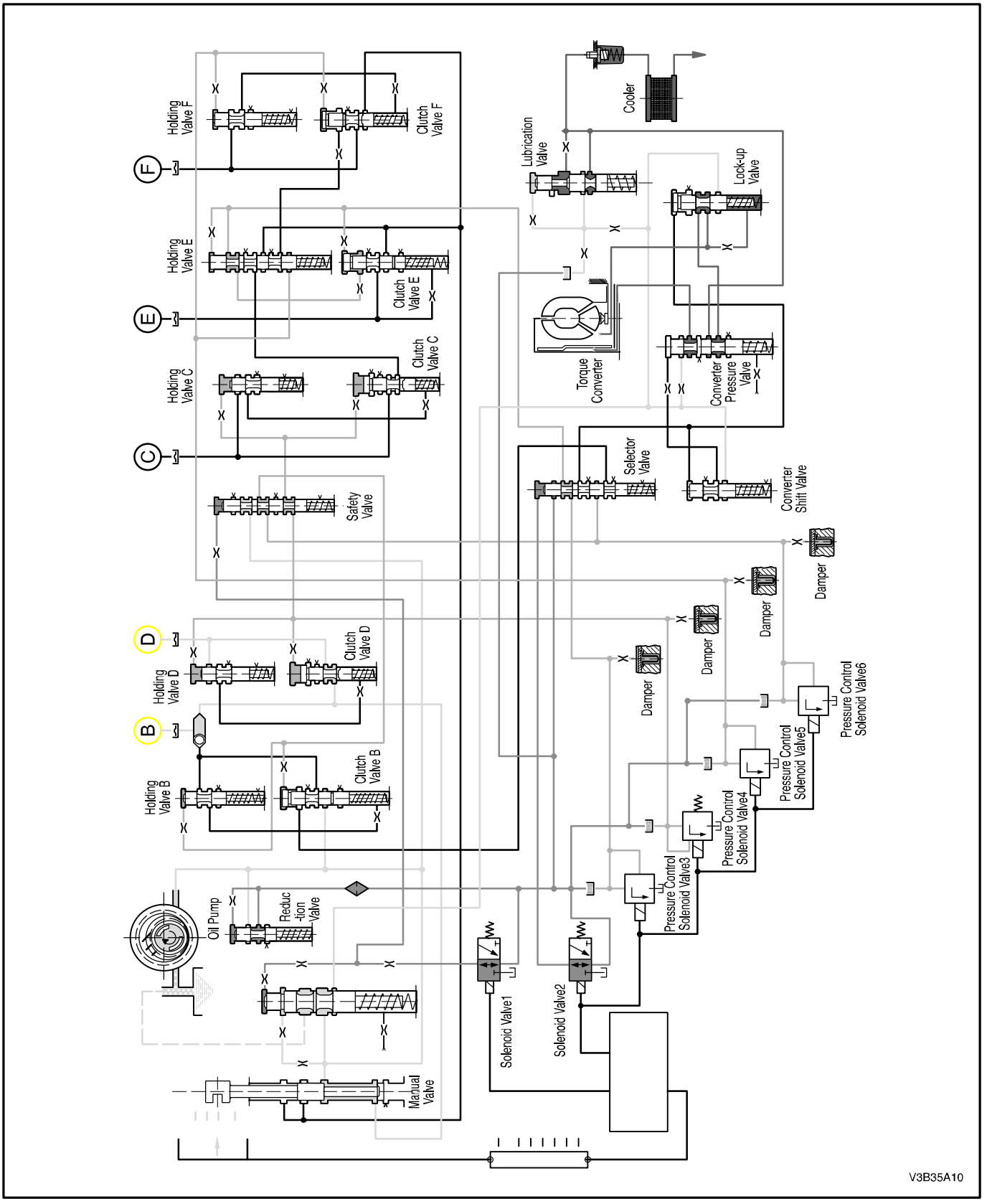
As a result, the oil pressure behind the converter lock–up clutch piston and in the turbine zone is equal. The direction of flow is through the turbine shaft and through the space behind the piston, to the turbine chamber.

Lubrication/Cooling.

The lubricating valve ensures that the converter is supplied with cooling oil first if the pump rate is low. The lubricating pressure valve in addition guarantees that the necessary amount of cooling and lubricating oil is available via the bypass duct.

The fluid, which is supplied from the torque converter, flows to the cooler via the lubrication valve.

Reverse


Holding Valve F
Clutch Valve F
F
Holding Valve E
Clutch Valve E
E
Holding Valve C
Clutch Valve C
C
Safety Valve
D
Holding Valve D
Clutch Valve D
B
Holding Valve B
Clutch Valve B
Oil Pump
Reduc -tion Valve
Manual Valve
Solenoid Valve1
Solenoid Valve2
Cooler
Lubrication Valve
Lock-up Valve
Torque Converter
Converter Pressure Valve
Selector Valve
Converter Shift Valve
Damper
Damper
Damper
Damper
Pressure Control Solenoid Valve6
Pressure Control Solenoid Valve5
Pressure Control Solenoid Valve4
Pressure Control Solenoid Valve3
V3B35A10

Reverse

In Reverse, transaxle drive is via the input shaft and clutch B. The elements of this transaxle function are as follows:

- Clutch B is engaged and drives the reverse sun gear in a clock—wise direction.
- The D band is engaged and holds the planetary gear carrier (front & rear) stationary causing the differential pinion to rotate clockwise.
- The differential rotates in a counterclockwise direction.
- The output shaft is driven in a counterclockwise or reverse direction.

Control

Clutch B Engaged

The line pressure, which is supplied by the oil pump, is directed to clutch B via the manual valve. The position of the check ball will change allowing direct pressure to clutch B.

Brake D Engaged

The line pressure, which engaged clutch B, is also supplied to clutch valve D.

In Reverse, solenoid 1 is switched ON and EDS 4 is switched OFF. This will cause the fluid supplied to the reduction valve to flow to clutch valve D via the EDS 4.

The spool of clutch valve D will be depressed allowing fluid to pass to holding valve D.

Lock–up Clutch (TCC)

Solenoid 2 is turned ON and the line pressure control valve spool will be depressed. Fluid will now flow through the torque converter pressure valve.

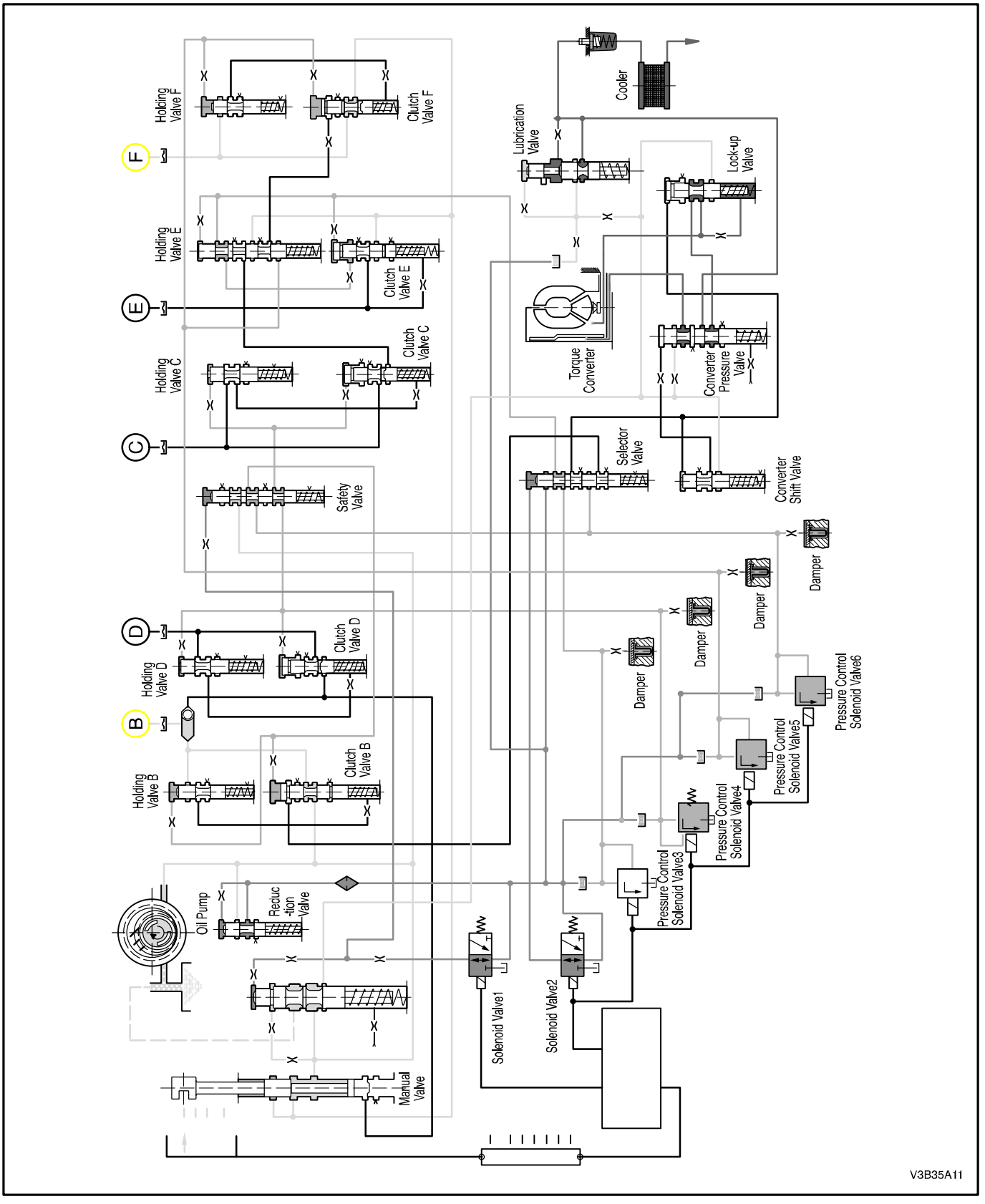
As a result, the oil pressure behind the converter lock–up clutch piston and in the turbine zone is equal. The direction of flow is through the turbine shaft and through the space behind the piston, to the turbine chamber.

Lubrication/Cooling

The lubricating valve ensures that the converter is supplied with cooling oil first if the pump rate is low. The lubricating pressure valve in addition guarantees that the necessary amount of cooling and lubricating oil is available via the bypass duct.

The fluid, which is supplied from the torque converter, flows to the cooler via the lubrication valve.

Drive Range – First Gear



Drive Range – First Gear

In Drive 1, transaxle drive is via the input shaft to clutch B. The elements of this transaxle function are as follows:

- Clutch B is engaged to drive the rear sun gear.
- The rear sun gear drives the front planetary gear carrier clockwise.
- The rear planetary gear carrier drives the front ring gear and front planetary gear carrier clockwise.

Control

Clutch B Engaged

In Park and Neutral solenoid valves 1 and 2 are both ON. Pressure control solenoids (EDS) 4 and 6 are also turned ON.

When EDS 6 is ON, the fluid supplied from the reduction valve flows to the safety valve, clutch valve B and holding valve B. The oil that is supplied to the inlet port of the clutch valve presses on the valve spool. Line pressure then flows to the holding valve and check ball, engaging clutch B.

Clutch F Engaged

EDS 5 will be switched ON. The line pressure, which passed through the reduction valve, will flow to the holding valve and the clutch valve inlet. As a result the valve spool is depressed.

Lock–up Clutch (TCC)

Solenoid 2 is turned ON and the line pressure control valve spool will be depressed. Fluid will now flow through the torque converter pressure valve.

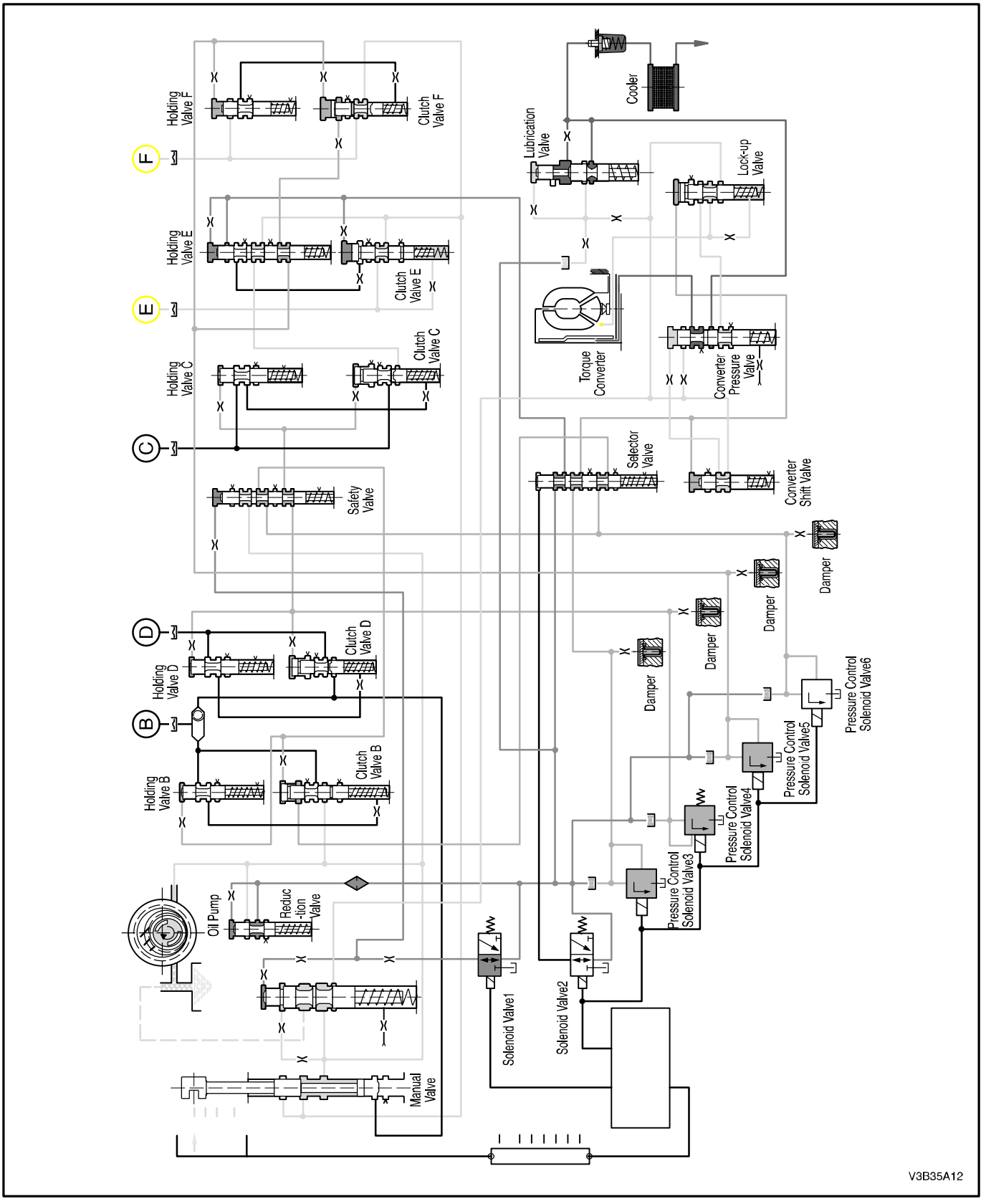
As a result, the oil pressure behind the converter lock–up clutch piston and in the turbine zone is equal. The direction of flow is through the turbine shaft and through the space behind the piston, to the turbine chamber.

Lubrication/Cooling

The lubricating valve ensures that the converter is sup–plied with cooling oil first if the pump rate is low. The lubri-cating pressure valve in addition guarantees that the nec-essary amount of cooling and lubricating oil is available via the bypass duct.

The fluid, which is supplied from the torque converter, flows to the cooler via the lubrication valve.

Drive Range – Second Gear



Drive Range – Second Gear

In Drive 2, the transaxle drive is via the input shaft and clutch E. The elements of this transaxle function are as follows:

- Clutch E is applied to drive the front ring gear.
- The front ring gear drives the front planetary gear carrier.
- The front planetary gear carrier drives the differential pinion gear clockwise.
- Brake F is applied holding the front sun gear stationary.

Control

Clutch E Engaged

Solenoid 2 will be switched OFF. Line pressure, which is supplied by the reduction valve, flows to the inlet port of clutch valve E. Fluid will then pass through the clutch valve and clutch E will engage.

Clutch F Engaged

EDS 5 will be switched ON. The line pressure, which passed through the reduction valve, will flow to the holding valve and the clutch valve inlet. As a result the valve spool is depressed.

Lock–up Clutch

Solenoid valve 2 is turned ON and the line pressure control valve spool will be depressed. Fluid will now flow through the torque converter pressure valve.

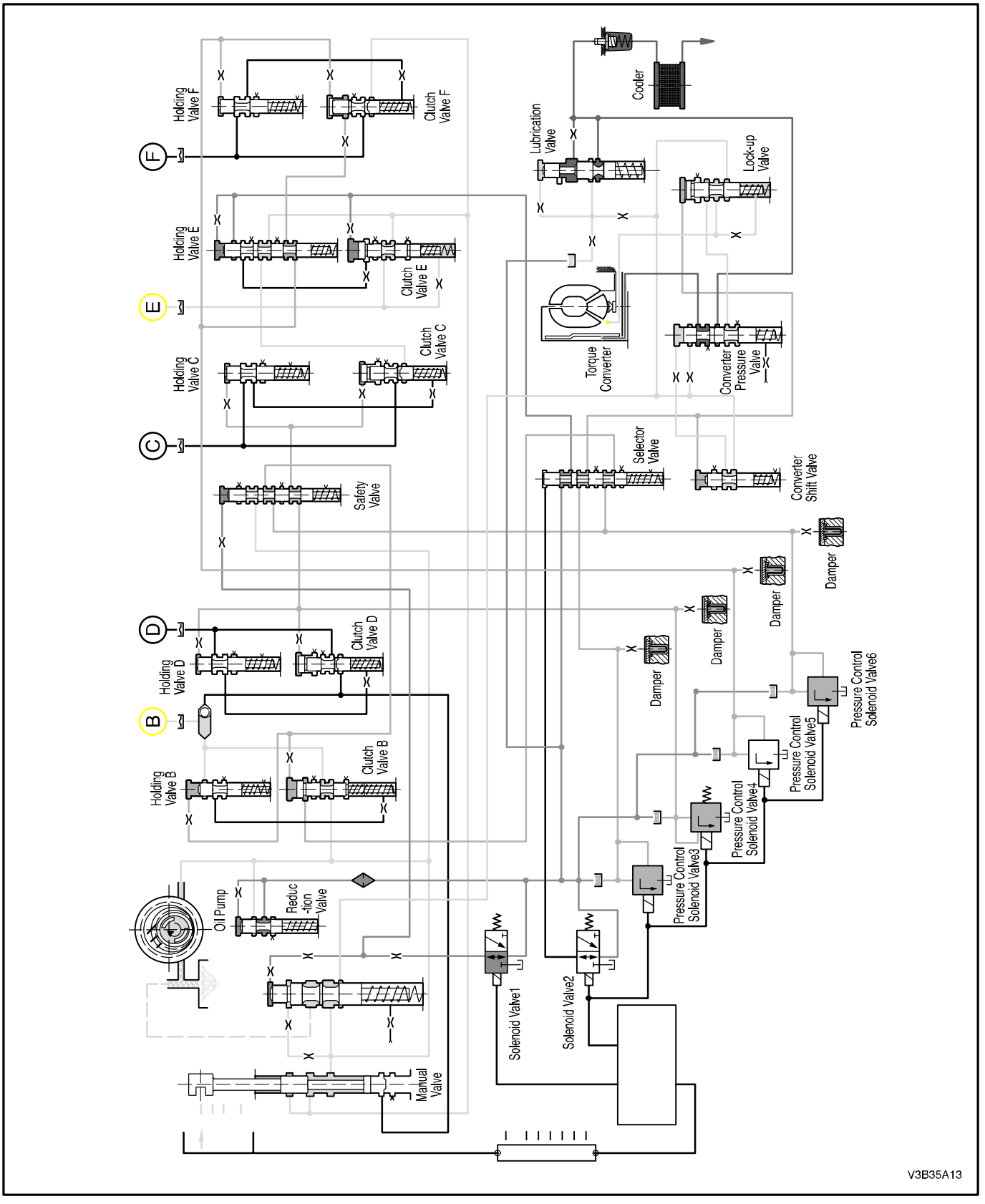
As a result, the oil pressure behind the converter lock–up clutch piston and in the turbine zone is equal. The direction of flow is through the turbine shaft and through the space behind the piston, to the turbine chamber.

Lubrication/Cooling

The lubricating valve ensures that the converter is supplied with cooling oil first if the pump rate is low. The lubricating pressure valve in addition guarantees that the necessary amount of cooling and lubricating oil is available via the bypass duct.

The fluid, which is supplied from the torque converter, flows to the cooler via the lubrication valve.

Drive Range – Third Gear



Drive Range – Third Gear

In Drive 3, transaxle drive is via the input shaft to clutches B and E. The elements of this transaxle function are as follows:

- Clutches B and E are engaged to drive the rear sun gear and rear planetary gear carrier clockwise.
- The clockwise rotation of the rear sun gear and rear planetary gear carrier will cause the front planetary gear to rotate in the same direction.

Control

Clutch B Engaged

In Park and Neutral solenoid valves 1 and 2 are both ON.

Pressure control solenoids (EDS) 4 and 6 are also turned ON.

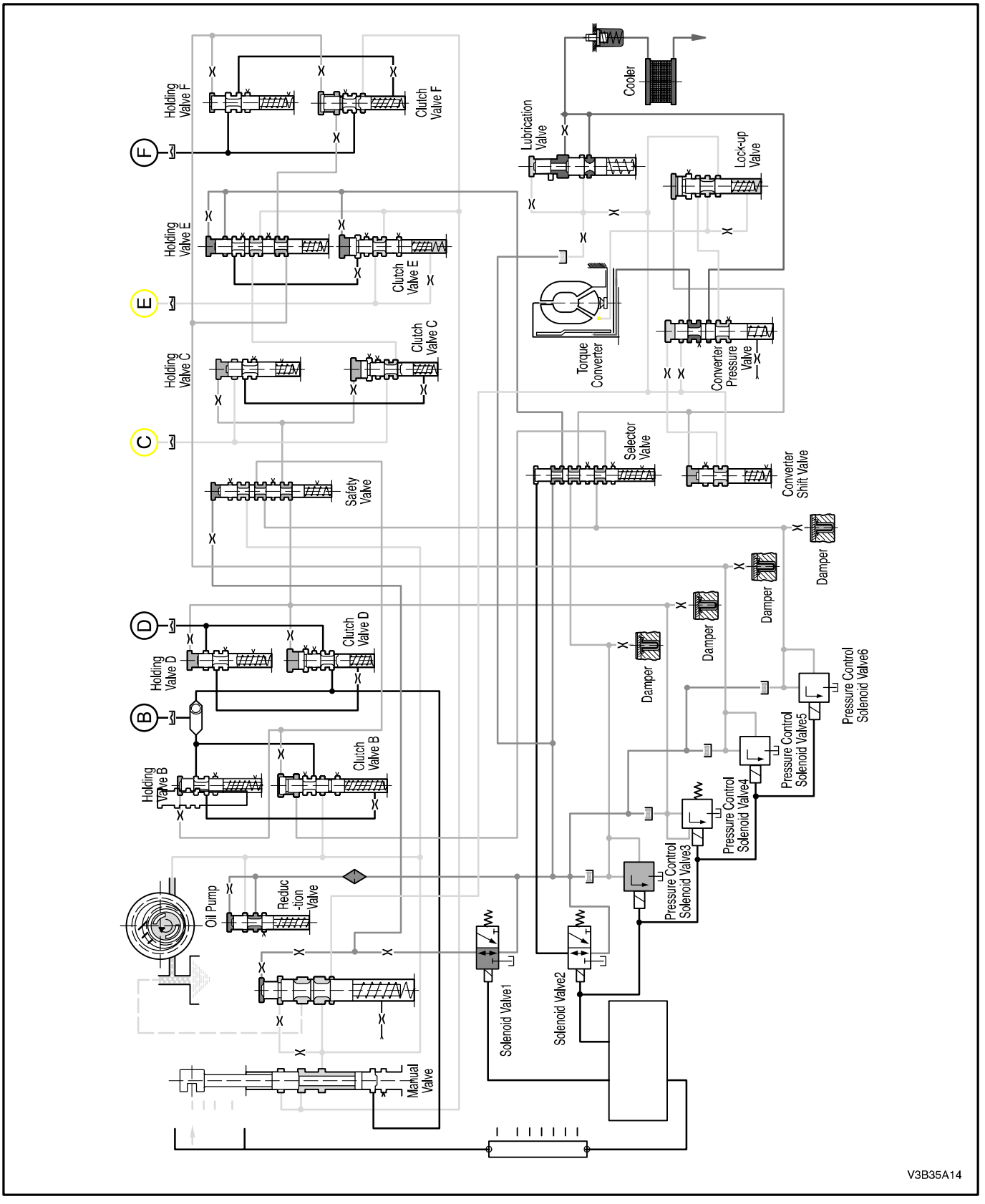
When EDS 6 is ON, the fluid supplied from the reduction valve flows to the safety valve, clutch valve B and holding valve B. The oil that is supplied to the inlet port of the clutch valve presses on the valve spool. Line pressure then flows to the holding valve and check ball, engaging clutch B.

Lock–up Clutch (TCC)

Solenoid valve 2 is turned ON and the line pressure control valve spool will be depressed. Fluid will now flow through the torque converter pressure valve.

As a result, the oil pressure behind the converter lock–up clutch piston and in the turbine zone is equal. The direction of flow is through the turbine shaft and through the space behind the piston, to the turbine chamber.

Drive Range – Fourth Gear



Drive Range – Fourth Gear

In Drive 4, transaxle drive is via the input shaft and clutches E and C. The elements of this transaxle function are as follows:

- Clutch E is engaged to drive the rear planetary gear carrier.
- The rear planetary gear carrier drives the rear ring gear.
- The rear ring gear carrier drives the differential gear.

Control

Clutch E Engaged

Solenoid 2 will be switched OFF. Line pressure, which is supplied by the reduction valve, flows to the inlet port of clutch valve E. Fluid will then pass through the clutch valve and clutch E will engage.

Clutch C Engaged

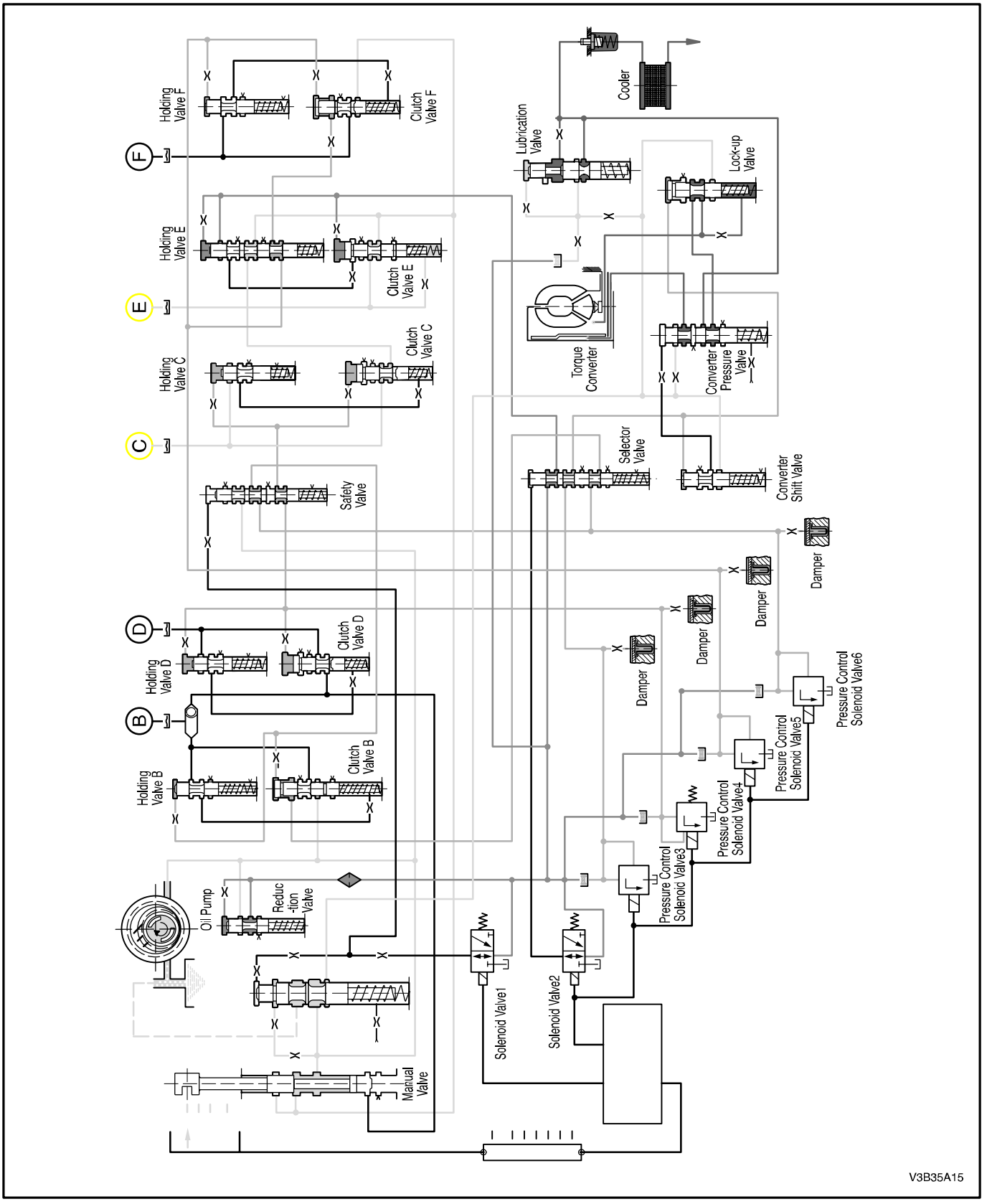
EDS 4 will be switched OFF causing the fluid level to be high. Line pressure will be directed to the safety valve, clutch valve D and holding valve D. Clutch valve C and holding valve C will engage as pressure flows through the safety valve.

Lock–up Clutch

Solenoid valve 2 is turned ON and the line pressure control valve spool will be depressed. Fluid will now flow through the torque converter pressure valve.

As a result, the oil pressure behind the converter lock–up clutch piston and in the turbine zone is equal. The direction of flow is through the turbine shaft and through the space behind the piston, to the turbine chamber.

Drive Range – Fourth Gear ; Emergency/Substitute Mode



Drive Range – Fourth Gear ; Emergency/Substitute Mode

In Drive 4, transaxle drive is via the input shaft and clutches E and C. The elements of this transaxle function are as follows:

- Clutch E is engaged to drive the rear planetary gear carrier.
- The rear planetary gear carrier drives the rear ring gear.
- The rear ring gear carrier drives the differential gear.

Control

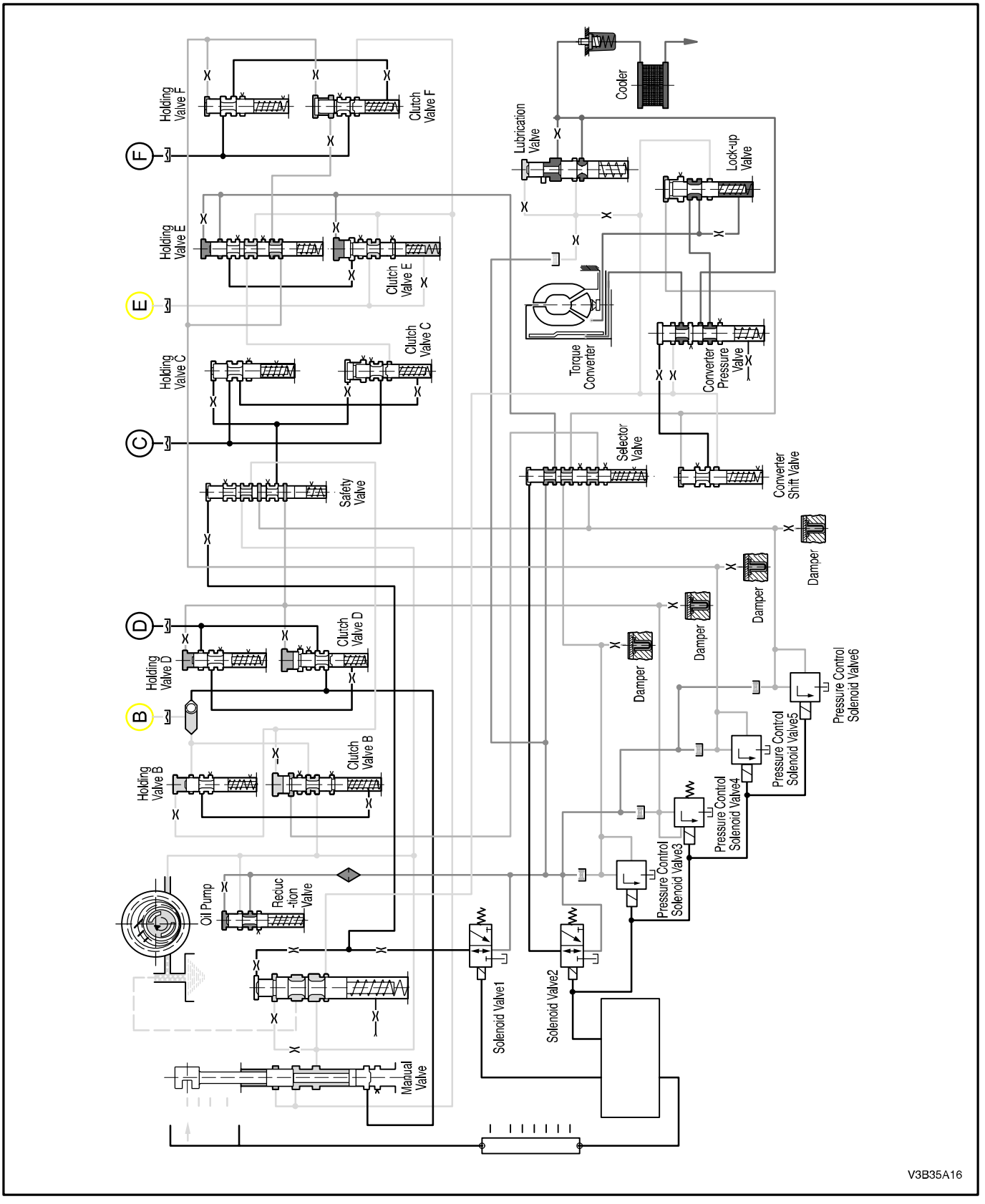
Clutch E Engaged

Solenoid 2 will be switched OFF. Line pressure, which is supplied by the reduction valve, flows to the inlet port of clutch valve E. Fluid will then pass through the clutch valve and clutch E will engage.

Clutch C Engaged

EDS 4 will be switched OFF causing the fluid level to be high. Line pressure will be directed to the safety valve, clutch valve D and holding valve D. Clutch valve C and holding valve C will engage as pressure flows through the safety valve.

Drive Range – Third Gear ; Emergency/Substitute Mode



Drive Range – Third Gear ; Emergency/Substitute Mode

In Drive 3, transaxle drive is via the input shaft to clutches B and E. The elements of this transaxle function are as follows:

- Clutches B and E are engaged to drive the rear sun gear and rear planetary gear carrier clockwise.
- The clockwise rotation of the rear sun gear and rear planetary gear carrier will cause the front planetary gear to rotate in the same direction.

Control

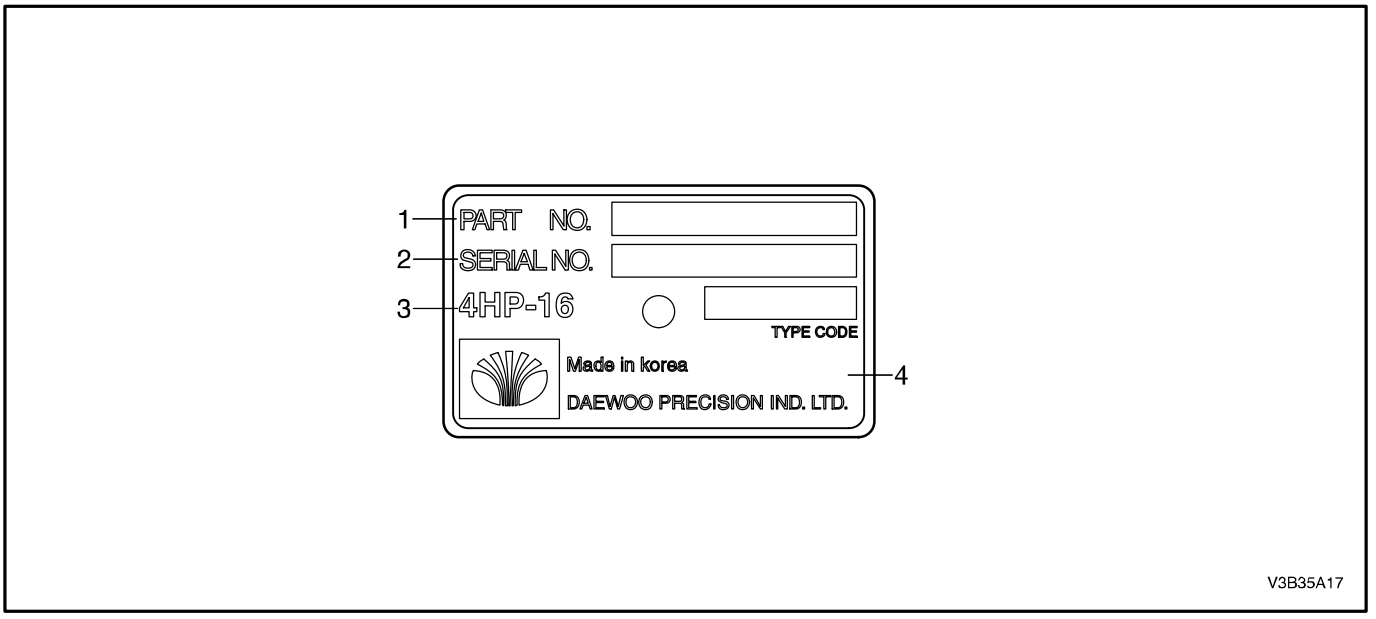
Clutch B Engaged

In Park and Neutral solenoid valves 1 and 2 are both ON. Pressure control solenoids (EDS) 4 and 6 are also turned ON.

When EDS 6 is ON, the fluid supplied from the reduction valve flows to the safety valve, clutch valve B and holding valve B. The oil that is supplied to the inlet port of the clutch valve presses on the valve spool. Line pressure then flows to the holding valve and check ball, engaging clutch B.

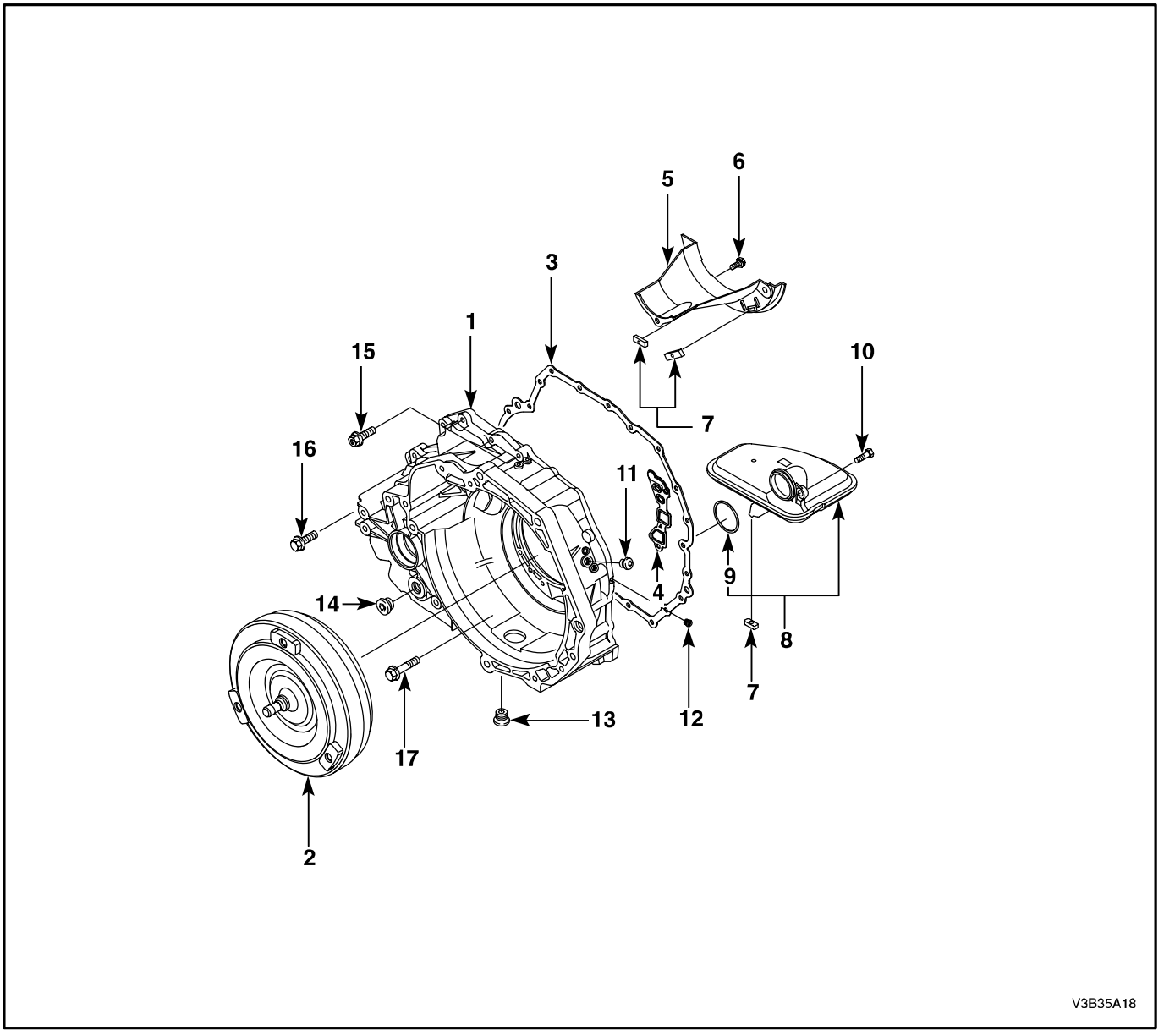
COMPONENT LOCATOR

TRANSAXLE IDENTIFICATION INFORMATION



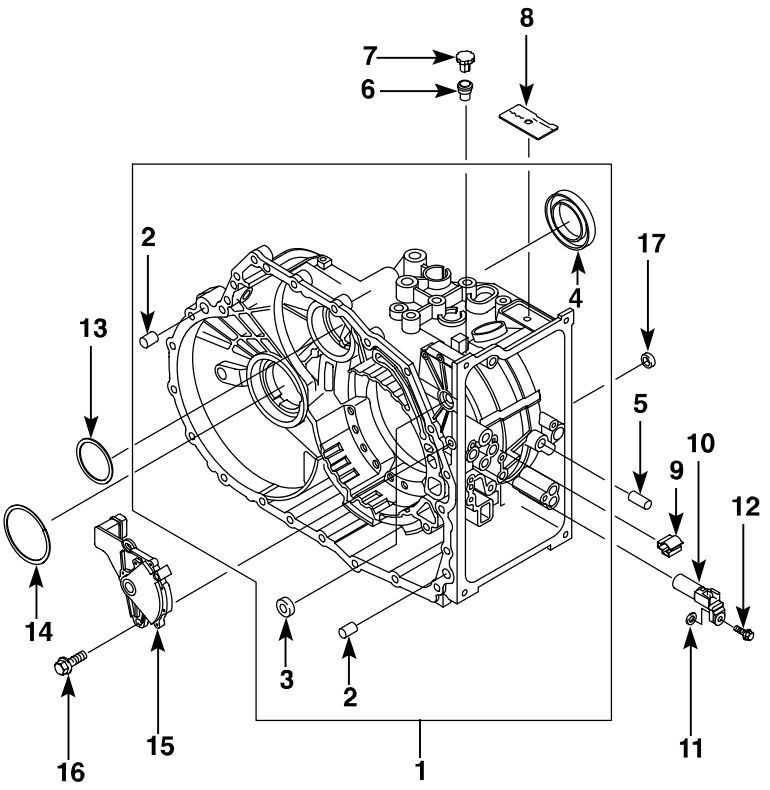
1. Part Number
2. Serial Number
3. Model Code
4. Manufactured Nation and Company

TORQUE CONVERTER



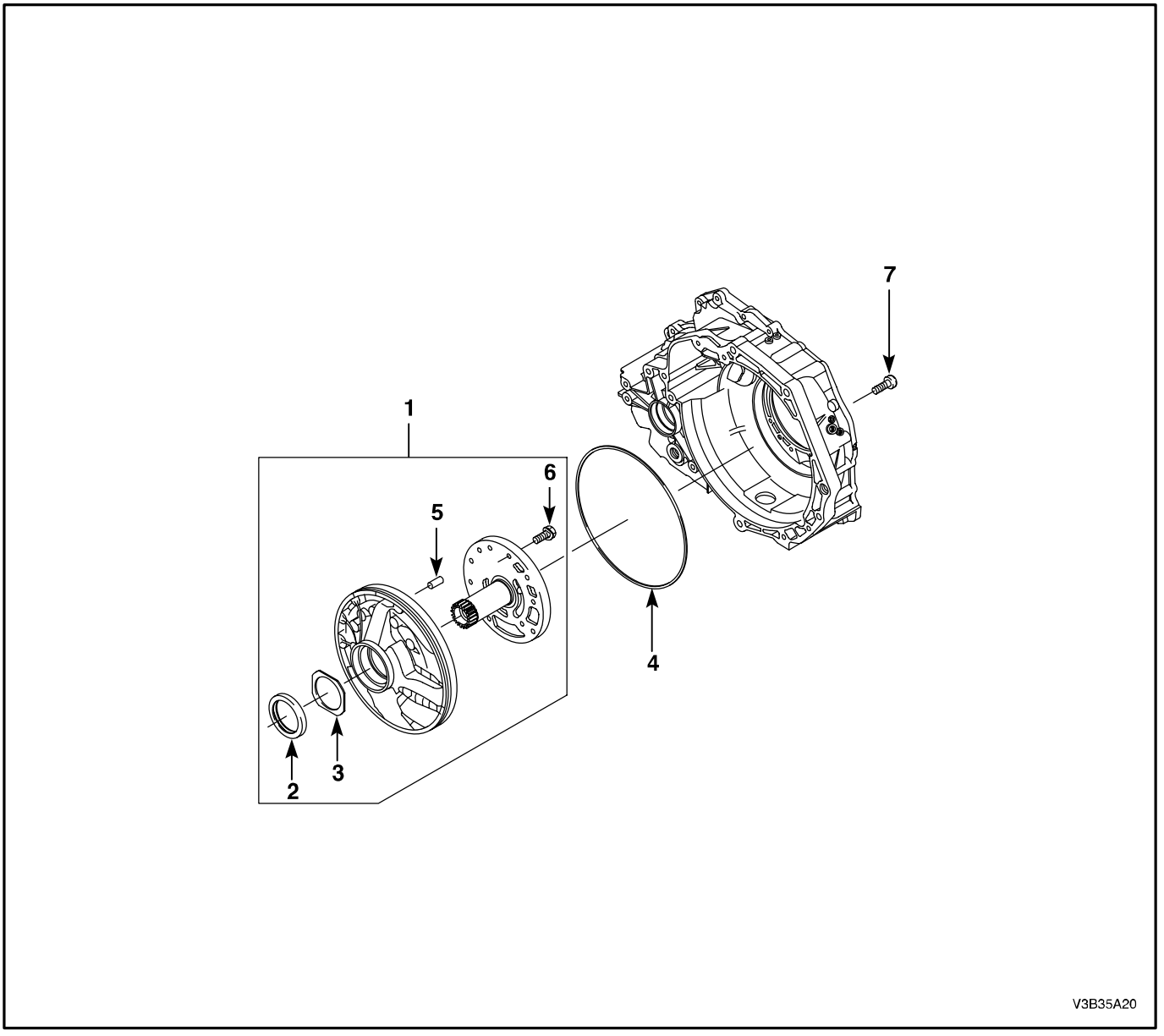
1. Torque Converter Housing
2. Torque Converter
3. Torque Converter Gasket
4. Steel Gasket
5. Oil Baffle Plate
6. Bolt
7. Magnet
8. Oil Filter
9. O–ring
10. Screw
11. Pressure Plug
12. Pressure Plug
13. Oil Drain Plug
14. Oil Level Plug
15. Screw
16. Bolt
17. Bolt

TRANSAXLE HOUSING



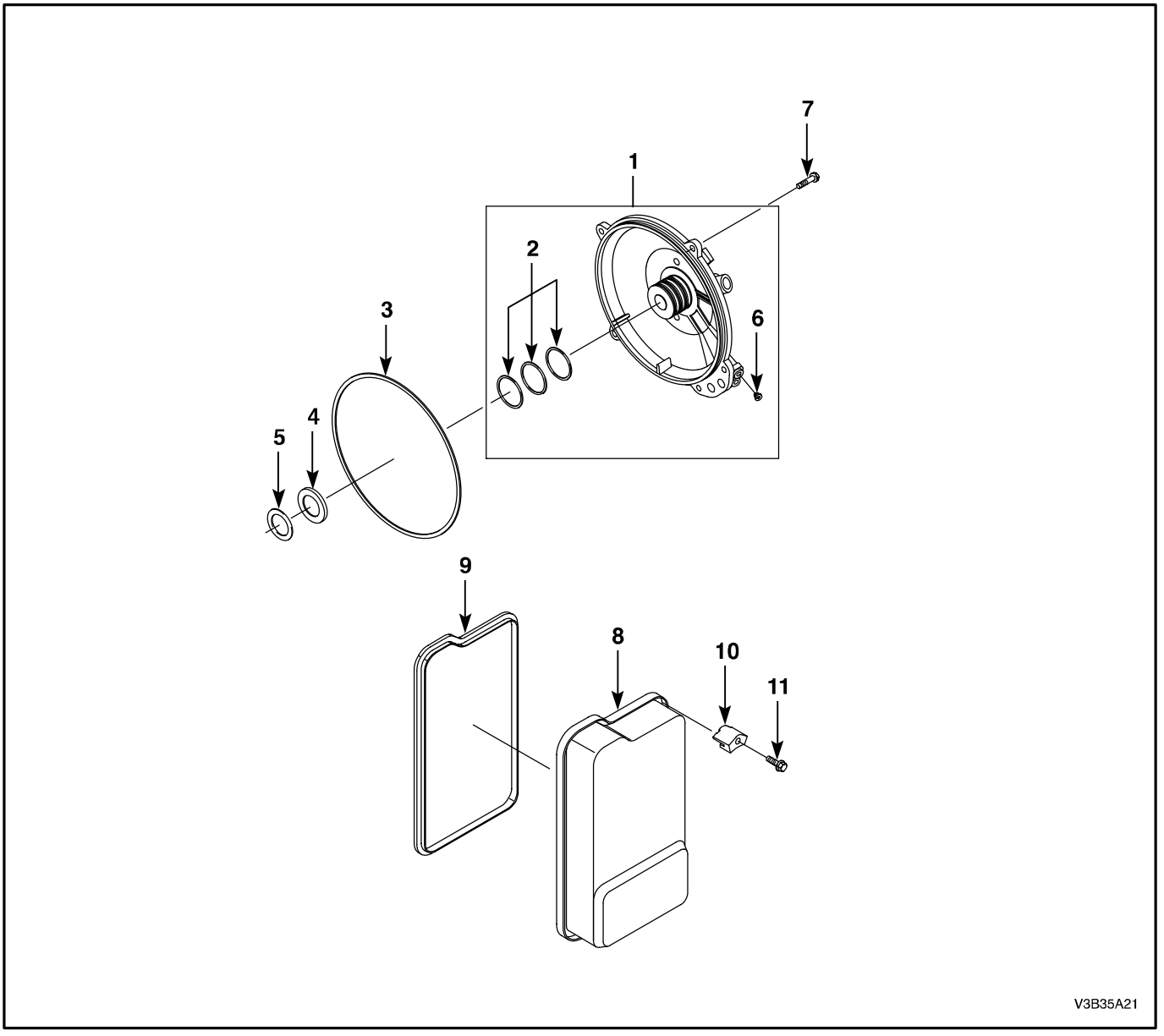
1. Transaxle Housing
2. Bushing
3. Shaft Seal
4. Axle Shaft Seal
5. Sealing Sleeve
6. Breather Pipe
7. Sleeve Protector
8. Type Plate
9. Cable Terminal
10. Output Speed Sensor
11. Washer
12. Bolt
13. Shim
14. Shim
15. Park/Neutral Position Switch
16. Bolt
17. Sealing sleeve

OIL PUMP



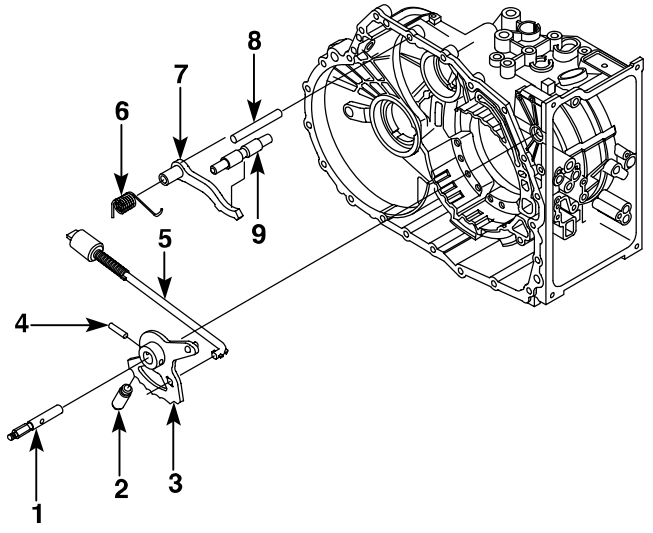
1. Oil Pump
2. Oil Pump Seal
3. Washer
4. O–ring
5. Dowel Pin
6. Bolt
7. Bolt

REAR COVER & OIL PAN COVER



1. Rear Cover
2. Piston Ring
3. O–ring
4. Needle Bearing
5. Shim
6. Screw Plug
7. Bolt
8. Oil Pan
9. Oil Pan Gasket
10. Oil Pan Bracket
11. Bolt

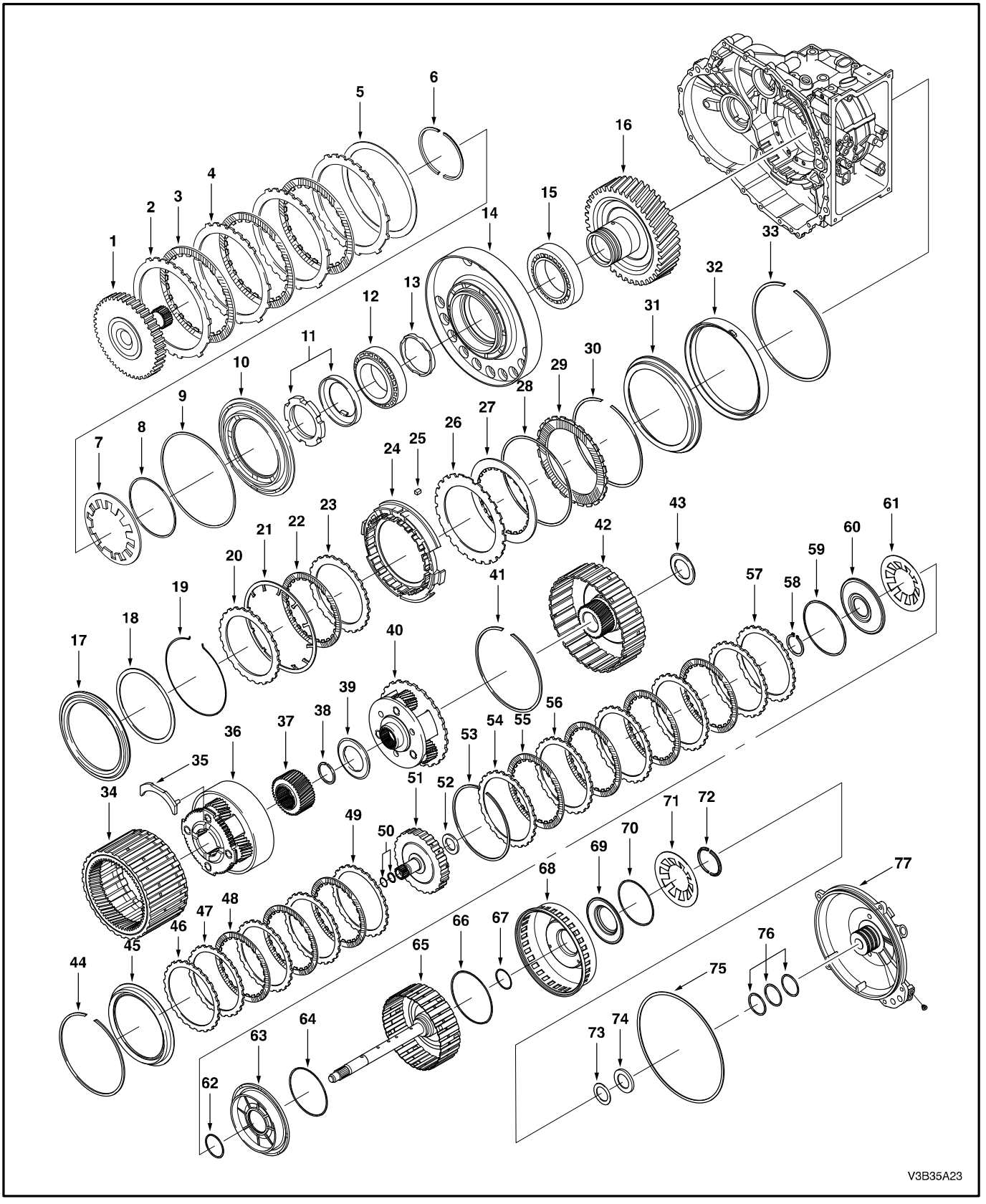
PARKING LEVER



V3B35A22

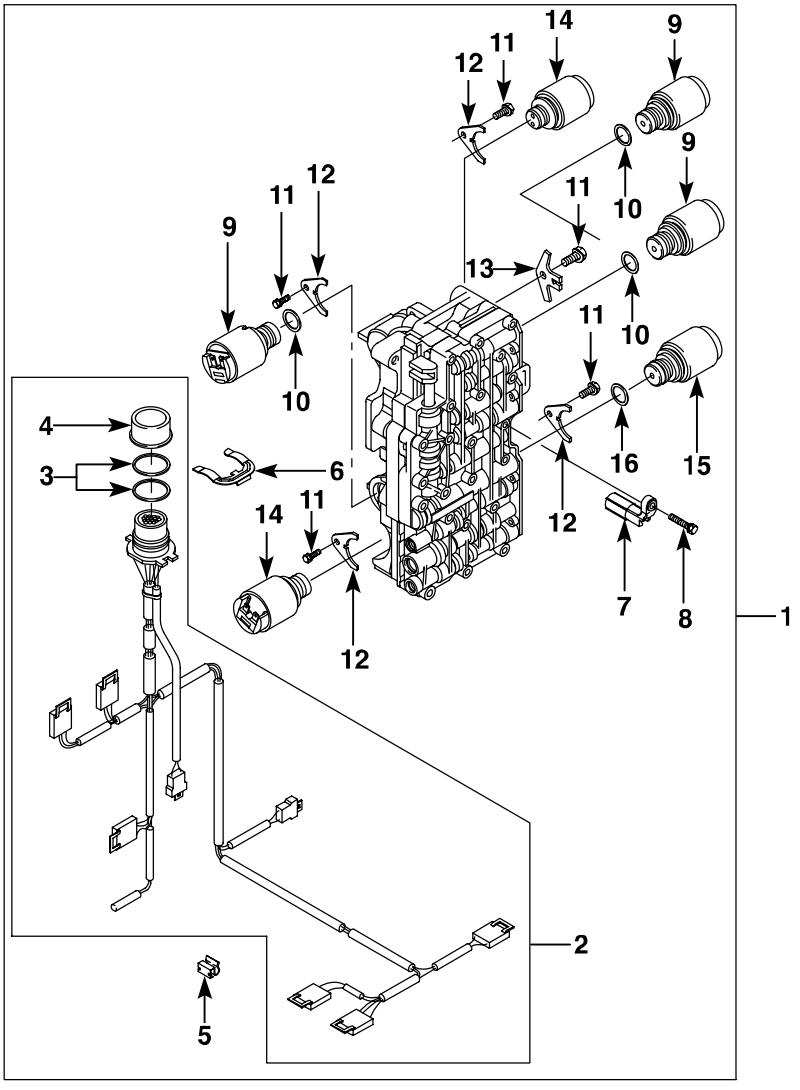
1. Selector Shaft
2. Stop Bushing
3. Detent Disc
4. Clamping Sleeve
5. Connecting Bar
6. Leg Spring
7. Pawl
8. Pin
9. Support Bolt

INPUT SHAFT & SHIFT GEAR



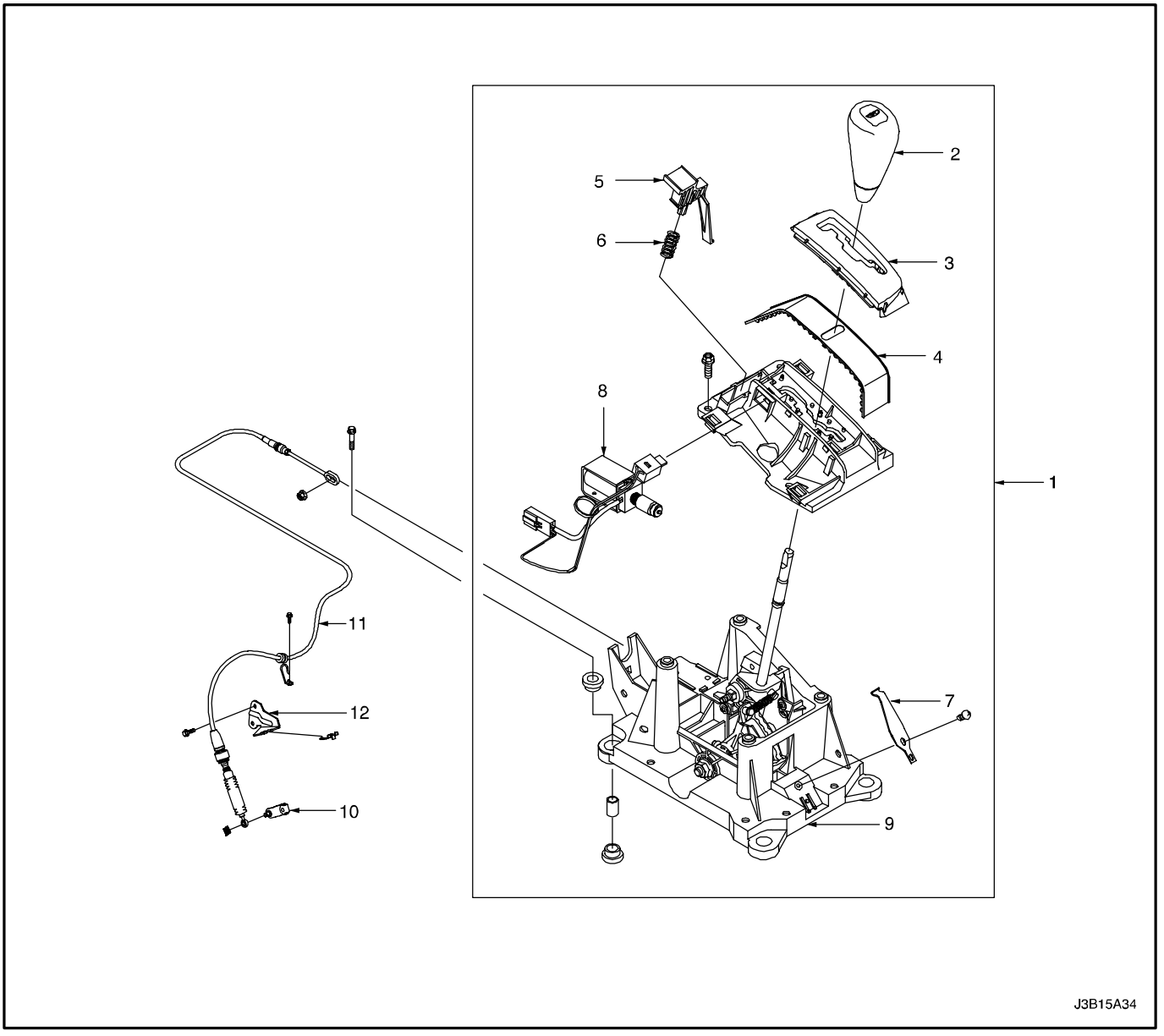
1. Inner Disc Carrier F
2. Clutch Plate F
3. Line Clutch Disc F
4. Clutch Outer Disc F
5. Spring Disc
6. Stop Ring
7. Cup Spring
8. O–ring
9. O–ring
10. Piston D
11. Slotted Nut
12. Roller Bearing
13. Adjust Ring
14. Bearing Plate
15. Roller Bearing
16. Spur Gear
17. Piston D
18. Spring Disc
19. Snap Ring
20. Clutch Plate D
21. Cup Spring
22. Line Clutch Disc D
23. Spring Disc
24. Disc Carrier C/D
25. Pitting Key
26. Line Clutch Disc C
27. Clutch Outer Disc C
28. Cup Spring
29. Line Clutch Disc C
30. Snap Ring
31. Piston C
32. Cylinder C
33. Snap Ring
34. Front Ring Gear
35. Oil Tray
36. Front Planetary Gear
37. Front Sun Gear
38. Snap Ring
39. Needle Bearing
40. Rear Planetary Gear Set
41. Snap Ring
42. Rear Sun Gear
43. Needle Bearing
44. Snap Ring
45. Piston B
46. Clutch Plate B
47. Clutch Outer Disc B
48. Line Clutch Disc B
49. Spring Disc
50. Piston Ring
51. Inner Disc Carrier E
52. Needle Bearing
53. Snap Ring
54. Clutch Plate Disc E
55. Line Clutch Disc E
56. Clutch Outer Disc E
57. Spring Disc
58. Retainer Ring
59. O–ring
60. Oil Dam
61. Cup Spring
62. O–ring
63. Piston E
64. O–ring
65. Input Shaft
66. O–ring
67. O–ring
68. Piston
69. Oil Dam
70. O–ring
71. Cup Spring
72. Stop Ring
73. Shim
74. Needle Bearing
75. O–ring
76. Piston Ring
77. Rear Cover

VALVE BODY



1. Control Valve Body
2. Valve Body Wiring Harness
3. O–ring
4. Plug
5. Cable Terminal
6. Retaining Clip
7. Input Speed Sensor
8. Cap Screw
9. Solenoid Valve
10. Cap Screw
11. Fixing Plate
12. Fixing Plate
13. Cap Screw
14. Solenoid Valve
15. Solenoid Valve

GEAR SHIFT CONTROL



1. Selector Control Lever
2. Gear Shift Knob
3. Cover
4. Step Gate Slider
5. BTSI Button
6. Spring
7. Positioning Spring
8. Solenoid
9. Base Plate
10. T/A Lever
11. Select Cable
12. Cable Fastener

DIAGNOSTIC INFORMATION AND PROCEDURES DIAGNOSIS

BASIC KNOWLEDGE REQUIRED

You must be familiar with some basic electronics to use this section of the Service Manual. They will help you to follow diagnostic procedures.

Notice : Lack of the basic knowledge of this transaxle when performing diagnostic procedures could result in incorrect diagnostic performance or damage to transaxle components.

Do not, under any circumstances, attempt to diagnose a transaxle problem without this basic knowledge.

Notice : If a wire is probed with a sharp instrument and not properly sealed afterward, the wire will corrode and an open circuit will result.

Diagnostic test probes are now available that allow you to probe individual wires without leaving the wire open to the environment. These probe devices are inexpensive and easy to install, and they permanently seal the wire from corrosion.

Special Tools

You should be able to use a Digital Volt Meter (DVM), a circuit tester, jumper wires or leads and a line pressure gauge set.

The functional check procedure is designed to verify the correct operation of electronic components in the transaxle.

This will eliminate the unnecessary removal of transaxle components.

FUNCTIONAL CHECK PROCEDURE

Begin with the Functional Check Procedure which provides a general outline of how to diagnose automatic transaxle. The following functional check procedure will indicate the proper path of diagnosing the transaxle by describing the basic checks and then referencing the locations of the specific checks.

- Check the fluid level according to the Fluid Level Service Procedure.
- Check the transaxle for fluid leaks.
- Check if the transaxle fluid is not burnt by color and smell.
- Ensure that the transaxle is not in Limp Home Mode(LHM).
- Check the battery terminals and the ground connections for corrosion or looseness.
- Check that the cooler flow is not restricted.
- Check all electrical connections for tightness.
- Use on–board diagnostic tool or a scan tool to see if any transaxle trouble codes have been set. Refer to the appropriate ”Diagnostic Trouble Code (DTC)” information and repair the vehicle as directed. After repairing the vehicle, perform the road test and verify that the code has not set again.
- Perform the Electrical/Garage Shift Tests.
- Perform the Road Test Procedure in this section.
- Inspect the oil and check for metal or other contaminants in the oil pan.

LINE PRESSURE CHECK PROCEDURE

The 4HP 16 A/T uses a trochoid type oil pump to produce hydraulic pressure, and a pressure control solenoid (solenoid 1) to control that pressure at the pressure regulator valve, after it leaves the pump. The transaxle pressure control solenoid is controlled by an electrical signal that ranges from 0 to 12 volts corresponds to minimum line pressure (approx. 89.9 to 124.7 psi (6.2 to 8.6 bar)) and 0 volt corresponds to a maximum line pressure (approx. 221.9 to 252.4 psi (15.3 to 17.4 bar)) in all range.

Line pressures are calculated for two sets of gear ranges – Drive–Park–Neutral and Reverse. This allow the transaxle line pressure to be appropriate for different pressure needs in different gear ranges:

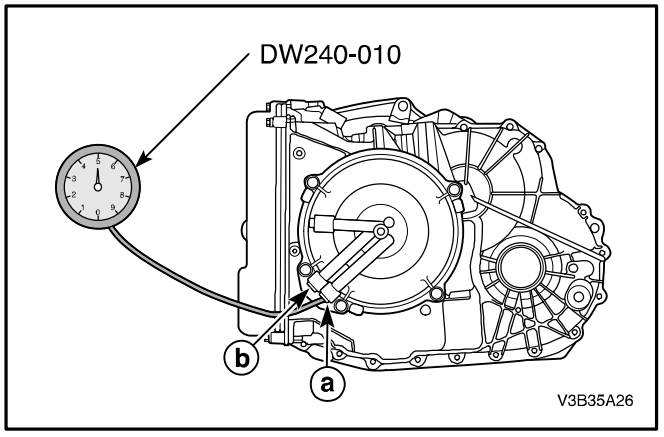
Gear Range	Solenoid 1	RPM	Pressure
Drive, Reverse	Off	2,500	221.9~252.4psi (15.3~17.4 bar)
	On	2,500	17.4~269.8psi (1.2~18.6 bar)
Neutral, Park	Off	2,500	221.9~252.4psi (15.3~17.4 bar)
	On	2,500	89.9~269.8 psi (6.2~18.6 bar)

Before performing a line pressure check, verify that the pressure control solenoid is receiving the correct electrical signal from the TCM:

1. Install a scan tool.
2. Start the engine and set parking brake.
3. Check for a stored pressure control solenoid diagnostic trouble code, and other diagnostic trouble codes.

4. Repair vehicle, if necessary.
   Inspect:
- Fluid level.
- Manual linkage.

   Install or Connect:
- Scan tool (scanner)
- Oil pressure gauge at line pressure port (clutch B or E ports on transaxle case)



5. Put gear selector in Park and set the parking brake.
6. Start engine and allow it to warm up at idle.
7. Access the ”Solenoid 1 Control Mode” on the scanner.
8. Switching solenoid 1 ON/OFF, accelerating the engine to 2,500rpm, and then read the line pressure at the each gear.
9. Compare data to the Drive–Park–Neutral line pressure chart below.

Notice : Total test running time should not exceed 2 minutes, or transaxle damage could occur.

CAUTION : Brake must be applied at all times to prevent unexpected vehicle motion.

If pressure readings differ greatly from the line pressure chart, refer to the Diagnosis Charts contained in this section.

Notice : Clutch damage may occur.

The scanner is only able to control the pressure control solenoid in Park and Neutral with the vehicle stopped.

This protects the clutches from extremely high or low pressures in Drive or Reverse rang.

Gear Range	Solenoid	Line Pressure	B Port	E Port
Park / Neutral	ON	LOW	90~124.7 psi (6.2~8.6 bar)	
	OFF	HIGH	221.9~252.3 ps i (15.3~17.4 bar)	
Reverse	ON	LOW	90~124.7 psi (6.2~8.6 bar)	
	OFF	HIGH	221.9~252.3 psi (15.3~17.4 bar)	
Drive	ON	LOW		90~124.7 psi (6.2~8.6 bar)
	OFF	HIGH		137.7~162.4 psi (9.5~11.2 bar)
3	ON	LOW	90~124.7 psi (6.2~8.6 bar)	90~124.7 psi (6.2~8.6 bar)
	OFF	HIGH	221.9~252.3 psi (15.3~17.4 bar)	137.7~162.4 psi (9.5~11.2 bar)
2	ON	LOW		90~124.7 psi (6.2~8.6 bar)
	OFF	HIGH		137.7~162.4 psi (9.5~11.2 bar)
1	ON	LOW	90~124.7 psi (6.2~8.6 bar)	
	OFF	HIGH	221.9~252.3 psi (15.3~17.4 bar)	

CLUTCH PLATE DIAGNOSIS

Composition Plates

Dry the plate and inspect the plates for the following conditions :

- Pitting
- Flaking
- Wear
- Glazing
- Cracking
- Charring

Chips or metal particles embedded in the lining

Replace a composition plate which shows any of these conditions.

Steel Plates

Wipe the plates dry and check the plates for heat discoloration. If the surfaces are smooth, even if colorsmear is indicated, you can reuse the plate. If the plate is discolored with hot spots or if the surface is scuffed, replace the plate.

Important : If the clutch shows evidence or extreme heat or burning, replace the springs.

Causes of Burned Clutch Plates

The following conditions can result in a burned clutch plate:

- Incorrect usage of clutch plates.
- Engine coolant in the transaxle fluid.
- A cracked clutch piston.
- Damaged or missing seals.
- Low line pressure.
- Valve problems.
  - – The valve body face is not flat
  - – Porosity between channels
  - – The valve bushing clips are improperly installed.
  - – The check balls are misplaced.
- The seal rings are worn or damaged

Engine Coolant in Transaxle

Notice : Antifreeze will deteriorate the O–ring seals and the glue used to bond the clutch material to the pressure plate. Both conditions may cause transaxle damage.

Perform the following steps if the transaxle oil cooler has developed a leak, allowing engine coolant to enter the transaxle:

1. Because the coolant will attach to the seal material causing leakage, disassemble the transaxle and replace all rubber type seals.
2. Because the facing material may become separated from the steel center portion, replace the composition faced clutch plate assemblies.
3. Replace all nylon parts including washers.
4. Replace the torque converter.
5. Thoroughly clean and rebuild the transaxle, using new gaskets and oil filter.
6. Flush the cooler lines after you have properly repaired or replaced the transaxle.

COOLER FLUSHING AND FLOW TEST

Notice : You must flush the cooler whenever you receive a transaxle for service. Cooler flushing is essential for SRTA installation, major overhaul, whenever you replace a pump or torque converter, or whenever you suspect that the fluid has been contaminated.

After filling the transaxle with fluid, start the engine and run for 30 seconds. This will remove any residual moisture from the oil cooler. Disconnect the return line at the transaxle and observe the flow with the engine running. If the fluid flow is insufficient, check the fluid flow by disconnecting the feed line at the cooler. Observe the flow with the engine running.

- If the flow from the cooler return line at the transaxle is insufficient, check the flow rate from the feed line to the cooler. BLockage exists in the transaxle or the cooler.
- If the flow from the transaxle feed line to the cooler is insufficient, the transaxle is the cause of the fluid flow problem.
- If the flow the transaxle feed line to the cooler is insufficient, but flow from the cooler return line to the transaxle is insufficient, inspect the cooler pipes and fittings. Then repeat the cooler flushing procedure. If the flow is still insufficient, replace the cooler.

TRANSAXLE FLUID LEVEL SERVICE PROCEDURE

This procedure is to be used when checking a concern with the fluid level in a vehicle. A low fluid level will result in slipping and loss of drive/ reverse or delay on engagement of drive/ reverse when the vehicle is cold.

The vehicle is first checked for transaxle diagnostic messages on the scan tool. If the oil level is low, it is possible to register a vehicle speed signal fault.

The vehicle is to be test driven to determine if there is an abnormal delay when selecting drive or reverse, or loss of drive. One symptom of low fluid level is a momentary loss of drive when driving the vehicle around a corner. Also when the transaxle fluid level is low, a loss of drive may occur when the transaxle fluid temperature is low.

When adding or changing transaxle fluid use only ESSO LT 71141 automatic transaxle fluid or other approved fluids. The use of incorrect fluid will cause the performance and durability of the transaxle to be severely degraded.

Fluid Level Diagnosis Procedure

1. If the vehicle is at operating temperature allow the vehicle to cool down for two hours, but no greater than four hours. Or if the vehicle is at cool status, start the engine and allow the engine to idle for approximately 5 minutes (825~875 rpm), if pos-

sible, drive the vehicle for a few kilometers (N–D, N–R, shift until two gear). This will allow the transaxle to be within the correct temperature range. Transaxle fluid level should be checked at temperature 20 to 45˚C (68 to 113˚F).

CAUTION : Removal of the fluid filler plug when the transaxle fluid is hot may cause injury if fluid drains from the filler hole.

2. Switch off accessories, especially air conditioner, heater.
3. With the brake pedal pressed, move the gear shift control lever through the gear ranges, pausing a few seconds in each range. Return the gearshift lever to P(Park). Turn the engine OFF.
4. Park the vehicle on a hoist, inspection pit or similar raised level surface. The vehicle must be level to obtain a correct fluid level measurement.
5. Place a fluid container below the fluid filler plug.
6. Clean all dirt from around the fluid filler plug. Remove the fluid filler plug. Clean the filler plug and check that there is no damage to the ”O” ring.
   - If fluid drains through the filler hole the transaxle may have been overfilled. When the fluid stops draining the fluid level is correct. Install the fluid filler plug and tighten it to 45N•m(34 lb–ft).
   - If fluid does not drain through the filler hole, the transaxle fluid level may be low. Lower the vehicle, and start the vehicle in P(Park) with the parking brake and the brake applied. With the engine idling, move the gear shift lever through the gear ranges, pausing a few seconds in each range and adding the fluid until gear application is felt. Return the gear shift lever to P(Park). Turn the engine OFF and raise the vehicle. Check if the fluid level is aligned with the bottom of the filler hole. If not, add a small quantity of fluid to the correct level. Install the fluid filler plug and tighten it to 45N•m(34 lb–ft).
7. When the fluid level checking procedure is completed, wipe any fluid around the filler plug with a rag or shop towel.

Fluid Level Set After Service

1. Depending on the service procedure performed, add the following amounts of fluid through the filler plug hole prior to adjusting the fluid level:

   Oil pan removal – 4 liters (4.23 quarts)
   Converter removal – 2 liters (2.11 quarts)
   Overhaul – 6.9liters (7.3 quarts)
   Oil drain plug removal – 4 liters (4.23 quarts)
2. Follow steps 1 through 4 of the Fluid Level Diagnosis Procedure.
3. Clean all dirt from around the fluid filler plug. Remove the fluid filler plug. Clean the filler plug and check that there is no damage to the ”O” ring.
4. Lower the vehicle with the filler plug still removed and start the vehicle in P(Park) with the parking brake and the brake applied. With the engine idling, move the gear shift lever through the gear ranges, pausing a few seconds in each range and adding the fluid until gear application is felt. Then add an additional 0.5 liters of fluid. Return the gear shift lever to P(Park). Turn the engine OFF and raise the vehicle. Install the fluid filler plug and tighten it to 45N•m (34 lb–ft).
5. Drive the vehicle at 2.2 miles(3.5km) to 2.8 miles(4.5 km) with light throttle so that the engine does not exceed 2500 rpm. This should result in the transaxle temperature being in the range 20 to 45˚C (68 to 11˚F). With the brake applied, move the shift lever through the gear ranges, pausing a few seconds in each range at the engine idling.
6. Return the gear shift lever to P(Park). Turn the engine OFF and raise the vehicle on the hoist, if applicable, ensuring the vehicle is level. When the three minutes passed after the engine stopped, remove the filler plug. Check if the fluid level is aligned with the bottom of the filler hole. If not, add a small quantity of fluid to the correct level. Install the fluid filler plug and tighten it to 45N•m (34 lb–ft).
7. Wipe any fluid around the filler plug with a rag or shop towel.

Fluid Leak Diagnosis and Repair

The cause of most external leaks can generally be Located and repaired with the transaxle in the vehicle.

Methods for Locating Leaks

General Method

1. Verify that the leak is transaxle fluid.
2. Thoroughly clean the suspected leak area.
3. Drive the vehicle for approximately 25 km (15 miles) or until the transaxle reaches normal operating temperature (88˚C, 190˚F).
4. Park the vehicle over clean paper or cardboard.
5. Turn the engine OFF and look for fluid spots on the paper.
6. Make the necessary repairs to correct the leak.

Powder Method

1. Thoroughly clean the suspected leak area.
2. Apply an aerosol type powder (foot powder) to the suspected leak area.
3. Drive the vehicle for approximately 25 km (15 miles) or until the transaxle reaches normal operating temperature (88˚C, 190˚F).
4. Turn the engine OFF.
5. Inspect the suspected leak area and trace the leak path through the powder to find the source of the leak.
6. Make the necessary repairs.

Dye and Black Light Method

1. Add dye to the transaxle though the transaxle fluid filler plug. Follow the manufacturer’s recommendation for the amount of dye to be used.
2. Use the black light to find the fluid leak.
3. Make the necessary repairs.

Repairing the Fluid Leak

Once the leak point is found the source of the leak must be determined. The following list describes the potential causes for the leak:

- Fasteners are not torqued to specification.
- Fastener threads and fastener holes are dirty or corroded.
- Gaskets, seals or sleeves are misarranged, damaged or worn.
- Damaged, warped or scratched seal bore or gasket surface.
- Loose or worn bearing causing excess seal or sleeve wears.
- Case or component porosity.
- Fluid level is too high.
- Plugged vent or damaged vent tube.
- Water or coolant in fluid.
- Fluid drain back holes plugged.

ELECTRICAL/GARAGE SHIFT TEST

This preliminary test should be performed before a hoist or road test to make sure electronic control inputs is connected and operating. If the inputs are not checked before operating the transaxle, a simple electrical condition could be misdiagnosed as a major transaxle condition.

A scan tool provides valuable information and must be used on the automatic transaxle for accurate diagnosis.

1. Move gear selector to P (Park) and set the parking brake.
2. Connect scan tool to Data Link Connector (DLC) terminal.
3. Start engine.
4. Turn the scan tool ON.
5. Verify that the appropriate signals are present. These signals may include:
   - ENGINE SPEED
   - VEHICLE SPEED
   - THROTTLE POSITION
   - TRANSAXLE GEAR STATE
   - GEAR SHIFT LEVER POSITION
   - TRANSAXLE FLUID TEMPERATURE
   - CLOSED THROTTLE POSITION LEARN
   - OPEN THROTTLE POSITION LEARNT
   - CLOSED ACCEL. PEDAL POSITION LEARNT
   - OPEN ACCEL. PEDAL POSITION LEARNT
   - A/C COMPRESSOR STATUS
   - MODE SWITCH
   - THROTTLE POSITION VOLTAGE
   - GEAR SHIFT LEVER POSITION VOLTAGE
   - TRANS. FLUID TEMPERATURE VOLTAGE
   - A/C SWITCH
   - MODE SWITCH VOLTAGE
   - BATTERY VOLTAGE
6. Monitor the A/C COMPRESSOR STATUS signal while pushing the A/C switch.
   - The A/C COMPRESSOR STATUS should come ON when the A/C switch is pressed, and turns OFF when the A/C switch is repushed.
7. Monitor the GEAR SHIFT LEVER POSITION signal and move the gear shift control lever through all the ranges.
   - Verify that the GEAR SHIFT LEVER POSITION value matches the gear range indicated on the instrument panel or console.
   - Gear selections should be immediate and not harsh.
8. Move gear shift control lever to neutral and monitor the THROTTLE POSITION signal while increasing and decreasing engine speed with the accelerator pedal.
   - THROTTLE POSITION should increase with engine speed.

ROAD TEST PROCEDURE

- Perform the road test using a scan tool.
- This test should be performed when traffic and road conditions permit.
- Observe all traffic regulations.

The TCM calculates upshift points based primarily on two inputs : throttle angle and vehicle speed. When the TCM wants a shift to occur, an electrical signal is sent to the shift solenoids which in turn moves the valves to perform the upshift.

The shift speed charts reference throttle angle instead of ”min throttle” or ”wot” to make shift speed measurement more uniform and accurate. A scan tool should be used to monitor throttle angle. Some scan tools have been programmed to record shift point information. Check the introduction manual to see if this test is available.

Upshift Procedure

With gear selector in drive(D)

1. Look at the shift speed chart contained in this section and choose a percent throttle angle of 10 or 25%.
2. Set up the scan tool to monitor throttle angle and vehicle speed.
3. Accelerate to the chosen throttle angle and hold the throttle steady.
4. As the transaxle upshifts, note the shift speed and commanded gear changes for :
   - Second gear.
   - Third gear.
   - Fourth gear.

Important : Shift speeds may vary due to slight hydraulic delays responding to electronic controls. A change from the original equipment tire size affects shift speeds.

Note when TCC applies. This should occur in fourth gear. If the apply is not noticed by an rpm drop, refer to the ”Lock–up Clutch Diagnosis” information contained in this section.

The Lock up clutch should not apply unless the transaxle has reached a minimum operating temperature of 8˚C (46˚F) TRANS TEMP AND engine coolant temp of 50˚C (122˚F).

5. Repeat steps 1–4 using several different throttle angles.

Part Throttle Detent Downshift

At vehicle steeds of 55 to 65km/h (34 to 40mph) in Fourth gear, quickly increase throttle angle to greater than 50%.

Verify that :

- TCC apply.
- Transaxle downshift to 3rd gear.
- Solenoid 1 turns ON to OFF.
- Solenoid 2 turns OFF.

Full Throttle Detent Downshift

At vehicle speeds of 55 to 65km/h (34 to 40mph)in Fourth gear, quickly increase throttle angle to its maximum position (100%)

Verify that :

- TCC release.
- Transaxle downshift to Second gear immediately.
- Solenoid 1 turns ON to OFF
- Solenoid 2 turns OFF.

Manual Downshifts

1. At vehicle speeds of 60km/h (40mph)in Fourth gear, release accelerator pedal while moving gear selector to Manual Third (3). Observe that :
   - Transaxle downshift to Third gear immediately.
   - Engine slows vehicle down.
2. Move gear selector back to overdrive(D) and accelerate to 31mph (50km/h). Release the accelerator pedal and move the gear selector to Manual First(1) and observe that :
   - Transaxle downshift to second gear immediately.
   - Engine slows vehicle down

Notice : A Manual First—Third Gear Ratio will occur at high speeds as an upshift safety feature. Do not attempt to perform this shift.

Coasting Downshifts

1. With the gear selector in Overdrive(D), accelerate to Fourth gear with TCC applied.
2. Release the accelerator pedal and lightly apply the brakes, and observe that :
   - TCC release.
   - Down shifts occur at speeds shown ON the shift speed chart.

Manual Gear Range Selection

Upshifts in the manual gear ranges are controlled by the shift solenoids. Perform the following tests by accelerating at 25 percent TP sensor increments.

Manual Third (3)

- With vehicle stopped, move the gear selector to Manual third(3) and accelerate to observe :
  – 1–2 shift.
  – 2–3 shift.

Manual Second (2)

- With vehicle stopped, move the gear selector to Manual second(2) and accelerate to observe :
  – 1–2 shift.
- Accelerate to 40km/h(25mph) and observe :
  – 2–3 shift does not occur
  – TCC does not apply

Manual First (1)

- With vehicle stopped, move gear selector to Manual First(1). Accelerate to 30km/h(19mph) and observe :
  – No upshifts occur

Reverse (R)

- With vehicle stopped, move gear selector to R(Reverse) and observe :
  – Solenoid 1 is OFF
  – Solenoid 2 is OFF

Use a scan tool to see if any transaxle trouble codes have been set. Refer to ”Diagnostic Trouble Codes”in this section and repair the vehicle as directed. After repairing the vehicle, perform the hoist test and verify that the code has not set again.

If the transaxle is not performing well and no trouble codes have been set, there may be an intermittent condition. Check all electrical connections for damage or a loose fit. You also have to perform a snapshot test which can help catch an intermittent condition that dose not occur long enough to set a code.

You may want to read ”Electronic Component Diagnosis” in this section to become familiar with transaxle conditions caused by transaxle electrical malfunction.

If no trouble codes have been set and the condition is suspected to be hydraulic, take the vehicle on a road test.

TORQUE CONVERTER LOCK–UP CLUTCH(TCC) DIAGNOSIS

To properly diagnosis the lock–up clutch(TCC) system, perform all electrical testing first and then the hydraulic testing.

The TCC is applied by fluid pressure which is controlled by a solenoid Located inside the valve body. The solenoid is energized by completing an electrical circuit through a combination of switches and sensors.

Functional Check Procedure

Inspect

1. Install a tachometer or scan tool.
2. Operate the vehicle unit proper operating temperature is reached.
3. Drive the vehicle at 80 to 88km/h (50 to 55 mph) with light throttle(road load).
4. Maintaining throttle position, lightly touch the brake pedal and check for release of the TCC and a slight increase in engine speed(rpm).
5. Release the brake slowly accelerate and check for a reapply of the Lock up clutch and a slight decrease in engine speed(rpm).

Torque Converter Evaluation

Torque Converter Stator

The torque converter stator roller clutch can have one of two different type malfunctions :

A. Stator assembly freewheels in both directions.

B. Stator assembly remains Locked up at all times.

Condition A – Poor Acceleration Low Speed

The car tends to have poor acceleration from a stand still. At speeds above 50 to 55km/h(30 to 35mph), the car may act normal. If poor acceleration is noted, it should first be determined that the exhaust system is not blocked, and the transaxle is in 1st(First) gear when starting out.

If the engine freely accelerates to high rpm in N(Neutral), it can be assumed that the engine and exhaust system are normal. Checking for poor performance in ”Drive” and ”Reverse” will help determine if the stator is freewheeling at all times.

Condition B – Poor Acceleration High Speed

Engine rpm and car speed limited or restricted at high speeds. Performance when accelerating from a standstill is normal. Engine may overheat. Visual examination of the converter may reveal a blue color from overheating.

If the converter has been removed, the stator roller clutch can be checked by inserting two fingers into the splined inner race of the roller clutch and trying to turn freely clockwise, but not turn or be very difficult to turn counter clockwise.

Noise

Torque converter whine is usually noticed when the vehicle is stopped and the transaxle is in ”Drive” or ”Reverse”. The noise will increase when engine rpm is increased. The noise will stop when the vehicle is moving or when the torque converter clutch is applied because both halves of the converter are turning at the same speed.

Perform a stall test to make sure the noise is actually coming from the converter :

1. Place foot on brake.
2. Put gear selector in ”Drive”.
3. Depress accelerator to approximately 1200rpm for no more than six seconds.

Notice : If the accelerator is depressed for more than six seconds, damage to the transaxle may occur.

A torque converter noise will increase under this load.

Important : This noise should not be confused with pump whine noise which is usually noticeable in P (Park), N (Neutral) and all other gear ranges. Pump whine will vary with pressure ranges.

The torque converter should be replaced under any of the following conditions:

- External leaks in the hub weld area.
- Converter hub is scored or damaged.
- Converter pilot is broken, damaged or fits poorly into crankshaft.
- Steel particles are found after flushing the cooler and cooler lines.
- Pump is damaged or steel particles are found in the converter.
- Vehicle has TCC shudder and/or no TCC apply. Replace only after all hydraulic and electrical diagnoses have been made.(Lock up clutch material may be glazed.)
- Converter has an imbalance which cannot be cor–rected. (Refer To Converter Vibration Test Procedure.)
- Converter is contaminated with engine coolant containing antifreeze.
- Internal failure of stator roller clutch.
- Excess end play.
- Heavy clutch debris due to overheating (blue converter).
- Steel particles or clutch lining material found in fluid filter or on magnet when no internal parts in unit are worn or damaged(indicates that lining material came from converter).

The torque converter should not be replace if :

- The oil has an odor, is discolored, and there is no evidence of metal or clutch facing particles.
- The threads in one or more of the converter bolt holes are damaged.

  –correct with thread insert.
- Transaxle failure did not display evidence of damage or worn internal parts, steel particles or clutch plate lining material in unit and inside the fluid filter.
- Vehicle has been exposed to high mileage(only). The exception may be where the Lock up clutch damper plate lining has seen excess wear by vehicles operated in heavy and/or constant traffic, such as taxi, delivery or police use.

Lock–Up Clutch Shudder Diagnosis

The key to diagnosing lock–up clutch(TCC) shudder is to note when it happens and under what conditions.

TCC shudder should only occur during the APPLY and/or RELEASE of the Lock up clutch.

While TCC Is Applying Or Releasing

If the shudder occurs while TCC is applying, the problem can be within the transaxle or torque converter.

Something is not allowing the clutch to become fully engaged, not allowing clutch to release, or is trying to release and apply the clutch at the same time. This could be caused by leaking turbine shaft seals, a restricted release orifice, a distorted clutch or housing surface due to long converter bolts, or defective friction material on the TCC plate.

Shudder Occurs After TCC Has Applied :

In this case, most of the time there is nothing wrong with the transaxle! As mentioned above, once the TCC has been applied, it is very unlikely that will slip. Engine problems may go unnoticed under light throttle and load, but become noticeable after TCC apply when going up a hill or accelerating, due to the mechanical coupling between engine and transaxle.

Important : Once TCC is applied there is no torque converter assistance. Engine or driveline vibrations could be unnoticeable before TCC engagement.

Inspect the following components to avoid misdiagnosis of TCC shudder and possibly disassembling a transaxle and/or replacing a torque converter unnecessarily :

- Spark plugs – Inspect for cracks, high resistance or broken insulator.
- Plug wires – Lock in each end, if there is red dust (ozone) or black substance (carbon) present, then the wires are bad. Also look for a white discoloration of the wire indicating arcing during hard acceleration.
- Distributor cap and rotor – look for broken or un–crimped parts.
- Coil – look for black on bottom indication arcing while engine is misfiring.
- Fuel injector – filter may be plugged.
- Vacuum leak – engine won't get correct amount of fuel. May run rich or lean depending on where the leak is.
- EGR valve – valve may let it too much unburnable exhaust gas and cause engine to run lean.
- MAP sensor – like vacuum leak, engine won't get correct amount of fuel for proper engine operation.
- Carbon on intake valves – restricts proper flow or air/fuel mixture into cylinders.
- Flat cam – valves don't open enough to let proper fuel/air mixture into cylinders.
- Oxygen sensor – may command engine too rich or too lean for too long.
- Fuel pressure – may be too low.
- Engine mounts – vibration of mounts can be multiplied by TCC engagement.
- Axle joints – checks for vibration.
- TPS – TCC apply and release depends on the TPS in many engines. If TPS is out of specification, TCC may remain applied during initial engine starting.
- Cylinder balance – bad piston rings or poorly sealing valves can cause low power in a cylinder.
- Fuel contamination – causes poor engine performance.

TCM INITIALIZATION PROCEDURE

When one or more operations such as shown below are performed, all learned contents which are stored in TCM memory should be erased after the operations.

- When A/T H/W is replaced in a vehicle,
- When a used TCU is installed in other vehicle,
- When a vehicle condition is unstable (engine RPM flare, TPS toggling and so on; at this kind of unstable conditions, mis–adaptation might be done).

1. Connect the Scan 100 with a DLC connector in a vehicle.
2. Turn ignition switch ON.
3. Turn the power on for the Scan 100.
4. Follow the "TCM LEARNED INITIALIZE" procedure on the Scan 100 menu.

Notice : Before pushing "Yes" Button for TCM initialization on the Scan 100 screen, make sure that the condition is as follows:

Condition :

1. Engine idle.
2. Select lever set "P" range.

SHIFT SPEED CHART

Up Shift Speed

MODEL	First–Second gear (±3.0 mph (4.8km/h))				Second–Third gear (±4.0 mph (6.4km/h))				Third–Fourth gear (±5.0 mph (8km/h))			
	10% TPS	25% TPS	50% TPS	100% TPS	10% TPS	25% TPS	50% TPS	100% TPS	10% TPS	25% TPS	50% TPS	100% TPS
1.8 DOHC mph (km/h)	9 (15)	11 (18)	18 (29)	32 (52)	18 (29)	23 (37)	34 (55)	62 (99)	25 (45)	34 (55)	47 (76)	98 (157)

Down Shift Speed

MODEL	Down Shift (±4.0 mph (6.4km/h))			Lock Up Clutch Applied (Fourth)		Lock Up Clutch Released (Fourth)	
	Fourth–Third (Coast)	Third–Second (Coast)	Second–First (Coast)	10%	25%	10%	25%
1.8 DOHC mph (km/h)	25 (41)	13 (21)	7 (11)	48 (77)	48 (77)	42 (68)	42 (68)

INTERNAL WIRING HARNESS CHECK

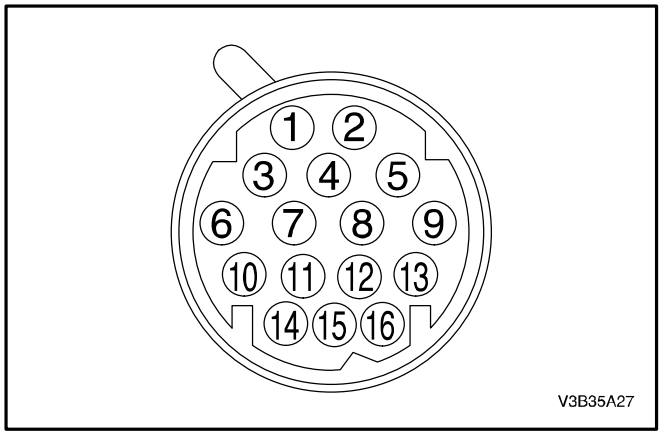
Step	Action	Value(s)	Yes	No
1	1. Disconnect the transaxle harness. 2. Measure the resistance between terminals 3 and 13 of the transaxle wiring connector. Is the resistance within the values shown?	Refer to *Component Resistance Chart*	Go to *Step 3*	Go to *Step 2*
2	1. Disconnect the internal transaxle harness from the first solenoid valve. 2. Measure the resistance of the first solenoid valve. Is the resistance within the values shown?	Refer to *Component Resistance Chart*	Go to *Step 20*	Go to *Step 22*
3	Measure the resistance between terminals 3 and 13 the second solenoid valve. Is the resistance within the values shown?	Refer to *Component Resistance Chart*	Go to *Step 5*	Go to *Step 4*
4	1. Disconnect the internal transaxle harness from the second solenoid valve. 2. Measure the resistance of the second solenoid valve. Is the resistance within the values shown?	Refer to *Component Resistance Chart*	Go to *Step 20*	Go to *Step 22*
5	Measure the resistance between terminals 5 and 6 the transaxle wiring connector(EDS 3). Is the resistance within the values shown?	Refer to *Component Resistance Chart*	Go to *Step 7*	Go to *Step 6*
6	1. Disconnect the internal transaxle harness from the pressure control valve 3(EDS 3). 2. Measure the resistance of the EDS 3. Is the resistance within the values shown?	Refer to *Component Resistance Chart*	Go to *Step 20*	Go to *Step 22*
7	Measure the resistance between terminals 5 and 7 the transaxle wiring connector(EDS 4). Is the resistance within the values shown?	Refer to *Component Resistance Chart*	Go to *Step 9*	Go to *Step 8*

Step	Action	Value(s)	Yes	No
8	1. Disconnect the internal transaxle harness from the pressure control valve 4(EDS 4). 2. Measure the resistance of the EDS 4. Is the resistance within the values shown?	Refer to *Component Resistance Chart*	Go to *Step 20*	Go to *Step 22*
9	Measure the resistance between terminals 5 and 10 the transaxle wiring connector(EDS 5). Is the resistance within the values shown?	Refer to *Component Resistance Chart*	Go to *Step 11*	Go to *Step 10*
10	1. Disconnect the internal transaxle harness from the pressure control valve 5(EDS 5). 2. Measure the resistance of the EDS 5. Is the resistance within the values shown?	Refer to *Component Resistance Chart*	Go to *Step 20*	Go to *Step 22*
11	Measure the resistance between terminals 5 and 11 the transaxle wiring connector(EDS 6). Is the resistance within the values shown?	Refer to *Component Resistance Chart*	Go to *Step 13*	Go to *Step 12*
12	1. Disconnect the internal transaxle harness from the pressure control valve 6(EDS 6). 2. Measure the resistance of the EDS 6. Is the resistance within the values shown?	Refer to *Component Resistance Chart*	Go to *Step 20*	Go to *Step 22*
13	Measure the resistance between terminals 4 and 9 the transaxle wiring connector(transaxle temperature sensor). Is the resistance within the values shown?	Refer to *Component Resistance Chart*	Go to *Step 15*	Go to *Step 14*
14	1. Disconnect the internal transaxle harness from the transaxle temperature sensor. 2. Measure the resistance of the transaxle temperature sensor. Is the resistance within the values shown?	Refer to *Component Resistance Chart*	Go to *Step 20*	Go to *Step 22*
15	Measure the resistance between terminals 15 and 16 the transaxle wiring connector(transaxle input speed sensor). Is the resistance within the values shown?	Refer to *Component Resistance Chart*	Go to *Step 17*	Go to *Step 16*
16	1. Disconnect the internal transaxle harness from the transaxle input speed sensor. 2. Measure the resistance of the input speed sensor. Is the resistance within the values shown?	Refer to *Component Resistance Chart*	Go to *Step 20*	Go to *Step 22*
17	Measure the resistance between terminals 1 and 2 the transaxle wiring connector(transaxle output speed sensor). Is the resistance within the values shown?	Refer to *Component Resistance Chart*	Go to *Step 19*	Go to *Step 18*
18	1. Disconnect the internal transaxle harness from the transaxle output speed sensor. 2. Measure the resistance of the transaxle output speed sensor. Is the resistance within the values shown?	Refer to *Component Resistance Chart*	Go to *Step 20*	Go to *Step 22*
19	Measure the resistance between terminals of internal wiring harness. Is the resistance within the values shown?	Refer to *Component Resistance Chart*	No problem found, exit table	Go to *Step 21*

Step	Action	Value(s)	Yes	No
20	Inspect for resistance: • Ispect the transaxle wiring for poor electrical connections at the transaxle. • Look for possible bent, backed out, deformed of damaged terminals. Check for weak terminal tension.	–	Verify repair and Go to *Step 12*	No problem found, exit table
21	Replace the internal wiring harness. Is the replacement complete.	–	No problem found, exit table	–
22	Replace the component. Is the replacement complete.	–	No problem found, exit table	–

TRANSAXLE WIRING HARNESS CONNECTOR

Wiring Harness Connector



Pin number	Description
1	Output Speed Sensor (+)
2	Output Speed Sensor (–)
3	Solenoid Valve (+)
4	Transmission Fluid Temperature Sensor (–)
5	Pressure Control Solenoid Valve (+)
6	Pressure Control Solenoid Valve (EDS3)
7	Pressure Control Solenoid Valve (EDS4)
8	Not Used
9	Transmission Fluid Temperature Sensor (+)
10	Pressure Control Valve Solenoid Valve (EDS5)
11	Pressure Control Valve Solenoid Valve (EDS6)
12	Solenoid Valve 1
13	Solenoid Valve 2
14	Not Used
15	Input Speed Sensor (–)
16	Input Speed Sensor (+)

Component Resistance Chart

Component	Pass Through Pins	Resistance 20˚C (68˚F) Ohms	Resistance ≥140˚C (212˚F) Ohms
Solenoid 1	3, 12	26.5± 0.5Ω	26–345 Ω (not relative to temperature)
Solenoid 2	3, 13	26.5± 0.5Ω	26–345 Ω (not relative to temperature)
Pressure Control Solenoid Valve (EDS3)	5, 6	5.7± 0.45Ω	5.3–6.3 Ω (not relative to temperature)
Pressure Control Solenoid Valve (EDS4)	5, 7	5.7± 0.45Ω	5.3–6.3 Ω (not relative to temperature)
Pressure Control Solenoid Valve (EDS5)	5, 10	5.7± 0.45Ω	5.3–6.3 Ω (not relative to temperature)

Component	Pass Through Pins	Resistance 20˚C (68˚F) Ohms	Resistance ≥140˚C (212˚F) Ohms
Pressure Control Solenoid Valve (EDS6)	5, 11	5.7± 0.45Ω	5.3–6.3 Ω (not relative to temperature)
Transaxle Temperature Sensor*	4, 9	980–1,000 Ω	
Input Speed Sensor	15, 16	830 ± 5 Ω	788–871 Ω (not relative to temperature)
Output Speed Sensor*	1, 2	∞	∞

* The resistance of the transaxle is necessarily dependent on the temperature.

SYMPTOM DIAGNOSIS

Oil Leakage

Notice :

– Careful localization of leakage points may make it possible to prevent incorrect or cost–intensive repairs.

Test Steps :

– Thoroughly clean the transaxle, engine, and surrounding area(using a steam jet, for example).
– To locate leakage, use a suitable identifying spray or similar product.
– Depending on the amount of leakage, take the car for a short or a longer test drive – It may prove sufficient to place the car on a hoist and run the engine at idle speed to trace the leak.
– If possible, determine exactly which type of oil is escaping.

Symptom	Possible Cause	Action
Transaxle Oil Leakage	Oil Pump(Torque Converter Sealing)	• Visually check torque converter sealing. • Replace the converter sealing as described in the transaxle repair on the vehicle service.
	Crankshaft Sealing Ring	• Check whether engine oil or TFT is leaking out. • If leak is engine oil, replace the sealing ring as described in the engine repair instruction.
	Torque Converter	• Visual check. • Fit an exchange converter as described in the repair instruction.
	Oil Content Too High	• Check oil level(TFT and axle oil) as described in this chapter. • Correct oil level, and recheck after a test drive. **Notice :** Comply with the measuring procedure (filling procedure) in the repair instruction. Check the oil level at the overflow plug adjust to proper level if necessary.
	O–ring at Bolt Head Damaged or Missing	• Check O–ring. • Replace O–ring as described in the repair instruction.
	Shaft Seal	• Visually check the shaft seal. • Replace the sealing ring as described in the repair instruction.
	Hose Clamp Loose	• Check to ensure that the hose clamp fits tightly. • If necessary, retighten clamp.
	Oil Pan Gasket Not Installed Properly	• Check to see if the gasket was positioned properly. • Install gasket properly as described in the repair instruction.
	Oil Pan Gasket Damaged	• Check the gasket visually. • Replace gasket as described in the repair instruction.
	Bolt at Bracket Loose	Check the Tightening Torque Retighten bolt
	Sealing Ring at Oil Dipstick	• Check O–ring. • If necessary, replace O–ring.
	Sealing Ring Near End–Cover Connection Defective	• Check sealing rings. • Put in new sealing ring Check O–ring as described in the repair instruction.

Symptom	Possible Cause	Action
	Sealing Ring Selector Shaft	• Check sealing ring. • Replace sealing ring as described in the repair instruction.
	O–ring at Socket Outlet	• Check O–ring. • Replace O–ring as described in the repair instruction.
	O–ring and Speed Sensor Connection	• Check O–ring. • Replace O–ring as described in the repair instruction.
	Oil Leak Incorrectly Identified	• No oil leak is possible at this point.
	Speed Sensor Itself Is Leaking	• Check speed sensor. • Replace speed sensor as described in the repair instruction.
	Hair Line Crack at the Piping in the Connection Area, Sealing Ring Fit in Transaxle Housing	• Pressurize the line with compressed air and check it. • Replace lines as described in the repair instruction.
	O–ring Defective, Incorrect	Check O–ring. Replace O–rings as described in the repair instruction.
	Plug Loose	Check the Tightening Torque for the screw plug. Tighten to torque specified in the repair instruction.

Noise

Symptom	Possible Cause	Action
Noise	TFT Level Too Low	• When the TFT level is too low, the gear wheels from the transaxle oil pump might generate noise. • Check the TFT level as described in the repair instruction and fill to the proper level.
	Monolith in Catalytic Converter Has Broken	• Check according to the exhaust gas diagnostic procedure or by shaking the catalytic converter casing. • Replace catalytic converter if necessary.
	Noise from Auxiliaries (e.g. exhaust system, alternator, drive shafts.)	• Check these components; if necessary, eliminate the faults as described in the repair instruction
	Noise from Tires or Wheel Bearings	• Eliminate fault if necessary
	Noise from Planetary Gears	• Whistling noise on traction and overrun(in first gear only)caused by high rotating speeds(functionally unavoidable)
	Cumulative Tooth Backlash in the Complete Drive Line	• Production status. Customer must be convinced.
	Jerky Noise of the Parking Lock (e.g. when the car is standing on a gradient)	• Load–reversal reaction • Apply the handbrake before selection the parking Lock (position P)

Symptom	Possible Cause	Action
Noise	The Engine's Torsional Vibrations are Being Transmitted to the Drive Shafts	• At low speeds in fourth gear, vibration can arise (driving at too low an engine speed) • Noise is functionally unavoidable; due to tolerances. Convince the customer.
Noise	Torque Reaction Strut Loose	• Check mounting and repair if necessary.

Shift quality

Notice :

– The assessment of shaft quality is, to a large extent, an individual, subjective matter. Take careful note of how the customer describes the complaint and of the manner in which he or she handles the vehicle and the controls.
– A sudden deterioration of shift quality may also be caused by the transaxle selecting an emergency or substitute program

Test Steps :

– Carry out the general checks described in the automatic transaxle diagnostic information.
– Perform a test drive to answer the following questions.

In which driving situations does the shift quality complaint arise?
To which shifts does the complaint apply?
Is the complaint reproducible within a short period, or has it only occurred sporadically or on a single occasion?

– Check the oil level and oil quality
– Interrogate the fault memory and read out measurement block data.

Symptom	Possible Cause	Action
Shift Quality	Rapid Pressure Build–up in the Clutch	• Operating error (position selected several times in quick succession).
	Jerk When Parking Lock Is Released	• Refer to "Noise" in this section.
	Incorrect Electronic Transaxle Control module	• Check the data status for transaxle control module ; refer to "TCM" in this section.
	Emergency/Substitute Program Has Been Activated	• For checking and remedial action, refer to "Emergency/Substitute program" in this section.
	Accelerator Pedal in Indefinite Position Between Full Throttle and Kick Down	• Persuade customer to choose clearly between kick down and full throttle • Check setting according go engine repair instruction ; adjust if necessary.
	Control Overlap Between to Clutches During Shift	• Production status • Convince the customer
	Temperature Sensor (Not Fault Memory)	• Check function according to "Emergency/Substitute program" in this section.
	Kick Down Setting Incorrect	• Check A) Floor mat is obstructing accelerator pedal B) The kick down setting as described in the Engine Section.

Malfunction

Notice :

The faults dealt with here concern transaxle functions such as "traction" (forwards and reverse) and all type of shifts. Entries will not always be made in the fault memory.

Test Steps :

Perform the general checks according to the automatic transaxle diagnostic procedure.

– Test drive
– Check oil level and quality
– Interrogate fault memory

Symptom	Possible Cause	Action
Malfunction	Defective Clutch in Transaxle It There Is Still No Drive With the TCM Disconnected	• This is usually due to too little oil being added or to internal leakage. • Repair is not possible ; if necessary, exchange transaxle.
	Kick Down Switch Not Functioning Properly	• For checking and remedial action, refer to ”Emergency/Substitute Program” in this section.
	Kick Down Switch Not Operating Properly	• For checking and remedial action, refer to Engine Instruction.
	Vehicle Is in Emergency Mode	• For checking and remedial action, refer to ”Emergency/Substitute Program” in this section.

DIAGNOSTIC TROUBLE CODE DIAGNOSIS

DIAGNOSTIC TROUBLE CODE (DTC) IDENTIFICATION

DTC	Description	Indication	Default Action
P0562	System Voltage Low	MIL ON	• The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer. • Adopt Emergency/Substitute mode and constant 4th gear by hydraulic control. • After ignition OFF/ON: 3rd gear by hydraulic control. Possible P, R and N also possible. • Power supply cut off to the EDS valve.
P0563	System Voltage High	MIL ON	• The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer. • Adopt Emergency/Substitute mode and constant 4th gear by hydraulic control. • After ignition OFF/ON: 3rd gear by hydraulic control. Possible P, R and N also possible. • Power supply cut off to the EDS valve.
P0601	Internal Control Module Memory Checksum Error	MIL ON	• The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer. • Adopt Emergency/Substitute mode and constant 4th gear by hydraulic control. • After ignition OFF/ON : 3rd gear by hydraulic control. Possible P, R and N also possible. • Power supply cut off to the EDS valve.
P0603	• Internal Control Module Keep Alive Memory(KAM)Error	MIL ON	• The TCM will record operating conditions at he time the diagnostic fails. This information will be stored in the Failure Records buffer. • Adopt Emergency/Substitute mode and constant 4th gear by hydraulic control. • After ignition OFF/ON: 3rd gear by hydraulic control. Possible P, R and N also possible. • Power supply cut off to the EDS valve.
P0604	Internal Control Module Random Access Memory (RAM) Error	MIL ON	• The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer. • Adopt Emergency/ Substitute mode and constant 4th gear by hydraulic control. • After ignition OFF/ON : 3rd gear by hydraulic control. Possible P, R and N also possible. • Power supply cut off to the EDS valve.
P0606	• Transaxle Control Module Processor Fault	MIL ON	• The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer. • Adopt Emergency/Substitute mode and constant 4th gear by hydraulic control. • After ignition OFF/ON: 3rd gear by hydraulic control. Possible P, R and N also possible. • Power supply cut off to the EDS valve.

DTC	Description	Indication	Default Action
P0703	Brake Switch Circuit Malfunction	No Change	• TCM assume that the brake light always active. • Open lock up clutch.
P0705	Transmission Range Sensor Circuit Malfunction (PRNDL Input)	MIL ON	• The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer. • Adopt Emergency/ Substitute mode and constant 4th gear by hydraulic control. • After ignition OFF/ON : 3rd gear by hydraulic control, position P, R and N also possible.
P0710	• Transmission Fluid Temperature Sensor Circuit Malfunction	No Change	• TCM assume the transaxle fluid temperature is 140˚F (60˚C). • No influence at vehicle running.
P0715	• Input Speed Sensor Circuit Malfunction	MIL ON	• The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer. • Adopt Emergency/Substitute mode and constant 4th gear by hydraulic control. • After ignition OFF/ON : 3rd gear by hydraulic control, position P, R and N also possible. • Open lock up clutch.
P0716	• Input Speed Sensor Circuit Range/Performance	MIL ON	• The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer. • Adopt Emergency/ Substitute mode and constant 4th gear by hydraulic control. • After ignition OFF/ON : 3rd gear by hydraulic control, position P, R and N also possible. • Open lock up clutch.
P0717	• Input Speed Sensor Circuit Range/Performance	MIL ON	• The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer. • Adopt Emergency/ Substitute mode and constant 4th gear by hydraulic control. • After ignition OFF/ON : 3rd gear by hydraulic control, position P, R and N also possible. • Open lock up clutch.
P0720	Output Speed Sensor Circuit Malfunction	MIL ON	• The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer. • Adopt Emergency/ Substitute mode and constant 4th gear. • Open lock up clutch.
P0721	Output Speed Sensor Circuit Range/Performance	MIL ON	• The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer. • Adopt Emergency/ Substitute mode and constant 4th gear. • Open lock up clutch.

DTC	Description	Indication	Default Action
P0722	• Output Speed Sensor Circuit No Signal	MIL ON	• The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer. • Vehicle running remains actual gear. • Open lock up clutch.
P0725	• Engine Speed Input Circuit Malfunction	No Change	• Adopt Emergency/Substitute mode and constant 4th gear. • Open lock up clutch.
P0726	• Engine Speed Input Circuit Range/Performance	MIL ON	• The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer. • Adopt Emergency/ Substitute mode and constant 4th gear. • Open lock up clutch.
P0727	• Engine Speed Input Circuit No Signal	MIL ON	• The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer. • Adopt Emergency/ Substitute mode and constant 4th gear. • Open lock up clutch.
P0731	• Gear 1 Incorrect Ratio	MIL ON	• The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer. • Adopt Emergency/ Substitute mode and constant 4th gear. • High line pressure
P0732	• Gear 2 Incorrect Ratio	MIL ON	• The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer. • Adopt Emergency/ Substitute mode and constant 3rd gear. • High line pressure.
P0733	• Gear 3 Incorrect Ratio	MIL ON	• The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer. • Adopt Emergency/ Substitute mode and constant 4th gear. • High line pressure
P0734	• Gear 4 Incorrect Ratio	MIL ON	• The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer. • Adopt Emergency/ Substitute mode and constant 4th gear by hydraulic control. • After ignition OFF/ON : 3rd gear by hydraulic control. Possible P, R and N also possible. • High line pressure.

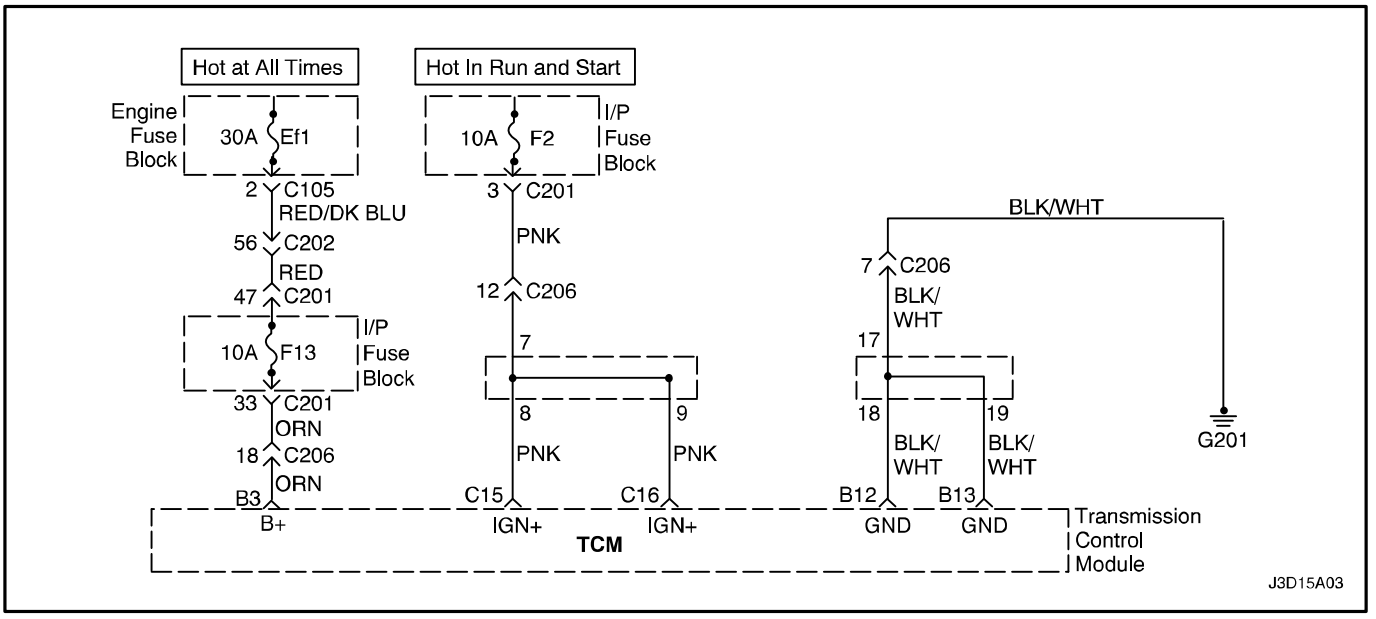
DTC	Description	Indication	Default Action
P0781	• 1–2 Shift Malfunction	MIL ON	• The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer. • Adopt Emergency/ Substitute mode and constant 1st gear. • Open lock up clutch.
P0782	• 2–3 Shift Malfunction	MIL ON	• The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer. • Adopt Emergency/ Substitute mode and constant 2nd gear. • Open lock up clutch.
P0783	• 3–4 Shift Malfunction	MIL ON	• The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer. • Adopt Emergency/ Substitute mode and constant 3rd gear. • Open lock up clutch.
P1604	• Data Check of Internal & Extended Ram Failed	MIL ON	• The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer. • Adopt Emergency/ Substitute mode and constant 4th gear by hydraulic control. • After ignition OFF/ON : 3rd gear by hydraulic control. Possible P, R and N also possible. • Power supply cut off to the EDS valve.
P1606	• Failure of External Watchdog	MIL ON	• The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer. • Adopt Emergency/Substitute mode and constant 4th gear by hydraulic control. • After ignition OFF/ON: 3rd gear by hydraulic control. Possible P, R and N also possible. • Power supply cut OFF to the EDS valve.
P1671	CAN Transmit Message Failure	MIL ON	• The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer. • Adopt Emergency/ Substitute mode and constant 4th gear by hydraulic control. • After ignition OFF/ON : 3rd gear by hydraulic control. Possible P, R and N also possible.
P1672	CAN Bus OFF Failure	MIL ON	• The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer. • Adopt Emergency/ Substitute mode and constant 4th gear by hydraulic control. • After ignition OFF/ON : 3rd gear by hydraulic control. Possible P, R and N also possible.

DTC	Description	Indication	Default Action
P1673	CAN Receive ECM Message Failure	MIL ON	• The TCM will record operating conditions at he time the diagnostic fails. This information will be stored in the Failure Records buffer. • Adopt Emergency/ Substitute mode and constant 4th gear by hydraulic control. • After ignition OFF/ON : 3rd gear by hydraulic control. Possible P, R and N also possible.
P1839	EDS3 Output Shorted To Ground	MIL ON	• The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer. • Adopt Emergency/Substitute mode and constant 4th gear by hydraulic control. • After ignition OFF/ON: 3rd gear by hydraulic control. Possible P, R and N also possible. • Power supply cut OFF to the EDS valve.
P1840	• EDS3 Output Shorted To Power	MIL ON	• The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer. • Adopt Emergency/Substitute mode and constant 4th gear by hydraulic control. • After ignition OFF/ON: 3rd gear by hydraulic control. Possible P, R and N also possible. • Power supply cut OFF to the EDS valve.
P1841	EDS3 Output Open	MIL ON	• The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer. • Adopt Emergency/Substitute mode and constant 4th gear by hydraulic control. • After ignition OFF/ON: 3rd gear by hydraulic control. Possible P, R and N also possible. • Power supply cut OFF to the EDS valve.
P1850	Solenoid 1 Output Shorted To Ground	MIL ON	• The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer. • Adopt Emergency/ Substitute mode and constant 4th gear by hydraulic control. • After ignition OFF/ON : 3rd gear by hydraulic control. Possible P, R and N also possible.
P1851	Solenoid 1 Output Shorted To Power	MIL ON	• The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer.
P1852	Solenoid 1 Output Open	MIL ON	• The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer. • Adopt Emergency/ Substitute mode and constant 4th gear by hydraulic control. • After ignition OFF/ON : 3rd gear by hydraulic control. Possible P, R and N also possible.

DTC	Description	Indication	Default Action
P1853	Solenoid 2 Output Shorted To Ground	MIL ON	• The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer. • Adopt Emergency/ Substitute mode and constant 4th gear by hydraulic control. • After ignition OFF/ON : 3rd gear by hydraulic control. Possible P, R and N also possible.
P1854	Solenoid 2 Output Shorted To Power	MIL ON	• The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer. • Adopt Emergency/ Substitute mode and constant 4th gear by hydraulic control. • After ignition OFF/ON : 3rd gear by hydraulic control. Possible P, R and N also possible.
P1855	Solenoid 2 Output Open	MIL ON	• The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer. • Adopt Emergency/ Substitute mode and constant 4th gear by hydraulic control. • After ignition OFF/ON : 3rd gear by hydraulic control. Possible P, R and N also possible.
P1861	• EDS4 Output Shorted To Ground	MIL ON	• The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer. • Adopt Emergency/Substitute mode and constant 4th gear by hydraulic control. • After ignition OFF/ON: 3rd gear by hydraulic control. Possible P, R and N also possible. • Power supply cut OFF to the EDS valve.
P1862	• EDS4 Output Shorted To Power	MIL ON	• The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer. • Adopt Emergency/Substitute mode and constant 4th gear by hydraulic control. • After ignition OFF/ON: 3rd gear by hydraulic control. Possible P, R and N also possible. • Power supply cut OFF to the EDS valve.
P1863	EDS4 Output Open	MIL ON	• The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer. • Adopt Emergency/Substitute mode and constant 4th gear by hydraulic control. • After ignition OFF/ON: 3rd gear by hydraulic control. Possible P, R and N also possible. • Power supply cut OFF to the EDS valve.
P1864	EDS5 Output Shorted To Ground	MIL ON	• The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer. • Adopt Emergency/Substitute mode and constant 4th gear by hydraulic control. • After ignition OFF/ON: 3rd gear by hydraulic control. Possible P, R and N also possible. • Power supply cut OFF to the EDS valve.

DTC	Description	Indication	Default Action
P1865	EDS5 Output Shorted To Power	MIL ON	• The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer. • Adopt Emergency/Substitute mode and constant 4th gear by hydraulic control. • After ignition OFF/ON: 3rd gear by hydraulic control. Possible P, R and N also possible. • Power supply cut OFF to the EDS valve.
P1866	EDS5 Output Open	MIL ON	• The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer. • Adopt Emergency/Substitute mode and constant 4th gear by hydraulic control. • After ignition OFF/ON: 3rd gear by hydraulic control. Possible P, R and N also possible. • Power supply cut OFF to the EDS valve.
P1867	EDS6 Output Shorted To Ground	MIL ON	• The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer. • Adopt Emergency/Substitute mode and constant 4th gear by hydraulic control. • After ignition OFF/ON: 3rd gear by hydraulic control. Possible P, R and N also possible. • Power supply cut OFF to the EDS valve.
P1868	• EDS6 Output Shorted To Power	MIL ON	• The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer. • Adopt Emergency/Substitute mode and constant 4th gear by hydraulic control. • After ignition OFF/ON: 3rd gear by hydraulic control. Possible P, R and N also possible. • Power supply cut OFF to the EDS valve.
P1869	EDS6 Output Open	MIL ON	• The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer. • Adopt Emergency/Substitute mode and constant 4th gear by hydraulic control. • After ignition OFF/ON: 3rd gear by hydraulic control. Possible P, R and N also possible. • Power supply cut OFF to the EDS valve.
P1871	• EDS Valve Power Supply Circuit Shorted To Power	MIL ON	• The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer. • Adopt Emergency/Substitute mode and constant 4th gear by hydraulic control. • After ignition OFF/ON: 3rd gear by hydraulic control. Possible P, R and N also possible. • Power supply cut OFF to the EDS valve.

DTC	Description	Indication	Default Action
P1874	• Solenoid Valve Power Supply Circuit Shorted To Power	MIL ON	• The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer. • Adopt Emergency/ Substitute mode and constant 4th gear by hydraulic control. • After ignition OFF/ON : 3rd gear by hydraulic control. Possible P, R and N also possible.
P1881	2–1 Shift Malfunction	MIL ON	• The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer. • Adopt Emergency/ Substitute mode and constant 3rd gear. • Open lock up clutch.
P1883	• 3–2 Shift Malfunction	MIL ON	• The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer. • Adopt Emergency/ Substitute mode and constant 3rd gear. • Open lock up clutch.
P1884	4–3 Shift Malfunction	MIL ON	• The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer. • Adopt Emergency/ Substitute mode and constant 4th gear. • Open lock up clutch.
P1885	• 3–1 Shift Malfunction	MIL ON	• The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer. • Adopt Emergency/ Substitute mode and constant 3rd gear. • Open lock up clutch.
P1886	• 4–2 Shift Malfunction	MIL ON	• The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer. • Adopt Emergency/ Substitute mode and constant 4th gear. • Open lock up clutch.



DIAGNOSTIC TROUBLE CODE(DTC) P0562

SYSTEM VOLTAGE LOW

Circuit Description

The transaxle control module(TCM) is an electronic device which monitors inputs to control various transaxle functions including shift quality and transaxle sensors, switches, and components to process for use within its' control program. Based on this input information, the TCM controls various transaxle output functions and devices.

Conditions For Setting The DTC

- System voltage is less than 8.5 volts.
- Transaxle input voltage is too low.
- Engine speed is greater than 500 rpm.
- Immediately after the above condition occurs.

Action Taken When The DTC Sets

- The Malfunction Indicator Lamp(MIL) will illuminate.
- The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer.
- Adopt Emergency/ Substitute mode and constant 4th gear by hydraulic control.
- After ignition OFF/ON : 3rd gear by hydraulic control. Possible P, R and N also possible.
- Power supply cut off to the EDS valve.

Conditions For Clearing The DTC

- The MIL will turn OFF when the malfunction has not occurred after three–ignition cycle.
- A history DTC will clear after 40 consecutive warm up cycles without a fault.
- Using a scan tool can clear history DTCs.

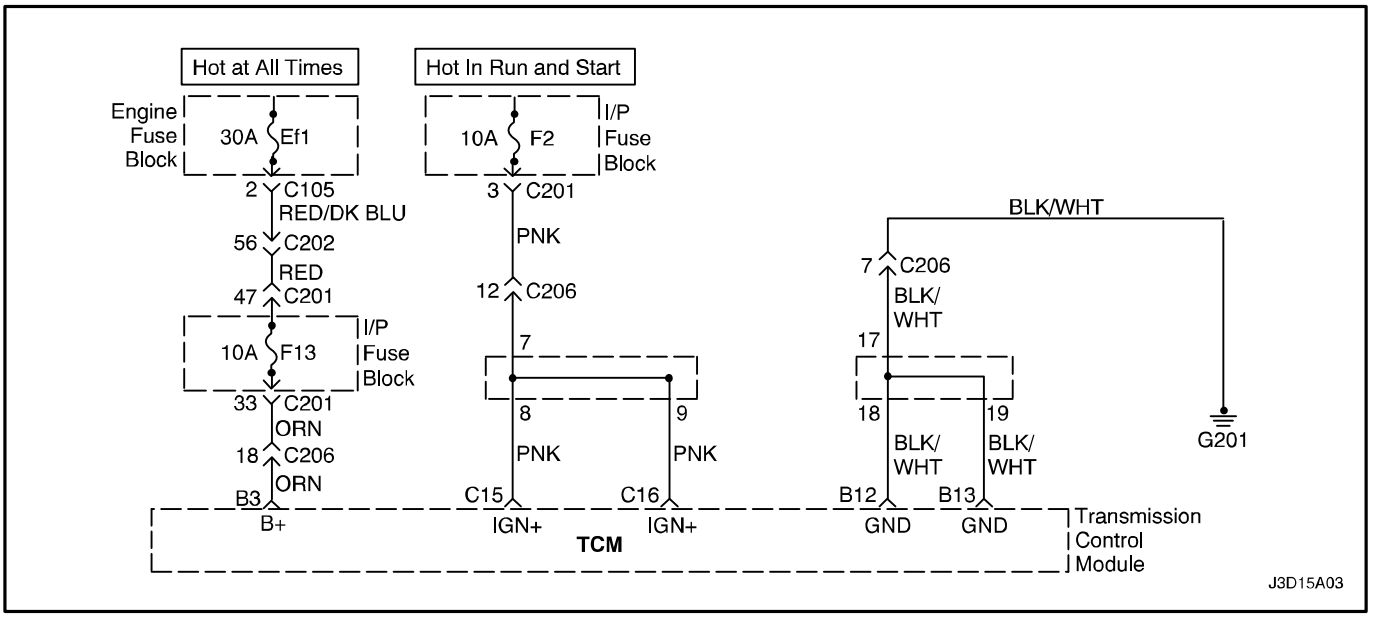
Diagnostic Aids

- Inspect the poor wiring harness connection for TCM connectors and transaxle wiring connectors.
- Inspect the improperly formed or damaged terminals.

DTC P0562 – System Voltage Low

Step	Action	Value(s)	Yes	No
1	Perform an On–Board Diagnostic (EOBD) System Check. Is the check completed?	–	Go to *Step 2*	Go to *"On–Board Diagnostic System Check"*
2	1. Install the scan tool. 2. Turn the ignition ON and record then clear DTC(s), then turn ignition OFF. 3. Turn the ignition ON and start the engine. 4. Run the engine to 1,200 rpm. 5. Select system voltage on the scan tool. 6. Drive the vehicle and observe the scan tool for system voltage. Is the voltage within the values shown?	9–16V	Go to *Step 4*	Go to *Step 3*
3	1. Disconnect the negative battery cable. 2. Measure the voltage of the battery at the battery. Is the voltage within the values shown?	9–16V	Go to *Step 4*	Go to *"Section 1E, Engine Electrical"*
4	1. Turn the headlamp ON. 2. Turn the air conditioner ON. 3. Run the engine to 1,200rpm. 4. Observe the scan tool for system voltage. Is the voltage within the values shown?	9–16V	Go to *Step 6*	Go to *Step 5*
5	1. Turn the ignition OFF. 2. After testing the charging system, repair the alternator circuit if necessary. Is the action completed?	–	System OK	–
6	The vehicle would not have started if F2 or EF1 were blown. Was a problem found?	–	Go to *Step 7*	Go to *Step 8*
7	Replace the fuse. Is the replacement complete?	–	System OK	–
8	1. Turn the ignition ON. 2. Measure the voltage of F2, EF1. Is the voltage within the values shown?	9–16V	Go to *Step 10*	Go to *Step 9*
9	Repair the fuse voltage supply lines for an open. Is the action completed?	–	System OK	–
10	1. Turn the ignition OFF. 2. Disconnect the TCM wiring connector. 3. Measure the resistance between EF1 fuse and terminal B3 of the TCM wiring connector. Is the resistance within the values shown?	≈0Ω	Go to *Step 12*	Go to *Step 11*
11	Repair the circuit(between EF1 and terminal B3) for short to ground and open. Is the repair completed?	–	System OK	–

Step	Action	Value(s)	Yes	No
12	1. Disconnect the C105 connector and TCM connector. 2. Turn the ignition ON. 3. Measure the voltage of the terminal B3(TCM wiring connector). Is the voltage within the values shown?	9–16V	Go to *Step 13*	Go to *Step 14*
13	Repair the circuit from EF1 to terminal B3 of the TCM for a short to power. Is the repair complete?	–	System OK	–
14	1. Turn the ignition OFF. 2. Disconnect the C206 connector. 3. Measure the resistance between F2 fuse and terminal C15 or C16 of the TCM wiring connector. Is the resistance within the values shown?	≈0Ω	Go to *Step 16*	Go to *Step 15*
15	Repair the circuit(between F2 and terminal C15 or C16) for a short to ground and open. Is the repair completed?	–	System OK	–
16	1. Turn the ignition ON. 2. Measure the voltage of the terminal C15 or C16(TCM wiring connector). Is the voltage within the values shown?	9–16V	Go to *Step 17*	Go to *Step 18*
17	Repair the circuit(between F2 and terminal C15 or C16) for short to power. Is the repair complete?	–	System OK	–
18	1. Inspect the transaxle wiring for poor electrical connections at the transaxle connector. 2. Look for possible bent, backed out, deformed, or damaged terminals. 3. Check for weak terminal tension. Was a condition found?	–	Verify repair and Go to *Step 1*	Go to *Step 19*
19	Replace the TCM. Is the replacement complete?	–	Go to *Step 20*	–
20	1. After the repair, use a scan tool ”clear info” function and road test the vehicle. 2. Review the ”DTC info”. Has the last test failed or is the current DTC displayed?	–	Begin diagnosis again	Repair verified exit DTC chart



DIAGNOSTIC TROUBLE CODE(DTC) P0563

SYSTEM VOLTAGE HIGH

Circuit Description

The transaxle control module(TCM) is an electronic device which monitors inputs to control various transaxle functions including shift quality and transaxle sensors, switches, and components to process for use within its' control program. Based on this input information, the TCM controls various transaxle output functions and devices.

Conditions For Setting The DTC

- System voltage is greater than 16 volts.
- Transaxle input voltage is too high.
- Immediately after the above condition occurs.

Action Taken When The DTC Sets

- The Malfunction Indicator Lamp(MIL) will illuminate.
- The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer.
- Adopt Emergency/ Substitute mode and constant 4th gear by hydraulic control.
- After ignition OFF/ON : 3rd gear by hydraulic control. Possible P, R and N also possible.
- Power supply cut off to the EDS valve.

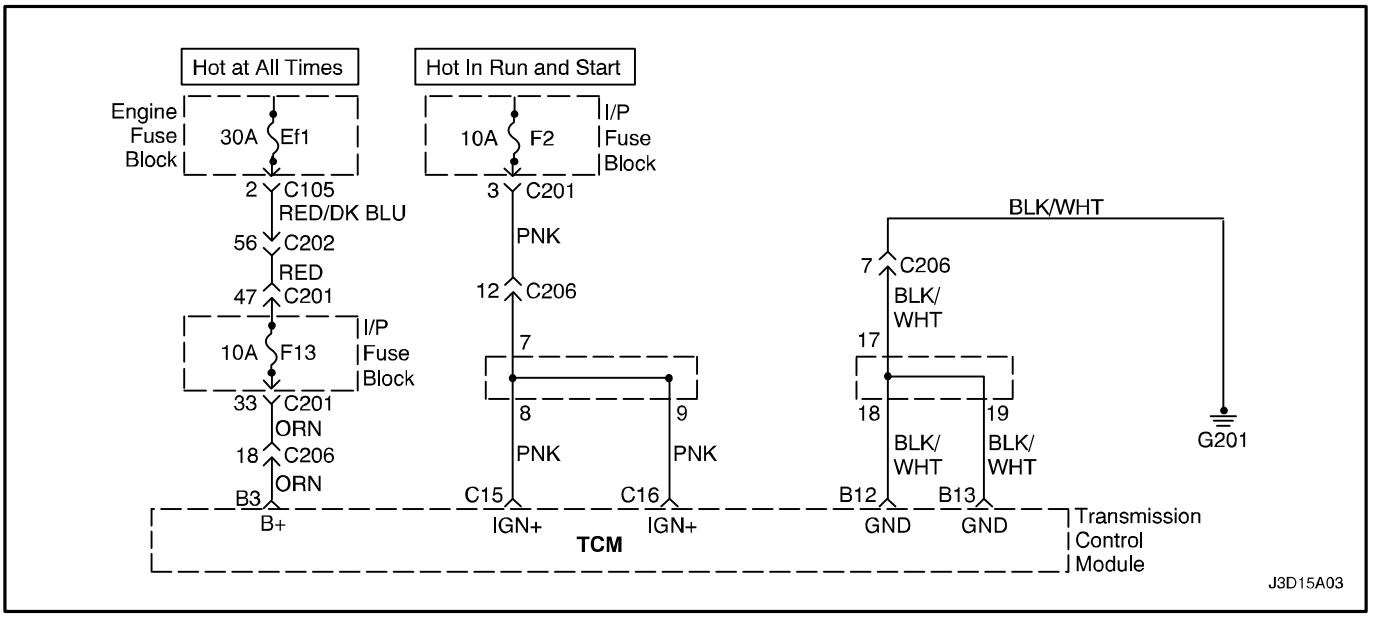
Conditions For Clearing The MIL/DTC

- The MIL will turn OFF when the malfunction has not occurred after three–ignition cycle.
- A history DTC will clear after 40 consecutive warm up cycles without a fault.
- Using a scan tool can clear history DTCs.

DTC P0563 – System Voltage High

Step	Action	Value(s)	Yes	No
1	Perform an On–Board Diagnostic (EOBD) System Check. Is the check completed?	–	Go to *Step 2*	Go to *"On–Board Diagnostic System Check"*
2	1. Install the scan tool. 2. Turn the ignition ON and record then clear DTC(s), then turn ignition OFF. 3. Turn the ignition ON and start the engine. 4. Run the engine to 1,200 rpm. 5. Select system voltage on the scan tool. 6. Drive the vehicle and observe the scan tool for system voltage. Is the voltage within the values shown?	9–16V	Go to *Step 4*	Go to *Step 3*
3	1. Disconnect the negative battery cable. 2. Measure the voltage of the battery. Is the voltage within the values shown?	9–16V	Go to *Step 4*	Go to *"Section 1E, Engine Electrical"*
4	1. Turn the headlamp ON. 2. Turn the air conditioner ON. 3. Run the engine to 1,200rpm. 4. Observe the scan tool for system voltage. Is the voltage within the values shown?	9–16V	Go to *Step 6*	Go to *Step 5*
5	1. Turn the ignition OFF. 2. After testing the charging system, repair the alternator circuit if necessary. Is the action completed?	–	System OK	–
6	Inspect the F2, EF1 fuse for an open. Was a problem found?	–	Go to *Step 7*	Go to *Step 8*
7	Replace the fuse if necessary. Is the replacement complete?	–	System OK	–
8	1. Turn the ignition ON. 2. Measure the voltage of F2, EF1. Is the voltage within the values shown?	9–16V	Go to *Step 10*	Go to *Step 9*
9	Repair the fuse voltage supply lines for an open. Is the repair completed?	–	System OK	–
10	1. Turn the ignition OFF. 2. Disconnect the TCM wiring connector. 3. Measure the resistance between EF1 fuse and terminal B3 of the TCM wiring connector. Is the resistance within the values shown?	≈0Ω	Go to *Step 12*	Go to *Step 11*
11	Repair the circuit(between EF1 and terminal B3) for a short to ground and open. Is the repair completed?	–	System OK	–
12	1. Disconnect the C105 connector and TCM connector. 2. Turn the ignition ON. 3. Measure the voltage of the terminal B3(TCM wiring connector). Is the voltage within the values shown?	9–16V	Go to *Step 13*	Go to *Step 14*

Step	Action	Value(s)	Yes	No
13	Repair the circuit from EF1 to terminal B3 of the TCM for a short to power. Is the repair complete?	–	System OK	–
14	1. Turn the ignition OFF. 2. Disconnect the C206 connector. 3. Measure the resistance between F2 fuse and terminal C15 or C16 of the TCM wiring connector. Is the resistance within the values shown?	≈0Ω	Go to *Step 15*	Go to *Step 15*
15	Repair the circuit(between F2 and terminal C15 or C16) for a short to ground and open. Is the repair completed?	–	System OK	–
16	1. Turn the ignition ON. 2. Measure the voltage of the terminal C15 or C16(TCM wiring connector). Is the voltage within the values shown?	11–14V	Go to *Step 17*	Go to *Step 18*
17	Repair the circuit(between F2 and terminal C15 or C16) for short to power. Is the repair complete?	–	System OK	–
18	1. Inspect the transaxle wiring for poor electrical connections at the transaxle connector. 2. Look for possible bent, backed out, deformed, or damaged terminals. 3. Check for weak terminal tension. Was a condition found?	–	Verify repair and Go to *Step 1*	Go to *Step 19*
19	Replace the TCM. Is the replacement complete?	–	Go to *Step 20*	–
20	1. After the repair, use a scan tool ”clear info” function and road test the vehicle. 2. Review the ”DTC info”. Has the last test failed or is the current DTC displayed?	–	Begin diagnosis again	Repair verified exit DTC chart



DIAGNOSTIC TROUBLE CODE(DTC) P0601

INTERNAL CONTROL MODULE MEMORY CHECKSUM ERROR

Circuit Description

A normal function of the Transmission Control Module (TCM) programming is to perform an internal check that verifies the integrity of the RAM memory allocations.

The DTC P0601 sets when the Random Access Memory(RAM) is not operating correctly when checked on initialization. An area of RAM is failed a read/ write test.

Conditions For Setting The DTC

- The EEPROM checksum test is separated in two independent parts, the code checksum test and the calibration checksum test. For each area the checksum is calculated and compared with the corresponding checksum valve. If the valves are different, the fault will be set.
- System voltage is too high or too low.
- Transaxle input voltage is too high or too low.
- Immediately after the above condition occurs.

Action Taken When The DTC Sets

- The Malfunction Indicator Lamp(MIL) will illuminate.
- The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer.
- Adopt Emergency/ Substitute mode and constant 4th gear by hydraulic control.
- After ignition OFF/ON : 3rd gear by hydraulic control. Possible P, R and N also possible.
- Power supply cut off to the EDS valve.

Conditions For Clearing The MIL/DTC

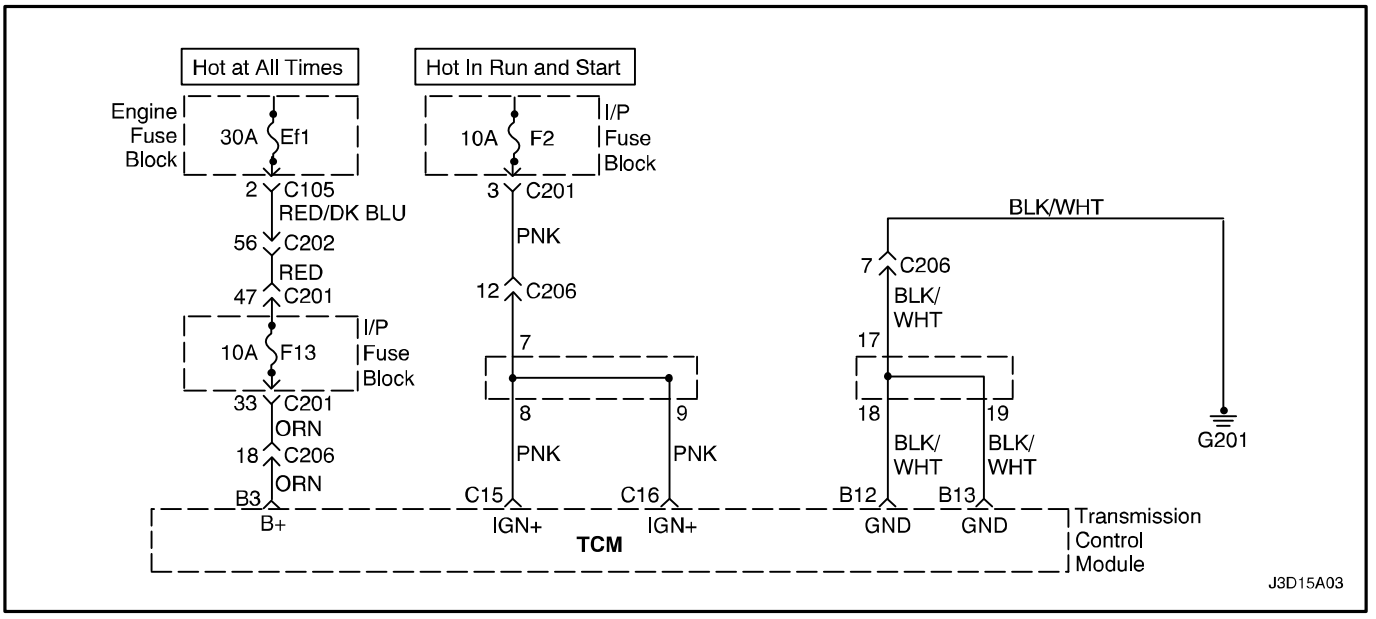
- The MIL will turn OFF when the malfunction has not occurred after three–ignition cycle.
- A history DTC will clear after 40 consecutive warm up cycles without a fault.
- Using a scan tool can clear history DTCs.

Diagnostic Aids

- When DTC P0601 sets, the possible cause of fault could be TCM.

DTC P0601 – Internal Control Module Memory Checksum Error

Step	Action	Value(s)	Yes	No
1	Perform an On–Board Diagnostic (EOBD) System Check. Is the check completed?	–	Go to *Step 2*	Go to *"On–Board Diagnostic System Check"*
2	1. Install the scan tool. 2. Turn the ignition ON, with the engine OFF. Does the scan tool display P0601?	–	Go to *Step 3*	Go to *"Diagnostic Aids"*
3	1. Turn the ignition OFF. 2. Replace the TCM. Is the action complete?	–	Go to *Step 4*	–
4	1. Using the scan tool, clear the DTCs. 2. Road test the vehicle within the conditions for setting this DTC as specified in the text. Does the scan tool indicate that this diagnostic has run and passed?	–	Go to *Step 5*	Go to *Step 2*
5	1. Check if any DTCs are set. 2. Are any DTCs displayed that have not been diagnosed?	–	Go to *"Applicable DTC table"*	System OK



DIAGNOSTIC TROUBLE CODE(DTC) P0603

INTERNAL CONTROL MODULE KEEP ALIVE MEMORY(KAM) ERROR

Circuit Description

A normal function of the Transmission Control Module (TCM) programming is to perform an internal check that verifies the integrity of the KAM memory allocations.

The DTC P0603 sets when the keep alive memory (KAM) is not operating correctly when checked on initialization.

An area of KAM is failed a read/ write test.

Conditions For Setting The DTC

- The checksum of the current regulator data will be tested. If the checksum is not OK, then the error bit will be set.
- If writing to FLASH during power latch phase failed.
- Each of the flash blocks has its own status which is located at the beginning of the each flash block and the status of the FLASH blocks do not fit together.
- System voltage is too high or too low.
- Transaxle input voltage is too high or too low.
- Immediately after the above condition occurs.

Action Taken When The DTC Sets

- The Malfunction Indicator Lamp(MIL) will illuminate.
- The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer.
- Adopt Emergency/ Substitute mode and constant 4th gear by hydraulic control.
- After ignition OFF/ON : 3rd gear by hydraulic control. Possible P, R and N also possible.
- Power supply cut off to the EDS valve.

Conditions For Clearing The MIL/DTC

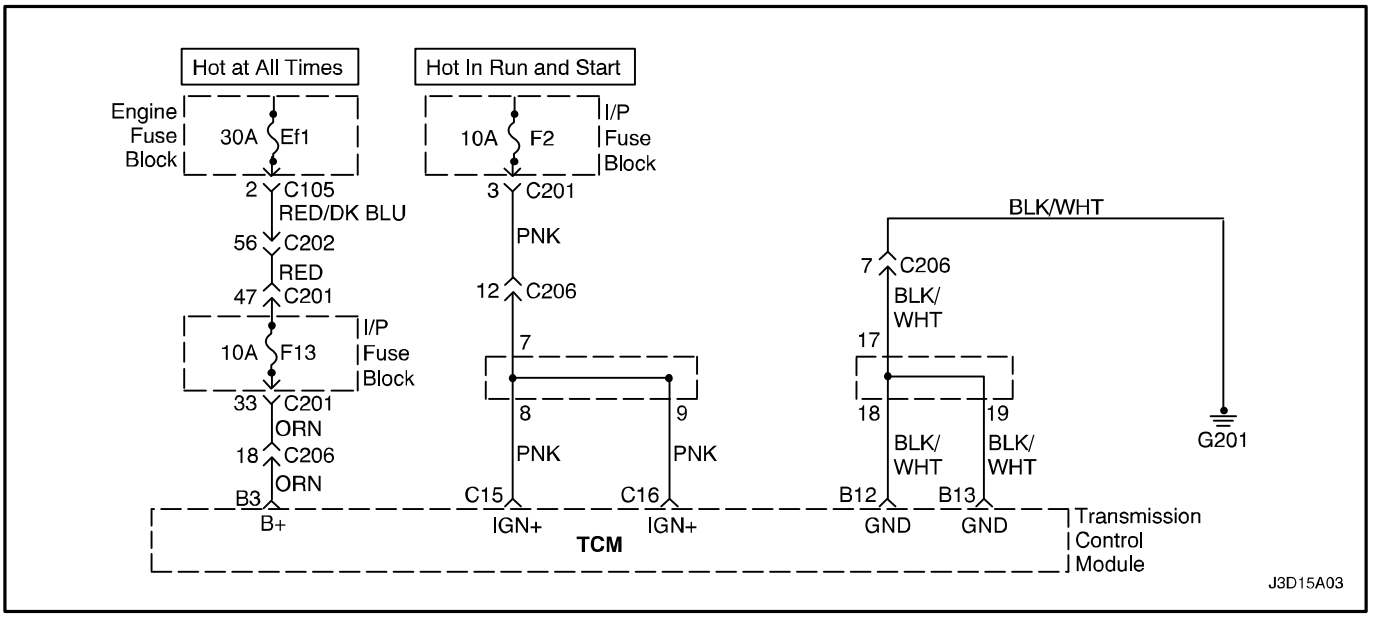
- The MIL will turn OFF when the malfunction has not occurred after three–ignition cycle.
- A history DTC will clear after 40 consecutive warm up cycles without a fault.
- Using a scan tool can clear history DTCs.

Diagnostic Aids

- When DTC P0603 sets, the possible cause of fault could be TCM.

DTC P0603 – Internal Control Module Keep Alive Memory(KAM) Error

Step	Action	Value(s)	Yes	No
1	Perform an On–Board Diagnostic (EOBD) System Check. Is the check completed?	–	Go to *Step 2*	Go to *"On–Board Diagnostic System Check"*
2	1. Install the scan tool. 2. Turn the ignition ON, with the engine OFF. Does the scan tool display P0603?	–	Go to *Step 3*	Go to *"Diagnostic Aids"*
3	1. Turn the ignition OFF. 2. Replace the TCM. Is the replacement complete?	–	Go to *Step 4*	–
4	1. Using the scan tool, clear the DTCs. 2. Road test the vehicle within the conditions for setting this DTC as specified in the text. Does the scan tool indicate that this diagnostic has run and passed?	–	Go to *Step 5*	Go to *Step 2*
5	1. Check if any DTCs are set. 2. Are any DTCs displayed that have not been diagnosed?	–	Go to *"Applicable DTC table"*	System OK



DIAGNOSTIC TROUBLE CODE(DTC) P0604

INTERNAL CONTROL MODULE RANDOM ACCESS MEMORY(RAM) ERROR

Circuit Description

A normal function of the Transmission Control Module (TCM) programming is to perform an internal check that verifies the integrity of the RAM memory allocations.

The DTC P0604 sets when the Random Access Memory(RAM) is not operating correctly when checked on initialization. An area of RAM is failed a read/ write test.

Conditions For Setting The DTC

- An area of RAM is failed a read/ write test.
- System voltage is too high or too low.
- Transaxle input voltage is too high or too low.
- Immediately after the above condition occurs.

Action Taken When The DTC Sets

The Malfunction Indicator Lamp(MIL) will illuminate.

- The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer.
- Adopt Emergency/ Substitute mode and constant 4th gear by hydraulic control.
- After ignition OFF/ON : 3rd gear by hydraulic control. Possible P, R and N also possible.
- Power supply cut off to the EDS valve.

Conditions For Clearing The MIL/DTC

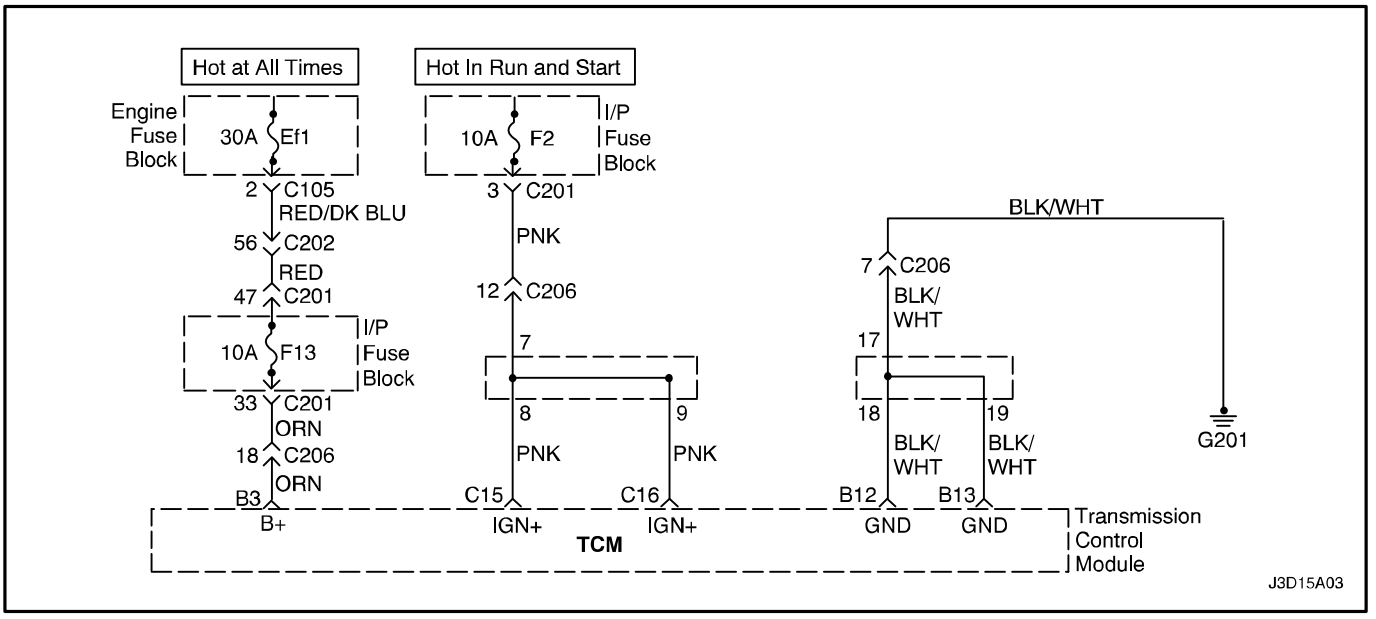
- The MIL will turn OFF when the malfunction has not occurred after three–ignition cycle.
- A history DTC will clear after 40 consecutive warm up cycles without a fault.
- Using a scan tool can clear history DTCs.

Diagnostic Aids

- When DTC P0604 sets, the replacement of TCM is recommended.

DTC P0604 – Internal Control Module Random Access Memory(RAM) Error

Step	Action	Value(s)	Yes	No
1	Perform an On–Board Diagnostic (EOBD) System Check. Is the check completed?	–	Go to *Step 2*	Go to *"On–Board Diagnostic System Check"*
2	1. Install the scan tool. 2. Turn the ignition ON, with the engine OFF. Does the scan tool display P0604?	–	Go to *Step 3*	Go to *"Diagnostic Aids"*
3	1. Turn the ignition OFF. 2. Replace the TCM. Is the action complete?	–	Go to *Step 4*	–
4	1. Using the scan tool, clear the DTCs. 2. Road test the vehicle within the conditions for setting this DTC as specified in the text. Does the scan tool indicate that this diagnostic has run and passed?	–	Go to *Step 5*	Go to *Step 2*
5	1. Check if any DTCs are set. 2. Are any DTCs displayed that have not been diagnosed?	–	Go to *"Applicable DTC table"*	System OK



DIAGNOSTIC TROUBLE CODE(DTC) P0606

TRANSAXLE CONTROL MODULE PROCESSOR FAULT

Circuit Description

In case that TCM reset has occurred by software (warm reset) not by ignition key ON, TCM increments software reset counter. If the counter exceeds the permissible maximum value for the software count then the fault will be detected.

Conditions For Setting The DTC

- System voltage is too high or too low.
- Transaxle input voltage is too high or too low.
- Immediately after the above condition occurs.

Action Taken When The DTC Sets

- The Malfunction Indicator Lamp(MIL) will illuminate.
- The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer.
- Adopt Emergency/ Substitute mode and constant 4th gear.
- Power supply cut off to the EDS valve.

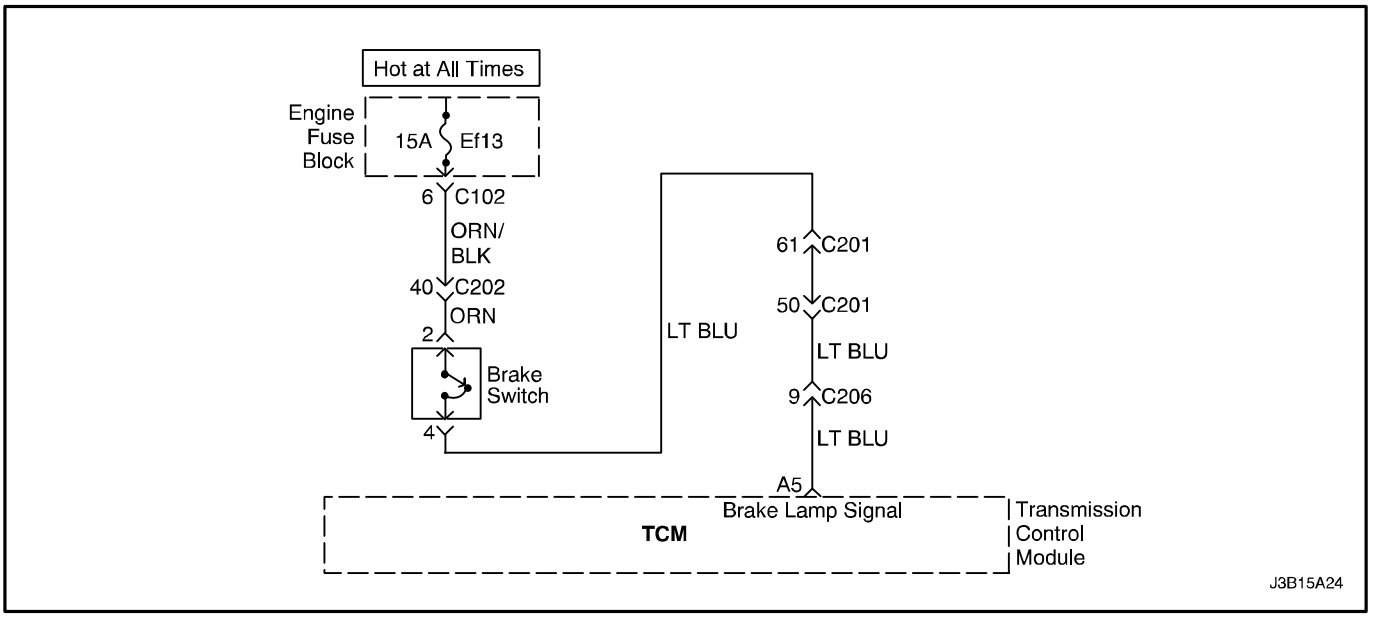
Conditions For Clearing The MIL/DTC

- The MIL will turn OFF when the malfunction has not occurred after three–ignition cycle.
- A history DTC will clear after 40 consecutive warm up cycles without a fault.
- Using a scan tool can clear history DTCs.

DTC P0606 – Transaxle Control Module Processor Fault

Step	Action	Value(s)	Yes	No
1	Perform an On–Board Diagnostic (EOBD) System Check. Is the check completed?	–	Go to *Step 2*	Go to *"On–Board Diagnostic System Check"*
2	1. Install the scan tool. 2. Turn the ignition ON and record then clear DTC(s), then turn ignition OFF. 3. Turn the ignition ON and start the engine. 4. Run the engine to 1,200 rpm. 5. Select system voltage on the scan tool. 6. Drive the vehicle and observe the scan tool for system voltage. Is the voltage within the values shown?	9–16V	Go to *Step 4*	Go to *Step 3*
3	1. Disconnect the negative battery cable. 2. Measure the voltage of the battery at the battery. Is the voltage within the values shown?	9–16V	Go to *Step 4*	Go to *"Section 1E, Engine Electrical"*
4	1. Turn the headlamp ON. 2. Turn the air conditioner ON. 3. Run the engine to 1,200rpm. 4. Observe the scan tool for system voltage. Is the voltage within the values shown?	9–16V	Go to *Step 6*	Go to *Step 5*
5	1. Turn the ignition OFF. 2. After testing the charging system, repair the alternator circuit if necessary. Is the action completed?	–	System OK	–
6	The vehicle would not have started if F2 or EF1 were blown. Was a problem found?	–	Go to *Step 7*	Go to *Step 8*
7	Replace the fuse if necessary. Is the replacement complete?	–	System OK	–
8	1. Turn the ignition ON. 2. Measure the voltage of F2, EF1. Is the voltage within the values shown?	9–16V	Go to *Step 10*	Go to *Step 9*
9	Repair the fuse voltage supply lines for an open. Is the action completed?	–	System OK	–
10	1. Turn the ignition OFF. 2. Disconnect the TCM wiring connector. 3. Measure the resistance between EF1 fuse and terminal B3 of the TCM wiring connector. Is the resistance within the values shown?	≈0Ω	Go to *Step 12*	Go to *Step 11*
11	Repair the circuit(between EF1 and terminal B3) for short to ground and open. Is the repair completed?	–	System OK	–

Step	Action	Value(s)	Yes	No
12	1. Disconnect the C105 connector and TCM connector. 2. Turn the ignition ON. 3. Measure the voltage of the terminal B3(TCM wiring connector). Is the voltage within the values shown?	9–16V	Go to *Step 13*	Go to *Step 14*
13	Repair the circuit from EF1 to terminal B3 of the TCM for a short to power. Is the repair complete?	–	System OK	–
14	1. Turn the ignition OFF. 2. Disconnect the C206 connector. 3. Measure the resistance between F2 fuse and terminal C15 or C16 of the TCM wiring connector. Is the resistance within the values shown?	≈0Ω	Go to *Step 16*	Go to *Step 15*
15	Repair the circuit(between F2 and terminal C15 or C16) for a short to ground and open. Is the repair completed?	–	System OK	–
16	1. Turn the ignition ON. 2. Measure the voltage of the terminal C15 or C16(TCM wiring connector). Is the voltage within the values shown?	9–16V	Go to *Step 17*	Go to *Step 18*
17	Repair the circuit(between F2 and terminal C15 or C16) for short to power. Is the repair complete?	–	System OK	–
18	1. Inspect the transaxle wiring for poor electrical connections at the transaxle connector. 2. Look for possible bent, backed out, deformed, or damaged terminals. 3. Check for weak terminal tension. Was a condition found?	–	Verify repair and Go to *Step 1*	Go to *Step 19*
19	Replace the TCM. Is the replacement complete?	–	Go to *Step 20*	–
20	1. After the repair, use a scan tool ”clear info” function and road test the vehicle. 2. Review the ”DTC info”. Has the last test failed or is the current DTC displayed?	–	Begin diagnosis again	Repair verified exit DTC chart



DIAGNOSTIC TROUBLE CODE(DTC) P0703

BRAKE SWITCH CIRCUIT MALFUNCTION

Circuit Description

The brake switch is used to indicate brake pedal status to the transaxle control module(TCM). The brake switch is a normally open switch. Applying the brake pedal closes the switch, supplying voltage to the TCM. Releasing the brake pedal interrupts voltage to the TCM.

This DTC is stored at start–up. If the TCM receives a brake switch signal after start–up, the DTC will be stored in memory.

Conditions for Setting The DTC

- Brake switch stuck to closed.
- Brake switch wiring harness shortage to ground.
- Brake switch wiring harness shortage to power.
- Immediately after the above condition occurs.

Action Taken When The DTC Sets

- No lamp control required but diagnostic information should be stored immediately when malfunction is detected.
- TCM assume that the brake light always active.

Conditions For Clearing The MIL/DTC

- Using a scan tool can clear history DTCs.

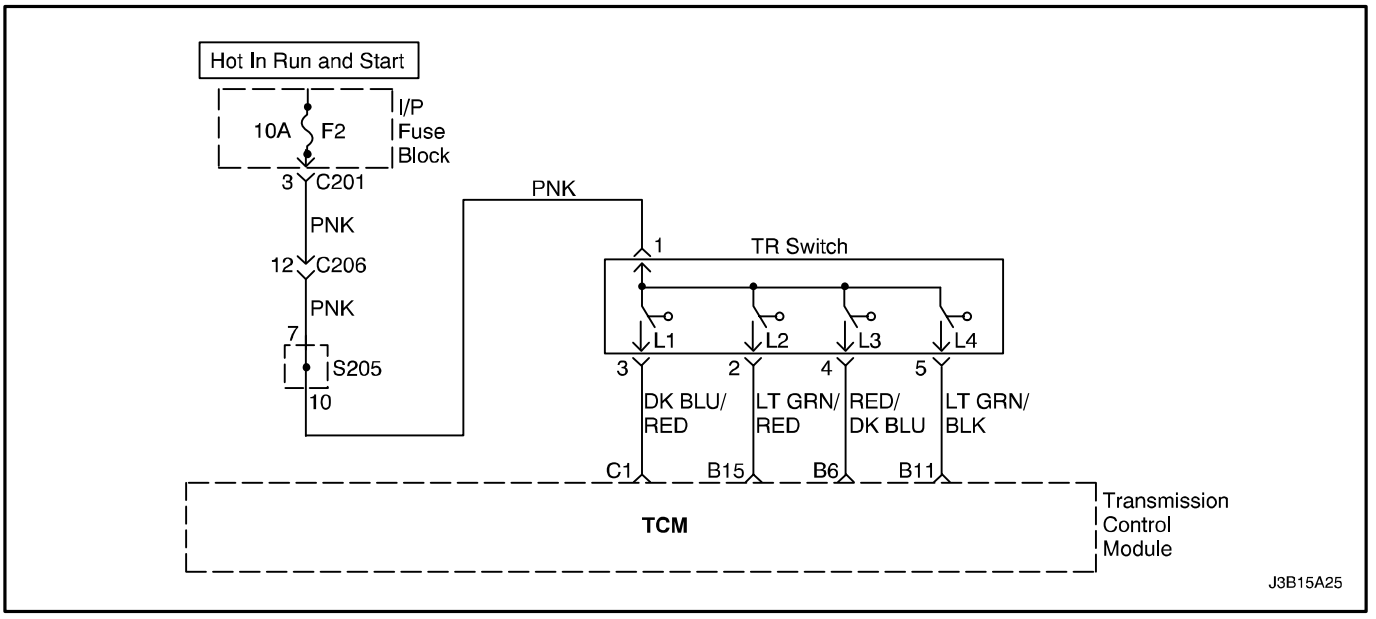
Diagnostic Aids

- Inspect the poor wiring harness connection for TCM connectors and transaxle wiring connectors.
- Inspect the improperly formed or damage terminals.

DTC P0703 – Brake Switch Circuit Malfunction

Step	Action	Value(s)	Yes	No
1	Perform an On–Board Diagnostic (EOBD) System Check. Is the check completed?	–	Go to *Step 2*	Go to *"On–Board Diagnostic System Check"*
2	1. Install the scan tool. 2. Turn the ignition ON. With the engine OFF. 3. Record then clear DTC(s) 4. Select scan tool stransmission data display. 5. Disconnect the brake switch connector. 6. Did the brake switch status change from" on" to "off"?	–	Go to *Step 3*	Go to *Step 4*
3	1. Replace the brake switch. 2. Refer to Brake Replacement. 3. After the ignition OFF, turn ignition ON. Is the DTC reset?	–	Go to *Step 4*	Go to *Step 15*
4	Inspect the EF13. Is the fuse blown?	–	Go to *Step 5*	Go to *Step 6*
5	Replace the fuse. Is the action complete?	–	System OK	–
6	1. Turn the ignition OFF. 2. Disconnect the C102 wiring connector and the brake switch wiring connector. 3. Measure the resistance between the terminal D5 of the C102 connector and the terminal 3 of the brake switch wiring connector. Is the resistance within the values shown?	≈0Ω	Go to *Step 8*	Go to *Step 7*
7	Repair the open circuit between the C102 connector and the brake switch connector. Is the action complete?	–	System OK	–
8	1. Turn the ignition ON. 2. Measure the voltage of the C102 connector, 6 terminal. Is the voltage within the values shown?	11–14v	Go to *Step 9*	Go to *Step 10*
9	Repair the short to power between the C102 connector and the brake switch connector. Is the action complete?	–	System OK	–
10	1. Turn the ignition OFF. 2. Disconnect the brake switch wiring connector and TCM wiring connector. 3. Measure between the brake switch connector, terminal 4 and TCM connector, terminal A5. Is the resistance within the values shown?	≈0Ω	System OK	Go to *Step 11*
11	Repair the open or short to ground between brake switch connector and TCM. Is the action complete?	–	System OK	–
12	1. Turn the ignition ON. 2. Measure the voltage of the brake switch wiring connector, terminal 4. Is the voltage within the values shown?	11–14v	Go to *Step 13*	Go to *Step 14*

Step	Action	Value(s)	Yes	No
13	Repair the short to power between the brake switch wiring connector and TCM. Is the action complete?	–	System OK	–
14	Replace the TCM. Is the action complete?	–	Go to *Step 15*	–
15	1. After the repair, use a scan tool ”clear info” function and road test the vehicle. 2. Review the ”DTC info”. Has the last test failed or is the current DTC displayed?	–	Begin diagnosis again	Repair verified exit DTC chart



DIAGNOSTIC TROUBLE CODE(DTC) P0705

TRANSMISSION RANGE SENSOR CIRCUIT MALFUNCTION (PRNDL INPUT)

Circuit Description

The Transmission range switch is located on the selector shaft and informs the TCM of the current selector lever position P–R–N–D–3–2–1.

The selector lever position is transmitted to the TCM in encoded form along 4 lines. The encoding is such that malfunctions in the connecting lead are identified.

The TR switch is located on the selector shaft, which is connected to the selector lever via a pull cable. In addition, the TR switch controls the starter interlock, the reverse lights and the selector lever position indicator on the instrument panel.

Conditions for Setting The DTC

- TR switch stuck to closed.
- TR switch wiring harness shortage to ground.
- TR switch wiring harness shortage to power.
- Immediately after the above condition occurs.

Action Taken When The DTC Sets

- The Malfunction Indicator Lamp(MIL) will illuminate.
- The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer.
- Adopt Emergency/ Substitute mode and constant 4th gear.

Conditions for Clearing the MIL/DTC

- The MIL will turn OFF when the malfunction has not occurred after three–ignition cycles.
- A history DTC will clear after 40 consecutive warm up cycles without a fault.
- Using a scan tool can clear history DTCs.

Diagnostic Aids

- When DTC P0705 sets, the possible cause of TR switch.

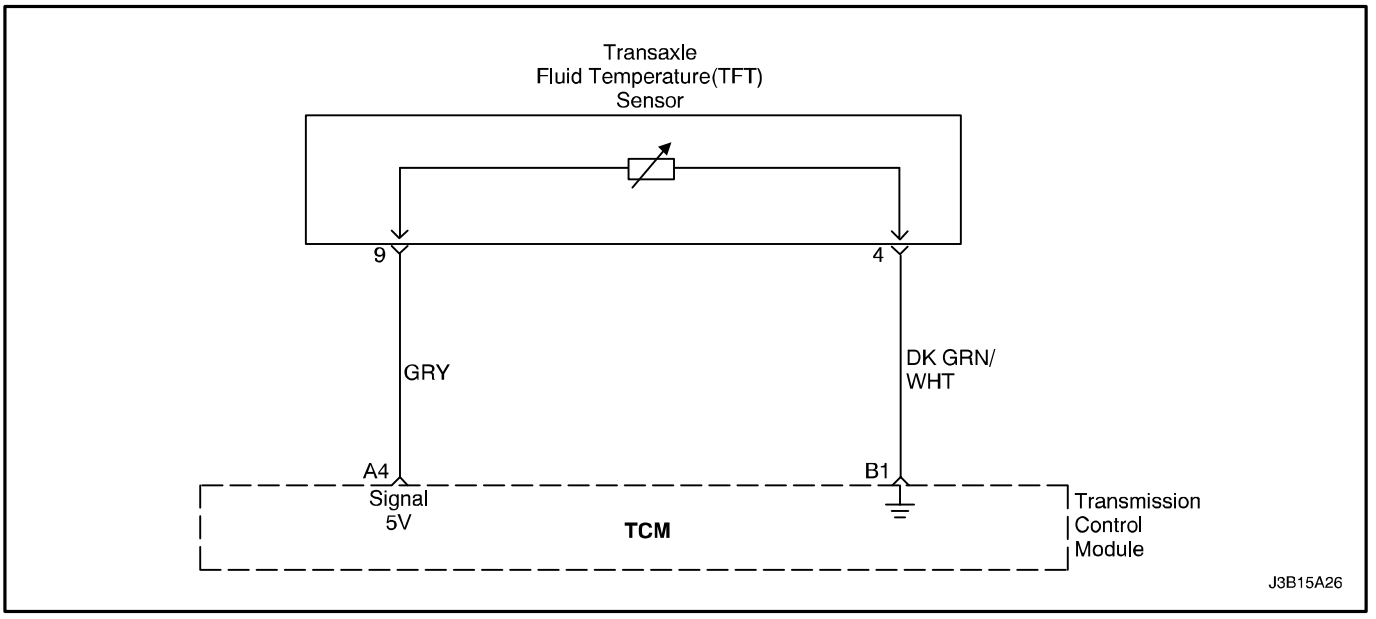
Gear Position And Range Signal Chart.

	L1	L2	L3	L4
P	0	0	12	0
R	0	0	0	12
N	0	12	0	0
D	12	12	12	0
3	12	12	0	12
2	12	0	12	12
1	0	12	12	12

DTC P0705 – Transmission Range Sensor Circuit Malfunction (PRNDL Input)

Step	Action	Value(s)	Yes	No
1	Perform an On–Board Diagnostic (EOBD) System Check. Is the check completed?	–	Go to *Step 2*	Go to *"On–Board Diagnostic System Check"*
2	1. Install the scan tool. 2. Turn the ignition ON. 3. Record then clear DTC(s) and turn the ignition OFF, then turn the ignition ON. 4. Applying the brakes and select each transaxle range (P, R,N,D,3,2,1), while monitoring scan tool. Refer to Gear Position And Range Signal Chart. Does each selected transaxle range match scan tool and signal range chart?	–	Go to *Step 3*	Go to *"Diagnostic Aids"*
3	Inspect the F2 for open? Was a problem found?	–	Go to *Step 4*	Go to *Step 5*
4	Replace the fuse as necessary. Is the action complete?	–	System OK	–
5	Inspect the TR switch. Refer to "Diagnostic Aids". Was the problem found?	–	Go to *Step 6*	Go to *Step 7*
6	Replace the TR switch. Is the action complete?	–	System OK	–
7	1. Disconnect the TR switch connector and TCM connector. 2. Measure the resistance between terminal 3 of the TR switch and terminal C1 of the TCM connector. 3. Measure the resistance between terminal 2 of the TR switch and terminal B15 of the TCM connector. 4. Measure the resistance between terminal 4 of the TR switch and terminal B6 of the TCM connector. 5. Measure the resistance between terminal 5 of the TR switch and terminal B11 of the TCM connector. Is the resistance within the values shown?	$\approx 0\Omega$	Go to *Step 9*	Go to *Step 8*

Step	Action	Value(s)	Yes	No
8	Repair the malfunctioning terminals as necessary. Is the action complete?	–	System OK	–
9	1. Turn the ignition ON. 2. Measure the voltage of terminal 3. 3. Measure the voltage of terminal 2. 4. Measure the voltage of terminal 4. 5. Measure the voltage of terminal 5. Is the voltage within the values shown?	11–14V	Go to *Step 10*	Go to *Step 11*
10	Repair the malfunctioning terminals as necessary. Is the action complete?	–	System OK	–
11	Replace the TCM. Is The action complete?	–	Go to *Step 12*	–
12	1. After the repair, use a scan tool ”clear info” function and road test the vehicle. 2. Review the ”DTC info”. Has the last test failed or is the current DTC displayed?	–	Begin diagnosis again	Repair verified exit DTC chart



DIAGNOSTIC TROUBLE CODE(DTC) P0710

TRANSMISSION FLUID TEMPERATURE SENSOR CIRCUIT MALFUNCTION

Circuit Description

The TFT sensor is a positive temperature coefficient thermistor (temperature sensitive resistor) that provides information to the TCM regarding transaxle fluid temperature. The temperature sensor is located in valve body. Calculated temperature is a factor used to determine the shift time and shift delay time.

The internal electrical resistance of the sensor varies in relation to the operating temperature of the transaxle fluid.

The TCM sends a 5 volt–reference signal to the temperature sensor and measures the voltage rise in the electrical circuit. A higher fluid temperature creates a higher resistance in the temperature sensor, thereby measuring a higher voltage signal.

The TCM measures this voltage as another input to help control line pressure, shift schedules and TCC apply. When transaxle fluid temperature reaches 120˚C (248˚F) the TCM enters ”hot mode.” Above this temperature the TCM modifies transaxle shift schedules and TCC apply in an attempt to reduce fluid temperature by reducing transaxle heat generation.

Conditions for Setting The DTC

- The calculated temperature is compared with the predetermined min. and max. value.
- If the temperature is less than min. value or greater than max value then the current temperature is regarded as of range and the corresponding error but will be set.
- Transmission fluid temperature is not between –40˚C (–40˚F) and 150˚C (302˚F).

Action Taken When The DTC Sets

- No lamp control required but diagnostic information should be stored immediately when malfunction is defected.
- TCM assumes the transaxle fluid temperature is 60˚C.
- No influence on drivability.

Conditions for Clearing the MIL/DTC

- Using a scan tool can clear history DTCs.

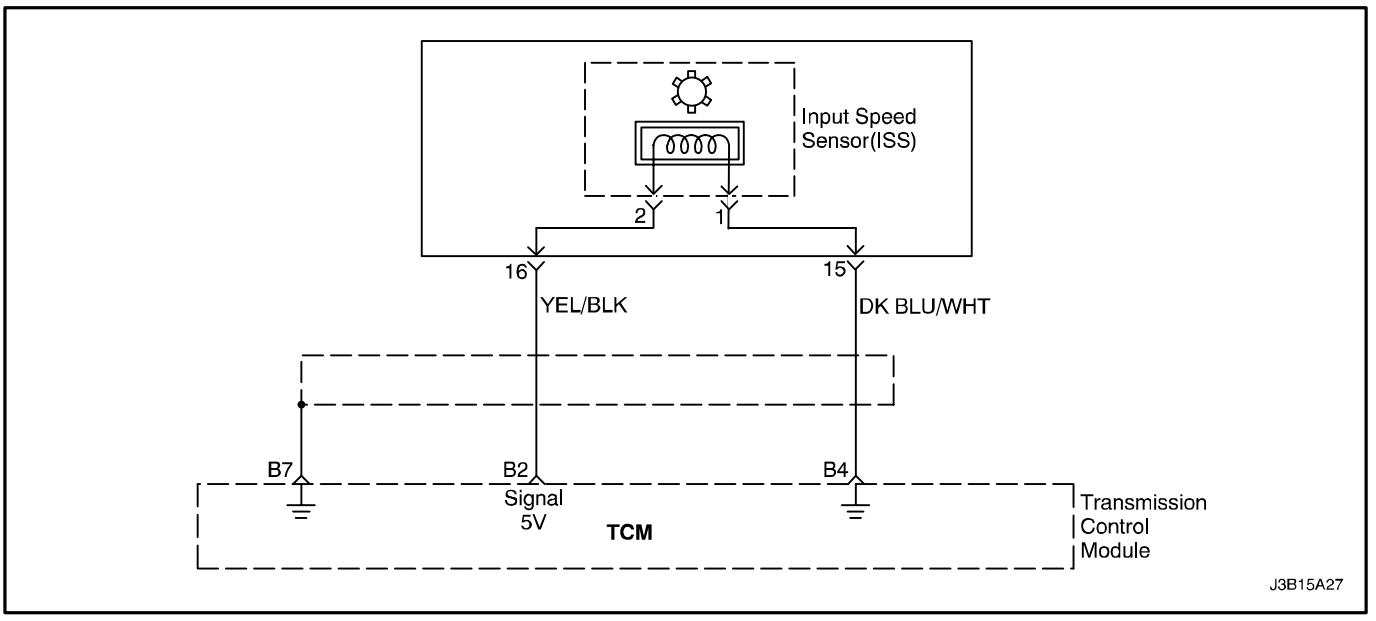
Diagnostic Aids

- When DTC P0710 sets, the possible cause of fault could be Transmission Temperature Sensor.

DTC P0710 – Transmission Fluid Temperature Sensor Circuit Malfunction

Step	Action	Value(s)	Yes	No
1	Perform an On–Board Diagnostic (EOBD) System Check. Is the check completed?	–	Go to *Step 2*	Go to *"On–Board Diagnostic System Check"*
2	1. Install the scan tool. 2. Turn the ignition ON, with the engine OFF. 3. Record then clear DTC(s) and turn the ignition OFF, then turn the ignition ON. 4. Select TFT on the scan tool. 5. Drive the vehicle and observe the scan tool for either of the flowing conditions: 6. The TFT does not change more than 1.5˚C (34.7˚F) in 80 seconds since start–up. 7. The TFT changes more than 20˚C (68˚F) within 7 seconds (unrealistic change). Did either of the fail conditions occur?	–	Go to *Step 3*	Go to *"Diagnostic Aids"*
3	1. Turn the ignition OFF. 2. Disconnect the transaxle wiring connector. 3. Measure the resistance between terminals 9 and 4 of the transaxle wiring connector. Is the resistance within the values shown?	TFT 25˚C 990 Ω	Go to *Step 7*	Go to *Step 4*
4	1. Remove the oil pan. 2. Disconnect the wiring connector of the transaxle fluid temperature sensor. 3. Inspect the automatic transaxle wiring harness for an intermittent short or open. Was a problem found?	–	Go to *Step 5*	Go to *Step 6*
5	Replace the automatic transaxle wiring harness. Is the replacement complete?	–	System OK	–
6	Replace the TFT sensor. Is the action complete?	–	System OK	–
7	1. Disconnect the automatic transaxle wiring connector and disconnect the wiring connector of the TCM(transaxle control module). 2. Measure the resistance between terminal 4 of the transaxle wiring connector and terminal B1 of the TCM wiring connector. 3. Measure the resistance between terminal 9 of the transaxle wiring connector and terminal A4 of the TCM wiring connector. Is the resistance within the values shown?	≈0Ω	Go to *Step 9*	Go to *Step 8*
8	1. Inspect the automatic transaxle wiring harness for an intermittent short to ground or open condition. 2. Inspect the automatic TFT sensor wiring harness for an intermittent short to ground or open condition. 3. Repair the circuits if necessary. Is the repair complete?	–	System OK	–

Step	Action	Value(s)	Yes	No
9	1. Turn the ignition ON. 2. Measure the voltage of terminal A4 of the TCM wiring connector. 3. Measure the voltage of terminal B1 of the TCM wiring connector. Is the voltage within the values shown?	9–16V	Go to *Step 10*	Go to *Step 11*
10	1. Inspect the automatic transaxle wiring harness for an intermittent short to power. 2. Inspect the automatic TFT sensor wiring harness for an intermittent short to power. 3. Repair the circuits if necessary. Is the repair complete?	–	System OK	–
11	Replace the TCM. Is the replacement complete?	–	Go to *Step 12*	–
12	1. After the repair, use a scan tool ”clear info” function and road test the vehicle. 2. Review the ”DTC info”. Has the last test failed or is the current DTC displayed?	–	Begin diagnosis again	Repair verified exit DTC chart



DIAGNOSTIC TROUBLE CODE(DTC) P0715

INPUT SPEED SENSOR(ISS) CIRCUIT MALFUNCTION

Circuit Description

Information relative to transaxle input speed to the TCM. The TCM uses transaxle input speed information to control line pressure, TCC apply and release and transaxle shift patterns. This information is also uses to calculate the appropriate operating gear ratios and TCC slippage.

The input speed sensor mounts onto piston B that is inside of valve body.

An air gap of 1.8~2.2mm(0.07~0.086inch) is maintained between the sensor and the piston B.

The sensor consists of a permanent magnet surrounded by a coil of wire. As the piston B is driven by the turbine shaft, an AC signal is induced by the input speed sensor. Higher vehicle speeds induce a higher frequency and voltage measurement at the sensor.

Sensor resistance should measure between 825~835 ohms at 20˚C(68˚F). Sensor can measure from 1,000~8,000HZ.

Conditions for Setting The DTC

- Input speed is more than 7,000 rpm.
- System voltage is too high or too low.
- TCM or ECM is defective.
- Immediately after the above condition occurs.

Action Taken When The DTC Sets

- The Malfunction Indicator Lamp(MIL) will illuminate.
- The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer.
- Adopt Emergency/ Substitute mode and constant 4th gear by hydraulic control.
- After ignition OFF/ON : 3rd gear by hydraulic control, position P, R and N also possible.
- Open lock up clutch.

Conditions for Clearing The MIL/DTC

- The MIL will turn OFF when the malfunction has not occurred after three–ignition cycles.
- A history DTC will clear after 40 consecutive warm up cycles without a fault.
- Using a scan tool can clear history DTCs.

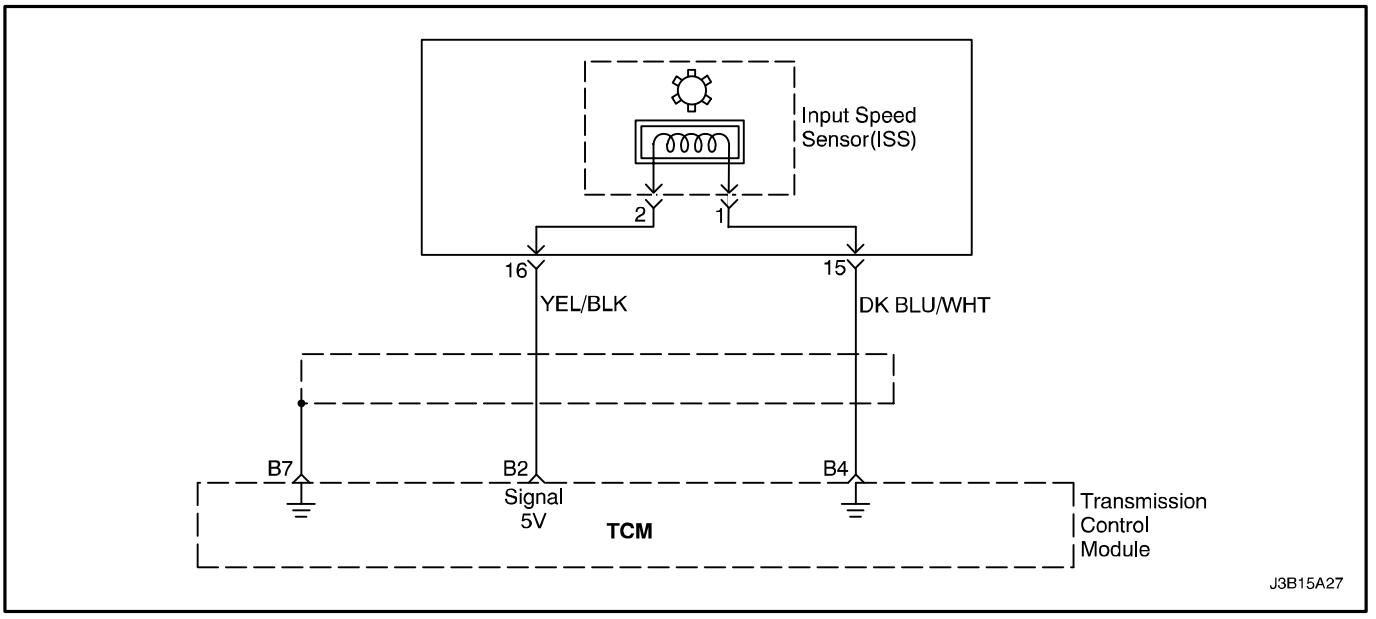
Diagnostic Aids

- When DTC P0715 sets, the possible cause of fault could be ISS(input speed sensor).

DTC P0715 – Input Speed Sensor(ISS) Circuit Malfunction

Step	Action	Value(s)	Yes	No
1	Perform an On–Board Diagnostic (EOBD) System Check. Is the check completed?	–	Go to *Step 2*	Go to *"On–Board Diagnostic System Check"*
2	1. Install the scan tool. 2. Turn the ignition ON and record then clear DTC(s). 3. Turn the ignition OFF, then turn the ignition ON. 4. Observe the input speed on the scan tool. Is the speed within the values shown?	Input speed : 0–7,000rpm	Go to *"Diagnostic Aids"*	Go to *Step 3*
3	1. Turn the ignition OFF. 2. Disconnect the transaxle wiring connector. 3. Measure the resistance between terminals 15 and 16 of the transaxle wiring connector. Is the resistance within the values shown?	830 ± 5Ω	Go to *Step 9*	Go to *Step 4*
4	1. Remove the oil pan. 2. Disconnect the input speed sensor wiring connector. 3. Measure the resistance between terminal 1 of the input speed sensor wiring connector and terminal 15 of the transaxle wiring connector. 4. Measure the resistance between terminal 2 of the input speed sensor wiring connector and terminal 16 of the transaxle wiring connector. Is the resistance within the values shown?	≈0Ω	Go to *Step 6*	Go to *Step 5*
5	Repair the malfunctioning terminals as necessary. Is the action complete?	–	System OK	–
6	1. Turn the ignition ON. 2. Measure the voltage of terminal 1. 3. Measure the voltage of terminal 2. Is the voltage within the values shown?	11–14V	Go to *Step 7*	Go to *Step 8*
7	Repair the short to battery power. Is the action complete?	–	System OK	–
8	Replace the input speed sensor. Is the action complete?	–	System OK	–
9	1. Disconnect the transaxle wiring connector and TCM connector. 2. Measure the resistance between terminal 15 of the transaxle wiring connector and terminal B4 of the TCM wiring connector. 3. Measure the resistance between terminal 16 of the transaxle wiring connector and terminal B2 of the TCM wiring connector. Is the resistance within the values shown?	≈0Ω	Go to *Step 11*	Go to *Step 10*
10	Repair the malfunctioning terminals as necessary. Is the action complete?	–	System OK	–

Step	Action	Value(s)	Yes	No
11	1. Turn the ignition ON. 2. Measure the voltage of terminal 15. 3. Measure the voltage of terminal 16. Is the voltage within the values shown?.	11–14V	Go to *Step 12*	Go to *Step 13*
12	Repair the malfunctioning terminals as necessary. Is the action complete?	–	System OK	–
13	Replace the TCM. Is the action complete?	–	Go to *Step 14*	–
14	1. After the repair, use a scan tool ”clear info” function and road test the vehicle. 2. Review the ”DTC info”. Has the last test failed or is the current DTC displayed?	–	Begin diagnosis again	Repair verified exit DTC chart



DIAGNOSTIC TROUBLE CODE(DTC) P0716

INPUT SPEED SENSOR(ISS) CIRCUIT RANGE/PERFORMANCE

Circuit Description

Information relative to transaxle input speed to the TCM. The TCM uses transaxle input speed information to control line pressure, TCC apply and release and transaxle shift patterns. This information is also uses to calculate the appropriate operating gear ratios and TCC slippage.

The input speed sensor mounts onto piston B that is inside of valve body.

An air gap of 1.8~2.2mm(0.07~0.086inch) is maintained between the sensor and the piston B.

The sensor consists of a permanent magnet surrounded by a coil of wire. As the piston B is driven by the turbine shaft, an AC signal is induced by the input speed sensor. Higher vehicle speeds induce a higher frequency and voltage measurement at the sensor.

Sensor resistance should measure between 825~835 ohms at 20˚C(68˚F). Sensor can measure from 1,000~8,000HZ.

Conditions for Setting The DTC

- The increasing rate of the turbine speed is more than 45,000 rpm/sec.
- System voltage is greater than 8.5 volts.
- Engine is running.
- No engine speed error DTCs P0727, P0725.
- Gear position is D.
- TCM or ECM is defective.
- Immediately after the above condition occurs.

Action Taken When The DTC Sets

- The Malfunction Indicator Lamp(MIL) will illuminate.
- The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer.
- Adopt Emergency/ Substitute mode and constant 4th gear by hydraulic control.
- After ignition OFF/ON : 3rd gear by hydraulic control, position P, R and N also possible.
- Open lock up clutch.

Conditions for Clearing The MIL/DTC

- The MIL will turn OFF when the malfunction has not occurred after three–ignition cycles.
- A history DTC will clear after 40 consecutive warm up cycles without a fault.
- Using a scan tool can clear history DTCs.

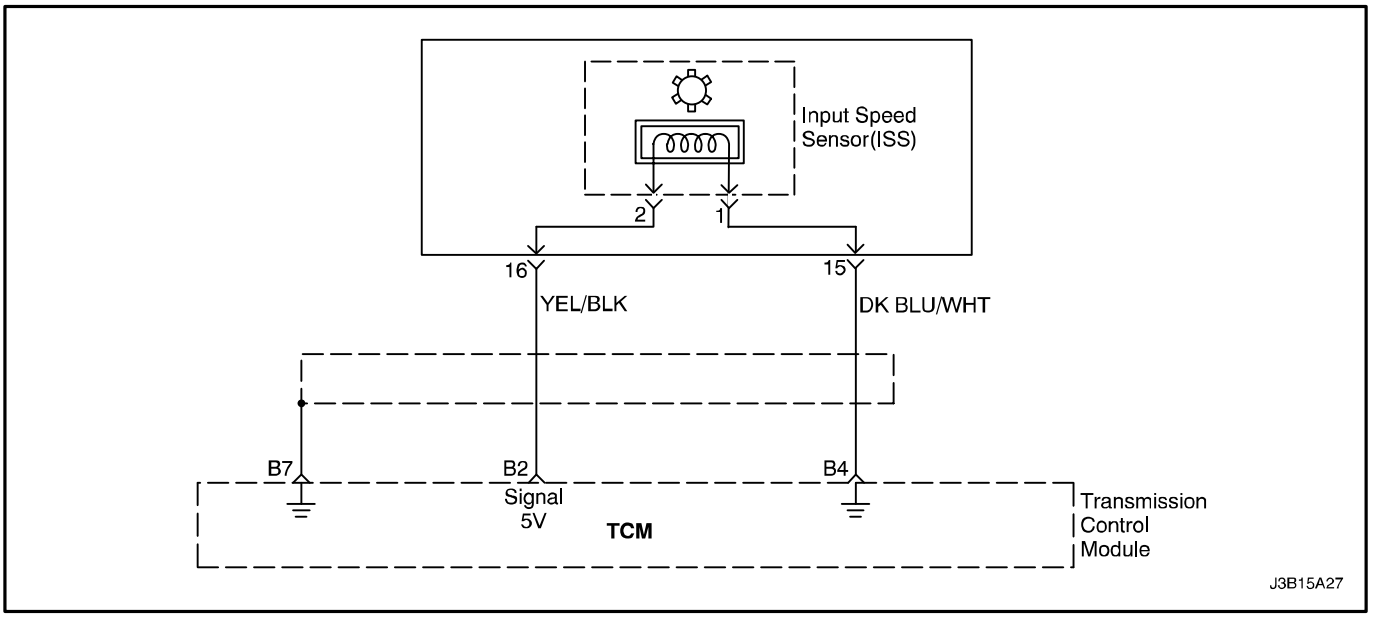
Diagnostic Aids

- When DTC P0716 sets, the possible cause of fault could be ISS(input speed sensor).

DTC P0716 – Input Speed Sensor(ISS) Circuit Range/Performance

Step	Action	Value(s)	Yes	No
1	Perform an On–Board Diagnostic (EOBD) System Check. Is the check completed?	–	Go to *Step 2*	Go to *"On–Board Diagnostic System Check"*
2	1. Install the scan tool. 2. Turn the ignition ON and record then clear DTC(s). 3. Turn the ignition OFF, then turn the ignition ON. 4. Observe the input speed on the scan tool. Is the speed within the values shown?	Input speed : 0–7,000rpm	Go to *"Diagnostic Aids"*	Go to *Step 3*
3	1. Turn the ignition OFF. 2. Disconnect the transaxle wiring connector. 3. Measure the resistance between terminals 15 and 16 of the transaxle wiring connector. Is the resistance within the values shown?	830 ± 5Ω	Go to *Step 9*	Go to *Step 4*
4	1. Remove the oil pan. 2. Disconnect the input speed sensor wiring connector. 3. Measure the resistance between terminal 1 of the input speed sensor wiring connector and terminal 15 of the transaxle wiring connector. 4. Measure the resistance between terminal 2 of the input speed sensor wiring connector and terminal 16 of the transaxle wiring connector. Is the resistance within the values shown?	≈0Ω	Go to *Step 6*	Go to *Step 5*
5	Repair the malfunctioning terminals as necessary. Is the action complete?	–	System OK	–
6	1. Turn the ignition ON. 2. Measure the voltage of terminal 1. 3. Measure the voltage of terminal 2. Is the voltage within the values shown?	11–14V	Go to *Step 7*	Go to *Step 8*
7	Repair the short to battery power. Is the action complete?	–	System OK	–
8	Replace the input speed sensor. Is the action complete?	–	System OK	–
9	1. Disconnect the transaxle wiring connector and TCM connector. 2. Measure the resistance between terminal 15 of the transaxle wiring connector and terminal B4 of the TCM wiring connector. 3. Measure the resistance between terminal 16 of the transaxle wiring connector and terminal B2 of the TCM wiring connector. Is the resistance within the values shown?	≈0Ω	Go to *Step 11*	Go to *Step 10*
10	Repair the malfunctioning terminals as necessary. Is the action complete?	–	System OK	–

Step	Action	Value(s)	Yes	No
11	1. Turn the ignition ON. 2. Measure the voltage of terminal 15. 3. Measure the voltage of terminal 16. Is the voltage within the values shown?.	11–14V	Go to *Step 12*	Go to *Step 13*
12	Repair the malfunctioning terminals as necessary. Is the action complete?	–	System OK	–
13	Replace the TCM. Is the action complete?	–	Go to *Step 14*	–
14	1. After the repair, use a scan tool ”clear info” function and road test the vehicle. 2. Review the ”DTC info”. Has the last test failed or is the current DTC displayed?	–	Begin diagnosis again	Repair verified exit DTC chart



DIAGNOSTIC TROUBLE CODE(DTC) P0717

INPUT SPEED SENSOR(ISS) CIRCUIT NO SIGNAL

Circuit Description

Information relative to transaxle input speed to the TCM. The TCM uses transaxle input speed information to control line pressure, TCC apply and release and transaxle shift patterns. This information is also uses to calculate the appropriate operating gear ratios and TCC slippage.

The input speed sensor mounts onto piston B that is inside of valve body.

An air gap of 1.8~2.2mm(0.07~0.086inch) is maintained between the sensor and the piston B.

The sensor consists of a permanent magnet surrounded by a coil of wire. As the piston B is driven by the turbine shaft, an AC signal is induced by the input speed sensor. Higher vehicle speeds induce a higher frequency and voltage measurement at the sensor.

Sensor resistance should measure between 825~835 ohms at 20˚C(68˚F). Sensor can measure from 1,000~8,000HZ.

Conditions for Setting The DTC

- When engine speed(rpm) is more than 3,100rpm, Turbine speed is less than 100rpm.
- System voltage is too high or too low.
- CAN transmitting wiring harness shortage or open.
- TCM or ECM is defective.
- Immediately after the above condition occurs.

Action Taken When The DTC Sets

- The Malfunction Indicator Lamp(MIL) will illuminate.
- The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer.
- Adopt Emergency/ Substitute mode and constant 4th gear by hydraulic control.
- After ignition OFF/ON : 3rd gear by hydraulic control, position P, R and N also possible.
- Open lock up clutch.

Conditions for Clearing The MIL/DTC

- The MIL will turn OFF when the malfunction has not occurred after three–ignition cycles.
- A history DTC will clear after 40 consecutive warm up cycles without a fault.
- Using a scan tool can clear history DTCs.

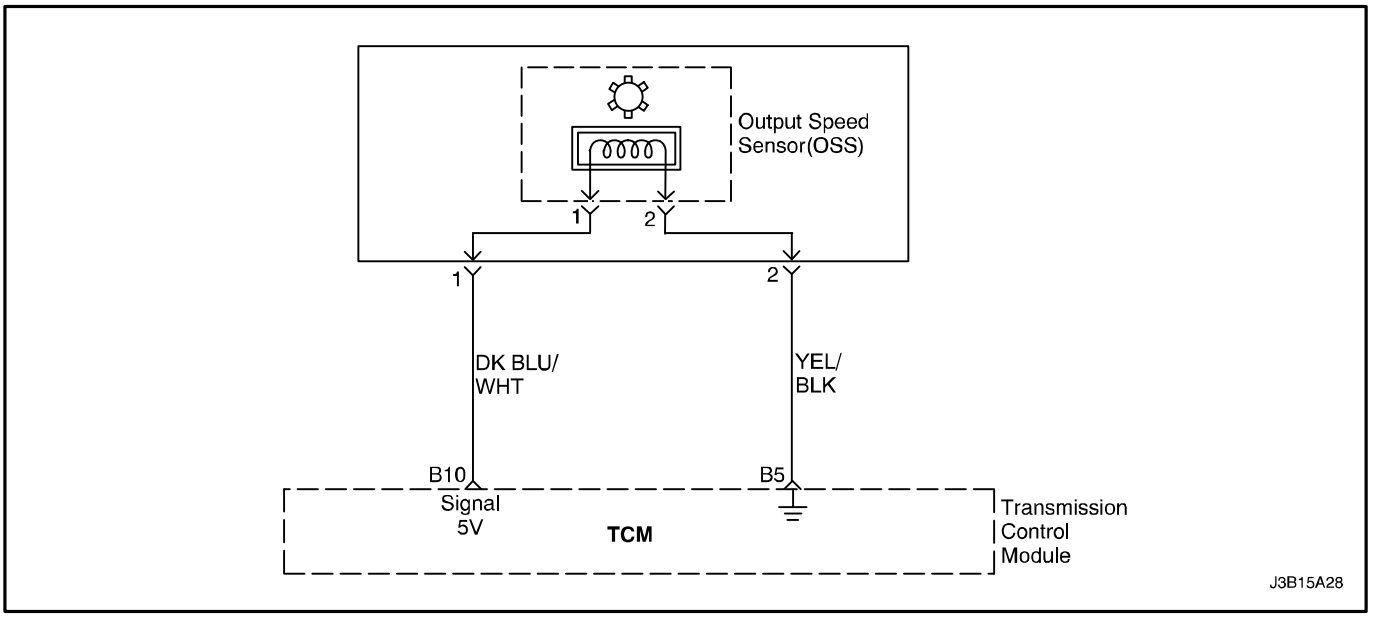
Diagnostic Aids

- When DTC P0717 sets, the possible cause of fault could be ISS(input speed sensor).

DTC P0717 – Input Speed Sensor(ISS) Circuit No Signal

Step	Action	Value(s)	Yes	No
1	Perform an On–Board Diagnostic (EOBD) System Check. Is the check completed?	–	Go to *Step 2*	Go to *"On–Board Diagnostic System Check"*
2	1. Install the scan tool. 2. Turn the ignition ON and record then clear DTC(s). 3. Turn the ignition OFF, then turn the ignition ON. 4. Observe the input speed on the scan tool. Is the speed within the values shown?	100rpm	Go to *"Diagnostic Aids"*	Go to *Step 3*
3	1. Turn the ignition OFF. 2. Disconnect the transaxle wiring connector. 3. Measure the resistance between terminals 15 and 16 of the transaxle wiring connector. Is the resistance within the values shown?	830 ± 5Ω	Go to *Step 9*	Go to *Step 4*
4	1. Remove the oil pan. 2. Disconnect the input speed sensor wiring connector. 3. Measure the resistance between terminal 1 of the input speed sensor wiring connector and terminal 15 of the transaxle wiring connector. 4. Measure the resistance between terminal 2 of the input speed sensor wiring connector and terminal 16 of the transaxle wiring connector. Is the resistance within the values shown?	≈0Ω	Go to *Step 6*	Go to *Step 5*
5	Repair the malfunctioning terminals as necessary. Is the action complete?	–	System OK	–
6	1. Turn the ignition ON. 2. Measure the voltage of terminal 1. 3. Measure the voltage of terminal 2. Is the voltage within the values shown?	11–14V	Go to *Step 7*	Go to *Step 8*
7	Repair the short to battery power. Is the action complete?	–	System OK	–
8	Replace the input speed sensor. Is the action complete?	–	System OK	–
9	1. Disconnect the transaxle wiring connector and TCM connector. 2. Measure the resistance between terminal 15 of the transaxle wiring connector and terminal B4 of the TCM wiring connector. 3. Measure the resistance between terminal 16 of the transaxle wiring connector and terminal B2 of the TCM wiring connector. Is the resistance within the values shown?	≈0Ω	Go to *Step 11*	Go to *Step 10*
10	Repair the malfunctioning terminals as necessary. Is the action complete?	–	System OK	–

Step	Action	Value(s)	Yes	No
11	1. Turn the ignition ON. 2. Measure the voltage of terminal 15. 3. Measure the voltage of terminal 16. Is the voltage within the values shown?.	11–14V	Go to *Step 12*	Go to *Step 13*
12	Repair the malfunctioning terminals as necessary. Is the action complete?	–	System OK	–
13	Replace the TCM. Is the action complete?	–	Go to *Step 14*	–
14	1. After the repair, use a scan tool ”clear info” function and road test the vehicle. 2. Review the ”DTC info”. Has the last test failed or is the current DTC displayed?	–	Begin diagnosis again	Repair verified exit DTC chart



DIAGNOSTIC TROUBLE CODE(DTC) P0720

OUTPUT SPEED SENSOR(OSS) CIRCUIT MALFUNCTION

Circuit Description

The vehicle A/T OSS is a magnetic inductive pickup that relays information relative to vehicle speed to the TCM.

Vehicle speed information is used by the TCM to control shift timing, line pressure, and TCC apply and release.

The output speed sensor mounts in the case at the speed sensor rotor, which is pressed onto the spur gear. An air gap of 0.1mm~1.3mm(0.004~0.05in) is maintained between the sensor and the teeth on the spur gear teeth. The sensor consists of a permanent magnet surrounded by a coil of wire. As the differential rotates, an AC signal induces a higher frequency and voltage measurement at the sensor. Sensor resistance should measure ∞ at 20˚C (68˚F). Sensor can measure from 20HZ~8,000HZ.

Conditions for Setting The DTC

- Output speed is greater than 9,762rpm.
- System voltage is too high or too low.
- CAN transmitting wiring harness shortage or open.
- TCM or ECM is defective.
- Immediately after the above condition occurs.

Action Taken When The DTC Sets

- The Malfunction Indicator Lamp(MIL) will illuminate.
- The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer.
- Adopt Emergency/ Substitute mode and constant 4th gear.
- Open lock up clutch.

Conditions for Clearing The MIL/DTC

- The MIL will turn OFF when the malfunction has not occurred after three–ignition cycles.
- A history DTC will clear after 40 consecutive warm up cycles without a fault.
- Using a scan tool can clear history DTCs.

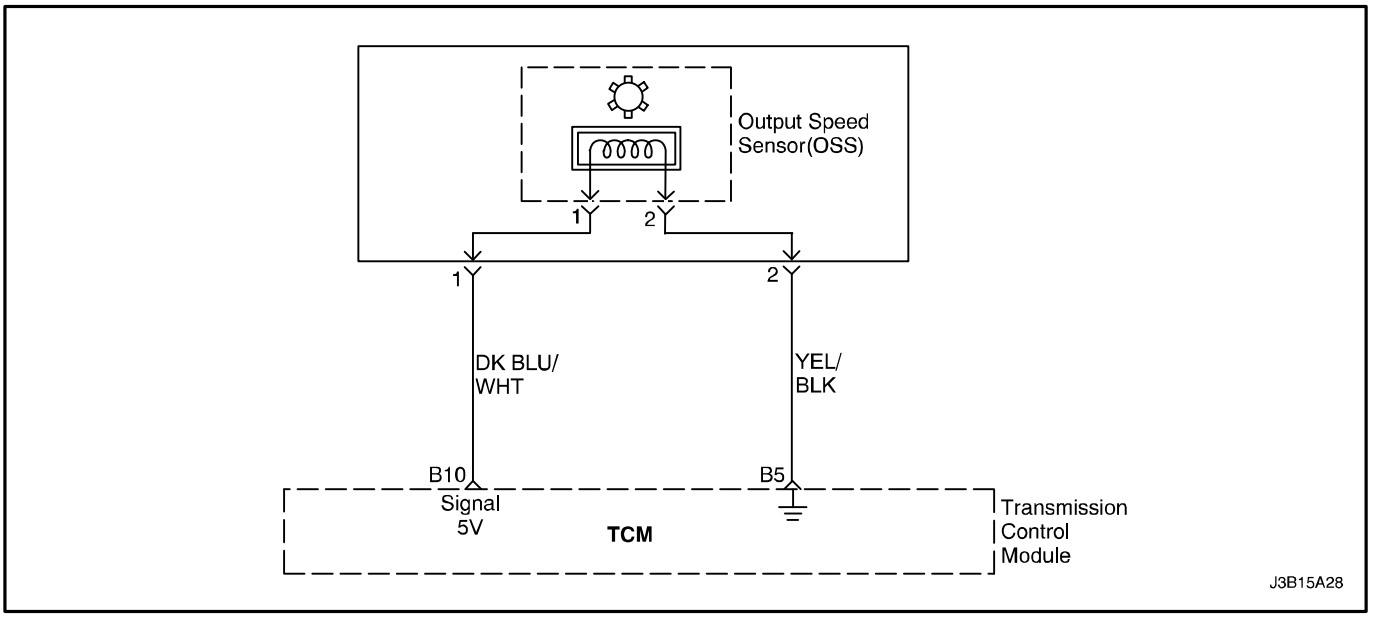
Diagnostic Aids

- When DTC P0720 sets, the possible cause of fault could be OSS(Output speed sensor).

DTC P0720 – Output Speed Sensor(OSS) Circuit Malfunction

Step	Action	Value(s)	Yes	No
1	Perform an On–Board Diagnostic (EOBD) System Check. Is the check completed?	–	Go to *Step 2*	Go to *"On–Board Diagnostic System Check"*
2	1. Install the scan tool. 2. Turn the ignition ON and record then clear DTC(s), then turn the ignition OFF. 3. Raise and support the drive wheels, then start the engine. 4. Gear position is D and observe the output speed on the scan tool. Is the speed within the values shown?	190~9,762rpm	Go to *"Diagnostic Aids"*	Go to *Step 3*
3	1. Turn the ignition OFF. 2. Disconnect the transaxle wiring connector. 3. Measure the resistance between terminals 1 and 2 of the transaxle wiring connector. Is the resistance within the values shown?	∞	Go to *Step 9*	Go to *Step 4*
4	1. Remove the oil pan. 2. Disconnect the output speed sensor wiring connector. 3. Measure the resistance between terminal 1 of the output speed sensor wiring connector and terminal 1 of the transaxle wiring connector. 4. Measure the resistance between terminal 2 of the output speed sensor wiring connector and terminal 2 of the transaxle wiring connector. Is the resistance within the values shown?	≈0Ω	Go to *Step 6*	Go to *Step 5*
5	Repair the malfunctioning terminals as necessary. Is the action complete?	–	System OK	–
6	1. Turn the ignition ON. 2. Measure the voltage of terminal 1. 3. Measure the voltage of terminal 2. Is the voltage within the values shown?	11–14V	Go to *Step 7*	Go to *Step 8*
7	Repair the malfunctioning terminals as necessary. Is the action complete?	–	System OK	–
8	Replace the output speed sensor. Is the action complete?	–	System OK	–
9	1. Disconnect the transaxle wiring connector and TCM connector. 2. Measure the resistance between terminal 1 of the transaxle wiring connector and terminal B10 of the TCM wiring connector. 3. Measure the resistance between terminal 2 of the transaxle wiring connector and terminal B5 of the TCM wiring connector. Is the resistance within the values shown?	≈0Ω	Go to *Step 11*	Go to *Step 10*
10	Repair the malfunctioning terminals as necessary. Is the action complete?	–	System OK	–

Step	Action	Value(s)	Yes	No
11	1. Turn the ignition ON. 2. Measure the voltage of terminal 1. 3. Measure the voltage of terminal 2. Is the voltage within the values shown?.	11–14V	Go to *Step 12*	Go to *Step 13*
12	Repair the malfunctioning terminals as necessary. Is the action complete?	–	System OK	–
13	Replace the TCM. Is the action complete?	–	Go to *Step 14*	–
14	1. After the repair, use a scan tool ”clear info” function and road test the vehicle. 2. Review the ”DTC info”. Has the last test failed or is the current DTC displayed?	–	Begin diagnosis again	Repair verified exit DTC chart



DIAGNOSTIC TROUBLE CODE(DTC) P0721

OUTPUT SPEED SENSOR(OSS) CIRCUIT RANGE/PERFORMANCE

Circuit Description

The vehicle A/T OSS is a magnetic inductive pickup that relays information relative to vehicle speed to the TCM.

Vehicle speed information is used by the TCM to control shift timing, line pressure, and TCC apply and release.

The output speed sensor mounts in the case at the speed sensor rotor, which is pressed onto the spur gear. An air gap of 0.1mm~1.3mm(0.004~0.05in) is maintained between the sensor and the teeth on the spur gear teeth. The sensor consists of a permanent magnet surrounded by a coil of wire. As the differential rotates, an AC signal induces a higher frequency and voltage measurement at the sensor. Sensor resistance should measure ∞ at 20˚C (68˚F). Sensor can measure from 20HZ~8,000HZ.

Conditions for Setting The DTC

- Transaxle speed is less than 8,160rpm.
- The increasing rate of output speed is more than 45,000rpm/sec.
- System voltage is greater than 8.5 volts.
- Engine is running.
- No engine speed error DTCs P0727, P0725.
- No transmission range sensor error DTC P0705.
- TCM or ECM is defective.
- Immediately after the above condition occurs.

Action Taken When The DTC Sets

- The Malfunction Indicator Lamp(MIL) will illuminate.
- The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer.
- Adopt Emergency/ Substitute mode and constant 4th gear.
- Open lock up clutch.

Conditions for Clearing The MIL/DTC

- The MIL will turn OFF when the malfunction has not occurred after three–ignition cycles.
- A history DTC will clear after 40 consecutive warm up cycles without a fault.
- Using a scan tool can clear history DTCs.

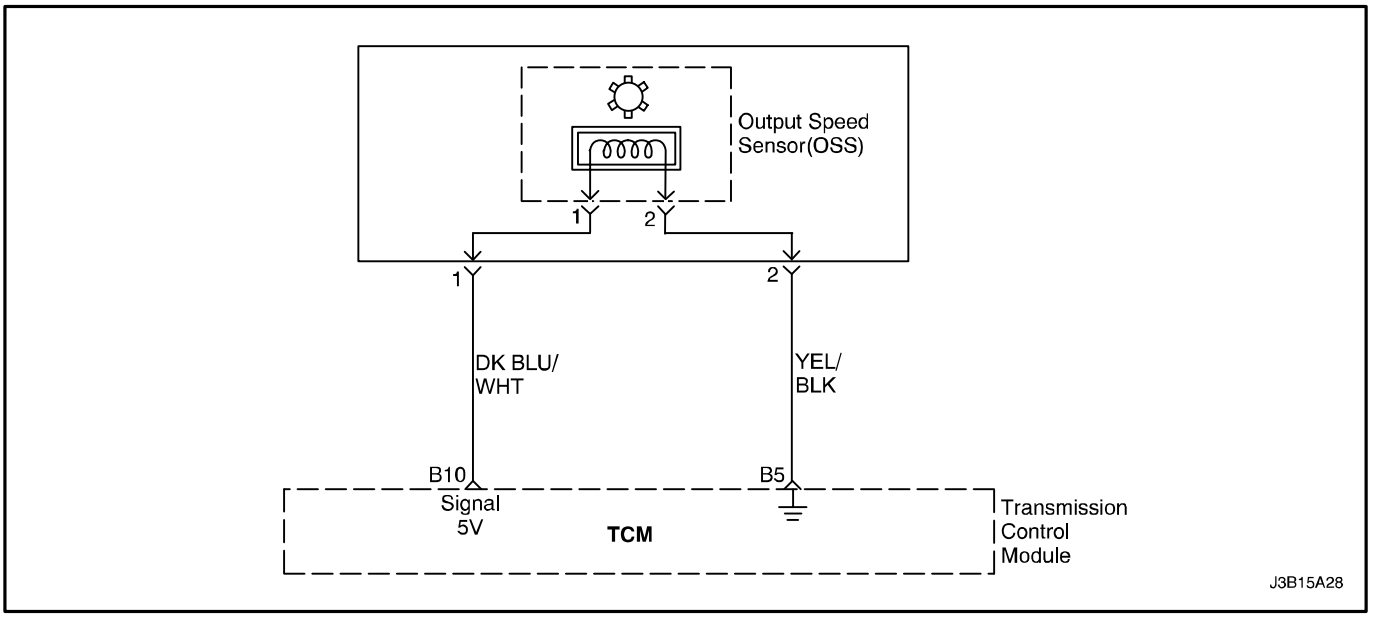
Diagnostic Aids

- When DTC P0721 sets, the possible cause of fault could be OSS(Output speed sensor).

DTC P0721 – Output Speed Sensor(OSS) Circuit Range/Performance

Step	Action	Value(s)	Yes	No
1	Perform an On–Board Diagnostic (EOBD) System Check. Is the check completed?	–	Go to *Step 2*	Go to *"On–Board Diagnostic System Check"*
2	1. Install the scan tool. 2. Turn the ignition ON and record then clear DTC(s), then turn the ignition OFF. 3. Raise and support the drive wheels, then start the engine. 4. Gear position is D and observe the output speed on the scan tool. Is the speed within the values shown?	190~9,762rpm	Go to *"Diagnostic Aids"*	Go to *Step 3*
3	1. Turn the ignition LOCK. 2. Disconnect the transaxle wiring connector. 3. Measure the resistance between terminals 1 and 2 of the transaxle wiring connector. Is the resistance within the values shown?	∞	Go to *Step 9*	Go to *Step 4*
4	1. Remove the oil pan. 2. Disconnect the output speed sensor wiring connector. 3. Measure the resistance between terminal 1 of the output speed sensor wiring connector and terminal 1 of the transaxle wiring connector. 4. Measure the resistance between terminal 2 of the output speed sensor wiring connector and terminal 2 of the transaxle wiring connector. Is the resistance within the values shown?	≈0Ω	Go to *Step 6*	Go to *Step 5*
5	Repair the malfunctioning terminals as necessary. Is the action complete?	–	System OK	–
6	1. Turn the ignition ON. 2. Measure the voltage of terminal 1. 3. Measure the voltage of terminal 2. Is the voltage within the values shown?	11–14V	Go to *Step 7*	Go to *Step 8*
7	Repair the malfunctioning terminals as necessary. Is the action complete?	–	System OK	–
8	Replace the input speed sensor. Is the action complete?	–	System OK	–
9	1. Disconnect the transaxle wiring connector and TCM connector. 2. Measure the resistance between terminal 1 of the transaxle wiring connector and terminal B10 of the TCM wiring connector. 3. Measure the resistance between terminal 2 of the transaxle wiring connector and terminal B5 of the TCM wiring connector. Is the resistance within the values shown?	≈0Ω	Go to *Step 11*	Go to *Step 10*
10	Repair the malfunctioning terminals as necessary. Is the action complete?	–	System OK	–

Step	Action	Value(s)	Yes	No
11	1. Turn the ignition ON. 2. Measure the voltage of terminal 1. 3. Measure the voltage of terminal 2. Is the voltage within the values shown?.	11–14V	Go to *Step 12*	Go to *Step 13*
12	Repair the malfunctioning terminals as necessary. Is the action complete?	–	System OK	–
13	Replace the TCM. Is the action complete?	–	Go to *Step 14*	–
14	1. After the repair, use a scan tool ”clear info” function and road test the vehicle. 2. Review the ”DTC info”. Has the last test failed or is the current DTC displayed?	–	Begin diagnosis again	Repair verified exit DTC chart



DIAGNOSTIC TROUBLE CODE(DTC) P0722

OUTPUT SPEED SENSOR(OSS) CIRCUIT NO SIGNAL

Circuit Description

The vehicle A/T OSS is a magnetic inductive pickup that relays information relative to vehicle speed to the TCM.

Vehicle speed information is used by the TCM to control shift timing, line pressure, and TCC apply and release.

The output speed sensor mounts in the case at the speed sensor rotor, which is pressed onto the spur gear. An air gap of 0.1mm~1.3mm(0.004~0.05in) is maintained between the sensor and the teeth on the spur gear teeth. The sensor consists of a permanent magnet surrounded by a coil of wire. As the differential rotates, an AC signal induces a higher frequency and voltage measurement at the sensor. Sensor resistance should measure ∞ at 20˚C (68˚F). Sensor can measure from 20HZ~8,000HZ.

Conditions for Setting The DTC

- If the gear shift is not in progress and the selector lever position is ”1”, ”2”, ”3”, ”D”, or ”Z3” and the transaxle output speed is less than the limit value of transaxle output speed for plausibility check of transaxle output speed and the turbine speed is greater than the limit value of turbine speed for plausibility check of transaxle output speed then the error bit will be set.
- System voltage is greater than 7 volts.
- Engine is running.
- No input speed error DTCs P0715, P0716, and P0717.
- No transmission range sensor error DTC P0705.
- TCM or ECM is defective.
- Immediately after the above condition occurs.

Action Taken When The DTC Sets

- The Malfunction Indicator Lamp(MIL) will illuminate.
- The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer.
- Vehicle running remains actual gear.
- Open lock up clutch.

Conditions for Clearing The MIL/DTC

- The MIL will turn OFF when the malfunction has not occurred after three–ignition cycles.
- A history DTC will clear after 40 consecutive warm up cycles without a fault.
- Using a scan tool can clear history DTCs.

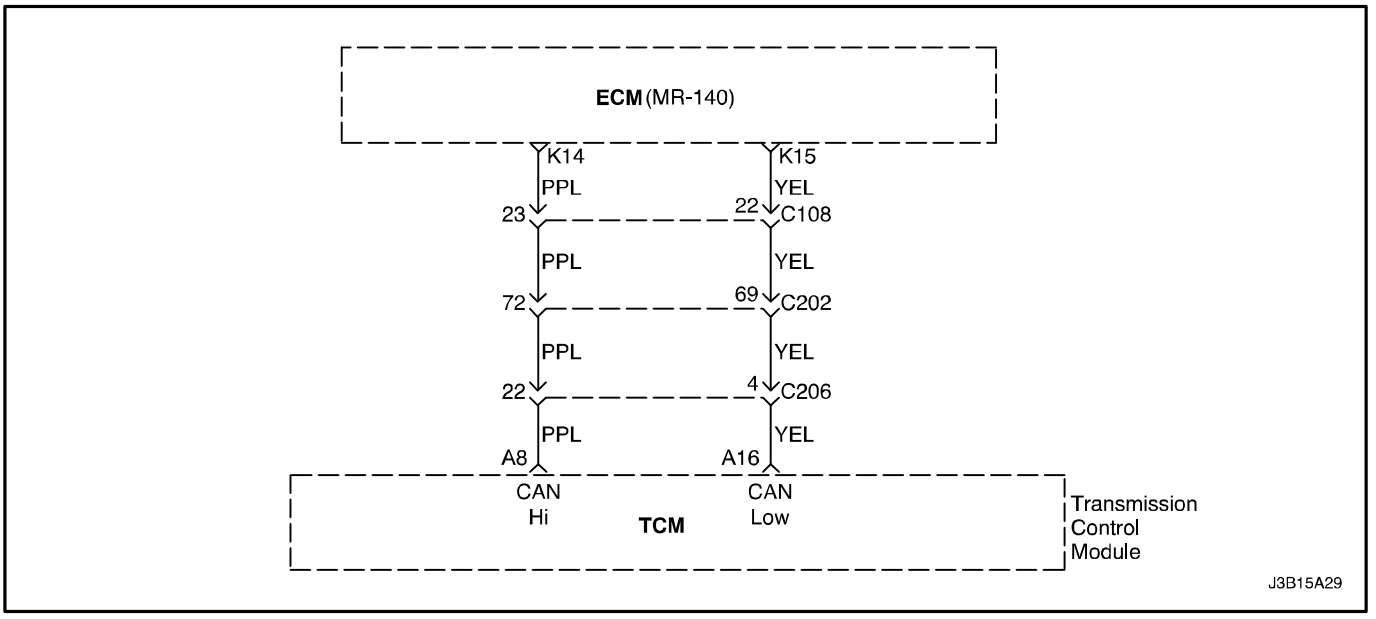
Diagnostic Aids

- When DTC P0722 sets, the possible cause of fault could be OSS(Output speed sensor).

DTC P0722 – Output Speed Sensor(OSS) Circuit No Signal

Step	Action	Value(s)	Yes	No
1	Perform an On–Board Diagnostic (EOBD) System Check. Is the check completed?	–	Go to *Step 2*	Go to *"On–Board Diagnostic System Check"*
2	1. Install the scan tool. 2. Turn the ignition ON and record then clear DTC(s), then turn the ignition OFF. 3. Raise and support the drive wheels, then start the engine. 4. Gear position is D and observe the output speed on the scan tool. Is the speed within the values shown?	190~9,762rpm	Go to *"Diagnostic Aids"*	Go to *Step 3*
3	1. Turn the ignition LOCK. 2. Disconnect the transaxle wiring connector. 3. Measure the resistance between terminals 1 and 2 of the transaxle wiring connector. Is the resistance within the values shown?	∞	Go to *Step 9*	Go to *Step 4*
4	1. Remove the oil pan. 2. Disconnect the output speed sensor wiring connector. 3. Measure the resistance between terminal 1 of the output speed sensor wiring connector and terminal 1 of the transaxle wiring connector. 4. Measure the resistance between terminal 2 of the output speed sensor wiring connector and terminal 2 of the transaxle wiring connector. Is the resistance within the values shown?	≈0Ω	Go to *Step 6*	Go to *Step 5*
5	Repair the malfunctioning terminals as necessary. Is the action complete?	–	System OK	–
6	1. Turn the ignition ON. 2. Measure the voltage of terminal 1. 3. Measure the voltage of terminal 2. Is the voltage within the values shown?	11–14V	Go to *Step 7*	Go to *Step 8*
7	Repair the malfunctioning terminals as necessary. Is the action complete?	–	System OK	–
8	Replace the output speed sensor. Is the action complete?	–	System OK	–
9	1. Disconnect the transaxle wiring connector and TCM connector. 2. Measure the resistance between terminal 1 of the transaxle wiring connector and terminal B10 of the TCM wiring connector. 3. Measure the resistance between terminal 2 of the transaxle wiring connector and terminal B5 of the TCM wiring connector. Is the resistance within the values shown?	≈0Ω	Go to *Step 11*	Go to *Step 10*
10	Repair the malfunctioning terminals as necessary. Is the action complete?	–	System OK	–

Step	Action	Value(s)	Yes	No
11	1. Turn the ignition ON. 2. Measure the voltage of terminal 1. 3. Measure the voltage of terminal 2. Is the voltage within the values shown?.	11–14V	Go to *Step 12*	Go to *Step 13*
12	Repair the malfunctioning terminals as necessary. Is the action complete?	–	System OK	–
13	Replace the TCM. Is the action complete?	–	Go to *Step 14*	–
14	1. After the repair, use a scan tool ”clear info” function and road test the vehicle. 2. Review the ”DTC info”. Has the last test failed or is the current DTC displayed?	–	Begin diagnosis again	Repair verified exit DTC chart



DIAGNOSTIC TROUBLE CODE(DTC) P0725

ENGINE SPEED INPUT CIRCUIT MALFUNCTION

Circuit Description

The transaxle control module(TCM) is an electronic device which monitors inputs to control various transaxle functions including shift quality and transaxle sensors, switches, and components to process for use within its' control program. Based on this input information, the TCM controls various transaxle output functions and devices.

DTC's P0725, P0726 and P0727 are related to the same circuit. These DTC's will not illuminate the MIL, however, the DTC will be stored in memory.

Information transmit between TCM and ECM through the CAN line. information is as follows :

- Engine Malfunction Signal.
- Engine Speed.
- Engine Output Torque Reduction Signal.
- Engine Coolant Temperature.

Conditions for Setting The DTC

- The engine speed is greater than 7,000rpm.
- System voltage is too high or too low.
- CAN transmitting wiring harness shorted or open.
- TCM or ECM is defective.
- Immediately after the above condition occurs.

Action Taken When The DTC Sets

- No lamp control required but diagnostic information should be stored immediately when malfunction is detected.
- Adopt Emergency/ Substitute mode and constant 4th gear.
- Open lock up clutch.

Conditions for Clearing the MIL/DTC

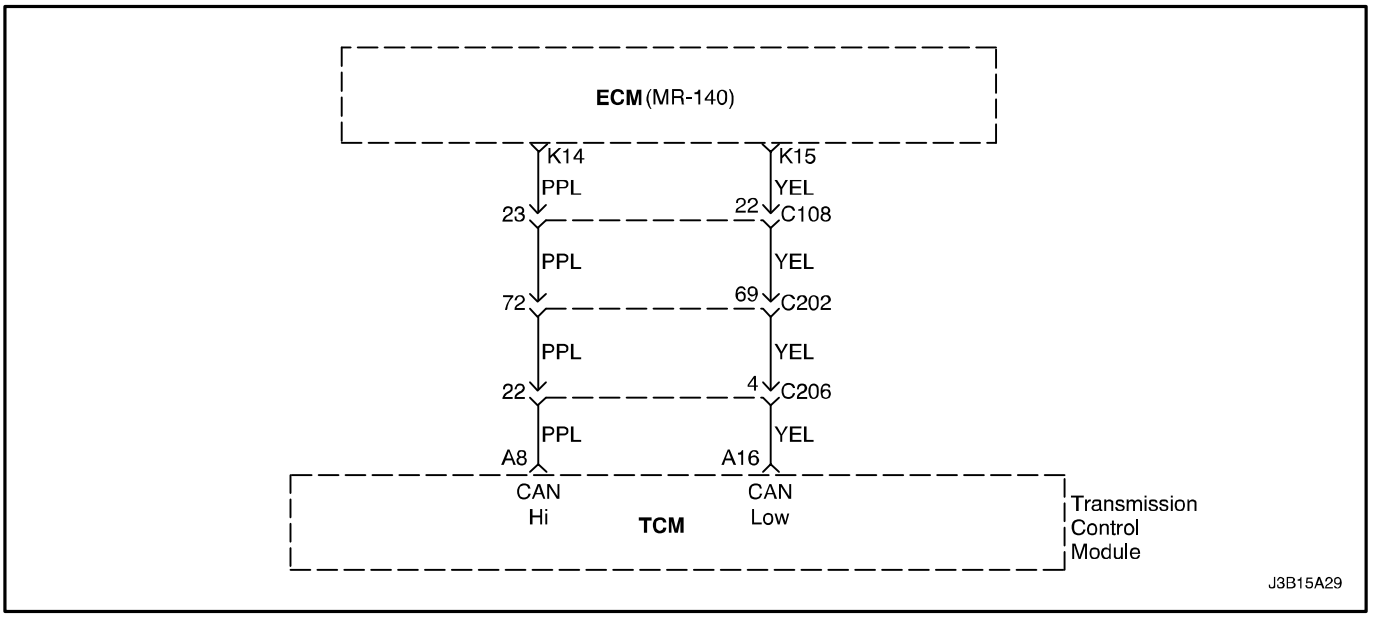
- The MIL will turn OFF when the malfunction has not occurred after three–ignition cycles.
- A history DTC will clear after 40 consecutive warm up cycles without a fault.
- Using a scan tool can clear history DTCs.

Diagnostic Aids

- Inspect the poor wiring harness connection for TCM connectors and transaxle wiring connectors.
- Inspect the improperly formed or damaged terminals.

DTC P0725 – Engine Speed Input Circuit Malfunction

Step	Action	Value(s)	Yes	No
1	Perform an On–Board Diagnostic (EOBD) System Check. Is the check completed?	–	Go to *Step 2*	Go to *"On–Board Diagnostic System Check"*
2	1. Install the scan tool. 2. Turn the ignition ON and record then clear DTC(s), then turn the ignition OFF. 3. Observe the engine speed on the scan tool. Is the speed within the values shown?	Engine speed 0–7,000rpm	Go to *"Diagnostic Aids"*	Go to *Step 3*
3	1. Turn the ignition OFF. 2. Disconnect the TCM wiring connector and ECM wiring connector. 3. Measure the resistance between terminal A8 of the TCM wiring connector and terminal K14 of the ECM wiring connector. 4. Measure the resistance between terminal A16 of the TCM wiring connector and terminal K15 of the ECM wiring connector. Is the resistance within the values shown?	≈0Ω	Go to *Step 5*	Go to *Step 4*
4	Repair the malfunctioning terminals as necessary. Is the action complete?	–	System OK	–
5	1. Turn the ignition ON. 2. Measure the voltage of terminal A8. 3. Measure the voltage of terminal A16. Is the voltage within the values shown?	11–14V	Go to *Step 6*	Go to *Step 7*
6	Repair the short to power. Is the action complete?	–	System OK	–
7	Inspect the "Engine Speed". Refer to *Section 1F, System Diagnosis.* Was a problem found?	–	Refer to *Section 1F, System Diagnosis.*	Go to *Step 8*
8	1. Replace the TCM. 2. Turn the ignition OFF. 3. Turn the ignition ON. 4. Check if P0725 DTC is set. 5. Is The DTC set?	–	Go to *Step 9*	Go to *Step 10*
9	1. Replace the ECM. 2. Is the action complete?	–	Go to *Step 10*	–
10	1. After the repair, use a scan tool "clear info" function and road test the vehicle. 2. Review the "DTC info". Has the last test failed or is the current DTC displayed?	–	Begin diagnosis again	Repair verified exit DTC chart



DIAGNOSTIC TROUBLE CODE(DTC) P0726

ENGINE SPEED INPUT CIRCUIT RANGE/PERFORMANCE

Circuit Description

The transaxle control module(TCM) is an electronic device which monitors inputs to control various transaxle functions including shift quality and transaxle sensors, switches, and components to process for use within its' control program. Based on this input information, the TCM controls various transaxle output functions and devices.

DTC's P0725, P0726 and P0727 are related to the same circuit. These DTC's will not illuminate the MIL, however, the DTC will be stored in memory.

Information transmit between TCM and ECM through the CAN line. information is as follows :

- Engine Malfunction Signal.
- Engine Speed.
- Engine Output Torque Reduction Signal.
- Engine Coolant Temperature.

Conditions for Setting The DTC

- Gear position is D.
- The engine speed is greater than 7,000rpm.
- System voltage is greater than 8.5 volts.
- Engine is running.
- No engine speed error DTCs P0727, P0725.
- CAN transmitting wiring harness shorted or open.
- TCM or ECM is defective.
- Immediately after the above condition occurs.

Action Taken When The DTC Sets

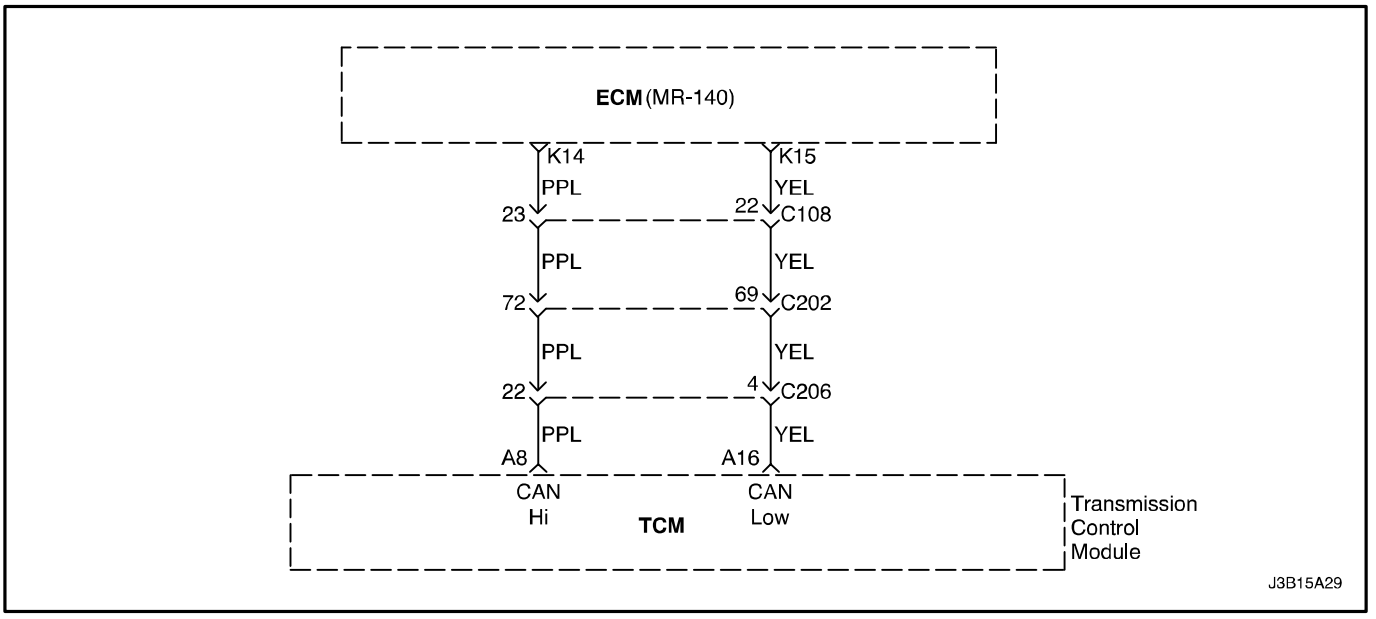
- The Malfunction Indicator Lamp(MIL) will illuminate.
- The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer.
- Adopt Emergency/ Substitute mode and constant 4th gear.
- Open lock up clutch.

Conditions for Clearing the MIL/DTC

- The MIL will turn OFF when the malfunction has not occurred after three–ignition cycles.
- A history DTC will clear after 40 consecutive warm up cycles without a fault.
- Using a scan tool can clear history DTCs.

DTC P0726 – Engine Speed Input Circuit Range/Performance

Step	Action	Value(s)	Yes	No
1	Perform an On–Board Diagnostic (EOBD) System Check. Is the check completed?	–	Go to *Step 2*	Go to *"On–Board Diagnostic System Check"*
2	1. Install the scan tool. 2. Turn the ignition ON and record then clear DTC(s), then turn the ignition OFF. 3. Observe the engine speed on the scan tool. Is the speed within the values shown?	Engine speed 0–7,000rpm	Go to *"Diagnostic Aids"*	Go to *Step 3*
3	1. Turn the ignition OFF. 2. Disconnect the TCM wiring connector and ECM wiring connector. 3. Measure the resistance between terminal A8 of the TCM wiring connector and terminal K14 of the ECM wiring connector. 4. Measure the resistance between terminal A16 of the TCM wiring connector and terminal K15 of the ECM wiring connector. Is the resistance within the values shown?	≈0Ω	Go to *Step 5*	Go to *Step 4*
4	Repair the malfunctioning terminals as necessary. Is the action complete?	–	System OK	–
5	1. Turn the ignition ON. 2. Measure the voltage of terminal A8. 3. Measure the voltage of terminal A16. Is the voltage within the values shown?	11–14V	Go to *Step 6*	Go to *Step 7*
6	Repair the short to power. Is the action complete?	–	System OK	–
7	Inspect the "Engine Speed". Refer to *Section 1F, System Diagnosis.* Was a problem found?	–	Refer to *Section 1F, System Diagnosis.*	Go to *Step 8*
8	1. Replace the TCM. 2. Turn the ignition OFF. 3. Turn the ignition ON. 4. Check if P0726 DTC is set. 5. Is The DTC set?	–	Go to *Step 9*	Go to *Step 10*
9	1. Replace the ECM. 2. Is the action complete?	–	Go to *Step 10*	–
10	1. After the repair, use a scan tool "clear info" function and road test the vehicle. 2. Review the "DTC info". Has the last test failed or is the current DTC displayed?	–	Begin diagnosis again	Repair verified exit DTC chart



DIAGNOSTIC TROUBLE CODE(DTC) P0727

ENGINE SPEED INPUT CIRCUIT NO SIGNAL

Circuit Description

The transaxle control module(TCM) is an electronic device which monitors inputs to control various transaxle functions including shift quality and transaxle sensors, switches, and components to process for use within its' control program. Based on this input information, the TCM controls various transaxle output functions and devices.

DTC's P0725, P0726 and P0727 are related to the same circuit. These DTC's will not illuminate the MIL, however, the DTC will be stored in memory.

Information transmit between TCM and ECM through the CAN line. information is as follows :

- Engine Malfunction Signal.
- Engine Speed.
- Engine Output Torque Reduction Signal.
- Engine Coolant Temperature.

Conditions for Setting The DTC

- When turbine speed is more than 1,500 rpm, engine speed is less than 400 rpm.
- System voltage is too high or too low.
- CAN transmitting wiring harness shorted or open.
- TCM or ECM is defective.
- Immediately after the above condition occurs.

Action Taken When The DTC Sets

- The Malfunction Indicator Lamp(MIL) will illuminate.
- The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer.
- Adopt Emergency/ Substitute mode and constant 4th gear.
- Open lock up clutch.

Conditions for Clearing the MIL/DTC

- The MIL will turn OFF when the malfunction has not occurred after three–ignition cycles.
- A history DTC will clear after 40 consecutive warm up cycles without a fault.
- Using a scan tool can clear history DTCs.

DTC P0727 – Engine Speed Input Circuit No Signal

Step	Action	Value(s)	Yes	No
1	Perform an On–Board Diagnostic (EOBD) System Check. Is the check completed?	–	Go to *Step 2*	Go to *"On–Board Diagnostic System Check"*
2	1. Install the scan tool. 2. Turn the ignition ON and record then clear DTC(s), then turn the ignition OFF. 3. Observe the engine speed on the scan tool. Is the speed within the values shown?	Engine speed 0–7,000rpm	Go to *"Diagnostic Aids"*	Go to *Step 3*
3	1. Turn the ignition OFF. 2. Disconnect the TCM wiring connector and ECM wiring connector. 3. Measure the resistance between terminal A8 of the TCM wiring connector and terminal K14 of the ECM wiring connector. 4. Measure the resistance between terminal A16 of the TCM wiring connector and terminal K15 of the ECM wiring connector. Is the resistance within the values shown?	≈0Ω	Go to *Step 5*	Go to *Step 4*
4	Repair the malfunctioning terminals as necessary. Is the action complete?	–	System OK	–
5	1. Turn the ignition ON. 2. Measure the voltage of terminal A8. 3. Measure the voltage of terminal A16. Is the voltage within the values shown?	11–14V	Go to *Step 6*	Go to *Step 7*
6	Repair the short to power. Is the action complete?	–	System OK	–
7	Inspect the "Engine Speed". Refer to *Section 1F, System Diagnosis.* Was a problem found?	–	Refer to *Section 1F, System Diagnosis.*	Go to *Step 8*
8	1. Replace the TCM. 2. Turn the ignition OFF. 3. Turn the ignition ON. 4. Check if P0727 DTC is set. 5. Is The DTC set?	–	Go to *Step 9*	Go to *Step 10*
9	1. Replace the ECM. 2. Is the action complete?	–	Go to *Step 10*	–
10	1. After the repair, use a scan tool "clear info" function and road test the vehicle. 2. Review the "DTC info". Has the last test failed or is the current DTC displayed?	–	Begin diagnosis again	Repair verified exit DTC chart

Range	Park/ Neutral	Reverse	D				3			2		1
Gear	**N**	**R**	**1st**	**2nd**	**3rd**	**4th**	**1st**	**2nd**	**3rd**	**1st**	**2nd**	**1st**
Solenoid Valve 1	ON	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF
Solenoid Valve 2	ON	ON	ON	OFF	OFF	OFF	ON	OFF	OFF	ON	OFF	ON
Line Pressure Control Solenoid Valve 3 (EDS 3)	OFF	OFF	OFF	ON	ON/ OFF	ON/ OFF	OFF	ON	ON/ OFF	OFF	ON	OFF
Line Pressure Control Solenoid Valve 4 (EDS 4)	ON	OFF	ON	ON	ON	OFF	ON	ON	ON	ON	ON	ON
Line Pressure Control Solenoid Valve 5 (EDS 5)	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	ON	ON	ON
Line Pressure Control Solenoid Valve 6 (EDS 6)	ON	OFF	ON	ON	ON	OFF	ON	ON	ON	ON	ON	ON
Brake B	A	A	A		A		A		A	A		A
Brake C						H						
Brake D		H										
Clutch E				A	A	A		A	A		A	
Brake F			H	H			H	H		H	H	H
Lock–up Clutch						A						

A = Applied
H = Holding
ON = The solenoid is energized.
OFF = The solenoid is de–energized.
** = Manual Second–Third gear is only available above approximately 100 km/h (62 mph).
*** = Manual First–Second gear is only available above approximately 60 km/h (37 mph).
Note : Manual First–Third gear is also possible at high vehicle speed as a safety feature.

DIAGNOSTIC TROUBLE CODE(DTC) P0731

GEAR 1 INCORRECT RATIO

Circuit Description

The TCM uses transaxle input speed information and output speed sensor to control line pressure, TCC apply and release and transaxle shift patterns. This information is also uses to calculate the appropriate operating gear ratios and TCC slippage. Conditions for Setting the DTC.

Conditions for Setting The DTC

- Time since TCM reset is greater than 500 msec.
- Time since shift end is greater than 500 msec.
- Transmission oil temperature is greater than –10˚C (14˚F).
- System voltage is greater than 9 volts.
- No input speed error DTCs P0715, P0716, and P0717.
- Output speed is greater than 256 rpm.
- Input speed is greater than 400 rpm.
- No gear shift active.

Action Taken When The DTC Sets

- The Malfunction Indicator Lamp(MIL) will illuminate.

- The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer.
- Adopt Emergency/ Substitute mode and constant 4th gear.
- High line pressure

Conditions for Clearing the MIL/DTC

- The MIL will turn OFF when the malfunction has not occurred after three–ignition cycle.
- A history DTC will clear after 40 consecutive warm up cycles without a fault.
- Using a scan tool can clear history DTCs.

Diagnostic Aids

- Check for intermittent input speed sensor or output speed sensor circuit problems.
- Check for possible incorrect calibration.

DTC P0731 – Gear 1 Incorrect Ratio

Step	Action	Value(s)	Yes	No
1	Perform an On–Board Diagnostic (EOBD) System Check. Is the check completed?	–	Go to *Step 2*	Go to *"On–Board Diagnostic System Check"*
2	Visually inspect the transaxle cooling system for fluid leaks. Was condition found and corrected?	–	Go to *Step 7*	Go to *Step 3*
3	Has the transaxle fluid checking procedure been performed?	–	Go to *Step 4*	Go to Transaxle fluid check procedures
4	1. Using the scan tool record each transaxle drive range. 2. Drive the vehicle in transaxle gear ranges 1,2,3 and D with TP greater than 15% and vehicle speed greater than 16km/h(10mph) for five seconds. Does commanded gear ratio match ranges as shown?	1st = 2.719 2nd = 1.487 3rd = 1.000 4th = 0.717	Refer to Diagnostic Aids	Go to *Step 5*
5	Perform line pressure check. Was the condition found and corrected?	–	Go to *Step 7*	Go to *Step 6*
6	Check for possible clutch slippage. Was the condition found and corrected?	–	Go to *Step 7*	–
7	1. After the repair, use a scan tool "clear info" function and road test the vehicle. 2. Review the "DTC info". Has the last test failed or is the current DTC displayed?		Replace transaxle assembly	Repair verified exit DTC chart

Range	Park/ Neutral	Reverse	D				3			2		1
Gear	**N**	**R**	**1st**	**2nd**	**3rd**	**4th**	**1st**	**2nd**	**3rd**	**1st**	**2nd**	**1st**
Solenoid Valve 1	ON	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF
Solenoid Valve 2	ON	ON	ON	OFF	OFF	OFF	ON	OFF	OFF	ON	OFF	ON
Line Pressure Control Solenoid Valve 3 (EDS 3)	OFF	OFF	OFF	ON	ON/ OFF	ON/ OFF	OFF	ON	ON/ OFF	OFF	ON	OFF
Line Pressure Control Solenoid Valve 4 (EDS 4)	ON	OFF	ON	ON	ON	OFF	ON	ON	ON	ON	ON	ON
Line Pressure Control Solenoid Valve 5 (EDS 5)	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	ON	ON	ON
Line Pressure Control Solenoid Valve 6 (EDS 6)	ON	OFF	ON	ON	ON	OFF	ON	ON	ON	ON	ON	ON
Brake B	A	A	A		A		A		A	A		A
Brake C						H						
Brake D		H										
Clutch E				A	A	A		A	A		A	
Brake F			H	H			H	H		H	H	H
Lock–up Clutch						A						

A = Applied
H = Holding
ON = The solenoid is energized.
OFF = The solenoid is de–energized.
** = Manual Second–Third gear is only available above approximately 100 km/h (62 mph).
*** = Manual First–Second gear is only available above approximately 60 km/h (37 mph).
Note : Manual First–Third gear is also possible at high vehicle speed as a safety feature.

DIAGNOSTIC TROUBLE CODE(DTC) P0732

GEAR 2 INCORRECT RATIO

Circuit Description

The TCM uses transaxle input speed information and output speed sensor to control line pressure, TCC apply and release and transaxle shift patterns. This information is also uses to calculate the appropriate operating gear ratios and TCC slippage. Conditions for Setting the DTC.

Conditions for Setting The DTC

- Time since TCM reset is greater than 500 msec.
- Time since shift end is greater than 500 msec.
- Transmission oil temperature is greater than –10˚C (14˚F).
- System voltage is greater than 9 volts.
- No input speed error DTCs P0715, P0716 or P0717.
- Output speed is greater than 256 rpm.
- Input speed is greater than 400 rpm.
- No gear shift active.

Action Taken When The DTC Sets

- The Malfunction Indicator Lamp(MIL) will illuminate.

- The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer.
- Adopt Emergency/ Substitute mode and constant 3rd gear.
- High line pressure

Conditions for Clearing the MIL/DTC

- The MIL will turn OFF when the malfunction has not occurred after three–ignition cycle.
- A history DTC will clear after 40 consecutive warm up cycles without a fault.
- Using a scan tool can clear history DTCs.

Diagnostic Aids

- Check for intermittent input speed sensor or output speed sensor circuit problems.
- Check for possible incorrect calibration.

DTC P0732 – Gear 2 Incorrect Ratio

Step	Action	Value(s)	Yes	No
1	Perform an On–Board Diagnostic (EOBD) System Check. Is the check completed?	–	Go to *Step 2*	Go to *"On–Board Diagnostic System Check"*
2	Visually inspect the transaxle cooling system for fluid leaks. Was condition found and corrected?	–	Go to *Step 7*	Go to *Step 3*
3	Has the transaxle fluid checking procedure been performed?	–	Go to *Step 4*	Go to Transaxle fluid check procedures
4	1. Using the scan tool record each transaxle drive range. 2. Drive the vehicle in transaxle gear ranges 1,2,3 and D with TP greater than 15% and vehicle speed greater than 16km/h(10mph) for five seconds. Does commanded gear ratio match ranges as shown?	1st = 2.719 2nd = 1.487 3rd = 1.000 4th = 0.717	Refer to Diagnostic Aids	Go to *Step 5*
5	Perform line pressure check. Was the condition found and corrected?	–	Go to *Step 7*	Go to *Step 6*
6	Check for possible clutch slippage. Was the condition found and corrected?	–	Go to *Step 7*	–
7	1. After the repair, use a scan tool "clear info" function and road test the vehicle. 2. Review the "DTC info". Has the last test failed or is the current DTC displayed?		Replace transaxle assembly	Repair verified exit DTC chart

Range	Park/ Neutral	Reverse	D				3			2		1
Gear	**N**	**R**	**1st**	**2nd**	**3rd**	**4th**	**1st**	**2nd**	**3rd**	**1st**	**2nd**	**1st**
Solenoid Valve 1	ON	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF
Solenoid Valve 2	ON	ON	ON	OFF	OFF	OFF	ON	OFF	OFF	ON	OFF	ON
Line Pressure Control Solenoid Valve 3 (EDS 3)	OFF	OFF	OFF	ON	ON/ OFF	ON/ OFF	OFF	ON	ON/ OFF	OFF	ON	OFF
Line Pressure Control Solenoid Valve 4 (EDS 4)	ON	OFF	ON	ON	ON	OFF	ON	ON	ON	ON	ON	ON
Line Pressure Control Solenoid Valve 5 (EDS 5)	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	ON	ON	ON
Line Pressure Control Solenoid Valve 6 (EDS 6)	ON	OFF	ON	ON	ON	OFF	ON	ON	ON	ON	ON	ON
Brake B	A	A	A		A		A		A	A		A
Brake C						H						
Brake D		H										
Clutch E				A	A	A		A	A		A	
Brake F			H	H			H	H		H	H	H
Lock–up Clutch						A						

A = Applied
H = Holding
ON = The solenoid is energized.
OFF = The solenoid is de–energized.
** = Manual Second–Third gear is only available above approximately 100 km/h (62 mph).
*** = Manual First–Second gear is only available above approximately 60 km/h (37 mph).
Note : Manual First–Third gear is also possible at high vehicle speed as a safety feature.

DIAGNOSTIC TROUBLE CODE(DTC) P0733

GEAR 3 INCORRECT RATIO

Circuit Description

The TCM uses transaxle input speed information and output speed sensor to control line pressure, TCC apply and release and transaxle shift patterns. This information is also uses to calculate the appropriate operating gear ratios and TCC slippage. Conditions for Setting the DTC.

Conditions for Setting The DTC

- Time since TCM reset is greater than 500 msec.
- Time since shift end is greater than 500 msec.
- Transmission oil temperature is greater than –10˚C (14˚F).
- System voltage is greater than 9 volts.
- No input speed error DTCs P0715, P0716, and P0717.
- Output speed is greater than 256 rpm.
- Input speed is greater than 400 rpm.
- No gear shift active.

Action Taken When The DTC Sets

- The Malfunction Indicator Lamp(MIL) will illuminate.

- The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer.
- Adopt Emergency/ Substitute mode and constant 4th gear.
- High line pressure

Conditions for Clearing the MIL/DTC

- The MIL will turn OFF when the malfunction has not occurred after three–ignition cycle.
- A history DTC will clear after 40 consecutive warm up cycles without a fault.
- Using a scan tool can clear history DTCs.

Diagnostic Aids

- Check for intermittent input speed sensor or output speed sensor circuit problems.
- Check for possible incorrect calibration.

DTC P0733 – Gear 3 Incorrect Ratio

Step	Action	Value(s)	Yes	No
1	Perform an On–Board Diagnostic (EOBD) System Check. Is the check completed?	–	Go to *Step 2*	Go to *"On–Board Diagnostic System Check"*
2	Visually inspect the transaxle cooling system for fluid leaks. Was condition found and corrected?	–	Go to *Step 7*	Go to *Step 3*
3	Has the transaxle fluid checking procedure been performed?	–	Go to *Step 4*	Go to Transaxle fluid check procedures
4	1. Using the scan tool record each transaxle drive range. 2. Drive the vehicle in transaxle gear ranges 1,2,3 and D with TP greater than 15% and vehicle speed greater than 16km/h(10mph) for five seconds. Does commanded gear ratio match ranges as shown?	1st = 2.719 2nd = 1.487 3rd = 1.000 4th = 0.717	Refer to Diagnostic Aids	Go to *Step 5*
5	Perform line pressure check. Was the condition found and corrected?	–	Go to *Step 7*	Go to *Step 6*
6	Check for possible clutch slippage. Was the condition found and corrected?	–	Go to *Step 7*	–
7	1. After the repair, use a scan tool "clear info" function and road test the vehicle. 2. Review the "DTC info". Has the last test failed or is the current DTC displayed?		Replace transaxle assembly	Repair verified exit DTC chart

Range	Park/ Neutral	Reverse	D				3			2		1
Gear	**N**	**R**	**1st**	**2nd**	**3rd**	**4th**	**1st**	**2nd**	**3rd**	**1st**	**2nd**	**1st**
Solenoid Valve 1	ON	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF
Solenoid Valve 2	ON	ON	ON	OFF	OFF	OFF	ON	OFF	OFF	ON	OFF	ON
Line Pressure Control Solenoid Valve 3 (EDS 3)	OFF	OFF	OFF	ON	ON/ OFF	ON/ OFF	OFF	ON	ON/ OFF	OFF	ON	OFF
Line Pressure Control Solenoid Valve 4 (EDS 4)	ON	OFF	ON	ON	ON	OFF	ON	ON	ON	ON	ON	ON
Line Pressure Control Solenoid Valve 5 (EDS 5)	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	ON	ON	ON
Line Pressure Control Solenoid Valve 6 (EDS 6)	ON	OFF	ON	ON	ON	OFF	ON	ON	ON	ON	ON	ON
Brake B	A	A	A		A		A		A	A		A
Brake C						H						
Brake D		H										
Clutch E				A	A	A		A	A		A	
Brake F			H	H			H	H		H	H	H
Lock–up Clutch						A						

A = Applied
H = Holding
ON = The solenoid is energized.
OFF = The solenoid is de–energized.
** = Manual Second–Third gear is only available above approximately 100 km/h (62 mph).
*** = Manual First–Second gear is only available above approximately 60 km/h (37 mph).
Note : Manual First–Third gear is also possible at high vehicle speed as a safety feature.

DIAGNOSTIC TROUBLE CODE(DTC) P0734

GEAR 4 INCORRECT RATIO

Circuit Description

The TCM uses transaxle input speed information and output speed sensor to control line pressure, TCC apply and release and transaxle shift patterns. This information is also uses to calculate the appropriate operating gear ratios and TCC slippage. Conditions for Setting the DTC.

Conditions for Setting The DTC

- Time since TCM reset is greater than 500 msec.
- Time since shift end is greater than 500 msec.
- Transmission oil temperature is greater than –10˚C (14˚F).
- System voltage is greater than 9 volts.
- No input speed error DTCs P0715, P0716, and P0717.
- Output speed is greater than 256 rpm.
- Input speed is greater than 400 rpm.
- No gear shift active.

Action Taken When The DTC Sets

- The Malfunction Indicator Lamp(MIL) will illuminate.

- The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer.
- Adopt Emergency/ Substitute mode and constant 4th gear by hydraulic control.
- After ignition OFF/ON : 3rd gear by hydraulic control. Possible P, R and N also possible.
- High line pressure

Conditions for Clearing the MIL/DTC

- The MIL will turn OFF when the malfunction has not occurred after three–ignition cycle.
- A history DTC will clear after 40 consecutive warm up cycles without a fault.
- Using a scan tool can clear history DTCs.

Diagnostic Aids

- Check for intermittent input speed sensor or output speed sensor circuit problems.
- Check for possible incorrect calibration.

DTC P0734 – Gear 4 Incorrect Ratio

Step	Action	Value(s)	Yes	No
1	Perform an On–Board Diagnostic (EOBD) System Check. Is the check completed?	–	Go to *Step 2*	Go to *"On–Board Diagnostic System Check"*
2	Visually inspect the transaxle cooling system for fluid leaks. Was condition found and corrected?	–	Go to *Step 7*	Go to *Step 3*
3	Has the transaxle fluid checking procedure been performed?	–	Go to *Step 4*	Go to Transaxle fluid check procedures
4	1. Using the scan tool record each transaxle drive range. 2. Drive the vehicle in transaxle gear ranges 1,2,3 and D with TP greater than 15% and vehicle speed greater than 16km/h(10mph) for five seconds. Does commanded gear ratio match ranges as shown?	1st = 2.719 2nd = 1.487 3rd = 1.000 4th = 0.717	Refer to Diagnostic Aids	Go to *Step 5*
5	Perform line pressure check. Was the condition found and corrected?	–	Go to *Step 7*	Go to *Step 6*
6	Check for possible clutch slippage. Was the condition found and corrected?	–	Go to *Step 7*	–
7	1. After the repair, use a scan tool "clear info" function and road test the vehicle. 2. Review the "DTC info". Has the last test failed or is the current DTC displayed?		Replace transaxle assembly	Repair verified exit DTC chart

Range	Park/ Neutral	Reverse	D				3			2		1
Gear	**N**	**R**	**1st**	**2nd**	**3rd**	**4th**	**1st**	**2nd**	**3rd**	**1st**	**2nd**	**1st**
Solenoid Valve 1	ON	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF
Solenoid Valve 2	ON	ON	ON	OFF	OFF	OFF	ON	OFF	OFF	ON	OFF	ON
Line Pressure Control Solenoid Valve 3 (EDS 3)	OFF	OFF	OFF	ON	ON/ OFF	ON/ OFF	OFF	ON	ON/ OFF	OFF	ON	OFF
Line Pressure Control Solenoid Valve 4 (EDS 4)	ON	OFF	ON	ON	ON	OFF	ON	ON	ON	ON	ON	ON
Line Pressure Control Solenoid Valve 5 (EDS 5)	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	ON	ON	ON
Line Pressure Control Solenoid Valve 6 (EDS 6)	ON	OFF	ON	ON	ON	OFF	ON	ON	ON	ON	ON	ON
Brake B	A	A	A		A		A		A	A		A
Brake C						H						
Brake D		H										
Clutch E				A	A	A		A	A		A	
Brake F			H	H			H	H		H	H	H
Lock–up Clutch						A						

A = Applied
H = Holding
ON = The solenoid is energized.
OFF = The solenoid is de–energized.
** = Manual Second–Third gear is only available above approximately 100 km/h (62 mph).
*** = Manual First–Second gear is only available above approximately 60 km/h (37 mph).
Note : Manual First–Third gear is also possible at high vehicle speed as a safety feature.

DIAGNOSTIC TROUBLE CODE(DTC) P0781

1–2 SHIFT MALFUNCTION

Circuit Description

The special feature of 4HP 16 Auto Transaxle is that it operates without freewheels. Shifting between individual gears takes place by means of overlapping clutch engagement and release.

The advantage of overlap shifting are as follows:

–The transaxle can be of more compact design and is lighter on account of the absence of freewheels and the lower number of shift elements.
–Lower drag losses, i.e. higher efficiency.
–Lower peak torque acting on the components and driveline.

However, overlap shifting necessitates high–performance hardware and software, and precision engine signals.

Conditions for Setting The DTC

- Transmission oil temperature is greater than –10˚C (14˚F).
- Selector lever is not N(Neutral), P(Park) position.
- System voltage is greater than 9 volts.

- No input speed error DTCs P0715, P0716, and P0717.
- Output speed is greater than 256 rpm.
- Input speed is greater than 400 rpm.
- 1–2 gear shift is active.
- Immediately after the above condition occurs.

Action Taken When The DTC Sets

- The Malfunction Indicator Lamp(MIL) will illuminate.
- The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer.
- Adopt Emergency/ Substitute mode and constant 1st gear.
- Open lock up clutch.

Conditions for Clearing the MIL/DTC

- The MIL will turn OFF when the malfunction has not occurred after three–ignition cycle.
- A history DTC will clear after 40 consecutive warm up cycles without a fault.
- Using a scan tool can clear history DTCs.

Diagnostic Aids

- When DTC P0781 sets, the possible cause of fault could be TCM.

DTC P0781 – 1–2 Shift Malfunction

Step	Action	Value(s)	Yes	No
1	Perform an On–Board Diagnostic (EOBD) System Check. Is the check completed?	–	Go to *Step 2*	Go to *"On–Board Diagnostic System Check"*
2	1. Install the scan tool. 2. Turn the ignition ON, with the engine OFF. 3. Start engine and allow it to warm up at idle. 4. Observe "idle rpm, TPS" on the scan tool. Was condition found and corrected?	–	Refer to *"Engine diagnostic information"*	Go to *Step 3*
3	Inspect "ECM". Refer to *Section 1F, System Diagnosis, EOBD System Check.* Was a problem found?	–	Go to *"Section 1F, System Diagnosis"*	Go to *Step 4*
4	1. Turn the ignition OFF. 2. Disconnect the TCM wiring connector. 3. Measure the voltage between terminal B3 and B13 of the transaxle wiring connector. 4. Turn the ignition ON. 5. Measure the voltage between terminal C15 and B13 of the transaxle wiring connector. 6. Measure the voltage between terminal C16 and B13 of the transaxle wiring connector. Is the voltage within the values shown?	11–14V	Go to *Step 5*	Go to *"System voltage low or high"*
5	Replace the TCM. Is the action complete?	–	Go to *Step 6*	–
6	1. After the repair, use a scan tool "clear info" function and road test the vehicle. 2. Review the "DTC info". Has the last test failed or is the current DTC displayed?	–	Replace the transaxle assembly	Repair verified exit DTC chart

Range	Park/ Neutral	Reverse	D				3			2		1
Gear	**N**	**R**	**1st**	**2nd**	**3rd**	**4th**	**1st**	**2nd**	**3rd**	**1st**	**2nd**	**1st**
Solenoid Valve 1	ON	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF
Solenoid Valve 2	ON	ON	ON	OFF	OFF	OFF	ON	OFF	OFF	ON	OFF	ON
Line Pressure Control Solenoid Valve 3 (EDS 3)	OFF	OFF	OFF	ON	ON/ OFF	ON/ OFF	OFF	ON	ON/ OFF	OFF	ON	OFF
Line Pressure Control Solenoid Valve 4 (EDS 4)	ON	OFF	ON	ON	ON	OFF	ON	ON	ON	ON	ON	ON
Line Pressure Control Solenoid Valve 5 (EDS 5)	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	ON	ON	ON
Line Pressure Control Solenoid Valve 6 (EDS 6)	ON	OFF	ON	ON	ON	OFF	ON	ON	ON	ON	ON	ON
Brake B	A	A	A		A		A		A	A		A
Brake C						H						
Brake D		H										
Clutch E				A	A	A		A	A		A	
Brake F			H	H			H	H		H	H	H
Lock–up Clutch						A						

A = Applied
H = Holding
ON = The solenoid is energized.
OFF = The solenoid is de–energized.
** = Manual Second–Third gear is only available above approximately 100 km/h (62 mph).
*** = Manual First–Second gear is only available above approximately 60 km/h (37 mph).
Note : Manual First–Third gear is also possible at high vehicle speed as a safety feature.

DIAGNOSTIC TROUBLE CODE(DTC) P0782

2–3 SHIFT MALFUNCTION

Circuit Description

The special feature of 4HP 16 Auto Transaxle is that it operates without freewheels. Shifting between individual gears takes place by means of overlapping clutch engagement and release.

The advantage of overlap shifting are as follows:

–The transaxle can be of more compact design and is lighter on account of the absence of freewheels and the lower number of shift elements.
–Lower drag losses, i.e. higher efficiency.
–Lower peak torque acting on the components and driveline.

However, overlap shifting necessitates high–performance hardware and software, and precision engine signals.

Conditions for Setting The DTC

- Transmission oil temperature is greater than –10˚C (14˚F).
- Selector lever is not N(Neutral), P(Park) position.
- System voltage is greater than 9 volts.

- No input speed error DTCs P0715, P0716, and P0717.
- Output speed is greater than 256 rpm.
- Input speed is greater than 400 rpm.
- 2–3 gear shift is active.
- Immediately after the above condition occurs.

Action Taken When The DTC Sets

- The Malfunction Indicator Lamp(MIL) will illuminate.
- The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer.
- Adopt Emergency/ Substitute mode and constant 2nd gear.
- Open lock up clutch.

Conditions for Clearing the MIL/DTC

- The MIL will turn OFF when the malfunction has not occurred after three–ignition cycle.
- A history DTC will clear after 40 consecutive warm up cycles without a fault.
- Using a scan tool can clear history DTCs.

Diagnostic Aids

- When DTC P0782 sets, the possible cause of fault could be TCM.

DTC P0782 – 2–3 Shift Malfunction

Step	Action	Value(s)	Yes	No
1	Perform an On–Board Diagnostic (EOBD) System Check. Is the check completed?	–	Go to *Step 2*	Go to *"On–Board Diagnostic System Check"*
2	1. Install the scan tool. 2. Turn the ignition ON, with the engine OFF. 3. Start engine and allow it to warm up at idle. 4. Observe "idle rpm, TPS and so on" the scan tool. Was condition found and corrected?	–	Refer to *"Engine diagnostic information"*	Go to *Step 3*
3	Inspect "ECM". Refer to *Section 1F, System Diagnosis, EOBD System Check.* Was a problem found?	–	Go to *"Section 1F, System Diagnosis"*	Go to *Step 4*
4	1. Turn the ignition OFF. 2. Disconnect the TCM wiring connector. 3. Measure the voltage between terminal B3 and B13 of the transaxle wiring connector. 4. Turn the ignition ON. 5. Measure the voltage between terminal C15 and B13 of the transaxle wiring connector. 6. Measure the voltage between terminal C16 and B13 of the transaxle wiring connector. Is the voltage within the values shown?	11–14V	Go to *Step 5*	Go to *"System voltage low or high"*
5	Replace the TCM. Is the action complete?	–	Go to *Step 6*	–
6	1. After the repair, use a scan tool "clear info" function and road test the vehicle. 2. Review the "DTC info". Has the last test failed or is the current DTC displayed?	–	Replace the transaxle assembly	Repair verified exit DTC chart

Range	Park/ Neutral	Reverse	D				3			2		1
Gear	**N**	**R**	**1st**	**2nd**	**3rd**	**4th**	**1st**	**2nd**	**3rd**	**1st**	**2nd**	**1st**
Solenoid Valve 1	ON	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF
Solenoid Valve 2	ON	ON	ON	OFF	OFF	OFF	ON	OFF	OFF	ON	OFF	ON
Line Pressure Control Solenoid Valve 3 (EDS 3)	OFF	OFF	OFF	ON	ON/ OFF	ON/ OFF	OFF	ON	ON/ OFF	OFF	ON	OFF
Line Pressure Control Solenoid Valve 4 (EDS 4)	ON	OFF	ON	ON	ON	OFF	ON	ON	ON	ON	ON	ON
Line Pressure Control Solenoid Valve 5 (EDS 5)	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	ON	ON	ON
Line Pressure Control Solenoid Valve 6 (EDS 6)	ON	OFF	ON	ON	ON	OFF	ON	ON	ON	ON	ON	ON
Brake B	A	A	A		A		A		A	A		A
Brake C						H						
Brake D		H										
Clutch E				A	A	A		A	A		A	
Brake F			H	H			H	H		H	H	H
Lock–up Clutch						A						

A = Applied
H = Holding
ON = The solenoid is energized.
OFF = The solenoid is de–energized.
** = Manual Second–Third gear is only available above approximately 100 km/h (62 mph).
*** = Manual First–Second gear is only available above approximately 60 km/h (37 mph).
Note : Manual First–Third gear is also possible at high vehicle speed as a safety feature.

DIAGNOSTIC TROUBLE CODE(DTC) P0783

3–4 SHIFT MALFUNCTION

Circuit Description

The special feature of 4HP 16 Auto Transaxle is that it operates without freewheels. Shifting between individual gears takes place by means of overlapping clutch engagement and release.

The advantage of overlap shifting are as follows:

–The transaxle can be of more compact design and is lighter on account of the absence of freewheels and the lower number of shift elements.
–Lower drag losses, i.e. higher efficiency.
–Lower peak torque acting on the components and driveline.

However, overlap shifting necessitates high–performance hardware and software, and precision engine signals.

Conditions for Setting The DTC

- Transmission oil temperature is greater than –10˚C (14˚F).
- Selector lever is not N(Neutral), P(Park) position.
- System voltage is greater than 9 volts.

- No input speed error DTCs P0715, P0716, and P0717.
- Output speed is greater than 256 rpm.
- Input speed is greater than 400 rpm.
- 3–4 gear shift is active.
- Immediately after the above condition occurs.

Action Taken When The DTC Sets

- The Malfunction Indicator Lamp(MIL) will illuminate.
- The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer.
- Adopt Emergency/ Substitute mode and constant 3rd gear.
- Open lock up clutch.

Conditions for Clearing the MIL/DTC

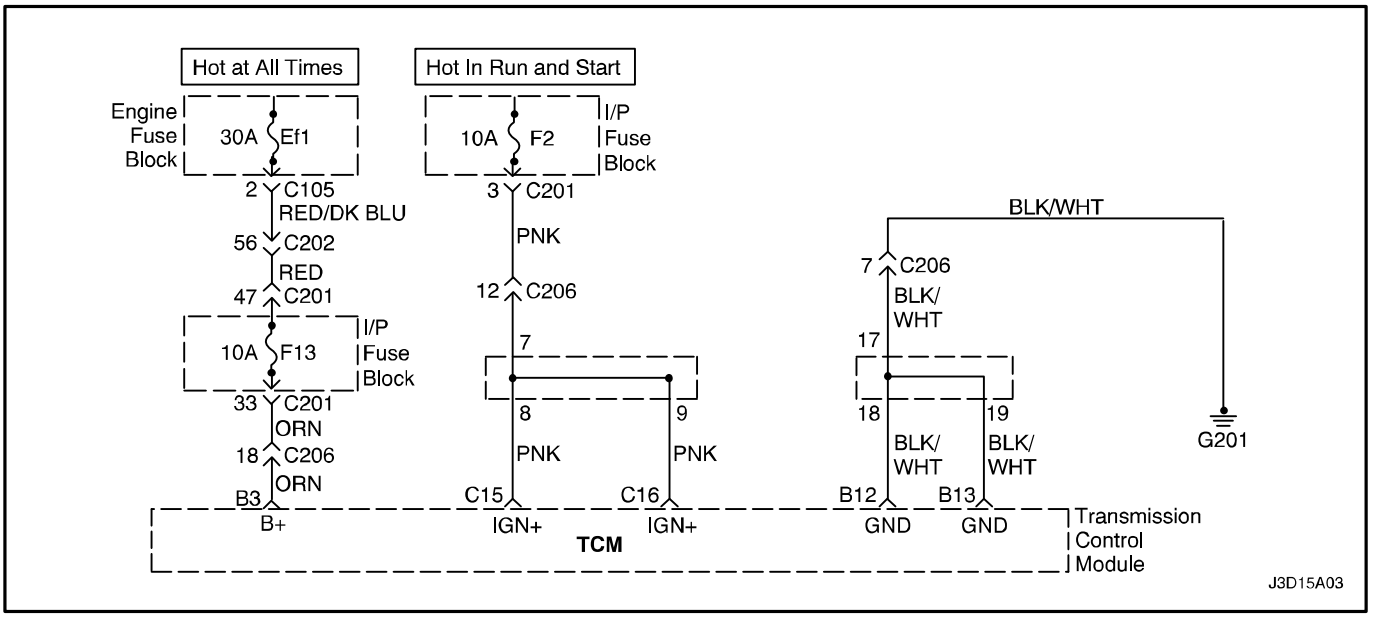
- The MIL will turn OFF when the malfunction has not occurred after three–ignition cycle.
- A history DTC will clear after 40 consecutive warm up cycles without a fault.
- Using a scan tool can clear history DTCs.

Diagnostic Aids

- When DTC P0783 sets, the possible cause of fault could be T/M.

DTC P0783 – 3–4 Shift Malfunction

Step	Action	Value(s)	Yes	No
1	Perform an On–Board Diagnostic (EOBD) System Check. Is the check completed?	–	Go to *Step 2*	Go to *"On–Board Diagnostic System Check"*
2	1. Install the scan tool. 2. Turn the ignition ON, with the engine OFF. 3. Start engine and allow it to warm up at idle. 4. Observe "idle rpm, TPS and so on" the scan tool. Was condition found and corrected?	–	Refer to *"Engine diagnostic information"*	Go to *Step 3*
3	Inspect "ECM". Refer to *Section 1F, System Diagnosis, EOBD System Check.* Was a problem found?	–	Go to *"Section 1F, System Diagnosis"*	Go to *Step 4*
4	1. Turn the ignition OFF. 2. Disconnect the TCM wiring connector. 3. Measure the voltage between terminal B3 and B13 of the transaxle wiring connector. 4. Turn the ignition ON. 5. Measure the voltage between terminal C15 and B13 of the transaxle wiring connector. 6. Measure the voltage between terminal C16 and B13 of the transaxle wiring connector. Is the voltage within the values shown?	11–14V	Go to *Step 5*	Go to *"System voltage low or high"*
5	Replace the TCM. Is the action complete?	–	Go to *Step 6*	–
6	1. After the repair, use a scan tool "clear info" function and road test the vehicle. 2. Review the "DTC info". Has the last test failed or is the current DTC displayed?	–	Replace the transaxle assembly	Repair verified exit DTC chart



DIAGNOSTIC TROUBLE CODE(DTC) P1604

DATA CHECK OF INTERNAL & EXTENDED RAM FAILED

Circuit Description

A normal function of the Transmission Control Module (TCM) programming is to perform an internal check that verifies the integrity of the RAM memory allocations.

The DTC P1604 sets when the Random Access Memory(RAM) is not operating correctly when checked on initialization. An area of RAM is failed a read/ write test.

Conditions for Setting The DTC

- An area of RAM is failed a read/ write test.
- System voltage is too high or too low.
- Transaxle input voltage is too high or too low.
- Immediately after the above condition occurs.

Action Taken When The DTC Sets

- The Malfunction Indicator Lamp(MIL) will illuminate.
- The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer.
- Adopt Emergency/ Substitute mode and constant 4th gear by hydraulic control.
- After ignition OFF/ON : 3rd gear by hydraulic control. Possible P, R and N also possible.
- Power supply cut off to the EDS valve.

Conditions for Clearing the MIL/DTC

The MIL will turn OFF when the malfunction has not occurred after three–ignition cycle.

A history DTC will clear after 40 consecutive warm up cycles without a fault.

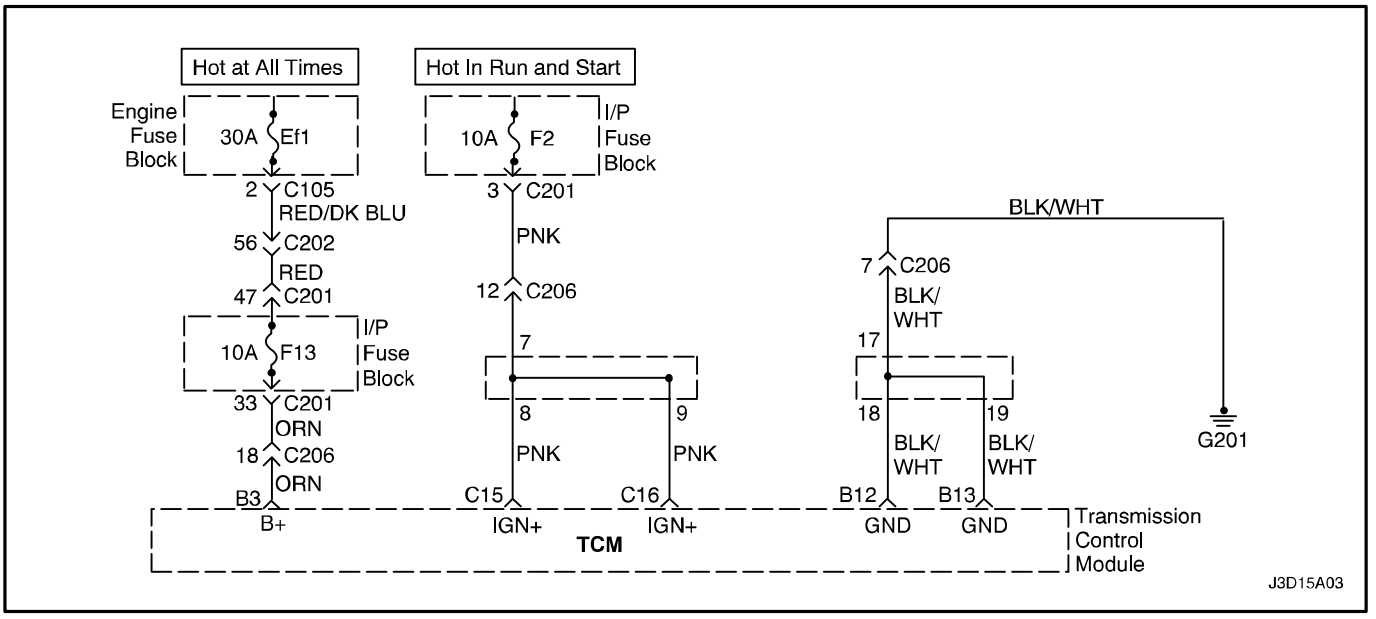
Using a scan tool can clear history DTCs.

Diagnostic Aids

- When DTC P1604 sets, the possible cause of fault could be TCM.

DTC P1604 – Data Check Of Internal & Extended Ram Failed

Step	Action	Value(s)	Yes	No
1	Perform an On–Board Diagnostic (EOBD) System Check. Is the check completed?	–	Go to *Step 2*	Go to *"On–Board Diagnostic System Check"*
2	1. Install the scan tool. 2. Turn the ignition ON, with the engine OFF. Does the scan tool display P1604?	–	Go to *Step 3*	Go to *"Diagnostic Aids"*
3	1. Turn the ignition OFF. 2. Replace the TCM. Is the action complete?	–	Go to *Step 4*	–
4	1. Using the scan tool, clear the DTC. 2. Road test the vehicle within the conditions for setting this DTC as specified in the text. Does the scan tool indicate that this diagnostic has run and passed?	–	Go to *Step 5*	Go to *Step 2*
5	1. Check if any DTC(s) are set. 2. Are any DTC(s) displayed that have not been diagnosed?	–	Go to *"Applicable DTC table"*	System OK



DIAGNOSTIC TROUBLE CODE(DTC) P1606

FAILURE OF EXTERNAL WATCHDOG

Circuit Description

The external watchdog will be triggered. If the external watchdog does not run out after 30ms then the fault will be detected.

Conditions for Setting The DTC

- System voltage is too high or too low.
- Transaxle input voltage is too high or too low.
- Immediately after the above condition occurs.

Action Taken When The DTC Sets

- The Malfunction Indicator Lamp(MIL) will illuminate.
- The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer.
- Adopt Emergency/ Substitute mode and constant 4th gear by hydraulic control.
- After ignition OFF/ON : 3rd gear by hydraulic control. Possible P, R and N also possible.
- Power supply cut off to the EDS valve.

Conditions for Clearing the MIL/DTC

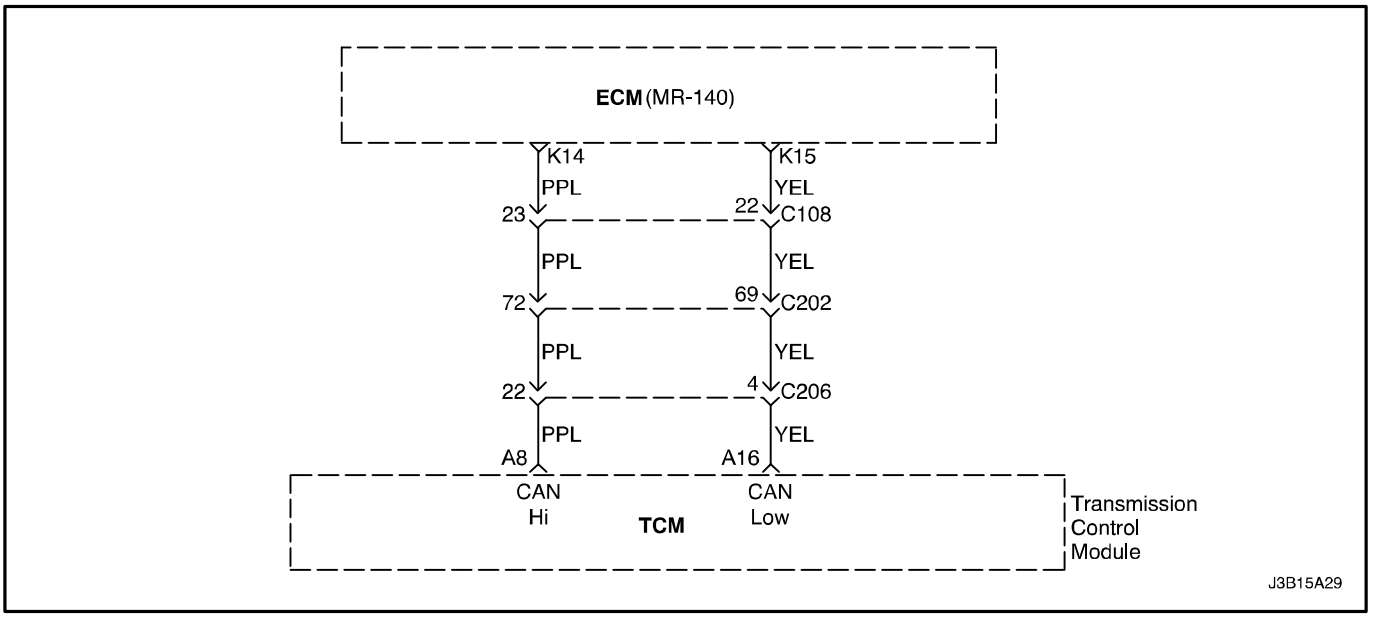
- The MIL will turn OFF when the malfunction has not occurred after three–ignition cycle.
- A history DTC will clear after 40 consecutive warm up cycles without a fault.
- History DTCs can be cleared by using a scan tool.

Diagnostic Aids

- When DTC P1606 sets, the possible cause of fault could be TCM.

DTC P1606 – Failure Of External Watchdog

Step	Action	Value(s)	Yes	No
1	Perform an On–Board Diagnostic (EOBD) System Check. Is the check completed?	–	Go to *Step 2*	Go to *"On–Board Diagnostic System Check"*
2	1. Install the scan tool. 2. Turn the ignition ON, with the engine OFF. Does the scan tool display P1606?	–	Go to *Step 3*	Go to *"Diagnostic Aids"*
3	Inspect EF1 or F2 fuse for open. Was a problem found?	–	Go to *Step 4*	Go to *Step 5*
4	Replace the fuse as necessary. Is the action completed?	–	System OK	–
5	1. Turn the ignition OFF. 2. Disconnect the TCM wiring connector. 3. Inspect the wiring harness for short to battery between the fuses (EF1 or F2) and the TCM terminals (B3, C15, or C16). Was a problem found?	–	Repair the wiring harness.	Go to *Step 6*
6	Inspect the wiring harness for open between the fuses (EF1 or F2) and the TCM terminals (B3, C15 or C16). Was a problem found?	–	Repair the wiring harness.	Go to Step 7
7	Inspect the wiring harness for open or short to ground between TCM terminals (B12 or B13) and G201. Was a problem found?	–	Repair the wiring harness.	Go to Step 8
8	Inspect the wiring harness for short to power between the terminals (B12 or B13) and G201. Was a problem found?	–	Repair the wiring harness.	Go to Step 9
9	Replace the TCM. Is the replacement complete?	–	Go to *Step 10*	–
10	1. Using the scan tool, clear the DTCs. 2. Road test the vehicle within the conditions for setting this DTC as specified in the text. Does the scan tool indicate that this diagnostic has run and passed?	–	Go to *Step 11*	Go to *Step 2*
11	1. Check if any DTCs are set. 2. Are any DTCs displayed that have not been diagnosed?	–	Go to *"Applicable DTC table"*	System OK



DIAGNOSTIC TROUBLE CODE(DTC) P1671

CAN TRANSMIT MESSAGE FAILURE

Circuit Description

The transaxle control module(TCM)is an electronic device which monitors inputs to control various transaxle functions including shift quality and transaxle sensors, switches, and components to process for use within its' control program. Based on this input information, the TCM controls various transaxle output functions and devices.

Information is transmitted between the TCM and ECM through the CAN. Information is as follows:

- Engine Malfunction Signal.
- Engine Speed.
- Engine Output Torque Reduction Signal.
- Engine Coolant Temperature.

Conditions for Setting the DTC

- System voltage is too high or too low.
- CAN transmitting wiring harness shortage or open.
- TCM or ECM is defective.
- Immediately after the above condition occurs.

Action Taken When The DTC Sets

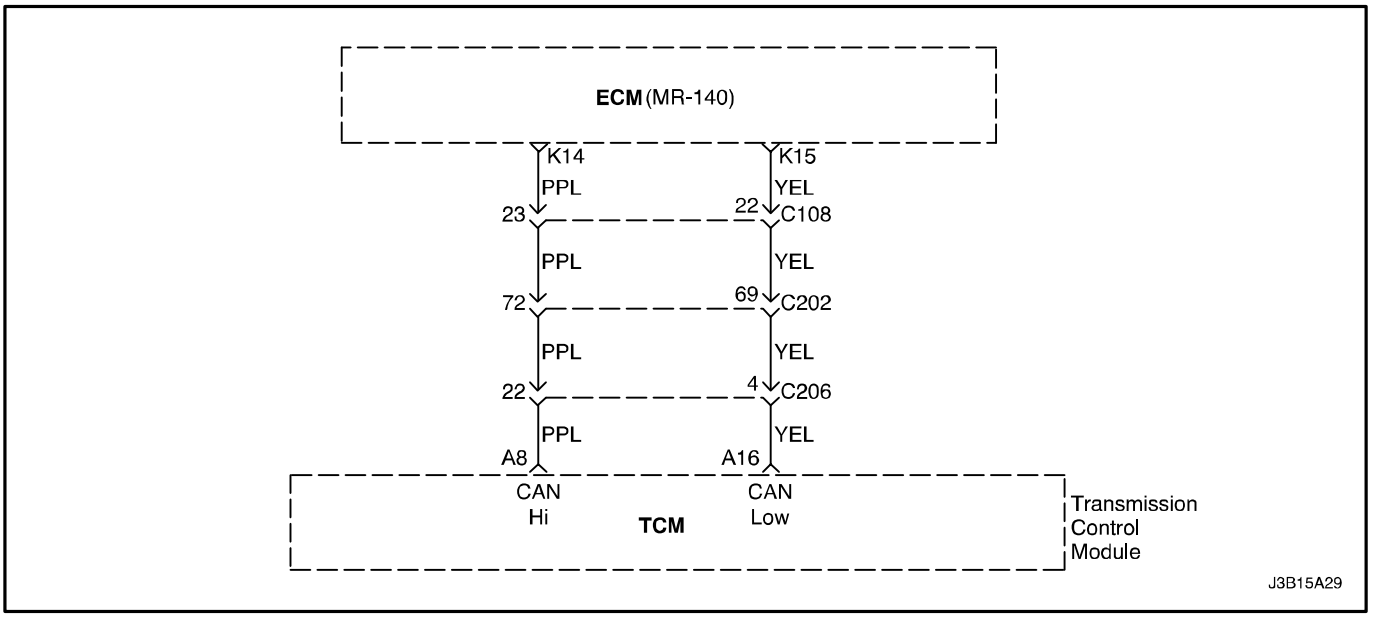
- The malfunction indicator lamp(MIL) will illuminate.
- The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer.
- Adopt Emergency/ Substitute mode and constant 4th gear by hydraulic control.
- After ignition OFF/ON : 3rd gear by hydraulic control. Possible P, R and N also possible.

Conditions for Clearing the MIL/DTC

- The MIL will turn OFF when the malfunction has not occurred after three–ignition cycles.
- A history DTC will clear after 40 consecutive warm up cycles without a fault.
- Using a scan tool can clear history DTCs.

DTC P1671 – CAN Transmit Message Failure

Step	Action	Value(s)	Yes	No
1	Perform an On–Board Diagnostic (EOBD) System Check. Is the check completed?	–	Go to *Step 2*	Go to *"On–Board Diagnostic System Check"*
2	1. Turn the ignition OFF. 2. Disconnect the TCM wiring connector and ECM wiring connector. 3. Measure the resistance between terminal A8 of the TCM wiring connector and terminal K14 of the ECM wiring connector. 4. Measure the resistance between terminal A16 of the TCM wiring connector and terminal K15 of the ECM wiring connector. Is the resistance within the values shown?	≈0Ω	Go to *Step 4*	Go to *Step 3*
3	Repair the malfunctioning terminals as necessary. Is the action complete?	–	System OK	–
4	1. Turn the ignition ON. 2. Measure the voltage of terminal A8. 3. Measure the voltage of terminal A16. Is the voltage within the values shown?	11–14V	Go to *Step 5*	Go to *Step 6*
5	Repair the short to power on the terminal(s) as necessary. Is the action complete?	–	System OK	–
6	1. Replace the TCM. 2. Turn the ignition OFF and turn the ignition ON. 3. Check if P1671 DTC is set. Is The DTC set?	–	Go to *Step 7*	Go to *Step 8*
7	1. Replace the ECM. 2. Is the action complete?	–	Go to *Step 8*	–
8	1. After the repair, use a scan tool "clear info" function and road test the vehicle. 2. Review the "DTC info". Has the last test failed or is the current DTC displayed?	–	Begin diagnosis again	Repair verified exit DTC chart



DIAGNOSTIC TROUBLE CODE(DTC) P1672

CAN BUS OFF FAILURE

Circuit Description

The transaxle control module(TCM)is an electronic device which monitors inputs to control various transaxle functions including shift quality and transaxle sensors, switches, and components to process for use within its' control program. Based on this input information, the TCM controls various transaxle output functions and devices.

Information is transmitted between the TCM and ECM through the CAN. Information is as follows:

- Engine Malfunction Signal.
- Engine Speed.
- Engine Output Torque Reduction Signal.
- Engine Coolant Temperature.

Conditions for Setting the DTC

- System voltage is too high or too low.
- CAN transmitting wiring harness shortage or open.
- TCM or ECM is defective.
- Immediately after the above condition occurs.

Action Taken When The DTC Sets

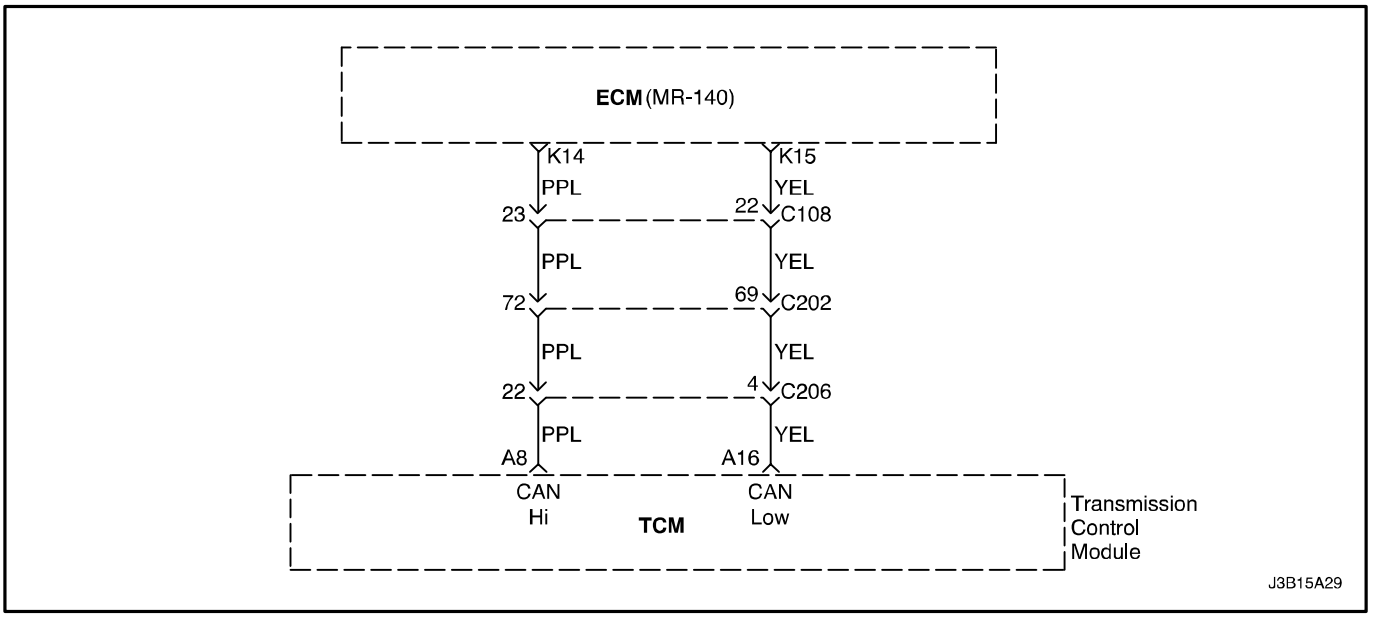
- The malfunction indicator lamp(MIL) will illuminate.
- The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer.
- Adopt Emergency/ Substitute mode and constant 4th gear by hydraulic control.
- After ignition OFF/ON : 3rd gear by hydraulic control. Possible P, R and N also possible.

Conditions for Clearing the MIL/DTC

- The MIL will turn OFF when the malfunction has not occurred after three–ignition cycles.
- A history DTC will clear after 40 consecutive warm up cycles without a fault.
- Using a scan tool can clear history DTCs.

DTC P1672 – CAN Bus Off Failure

Step	Action	Value(s)	Yes	No
1	Perform an On–Board Diagnostic (EOBD) System Check. Is the check completed?	–	Go to *Step 2*	Go to *"On–Board Diagnostic System Check"*
2	1. Turn the ignition OFF. 2. Disconnect the TCM wiring connector and ECM wiring connector. 3. Measure the resistance between terminal A8 of the TCM wiring connector and terminal K14 of the ECM wiring connector. 4. Measure the resistance between terminal A16 of the TCM wiring connector and terminal K15 of the ECM wiring connector. Is the resistance within the values shown?	≈0Ω	Go to *Step 4*	Go to *Step 3*
3	Repair the malfunctioning terminals as necessary. Is the action complete?	–	System OK	–
4	1. Turn the ignition ON. 2. Measure the voltage of terminal A8. 3. Measure the voltage of terminal A16. Is the voltage within the values shown?	11–14V	Go to *Step 5*	Go to *Step 6*
5	Repair the short to power on the terminal(s) as necessary. Is the action complete?	–	System OK	–
6	1. Replace the TCM. 2. Turn the ignition OFF and turn the ignition ON. 3. Check if P1672 DTC is set. Is The DTC set?	–	Go to *Step 7*	Go to *Step 8*
7	1. Replace the ECM. 2. Is the action complete?	–	Go to *Step 8*	–
8	1. After the repair, use a scan tool "clear info" function and road test the vehicle. 2. Review the "DTC info". Has the last test failed or is the current DTC displayed?	–	Begin diagnosis again	Repair verified exit DTC chart



DIAGNOSTIC TROUBLE CODE(DTC) P1673

CAN RECEIVE ECM MESSAGE FAILURE

Circuit Description

The transaxle control module(TCM) is an electronic device which monitors inputs to control various transaxle functions including shift quality and transaxle sensors, switches, and components to process for use within its' control program. Based on this input information, the TCM controls various transaxle output functions and devices.

Information is transmitted between the TCM and ECM through the CAN. Information is as follows:

- Engine Malfunction Signal.
- Engine Speed.
- Engine Output Torque Reduction Signal.
- Engine Coolant Temperature.

Conditions for Setting the DTC

- System voltage is too high or too low.
- CAN transmitting wiring harness shortage or open.
- TCM or ECM is defective.
- Immediately after the above condition occurs.

Action Taken When The DTC Sets

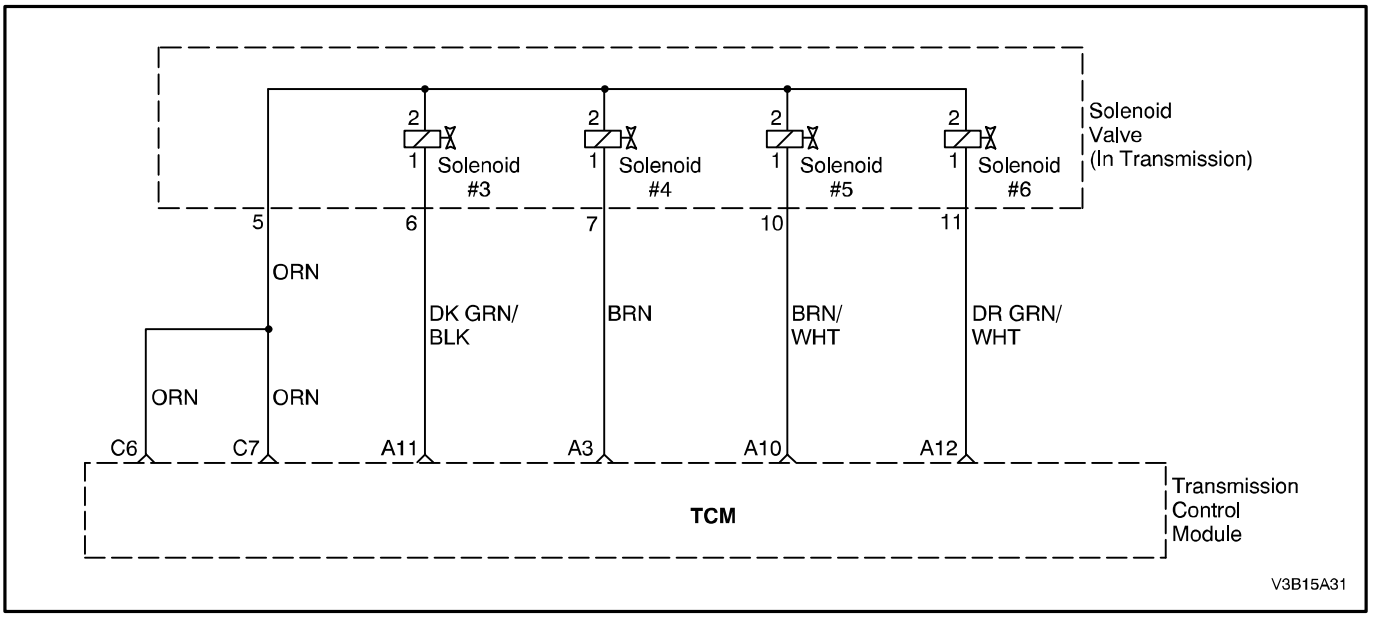
- The malfunction indicator lamp(MIL) will illuminate.
- The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer.
- Adopt Emergency/ Substitute mode and constant 4th gear by hydraulic control.
- After ignition OFF/ON : 3rd gear by hydraulic control. Possible P, R and N also possible.

Conditions for Clearing the MIL/DTC

- The MIL will turn OFF when the malfunction has not occurred after three–ignition cycles.
- A history DTC will clear after 40 consecutive warm up cycles without a fault.
- Using a scan tool can clear history DTCs.

DTC P1673 – CAN Receive ECM Message Failure

Step	Action	Value(s)	Yes	No
1	Perform an On–Board Diagnostic (EOBD) System Check. Is the check completed?	–	Go to *Step 2*	Go to *"On–Board Diagnostic System Check"*
2	1. Turn the ignition OFF. 2. Disconnect the TCM wiring connector and ECM wiring connector. 3. Measure the resistance between terminal A8 of the TCM wiring connector and terminal K14 of the ECM wiring connector. 4. Measure the resistance between terminal A16 of the TCM wiring connector and terminal K15 of the ECM wiring connector. Is the resistance within the values shown?	≈0Ω	Go to *Step 4*	Go to *Step 3*
3	Repair the malfunctioning terminals as necessary. Is the action complete?	–	System OK	–
4	1. Turn the ignition ON. 2. Measure the voltage of terminal A8. 3. Measure the voltage of terminal A16. Is the voltage within the values shown?	11–14V	Go to *Step 5*	Go to *Step 6*
5	Repair the short to power on the terminal(s) as necessary. Is the action complete?	–	System OK	–
6	1. Replace the TCM. 2. Turn the ignition OFF and turn the ignition ON. 3. Check if P1673 DTC is set. Is The DTC set?	–	Go to *Step 7*	Go to *Step 8*
7	1. Replace the ECM. 2. Is the action complete?	–	Go to *Step 8*	–
8	1. After the repair, use a scan tool "clear info" function and road test the vehicle. 2. Review the "DTC info". Has the last test failed or is the current DTC displayed?	–	Begin diagnosis again	Repair verified exit DTC chart



DIAGNOSTIC TROUBLE CODE(DTC) P1839

EDS 3 OUTPUT SHORTED TO GROUND

Circuit Description

The pressure control valves (EDS valves 3,4,5 and 6) are precision electronic pressure regulators that control the operation of the clutches, brakes and lock–up clutch.

The valve reduces the system pressure with which the downstream solenoid valves and electrical pressure regulating valves are supplied. It is possible to use smaller solenoid valves as a result. The EDS require a constant input pressure.

Conditions for Setting the DTC

- Output voltage of the EDS 3 is less than 2 volts.
- No DTC P1840, P1841.
- Immediately after the above condition occurs.

Action Taken When The DTC Sets

- The Malfunction Indicator Lamp(MIL) will illuminate.
- The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer.
- Adopt Emergency/ Substitute mode and constant 4th gear by hydraulic control.
- After ignition OFF/ON : 3rd gear by hydraulic control. Possible P, R and N also possible.
- Power supply cut off to the EDS valve.

Conditions for Clearing the MIL/DTC

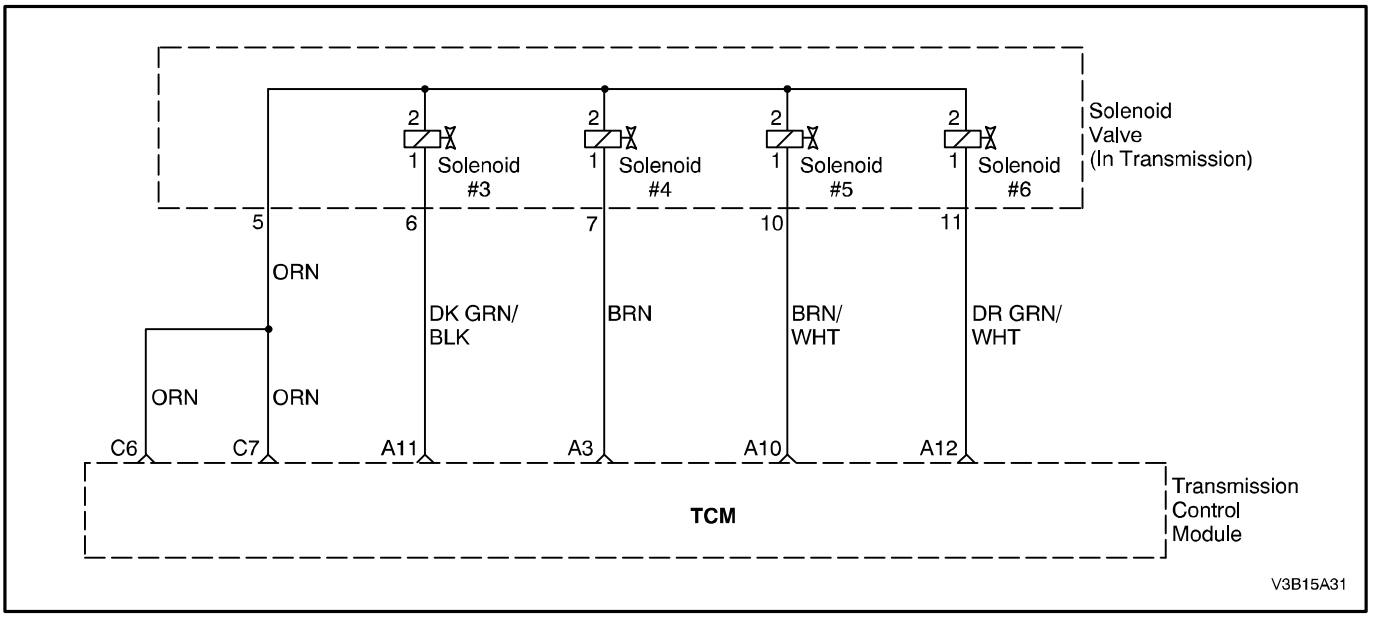
- The MIL will turn OFF when the malfunction has not occurred after three–ignition cycle.
- A history DTC will clear after 40 consecutive warm up cycles without a fault.
- Using a scan tool can clear history DTCs.

Diagnostic Aids

- When DTC P1839 sets, the possible cause of fault could be EDS3 valve.

DTC P1839 – EDS 3 Output Shorted To Ground

Step	Action	Value(s)	Yes	No
1	Perform an On–Board Diagnostic (EOBD) System Check. Is the check completed?	–	Go to *Step 2*	Go to *"On–Board Diagnostic System Check"*
2	1. Install the scan tool. 2. Turn the ignition On, with the engine OFF. 3. Select "Actuating" on the scan tool. 4. Actuate the EDS 3 ON/OFF. Does the EDS 3 change ON/OFF?	ON/OFF	Go to *"Diagnostic Aids"*	Go to *Step 3*
3	1. Turn the ignition OFF. 2. Disconnect the transaxle wiring connector. 3. Measure the resistance between terminals 5 and 6 of the transaxle wiring connector. Is the resistance within the values shown?	TFT 25˚C (77˚F) 6 Ω	Go to *Step 7*	Go to *Step 4*
4	1. Remove the oil pan. 2. Disconnect the wiring connector of the EDS 3. 3. Measure the resistance between terminal 2 of the EDS 3 and ground. 4. Measure the resistance between terminal 1 of the EDS 3 and ground. Is the resistance within the values shown?	∞	Go to *Step 6*	Go to *Step 5*
5	Repair the internal line(EDS 3) for a short to ground. Is the repair complete?	–	System OK	–
6	Replace the EDS 3. Is the replacement complete?	–	System OK	–
7	1. Disconnect the transaxle wiring connector and TCM connector. 2. Measure the resistance between terminal 5 of the EDS 3 and ground. 3. Measure the resistance between terminal 6 of the EDS 3 and ground. Is the resistance within the values shown?	∞	Go to *Step 9*	Go to *Step 8*
8	Repair the transaxle wiring harness for a short to ground. Is the repair complete?	–	System OK	–
9	Replace the TCM. Is the replacement complete?	–	Go to *Step 10*	–
10	1. After the repair, use a scan tool "clear info" function and road tests the vehicle. 2. Review the "DTC info". Has the last failed or is the current DTC displayed?	–	Begin diagnosis again	Repair verified exit DTC chart



DIAGNOSTIC TROUBLE CODE(DTC) P1840

EDS 3 OUTPUT SHORTED TO POWER

Circuit Description

The pressure control valves (EDS valves 3,4,5 and 6) are precision electronic pressure regulators that control the operation of the clutches, brakes and lock–up clutch.

The valve reduces the system pressure with which the downstream solenoid valves and electrical pressure regulating valves are supplied. It is possible to use smaller solenoid valves as a result. The EDS require a constant input pressure.

Conditions for Setting the DTC

- Output voltage of the EDS 3(at ON) is 12 volts.
- No DTC P1839, P1841.
- Immediately after the above condition occurs.

Action Taken When The DTC Sets

- The Malfunction Indicator Lamp(MIL) will illuminate.
- The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer.
- Adopt Emergency/ Substitute mode and constant 4th gear by hydraulic control.
- After ignition OFF/ON : 3rd gear by hydraulic control. Possible P, R and N also possible.
- Power supply cut off to the EDS valve.

Conditions for Clearing the MIL/DTC

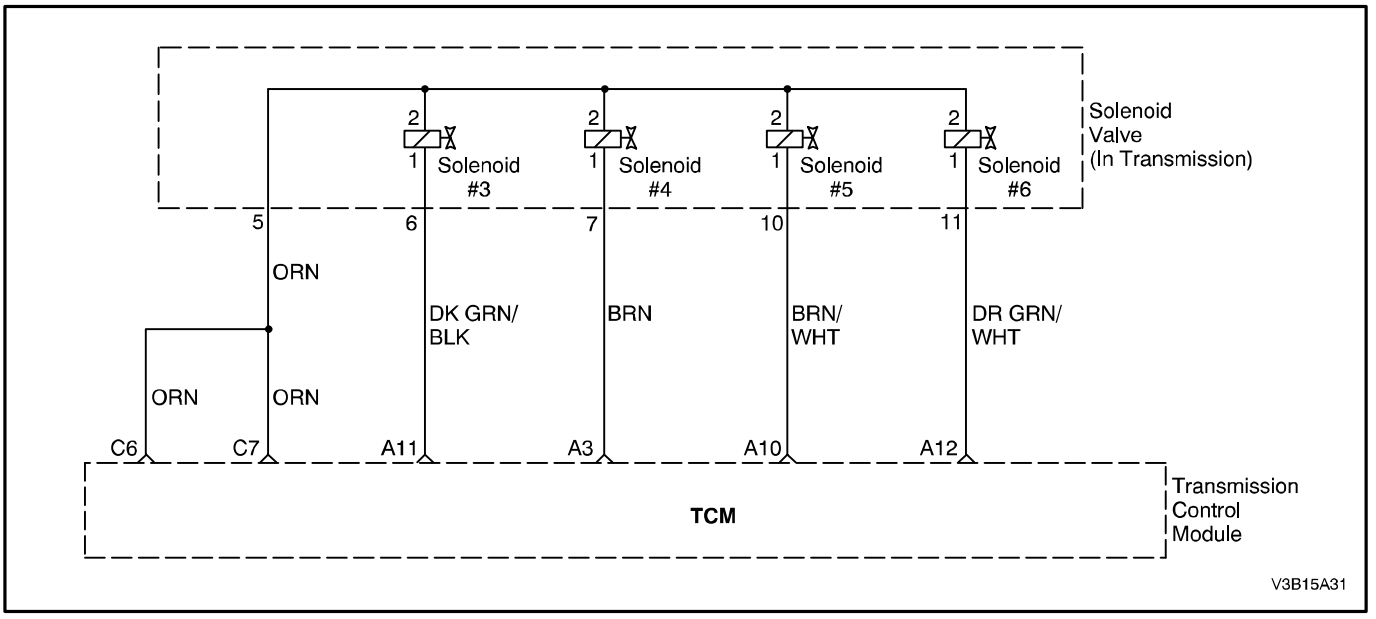
- The MIL will turn OFF when the malfunction has not occurred after three–ignition cycle.
- A history DTC will clear after 40 consecutive warm up cycles without a fault.
- Using a scan tool can clear history DTCs.

Diagnostic Aids

- When DTC P1840 sets, the possible cause of fault could be EDS3.

DTC P1840 – EDS 3 Output Shorted To Power

Step	Action	Value(s)	Yes	No
1	Perform an On–Board Diagnostic (EOBD) System Check. Is the check completed?	–	Go to *Step 2*	Go to *"On–Board Diagnostic System Check"*
2	1. Install the scan tool. 2. Turn the ignition ON, with the engine OFF. 3. Select "Actuating" on the scan tool. 4. Actuate the EDS 3 ON/OFF. Does the EDS 3 change ON/OFF?	ON/OFF	Go to *"Diagnostic Aids"*	Go to *Step 3*
3	1. Remove the oil pan. 2. Disconnect the wiring connector of the EDS 3. 3. Turn the ignition ON, with the engine OFF. 4. Measure the voltage of the EDS3 wiring connector terminal 1. Is the voltage within the values shown?	11–14V	Go to *Step 4*	Go to *Step 5*
4	Repair the internal line(EDS 3) for a short to power. Is the repair complete?	–	System OK	–
5	Replace the EDS 3. Is the replacement complete?	–	Go to *Step 6*	–
6	1. Check if any DTCs are set. 2. Are any DTCs displayed that have not been diagnosed?	–	Go to *"Applicable DTC table"*	System OK



DIAGNOSTIC TROUBLE CODE(DTC) P1841

EDS 3 OUTPUT OPEN

Circuit Description

The pressure control valves (EDS valves 3,4,5 and 6) are precision electronic pressure regulators that control the operation of the clutches, brakes and lock–up clutch.

The valve reduces the system pressure with which the downstream solenoid valves and electrical pressure regulating valves are supplied. It is possible to use smaller solenoid valves as a result. The EDS require a constant input pressure.

Conditions for Setting the DTC

- Output voltage of the EDS 3 is less than 10mA.
- No DTC P1839, P1840.
- Immediately after the above condition occurs.

Action Taken When The DTC Sets

- The Malfunction Indicator Lamp(MIL) will illuminate.
- The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer.
- Adopt Emergency/ Substitute mode and constant 4th gear by hydraulic control.
- After ignition OFF/ON : 3rd gear by hydraulic control. Possible P, R and N also possible.
- Power supply cut off to the EDS valve.

Conditions for Clearing the MIL/DTC

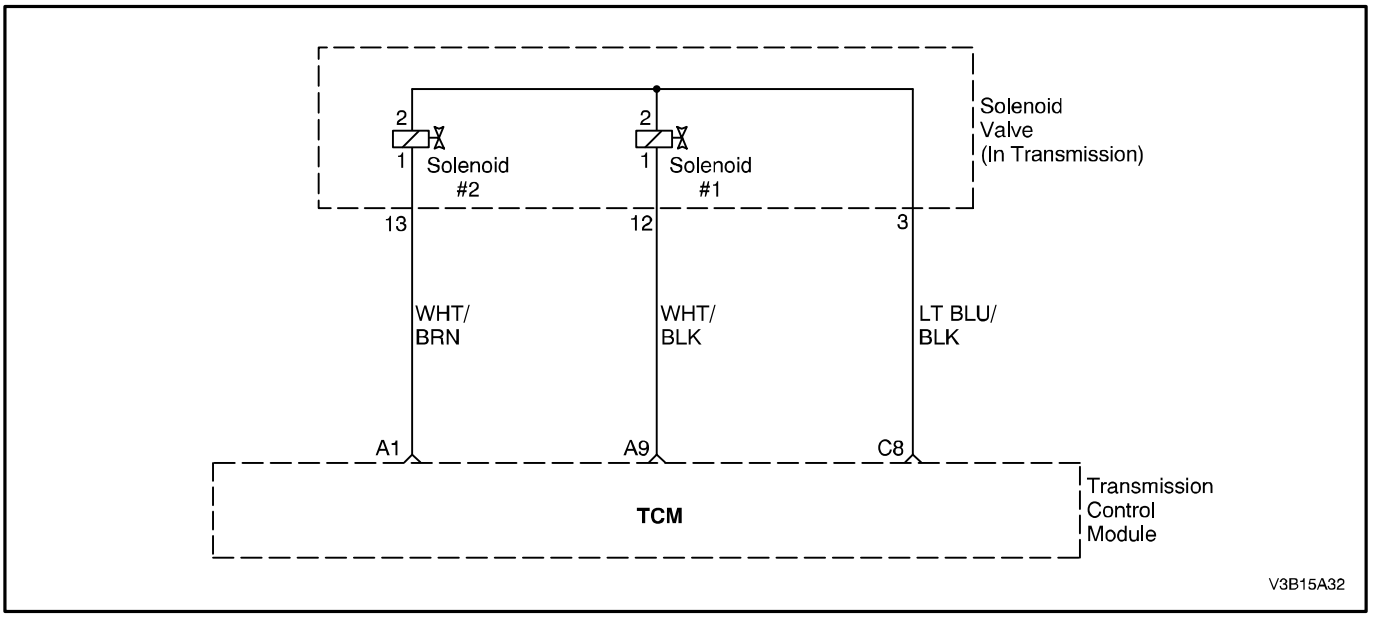
- The MIL will turn OFF when the malfunction has not occurred after three–ignition cycle.
- A history DTC will clear after 40 consecutive warm up cycles without a fault.
- Using a scan tool can clear history DTCs.

Diagnostic Aids

- When DTC P1841 sets, the possible cause of fault could be EDS3 valve.

DTC P1841 – EDS 3 Output Open

Step	Action	Value(s)	Yes	No
1	Perform an On–Board Diagnostic (EOBD) System Check. Is the check completed?	–	Go to *Step 2*	Go to *"On–Board Diagnostic System Check"*
2	1. Install the scan tool. 2. Turn the ignition On, with the engine OFF. 3. Select "Actuating" on the scan tool. 4. Actuate the EDS 3 ON/OFF. Does the EDS 3 change ON/OFF?	ON/OFF	Go to *"Diagnostic Aids"*	Go to *Step 3*
3	1. Turn the ignition OFF. 2. Disconnect the transaxle wiring connector. 3. Measure the resistance between terminals 5 and 6 of the transaxle wiring connector. Is the resistance within the values shown?	TFT 25˚C (77˚F) 6 Ω	Go to *Step 7*	Go to *Step 4*
4	1. Remove the oil pan. 2. Disconnect the wiring connector of the EDS 3. 3. Measure the resistance between terminal 2 of the EDS 3 and terminal 5 of the transaxle connector. 4. Measure the resistance between terminal 1 of the EDS 3 and terminal 6 of the transaxle connector. Is the resistance within the values shown?	≈ 0 Ω	Go to *Step 6*	Go to *Step 5*
5	1. Repair the circuit(between terminal 2 and terminal 5) for an open. 2. Repair the circuit(between terminal 1 and terminal 6) for an open. Is the repair complete?	–	System OK	–
6	Replace the EDS 3. Is the replacement complete?	–	System OK	–
7	1. Disconnect the transaxle wiring connector and TCM connector. 2. Measure the resistance between terminal 5 of the transaxle wiring connector and terminal C7 of the TCM wiring connector. 3. Measure the resistance between terminal 6 of the transaxle wiring connector and terminal A11 of the TCM wiring connector. Is the resistance within the values shown?	≈ 0 Ω	Go to *Step 9*	Go to *Step 8*
8	Repair the transaxle wiring harness for an open. Is the repair complete?	–	System OK	–
9	Replace the TCM. Is the replacement complete?	–	Go to *Step 10*	–
10	1. After the repair, use a scan tool "clear info" function and road test the vehicle. 2. Review the "DTC info". Has the last test failed or is the current DTC displayed?	–	Begin diagnosis again	Repair verified exit DTC chart



DIAGNOSTIC TROUBLE CODE(DTC) P1850

SOLENOID 1 OUTPUT SHORTED TO GROUND

Circuit Description

The shift solenoids are two identical, normally open electronic exhaust valves that control upshifts and downshifts in all forward gear ranges. These shift solenoids work together in a combination of ON and OFF sequences to control the line pressure and shift mechanisms(clutches, brakes).

Solenoid 1 controls the high or low of the line pressure (flow to each clutch valve) by the operation type (ON/OFF), i.e. solenoid 1 is ON, line pressure will be low (87~116psi (6~8bar)), solenoid 1 is OFF, line pressure will be high (232~261psi (16~18bar)). Solenoid 2 controls the oil flow to clutch valve E or lock–up clutch valve by the ON/OFF signal.

The TCM monitors numerous inputs to determine the appropriate solenoid state combination and transaxle gear tor the vehicle operating conditions.

Conditions for Setting the DTC

- Solenoid wiring shorted to ground.
- No DTC P1851, P1852.
- Immediately after the above condition occurs.

Action Taken When The DTC Sets

- The Malfunction Indicator Lamp(MIL) will illuminate.
- The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer.
- Adopt Emergency/ Substitute mode and constant 4th gear by hydraulic control.
- After ignition OFF/ON : 3rd gear by hydraulic control. Possible P, R and N also possible.

Conditions for Clearing the MIL/DTC

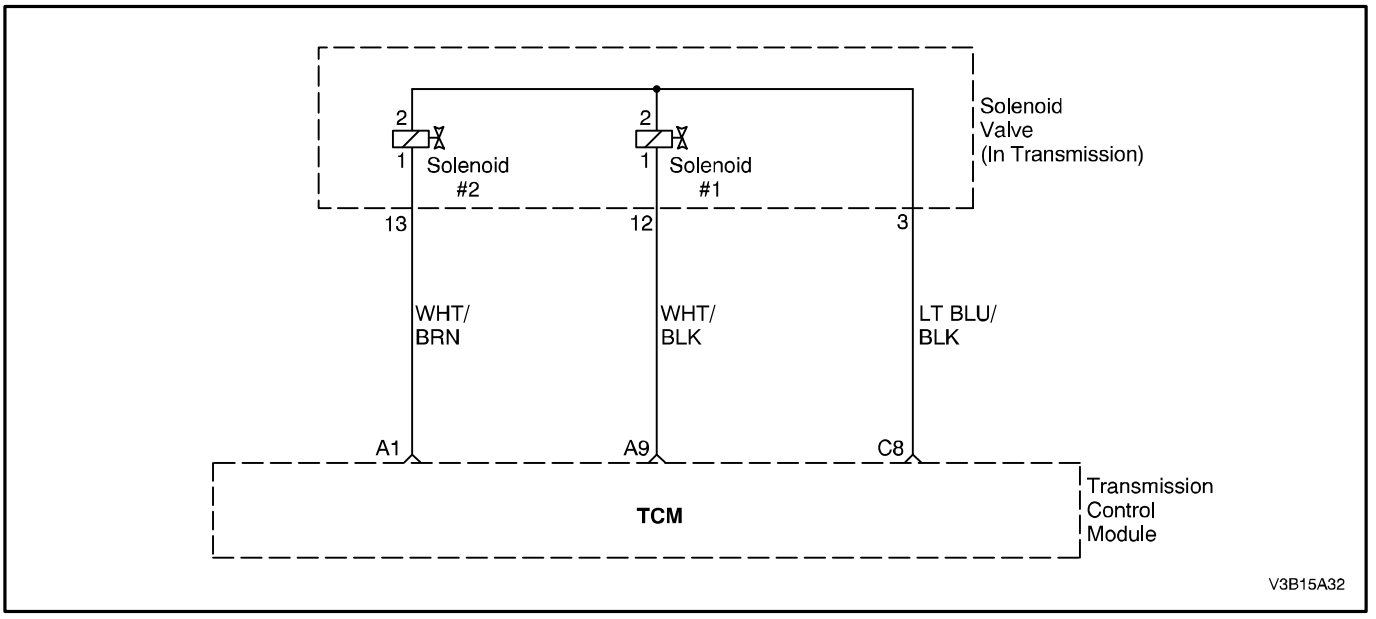
- The MIL will turn OFF when the malfunction has not occurred after three–ignition cycle.
- A history DTC will clear after 40 consecutive warm up cycles without a fault.
- Using a scan tool can clear history DTCs.

Diagnostic Aids

- When DTC P1850 sets, the possible cause of fault could be solenoid 1.

DTC P1850 – Solenoid 1 Output Shorted To Ground

Step	Action	Value(s)	Yes	No
1	Perform an On–Board Diagnostic (EOBD) System Check. Is the check completed?	–	Go to *Step 2*	Go to *"On–Board Diagnostic System Check"*
2	1. Install the scan tool. 2. Turn the ignition On, with the engine OFF. 3. Record then clear DTC(s). 4. Select "Actuating" on the scan tool. 5. Actuate solenoid 1 ON/OFF. Does the solenoid 1 change ON/OFF?	ON/OFF	Go to *"Diagnostic Aids"*	Go to *Step 3*
3	1. Turn the ignition OFF. 2. Disconnect the transaxle wiring connector. 3. Measure the resistance between terminals 3 and 12 of the transaxle wiring connector. Is the resistance within the values shown?	TFT 25˚C (77˚F) 26~34.5 Ω	Go to *Step 7*	Go to *Step 4*
4	1. Remove the oil pan. 2. Disconnect the wiring connector of solenoid 1. 3. Measure the resistance between terminal 2 of solenoid 1 and ground. 4. Measure the resistance between terminal 1 of solenoid 1 and ground. Is the resistance within the values shown?	∞	Go to *Step 6*	Go to *Step 5*
5	Repair the internal line(solenoid 1) for a short to ground. Is the repair complete?	–	System OK	–
6	Replace the solenoid 1. Is the replacement complete?	–	System OK	–
7	1. Disconnect the transaxle wiring connector and TCM connector. 2. Measure the resistance between terminal 3 of the transaxle wiring connector and ground. 3. Measure the resistance between terminal 12 of the transaxle wiring connector and ground. Is the resistance within the values shown?	∞	Go to *Step 9*	Go to *Step 8*
8	Repair the transaxle wiring harness for a short to ground. Is the repair complete?	–	System OK	–
9	Replace the TCM. Is the replacement complete?	–	Go to *Step 10*	–
10	1. After the repair, use a scan tool "clear info" function and road tests the vehicle. 2. Review the "DTC info". 3. Has the last test failed or is the current DTC displayed?	–	Begin diagnosis again	Repair verified exit DTC chart



DIAGNOSTIC TROUBLE CODE(DTC) P1851

SOLENOID 1 OUTPUT SHORTED TO POWER

Circuit Description

The shift solenoids are two identical, normally open electronic exhaust valves that control upshifts and downshifts in all forward gear ranges. These shift solenoids work together in a combination of ON and OFF sequences to control the line pressure and shift mechanisms(clutches, brakes).

Solenoid 1 controls the high or low of the line pressure (flow to each clutch valve) by the operation type (ON/OFF), i.e. solenoid 1 is ON, line pressure will be low (87~116psi (6~8bar)), solenoid 1 is OFF, line pressure will be high (232~261psi (16~18bar)). Solenoid 2 controls the oil flow to clutch valve E or lock–up clutch valve by the ON/OFF signal.

The TCM monitors numerous inputs to determine the appropriate solenoid state combination and transaxle gear tor the vehicle operating conditions.

Conditions for Setting the DTC

- Solenoid wiring shorted to power.
- No DTC P1850, P1852.
- Immediately after the above condition occurs.

Action Taken When The DTC Sets

- The Malfunction Indicator Lamp(MIL) will illuminate.
- The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer.

Conditions for Clearing the MIL/DTC

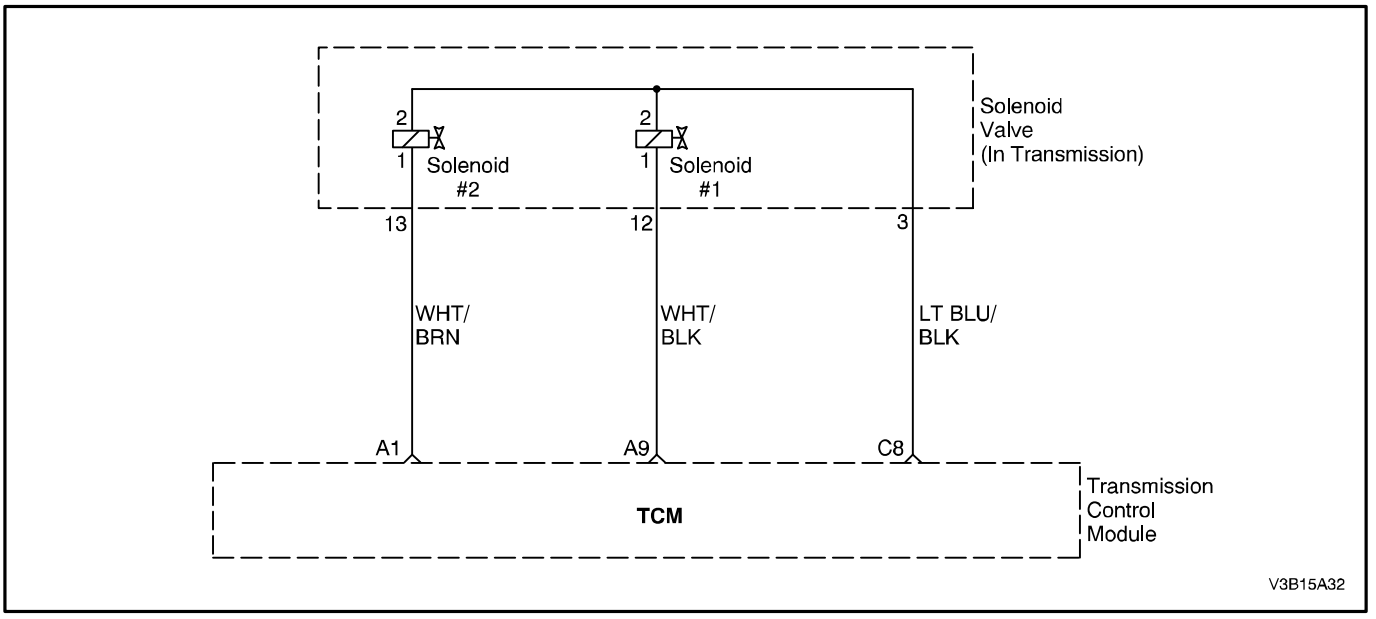
- The MIL will turn OFF when the malfunction has not occurred after three–ignition cycle.
- A history DTC will clear after 40 consecutive warm up cycles without a fault.
- Using a scan tool can clear history DTCs.

Diagnostic Aids

- When DTC P1851 sets, the possible cause of fault could be solenoid 1.

DTC P1851 – Solenoid 1 Output Shorted To Power

Step	Action	Value(s)	Yes	No
1	Perform an On–Board Diagnostic (EOBD) System Check. Is the check completed?	–	Go to *Step 2*	Go to *"On–Board Diagnostic System Check"*
2	1. Install the scan tool. 2. Turn the ignition ON, with the engine OFF. 3. Select "Actuating" on the scan tool. 4. Actuate solenoid 1 ON/OFF. Does the solenoid 1 change ON/OFF?	ON/OFF	Go to *"Diagnostic Aids"*	Go to *Step 3*
3	1. Remove the oil pan. 2. Disconnect the wiring connector of solenoid 1. 3. Turn the ignition ON, with the engine OFF. 4. Measure the voltage of solenoid 1 wiring connector terminal 1. Is the voltage within the values shown?	11–14V	Go to *Step 4*	Go to *Step 5*
4	Repair the internal line(solenoid 1) for a short to power. Is the repair complete?	–	System OK	–
5	Replace the solenoid 1. Is the replacement complete?	–	Go to *Step 6*	–
6	1. Check if any DTCs are set. 2. Are any DTCs displayed that have not been diagnosed?	–	Go to *"Applicable DTC table"*	System OK



DIAGNOSTIC TROUBLE CODE(DTC) P1852

SOLENOID 1 OUTPUT OPEN

Circuit Description

The shift solenoids are two identical, normally open electronic exhaust valves that control upshifts and downshifts in all forward gear ranges. These shift solenoids work together in a combination of ON and OFF sequences to control the line pressure and shift mechanisms(clutches, brakes).

Solenoid 1 controls the high or low of the line pressure (flow to each clutch valve) by the operation type (ON/OFF), i.e. solenoid 1 is ON, line pressure will be low (87~116psi (6~8bar)), solenoid 1 is OFF, line pressure will be high (232~261psi (16~18bar)). Solenoid 2 controls the oil flow to clutch valve E or lock–up clutch valve by the ON/OFF signal.

The TCM monitors numerous inputs to determine the appropriate solenoid state combination and transaxle gear tor the vehicle operating conditions.

Conditions for Setting the DTC

- Solenoid wiring open.
- No DTC P1850, P1851.
- Immediately after the above condition occurs.

Action Taken When The DTC Sets

- The Malfunction Indicator Lamp(MIL) will illuminate.
- The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer.
- Adopt Emergency/ Substitute mode and constant 4th gear by hydraulic control.
- After ignition OFF/ON : 3rd gear by hydraulic control. Possible P, R and N also possible.

Conditions for Clearing the MIL/DTC

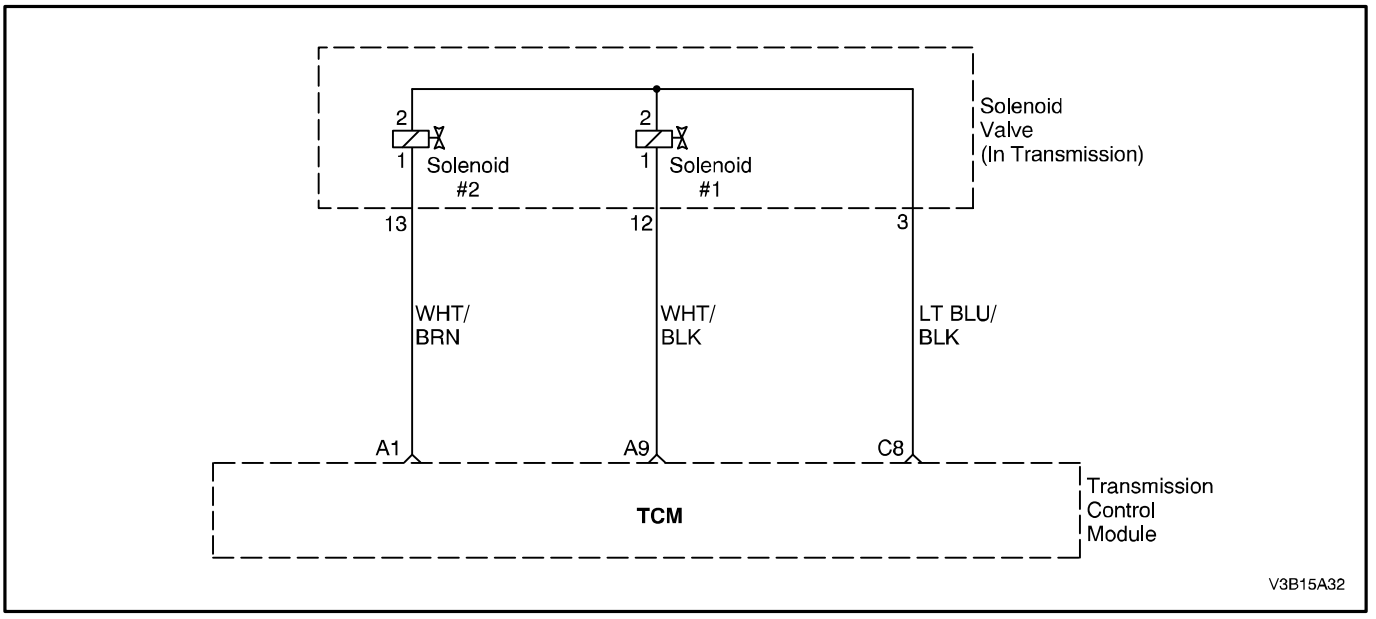
- The MIL will turn OFF when the malfunction has not occurred after three–ignition cycle.
- A history DTC will clear after 40 consecutive warm up cycles without a fault.
- Using a scan tool can clear history DTCs.

Diagnostic Aids

- When DTC P1852 sets, the possible cause of fault could be solenoid 1.

DTC P1852 – Solenoid 1 Output Open

Step	Action	Value(s)	Yes	No
1	Perform an On–Board Diagnostic (EOBD) System Check. Is the check completed?	–	Go to *Step 2*	Go to *"On–Board Diagnostic System Check"*
2	1. Install the scan tool. 2. Turn the ignition On, with the engine OFF. 3. Select "Actuating" on the scan tool. 4. Actuate solenoid 1 ON/OFF. Does the solenoid 1 change ON/OFF?	ON/OFF	Go to *"Diagnostic Aids"*	Go to *Step 3*
3	1. Turn the ignition OFF. 2. Disconnect the transaxle wiring connector. 3. Measure the resistance between terminals 3 and 12 of the transaxle wiring connector. Is the resistance within the values shown?	TFT 25˚C (77˚F) 6 Ω	Go to *Step 7*	Go to *Step 4*
4	1. Remove the oil pan. 2. Disconnect the wiring connector of solenoid 1. 3. Measure the resistance between terminal 1 of solenoid 1 and terminal 12 of the transaxle wiring connector. 4. Measure the resistance between terminal 2 of solenoid 1 and terminal 3 of the transaxle wiring connector. Is the resistance within the values shown?	≈ 0 Ω	Go to *Step 6*	Go to *Step 5*
5	1. Repair the line(between terminal 1 and terminal 12) for an open. 2. Repair the line(between terminal 2 and terminal 3) for an open. Is the repair complete?	–	System OK	–
6	Replace the solenoid 1. Is the replacement complete?	–	System OK	–
7	1. Disconnect the transaxle wiring connector and TCM connector. 2. Measure the resistance between terminal 3 of the transaxle wiring connector and terminal C8 of the TCM wiring connector. 3. Measure the resistance between terminal 12 of the transaxle wiring connector and terminal A9 of the TCM wiring connector. Is the resistance within the values shown?	≈ 0 Ω	Go to *Step 9*	Go to *Step 8*
8	Repair the transaxle wiring harness for an open. Is the repair complete?	–	System OK	–
9	Replace the TCM. Is the replacement complete?	–	Go to *Step 10*	–
10	1. After the repair, use a scan tool "clear info" function and road test the vehicle. 2. Review the "DTC info". 3. Has the last test failed or is the current DTC displayed?	–	Begin diagnosis again	Repair verified exit DTC chart



DIAGNOSTIC TROUBLE CODE(DTC) P1853

SOLENOID 2 OUTPUT SHORTED TO GROUND

Circuit Description

The shift solenoids are two identical, normally open electronic exhaust valves that control upshifts and downshifts in all forward gear ranges. These shift solenoids work together in a combination of ON and OFF sequences to control the line pressure and shift mechanisms(clutches, brakes).

Solenoid 2 controls the high or low of the line pressure (flow to each clutch valve) by the operation type (ON/OFF), i.e. solenoid 2 is ON, line pressure will be low (87~116psi (6~8bar)), solenoid 1 is OFF, line pressure will be high (232~261psi (16~18bar)). Solenoid 2 controls the oil flow to clutch valve E or lock–up clutch valve by the ON/OFF signal.

The TCM monitors numerous inputs to determine the appropriate solenoid state combination and transaxle gear tor the vehicle operating conditions.

Conditions for Setting the DTC

- Solenoid wiring shorted to ground.
- No DTC P1854, P1855.
- Immediately after the above condition occurs.

Action Taken When The DTC Sets

- The Malfunction Indicator Lamp(MIL) will illuminate.
- The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer.
- Adopt Emergency/ Substitute mode and constant 4th gear by hydraulic control.
- After ignition OFF/ON : 3rd gear by hydraulic control. Possible P, R and N also possible.

Conditions for Clearing the MIL/DTC

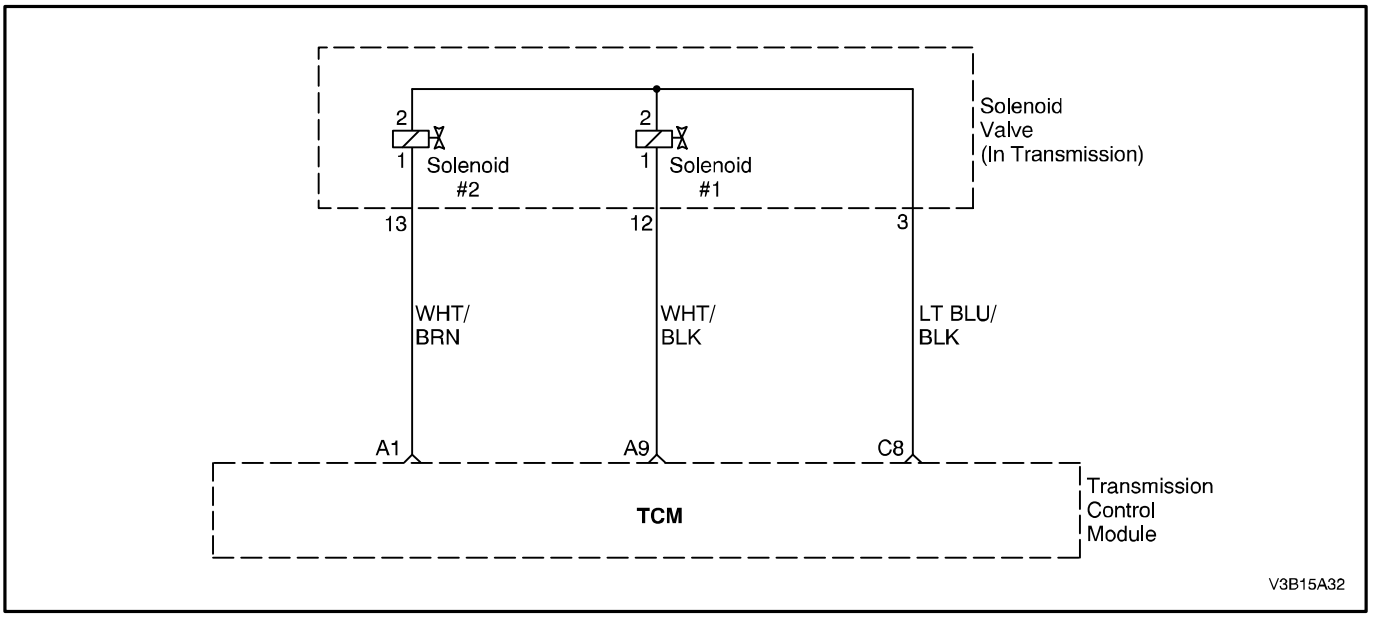
- The MIL will turn OFF when the malfunction has not occurred after three–ignition cycle.
- A history DTC will clear after 40 consecutive warm up cycles without a fault.
- Using a scan tool can clear history DTCs.

Diagnostic Aids

- When DTC P1853 sets, the possible cause of fault could be solenoid 2.

DTC P1853 – Solenoid 2 Output Shorted To Ground

Step	Action	Value(s)	Yes	No
1	Perform an On–Board Diagnostic (EOBD) System Check. Is the check completed?	–	Go to *Step 2*	Go to *"On–Board Diagnostic System Check"*
2	1. Install the scan tool. 2. Turn the ignition On, with the engine OFF. 3. Record then clear DTC(s). 4. Select "Actuating" on the scan tool. 5. Actuate solenoid 2 ON/OFF. Does the solenoid 2 change ON/OFF?	ON/OFF	Go to *"Diagnostic Aids"*	Go to *Step 3*
3	1. Turn the ignition OFF. 2. Disconnect the transaxle wiring connector. 3. Measure the resistance between terminals 3 and 12 of the transaxle wiring connector. Is the resistance within the values shown?	TFT 25˚C (77˚F) 26~34.5 Ω	Go to *Step 7*	Go to *Step 4*
4	1. Remove the oil pan. 2. Disconnect the wiring connector of solenoid 2. 3. Measure the resistance between terminal 2 of solenoid 2 and ground. 4. Measure the resistance between terminal 1 of solenoid 2 and ground. Is the resistance within the values shown?	∞	Go to *Step 6*	Go to *Step 5*
5	Repair the internal line(solenoid 2) for a short to ground. Is the repair complete?	–	System OK	–
6	Replace the solenoid 2. Is the replacement complete?	–	System OK	–
7	1. Disconnect the transaxle wiring connector and TCM connector. 2. Measure the resistance between terminal 3 of the transaxle wiring connector and ground. 3. Measure the resistance between terminal 13 of the transaxle wiring connector and ground. Is the resistance within the values shown?	∞	Go to *Step 9*	Go to *Step 8*
8	Repair the transaxle wiring harness for a short to ground. Is the repair complete?	–	System OK	–
9	Replace the TCM. Is the replacement complete?	–	Go to *Step 10*	–
10	1. After the repair, use a scan tool "clear info" function and road tests the vehicle. 2. Review the "DTC info". 3. Has the last test failed or is the current DTC displayed?	–	Begin diagnosis again	Repair verified exit DTC chart



DIAGNOSTIC TROUBLE CODE(DTC) P1854

SOLENOID 2 OUTPUT SHORTED TO POWER

Circuit Description

The shift solenoids are two identical, normally open electronic exhaust valves that control upshifts and downshifts in all forward gear ranges. These shift solenoids work together in a combination of ON and OFF sequences to control the line pressure and shift mechanisms(clutches, brakes).

Solenoid 2 controls the high or low of the line pressure (flow to each clutch valve) by the operation type (ON/ OFF), i.e. solenoid 2 is ON, line pressure will be low (87~116psi (6~8bar)), solenoid 1 is OFF, line pressure will be high (232~261psi (16~18bar)). Solenoid 2 controls the oil flow to clutch valve E or lock–up clutch valve by the ON/ OFF signal.

The TCM monitors numerous inputs to determine the appropriate solenoid state combination and transaxle gear tor the vehicle operating conditions.

Conditions for Setting the DTC

- Solenoid wiring shorted to power.
- No DTC P1853, P1855.
- Immediately after the above condition occurs.

Action Taken When The DTC Sets

- The Malfunction Indicator Lamp(MIL) will illuminate.
- The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer.
- Adopt Emergency/ Substitute mode and constant 4th gear.

Conditions for Clearing the MIL/DTC

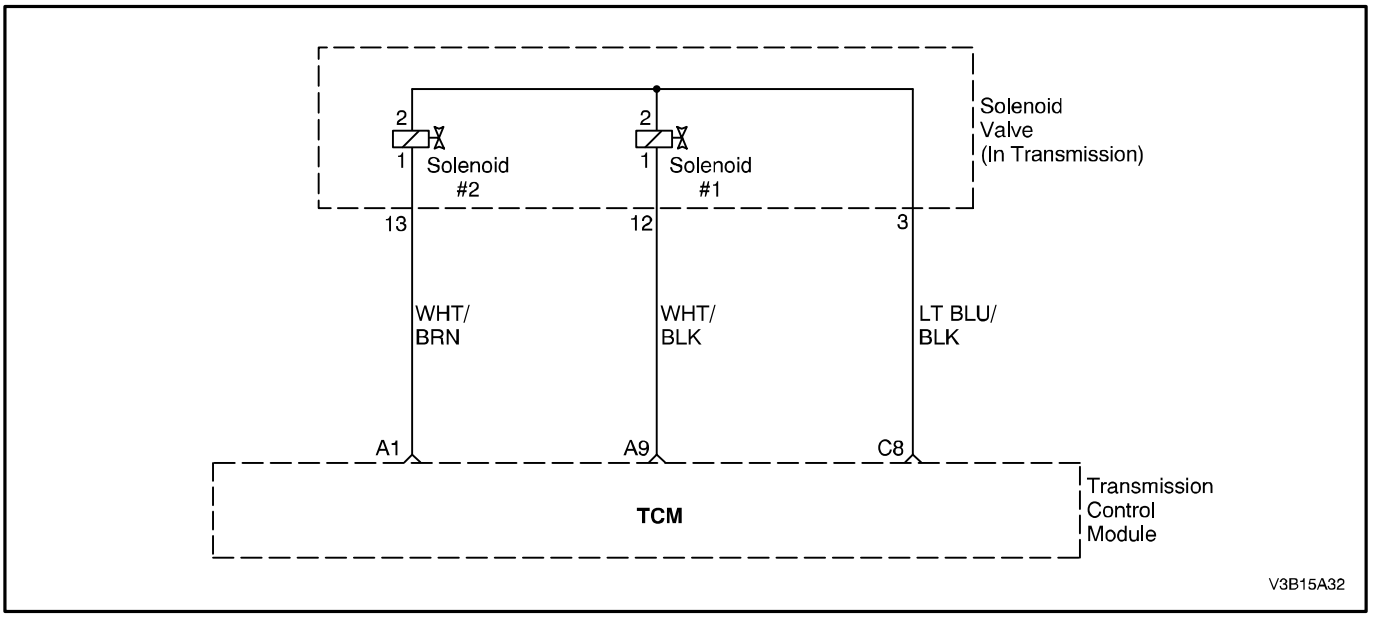
- The MIL will turn OFF when the malfunction has not occurred after three–ignition cycle.
- A history DTC will clear after 40 consecutive warm up cycles without a fault.
- Using a scan tool can clear history DTCs.

Diagnostic Aids

- When DTC P1854 sets, the possible cause of fault could be solenoid 2.

DTC P1854 – Solenoid 2 Output Shorted To Power

Step	Action	Value(s)	Yes	No
1	Perform an On–Board Diagnostic (EOBD) System Check. Is the check completed?	–	Go to *Step 2*	Go to *"On–Board Diagnostic System Check"*
2	1. Install the scan tool. 2. Turn the ignition On, with the engine OFF. 3. Select "Actuating" on the scan tool. 4. Actuate solenoid 2 ON/OFF. Does the solenoid 2 change ON/OFF?	ON/OFF	Go to *"Diagnostic Aids"*	Go to *Step 3*
3	1. Remove the oil pan. 2. Disconnect the wiring connector of solenoid 2. 3. Turn the ignition ON, with the engine OFF. 4. Measure the voltage of solenoid 2 wiring connector terminal 1. Is the voltage within the values shown?	11–14V	Go to *Step 4*	Go to *Step 5*
4	Repair the internal line(solenoid 2) for a short to power. Is the repair complete?	–	System OK	–
5	Replace the solenoid 2. Is the replacement complete?	–	Go to *Step 6*	–
6	1. Check if any DTCs are set. 2. Are any DTCs displayed that have not been diagnosed?	–	Go to *"Applicable DTC table"*	System OK



DIAGNOSTIC TROUBLE CODE(DTC) P1855

SOLENOID 2 OUTPUT OPEN

Circuit Description

The shift solenoids are two identical, normally open electronic exhaust valves that control upshifts and downshifts in all forward gear ranges. These shift solenoids work together in a combination of ON and OFF sequences to control the line pressure and shift mechanisms(clutches, brakes).

Solenoid 2 controls the high or low of the line pressure (flow to each clutch valve) by the operation type (ON/OFF), i.e. solenoid 2 is ON, line pressure will be low (87~116psi (6~8bar)), solenoid 1 is OFF, line pressure will be high (232~261psi (16~18bar)). Solenoid 2 controls the oil flow to clutch valve E or lock–up clutch valve by the ON/OFF signal.

The TCM monitors numerous inputs to determine the appropriate solenoid state combination and transaxle gear tor the vehicle operating conditions.

Conditions for Setting the DTC

- Solenoid wiring open.
- No DTC P1853, P1854.
- Immediately after the above condition occurs.

Action Taken When The DTC Sets

- The Malfunction Indicator Lamp(MIL) will illuminate.
- The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer.
- Adopt Emergency/ Substitute mode and constant 4th gear.
- After ignition OFF/ON : 3rd gear by hydraulic control. Possible P, R and N also possible.

Conditions for Clearing the MIL/DTC

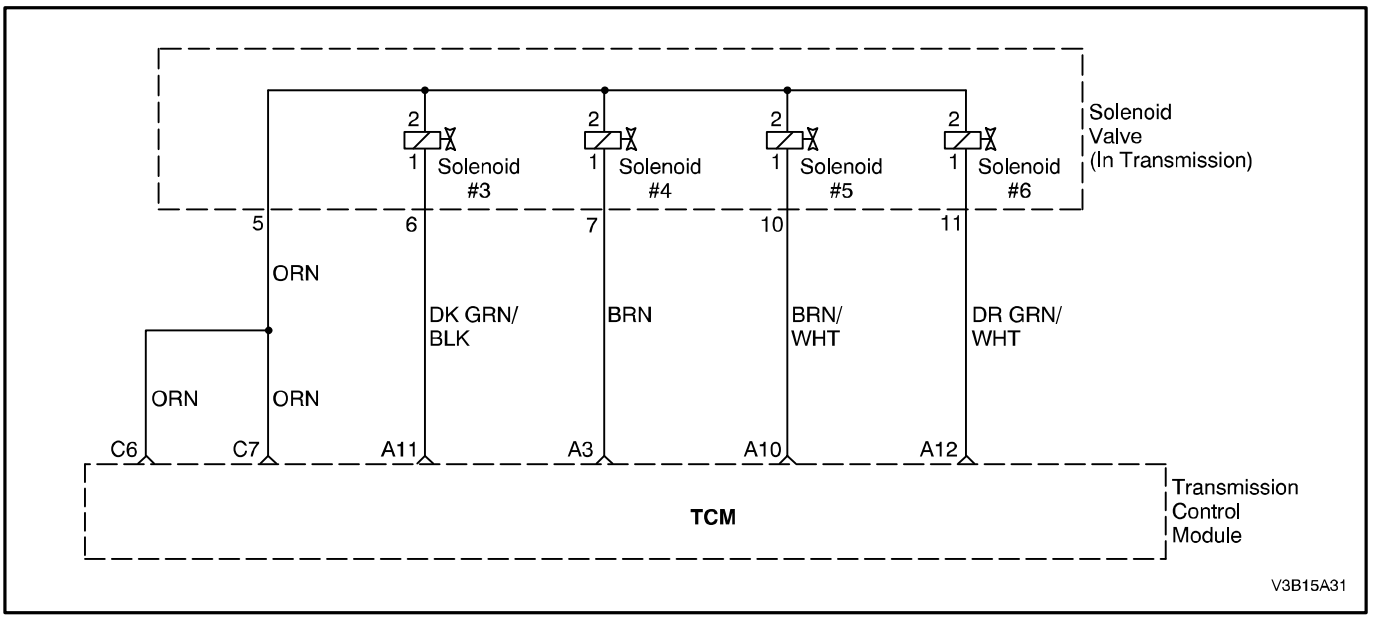
- The MIL will turn OFF when the malfunction has not occurred after three–ignition cycle.
- A history DTC will clear after 40 consecutive warm up cycles without a fault.
- Using a scan tool can clear history DTCs.

Diagnostic Aids

- When DTC P1855 sets, the possible cause of fault could be solenoid 2.

DTC P1855 – Solenoid 2 Output Open

Step	Action	Value(s)	Yes	No
1	Perform an On–Board Diagnostic (EOBD) System Check. Is the check completed?	–	Go to *Step 2*	Go to *"On–Board Diagnostic System Check"*
2	1. Install the scan tool. 2. Turn the ignition On, with the engine OFF. 3. Select "Actuating" on the scan tool. 4. Actuate solenoid 2 ON/OFF. Does the solenoid 2 change ON/OFF?	ON/OFF	Go to *"Diagnostic Aids"*	Go to *Step 3*
3	1. Turn the ignition OFF. 2. Disconnect the transaxle wiring connector. 3. Measure the resistance between terminals 3 and 12 of the transaxle wiring connector. Is the resistance within the values shown?	TFT 25˚C (77˚F) 6 Ω	Go to *Step 7*	Go to *Step 4*
4	1. Remove the oil pan. 2. Disconnect the wiring connector of solenoid 2. 3. Measure the resistance between terminal 1 of solenoid 2 and terminal 13 of the transaxle connector. 4. Measure the resistance between terminal 2 of solenoid 2 and terminal 3 of the transaxle connector. Is the resistance within the values shown?	≈ 0 Ω	Go to *Step 6*	Go to *Step 5*
5	1. Repair the line(between terminal 1 and terminal 13) for an open. 2. Repair the line(between terminal 2 and terminal 3) for an open. Is the repair complete?	–	System OK	–
6	Replace the solenoid 2. Is the replacement complete?	–	System OK	–
7	1. Disconnect the transaxle wiring connector and TCM connector. 2. Measure the resistance between terminal 3 of the transaxle wiring connector and terminal C8 of the TCM wiring connector. 3. Measure the resistance between terminal 13 of the transaxle wiring connector and terminal A9 of the TCM wiring connector. Is the resistance within the values shown?	≈ 0 Ω	Go to *Step 9*	Go to *Step 8*
8	Repair the transaxle wiring harness for an open. Is the repair complete?	–	System OK	–
9	Replace the TCM. Is the replacement complete?	–	Go to *Step 10*	–
10	1. After the repair, use a scan tool "clear info" function and road test the vehicle. 2. Review the "DTC info". 3. Has the last test failed or is the current DTC displayed?	–	Begin diagnosis again	Repair verified exit DTC chart



DIAGNOSTIC TROUBLE CODE(DTC) P1861

EDS 4 OUTPUT SHORTED TO GROUND

Circuit Description

The pressure control valves (EDS valves 3,4,5 and 6) are precision electronic pressure regulators that control the operation of the clutches, brakes and lock–up clutch.

The valve reduces the system pressure with which the downstream solenoid valves and electrical pressure regulating valves are supplied. It is possible to use smaller solenoid valves as a result. The EDS require a constant input pressure.

Conditions for Setting the DTC

- Output voltage of the EDS 4 is less than 2 volt.
- No DTC P1862, P1863.
- Immediately after the above condition occurs.

Action Taken When The DTC Sets

- The Malfunction Indicator Lamp(MIL) will illuminate.
- The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer.
- Adopt Emergency/ Substitute mode and constant 4th gear by hydraulic control.
- After ignition OFF/ON : 3rd gear by hydraulic control. Possible P, R and N also possible.
- Power supply cut off to the EDS valve.

Conditions for Clearing the MIL/DTC

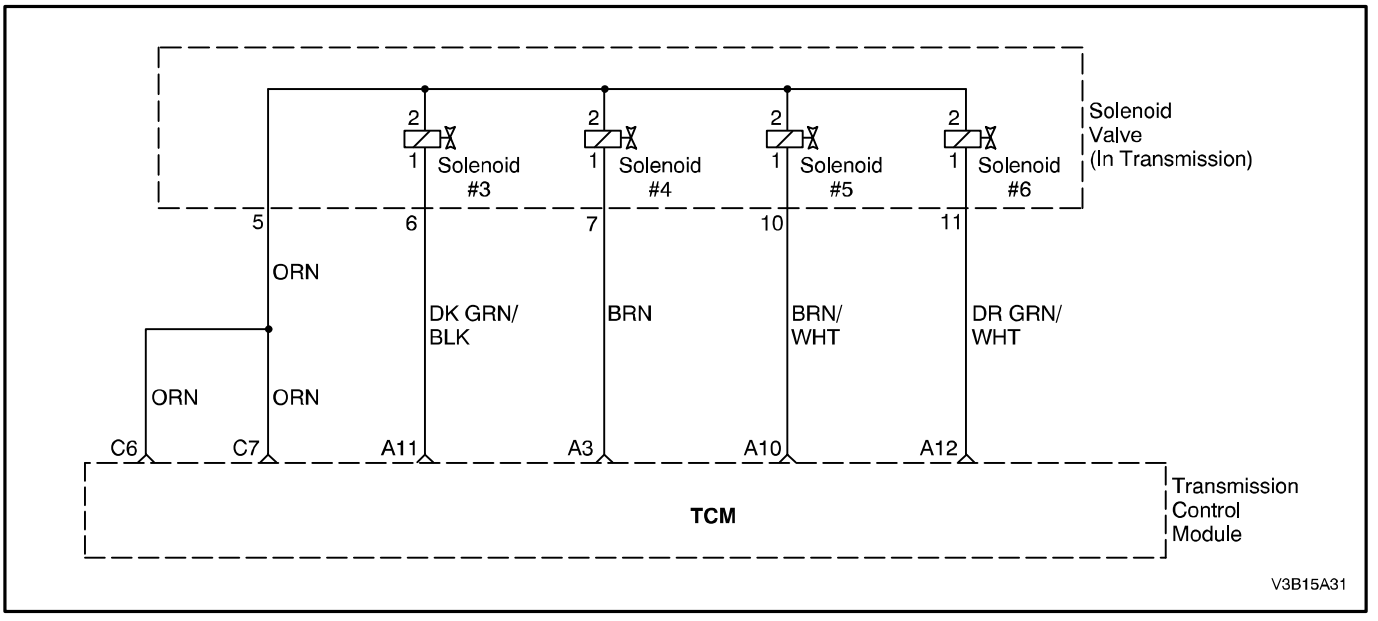
- The MIL will turn OFF when the malfunction has not occurred after three–ignition cycle.
- A history DTC will clear after 40 consecutive warm up cycles without a fault.
- Using a scan tool can clear history DTCs.

Diagnostic Aids

- When DTC P1861 sets, the possible cause of fault could be EDS4 valve.

DTC P1861 – EDS 4 Output Shorted To Ground

Step	Action	Value(s)	Yes	No
1	Perform an On–Board Diagnostic (EOBD) System Check. Is the check completed?	–	Go to *Step 2*	Go to *"On–Board Diagnostic System Check"*
2	1. Install the scan tool. 2. Turn the ignition ON, with the engine OFF. 3. Select "Actuating" on the scan tool. 4. Actuate EDS 4 ON/OFF. Does the EDS 4 change ON/OFF?	ON/OFF	Go to *"Diagnostic Aids"*	Go to *Step 3*
3	1. Turn the ignition OFF. 2. Disconnect the transaxle wiring connector. 3. Measure the resistance between terminals 5 and 7 of the transaxle wiring connector. Is the resistance within the values shown?	TFT 25˚C (77˚F) 6 Ω	Go to *Step 7*	Go to *Step 4*
4	1. Remove the oil pan. 2. Disconnect the wiring connector of EDS 4. 3. Measure the resistance between terminal 2 of EDS 4 and ground. 4. Measure the resistance between terminal 1 of EDS 4 and ground. Is the resistance within the values shown?	∞	Go to *Step 6*	Go to *Step 5*
5	Repair the internal line(EDS 4) for a short to ground. Is the repair complete?	–	System OK	–
6	Replace the EDS 4. Is the replacement complete?	–	System OK	–
7	1. Disconnect the transaxle wiring connector and TCM connector. 2. Measure the resistance between terminal 5 of the transaxle wiring connector and ground. 3. Measure the resistance between terminal 7 of the transaxle wiring connector and ground. Is the resistance within the values shown?	∞	Go to *Step 9*	Go to *Step 8*
8	Repair the transaxle wiring harness for a short to ground. Is the repair complete?	–	System OK	–
9	Replace the TCM. Is the replacement complete?	–	Go to *Step 10*	–
10	1. After the repair, use a scan tool "clear info" function and road tests the vehicle. 2. Review the "DTC info". 3. Has the last test failed or is the current DTC displayed?	–	Begin diagnosis again	Repair verified exit DTC chart



DIAGNOSTIC TROUBLE CODE(DTC) P1862

EDS 4 OUTPUT SHORTED TO POWER

Circuit Description

The pressure control valves (EDS valves 3,4,5 and 6) are precision electronic pressure regulators that control the operation of the clutches, brakes and lock–up clutch.

The valve reduces the system pressure with which the downstream solenoid valves and electrical pressure regulating valves are supplied. It is possible to use smaller solenoid valves as a result. The EDS require a constant input pressure.

Conditions for Setting the DTC

- Output voltage of the EDS 4 (at ON) is 12 volt.
- No DTC P1861, P1863.
- Immediately after the above condition occurs.

Action Taken When The DTC Sets

- The Malfunction Indicator Lamp(MIL) will illuminate.
- The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer.
- Adopt Emergency/ Substitute mode and constant 4th gear by hydraulic control.
- After ignition OFF/ON : 3rd gear by hydraulic control. Possible P, R and N also possible.
- Power supply cut off to the EDS valve.

Conditions for Clearing the MIL/DTC

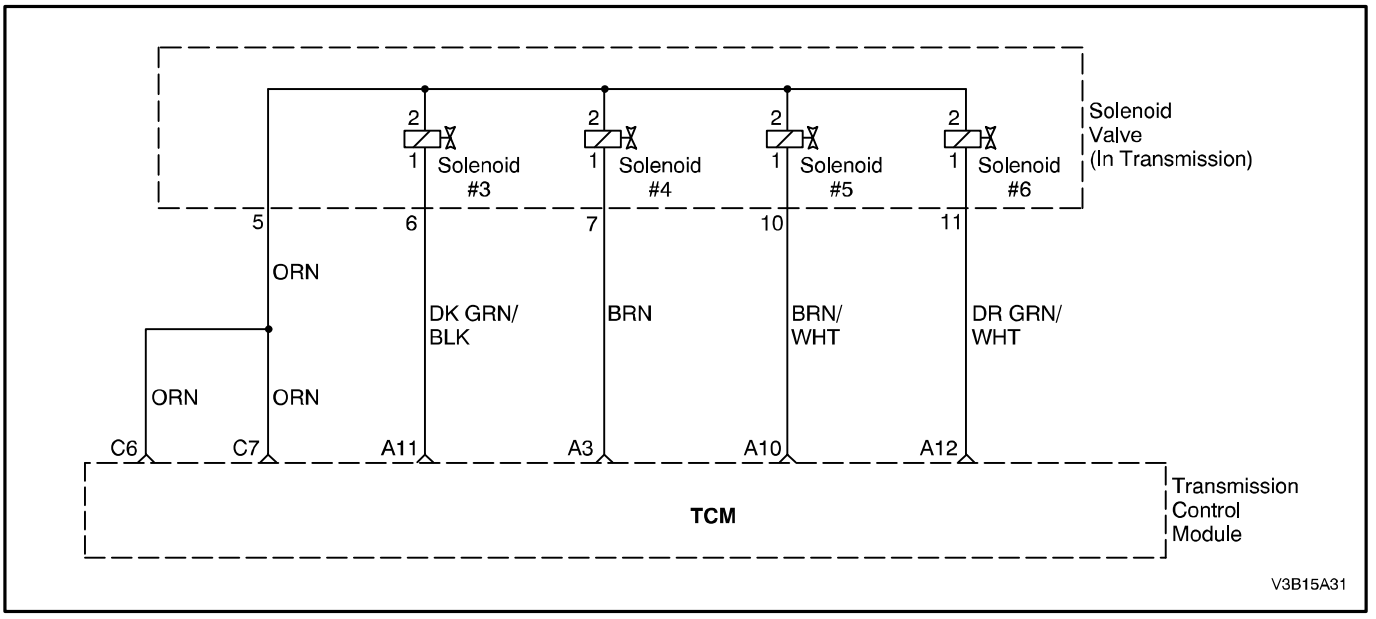
- The MIL will turn OFF when the malfunction has not occurred after three–ignition cycle.
- A history DTC will clear after 40 consecutive warm up cycles without a fault.
- Using a scan tool can clear history DTCs.

Diagnostic Aids

- When DTC P1862 sets, the possible cause of fault could be TCM.

DTC P1862 – EDS 4 Output Shorted To Power

Step	Action	Value(s)	Yes	No
1	Perform an On–Board Diagnostic (EOBD) System Check. Is the check completed?	–	Go to *Step 2*	Go to *"On–Board Diagnostic System Check"*
2	1. Install the scan tool. 2. Turn the ignition ON, with the engine OFF. 3. Select "Actuating" on the scan tool. 4. Actuate EDS 4 ON/OFF. Does the EDS 4 change ON/OFF?	ON/OFF	Go to *"Diagnostic Aids"*	Go to *Step 3*
3	1. Remove the oil pan. 2. Disconnect the wiring connector of EDS 4. 3. Turn the ignition ON, with the engine OFF. 4. Measure the voltage of EDS 4 wiring connector terminal 1. Is the voltage within the values shown?	11–14V	Go to *Step 4*	Go to *Step 5*
4	Repair the internal line(EDS 4) for a short to power. Is the repair complete?	–	System OK	–
5	Replace the EDS 4. Is the replacement complete?	–	Go to *Step 6*	–
6	1. Check if any DTCs are set. 2. Are any DTCs displayed that have not been diagnosed?	–	Go to *"Applicable DTC table"*	System OK



DIAGNOSTIC TROUBLE CODE(DTC) P1863

EDS 4 OUTPUT OPEN

Circuit Description

The pressure control valves (EDS valves 3,4,5 and 6) are precision electronic pressure regulators that control the operation of the clutches, brakes and lock–up clutch.

The valve reduces the system pressure with which the downstream solenoid valves and electrical pressure regulating valves are supplied. It is possible to use smaller solenoid valves as a result. The EDS require a constant input pressure.

Conditions for Setting the DTC

- Output ampere of the EDS 4 is less than 10mA.
- No DTC P1861, P1862.
- Immediately after the above condition occurs.

Action Taken When The DTC Sets

- The Malfunction Indicator Lamp(MIL) will illuminate.
- The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer.
- Adopt Emergency/ Substitute mode and constant 4th gear by hydraulic control.
- After ignition OFF/ON : 3rd gear by hydraulic control. Possible P, R and N also possible.
- Power supply cut off to the EDS valve.

Conditions for Clearing the MIL/DTC

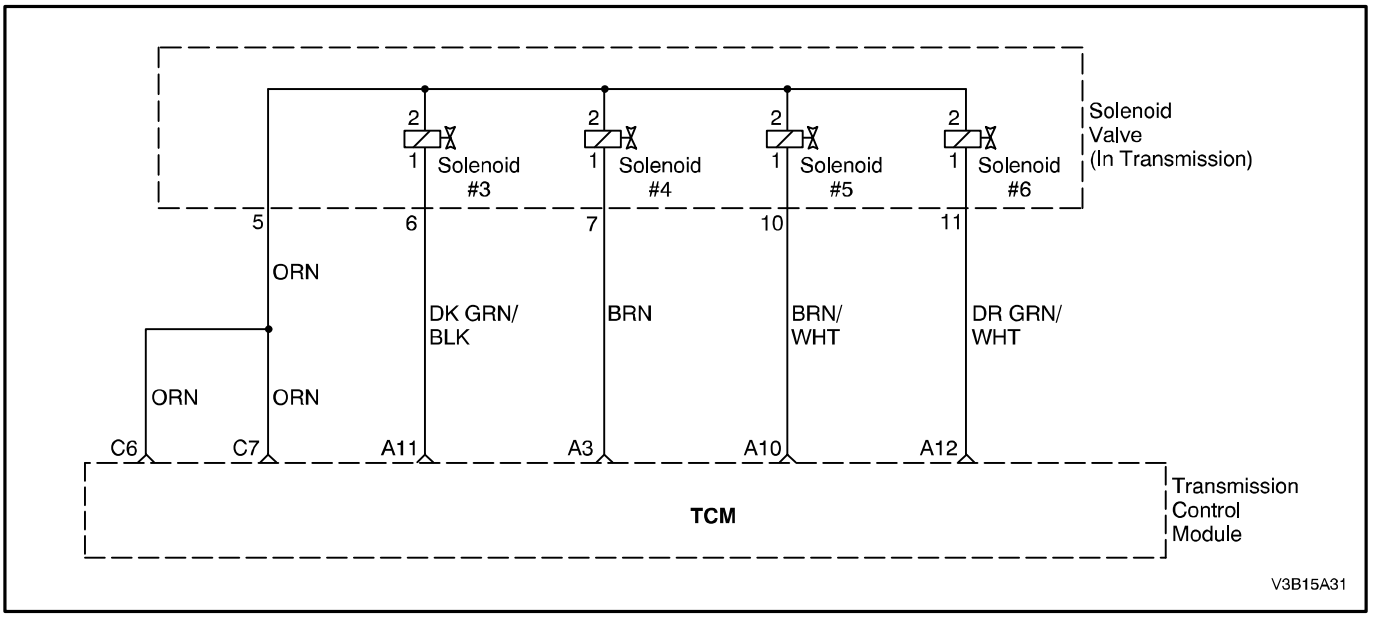
- The MIL will turn OFF when the malfunction has not occurred after three–ignition cycle.
- A history DTC will clear after 40 consecutive warm up cycles without a fault.
- Using a scan tool can clear history DTCs.

Diagnostic Aids

- When DTC P1863 sets, the possible cause of fault could be EDS4 valve.

DTC P1863 – EDS 4 Output Open

Step	Action	Value(s)	Yes	No
1	Perform an On–Board Diagnostic (EOBD) System Check. Is the check completed?	–	Go to *Step 2*	Go to *"On–Board Diagnostic System Check"*
2	1. Install the scan tool. 2. Turn the ignition ON, with the engine OFF. 3. Select "Actuating" on the scan tool. 4. Actuate EDS 4 ON/OFF. Does the EDS 4 change ON/OFF?	ON/OFF	Go to *"Diagnostic Aids"*	Go to *Step 3*
3	1. Turn the ignition OFF. 2. Disconnect the transaxle wiring connector. 3. Measure the resistance between terminals 5 and 7 of the transaxle wiring connector. Is the resistance within the values shown?	TFT 25˚C (77˚F) 6 Ω	Go to *Step 7*	Go to *Step 4*
4	1. Remove the oil pan. 2. Disconnect the wiring connector of EDS 4. 3. Measure the resistance between terminal 2 of the EDS 4 and terminal 5 of the transaxle connector. 4. Measure the resistance between terminal 1 of the EDS 4 and terminal 7 of the transaxle connector. Is the resistance within the values shown?	≈ 0 Ω	Go to *Step 6*	Go to *Step 5*
5	1. Repair the circuit (between terminal 2 and terminal 5) for an open. 2. Repair the circuit (between terminal 1 and terminal 7) for an open. Is the repair complete?	–	System OK	–
6	Replace the EDS 4. Is the replacement complete?	–	System OK	–
7	1. Disconnect the transaxle wiring connector and TCM connector. 2. Measure the resistance between terminal 5 of the transaxle wiring connector and terminal C7 of the TCM wiring connector. 3. Measure the resistance between terminal 7 of the transaxle wiring connector and terminal A3 of the TCM wiring connector. Is the resistance within the values shown?	≈ 0 Ω	Go to *Step 9*	Go to *Step 8*
8	Repair the transaxle wiring harness for an open. Is the repair complete?	–	System OK	–
9	Replace the TCM. Is the replacement complete?	–	Go to *Step 10*	–
10	1. After the repair, use a scan tool "clear info" function and road tests the vehicle. 2. Review the "DTC info". 3. Has the last test failed or is the current DTC displayed?	–	Begin diagnosis again	Repair verified exit DTC chart



DIAGNOSTIC TROUBLE CODE(DTC) P1864

EDS 5 OUTPUT SHORTED TO GROUND

Circuit Description

The pressure control valves (EDS valves 3,4,5 and 6) are precision electronic pressure regulators that control the operation of the clutches, brakes and lock–up clutch.

The valve reduces the system pressure with which the downstream solenoid valves and electrical pressure regulating valves are supplied. It is possible to use smaller solenoid valves as a result. The EDS require a constant input pressure.

Conditions for Setting the DTC

- Output voltage of the EDS 5 is less than 2 volt.
- No DTC P1865, P1866.
- Immediately after the above condition occurs.

Action Taken When The DTC Sets

- The Malfunction Indicator Lamp(MIL) will illuminate.
- The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer.
- Adopt Emergency/ Substitute mode and constant 4th gear by hydraulic control.
- After ignition OFF/ON : 3rd gear by hydraulic control. Possible P, R and N also possible.
- Power supply cut off to the EDS valve.

Conditions for Clearing the MIL/DTC

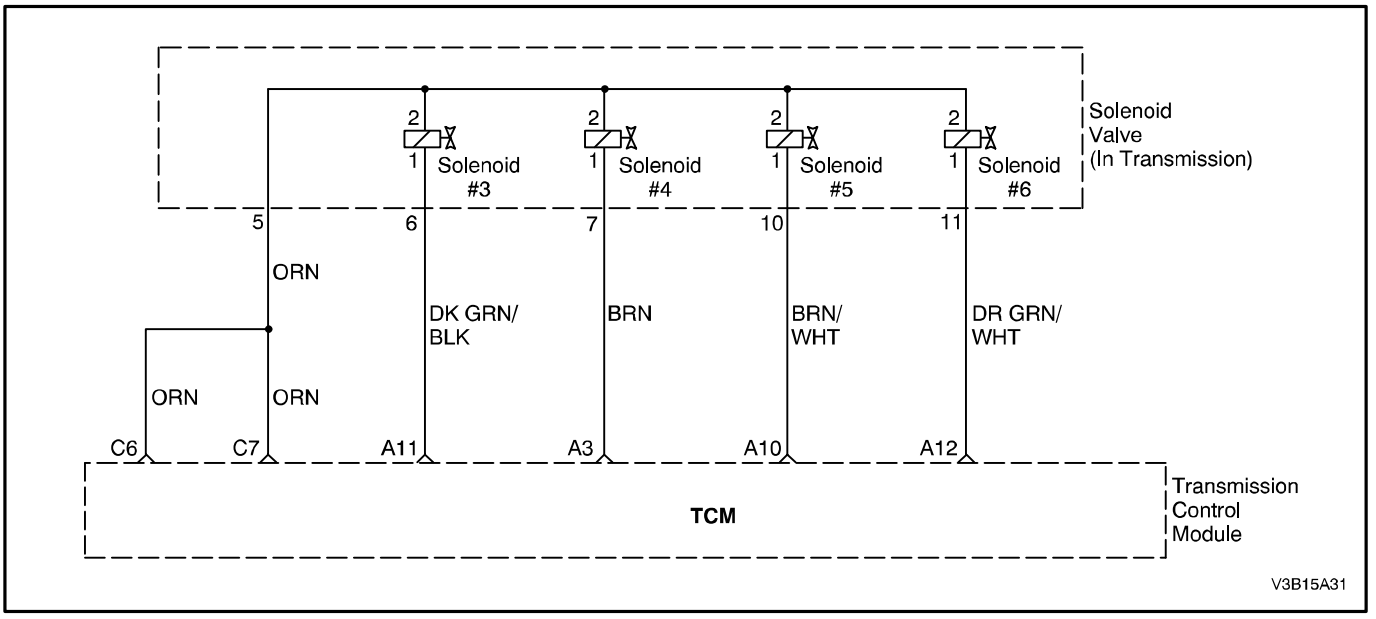
- The MIL will turn OFF when the malfunction has not occurred after three–ignition cycle.
- A history DTC will clear after 40 consecutive warm up cycles without a fault.
- Using a scan tool can clear history DTCs.

Diagnostic Aids

- When DTC P1864 sets, the possible cause of fault could be EDS valve.

DTC P1864 – EDS 5 Output Shorted To Ground

Step	Action	Value(s)	Yes	No
1	Perform an On–Board Diagnostic (EOBD) System Check. Is the check completed?	–	Go to *Step 2*	Go to *"On–Board Diagnostic System Check"*
2	1. Install the scan tool. 2. Turn the ignition ON, with the engine OFF. 3. Select "Actuating" on the scan tool. 4. Actuate EDS 5 ON/OFF. Does the EDS 5 change ON/OFF?	ON/OFF	Go to *"Diagnostic Aids"*	Go to *Step 3*
3	1. Turn the ignition OFF. 2. Disconnect the transaxle wiring connector. 3. Measure the resistance between terminals 5 and 10 of the transaxle wiring connector. Is the resistance within the values shown?	TFT 25˚C (77˚F) 6 Ω	Go to *Step 7*	Go to *Step 4*
4	1. Remove the oil pan. 2. Disconnect the wiring connector of EDS 5. 3. Measure the resistance between terminal 2 of EDS 5 and ground. 4. Measure the resistance between terminal 1 of EDS 5 and ground. Is the resistance within the values shown?	∞	Go to *Step 6*	Go to *Step 5*
5	Repair the internal line(EDS 5) for a short to ground. Is the repair complete?	–	System OK	–
6	Replace the EDS 5. Is the replacement complete?	–	System OK	–
7	1. Disconnect the transaxle wiring connector and TCM connector. 2. Measure the resistance between terminal 5 of the transaxle wiring connector and ground. 3. Measure the resistance between terminal 10 of the transaxle wiring connector and ground. Is the resistance within the values shown?	∞	Go to *Step 9*	Go to *Step 8*
8	Repair the transaxle wiring harness for a short to ground. Is the repair complete?	–	System OK	–
9	Replace the TCM. Is the replacement complete?	–	Go to *Step 10*	–
10	1. After the repair, use a scan tool "clear info" function and road tests the vehicle. 2. Review the "DTC info". 3. Has the last test failed or is the current DTC displayed?	–	Begin diagnosis again	Repair verified exit DTC chart



DIAGNOSTIC TROUBLE CODE(DTC) P1865

EDS 5 OUTPUT SHORTED TO POWER

Circuit Description

The pressure control valves (EDS valves 3,4,5 and 6) are precision electronic pressure regulators that control the operation of the clutches, brakes and lock–up clutch.

The valve reduces the system pressure with which the downstream solenoid valves and electrical pressure regulating valves are supplied. It is possible to use smaller solenoid valves as a result. The EDS require a constant input pressure.

Conditions for Setting the DTC

- Output voltage of the EDS 5 (at ON) is 12 volt.
- No DTC P1864, P1866.
- Immediately after the above condition occurs.

Action Taken When The DTC Sets

- The Malfunction Indicator Lamp(MIL) will illuminate.
- The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer.
- Adopt Emergency/ Substitute mode and constant 4th gear by hydraulic control.
- After ignition OFF/ON : 3rd gear by hydraulic control. Possible P, R and N also possible.
- Power supply cut off to the EDS valve.

Conditions for Clearing the MIL/DTC

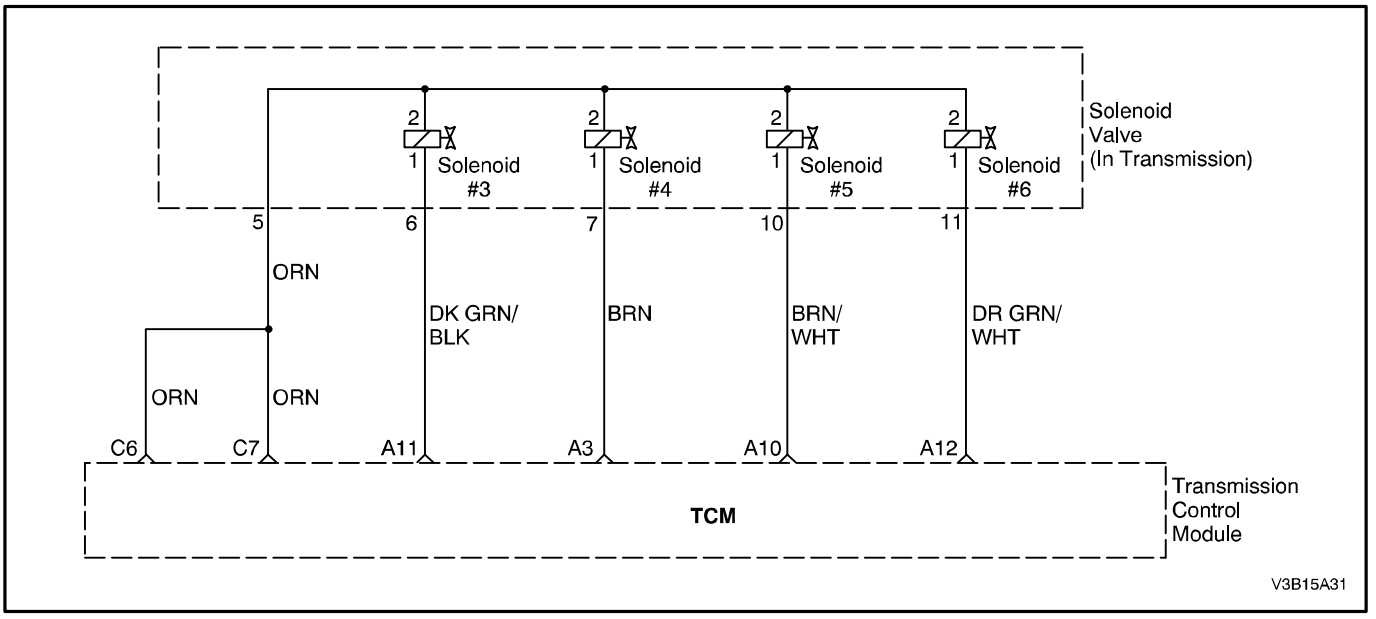
- The MIL will turn OFF when the malfunction has not occurred after three–ignition cycle.
- A history DTC will clear after 40 consecutive warm up cycles without a fault.
- Using a scan tool can clear history DTCs.

Diagnostic Aids

- When DTC P1865 sets, the possible cause of fault could be EDS5.

DTC P1865 – EDS 5 Output Shorted To Power

Step	Action	Value(s)	Yes	No
1	Perform an On–Board Diagnostic (EOBD) System Check. Is the check completed?	–	Go to *Step 2*	Go to *"On–Board Diagnostic System Check"*
2	1. Install the scan tool. 2. Turn the ignition ON, with the engine OFF. 3. Select "Actuating" on the scan tool. 4. Actuate EDS 5 ON/OFF. Does the EDS 5 change ON/OFF?	ON/OFF	Go to *"Diagnostic Aids"*	Go to *Step 3*
3	1. Remove the oil pan. 2. Disconnect the wiring connector of EDS 5. 3. Turn the ignition ON, with the engine OFF. 4. Measure the voltage of EDS 5 wiring connector terminal 2. Is the resistance within the values shown?	11–14V	Go to *Step 4*	Go to *Step 5*
4	Repair the internal line(EDS 5) for a short to power. Is the repair complete?	–	System OK	–
5	Replace the EDS 5. Is the replacement complete?	–	Go to *Step 6*	–
6	1. Check if any DTCs are set. 2. Are any DTCs displayed that have not been diagnosed?	–	Go to *"Applicable DTC table"*	System OK



DIAGNOSTIC TROUBLE CODE(DTC) P1866

EDS 5 OUTPUT OPEN

Circuit Description

The pressure control valves (EDS valves 3,4,5 and 6) are precision electronic pressure regulators that control the operation of the clutches, brakes and lock–up clutch.

The valve reduces the system pressure with which the downstream solenoid valves and electrical pressure regulating valves are supplied. It is possible to use smaller solenoid valves as a result. The EDS require a constant input pressure.

Conditions for Setting the DTC

- Output ampere of the EDS 5 is less than 10mA.
- No DTC P1864, P1865.
- Immediately after the above condition occurs.

Action Taken When The DTC Sets

- The Malfunction Indicator Lamp(MIL) will illuminate.
- The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer.
- Adopt Emergency/ Substitute mode and constant 4th gear by hydraulic control.
- After ignition OFF/ON : 3rd gear by hydraulic control. Possible P, R and N also possible.
- Power supply cut off to the EDS valve.

Conditions for Clearing the MIL/DTC

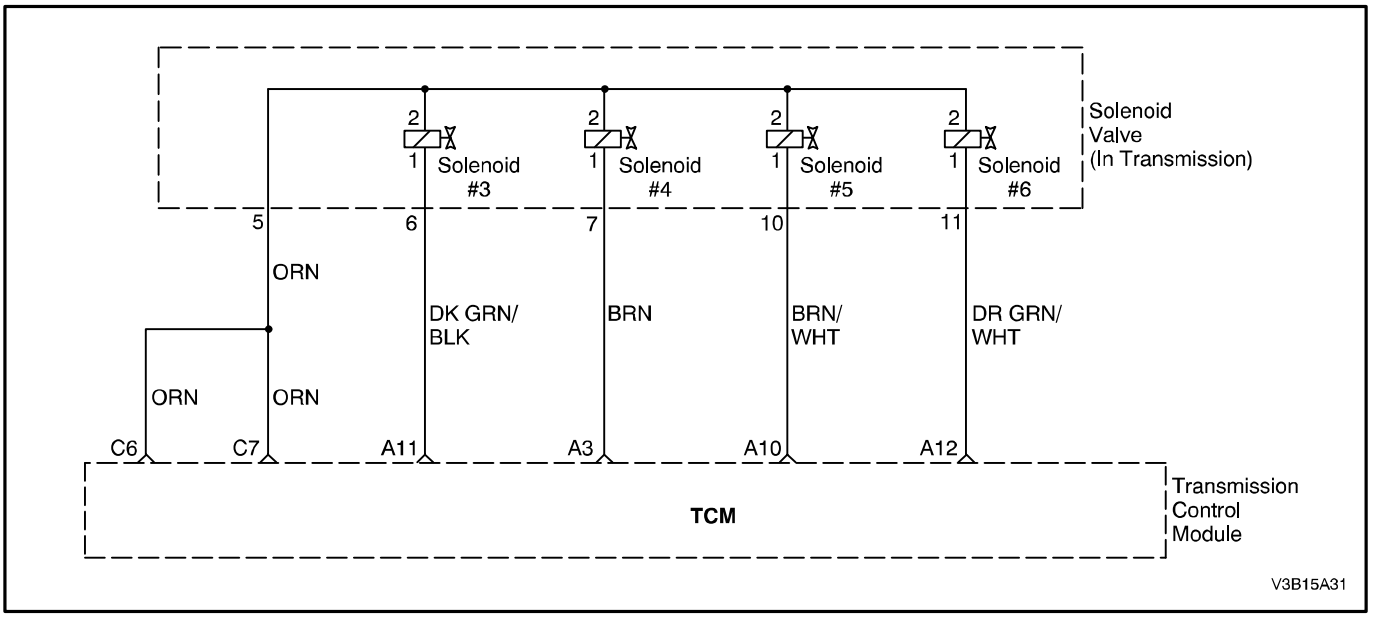
- The MIL will turn OFF when the malfunction has not occurred after three–ignition cycle.
- A history DTC will clear after 40 consecutive warm up cycles without a fault.
- Using a scan tool can clear history DTCs.

Diagnostic Aids

- When DTC P1866 sets, the possible cause of fault could be EDS valve.

DTC P1866 – EDS 5 Output Open

Step	Action	Value(s)	Yes	No
1	Perform an On–Board Diagnostic (EOBD) System Check. Is the check completed?	–	Go to *Step 2*	Go to *"On–Board Diagnostic System Check"*
2	1. Install the scan tool. 2. Turn the ignition ON, with the engine OFF. 3. Select "Actuating" on the scan tool. 4. Actuate EDS 5 ON/OFF. Does the EDS 5 change ON/OFF?	ON/OFF	Go to *"Diagnostic Aids"*	Go to *Step 3*
3	1. Turn the ignition OFF. 2. Disconnect the transaxle wiring connector. 3. Measure the resistance between terminals 5 and 10 of the transaxle wiring connector. Is the resistance within the values shown?	TFT 25˚C (77˚F) 6 Ω	Go to *Step 7*	Go to *Step 4*
4	1. Remove the oil pan. 2. Disconnect the wiring connector of EDS 5. 3. Measure the resistance between terminal 2 of the EDS 5 and terminal 5 of the transaxle connector. 4. Measure the resistance between terminal 1 of the EDS 5 and terminal 10 of the transaxle connector. Is the resistance within the values shown?	≈ 0 Ω	Go to *Step 6*	Go to *Step 5*
5	1. Repair the circuit (between terminal 2 and terminal 5) for an open. 2. Repair the circuit (between terminal 1 and terminal 10) for an open. Is the repair complete?	–	System OK	–
6	Replace the EDS 5. Is the replacement complete?	–	System OK	–
7	1. Disconnect the transaxle wiring connector and TCM connector. 2. Measure the resistance between terminal 5 of the transaxle wiring connector and terminal C7 of the TCM wiring connector. 3. Measure the resistance between terminal 10 of the transaxle wiring connector and terminal A10 of the TCM wiring connector. Is the resistance within the values shown?	≈ 0 Ω	Go to *Step 9*	Go to *Step 8*
8	Repair the transaxle wiring harness for an open. Is the repair complete?	–	System OK	–
9	Replace the TCM. Is the replacement complete?	–	Go to *Step 10*	–
10	1. After the repair, use a scan tool "clear info" function and road tests the vehicle. 2. Review the "DTC info". Has the last test failed or is the current DTC displayed?	–	Begin diagnosis again	Repair verified exit DTC chart



DIAGNOSTIC TROUBLE CODE(DTC) P1867

EDS 6 OUTPUT SHORTED TO GROUND

Circuit Description

The pressure control valves (EDS valves 3,4,5 and 6) are precision electronic pressure regulators that control the operation of the clutches, brakes and lock–up clutch.

The valve reduces the system pressure with which the downstream solenoid valves and electrical pressure regulating valves are supplied. It is possible to use smaller solenoid valves as a result. The EDS require a constant input pressure.

Conditions for Setting the DTC

- Output voltage of the EDS 6 is less than 2 volt.
- No DTC P1868, P1869.
- Immediately after the above condition occurs.

Action Taken When The DTC Sets

- The Malfunction Indicator Lamp(MIL) will illuminate.
- The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer.
- Adopt Emergency/ Substitute mode and constant 4th gear by hydraulic control.
- After ignition OFF/ON : 3rd gear by hydraulic control. Possible P, R and N also possible.
- Power supply cut off to the EDS valve.

Conditions for Clearing the MIL/DTC

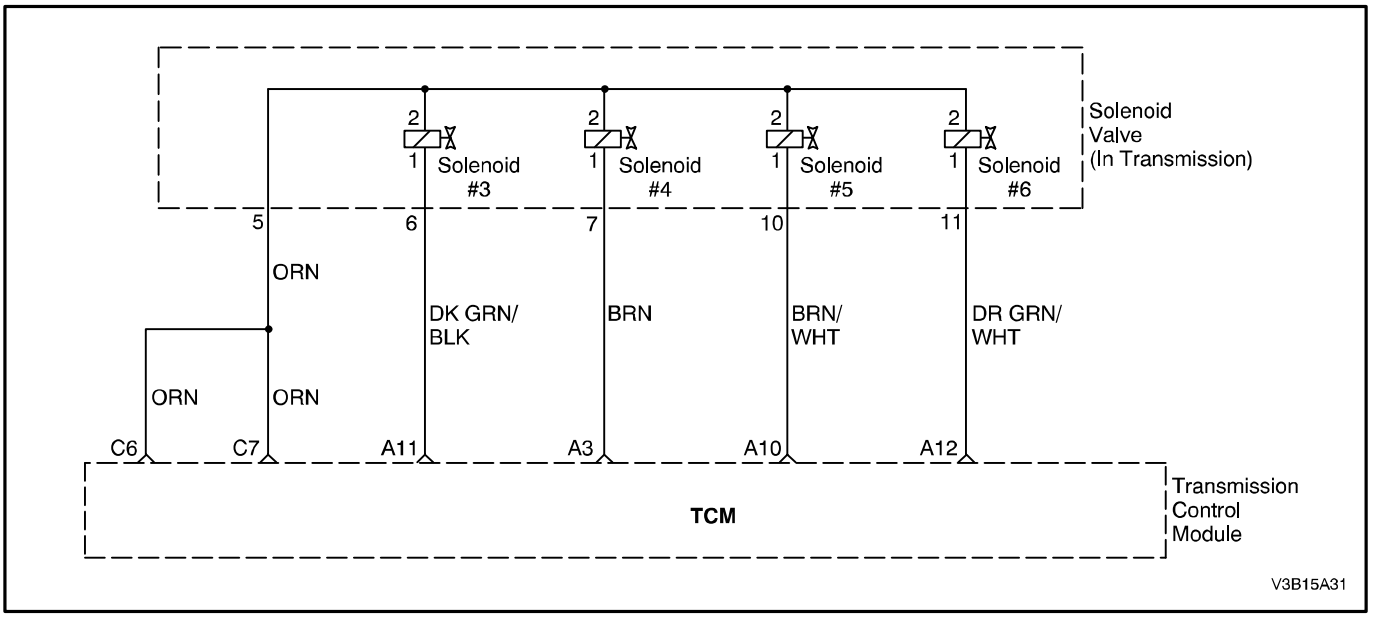
- The MIL will turn OFF when the malfunction has not occurred after three–ignition cycle.
- A history DTC will clear after 40 consecutive warm up cycles without a fault.
- Using a scan tool can clear history DTCs.

Diagnostic Aids

- When DTC P1867 sets, the possible cause of fault could be EDS valve.

DTC P1867 – EDS 6 Output Shorted To Ground

Step	Action	Value(s)	Yes	No
1	Perform an On–Board Diagnostic (EOBD) System Check. Is the check completed?	–	Go to *Step 2*	Go to *"On–Board Diagnostic System Check"*
2	1. Install the scan tool. 2. Turn the ignition ON, with the engine OFF. 3. Select "Actuating" on the scan tool. 4. Actuate EDS 6 ON/OFF. Does the EDS 6 change ON/OFF?	ON/OFF	Go to *"Diagnostic Aids"*	Go to *Step 3*
3	1. Turn the ignition OFF. 2. Disconnect the transaxle wiring connector. 3. Measure the resistance between terminals 5 and 11 of the transaxle wiring connector. Is the resistance within the values shown?	TFT 25˚C (77˚F) 6 Ω	Go to *Step 7*	Go to *Step 4*
4	1. Remove the oil pan. 2. Disconnect the wiring connector of EDS 6. 3. Measure the resistance between terminal 2 of EDS 6 and ground. 4. Measure the resistance between terminal 1 of EDS 6 and ground. Is the resistance within the values shown?	∞	Go to *Step 6*	Go to *Step 5*
5	Repair the internal line(EDS 6) for a short to ground. Is the repair complete?	–	System OK	–
6	Replace the EDS 6. Is the replacement complete?	–	System OK	–
7	1. Disconnect the transaxle wiring connector and TCM connector. 2. Measure the resistance between terminal 5 of the transaxle wiring connector and ground. 3. Measure the resistance between terminal 11 of the transaxle wiring connector and ground. Is the resistance within the values shown?	∞	Go to *Step 9*	Go to *Step 8*
8	Repair the transaxle wiring harness for a short to ground. Is the repair complete?	–	System OK	–
9	Replace the TCM. Is the replacement complete?	–	Go to *Step 10*	–
10	1. After the repair, use a scan tool "clear info" function and road tests the vehicle. 2. Review the "DTC info". Has the last test failed or is the current DTC displayed?	–	Begin diagnosis again	Repair verified exit DTC chart



DIAGNOSTIC TROUBLE CODE(DTC) P1868

EDS 6 OUTPUT SHORTED TO POWER

Circuit Description

The pressure control valves (EDS valves 3,4,5 and 6) are precision electronic pressure regulators that control the operation of the clutches, brakes and lock–up clutch.

The valve reduces the system pressure with which the downstream solenoid valves and electrical pressure regulating valves are supplied. It is possible to use smaller solenoid valves as a result. The EDS require a constant input pressure.

Conditions for Setting the DTC

- Output voltage of the EDS 6 (at ON) is 12 volt.
- No DTC P1867, P1869.
- Immediately after the above condition occurs.

Action Taken When The DTC Sets

- The Malfunction Indicator Lamp(MIL) will illuminate.
- The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer.
- Adopt Emergency/ Substitute mode and constant 4th gear by hydraulic control.
- After ignition OFF/ON : 3rd gear by hydraulic control. Possible P, R and N also possible.
- Power supply cut off to the EDS valve.

Conditions for Clearing the MIL/DTC

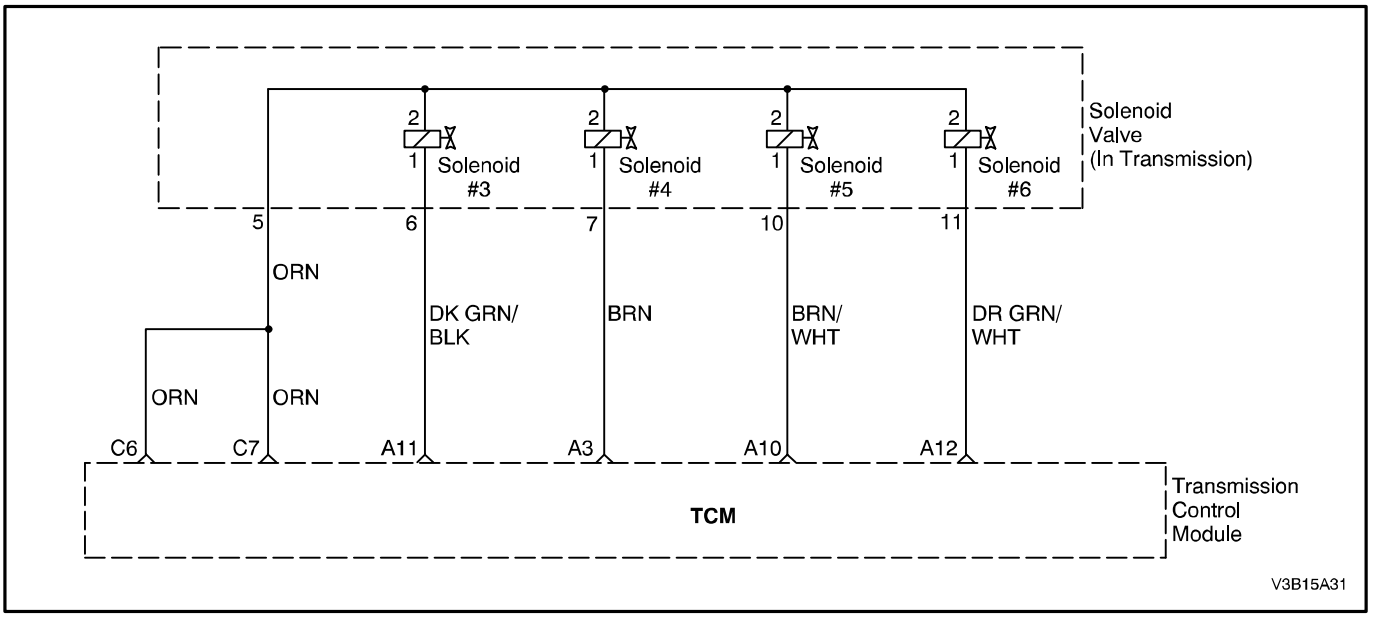
- The MIL will turn OFF when the malfunction has not occurred after three–ignition cycle.
- A history DTC will clear after 40 consecutive warm up cycles without a fault.
- Using a scan tool can clear history DTCs.

Diagnostic Aids

- When DTC P1868 sets, the possible cause of fault could be TCM.

DTC P1868 – EDS 6 Output Shorted To Power

Step	Action	Value(s)	Yes	No
1	Perform an On–Board Diagnostic (EOBD) System Check. Is the check completed?	–	Go to *Step 2*	Go to *"On–Board Diagnostic System Check"*
2	1. Install the scan tool. 2. Turn the ignition ON, with the engine OFF. 3. Select "Actuating" on the scan tool. 4. Actuate EDS 6 ON/OFF. Does the EDS 6 change ON/OFF?	ON/OFF	Go to *"Diagnostic Aids"*	Go to *Step 3*
3	1. Remove the oil pan. 2. Disconnect the wiring connector of EDS 6. 3. Turn the ignition ON, with the engine OFF. 4. Measure the voltage terminal 2 of the EDS 6 wiring connector. Is the voltage within the values shown?	11–14V	Go to *Step 4*	Go to *Step 5*
4	Repair the internal line(EDS 6) for a short to power. Is the repair complete?	–	System OK	–
5	Replace the EDS 6. Is the replacement complete?	–	Go to *Step 6*	–
6	1. Check if any DTCs are set. 2. Are any DTCs displayed that have not been diagnosed?	–	Go to *"Applicable DTC table"*	System OK



DIAGNOSTIC TROUBLE CODE(DTC) P1869

EDS 6 OUTPUT OPEN

Circuit Description

The pressure control valves (EDS valves 3,4,5 and 6) are precision electronic pressure regulators that control the operation of the clutches, brakes and lock–up clutch.

The valve reduces the system pressure with which the downstream solenoid valves and electrical pressure regulating valves are supplied. It is possible to use smaller solenoid valves as a result. The EDS require a constant input pressure.

Conditions for Setting the DTC

- Output ampere of the EDS 6 is less than 10mA.
- No DTC P1867, P1868.
- Immediately after the above condition occurs.

Action Taken When The DTC Sets

- The Malfunction Indicator Lamp(MIL) will illuminate.
- The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer.
- Adopt Emergency/ Substitute mode and constant 4th gear.
- Power supply cut off to the EDS valve.

Conditions for Clearing the MIL/DTC

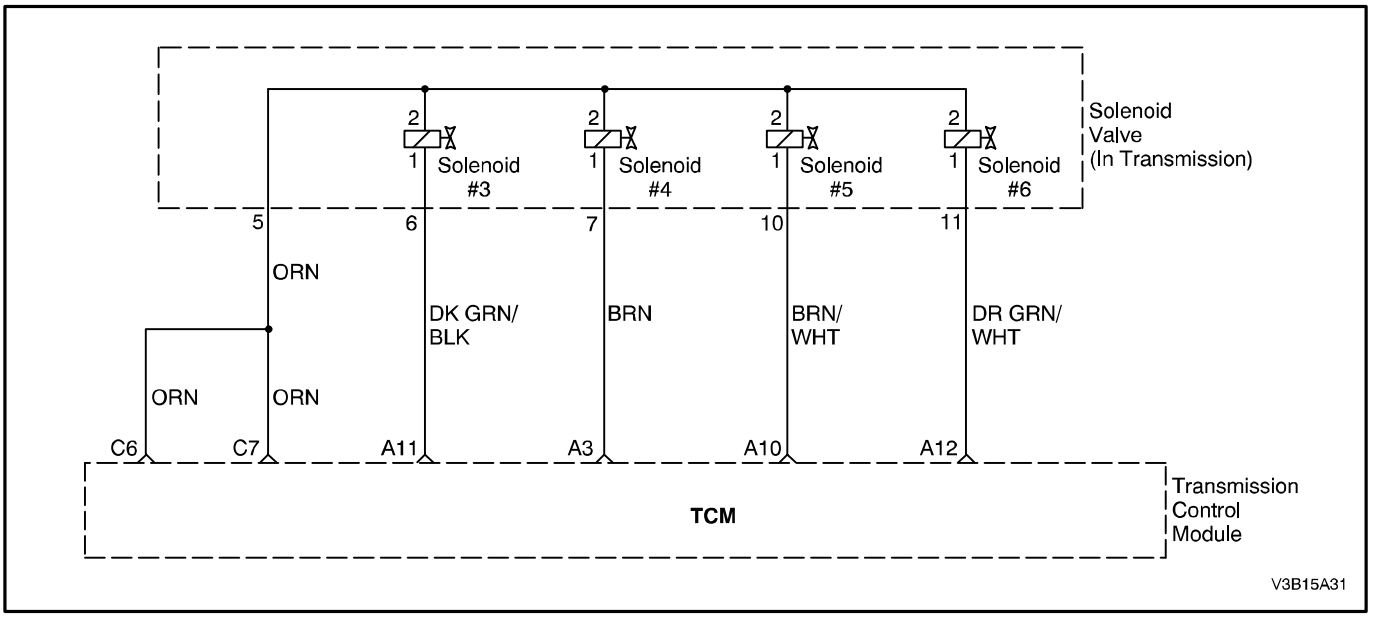
- The MIL will turn OFF when the malfunction has not occurred after three–ignition cycle.
- A history DTC will clear after 40 consecutive warm up cycles without a fault.
- Using a scan tool can clear history DTCs.

Diagnostic Aids

- When DTC P1869 sets, the possible cause of fault could be EDS valve.

DTC P1869 – EDS 6 Output Open

Step	Action	Value(s)	Yes	No
1	Perform an On–Board Diagnostic (EOBD) System Check. Is the check completed?	–	Go to *Step 2*	Go to *"On–Board Diagnostic System Check"*
2	1. Install the scan tool. 2. Turn the ignition ON, with the engine OFF. 3. Select "Actuating" on the scan tool. 4. Actuate EDS 6 ON/OFF. Does the EDS 6 change ON/OFF?	ON/OFF	Go to *"Diagnostic Aids"*	Go to *Step 3*
3	1. Turn the ignition OFF. 2. Disconnect the transaxle wiring connector. 3. Measure the resistance between terminals 5 and 11 of the transaxle wiring connector. Is the resistance within the values shown?	TFT 25˚C (77˚F) 6 Ω	Go to *Step 7*	Go to *Step 4*
4	1. Remove the oil pan. 2. Disconnect the wiring connector of EDS 6. 3. Measure the resistance between terminal 2 of the EDS 6 and terminal 5 of the transaxle connector. 4. Measure the resistance between terminal 1 of the EDS 6 and terminal 11 of the transaxle connector. Is the resistance within the values shown?	≈ 0 Ω	Go to *Step 6*	Go to *Step 5*
5	1. Repair the circuit (between terminal 2 and terminal 5) for an open. 2. Repair the circuit (between terminal 1 and terminal 11) for an open. Is the repair complete?	–	System OK	–
6	Replace the EDS 6. Is the replacement complete?	–	System OK	–
7	1. Disconnect the transaxle wiring connector and TCM connector. 2. Measure the resistance between terminal 5 of the transaxle wiring connector and terminal C7 of the TCM wiring connector. 3. Measure the resistance between terminal 11 of the transaxle wiring connector and terminal A12 of the TCM wiring connector. Is the resistance within the values shown?	≈ 0 Ω	Go to *Step 9*	Go to *Step 8*
8	Repair the transaxle wiring harness for an open. Is the repair complete?	–	System OK	–
9	Replace the TCM. Is the replacement complete?	–	Go to *Step 10*	–
10	1. After the repair, use a scan tool "clear info" function and road tests the vehicle. 2. Review the "DTC info". 3. Has the last test failed or is the current DTC displayed?	–	Begin diagnosis again	Repair verified exit DTC chart



DIAGNOSTIC TROUBLE CODE(DTC) P1871

EDS VALVE POWER SUPPLY CIRCUIT SHORTED TO POWER

Circuit Description

The pressure control valves (EDS valves 3,4,5 and 6) are precision electronic pressure regulators that control the operation of the clutches, brakes and lock–up clutch.

The valve reduces the system pressure with which the downstream solenoid valves and electrical pressure regulating valves are supplied. It is possible to use smaller solenoid valves as a result. The EDS require a constant input pressure.

Conditions for Setting the DTC

- If the voltage applied to high side driver is higher than the threshold(6V) with high side driver switch off status then a fault is detected.
- No DTC P1870.
- Immediately after the above condition occurs.

Action Taken When The DTC Sets

- The Malfunction Indicator Lamp(MIL) will illuminate.
- The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer.
- Adopt Emergency/ Substitute mode and constant 4th gear by hydraulic control.
- After ignition OFF/ON : 3rd gear by hydraulic control. Possible P, R and N also possible.
- Power supply cut off to the EDS valve.

Conditions for Clearing the MIL/DTC

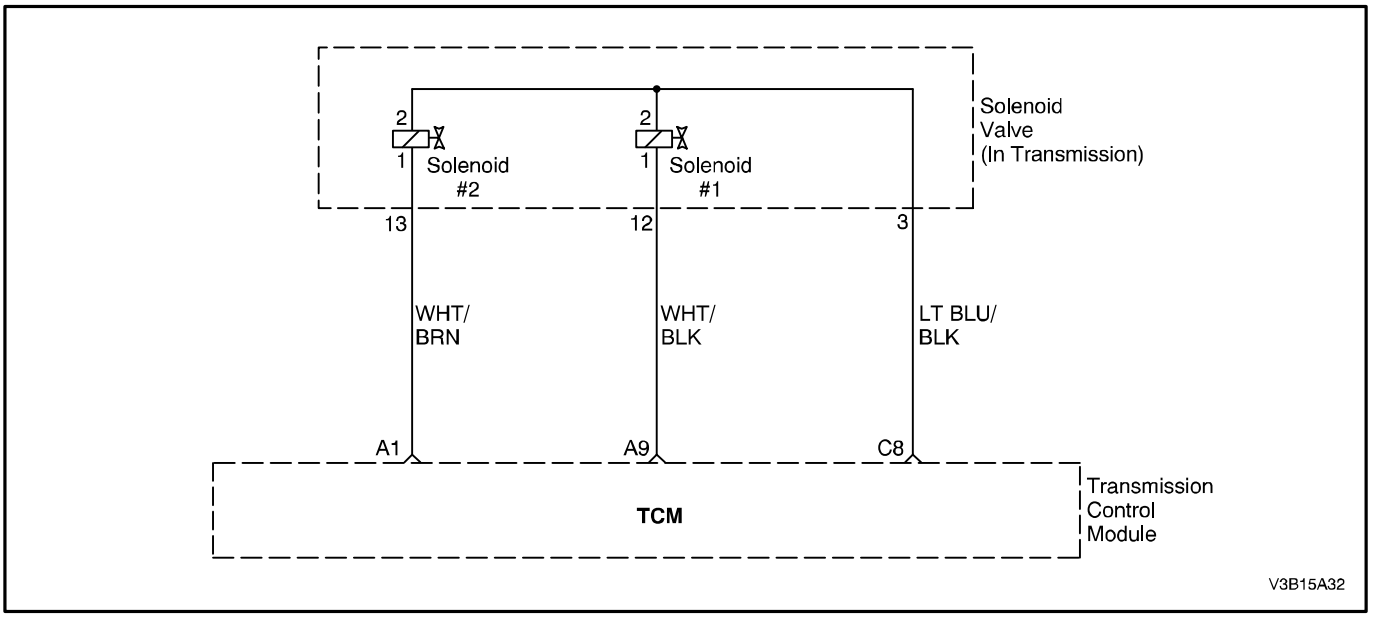
- The MIL will turn OFF when the malfunction has not occurred after three–ignition cycle.
- A history DTC will clear after 40 consecutive warm up cycles without a fault.
- Using a scan tool can clear history DTCs.

Diagnostic Aids

- When DTC P1871 sets, the possible cause of fault could be EDS valve power supply line.

DTC P1871 – EDS Valve Power Supply Circuit Shorted to Power

Step	Action	Value(s)	Yes	No
1	Perform an On–Board Diagnostic (EOBD) System Check. Is the check completed?	–	Go to *Step 2*	Go to *"On–Board Diagnostic System Check"*
2	1. Install the scan tool. 2. Turn the ignition ON, with the engine OFF. 3. Start engine and allow it to warm up at idle. 4. Put gear selector in Part and set the parking brake. 5. Observe "EDS 3,4,5,6's input ampere and output ampere" on the scan tool. Is the amperes within the values shown?	EDS ampere (0–2 Amp)	Go to *"Diagnostic Aids"*	Go to *Step 3*
3	1. Turn the ignition OFF. 2. Disconnect the transaxle wiring connector and TCM connector. 3. Measure the voltage of the transaxle wiring terminal 5. Is the voltage within the values shown?	11–14V	Go to *Step 4*	Go to *Step 5*
4	Repair the circuit for a short to power. Is the action complete?	–	System OK	–
5	1. Remove the oil pan. 2. Disconnect the EDS valve wiring connector. 3. Turn the ignition ON. 4. Measure the voltage of the EDS 3 terminal 2. 5. Measure the voltage of the EDS 4 terminal 2. 6. Measure the voltage of the EDS 5 terminal 2. 7. Measure the voltage of the EDS 6 terminal 2. Is the voltage within the values shown?	11–14V	Go to *Step 6*	Go to *Step 7*
6	Repair the circuits(power supply lines) for a short to power. Is the action complete?	–	System OK	–
7	Replace the TCM. Is the action complete?	–	Go to *Step 8*	–
8	1. After the repair, use a scan tool "clear info" function and road test the vehicle. 2. Review the "DTC info". Has the last test failed or is the current DTC displayed?	–	Begin diagnosis again	Repair verified exit DTC chart



DIAGNOSTIC TROUBLE CODE(DTC) P1874

SOLENOID VALVE POWER SUPPLY CIRCUIT SHORTED TO POWER

Circuit Description

The pressure control valves (EDS valves 3,4,5 and 6) are precision electronic pressure regulators that control the operation of the clutches, brakes and lock–up clutch.

The valve reduces the system pressure with which the downstream solenoid valves and electrical pressure regulating valves are supplied. It is possible to use smaller solenoid valves as a result. The EDS require a constant input pressure.

Conditions for Setting the DTC

- No DTC P1873.
- Immediately after the above condition occurs.

Action Taken When The DTC Sets

- The Malfunction Indicator Lamp(MIL) will illuminate.
- The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer.
- Adopt Emergency/ Substitute mode and constant 4th gear.
- Power supply cut off to the EDS valve.

Conditions for Clearing the MIL/DTC

- The MIL will turn OFF when the malfunction has not occurred after three–ignition cycle.
- A history DTC will clear after 40 consecutive warm up cycles without a fault.
- Using a scan tool can clear history DTCs.

Diagnostic Aids

- When DTC P1874 sets, the possible cause of fault could be solenoid valve power supply line.

DTC P1874 – Solenoid Valve Power Supply Circuit Shorted to Power

Step	Action	Value(s)	Yes	No
1	Perform an On–Board Diagnostic (EOBD) System Check. Is the check completed?	–	Go to *Step 2*	Go to *"On–Board Diagnostic System Check"*
2	1. Install the scan tool. 2. Turn the ignition ON, with the engine OFF. Then, start engine and allow it to warm up at idle. 3. Put gear selector in Park and set the parking brake. 4. Observe "solenoid 1,2" on the scan tool. Is the solenoid ON ?	–	Go to *"Diagnostic Aids"*	Go to *Step 3*
3	1. Turn the ignition OFF. 2. Disconnect the transaxle wiring connector and TCM connector. 3. Measure the voltage of the transaxle wiring terminal 3. Is the voltage within the values shown?	11–14V	Go to *Step 4*	Go to *Step 5*
4	Repair the circuit for a short to power. Is the action complete?	–	System OK	–
5	1. Remove the oil pan. 2. Disconnect the solenoid 1,2 wiring connector. 3. Turn the ignition ON. 4. Measure the voltage of the solenoid 1 terminal 2. 5. Measure the voltage of the solenoid 2 terminal 2. Is the voltage within the values shown?	11–14V	Go to *Step 6*	Go to *Step 7*
6	Repair the circuits(power supply lines) for a short to power. Is the action complete?	–	System OK	–
7	Replace the TCM. Is the action complete?	–	Go to *Step 8*	–
8	1. After the repair, use a scan tool "clear info" function and road test the vehicle. 2. Review the "DTC info". Has the last test failed or is the current DTC displayed?	–	Begin diagnosis again	Repair verified exit DTC chart

Range	Park/ Neutral	Reverse	D				3			2		1
Gear	**N**	**R**	**1st**	**2nd**	**3rd**	**4th**	**1st**	**2nd**	**3rd**	**1st**	**2nd**	**1st**
Solenoid Valve 1	ON	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF
Solenoid Valve 2	ON	ON	ON	OFF	OFF	OFF	ON	OFF	OFF	ON	OFF	ON
Line Pressure Control Solenoid Valve 3 (EDS 3)	OFF	OFF	OFF	ON	ON/ OFF	ON/ OFF	OFF	ON	ON/ OFF	OFF	ON	OFF
Line Pressure Control Solenoid Valve 4 (EDS 4)	ON	OFF	ON	ON	ON	OFF	ON	ON	ON	ON	ON	ON
Line Pressure Control Solenoid Valve 5 (EDS 5)	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	ON	ON	ON
Line Pressure Control Solenoid Valve 6 (EDS 6)	ON	OFF	ON	ON	ON	OFF	ON	ON	ON	ON	ON	ON
Brake B	A	A	A		A		A		A	A		A
Brake C						H						
Brake D		H										
Clutch E				A	A	A		A	A		A	
Brake F			H	H			H	H		H	H	H
Lock–up Clutch						A						

A = Applied
H = Holding
ON = The solenoid is energized.
OFF = The solenoid is de–energized.
** = Manual Second–Third gear is only available above approximately 100 km/h (62 mph).
*** = Manual First–Second gear is only available above approximately 60 km/h (37 mph).
Note : Manual First–Third gear is also possible at high vehicle speed as a safety feature.

DIAGNOSTIC TROUBLE CODE(DTC) P1881

2–1 SHIFT MALFUNCTION

Circuit Description

The special feature of 4HP 16 Auto Transaxle is that it operates without freewheels. Shifting between individual gears takes place by means of overlapping clutch engagement and release.

The advantage of overlap shifting are as follows:

– The transaxle can be of more compact design and is lighter on account of the absence of freewheels and the lower number of shift elements.
– Lower drag losses, i.e. higher efficiency.
– Lower peak torque acting on the components and driveline.

However, overlap shifting necessitates high–performance hardware and software, and precision engine signals.

Conditions for Setting the DTC

- Transmission oil temperature is greater than –10˚C (14˚F).
- Selector lever is not in N(Neutral), P(Park) position.
- System voltage is greater than 9 volts.

- No input speed error DTCs P0715, P0716, or P0717.
- Output speed is greater than 256 rpm.
- Input speed is greater than 400 rpm.
- 2–1 gear shift is active.
- Immediately after the above condition occurs.

Action Taken When The DTC Sets

- The Malfunction Indicator Lamp(MIL) will illuminate.
- The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer.
- Adopt Emergency/ Substitute mode and constant 3rd gear.
- Open lock–up clutch.

Conditions for Clearing the MIL/DTC

- The MIL will turn OFF when the malfunction has not occurred after three–ignition cycle.
- A history DTC will clear after 40 consecutive warm up cycles without a fault.
- Using a scan tool can clear history DTCs.

Diagnostic Aids

- When DTC P1881 sets, the possible cause of fault could be TCM.

DTC P1881 – 2–1 Shift Malfunction

Step	Action	Value(s)	Yes	No
1	Perform an On–Board Diagnostic (EOBD) System Check. Is the check completed?	–	Go to *Step 2*	Go to *"On–Board Diagnostic System Check"*
2	1. Install the scan tool. 2. Turn the ignition ON, with the engine OFF. Then, start engine and allow it to warm up at idle. 3. Observe "idle rpm, TPS" on the scan tool. Was a problem found?	–	Go to *"Engine Diagnostic Information"*	Go to *Step 3*
3	Inspect "ECM". Refer to *Section 1F, System Diagnosis, EOBD System Check.* Was a problem found?	–	Go to *"Engine Diagnostic Information"*	Go to *Step 4*
4	1. Turn the ignition OFF. 2. Disconnect the TCM wiring connector. 3. Measure the voltage between terminal B3 and B13 of the transaxle wiring connector. 4. Turn the ignition ON. 5. Measure the voltage between terminal C15 and B13 of the transaxle wiring connector. 6. Measure the voltage between terminal C16 and B13 of the transaxle wiring connector. Is the voltage within the values shown?	11–14V	Go to *Step 5*	Go to *"System Voltage Low or High"*
5	Replace the TCM. Is the action complete?	–	Go to *Step 6*	–
6	1. After the repair, use a scan tool "clear info" function and road test the vehicle. 2. Review the "DTC info". Has the last test failed or is the current DTC displayed?	–	Replace the transaxle assembly	Repair verified exit DTC chart

Range	Park/ Neutral	Reverse	D				3			2		1
Gear	**N**	**R**	**1st**	**2nd**	**3rd**	**4th**	**1st**	**2nd**	**3rd**	**1st**	**2nd**	**1st**
Solenoid Valve 1	ON	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF
Solenoid Valve 2	ON	ON	ON	OFF	OFF	OFF	ON	OFF	OFF	ON	OFF	ON
Line Pressure Control Solenoid Valve 3 (EDS 3)	OFF	OFF	OFF	ON	ON/ OFF	ON/ OFF	OFF	ON	ON/ OFF	OFF	ON	OFF
Line Pressure Control Solenoid Valve 4 (EDS 4)	ON	OFF	ON	ON	ON	OFF	ON	ON	ON	ON	ON	ON
Line Pressure Control Solenoid Valve 5 (EDS 5)	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	ON	ON	ON
Line Pressure Control Solenoid Valve 6 (EDS 6)	ON	OFF	ON	ON	ON	OFF	ON	ON	ON	ON	ON	ON
Brake B	A	A	A		A		A		A	A		A
Brake C						H						
Brake D		H										
Clutch E				A	A	A		A	A		A	
Brake F			H	H			H	H		H	H	H
Lock–up Clutch						A						

A = Applied
H = Holding
ON = The solenoid is energized.
OFF = The solenoid is de–energized.
** = Manual Second–Third gear is only available above approximately 100 km/h (62 mph).
*** = Manual First–Second gear is only available above approximately 60 km/h (37 mph).
Note : Manual First–Third gear is also possible at high vehicle speed as a safety feature.

DIAGNOSTIC TROUBLE CODE(DTC) P1883

3–2 SHIFT MALFUNCTION

Circuit Description

The special feature of 4HP 16 Auto Transaxle is that it operates without freewheels. Shifting between individual gears takes place by means of overlapping clutch engagement and release.

The advantage of overlap shifting are as follows:

– The transaxle can be of more compact design and is lighter on account of the absence of freewheels and the lower number of shift elements.
– Lower drag losses, i.e. higher efficiency.
– Lower peak torque acting on the components and driveline.

However, overlap shifting necessitates high–performance hardware and software, and precision engine signals.

Conditions for Setting the DTC

- Transmission oil temperature is greater than –10˚C (14˚F).
- Selector lever is not in N(Neutral), P(Park) position.
- System voltage is greater than 9 volts.

- No input speed error DTCs P0715, P0716, or P0717.
- Output speed is greater than 256 rpm.
- Input speed is greater than 400 rpm.
- 3–2 gear shift is active.
- Immediately after the above condition occurs.

Action Taken When The DTC Sets

- The Malfunction Indicator Lamp(MIL) will illuminate.
- The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer.
- Adopt Emergency/ Substitute mode and constant 3rd gear.
- Open lock–up clutch.

Conditions for Clearing the MIL/DTC

- The MIL will turn OFF when the malfunction has not occurred after three–ignition cycle.
- A history DTC will clear after 40 consecutive warm up cycles without a fault.
- Using a scan tool can clear history DTCs.

Diagnostic Aids

- When DTC P1883 sets, the possible cause of fault could be TCM.

DTC P1883 – 3–2 Shift Malfunction

Step	Action	Value(s)	Yes	No
1	Perform an On–Board Diagnostic (EOBD) System Check. Is the check completed?	–	Go to *Step 2*	Go to *"On–Board Diagnostic System Check"*
2	1. Install the scan tool. 2. Turn the ignition ON, with the engine OFF. Then, start engine and allow it to warm up at idle. 3. Observe "idle rpm, TPS" on the scan tool. Was a problem found?	–	Go to *"Engine Diagnostic Information"*	Go to *Step 3*
3	Inspect "ECM". Refer to *Section 1F, System Diagnosis, EOBD System Check.* Was a problem found?	–	Go to *"Engine Diagnostic Information"*	Go to *Step 4*
4	1. Turn the ignition OFF. 2. Disconnect the TCM wiring connector. 3. Measure the voltage between terminal B3 and B13 of the transaxle wiring connector. 4. Turn the ignition ON. 5. Measure the voltage between terminal C15 and B13 of the transaxle wiring connector. 6. Measure the voltage between terminal C16 and B13 of the transaxle wiring connector. Is the voltage within the values shown?	11–14V	Go to *Step 5*	Go to *"System Voltage Low or High"*
5	Replace the TCM. Is the action complete?	–	Go to *Step 6*	–
6	1. After the repair, use a scan tool "clear info" function and road test the vehicle. 2. Review the "DTC info". Has the last test failed or is the current DTC displayed?	–	Replace the transaxle assembly	Repair verified exit DTC chart

Range	Park/ Neutral	Reverse	D				3			2		1
Gear	**N**	**R**	**1st**	**2nd**	**3rd**	**4th**	**1st**	**2nd**	**3rd**	**1st**	**2nd**	**1st**
Solenoid Valve 1	ON	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF
Solenoid Valve 2	ON	ON	ON	OFF	OFF	OFF	ON	OFF	OFF	ON	OFF	ON
Line Pressure Control Solenoid Valve 3 (EDS 3)	OFF	OFF	OFF	ON	ON/ OFF	ON/ OFF	OFF	ON	ON/ OFF	OFF	ON	OFF
Line Pressure Control Solenoid Valve 4 (EDS 4)	ON	OFF	ON	ON	ON	OFF	ON	ON	ON	ON	ON	ON
Line Pressure Control Solenoid Valve 5 (EDS 5)	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	ON	ON	ON
Line Pressure Control Solenoid Valve 6 (EDS 6)	ON	OFF	ON	ON	ON	OFF	ON	ON	ON	ON	ON	ON
Brake B	A	A	A		A		A		A	A		A
Brake C						H						
Brake D		H										
Clutch E				A	A	A		A	A		A	
Brake F			H	H			H	H		H	H	H
Lock–up Clutch						A						

A = Applied
H = Holding
ON = The solenoid is energized.
OFF = The solenoid is de–energized.
** = Manual Second–Third gear is only available above approximately 100 km/h (62 mph).
*** = Manual First–Second gear is only available above approximately 60 km/h (37 mph).
Note : Manual First–Third gear is also possible at high vehicle speed as a safety feature.

DIAGNOSTIC TROUBLE CODE(DTC) P1884

4–3 SHIFT MALFUNCTION

Circuit Description

The special feature of 4HP 16 Auto Transaxle is that it operates without freewheels. Shifting between individual gears takes place by means of overlapping clutch engagement and release.

The advantage of overlap shifting are as follows:

– The transaxle can be of more compact design and is lighter on account of the absence of freewheels and the lower number of shift elements.
– Lower drag losses, i.e. higher efficiency.
– Lower peak torque acting on the components and driveline.

However, overlap shifting necessitates high–performance hardware and software, and precision engine signals.

Conditions for Setting the DTC

- Transmission oil temperature is greater than –10˚C (14˚F).
- Selector lever is not in N(Neutral), P(Park) position.
- System voltage is greater than 9 volts.

- No input speed error DTCs P0715, P0716, or P0717.
- Output speed is greater than 256 rpm.
- Input speed is greater than 400 rpm.
- 4–3 gear shift is active.
- Immediately after the above condition occurs.

Action Taken When The DTC Sets

- The Malfunction Indicator Lamp(MIL) will illuminate.
- The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer.
- Adopt Emergency/ Substitute mode and constant 4th gear.
- Open lock–up clutch.

Conditions for Clearing the MIL/DTC

- The MIL will turn OFF when the malfunction has not occurred after three–ignition cycle.
- A history DTC will clear after 40 consecutive warm up cycles without a fault.
- Using a scan tool can clear history DTCs.

Diagnostic Aids

- When DTC P1884 sets, the possible cause of fault could be TCM.

DTC P1884 – 4–3 Shift Malfunction

Step	Action	Value(s)	Yes	No
1	Perform an On–Board Diagnostic (EOBD) System Check. Is the check completed?	–	Go to *Step 2*	Go to *"On–Board Diagnostic System Check"*
2	1. Install the scan tool. 2. Turn the ignition ON, with the engine OFF. Then, start engine and allow it to warm up at idle. 3. Observe "idle rpm, TPS" on the scan tool. Was a problem found?	–	Go to *"Engine Diagnostic Information"*	Go to *Step 3*
3	Inspect "ECM". Refer to *Section 1F, System Diagnosis, EOBD System Check.* Was a problem found?	–	Go to *"Engine Diagnostic Information"*	Go to *Step 4*
4	1. Turn the ignition OFF. 2. Disconnect the TCM wiring connector. 3. Measure the voltage between terminal B3 and B13 of the transaxle wiring connector. 4. Turn the ignition ON. 5. Measure the voltage between terminal C15 and B13 of the transaxle wiring connector. 6. Measure the voltage between terminal C16 and B13 of the transaxle wiring connector. Is the voltage within the values shown?	11–14V	Go to *Step 5*	Go to *"System Voltage Low or High"*
5	Replace the TCM. Is the action complete?	–	Go to *Step 6*	–
6	1. After the repair, use a scan tool "clear info" function and road test the vehicle. 2. Review the "DTC info". Has the last test failed or is the current DTC displayed?	–	Replace the transaxle assembly	Repair verified exit DTC chart

Range	Park/ Neutral	Reverse	D				3			2		1
Gear	**N**	**R**	**1st**	**2nd**	**3rd**	**4th**	**1st**	**2nd**	**3rd**	**1st**	**2nd**	**1st**
Solenoid Valve 1	ON	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF
Solenoid Valve 2	ON	ON	ON	OFF	OFF	OFF	ON	OFF	OFF	ON	OFF	ON
Line Pressure Control Solenoid Valve 3 (EDS 3)	OFF	OFF	OFF	ON	ON/ OFF	ON/ OFF	OFF	ON	ON/ OFF	OFF	ON	OFF
Line Pressure Control Solenoid Valve 4 (EDS 4)	ON	OFF	ON	ON	ON	OFF	ON	ON	ON	ON	ON	ON
Line Pressure Control Solenoid Valve 5 (EDS 5)	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	ON	ON	ON
Line Pressure Control Solenoid Valve 6 (EDS 6)	ON	OFF	ON	ON	ON	OFF	ON	ON	ON	ON	ON	ON
Brake B	A	A	A		A		A		A	A		A
Brake C						H						
Brake D		H										
Clutch E				A	A	A		A	A		A	
Brake F			H	H			H	H		H	H	H
Lock–up Clutch						A						

A = Applied
H = Holding
ON = The solenoid is energized.
OFF = The solenoid is de–energized.
** = Manual Second–Third gear is only available above approximately 100 km/h (62 mph).
*** = Manual First–Second gear is only available above approximately 60 km/h (37 mph).
Note : Manual First–Third gear is also possible at high vehicle speed as a safety feature.

DIAGNOSTIC TROUBLE CODE(DTC) P1885

3–1 SHIFT MALFUNCTION

Circuit Description

The special feature of 4HP 16 Auto Transaxle is that it operates without freewheels. Shifting between individual gears takes place by means of overlapping clutch engagement and release.

The advantage of overlap shifting are as follows:

– The transaxle can be of more compact design and is lighter on account of the absence of freewheels and the lower number of shift elements.
– Lower drag losses, i.e. higher efficiency.
– Lower peak torque acting on the components and driveline.

However, overlap shifting necessitates high–performance hardware and software, and precision engine signals.

Conditions for Setting the DTC

- Transmission oil temperature is greater than –10˚C (14˚F).
- Selector lever is not in N(Neutral), P(Park) position.
- System voltage is greater than 9 volts.

- No input speed error DTCs P0715, P0716, or P0717.
- Output speed is greater than 256 rpm.
- Input speed is greater than 400 rpm.
- 3–1 gear shift is active.
- Immediately after the above condition occurs.

Action Taken When The DTC Sets

- The Malfunction Indicator Lamp(MIL) will illuminate.
- The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer.
- Adopt Emergency/ Substitute mode and constant 3rd gear.
- Open lock–up clutch.

Conditions for Clearing the MIL/DTC

- The MIL will turn OFF when the malfunction has not occurred after three–ignition cycle.
- A history DTC will clear after 40 consecutive warm up cycles without a fault.
- Using a scan tool can clear history DTCs.

Diagnostic Aids

- When DTC P1885 sets, the possible cause of fault could be TCM.

DTC P1885 – 3–1 Shift Malfunction

Step	Action	Value(s)	Yes	No
1	Perform an On–Board Diagnostic (EOBD) System Check. Is the check completed?	–	Go to *Step 2*	Go to *"On–Board Diagnostic System Check"*
2	1. Install the scan tool. 2. Turn the ignition ON, with the engine OFF. Then, start engine and allow it to warm up at idle. 3. Observe "idle rpm, TPS" on the scan tool. Was a problem found?	–	Go to *"Engine Diagnostic Information"*	Go to *Step 3*
3	Inspect "ECM". Refer to *Section 1F, System Diagnosis, EOBD System Check.* Was a problem found?	–	Go to *"Engine Diagnostic Information"*	Go to *Step 4*
4	1. Turn the ignition OFF. 2. Disconnect the TCM wiring connector. 3. Measure the voltage between terminal B3 and B13 of the transaxle wiring connector. 4. Turn the ignition ON. 5. Measure the voltage between terminal C15 and B13 of the transaxle wiring connector. 6. Measure the voltage between terminal C16 and B13 of the transaxle wiring connector. Is the voltage within the values shown?	11–14V	Go to *Step 5*	Go to *"System Voltage Low or High"*
5	Replace the TCM. Is the action complete?	–	Go to *Step 6*	–
6	1. After the repair, use a scan tool "clear info" function and road test the vehicle. 2. Review the "DTC info". Has the last test failed or is the current DTC displayed?	–	Replace the transaxle assembly	Repair verified exit DTC chart

Range	Park/ Neutral	Reverse	D				3			2		1
Gear	**N**	**R**	**1st**	**2nd**	**3rd**	**4th**	**1st**	**2nd**	**3rd**	**1st**	**2nd**	**1st**
Solenoid Valve 1	ON	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF	ON/ OFF
Solenoid Valve 2	ON	ON	ON	OFF	OFF	OFF	ON	OFF	OFF	ON	OFF	ON
Line Pressure Control Solenoid Valve 3 (EDS 3)	OFF	OFF	OFF	ON	ON/ OFF	ON/ OFF	OFF	ON	ON/ OFF	OFF	ON	OFF
Line Pressure Control Solenoid Valve 4 (EDS 4)	ON	OFF	ON	ON	ON	OFF	ON	ON	ON	ON	ON	ON
Line Pressure Control Solenoid Valve 5 (EDS 5)	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	ON	ON	ON
Line Pressure Control Solenoid Valve 6 (EDS 6)	ON	OFF	ON	ON	ON	OFF	ON	ON	ON	ON	ON	ON
Brake B	A	A	A		A		A		A	A		A
Brake C						H						
Brake D		H										
Clutch E				A	A	A		A	A		A	
Brake F			H	H			H	H		H	H	H
Lock–up Clutch						A						

A = Applied
H = Holding
ON = The solenoid is energized.
OFF = The solenoid is de–energized.
** = Manual Second–Third gear is only available above approximately 100 km/h (62 mph).
*** = Manual First–Second gear is only available above approximately 60 km/h (37 mph).
Note : Manual First–Third gear is also possible at high vehicle speed as a safety feature.

DIAGNOSTIC TROUBLE CODE(DTC) P1886

4–2 SHIFT MALFUNCTION

Circuit Description

The special feature of 4HP 16 Auto Transaxle is that it operates without freewheels. Shifting between individual gears takes place by means of overlapping clutch engagement and release.

The advantage of overlap shifting are as follows:

– The transaxle can be of more compact design and is lighter on account of the absence of freewheels and the lower number of shift elements.
– Lower drag losses, i.e. higher efficiency.
– Lower peak torque acting on the components and driveline.

However, overlap shifting necessitates high–performance hardware and software, and precision engine signals.

Conditions for Setting the DTC

- Transmission oil temperature is greater than –10˚C (14˚F).
- Selector lever is not in N(Neutral), P(Park) position.
- System voltage is greater than 9 volts.

- No input speed error DTCs P0715, P0716, or P0717.
- Output speed is greater than 256 rpm.
- Input speed is greater than 400 rpm.
- 4–2 gear shift is active.
- Immediately after the above condition occurs.

Action Taken When The DTC Sets

- The Malfunction Indicator Lamp(MIL) will illuminate.
- The TCM will record operating conditions at the time the diagnostic fails. This information will be stored in the Failure Records buffer.
- Adopt Emergency/ Substitute mode and constant 4th gear.
- Open lock–up clutch.

Conditions for Clearing the MIL/DTC

- The MIL will turn OFF when the malfunction has not occurred after three–ignition cycle.
- A history DTC will clear after 40 consecutive warm up cycles without a fault.
- Using a scan tool can clear history DTCs.

Diagnostic Aids

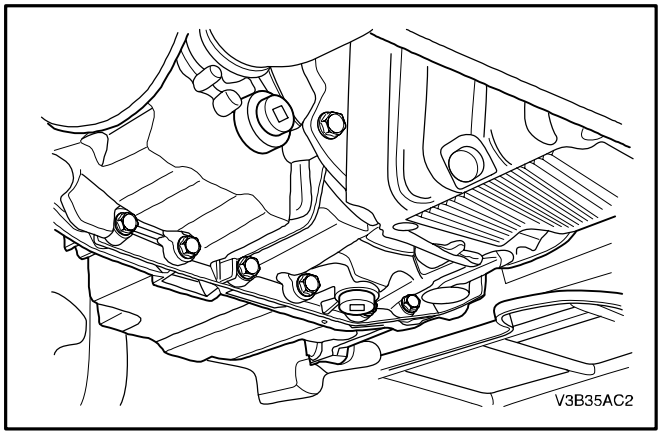
- When DTC P1886 sets, the possible cause of fault could be TCM.

DTC P1886 – 4–2 Shift Malfunction

Step	Action	Value(s)	Yes	No
1	Perform an On–Board Diagnostic (EOBD) System Check. Is the check completed?	–	Go to *Step 2*	Go to *"On–Board Diagnostic System Check"*
2	1. Install the scan tool. 2. Turn the ignition ON, with the engine OFF. Then, start engine and allow it to warm up at idle. 3. Observe "idle rpm, TPS" on the scan tool. Was a problem found?	–	Go to *"Engine Diagnostic Information"*	Go to *Step 3*
3	Inspect "ECM". Refer to *Section 1F, System Diagnosis, EOBD System Check.* Was a problem found?	–	Go to *"Engine Diagnostic Information"*	Go to *Step 4*
4	1. Turn the ignition OFF. 2. Disconnect the TCM wiring connector. 3. Measure the voltage between terminal B3 and B13 of the transaxle wiring connector. 4. Turn the ignition ON. 5. Measure the voltage between terminal C15 and B13 of the transaxle wiring connector. 6. Measure the voltage between terminal C16 and B13 of the transaxle wiring connector. Is the voltage within the values shown?	11–14V	Go to *Step 5*	Go to *"System Voltage Low or High"*
5	Replace the TCM. Is the action complete?	–	Go to *Step 6*	–
6	1. After the repair, use a scan tool "clear info" function and road test the vehicle. 2. Review the "DTC info". Has the last test failed or is the current DTC displayed?	–	Replace the transaxle assembly	Repair verified exit DTC chart

MAINTENANCE AND REPAIR

ON–VEHICLE SERVICE



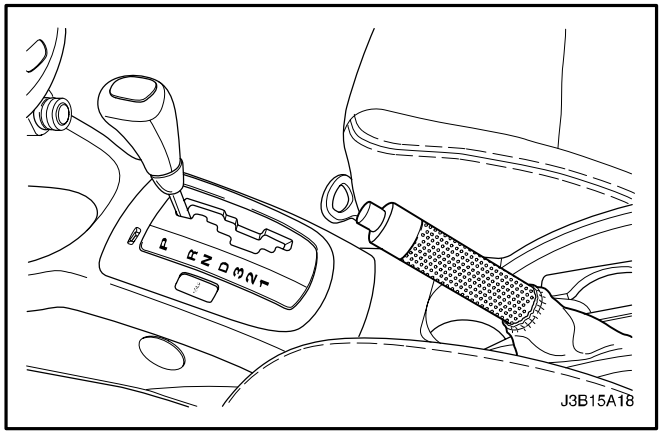
TRANSAXLE FLUID LEVEL CHECKING PROCEDURE

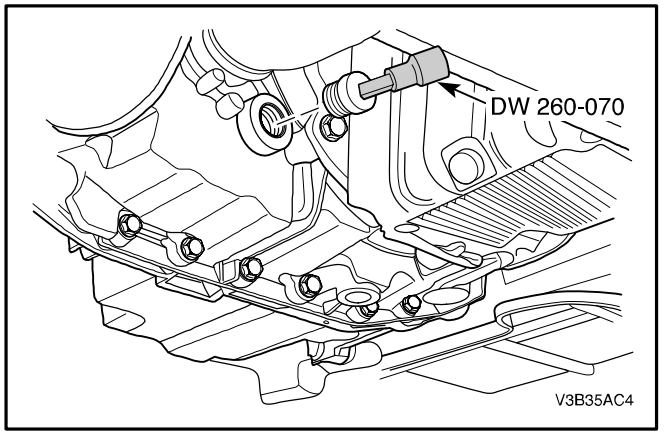
Tools Required

DW260–070 Plug Remover/Installer

Inspection Procedure

1. Start the engine and allow the engine to idle for approximately 5 minutes, or, if possible, drive the vehicle for a few kilometers(miles) to warm the transaxle fluid. Check the fluid level when the transaxle is over 30˚C(86˚F).
2. Press the brake pedal and move the shift lever through the gear ranges, pausing a few seconds in each range. Return the shift lever to the park position. (Left–Hand Drive Shown, Right–Hand Drive Similar.)

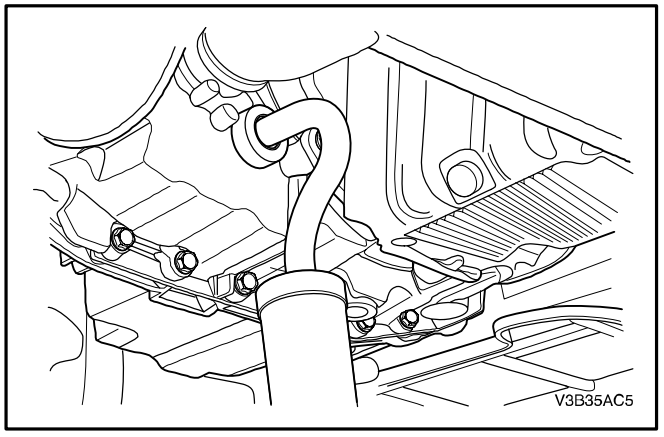




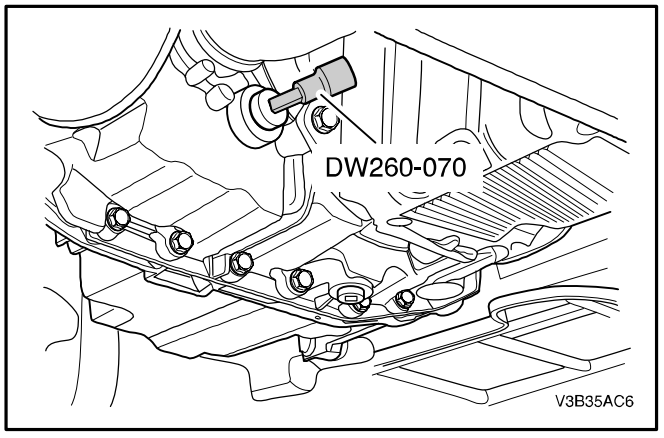
3. Raise and suitably support the vehicle.
4. Place a fluid container below the fluid level plug.

CAUTION : Do not remove the fluid level plug if the transaxle fluid is hot. This may cause injury if the fluid drains from the plug hole.

5. Remove the fluid level plug using the plug remover/installer DW260–070. Because the transaxle operates correctly over a range of levels, fluid may or may not drain out of the plug hole when the plug is removed.



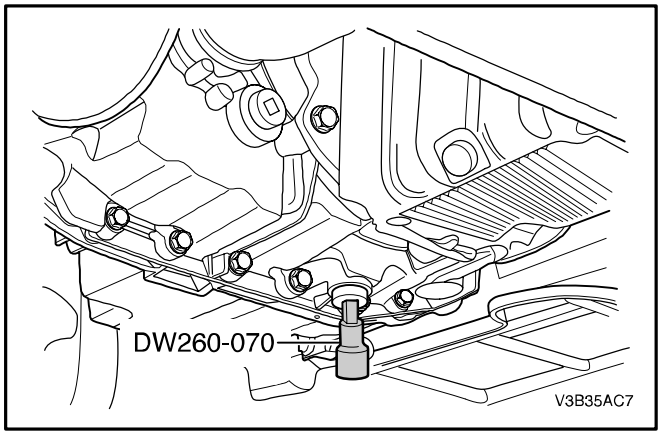
6. Check the oil fluid level. If fluid does not drain through the plug hole after adding a total of 4 liters, then the transaxle was either underfilled or the transaxle is leaking fluid. Inspect the transaxle for fluid leaks. Fix any leaks before setting the transaxle fluid level.



7. Install the fluid level plug using the plug remover/installer DW260–070.

   Tighten

   Tighten the Plug to 45 N•m (33 lb–ft).
8. When the fluid level checking procedure is completed, wipe any fluid from the transaxle case with a rag or shop towel. Also, check that the fluid fill cap and the vent tube are properly installed.



CHANGING THE FLUID

Tools Required

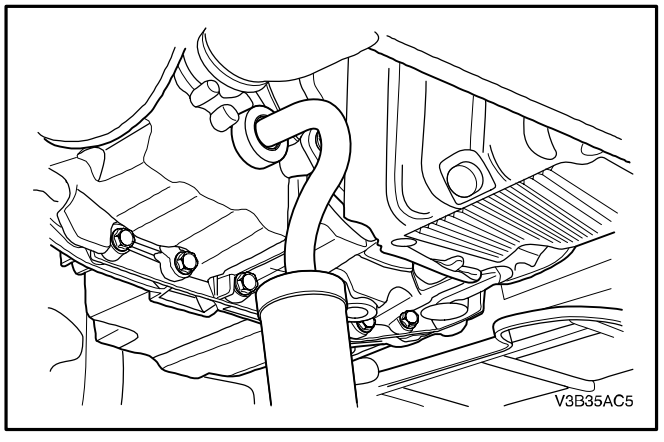
DW260–070 Plug Remover/Installer

Removal and Installation Procedure

1. Raise and suitably support the vehicle.
2. Place a fluid container below the fluid drain plug.
3. Remove the transaxle fluid drain plug using the plug remover/installer DW260–070.

   Tighten

   Tighten the Plug to 45 N•m (33 lb–ft).



4. Adding transaxle fluid. Refer to ”Transaxle Fluid Level Checking Procedure” in this section.
5. Connect the negative battery cable.

FLUID LEVEL SET AFTER SERVICE

1. Add transaxle fluid through the fill cap hole prior to adjusting the fluid level. The amount of fluid to add should be based on the type of service done.

Adjustment Notice

- Use ESSO LT 71141 transaxle fluid only.
- Oil pan removed : 4L (4.2 qt)
- Torque converter removed : 2L (2.1 qt)
- Complete overhaul : 6.7L (7.1qt)
- Drain plug removed : 4L (4.2 qt)

2. Check the transaxle fluid level. Refer to ”Transaxle Fluid Level Checking Procedure” in this section.
3. Add additional fluid through the fill cap hole in 0.5 liter (0.5 quart) increments until the fluid comes out through the plug hole.
4. Allow the fluid to finish draining out through the plug hole, then install the fluid level plug.
5. When the fluid level setting procedure is completed, wipe any fluid from the transaxle case with a rag or shop towel. Also, check that the fluid fill cap and the vent tube are properly installed.

REPAIRING FLUID LEAKS

Locating Leaks

General Method

1. Verify that the leak is transaxle fluid.
2. Thoroughly clean the suspected leak area.
3. Operate the vehicle for about 25 kilometers (15 miles) or until the transaxle reaches normal operating temperature, 88˚C (190˚F).
4. Park the vehicle over clean paper or cardboard.
5. Turn the engine off and look for fluid spots on the paper.
6. Make the necessary repairs to correct the leak.

Powder Method

1. Thoroughly clean the suspected leak area.
2. Apply an aerosol–type powder (foot powder) to the suspected leak area.
3. Operate the vehicle for about 25 kilometers (15 miles) or until the transaxle reaches normal operating temperature, 88˚C (190˚F).
4. Turn the engine off.
5. Inspect the suspected leak area and trace the leak path through the powder to find the source of the leak.
6. Make the necessary repairs.

Repairing the Fluid Leak

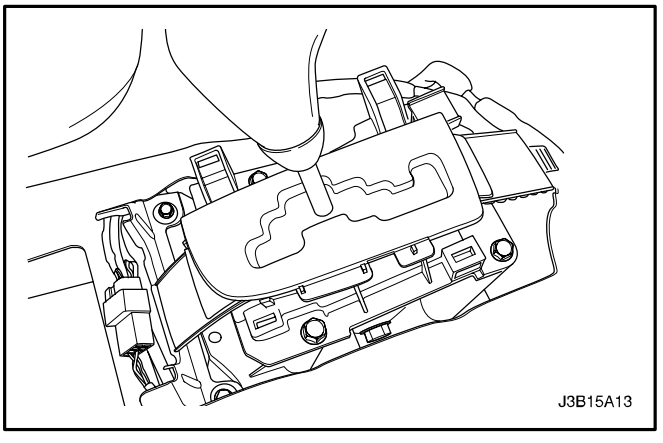
The following are potential causes for fluid leaks. Check and repair, as necessary.

- Fasteners are not tightened to specifications.
- Fastener threads and tapped holes are dirty or corroded.
- Gaskets, seals or sleeves are misaligned, damaged, or warped, or scratched.
- The manual shaft is nicked or damaged.
- There is a loose or worn bearing causing excess seal or sleeve wear.
- Case or component porosity.
- The fluid level is too high.
- There is a plugged vent or a damaged vent tube.
- There is water or coolant in the fluid.
- Fluid drain back holes are plugged.

CASE POROSITY REPAIR

CAUTION : Epoxy adhesive may cause skin irritations and eye damage. Read and follow all information on the container label as provided by the manufacturer.

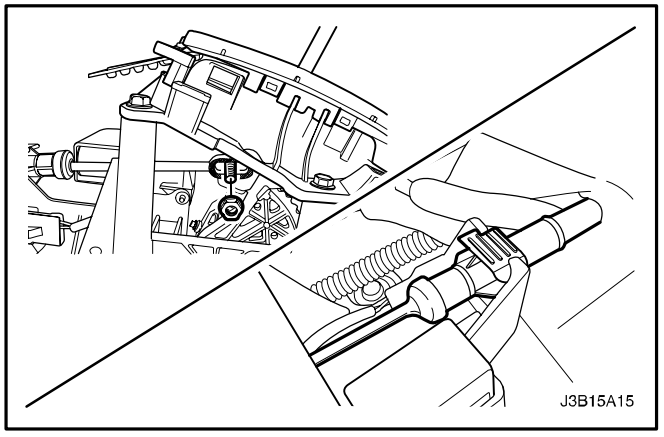
1. Thoroughly clean the area to be repaired with a cleaning solvent. Air dry the area.
2. Using instructions from the manufacturer, mix a sufficient amount of epoxy to make the repair.
3. While the transaxle case is still hot, apply the epoxy. You can use a clean, dry soldering acid brush to clean the area and also apply the epoxy cement. Make certain that the area to be repaired is fully covered.
4. Allow the epoxy cement to dry for 3 hours before starting the engine.
5. Repeat the fluid leak diagnosis procedures. Refer to ”Fluid Leak Diagnosis and Repair” in this section.



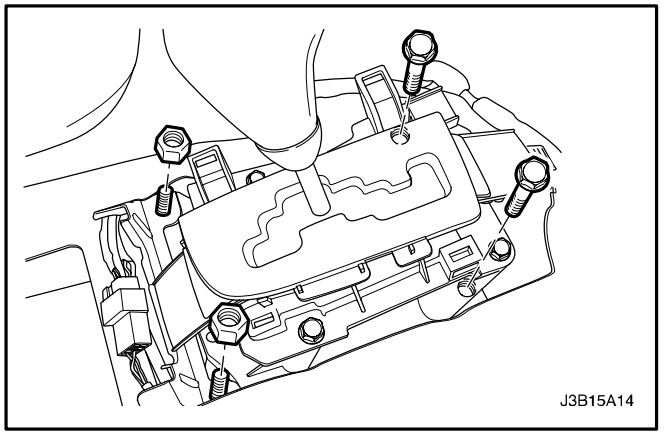
SHIFT CONTROL LEVER ASSEMBLY

Removal Procedure

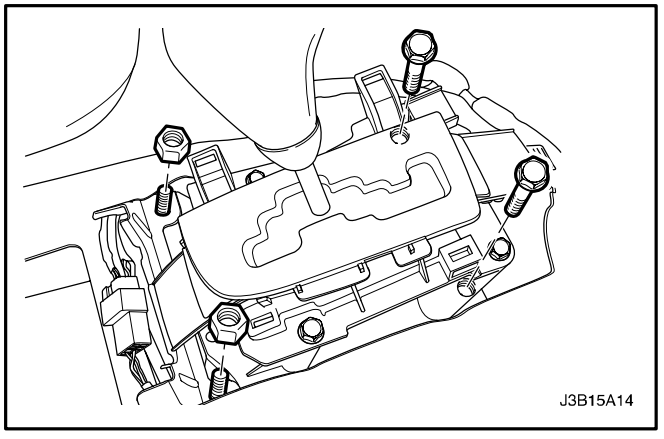
1. Disconnect the negative battery cable.
2. Remove the floor console. Refer to *Section 9G, Interior Trim.*
3. Disconnect the electrical switch connectors.



4. Remove the shift control cable adjuster pinch nut.
5. Remove the cable from the bracket.



6. Remove the bolts and nuts holding the shift control assembly to the floor panel.
7. Remove the shift control assembly.

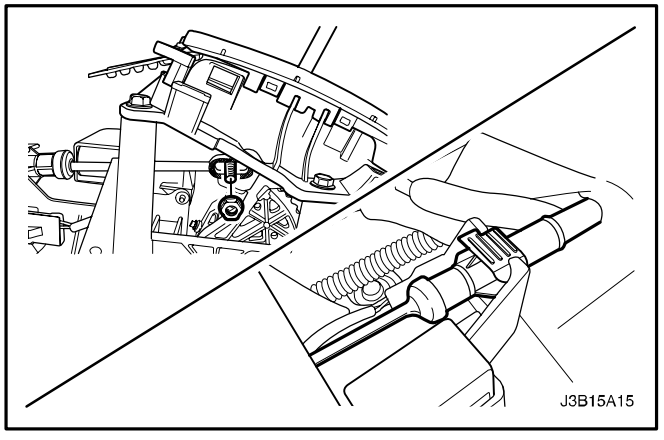


Installation Procedure

1. Install the shift control assembly.

   Tighten

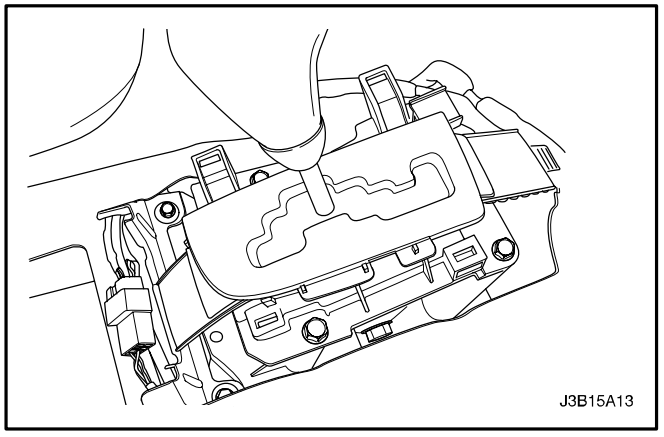
   Tighten the bolts and nuts to 8 N•m (71 lb–in).



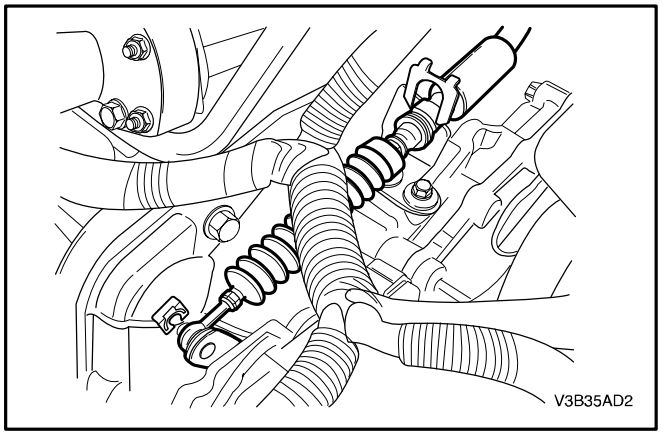
2. Install the shift control cable onto the bracket.
3. Install the shift control cable adjuster pinch nut.

   Tighten

   Tighten the shift control cable adjuster pinch nut to 8 N•m (71 lb–in).



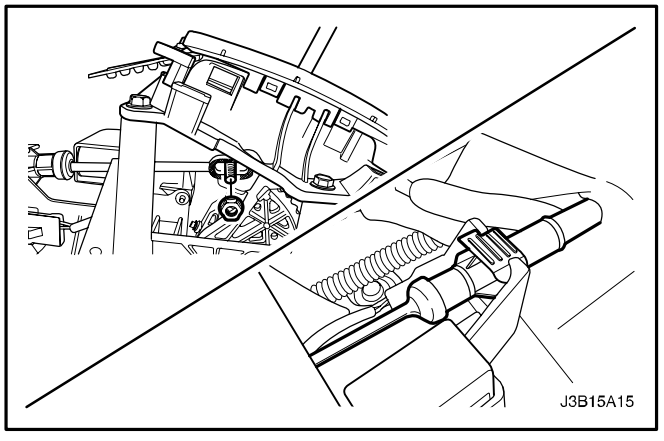
4. Connect the electrical switch connectors.
5. Install the floor console. Refer to *Section 9G, Interior Trim.*
6. Connect the negative battery cable.



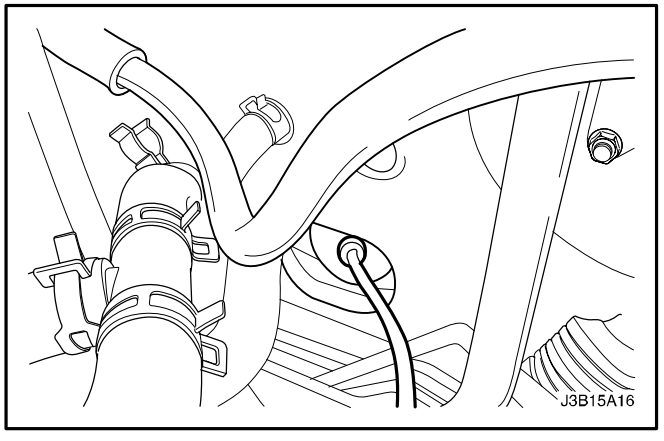
SHIFT CONTROL CABLE

Removal Procedure

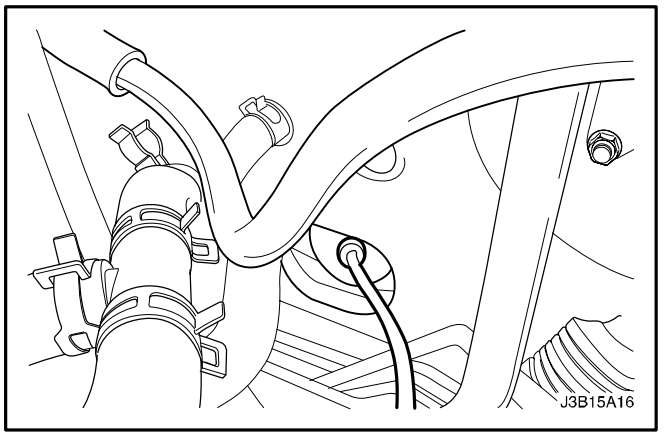
1. Disconnect the negative battery cable.
2. Remove the clip from the selector lever connection on the transaxle case and disconnect the shift control cable from the selector lever connection.
3. Remove the clip from the shift control cable at the transaxle mount connection.



4. Remove the floor console. Refer to *Section 9G, Interior Trim.*
5. Loosen the shift control cable adjuster pinch nut.
6. Remove the shift control cable from the shift control assembly.

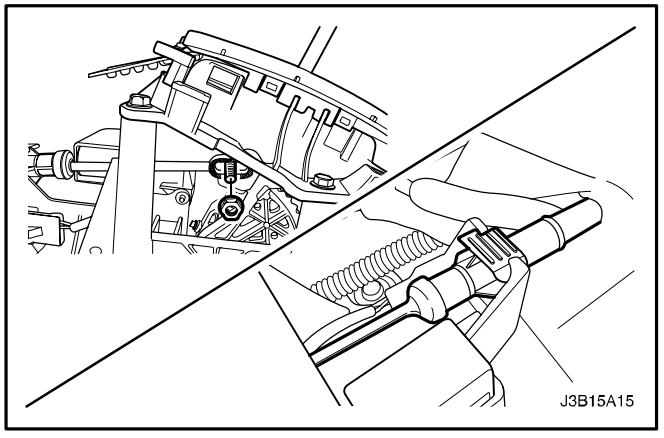


7. Remove the shift control cable from the transaxle mount.
8. Pull the shift control cable through the fire wall of the vehicle, bringing the rubber grommet with it.



Installation Procedure

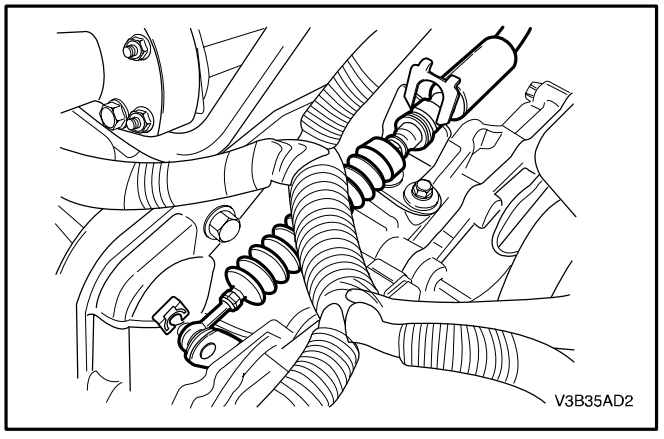
1. Install the shift control cable into the fire wall of the vehicle.
2. Install the shift control cable onto the transaxle mount.



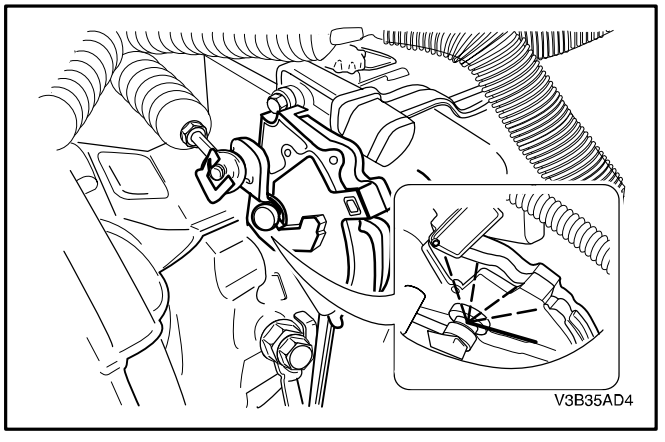
3. Install the shift control cable onto the shift control assembly.
4. Install the shift control cable adjuster pinch nut.

   Tighten

   Tighten the nut to 8 N•m (71 lb–in).



5. Install the clip to the shift control cable at the transaxle mount connection.
6. Install the clip to the select lever connection on the transaxle case.
7. Adjust the shift control cable. Refer to ”Shift Control Cable Adjustment” in this section.
8. Connect the negative battery cable.



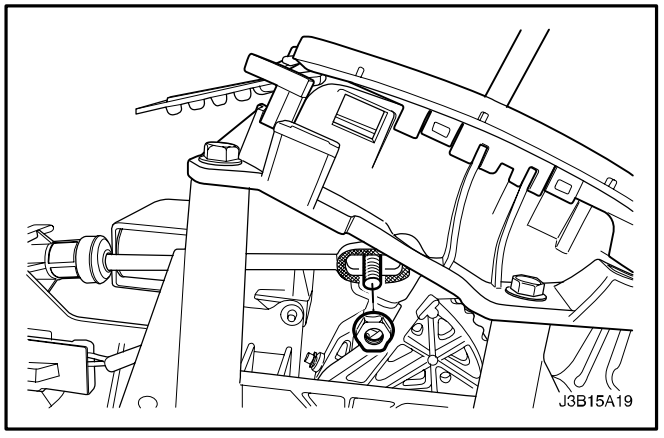
SHIFT CONTROL CABLE ADJUSTMENT

Adjustment Procedure

It is very important to match the shift control lever correctly with the selector lever connection. Place the shift control lever in the P position and check the selector lever connection to see if it is all the way forward. If it is not, proceed with the following adjustment.

1. Remove the battery and battery tray. Refer to *Section 1E, Engine Electrical.*
2. Remove the floor console. Refer to *Section 9G, interior Trim.*

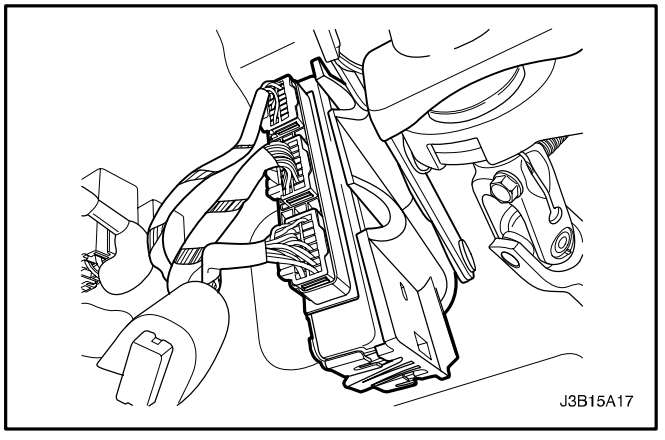
3. Place the shift control lever in the P position.
4. Loosen the pinch bolt nut on the shift control lever.



5. Place the selector lever connection all the way forward on the transaxle case.
6. Insert the shift control cable into the shift control lever tightly.
7. Secure the shift control cable with the shift control cable adjuster pinch bolt and nut.

   Tighten

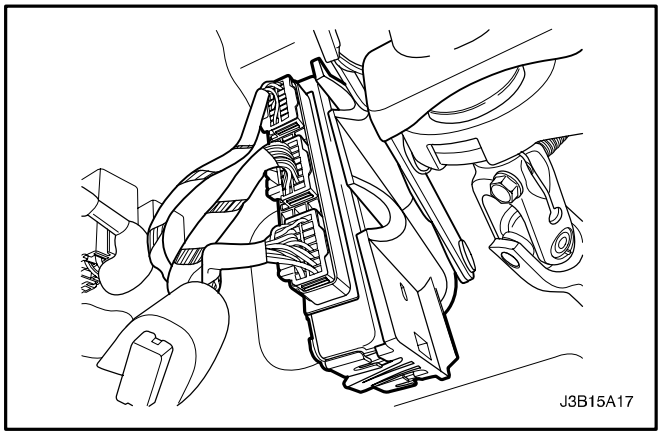
   Tighten the nut to 8 N•m (71 lb–in).
8. Install the floor console.
9. Install the battery and the battery tray. Refer to *Section 1E, Engine Electrical.*



TRANSAXLE CONTROL MODULE(TCM)

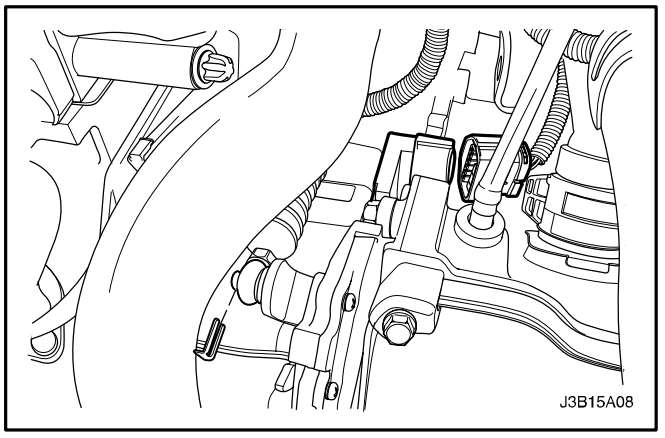
Removal Procedure

1. Disconnect the negative battery cable.
2. Disconnect the wiring connectors.
3. Remove the transaxle control module(TCM) from the bracket.



Installation Procedure

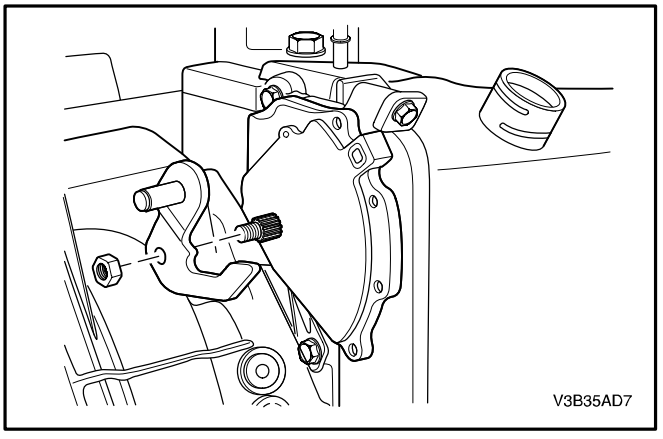
1. Install the TCM into the bracket.
2. Connect the wiring connectors.
3. Connect the negative battery cable.



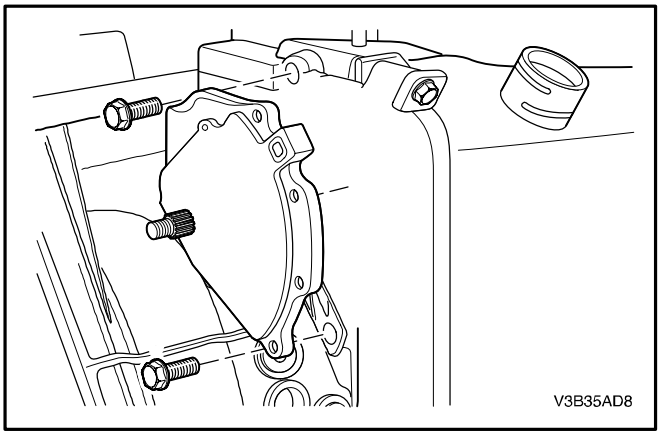
PARK/NEUTRAL START SWITCH

Removal Procedure

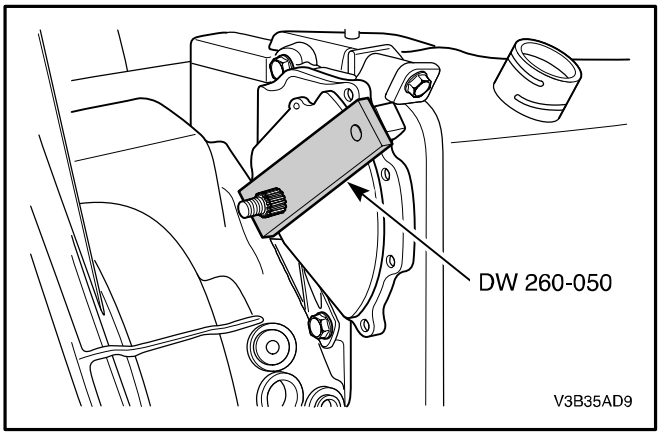
1. Disconnect the negative battery cable.
2. Disconnect the park/neutral position switch electrical connector.
3. Disconnect the shift control cable and the retaining clip.



4. Remove the shift lever nut and the shift lever.



5. Remove the park/neutral start switch.



Tools Required

DW260–050 P/N Switch Installer

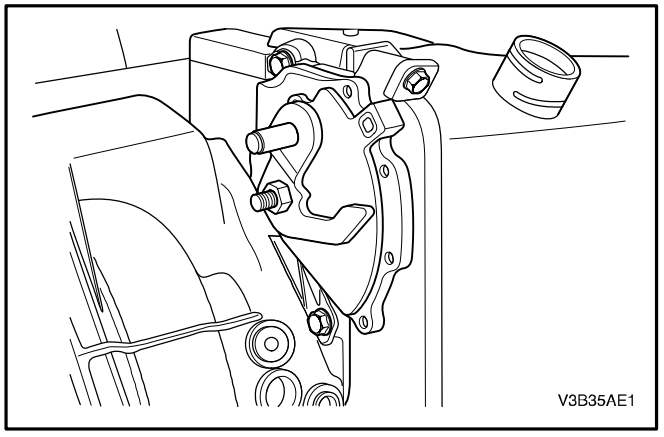
Installation Procedure

1. Install the park/neutral start switch.

   Tighten

   Tighten the bolts to 10 N•m (89 lb–in).
2. Adjust the park/neutral switch using the P/N switch installer DW260–050.

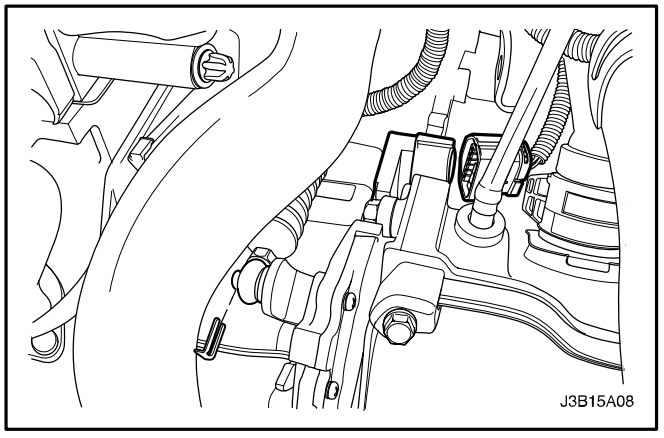
Notice : When install the park/neutral switch, using the special service tools and the shift lever must be positioned ”Neutral”.



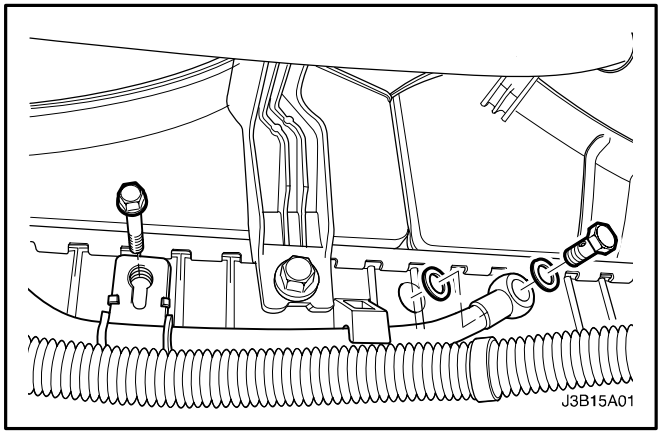
3. Install the shift lever and the shift lever nut.

Tighten

Tighten the shift lever nut to 10 N•m (89 lb–in).



4. Connect the shift control cable and the retaining clip.
5. Connect the park/neutral position switch electrical connector.
6. Connect the negative battery cable.

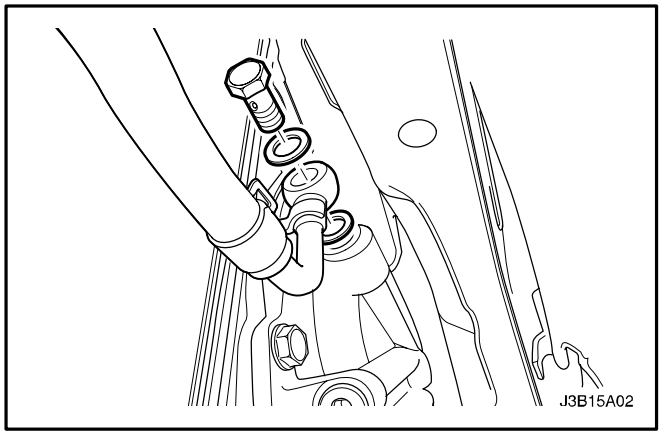


OIL COOLER PIPES/HOSES

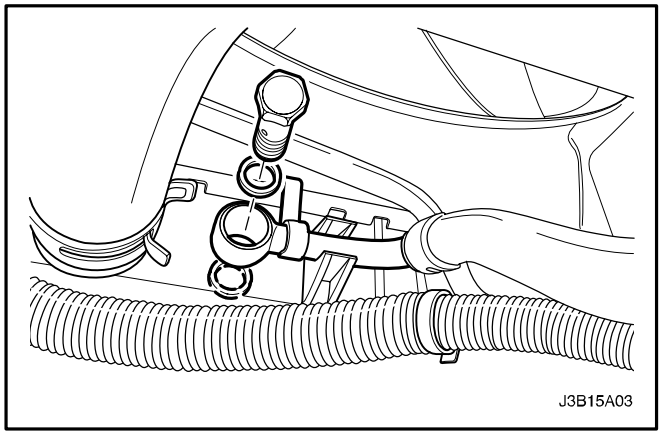
Removal Procedure

Important : Place a drip pan under the hoses to catch the fluid that will run out of the lines.

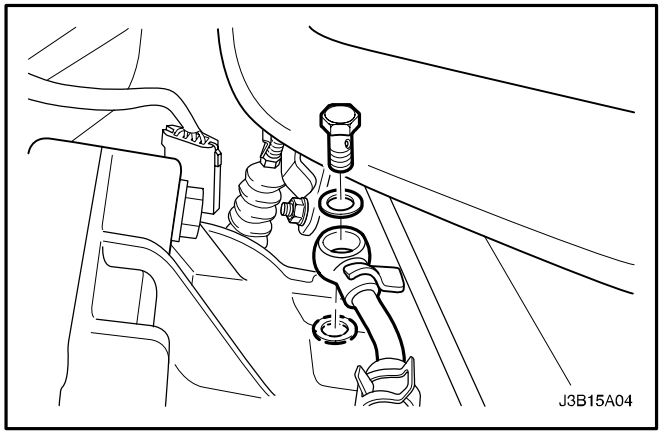
1. Disconnect the negative battery cable.
2. Raise and suitably support the vehicle.
3. Remove the engine under cover. Refer to *Section 9N, Frame and Underbody.*
4. Remove the oil cooler outlet pipe bolt from the right lower side of the radiator.
5. Remove the oil cooler outlet pipe bracket bolt.



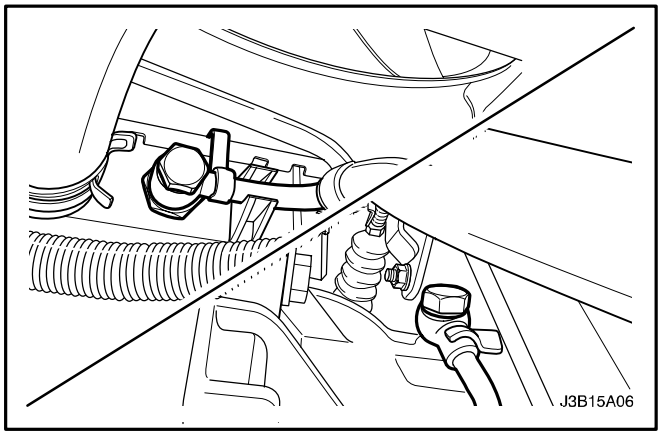
6. Remove the oil cooler outlet pipe bolt from the transaxle side.
7. Remove the oil cooler outlet pipe assembly.



8. Remove the oil cooler inlet pipe bolt from the left lower side of the radiator.



9. Remove the oil cooler inlet pipe bolt from the transaxle side.
10. Remove the oil cooler inlet pipe assembly.

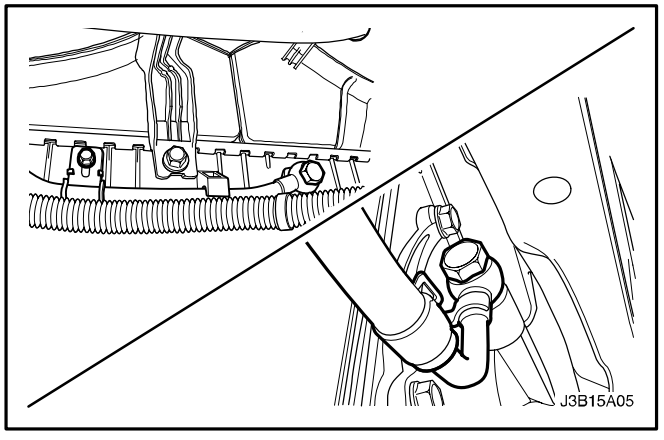


Installation Procedure

1. Install the oil cooler inlet pipe assembly and the bolts.

   Tighten

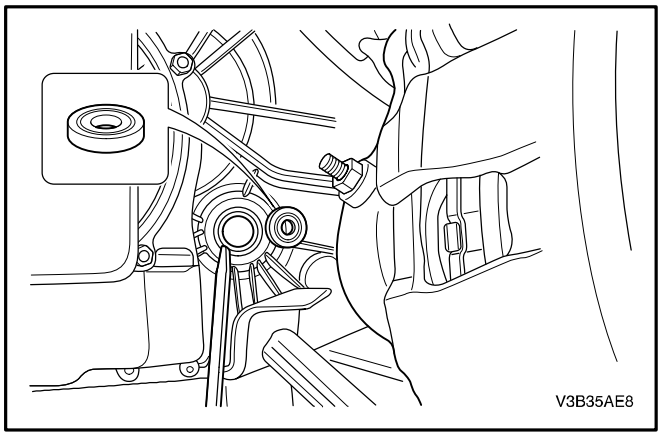
   Tighten the oil cooler inlet pipe bolts to 35 N•m (26 lb–ft).



2. Install the oil cooler outlet pipe assembly and the bolts.

   Tighten

   Tighten the oil cooler outlet pipe bolts to 35 N•m (26 lb–ft).
3. Refill the transaxle fluid. Refer to ”Transaxle Fluid Checking Procedure” in this section.
4. Install the engine under cover. Refer to *Section 9N, Frame and Underbody.*
5. Connect the negative battery cable.



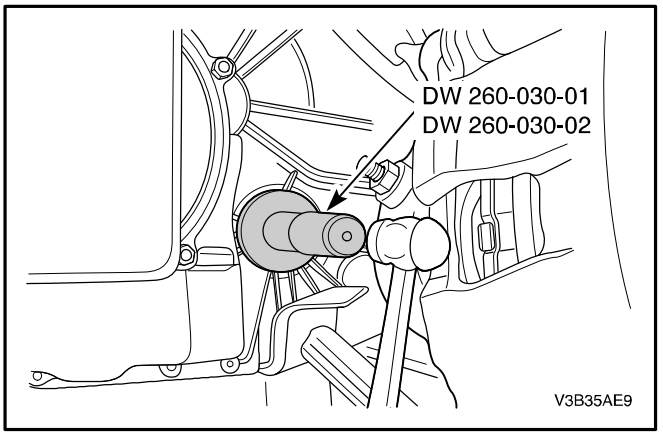
DRIVE AXLE OIL SEAL

Removal Procedure

1. Disconnect the negative battery cable.
2. Remove the drive axles. Refer to *Section 3A, Automatic Transaxle Drive Axle.*

Notice : Be careful not to damage the bore of the transaxle case.

3. Remove the transaxle drive seal using a screwdriver. If necessary, crush the seal first with the screwdriver in order to loosen the seal from the case.

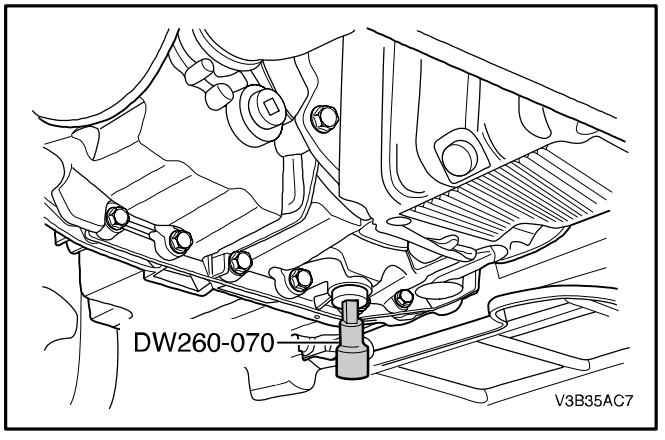


Tools Required

DW260–030 Axle Seal Installer

Installation Procedure

1. Install the transaxle drive seal using the axle seal installer DW260–030.
2. Install the drive axles. Refer to *Section 3A, Automatic Transaxle Drive Axle.*
3. Connect the negative battery cable.



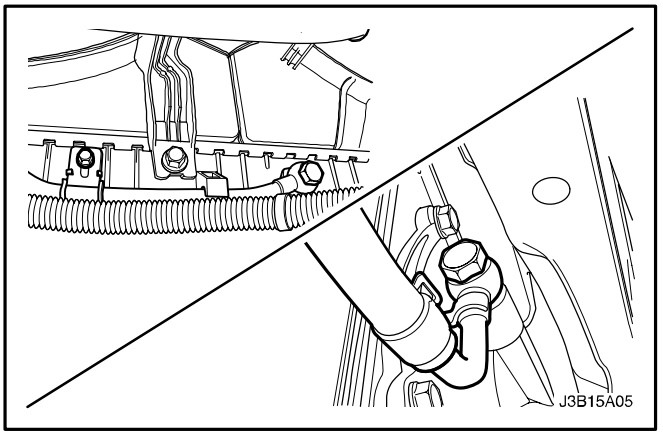
OIL PAN, OIL PAN GASKET

Tools Required

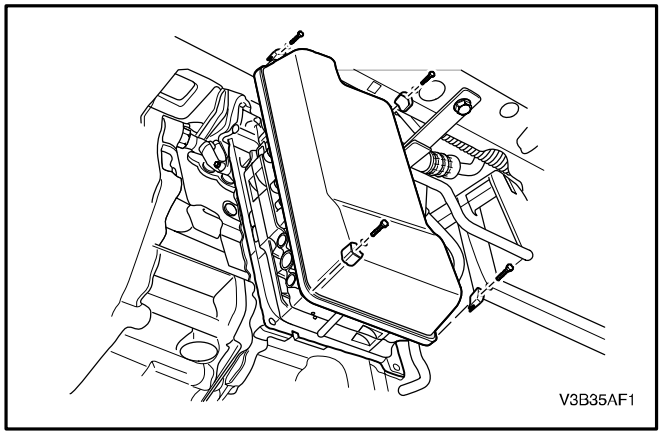
DW260–070 Plug Remover/Installer

Removal Procedure

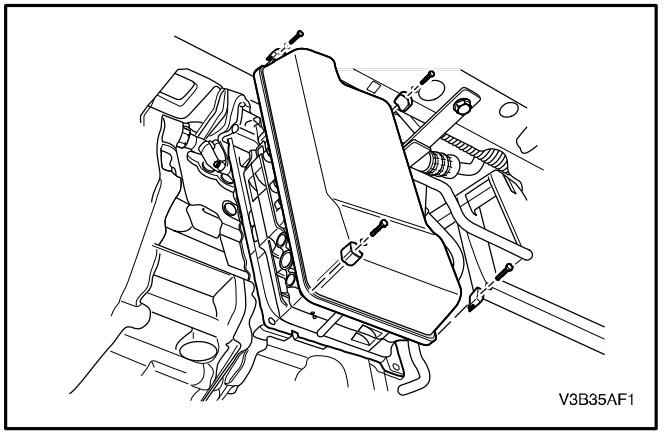
1. Disconnect the negative battery cable.
2. Raise and suitably support the vehicle.
3. Remove the engine under cover. Refer to *Section 9N, Frame and Underbody.*
4. Place a fluid container below the fluid drain plug.
5. Remove the transaxle fluid drain plug using the plug remover/installer DW260–070 and drain the transaxle fluid.



6. Remove the oil cooler inlet and outlet pipes. Refer to ”Oil Cooler Pipe/Hose” in this section.

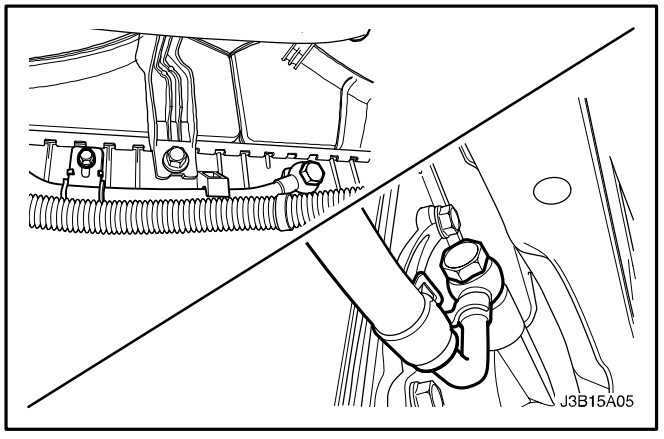


7. Remove the oil pan and oil pan gasket.

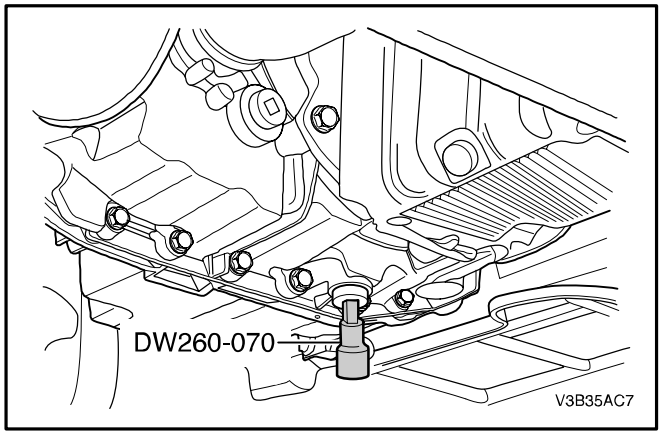


Installation Procedure

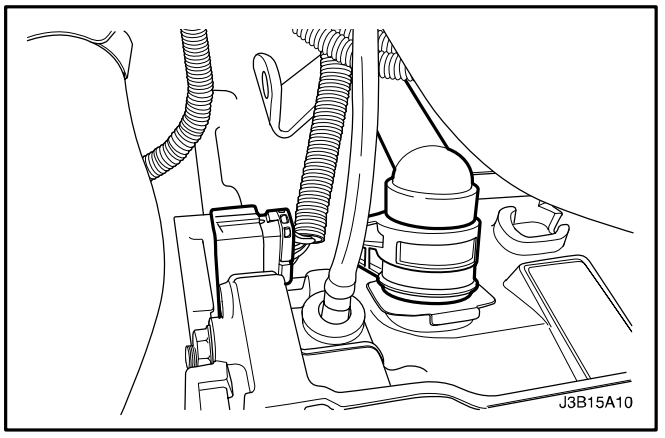
1. Install the oil pan, oil pan gasket and bolts.
   Tighten
   Tighten the oil pan bolts to 6 N•m (53 lb–in).



2. Install the oil cooler inlet and outlet pipes. Refer to”Oil Cooler Pipe/Hose” in this section.



3. Install the transaxle fluid drain plug using the plug remove/installer DW260–070.
4. Install the engine under cover. Refer to *Section 9N, Frame and Underbody.*
5. Refill the transaxle fluid. Refer to ”Transaxle Fluid Level Checking Procedure” in this section.
6. Connect the negative battery cable.



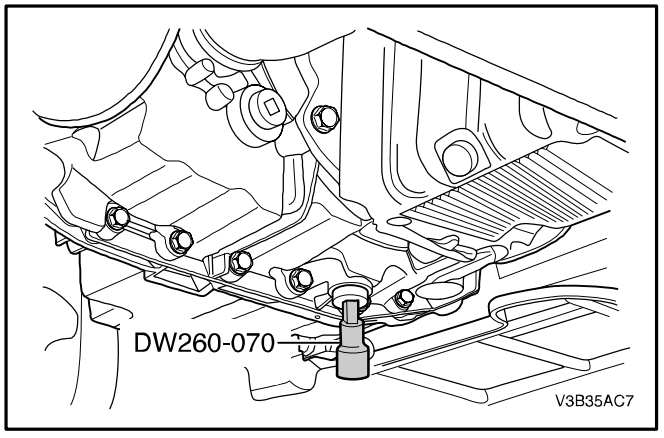
CONTROL VALVE BODY ASSEMBLY

Tools Required

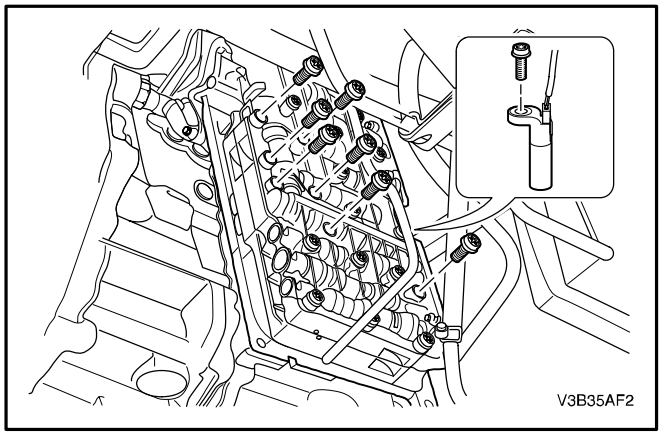
DW260–070 Plug Remover/Installer

Removal Procedure

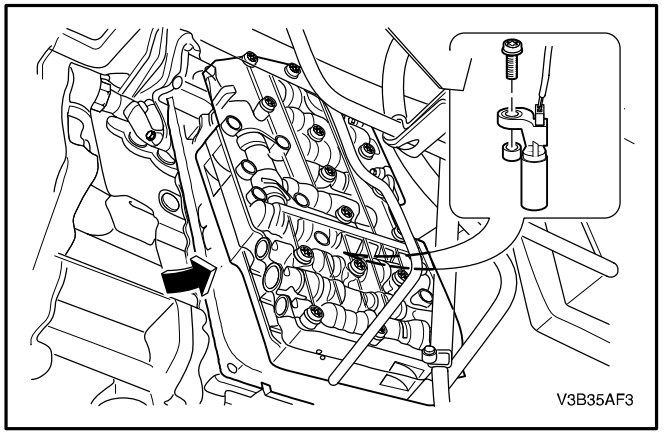
1. Disconnect the negative battery cable.
2. Disconnect the transaxle wiring harness and the park/neutral position switch electrical connector.



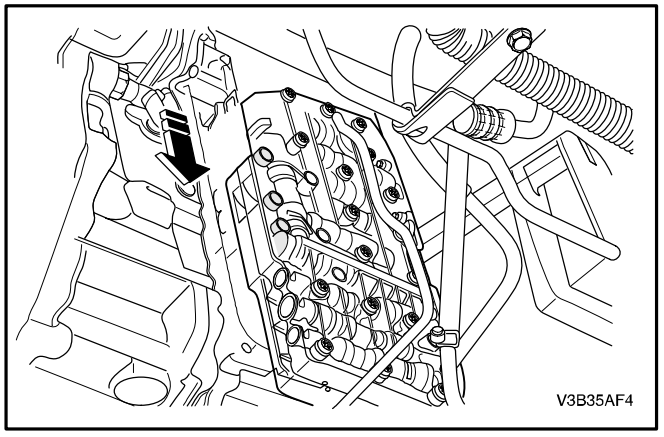
3. Raise and suitably support the vehicle.
4. Remove the engine under cover. Refer to *Section 9N, Frame and Underbody.*
5. Remove the transaxle fluid drain plug using the plug remover/installer DW260–070 and drain the transaxle fluid.



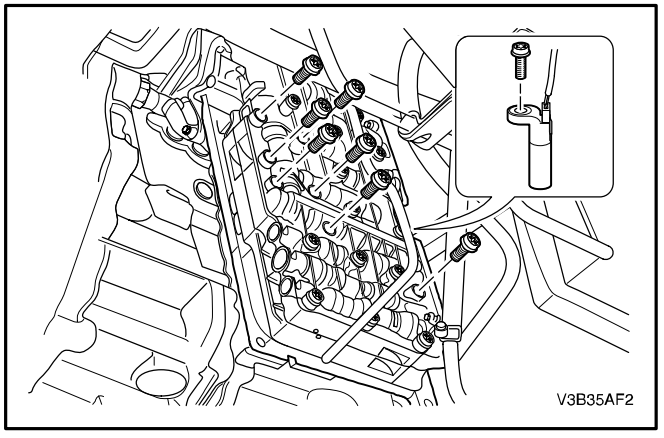
6. Remove the oil pan, oil pan gasket. Refer to ”Oil Pan, Oil Pan Gasket” in this section.
7. Remove the valve body mounting bolts.
8. Remove the automatic transmission input speed sensor mounting bolt.



9. Remove the automatic transmission output speed sensor mounting bolt.

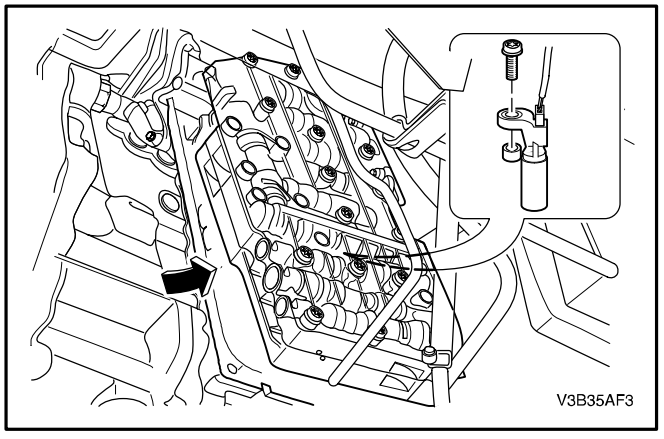


10. Remove the control valve body.

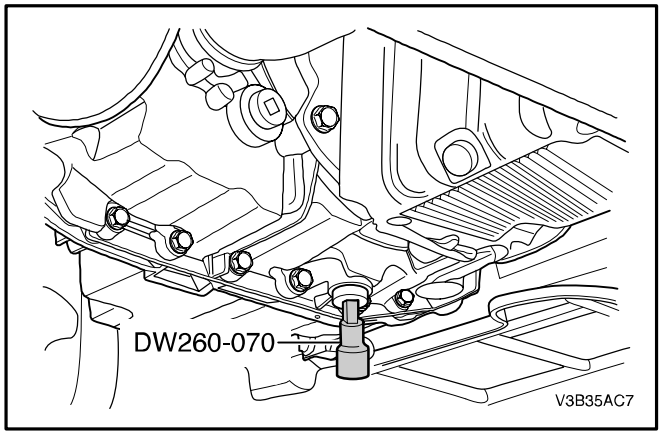


Installation Procedure

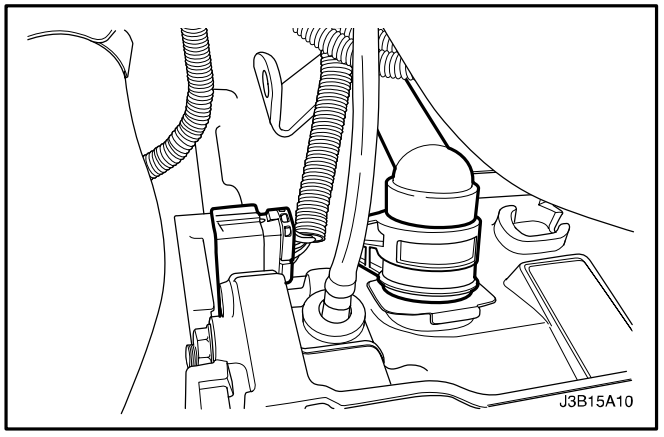
1. Install the control valve body and the bolts.
   Tighten
   Tighten the valve body mounting bolts to 8 N•m (71 lb–in).
2. Install the input speed sensor mounting bolt.
   Tighten
   Tighten the input speed sensor mounting bolt to 8 N•m (71 lb–in).



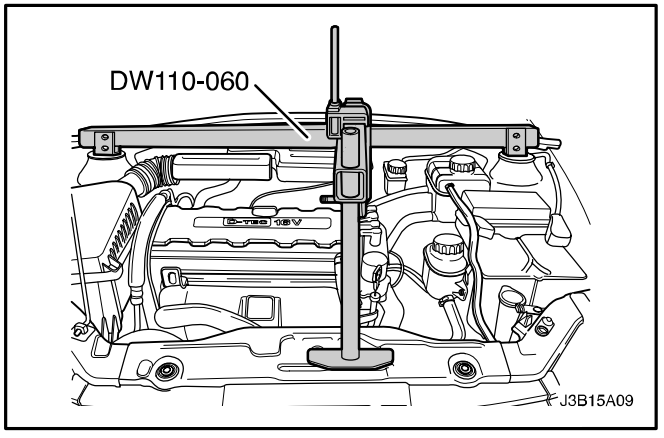
3. Install the output speed sensor mounting bolt.
   Tighten
   Tighten the output speed sensor mounting bolt to 6 N•m (53 lb–in).
4. Install the oil pan and oil pan gasket. Refer to ”Oil Pan Gasket” in this section.



5. Install the transaxle fluid drain plug using the plug remove/installer DW260–070.
6. Install the engine under cover. Refer to *Section 9N, Frame and Underbody.*



7. Lower the vehicle.
8. Connect the transaxle wiring harness and the PNP switch electrical connector.
9. Refill the transaxle fluid. Refer to ”Transaxle Fluid Level Checking Procedure” in this section.
10. Connect the negative battery cable.



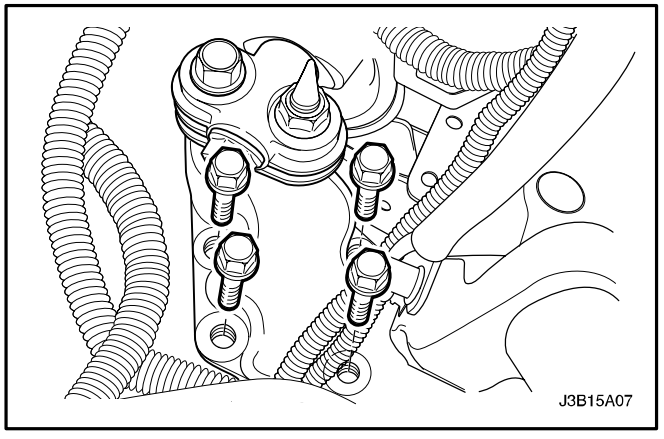
LEFT TRANSAXLE MOUNTING BRACKET

Tools Required

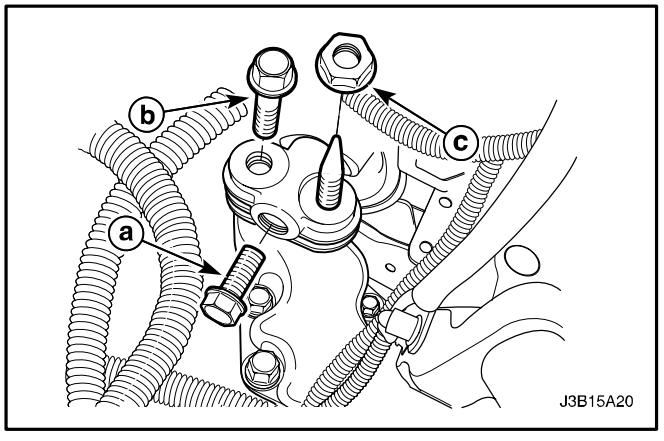
DW110–060 Engine Support Fixture

Removal Procedure

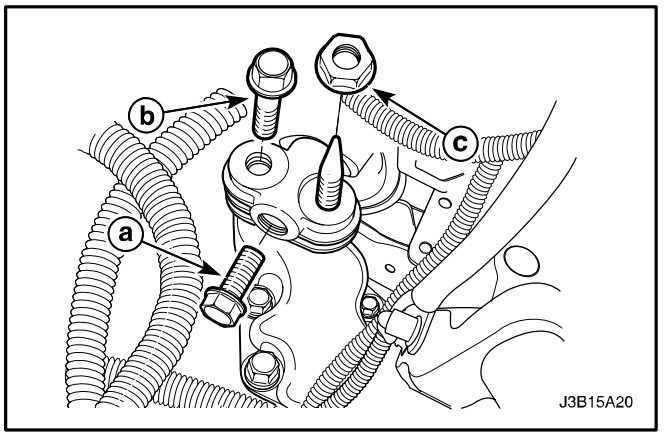
1. Remove the battery. Refer to *Section 1E, Engine Electrical.*
2. Install the engine support fixture DW110–060.



3. Remove the left transaxle mounting bolts.



4. Remove the left transaxle mount bracket cage bolts and nut.
5. Remove the transaxle mounting bracket.

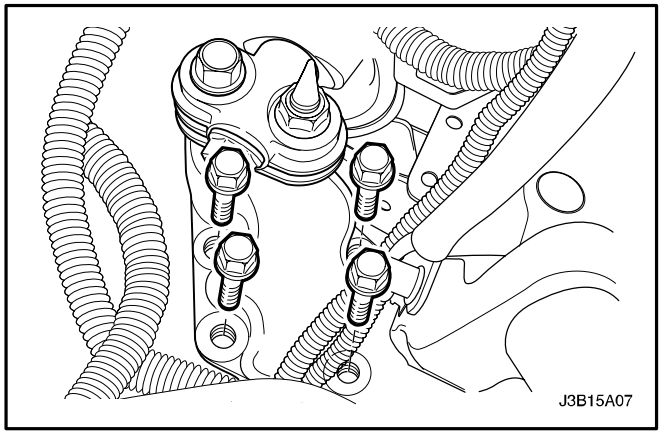


Installation Procedure

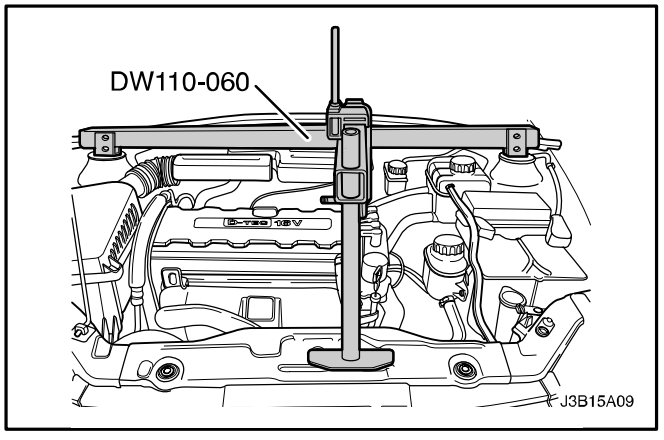
1. Install the left transaxle mount bracket cage bolts and nut.

   Tighten

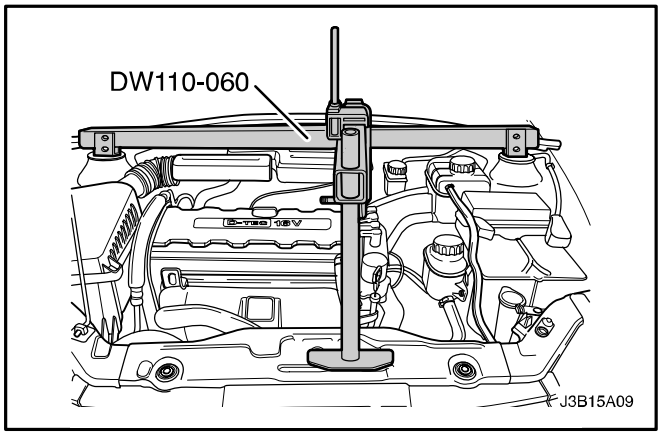
   - Tighten the left transaxle mount bracket cage bolt (a) to 110 N•m (81 lb–ft).
   - Tighten the left transaxle mount bracket cage bolt (b) to 65 N•m (48 lb–ft).
   - Tighten the nut (c) to 65 N•m (48 lb–ft).



2. Install the left transaxle mounting bolts to 48 N•m (35 lb–ft).



3. Remove the engine support fixture DW110–060.
4. Install the battery. Refer to *Section 1E, Engine Electrical.*



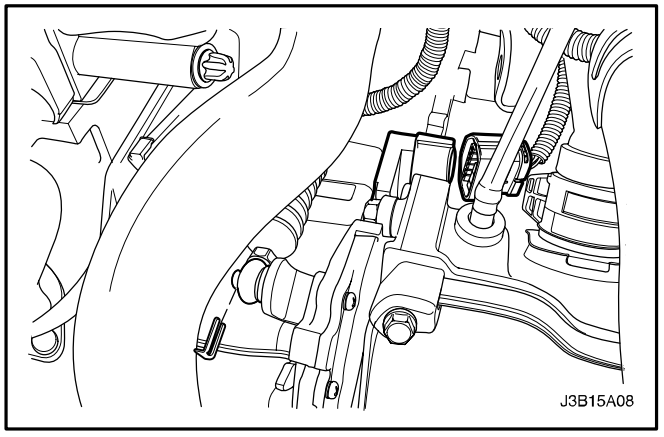
TRANSAXLE ASSEMBLY

Tools Required

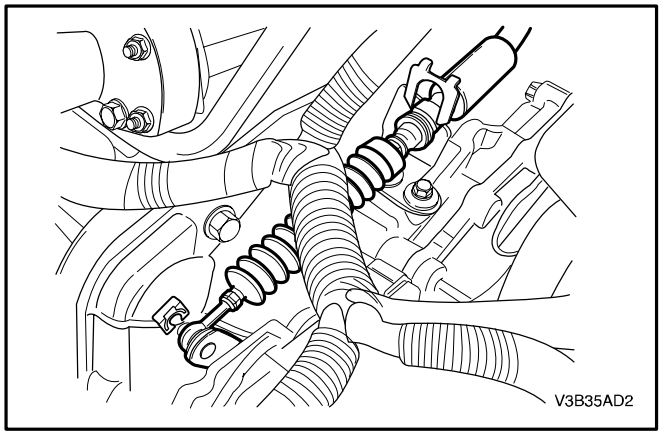
DW110–060 Engine Support Fixture
DW260–010 Transaxle Support Fixture

Removal Procedure

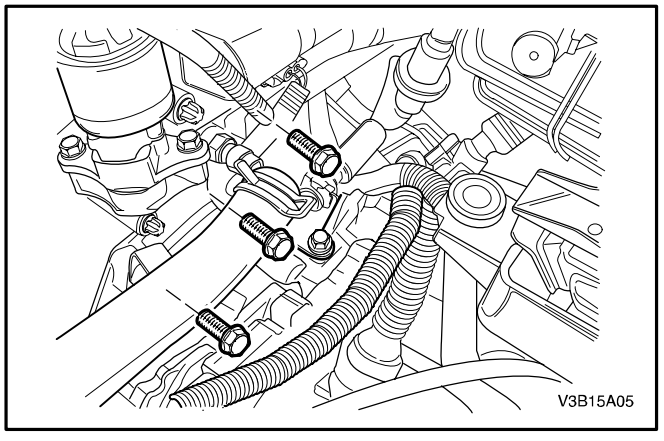
1. Disconnect the negative battery cable.
2. Position the select lever park position.
3. Remove the battery. Refer to *Section 1E, Engine Electrical.*
4. Install the engine support fixture DW110–060.



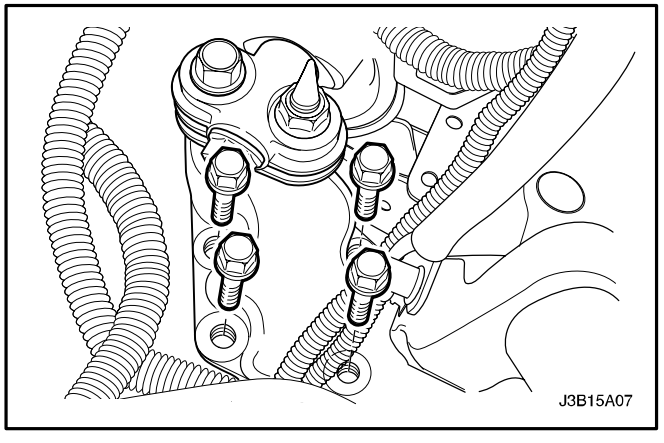
5. Disconnect the transaxle wiring harness from the transaxle.
6. Disconnect the park/neutral position switch electrical connector.



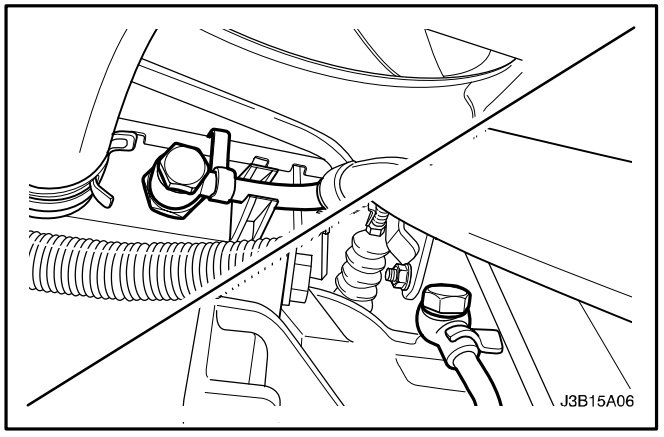
7. Remove the clips from the shift control cable and disconnect the shift control cable from the transaxle.



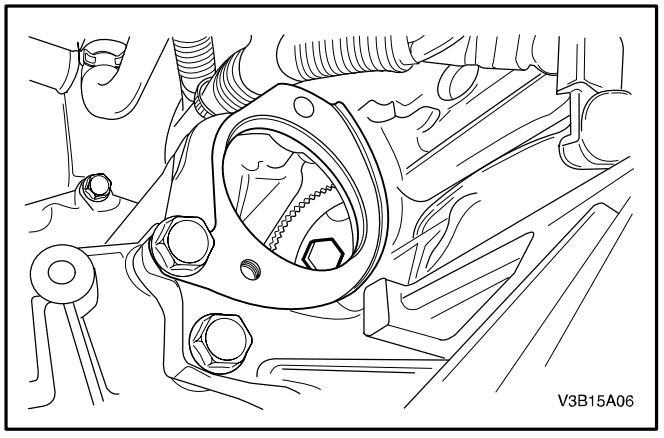
8. Remove the upper transaxle–to–engine bolts.



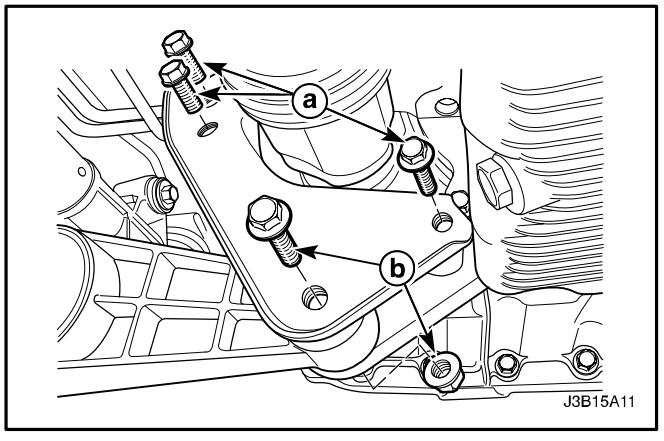
9. Remove the left transaxle mounting bracket. Refer to ”Left Transaxle Mounting Bracket” in this section.



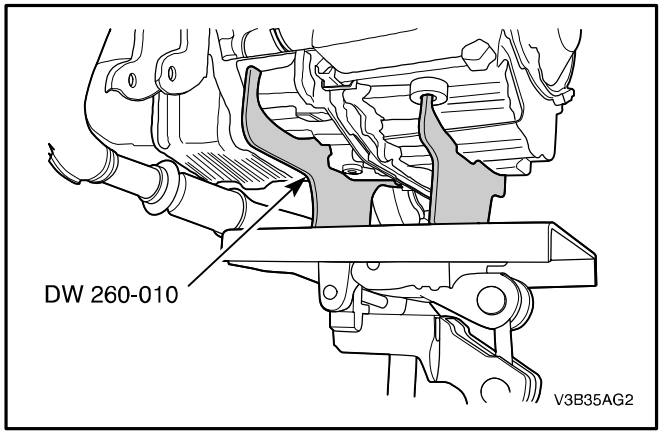
10. Raise and suitably support the vehicle.
11. Drain the transaxle fluid.
12. Remove the oil cooler pipes from the transaxle. Refer to ”Oil Cooler Pipes/Hoses” in this section.



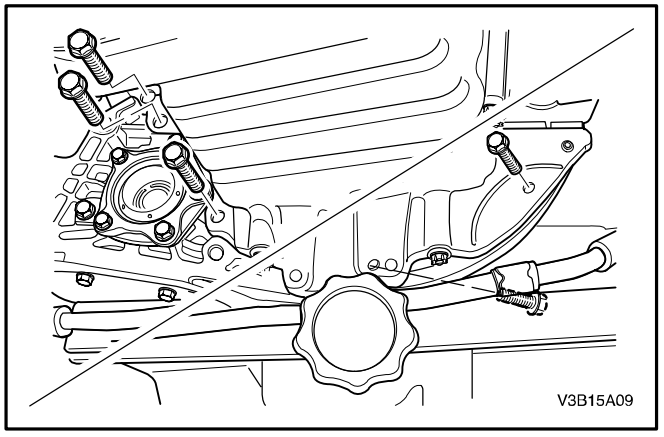
13. Remove the drive axle. Refer to *Section 3A, Automatic Drive Axle.*
14. Remove the starter motor. Refer to *Section 1E, Engine Electrical.*
15. Remove the torque converter bolts.



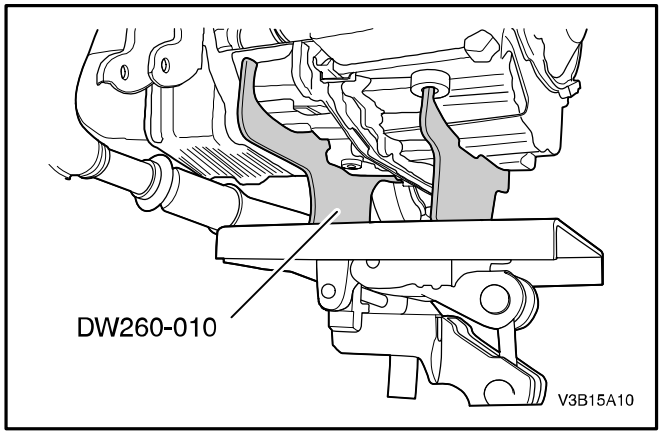
16. Support the transaxle.
17. Remove the rear transaxle mounting bracket bolts (a) and damping block connection bolt and nut (b).



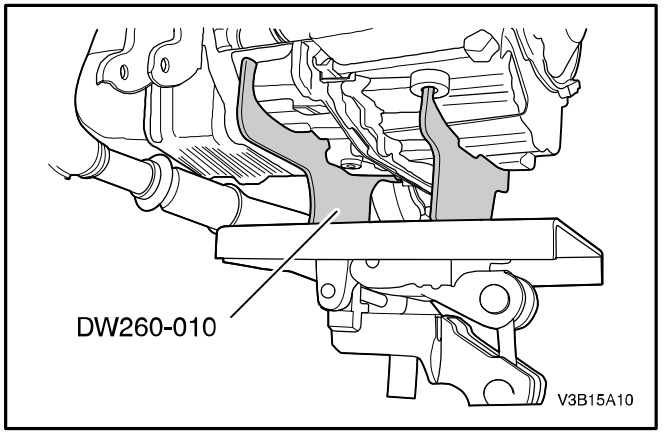
18. Support the transaxle assembly using the transaxle support fixture DW260–010.



19. Remove the lower engine–to–transaxle bolts.

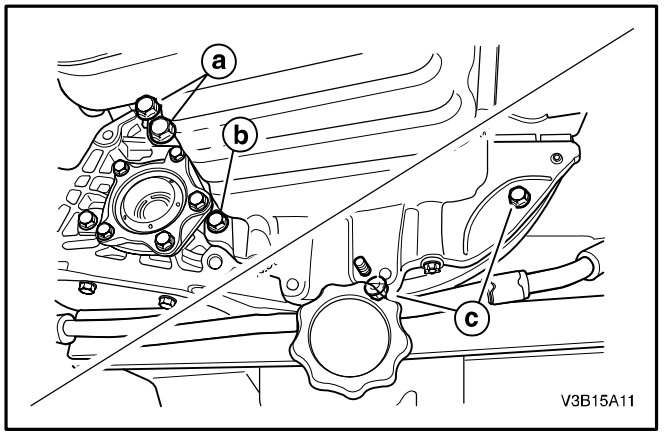


20. Remove the transaxle assembly.



Installation Procedure

1. Install the transaxle into the vehicle.
2. Support the transaxle assembly using the transaxle support fixture DW260–010.



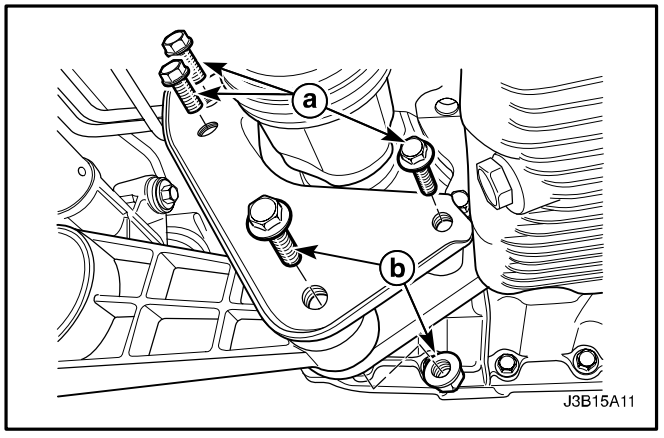
3. Install the lower engine–to–transaxle bolts.

Tighten

Tighten the lower engine–to–transaxle bolts (a) to 75 N•m (55 lb–ft).

Tighten the lower engine–to–transaxle bolt (b) to 21 N•m (15 lb–ft).

Tighten the lower engine–to–transaxle bolt (c) to 31 N•m (23 lb–ft).



4. Install the rear transaxle mounting bracket bolts (a).

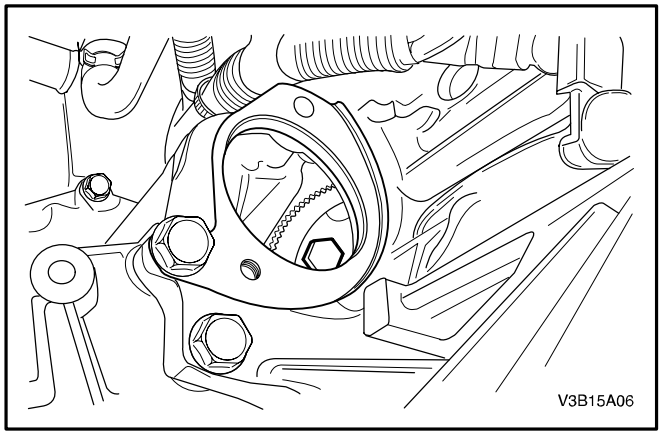
Tighten

Tighten the rear transaxle mounting bracket bolts (a) to 62 N•m (45 lb–ft).

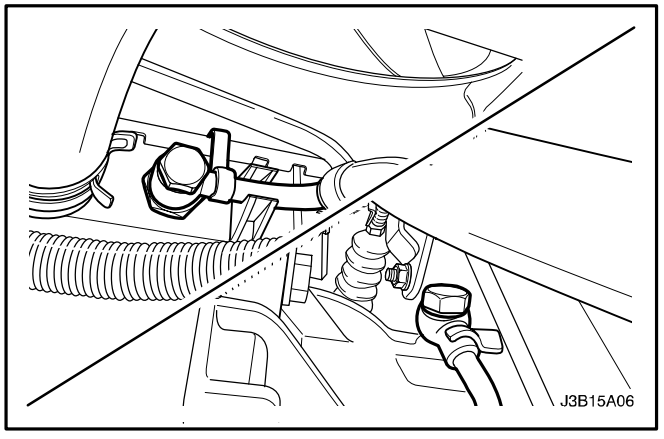
5. Install the damping block connection bolt and nut (b).

Tighten

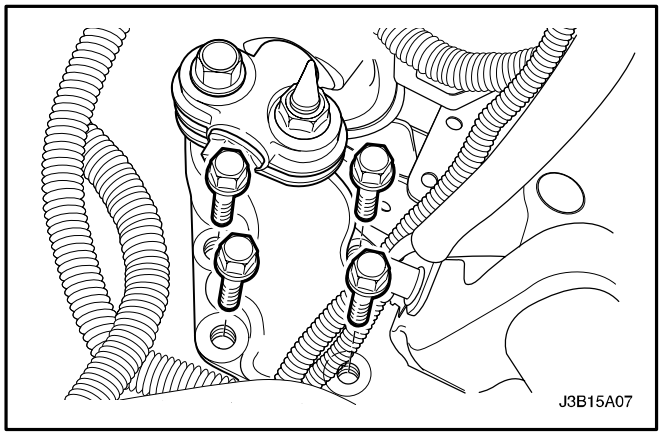
Tighten the damping block connection bolt and nut (b) to 68 N•m (50 lb–ft).



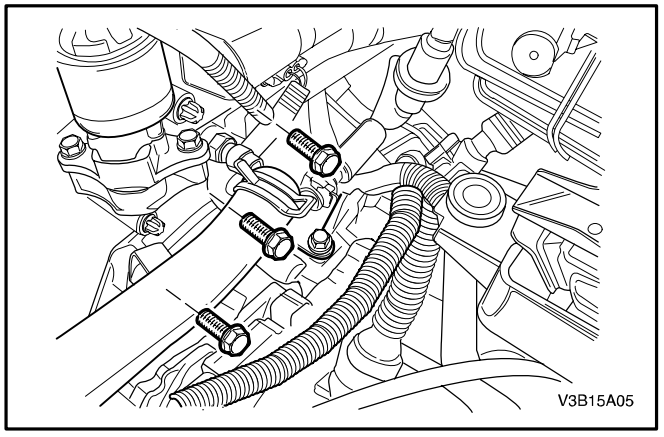
6. Install the torque converter bolts.
7. Install the starter motor. Refer to *Section 1E, Engine Electrical.*
8. Install the drive axle. Refer to *Section 3A, Automatic Drive Axle.*



9. Install the oil cooler pipes from the transaxle. Refer to ”Oil Cooler Pipes/Hoses” in this section.
10. Lower the vehicle.



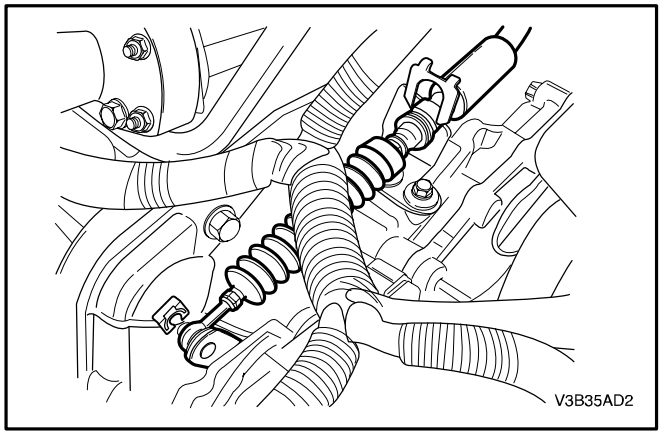
11. Install the left transaxle mounting bracket. Refer to ”Left Transaxle Mounting Bracket” in this section.



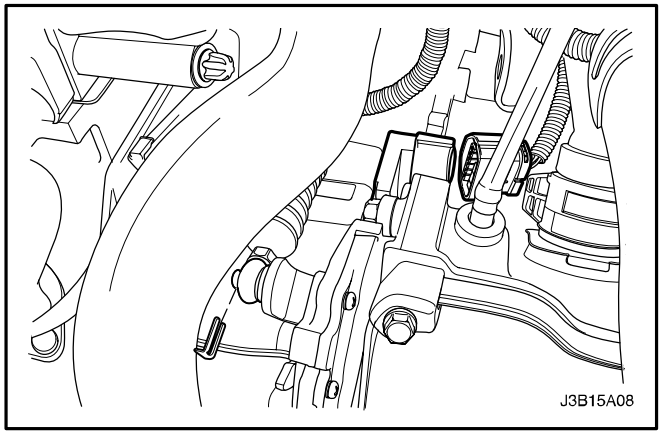
12. Install the upper transaxle–to–engine bolts.

Tighten

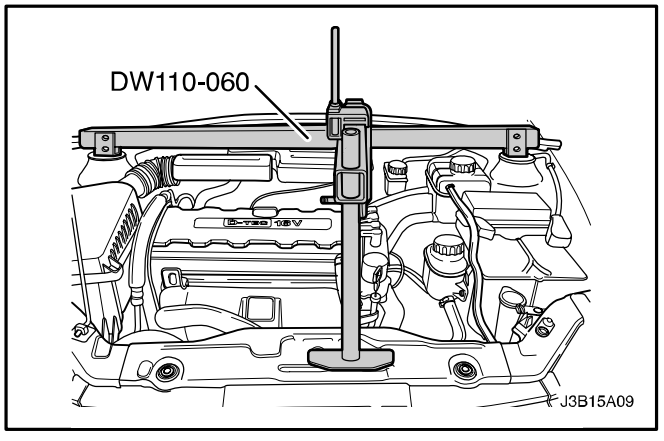
Tighten the upper transaxle–to–engine bolts to 75 N•m (55 lb–ft).



13. Install the clips to the shift control cable and connect the shift cable.

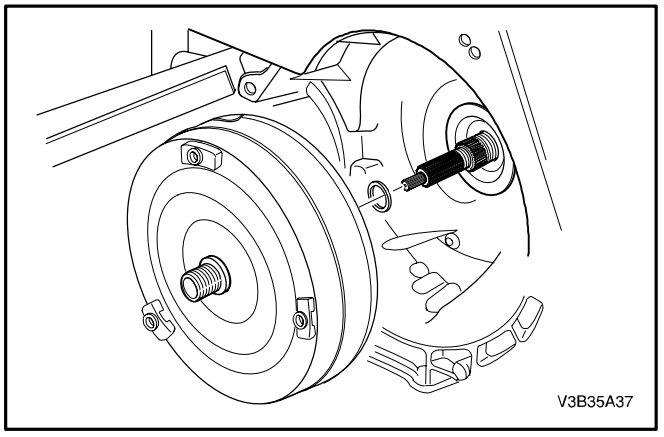


14. Install the park/neutral position switch electrical connector.
15. Connect the transaxle wiring harness to the transaxle.



16. Remove the engine support fixture DW110–060.
17. Install the battery. Refer to *Section 1E, Engine Electrical.*
18. Add the transaxle fluid. Refer to ”Transaxle Fluid Level Checking Procedure” in this section.
19. Connect the negative battery cable.

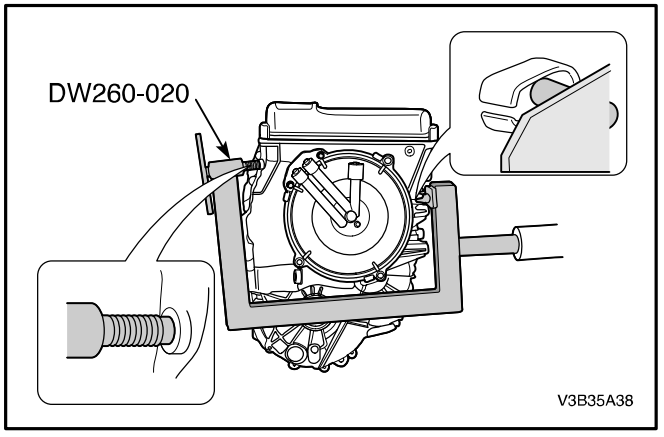
UNIT REPAIR



TORQUE CONVERTER

Disassembly and Assembly Procedure

1. Remove the transaxle assembly. Refer to ”Transaxle Assembly” in this section.
2. Remove the torque converter assembly.
3. Installation should follow the removal procedure in the reverse order.



TRANSAXLE HOLDING FIXTURE ASSEMBLY

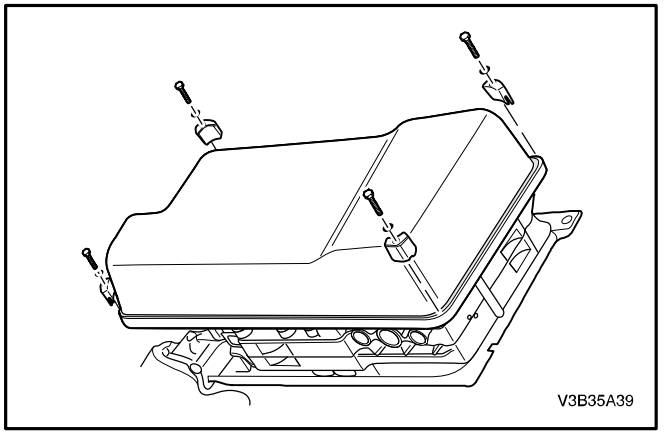
Tools Required

DW260–020 Transaxle Support Fixture

CAUTION : To reduce the possibility of personal injury or transaxle damage, make sure, when doing the next step, that all of the bolts for the support fixture are installed as shown, and that the bolts are tightened to 11 N•m (98 lb–in).

Disassembly and Assembly Procedure

1. Install the transaxle support fixture DW260–020 onto the transaxle.
2. Torque the support fixture bolts to 11 N•m (98 lb–in).
3. Position the transaxle with the rear cover facing up.



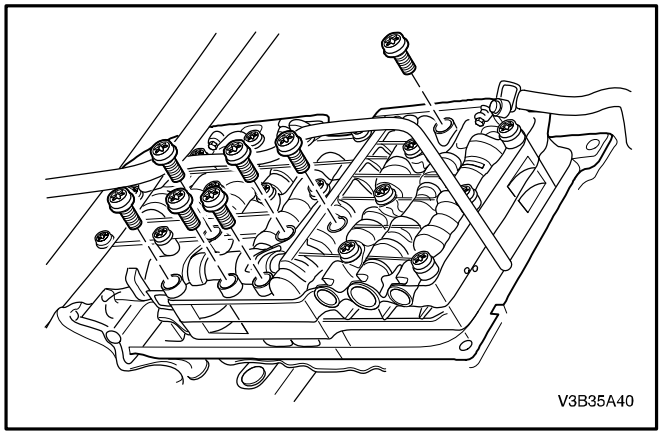
VALVE BODY

Disassembly and Assembly Procedure

1. Remove the oil pan bolts and oil pan.
2. Remove the oil pan gasket.

Installation Notice

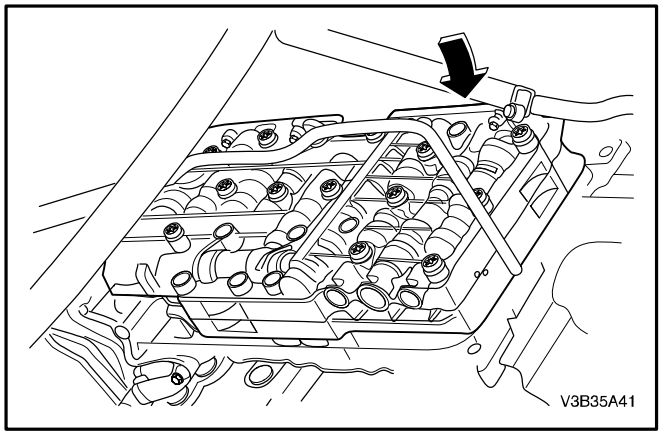
Tighten the oil pan bolts to 6 N•m (53 lb–in).



3. Remove valve body fixing bolts and transaxle input speed sensor bolt on the valve body.
4. Remove the holder for the transaxle input speed sensor.

Installation Notice

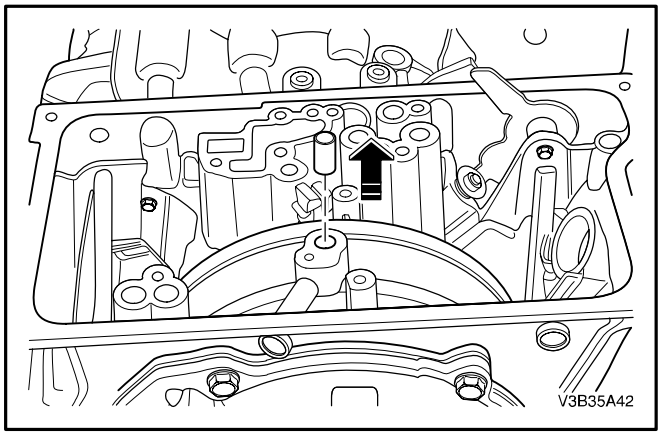
Tighten the bolts to 8 N•m (71 lb–in).



5. Tilt the valve body.
6. Remove the fastening screw for the output speed sensor under the valve body assembly.
7. Lever the cable out of the retaining clip and pull out the output speed sensor.
8. Installation should follow the removal procedure in the reverse order.

Installation Notice

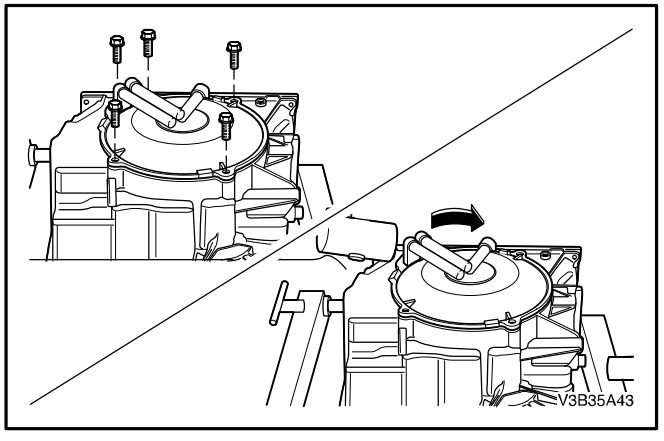
Tighten the screw to 6 N•m (53 lb–in).



REAR COVER

Disassembly and Assembly Procedure

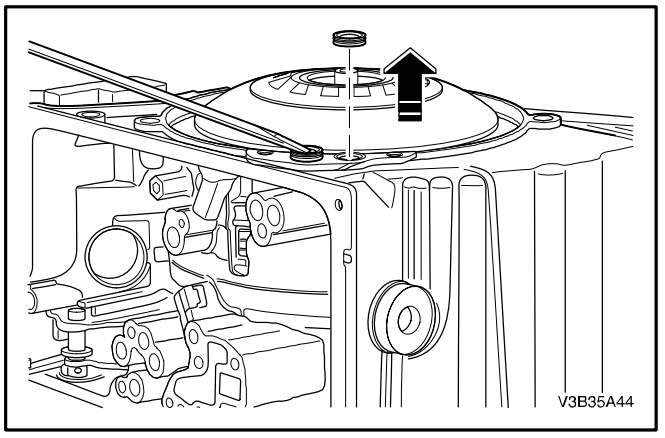
1. Removal the valve body assembly. Refer to ”Valve Body Removal” in this section.
2. Pull out sealing sleeve (brake C) with a kind of nail.
3. Turn transaxle by 90˚.



4. Remove the rear cover bolts.
5. Hit the rear cover rightly.
6. Remove the cover.
7. Installation should follow the removal procedure in the reverse order.

Installation Notice

Tighten the rear cover bolts to 23 N•m (17 lb–ft).



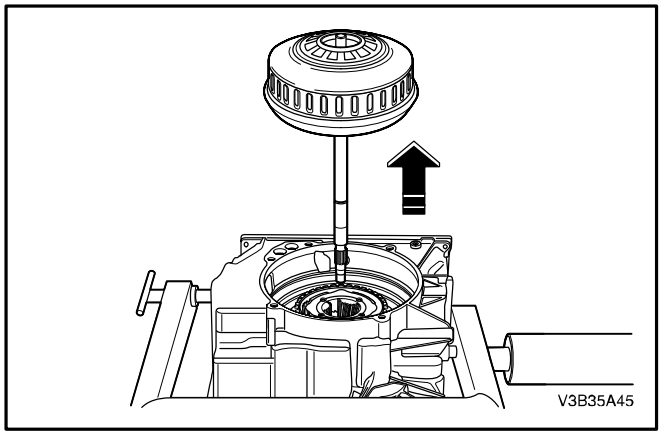
CLUTCH B/E

Tools Required

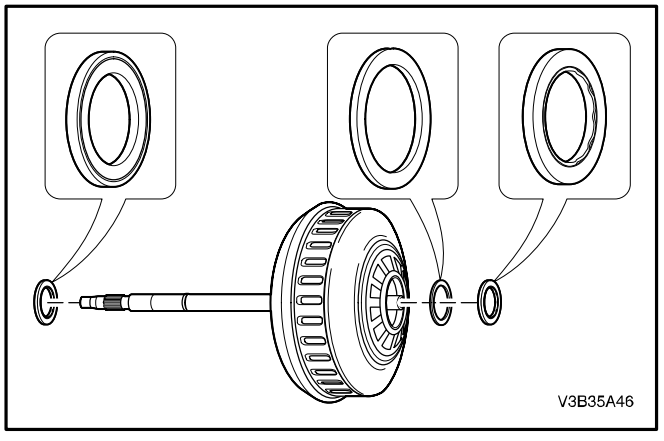
DW260–140 Clutch B Stop Ring Remover/Installer
DW260–150 Clutch B Stop Ring Remover/Installer

Disassembly and Assembly Procedure

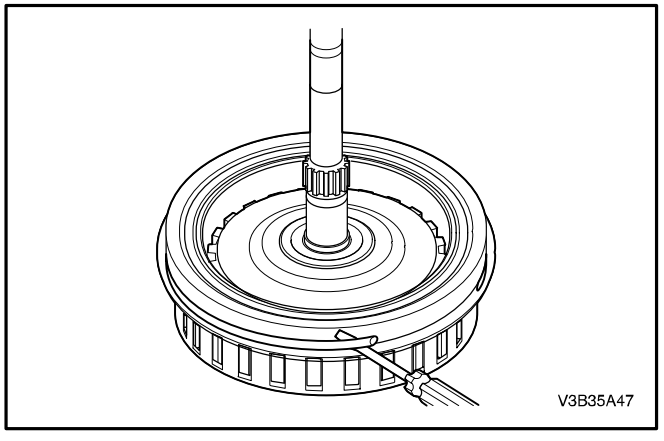
1. Remove the rear cover. Refer to ”Rear Cover Removal” in this section.
2. Remove the two sealing rings(clutch B/E).



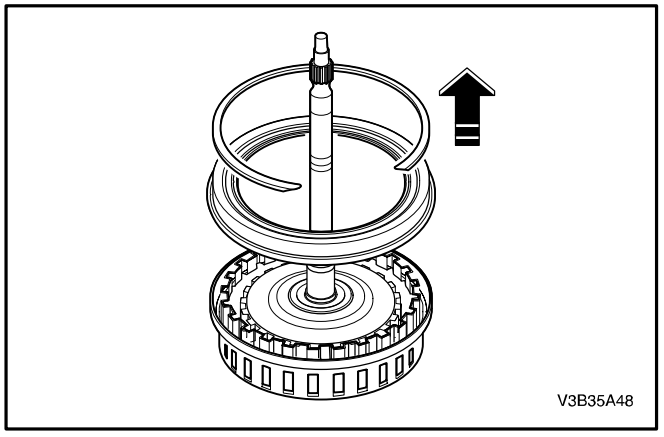
3. Take out input shaft with clutch B/E.



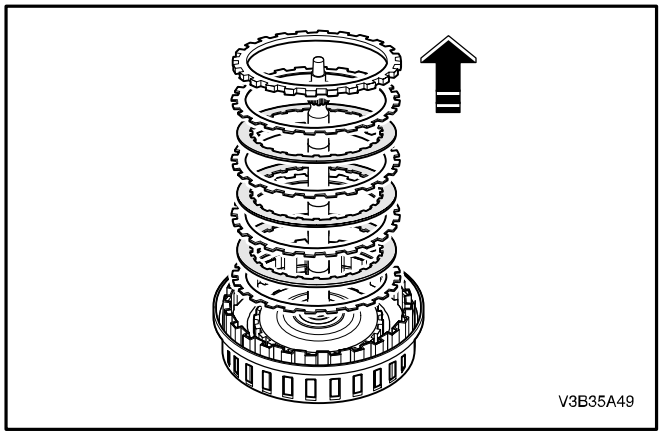
4. Remove needle bearing and thrust washer.
5. Remove shim.



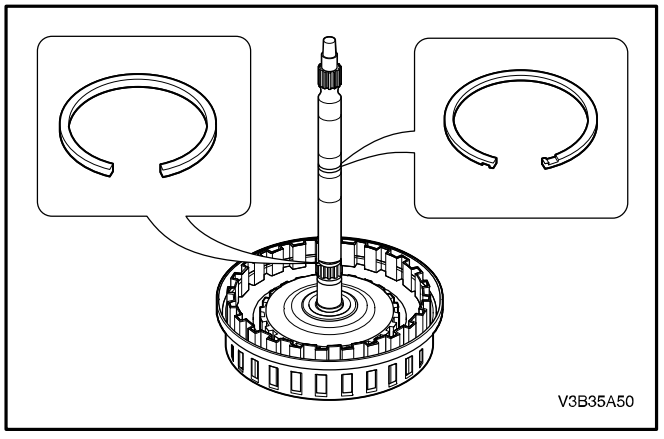
6. Take out the retaining snap ring.



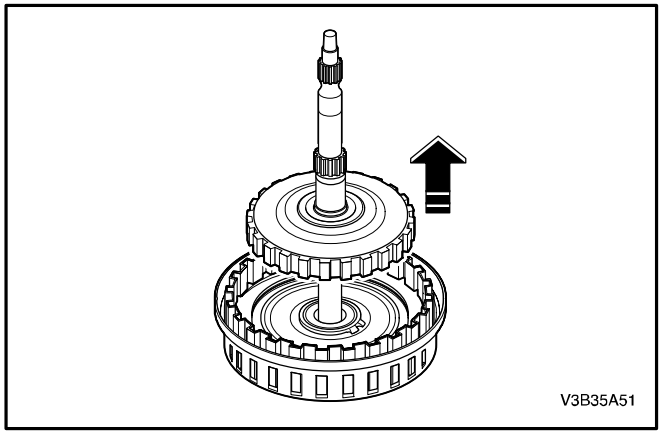
7. Take out the piston B.



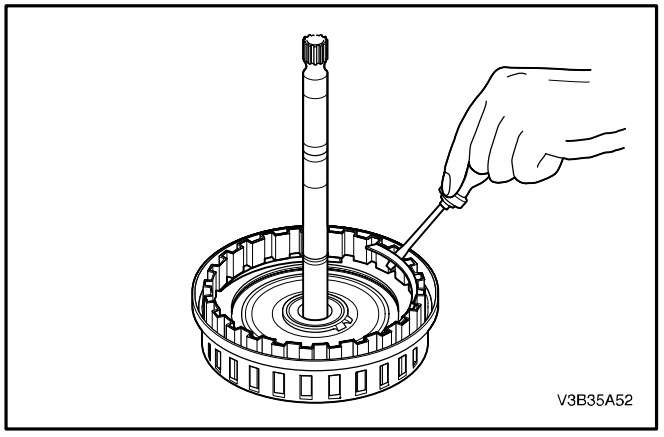
8. Remove disc set B.



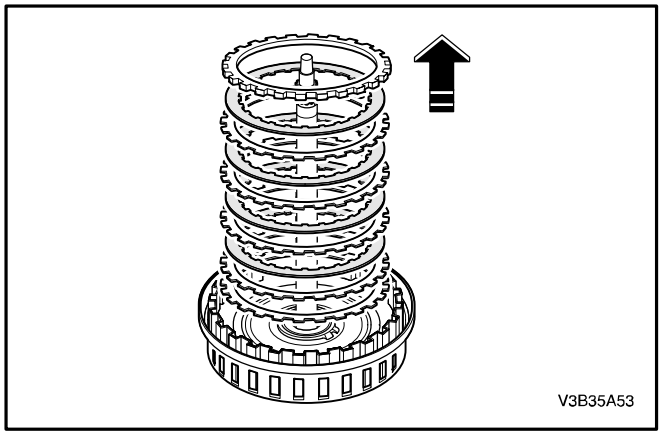
9. Take out the piston rings.
   Removal Notice
   - Remove the rectangular–section ring for the input shaft and the retaining ring.



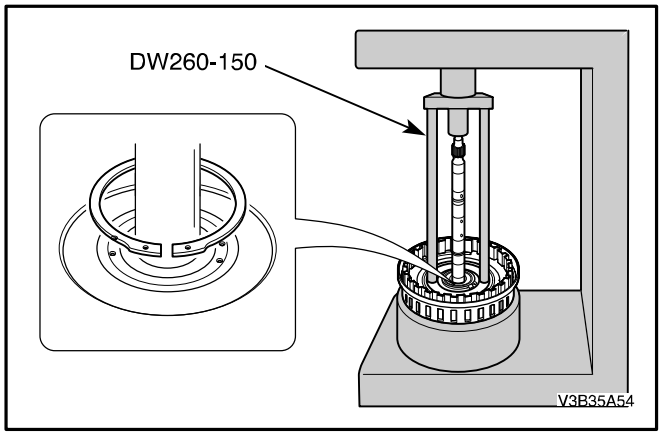
10. Remove inner disc carrier E and needle roller thrust bearing.



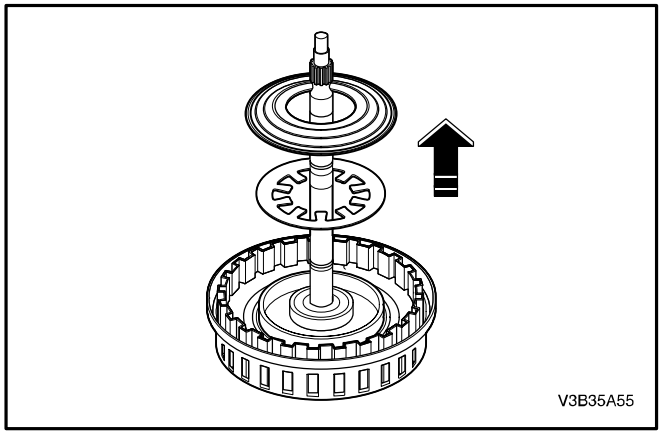
11. Take out the snap ring.



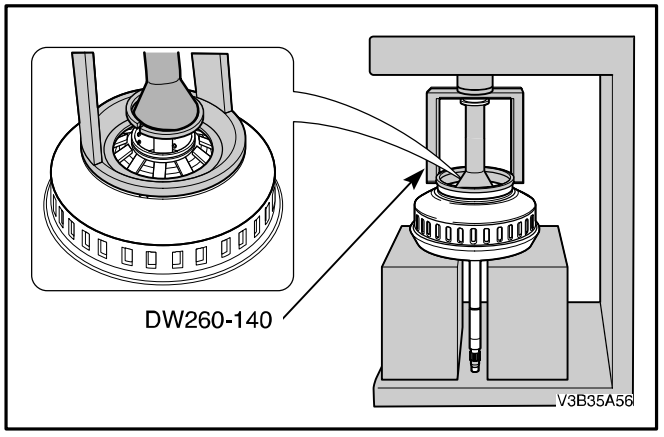
12. Remove disc set E.



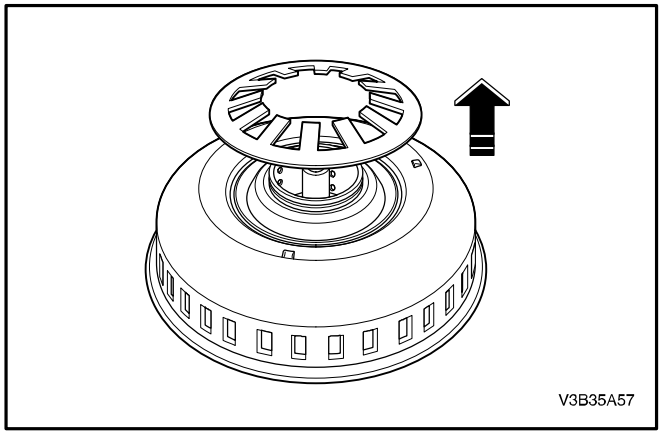
13. Press down cup spring(clutch E) with cup spring press fixture.
14. Remove the split stop ring.



15. Remove the oil dam and cup spring.
16. Pull the o–ring off the oil dam.



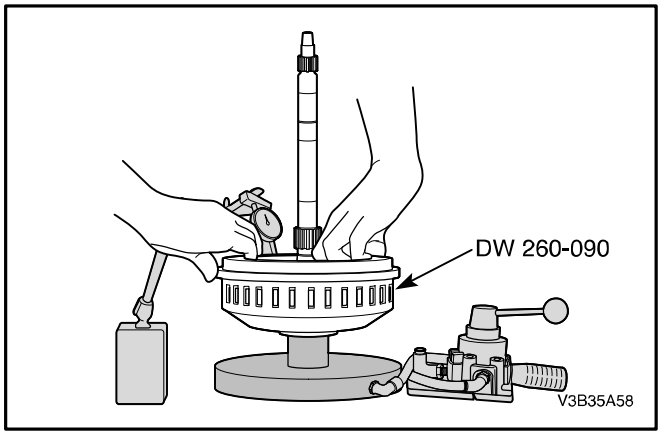
17. Press down cup spring(clutch B)with cup spring press fixture.
18. Remove the split stop ring.



19. Remove the cup spring.
20. Installation should follow the removal procedure in the reverse order.

Adjustment Notice

Before assembling clutch B/E, setting discs(clutch B/E) have to measured by below measurement procedure.



CLUTCH B/E MEASUREMENT PROCEDURE

Tools Required

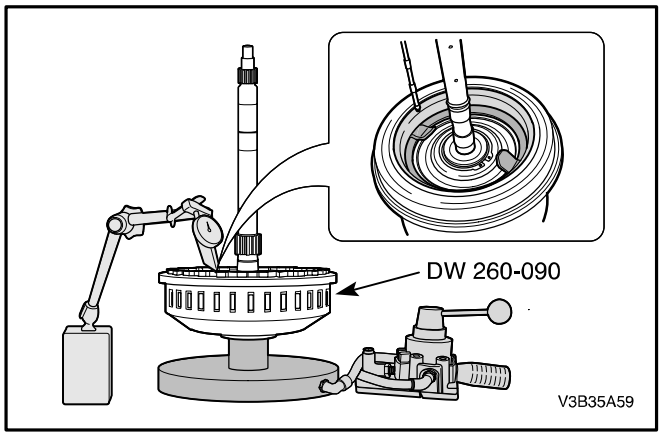
DW260–090 Clutch B/E(snap ring play, installation space) Measuring Fixture

Determine Snap Ring Play

1. Put the dial gauge sensor on the clutch B adjusting ring.
2. Feed compressed air to clutch B via control valves.
3. Set dial gauge to zero.
4. Pressurize clutch E via the control valve and read measurement value.
5. Repeat measurement twice with disc set turned by 120˚.
6. Average measurement values M1, M2, M3.(measurement value is S)
   - CALCULATION

     S = (M1+M2+M3)/3
   - EXAMPLE

     – M1 = 0.27mm, M2 = 0.23mm, M3 = 0.25mm
     – S = 0.25mm



Tools Required

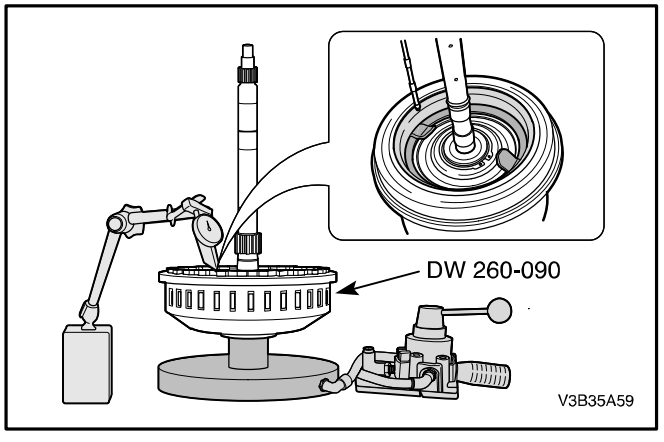
DW260–090 Clutch B/E (snap ring play, installation space) Measuring Fixture

Measuring Installation Space, Clutch B (EB)

1. Put the dial gauge's sensor on the clutch B adjusting ring.
2. Feed compressed air to clutch E via control valves.
3. Set dial gauge to zero.
4. Lift measurement ring B by hand until it touches the cup and read the measurement value.
5. Repeat measurement twice with the set turned by 120˚.
6. Average measurement values M4, M5, M6. (measurement value is MB)
   - The minimum installation space EB is equal to the height of the ring RB (specification value ; 11.99mm) plus measurement value MB
   - CALCULATION

     MB = (M4+M5+M6)/3
     EB = RB + MB
   - EXAMPLE

     M4 = 2.36mm
     M5 = 2.40mm
     M6 = 2.38mm
     So,MB = (2.36+2.40+2.38)/3 = 2.38mm
     EB = 11.99+2.38 =14.37mm



Tools Required

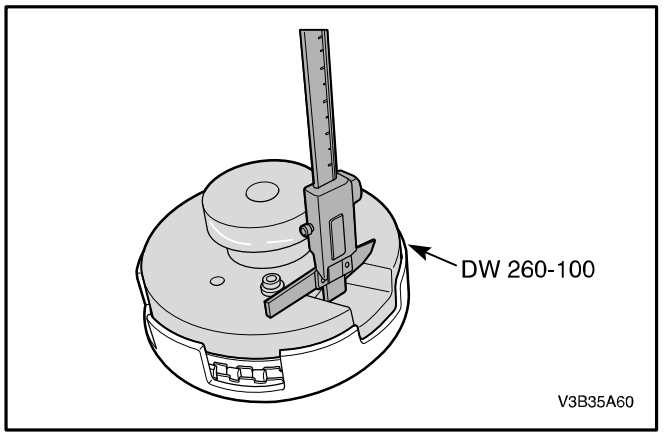
DW260–090 Clutch B/E(snap ring play, installation space) Measuring Fixture

Measuring Installation Space, Clutch E(EE)

1. Put the dial gauge's sensor on the clutch E adjusting ring.
2. Set dial gauge to zero.
3. Feed compressed air to clutch E via control valves.
4. Read off the measured value.
5. Repeat measurement twice with the set turned by 120˚.
6. Average measurement values M7, M8, M9. (measurement value is ME)
   - The minimum installation space BE is equals ring height RE (specification value : 20.98mm) plus ME – minus snap ring play S.
   - CALCULATION

     ME = (M7+M8+M9)/3
     EE = RE + ME–S
   - EXAMPLE

     M7 = 2.6mm
     M8 = 2.55mm
     M9 = 2.54mm
     So,ME = (2.6+2.55+2.54)/3 = 2.56mm
     EE = 20.98+2.56–0.25 = 23.29mm



Tools Required

DW260–100 Brake B/E Disc Thickness Measuring Fixture

Determining Adjusting Disc B(PB)

1. Using disc thickness gauge, determine thickness ME for the disc set for clutch B(without adjusting disc, which located in second highest plate).
2. Calculate the test dimension PB(PB = EB – MB)

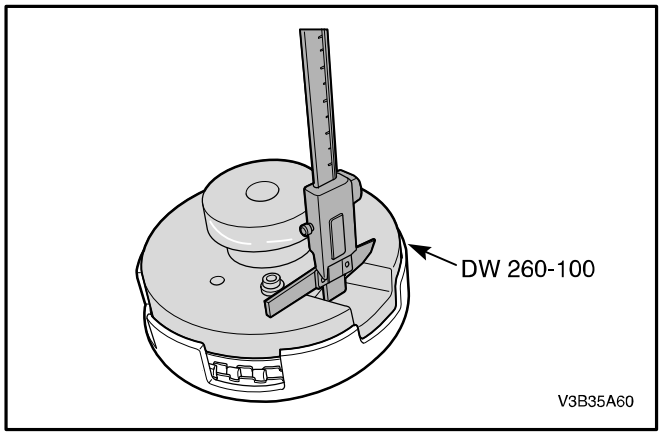
   EB = installation space
   MB = disc set thickness

   - EXAMPLE

     EB = 14.37mm
     MB = 11.3mm
     PB = 3.07mm
3. Find the disc set's thickness. Refer to the below table.

PB	Disc set's Thickness
2.83~3.39mm	1.8mm
3.40~3.68mm	2.1mm
3.69~4.08mm	2.5mm
4.09~4.54mm	3.0mm

   PB is 3.08mm so, the disc set's thickness is 1.8mm.
4. Replace clutch B's setting disc. (1.8mm)



Tools Required

DW 260–100 Brake B/E Disc Thickness Measuring Fixture

Determining Adjusting Disc E(PE)

1. Using disc thickness gauge, determine thickness MB for the disc set for clutch E(without adjusting disc, which located in the lowest plate).
2. Calculate the test dimension PE(PE = EE – ME)

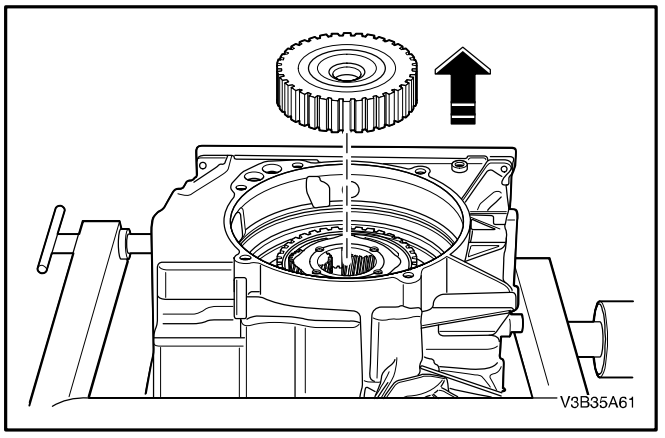
   EE = installation space
   MB = disc set thickness

   - EXAMPLE

     EE = 23.29mm
     ME = 16.70mm
     PE = 6.59mm
3. Find the disc set's thickness. Refer to the below table.

PE	Disc set's Thickness
5.41~6.00mm	3.9mm
6.01~6.48mm	4.4mm
6.49~6.98mm	5.0mm

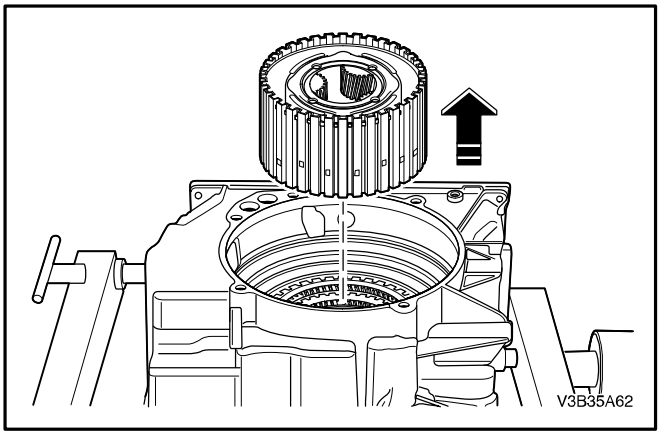
   PB is 3.08mm so, the disc set's thickness is 5.0mm.
4. Replace clutch B's setting disc. (5.0mm)



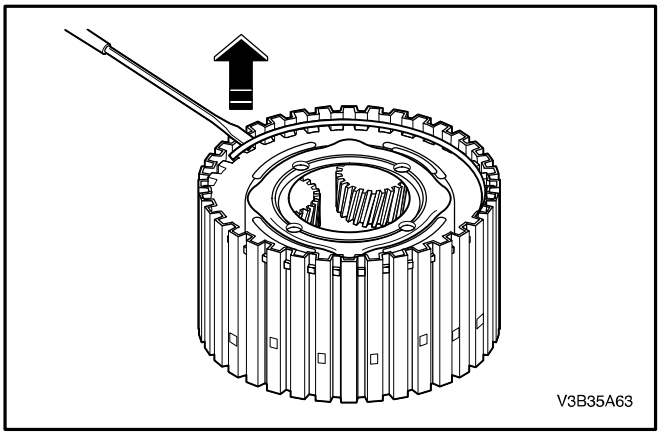
PLANETARY GEAR SET

Disassembly and Assembly Procedure

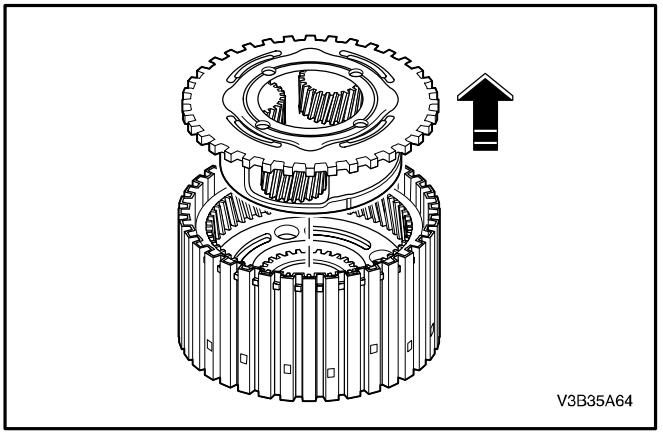
1. Remove the clutch B/E. Refer to "Clutch B/E" in this section.
2. Remove the rear sun gear.



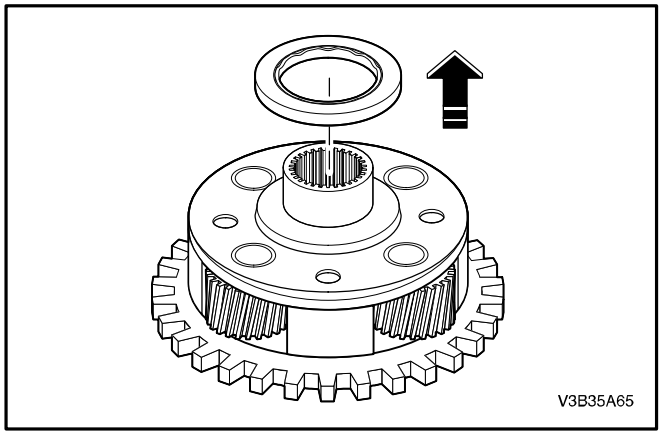
3. Remove the planetary gear set.



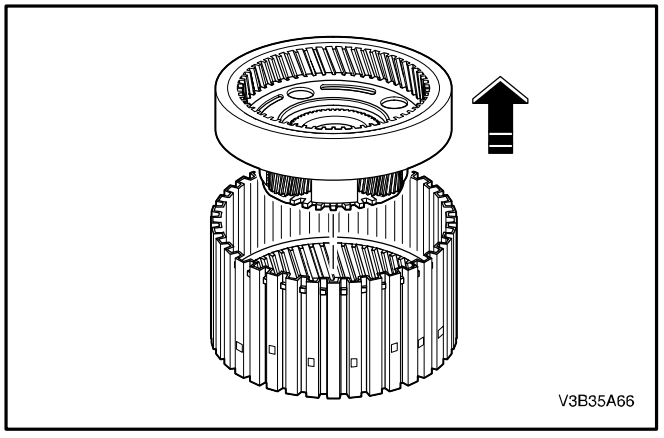
4. Remove snap ring from front ring gear.



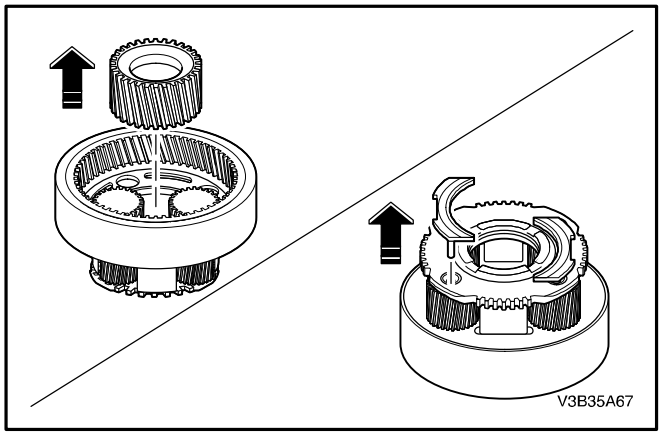
5. Take out rear planetary gear set.



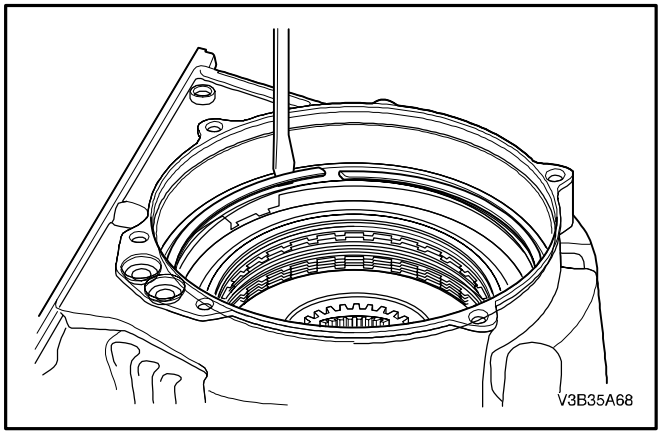
6. Remove the axial needle bearing.



7. Take out front gear set with rear ring gear, front sun gear and oil trays.



8. Take oil trays and front sun gear off the planetary gear set.
9. Installation should follow the removal procedure in the reverse order.



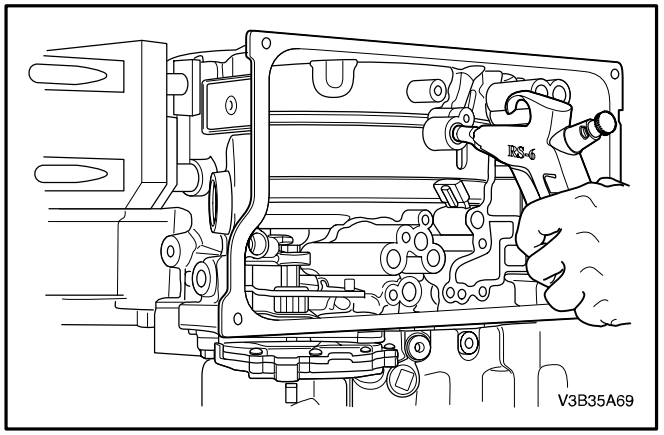
BRAKE C/D

Tools Required

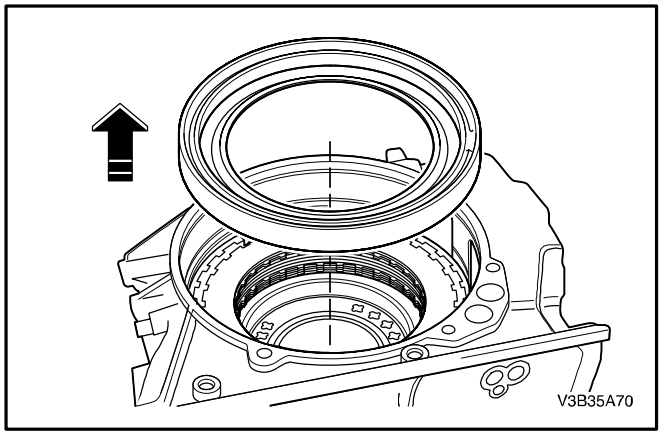
DW260–160 Brake C/D Snap Ring Remover/Installer

Disassembly and Assembly Procedure

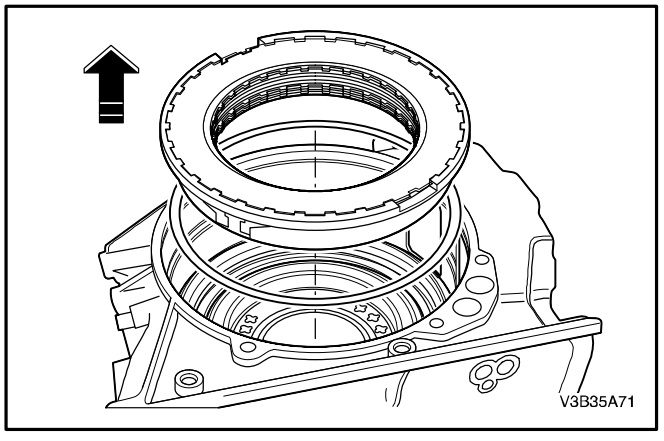
1. Take snap ring out of transaxle housing.



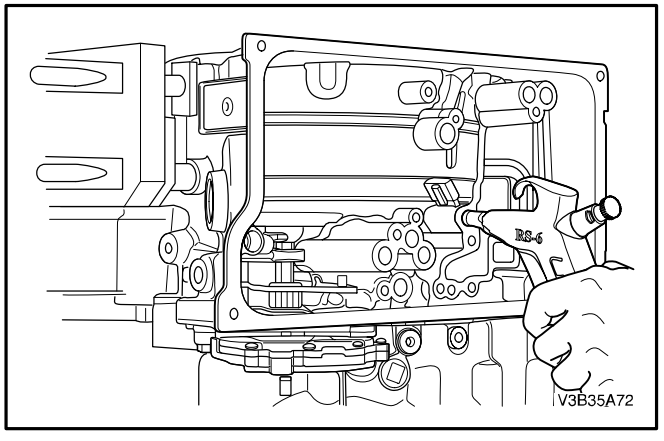
2. Release cylinder with piston C by applying compressed air to the feed bore .



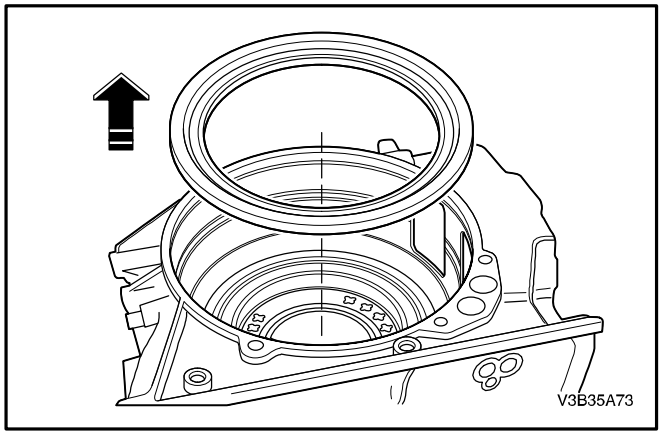
3. Remove cylinder with piston C.



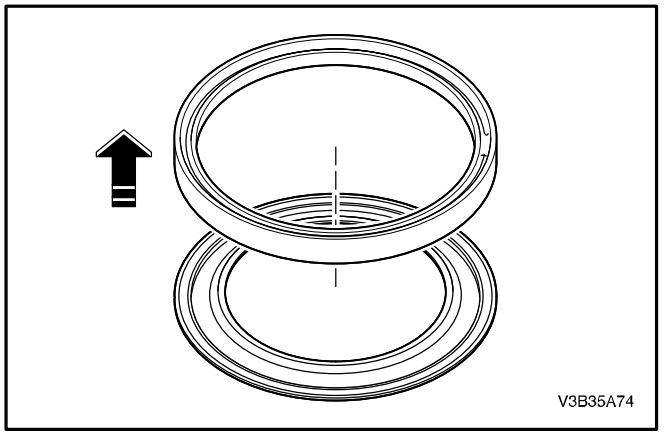
4. Take disc carrier C/D and spring disc out of transaxle housing.



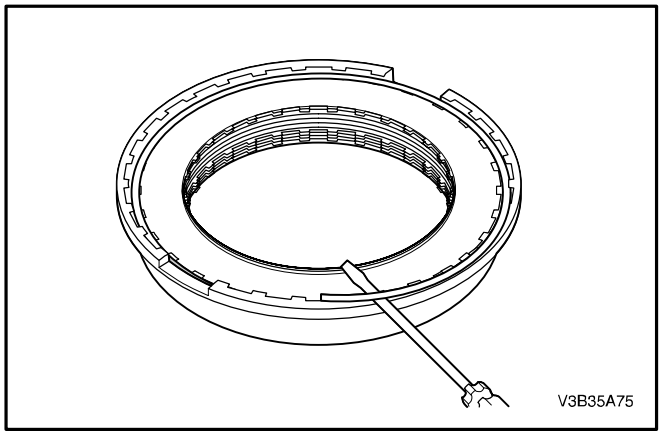
5. Release cylinder with piston D by applying compressed air to the feed bore.



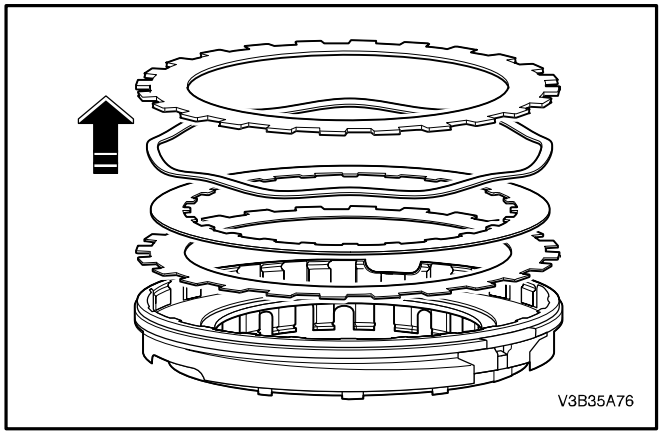
6. Remove cylinder with piston C.



7. Separate between piston C and cylinder C.



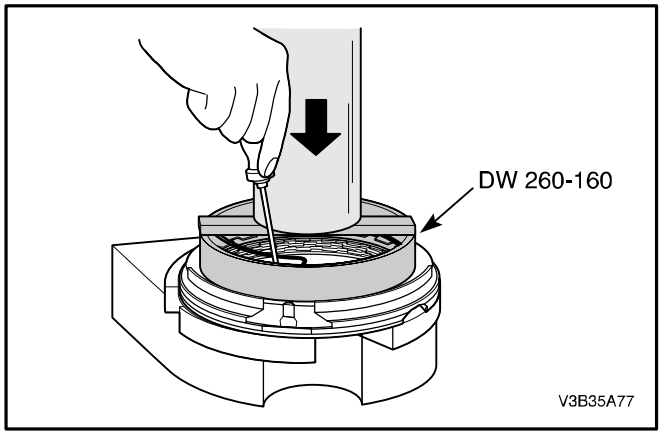
8. Take snap ring out of brake C.



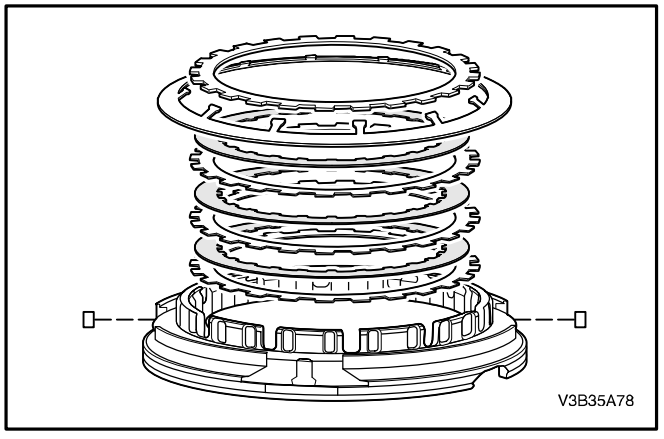
9. Remove the disc set C.

Installation Notice

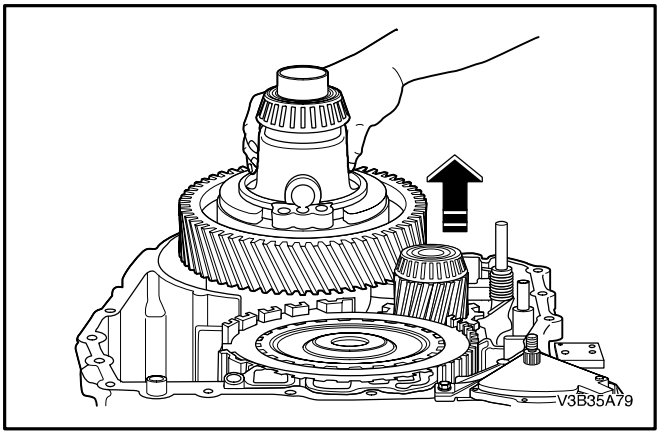
- Transaxle has two lined clutch discs and one steel clutch disc. The lined discs must be installed in such a way that the lining faces the steel disc.
- Insert the fitting keys into the appropriate grooves.



10. Turn the disc carrier C/D by 180˚.
11. Using assembly bracket Press down cup spring and take out the snap ring.



12. Remove the disc set D.
13. Installation should follow the removal procedure in the reverse order.



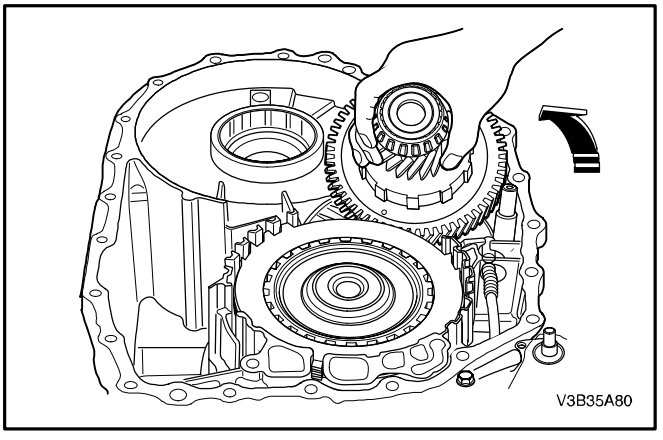
DIFFERENTIAL

Disassembly and Assembly Procedure

1. Remove the torque converter housing. Refer to ”Torque Converter” in this section.
2. Lift out the differential.
3. Installation should follow the removal procedure in the reverse order.

Removal Notice

- Don’t disassemble the differential to avoid incorrect operation.



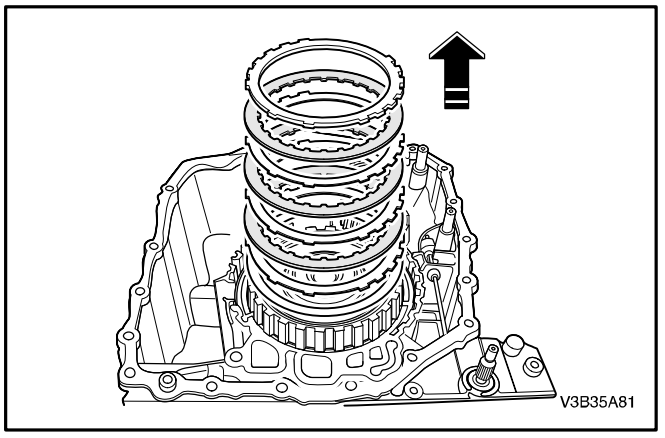
SIDE SHAFT

Disassembly and Assembly Procedure

1. Remove the differential. Refer to ”Differential” in this section.
2. Tilt and remove the side shaft.
3. Installation should follow the removal procedure in the reverse order.

Removal Notice

- Don’t disassemble the differential to avoid incorrect operation.



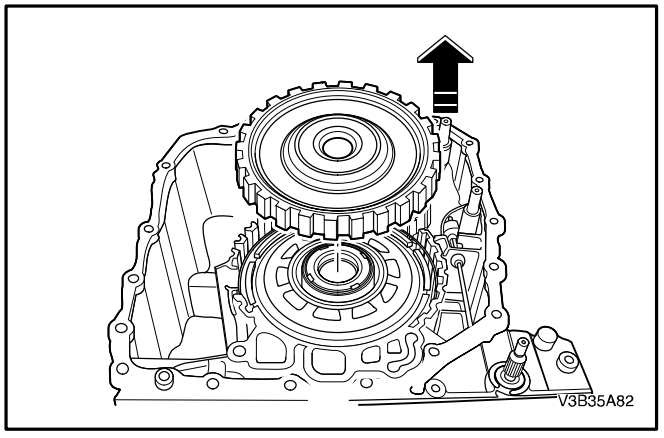
BRAKE F, SLOTTED NUT

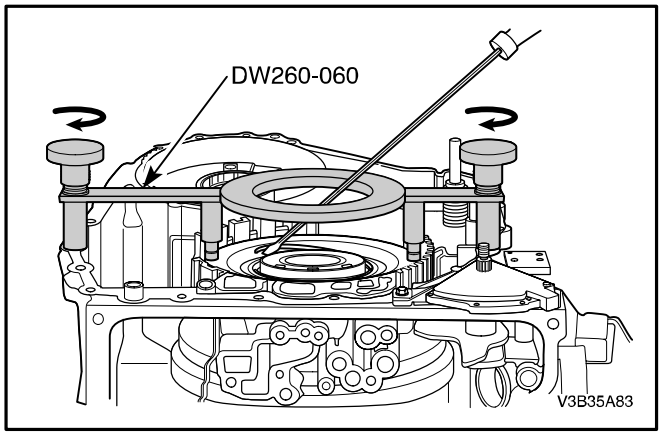
Tools Required

DW260–060 Brake F Split Stop Ring Remover

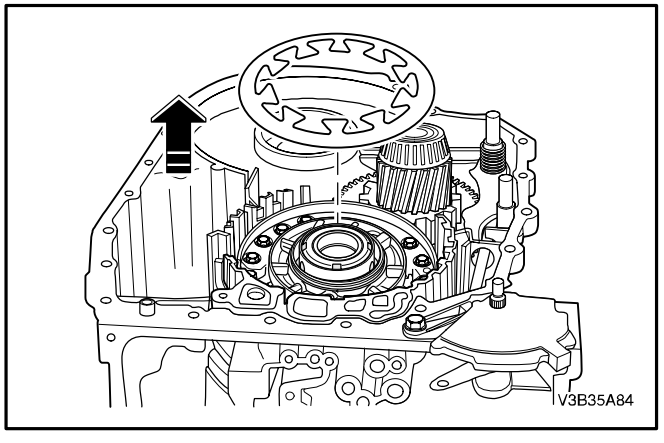
Disassembly and Assembly Procedure

1. Remove the side shaft. Refer to ”Side Shaft” in this section.
2. Take OFF the disc set and the brake F inner disc carrier.

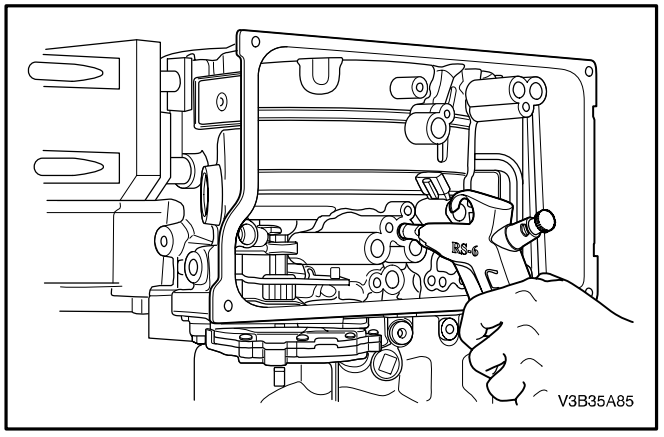




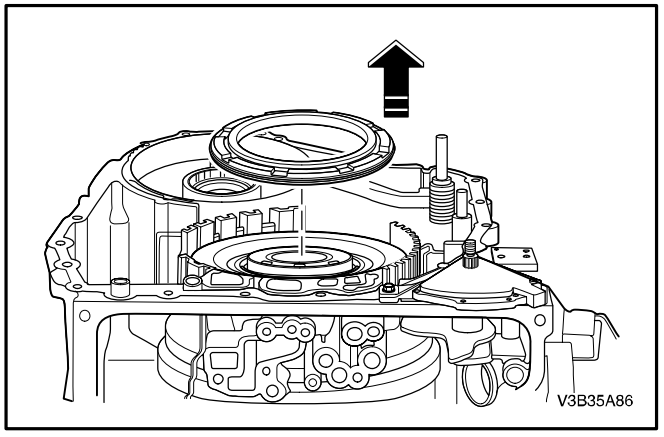
3. Mount fixture and remove the brake F split stop ring.



4. Remove the fixture and take off the cup spring.



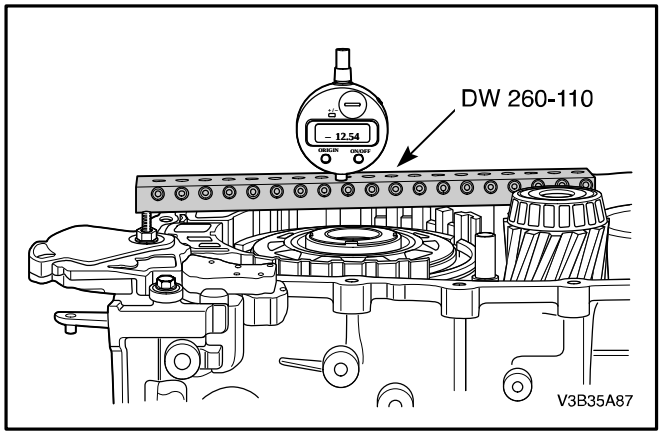
5. Release the piston F by applying compressed air to the bore.



6. Remove piston F and bearing plate with spur gear.
7. Installation should follow the removal procedure in the reverse order.

Removal Notice

Since the bearing set is tight, press the bearing plate upward from underneath to remove it.



Tools Required

DW 260–110 Brake F Disc Clearance Measuring Bar

Measuring Installation Space F

1. Using a depth gauge, measuring from the transaxle housing sealing surfaces to the piston's disc support surface at two opposing points = M1, M2
2. Average the measurement values M1, M2 = BF
   - CALCULATION

     BF = (M1+M2)/2
   - CALCULATION

     M1 = 18.6mm
     M2 = 18.8mm
     BF = 18.7mm

Determining Adjusting Disc F

1. Calculate the test dimension PF (PF = BF – MF)

   BF = installation space
   MF = disc set thickness (assume 14.50mm)
   - EXAMPLE

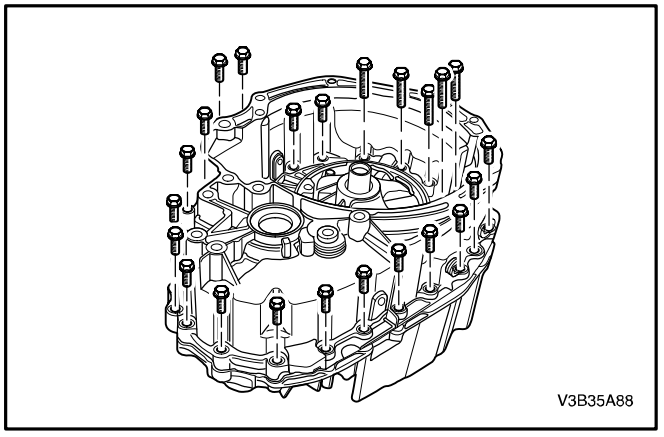
     BF = 18.70mm
     MF = 14.50mm
     PE = 4.2mm

2. Find the disc set's thickness. Refer to the below table.

PF	Disc set's Thickness
3.01~3.19mm	1.8mm
3.20~3.48mm	2.1mm
3.49~3.88mm	2.5mm
3.89~4.08mm	2.7mm
4.09~4.30mm	3.0mm

PE is 4.20mm so, the disc set's thickness is 3.0mm.

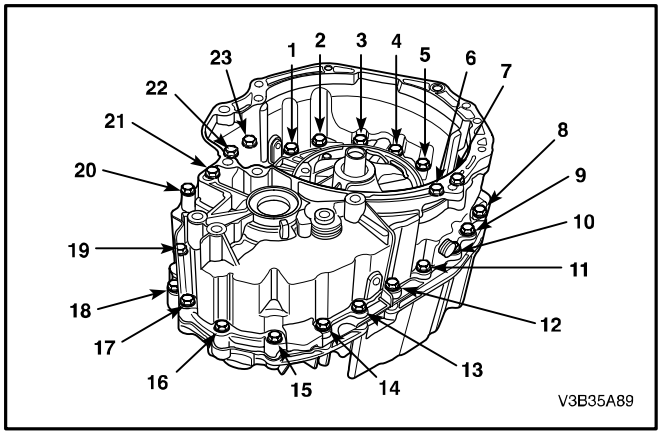
3. Replace clutch B's setting disc. (3.0mm)



TORQUE CONVERTER HOUSING

Disassembly and Assembly Procedure

1. Remove the torque converter bolts.
2. Hit the torque converter housing lightly.
3. Remove the torque converter housing.



Installation Notice

- First pre–tighten the bolts in the following order.(7,20)→(12,23)→(16,4)

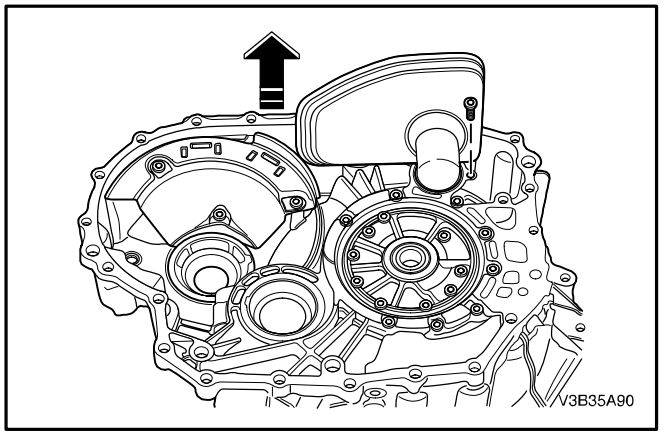
Tighten

Tighten the bolts to 15 N•m (11 lb–ft).

- Then, tighten the bolts in the following order. (15,3) →(16,4) →(14,5) →(13,23) →(12,22)→(11,21) →(10,20) →(9,19) →(8,18) →(7,17) →(6) →(1,2)
- Last, in numerical order, tighten the bolts all the way.(1→23)

Tighten

Tighten the bolts to 23 N•m (17 lb–ft).

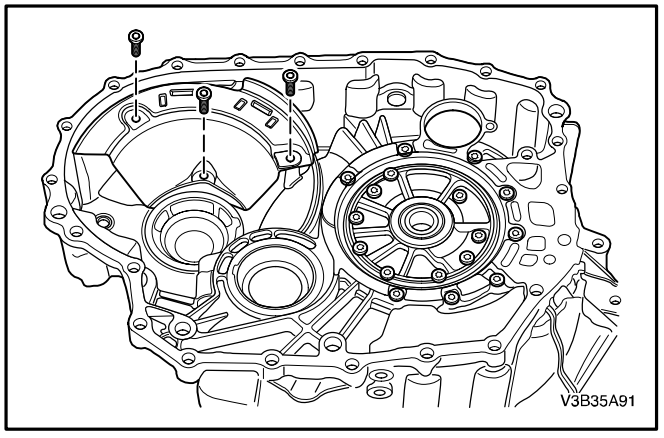


4. Take out the metal gasket.
5. Take out the paper gasket.
6. Remove the oil filter bolt and oil filter.

Installation Notice

Tighten

Tighten the oil filter bolt to 10 N•m (89 lb–in).

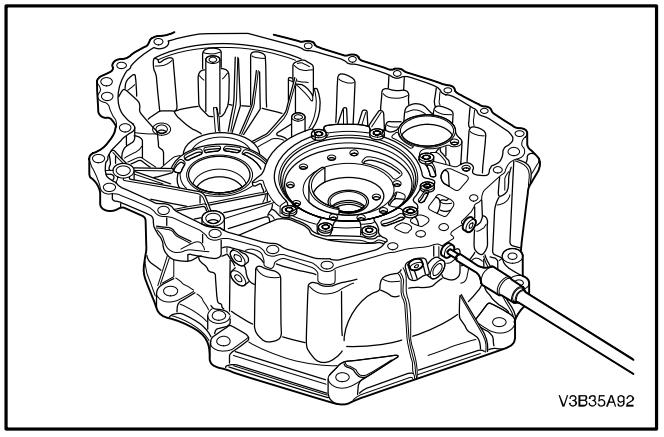


7. Remove the baffle plate bolts and baffle plate.

Installation Notice

Tighten

Tighten the baffle plate bolts to 10 N•m (89 lb–in).

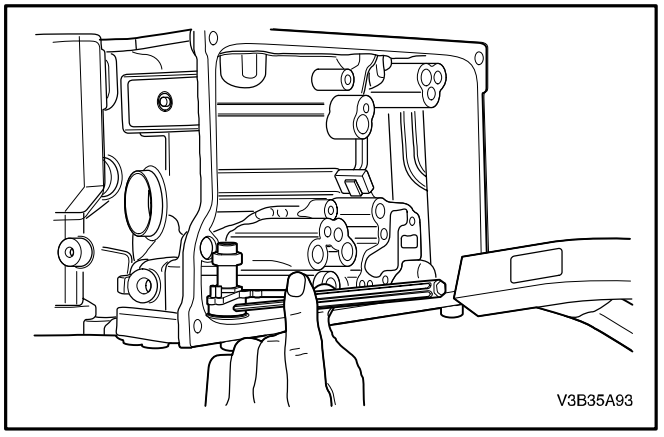


8. Remove the line pressure measurement plug.
9. Installation should follow the removal procedure in the reverse order.

Installation Notice

Tighten

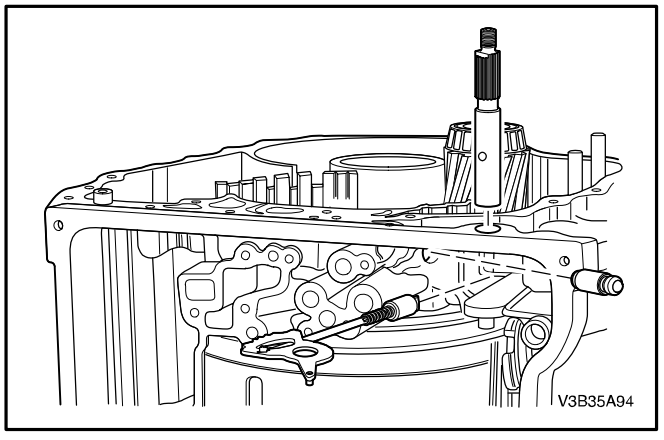
Tighten the line pressure measurement plug to 20 N•m (15 lb–ft).



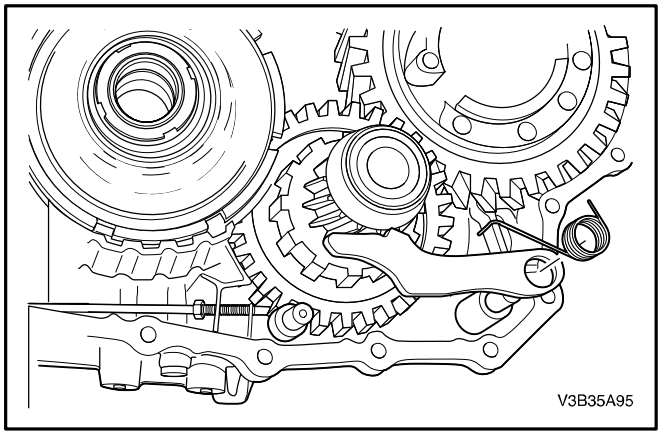
SHIFT MECHANISM

Disassembly and Assembly Procedure

1. Take out the select shaft clamping sleeve.



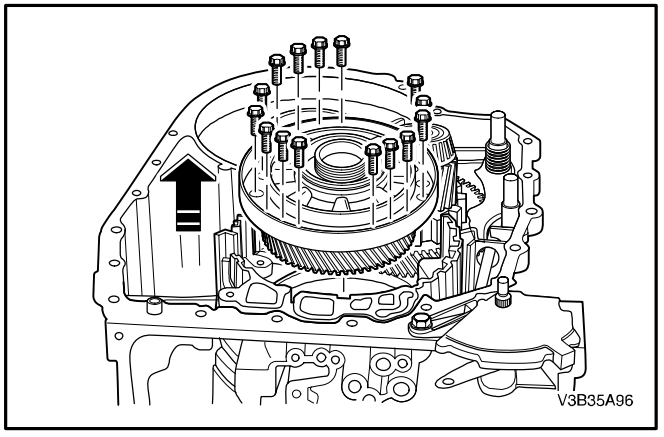
2. Remove the shift mechanism.
   - Shift mechanism is consist of select shaft, detent disc, connecting bar, stop bush.
3. Installation should follow the removal procedure in the reverse order.



PARKING LOCK SYSTEM

Disassembly and Assembly Procedure

1. Remove the parking lock assembly.
   - Parking lock system is consist of parking pawl, leg spring, support bolt.
2. Installation should follow the removal procedure in the reverse order.



BEARING PLATE(WITH SPUR GEAR) ASSEMBLY

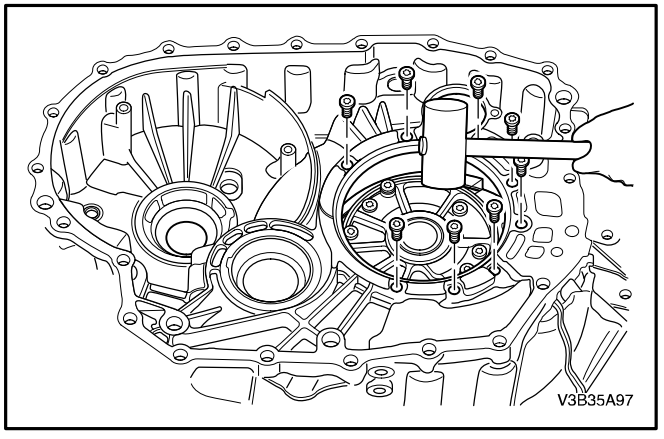
Disassembly and Assembly Procedure

1. Remove the piston F. Refer to ”Brake F” in this section.
2. Remove the bearing plate bolts and bearing plate.
3. Installation should follow the removal procedure in the reverse order.

Installation Notice

Tighten

Tighten the bearing plate bolts to 27 N•m (17 lb–ft).



OIL PUMP ASSEMBLY

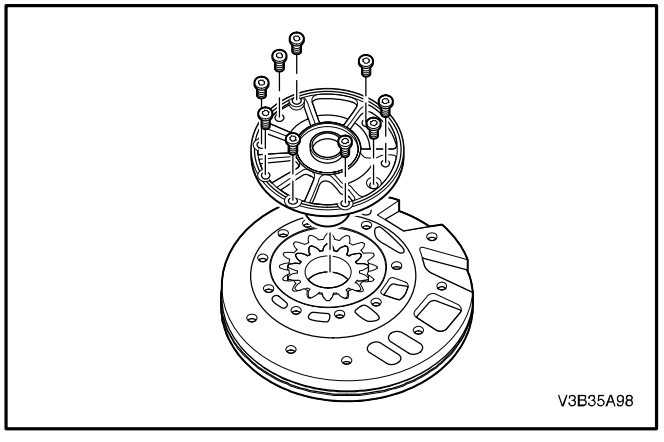
Disassembly and Assembly Procedure

1. Remove the oil pump housing bolts.
2. Using the plastic hammer. Take out the oil pump housing.

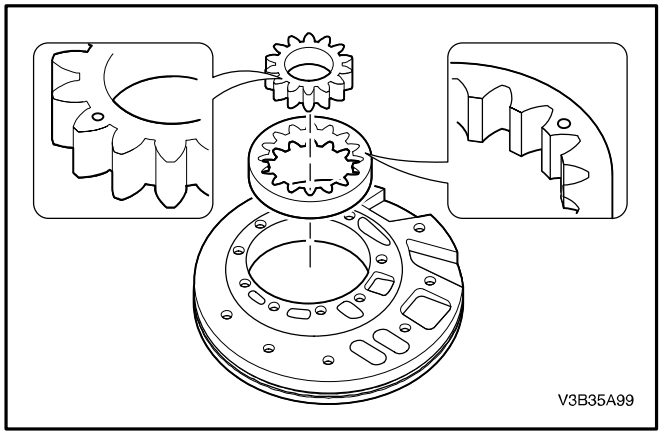
Installation Notice

Tighten

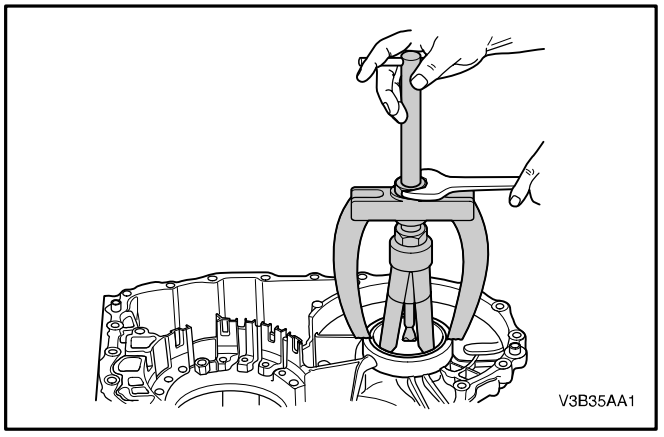
Tighten the oil pump housing bolts 10 N•m (89 lb–in).



3. Remove the stator shaft bolts.



4. Dismantle the oil pump gear, ring gear
5. Installation should follow the removal procedure in the reverse order.



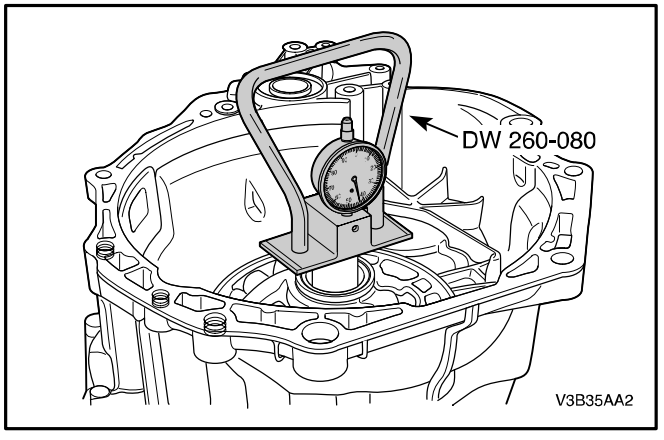
DIFFERENTIAL/SIDE SHAFT OUTER RACE, BEARING SHIM

Disassembly and Assembly Procedure

1. Take out the outer race of the transaxle housing side.
2. Remove the bearing shim.
3. Take out the outer race of the torque converter housing side.

Installation Notice

- Heat the bearing seats well and insert bearing outer rings with shim for differential and side shaft into the transaxle housing.



IMPORTANT MEASUREMENT/ADJUSTMENT

Tools Required

DW260–080 Clutch B/E Shim Setting Gauge

Adjusting Axial Play, Input Shaft

Important : After assembling the rear cover. You must measure the axial play specification, if the measured data is not satisfied the specification. Replace the clutch B/E's shim.

Incorrect axial play may cause the vibration or noise. The specification of the axial play is 0.18 to 0.42mm.

1. Clamp fixture on the input shaft so that the measuring base rests on the stator shaft.
2. Set dial gauge to zero.
3. Measure axial play by pulling and pressing on the handle.(repeat measurement)

4. Calculate the measurement values.(average)
   - EXAMPLE

     M1 = 0.51mm
     M2 = 0.49mm
     M = (0.51+0.49)/2 = 0.5mm
     S (specification) = 0.18~0.42mm
     D (adjustment value) = 0.5mm – (0.18~0.42)mm
     So, D is 0.08 to 0.32mm
     Calculate the average, so D is 0.2mm
5. Replace shim.
   - Disc thickness must be between 0.08 and 0.32mm thicker. It is sensible to select one with a disc that average 0.2mm thicker than the one that was installed.

GENERAL DESCRIPTION AND SYSTEM OPERATION

The ZF 4HP 16 automatic transaxle consists primarily of the following components.

Mechanical

- Torque converter with TCC
- Drive link assembly
- Two multiple disk clutch assemblies : Clutch B,E
- Three multiple brake assemblies : Brake C,D,F
- Lock–up clutch valve
- Two planetary gear sets
- One oil pump
- Final drive and differential assembly

Electronic

- Two shift solenoid valve(sol.1,2)
- Four pressure control solenoid valve(EDS)
- Two speed sensors : A/T ISS and A/T OSS
- Fluid temperature sensor
- Automatic transaxle control module(TCM)
- Wiring harness assembly

MECHANICAL COMPONENTS

Torque Converter

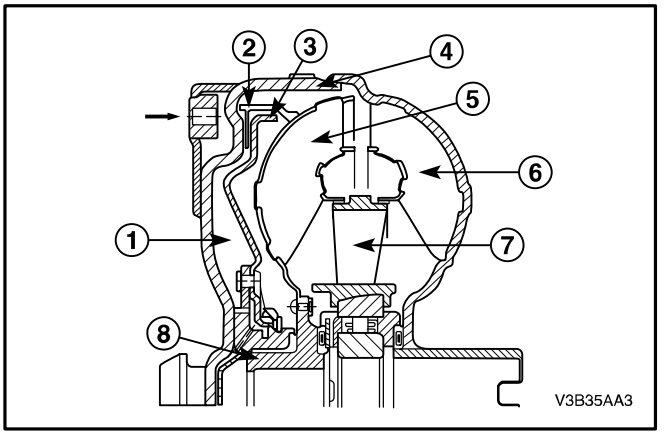
The converter consists of the impeller, the turbine wheel, the reaction member (stator) and the oil to transmit torque. The impeller, which is driven by the engine, causes the oil in the converter to flow in a circular pattern. This oil flow meets the turbine wheel, where is direction of flow is deflected. At the hub, the oil leaves the turbine and reaches the reaction member (stator), where it is once again deflected so that it reaches the impeller at the correct angle of flow.

The reversal effect generates movement in the stator, the reaction torque then amplifies the turbine torque.

The ratio between turbine torque and torque is referred to as torque multiplication.

The greater the difference is speed between the pump and turbine, the greater the torque multiplication; it is at its highest when the turbine is at a standstill. The higher the speed of the turbine, the lower the torque multiplication.

When the turbine speed reaches about 85%of the pump speed, torque multiplication=1, i.e. the turbine torque equivalent to pump torque.



The stator, which bears against the housing via the freewheel, is then rotating freely in the oil flow and the freewheel is over–come. From this point onwards, the converter acts as a straightforward fluid coupling.

Space Behind Lock–up Clutch Piston

1. Friction lining
2. Lock–up clutch piston
3. Converter cover
4. Turbine wheel
5. Impeller
6. Stator
7. Turbine hub
8. Torque converter impeller hub

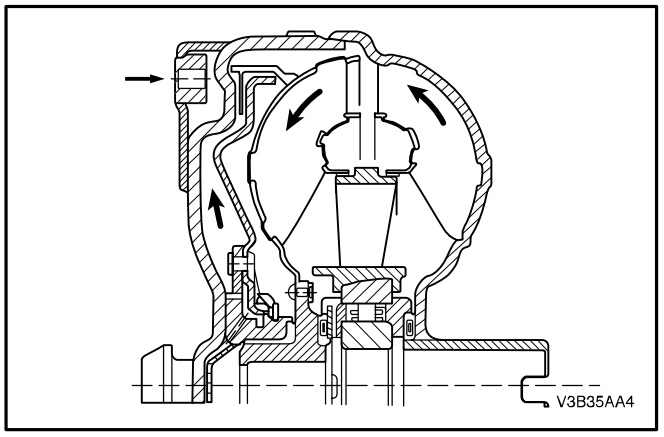
Torque Converter Lock–up Clutch (TCC)

The converter lock–up clutch is a device, which eliminates converter slip and thus helps to improve fuel consumption.

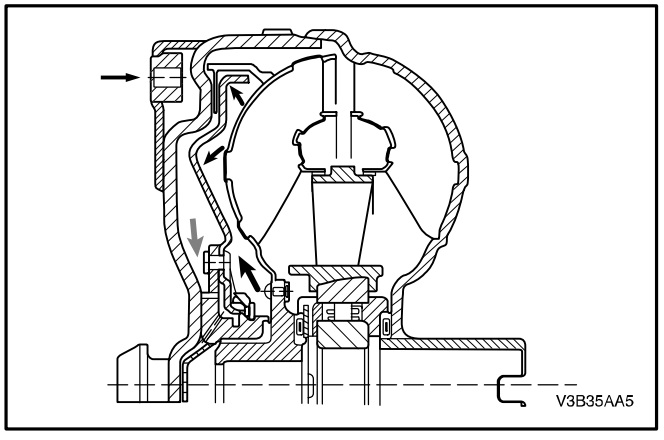
The previous control principle for converter lock–up clutch operation has been replaced by a controlling function on the 4 HP 16. The converter lock–up clutch is engaged and released in a controlled manner. During the controlled phase, a slight speed difference between the impeller and turbine wheel is established. This ensures that the engine's rotating vibration is not phased on to the transaxle. The result is optimum shift quality.

An electronic pressure–regulating valve determines pressure regulation of the lock–up converter clutch's piston.

When open (conversion range), the oil pressure behind the converter lock–up clutch piston and in the turbine zone is equal. The direction of flow is through the turbine shaft and through the space behind the piston, to the turbine chamber.



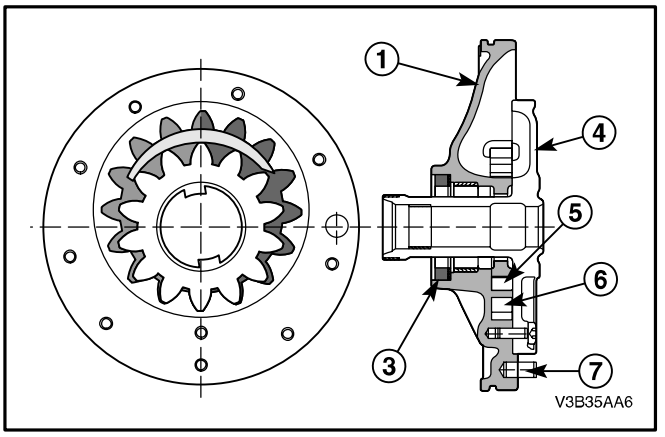
To engage the lock–up clutch, the direction of flow is modified (reversed) via a valve in the hydraulic selector unit. At the same time, the space behind the lock–up clutch piston is vented. The oil pressure passes from the turbine chamber to the lock–up clutch piston and presses it against the converter's cover. The turbine is thus blocked by way of the linings between the piston and cover, and permits rigid through drive with no slip (or reduced slip if controlled) to the mechanical stage of the transaxle.



Fluid Pump

The fluid pump is located between the torque converter and the transaxle case and is driven directly by the torque converter. The pump sucks the fluid through a filter and delivers it to the main pressure regulator valve of the control system. Excess fluid flows back to the pump. The fluid pump fulfills the following functions:

- Generates line pressure.
- Delivers fluid under pressure to the torque converter, thus preventing air bubbles in the fluid.
- Induces a flow of fluid through the torque converter in order to eliminate heat.
- Supplies fluid pressure to the hydraulic control system.
- Supplies fluid pressure to the shift components.
- Lubricates the transaxle with fluid.



Pump Housing

1. Disc
2. Shaft seal
3. Stator shaft
4. Pump wheel
5. Pump ring gear
6. Dowel pin

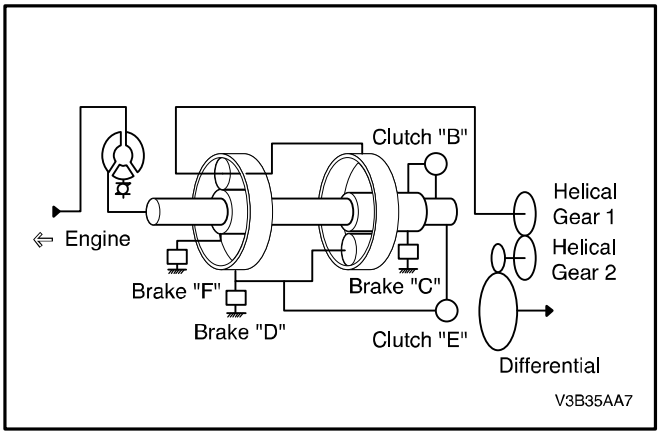
Planetary Gears

The ZF 4HP 16 automatic transaxle is equipped with a one sun gear, 4 planetary gears, planetary carrier, ring gear.

Each gear is located one directly behind the other and are linked together. In other words, front ring gear is permanently linked to rear planet carrier, front planet carrier is linked to rear ring gear.

The individual gear ratios are obtained by linking together the gear set elements in different ways by means of clutches and brakes.

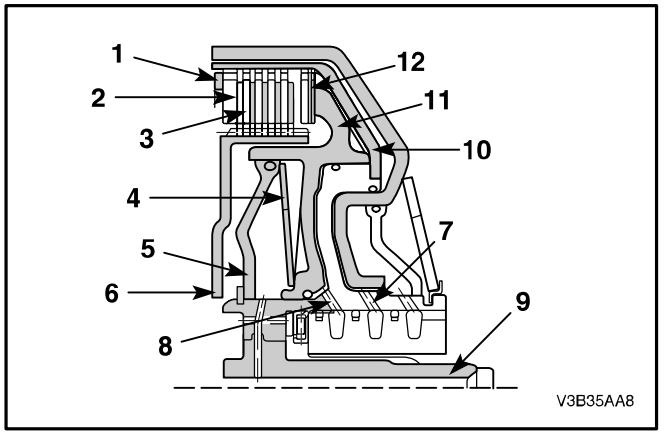
On the 4HP 16, the power flow is directed into the planetary gear set via rear planet carrier or rear sun gear, or via both simultaneously, depending on the gear in question. The output is always via the front planet carrier.



Shift Elements: Multi–disc Clutches and Brakes

The purpose of the shift elements is to perform shifts under load without the tractive flow being interrupted.

The shift elements consist of the following.



1. Snap Ring
2. Steel Disc
3. Lined Disc
4. Cup Spring
5. Baffle Plate
6. Disc Carrier
7. Input Shaft
8. Oil Supply to Dynamic Pressure Equalizer
9. Oil Supply to Clutch
10. Cylinder
11. Piston
12. Spring Disc

The shift elements are engaged hydraulically. The pressurized oil reaches the space between the cylinder and piston, as a result the discs are compressed. The clutch/brake is engaged when the oil pressure drops, the cup spring acting on the piston presses the piston back into its initial position. The clutch/brake is now released again.

Depending on the gear, the multi–disc clutches B and E supply the engine torque to the planetary gear train, with multi–disc brakes C, D and F directing the torque into the housing.

The dynamic pressure at clutches B and E is equal : i.e. the dynamic pressure in front of and behind the piston is equal. This equalizing effect is achieved in the following way.

The space between the baffle plate and piston is filled with unpressurized oil. A dynamic pressure dependent on the engine speed builds up. The space between pressure also builds up. However, there is simultaneously a static pressure, which causes the clutch to engage. If the static pressure is relieved, the cup spring is able to force the piston back into its original position.

The advantages of this dynamic pressure equalization are:

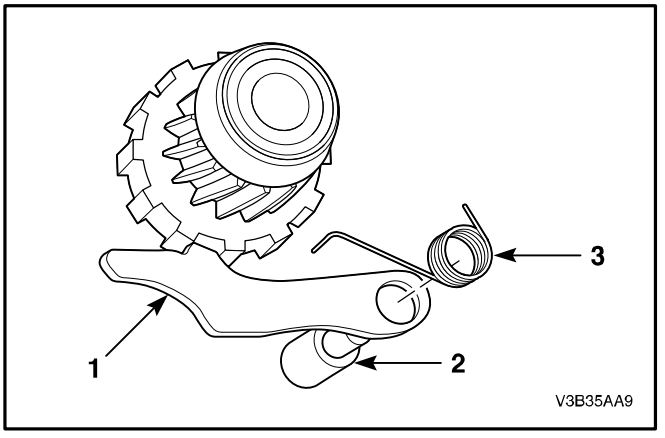
- Reliable clutch opening in all speed ranges
- Smoother shifts.

Parking Lock

The parking lock is actuated via the selector lever when in position P. It protects the vehicle mechanically against rolling away.

The stop plate is actuated by the selector shaft, which is permanently connected to the selector lever via a pull cable. The parking lock pawl on the parking lock gear is welded onto the lateral shaft of the transaxle and this prevents the drive wheels from turning.

This blocks the driven wheels.

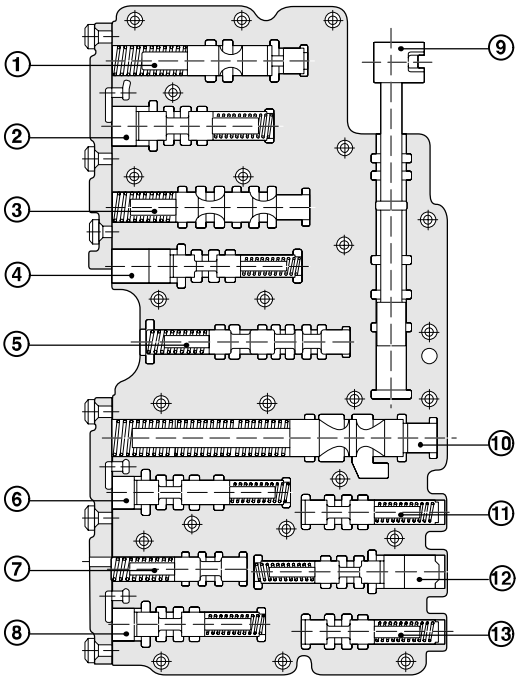


1. Pawl
2. Supporting Bolt
3. Leg Spring

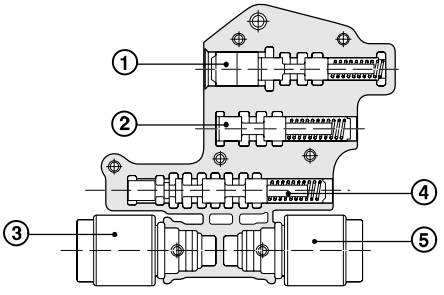
Valve Body

Valve body performs the following tasks:

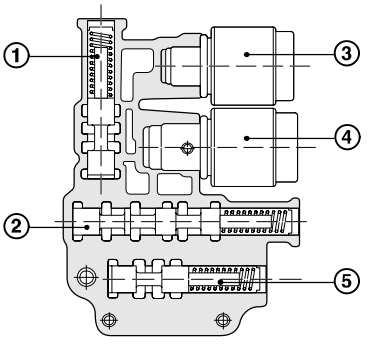
- Generates the line pressure needed for actuating the shift elements.
- Actuates the individual shift elements via the clutch valves.
- Assures limited operation of the automatic transaxle in the event of the electronics failing.
- Actuating the lock–up clutch.
- Generating the lubricating pressure for the transaxle



1. Lubrication Valve
2. Lock-up Clutch Valve
3. Converter Pressure Valve
4. Clutch Valve F
5. Holding Valve E
6. Clutch Valve E
7. Holding Valve B
8. Clutch Valve B
9. Manual Valve
10. Line Pressure Control Valve
11. Reduction Valve
12. Clutch Valve D
13. Holding Valve D



1. Clutch Valve C
2. Holding Valve C
3. Pressure Control Solenoid Valve(EDS)
4. Safety Valve
5. Solenoid Valve



1. Converter Shift Valve
2. Selector Valve
3. Solenoid Valve
4. Pressure Control Solenoid Valve
5. Holding Valve F

V3B35AB1

ELECTRONICAL COMPONENTS

Selector Lever/Program Switch

The driver engages the travel position via the selector lever:

P : Park Position
R : Reverse
N : Neutral
D : Forward Speeds

Park/Neutral Position Switch

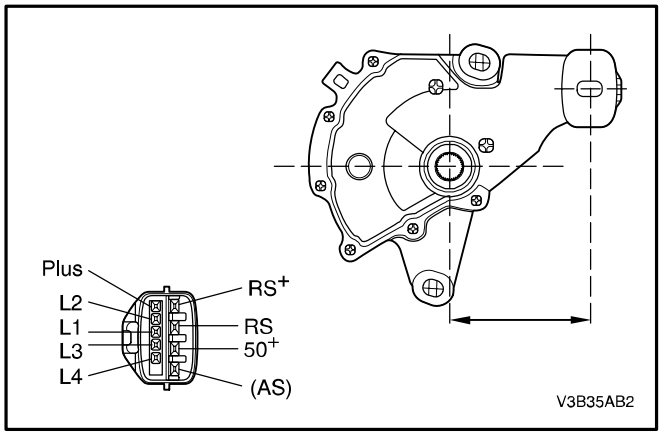
The Park/Neutral Position Switch is located on the selector shaft and informs the TCM of the current selector lever position P–R–N–D–3–2–1.

The selector lever position is transmitted to the TCM in encoded form along 4 lines. The encoding is such that malfunctions in the connecting lead are identified.

The Park/Neutral Position Switch is located on the selector shaft, which is connected to the selector lever via a pull cable. In addition, the Park/Neutral Position Switch controls the starter interlock, the reversing light and the selector lever position indicator on the instrument panel.

Signal Combination

	L1	L2	L3	L4
P	0	0	12	0
R	0	0	0	12
N	0	12	0	0
D	12	12	12	0
3	12	12	0	12
2	12	0	12	12
1	0	12	12	12



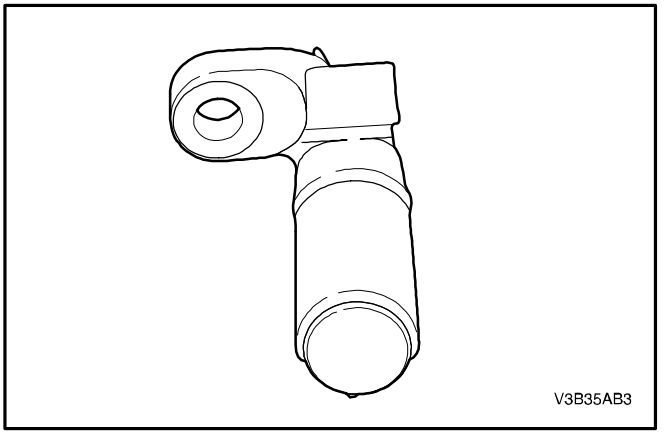
Automatic Transaxle Output Speed Sensor (A/T OSS)

The vehicle A/T OSS is a magnetic inductive pickup that relays information relative to vehicle speed to the TCM.

Vehicle speed information is used by the TCM to control shift timing, line pressure, and TCC (lock–up clutch) apply and release.

The output speed sensor mounts in the case at the speed sensor rotor, which is pressed onto the spur gear. An air gap of 0.1mm~1.3mm(0.004~0.05in) is maintained between the sensor and the teeth on the spur gear teeth. The sensor consists of a permanent magnet surrounded by a coil of wire.

As the differential rotates, an AC signal is generated by the output speed sensor (OSS).



Automatic Transaxle Input Speed Sensor (A/T ISS)

The A/T ISS is a magnetic inductive pickup that relays information relative to transaxle input speed to the TCM.

The TCM uses transaxle input speed information to control line pressure, TCC apply and release and transaxle shift patterns. This information is also uses to calculate the appropriate operating gear ratios and TCC slippage.

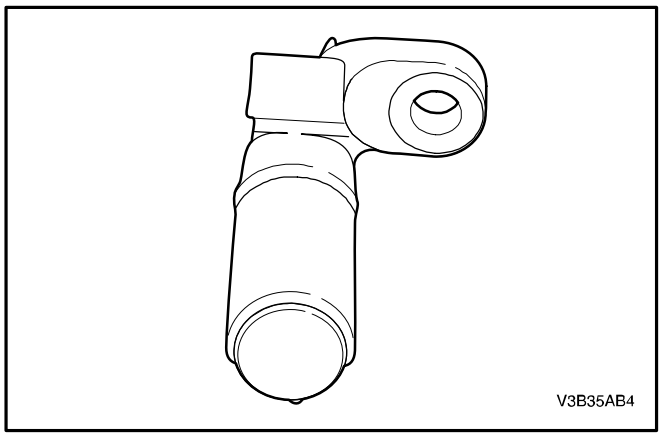
The input speed sensor mounts onto piston B that is inside of valve body.

An air gap of 1.8~2.2mm(0.07~0.086inch) is maintained between the sensor and the piston B.

The sensor consists of a permanent magnet surrounded by a coil of wire. As the piston B is driven by the turbine shaft, an AC signal induced in the input speed sensor.

Higher vehicle speeds induce a higher frequency and voltage measurement at the sensor.

Sensor resistance should measure between 825~835 ohms at 20˚C (68˚F). Sensor can measure from 1,000~8,000HZ.



Shift Solenoid Valve: Solenoid 1,2

The shift solenoids are two identical, normally open electronic exhaust work that control upshifts and downshifts in all forward gear ranges. These shift solenoids valves together in a combination of ON and OFF sequences to control the line pressure and shift mechanisms (clutches, brakes).

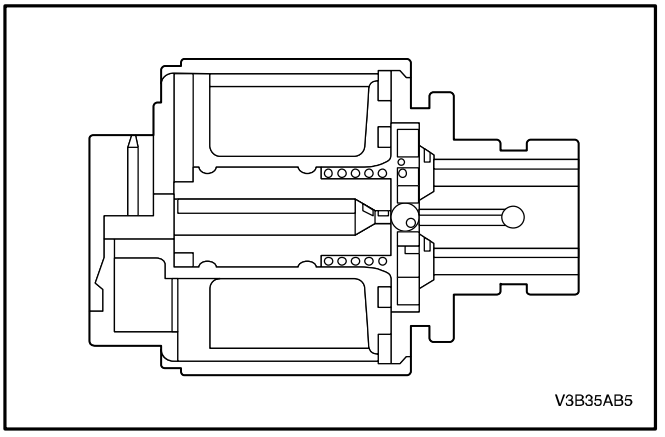
Solenoid 1 controls the high or low of the line pressure (flow to each clutch valve) by the operation type (ON/OFF), i.e. solenoid 1is ON, line pressure will be low (87~116 psi (6~8bar)), solenoid 1 is OFF, line pressure will be high (232~261 psi (16~18bar)).

Solenoid 2 controls the oil flow to clutch valve E or lockup clutch valve by the ON/OFF signal.

The TCM monitors numerous inputs to determine the appropriate solenoid state combination and transaxle gear for the vehicle operating conditions.

Gear	Solenoid 1	Solenoid 2
Park, Neutral	ON	ON
First	ON/OFF	ON
Second	ON/OFF	OFF
Third	ON/OFF	OFF
Fourth	ON/OFF	OFF
Reverse	ON/OFF	ON

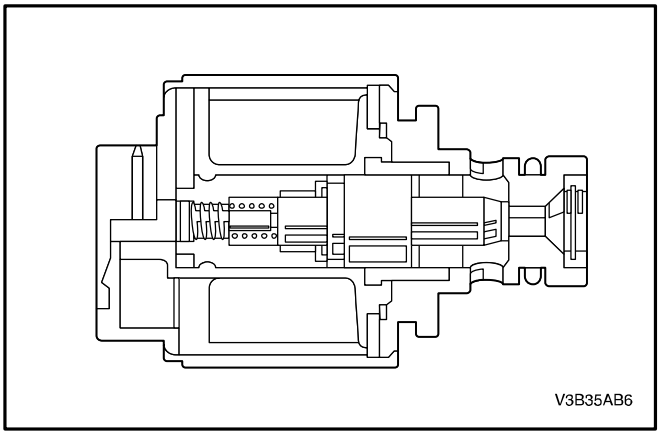
	Line Pressure	Resistance
Solenoid valve 1/Solenoid valve 2	ON(low) 89.9~98.6 psi (6.2~6.8 bar) OFF(high) • 221.9~253.24 psi • (15.3~17.46 bar)	26.5 ± 0.5ohm



Pressure Control Solenoid Valve (EDS VALVE 3,4,5,6)

The pressure control valve (EDS valve 3,4,5,6) is a precision electronic pressure regulator that controls the operation of the clutches, brakes and the lock–up clutch.

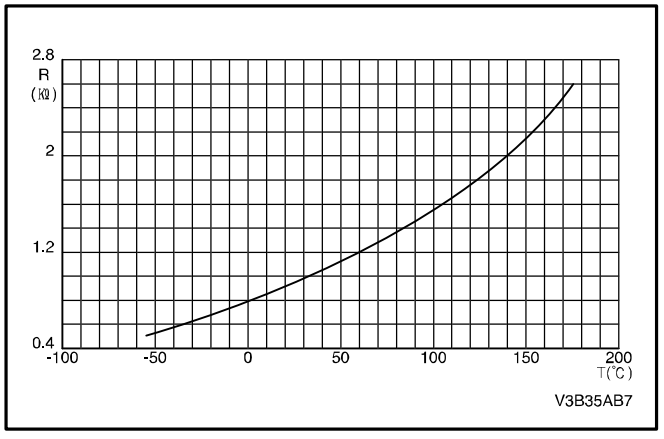
The valve reduces the system pressure with which the downstream solenoid valves and electrical pressure regulating valves are supplied. It is possible to use smaller solenoid valves as a result. The EDS require a constant input pressure.



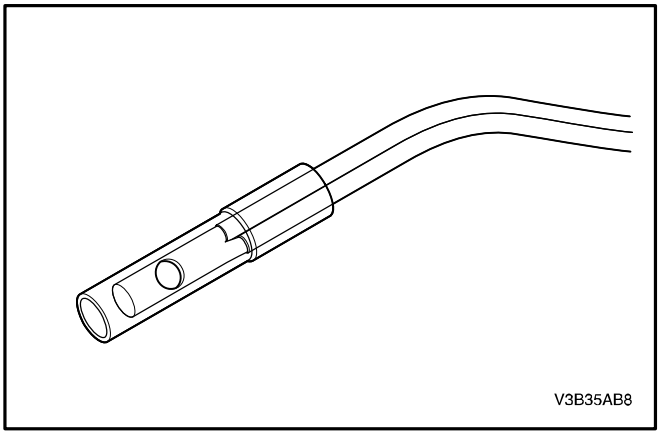
Transaxle Fluid Temperature (TFT) Sensor

The TFT sensor is a positive temperature coefficient thermistor (temperature sensitive resistor) that provides information to the TCM regarding transaxle fluid temperature. The temperature sensor is located in valve body. Calculated temperature is a factor used to determine the shift time and shift delay time.

The internal electrical resistance of the sensor varies in relation to the operating temperature of the transaxle fluid (see chart).



The TCM sends a 5 volt–reference signal to the temperature sensor and measures the voltage rise in the electrical circuit. A higher fluid temperature creates a higher resistance in the temperature sensor, thereby measuring a lower voltage signal.



The TCM measures this voltage as another input to help control line pressure, shift schedules and TCC apply.

When transaxle fluid temperature reaches 140˚C (284˚F) the TCM enters ”hot mode.” Above this temperature the TCM modifies transaxle shift schedules and TCC apply in an attempt to reduce fluid temperature by reducing transaxle heat generation. During hot mode the TCM applies the TCC at all times in fourth gear.

Also, the TCM commands the 2–3 and 3–4 shifts earlier to help reduce fluid heat generation. Hot mode may not be available on some applications.

Transaxle Sensor – Temperature To Resistance To Voltage (approximate)

˚C (˚F)	R high (ohms)	R low (ohms)	˚C (˚F)	R high (ohms)	R low (ohms)
–40 (–40)	586	556	50 (122)	1,206	1,173
–30 (–22)	641	611	60 (146)	1,295	1,256
–20 (–4)	699	670	70 (158)	1,388	1,341
–10 (14)	760	732	80 (176)	1,485	1,430
0 (32)	825	799	90 (194)	1,585	1,522
10 (50)	893	868	100 (212)	1,690	1,617
20 (68)	963	942	110 (230)	1,798	1,715
25 (77)	1,000	980	120 (248)	1,910	1,816
30 (86)	1,039	1,017	130 (266)	2,025	1,920
			140 (284)	2,145	2,027

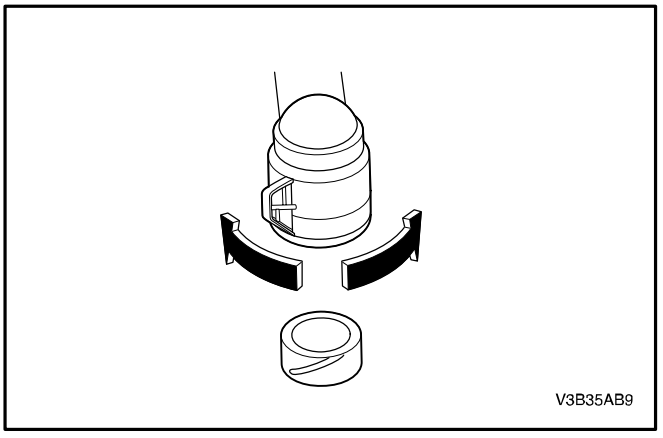
Transaxle Electrical Connector

The transaxle electrical connector is a very important part of the transaxle operating system. Any interference with the electrical connection can cause the transaxle to set Diagnostic Trouble Codes (DTCs) and/or affect proper operation.

The following items can affect the electrical connections:

- Bent pins in the connector from rough handling during connection and disconnection.
- Wires backing away from the pins or coming unclamped (in either internal or external wiring harness).
- Dirt contamination entering the connector when disconnected.
- Pins in the internal wiring connector backing out of the connector or pushed out during reconnection.

- Excessive transaxle fluid leaking into the connector, wicking up into the external wiring harness, and degrading the wire insulation.
- Water/moisture intrusion in the connector.
- Low pin retention in the external connector from excessive connection and disconnection of the wiring connector assembly.
- Pin corrosion from contamination.
- Broken/cracked connector assembly.
- Points to remember when working with transaxle wiring connector assembly.
- To remove the connector, squeeze the two tabs towards each other and pull straight up (refer to illustration).



Carefully limit twisting or wiggling the connector during removal. Bent pins can occur.

DO NOT pry the connector off with a screwdriver or other tool.

To reinstall the external wiring connector, first orient the pins by lining up arrows on each half of the connector.

Push the connector straight down into the transaxle without twisting or angling the mating parts.

The connector should click into place with a positive feel and/or noise.

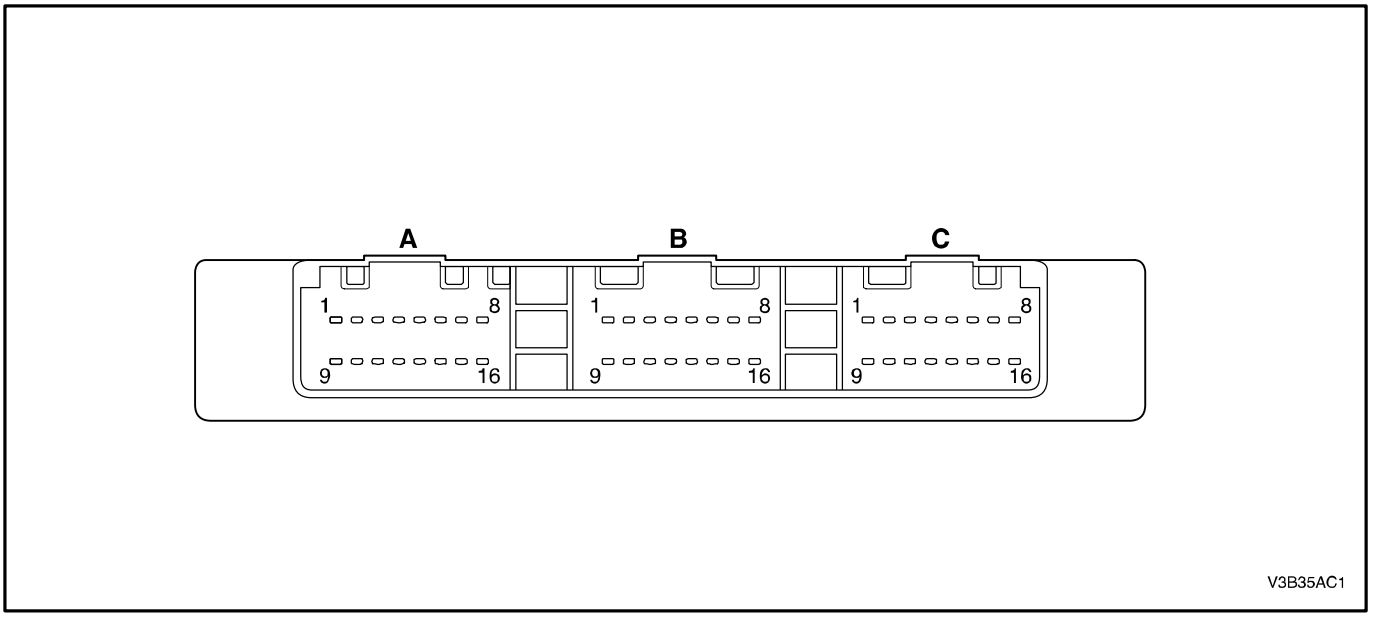
Transaxle Control Module (TCM)

The transaxle control module (TCM) is an electronic device which monitors inputs to control various transaxle functions including shift quality and transaxle sensors, switches, and components to process for use within its' control program. Based on this input information, the TCM controls various transaxle output functions and devices.

Data Link Connector (DLC)

The data link connector (DLC) is a multiple cavity connector. The DLC provides the means to access serial data from the TCM to aid in powertrain diagnosis. The DLC allows the technician to use a scan tool to monitor various systems and display diagnostic trouble codes (DTCs). The DLC connector is located within the driver's compartment, directly below the steering column.

Data Link Connector (CAN TYPE) 1.8L DOHC (Delphi 32 bit)



	A Connector (Blue)	B Connector (Green)	C Connector (Gray)
1	Solenoid 2	Fluid Temperature Ground	Selector Lever Line L1
2	Not Used	Input Speed Sensor (+)	Not Used
3	Pressure Control Solenoid Valve (EDS 4)	BAT +	Not Used
4	TFT Sensor	Input Speed Sensor (–)	Hold Mode Switch
5	Stoplamp Switch	Output Speed Sensor (–)	Not Used
6	Hold Mode Indicator	Selector Lever Line L3	EDS Supply
7	DLC	Input Speed Sensor Ground	EDS Supply
8	CAN High	Speedometer	Solenoid Supply
9	Solenoid 1	Not Used	Not Used
10	Pressure Control Solenoid Valve (EDS 5)	Output Speed Sensor (+)	Not Used
11	Pressure Control Solenoid Valve (EDS 3)	Selector Lever Line L4	Not Used
12	Pressure Control Solenoid Valve (EDS 6)	Ground	Not Used
13	Not Used	Ground	Not Used
14	Not Used	Not Used	Not Used
15	Not Used	Selector Lever Line L2	IG ON
16	CAN Low	Not Used	IG ON

TCM INPUTS THAT AFFECT THE 4HP 16 TRANSAXLE

Throttle Position Sensor

- Provides throttle position data to the TCM for determining shift patterns and TCC apply/release.
- An incorrect throttle position sensor input could causes erratic or shift pattern, poor shift quality or TCC function

Automatic Transaxle Output (Shaft) Speed Sensor

- Provides vehicle speed data to the TCM for determining shift patterns and TCC apply/release, and gear ratio calculations.
- An incorrect throttle position sensor input could causes erratic or shift pattern, poor shift quality or TCC function

Automatic Transaxle Input (Shaft) Speed Sensor

- Provides transaxle input speed data to the TCM for determining shift patterns and TCC apply/release, and gear ratio.

Engine Coolant Temperature Sensor

- Provides coolant temperature data to the TCM for determining initial TCC engagement.
- An incorrect engine coolant temperature sensor input could causes an incorrect initial TCC apply

Engine Speed

- The ignition module provides engine speed data the TCM.
- The TCM uses engine speed information for controlling wide open throttle shifts and the TCC PWM solenoid duty cycle.

Stoplamp Switch

- Provides brake apply information to the TCM for controlling TCC apply and release.
- An incorrect TCC stoplamp switch input could causes an incorrect TCC apply or release.

Transaxle Fluid Temperature (TFT) Sensor

- Provides transaxle fluid temperature information to the TCM for determining alternate shift patterns and TCC apply during high temperature conditions (hot mode operation).
- An incorrect transaxle temperature sensor input could causes altered shift patterns, poor shift quality and incorrect TCC apply.