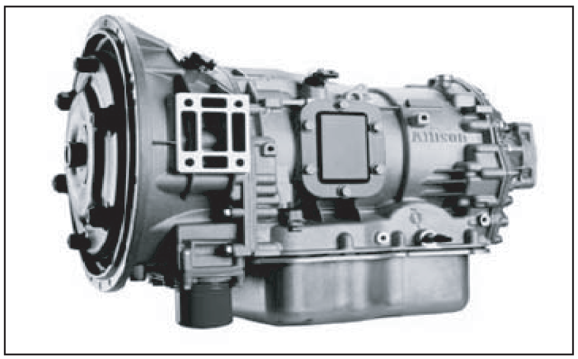
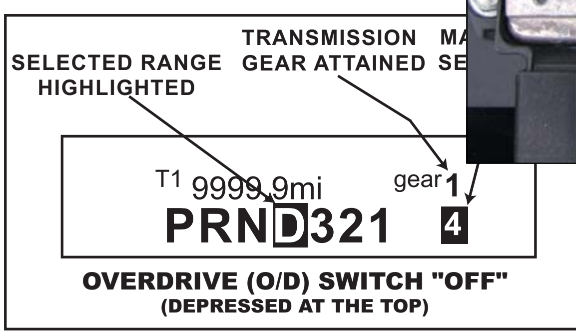
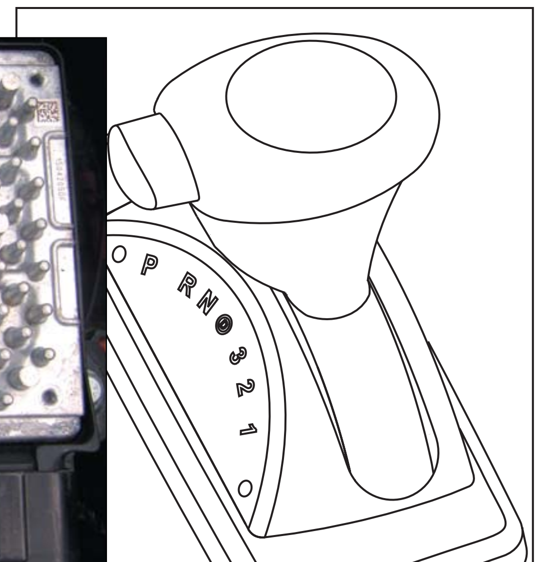
2007
AUTOMATIC TRANSMISSION
ALLISON 1000MH/2100MH/LCT1000







REMOTE SHIFTER

TABLE OF CONTENTS

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Application	Specification	
	Metric	English
Control Module Cover to Radiator Shroud Bolts	9 N·m	80 lb in
Control Valve Assembly to Main Housing Bolts	12 N·m	108 lb in
Converter Housing to Front Support Assembly Bolts	56 N·m	41 lb ft
Detent Lever Retaining Nut	29 N·m	21 lb ft
Detent Spring Assembly to Main Valve Body Bolts	12 N·m	108 lb in
Filler Tube Bracket to Transmission Nuts	18 N·m	13 lb ft
Fuel Line Bracket to Transmission Nut	18 N·m	13 lb ft
Fuel Line Retainer to Transmission Bolts	2.5 N·m	22 lb in
Heat Shield to Transmission Bolts	17 N·m	13 lb ft
Heat Shield to Transmission Nut	25 N·m	18 lb ft
Hydraulic Connector Assembly	25 N·m	18 lb ft
Input Speed Sensor to Torque Converter Housing Bolt	12 N·m	108 lb in
Main Pressure Tap Plug	12 N·m	108 lb in
Oil Cooler Line Clip to Oil Pan Nut	9 N·m	80 lb in
Oil Cooler to Radiator Brace Bolts	12 N·m	106 lb in
Oil Pan Drain Plug	35 N·m	26 lb ft
Oil Pan to Main Housing Bolts	27 N·m	20 lb ft
Output Speed Sensor to Rear Cover Bolt	12 N·m	108 lb in
Power Take-Off (PTO) Cover to Main Housing Bolts	43 N·m	32 lb ft

Application	Specification	
	Metric	English
Shift Cable Bracket to Transmission Bolts	25 N·m	18 lb ft
Shift Cable Support to Steering Column Brace Bolt	10 N·m	89 lb in
Shift Lever to Shift Selector Shaft Nut	24 N·m	18 lb ft
Shipping Bracket to Torque Converter Housing Bolts	27 N·m	20 lb ft
Shipping Bracket to Torque Converter Lug Bolts	27 N·m	20 lb ft
Torque Converter Housing Inspection Cover to Transmission Bolts	10 N·m	89 lb in
Torque Converter to Flywheel Bolts	60 N·m	44 lb ft
Transmission Fluid Pressure Switch to Main Valve Body Bolts	12 N·m	108 lb in
Transmission Mount to Adapter Bolts (4WD)	47 N·m	35 lb ft
Transmission Mount to Transmission Bolts (2WD)	50 N·m	37 lb ft
Transmission Mount to Transmission Support Nuts	40 N·m	30 lb ft
Transmission Support to Frame Nuts and Bolts	70 N·m	52 lb ft
Transmission to Engine Studs and Bolts	50 N·m	37 lb ft
Turbine Speed Sensor to Main Housing Bolt	12 N·m	108 lb in
Wire Harness/Vent Tube Bracket to Transmission Nut	18 N·m	13 lb ft
Yoke Assembly to Output Shaft Bolt	123 N·m	91 lb ft

FLUID CAPACITY SPECIFICATIONS

Fluid Quantities

Transmission	Initial Fill		Refill	
	Liters	Quarts	Liters	Quarts
Allison 1000	12	12.7	7	7.4

TRANSMISSION GENERAL SPECIFICATIONS

Torque Converter Clutch Pressure Control Solenoid (TCC PCS) Specifications

Sump Temperature		Resistance
Degrees C	Degrees F	Ohms
0	32	9.5
20	68	10.5
40	104	11.5

Shift Solenoid 1 (SS1), SS2, SS3, and Modulated Main Pressure (MAIN MOD) Solenoid Specifications

Sump Temperature		Resistance
Degrees C	Degrees F	Ohms
0	32	20.0
20	68	22.0
40	104	24.5

TRANSMISSION FLUID TEMPERATURE (TFT) SENSOR TEMPERATURE VS. RESISTANCE SPECIFICATIONS

Temperature	Temperature	Minimum Resistance	Nominal Resistance	Maximum Resistance
°C	°F	ohms	ohms	ohms
-45	-49	128565	141951	155338
-40	-40	95826	100735	105644
-35	-31	68952	72315	75679
-30	-22	50153	52480	54807
-25	-13	36854	38478	40103
-20	-4	27345	28488	29631
-15	5	20476	21286	22097
-10	14	15467	16045	16624
-5	23	11781	12197	12612
0	32	9045	9345	9646
5	41	6998	7219	7441
10	50	5458	5623	5787
15	59	4291	4413	4536
20	68	3398	3490	3582
25	77	2710	2779	2849
30	86	2173	2228	2282
35	95	1754	1797	1840
40	104	1424	1459	1493
45	113	1163	1191	1218
50	122	955.0	977.1	999.2
55	131	788.6	806.5	824.5
60	140	654.7	669.3	683.9
65	149	546.3	558.3	570.2
70	158	458.1	467.9	477.8
75	167	385.9	394.1	402.2
80	176	326.6	333.3	340.1

Temperature	Temperature	Minimum Resistance	Nominal Resistance	Maximum Resistance
°C	°F	ohms	ohms	ohms
85	185	277.5	283.2	288.9
90	194	236.5	241.6	246.7
95	203	202.4	206.9	211.5
100	212	173.8	177.9	182.0
105	221	149.8	153.6	157.3
110	230	129.7	133.0	136.4
115	239	112.6	115.6	118.7
120	248	98.17	100.9	103.6
125	257	85.87	88.29	90.71
130	266	75.35	77.52	79.69
135	275	66.34	68.27	70.21
140	284	58.58	60.31	62.04
145	293	51.88	53.42	54.97
150	302	46.08	47.46	48.84
155	311	41.04	42.27	43.50
160	320	36.65	37.74	38.84

TEMPERATURE VERSUS RESISTANCE (SPEED SENSOR)

Temperature	Temperature	Minimum Resistance	Nominal Resistance	Maximum Resistance
°C	°F	k ohms	k ohms	k ohms
-25	-13	1.93	2.14	2.36
0	32	2.16	2.40	2.64
25	77	2.34	2.60	2.86
50	122	2.61	2.90	3.20
75	167	2.84	3.16	3.47
100	212	3.07	3.41	3.75
125	257	3.30	3.67	4.03
150	302	3.48	3.87	4.26

TEMPERATURE VERSUS RESISTANCE (SOLENOID)

Sump Temperature	Sump Temperature	Pressure Control Solenoids 1, 2, and TCC Resistance	Shift Solenoids 1, 2, and 3	Mod Main Solenoid
°C	°F	ohms	ohms	ohms
0	32	4.5	20.0	20.0
20	68	5.5	22.0	22.0
40	104	6.5	24.5	24.5
80	176	7.5	27.0	27.0
120	248	8.5	29.5	29.5

PRESSURE SWITCH MANIFOLD (PSM) LOGIC

Range	Pressure Switch 1 - N/O		Pressure Switch 2 - N/O		Pressure Switch 3 - N/O		Pressure Switch 4 - N/C	
	Switch Status	Scan Tool Status	Switch Status	Scan Tool Status	Switch Status	Scan Tool Status	Switch Status	Scan Tool Status
R	Open	HIGH*	Closed	LOW	Closed	LOW	Closed	LOW
N	Closed	LOW	Closed	LOW	Closed	LOW	Open	HIGH
1	Open	HIGH	Closed	LOW	Open	HIGH	Open	HIGH
2	Open	HIGH	Open	HIGH	Open	HIGH	Open	HIGH
3	Closed	LOW	Open	HIGH	Open	HIGH	Open	HIGH
4	Closed	LOW	Open	HIGH	Closed	LOW	Open	HIGH
5	Open	HIGH	Open	HIGH	Closed	LOW	Open	HIGH
6	Open	HIGH	Open	HIGH	Closed	LOW	Open	HIGH

N/C = Normally Closed
N/O = Normally Open
* Pressure switch 1 (PS1) reverts to the Closed/LOW state with throttle applied in REVERSE.

TRANSMISSION INTERNAL MODE SWITCH LOGIC

Range	A	B	C	P
P	OFF	ON	ON	OFF
R	OFF	OFF	ON	ON
N	ON	OFF	ON	OFF
D	ON	OFF	OFF	ON
*M	OFF	OFF	OFF	OFF
1	OFF	ON	OFF	ON
*L1	OFF	OFF	OFF	OFF
*L2	OFF	OFF	OFF	OFF
*L3	OFF	OFF	OFF	OFF
*L4	OFF	OFF	OFF	OFF
*L5	OFF	OFF	OFF	OFF
*L6	OFF	OFF	OFF	OFF

ON = Open Circuit
OFF = Grounded Circuit
*M mode allows TAP Up/TAP Down feature functionally between 1st through 6th ranges.

SOLENOID AND CLUTCH CHART (NORMAL MODE)

Solenoid and Clutch Chart (Normal Mode)								
Range Status	Logic State	Clutch to Line	Pressure Control Solenoids		Shift Solenoids			TCC Sol.
			PCS1	PCS2	SS1	SS2	SS3	
Steady State	R	--	De-energized; Low and Reverse Clutch Applied	Energized; 3rd, 5th, and Reverse Clutch Applied	ON	ON	ON	OFF
Garage Shift	R-N	--	De-energizing; Low and Reverse Clutch Applied	Energizing; 3rd, 5th, and Reverse Clutch Trimming Off	ON	ON	ON	OFF
Garage Shift	N-R	--	De-energizing; Low and Reverse Clutch Trimming On	Energizing; 3rd, 5th, and Reverse Clutch Trimming On	ON	ON	ON	OFF
Steady State	N or P	--	De-energized; Low and Reverse Clutch Applied	De-energized; Exhausted	ON	ON	ON	OFF
Upshift	N-1	--	De-energized; Low and Reverse Clutch Applied	Energized; 1-2-3-4 Clutch Trimming On	ON	ON	ON	OFF

Solenoid and Clutch Chart (Normal Mode)								
Range Status	**Logic State**	**Clutch to Line**	**Pressure Control Solenoids**		**Shift Solenoids**			**TCC Sol.**
			PCS1	**PCS2**	**SS1**	**SS2**	**SS3**	
Downshift	1-N	--	De-energized; Low and Reverse Clutch Applied	Energized; 1-2-3-4 Clutch Trimming Off	ON	ON	ON	OFF
Steady State	1	1-2-3-4 Clutch	De-energized; Low and Reverse Clutch Applied	De-energized; 2-6 Clutch Exhausted	OFF	ON	OFF	OFF
Upshift	1-2	1-2-3-4 Clutch	Energized; Low and Reverse Clutch Trimming Off	Energized; 2-6 Clutch Trimming On	OFF	ON	OFF	OFF
Downshift	2-1	1-2-3-4 Clutch	Energized; Low and Reverse Clutch Trimming On	Energized; 2-6 Clutch Trimming Off	OFF	ON	OFF	OFF
Steady State	2	1-2-3-4 Clutch	Energized; 3rd, 5th, and Reverse Clutch Exhausted	Energized; 2-6 Clutch Applied	OFF	OFF	OFF	OFF
Upshift	2-3	1-2-3-4 Clutch	De-energized; 3rd, 5th, and Reverse Clutch Trimming On	De-energized; 2-6 Clutch Trimming Off	OFF	OFF	OFF	OFF
Downshift	3-2	1-2-3-4 Clutch	De-energized; 3rd, 5th, and Reverse Clutch Trimming Off	De-energized; 2-6 Clutch Trimming On	OFF	OFF	OFF	OFF
Steady State	3	1-2-3-4 Clutch	De-energized; 3rd, 5th, and Reverse Clutch Applied	De-energized; 4-5-6 Clutch Exhausted	ON	OFF	OFF	OFF
Upshift	3-4	1-2-3-4 Clutch	Energized; 3rd, 5th, and Reverse Clutch Trimming Off	Energized; 4-5-6 Clutch Trimming On	ON	OFF	OFF	ON
Downshift	4-3	1-2-3-4 Clutch	Energized; 3rd, 5th, and Reverse Clutch Trimming On	Energized; 4-5-6 Clutch Trimming Off	ON	OFF	OFF	OFF
Steady State	4	4-5-6 Clutch	Energized; 3rd, 5th, and Reverse Clutch Exhausted	Energized; 1-2-3-4 Clutch Applied	ON	OFF	ON	ON
Upshift	4-5	4-5-6 Clutch	De-energized; 3rd, 5th, and Reverse Clutch Trimming On	De-energized; 1-2-3-4 Clutch Trimming Off	ON	OFF	ON	ON
Downshift	5-4	4-5-6 Clutch	De-energized; 3rd, 5th, and Reverse Clutch Trimming Off	De-energized; 1-2-3-4 Clutch Trimming On	ON	OFF	ON	ON
Steady State	5	4-5-6 Clutch	De-energized; 3rd, 5th, and Reverse Clutch Applied	De-energized; 2-6 Clutch Exhausted	OFF	OFF	ON	ON
Upshift	5-6	4-5-6 Clutch	Energized; 3rd, 5th, and Reverse Clutch Trimming Off	Energized; 2-6 Clutch Trimming On	OFF	OFF	ON	ON
Downshift	6-5	4-5-6 Clutch	De-energized; 3rd, 5th, and Reverse Clutch Trimming On	De-energized; 2-6 Clutch Trimming Off	OFF	OFF	ON	ON
Steady State	6	4-5-6 Clutch	Energized; 3rd, 5th, and Reverse Clutch Exhausted	Energized; 2-6 Clutch Applied	OFF	OFF	ON	ON

SOLENOID AND CLUTCH CHART (TOW/HAUL)

Solenoid and Clutch Chart (Tow/Haul)								
Range Status	Logic State	Clutch to Line	Pressure Control Solenoids		Shift Solenoids			TCC Sol.
			PCS1	PCS2	SS1	SS2	SS3	
Steady State	R	--	De-energized; Low and Reverse Clutch Applied	Energized; 3rd, 5th, and Reverse Clutch Applied	ON	ON	ON	OFF
Garage Shift	R-N	--	De-energizing; Low and Reverse Clutch Applied	Energizing; 3rd, 5th, and Reverse Clutch Trimming Off	ON	ON	ON	OFF
Garage Shift	N-R	--	De-energizing; Low and Reverse Clutch Trimming On	Energizing; 3rd, 5th, and Reverse Clutch Trimming On	ON	ON	ON	OFF
Steady State	N or P	--	De-energized; Low and Reverse Clutch Applied	De-energized; Exhausted	ON	ON	ON	OFF
Upshift	N-1	--	De-energized; Low and Reverse Clutch Applied	Energized; 1-2-3-4 Clutch Trimming On	ON	ON	ON	OFF
Downshift	1-N	--	De-energized; Low and Reverse Clutch Applied	Energized; 1-2-3-4 Clutch Trimming Off	ON	ON	ON	OFF
Steady State	1	1-2-3-4 Clutch	De-energized; Low and Reverse Clutch Applied	De-energized; 2-6 Clutch Exhausted	OFF	ON	OFF	OFF
Upshift	1-2	1-2-3-4 Clutch	Energized; Low and Reverse Clutch Trimming Off	Energized; 2-6 Clutch Trimming On	OFF	ON	OFF	OFF
Downshift	2-1	1-2-3-4 Clutch	Energized; Low and Reverse Clutch Trimming On	Energized; 2-6 Clutch Trimming Off	OFF	ON	OFF	OFF
Steady State	2	1-2-3-4 Clutch	Energized; 3rd, 5th, and Reverse Clutch Exhausted	Energized; 2-6 Clutch Applied	OFF	OFF	OFF	ON
Upshift	2-3	1-2-3-4 Clutch	De-energized; 3rd, 5th, and Reverse Clutch Trimming On	De-energized; 2-6 Clutch Trimming Off	OFF	OFF	OFF	ON
Downshift	3-2	1-2-3-4 Clutch	De-energized; 3rd, 5th, and Reverse Clutch Trimming Off	De-energized; 2-6 Clutch Trimming On	OFF	OFF	OFF	ON
Steady State	3	1-2-3-4 Clutch	De-energized; 3rd, 5th, and Reverse Clutch Applied	De-energized; 4-5-6 Clutch Exhausted	ON	OFF	OFF	ON
Upshift	3-4	1-2-3-4 Clutch	Energized; 3rd, 5th, and Reverse Clutch Trimming Off	Energized; 4-5-6 Clutch Trimming On	ON	OFF	OFF	ON
Downshift	4-3	1-2-3-4 Clutch	Energized; 3rd, 5th, and Reverse Clutch Trimming On	Energized; 4-5-6 Clutch Trimming Off	ON	OFF	OFF	ON
Steady State	4	4-5-6 Clutch	Energized; 3rd, 5th, and Reverse Clutch Exhausted	Energized; 1-2-3-4 Clutch Applied	ON	OFF	ON	ON

Solenoid and Clutch Chart (Tow/Haul)

Range Status	Logic State	Clutch to Line	Pressure Control Solenoids		Shift Solenoids			TCC Sol.
			PCS1	PCS2	SS1	SS2	SS3	
Upshift	4-5	4-5-6 Clutch	De-energized; 3rd, 5th, and Reverse Clutch Trimming On	De-energized; 1-2-3-4 Clutch Trimming Off	ON	OFF	ON	ON
Downshift	5-4	4-5-6 Clutch	De-energized; 3rd, 5th, and Reverse Clutch Trimming Off	De-energized; 1-2-3-4 Clutch Trimming On	ON	OFF	ON	ON
Steady State	5	4-5-6 Clutch	De-energized; 3rd, 5th, and Reverse Clutch Applied	De-energized; 2-6 Clutch Exhausted	OFF	OFF	ON	ON
Upshift	5-6	4-5-6 Clutch	Energized; 3rd, 5th, and Reverse Clutch Trimming Off	Energized; 2-6 Clutch Trimming On	OFF	OFF	ON	ON
Downshift	6-5	4-5-6 Clutch	De-energized; 3rd, 5th, and Reverse Clutch Trimming On	De-energized; 2-6 Clutch Trimming Off	OFF	OFF	ON	ON
Steady State	6	4-5-6 Clutch	Energized; 3rd, 5th, and Reverse Clutch Exhausted	Energized; 2-6 Clutch Applied	OFF	OFF	ON	ON

SHIFT SPEED (1-2 AND 2-3 SHIFTS)

			1-2 Shift Output Shaft RPM				2-3 Shift Output Shaft RPM			
Engine		% of TPS	12	25	50	100	12	25	50	100
		Mode								
L18	8.1L	Normal	462	636	1040	1300	867	1127	1792	2312
L18	8.1L	Tow/Haul	722	722	1040	1300	1445	1445	1792	2370

SHIFT SPEED (3-4, 4-5, 5-6 AND CT DOWNSHIFTS)

			3-4 Shift Output Shaft RPM			4-5 Shift Output Shaft RPM			5-6 Shift Output Shaft RPM			Closed Throttle Downshift Output Shaft RPM				
												6-5	5-4	4-3	3-2	2-1
Engine		% of TPS	12	25	50	12	25	50	12	25	50	0	0	0	0	0
		Mode														
L18	8.1L	Normal	1185	1474	2370	1647	2081	3237	2451	2451	3488	1994	1517	1243	766	202
L18	8.1L	Tow/Haul	2023	1965	2399	2875	2774	3352	2976	3038	3756	2514	2167	1532	1040	202

RANGE REFERENCE

Range	Park	Reverse	Neutral	OD				D			2		1	
Gear	N	R	N	1st	2nd	3rd	4th	1st	2nd	3rd	1st	2nd	1st	2nd
**1-2 Shift Solenoid	ON	ON	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	OFF	ON	OFF
**2-3 Shift Solenoid	OFF	OFF	OFF	OFF	OFF	ON	ON	OFF	OFF	ON	OFF	OFF	OFF	OFF
Fourth Clutch	--	--	--	--	--	--	A	--	--	--	--	--	--	--
Overrun Clutch	--	--	--	--	--	--	--	A	A	A	A	A	A	A
Overdrive Roller Clutch	H	H	H	H	H	H	OR	A	A	A	A	A	A	A
Forward Clutch	--	--	--	A	A	A	A	A	A	A	A	A	A	A
Direct Clutch	--	A	--	--	--	A	A	--	--	A	--	--	--	--
Front Band	--	--	--	--	--	--	--	--	--	--	--	A	--	A
Intermediate Sprag Clutch	--	--	--	*	H	OR	OR	*	H	OR	*	H	*	H
Intermediate Clutch	--	--	--	--	A	A	A	--	A	A	--	A	--	A
Lo Roller Clutch	--	--	--	H	OR	OR	OR	H	OR	OR	H	OR	H	OR
Rear Band	--	A	--	--	--	--	--	--	--	--	--	--	A	--

A = Applied

H = Holding

OR = Overrunning

* = Holding, but not effective

ON = The solenoid is energized

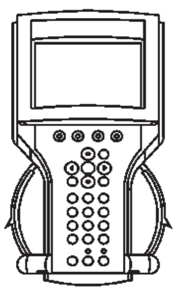
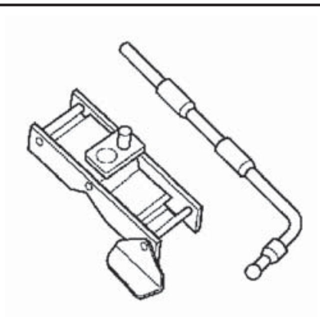
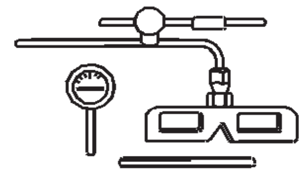
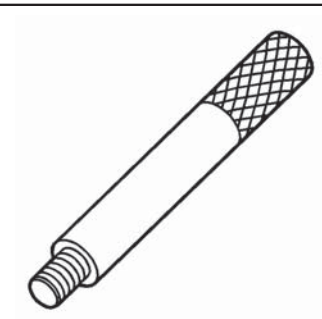
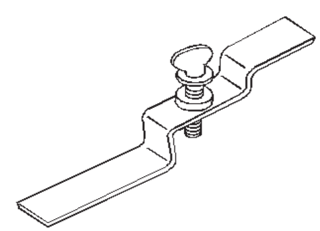
OFF = The solenoid is de-energized

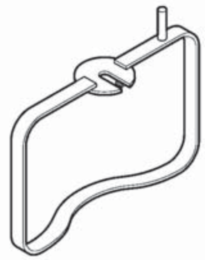
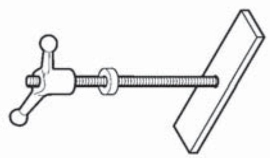
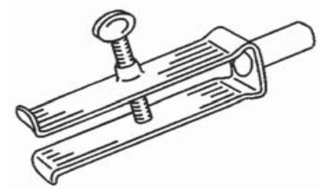
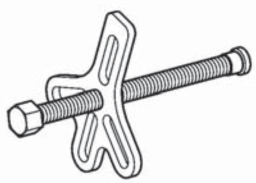
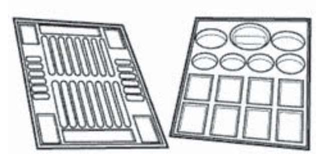
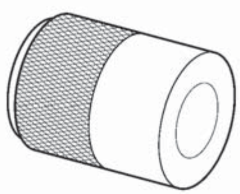
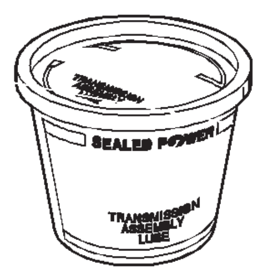
** = The state of the solenoid follows a shift pattern, which depends upon vehicle speed and throttleposition. The pattern does not depend upon the selected gear.

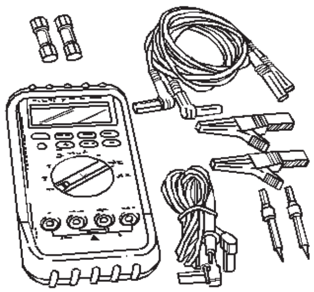
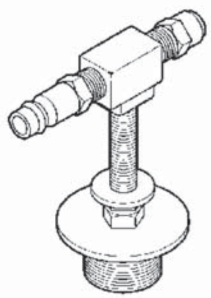
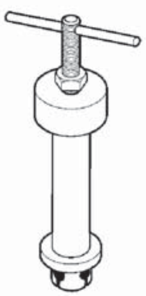
LINE PRESSURE

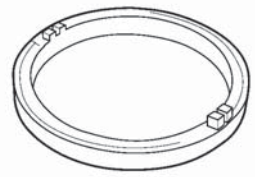
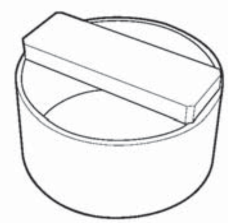
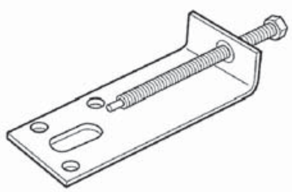
Range	Line Pressure @ 600 RPM	Line Pressure @ 2100 RPM
Forward Converter - Torque Converter Clutch Not Applied	700- 380 kPa (101-200 PSI)	1 515-1 795 kPa (220-260 PSI)
Forward Lockup - Torque Converter Clutch Applied	N/A	1 000-1 170 kPa (145-170 PSI)
Reverse	700-1 380 kPa (101-200 PSI)	1 515-1 795 kPa (220-260 PSI)
Neutral/Park	590-720 kPa (85-105 PSI)	1 515-1 795 kPa (220-260 PSI)

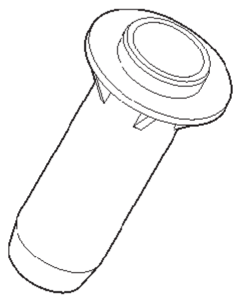
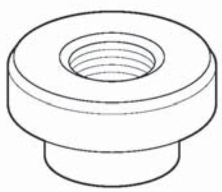
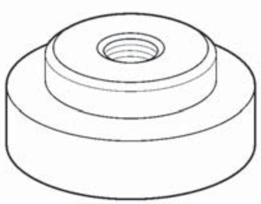
SPECIAL TOOLS

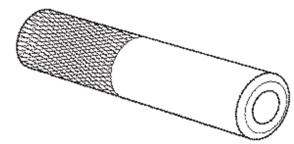
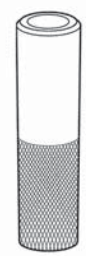
Illustration	Tool Number/ Description
	Scan Tool
	J 5959 Dial Indicator Clamp and Adjuster
	J 7872 Magnetic Base Dial Indicator
	J 8092 Universal Driver Handle - 3/4 in - 10
	J 21366 Torque Converter Retaining Strap

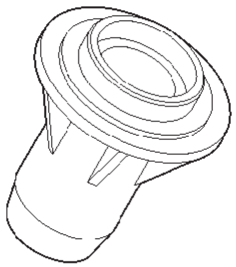
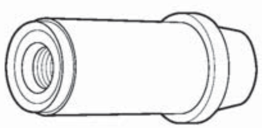
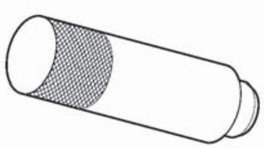
	J 21369-F Torque Converter Leak Test Fixture		J 24459-5 Spring Compressor Adapter
	J 24204-2 Bar and Stud Assembly		J 26941 Bushing and Bearing Remover 3-4 in
	J 24420-B Universal Puller		J 33163 Valve Tray Set
	J 24446 Rear Bearing Installer		J 36850 Transjel® Lubricant

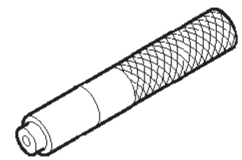
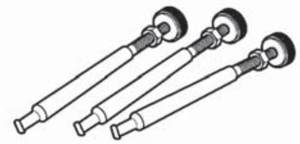
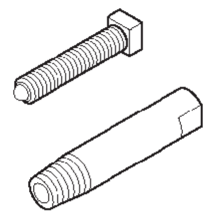
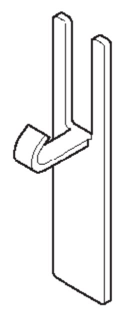
	J 39200 Digital Multimeter (DMM)
	J 43763 Torque Converter Leak Test Plug
	J 43764 Torque Converter End Play Gage
	J 43765 Stator Shaft Installer/Remover

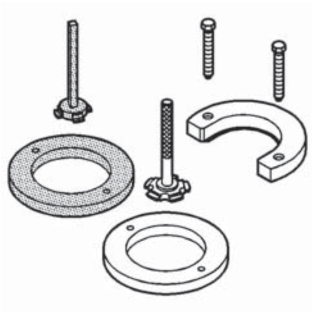
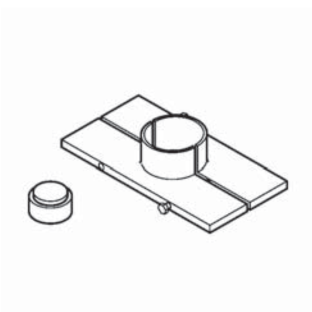
	J 43767 Tone Wheel Staker
	J 43768 Tone Wheel Driver
	J 43770 Main Lube, Converter Relief Valve Spring Compressor
	J 43771 Pump Bushing Removal and Installation Tool

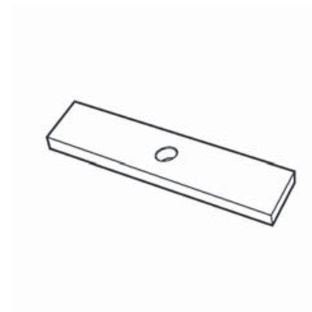
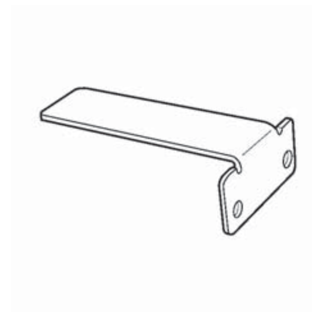
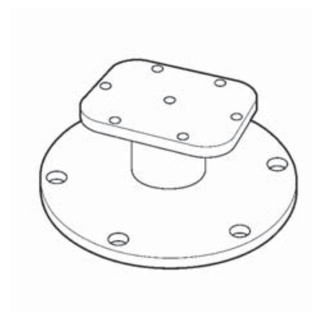
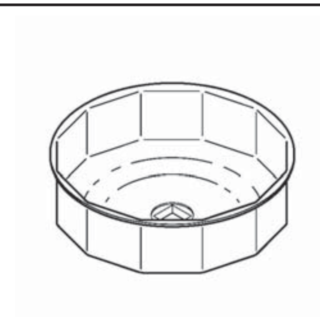
	J 43772 Torque Converter Seal Installer
	J 43773 Valve Spring Compressor
	J 43774 Stator Shaft Bushing Installer
	J 43775 Oil Pump Cover Needle Bearing Installer

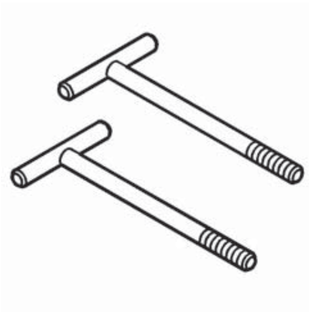
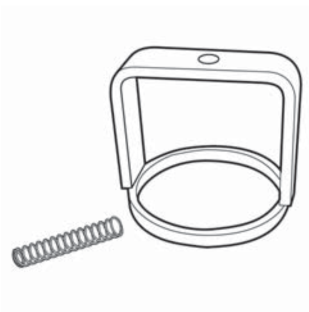
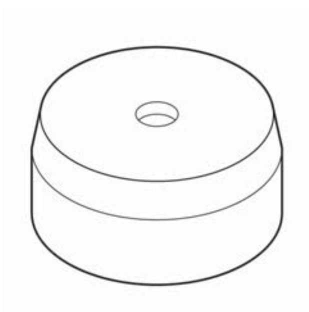
	J 43778 Clutch Bushing Installer
	J 43779 Locating Pin Installer
	J 43780 Transmission Case Locating Pin Installer
	J 43781 Input Carrier Bushing Remover/ Installer

	J 43782 Rear Seal Installer
	J 43785 Intermediate Bushing Remover/ Installer
	J 43791 Output/Turbine Shaft Bushing Installer
	J 43797 Output Carrier Bearing Race Installer

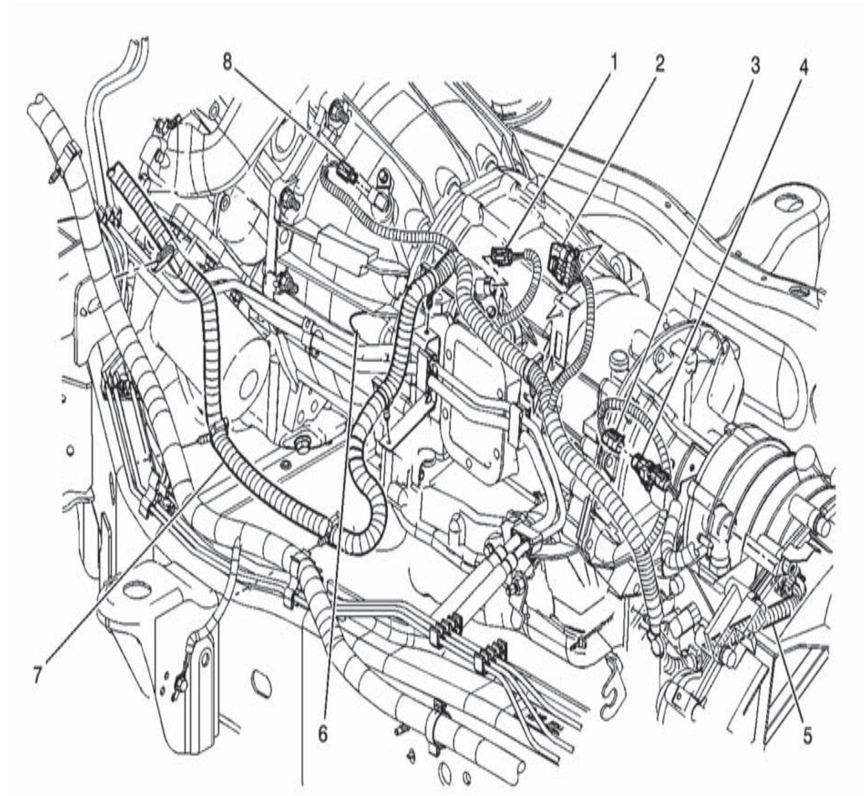
	J 43909 Manual Shift Shaft Seal Installer
	J 43910 Output Bearing Puller Leg Set
	J 43911 Manual Shift Shaft Seal Remover
	J 44247 Internal Wiring Harness Installer

	J 44525 Clutch Backing Plate Selector
	J 44526 Output/Turbine Shaft Bushing Remover
	J 44528 Output Carrier Bearing Race Remover
	J 44529 Stator Shaft Bushing Remover

	J 44530 Clutch Piston Spring Compressor
	J 44587 Main Shaft Holder
	J 44723 Transmission/Stand Adapter Plate
	J 45023 Control Main Filter Wrench

	J 46409 Torque Converter Lifting Handles
	J 47339-1 Piston Return Spring Compressor
	J 47339-2 Seal Area Protector

COMPONENT LOCATOR



(1) Turbine Sensor Harness Connector

(2) Power Take-Off (PTO) Connector

(3) Output Speed Sensor Harness Connector

(4) Transfer Case Selector Shift Control Switch

(5) Transmission Connector Harness

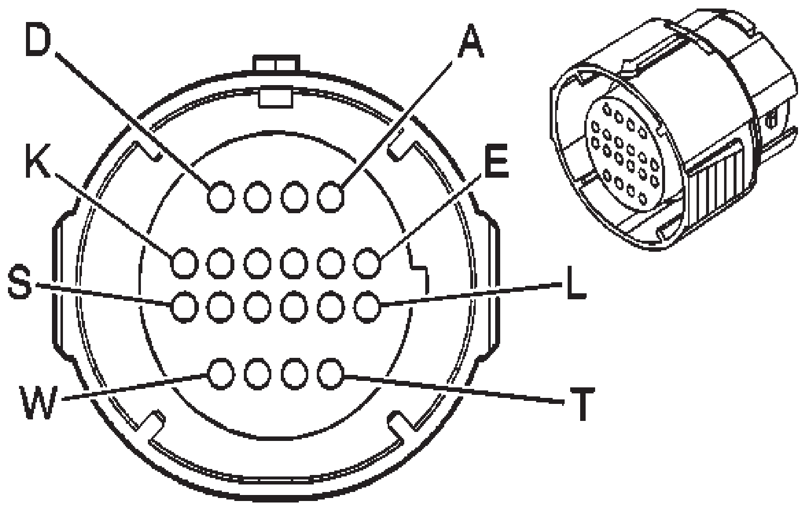
(6) Allison Transmission

(7) Engine Harness

(8) Automatic Transmission Input Shaft Speed (ISS) Sensor

AUTOMATIC TRANSMISSION INLINE HARNESS CONNECTOR END VIEW

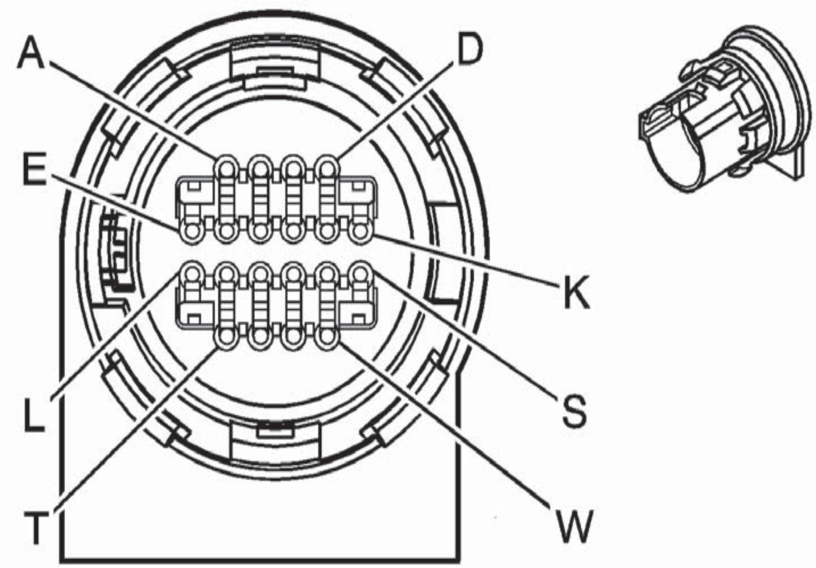
Automatic Transmission Inline Harness Connector End View



Connector Part Information

* OEM: 12186609
* Service: --
* Description: 20-Way F Micro-Pack 100 Series (GY)

Pin	Wire Color	Circuit No.	Function
A	L-GN	1222	Shift Solenoid 1 (SS1) Low
B	YE/BK	1223	Shift Solenoid 2 (SS2) Low
C	OG/WH	2527	Shift Solenoid 3 (SS3) Low
D	PK	1224	Fluid Pressure Switch 1 (PS1) Signal
E	RD	1226	Fluid Pressure Switch 3 (PS3) Signal
F	D-BU	1225	Fluid Pressure Switch 2 (PS2) Signal
G	YE/BK	1227	Transmission Fluid Temperature (TFT) Sensor Signal

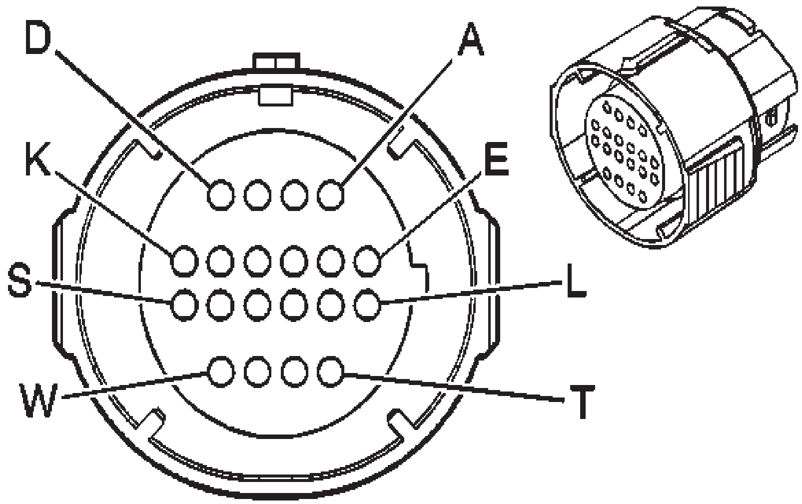


Connector Part Information

* OEM: 12160782
* Service: --
* Description: 20-Way M Micro-Pack 100 Series (GY)

Pin	Wire Color	Circuit No.	Function
A	D-GN	1222	Shift Solenoid 1 (SS1) Low
B	L-GN	1223	Shift Solenoid 2 (SS2) Low
C	PU	2527	Shift Solenoid 3 (SS3) Low
D	OG	1224	Fluid Pressure Switch 1 (PS1) Signal
E	GY	1226	Fluid Pressure Switch 3 (PS3) Signal
F	WH	1225	Fluid Pressure Switch 2 (PS2) Signal
G	TN	1227	Transmission Fluid Temperature (TFT) Sensor Signal

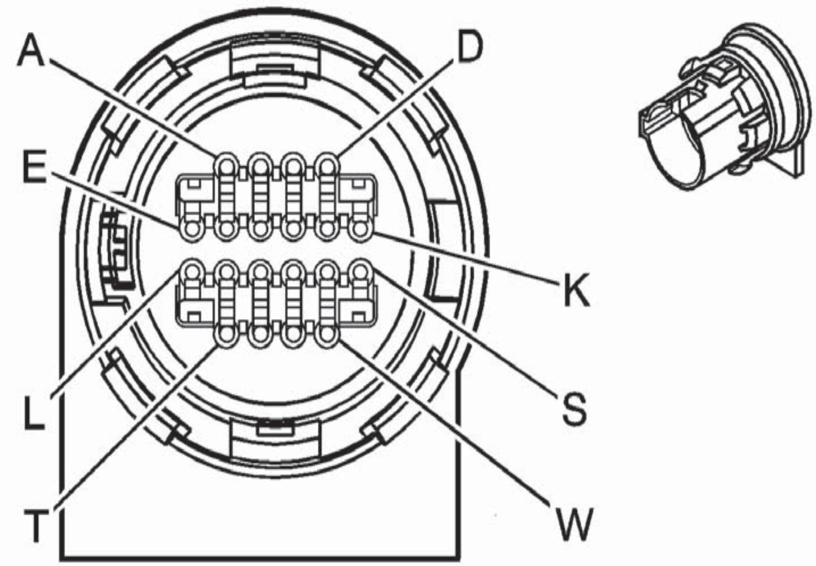
Automatic Transmission Inline Harness Connector End View



Connector Part Information

* OEM: 12186609
* Service: --
* Description: 20-Way F Micro-Pack 100 Series (GY)

Pin	Wire Color	Circuit No.	Function
H	BK	2762	Transmission Fluid Temperature (TFT) Sensor
J	BN	418	Torque Converter Clutch Pressure Control Solenoid (TCC PCS) Low
K	L-GN/BK	2529	Fluid Pressure Switch 4 (PS4) Signal
L	RD/BK	1228	Actuator Supply Voltage 1 (HSD1)
M	L-BU/WH	1229	Pressure Control Solenoid 2 (PCS2) Low
N	BN	323	Actuator Supply Voltage 2 (HSD2)
P	BN/WH	2469	Pressure Control Solenoid 1 (PCS1) Low

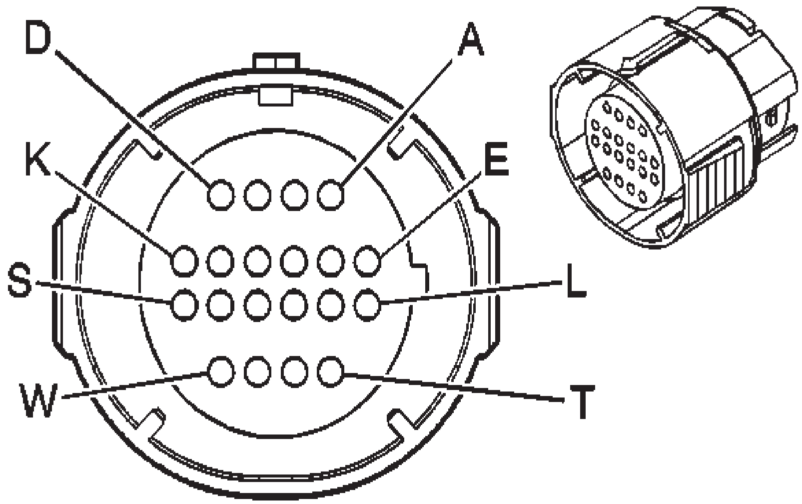


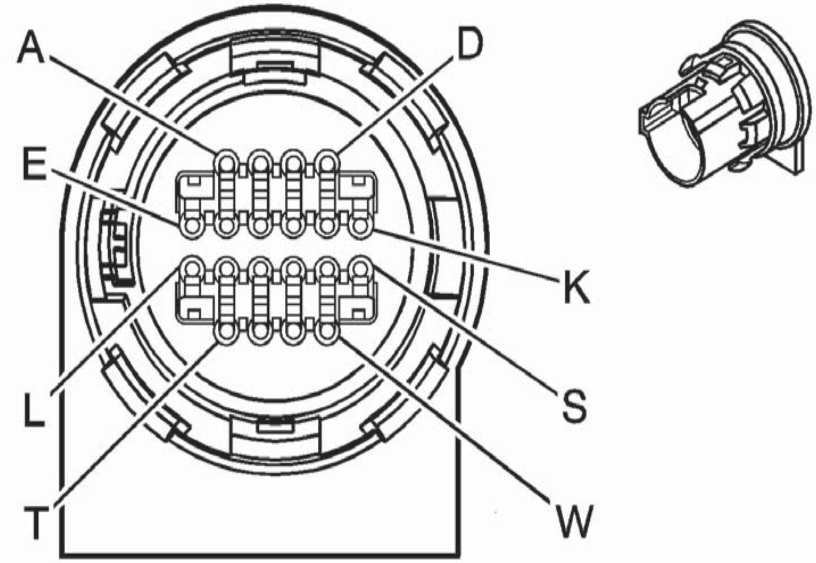
Connector Part Information

* OEM: 12160782
* Service: --
* Description: 20-Way M Micro-Pack 100 Series (GY)

Pin	Wire Color	Circuit No.	Function
H	BK	2762	Transmission Fluid Temperature (TFT) Sensor Low
J	PK	418	Torque Converter Clutch Pressure Control Solenoid (TCC PCS) Low
K	BN	2529	Fluid Pressure Switch 4 (PS4) Signal
L	RD	1228	Actuator Supply Voltage 1 (HSD1)
M	D-BU	1229	Pressure Control Solenoid 2 (PCS2) Low
N	RD/BK	323	Actuator Supply Voltage 2 (HSD2)
P	L-BU	2469	Pressure Control Solenoid 1 (PCS1) Low

Automatic Transmission Inline Harness Connector End View

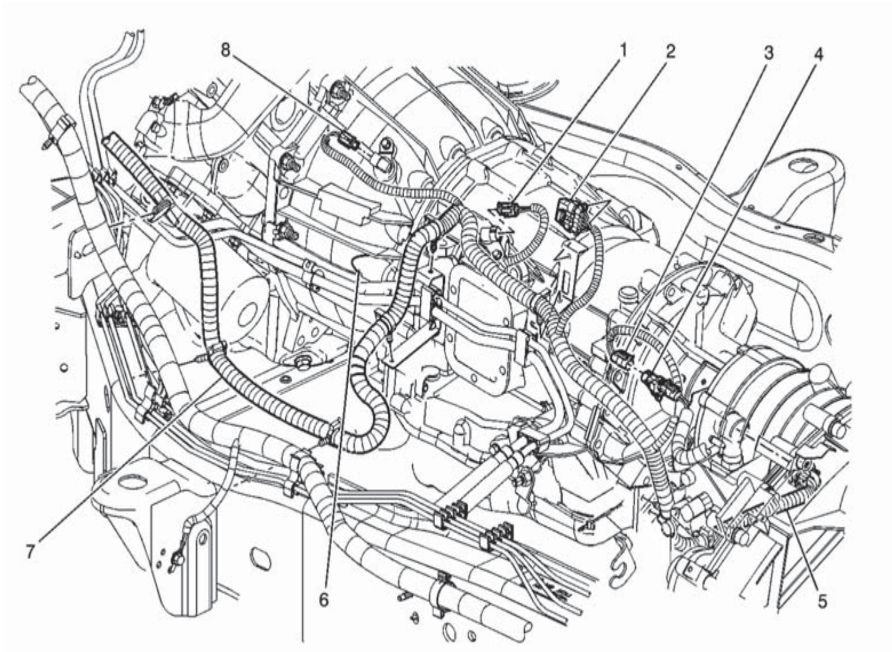




Connector Part Information	Connector Part Information
* OEM: 12186609 * Service: -- * Description: 20-Way F Micro-Pack 100 Series (GY)	* OEM: 12160782 * Service: -- * Description: 20-Way M Micro-Pack 100 Series (GY)

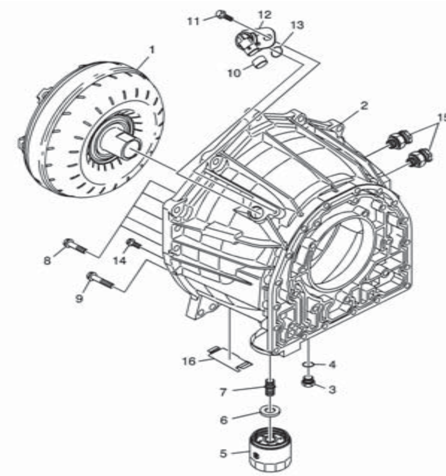
Pin	Wire Color	Circuit No.	Function	Pin	Wire Color	Circuit No.	Function
R	OG/BK	1786	Transmission Park/Neutral Signal	R	PU	1786	Transmission Park/Neutral Signal
S	D-BU	1530	Mod Main Solenoid Low	S	YE	1530	Mod Main Solenoid Low
T	GY	773	Internal Mode Switch Signal C	T	BK	773	Internal Mode Switch Signal C
U	YE	772	Internal Mode Switch Signal B	U	PK/BK	772	Internal Mode Switch Signal B
V	BK/WH	771	Internal Mode Switch Signal A	V	YE/BK	771	Internal Mode Switch Signal A
W	WH	776	Internal Mode Switch Signal P	W	WH	776	Internal Mode Switch Signal P

ENGINE HARNESS TO TRANSMISSION



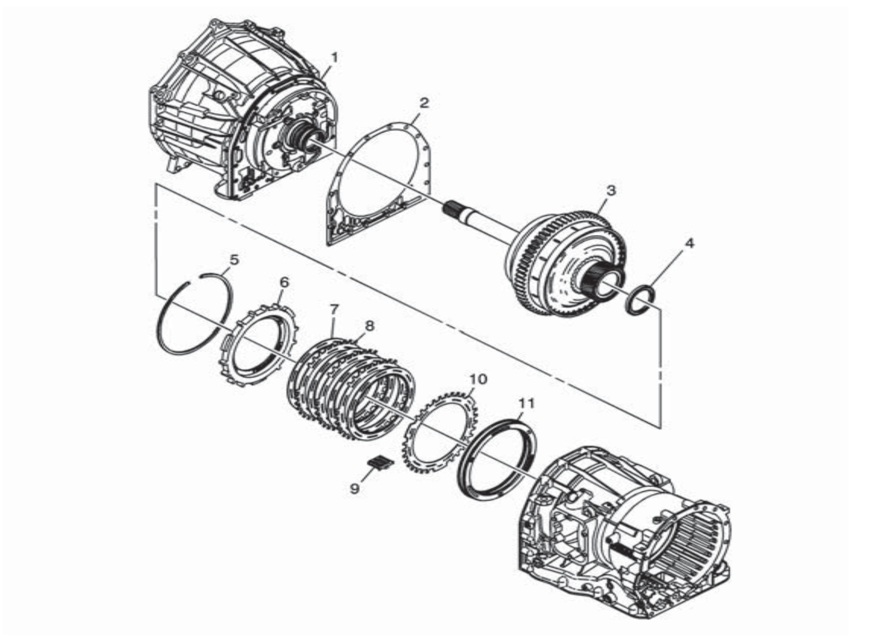
1	Turbine Sensor Harness Connector
2	Power Take-Off (PTO) Connector
3	Output Speed Sensor Harness Connector
4	Transfer Case Selector Shift Control Switch
5	Transmission Connector Harness
6	Allison Transmission
7	Engine Harness
8	Automatic Transmission Input Shaft Speed (ISS) Sensor

TORQUE CONVERTER CLUTCH/CONVERTER HOUSING ASSEMBLY DISASSEMBLED VIEW



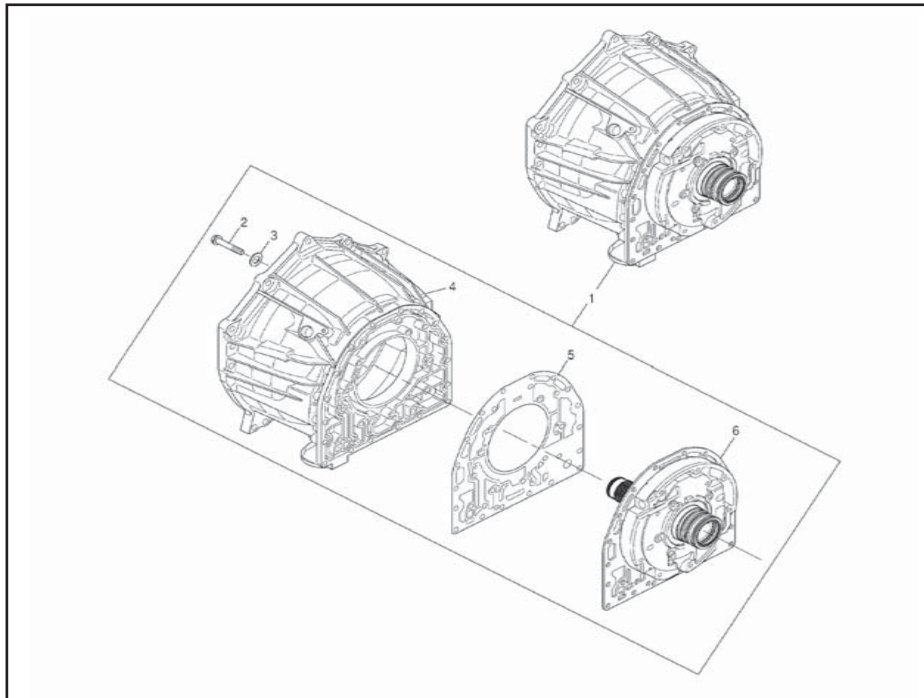
1	Torque Converter
2	Torque Converter Housing
3	Line Pressure Test Hole Plug
4	Line Pressure Test Hole Plug O-ring
5	Transmission External Oil Filter
6	Transmission External Oil Filter Magnet
7	Transmission External Oil Filter Adapter
8	Torque Converter Housing Bolt, M10 x 1.5 x 50, Flanged Head (18)
9	Torque Converter Housing Bolt, M10 x 1.5 x 70, Flanged Head (2)
10	Sensor Shipping Cover
11	Vehicle Speed Sensor Bolt
12	Input Speed Sensor
13	Vehicle Speed Sensor O-ring
14	Torque Converter Housing Bolt, M10 x 1.5 x 25 (10)
15	Transmission Oil Cooler Pipe Connector (2)
16	Torque Converter Housing Access Hole Cover

TORQUE CONVERTER HOUSING, 1-2-3-4-5-6 CLUTCH ASSEMBLY, AND 3RD, 5TH, AND REVERSE CLUTCH COMPONENTS DISASSEMBLED VIEW



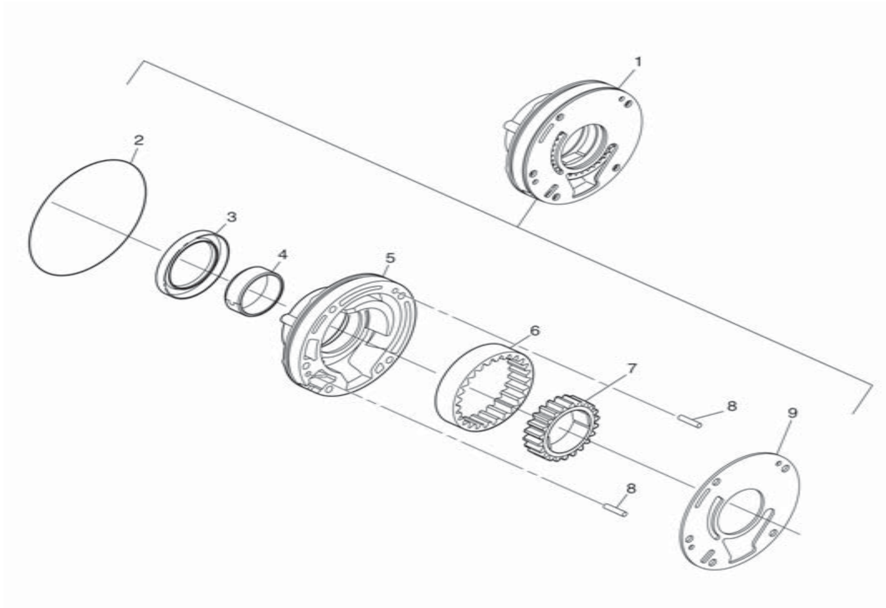
1	Torque Converter Housing/Oil Pump Cover Assembly
2	Torque Converter Housing to Case Gasket
3	1-2-3-4, 4-5-6 Clutch Assembly
4	Input Sun Gear Thrust Bearing
5	Internal Retaining Ring
6	3rd, 5th, and Reverse Clutch Backing Plate
7	3rd, 5th, and Reverse Clutch Fiber Plate (4)
8	3rd, 5th, and Reverse Clutch Steel Plate (3)
9	3rd, 5th, and Reverse Clutch Piston Return Spring Assembly (3)
10	3rd, 5th, and Reverse Clutch Spring Plate
11	3rd, 5th, and Reverse Clutch Piston Assembly (Bonded Seals)

TORQUE CONVERTER HOUSING/OIL PUMP COVER ASSEMBLY



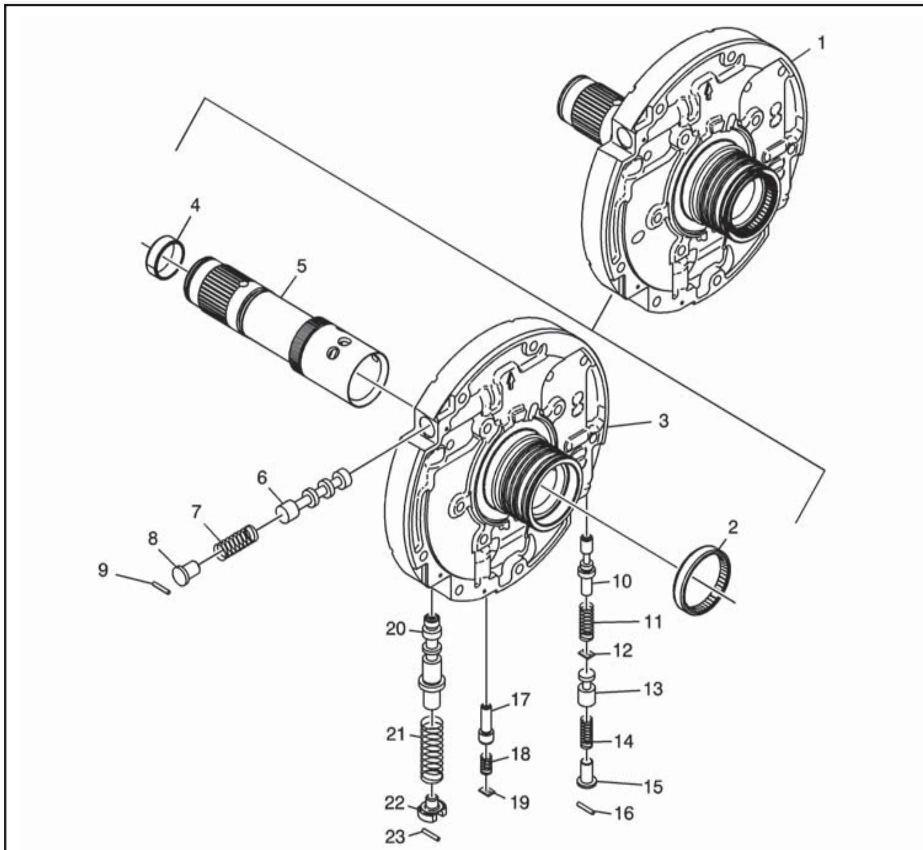
1	Torque Converter Housing/Oil Pump Cover Assembly
2	Torque Converter Housing Bolt, M10 x 1.5 x 50, Flanged Head (10)
3	Torque Converter Housing Bolt Seal
4	Torque Converter Housing
5	Torque Converter Housing Gasket
6	Oil Pump Cover Assembly

OIL PUMP ASSEMBLY DISASSEMBLED VIEW



1	Oil Pump Assembly
2	Oil Pump O-Ring Seal
3	Torque Converter Oil Seal
4	Oil Pump Bushing
5	Oil Pump Body
6	Oil Pump Driven Gear
7	Oil Pump Drive Gear
8	Locating Pin
9	Oil Pump Wear Plate

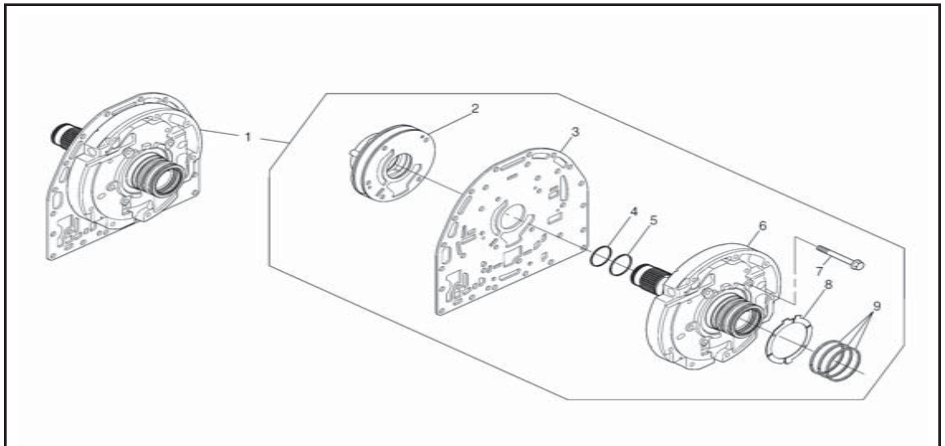
OIL PUMP COVER ASSEMBLY DISASSEMBLED VIEW



1	Oil Pump Cover Assembly
2	Oil Pump Cover Assembly Bearing
3	Oil Pump Cover
4	Bushing, 33.8 mm (1.33 in) ID
5	Stator Shaft
6	Torque Converter Clutch Valve
7	Torque Converter Clutch Valve Spring
8	Torque Converter Clutch Valve Stop
9	Torque Converter Clutch Valve Retainer

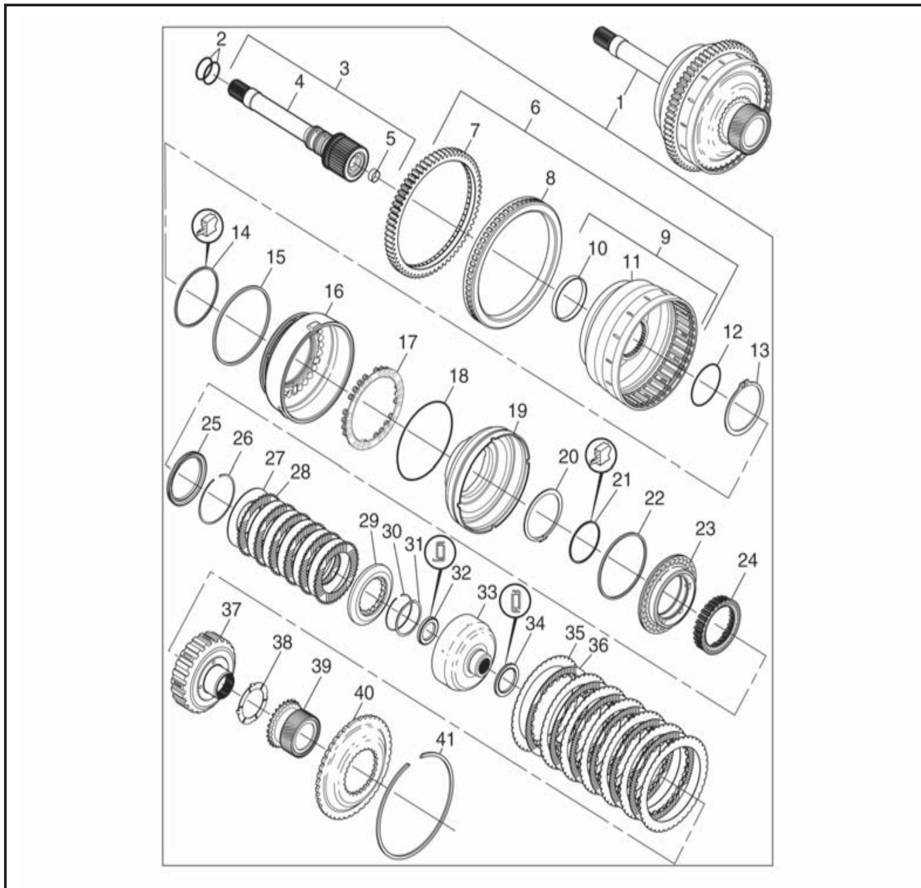
10	Torque Converter Clutch Relief Valve
11	Torque Converter Clutch Relief Valve Spring
12	Torque Converter Clutch Relief Valve Retainer
13	Oil Pump Lube Regulator Valve
14	Oil Pump Lube Regulator Valve Spring
15	Oil Pump Lube Regulator Valve Stop
16	Oil Pump Lube Regulator Valve Stop Retainer
17	1-2-3-4 Clutch Backfill Valve
18	1-2-3-4 Clutch Backfill Valve Spring
19	Retaining Clip
20	Pressure Regulator Valve
21	Pressure Regulator Valve Spring
22	Pressure Regulator Valve Stop
23	Pressure Regulator Spring Stop Retainer

OIL PUMP COVER/OIL PUMP ASSEMBLY AND ASSOCIATED PARTS DISASSEMBLED VIEW



1	Oil Pump Cover Module
2	Oil Pump Assembly
3	Torque Converter Housing to Case Channel Plate
4	Overlap Seal Ring, End
5	Overlap Seal Ring, Middle
6	Oil Pump Cover Assembly
7	Oil Pump Cover Assembly Bolt, M8 x 1.25 x 55, Flanged Head (5)
8	Oil Pump Cover Assembly Thrust Washer
9	Overlap Seal Ring (3)

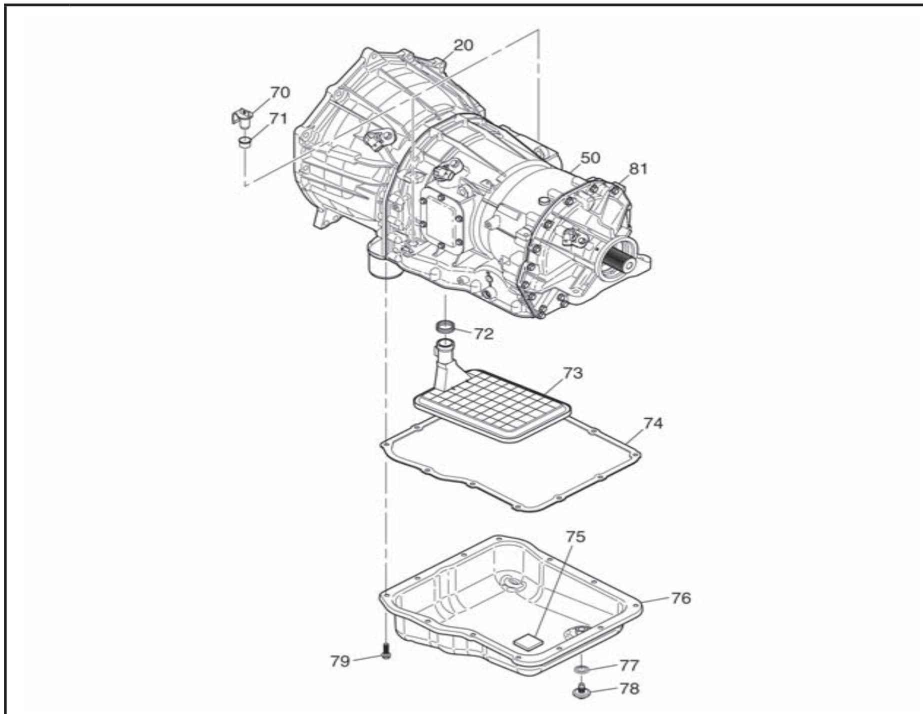
1-2-3-4, 4-5-6 CLUTCH ASSEMBLY DISASSEMBLED VIEW



1	1-2-3-4, 4-5-6 Clutch Assembly
2	Overlap Seal Ring (2)

3	Turbine Shaft Assembly
4	Turbine Shaft
5	Bushing, 20 mm (0.8 in) ID
6	1-2-3-4, 4-5-6 Clutch Piston Housing Assembly
7	Power Take-Off (PTO) Gear
8	Turbine Tone Wheel
9	1-2-3-4, 4-5-6 Clutch Housing Assembly
10	1-2-3-4, 4-5-6 Clutch Bushing
11	1-2-3-4, 4-5-6 Clutch Housing
12	O-ring
13	External Retaining Ring
14	4-5-6 Clutch Piston Inner Seal
15	4-5-6 Clutch Piston Outer Seal
16	4-5-6 Clutch Piston
17	4-5-6 Clutch Return Spring Assembly
18	1-2-3-4 Clutch Piston Outer Seal
19	1-2-3-4 Clutch Piston Housing
20	4-5-6 Clutch Piston Return Spring Retainer
21	1-2-3-4 Clutch Piston Inner Seal
22	1-2-3-4 Clutch Piston Outer Seal
23	1-2-3-4 Clutch Piston
24	1-2-3-4 Clutch Piston Return Spring Assembly
25	1-2-3-4 Clutch Balance Piston
26	1-2-3-4 Clutch Hub Internal Retainer Ring
27	1-2-3-4 Clutch Steel Plate (6)
28	1-2-3-4 Clutch Fiber Plate (6)
29	1-2-3-4 Clutch Selective Backing Plate 5.84-6.04 mm (0.2299-0.2378 in)
30	1-2-3-4 Clutch Backing Plate External Retainer Ring
31	1-2-3-4 Clutch Backing Plate Internal Retainer Ring
32	1-2-3-4 Clutch Hub Thrust Bearing Assembly
33	1-2-3-4 Clutch Hub
34	4-5-6 Clutch Hub Thrust Bearing
35	4-5-6 Clutch Steel Plate (7)
36	4-5-6 Clutch Fiber Plate (6)
37	4-5-6 Clutch Hub
38	Input Sun Gear Thrust Washer
39	Input Sun Gear
40	Input Sun Gear Flange
41	Input Sun Gear External Retaining Ring

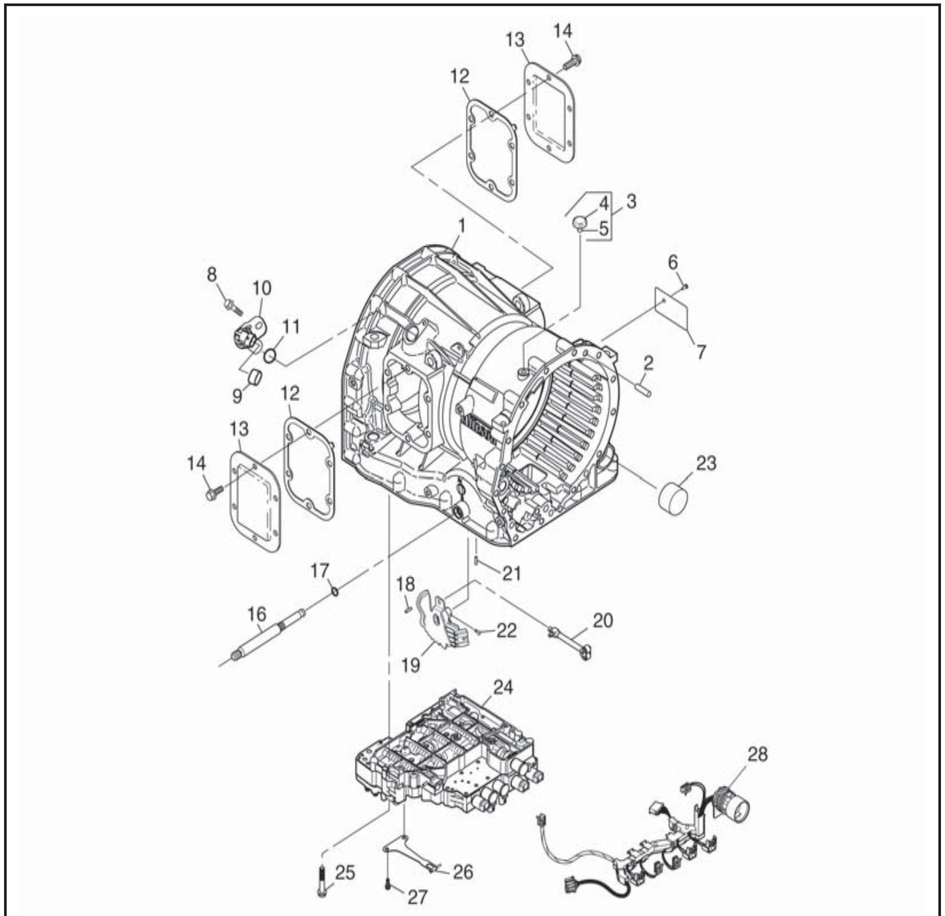
TORQUE CONVERTER HOUSING/AUTOMATIC TRANSMISSION CASE AND ASSOCIATED COMPONENTS DISASSEMBLED VIEW



20	Torque Converter Housing
50	Transmission Case
70	Transmission Fill Tube Plug

71	Transmission Fill Tube Seal (2)
72	Transmission Internal Oil Filter Seal
73	Transmission Internal Oil Filter
74	Transmission Oil Pan Gasket
75	Transmission Oil Pan Magnet
76	Transmission Oil Pan
77	Transmission Oil Pan Drain Plug O-ring
78	Transmission Oil Pan Drain Plug
79	Transmission Oil Pan Bolt, M8 x 1.25 x 20 Flanged Head
81	Low and Reverse Clutch Housing, 2WD

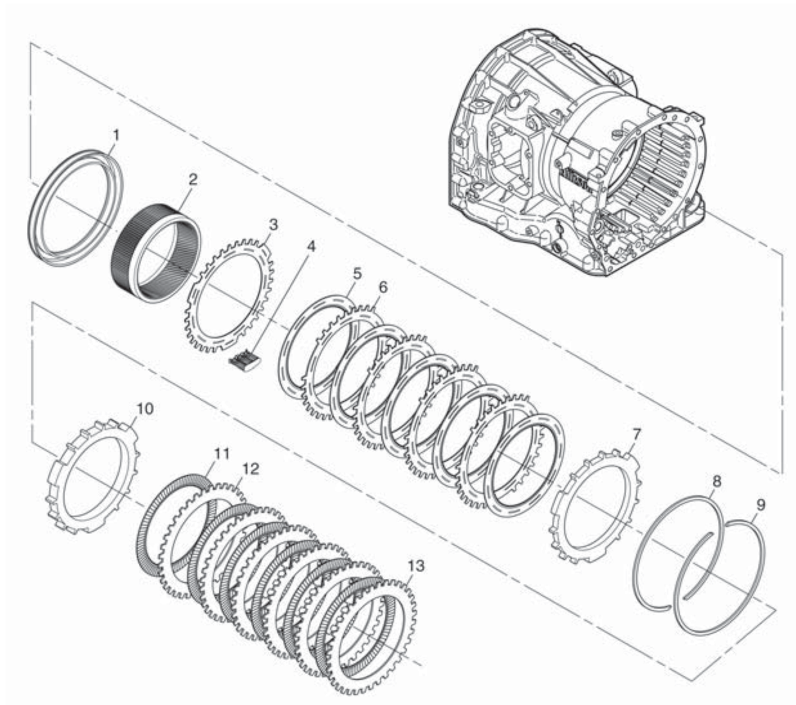
AUTOMATIC TRANSMISSION CASE DISASSEMBLED VIEW



1	Automatic Transmission Case
2	Transmission Case Locating Pin
3	Transmission Vent Assembly
4	Transmission Vent Cap
5	Transmission Vent
6	Nameplate Rivet
7	Nameplate
8	Vehicle Speed Sensor Bolt, M6 x 1.0 x 13

9	Sensor Shipping Cover
10	Turbine Speed Sensor
11	Vehicle Speed Sensor O-Ring
12	Power Take-Off (PTO) Cover Gasket (2)
13	PTO Cover (2)
14	PTO Cover Bolt, M10 x 1.5 x 20, Flanged Head, Coated (12)
16	Manual Shift Shaft
17	Manual Shift Shaft Seal
18	Manual Shift Shaft Pin
19	Manual Shift Shaft Detent Lever/Internal Mode Switch (IMS) Assembly
20	Park Pawl Assembly
21	Control Valve Body Locating Pin
22	Detent Lever/IMS Bolt
23	Connector Shipping Cover
24	Control Valve Body Assembly
25	Control Valve Body Bolt, M6 x 1.0 x 50, Flanged Head (15)
26	Manual Shift Shaft Detent Spring
27	Manual Shift Shaft Detent Spring Bolt M6 x 1.0 x 12. Flanged Head (2)
28	Transmission Wiring Harness Assembly

2-6 CLUTCH/LOW AND REVERSE CLUTCH DISASSEMBLED VIEW

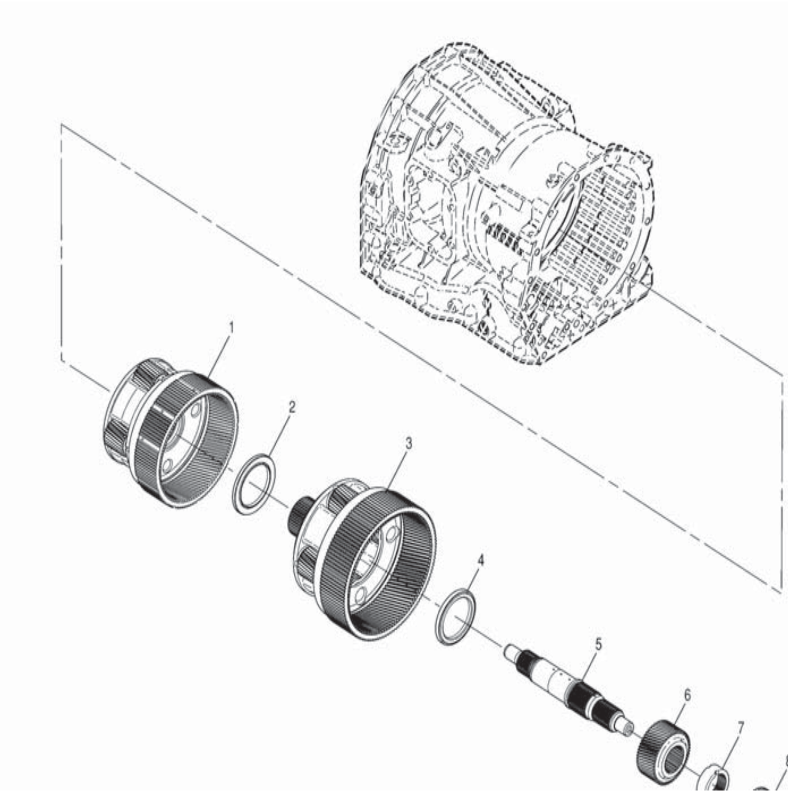


1	2-6 Clutch Piston Assembly, Bonded Seals
2	Input and 3rd, 5th, and Reverse Clutch Ring Gear
3	2-6 Clutch Spring Plate
4	Piston Return Spring Assembly (3)
5	2-6 Clutch Fiber Plate (5)
6	2-6 Clutch Steel Plate (4)
7	2-6 Clutch Backing Plate
8	Internal Retaining Ring
9	Internal Retaining Ring
10	Low and Reverse Clutch Backing Plate
11	Low and Reverse Clutch Fiber Plate (6)
12	Low and Reverse Clutch Steel Plate (5)

13	Low and Reverse Clutch Steel Plate, Selective

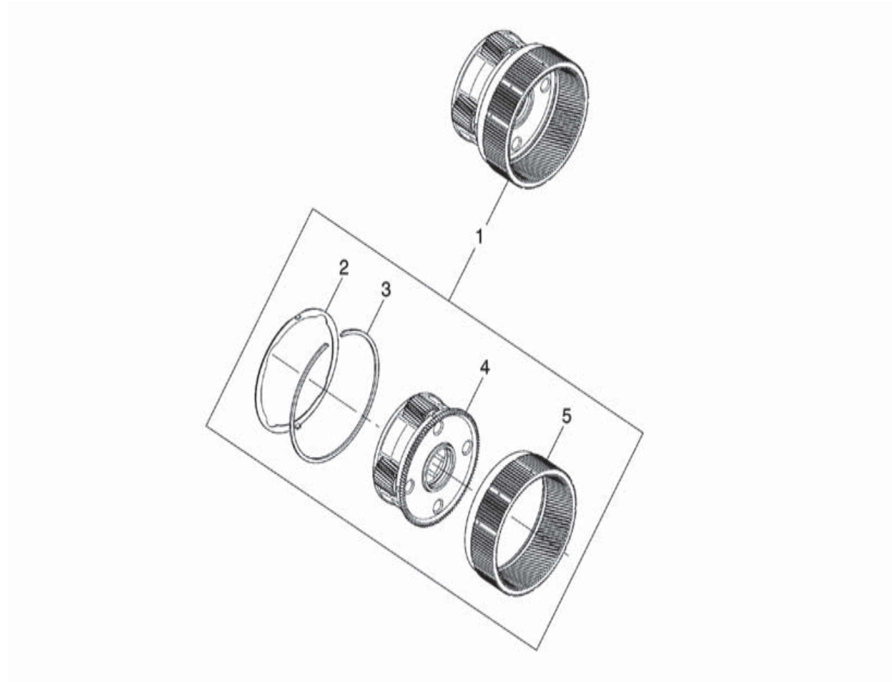
9	Output Shaft Thrust Bearing

INPUT CARRIER, INTERMEDIATE CARRIER, AND MAIN SHAFT DISASSEMBLED VIEW



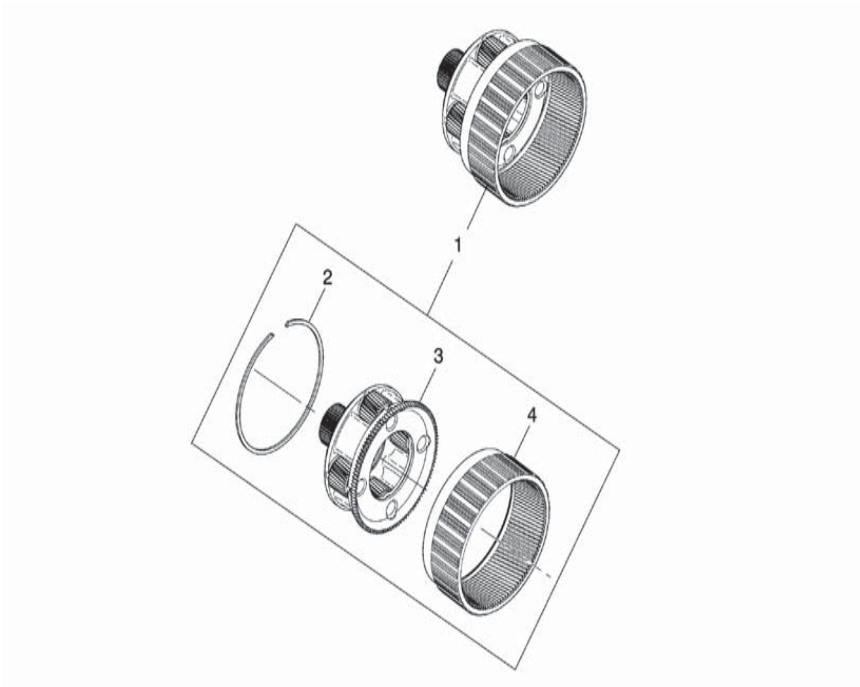
1	Input Carrier and Ring Gear Assembly
2	Input Carrier Thrust Bearing
3	Intermediate Carrier and Ring Gear Assembly
4	Intermediate Carrier Thrust Bearing
5	Main Shaft
6	Intermediate Sun Gear
7	Intermediate Sun Gear Spacer
8	Output Sun Gear

INPUT CARIER AND RING GEAR ASSEMBLY DISASSEMBLED VIEW



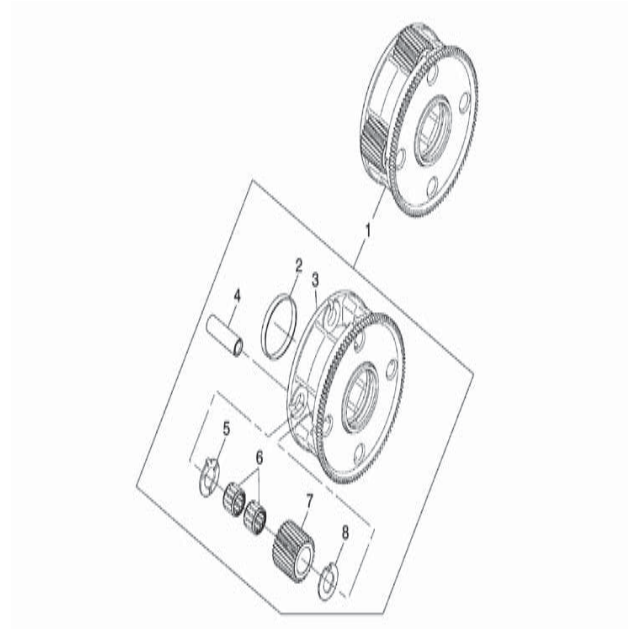
1	Input Carrier and Ring Gear Assembly
2	Input Carrier Thrust Washer
3	Input Carrier Internal Retaining Ring
4	Input Carrier Assembly
5	Intermediate and 2-6 Clutch Ring Gear

OUTPUT CARRIER DISASSEMBLED VIEW



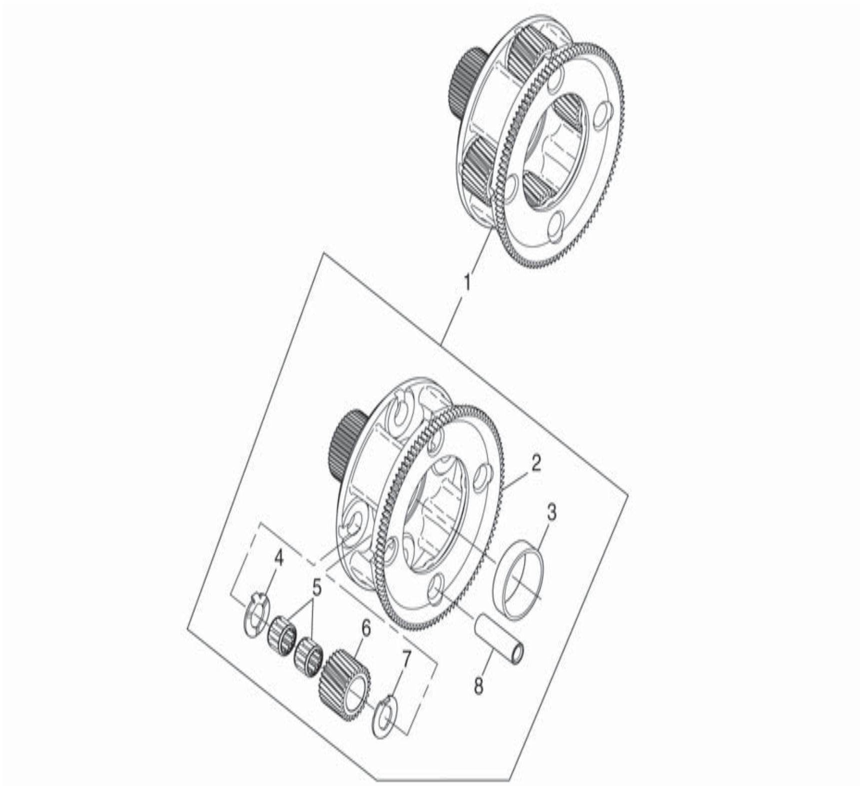
1	Intermediate Carrier and Ring Gear Assembly
2	Intermediate Carrier Internal Retaining Ring
3	Intermediate Carrier Assembly
4	Output Carrier and Low and Reverse Clutch Ring Gear

INPUT CARRIER ASSEMBLY DISASSEMBLED VIEW



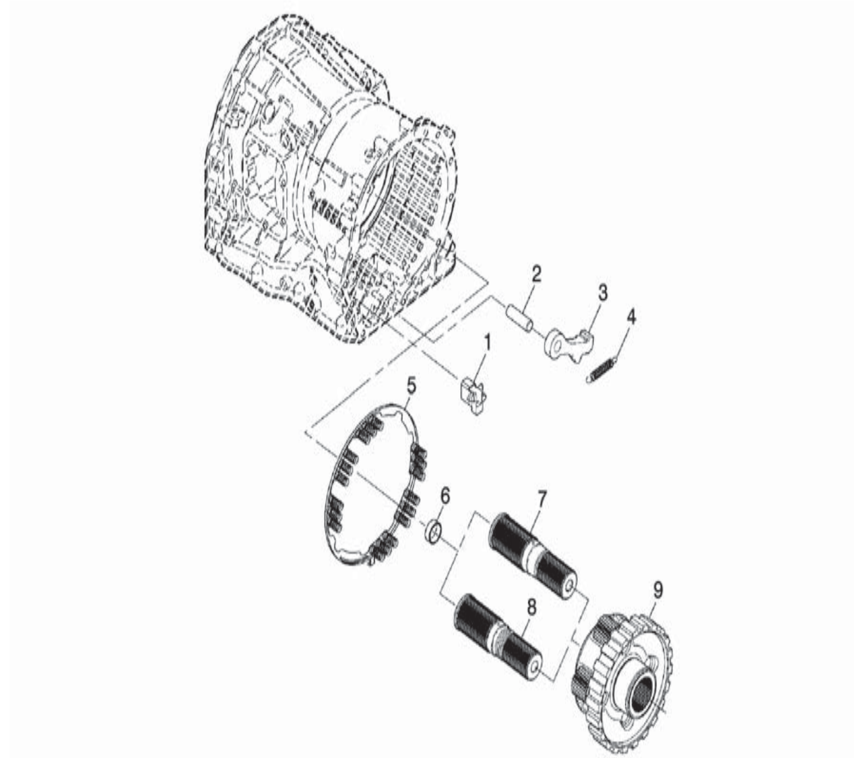
1	Input Carrier Assembly
2	Bushing, 53.0 mm (2.09 in) ID
3	Input Carrier
4	Input Carrier Spindle (4)
5	Input Carrier Thrust Washer (4)
6	Input Carrier Roller Bearing Assembly (8)
7	Input Carrier Pinion Gear (4)
8	Input Carrier Thrust Washer (4)

INTERMEDIATE CARRIER ASSEMBLY DISASSEMBLED VIEW



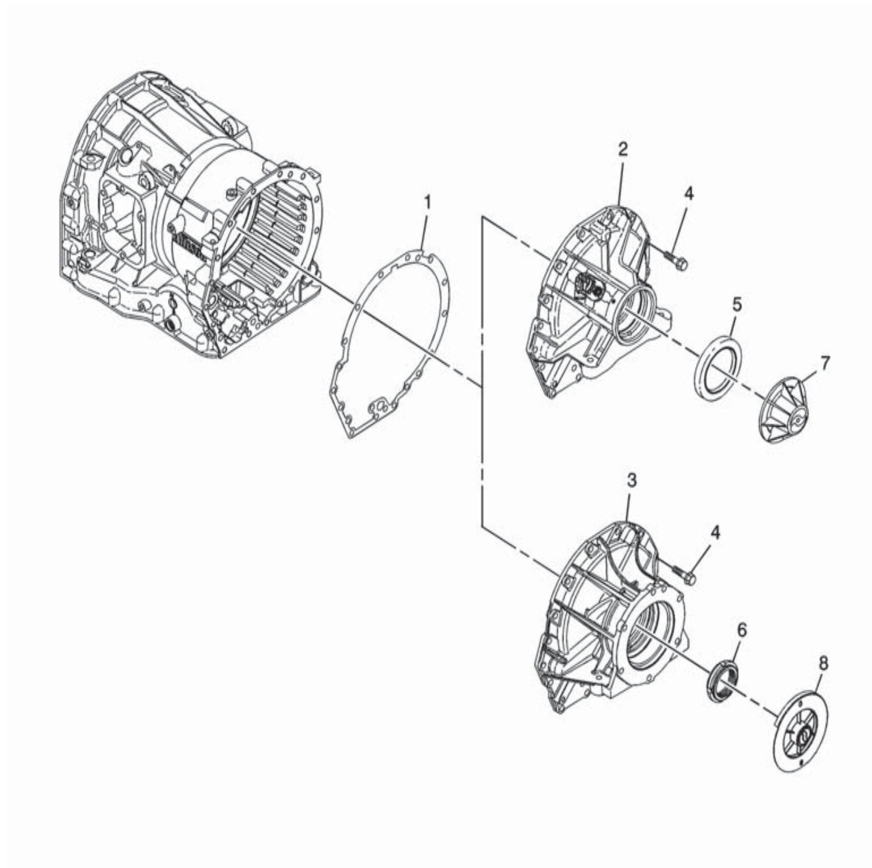
1	Intermediate Carrier Assembly
2	Intermediate Carrier
3	Intermediate Carrier Bushing, 36.0 mm (1.42 in) ID
4	Intermediate Carrier Thrust Washer (4)
5	Intermediate Carrier Roller Bearing Assembly (8)
6	Intermediate Carrier Pinion Gear (4)
7	Intermediate Carrier Thrust Washer (4)
8	Intermediate Carrier Spindle (4)

OUTPUT CARRIER ASSEMBLY, OUTPUT SHAFT, LOW AND REVERSE CLUTCH RETRURN SPRING ASSEMBLY AND PARK PAWL DISASSEMBLED VIEW



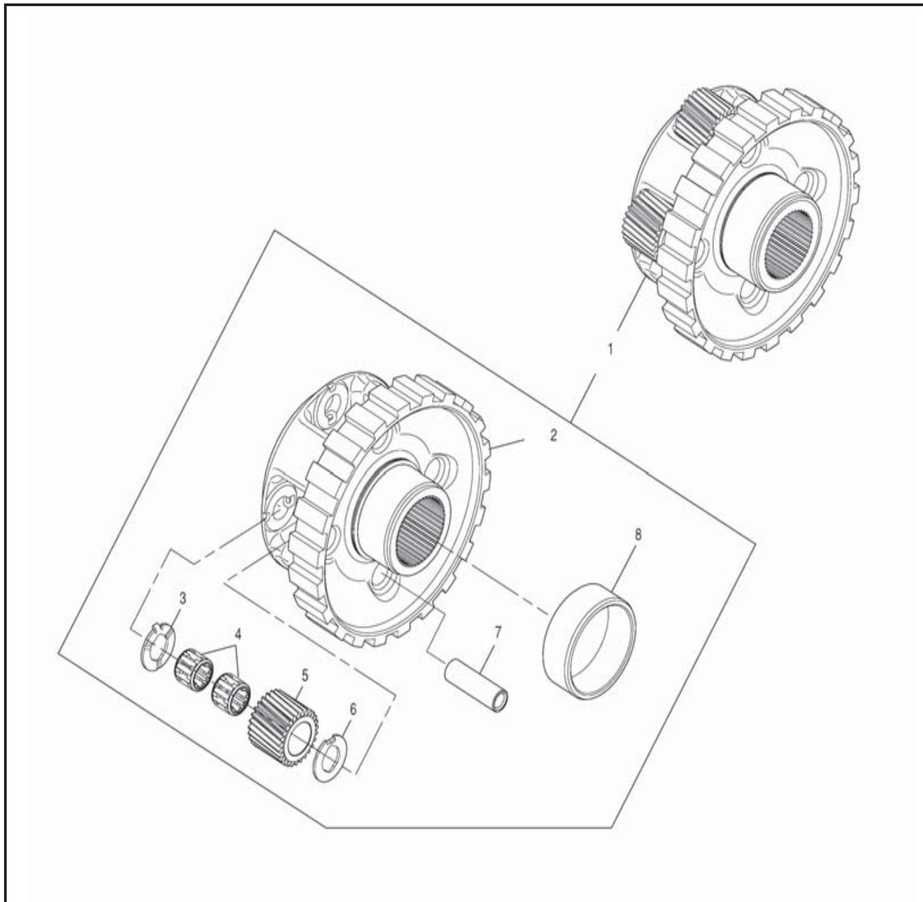
1	Park Pawl Cam Guide
2	Park Pawl Support Pin
3	Park Pawl
4	Park Pawl Return Spring
5	Low and Reverse Clutch Piston Return Spring Assembly
6	Bushing, 20 mm (0.8 in) ID
7	Output Shaft, 2WD
8	Output Shaft, 4WD (Not Used)
9	Output Carrier Assembly

LOW AND REVERSE CLUTCH PISTON HOUSING DISASSEMBLED VIEW



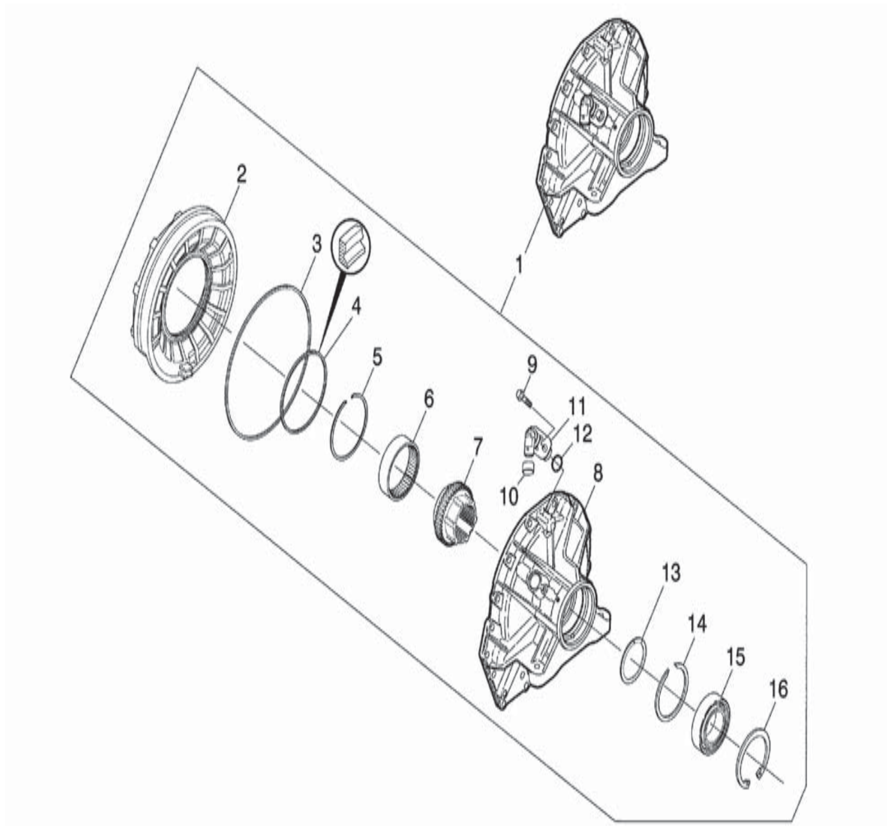
1	Low and Reverse Clutch Housing Gasket
2	Low and Reverse Clutch Housing, 2WD
3	Low and Reverse Clutch Housing, 4WD (Not Used)
4	Low and Reverse Clutch Housing Bolt, M10 x 1.5 x 40, Flanged Head (16)
5	Prop Shaft Front Slip Yoke Oil Seal
6	Output Nut, 4WD (Not Used)
7	Rear Shipping Cover, 2WD
8	Rear Shipping Cover, 4WD (Not Used)

OUTPUT CARRIER ASSEMBLY DISASSEMBLED VIEW



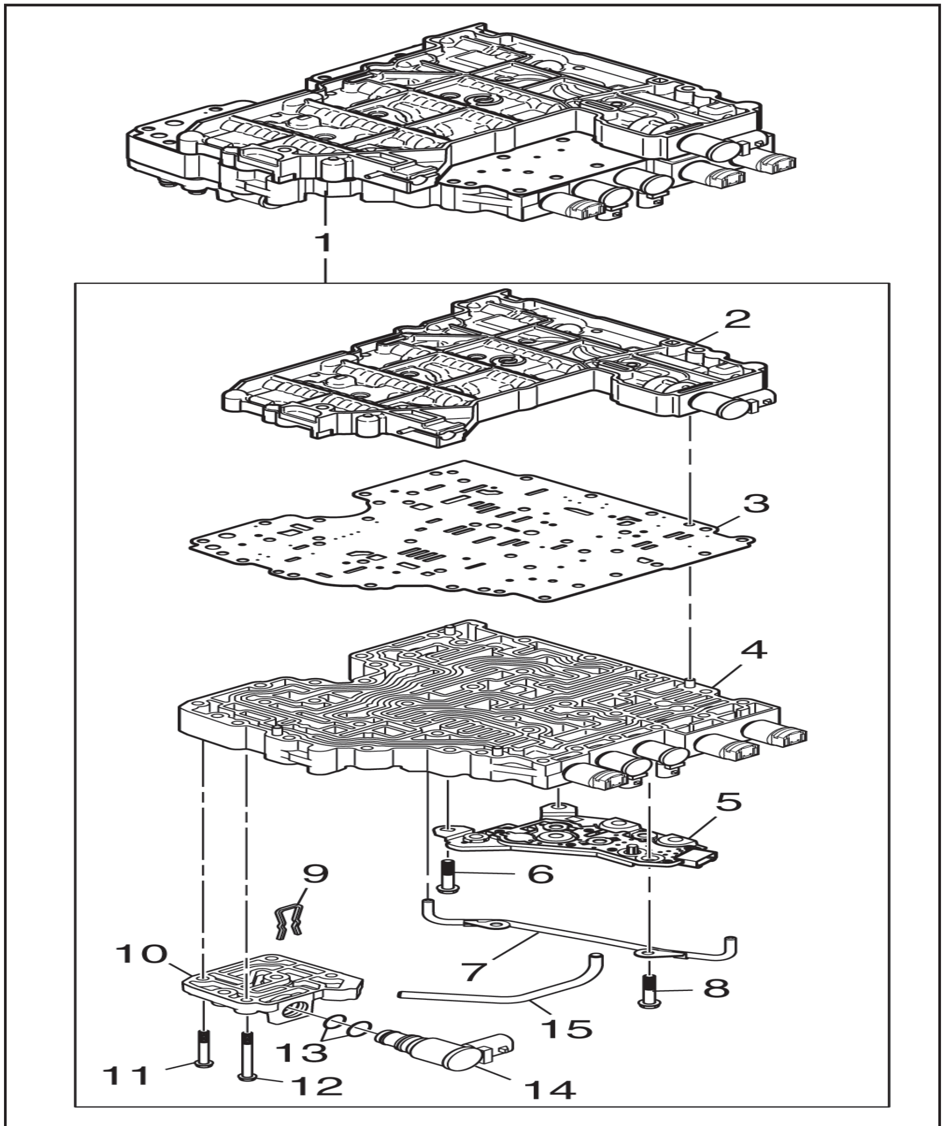
1	Output Carrier Assembly
2	Output Carrier
3	Output Carrier Thrust Washer (4)
4	Output Carrier Roller Bearing Assembly (8)
5	Output Carrier Pinon Gear (4)
6	Output Carrier Thrust Washer (4)
7	Output Carrier Planetary Spindle (4)
8	Output Carrier Bearing Race

LOW AND REVERSE CLUTCH HOUSING ASSEMBLY DISASSEMBLED VIEW



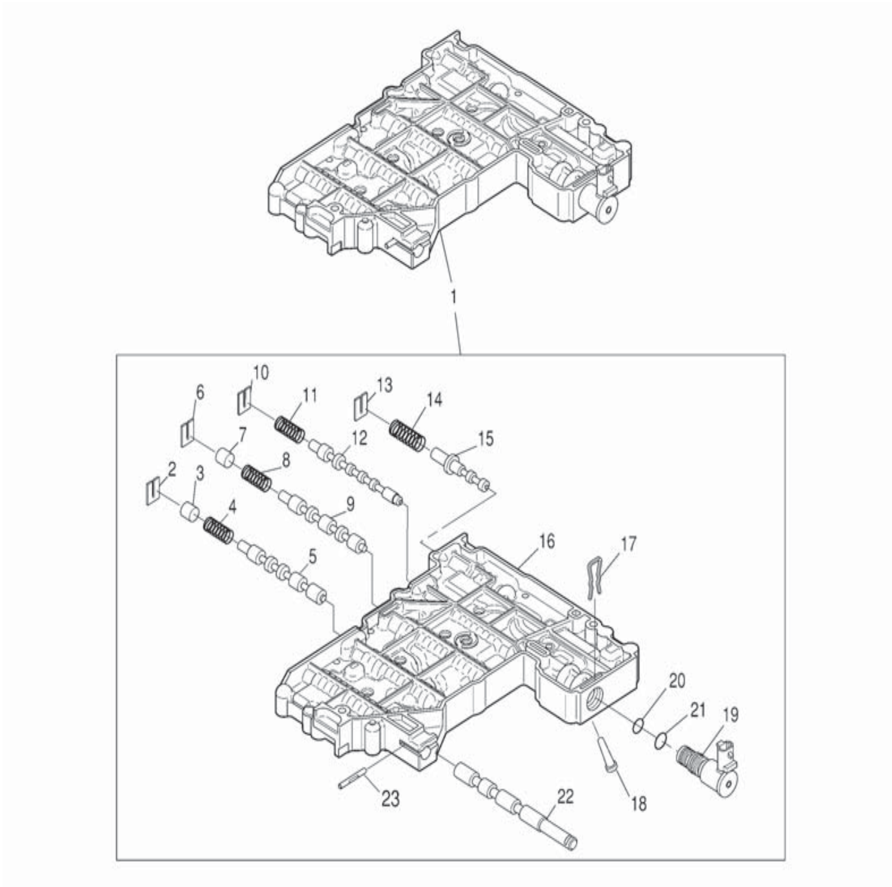
1	Low and Reverse Clutch Housing Assembly
2	Low and Reverse Clutch Piston
3	Low and Reverse Clutch Outer Piston Seal
4	Low and Reverse Clutch Inner Piston Seal
5	Internal Retaining Ring
6	Output Carrier Support Bearing
7	Output Speed Sensor Reluctor Wheel
8	Low and Reverse Clutch Housing,
9	Vehicle Speed Sensor Bolt, M6 x 1.0 x 13
10	Sensor Shipping Cover
11	Output Speed Sensor
12	Vehicle Speed Sensor O-Ring
13	Low and Reverse Clutch Selective Spacer
14	Low and Reverse Clutch External Retaining Ring
15	Output Shaft Support Bearing
16	Low and Reverse Clutch Internal Retaining Ring

CONTROL VALVE BODY ASSEMBLY DISASSEMBLED VIEW



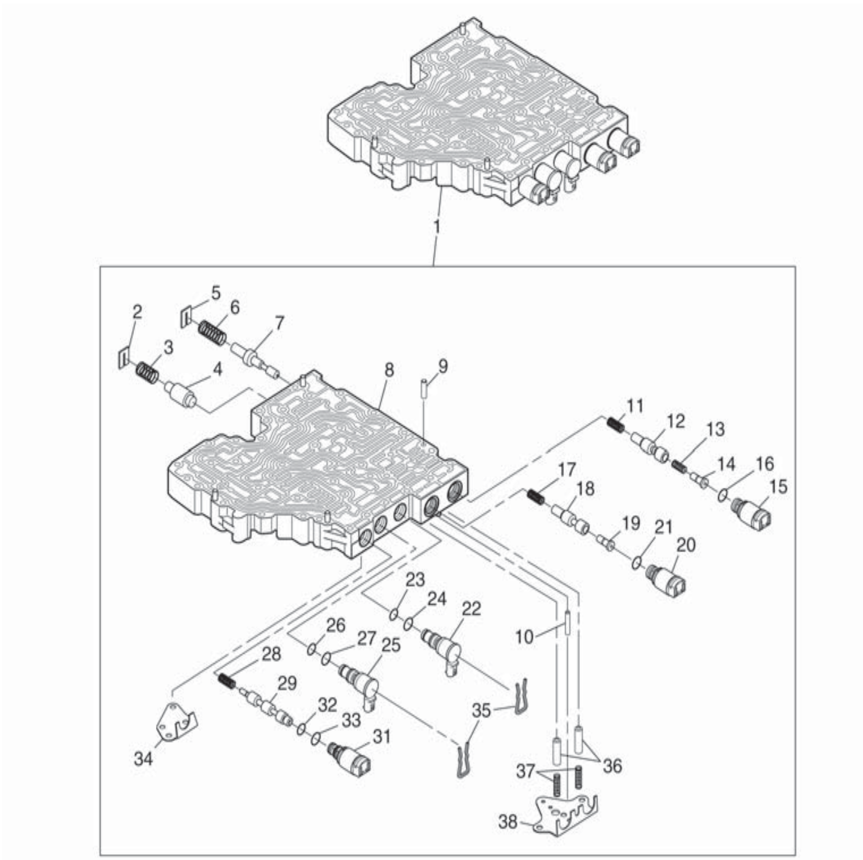
1	Control Valve Body Assembly
2	Shift Valve Body Assembly
3	Separator Plate
4	Main Valve Body Assembly
5	Transmission Fluid Pressure (TFP) Switch
6	Main Valve Body Assembly Bolt, M6 x 10 x 50, Flanged Head (23)
7	Reverse Signal Pipe
8	Reverse Signal Pipe Bolt, M6 x 10 x 50, Flanged Head
9	Retaining Clip
10	Modulated Main Valve Body
11	Bolt, M6 x 10 x 65
12	Bolt, M6 x 10 x 50
13	O-Rings
14	Modulated Main Pressure (MAIN MOD) Solenoid
15	6 Speed Pipe

SHIFT VALVE BODY ASSEMBLY



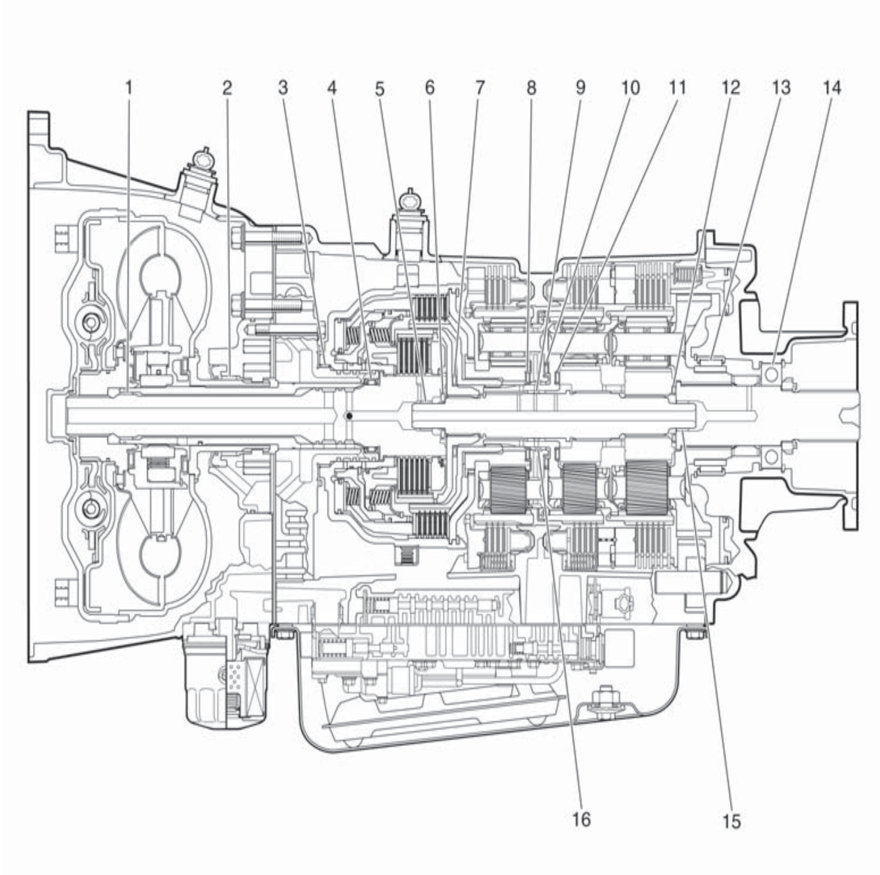
1	Shift Valve Body Assembly
2	Retaining Clip
3	Shift Solenoid 2 (SS2) Shift Plug
4	SS2 Shift Spring
5	SS2 Shift Valve
6	Retaining Clip
7	SS3 Shift Plug
8	SS3 Shift Spring
9	SS3 Shift Valve
10	Retaining Clip
11	SS1 Shift Spring
12	SS1 Shift Valve
13	Retaining Clip
14	Control Main Spring
15	Control Main Valve
16	Shift Valve Body
17	Shift Solenoid Retainer
18	Shift Solenoid Screen
19	SS1
20	Shift Solenoid O-Ring
21	Shift Solenoid O-Ring
22	Manual Valve
23	Manual Valve Pin

MAIN VALVE BODY ASSEMBLY DISASSEMBLED VIEW



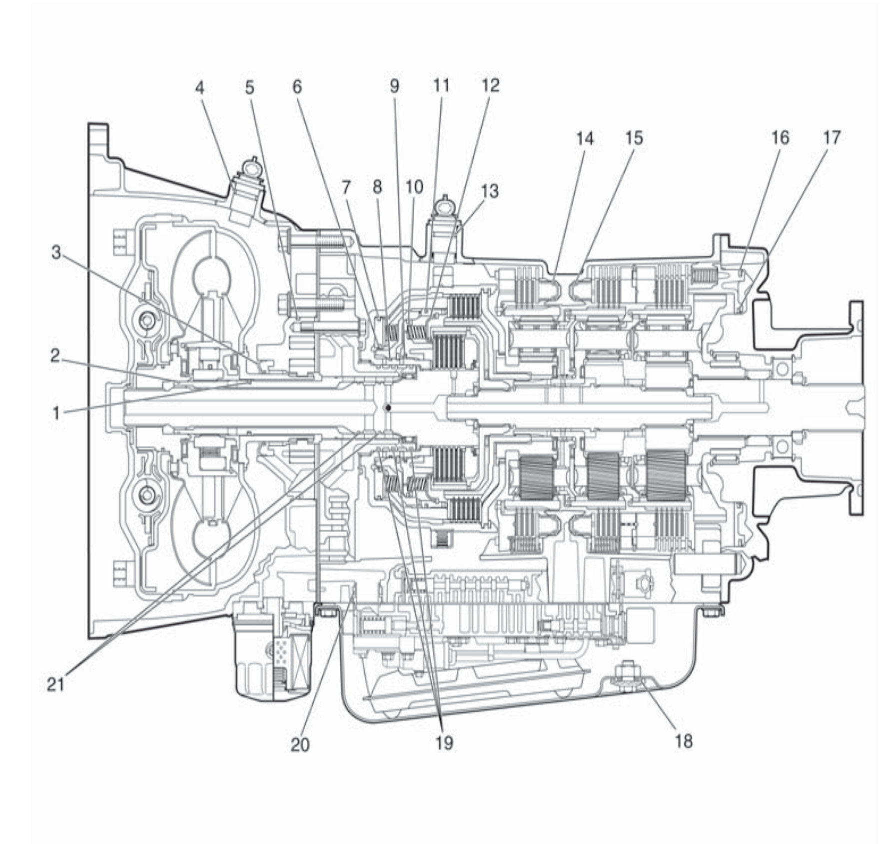
1	Main Valve Body Assembly
2	Retaining Clip
3	Exhaust Pressure Regulator Valve Spring
4	Exhaust Pressure Regulator Valve
5	Retaining Clip
6	Control Relief Spring
7	Control Relief Valve
8	Main Valve Body
9	Locating Pin (4)
10	Locating Pin
11	Pressure Control Solenoid 1 (PCS1) Spring
12	PCS1 Valve
13	PCS1 Spring
14	Trim Gain Valve
15	PCS1
16	PCS1 O-Ring
17	PCS2 Spring
18	PCS2 Valve
19	Trim Gain Valve
20	PCS2
21	PCS2 O-Ring
22	Shift Solenoid (SS) 3
23	SS3 O-Ring
24	SS3 O-Ring
25	SS2
26	SS2 O-Ring
27	SS2 O-Ring
28	Torque Converter Clutch Pressure Control Solenoid (TCC PCS) Spring
29	TCC PCS Valve
31	TCC PCS
32	TCC PCS O-Ring
33	TCC PCS O-Ring
34	TCC PCS Retaining Bracket
35	SS2 and SS3 Retainers (2)
36	Accumulator Plug (2)
37	Accumulator Spring (2)
38	PCS1 and PCS2 Retaining Bracket

BEARING AND BUSHING LOCATIONS



1	Stator Shaft Bushing
2	Oil Pump Bushing
3	1-2-3-4, 4-5-6 Clutch Piston Housing Bushing
4	Oil Pump Cover Assembly Needle Bearing
5	Turbine Shaft Bushing
6	1-2-3-4 Clutch Drive Hub Thrust Bearing
7	4-5-6 Clutch Hub Thrust Bearing
8	Input Carrier Thrust Bearing
9	Intermediate Carrier Bushing
10	Intermediate Carrier Thrust Bearing
11	Intermediate Carrier Thrust Bearing
12	Output Sun Gear Thrust Bearing
13	Output Carrier Needle Bearing
14	Low and Reverse Clutch Housing Ball Bearing
15	Output Shaft Bushing
16	Input Carrier Bushing

SEAL LOCATIONS

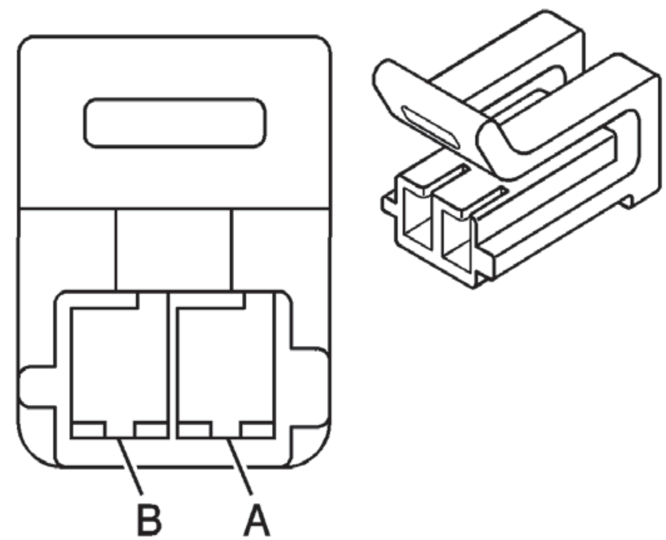


1	Stator Shaft Overlap Seal Ring
2	Stator Shaft Overlap Seal Ring

3	Oil Pump Lip Seal
4	Input Speed Sensor O-Ring
5	Pump Body O-Ring
6	4-5-6 Clutch Piston Inner Seal
7	4-5-6 Clutch Piston Outer Seal
8	1-2-3-4 Clutch Piston Assembly Outer Seal
9	1-2-3-4 Clutch Piston Inner Seal
10	1-2-3-4 Clutch Piston Outer Seal
11	1-2-3-4 Clutch Assembly Outer Seal
12	1-2-3-4 Clutch Balance Piston
13	Turbine Speed Sensor O-Ring
14	3rd, 5th, and Reverse Clutch Piston Seal Assembly
15	2-6 Clutch Piston Seal Assembly
16	Low and Reverse Clutch Piston Outer Seal
17	Low and Reverse Clutch Piston Outer Seal
18	Drain Plug O-Ring
19	Stator Shaft Overlap Seal Ring (3)
20	Transmission Internal Oil Filter Seal
21	Turbine Shaft Seal, 2

AUTOMATIC TRANSMISSION INTERNAL CONNECTOR END VIEWS

Mod Main Pressure Control Solenoid

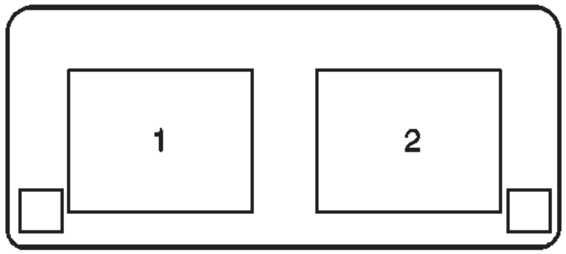


Connector Part Information

- OEM: 12146094
- Service: --
- Description: 2-Way F Metri-Pack 150.2 Series P2S (MD-GY)

Pin	Wire Color	Circuit No.	Function
A	RD	150	Actuator Supply Voltage 1 (HSD1)
B	YE	1532	Modulated Main Pressure Control Solenoid Low Pressure Control Solenoid 1 (PCS1)

Pressure Control Solenoid 1 (PCS1)

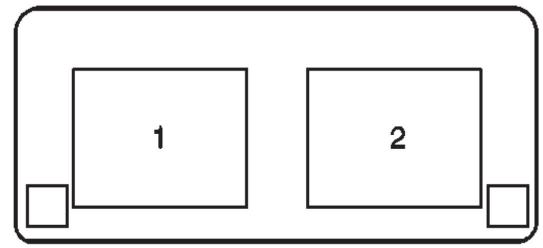


Connector Part Information

- OEM: 15326727
- Service: --
- Description: 2-Way F SRS Faston (NA)

Pin	Wire Color	Circuit No.	Function
1	RD	150	Actuator Supply Voltage 1 (HSD1)
2	D-BU	1525	Pressure Control Solenoid 1 (PCS1) Low

Pressure Control Solenoid 2 (PCS2)

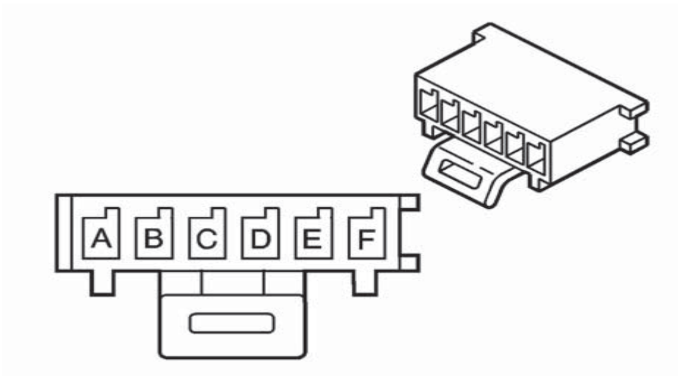


Connector Part Information

- OEM: 15326727
- ervice: --
- Description: 2-Way F SRS Faston (NA)

Pin	Wire Color	Circuit No.	Function
1	RD/BK	250	Actuator Supply Voltage 2 (HSD2)
2	L-BU	1526	Pressure Control Solenoid 2 (PCS2) Low

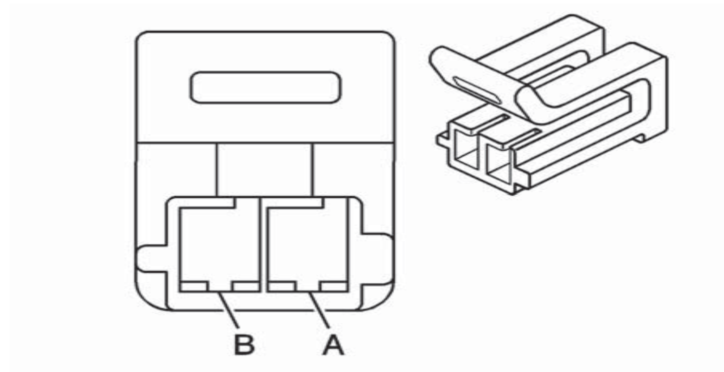
Pressure Switch Manifold (PSM)



Connector Part Information
- OEM: 12146095
- Service: --
- Description: 6-Way F Metri-Pack 150.2 Series P2S (NA)

Pin	Wire Color	Circuit No.	Function
A	OG	1224	Fluid Pressure Switch 1 (PS1) Signal
B	WH	1225	Fluid Pressure Switch 2 (PS2) Signal
C	GY	1226	Fluid Pressure Switch 3 (PS3) Signal
D	BN	901	Fluid Pressure Switch 4 (PS4) Signal
E	TN	1227	Transmission Fluid Temperature (TFT) Sensor Signal
F	BK	407	Transmission Fluid Temperature (TFT) Sensor Low

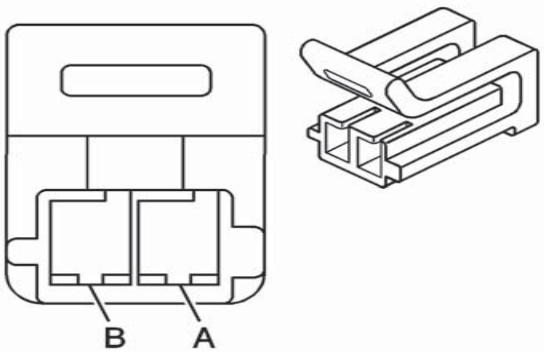
Shift Solenoid 1 (SS1)



Connector Part Information
- OEM: 12146094
- Service: --
- Description: 2-Way F Metri-Pack 150.2 Series P2S (GY)

Pin	Wire Color	Circuit No.	Function
A	RD/BK	250	Actuator Supply Voltage 2 (HSD2)
B	D-GN	1527	Shift Solenoid 1 (SS1) Low

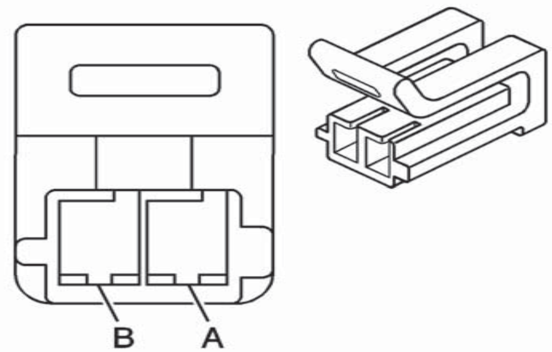
Shift Solenoid 2 (SS2)



Connector Part Information
- OEM: 12146094
- Service: --
- Description: 2-Way F Metri-Pack 150.2 Series P2S (GY)

Pin	Wire Color	Circuit No.	Function
A	RD/BK	250	Actuator Supply Voltage 2 (HSD2)
B	YE/BK	1528	Shift Solenoid 2 (SS2) Low

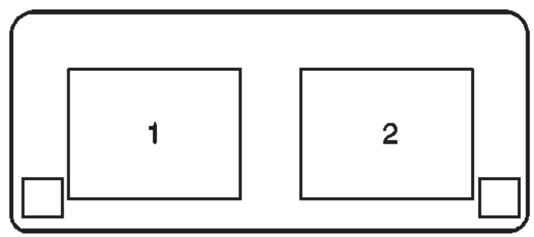
Shift Solenoid 3 (SS3)



Connector Part Information
- OEM: 12146094
- Service: --
- Description: 2-Way F Metri-Pack 150.2 Series P2S (GY)

Pin	Wire Color	Circuit No.	Function
A	RD/BK	250	Actuator Supply Voltage 2 (HSD2)
B	BK/WH	1529	Shift Solenoid 3 (SS3) Low

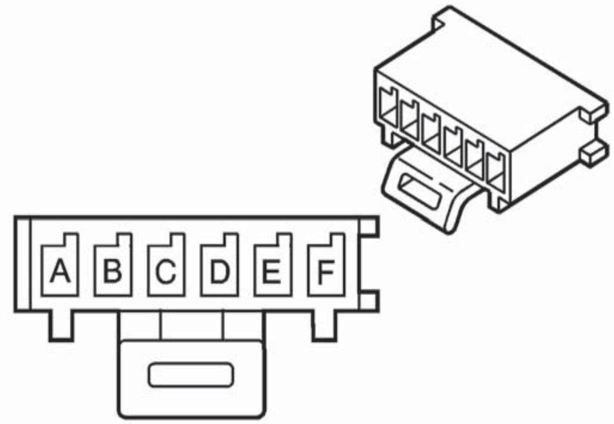
Torque Converter Clutch Pressure Control Solenoid (TCC PCS)



Connector Part Information
- OEM: 15326727
- Service: --
- Description: 2-Way F SRS Faston (NA)

Pin	Wire Color	Circuit No.	Function
1	RD	150	Actuator Supply Voltage 1 (HSD1)
2	PK	1531	Torque Converter Clutch Pressure Control Solenoid (TCC PCS) Low

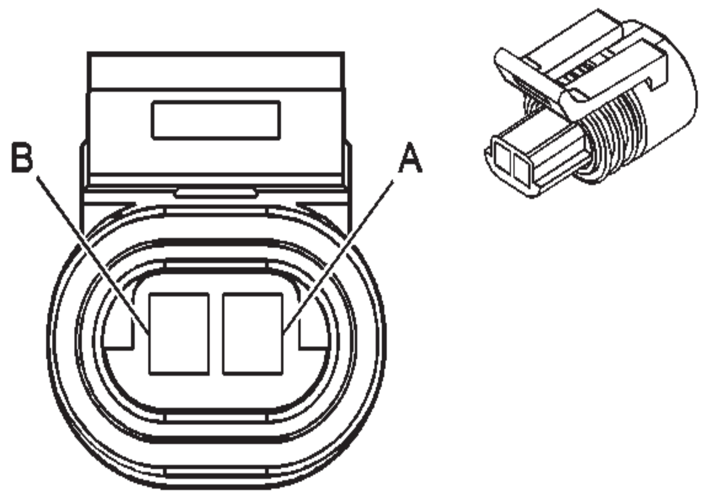
Transmission Internal Mode Switch



Connector Part Information
- OEM: 12146095
- Service: --
- Description: 6-Way F Metri-Pack 150.2 Series P2S (NA)

Pin	Wire Color	Circuit No.	Function
A	PU/BK	771	Park/Neutral Signal
B	PK/BK	772	Transmission Range Switch Signal P
C	YE/BK	773	Transmission Range Switch Signal A
D	TN/WH	776	Transmission Range Switch Signal B
E	BK/WH	1995	Transmission Range Switch Signal C
F	BK	407	Ground

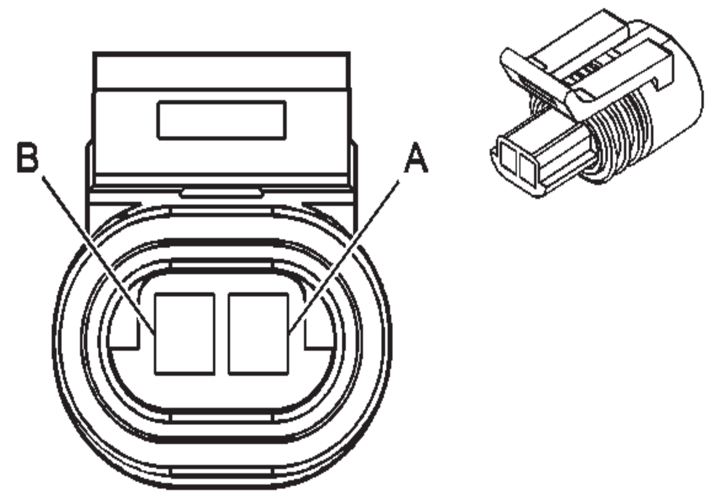
Automatic Transmission Input Speed Sensor (AT ISS)



Connector Part Information
- OEM: 12162194
- Service: --
- Description: 2-Way F Metri-Pack 150.2 Series SLD (BK)

Pin	Wire Color	Circuit No.	Function
A	RD/BK	1230	Automatic Transmission Input Speed Sensor (AT ISS) Signal - High
B	D-BU/WH	1231	Automatic Transmission Input Speed Sensor (AT ISS) Signal - Low

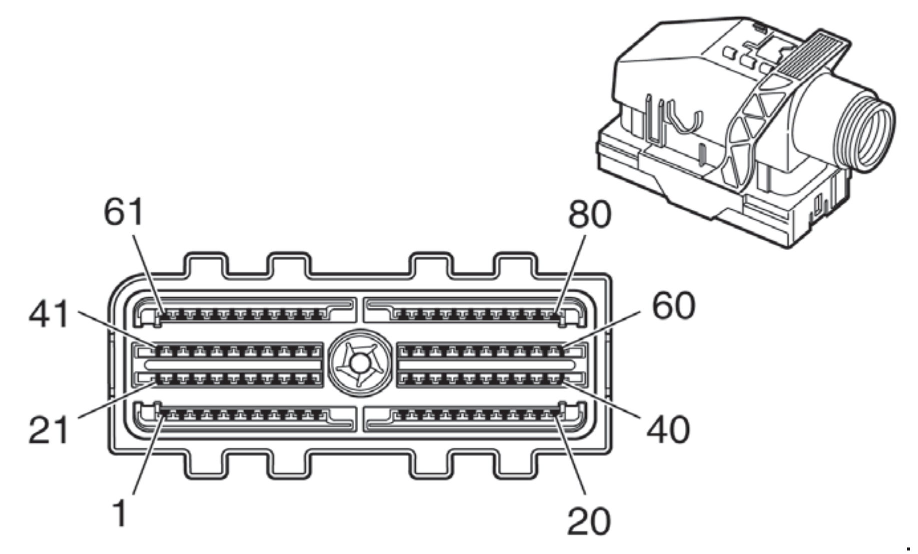
Automatic Transmission Turbine Speed Sensor



Connector Part Information
- OEM: 12162194
- Service: --
- Description: 2-Way F Metri-Pack 150.2 Series SLD (BK)

Pin	Wire Color	Circuit No.	Function
A	OG	1983	Transmission Turbine Speed Sensor Signal
B	L-BU	1984	Transmission Turbine Speed Sensor Low Reference

Transmission Control Module (TCM) 80-Way Connector

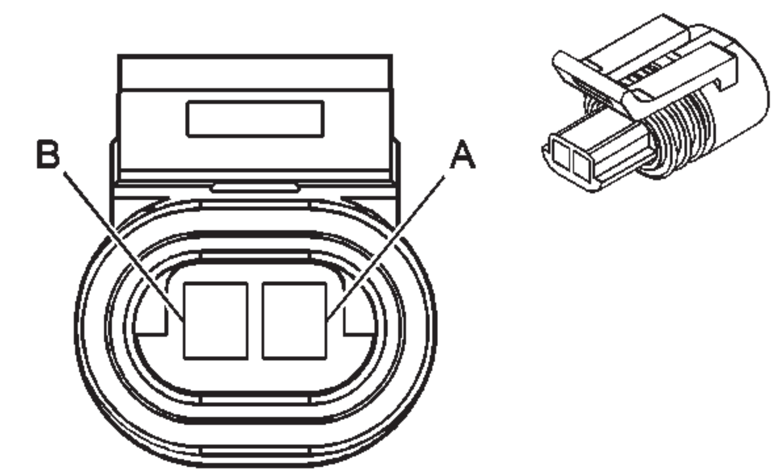


Connector Part Information
- OEM: 13551663
- Service: --
- Description: 80-Way

Pin	Wire Color	Circuit No.	Function
1	--	--	Not Used
2	PU	420	Torque Converter Clutch (TCC) Brake Switch/Cruise Control Release Signal
3-4	--	--	Not Used
5	OG/BK	483	Requested Torque Signal
6	TN/WH	2500	High Speed GMLAN Serial Data Bus High
7-8	--	--	Not Used
9	BK/WH	451	Ground
10	OG	4440	Battery Positive Voltage
11	RD/BK	1228	Actuator Supply Voltage 1 (HSD1)
12-13	--	--	Not Used
14	GY	773	Transmission Range Switch Signal C
15-16	--	--	Not Used
17	PK	1224	Fluid Pressure Switch Signal 1
18	YE	400	Vehicle Speed Sensor (VSS) Signal High
19	--	--	Not Used
20	L-BU	1984	Transmission Turbine Speed Switch Low
21	--	--	Not Used
22	WH	2467	Unmanaged Torque Signal
23	YE	2522	Power Take-Off (PTO) Engage Signal
24-25	--	--	Not Used
26	TN/WH	2500	High Speed GMLAN Serial Data Bus High
27	TN	2501	High Speed GMLAN Serial Data Bus Low
28	--	--	Not Used
29	D-BU	2466	Transmission Malfunction Indicator Lamp (MIL) Request Signal
30-32	--	--	Not Used
33	YE/BK	1223	Shift Solenoid 2 (SS2) Low
34	WH	776	Transmission Range Switch Signal P
35	--	--	Not Used
36	BN/WH	2469	Pressure Control Solenoid 2 (PCS2) Low
37-38	--	--	Not Used
39	D-BU/BK	1231	Automatic Transmission Input Speed Sensor (AT ISS) Signal Low
40	L-GN/BK	822	Vehicle Speed Sensor (VSS) Signal Low
41	--	--	Not Used
42	GY/BK	1694	Four Wheel Drive (4WD) Low Signal

43	PU	806	Crank Voltage
44	TN/BK	464	Delivered Torque Signal
45	--	--	Not Used
46	YE	2470	Class 2 Serial Data
47	L-BU	6106	High Speed GMLAN Serial Data Bus Low
48-50	--	--	Not Used
51	OG/WH	2527	Shift Solenoid 3 (SS3) Low
52	L-GN	1222	Shift Solenoid 1 (SS1) Low
53	YE	772	Transmission Range Switch Signal B
54	YE/BK	1227	Transmission Fluid Temperature (TFT) Sensor Signal
55	L-BU/WH	1229	Pressure Control Solenoid 1 (PCS1) Low
56	PU	5526	Driver Shift Request Signal
57	RD	1226	Fluid Pressure Switch Signal 3
58	BK	2762	Transmission Fluid Temperature (TFT) Sensor Return
59	RD/BK	1280	Automatic Transmission Input Speed Sensor (AT ISS) Signal High
60	PU/WH	821	Vehicle Speed Sensor (VSS) Signal High
61-62	--	--	Not Used
63	PK	1020	Ignition 0 Voltage
64-65	--	--	Not Used
66	D-BU	6105	High Speed GMLAN Serial Data Bus High
67-68	--	--	Not Used
69	BK/WH	451	Ground
70	--	--	Not Used
71	BN	323	Actuator Supply Voltage 2 (HSD2)
72	--	--	Not Used
73	BK/WH	771	Transmission Range Switch Signal A
74	D-BU	1530	Mod Main Pressure Control Solenoid Low
75-76	--	--	Not Used
77	L-GN/BK	2529	Fluid Pressure Switch Signal 4
78	BN	418	Torque Converter Clutch Pressure Control Solenoid (TCC PCS) Low
79	D-BU	1225	Fluid Pressure Switch Signal 2
80	OG	1983	Transmission Turbine Speed Switch Signal

Vehicle Speed Sensor (VSS)



Connector Part Information
- OEM: 12162194
- Service: --
- Description: 2-Way F Metri-Pack 150.2 Series SLD (BK)

Pin	Wire Color	Circuit No.	Function
A	PU/WH	821	Vehicle Speed Sensor (VSS) Signal HI
B	L-GN/BK	822	Vehicle Speed Sensor (VSS) Signal Low

INTRODUCTION

OBJECTIVES OF THIS SECTION

This section is intended to provide information regarding the automatic transmission systems. This is specific to the W-Series Workhorse Chassis.

Explanations for most components will include purpose, function, operation, and location. Guidance for proper and safe disassembly, inspection, repair, and assembly are provided.

DESCRIPTION AND OPERATION

Transmission General Information

When attempting to diagnose a suspected 1000 Series transmission problem, always begin by conducting the Functional Test Procedure. Refer to Functional Test Procedure. This procedure indicates the proper path for diagnosing the transmission by making basic checks. This procedure will refer you to the locations of specific checks. After you have determined the cause of a condition, you either take corrective action or install a replacement transmission. Refer to Transmission Replacement.

NOTICE:
DO NOT, under any circumstances, attempt to diagnose a powertrain condition without basic knowledge of this powertrain. If you perform diagnostic procedures without this basic knowledge, you may incorrectly diagnose the condition or damage the powertrain components.

You must be familiar with some basic electronics in order to use this section of the manual. You should be able to use the following special tools:

- A Digital Multimeter (DMM)
- A circuit tester
- Jumper wires or leads
- A line pressure gauge set

The functional test procedures verify the correct operation of electronic components in the transmission. These procedures eliminate the unnecessary removal of transmission components.

IMPORTANT:
If you probe a wire with a sharp instrument and do not properly seal the wire afterward, the wire corrodes and an open circuit results.

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, easy to install and they permanently seal the wire from corrosion.

DEFINITIONS AND ABBREVIATIONS

Throttle Position Definitions

Heavy Throttle: Approximately 75% of accelerator pedal travel

Light Throttle: Approximately 25% of accelerator pedal travel

Medium Throttle: Approximately 50% of accelerator pedal travel

Wide-Open Throttle (WOT): Full travel of the accelerator pedal, 100% throttle

Closed Throttle: Foot is off the accelerator pedal or pedal is not depressed, 0% throttle

Throttle-Related Shift Condition Definitions

Closed Throttle Manual Downshift: A condition where the engine is used to slow the vehicle by manually downshifting during a closed throttle coast down

Closed Throttle Coast Down: A full release of the accelerator pedal while the transmission remains in DRIVE range, allowing the transmission to downshift as vehicle speed reduces

WOT Detent Downshift: Quick apply of the accelerator pedal to its full travel, forcing a downshift

WOT Upshifts/Downshifts: Accelerator pedal is fully depressed and transmission shifts sequentially through ranges as dictated by load and grade

Shift Condition Definitions

Bump: A sudden and forceful apply of a clutch

Delayed: A shift was expected but did not occur for several seconds, as during a manual downshift or WOT detent downshift - may also be defined as Late or Extended

Double Bump: Two bumps felt during a clutch apply

Early: Shift occurs at lower speed than expected, often accompanied by engine laboring after an upshift

End Bump: A firmer feel at the end of a shift than at the start of a shift

Firm: A noticeably quick apply of a clutch at medium or heavy throttle conditions - DO NOT confuse with Harsh or Rough

Flare: A quick increase in engine speed along with a momentary loss of torque during a shift transition - also defined as Slipping

Harsh – Rough: More noticeable clutch apply than Firm - considered unacceptable at any throttle position

Hunting: A repeating quick series of upshifts and downshifts that cause a noticeable change in engine speed, such as 4-3-4, etc. - sometimes defined as Cycling

Initial Feel: A distinctly firmer feel at the start of a shift than at the finish of a shift

Late: A shift that occurs at a higher speed than normal for a given throttle position

Shudder: Multiple, rapid jerks usually associated with an oncoming clutch

Slipping: A noticeable increase in engine speed without an increase in vehicle speed - usually occurring just after the initial application of a clutch

Soft: A slow, almost unnoticeable, clutch apply

Surge: A repeating engine-related condition of acceleration and deceleration that is less intense than Shudder

Tie-up: A condition where 2 opposing clutches, usually 1 oncoming and 1 offgoing, are applied at the same time - giving a braking sensation and/or loss of engine speed

Noise Conditions

Planetary Gear Noise: A whine related to engine speed and noticeable in a particular transmission range - may be less noticeable or disappear following a transmission upshift

Pump Noise: A high pitched whine that increases in intensity with increasing engine speed - may occur in any transmission range and with the vehicle moving or stationary

Torque Converter Noise: A whine usually noticed when the vehicle is stopped and the transmission is in D, DRIVE, or R, REVERSE

Thermostatic Fan Noise: A normal noise that occurs while climbing a grade under load, caused by the engaging/disengaging of the engine cooling fan thermostatic clutch

TRANSMISSION ABBREVIATIONS

AC: Alternating Current

DC: Direct Current

DLC: Diagnostic Link Connector

DMM: Digital Multimeter

DTC: Diagnostic Trouble Code

ECM: Engine Control Module

ECT: Engine Coolant Temperature

EMI: Electromagnetic Interference

IGN: Ignition

IMS: Internal Mode Switch

MIL: Malfunction Indicator Lamp

NC: Normally Closed

NO: Normally Open

OBD: On Board Diagnostic

PCS: Pressure Control Solenoid

PS: Pressure Switch

PTO: Power Take-Off

RPM: Revolutions Per Minute

SS: Shift Solenoid

TCC: Torque Converter Clutch

TCM: Transmission Control Module

TFT: Transmission Fluid Temperature

TP: Throttle Position

TPS: Throttle Position Sensor

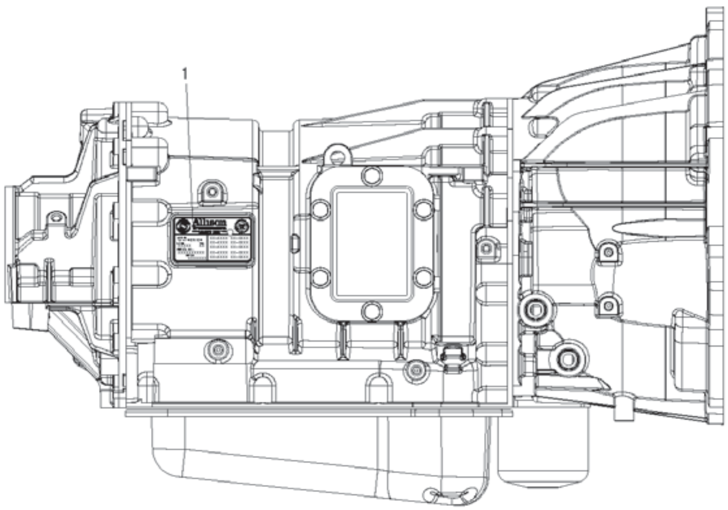
VBS: Variable Bleed Solenoid

WOT: Wide-Open Throttle

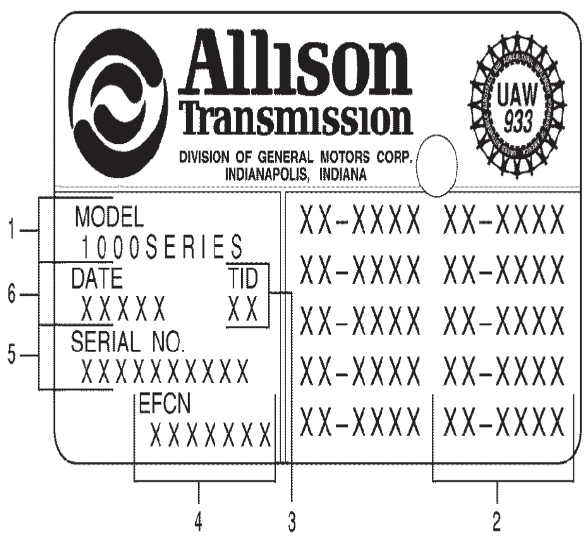
2WD: Two-Wheel Drive

4WD: Four-Wheel Drive

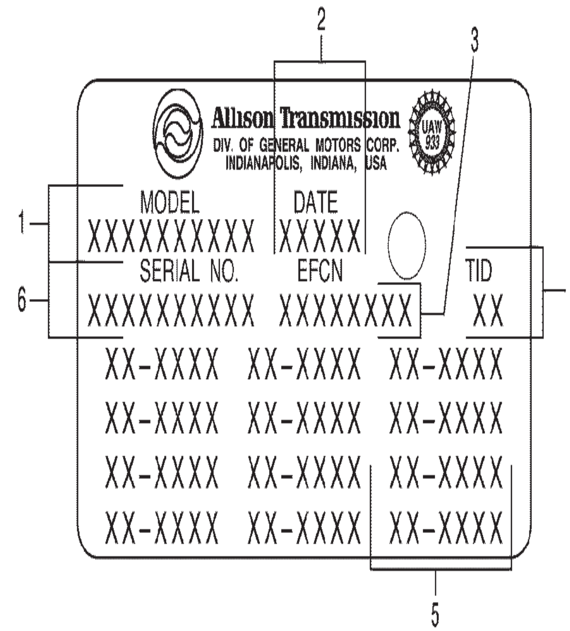
TRANSMISSION IDENTIFICATION INFORMATION



(1) Nameplate



(1) Model (Series)
(2) Engineering Group Number
(3) Transmission Identification Number
(4) Engineering Feature Configuration Number
(5) Serial Number
(6) Date of Manufacture



(1) Model (Series)
(2) Date of Manufacture
(3) Engineering Feature Configuration Number
(4) Transmission Identification Number
(5) Engineering Group Number
(6) Serial Number

Externally Generated Electronic Interference (Speed Sensor Signals)

Use the following procedures in order to determine if speed sensor signals, generated by a source external to the transmission or wiring harness, are present:

1. Turn the ignition ON.
2. Keep the engine OFF.
3. If the transmission control module (TCM) is ON, install the scan tool.

IMPORTANT:
If false speed signals were present at the previous shutdown, the TCM might still be ON, even though the ignition is OFF. The scan tool is powered by ignition power. The ignition must be ON in order to use the scan tool to read the speed signals.

4. Read the speed sensor signals.
5. If a speed sensor signal is something other than one (1), there is a short to another circuit that is carrying an AC or pulse width modulated (PWM) signal.
6. Measure the resistance of the sensor.
7. Inspect for shorts to other circuits within the harness or transmission connector.
8. Inspect to ensure there is no conductive material inside the connector.
9. Inspect to ensure the speed sensor circuit wires are a twisted pair.
10. Inspect to ensure a properly grounded drain wire.
11. Inspect for the presence of a strong external AC signal.
12. Repair or replace parts as required.

TRANSMISSION GENERAL DESCRIPTION

Allison 1000 Series transmissions are torque converter driven, fully automatic, transmission systems. The 1000 Series transmissions have 6 forward speeds, NEUTRAL, and REVERSE. The fifth and sixth range has overdrive gear ratio. The 1000 Series incorporates a variety of standard and optional design features. These design features include the following:

- Direct mount to engine block
- Flexplate drive
- Torque converter with a torque converter clutch (TCC) and integral vibration damper
- 3 constant-mesh planetary gear sets with helical gears
- 5 multiple disk clutches - 2 rotating and 3 stationary
- Common hydraulic system for all transmission functions
- 2 transmission fluid filtration systems
- Electrohydraulic control valve assembly
- Electronically controlled automatic gear selection and clutch apply
- Fill tube/dipstick provision on both sides of transmission
- Parking pawl
- Power takeoff (PTO) provision on both sides of transmission

TRANSMISSION COMPONENT AND SYSTEM DESCRIPTION

Engine/Transmission Connection

The converter housing of 1000 Series transmissions mates directly to the engine block. Flexplate drive is used for engine-to-transmission torque transfer.

Torque Converter

Several torque converters are available to match the transmissions to a wide variety of diesel and gasoline engines. The torque converter is a single-stage, polyphase, and 3-element unit, consisting of a pump, stator, and turbine. At lower output speeds, the torque converter multiplies torque and provides a fluid coupling to the engine. At higher speeds, the torque converter clutch (TCC) is automatically engaged to provide direct drive from the engine to the transmission. Hydraulic fluid for converter charging pressure comes from the sump and is supplied by the input pump. The TCC is applied or released by changing direction of fluid in the torque converter. An integral converter damper minimizes the need for additional engine vibration control.

Gear Sets

The planetary gear train includes 3 constant-mesh planetary gear sets containing high-helix gears. By the engagement of the clutches in various combinations, the planetary sets act singly or together to provide 6 forward ranges, NEUTRAL, and REVERSE.

Clutches

5 clutches, 2 rotating and 3 stationary, direct the flow of torque through the transmission. All range clutches are hydraulically actuated and spring-released, with automatic wear compensation. The transmission fluid cools the clutches. The transmission control module (TCM) signals solenoid valves to apply and release clutches based on speed and power combinations and the range selected by the operator.

Hydraulic System

A common hydraulic system serves the torque converter and the transmission. Transmission fluid for all hydraulic operations, lubrication, and cooling comes from the sump and is supplied by the charging pump.

Transmission Fluid Filtration

Fluid filtration is provided by 2 filter systems. A suction filter, located in the sump, provides general protection to the entire hydraulic system by filtering large particulates. A spin-on filter provides full-time protection for the control solenoids and multipass protection for the entire system. The spin-on filter is externally located on the converter housing at the lower left front of the transmission.

Electrohydraulic Control Valve Assembly

The control valve assembly consists of 2 components. The main valve body contains the pressure control valves, the TCC valve, the exhaust backfill valve, and the control main relief valve. The shift valve body contains the shift valves, the control main pressure valve, and the manual selector valve. The control valve assembly attaches to the bottom of the main case module and is enclosed by the oil pan.

Remote Oil Cooler Provision

Ports for remote-mount oil cooler lines are located on the right side of the converter housing near the converter housing/main housing splitline. Remote oil-to-water coolers require plumbing for transmission fluid and engine-cooling water. Remote oil-to-air coolers may also be used and only transmission fluid lines need to be provided. Heat is transferred from the transmission fluid to either water or air depending upon the cooler type used.

Fill Tube/Dipstick Provision

All 1000 Series models have a fill tube/dipstick provision on both sides of the transmission. A plug is installed in the unused location.

Park Pawl

All 1000 Series transmissions have a park pawl. The internal parking pawl is engaged by selection of the PARK position on the shift selector.

Power Take-Off (PTO) Provision

The 1000 Series transmissions have a provision to mount and drive a PTO unit on the left and/or right side of the transmission housing. The torque converter turbine drives the optional PTO drive gear. The PTO reflects engine and torque converter characteristics.

Tow/Haul Mode

Tow/Haul mode significantly changes the transmission shift pattern to reduce shift cycling and to deliver better performance, control, and cooling when towing or hauling heavy loads. For instance:

- Upshift points are raised at light to mid throttle position to use more of the available engine power for acceleration. Downshift points are raised to enhance engine braking to help slow the vehicle.
- During deceleration, the torque converter clutch (TCC) remains applied at closed throttle at lower speeds to significantly improve the effect of engine braking.
- During acceleration, the TCC is applied in 2nd range and remains applied in 3rd, 4th, 5th and 6th. This improves the drivetrain efficiency and significantly lowers transmission sump temperature when towing heavy loads. In Normal mode, the TCC generally applies only in higher ranges and is dependent on throttle position.
- Tow/haul is designed to be most effective when the

vehicle and trailer combined weight is at least 75 percent of the gross combined weight rating (GCWR) of the vehicle.

- Operation of tow/haul in a lightly loaded or non-loaded vehicle will not cause damage. However, there is no benefit to the selection of tow/haul when the vehicle is unloaded. This situation will cause a firm shift. The tow/haul switch is not a performance switch.
- Selection of tow/haul when unloaded may result in unpleasant engine and transmission driving characteristics and reduced fuel economy. Tow/haul is recommended only when pulling a heavy trailer or a large or heavy load.

Activation

- Tow/Haul is selected or de-selected via a switch on the end of the transmission shift lever. A lamp on the instrument panel will illuminate to indicate that tow/haul has been selected.
- Tow/Haul must be selected again, every time the vehicle is started, if desired.

Adapt Function

The transmission control module (TCM) produces excellent shift quality by applying closed loop control that constantly adjusts shift characteristics for changes in operating conditions. These adjustments are based on vehicle conditions, such as grade, load, and engine power.

The learning process of comparing and adjusting shift parameters is referred to as adaptive control. Adaptive control establishes initial conditions for shifts and makes during shift adjustments. The TCM constantly monitors operating conditions, such as battery voltage and transmission sump temperature, and adjusts shift parameters accordingly. After a shift is completed, the TCM compares the shift to a target shift profile in the TCM calibration and makes adjustments before the next shift of the same kind is made.

The Allison 1000 Series transmission consists of 5 clutches. A combination of 2 clutches is required to be engaged, in order to attain a torque path from the input to the output of the transmission. The following table indicates the clutch combinations for each gear range.

Gear Range	1-2-3-4 Clutch	4-5-6 Clutch	3rd, 5th and Reverse Clutch	2-6 Clutch	Low and Reverse Clutch	TCC
PARK/ NEUTRAL	--	--	--	--	X	--
REVERSE	--	--	X	--	X	--
First	X	--	--	--	X	--
Second	X	--	--	X	--	X
Third	X	--	X	--	--	X
Fourth	X	X	--	--	--	X
Fifth	--	X	X	--	--	X
Sixth	--	X	--	X	--	X

TRANSMISSION INDICATORS AND MESSAGES

NORMAL Inhibits Which Result in a Blinking PRNDL

High engine speed NEUTRAL to Range shifts : When a NEUTRAL to DRIVE or NEUTRAL to REVERSE shift is made, when engine RPM is high, the shift is inhibited to NEUTRAL. The TCM has torque management capability and attempts to slow the engine to a point where it makes the requested shift.

High Throttle or Torque Direction Change Shifts: REVERSE to DRIVE, DRIVE to REVERSE, NEUTRAL to DRIVE, and NEUTRAL to REVERSE shifts, where throttle position is greater than 25 percent, are inhibited to NEUTRAL. The TCM has torque management capability and attempts to slow the engine to a point where it makes the requested shift.

High Output Speed Direction Change Shifts : REVERSE to DRIVE, DRIVE to REVERSE, and NEUTRAL to REVERSE shifts, initiated above 300 RPM output speed are inhibited to NEUTRAL.

Low Automatic Transmission Fluid (ATF) Level Low: Low ATF level is caused by insufficient transmission fluid and lack of initial pump prime, caused by refilling the transmission.

Extremely Low ATF temperature: A shift out of NEUTRAL when the ATF temperature is below -45°C (-49°F) may be inhibited.

MALFUNCTIONS Which May Cause a Blinking PRNDL

Failure to detect turbine speed pull-down during a shift may occur under the following conditions:

- A clutch is failed and the transmission cannot attain the requested range.
- Invalid gear ratio
- Pressure control solenoid failure
- Turbine or output speed sensor failure
- Lack of pressure at startup

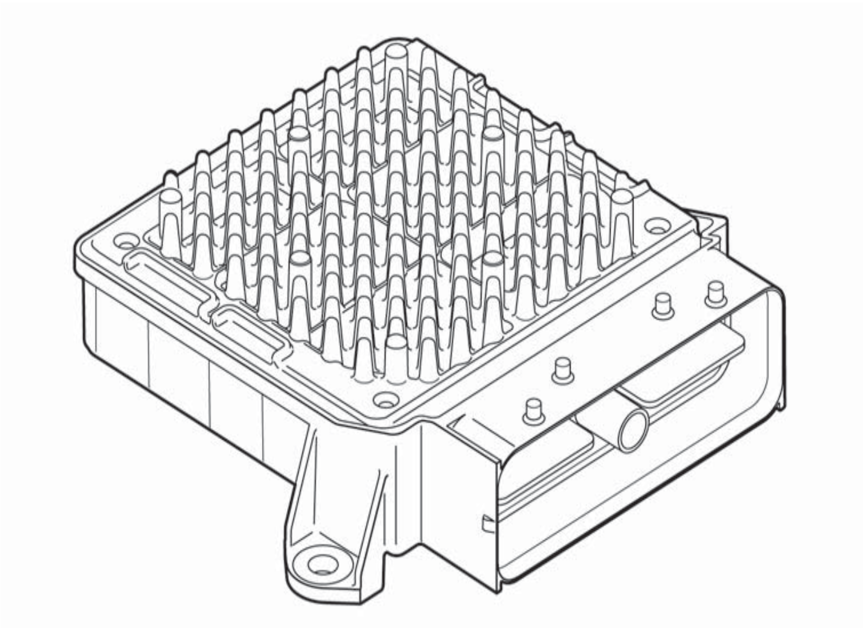
Conditions Which May Cause a BLANK PRNDL

The PRNDL display may be blank because of failure of the internal mode switch circuits A, B, C, or P.

The transmission will command the most appropriate range, based on reverse pressure switch and the remaining internal mode switch inputs.

ELECTRONIC COMPONENT DESCRIPTION

Transmission Control Module



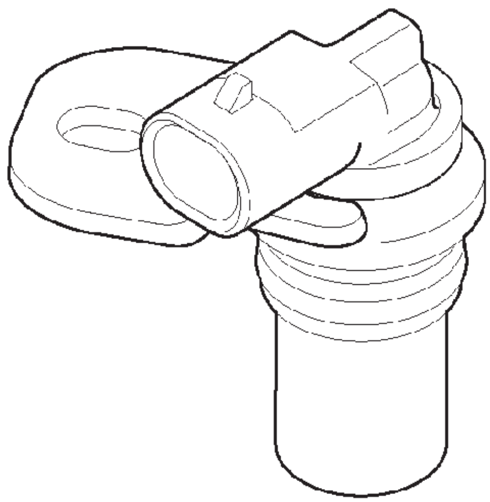
A microcomputer controls the transmission by receiving and processing signals from various switches and sensors. The microcomputer determines shift sequences, shift timing, and clutch apply and release characteristics. The microcomputer is an independent controller and is referred to as a transmission control module (TCM). The pressure switch manifold (PSM) and the internal mode switch (IMS) provide operator input to the TCM. Other data sent to the TCM include throttle position, engine, turbine, and output speeds, and sump temperature. Any active special function, such as anti-lock brakes or power take-off, is also an input to the TCM. The TCM processes this data to determine proper shift points, to monitor the current range, to perform ratio tests, and to compile diagnostic data. The TCM is programmed to protect the transmission and other vehicle driveline components by inhibiting actions, such as full-throttle NEUTRAL-to-range shifts and high speed direction changes. The TCM determines if a system malfunction exists and stores diagnostic codes related to the malfunction. The codes, accessed by the service technician, are used in diagnosing persistent or intermittent trouble in the system.

Throttle Position/Torque Management

The TCM receives input on throttle position/torque management from a signal transmitted by the engine control module (ECM).

The ECM communicates directly to the transmission electronic controls over an SAE J1850 or J1939 serial communication interface (SCI) data link. The TCM must be calibrated to receive these signals.

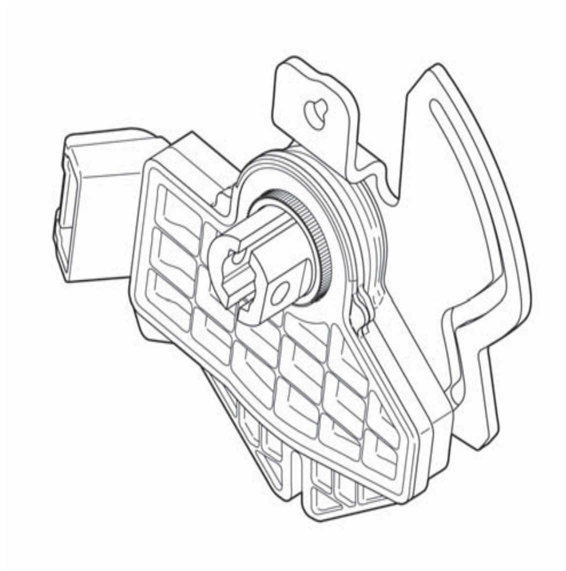
Speed Sensors



IMPORTANT:
Do not rotate the sensor in the retaining bracket. Changing the sensor/bracket orientation may cause improper operation.

There are 3 speed sensors typically required for use with 1000 Series transmissions. They include the engine speed sensor, the turbine speed sensor, and the output speed sensor. The speed sensors provide revolutions per minute (RPM) information to the TCM. The speed ratios between the various sensors allow the TCM to determine the transmission operating range. Speed sensor information is also used to control the timing of clutch apply pressures, resulting in the best possible shift quality. Hydraulic conditions are detected by comparing the speed sensor information for the current range, to the range of the speed sensor information stored in TCM memory. The speed sensors are variable reluctance devices that convert mechanical motion to an AC voltage. Each sensor consists of a wire coil wrapped around a pole piece that is adjacent to a permanent magnet. These elements are contained in a housing that is mounted adjacent to a rotating ferrous member.

Shift Selector



The vehicle is equipped with a column type shift selector. In addition to the column shifter, another component associated with the shift selector is the internal mode switch (IMS), which is mounted internally on the selector shaft. The IMS transmits selector position information to the TCM. The IMS detects the angular position of the shift selector shaft. This position is communicated to the TCM so that certain vehicle control functions can be coordinated with the position of the shift controls. The IMS has redundant circuitry to alert the TCM in the event of a single wire or switch failure. The neutral signal output of the IMS is typically used as confirmation that the transmission is in NEUTRAL before the engine starter is engaged. The IMS is interfaced to the starter circuit.

The operator chooses the transmission range by moving the selector lever to the appropriate gate position. When properly adjusted, the shifter gates prevent inadvertent shifting between ranges, and corresponds to the internal transmission detent positions. A positive detent is provided in the transmission in order to maintain the selector shaft in the selected position.

The TCM shift calibration determines the available forward ranges for each selector position. Although specific installations vary, typical selector positions for the 1000 Series include the following:

P - PARK: The parking pawl is engaged. The transmission is in NEUTRAL.

R - REVERSE: REVERSE is selected in order to move the vehicle backward.

N - NEUTRAL: NEUTRAL may be used when starting the engine and for stationary operations. The TCM disables the starter switch if a range other than NEUTRAL or PARK is selected before starting the vehicle.

D - DRIVE: DRIVE is the highest forward range used for normal driving. The transmission shifts to first range for starting, then automatically upshifts through the ranges, as operating conditions permit, until the highest range is attained.

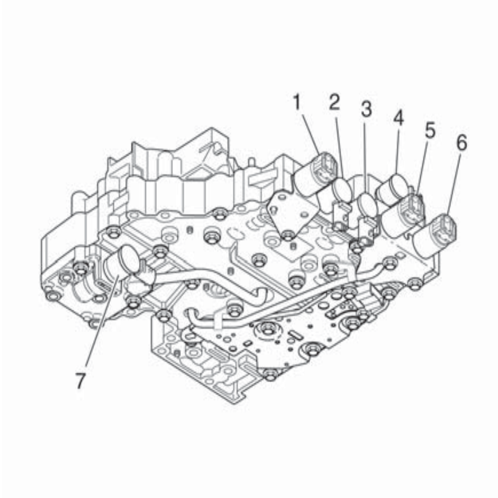
M - Manual: Manual selection of ranges is provided by moving the selector to the M - MANUAL position. A driver shift request switch has been added to the column shift lever. The driver information center (DIC) then shows the 6 available ranges with the current range bracketed. The bracketed range is the highest attainable range with all gears below accessible, for example, when 4th range is selected, ranges 1st through 4th are available. By using the +/- buttons on the gear select lever, the driver can select the range of gears desired for their current driving conditions.

1 - Manual LOW: Manual LOW provides first gear operation only.

Internal Components

Several components of the 1000 Series electrical control system are located within the transmission as part of the main control valve body. These components include 3 types of solenoids for controlling the hydraulic action of the valves. They include the PSM and an internal wiring harness that links the internal components with the TCM.

Solenoids



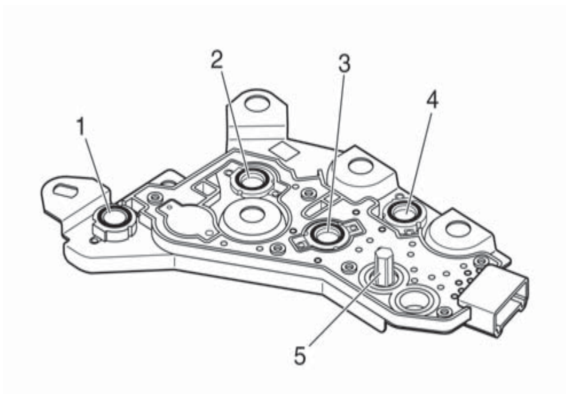
The 1000 Series control valve body contains both normally closed (N/C) and normally open (N/O) solenoids. A N/C solenoid remains closed until a signal from the TCM energizes the solenoid. A N/O solenoid remains open until the TCM energizes the solenoid. When a solenoid valve is in the closed position, the valve blocks the flow. When a solenoid valve is in the open position, flow is permitted through the valve. Shift solenoid 1 (SS1) (4), shift solenoid 2 (SS2) (2) and shift solenoid 3 (SS3) (3) are N/C. Both solenoid types have an orifice, electrical windings, an iron core, and a steel check ball.

Shift solenoids provide the necessary logic to distribute fluid to the correct clutches. The shift solenoids provide either full control main pressure or exhaust to the head of each of the corresponding shift valves. Since the valve states, stroked or unstroked, are critical to providing the correct transmission range, each shift valve has a pressure switch, located in the PSM, which provides feedback to the computer regarding the position of the valve.

Modulated main pressure solenoid (7) is a N/C solenoid used to modulate the transmission main pressure. Under specific conditions, such as low throttle setting, low engine torque, low engine speed, and low transmission output speeds, the TCM commands the solenoid ON. When the solenoid is applied, fluid is routed to the main pressure regulator valve; this in turn reduces the main pressure schedule and improves the volume of oil through the overage circuit. By modulating main pressure, the cooler flow at idle can be increased, allowing improved cooling and reducing transmission pump noise.

Pressure control solenoid 1 (PCS1) (6), pressure control solenoid 2 (PCS2) (4), and the torque converter clutch (TCC) (1) are used to control on-coming, off-going, and holding pressure to the 5 clutches and the TCC. These solenoids are referred to as variable bleed solenoids, since the output hydraulic pressure supplied by these solenoids is proportional to the controlled current command.

Pressure Switch Manifold

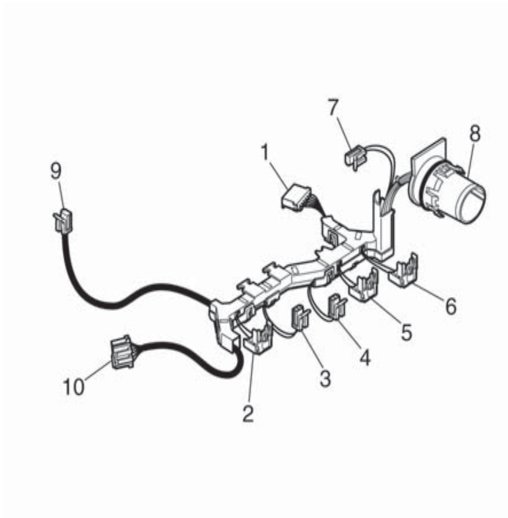


The PSM is a multiple-switch assembly made up of 3 N/O pressure switches, PS1 (4), PS2 (3), and PS3 (2) and 1 N/C pressure switch. N/O pressure switches, PS1, PS2, and PS3, correspond to shift valves SS1, SS2, and SS3. Fluid pressures are fed from shift valves SS1, SS2, and SS3 to the manual selector valve and to the pressure switches based on the positions of the valves and shift selector. The shift valve fluid pressures reflect the logic condition at the corresponding solenoids. This logic indicates the current transmission operating range to the TCM.

The 3 fluid pressure switches corresponding to the shift valves are N/O, contacts not touching, when no fluid pressure is present, so that electrical current is stopped at the switch. When fluid pressure is routed to the switch, it moves the diaphragm and upper contact so that the contact element touches both the positive and ground contacts. This closes the circuit and allows current to flow from the positive contact and through the switch.

Pressure switch 4 (PS4) (1) corresponding to REVERSE is N/C, since fluid pressure is always present unless the selector valve is moved to REVERSE. The PSM also contains a transmission fluid temperature (TFT) sensor thermistor (5) for sump temperature. Changes in sump fluid temperature are indicated by changes in sensor resistance. Increasing temperature causes decreased sensor resistance. The resistance value is then relayed to the TCM as an input for shift control.

Internal Wiring Harness



The internal wiring harness has connectors for shift solenoids SS1 (7), SS2 (3) and SS3 (4), PCS1 (6) and PCS2 (5), TCC pressure control solenoid (TCC PCS) (2), and the PSM (1). There is also a connector for the modulated main (MOD MAIN) pressure solenoid (9) and the IMS (10). All of these connectors go to the main electrical connector (8). The transmission main electrical connector transports signals from these connectors to the TCM via the external harness.

Neutral - Engine Running

In Neutral (N), pressure control solenoid 1 (PCS1) is in the normally closed state (de-energized), PCS2 is in the normally open state (de-energized), shift solenoid 1 (SS1), SS2, and SS3 are energized, and the torque converter clutch pressure control solenoid (TCC PCS) remains de-energized.

SS1, SS2, and SS3 supply control main pressure to the top of shift valve 1, shift valve 2, and shift valve 3, stroking the valves against spring force.

With shift valve 1 stroked, control main pressure is directed through shift valve 1 to pressure switch 1, turning the switch on. With shift valve 2 stroked, the exhaust path is blocked for the control main pressure being supplied through an orifice to pressure switch 2, and the pressure raises to control main and pressure switch 2 turns on. With shift valve 3 stroked, the exhaust path is blocked for the control main pressure being supplied through an orifice to pressure switch 3, and the pressure raises to control main and pressure switch 3 turns ON. With pressure switch 1, pressure switch 2, and pressure switch 3 ON, feedback is provided to the transmission control module (TCM) that shift valve 1, shift valve 2, and shift valve 3 are stroked.

Normally closed PCS1 blocks the exhaust of the PCS1 signal pressure, raising the signal pressure. PCS1 signal pressure strokes pressure control valve 1, raising the PCS1 pressure which is directed to shift valve 2. In the stroked position, shift valve 2 routes fluid to the low and reverse clutch, applying the clutch. All other clutches are exhausted.

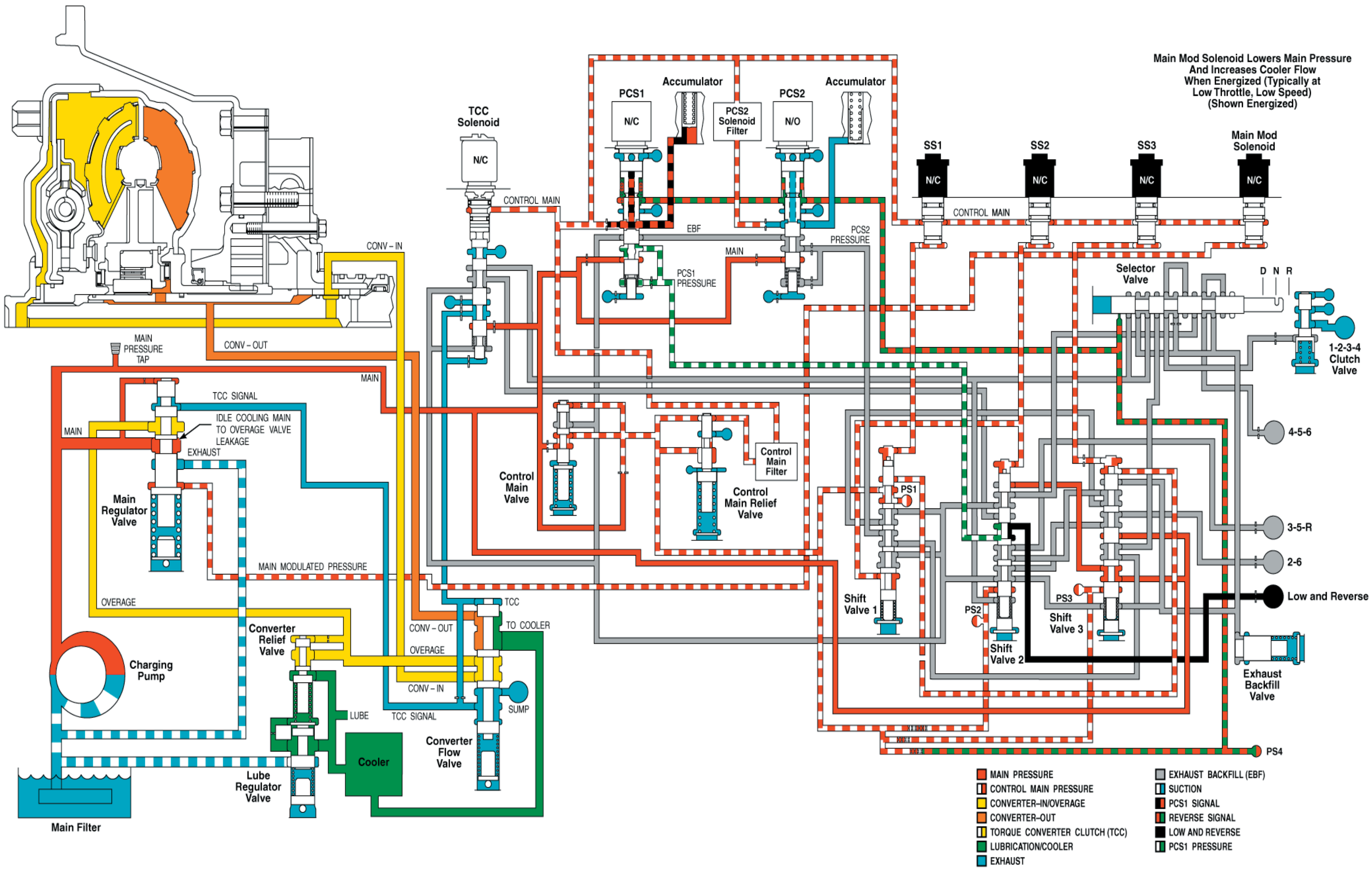
With only one clutch applied, the transmission is in Neutral (N).

If electrical power is interrupted while Neutral (N) is selected, SS1, SS2, and SS3 are de-energized and shift valve 1 de-strokes. Due to valve timing, when power is lost, shift valve 1 strokes faster than shift valve 3. When shift valve 1 de-strokes, control main pressure is fed through shift valve 1 to the top of shift valve 3, keeping the valve stroked. Normally closed PCS1 continues to block the exhaust of the solenoid signal pressure (solenoid signal remains control main). The solenoid signal pressure on top of pressure control valve 1 produces maximum pressure, which is routed to shift valve 2. Shift valve 2 stays stroked due to the “latching” effect of the low and reverse clutch pressure acting on two different diameter lands. In the stroked position, pressure continues to be routed to the low and reverse clutch, keeping the clutch applied. Since only one clutch is applied, the transmission remains in Neutral (N).

If electrical power is interrupted with the transmission in Neutral (N) and the manual selector valve is moved to a forward range or reverse, the transmission stays in neutral because shift valve 3 stays de-stroked and main pressure is blocked from reaching the manual selector valve.

If the engine is shutdown and restarted with the electrical power interrupted to the TCM, shift valve 1, shift valve 2, and shift valve 3 remain de-stroked. Normally closed PCS1 blocks the exhaust of the PCS1 signal pressure (signal pressure becomes control main). The solenoid signal pressure on top of PCV1 produces maximum pressure, which is routed to shift valve 2. In the de-stroked position, shift valve 2 routes fluid to the 3rd, 5th, and reverse clutch. All other clutches are exhausted, so the transmission remains in Neutral (N). When shift valve 3 is de-stroked, main pressure is routed through shift valve 3 to the manual selector valve. If a forward range is selected, the manual selector valve routes fluid to the 1-2-3-4 clutch. 3rd, 5th, and reverse clutch remains on with the 1-2-3-4 clutch, resulting in third range being attained for limp home capability. If Reverse (R) is selected, the selector valve directs fluid through the TCC valve and shift valve 2 to low and reverse clutch. 3rd, 5th, and reverse clutch remains on with low and reverse clutch, resulting in Reverse (R) range being attained.

Neutral


Main Mod Solenoid Lowers Main Pressure And Increases Cooler Flow When Energized (Typically at Low Throttle, Low Speed) (Shown Energized)
TCC Solenoid
PCS1
Accumulator
PCS2 Solenoid Filter
PCS2
Accumulator
SS1
SS2
SS3
Main Mod Solenoid
Selector Valve
1-2-3-4 Clutch Valve
4-5-6
3-5-R
2-6
Low and Reverse
Exhaust Backfill Valve
PS4
Control Main Valve
Control Main Relief Valve
Control Main Filter
Main Regulator Valve
Charging Pump
Main Filter
Converter Relief Valve
Lube Regulator Valve
Cooler
Converter Flow Valve
Shift Valve 1
Shift Valve 2
Shift Valve 3
MAIN PRESSURE
CONTROL MAIN PRESSURE
CONVERTER-IN/OVERAGE
CONVERTER-OUT
TORQUE CONVERTER CLUTCH (TCC)
LUBRICATION/COOLER
EXHAUST
EXHAUST BACKFILL (EBF)
SUCTION
PCS1 SIGNAL
REVERSE SIGNAL
LOW AND REVERSE
PCS1 PRESSURE

First Range

When the selector lever is moved from Neutral (N) to Drive (D), the transmission shifts from neutral to first range operation. Shift solenoid 1 (SS1), SS2, and SS3 remain energized. Pressure control solenoid 1 (PCS1) and the torque converter clutch (TCC) solenoid remain de-energized.

Shift valve 1, shift valve 2, and shift valve 3 stay in the stroked position. With normally closed PCS1 de-energized, pressure control valve 1 continues to supply full control pressure through shift valve 2 to the low and reverse clutch, keeping the clutch applied. During the shift, PCS2 energizes, blocking the exhaust of the PCS2 signal pressure, causing the pressure to rise. The PCS2 signal pressure strokes pressure control valve 2, opening the pressure control valve 2 pressure port to main pressure. PCS2 pressure is directed through shift valve 1, shift valve 3, and the manual selector valve to the 1-2-3-4 clutch, applying the 1-2-3-4 clutch. The transmission control module (TCM) provides current to PCS2, which controls the rate of pressure buildup of the 1-2-3-4 clutch, assuring a smooth transition to first range. The combination of the 1-2-3-4 clutch and the low and reverse clutch application produces first range operation.

After the shift to first range is complete, SS3 is de-energized followed closely by SS1 (timed to prevent SS3 from becoming “latched” down), allowing both valves to de-stroke. PCS2 is also de-energized, exhausting PCS2 signal pressure, allowing the pressure control valve 2 to de-stroke which exhausts PCS2 pressure. In the de-stroked position, shift valve 3 routes main pressure to the manual selector valve which directs the main pressure to the 1-2-3-4 clutch, keeping the 1-2-3-4 clutch applied. With the 1-2-3-4 clutch and the low and reverse clutch applied, the transmission stays in first range.

Control main pressure exhaust for pressure switch 2 is blocked by shift valve 2, keeping the switch turned on and providing feedback to the TCM that shift valve 2 is stroked. With shift valve 1 in the de-stroked position, the pressure feed to pressure switch 1 is eliminated and with the pressure exhausted, the pressure switch turns off, providing feedback that shift valve 1 is in the de-stroked position. With shift valve 3 de-stroked, the control main pressure to pressure switch 3 is exhausted and pressure switch 3 turns off, providing feedback that shift valve 3 is in the de-stroked position.

If electrical power is interrupted while the transmission is in first range, SS2 is de-energized. Normally closed PCS1 continues to block the exhaust of PCS1 signal pressure (signal pressure remains control main) which results in maximum PCS1 pressure being maintained. PCS1 pressure continues to be directed to shift valve 2, which stays stroked due to the “latching” effect of pressure on two different diameter lands and fluid continues to be directed to the low and reverse clutch, keeping the low and reverse clutch applied. Main pressure continues to be directed through shift valve

3 and the manual selector valve to the 1-2-3-4 clutch, keeping the 1-2-3-4 clutch applied. The combination of the 1-2-3-4 clutch and the low and reverse clutch application allows the transmission to stay in first range for limp home capability.

If electrical power is interrupted while the transmission is in first range, moving the manual selector valve to Neutral (N) will cut off main pressure to the 1-2-3-4 clutch and the clutch will be exhausted. The low and reverse clutch remains applied. Because only one clutch is applied, the transmission goes to neutral.

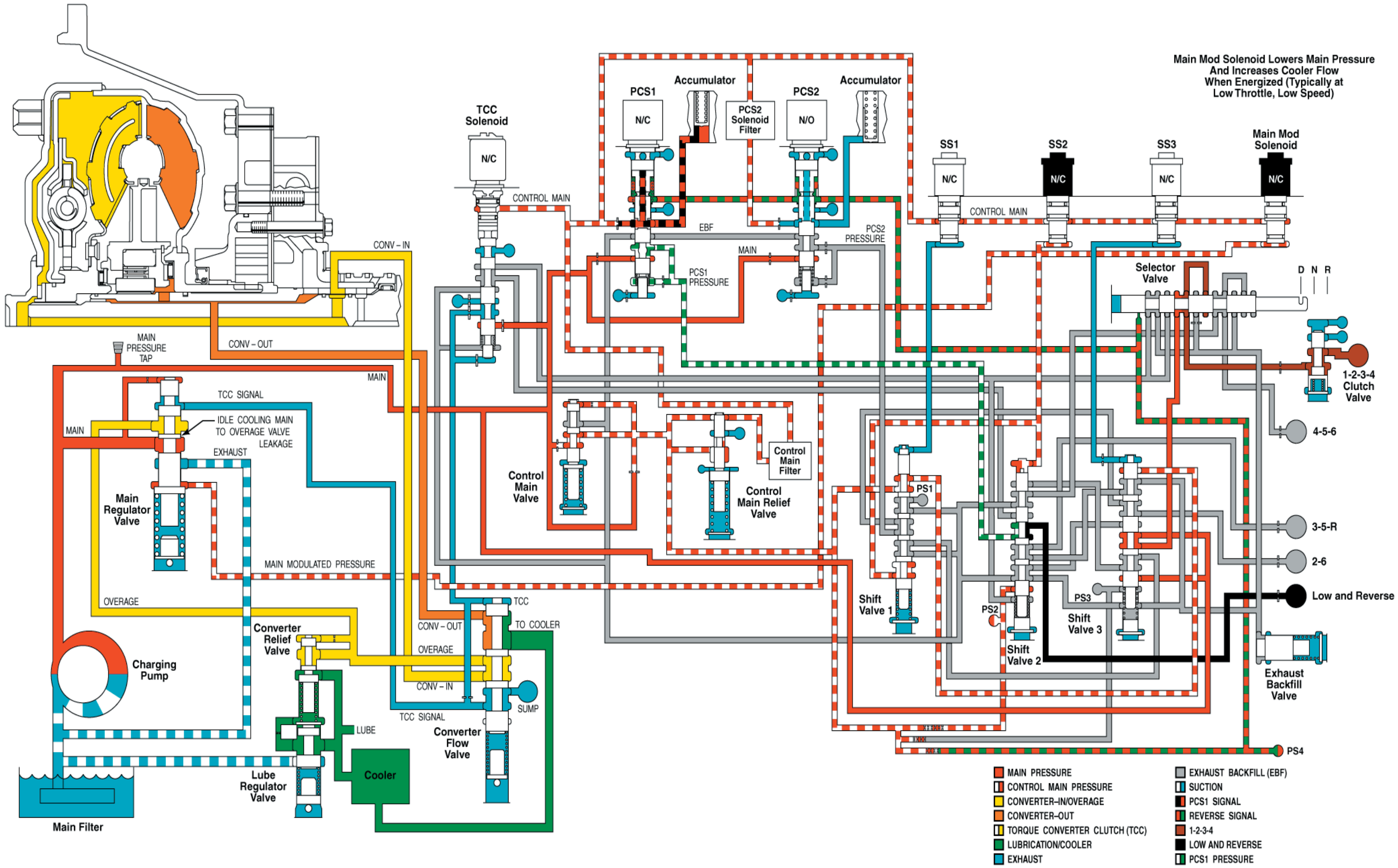
If electrical power is interrupted while the transmission is in first range, moving the manual selector valve to Reverse (R) cuts off main pressure to the 1-2-3-4 clutch, exhausting the 1-2-3-4 clutch. The manual selector valve directs main pressure through the TCC valve to the bottom of shift valve 2, de-stroking the valve and opening the path for main pressure to feed the low and reverse clutch, keeping the clutch applied. PCS1 control pressure is then directed to the 3rd, 5th, and reverse clutch, applying the clutch. The combination of the 3rd, 5th, and reverse clutch and the low and reverse clutch application produces Reverse (R) range operation, for limp home capability.

IMPORTANT:

If the manual selector valve is put back in a forward range after reverse has been attained, the selector valve will direct fluid to the 1-2-3-4 clutch and shift valve 2 will stay de-stroked, directing fluid to the 3rd, 5th, and reverse clutch, resulting in third range operation.

If electrical power is interrupted while the transmission is in first range, resulting in only first, neutral, and reverse operation, the engine may be shut down and restarted to attain neutral, third, and reverse operation.

First Range


Main Mod Solenoid Lowers Main Pressure And Increases Cooler Flow When Energized (Typically at Low Throttle, Low Speed)
TCC Solenoid
N/C
PCS1
Accumulator
PCS2 Solenoid Filter
PCS2
N/O
SS1
SS2
SS3
Main Mod Solenoid
CONTROL MAIN
EBF
PCS2 PRESSURE
MAIN
PCS1 PRESSURE
CONV – IN
CONV – OUT
MAIN PRESSURE TAP
TCC SIGNAL
IDLE COOLING MAIN TO OVERAGE VALVE LEAKAGE
EXHAUST
Main Regulator Valve
MAIN MODULATED PRESSURE
OVERAGE
Converter Relief Valve
Charging Pump
Lube Regulator Valve
LUBE
Cooler
Main Filter
TCC
TO COOLER
SUMP
Converter Flow Valve
Control Main Valve
Control Main Filter
Control Main Relief Valve
Selector Valve
D N R
1-2-3-4 Clutch Valve
4-5-6
3-5-R
2-6
Low and Reverse
PS1
PS2
PS3
PS4
Shift Valve 1
Shift Valve 2
Shift Valve 3
Exhaust Backfill Valve
MAIN PRESSURE
CONTROL MAIN PRESSURE
CONVERTER-IN/OVERAGE
CONVERTER-OUT
TORQUE CONVERTER CLUTCH (TCC)
LUBRICATION/COOLER
EXHAUST
EXHAUST BACKFILL (EBF)
SUCTION
PCS1 SIGNAL
REVERSE SIGNAL
1-2-3-4
LOW AND REVERSE
PCS1 PRESSURE

Second Range (Without TCC Applied)

Before shifting from first to second range, the transmission control module (TCM) makes certain shift valve 1, shift valve 2, and shift valve 3 are in the correct position with shift valve 1 and shift valve 2 de-stroked and shift valve 3 stroked.

Pressure control solenoid 1 (PCS1) is energized, opening PCS1 signal pressure to exhaust and allowing pressure control valve 1 to de-stroke, exhausting the low and reverse clutch pressure. PCS2 is energized, raising PCS2 signal and PCS2 pressures. The PCS2 pressure is directed through shift valve 1 and shift valve 3 to the 2-6 clutch. The TCM provides current to PCS2, which controls the rate at which the pressure control valve 2 supplies pressure to the 2-6 clutch, and current to PCS1, which controls the rate at which the low and reverse clutch is exhausted, assuring a smooth transition to second range. Main pressure continues to feed through shift valve 3 and the manual selector valve, keeping the 1-2-3-4 clutch applied.

The combination of the 1-2-3-4 and the 2-6 clutch application produces second range operation.

After the shift to second range is complete, SS2 is de-energized allowing shift valve 2 to de-stroke. The low and reverse clutch feed, which was exhausted through shift valve 2 and the PCS1, now exhausts through exhaust backfill, keeping the low and reverse clutch released. The 3rd, 5th, and reverse clutch has an exhaust path through shift valve 2 to the pressure control valve 1, keeping the 3rd, 5th, and reverse clutch released.

Pressure switch 1, pressure switch 2, and pressure switch 3 turn off, providing feedback that the valves are in the de-stroked position.

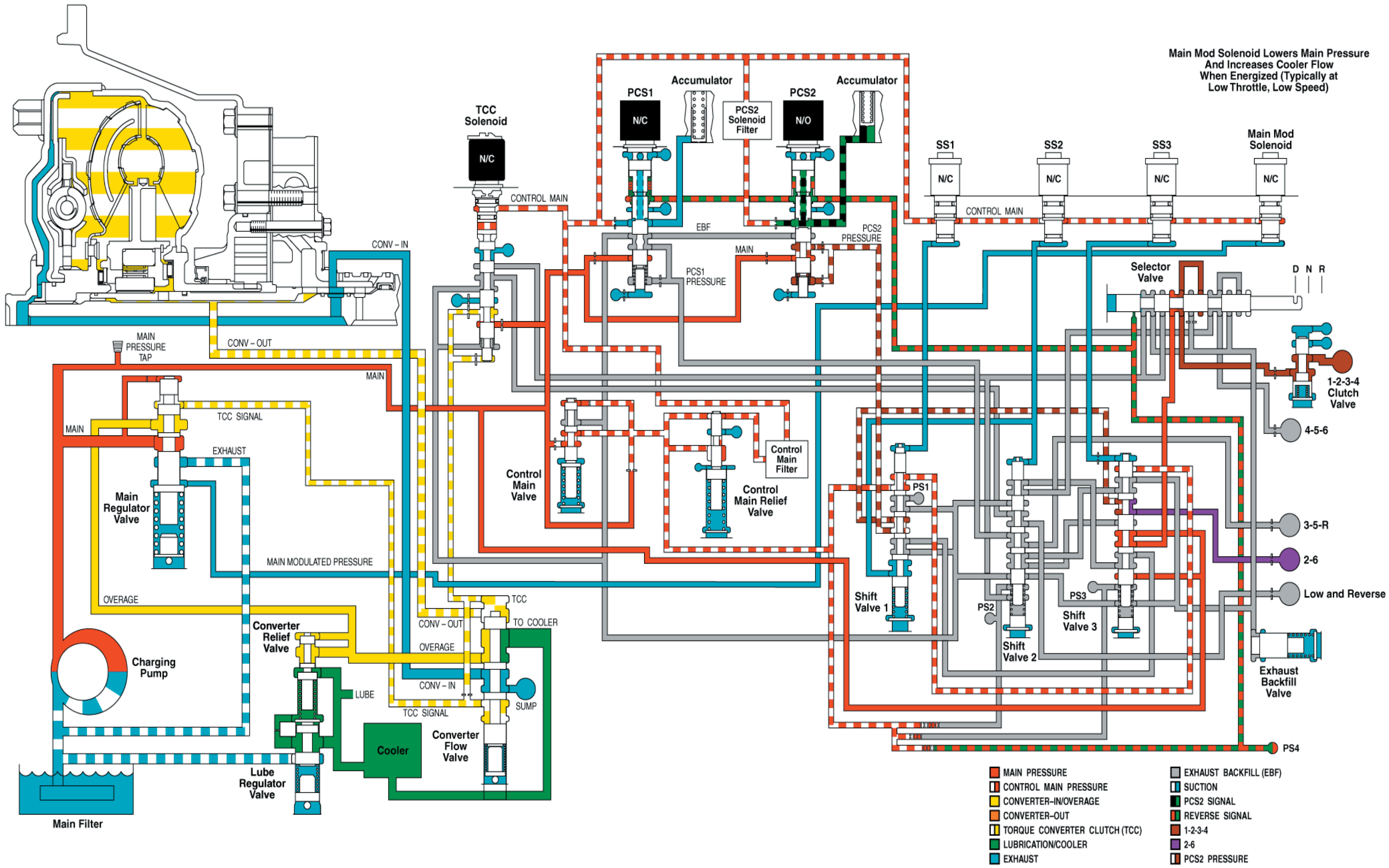
If electrical power is interrupted while the transmission is in second range, PCS1 and PCS2 de-energize. Normally open PCS2 exhausts the PCS2 signal pressure, allowing pressure control valve 2 to de-stroke, exhausting the 2-6 clutch. Normally closed PCS1 blocks the exhaust of the pressure control valve 1 signal pressure, allowing the PCS1 signal and PCS1 pressures to rise. Pressure control valve 1 directs full pressure through shift valve 2 to the 3rd, 5th, and reverse clutch, applying the clutch. The 1-2-3-4 clutch continues to be applied with main pressure through shift valve 3 and the manual selector valve. The combination of the 1-2-3-4 clutch and the 3rd, 5th, and reverse clutch applied produces third range converter operation for limp home capability.

If the torque converter clutch was applied during the power interrupt, the TCC solenoid is de-energized and the transmission returns to converter operation.

If electrical power is interrupted while the transmission is in second range and subsequent third range operation, moving the manual selector valve to Neutral (N) will cut off main pressure to the 1-2-3-4 clutch and the clutch will be exhausted. The 3rd, 5th, and reverse clutch remains applied. Because only one clutch is applied, the transmission goes to neutral.

If electrical power is interrupted while the transmission is in second range with subsequent third range operation, moving the manual selector valve to reverse will cut off main pressure to the 1-2-3-4 clutch, exhausting the 1-2-3-4 clutch. The manual selector directs main pressure through the TCC valve and shift valve 2 to the low and reverse clutch, applying the clutch. The 3rd, 5th and reverse clutch remains applied. The combination of the 3rd, 5th, and reverse clutch and the low and reverse clutch application produces reverse range operation for limp home capability.

Second Range



Second Range (With TCC Applied (Tow-Haul))

Energizing the torque converter clutch (TCC) solenoid strokes the TCC valve against the stop, allowing main pressure to flow to the top of the converter flow valve. The converter flow valve is stroked, exhausting converter-in pressure to sump, and eliminating the separating force between the TCC piston and the converter cover. At the same time, the converter flow valve opens the passage supplying TCC-apply pressure to the converter-out circuit. The pressure differential across the TCC piston applies the torque converter clutch.

Depending upon the calibration, TCC solenoid could be energized in ranges 2-6. The calibrations can also apply the TCC for special applications such as power take-off (PTO) operation controlled directly by engine speed with transmission in neutral or TCC operation in first hold.

Third Range

Before making the shift from second to third range, the transmission control module (TCM) makes certain all of the shift valves are in the correct position with shift valve 1, shift valve 2, and shift valve 3 de-stroked.

Pressure control solenoid 2 (PCS2) is de-energized, exhausting PCS2 signal pressure which allows the pressure control valve 2 to de-stroke, exhausting the 2-6 clutch. PCS1 is de-energized, raising PCS1 signal and PCS1 pressures. The PCS1 pressure is directed through shift valve 2 to the 3rd, 5th, and reverse clutch. The TCM reduces current to PCS1, which controls the rate at which the pressure control valve 1 supplies pressure to the 3rd, 5th, and reverse clutch, and reduces current to PCS2, which controls the rate at which pressure control valve 2 exhausts the 2-6 clutch, assuring a smooth transition to third range. Main pressure continues to flow through shift solenoid 3 (SS3) and the manual selector valve to the 1-2-3-4 clutch, keeping the clutch applied.

The combination of the 1-2-3-4 clutch and the 3rd, 5th, and reverse clutch application produces third range operation.

After the shift into third range is complete, SS1 is energized and directs control main pressure to the top of shift valve 1, stroking the valve. With shift valve 1 in the stroked position, the 2-6 clutch feed is exhausted through shift valve 1 to exhaust backfill keeping the 2-6 clutch released and the 4-5-6 clutch has an exhaust path through shift valve 1 to pressure control valve 2, keeping the 4-5-6 clutch released.

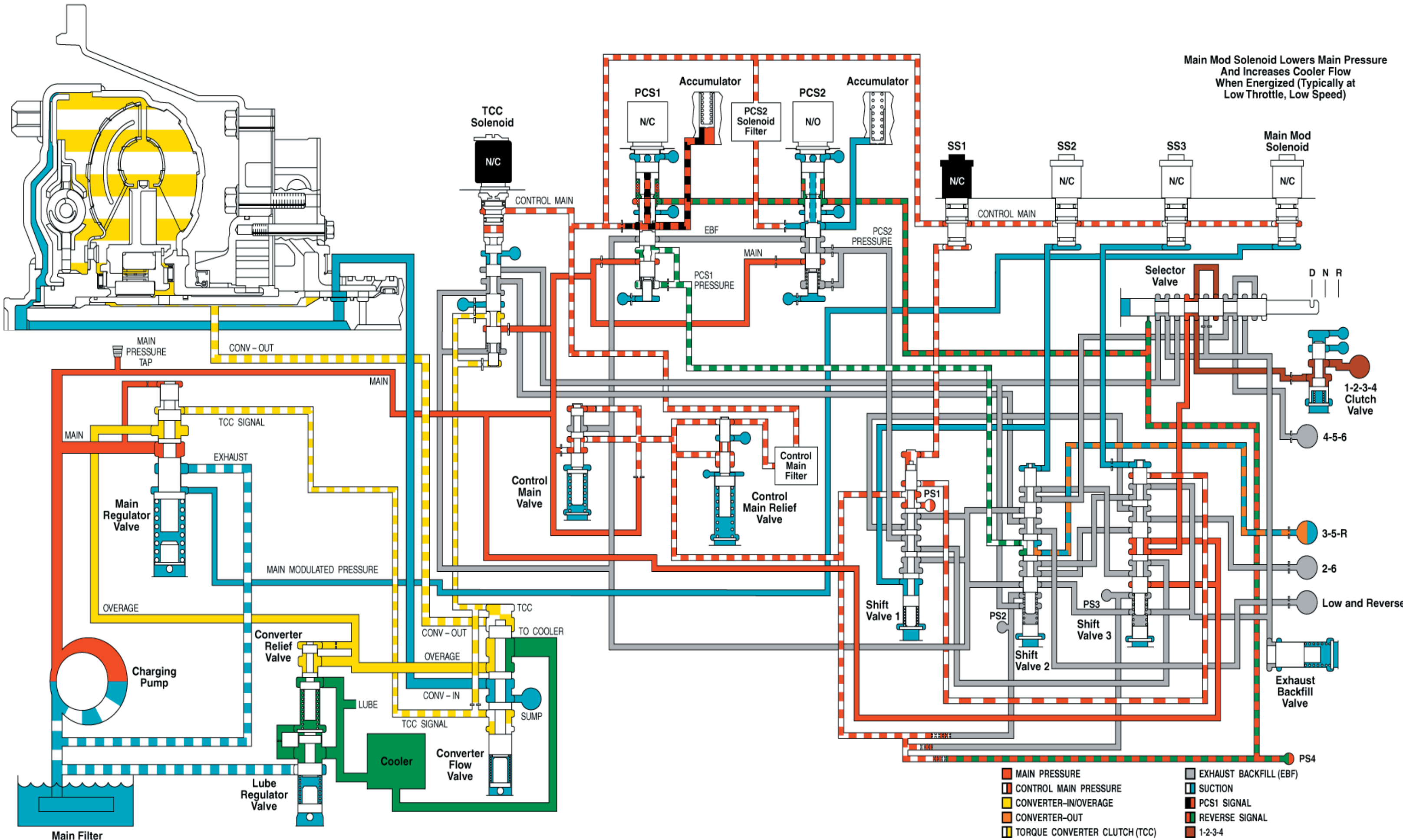
Pressure switch 1 turns ON, providing feedback that shift valve 1 is stroked. Pressure switch 2 and pressure switch 3 remain OFF, providing feedback that shift valve 2 and shift valve 3 are in the de-stroked position.

If electrical power is interrupted while the transmission is in third range, SS1 and the torque converter clutch (TCC) solenoid (if TCC is applied) are de-energized. Shift valve 1 de-strokes, changing the exhaust path of the 4-5-6 clutch to exhaust backfill and the exhaust path of the 2-6 clutch to pressure control valve 2. Normally closed PCS1 continues to block the exhaust of the PCS1 signal pressure (signal remains control main). The signal pressure on top of pressure control valve 1 produces maximum PCS1 pressure, which is routed through shift valve 2 to the 3rd, 5th, and reverse clutch, keeping the clutch applied. With the manual selector valve in a forward position, main pressure continues to feed the 1-2-3-4 clutch through shift valve 3 and the manual selector valve. The combination of the 1-2-3-4 clutch and the 3rd, 5th, and reverse clutch applied keeps the transmission in third range for limp home capability. If the TCC is applied, the TCC solenoid de-energizes, causing the TCC valve to de-stroke, exhausting pressure from the top of the converter flow valve. The converter flow valve de-strokes, redirecting main overage to converter in and converter out to the cooler. The TCC is now released.

If electrical power is interrupted while the transmission is in third range, and the manual selector valve is moved to Neutral (N), the 1-2-3-4 clutch exhausts through the manual selector valve to exhaust backfill. The 3rd, 5th, and reverse clutch remains applied. With only one clutch applied, the transmission goes to Neutral (N).

If electrical power is interrupted while the transmission is in third range and the manual selector valve is moved to the Reverse (R) position, the 1-2-3-4 clutch exhausts through the manual selector valve which releases the clutch. Main pressure goes through shift valve 3, the manual selector valve and shift valve 2 to the low and reverse clutch, applying the clutch. The combination of the 3rd, 5th, and reverse clutch and the low and reverse clutch application produces Reverse (R) range for limp home capability.

Third Range


Main Mod Solenoid Lowers Main Pressure And Increases Cooler Flow When Energized (Typically at Low Throttle, Low Speed)
TCC Solenoid
N/C
PCS1
N/C
Accumulator
PCS2 Solenoid Filter
PCS2
N/O
Accumulator
SS1
SS2
SS3
Main Mod Solenoid
CONTROL MAIN
EBF
MAIN
PCS1 PRESSURE
PCS2 PRESSURE
Selector Valve
D N R
1-2-3-4 Clutch Valve
4-5-6
3-5-R
2-6
Low and Reverse
Exhaust Backfill Valve
PS4
PS1
PS2
PS3
Shift Valve 1
Shift Valve 2
Shift Valve 3
Control Main Valve
Control Main Filter
Control Main Relief Valve
MAIN PRESSURE TAP
CONV – OUT
TCC SIGNAL
EXHAUST
Main Regulator Valve
MAIN MODULATED PRESSURE
OVERAGE
Converter Relief Valve
Charging Pump
LUBE
Lube Regulator Valve
Main Filter
Cooler
Converter Flow Valve
TCC
TO COOLER
CONV – IN
SUMP
MAIN PRESSURE
CONTROL MAIN PRESSURE
CONVERTER–IN/OVERAGE
CONVERTER–OUT
TORQUE CONVERTER CLUTCH (TCC)
LUBRICATION/COOLER
EXHAUST
EXHAUST BACKFILL (EBF)
SUCTION
PCS1 SIGNAL
REVERSE SIGNAL
1-2-3-4
3-5-R
PCS1 PRESSURE

Fourth Range

Before making the shift from third to fourth range, the transmission control module (TCM) makes certain all of the shift valves are in the correct position, with shift valve 1 stroked and shift valve 2 and shift valve 3 de-stroked.

Pressure control solenoid 1 (PCS1) is energized, opening the PCS1 signal pressure to exhaust which allows the pressure control valve 1 to de-stroke and the 3rd, 5th, and reverse clutch pressure is exhausted. PCS2 is energized, raising the PCS2 signal and PCS2 pressures. The PCS2 pressure is directed through shift valve 1, shift valve 3, shift valve 2, and the manual selector valve to the 4-5-6 clutch, applying the clutch. Main pressure continues to flow through shift valve 3 and the manual selector valve to the 1-2-3-4 clutch, keeping the 1-2-3-4 clutch applied. The TCM supplies current to PCS2, which controls the rate at which pressure control valve 2 supplies pressure to the 4-5-6 clutch, and current to PCS1, which controls the rate at which pressure control valve 1 exhausts the 3rd, 5th, and reverse clutch, assuring a smooth transition to fourth range.

The combination of the 1-2-3-4 clutch and the 4-5-6 clutch application produces fourth range operation.

After the shift to fourth range is completed, SS3 is energized, directing control main pressure to the top of shift valve 3, stroking the valve. In the stroked position, main pressure is redirected through shift valve 2 and the manual selector valve to the 4-5-6 clutch, keeping the 4-5-6 clutch applied. Flow from pressure control valve 2 to shift valve 3 is directed through the manual selector valve to the 1-2-3-4 clutch, keeping the 1-2-3-4 clutch applied.

Pressure switch 3 turns ON and pressure switch 1 remains ON, providing feedback that the valves are stroked. Pressure switch 2 remains OFF, providing feedback that shift valve 2 is in the de-stroked position.

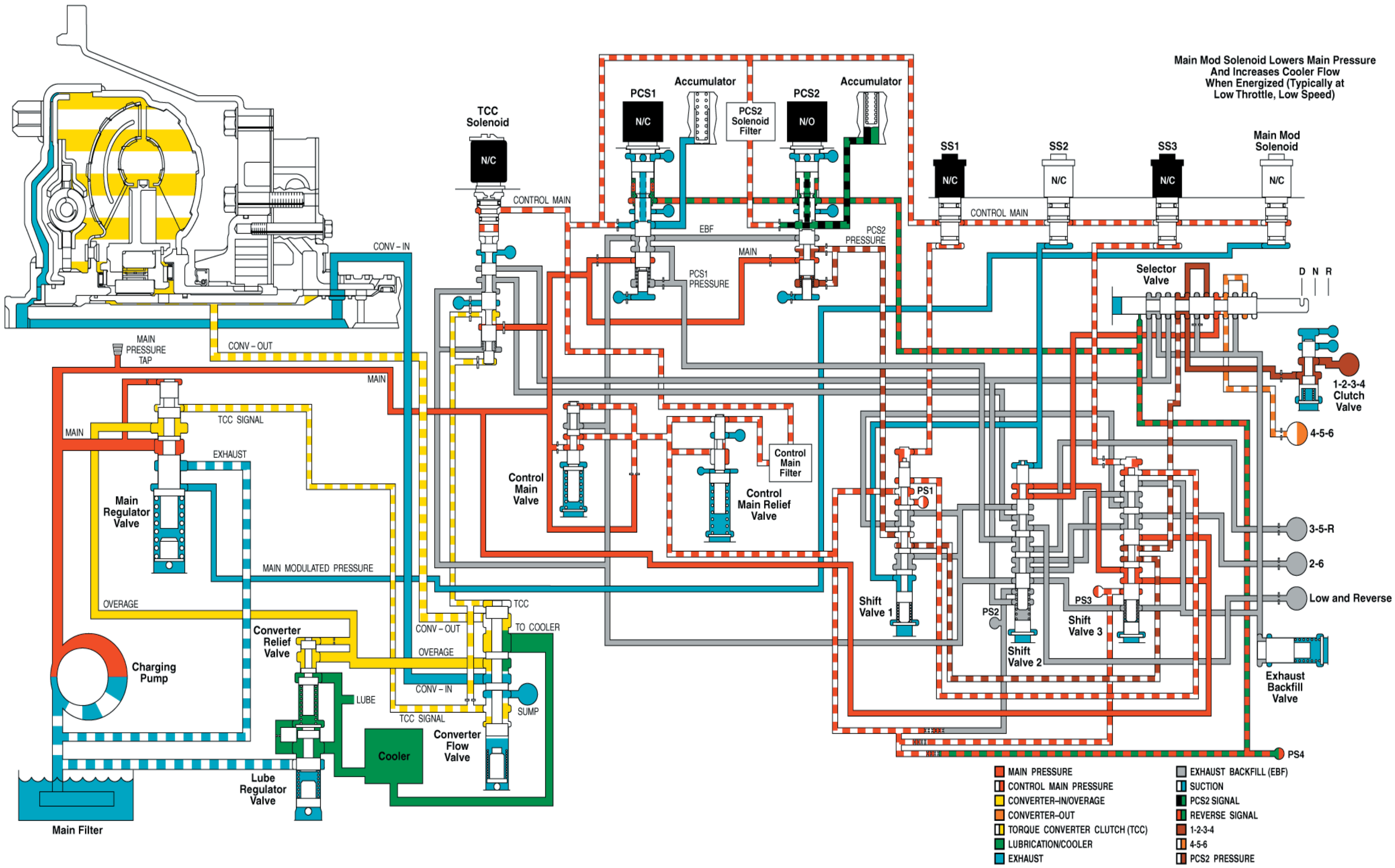
If electrical power is interrupted while the transmission is in fourth range, PCS1, PCS2, the torque converter clutch (TCC) solenoid, SS1, and SS3 are de-energized. Main pressure continues to flow through shift valve 3 and shift valve 2 and the manual selector valve to the 4-5-6 clutch, keeping the 4-5-6 clutch applied. When de-energized, normally open PCS2 exhausts the PCS2 signal pressure, allowing pressure control valve 2 to de-stroke and the 1-2-3-4 clutch exhausts. After shift valve 1 de-strokes, the 1-2-3-4 clutch exhausts to exhaust backfill. Normally closed PCS1 blocks the exhaust of PCS1 signal pressure, allowing the PCS1 signal and PCS1 pressures to rise. Pressure control valve 1 directs full pressure through shift valve 2 to the 3rd, 5th, and reverse clutch, applying the clutch. The combination of the 4-5-6 clutch and the 3rd, 5th, and reverse clutch applied produces fifth range operation for a limp home capability. If the TCC is applied, de-energizing the TCC solenoid causes the TCC valve to de-stroke, exhausting pressure from the top of the converter flow valve. The converter flow valve de-strokes, redirecting main overage to converter in and converter out to the cooler. The TCC is now released.

If electrical power is interrupted while the transmission is in fourth range (causing fifth range converter operation) and the manual selector valve is moved to Neutral (N), the 4-5-6 clutch exhausts through the manual selector valve to exhaust backfill, releasing the 4-5-6 clutch. The 3rd, 5th, and reverse clutch remains applied. With only one clutch applied, the transmission goes to neutral.

If electrical power is interrupted while the transmission is in fourth range (causing fifth range converter operation) and the manual selector valve is moved to Reverse (R), the 4-5-6 clutch exhausts through the manual selector valve, releasing the clutch. The 3rd, 5th, and reverse clutch remains applied. With only one clutch applied, the transmission goes to neutral.

If electrical power is interrupted with the transmission in fourth range, resulting in only fifth range and neutral operation, the engine may be shut down and restarted to attain neutral, third, and reverse operation.

Fourth Range



Fifth Range

Before making a shift from fourth to fifth range, the transmission control module (TCM) makes certain all of the shift valves are in the correct position with shift valve 1 and shift valve 3 stroked and shift valve 2 de-stroked.

Pressure control solenoid 2 (PCS2) is de-energized, exhausting PCS2 signal pressure and pressure control valve 2 de-strokes, which allows the 1-2-3-4 clutch to exhaust through the manual selector valve, shift valve 3 and shift valve 1, and pressure control valve 2. PCS1 is de-energized, raising the PCS1 signal and pressure control valve 1 pressures. PCS1 pressure is directed through shift valve 2 to the 3rd, 5th, and reverse clutch, applying the clutch. The TCM reduces the current to PCS1, which controls the rate at which pressure control valve 1 supplies pressure to the 3rd, 5th, and reverse clutch, and reduces the current to PCS2, which controls the rate at which pressure control valve 2 exhausts the 1-2-3-4 clutch, assuring a smooth transition from fourth to fifth range. The 4-5-6 clutch continues to be applied by main pressure flowing through shift valve 3, shift valve 2, and the manual selector valve.

The combination of the 4-5-6 clutch and the 3rd, 5th, and reverse clutch application produces fifth range operation.

Pressure switch 1 and pressure switch 2 are turned OFF, providing feedback that shift valve 1 and shift valve 2 are in the de-stroked position, and pressure switch 3 remains ON, providing feedback that shift valve 3 is in the stroked position.

If electrical power is interrupted while the transmission is in fifth range, PCS2, shift solenoid 3 (SS3), and the torque converter clutch (TCC) solenoid (if TCC is applied) de-energize. Although SS3 no longer supplies control main pressure to the top of shift valve 3, control main pressure flows through shift valve 1 to the top of shift valve 3, keeping the valve stroked. Normally closed PCS1 continues to block the exhaust of the signal pressure (signal remains control main). The signal pressure on top of pressure control valve 1 produces maximum control pressure, which is routed through shift valve 2 to the 3rd, 5th, and reverse clutch, keeping the clutch applied. Main pressure feeds through shift valve 3 and shift valve 2 and the manual selector valve to the 4-5-6 clutch, keeping the clutch applied.

The combination of the 4-5-6 clutch and the 3rd, 5th, and reverse clutch application produces fifth range operation for limp home capability.

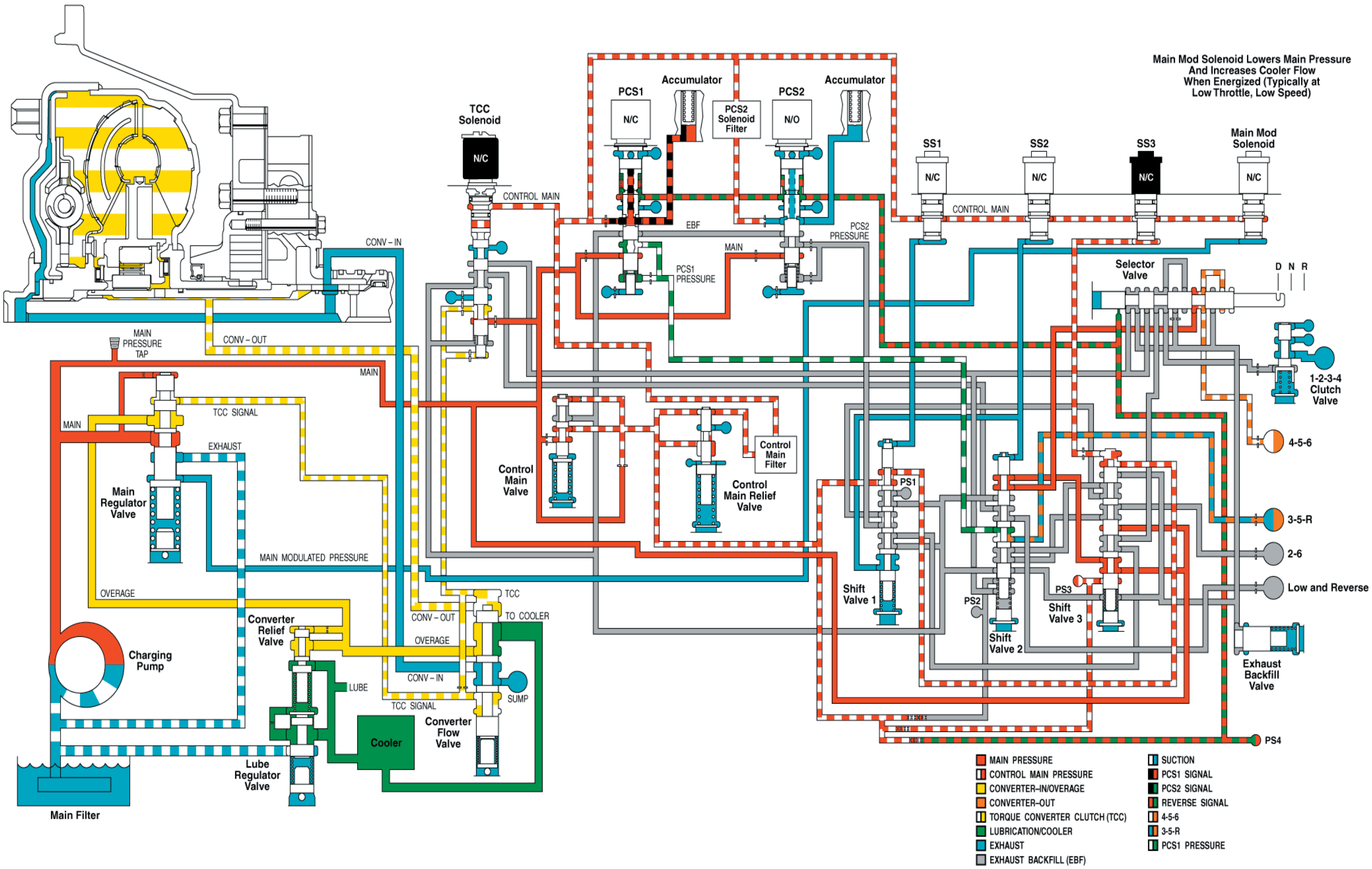
If the TCC is applied, the TCC solenoid de-energizes, causing the TCC pressure control valve to de-stroke, exhausting pressure from the top of the converter flow valve. The converter flow valve de-strokes, redirecting main overage to converter in and converter out flow to the cooler. The TCC is now released.

If electrical power is interrupted while the transmission is in fifth range (causing fifth range converter operation) and the manual selector valve is moved to Neutral (N), the 4-5-6 clutch exhausts through the manual selector valve to exhaust backfill, releasing the 4-5-6 clutch. The 3rd, 5th, and reverse clutch remains applied. With only one clutch applied, the transmission goes to neutral.

If electrical power is interrupted while the transmission is in fifth range, (fifth range converter operation) and the manual selector valve is moved to Reverse (R), the 4-5-6 clutch exhausts through the manual selector valve, releasing the clutch. The 3rd, 5th, and reverse clutch remains applied. With only one clutch applied, the transmission goes to neutral.

If electrical power is interrupted while the transmission is in fifth range, resulting in only fifth and neutral operation, the engine may be shut down and restarted to attain neutral, third and reverse operation.

Fifth Range


Main Mod Solenoid Lowers Main Pressure And Increases Cooler Flow When Energized (Typically at Low Throttle, Low Speed)
TCC Solenoid
N/C
PCS1
N/C
Accumulator
PCS2 Solenoid Filter
PCS2
N/O
Accumulator
SS1
N/C
SS2
N/C
SS3
N/C
Main Mod Solenoid
N/C
CONTROL MAIN
EBF
PCS2 PRESSURE
MAIN
PCS1 PRESSURE
CONV – IN
CONV – OUT
MAIN PRESSURE TAP
MAIN
TCC SIGNAL
EXHAUST
Main Regulator Valve
MAIN MODULATED PRESSURE
OVERAGE
Control Main Valve
Control Main Filter
Control Main Relief Valve
Selector Valve
D N R
1-2-3-4 Clutch Valve
4-5-6
3-5-R
2-6
Low and Reverse
PS1
PS2
PS3
PS4
Shift Valve 1
Shift Valve 2
Shift Valve 3
Exhaust Backfill Valve
TCC
TO COOLER
CONV – OUT
OVERAGE
CONV – IN
TCC SIGNAL
SUMP
Converter Relief Valve
Charging Pump
LUBE
Cooler
Converter Flow Valve
Lube Regulator Valve
Main Filter
MAIN PRESSURE
CONTROL MAIN PRESSURE
CONVERTER–IN/OVERAGE
CONVERTER–OUT
TORQUE CONVERTER CLUTCH (TCC)
LUBRICATION/COOLER
EXHAUST
EXHAUST BACKFILL (EBF)
SUCTION
PCS1 SIGNAL
PCS2 SIGNAL
REVERSE SIGNAL
4-5-6
3-5-R
PCS1 PRESSURE

Sixth Range

Before making a shift from fifth to sixth range, the transmission control module (TCM) makes certain that all shift valves are in the correct position. Shift solenoid 1 (SS1) and SS2 are electrically off and shift valve 1 and shift valve 2 are in the de-stroked position. SS3 is electrically on and shift valve 3 is in the stroked position.

Pressure control solenoid 1 (PCS1) is energized, opening PCS1 pressure to exhaust, which allows pressure control valve 3 to de-stroke, exhausting the 3rd, 5th, and reverse clutch pressure and releasing the 3rd, 5th, and reverse clutch. PCS2 is energized, raising the PCS2 signal and PCS2 pressure. PCS2 pressure is directed through shift valve 1, shift valve 3, shift valve 2, and again through shift valve 3 to the 2-6 clutch, applying the clutch. Main pressure continues to flow through shift valve 3, shift valve 2, and the manual selector valve to the 4-5-6 clutch, keeping the 4-5-6 clutch applied. The TCM supplies current to the PCS2, which controls the rate at which the pressure control valve 2 supplies pressure to the 2-6 clutch, and current to PCS1, which controls the rate at which the pressure control valve 1 exhausts the 3rd, 5th, and reverse clutch, assuring a smooth transition to sixth range.

The combined application of the 4-5-6 clutch and the 2-6 clutch produces sixth range operation.

Pressure switch 1 and pressure switch 2 remain open (OFF) providing feedback that shift valve 1 and shift valve 2 remain in the de-stroked position, and pressure switch 3 remains closed (ON) providing feedback that shift valve 3 remains in the stroked position.

If electrical power is interrupted while the transmission is in sixth range, PCS1 and PCS2, SS3 and the torque converter clutch (TCC) solenoid (if TCC is applied) are de-energized. Although SS3 supplies control main pressure to the top of shift valve 3, control main pressure flows through shift valve 1 to the top of shift valve 3, keeping the valve in the stroked position. Normally open PCS2 exhausts PCS2 signal pressure, allowing the pressure control valve 2 to de-stroke, exhausting the 2-6 clutch. Normally closed PCS1 blocks exhausting of PCS1 signal pressure, allowing PCS1 signal and PCS1 pressure to rise.

PCS1 pressure is directed through shift valve 2 to the 3rd, 5th, and reverse clutch, applying the clutch. Main pressure continues to flow through shift valve 3, shift valve 2, and the manual selector valve to the 4-5-6 clutch, keeping the 4-5-6 clutch applied. The combination of 4-5-6 clutch and 3rd, 5th, and reverse clutch application produces fifth range operation for limp home capability.

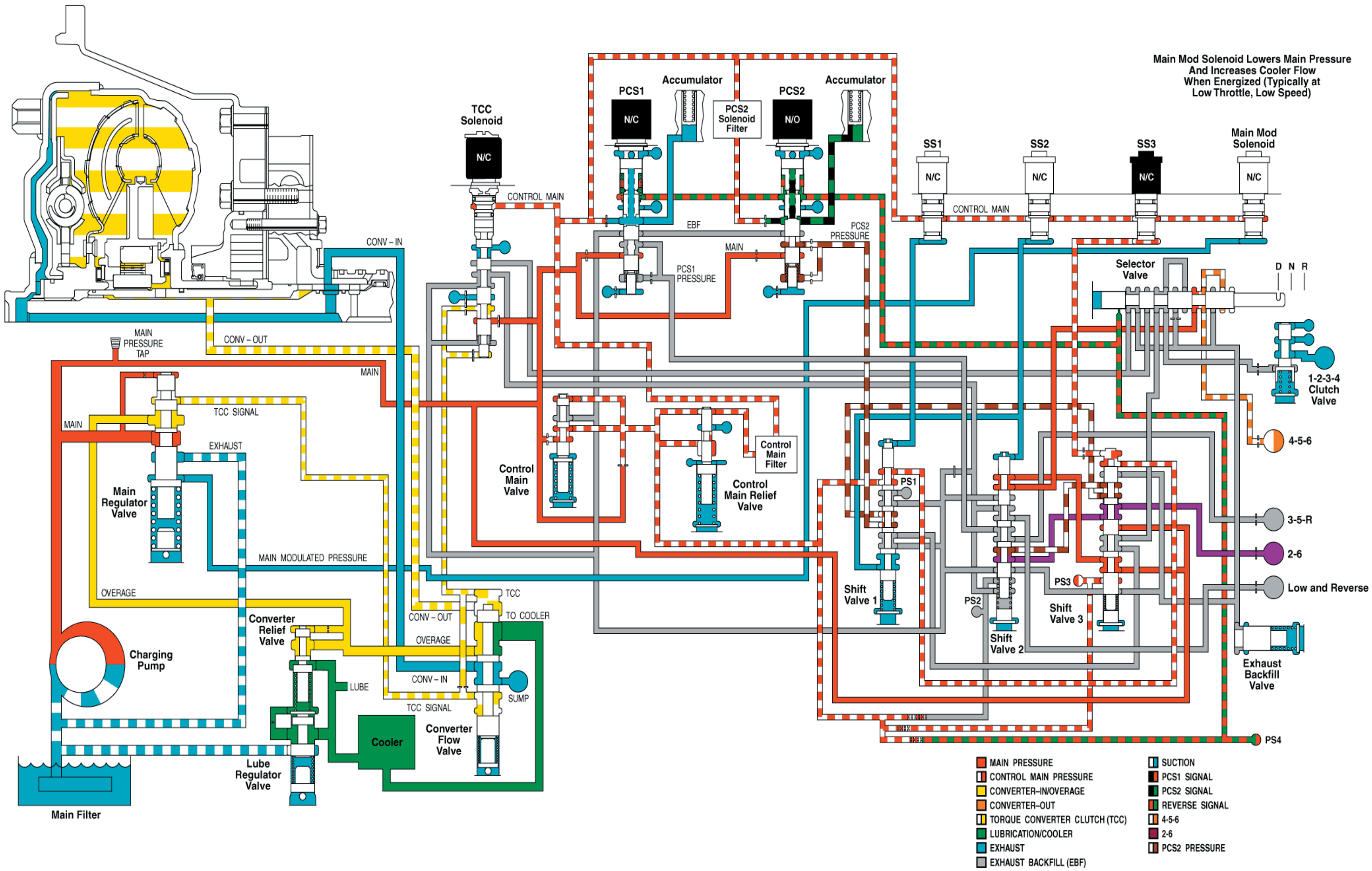
If the TCC is applied, the TCC solenoid de-energizes, causing the TCC valve to de-stroke, exhausting pressure form the top of the converter flow valve. De-stroking the converter flow valve redirects main overage pressure to “converter in” path, then to “converter out” proceeding on to the transmission oil cooler. The TCC is now released.

If electrical power is interrupted while the transmission is in sixth range (causing sixth range converter operation [TCC OFF]) and the manual selector valve is moved to Neutral (N), the 4-5-6 clutch exhausts through the manual selector valve to exhaust backfill pressure, releasing the 4-5-6 clutch. The 3rd, 5th, and reverse clutch remains applied. With only one clutch applied the transmission shifts to neutral

If electrical power is interrupted while the transmission is in sixth range (causing fifth range converter operation [TCC OFF]) and the manual selector valve is moved to Reverse (R), the 4-5-6 clutch exhausts through the manual selector valve to exhaust backfill pressure, releasing the 4-5-6 clutch. The 3rd, 5th, and reverse clutch remains applied. With only one clutch applied, the transmission shifts to neutral.

If electrical power is interrupted while the transmission is in sixth range, resulting in only fifth range and neutral operation, the engine may be shut down and restarted to attain neutral, drive, and reverse operation.

Sixth Range


Main Mod Solenoid Lowers Main Pressure And Increases Cooler Flow When Energized (Typically at Low Throttle, Low Speed)
TCC Solenoid
N/C
PCS1
N/C
Accumulator
PCS2 Solenoid Filter
PCS2
N/O
Accumulator
SS1
SS2
SS3
Main Mod Solenoid
CONTROL MAIN
EBF
MAIN
PCS1 PRESSURE
PCS2 PRESSURE
CONV – IN
CONV – OUT
MAIN PRESSURE TAP
MAIN
TCC SIGNAL
EXHAUST
Main Regulator Valve
MAIN MODULATED PRESSURE
OVERAGE
Converter Relief Valve
Charging Pump
Main Filter
Lube Regulator Valve
LUBE
Cooler
Converter Flow Valve
TCC
TO COOLER
SUMP
Control Main Valve
Control Main Relief Valve
Control Main Filter
Selector Valve
D N R
1-2-3-4 Clutch Valve
4-5-6
3-5-R
2-6
Low and Reverse
PS1
PS2
PS3
PS4
Shift Valve 1
Shift Valve 2
Shift Valve 3
Exhaust Backfill Valve
MAIN PRESSURE
CONTROL MAIN PRESSURE
CONVERTER-IN/OVERAGE
CONVERTER-OUT
TORQUE CONVERTER CLUTCH (TCC)
LUBRICATION/COOLER
EXHAUST
EXHAUST BACKFILL (EBF)
SUCTION
PCS1 SIGNAL
PCS2 SIGNAL
REVERSE SIGNAL
4-5-6
2-6
PCS2 PRESSURE

Reverse

When the manual selector valve is moved from Neutral (N) to Reverse (R), shift solenoid 1 (SS1) de-energizes, turning OFF pressure switch 1. SS2 and SS3 remain energized, keeping pressure switch 2 and pressure switch 3 on. Reverse signal pressure is exhausted, removing pressure from pressure switch 4, turning on the normally closed pressure switch 4.

The transmission control module (TCM) energizes pressure control solenoid 2 (PCS2) to control the rate at which PCS2 pressure supplies oil to the oncoming 3rd, 5th, and reverse clutch, assuring a smooth transition to reverse. As PCS2 is energized, PCS2 signal pressure increases. Initially, the pressure control valve 2 gain valve spring keeps the gain valve away from pressure control valve 2, so that only PCS2 signal pressure acts on pressure control valve 2. As PCS2 signal pressure increases, the PCS2 pressure increases. The PCS2 signal pressure also acts on the gain valve, stroking the valve and compressing the gain valve spring. When the gain valve spring is compressed sufficiently, the gain valve contacts pressure control valve 2. The gain valve spring allows the 3rd, 5th, and reverse clutch initial apply to be controlled at a lower gain rate, improving control of the oncoming 3rd, 5th, and reverse clutch. Once the gain valve makes contact with pressure control valve 2, PCS2 pressure increases at a higher gain rate, PCS2 pressure flows through shift valve 1 to shift valve 3 and on to apply the 3rd, 5th, and reverse clutch. When the shift to reverse is complete, PCS2 fully energizes and PCS2 pressure fully applies the 3rd, 5th, and reverse clutch. PCS1 supplies full pressure to the low and reverse clutch.

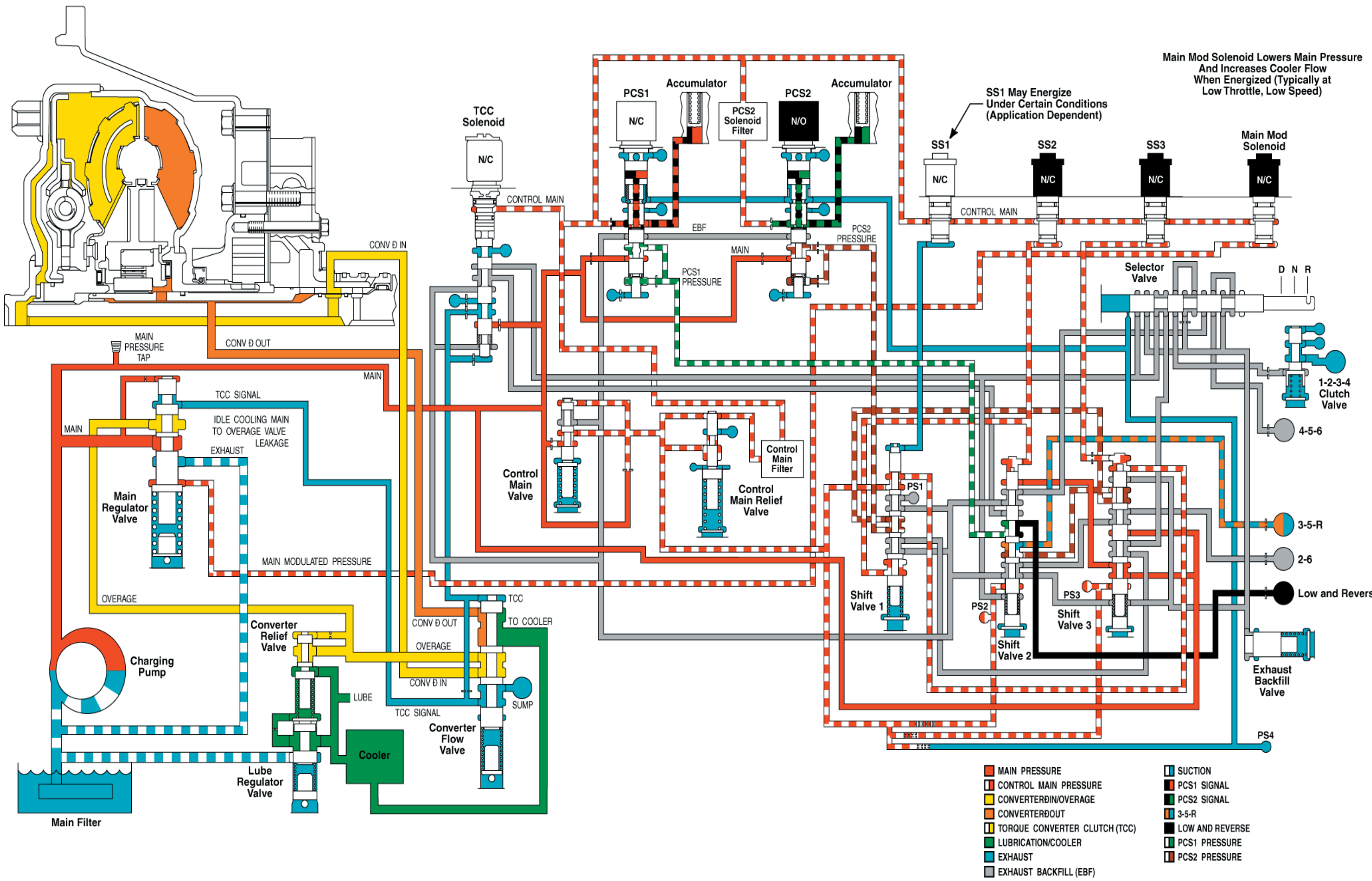
The application of the 3rd, 5th, and reverse clutch and the low and reverse clutch produces reverse range operation.

If electrical power is interrupted with the transmission operating in reverse range, PCS2, SS2, and SS3 de-energize. When PCS2 de-energizes, the normally open solenoid exhausts PCS2 signal pressure, causing pressure control valve 2 to de-stroke, exhausting and releasing the 3rd, 5th, and reverse clutch. Shift valve 1 remains in the stroked position. Control main pressure goes through shift valve 1 to the top of shift valve 3 keeping shift valve 3 stroked. Normally closed PCS1 blocks the exhaust of PCS1 signal pressure, and PCS1 pressure is maintained. PCS1 pressure continues to be directed through shift valve 2, which stays down due to the “latching” effect of pressure on two different diameter lands, to the low and reverse clutch, keeping the low and reverse clutch applied. Because only one clutch is applied, the transmission shifts to neutral range.

If electrical power is interrupted with the transmission operating in reverse range, resulting in neutral operation, main pressure is directed through shift valve 3 to shift valve 2. Because shift valve 2 stays stroked due to the “latching” effect of pressure on two different diameter lands, main pressure is blocked from reaching the manual selector valve. If the manual selector valve is moved to Neutral (N) or a forward range, the transmission remains in neutral.

If electrical power is interrupted with the transmission operating in reverse range, resulting in neutral operation, the engine may be shut down and restarted to attain neutral, third and reverse operation.

Reverse Range

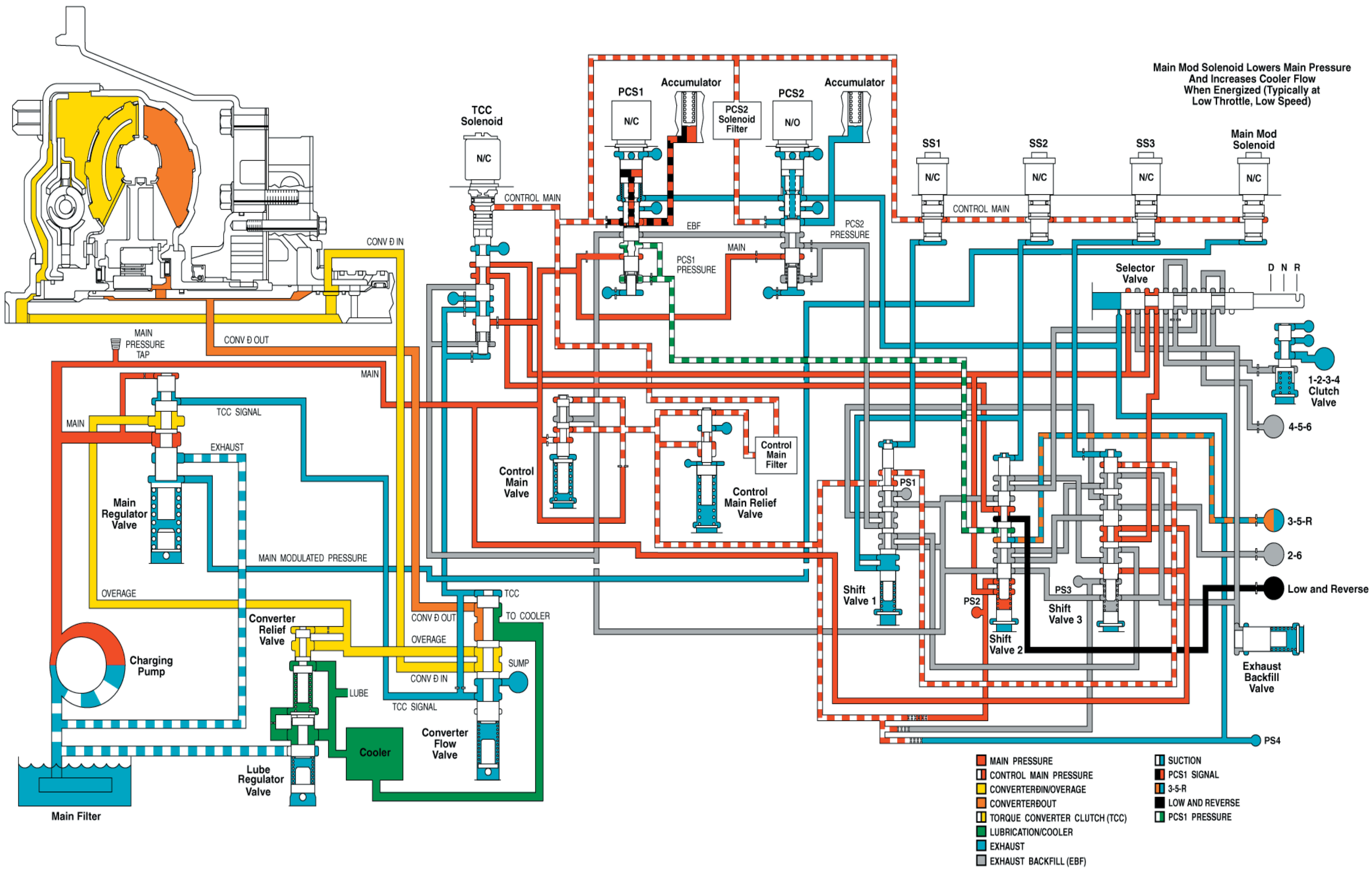


Default Reverse - Limp Home

If electrical power is interrupted with the transmission operating in reverse range, resulting in neutral operation, main pressure is directed through shift valve 3 to shift valve 2. Because shift valve 2 stays stroked due to the “latching” effect of pressure on two different diameter lands, main pressure is blocked from reaching the manual selector valve. If the manual selector valve is moved to Neutral (N) or a forward range, the transmission remains in neutral.

If electrical power is interrupted with the transmission operating in reverse range, resulting in neutral operation, the engine may be shut down and restarted to attain neutral, third and reverse operation.

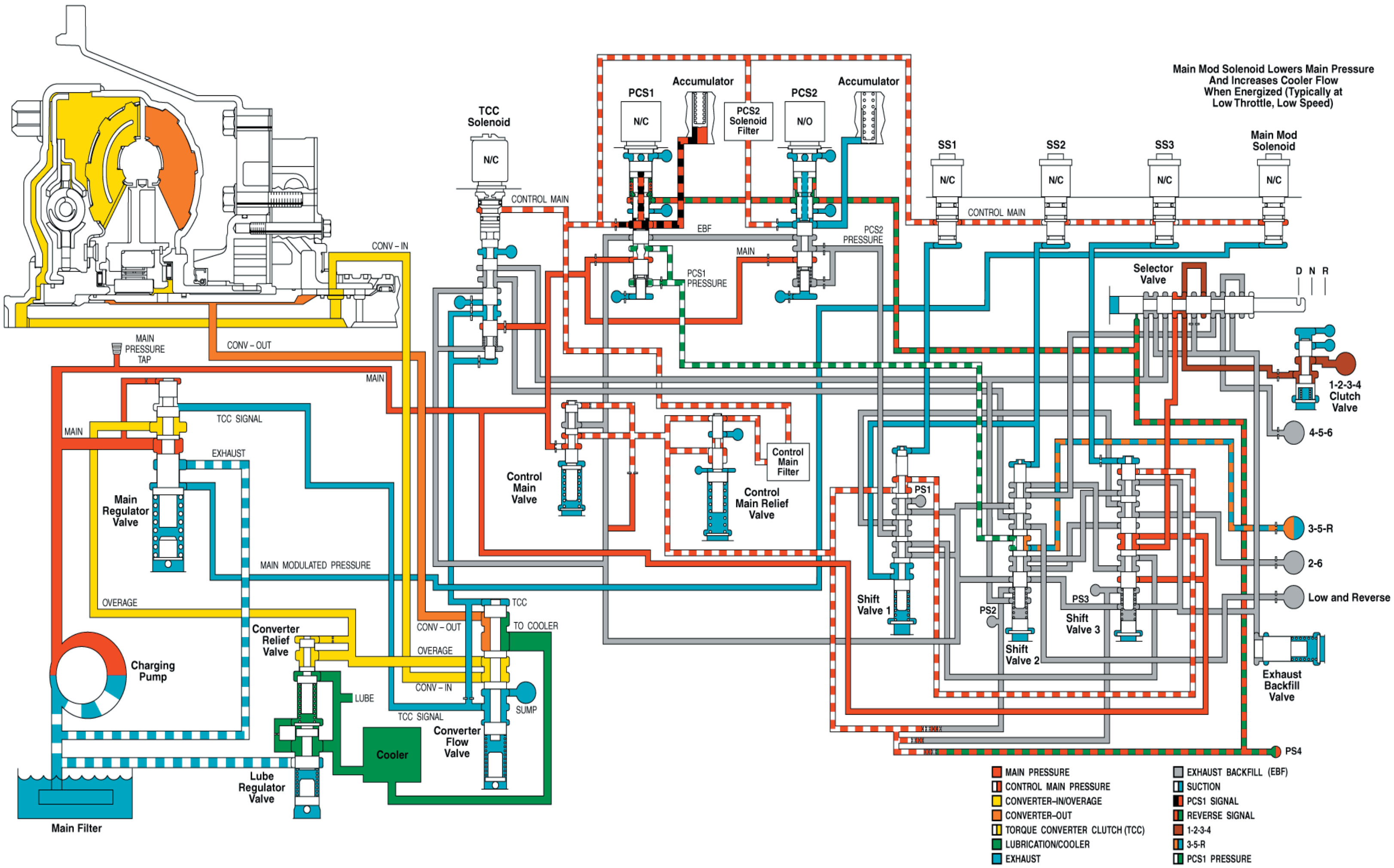
Reverse Range - Limp Home



Default Forward - 3rd Range Limp Home

If electrical power is interrupted while the transmission is in third range, SS1 and the torque converter clutch (TCC) solenoid (if TCC is applied) are de-energized. Shift valve 1 de-strokes, changing the exhaust path of the 4-5-6 clutch to exhaust backfill and the exhaust path of the 2-6 clutch to pressure control valve 2. Normally closed PCS1 continues to block the exhaust of the PCS1 signal pressure (signal remains control main). The signal pressure on top of pressure control valve 1 produces maximum PCS1 pressure, which is routed through shift valve 2 to the 3rd, 5th, and reverse clutch, keeping the clutch applied. With the manual selector valve in a forward position, main pressure continues to feed the 1-2-3-4 clutch through shift valve 3 and the manual selector valve. The combination of the 1-2-3-4 clutch and the 3rd, 5th, and reverse clutch applied keeps the transmission in third range for limp home capability. If the TCC is applied, the TCC solenoid de-energizes, causing the TCC valve to de-stroke, exhausting pressure from the top of the converter flow valve. The converter flow valve de-strokes, redirecting main overage to converter in and converter out to the cooler. The TCC is now released.

Third Range - Limp Home



ELECTRONIC CONTROLLED SHIFTER (ECS) SYSTEM

Shifter Overview

The Arens Controls' Electronic Controlled Shifter (ECS) System is a state of the art control developed for use with Allison 1000/2000/2400 Series Transmissions. This shift selector has been designed to provide for easier driver operation, and features:

- Push-button operation
- Integrated safety features
- Diagnostic capabilities
- Solid state construction for reliable, extended life operation

The system consist of two major components:

1. Push Button Shift Selector – A compact, solid-state shift selector available for PARK and NON-PARK transmission applications. The shift selector is mounted in a convenient location near the vehicle operator. The shift selector is a self-contained electronic control that contains the push button system, Interface Control Module, and Actuator Control Module. The push button pad provides quick, easy operation of the system functions. The Interface Module communicates electronically with Allison TCM and Park-Neutral-Position (PNP) switch. The Actuator Control communicates with the Arens 12VDC actuator and the integrated Position Sensor.
2. The ECS actuator is a 12VDC powered shift actuator mounted on the Allison transmission. The actuator shifts the transmission as directed by commands from the shift selector and within the operating guidelines of the Allison transmission. The Arens ECS system works in conjunction with the Allison "adaptive shifting" electronic control system to provide optimized shift quality. The ECS system components also have a unique redundant electronic system, which prevents single point electrical failures in the system and ensures long life, trouble free operation of the ECS system and the Allison transmission.

Control Panel Operation

Pressing the "P" button shifts the transmission into Neutral and engages the Park Pawl [in 1000 and 2400 transmissions only]. (See the Allison Transmission's Operator's Manual regarding information for the Park Pawl.) Park or Neutral are used to start the vehicle.

WARNING:

If Park is selected, and "P" does not display on the Monitor, the Parking Brake must be set to prevent the vehicle from moving unexpectedly. The system should be checked and serviced.

WARNING:

On Park equipped transmissions, if the ignition is turned off without shifting to Park; a buzzer will sound and the display panel will illuminate and show the gear currently engaged. Shifting to "P" will engage Park and turn off the display and buzzer.

NOTE:

On PARK equipped transmissions, if the vehicle engine is off, the ignition on, and the Park Pawl is not engaged (see Allison Transmission's Operator's Manual for Park Pawl information), the MONITOR will display "N" and a buzzer will sound regardless of the operator's selection. Shifting to "P" will engage Park and turn off the system.

Pressing the "R" button shifts the transmission into Reverse.

Pressing the "N" button shifts the transmission to Neutral. Neutral can be used to start the vehicle.

WARNING:

If the transmission is in "N" and the operator leaves the driver's station, the vehicle parking brake must be set to prevent the vehicle from rolling.

Pressing the "D" button shifts the transmission into Drive and allows the transmission to automatically shift through the full range of 1st through 6th gears. When Drive is initially selected, the Select and Monitor displays read "D1" indicating that Drive has been selected and the transmission is in 1st gear. As the transmission automatically upshifts or downshifts, the Select/ Monitor Display will show which gear the transmission is actually in – D1, D2, D3, D4, D5, or D6.

Manual Gear Selector– Down

When the transmission is in DRIVE, the down-arrow button allows the operator to manually downshift one gear at a time, 5th through 1st. The Select Display will show what gear range has been selected; the Monitor Display will show the actual gear range the transmission is in.

NOTE:

The transmission will not upshift beyond the gear range selected. When DRIVE is selected the full range automatic shift capability is restored.

NOTE:

Selecting DRIVE at any time during the downshift sequence cancels the manual shifting function and allows the transmission to shift automatically.

Manual Gear Selector – Up

When the transmission is in 1 1, 2 2, 3 3, or 4 4, depressing the up-arrow button manually upshifts the transmission one gear at a time until D is selected. The Selector Display shows what gear has been selected, the Monitor Display will show what gear the transmission is actually in.

NOTE:
The transmission will not upshift beyond the gear range selected. When DRIVE is selected the full range automatic shift capability is restored.

NOTE:
Selecting DRIVE at any time during the upshift sequence cancels the manual shifting function and allows the transmission to shift automatically.

Mode

The MODE button activates the function identified by the label above it and may vary from vehicle to vehicle. A light will illuminate in the corner of the button when the MODE is on. (This function is optional.)

Service

If the SERVICE display illuminates there is a fault in the ECS system. A qualified technician should inspect the system as soon as possible.

WARNING:
Operation with the Service light illuminated may indicate a loss of safety back-up systems, and the operator should use extra caution when shifting to insure that the transmission is performing properly.

Additional System Features:

Flashing Display

This indicates that the transmission (rather than the ECS) has inhibited the selected transmission operation; this could occur for a variety of reasons. Refer to the Allison Transmission's Operator's Manual for more information.

Monitor and Buzzer Sounding

This indicates that the engine was shut-off without shifting the transmission to Park. (Park-Equipped Transmissions Only). The display will stay illuminated and show the gear it is currently in. In addition, a warning buzzer will sound. Selecting Park will turn off the panel and engage Park.

WARNING:
Operation with the Service light illuminated may indicate a loss of safety back-up systems and the operator should use extra caution when shifting to insure that the transmission is performing properly.

DIAGNOSTIC INFORMATION AND PROCEDURES

DIAGNOSTIC STARTING POINT - AUTOMATIC TRANSMISSION

Begin the system diagnosis with Diagnostic System Check – Vehicle in Vehicle DTC Information. The Diagnostic System Check provides the following information:

- The identification of the control module which commands the system
- The ability of the control module or modules to communicate through the serial data circuit
- The identification and status of stored diagnostic trouble codes (DTCs)

The use of Diagnostic System Check - Vehicle in Vehicle DTC Information identifies the correct procedure for diagnosing the system and where the procedure is located.

Symptoms

When it has been determined through Diagnostic System Check – Vehicle in Vehicle DTC Information that no DTCs are present, begin symptom diagnosis by reviewing the Functional Test Procedure . This helps you determine if the condition described by the customer is normal or if a malfunction exists. If it is determined that a malfunction exists, identify the concern by referring to Symptoms - Automatic Transmission . The Symptoms - Automatic Transmission provides common diagnostic categories which relate directly to diagnostic information or procedures.

SCAN TOOL DATA LIST

Scan Tool Parameter	Data List	Units Displayed	Typical Data Value
Engine is at Idle, Upper Radiator Hose is Hot, Closed Throttle, Gear is in PARK, and Accessories are OFF.			
1-2 Adapt Status Cell 0	F4	Fast/Slow	Varies
1-2 Adapt Status Cell 1	F4	Fast/Slow	Varies
1-2 Adapt Status Cell 2	F4	Fast/Slow	Varies
1-2 TAP Cell 1	F4	PSI	Varies
1-2 TAP Cell 2	F4	PSI	Varies
1-2 TAP Cell 3	F4	PSI	Varies
1-2 TAP Cell 4	F4	PSI	Varies
2-1 Adapt Status 0% Throttle	F4	Fast/Slow	Varies
2-1 Adapt Status Full Throttle	F4	Fast/Slow	Varies
2-1 Adapt Status Lift Foot	F4	Fast/Slow	Varies
2-1 Adapt Status Part Throttle	F4	Fast/Slow	Varies
2-1 Adapt Status Pre-Select	F4	Fast/Slow	Varies
2-1 TAP Cell 1	F4	PSI	Varies
2-1 TAP Cell 2	F4	PSI	Varies
2-1 TAP Cell 3	F4	PSI	Varies
2-1 TAP Cell 4	F4	PSI	Varies
2-1 TAP Cell 5	F4	PSI	Varies
2-1 TAP Cell 6	F4	PSI	Varies
2-1 TAP Cell 7	F4	PSI	Varies
2-1 TAP Cell 8	F4	PSI	Varies

Scan Tool Parameter	Data List	Units Displayed	Typical Data Value
2-1 TAP Cell 9	F4	PSI	Varies
2-1 TAV Cell 1	F4	CM[caret]3	Varies
2-1 TAV Cell 2	F4	CM[caret]3	Varies
2-3 Adapt Status Cell 0	F5	Fast/Slow	Varies
2-3 Adapt Status Cell 1	F5	Fast/Slow	Varies
2-3 Adapt Status Cell 2	F5	Fast/Slow	Varies
2-3 TAP Cell 1	F5	PSI	Varies
2-3 TAP Cell 2	F5	PSI	Varies
2-3 TAP Cell 3	F5	PSI	Varies
2-3 TAP Cell 4	F5	PSI	Varies
3-2 Adapt Status 0% Throttle	F5	Fast/Slow	Varies
3-2 Adapt Status Full Throttle	F5	Fast/Slow	Varies
3-2 Adapt Status Lift Foot	F5	Fast/Slow	Varies
3-2 Adapt Status Part Throttle	F5	Fast/Slow	Varies
3-2 Adapt Status Pre-Select	F5	Fast/Slow	Varies
3-2 TAP Cell 1	F5	PSI	Varies
3-2 TAP Cell 2	F5	PSI	Varies
3-2 TAP Cell 3	F5	PSI	Varies
3-2 TAP Cell 4	F5	PSI	Varies
3-2 TAP Cell 5	F5	PSI	Varies
3-2 TAP Cell 6	F5	PSI	Varies
3-2 TAP Cell 7	F5	PSI	Varies
3-2 TAP Cell 8	F5	PSI	Varies
3-2 TAP Cell 9	F5	PSI	Varies
3-2 TAV Cell 1	F5	CM[caret]3	Varies
3-2 TAV Cell 2	F5	CM[caret]3	Varies
3-4 Adapt Status Cell 0	F6	Fast/Slow	Varies
3-4 Adapt Status Cell 1	F6	Fast/Slow	Varies
3-4 Adapt Status Cell 2	F6	Fast/Slow	Varies
3-4 TAP Cell 1	F6	PSI	Varies
3-4 TAP Cell 2	F6	PSI	Varies
3-4 TAP Cell 3	F6	PSI	Varies
3-4 TAP Cell 4	F6	PSI	Varies
4-3 Adapt Status 0% Throttle	F6	Fast/Slow	Varies
4-3 Adapt Status Full Throttle	F6	Fast/Slow	Varies
4-3 Adapt Status Lift Foot	F6	Fast/Slow	Varies
4-3 Adapt Status Part Throttle	F6	Fast/Slow	Varies
4-3 Adapt Status Pre-Select	F6	Fast/Slow	Varies
4-3 TAP Cell 1	F6	PSI	Varies
4-3 TAP Cell 2	F6	PSI	Varies
4-3 TAP Cell 3	F6	PSI	Varies
4-3 TAP Cell 4	F6	PSI	Varies
4-3 TAP Cell 5	F6	PSI	Varies
4-3 TAP Cell 6	F6	PSI	Varies
4-3 TAP Cell 7	F6	PSI	Varies
4-3 TAP Cell 8	F6	PSI	Varies
4-3 TAP Cell 9	F6	PSI	Varies
4-3 TAV Cell 1	F6	CM[caret]3	Varies
4-3 TAV Cell 2	F6	CM[caret]3	Varies
4-5 Adapt Status Cell 0	F7	Fast/Slow	Varies
4-5 Adapt Status Cell 1	F7	Fast/Slow	Varies
4-5 Adapt Status Cell 2	F7	Fast/Slow	Varies
4-5 TAP Cell 1	F7	PSI	Varies
4-5 TAP Cell 2	F7	PSI	Varies

Scan Tool Parameter	Data List	Units Displayed	Typical Data Value
4-5 TAP Cell 3	F7	PSI	Varies
4-5 TAP Cell 4	F7	PSI	Varies
5-4 Adapt Status 0% Throttle	F7	Fast/Slow	Varies
5-4 Adapt Status Full Throttle	F7	Fast/Slow	Varies
5-4 Adapt Status Lift Foot	F7	Fast/Slow	Varies
5-4 Adapt Status Part Throttle	F7	Fast/Slow	Varies
5-4 Adapt Status Pre-Select	F7	Fast/Slow	Varies
5-4 TAP Cell 1	F7	PSI	Varies
5-4 TAP Cell 2	F7	PSI	Varies
5-4 TAP Cell 3	F7	PSI	Varies
5-4 TAP Cell 4	F7	PSI	Varies
5-4 TAP Cell 5	F7	PSI	Varies
5-4 TAP Cell 6	F7	PSI	Varies
5-4 TAP Cell 7	F7	PSI	Varies
5-4 TAP Cell 8	F7	PSI	Varies
5-4 TAP Cell 9	F7	PSI	Varies
5-4 TAV Cell 1	F7	CM[caret]3	Varies
5-4 TAV Cell 2	F7	CM[caret]3	Varies
4WD Low	F0	Enabled/ Disabled	Disabled
Cold Shift Pattern	F2	Disabled/ Enabled	Disabled
Current Gear	F0, F1, F2, F3	0-7	0
Driver Demanded Engine Torque	F0, F2, F4, F5, F6, F7, F8	N·m (lb ft)	0
Driver-Reverse Adapt Status Cell 0	F8	Numeric Value	Varies

Scan Tool Parameter	Data List	Units Displayed	Typical Data Value
ECT	F0, F1	°C (°F)	Varies
Engine Run Time	F0, F1, F2, F3, F4, F5, F6, F7, F8	Hr:Min:Sec	Varies
Engine Torque	F0, F1, F2, F4, F5, F6, F7, F8	N·m (lb ft)	10
Force Motor Solenoid A Enabled	F3	Yes/No	Yes
Forced Motor Solenoid B Enabled	F3	Yes/No	Yes
Gear Commanded	F0, F1, F2, F3	0-7	0
Gear Ratio	F0, F1, F2, F4, F5, F6, F7, F8	Ratio	--
Gear Selected	F0, F1, F2, F3	0-8	8
GS Delay From Drive 4 to R Cell 3	F8	Seconds	Varies
GS Delay From Reverse to D 1 Cell 3	F8	Seconds	Varies
GS TAP From Drive 4 to R Cell 1	F8	PSI	Varies
GS TAP From Neutral to D 1 Cell 1	F8	PSI	Varies
GS TAP From Neutral to R Cell 1	F8	PSI	Varies
GS TAP From Reverse to D 1 Cell 1	F8	PSI	Varies
GS TAP From Reverse to N Cell 2	F8	PSI	Varies
GS TAV From Drive 4 to R Cell 1	F8	CM[caret]3	Varies
GS TAV From Drive 4 to R Cell 2	F8	CM[caret]3	Varies

Scan Tool Parameter	Data List	Units Displayed	Typical Data Value
GS TAV From Neutral to D 1 Cell 1	F8	CM[caret]3	Varies
GS TAV From Neutral to D 1 Cell 2	F8	CM[caret]3	Varies
GS TAV From Neutral to R Cell 1	F8	CM[caret]3	Varies
GS TAV From Neutral to R Cell 2	F8	CM[caret]3	Varies
GS TAV From Reverse to D 1 Cell 1	F8	CM[caret]3	Varies
GS TAV From Reverse to D 1 Cell 2	F8	CM[caret]3	Varies
Ignition Voltage	F0	Volts	14.00
Last Output Speed Range Shift	F2, F4, F5, F6, F7, F8	RPM	Varies
Neutral-First Adapt Status Cell 0	F8	Slow/Fast	Varies
Neutral-Reverse Adapt Status Cell 0	F8	Slow/Fast	Varies
Neutral-Second Adapt Status Cell 0	F8	Slow/Fast	Varies
Next Output Speed for Downshift	F0, F2, F4, F5, F6, F7, F8	RPM	0
Next Output Speed Upshift	F0, F2, F4, F5, F6, F7, F8	RPM	Varies
Normal Shift Pattern	F2	Enabled/ Disabled	Enabled
PC Sol. A Actual Current	F0, F3	Amps	Varies
PC Sol. A Ref. Current	F0, F3	Amps	Varies
PC Sol. B Actual Current	F0, F3	Amps	Varies
PC Sol. B Ref. Current	F0, F3	Amps	Varies

Scan Tool Parameter	Data List	Units Displayed	Typical Data Value
PC Solenoid A Duty Cycle	F0, F3	%	0%
PC Solenoid B Duty Cycle	F0, F3	%	0%
Previous Gear	F0, F1, F2, F3	0-7	0
Requested Torque	F4, F5, F6, F7, F8	Numeric Value	Varies
Reverse-First Adapt Status Cell 0	F8	Fast/Slow	Varies
Reverse-Second Adapt Status Cell 0	F8	Fast/Slow	Varies
Service Brake Status Inverted	F0, F1	Enabled/ Disabled	Enabled
Shift Solenoid C	F0, F2	On/Off	On
Shift Solenoid D	F0, F2	On/Off	On
Shift Solenoid E	F0, F2	On/Off	On
Shift Solenoid C Open/ Short to ND	F2	Yes/No	No
Shift Solenoid C Short to Volts	F2	Yes/No	No
Shift Solenoid D Open/ Short to GND	F2	Yes/No	No
Shift Solenoid D Short to Volts	F2	Yes/No	No
Shift Solenoid E Open/ Short to GND	F2	Yes/No	No
Shift Solenoid E Short to Volts	F2	Yes/No	No
TCC Duty Cycle	F0, F1	%	0%
TCC Duty Cycle Open/ Short to GND	F1	Yes/No	No
TCC Duty Cycle Short to Volts	F1	Yes/No	No
TCC Slip Speed	F0, F1	RPM	Varies

Scan Tool Parameter	Data List	Units Displayed	Typical Data Value
TFP Sw. C/D/E/R	F0	On/Off	--
Torque Management Duty Cycle	F0, F2	% DC	Varies
Tow/Haul Mode	F0	Inactive/ Active	Inactive
Torque Requested	F0, F2	N·m (lb ft)	0
TP Angle	F0, F1, F2, F3, F4, F5, F6, F7, F8	Percent	0%
TR Sw.	F0	Park, Reverse, Neutral, Drive, 4,3,2,1	Park
TR Sw. A/B/C/P	F0	On/Off	Off/On/On/ Off
Trans. Fluid Temp.	F0, F1, F2, F3, F4, F5, F6, F7, F8	°C (°F)	Varies
Transmission Hot Mode	F0, F1	On/Off	Off
Transmission ISS	F0, F1, F2, F3, F4, F5, F6, F7, F8	RPM	600-800
Transmission OSS	F0, F1, F2, F3, F4, F5, F6, F7, F8	RPM	0
Turbine Speed	F0, F1, F2, F3, F4, F5, F6, F7, F8	RPM	600-800

Scan Tool Parameter	Data List	Units Displayed	Typical Data Value
Data List Legend • F0: Trans. Data • F1: TCC Data • F2: Shift Data • F3: PC Solenoid Data • F4: 1-2 Adapt. Data • F5: 2-3 Adapt. Data • F6: 3-4 Adapt. Data • F7: 4-5 Adapt. Data • F8: Garage Shift Adapt. Data			

SCAN TOOL DATA DEFINITIONS

Cold Shift Pattern: Displays Enabled or Disabled. This parameter indicates whether the transmission is operating under a cold shift strategy.

Current Gear: Displays 1, 2, 3, 4, or 5. This parameter indicates the current commanded state of the shift solenoids.

Driver Demanded Engine Torque: Displays a range of 0-9,999 lb ft. This parameter indicates the amount of torque that is requested by throttle angle and driving conditions.

ECT (Engine Coolant Temperature): Displays a range of -40°C to +151°C (-40°F to +304°F). This parameter is the input signal of the engine coolant temperature (ECT) sensor. When the ECT is high (151°C), the signal voltage is low (0 V). When the ECT is low -40°C (-40°F), the signal voltage is high (5 V).

Engine Run Time: Displays a range of 0:00:00-

18:12:15 hr/min/sec. This parameter measures the length of time the engine has been in operation during the present ignition cycle.

Engine Torque: Displays a range of 0-9,999 lb ft. This parameter is a calculated value based on engine load, throttle position, mass air flow, and other engine and transmission inputs. This parameter is accurate to within 15 lb ft of actual measured engine torque.

Forced Motor Solenoid A Enabled: Displays Yes or No. This parameter indicates the commanded state of the pressure control solenoid A, reading Yes when the solenoid is energized and No when de-energized.

Forced Motor Solenoid B Enabled: Displays Yes or No. This parameter indicates the commanded state of the pressure control solenoid B, reading Yes when the solenoid is energized and No when de-energized.

Gear Commanded: Displays a range of 0-8. This parameter indicates the commanded gear state from the transmission control module (TCM). When the vehicle is in the Park or Neutral position this parameter displays 0. When the vehicle is placed in Drive, this parameter displays 1 while the vehicle is in first gear and changes accordingly as the vehicle shifts through 2, 3, 4, and 5.

Gear Ratio: Displays a range of 0.000 to 8.00:1. This parameter is the actual gear ratio of the current commanded gear. In the current gear of R, D4, D3, D2, D1, it is calculated by dividing the input speed by the output speed. In the current gear of D5, with TCC locked, the gear ratio is calculated by dividing the turbine speed by the output speed.

Gear Selected: Displays a range of 0-8. This parameter indicates the selected state of the gear selector. Park = 8, Reverse = 7, Neutral = 0, Drive = 5, 3 = 3, 2 =2, 1 =1 as the gear selector is moved through the ranges.

Ignition Voltage: Displays a range of 0.0-25.5 Volts. This parameter indicates the voltage level on the ignition input to the TCM. The normal ignition voltage is approximately 13.8 volts, but may vary between 11-16 volts.

Last Output Speed Range Shift: Displays a range of 0-8,192 RPM. This parameter indicates the RPM value at which the last shift occurred.

Next Output Speed for Downshift: Displays a range of 0-8,192 RPM. This parameter indicates the RPM value at which the next output speed downshift will occur based on current driving requirements.

Next Output Speed Upshift: Displays a range of 0-8,192 RPM. This parameter indicates the RPM value at which the next output speed upshift will occur based on current driving requirements.

Normal Shift Pattern: Displays Enabled or Disabled. This parameter indicates the transmission is operating under a normal shift pattern strategy.

PC Sol. A Actual Current: Displays 0.00-1.1 amps. This parameter is the actual current of the pressure control A solenoid circuit at the control module.

PC Sol. A Ref. Current: Displays 0.00-1.1 amps. This parameter is the commanded current of the pressure control A solenoid circuit at the control module.

PC Sol. B Actual Current: Displays 0.00-1.1 amps. This parameter is the actual current of the pressure control solenoid B circuit at the control module.

PC Sol. B Ref. Current: Displays 0.00-1.1 amps. This parameter is the commanded current of the pressure control solenoid B circuit at the control module.

PC Sol. A Duty Cycle: Displays 0-100 percent. This parameter is the commanded state of the pressure control A solenoid expressed as a percentage of energized On time.

PC Sol. B Duty Cycle: Displays 0-100 percent. This parameter is the commanded state of the pressure control solenoid B expressed as a percentage of energized On time.

Previous Gear: Displays 0-7. This parameter displays the most recent gear the transmission has completed. During an upshift or downshift it continues to display the gear it was currently in until the new gear position has been successfully completed.

Requested Torque: Displays a range of 0-9,999 lb ft. This parameter indicates the amount of torque required by the driver.

Service Brake Status Inverted: Displays Enabled or Disabled. This parameter indicates the status of the brake switch. Enabled indicates that the brake pedal is not depressed. Disabled indicates that the brake pedal is depressed.

Shift Solenoid C: Displays On or Off. This parameter is the commanded state of the shift solenoid C valve. On represents a commanded energized state, current is flowing through the solenoid. Off represents a non-commanded state, current is not flowing through the solenoid.

Shift Solenoid D: Displays On or Off. This parameter is the commanded state of the shift solenoid D valve. On represents a commanded energized state, current is flowing through the solenoid. Off represents a non-commanded state, current is not flowing through the solenoid.

Shift Solenoid E: Displays On or Off. This parameter is the commanded state of the shift solenoid E valve. On represents a commanded energized state, current is flowing through the solenoid. Off represents a non-commanded state, current is not flowing through the solenoid.

Shift Solenoid C Open/Short to GND: Displays Yes or No. This parameter indicates if an open or a short to ground exists in the feedback signal from the shift solenoid C to the powertrain control module (PCM).

Shift Solenoid C Short to Volts: Displays Yes or No. This parameter indicates if a short to B+ exists in the feedback signal from the shift solenoid C to the PCM.

Shift Solenoid D Open/Short to GND: Displays Yes or No. This parameter indicates if an open or a short to ground exists in the feedback signal from the shift solenoid D to the PCM.

Shift Solenoid D Short to Volts: Displays Yes or No. This parameter indicates if a short to B+ exists in the feedback signal from the shift solenoid D to the PCM.

Shift Solenoid E Open/Short to GND: Displays Yes or No. This parameter indicates if an open or a short to ground exists in the feedback signal from the shift solenoid E to the PCM.

Shift Solenoid E Short to Volts: Displays Yes or No. This parameter indicates if a short to B+ exists in the feedback signal from the shift solenoid E to the PCM.

TCC Duty Cycle: Displays 0-100 percent. This parameter is the commanded percentage of On time the TCC solenoid is energized. 90 percent represents an On, energized, commanded state. 0 percent represents an Off, non-energized, commanded state.

TCC Duty Cycle Open/Short to GND: Displays Yes or No. This parameter indicates if an open or a short to ground exits in the feedback signal from the TCC solenoid valve to the PCM.

TCC Duty Cycle Short to Volts: Displays Yes or No. This parameter indicates if a short to B+ exits in the feedback signal from the TCC solenoid valve to the PCM.

TCC Slip Speed: Displays -4,080 to +4,079 RPM. This parameter is the difference between transmission input speed and engine speed. A negative value indicates the engine speed is less than the input speed, deceleration. A positive value indicates the engine speed is equal to the input speed, TCC applied.

TFP Sw. C/D/E/R: Displays On/Off, On/Off, On/Off. This parameter indicates the state of the three inputs from the automatic transmission fluid pressure manual valve position switch assembly. On represents a 0 voltage signal. Off represents a B+ voltage signal.

Torque Management Duty Cycle: Displays in a percent of Duty Cycle. This parameter indicates the amount of torque management being used by the transmission control module (TCM).

Tow/Haul Mode: Displays Active/Inactive. This parameter indicates whether the driver has placed the vehicle in the Tow/Haul mode. When this parameter is active, the TCM modifies the shift strategy in order to provide more torque to the wheels during shifts.

Torque Requested: Displays a range of 0-9,999 lb ft. This parameter indicates the amount of torque required by the driver.

TP Angle: Displays a range of 0-100 percent. The TP angle is computed by the PCM, from TP voltage. The TP angle should display 0 percent at idle and 100 percent at wide open throttle (WOT).

TR Sw.: Displays a range of Park, Reverse, Neutral, Drive, 4, 3, 2, 1. The transmission range (TR) switch indicates the TR selected by the driver.

TR Sw. A/B/C/P: Displays On/Off, On/Off, On/Off, On/Off. These parameters are the four inputs from the automatic transmission fluid pressure manual valve position switch assembly. ON represents a 0 voltage signal. OFF represents a B+ voltage signal.

Trans. Fluid Temp.: Displays -40°C to +151°C (-40°F to +304°F). This parameter is the input signal of the transmission fluid temperature sensor. The transmission fluid temperature is high when the signal voltage is low, 0 volts, and transmission fluid temperature is low when the signal voltage is high, 5 volts.

Transmission Hot Mode: Displays On or Off. This parameter monitors the transmission fluid temperature (TFT). Yes indicates the transmission fluid temperature has exceeded 135°C (275°F).

Transmission ISS: Displays 0-8,192 RPM. This parameter measures the rotational speed of the input shaft expressed as revolutions per minute (RPM).

Transmission OSS: Displays 0-8,192 RPM. This parameter measures the rotational speed of the transmission output shaft expressed as RPM. On four-wheel drive applications, the transfer case output shaft speed is measured.

Turbine Speed: Displays 0-8,192 RPM. This parameter indicates the rotational speed of the torque convertor turbine shaft expressed as RPM. In commanded gears 1, 2, 3, and 4, the turbine speed equals the input speed.

4WD Low: Displays Enabled or Disabled. This parameter is the signal state of the four-wheel drive low circuit. Enabled indicates a 0 voltage signal requested 4WD low. Disabled indicates a B+ voltage signal, which does not request 4WD low.

DIAGNOSTIC TROUBLE CODE (DTC) TYPE DEFINITIONS

The DTC Type Definitions contain the characteristics for all types of DTCs. Each DTC type may or may not be found in this section. The DTC type is based on the action that the control module takes when storing DTC information, and whether or not the control module illuminates a service lamp or displays a message on a driver information center (DIC). The DTC descriptions in the Diagnostic Trouble Code List/Type are listed in numeric order and indicate the DTC types for domestic and export vehicle applications. Each DTC is categorized into one of the following types:

Type A

This DTC is emissions related. The control module stores the DTC in History, Freeze Frame and Failure Records during the first trip in which the conditions for setting the DTC are met. The control module also illuminates the malfunction indicator lamp (MIL) during the first trip in which the conditions for setting the DTC are met.

Type B

This DTC is emissions related. The control module stores the DTC in Failure Records during the first trip in which the conditions for setting the DTC are met. The control module stores the DTC in History and Freeze

Frame during the second consecutive trip in which the conditions for setting the DTC are met. The control module also illuminates the MIL during the second consecutive trip in which the conditions for setting the DTC are met.

Type C

This DTC is non-emissions related. The control module stores the DTC in History and Failure Records during the first trip in which the conditions for setting the DTC are met. The control module does not store the DTC in Freeze Frame and does not illuminate the MIL. For some type C DTCs, a message may be displayed on a DIC, if equipped. For other type C DTCs, a separate service lamp, other than the MIL, may be illuminated. Type C DTCs that do not display a message on the DIC or illuminate a separate service lamp were formerly referred to as type D.

Type X

This DTC is available in the control module software, but has been disabled, or turned off. In this case, the diagnostic does not run, DTCs are not stored, and the MIL does not illuminate. Type X DTCs are used primarily for export vehicles that do not require MIL illumination or DTC storing.

The service information contained in this manual refers to the domestic, federal, calibration package. Domestic calibrations apply to vehicles sold in the United States, Canada and Japan. Export calibrations exist for both leaded and unleaded vehicles. DTC types may change for some export vehicles, and some DTCs may be turned off for leaded export vehicles. Differences between domestic and export calibrations are not reflected on DTC support information pages. DTC types for export calibrations are referenced only in the Diagnostic Trouble Code List/Type.

DIAGNOSTIC TROUBLE CODE (DTC) LIST/TYPE

DTC Code	DTC Type
DTC P0218	C
DTC P0561	C
DTC P0562	C
DTC P0563	C
DTC P0602	C
DTC P0613	C
DTC P0634	B
DTC P0658	A
DTC P0659	B
DTC P0700	A
DTC P0701	C
DTC P0703	C
DTC P0706	A
DTC P0708	A
DTC P0711	B
DTC P0712	B
DTC P0713	B
DTC P0716	A
DTC P0717	A
DTC P0721	A
DTC P0722	A

DTC Code	DTC Type
DTC P0726	B
DTC P0727	B
DTC P0729	A
DTC P0731	A
DTC P0732	A
DTC P0733	A
DTC P0734	A
DTC P0735	A
DTC P0736	A
DTC P0741	B
DTC P0742	B
DTC P0751	A
DTC P0752	A
DTC P0756	A
DTC P0757	A
DTC P0761	A
DTC P0762	A
DTC P0776	A
DTC P0777	A
DTC P0826	B
DTC P0827	B
DTC P0828	B
DTC P0842	A
DTC P0843	A
DTC P0847	A
DTC P0848	A
DTC P0872	A
DTC P0873	A
DTC P0877	A
DTC P0878	A
DTC P0880	C

DTC Code	DTC Type
DTC P0881	C
DTC P0882	C
DTC P0883	C
DTC P0960	A
DTC P0962	A
DTC P0963	A
DTC P0964	A
DTC P0966	A
DTC P0967	A
DTC P0972	A
DTC P0973	A
DTC P0974	A
DTC P0975	A
DTC P0976	A
DTC P0977	A
DTC P0978	A
DTC P0979	A
DTC P0980	A
DTC P1688	B
DTC P1779	B
DTC P2670	A
DTC P2671	B
DTC P2723	A
DTC P2724	A
DTC P2727	A
DTC P2729	A
DTC P2730	A
DTC P2761	A
DTC P2763	A
DTC P2764	A
DTC P2771	B

DTC P0218

Circuit Description

The flow of transmission fluid starts in the transmission pan. The transmission fluid is then drawn through the filter and the transmission case into the oil pump assembly. The oil pump pressurizes the fluid into main pressure, that is regulated at the main pressure regulator valve. From this point, fluid is directed to the torque converter clutch (TCC) solenoid and to the control main regulator valve and control main relief valve, into the control main filter assembly and on to all solenoids for use as control pressure. Hot fluid leaving the torque converter is routed through the converter flow valve, to cooler lines, and into the cooler assembly, located in the radiator. The vehicle may be equipped with an auxiliary oil cooler. The cooled fluid is returned to the transmission through the return cooler line and to the transmission lube circuit. The automatic transmission fluid temperature (TFT) sensor, which is part of the pressure switch manifold (PSM) assembly, is mounted to the valve body.

If the transmission control module (TCM) detects a high TFT for an extended period of time, then DTC P0218 sets.

DTC P0218 is a type C DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P0218 Transmission Condition Overtemperature

Conditions for Running the DTC

- DTCs P0711, P0712, P0713 are not active.
- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.
- Engine speed is greater than 200 RPM for greater than 5 seconds.

Conditions for Setting the DTC

DTC P0218 sets when the TCM detects a transmission sump temperature greater than 126°C (252°F) for 10 seconds.

Action Taken When the DTC Sets

- The TCM does not illuminate the malfunction indicator lamp (MIL).
- The TCM freezes shift adapts from being updated.
- The TCM records the operating conditions when the Conditions for Setting the DTC are met. The TCM stores this information as Failure Records.
- The TCM stores DTC P0218 in TCM history.
- The TCM inhibits TCC engagement.

Conditions for Clearing the DTC

- A scan tool can clear the code from the TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.
- The TCM cancels the DTC default actions when the condition no longer exists and the DTC passes the test.

Diagnostic Aids

- Verify the driving habits of the customer, such as trailer towing, etc.
- The TFT should rise steadily during warm-up cycles, then stabilize.
- DTC P0218 may set after DTC P0711 has set. Follow the diagnostic table for DTC P0711 before proceeding to the diagnostic for DTC P0218.
- Repairing the condition that set DTC P0711 will likely eliminate DTC P0218.

Test Description

The number below refers to the step number on the diagnostic table.

3. This step inspects for air restriction and loss of transmission fluid flow, causing an extremely high TFT.

DTC P0218			
Step	**Action**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics			
1	Did you perform the Diagnostic System Check - Vehicle?	Go to Step 2	Go to Diagnostic System Check - Vehicle
2	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** *Before clearing the DTCs, use the scan tool in order to record the Freeze Frame and Failure Records. The Clear Info function will erase the data.* 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Perform the Transmission Fluid Checking Procedure. Refer to Transmission Fluid Checking Procedure . Is the transmission fluid level correct?	Go to Step 3	Go to Transmission Fluid Checking Procedure
3	1. Inspect the engine cooling system for the following conditions: – Air flow restrictions – Air flow blockage – System fluid level and condition – Debris 2. Inspect the transmission cooling system for the following conditions: – Air flow restrictions – Air flow blockage – System fluid level and conditions – Debris – Damaged cooler lines or hoses Did you find and correct the condition?	Go to Step 6	Go to Step 4
4	Perform the Line Pressure Check Procedure. Refer to Line Pressure Check Procedure. Is the line pressure correct?	Go to Step 6	Go to Step 5

DTC P0218			
Step	**Action**	**Yes**	**No**
5	Inspect the torque converter stator for damage. Refer to Torque Converter Diagnosis Procedure . Did you find and correct the condition?	Go to Step 6	Go to Symptoms - Automatic Transmission
6	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Using the scan tool, monitor the TFT. 3. Start the engine. 4. The TFT must be less than 122°C (252°F) for at least 10 seconds. 5. Select Specific DTC. 6. Enter DTC P0218. Has the test run and passed?	Go to Step 7	Go to Step 2
7	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P0561

Circuit Description

The transmission control module (TCM) requires a switched ignition voltage input and a direct battery voltage input.

DTC P0561 is a type C DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P0561 System Voltage Unstable

Conditions for Running the DTC

- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.
- Engine speed is greater than 400 RPM for 0.5 second.

Conditions for Setting the DTC

DTC P0561 sets when the TCM detects a large variation in ignition voltage or battery direct voltage. When an ignition or battery direct voltage variation of 4.0 volts or greater is detected for 0.5 second, a fault pending is reported. After 1.0 second of 4.0 volts or greater variation, a DTC is set with a failure response.

Action Taken When the DTC Sets

- The TCM does not illuminate the malfunction indicator lamp (MIL).
- The transmission fails to hydraulic default.
- DTC P0561 is stored in TCM history.
- The TCM inhibits torque converter clutch (TCC) engagement.
- The TCM freezes shift adapts.

Conditions for Clearing the DTC

- A scan tool can clear the code from the TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

- Inspect for aftermarket devices that could affect the operation of the starting and charging systems.
- Inspect the wiring for poor electrical connections at the TCM. Inspect for the following conditions:
  – A bent terminal
  – A backed-out terminal
  – A damaged terminal
  – Poor terminal tension
  – A chafed wire
  – A broken wire inside the insulation
- When diagnosing for an intermittent short or open, massage the wiring harness while watching the test equipment for a change.
- You may have to drive the vehicle in order to experience a condition.
- Inspect for the presence of aftermarket accessories, such as a remote starter, etc. Depending on how these aftermarket accessories are installed, they may interfere with the required voltage for proper operation of the transmission.

Test Description

The number below refers to the step number on the diagnostic table.

3. This step observes battery feed.
4. This step observes ignition feed.
7. This step observes accessories for voltage fluctuations.

DTC P0561				
Step	**Action**	**Value**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics				
1	Did you perform the Diagnostic System Check - Vehicle?	—	Go to Step 2	Go to Diagnostic System Check - Vehicle
2	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** *Before clearing the DTCs, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.* 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Start the engine and observe the charge indicator on the instrument panel cluster (IPC). Does the charge indicator illuminate?	—	Go to Charging System Test	Go to Step 3
3	1. Turn the ignition OFF. 2. Disconnect the 80-way connector at the TCM. 3. Install the J 39700 breakout box, the J-47275 breakout box adapter and the J 47275-1 magnetic overlay. 4. Using the DMM, and in sequence, measure voltage at connector terminals 10 and 70 and ground. Is voltage within the specified value?	B+	Go to Step 4	Go to Step 5
4	1. Using the DMM, measure voltage at connector terminal 63 and ground. 2. Turn ON the ignition, with the engine OFF. Is voltage within the specified value?	B+	Go to Step 7	Go to Step 6
5	Test the battery positive voltage circuit for an open or short to ground. Refer to Circuit Testing and Wiring Repairs . Did you find and correct the condition?	—	Go to Step 10	Go to Diagnostic Aids

DTC P0561				
Step	**Action**	**Value**	**Yes**	**No**
6	Test the ignition feed circuit for an open or short to ground. Refer to Circuit Testing and Wiring Repairs . Did you find and correct the condition?	—	Go to Step 10	Go to Step 9
7	1. Start the engine. 2. Operate all accessories. Refer to Checking Aftermarket Accessories Did voltage fluctuate by the specified amount?	4V	Go to Step 8	Go to Step 9
8	Determine the cause of the accessory voltage drop. Refer to Circuit Testing and Wiring Repairs. Did you find and correct the condition?	—	Go to Step 10	Go to Diagnostic Aids
9	**IMPORTANT:** *In most cases, the TCM is not at fault. Investigate thoroughly before replacing the TCM.* Replace the TCM. Refer to Control Module References for replacement, setup, and programming. Did you complete the replacement?	—	Go to Step 10	
10	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Using the scan tool, monitor TCM voltage. 3. Select Specific DTC. 4. Enter DTC P0561. Has the test run and passed?	—	Go to Step 11	Go to Step 2
11	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	—	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P0562

Circuit Description

The transmission control module (TCM) requires a switched ignition voltage to operate. The voltage signal should be direct from the ignition switch to avoid any interference.

DTC P0562 is a type C DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P0562 System Voltage Low

Conditions for Running the DTC

- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.
- The engine speed is greater than 450 RPM for 10 seconds.

Conditions for Setting the DTC

DTC P0562 sets when the TCM detects ignition voltage below 8.0 volts at 0°C (32°F) for a total of 5 out of 7 seconds. The voltage threshold is temperature dependant, varying from 5.0 volts at -60°C (-76°F) to 9.0 volts at 20°C (68°F).

Action Taken When the DTC Sets

- The TCM does not illuminate the malfunction indicator lamp (MIL).
- The transmission fails to hydraulic default.
- DTC P0562 is stored in TCM history.
- The TCM inhibits torque converter clutch (TCC) engagement.
- The TCM freezes shift adapts.

Conditions for Clearing the DTC

- A scan tool can clear the code from the TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

- Inspect the wiring for poor electrical connections at the TCM. Inspect for the following conditions:
  - A bent terminal
  - A backed-out terminal
  - A damaged terminal
  - Poor terminal tension
  - A chafed wire
  - A broken wire inside the insulation
- When diagnosing for an intermittent short or open, massage the wiring harness while watching the test equipment for a change.
- You may have to drive the vehicle in order to experience a condition.
- Inspect for the presence of aftermarket accessories, such as a remote starter, etc. Depending on how these aftermarket accessories are installed, they may interfere with the required voltage for proper operation of the transmission.

DTC P0562				
Step	**Action**	**Value**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics				
1	Did you perform the Diagnostic System Check – Vehicle?	—	Go to Step 2	Go to Diagnostic System Check - Vehicle
2	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** *Before clearing the DTCs, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.* 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Using the DMM, measure and record voltage at the battery terminals. Is voltage within the specified value?	B+	Go to Step 3	Go to Step 4
3	Start the engine and observe the charge indicator on the instrument cluster. Refer to Charging System Test . Does the charge indicator illuminate?	—	Go to Step 5	Go to Step 6
4	Replace the battery or resolve the battery condition. Refer to Battery Inspection/Test . Did you resolve the condition or complete the replacement?	—	Go to Step 6	—
5	Repair the charging system. Refer to Charging System Test or Generator Replacement . Did you complete the repair?	—	Go to Step 6	—

DTC P0562				
Step	**Action**	**Value**	**Yes**	**No**
6	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Using the scan tool, monitor TCM voltage. 3. Select Specific DTC. 4. Enter DTC P0562. Has the test run and passed?	—	Go to Step 7	Go to Step 2
7	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	—	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P0563

Circuit Description

The transmission control module (TCM) requires ignition voltage to operate correctly. The voltage signal should be direct from the ignition switch to avoid any interference.

DTC P0563 is a type C DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P0563 System Voltage High

Conditions for Running the DTC

- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.
- The engine speed is greater than 450 RPM for 1 second.

Conditions for Setting the DTC

DTC P0563 sets when the TCM detects a voltage greater than 18 volts for 6 out of 10 seconds.

Action Taken When the DTC Sets

- The TCM does not illuminate the malfunction indicator lamp (MIL).
- The transmission fails to hydraulic default.
- DTC P0563 is stored in TCM history.
- The TCM inhibits torque converter clutch (TCC) engagement.
- The TCM freezes shift adapts.

Conditions for Clearing the DTC

- A scan tool can clear the code from the TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

- Inspect the wiring for poor electrical connections at the TCM. Inspect for the following conditions:
  - A bent terminal
  - A backed-out terminal
  - A damaged terminal
  - Poor terminal tension
  - A chafed wire
  - A broken wire inside the insulation
- When diagnosing for an intermittent short or open, massage the wiring harness while watching the test equipment for a change.
- You may have to drive the vehicle in order to experience a condition.
- Inspect for the presence of aftermarket accessories, such as a remote starter, etc. Depending on how these aftermarket accessories are installed, they may interfere with the required voltage for proper operation of the transmission.

DTC P0563				
Step	**Action**	**Value**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics				
1	Did you perform the Diagnostic System Check – Vehicle?	—	Go to Step 2	Go to Diagnostic System Check - Vehicle
2	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** ***Before clearing the DTCs, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.*** 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Using the DMM, measure and record voltage at the battery terminals. Is voltage within the specified value?	B+	Go to Step 3	Go to Step 4
3	Start the engine and observe the charge indicator on the instrument cluster. Refer to Charging System Test. Does the charge indicator display voltage higher than specified value?	18 V	Go to Step 5	Go to Step 6
4	Replace the battery or resolve the battery condition. Refer to Battery Inspection/Test. Did you resolve the condition or complete the replacement?	—	Go to Step 6	—
5	Repair the charging system. Refer to Charging System Test or Generator Replacement. Did you complete the repair?	—	Go to Step 6	—

DTC P0563				
Step	**Action**	**Value**	**Yes**	**No**
6	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Using the scan tool, monitor TCM voltage. 3. Select Specific DTC. 4. Enter DTC P0564. Has the test run and passed?	—	Go to Step 7	Go to Step 2
7	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	—	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P0602

Circuit Description

When the ignition is turned on and the transmission control module (TCM) is powered up or when DTCs are cleared, the TCM performs a self-test to determine if the calibration is valid.

DTC P0602 is a type C DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P0602 Transmission Control Module (TCM) Not Programmed

Conditions for Running the DTC

- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.
- This test will run before any TCM function.

Conditions for Setting the DTC

DTC P0602 sets if the TCM determines the present calibration is invalid.

Action Taken When the DTC Sets

- The TCM does not illuminate the malfunction indicator lamp (MIL).
- The transmission is limited to forward range, due to presence of default calibration.
- The TCM returns to the boot program, and then waits to be calibrated.
- The TCM inhibits torque converter clutch (TCC) engagement.

Conditions for Clearing the DTC

The TCM must be calibrated.

Diagnostic Aids

DTC P0602 may set because of improper TCM reprogramming.

DTC P0602			
Step	**Action**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics			
1	Did you perform the Diagnostic System Check - Vehicle?	Go to Step 2	Go to Diagnostic System Check - Vehicle
2	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** *Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records. The Clear Info function will erase the data.* 3. Record the DTC Failure Records. 4. Clear the DTC. 5. Turn OFF the ignition for at least 30 seconds. 6. Turn ON the ignition. Is the transmission fluid level correct?	Go to Step 3	Go to Diagnostic Aids
3	Perform the transmission control module programming procedure. Refer to Control Module References for replacement, setup, and programming. Did DTC P0602 set again?	Go to Step 4	Go to Step 5
4	**IMPORTANT:** *In most cases, the TCM is not at fault. Investigate thoroughly before replacing the TCM.* Replace the TCM. Refer to Control Module References for replacement, setup, and programming. Did you complete the replacement?	Go to Step 5	—

DTC P0602			
Step	**Action**	**Yes**	**No**
5	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Turn OFF the ignition for 30 seconds. 3. Turn ON the ignition. 4. Select Specific DTC. 5. Enter DTC P0602. Has the test run and passed?	Go to Step 6	Go to Step 2
6	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P0613

Circuit Description

The transmission control module (TCM) continually performs a series of processing steps, known as a processing loop, during normal operation. The TCM must complete the processing loop within a specific time limit. The TCM will set if it does not complete two consecutive loops inside a predetermined time interval.

DTC P0613 is a type C DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P0613 Transmission Control Module (TCM) Processor

Conditions for Running the DTC

- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.
- This test is run during the entire ignition cycle.

Conditions for Setting the DTC

DTC P0613 sets if the TCM does not complete two processing loops within the allotted time.

Action Taken When the DTC Sets

- The TCM does not illuminate the malfunction indicator lamp (MIL).
- The TCM commands all transmission solenoids to OFF.
- DTC P0613 is stored in TCM history.
- The TCM freezes shift adapts.
- The TCM inhibits torque converter clutch (TCC) engagement.

Conditions for Clearing the DTC

- A scan tool can clear the code from the TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

2. This step test B+ voltage.
4. This step tests the status of the charging system.

DTC P0613				
Step	**Action**	**Value**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics				
1	Did you perform the Diagnostic System Check - Vehicle?	—	Go to Step 2	Go to Diagnostic System Check - Vehicle
2	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** *Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.* 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Using the DMM, measure and record voltage at the battery terminals. Is voltage within the specified value?	B+	Go to Step 3	Go to Step 4
3	Start the engine and observe the charge indicator on the instrument cluster. Refer to Charging System Test . Does the charge indicator display voltage higher than the specified value?	18 V	Go to Step 5	Go to Step 6
4	Replace the battery or resolve the battery condition. Refer to Battery Inspection/Test. Did you resolve the condition or complete the replacement?	—	Go to Step 6	—
5	Repair the charging system. Refer to Charging System Test or Generator Replacement . Did you complete the repair?	—	Go to Step 6	—

DTC P0613				
Step	**Action**	**Value**	**Yes**	**No**
6	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Using the scan tool, monitor TCM voltage. 3. Select Specific DTC. 4. Enter DTC P0563. Has the test run and passed?	—	Go to Step 7	Go to Step 2
7	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	—	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P0634

Circuit Description

The transmission control module (TCM) is equipped with an internal temperature sensor mounted directly to the TCM circuit board. The TCM will take action to protect against damage from overheating.

DTC P0634 is a type B DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P0634 Transmission Control Module (TCM) Internal Temperature Too High

Conditions for Running the DTC

- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.
- Engine speed is greater than 200 RPM and less than 7,500 RPM for greater than 10 seconds.

Conditions for Setting the DTC

DTC P0634 sets if the TCM internal temperature is greater than or equal to 140°C (284°F) for 10 seconds with the engine running.

Action Taken When the DTC Sets

- The TCM illuminates the malfunction indicator lamp (MIL) during the second consecutive trip in which the Conditions for Setting the DTC are met.
- When DTC P0613 is active, the TCM commands all transmission solenoids to OFF.
- DTC P0634 is stored in TCM history.
- The TCM inhibits torque converter clutch (TCC) engagement.

Conditions for Clearing the DTC

- A scan tool can clear the code from the TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

Clean the TCM if necessary. Excessive road debris will reduce the effectiveness of the heat sink on the TCM and could cause the internal temperature to rise.

DTC P0634			
Step	**Action**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics			
1	Did you perform the Diagnostic System Check - Vehicle?	Go to Step 2	Go to Diagnostic System Check - Vehicle
2	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** *Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.* 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Using the scan tool, drive the vehicle and monitor TCM internal temperature. Did DTC P0634 return?	Go to Step 3	Go to Diagnostic Aids
3	1. Inspect the TCM and surrounding area for obstructions. 2. Ensure the engine cooling fan is operating properly. Do you find and correct the condition?	Go to Step 5	Go to Step 4
4	**IMPORTANT:** *In most cases, the TCM is not at fault. Investigate thoroughly before replacing the TCM.* Replace the TCM. Refer to Control Module References for replacement, setup, and programming. Did you complete the replacement?	Go to Step 6	—
5	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Start the engine. 3. Using the scan tool, drive the vehicle and monitor TCM internal temperature. 4. Select Specific DTC. 5. Enter DTC P0634. Has the test run and passed?	Go to Step 6	—

DTC P0634			
Step	**Action**	**Yes**	**No**
6	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P0658

Circuit Description

The transmission control module (TCM) provides voltage to the main modulation (MAIN MOD), torque converter clutch (TCC) and pressure control solenoid 1 (PCS1) through a separate solid state device called high side driver 1 (HDS1). HSD1 is continuously ON during normal operation, except during a brief circuit test. The TCM regulates control current to the solenoids by switching the appropriate low side driver ON and OFF.

DTC P0658 is a type A DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P0658 Actuator Supply Voltage 1 Low

Conditions for Running the DTC

- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.
- HSD1 is commanded ON.

Conditions for Setting the DTC

DTC P0658 is set when the TCM detects a low voltage condition, less than 6 volts, in 3 solenoids in the HSD1 circuit.

Action Taken When the DTC Sets

- The TCM illuminates the malfunction indicator lamp (MIL)
- If the failure occurs while in a forward range, a shift to 1st, 3rd or 5th range is made.
- While diagnostic response is active, if the shift selector is moved to NEUTRAL, the transmission will shift to NEUTRAL. If the shift selector is moved to REVERSE, the transmission shifts to REVERSE. If the shift selector is moved to a forward range or REVERSE and the transmission is compromised by overspeeding or direction change, the transmission shifts to NEUTRAL.
- DTC P0658 is stored in TCM history.
- The TCM inhibits MAIN MOD.
- The TCM freezes shift adapts.
- The TCM inhibits TCC engagement.

Conditions for Clearing the MIL/DTC

- A scan tool can clear the code from TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

Inspect the wiring for poor electrical connections at the TCM. Inspect for the following conditions:

- A bent terminal
- A backed-out terminal
- A damaged terminal
- Poor terminal tension
- A chafed wire
- A broken wire inside the insulation
- When diagnosing for an intermittent short or open, massage the wiring harness while watching the test equipment for a change.
- You may have to drive the vehicle in order to experience

a condition.

Test Description

The number below refers to the step number on the diagnostic table.

3. This step tests HSD1 supply voltage..

DTC P0658				
Step	**Action**	**Value**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics				
1	Did you perform the Diagnostic System Check - Vehicle?	—	Go to Step 2	Go to Diagnostic System Check - Vehicle
2	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** *Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.* 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Using the scan tool, measure ignition voltage. Is the voltage within the specified range?	9-18 V	Go to Step 3	Go to DTC P0562 for low voltage or DTC P0563 for high voltage
3	1. Turn the ignition OFF. 2. Disconnect the 80-way connector at the TCM. 3. Install the J 39700 breakout box, the J-47275 breakout box adapter and the J 47275-1 magnetic overlay. 4. Turn ON the ignition, with the engine OFF. 5. Using the DMM, measure voltage at terminal 11 and ground. Is the voltage within the specified value?	B+	Go to Diagnostic Aids	Go to Step 4

DTC P0658				
Step	**Action**	**Value**	**Yes**	**No**
4	1. Turn the ignition OFF. 2. Disconnect the AT inline 20-way connector. 3. Turn ON the ignition, with the engine OFF. Additional DTCs may set. 4. Using the DMM, measure voltage on the engine side of the AT inline 20-way connector terminal L and ground. Is the voltage within the specified value?	B+	Go to Step 5	Go to Step 4
5	1. Connect the AT inline 20-way connector. 2. Remove the transmission oil pan. Refer to Oil Pan Replacement. 3. Remove the connectors to PCS1, MAIN MOD and TCC solenoids. 4. Using the DMM measure the supply voltage of each solenoid connector. Is the voltage within the specified value at each solenoid connector?	B+	Go to Step 6	Go to Step 8
6	Test the PCS1, MAIN MOD and TCC solenoid for an open or shorted condition. Refer to Temperature vs Resistance. Refer to Testing for Continuity and Testing for Short to Ground . Did you find a condition?	—	Go to Step 9	Go to Step 10
7	1. Turn the ignition OFF. 2. Disconnect the TCM. 3. Test the high side driver circuit between the TCM and AT inline 20-way connector for an open or short to ground. Refer to Testing for Continuity and Testing for Short to Ground . Did you find and correct the condition?	—	Go to Step 11	—
8	Replace the AT internal wiring harness. Refer to Wiring Harness Replacement . Did you complete the replacement?	—	Go to Step 11	—

DTC P0658				
Step	**Action**	**Value**	**Yes**	**No**
9	Replace the open or shorted solenoid. Refer to Control Valve Solenoid Replacement. Did you complete the replacement?	—	Go to Step 11	—
10	**IMPORTANT:** *In most cases, the TCM is not at fault. Investigate thoroughly before replacing the TCM.* Replace the TCM. Refer to Control Module References for replacement, setup, and programming. Did you complete the replacement?	—	Go to Step 11	—
11	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Start the engine. 3. Select Specific DTC. 4. Enter DTC P0658. Has the test run and passed?	—	Go to Step 12	Go to Step 2
12	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	—	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P0659

Circuit Description

The transmission control module (TCM) provides voltage to the main modulation (MAIN MOD), torque converter clutch (TCC) and pressure control solenoid 1 (PCS1) through a separate solid state device called high side driver 1 (HDS1). HSD1 is continuously ON during normal operation, except during a brief circuit test. The TCM regulates control current to the solenoids by switching the appropriate low side driver ON and OFF.

DTC P0659 is a type A DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

DTC P0659 Actuator Supply Voltage 1 High

Conditions for Running the DTC

- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.
- HSD1 is commanded ON.

Conditions for Setting the DTC

DTC P0659 is set when the TCM detects greater than 6.0 volts at the HSD1 terminal prior to commanding HSD1 ON.

Action Taken When the DTC Sets

- The TCM illuminates the malfunction indicator lamp (MIL).
- If the failure occurs while in a forward range, a shift to 1st, 3rd or 5th range is made.
- While diagnostic response is active, if the shift selector is moved to NEUTRAL, the transmission will shift to NEUTRAL. If the shift selector is moved to REVERSE, the transmission shifts to REVERSE. If the shift selector is moved to forward range or REVERSE and the transmission is compromised by overspeeding or direction change, the transmission shifts to NEUTRAL.
- DTC P0659 is stored in TCM history.
- MAIN MOD is inhibited.
- The TCM freezes shift adapts.
- The TCM inhibits torque converter clutch (TCC) engagement.

Conditions for Clearing the MIL/DTC

- A scan tool can clear the code from TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

Inspect the wiring for poor electrical connections at the TCM. Inspect for the following conditions:

- A bent terminal
- A backed-out terminal
- A damaged terminal
- Poor terminal tension
- A chafed wire
- A broken wire inside the insulation
- When diagnosing for an intermittent short or open, massage the wiring harness while watching the test

equipment for a change.

- You may have to drive the vehicle in order to experience a condition.

DTC P0659				
Step	**Action**	**Value**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics				
1	Did you perform the Diagnostic System Check - Vehicle?	—	Go to Step 2	Go to Diagnostic System Check - Vehicle
2	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** *Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.* 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Using the scan tool, measure ignition voltage. Is the voltage within the specified range?	9-18 V	Go to Step 3	Go to DTC P0562 for low voltage or DTC P0563 for high voltage
3	1. Turn the ignition OFF. 2. Disconnect the 80-way connector at the TCM. **IMPORTANT:** *Do not connect the TCM again.* 3. Install the J 39700 breakout box, the J-47275 breakout box adapter and the J 47275-1 magnetic overlay. Additional DTCs may set. 4. Turn ON the ignition, with the engine OFF. 5. Using the DMM, measure voltage at terminal 11 and ground. Is the voltage greater than the specified value?	6 V	Go to Step 4	Go to Step 8
4	1. Turn the ignition OFF. 2. Disconnect the AT inline 20-way connector. 3. Turn ON the ignition, with the engine OFF. Additional DTCs may set. 4. Using the DMM, measure voltage on the engine side of the AT inline 20-way connector terminal L and ground. Is the voltage greater than the specified value?	6 V	Go to Step 6	Go to Step 5

DTC P0659				
Step	Action	Value	Yes	No
5	1. Connect the AT inline 20-way connector. 2. Remove the transmission oil pan. Refer to Oil Pan Replacement . 3. Remove the connectors to PCS1, MAIN MOD and TCC solenoids. 4. Using the DMM measure the supply voltage of each solenoid connector. Is the voltage greater than the specified value?	6 V	Go to Step 7	Go to Diagnostic Aids
6	Test the high side driver circuit between the TCM and AT inline 20-way connector for a short to voltage. Refer to Testing for a Short to Voltage . Did you find and correct the condition?	—	Go to Step 10	—
7	Replace the AT internal wiring harness. Refer to Wiring Harness Replacement. Did you complete the replacement?	—	Go to Step 10	—
8	**IMPORTANT:** *In most cases, the TCM is not at fault. Investigate thoroughly before replacing the TCM.* Replace the TCM. Refer to Control Module References for replacement, setup, and programming. Did you complete the replacement?	—	Go to Step 10	—
9	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Start the engine. 3. Select Specific DTC. 4. Enter DTC P0659. Has the test run and passed?	—	Go to Step 10	Go to Step 2
10	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	—	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P0700

Circuit Description

This diagnostic trouble code (DTC) indicates that a related transmission DTC set in the transmission control module (TCM). The engine control module (ECM) receives the TCM DTC information over the serial data circuit. The ECM turns ON the malfunction indicator lamp (MIL) when the TCM sends a message over the serial data circuit requesting MIL illumination.

DTC P0700 is a type A DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P0700 Transmission Control Module (TCM) Requested MIL Illumination

Conditions for Running the DTC

The engine is running.

Conditions for Setting the DTC

The ECM receives a serial data message from the TCM in order to illuminate the MIL.

Action Taken When the DTC Sets

- The ECM illuminates the MIL when the diagnostic runs and fails.
- The ECM records the operating conditions at the time the diagnostic fails. The control module stores this information in the Freeze Frame/Failure Records.

Conditions for Clearing the DTC

- The ECM turns OFF the MIL after 3 consecutive ignition cycles that the diagnostic runs and does not fail.
- A current DTC, Last Test Failed, clears when the diagnostic runs and passes.
- A scan tool can clear the code from the TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

DTC P0700			
Step	**Action**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics			
1	Did you perform the Diagnostic System Check - Vehicle?	Go to Step 2	Go to Diagnostic System Check - Vehicle
2	1. Install the scan tool. **IMPORTANT:** • Before clearing the DTCs, use the scan tool in order to record the Freeze Frame and Failure Records. The Clear Info function will erase the data. • DTC P0700 is set by the ECM. DTC P0700 allows a technician to be alerted from the engine diagnostic side that the TCM is setting a DTC and is requesting the MIL. • If the TCM has DTCs set that are requesting MIL illumination, those DTCs must be diagnosed first. Refer to Obtaining Diagnostic Trouble Codes . 2. Turn ON the ignition, with the engine OFF. Does the scan tool display any DTCs other than DTC P0700?	Go to Diagnostic Trouble Code (DTC) List - Vehicle	Go to Diagnostic System Check - Vehicle

DTC P0701

Circuit Description

The transmission control module (TCM) monitors the status of the pressure switches at start-up, in order to detect the presence of hydraulic pressure.

DTC P0701 is a type C DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P0701 Transmission Control System Performance

Conditions for Running the DTC

- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.
- Engine speed is greater than 200 RPM and less than 7,500 RPM for 5 seconds.

Conditions for Setting the DTC

DTC P0701 sets when the TCM detects the following conditions:

- Transmission fluid temperature is greater than -25°C (-13°F).
- All pressure switches do not indicate pressure at start-up.
- Engine speed is greater than 500 RPM for 6 seconds or 400 RPM for 15 seconds.
- Forward or REVERSE range is selected.

Action Taken When the DTC Sets

- The TCM does not illuminate the malfunction indicator lamp (MIL).
- DTC P0701 is stored in TCM history.DTC P0701 is stored in TCM history.DTC P0701 is stored in TCM history.
- The TCM inhibits torque converter clutch (TCC) engagement.

Conditions for Clearing the DTC

- A scan tool can clear the code from TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

- Inspect the wiring for poor electrical connections at the TCM. Inspect for the following conditions:
  – A bent terminal
  – A backed-out terminal
  – A damaged terminal
  – Poor terminal tension
  – A chafed wire
  – A broken wire inside the insulation
- When diagnosing for an intermittent short or open, massage the wiring harness while watching the test equipment for a change.
- You may have to drive the vehicle in order to experience a condition.
- DTC P0701 may be logged if a forward or REVERSE range is selected immediately after the engine is started, and before the TCM detects pressure at the switches, 2-

6 seconds after the engine starts.

- A plugged control main filter may cause DTC P0701 to set.

Test Description

The number below refers to the step number on the diagnostic table.

5. This step tests for line pressure.

DTC P0701			
Step	**Action**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics			
1	Did you perform the Diagnostic System Check - Vehicle?	Go to Step 2	Go to Diagnostic System Check - Vehicle
2	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** *Before clearing the DTCs, use the scan tool in order to record the Freeze Frame and Failure Records. The Clear Info function will erase the data.* 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Start the engine. 6. Measure the transmission fluid level. Refer to Transmission Fluid Checking Procedure . Is the transmission fluid level correct?	Go to Step 3	Go to Step 4
3	DTC P0701 can set after performing fluid service and filter change, after replacement of the pressure switch manifold (PSM), or after a long period of storage. Have any of these conditions occurred?DTC P0701 can set after performing fluid service and filter change, after replacement of the pressure switch manifold (PSM), or after a long period of storage. Have any of these conditions occurred?	Go to Step 7	Go to Step 5

DTC P0701			
Step	**Action**	**Yes**	**No**
4	Add fluid to the proper level. Is the fluid at the appropriate level?	Go to Step 5	—
5	Measure line pressure. Refer to Line Pressure Check Procedure . Is the pressure within the specified value?	Go to Step 7	Go to Step 2
6	No main pressure at idle may be an indication of the following conditions: • Stuck or sticking lube regulator valve • Stuck or sticking main regulator valve • Loose or damaged suction filter • Defective suction filter seal Did you find the reason for a no line pressure condition and was it repaired?	Go to Step 7	Go to Symptoms - Automatic Transmission
7	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Start the engine. 3. Select Specific DTC. 4. Enter DTC P0701. Has the test run and passed?	Go to Step 8	Go to Step 2
8	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P0703

Circuit Description

A mechanical switch attached to the brake pedal sends a signal to the transmission control module (TCM) indicating the service brake has been applied.

DTC P0703 is a type C DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P0703 Brake Switch Circuit

Conditions for Running the DTC

- DTC P0721 and P0722 are not active.
- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.

Conditions for Setting the DTC

DTC P0703 sets when the vehicle accelerates 10 times with the brake switch in the ON position, or decelerates 10 times with the brake switch in the OFF position.

Action Taken When the DTC Sets

- The TCM does not illuminate the malfunction indicator lamp (MIL).
- The TCM uses default assumption that the brake is OFF.
- DTC P0703 is stored in TCM history.
- The TCM inhibits torque converter clutch (TCC) engagement.
- The TCM inhibits grade braking.

Conditions for Clearing the DTC

- A scan tool can clear the code from TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

DTC P0703 indicates that the TCM did not see the proper input signal for service brake status during an acceleration or deceleration cycle. This may indicate an open or short in the TCC brake switch/cruise control release circuit or a faulty stop lamp switch.

- Inspect the wiring for poor electrical connections at the TCM. Inspect for the following conditions:
  - A bent terminal
  - A backed-out terminal
  - A damaged terminal
  - Poor terminal tension
  - A chafed wire
  - A broken wire inside the insulation
- When diagnosing for an intermittent short or open, massage the wiring harness while watching the test equipment for a change.
- You may have to drive the vehicle in order to experience a condition.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

2. This step tests brake switch status.
3. This step tests for voltage at the TCM.

4. This step tests for voltage before the stop lamp switch.
5. This step tests for voltage after the stop lamp switch.

DTC P0703				
Step	**Action**	**Value**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics				
1	Did you perform the Diagnostic System Check - Vehicle?	—	Go to Step 2	Go to Diagnostic System Check - Vehicle
2	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** *Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.* 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. **CAUTION:** ***When performing service on or near the SIR components or the SIR wiring, the SIR system must be disabled. Refer to SIR Disabling and Enabling. Failure to observe the correct procedure could cause deployment of the SIR components, personal injury, or unnecessary SIR system repairs.*** 5. Apply and release the service brake. Does the scan tool indicate that the brake switch is toggling off and on?	—	Go to Diagnostic Aids	Go to Step 3

DTC P0703				
Step	**Action**	**Value**	**Yes**	**No**
3	1. Turn the ignition OFF. 2. Disconnect the 80-way connector at the TCM. 3. Install the J 39700 breakout box, the J-47275 breakout box adapter and the J 47275-1 magnetic overlay. 4. Turn ON the ignition. 5. Using the DMM, measure voltage at connector terminal 2 and ground. 6. Apply and release the service brake. Is voltage within the specified value?	Brakes applied: 0.0V Brakes released: 12.0 V	Go to Diagnostic Aids	Go to Step 4
4	Using the DMM, measure voltage at terminal C of the stop lamp switch and ground. Refer to Automatic Transmission Controls Schematics. Is voltage within the specified value?	B+	Go to Step 5	Go to Step 6
5	Using the DMM, measure voltage at terminal D of the stop lamp switch. Is voltage available?	B+	Go to Step 8	Go to Step 7
6	1. Remove the brake fuse. 2. Inspect the brake fuse for an open. Refer to General Electrical Diagnosis Procedures . Did you find and correct the condition?	—	Go to Step 9	—
7	Repair or replace the stop lamp switch. Refer to Stop Lamp Switch Replacement . Did you complete the repair or replacement?	—	Go to Step 9	—
8	Inspect the engine wiring harness for an open or short to ground. Refer to Circuit Testing and Wiring Repairs . Did you find and correct the condition?	—	Go to Step 9	—

DTC P0703				
Step	**Action**	**Value**	**Yes**	**No**
9	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Using the scan tool, monitor the brake switch. 3. Operate the vehicle under the Conditions for Setting the DTC. 4. Select Specific DTC. 5. Enter DTC P0703. Has the test run and passed?	—	Go to Step 10	Go to Step 2
10	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	—	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P0706

Circuit Description

The transmission internal mode switch (IMS) is a sliding contact switch attached to the selector detent inside the transmission. The IMS is used by the transmission control module (TCM) to detect the angular position of the shift selector shaft. There are 5 internal switches in the IMS, A, B, C, P and NS. The TCM uses 4 of these switch inputs to determine the proper gear range that is selected. The fifth switch, NS, located in the IMS, is used as confirmation that the transmission is in NEUTRAL before the engine starter is engaged.

DTC P0706 is a type A DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P0706 Transmission Range Sensor Circuit - PRNDL Input

Conditions for Running the DTC

- The components are powered and the ignition voltage is greater than 9.0 volts and less than 18 volts.
- Engine speed is less than 350 RPM.

Conditions for Setting the DTC

DTC P0706 sets when the TCM detects an invalid IMS range input at engine start-up. NEUTRAL or PARK is not indicated.

Action Taken When the DTC Sets

- The TCM illuminates the malfunction indicator lamp (MIL).
- The transmission fails to hydraulic default.
- DTC P0708 is stored in TCM history.
- The TCM inhibits main modulation.
- The TCM freezes shift adapts.
- The TCM inhibits torque converter clutch (TCC) engagement.

Conditions for Clearing the DTC

- A scan tool can clear the code from TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

- Inspect the wiring for poor electrical connections at the TCM. Inspect for the following conditions:
  - A bent terminal
  - A backed-out terminal
  - A damaged terminal
  - Poor terminal tension
  - A chafed wire
  - A broken wire inside the insulation
- When diagnosing for an intermittent short or open, massage the wiring harness while watching the test equipment for a change.
- You may have to drive the vehicle in order to experience a condition.
- Due to this failure and associated response, DTC P0722 may also set.

DTC P0706				
Step	**Action**	**Value**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics				
1	Did you perform the Diagnostic System Check - Vehicle?	—	Go to Step 2	Go to Diagnostic System Check - Vehicle
2	Inspect the shift linkage for proper adjustment. Refer to Automatic Transmission Range Selector Cable Adjustment . Is the shift linkage properly adjusted?	—	Go to Step 3	—
3	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** *Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.* 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. With the scan tool, monitor IMS A/B/C/P status while moving the shift selector through each range. Refer to Transmission Internal Mode Switch Logic. Does each selected transmission range match the scan tool IMS display?	—	Go to Diagnostic Aids	Go to Step 4
4	1. Turn the ignition OFF. 2. Install the J 39700 breakout box, the J-47275 breakout box adapter and the J 47275-1 magnetic overlay at the TCM. 3. Disconnect the 16-way bypass connector on the J-47275 . 4. Turn ON the ignition, with the engine OFF. 5. In sequence, connect terminal 58 to terminals 14, 34, 53 and 73 to ground. 6. Using the scan tool, monitor IMS A/B/C/P status. Does each IMS signal indicate LOW when grounded and HIGH when open?	A = terminal 73 B = terminal 53 C = terminal 14 P = terminal 34 HIGH = Open LOW = Grounded	Go to Step 5	Go to Step 10

DTC P0706				
Step	**Action**	**Value**	**Yes**	**No**
5	1. Turn the ignition OFF. 2. Connect the 80-way connector to the TCM. 3. Disconnect the transmission AT inline 20-way connector. Additional DTCs may set. 4. Install the J 44152 jumper harness (20 pins) on the engine side of the AT inline 20-way connector. 5. Turn ON the ignition, with the engine OFF. 6. Using the J 35616 GM terminal test kit, connect a fused jumper wire, in sequence, to terminals T, U, V and W to ground. Refer to Automatic Transmission Inline Harness Connector End View. Does each IMS signal indicate LOW when grounded and HIGH when open?	—	Go to Step 6	Go to Step 7
6	1. Turn the ignition OFF. 2. Connect the transmission AT inline 20-way connector. 3. Remove the transmission oil pan. Refer to Oil Pan Replacement . 4. Remove the AT internal wiring harness at the IMS connector. 5. Turn ON the ignition, with the engine OFF. 6. Using the J 35616 , connect a fused jumper wire, in sequence, to terminals B, D, C and E to ground. Does each IMS signal indicate LOW when grounded and HIGH when open?	—	Go to Step 9	Go to Step 8
7	Test the IMS circuit between the TCM and AT inline 20-way connector for an open or short to ground condition. Refer to Circuit Testing . Did you find and correct the condition?	—	Go to Step 11	—
8	Replace the internal wiring harness. Refer to Wiring Harness Replacement . Did you complete the replacement?	—	Go to Step 11	—
9	Replace the internal mode switch. Refer to Transmission Internal Mode Switch Replacement . Did you complete the replacement?	—	Go to Step 11	—

DTC P0706				
Step	**Action**	**Value**	**Yes**	**No**
10	**IMPORTANT:** *In most cases, the TCM is not at fault. Investigate thoroughly before replacing the TCM.* Replace the TCM. Refer to Control Module References for replacement, setup, and programming. Did you complete the replacement?	—	Go to Step 11	—
11	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. With the scan tool, monitor IMS A/B/C/P status while moving the shift selector through each range. 3. Select Specific DTC. 4. Enter DTC P0706. Has the test run and passed?	—	Go to Step 12	Go to Step 2
12	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	—	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P0708

Circuit Description

The transmission internal mode switch (IMS) is a sliding contact switch attached to the selector detent inside the transmission. The IMS is used by the transmission control module (TCM) to detect the angular position of the shift selector shaft. There are 5 internal switches in the IMS, A, B, C, P and NS. The TCM uses 4 of these switch inputs to determine the proper gear range that is selected. The fifth switch, NS, located in the IMS, is used as confirmation that the transmission is in NEUTRAL before the engine starter is engaged.

DTC P0708 is a type A DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P0708 Transmission Range (TR) Sensor Circuit High

Conditions for Running the DTC

- The components are powered and the ignition voltage is greater than 9.0 volts and less than 18 volts.
- Engine speed is greater than 200 RPM and less than 7,500 RPM for 5 seconds.

Conditions for Setting the DTC

DTC P0708 sets when the TCM detects an invalid condition and parity error occurring over consecutive ignition cycles.

Action Taken When the DTC Sets

While diagnostic response is active, one of the following conditions can occur:

- The TCM illuminates the malfunction indicator lamp (MIL).
- The transmission fails to hydraulic default.
- A shift to REVERSE will allow REVERSE range if DTC P0878 is not active.
- DTC P0708 is stored in TCM history.
- The TCM freezes shift adapts.
- The TCM inhibits torque converter clutch (TCC) engagement.

Conditions for Clearing the DTC

- A scan tool must be used to clear the code from TCM history. This DTC does not automatically clear from TCM history after 40 ignition cycles.

Diagnostic Aids

IMPORTANT:
Due to the TCM logic used to detect and set DTC P0708, this code can remain active even after an IMS switch replacement is complete and the ignition has been cycled. Therefore, always clear all active DTCs from the TCM after servicing the IMS switch.

- Inspect the wiring for poor electrical connections at the TCM and powertrain control module (PCM). Inspect for the following conditions:
  - A bent terminal
  - A backed-out terminal
  - A damaged terminal
  - Poor terminal tension

- A chafed wire
- A broken wire inside the insulation

- When diagnosing for an intermittent short or open, massage the wiring harness while watching the test equipment for a change.
- You may have to drive the vehicle in order to experience a condition.
- Due to this failure and associated response, DTC P0722 can also set.

Test Description

The numbers below refer to step numbers on the diagnostic table.

4. This step tests TCM input response.
5. This step tests the integrity of the engine wiring harness.
6. This step tests the integrity of the transmission internal wiring harness.

DTC P0708				
Step	**Action**	**Value**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics				
1	Did you perform the Diagnostic System Check - Vehicle?	—	Go to Step 2	Go to Diagnostic System Check - Vehicle
2	Inspect the shift linkage for proper adjustment. Refer to Automatic Transmission Range Selector Cable Adjustment . Is the shift linkage properly adjusted?	—	Go to Step 3	—

DTC P0708				
Step	**Action**	**Value**	**Yes**	**No**
3	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** ***Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.*** 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. With the scan tool, monitor IMS A/B/C/P status while moving the shift selector through each range. Refer to Transmission Internal Mode Switch Logic. Does each selected transmission range match the scan tool IMS display?	—	Go to Diagnostic Aids	Go to Step 4
4	1. Turn the ignition OFF. 2. Install the J 39700 breakout box, the J-47275 breakout box adapter and the J 47275-1 magnetic overlay at the TCM. 3. Disconnect the 16-way bypass connector on the J-47275 . 4. Turn ON the ignition, with the engine OFF. 5. In sequence, connect terminal 58 to terminals 14, 34, 53 and 73 to ground. 6. Using the scan tool, monitor IMS A/B/C/P status. Does each IMS signal indicate LOW when grounded and HIGH when open?	A = terminal 73 B = terminal 53 C = terminal 14 P = terminal 34 HIGH = Open LOW = Grounded	Go to Step 5	Go to Step 10

DTC P0708				
Step	**Action**	**Value**	**Yes**	**No**
5	1. Turn the ignition OFF. 2. Connect the 80-way connector to the TCM. 3. Disconnect the transmission AT inline 20-way connector. Additional DTCs may set. 4. Install the J 44152 jumper harness (20 pins) on the engine side of the AT inline 20-way connector. 5. Turn ON the ignition, with the engine OFF. 6. Using the J 35616 GM terminal test kit, connect a fused jumper wire, in sequence, to terminals T, U, V and W to ground. Refer to Automatic Transmission Inline Harness Connector End View. Does each IMS signal indicate LOW when grounded and HIGH when open?	—	Go to Step 6	Go to Step 7
6	1. Turn the ignition OFF. 2. Connect the transmission AT inline 20-way connector. 3. Remove the transmission oil pan. Refer to Oil Pan Replacement . 4. Remove the AT internal wiring harness at the IMS connector. 5. Turn ON the ignition, with the engine OFF. 6. Using the J 35616 , connect a fused jumper wire, in sequence, to terminals B, D, C and E to ground. Does each IMS signal indicate LOW when grounded and HIGH when open?	—	Go to Step 9	Go to Step 8
7	Test the IMS circuit between the TCM and AT inline 20-way connector for an open or short to ground condition. Refer to Circuit Testing . Did you find and correct the condition?	—	Go to Step 11	—
8	Replace the internal wiring harness. Refer to Wiring Harness Replacement . Did you complete the replacement?	—	Go to Step 11	—
9	Replace the internal mode switch. Refer to Transmission Internal Mode Switch Replacement . Did you complete the replacement?	—	Go to Step 11	—

DTC P0708				
Step	**Action**	**Value**	**Yes**	**No**
10	**IMPORTANT:** *In most cases, the TCM is not at fault. Investigate thoroughly before replacing the TCM.* Replace the TCM. Refer to Control Module References for replacement, setup, and programming. Did you complete the replacement?	—	Go to Step 11	—
11	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. With the scan tool, monitor IMS A/B/C/P status while moving the shift selector through each range. 3. Select Specific DTC. 4. Enter DTC P0708. Has the test run and passed?	—	Go to Step 12	Go to Step 2
12	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	—	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P0711

Circuit Description

The transmission fluid temperature (TFT) sensor is a part of the pressure switch manifold (PSM) assembly, and is located in the transmission oil pan. The TFT sensor is a thermistor, which changes value based on the temperature of the transmission fluid. The transmission control module (TCM) supplies a 5-volt reference voltage signal to the TFT sensor and measures the voltage drop in the circuit. When the transmission is cold, the sensor resistance is high and the TCM detects high signal voltage. As the fluid temperature warms to a normal operating temperature, the resistance becomes less and the signal voltage decreases. The TCM uses this information to control shift quality and torque converter clutch (TCC) apply.

DTC P0711 is a type B DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P0711 Transmission Fluid Temperature (TFT) Sensor Circuit - Performance

Conditions for Running the DTC

- DTC P0712, P0713, P0716, P0717, P0721, and P0722 are not active.
- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.
- Engine speed is greater than 200 RPM and less than 7,500 RPM for 5 seconds.
- The engine has been running for 2 seconds.
- Engine speed is above 450 RPM and output speed is above 100 RPM.
- The TFT is in the range of -35°C to +149°C (-31°F to +300°F).

Conditions for Setting the DTC

DTC P0711 sets when the TCM detects one of the following conditions:

- The TCM detects a temperature change that is below a set limit when compared to samples of the minimum and maximum temperature values.
- The TFT has an unrealistic temperature change of greater than 10°C (50°F) for 10 occurrences.
- The temperature from startup decreases 40°C (104°F) or greater within a duration of 6 seconds or greater.

Action Taken When the DTC Sets

- The TCM illuminates the malfunction indicator lamp (MIL) during the second consecutive trip in which the Conditions for Setting the DTC are met.
- The TCM freezes shift adapts.
- The TCM records the operating conditions when the Conditions for Setting the DTC are met. The TCM stores this information as Failure Records.
- The TCM stores DTC P0711 in TCM history.
- The TCM inhibits TCC engagement.

Conditions for Clearing the DTC

A scan tool can clear the code from TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

- The TFT should rise steadily during warm-up cycles, then stabilize.
- DTC P0218 may set after DTC P0711 has set. Follow the diagnostic table for DTC P0711 before proceeding to the diagnostic for DTC P0218.
  - Inspect the wiring for poor electrical connections at the TCM. Inspect for the following conditions:
    - A bent terminal
    - A backed-out terminal
    - A damaged terminal
    - Poor terminal tension
    - A chafed wire
    - A broken wire inside the insulation
- When diagnosing for an intermittent short or open, massage the wiring harness while watching the test equipment for a change.
- You may have to drive the vehicle in order to experience a condition.
- An open condition at the circuit may allow a ground path internally through this circuit. If this occurs, the TCM sees a temperature that appears to be within normal operation, approximately -22°C (-7.6°F), and initially a code will not be set. However, the transmission will still inhibit shift adapts and TCC operation. It may take several minutes before DTC P0711 is set to indicate a failure.

Test Description

The numbers below refer to step numbers on the diagnostic table.

4. This step tests 5-volt reference.

6. This step tests the TFT sensor and internal wiring harness.

7. This step tests the resistance of the TFT sensor.

DTC P0711				
Step	**Action**	**Value**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics				
1	Did you perform the Diagnostic System Check - Vehicle?	—	Go to Step 2	Go to Diagnostic System Check - Vehicle
2	Measure the transmission fluid level. Refer to Transmission Fluid Checking Procedure . Is the transmission fluid level correct?	—	Go to Step 3	Go to Transmission Fluid Checking Procedure
3	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** *Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.* 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Select TFT on the scan tool. 6. Drive the vehicle and look for an unrealistic TFT reading. Is the TFT reading at or below the specified value?	1.5°C (2.7°F)	Go to Step 4	Go to Diagnostic Aids
4	1. Turn the ignition OFF. 2. Disconnect the 80-way connector at the TCM. 3. Install the J 39700 breakout box, the J-47275 breakout box adapter and the J 47275-1 magnetic overlay. 4. Turn ON the ignition, with the engine OFF. 5. Using the DMM, measure voltage at connector terminal 54 and ground. Is voltage within the specified value?	5 V	Go to Step 5	Go to Step 11

DTC P0711				
Step	**Action**	**Value**	**Yes**	**No**
5	1. Turn the ignition OFF. 2. Disconnect the TCM from the J 39700 . Additional DTCs may set. 3. Using the DMM, measure resistance at terminals 54 and 58. Is the resistance within the specified value?	3,490 ohms @ 20°C (68°F) 177.9 ohms @ 100°C (212°F)	Go to Diagnostic Aids	Go to Step 6
6	1. Disconnect the AT inline 20-way connector. 2. Install the J 44152 jumper harness (20 pins) on the transmission side of the AT inline 20-way connector. 3. Using the DMM and the J 35616 GM terminal test kit, measure the resistance at terminals G and H of the J 44152 . Refer to Automatic Transmission Inline Harness Connector End View. Is the resistance within the specified value?	3,490 ohms @ 20°C (68°F) 177.9 ohms @ 100°C (212°F)	Go to Step 8	Go to Step 7
7	1. Remove the oil pan. Refer to Oil Pan Replacement . 2. Disconnect the PSM from the internal wiring harness. 3. Using the DMM, measure PSM resistance at terminals E and F. Is resistance within the specified value?	3,490 ohms @ 20°C (68°F) 177.9 ohms @ 100°C (212°F)	Go to Step 9	Go to Step 10
8	Test the PSM circuit between the TCM and AT inline 20-way connector for an open condition. Refer to Testing for Continuity . Did you find and correct the condition?	—	Go to Step 12	—
9	Replace the AT internal wiring harness. Refer to Wiring Harness Replacement . Did you complete the replacement?	—	Go to Step 12	—
10	Replace the PSM. Refer to Pressure Switch Manifold Replacement . Did you complete the replacement?	—	Go to Step 12	—

DTC P0711				
Step	**Action**	**Value**	**Yes**	**No**
11	**IMPORTANT:** *In most cases, the TCM is not at fault. Investigate thoroughly before replacing the TCM.* Replace the TCM. Refer to Control Module References for replacement, setup, and programming. Did you complete the replacement?	—	Go to Step 12	—
12	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Using the scan tool, monitor the TFT. 3. Drive the vehicle under normal operating conditions. Watch for significant changes in the TFT. 4. Select Specific DTC. 5. Enter DTC P0711. Has the test run and passed?	—	Go to Step 13	Go to Step 2
13	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	—	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P0712

Circuit Description

The transmission fluid temperature (TFT) sensor is part of the pressure switch manifold (PSM) assembly, and is located in the transmission oil pan. The TFT sensor is a thermistor, which changes value based on the temperature of the transmission fluid. The transmission control module (TCM) supplies a 5-volt reference voltage signal to the TFT sensor and measures the voltage drop in the circuit. When the transmission is cold, the sensor resistance is high and the TCM detects high signal voltage. As the fluid temperature warms to a normal operating temperature, the resistance becomes less and the signal voltage decreases. The TCM uses this information to control shift quality and torque converter clutch (TCC) apply.

DTC P0712 is a type B DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P0712 Transmission Fluid Temperature (TFT) Sensor Circuit - Low Input

Conditions for Running the DTC

- DTC P0711 and P0713 are not active.
- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.
- Engine speed is greater than 200 RPM and less than 7,500 RPM for 5 seconds.
- The engine has been running for 20 seconds with a coolant temperature above 20°C (68°F).

Conditions for Setting the DTC

DTC P0712 sets when the TCM detects a voltage of less than 313m volts for 2.5 seconds.

Action Taken When the DTC Sets

- The TCM illuminates the malfunction indicator lamp (MIL) during the second consecutive trip in which the Conditions for Setting the DTC are met.
- The TCM uses a TFT default value.
- The TCM freezes shift adapts.
- The TCM stores this information as Failure Records.
- The TCM stores DTC P0712 in TCM history.
- The TCM inhibits TCC engagement.

Conditions for Clearing the DTC

A scan tool can clear the code from TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

- Inspect the wiring for poor electrical connections at the TCM. Inspect for the following conditions:
  - A bent terminal
  - A backed-out terminal
  - A damaged terminal
  - Poor terminal tension

- A chafed wire
- A broken wire inside the insulation

- When diagnosing for an intermittent short or open, massage the wiring harness while watching the test equipment for a change.
- You may have to drive the vehicle in order to experience a condition.
- A short to ground allows DTC P0712 to set.
- DTC P0218 may set after DTC P0712 has set. Follow the diagnostic table for DTC P0712 before proceeding to the diagnostics for DTC P0218.

Test Description

The numbers below refer to step numbers on the diagnostic table.

4. This step tests 5-volt reference.

6. This step tests the TFT sensor and internal wiring harness.

7. This step tests the resistance of the TFT sensor.

DTC P0712				
Step	**Action**	**Value**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics				
1	Did you perform the Diagnostic System Check - Vehicle?	—	Go to Step 2	Go to Diagnostic System Check - Vehicle
2	Measure the transmission fluid level. Refer to Transmission Fluid Checking. Is the transmission fluid level correct?	—	Go to Step 3	Go to Transmission Fluid Checking Procedure

DTC P0712

Step	Action	Value	Yes	No
3	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** *Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.* 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Select TFT on the scan tool. 6. Drive the vehicle and look for an unrealistic TFT reading. Is the TFT reading at or below the specified value?	-36°C (-32°F)	Go to Step 4	Go to Diagnostic Aids
4	1. Turn the ignition OFF. 2. Disconnect the 80-way connector at the TCM. 3. Install the J 39700 breakout box, the J-47275 breakout box adapter and the J 47275-1 magnetic overlay. 4. Turn ON the ignition, with the engine OFF. 5. Using the DMM, measure voltage at connector terminal 54 and ground. Is voltage within the specified value?	5 V	Go to Step 5	Go to Step 11
5	1. Turn the ignition OFF. 2. Disconnect the TCM from the J 39700 . Additional DTCs may set. 3. Using the DMM, measure resistance at terminals 54 and 58. Is the resistance within the specified value?	3,490 ohms @ 20°C (68°F) 177.9 ohms @ 100°C (212°F)	Go to Diagnostic Aids	Go to Step 6
6	1. Disconnect the AT inline 20-way connector. 2. Install the J 44152 jumper harness (20 pins) on the transmission side of the AT inline 20-way connector. 3. Using the DMM and the J 35616 GM terminal test kit, measure the resistance at terminals G and H of the J 44152 . Refer to Automatic Transmission Inline Harness Connector End View. Is the resistance within the specified value?	3,490 ohms @ 20°C (68°F) 177.9 ohms @ 100°C (212°F)	Go to Step 8	Go to Step 7

DTC P0712				
Step	**Action**	**Value**	**Yes**	**No**
7	1. Remove the oil pan. Refer to Oil Pan Replacement . 2. Disconnect the PSM from the internal wiring harness. 3. Using the DMM, measure PSM resistance at terminals E and F. Is resistance within the specified value?	3,490 ohms @ 20°C (68°F) 177.9 ohms @ 100°C (212°F)	Go to Step 9	Go to Step 10
8	Test the PSM circuit between the TCM and AT inline 20-way connector for a short to ground condition. Refer to Testing for Short to Ground . Did you find and correct the condition?	—	Go to Step 12	—
9	Replace the automatic transmission internal harness. Refer to Wiring Harness Replacement . Did you complete the replacement?	—	Go to Step 12	—
10	Replace the PSM. Refer to Pressure Switch Manifold Replacement . Did you complete the replacement?	—	Go to Step 12	—
11	**IMPORTANT:** *In most cases, the TCM is not at fault. Investigate thoroughly before replacing the TCM.* Replace the TCM. Refer to Control Module References for replacement, setup, and programming. Did you complete the replacement?	—	Go to Step 12	—
12	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Using the scan tool, monitor the TFT. 3. Drive the vehicle under normal operating conditions. Watch for significant changes in the TFT. 4. Select Specific DTC. 5. Enter DTC P0712. Has the test run and passed?	—	Go to Step 13	Go to Step 2

DTC P0712				
Step	**Action**	**Value**	**Yes**	**No**
13	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	—	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P0713

Circuit Description

The transmission fluid temperature (TFT) sensor is part of the pressure switch manifold (PSM) assembly, and is located in the transmission oil pan. The transmission control module (TCM) supplies a 5-volt reference voltage signal to the TFT sensor and measures the voltage drop in the circuit. When the transmission is cold, the sensor resistance is high and the TCM detects high signal voltage. As the fluid temperature warms to a normal operating temperature, the resistance becomes less and the signal voltage decreases. The TCM uses this information to control shift quality and torque converter clutch (TCC) apply.

DTC P0713 is a type B DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P0713 Transmission Fluid Temperature (TFT) Sensor Circuit - High Input

Conditions for Running the DTC

- DTC P0711 and P0712 are not active.
- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.
- Engine speed is greater than 200 RPM and less than 7,500 RPM for 5 seconds.
- The engine has been running for 20 seconds with a coolant temperature above 20°C (68°F).

Conditions for Setting the DTC

DTC P0713 sets when the TCM detects a voltage greater than 4.84 volts for 2.5 seconds.

Action Taken When the DTC Sets

- The TCM illuminates the malfunction indicator lamp (MIL) during the second consecutive trip in which the Conditions for Setting the DTC are met.
- The TCM uses a TFT default value.
- The TCM freezes shift adapts.
- The TCM stores this information as Failure Records.
- The TCM stores DTC P0713 in TCM history.
- The TCM inhibits TCC engagement.

Conditions for Clearing the DTC

A scan tool can clear the code from TCM history. The

TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

- Inspect the wiring for poor electrical connections at the TCM. Inspect for the following conditions:
  - A bent terminal
  - A backed-out terminal
  - A damaged terminal
  - Poor terminal tension
  - A chafed wire
  - A broken wire inside the insulation
- When diagnosing for an intermittent short or open, massage the wiring harness while watching the test equipment for a change.
- You may have to drive the vehicle in order to experience a condition.
- A short to ground allows DTC P0713 to set.
- A short to power may also damage the TFT sensor.

Test Description

The numbers below refer to step numbers on the diagnostic table.

4. This step tests 5-volt reference.
6. This step tests the TFT sensor and internal wiring harness.
7. This step tests the resistance of the TFT sensor.

DTC P0713				
Step	**Action**	**Value**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics				
1	Did you perform the Diagnostic System Check - Vehicle?	—	Go to Step 2	Go to Diagnostic System Check - Vehicle
2	Measure the transmission fluid level. Refer to Transmission Fluid Checking . Is the transmission fluid level correct?	—	Go to Step 3	Go to Transmission Fluid Checking Procedure
3	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** *Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.* 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Select TFT on the scan tool. 6. Drive the vehicle and look for an unrealistic TFT reading. Is the TFT reading at or below the specified value?	-36°C (-32.8°F)	Go to Step 4	Go to Diagnostic Aids
4	1. Turn the ignition OFF. 2. Disconnect the 80-way connector at the TCM. 3. Install the J 39700 breakout box, the J-47275 breakout box adapter and the J 47275-1 magnetic overlay. 4. Turn ON the ignition, with the engine OFF. 5. Using the DMM, measure voltage at connector terminal 54 and ground. Is voltage within the specified value?	5 V	Go to Step 5	Go to Step 11

DTC P0713				
Step	**Action**	**Value**	**Yes**	**No**
5	1. Turn the ignition OFF. 2. Disconnect the TCM from the J 39700 . Additional DTCs may set. 3. Using the DMM, measure resistance at terminals 54 and 58. Is the resistance within the specified value?	3,490 ohms @ 20°C (68°F) 177.9 ohms @ 100°C (212°F)	Go to Diagnostic Aids	Go to Step 6
6	1. Disconnect the AT inline 20-way connector. 2. Install the J 44152 jumper harness (20 pins) on the transmission side of the AT inline 20-way connector. 3. Using the DMM and the J 35616 GM terminal test kit, measure the resistance at terminals G and H of the J 44152 . Refer to Automatic Transmission Inline Harness Connector End View. Is the resistance within the specified value?	3,490 ohms @ 20°C (68°F) 177.9 ohms @ 100°C (212°F)	Go to Step 8	Go to Step 7
7	1. Remove the oil pan. Refer to Oil Pan Replacement . 2. Disconnect the PSM from the internal wiring harness. 3. Using the DMM, measure PSM resistance at terminals E and F. Is resistance within the specified value?	3,490 ohms @ 20°C (68°F) 177.9 ohms @ 100°C (212°F)	Go to Step 9	Go to Step 10
8	Test the PSM circuit between the TCM and AT inline 20-way connector for a short to voltage condition. Refer to Testing for a Short to Voltage. Did you find and correct the condition?	—	Go to Step 12	—
9	Replace the automatic transmission internal harness. Refer to Wiring Harness Replacement . Did you complete the replacement?	—	Go to Step 12	—
10	Replace the PSM. Refer to Pressure Switch Manifold Replacement . Did you complete the replacement?	—	Go to Step 12	—

DTC P0713				
Step	**Action**	**Value**	**Yes**	**No**
11	**IMPORTANT:** *In most cases, the TCM is not at fault. Investigate thoroughly before replacing the TCM.* Replace the TCM. Refer to Control Module References for replacement, setup, and programming. Did you complete the replacement?	—	Go to Step 12	—
12	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Using the scan tool, monitor the TFT. 3. Drive the vehicle under normal operating conditions. Watch for significant changes in the TFT. 4. Select Specific DTC. 5. Enter DTC P0713. Has the test run and passed?	—	Go to Step 13	Go to Step 2
13	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	—	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P0716

Circuit Description

The speed sensors are variable reluctance devices that convert mechanical motion to an AC voltage. Each sensor consists of a wire coil wrapped around a pole piece that is adjacent to a permanent magnet. These elements are contained in a housing that is mounted adjacent to a rotating ferrous member, such as a gear tooth. 2 signal wires extend from one end of the housing and an exposed end of the pole piece is at the opposite end of the housing. The permanent magnet produces lines of flux around the pole piece. As a ferrous object, such as a gear tooth, approaches and passes through the gap at the end of the pole piece, an AC voltage pulse is induced in the wire coil. The transmission control module (TCM) calculates the frequency of these AC pulses and converts it to a speed value. The AC voltage generated varies from 150 m volts at low speed to 15 volts at high speed. The signal wires from the sensor are formed as twisted pairs to cancel magnetically induced fields. The cable is also shielded to protect from voltage related fields. Using 2 wire differential inputs at the TCM eliminates noise from other sources.

DTC P0716 is a type A DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P0716 Turbine Speed Sensor Circuit Performance

Conditions for Running the DTC

- DTC P0717, P0721 and P0722 are not active.
- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.
- Engine speed is greater than 200 RPM and less than 7,500 RPM for 5 seconds.
- The turbine speed is greater than 200 RPM.

Conditions for Setting the DTC

DTC P0716 sets when the TCM detects a large unrealistic change in turbine speed or if excessive noise is present in the turbine speed sensor circuit.

Action Taken When the DTC Sets

- The TCM illuminates the malfunction indicator lamp (MIL).
- When failure occurs in a forward range and shifting is complete, the transmission remains in the current range. When failure occurs while in a forward range and the shift is in process, the transmission returns to the previous range, except in post-shift state, where the transmission will continue the commanded range. When failure occurs in other conditions, the transmission shifts to 1st, 3rd or 5th. While diagnostic response is active, if the shift selector is moved to NEUTRAL or REVERSE, or is selecting DRIVE again, the transmission will lock in NEUTRAL.
- DTC P0716 is stored in TCM history.
- The TCM inhibits torque converter clutch (TCC) engagement.

Conditions for Clearing the DTC

A scan tool can clear the code from TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

- Inspect the wiring for poor electrical connections at the TCM. Inspect for the following conditions:
  - A bent terminal
  - A backed-out terminal
  - A damaged terminal
  - Poor terminal tension
  - A chafed wire
  - A broken wire inside the insulation
- When diagnosing for an intermittent short or open, massage the wiring harness while watching the test equipment for a change.
- You may have to drive the vehicle in order to experience a condition.
- If the condition is intermittent, connect the scan tool and select the speed sensor indicated by the code. If the signal is erratic, investigate and eliminate the following:
  - Intermittent wiring connection
  - Excessive vibration, such as driveline or engine torsionals
  - Irregular sensor gap, such as a loose sensor, a loose tone wheel or a damaged tone wheel
  - Inspect that the speed sensor wiring consists of twisted pairs at the rate of 12-16 twists per 300 mm (12 in). These twists must extend the entire length of the wiring harness to within at least 50 mm (2 in) of the speed sensor connector.

DTC P0716				
Step	**Action**	**Value**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics				
1	Did you perform the Diagnostic System Check – Vehicle?	—	Go to Step 2	Go to Diagnostic System Check - Vehicle
2	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** ***Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.*** 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Using the scan tool, observe ignition voltage. Is the voltage within the specified range?	9-18 V	Go to Step 3	Go to DTC P0562 for low voltage or DTC P0563 for high voltage
3	1. Turn the ignition OFF. 2. Disconnect the 80-way connector at the TCM. 3. Install the J 39700 breakout box, the J-47275 breakout box adapter and the J 47275-1 magnetic overlay. 4. Using the DMM, measure the resistance between connector terminals 20 and 80. Is the speed sensor resistance within the specified value?	2,600 ohms @ 25°C (77°F)	Go to Diagnostic Aids	Go to Step 4
4	1. Disconnect the wiring harness from the turbine speed sensor. 2. Using the DMM and the J 35616 GM terminal test kit, measure the resistance between the speed sensor terminals. Is the speed sensor resistance within the specified value?	2,600 ohms @ 25°C (77°F)	Go to Step 5	Go to Step 6
5	Test the turbine speed sensor circuit between the TCM and turbine speed sensor for an open or short to ground condition. Refer to Circuit Testing . Did you find and correct the condition?	—	Go to Step 7	—

DTC P0716				
Step	**Action**	**Value**	**Yes**	**No**
6	**IMPORTANT:** *Do not rotate the speed sensor in the retaining bracket. Orientation is fixed, and if changed, may cause improper operation.* Replace the turbine speed sensor. Refer to Speed Sensor Replacement. Did you complete the replacement?	—	Go to Step 7	—
7	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Using the scan tool, monitor the turbine speed sensor operation. 3. Select Specific DTC. 4. Enter DTC P0716. Has the test run and passed?	—	Go to Step 8	Go to Step 2
8	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	—	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P0717

Circuit Description

The speed sensors are variable reluctance devices that convert mechanical motion to an AC voltage. Each sensor consists of a wire coil wrapped around a pole piece that is adjacent to a permanent magnet. These elements are contained in a housing that is mounted adjacent to a rotating ferrous member, such as a gear tooth. 2 signal wires extend from one end of the housing and an exposed end of the pole piece is at the opposite end of the housing. The permanent magnet produces lines of flux around the pole piece. As a ferrous object, such as a gear tooth, approaches and passes through the gap at the end of the pole piece, an AC voltage pulse is induced in the wire coil. The transmission control module (TCM) calculates the frequency of these AC pulses and converts it to a speed value. The AC voltage generated varies from 150 m volts at low speed to 15 volts at high speed. The signal wires from the sensor are formed as twisted pairs to cancel magnetically induced fields. The cable is also shielded to protect from voltage related fields. Using 2 wire differential inputs at the TCM eliminates noise from other sources.

DTC P0717 is a type A DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P0717 Turbine Speed Sensor

Conditions for Running the DTC

- DTC P0721, P0722, P0731, P0732, P0733, P0734, P0735, and P0736 is not active.
- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.
- Engine speed is greater than 200 RPM and less than 7,500 RPM for 5 seconds.
- The shift selector indicates a valid range selection except NEUTRAL.

Conditions for Setting the DTC

DTC P0717 sets when the TCM detects one of the following conditions:

- An unrealistically large change in turbine speed
- An unrealistically low turbine speed

Action Taken When the DTC Sets

- The TCM illuminates the malfunction indicator lamp (MIL).
- When failure occurs in a forward range and shifting is complete, the transmission remains in the current range. When failure occurs while in a forward range and the shift is in process, the transmission returns to the previous range, except in post-shift state, where the transmission will continue to the commanded range. When failure occurs in other conditions, the transmission shifts to 1st, 3rd or 5th. While diagnostic response is active, if the shift selector is moved to NEUTRAL or REVERSE, or selecting DRIVE again, the transmission will lock in NEUTRAL.
- DTC P0717 is stored in TCM history.

- The TCM freezes shift adapts.
- The TCM inhibits torque converter clutch (TCC) engagement.

Conditions for Clearing the DTC

A scan tool can clear the code from TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

- Inspect the wiring for poor electrical connections at the TCM. Inspect for the following conditions:
  - A bent terminal
  - A backed-out terminal
  - A damaged terminal
  - Poor terminal tension
  - A chafed wire
  - A broken wire inside the insulation
- When diagnosing for an intermittent short or open, massage the wiring harness while watching the test equipment for a change.
- You may have to drive the vehicle in order to experience a condition.
- If the condition is intermittent, connect the scan tool and select the speed sensor indicated by the code. If the signal is erratic, investigate and eliminate the following:
  - Intermittent wiring connection
  - Excessive vibration, such as driveline or engine torsionals
  - Irregular sensor gap, such as a loose sensor, a loose tone wheel or a damaged tone wheel
  - Inspect that the speed sensor wiring consists of twisted pairs at the rate of 12-16 twists per 300 mm (12 in). These twists must extend the entire length of the wiring harness to within at least 50 mm (2 in) of the speed sensor connector.

DTC P0717				
Step	**Action**	**Value**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics				
1	Did you perform the Diagnostic System Check – Vehicle?	—	Go to Step 2	Go to Diagnostic System Check - Vehicle
2	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** ***Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.*** 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Using the scan tool, observe ignition voltage. Is the voltage within the specified range?	9-18 V	Go to Step 3	Go to DTC P0562 for low voltage or DTC P0563 for high voltage
3	1. Turn the ignition OFF. 2. Disconnect the 80-way connector at the TCM. 3. Install the J 39700 breakout box, the J-47275 breakout box adapter and the J 47275-1 magnetic overlay. 4. Using the DMM, measure the resistance between connector terminals 20 and 80. Is the speed sensor resistance within the specified value?	2,600 ohms @ 25°C (77°F)	Go to Diagnostic Aids	Go to Step 4
4	1. Disconnect the wiring harness from the turbine speed sensor. 2. Using the DMM and the J 35616 GM terminal test kit, measure the resistance between the speed sensor terminals. Is the speed sensor resistance within the specified value?	2,600 ohms @ 25°C (77°F)	Go to Step 5	Go to Step 6
5	Test the turbine speed sensor circuit between the TCM and turbine speed sensor for an open or short to ground condition. Refer to Circuit Testing . Did you find and correct the condition?	—	Go to Step 7	—

DTC P0717				
Step	**Action**	**Value**	**Yes**	**No**
6	**IMPORTANT:** *Do not rotate the speed sensor in the retaining bracket. Orientation is fixed, and if changed, may cause improper operation.* Replace the turbine speed sensor. Refer to Speed Sensor Replacement. Did you complete the replacement?	—	Go to Step 7	—
7	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Using the scan tool, monitor the turbine speed sensor operation. 3. Select Specific DTC. 4. Enter DTC P0717. Has the test run and passed?	—	Go to Step 8	Go to Step 2
8	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	—	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P0721

Circuit Description

The speed sensors are variable reluctance devices that convert mechanical motion to an AC voltage. Each sensor consists of a wire coil wrapped around a pole piece that is adjacent to a permanent magnet. These elements are contained in a housing that is mounted adjacent to a rotating ferrous member. 2 signal wires extend from one end of the housing and an exposed end of the pole piece is at the opposite end of the housing. The permanent magnet produces lines of flux around the pole piece. As a ferrous object, such as a gear tooth, approaches and passes through the gap at the end of the pole piece, an AC voltage pulse is induced in the wire coil. The transmission control module (TCM) calculates the frequency of these AC pulses and converts it to a speed value. The AC voltage generated varies from 150 m volts at low speed to 15 volts at high speed. The signal wires from the sensor are formed as twisted pairs to cancel magnetically induced fields. The cable is also shielded to protect from voltage related fields. Using 2 wire differential inputs at the TCM eliminates noise from other sources.

DTC P0721 is a type A DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P0721 Output Speed Sensor Circuit Performance

Conditions for Running the DTC

- DTC P0716, P0717 and P0722 are not active.
- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.
- Engine, input, speed is greater than 200 RPM and less than 7,500 RPM for 5 seconds.
- The output speed is greater than 200 RPM.

Conditions for Setting the DTC

DTC P0721 sets when the TCM detects an unrealistically large change in output speed or if excessive noise is present in the output speed sensor circuit.

Action Taken When the DTC Sets

- The TCM illuminates the malfunction indicator lamp (MIL).
- When failure occurs in a forward range and shifting is complete, the transmission remains in the current range. When failure occurs while in a forward range and the shift is in process, the transmission returns to the previous range, except in post-shift state, where the transmission will continue to the commanded range. When failure occurs in other conditions, the transmission shifts to 1st, 3rd or 5th. While diagnostic response is active, if the shift selector is moved to NEUTRAL or REVERSE, or any other forward range, the transmission will lock in NEUTRAL.
- DTC P0721 is stored in TCM history.
- The TCM freezes shift adapts.
- The TCM inhibits torque converter clutch (TCC) engagement.

Conditions for Clearing the DTC

A scan tool can clear the code from TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

- Inspect the wiring for poor electrical connections at the TCM. Inspect for the following conditions:
  - A bent terminal
  - A backed-out terminal
  - A damaged terminal
  - Poor terminal tension
  - A chafed wire
  - A broken wire inside the insulation
- When diagnosing for an intermittent short or open, massage the wiring harness while watching the test equipment for a change.
- You may have to drive the vehicle in order to experience a condition.
- If the condition is intermittent, connect the scan tool and select the speed sensor indicated by the code. If the signal is erratic, investigate and eliminate the following:
  - Intermittent wiring connection
  - Excessive vibration, such as driveline or engine torsionals
  - Irregular sensor gap, such as a loose sensor, a loose tone wheel or a damaged tone wheel
  - Inspect that the speed sensor wiring consists of twisted pairs at the rate of 12-16 twists per 300 mm (12 in). These twists must extend the entire length of the wiring harness to within at least 50 mm (2 in) of the speed sensor connector.

DTC P0721				
Step	**Action**	**Value**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics				
1	Did you perform the Diagnostic System Check - Vehicle?	—	Go to Step 2	Go to Diagnostic System Check - Vehicle
2	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** *Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.* 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Using the scan tool, observe ignition voltage. Is the voltage within the specified range?	9-18 V	Go to Step 3	Go to DTC P0562 for low voltage or DTC P0563 for high voltage
3	1. Turn the ignition OFF. 2. Disconnect the 80-way connector at the TCM. 3. Install the J 39700 breakout box, the J-47275 breakout box adapter and the J 47275-1 magnetic overlay. 4.Using the DMM, measure the resistance between connector terminals 60 and 40. Is the speed sensor resistance within the specified value?	2,600-3,160 ohms	Go to Diagnostic Aids	Go to Step 4
4	1. Disconnect the wiring harness from the output speed sensor. 2. Using the DMM and the J 35616 GM terminal test kit, measure the resistance between the speed sensor terminals. Is the speed sensor resistance within the specified value?	2,600-3,160 ohms	Go to Step 5	Go to Step 6
5	Test the output speed sensor circuit between the TCM and output speed sensor for an open or short to ground condition. Refer to Circuit Testing. Did you find and correct the condition?	—	Go to Step 7	—

DTC P0721				
Step	**Action**	**Value**	**Yes**	**No**
6	**IMPORTANT:** *Do not rotate the speed sensor in the retaining bracket. Orientation is fixed, and if changed, may cause improper operation.* Replace the output speed sensor. Refer to Speed Sensor Replacement . Did you complete the replacement?	—	Go to Step 7	—
7	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Using the scan tool, monitor the output speed sensor operation. 3. Select Specific DTC. 4. Enter DTC P0721. Has the test run and passed?	—	Go to Step 8	Go to Step 2
8	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	—	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P0722

Circuit Description

The speed sensors are variable reluctance devices that convert mechanical motion to an AC voltage. Each sensor consists of a wire coil wrapped around a pole piece that is adjacent to a permanent magnet. These elements are contained in a housing that is mounted adjacent to a rotating ferrous member. 2 signal wires extend from one end of the housing and an exposed end of the pole piece is at the opposite end of the housing. The permanent magnet produces lines of flux around the pole piece. As a ferrous object, such as a gear tooth, approaches and passes through the gap at the end of the pole piece, an AC voltage pulse is induced in the wire coil. The transmission control module (TCM) calculates the frequency of these AC pulses and converts it to a speed value. The AC voltage generated varies from 150 m volts at low speed to 15 volts at high speed. The signal wires from the sensor are formed as twisted pairs to cancel magnetically induced fields. The cable is also shielded to protect from voltage related fields. Using 2 wire differential inputs at the TCM eliminates noise from other sources.

DTC P0722 is a type A DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P0722 Output Speed Sensor Circuit No Signal

Conditions for Running the DTC

- DTC P0716, P0717, P0721, P0731, P0732, P0733, P0734, P0735, and P0736 are not active.
- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.
- Engine speed is greater than 200 RPM and less than 7,500 RPM for 5 seconds.
- Turbine speed is greater than 1,050 RPM.
- The shift selector indicates a valid range selection.

Conditions for Setting the DTC

DTC P0722 sets when the TCM detects one of the following conditions:

- An unrealistically large change in output speed
- An unrealistically low output speed

Action Taken When the DTC Sets

- The TCM illuminates the malfunction indicator lamp (MIL).
- When failure occurs in a forward range and shifting is complete, the transmission remains in the current range. When failure occurs while in a forward range and the shift is in process, the transmission returns to the previous range, except in post-shift state, where the transmission will continue to the commanded range. When failure occurs in other conditions, the transmission shifts to 1st, 3rd or 5th. While diagnostic response is active, if the shift selector is moved to NEUTRAL or REVERSE, or any other forward range, the transmission will lock in NEUTRAL.
- DTC P0722 is stored in TCM history.

- The TCM freezes shift adapts.
- The TCM inhibits torque converter clutch (TCC) engagement.

Conditions for Clearing the DTC

A scan tool can clear the code from TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

- Inspect the wiring for poor electrical connections at the TCM. Inspect for the following conditions:
  - A bent terminal
  - A backed-out terminal
  - A damaged terminal
  - Poor terminal tension
  - A chafed wire
  - A broken wire inside the insulation
- When diagnosing for an intermittent short or open, massage the wiring harness while watching the test equipment for a change.
- You may have to drive the vehicle in order to experience a condition.
- If the condition is intermittent, connect the scan tool and select the speed sensor indicated by the code. If the signal is erratic, investigate and eliminate the following:
  - Intermittent wiring connection
  - Excessive vibration, such as driveline or engine torsionals
  - Irregular sensor gap, such as a loose sensor, a loose tone wheel or a damaged tone wheel
  - Inspect that the speed sensor wiring consists of twisted pairs at the rate of 12-16 twists per 300 mm (12 in). These twists must extend the entire length of the wiring harness to within at least 50 mm (2 in) of the speed sensor connector.

DTC P0722				
Step	**Action**	**Value**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics				
1	Did you perform the Diagnostic System Check - Vehicle?	—	Go to Step 2	Go to Diagnostic System Check - Vehicle
2	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** *Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.* 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Using the scan tool, observe ignition voltage. Is the voltage within the specified range?	9-18 V	Go to Step 3	Go to DTC P0562 for low voltage or DTC P0563 for high voltage
3	1. Turn the ignition OFF. 2. Disconnect the 80-way connector at the TCM. 3. Install the J 39700 breakout box, the J-47275 breakout box adapter and the J 47275-1 magnetic overlay. 4.Using the DMM, measure the resistance between connector terminals 60 and 40. Is the speed sensor resistance within the specified value?	2,600-3,160 ohms	Go to Diagnostic Aids	Go to Step 4
4	1. Disconnect the wiring harness from the output speed sensor. 2. Using the DMM and the J 35616 GM terminal test kit, measure the resistance between the speed sensor terminals. Is the speed sensor resistance within the specified value?	2,600-3,160 ohms	Go to Step 5	Go to Step 6
5	Test the output speed sensor circuit between the TCM and output speed sensor for an open or short to ground condition. Refer to Circuit Testing . Did you find and correct the condition?	—	Go to Step 7	—

DTC P0722				
Step	**Action**	**Value**	**Yes**	**No**
6	**IMPORTANT:** *Do not rotate the speed sensor in the retaining bracket. Orientation is fixed, and if changed, may cause improper operation.* Replace the output speed sensor. Refer to Speed Sensor Replacement. Did you complete the replacement?	—	Go to Step 7	—
7	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Using the scan tool, monitor the output speed sensor operation. 3. Select Specific DTC. 4. Enter DTC P0722. Has the test run and passed?	—	Go to Step 8	Go to Step 2
8	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	—	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P0726

Circuit Description

The speed sensors are variable reluctance devices that convert mechanical motion to an AC voltage. Each sensor consists of a wire coil wrapped around a pole piece that is adjacent to a permanent magnet. These elements are contained in a housing that is mounted adjacent to a rotating ferrous member. 2 signal wires extend from one end of the housing and an exposed end of the pole piece is at the opposite end of the housing. The permanent magnet produces lines of flux around the pole piece. As a ferrous object, such as a gear tooth, approaches and passes through the gap at the end of the pole piece, an AC voltage pulse is induced in the wire coil. The transmission control module (TCM) calculates the frequency of these AC pulses and converts it to a speed value. The AC voltage generated varies from 150 m volts at low speed to 15 volts at high speed. The signal wires from the sensor are formed as twisted pairs to cancel magnetically induced fields. The cable is also shielded to protect from voltage related fields. Using 2 wire differential inputs at the TCM eliminates noise from other sources.

DTC P0726 is a type B DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P0726 Engine Speed Sensor Circuit Performance

Conditions for Running the DTC

- DTC P0716, P0717 and P0727 are not active.
- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.
- Engine speed is greater than 200 RPM and less than 7,500 RPM for 5 seconds.
- The input speed is greater than 600 RPM for 1.0 second.

Conditions for Setting the DTC

DTC P0726 sets when the TCM detects a large unrealistic engine speed or if excessive noise is present in the engine speed sensor circuit.

Action Taken When the DTC Sets

- The TCM illuminates the malfunction indicator lamp (MIL) during the second consecutive trip in which the Conditions for Setting the DTC are met.
- DTC P0726 is stored in TCM history.
- The TCM freezes shift adapts.
- The TCM inhibits torque converter clutch (TCC) engagement.

Conditions for Clearing the DTC

A scan tool can clear the code from TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

- Inspect the wiring for poor electrical connections at the TCM. Inspect for the following conditions:
  – A bent terminal
  – A backed-out terminal

- A damaged terminal
- Poor terminal tension
- A chafed wire
- A broken wire inside the insulation

- When diagnosing for an intermittent short or open, massage the wiring harness while watching the test equipment for a change.
- You may have to drive the vehicle in order to experience a condition.
- If the condition is intermittent, connect the scan tool and select the speed sensor indicated by the code. If the signal is erratic, investigate and eliminate the following:
  - Intermittent wiring connection
  - Excessive vibration, such as driveline or engine torsionals
  - Irregular sensor gap, such as a loose sensor, a loose tone wheel or a damaged tone wheel
  - Inspect that the speed sensor wiring consists of twisted pairs at the rate of 12-16 twists per 300 mm (12 in). These twists must extend the entire length of the wiring harness to within at least 50 mm (2 in) of the speed sensor connector.

DTC P0726				
Step	**Action**	**Value**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics				
1	Did you perform the Diagnostic System Check - Vehicle?	—	Go to Step 2	Go to Diagnostic System Check - Vehicle

DTC P0726				
Step	**Action**	**Value**	**Yes**	**No**
2	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** *Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.* 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Using the scan tool, observe ignition voltage. Is the voltage within the specified range?	9-18 V	Go to Step 3	Go to DTC P0562 for low voltage or DTC P0563 for high voltage
3	1. Turn the ignition OFF. 2. Disconnect the 80-way connector at the TCM. 3. Install the J 39700 breakout box, the J-47275 breakout box adapter and the J 47275-1 magnetic overlay. 4.Using the DMM, measure the resistance between connector terminals 39 and 59. Is the speed sensor resistance within the specified value?	2,600 ohms @ 25°C (77°F)	Go to Diagnostic Aids	Go to Step 4
4	1. Disconnect the wiring harness from the engine speed sensor. 2. Using the DMM and the J 35616 GM terminal test kit, measure the resistance between the speed sensor terminals. Is the speed sensor resistance within the specified value?	2,600 ohms @ 25°C (77°F)	Go to Step 5	Go to Step 6
5	Test the engine speed sensor circuit between the TCM and engine speed sensor for an open or short to ground condition. Refer to Circuit Testing . Did you find and correct the condition?	—	Go to Step 7	—

DTC P0726				
Step	**Action**	**Value**	**Yes**	**No**
6	**IMPORTANT:** *Do not rotate the speed sensor in the retaining bracket. Orientation is fixed, and if changed, may cause improper operation.* Replace the engine speed sensor. Refer to Speed Sensor Replacement. Did you complete the replacement?	—	Go to Step 7	—
7	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Using the scan tool, monitor the engine speed sensor operation. 3. Select Specific DTC. 4. Enter DTC P0726. Has the test run and passed?	—	Go to Step 8	Go to Step 2
8	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	—	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P0727

Circuit Description

The speed sensors are variable reluctance devices that convert mechanical motion to an AC voltage. Each sensor consists of a wire coil wrapped around a pole piece that is adjacent to a permanent magnet. These elements are contained in a housing that is mounted adjacent to a rotating ferrous member. 2 signal wires extend from one end of the housing and an exposed end of the pole piece is at the opposite end of the housing. The permanent magnet produces lines of flux around the pole piece. As a ferrous object, such as a gear tooth, approaches and passes through the gap at the end of the pole piece, an AC voltage pulse is induced in the wire coil. The transmission control module (TCM) calculates the frequency of these AC pulses and converts it to a speed value. The AC voltage generated varies from 150 m volts at low speed to 15 volts at high speed. The signal wires from the sensor are formed as twisted pairs to cancel magnetically induced fields. The cable is also shielded to protect from voltage related fields. Using 2 wire differential inputs at the TCM eliminates noise from other sources.

DTC P0727 is a type B DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P0727 Engine Speed Sensor Circuit No Signal

Conditions for Running the DTC

- DTC P0716, P0717 and P0726 are not active.
- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.
- Transmission turbine speed is at or greater than 400 RPM.

Conditions for Setting the DTC

DTC P0727 sets if engine speed is detected less than 61 RPM for 4 seconds.

Action Taken When the DTC Sets

- The TCM illuminates the malfunction indicator lamp (MIL) during the second consecutive trip in which the Conditions for Setting the DTC are met.
- DTC P0727 is stored in TCM history.
- The TCM freezes shift adapts.
- The TCM inhibits torque converter clutch (TCC) engagement.

Conditions for Clearing the DTC

A scan tool can clear the code from TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

- Inspect the wiring for poor electrical connections at the TCM. Inspect for the following conditions:
  - A bent terminal
  - A backed-out terminal
  - A damaged terminal

- Poor terminal tension
- A chafed wire
- A broken wire inside the insulation

- When diagnosing for an intermittent short or open, massage the wiring harness while watching the test equipment for a change.
- You may have to drive the vehicle in order to experience a condition.
- If the condition is intermittent, connect the scan tool and select the speed sensor indicated by the code. If the signal is erratic, investigate and eliminate the following:
  - Intermittent wiring connection
  - Excessive vibration, such as driveline or engine torsionals
  - Irregular sensor gap, such as a loose sensor, a loose tone wheel or a damaged tone wheel
  - Inspect that the speed sensor wiring consists of twisted pairs at the rate of 12-16 twists per 300 mm (12 in). These twists must extend the entire length of the wiring harness to within at least 50 mm (2 in) of the speed sensor connector.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

2. This step tests ignition voltage.
3. This step tests the wiring at the TCM.
4. This step tests engine speed sensor resistance.

DTC P0727				
Step	**Action**	**Value**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics				
1	Did you perform the Diagnostic System Check - Vehicle?	—	Go to Step 2	Go to Diagnostic System Check - Vehicle
2	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** *Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.* 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Using the scan tool, observe ignition voltage. Is the voltage within the specified range?	9-18 V	Go to Step 3	Go to DTC P0562 for low voltage or DTC P0563 for high voltage
3	1. Turn the ignition OFF. 2. Disconnect the 80-way connector at the TCM. 3. Install the J 39700 breakout box, the J-47275 breakout box adapter and the J 47275-1 magnetic overlay. 4.Using the DMM, measure the resistance between connector terminals 39 and 59. Is the speed sensor resistance within the specified value?	2,600 ohms @ 25°C (77°F)	Go to Diagnostic Aids	Go to Step 4
4	1. Disconnect the wiring harness from the engine speed sensor. 2. Using the DMM and the J 35616 GM terminal test kit, measure the resistance between the speed sensor terminals. Is the speed sensor resistance within the specified value?	2,600 ohms @ 25°C (77°F)	Go to Step 5	Go to Step 6
5	Test the engine speed sensor circuit between the TCM and engine speed sensor for an open or short to ground condition. Refer to Circuit Testing . Did you find and correct the condition?	—	Go to Step 7	

DTC P0727				
Step	**Action**	**Value**	**Yes**	**No**
6	**IMPORTANT:** *Do not rotate the speed sensor in the retaining bracket. Orientation is fixed, and if changed, may cause improper operation.* Replace the turbine speed sensor. Refer to Speed Sensor Replacement. Did you complete the replacement?	—	Go to Step 7	—
7	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Using the scan tool, monitor the engine speed sensor operation. 3. Select Specific DTC. 4. Enter DTC P0727. Has the test run and passed?	—	Go to Step 8	Go to Step 2
8	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	—	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P0729

Circuit Description

The transmission control module (TCM) uses input from the input speed sensor (ISS) and the output speed sensor (OSS) to determine gear ratios. The TCM then compares the known gear ratio to the calculated gear ratio for the current range.

DTC P0729 is a type A DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P0729 Incorrect 6th Gear Ratio

Conditions for Running the DTC

- DTCs P0716, P0717, P0721, P0722, P0875, and P0876 are not active.
- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.
- Output speed exceeds 200 RPM.
- 6th range is selected and attained.

Conditions for Setting the DTC

DTC P0729 sets when the calculated 6th range ratio, steady state, differs from the known 6th range ratio.

Action Taken When the DTC Sets

- The TCM illuminates the malfunction indicator lamp (MIL).
- The transmission defaults to 4th range while diagnostic response is active.
- If the shift selector is moved to NEUTRAL, the transmission will shift to NEUTRAL.
- If the shift selector is moved to REVERSE, the transmission will shift to REVERSE, unless the transmission is compromised by a direction change, then the transmission will shift to NEUTRAL.
- If the shift selector is returned to a forward range and the transmission is compromised by overspeeding or direction change, the transmission will lock in NEUTRAL.
- DTC P0729 is stored in TCM history.
- The TCM freezes shift adapts.
- The TCM inhibits torque converter clutch (TCC) engagement.

Conditions for Clearing the DTC

A scan tool can clear the code from TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

- Incorrect ratio codes typically indicate mechanical conditions with specific clutches, such as 2-6 clutch and 3-5-6-REVERSE clutch for 6th range.
- Incorrect ratio code could indicate a hydraulically failed solenoid. Observe DTC information for the specific solenoid.
- Clutch test mode can be used to measure stall speed.
- You may have to drive the vehicle in order to experience a condition.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

3. This step tests ignition voltage.
5. This step tests for turbine speed not remaining at zero in 6th range.

DTC P0729				
Step	**Action**	**Value**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics				
1	Did you perform the Diagnostic System Check - Vehicle?	—	Go to Step 2	Go to Diagnostic System Check - Vehicle
2	Measure the transmission fluid level. Refer to Transmission Fluid Checking Procedure . Is the transmission fluid level correct?	—	Go to Step 3	Go to Transmission Fluid Checking Procedure
3	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** *Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.* 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Using the scan tool, measure ignition voltage. Is the voltage within the specified range?	9-18 V	Go to Step 4	Go to DTC P0562 for low voltage or DTC P0563 for high voltage
4	1. Drive the vehicle under normal operating conditions. 2. Using the scan tool, monitor engine, turbine and output-speed readings. Is speed sensor data erratic?	—	Go to the appropriate speed sensor DTC	Go to Step 5

DTC P0729				
Step	**Action**	**Value**	**Yes**	**No**
5	Refer to Transmission Stall Test Notice. Conduct a clutch test for 6th range. Refer to Clutch Test . Did turbine speed remain at zero?	—	Go to Diagnostic Aids	Go to Step 6
6	1. Remove the transmission oil pan. Refer to Automatic Transmission Fluid/Filter Replacement . 2. Inspect for contaminated fluid and excessive material in the pan. Is the fluid contaminated or excessive material found in the pan?	—	Go to Step 7	Go to Step 8
7	Remove the transmission for overhaul or replacement. Refer to Transmission Replacement . Did you complete the replacement?	—	Go to Step 10	—
8	Inspect for a stuck or sticking pressure control valve. Refer to Control Valve Body Cleaning and Inspection . Did you find a valve condition and repair it?	—	Go to Step 10	Go to Step 9
9	Replace pressure control solenoid 2 (PCS2). Refer to Control Valve Solenoid Replacement . Did you complete the replacement?	—	Go to Step 10	—
10	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Start the engine. 3. Using the scan tool operate the vehicle under normal operating conditions. 4. Select Specific DTC. 5. Enter DTC P0729. Has the test run and passed?	—	Go to Step 11	Go to Step 2

DTC P0729				
Step	Action	Value	Yes	No
11	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	—	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P0731

Circuit Description

The transmission control module (TCM) uses input from the turbine speed sensor and the output speed sensor (OSS) to determine gear ratios. The TCM then compares the known gear ratio to the calculated gear ratio for the current range.

DTC P0731 is a type A DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P0731 Incorrect 1st Gear Ratio

Conditions for Running the DTC

- DTCs P0716, P0717, P0721, P0722, P0726, P0727, P0875, and P0876 are not active.
- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.
- Output speed exceeds 200 RPM.
- 1st range is selected and attained.

Conditions for Setting the DTC

DTC P0731 sets when the calculated 1st range ratio, steady state, differs from the known 1st range ratio.

Action Taken When the DTC Sets

- The TCM illuminates the malfunction indicator lamp (MIL).
- The transmission defaults to 2nd or 5th range while diagnostic response is active.
- If the shift selector is moved to NEUTRAL, the transmission will shift to NEUTRAL.
- If the shift selector is moved to REVERSE, the transmission will either lock in NEUTRAL or shift to REVERSE, unless the transmission is compromised by overspeeding or direction change, then the transmission will lock in NEUTRAL.
- DTC P0731 is stored in TCM history.
- The TCM freezes shift adapts.
- The TCM inhibits torque converter clutch (TCC) engagement.

Conditions for Clearing the DTC

A scan tool can clear the code from TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

- Incorrect ratio codes typically indicate mechanical conditions with specific clutches, such as 1-2-3-4 clutch or low and reverse clutch for 1st range.

- Incorrect ratio code could indicate a hydraulically failed solenoid. Observe DTC information for the specific solenoid.
- Clutch test mode can be used to measure stall speed.
- You may have to drive the vehicle in order to experience a condition.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

3. This step tests ignition voltage.
5. This step tests speed sensor readings.
6. This step tests for clutch slippage in 1st range shown by turbine speed not remaining at zero.

DTC P0731				
Step	**Action**	**Value**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics				
1	Did you perform the Diagnostic System Check - Vehicle?	—	Go to Step 2	Go to Diagnostic System Check - Vehicle
2	Measure the transmission fluid level. Refer to Transmission Fluid Checking Procedure . Is the transmission fluid level correct?	—	Go to Step 3	Go to Transmission Fluid Checking Procedure

DTC P0731				
Step	**Action**	**Value**	**Yes**	**No**
3	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** *Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.* 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Using the scan tool, measure ignition voltage. Is the voltage within the specified range?	9-18 V	Go to Step 4	Go to DTC P0562 for low voltage or DTC P0563 for high voltage
4	1. Start the engine. 2. Using the scan tool, observe the gear ratio. Is the correct 1st range ratio shown?	3.10:1	Go to Step 5	Go to Diagnostic Aids
5	1. Drive the vehicle under normal operating conditions. 2. Using the scan tool, monitor engine, turbine and output-speed readings. Is speed sensor data erratic?	—	Go to the appropriate speed sensor DTC	Go to Step 6
6	Refer to Transmission Stall Test Notice. Conduct a clutch test for 1st range. Refer to Clutch Test. Did turbine speed remain at zero?	—	Go to Diagnostic Aids	Go to Step 7
7	1. Remove the transmission oil pan. Refer to Automatic Transmission Fluid/ Filter Replacement . 2. Inspect for contaminated fluid and excessive material in the pan. Is the fluid contaminated or excessive material found in the pan?	—	Go to Step 8	Go to Step 9
8	Remove the transmission for overhaul or replacement. Refer to Transmission Replacement . Did you complete the replacement?	—	Go to Step 11	—

DTC P0731				
Step	**Action**	**Value**	**Yes**	**No**
9	Inspect for a stuck or sticking pressure control valve. Refer to Control Valve Body Cleaning and Inspection . Did you find and correct a condition?	—	Go to Step 11	Go to Step 10
10	Replace pressure control solenoid 3 (PCS3). Refer to Control Valve Solenoid Replacement . Did you complete the replacement?	—	Go to Step 11	—
11	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Start the engine. 3. Using the scan tool, monitor 1st gear ratio and operate vehicle under normal operating conditions. 4. Select Specific DTC. 5. Enter DTC P0731. Has the test run and passed?	—	Go to Step 12	Go to Step 2
12	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	—	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P0732

Circuit Description

The transmission control module (TCM) uses input from the turbine speed sensor and output speed sensor (OSS) to determine gear ratios. The TCM then compares the known gear ratio to the calculated gear ratio for the current range.

DTC P0732 is a type A DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P0732 Incorrect 2nd Gear Ratio

Conditions for Running the DTC

- DTCs P0716, P0717, P0721, P0722, P0875, and P0876 are not active.
- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.
- Output speed exceeds 200 RPM.
- 2nd range is attained.

Conditions for Setting the DTC

DTC P0732 sets when the calculated 2nd range ratio, steady state, differs from the known 2nd range ratio.

Action Taken When the DTC Sets

- The TCM illuminates the malfunction indicator lamp (MIL).
- The transmission defaults to 3rd range while diagnostic response is active.
- If the shift selector is moved to NEUTRAL, the transmission will shift to NEUTRAL.
- If the shift selector is moved to REVERSE, the transmission will shift to REVERSE, unless the transmission is compromised by overspeeding or direction change, then the transmission will lock in NEUTRAL.
- DTC P0732 is stored in TCM history.
- The TCM freezes shift adapts.
- The TCM inhibits torque converter clutch (TCC) engagement.

Conditions for Clearing the DTC

A scan tool can clear the code from TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

- Incorrect ratio codes typically indicate mechanical conditions with specific clutches, such as 1-2-3-4 clutch and 2-6 clutch for 2nd range.
- Incorrect ratio code could indicate a hydraulically failed solenoid. Observe DTC information for specific solenoid.
- Clutch test mode can be used to observe stall speed.
- You may have to drive the vehicle in order to experience a condition.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

3. This step tests ignition voltage.

5. This step tests for turbine speed not remaining at zero in 2nd range.

DTC P0732				
Step	**Action**	**Value**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics				
1	Did you perform the Diagnostic System Check - Vehicle?	—	Go to Step 2	Go to Diagnostic System Check - Vehicle
2	Measure the transmission fluid level. Refer to Transmission Fluid Checking Procedure . Is the transmission fluid level correct?	—	Go to Step 3	Go to Transmission Fluid Checking Procedure
3	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** *Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.* 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Using the scan tool, measure ignition voltage. Is the voltage within the specified range?	9-18 V	Go to Step 4	Go to DTC P0562 for low voltage or DTC P0563 for high voltage
4	1. Drive the vehicle under normal operating conditions. 2. Using the scan tool, monitor engine, turbine and output-speed readings. Is speed sensor data erratic?	—	Go to the appropriate speed sensor DTC	Go to Step 5
5	Refer to Transmission Stall Test Notice. Conduct a clutch test for 2nd range. Refer to Clutch Test. Did turbine speed remain at zero?	—	Go to Diagnostic Aids	Go to Step 6

DTC P0732				
Step	**Action**	**Value**	**Yes**	**No**
6	1. Remove the transmission oil pan. Refer to Automatic Transmission Fluid/Filter Replacement . 2. Inspect for contaminated fluid and excessive material in the pan. Is the fluid contaminated or excessive material found in the pan?	—	Go to Step 7	Go to Step 8
7	Remove the transmission for overhaul or replacement. Refer to Transmission Replacement . Did you complete the replacement?	—	Go to Step 10	—
8	Inspect for a stuck or sticking pressure control valve. Refer to Control Valve Body Cleaning and Inspection . Did you find and correct the condition?	—	Go to Step 10	Go to Step 9
9	Replace pressure control solenoid 2 (PCS2). Refer to Control Valve Solenoid Replacement . Did you complete the replacement?	—	Go to Step 10	—
10	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Start the engine. 3. Using the scan tool, operate the vehicle under normal operating conditions. 4. Select Specific DTC. 5. Enter DTC P0732. Has the test run and passed?	—	Go to Step 11	Go to Step 2
11	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	—	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P0733

Circuit Description

The transmission control module (TCM) uses input from the turbine speed sensor and output speed sensor (OSS) to determine gear ratios. The TCM then compares the known gear ratio to the calculated gear ratio for the current range.

DTC P0733 is a type A DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P0733 Incorrect 3rd Gear Ratio

Conditions for Running the DTC

- DTCs P0716, P0717, P0721, P0722, P0875, and P0876 are not active.
- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.
- Output speed exceeds 200 RPM.
- 3rd range is selected and attained.

Conditions for Setting the DTC

DTC P0733 sets when the calculated 3rd range ratio, steady state, differs from the known 3rd range ratio.

Action Taken When the DTC Sets

- The TCM illuminates the malfunction indicator lamp (MIL).
- The transmission defaults to 4th range while diagnostic response is active.
- If the shift selector is moved to NEUTRAL, the transmission will shift to NEUTRAL.
- If the shift selector is moved to REVERSE, the transmission will shift to NEUTRAL.
- If the shift selector is returned to a forward range and the transmission is compromised by overspeeding or direction change, the transmission will lock in NEUTRAL.
- DTC P0733 is stored in TCM history.
- The TCM freezes shift adapts.
- The TCM inhibits torque converter clutch (TCC) engagement.

Conditions for Clearing the DTC

A scan tool can clear the code from TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

- Incorrect ratio codes typically indicate mechanical conditions with specific clutches, such as 1-2-3-4 clutch and 3-5-Reverse clutch, for 3rd range.
- Incorrect ratio code could indicate a hydraulically failed solenoid. Observe DTC information for specific solenoid.
- Clutch test mode can be used to observe stall speed.
- You may have to drive the vehicle in order to experience a condition.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

3. This step tests ignition voltage.
5. This step tests for turbine speed not remaining at zero in 3rd range.

DTC P0733				
Step	**Action**	**Value**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics				
1	Did you perform the Diagnostic System Check - Vehicle?	—	Go to Step 2	Go to Diagnostic System Check - Vehicle
2	Measure the transmission fluid level. Refer to Transmission Fluid Checking Procedure . Is the transmission fluid level correct?	—	Go to Step 3	Go to Transmission Fluid Checking Procedure
3	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** *Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.* 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Using the scan tool, measure ignition voltage. Is the voltage within the specified range?	9-18 V	Go to Step 4	Go to DTC P0562 for low voltage or DTC P0563 for high voltage
4	1. Drive the vehicle under normal operating conditions. 2. Using the scan tool, monitor engine, turbine and output-speed readings. Is speed sensor data erratic?	—	Go to the appropriate speed sensor DTC	Go to Step 5
5	Refer to Transmission Stall Test Notice . Conduct a clutch test for 3rd range. Refer to Clutch Test . Did turbine speed remain at zero?	—	Go to Diagnostic Aids	Go to Step 6

DTC P0733				
Step	**Action**	**Value**	**Yes**	**No**
6	1. Remove the transmission oil pan. Refer to Automatic Transmission Fluid/ Filter Replacement . 2. Inspect for contaminated fluid and excessive material in the pan. Is the fluid contaminated or excessive material found in the pan?	—	Go to Step 7	Go to Step 8
7	Remove the transmission for overhaul or replacement. Refer to Transmission Replacement . Did you complete the replacement?	—	Go to Step 10	—
8	Inspect for a stuck or sticking pressure control valve. Refer to Control Valve Body Cleaning and Inspection . Did you find and correct a condition?	—	Go to Step 10	Go to Step 9
9	Replace pressure control solenoid 3 (PCS3). Refer to Control Valve Solenoid Replacement . Did you complete the replacement?	—	Go to Step 10	—
10	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Start the engine. 3. Using the scan tool, operate the vehicle under normal operating conditions. 4. Select Specific DTC. 5. Enter DTC P0733. Has the test run and passed?	—	Go to Step 11	Go to Step 2
11	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	—	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P0734

Circuit Description

The transmission control module (TCM) uses input from the turbine speed sensor and output speed sensor (OSS) to determine gear ratios. The TCM then compares the known gear ratio to the calculated gear ratio for the current range.

DTC P0734 is a type A DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P0734 Incorrect 4th Gear Ratio

Conditions for Running the DTC

- DTCs P0716, P0717, P0721, P0722, P0875, and P0876 are not active.
- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.
- Output speed exceeds 200 RPM.
- 4th range is selected and attained.

Conditions for Setting the DTC

DTC P0734 sets when the calculated 4th range ratio, steady state, differs from the known 4th range ratio.

Action Taken When the DTC Sets

- The TCM illuminates the malfunction indicator lamp (MIL).
- The transmission defaults to 5th range while diagnostic response is active.
- If the shift selector is moved to NEUTRAL, the transmission will shift to NEUTRAL.
- If the shift selector is moved to REVERSE, the transmission will shift to REVERSE, unless the transmission is compromised by a direction change, then the transmission will shift to NEUTRAL.
- If the shift selector is returned to a forward range and the transmission is compromised by overspeeding or direction change, the transmission will lock in NEUTRAL.
- DTC P0734 is stored in TCM history.
- The TCM freezes shift adapts.
- The TCM inhibits torque converter clutch (TCC) engagement.

Conditions for Clearing the DTC

A scan tool can clear the code from TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

- Incorrect ratio codes typically indicate mechanical conditions with specific clutches, such as 1-2-3-4 clutch and 4-5-6 clutch, for 4th range.
- Incorrect ratio code could indicate a hydraulically failed solenoid. Observe DTC information for specific solenoid.
- Clutch test mode can be used to observe stall speed.
- You may have to drive the vehicle in order to experience a condition.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

3. This step tests ignition voltage.
5. This step tests for turbine speed not remaining at zero in 4th range.

DTC P0734				
Step	**Action**	**Value**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics				
1	Did you perform the Diagnostic System Check – Vehicle?	—	Go to Step 2	Go to Diagnostic System Check - Vehicle
2	Measure the transmission fluid level. Refer to Transmission Fluid Checking Procedure . Is the transmission fluid level correct?	—	Go to Step 3	Go to Transmission Fluid Checking Procedure
3	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** *Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.* 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Using the scan tool, measure ignition voltage. Is the voltage within the specified range?	9-18 V	Go to Step 4	Go to DTC P0562 for low voltage or DTC P0563 for high voltage
4	1. Drive the vehicle under normal operating conditions. 2. Using the scan tool, monitor engine, turbine and output-speed readings. Is speed sensor data erratic?	—	Go to the appropriate speed sensor DTC	Go to Step 5

DTC P0734				
Step	**Action**	**Value**	**Yes**	**No**
5	Refer to Transmission Stall Test Notice. Conduct a clutch test for 4th range. Refer to Clutch Test . Did turbine speed remain at zero?	—	Go to Diagnostic Aids	Go to Step 6
6	1. Remove the transmission oil pan. Refer to Automatic Transmission Fluid/ Filter Replacement . 2. Inspect for contaminated fluid and excessive material in the pan. Is the fluid contaminated or excessive material found in the pan?	—	Go to Step 7	Go to Step 8
7	Remove the transmission for overhaul or replacement. Refer to Transmission Replacement . Did you complete the replacement?	—	Go to Step 10	—
8	Inspect for a stuck or sticking pressure control valve. Refer to Control Valve Body Cleaning and Inspection . Did you find and correct a condition?	—	Go to Step 10	Go to Step 9
9	Replace pressure control solenoid 2 (PCS2). Refer to Control Valve Solenoid Replacement . Did you complete the replacement?	—	Go to Step 10	—
10	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Start the engine. 3. Using the scan tool, operate the vehicle under normal operating conditions. 4. Select Specific DTC. 5. Enter DTC P0734. Has the test run and passed?	—	Go to Step 11	Go to Step 2
11	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	—	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P0735

Circuit Description

The transmission control module (TCM) uses input from the input speed sensor (ISS) and output speed sensor (OSS) to determine gear ratios. The TCM then compares the known gear ratio to the calculated gear ratio for the current range.

DTC P0735 is a type A DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P0735 Incorrect 5th Gear Ratio

Conditions for Running the DTC

- DTCs P0716, P0717, P0721, P0722, P0875, and P0876 are not active.
- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.
- Output speed exceeds 200 RPM.
- 5th range is selected and attained.

Conditions for Setting the DTC

DTC P0735 sets when the calculated 5th range ratio, steady state, differs from the known 5th range ratio.

Action Taken When the DTC Sets

- The TCM illuminates the malfunction indicator lamp (MIL).
- The transmission defaults to 4th range while diagnostic response is active.
- If the shift selector is moved to NEUTRAL, the transmission will shift to NEUTRAL.
- If the shift selector is moved to REVERSE, the transmission will shift to REVERSE, unless the transmission is compromised by a direction change, then the transmission will shift to NEUTRAL.
- If the shift selector is returned to a forward range and the transmission is compromised by overspeeding or direction change, the transmission will lock in NEUTRAL.
- DTC P0735 is stored in TCM history.
- The TCM freezes shift adapts.
- The TCM inhibits torque converter clutch (TCC) engagement.

Conditions for Clearing the DTC

A scan tool can clear the code from TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

- Incorrect ratio codes typically indicate mechanical conditions with specific clutches, such as 4-5-6 clutch and 3-5-Reverse clutch, for 5th range.
- Incorrect ratio code could indicate a hydraulically failed solenoid. Observe DTC information for specific solenoid.
- Clutch test mode can be used to observe stall speed.
- You may have to drive the vehicle in order to experience a condition.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

3. This step tests ignition voltage.
5. This step tests for turbine speed not remaining at zero in 5th range.

DTC P0735				
Step	**Action**	**Value**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics				
1	Did you perform the Diagnostic System Check - Vehicle?	—	Go to Step 2	Go to Diagnostic System Check - Vehicle
2	Measure the transmission fluid level. Refer to Transmission Fluid Checking Procedure . Is the transmission fluid level correct?	—	Go to Step 3	Go to Transmission Fluid Checking Procedure
3	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** ***Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.*** 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Using the scan tool, measure ignition voltage. Is the voltage within the specified range?	9-18 V	Go to Step 4	Go to DTC P0562 for low voltage or DTC P0563 for high voltage
4	1. Drive the vehicle under normal operating conditions. 2. Using the scan tool, monitor engine, turbine and output-speed readings. Is speed sensor data erratic?	—	Go to the appropriate speed sensor DTC	Go to Step 5

DTC P0735				
Step	**Action**	**Value**	**Yes**	**No**
5	Refer to Transmission Stall Test Notice. Conduct a clutch test for 5th range. Refer to Clutch Test . Did turbine speed remain at zero?	—	Go to Diagnostic Aids	Go to Step 6
6	1. Remove the transmission oil pan. Refer to Automatic Transmission Fluid/Filter Replacement . 2. Inspect for contaminated fluid and excessive material in the pan. Is the fluid contaminated or excessive material found in the pan?	—	Go to Step 7	Go to Step 8
7	Remove the transmission for overhaul or replacement. Refer to Transmission Replacement . Did you complete the replacement?	—	Go to Step 10	—
8	Inspect for a stuck or sticking pressure control valve. Refer to Control Valve Body Cleaning and Inspection . Did you find and correct a condition?	—	Go to Step 10	Go to Step 9
9	Replace pressure control solenoid 3 (PCS3). Refer to Control Valve Solenoid Replacement . Did you complete the replacement?	—	Go to Step 10	—
10	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Start the engine. 3. Using the scan tool, operate the vehicle under normal operating conditions. 4. Select Specific DTC. 5. Enter DTC P0735. Has the test run and passed?	—	Go to Step 11	Go to Step 2
11	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	—	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P0736

Circuit Description

The transmission control module (TCM) uses input from the input speed sensor (ISS) and output speed sensor (OSS) to determine gear ratios. The TCM then compares the known gear ratio to the calculated gear ratio for the current gear.

DTC P0736 is a type A DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P0736 Incorrect Reverse Ratio

Conditions for Running the DTC

- DTCs P0716, P0717, P0721, P0722, P0875, and P0876 are not active.
- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.
- Output speed exceeds 200 RPM.
- REVERSE is selected and attained.

Conditions for Setting the DTC

DTC P0736 sets when the calculated REVERSE range ratio, steady state, detected by the TCM differs from the known REVERSE range ratio.

Action Taken When the DTC Sets

- The TCM illuminates the malfunction indicator lamp (MIL).
- The transmission will lock in NEUTRAL.
- DTC P0736 is stored in TCM history.
- The TCM freezes shift adapts.
- The TCM inhibits torque converter clutch (TCC) engagement.

Conditions for Clearing the DTC

A scan tool can clear the code from TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

- Incorrect ratio codes typically indicate mechanical conditions with specific clutches, such as 3-5-Reverse clutch and low and reverse clutch for REVERSE range.
- Incorrect ratio code could indicate a hydraulically failed solenoid. Observe DTC information for specific solenoid.
- You may have to drive the vehicle in order to experience a condition.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

3. This step tests ignition voltage.
5. This step tests speed sensor readings.
6. This step tests for turbine speed not remaining at zero in REVERSE range.

DTC P0736				
Step	**Action**	**Value**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics				
1	Did you perform the Diagnostic System Check - Vehicle?	—	Go to Step 2	Go to Diagnostic System Check - Vehicle
2	Measure the transmission fluid level. Refer to Transmission Fluid Checking Procedure . Is the transmission fluid level correct?	—	Go to Step 3	Go to Transmission Fluid Checking Procedure
3	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** ***Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.*** 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Using the scan tool, measure ignition voltage. Is the voltage within the specified range?	9-18 V	Go to Step 4	Go to DTC P0562 for low voltage or DTC P0563 for high voltage
4	1. Start the engine. 2. Select REVERSE range. 3. Using the scan tool, observe the gear ratio. Is the correct REVERSE range ratio shown?	-4.49:1	Go to Step 5	Go to Diagnostic Aids
5	1. Turn the ignition ON. 2. Start the engine and run at idle. 3. Using the scan tool, monitor engine, turbine, and output speed readings in REVERSE range with the vehicle brakes applied. Is speed sensor data erratic?	—	Go to the appropriate speed sensor DTC	Go to Step 6

DTC P0736				
Step	**Action**	**Value**	**Yes**	**No**
6	**NOTICE:** *Do not perform a full RPM stall test in reverse range, or vehicle damage may occur.* 1. Apply vehicle brakes and select REVERSE. 2. With the engine at idle and REVERSE range attained, turbine speed should go to zero. 3. Using the scan tool, monitor turbine speed while increasing engine speed to 1,000 RPM. Did turbine speed remain at zero?	—	Go to Diagnostic Aids	Go to Step 7
7	1. Remove the transmission oil pan. Refer to Automatic Transmission Fluid/Filter Replacement . 2. Inspect for contaminated fluid and excessive material in the pan. Is the fluid contaminated or excessive material found in the pan?	—	Go to Step 8	Go to Step 9
8	Remove the transmission for overhaul or replacement. Refer to Transmission Replacement . Did you complete the replacement?	—	Go to Step 11	—
9	Inspect for a stuck or sticking pressure control valve. Refer to Control Valve Body Cleaning and Inspection . Did you find and correct a condition?	—	Go to Step 11	Go to Step 10
10	Replace pressure control solenoid 2 (PCS2). Refer to Control Valve Solenoid Replacement . Did you complete the replacement?	—	Go to Step 11	—

DTC P0736				
Step	**Action**	**Value**	**Yes**	**No**
11	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Start the engine. 3. Using the scan tool, monitor REVERSE gear ratio and operate the vehicle under normal operating conditions. 4. Select Specific DTC. 5. Enter DTC P0736. Has the test run and passed?	—	Go to Step 12	Go to Step 2
12	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	—	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P0741

Circuit Description

The transmission control module (TCM) uses data from the engine speed sensor and the turbine speed sensor to calculate torque converter slip value. The TCM then compares this calculated slip value to a preset value in the TCM calibration.

DTC P0741 is a type B DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P0741 Torque Converter Clutch (TCC) System - Stuck Off

Conditions for Running the DTC

- DTC P0716, P0717, P0721, P0722 and P0743 are not active.
- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.
- Engine speed is greater than 200 RPM and less than 7,500 RPM for 5 seconds.
- The throttle position is in the 10-90 percent range.
- The transmission must be in forward range.
- The torque converter clutch (TCC) is enabled.

Conditions for Setting the DTC

DTC P0741 sets when the TCM detects one of the following conditions:

- A TCC slip value greater than 80 RPM for 15 seconds.
- The TCC slip speed values indicate a stuck off state.

Action Taken When the DTC Sets

- The TCM illuminates the malfunction indicator lamp (MIL) during the second consecutive trip in which the Conditions for Setting the DTC are met.
- DTC P0741 is stored in TCM history.
- The TCM freezes shift adapts.
- The TCM inhibits TCC engagement.

Conditions for Clearing the DTC

A scan tool can clear the code from TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

- Inspect the wiring for poor electrical connections at the TCM. Inspect for the following conditions:
  - A bent terminal
  - A backed-out terminal
  - A damaged terminal
  - Poor terminal tension
  - A chafed wire
  - A broken wire inside the insulation
- When diagnosing for an intermittent short or open, massage the wiring harness while watching the test equipment for a change.
- You may have to drive the vehicle in order to experience

a condition.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

2. This step tests ignition voltage.
3. This step tests for TCC enable status.

DTC P0741				
Step	**Action**	**Value**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics				
1	Did you perform the Diagnostic System Check - Vehicle?	—	Go to Step 2	Go to Diagnostic System Check - Vehicle
2	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** *Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.* 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Using the scan tool, measure ignition voltage. Is the voltage within the specified range?	9-18 V	Go to Step 3	Go to DTC P0562 for low voltage or DTC P0563 for high voltage
3	1. Drive the vehicle under normal operating conditions. 2. Using the scan tool, monitor converter slip speed indicated when a range is attained where the TCC should be applied. Is the slip speed value at or greater than the specified value when the TCC should be applied?	80 RPM	Go to Step 4	Go to Diagnostic Aids

DTC P0741				
Step	**Action**	**Value**	**Yes**	**No**
4	This condition indicates the TCC is mechanically stuck OFF. Inspect for the following conditions: • Worn TCC clutch • Faulty TCC solenoid • Debris in the TCC valve bore • Clogged converter relief passage Did you find and repair a condition?	—	Go to Step 5	—
5	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Start the engine. 3. Using the scan tool, operate the vehicle under normal operating conditions. 4. Select Specific DTC. 5. Enter DTC P0741. Has the test run and passed?	—	Go to Step 6	Go to Step 2
6	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	—	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P0742

Circuit Description

The transmission control module (TCM) uses data from the engine speed sensor and the turbine speed sensor to calculate the torque converter slip value. The TCM then compares this calculated slip value to a preset value in the TCM calibration.

DTC P0742 is a type B DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P0742 Torque Converter Clutch (TCC) System - Stuck On

Conditions for Running the DTC

- DTC P0122, P0123, P0716, P0717, P0721, P0722, P0743 are not active.
- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.
- Engine speed is greater than 200 RPM and less than 7,500 RPM for 5 seconds.
- The transmission must be in a forward range.
- The torque converter clutch (TCC) is not enabled or requested.

Conditions for Setting the DTC

DTC P0742 sets when the TCM detects TCC slip speed values indicating a stuck on or locked condition for 2.5 seconds.

Action Taken When the DTC Sets

- The TCM illuminates the malfunction indicator lamp (MIL) during the second consecutive trip in which the Conditions for Setting the DTC are met.
- If failure occurs before shifting is completed, the transmission will shift to NEUTRAL. If failure occurs while shifting is being completed, the transmission will shift to NEUTRAL or 1st range while diagnostic response is active.
- If the shift selector is moved to NEUTRAL, the transmission will shift to NEUTRAL.
- If the shift selector is moved to REVERSE, the transmission will shift to NEUTRAL or REVERSE.
- If the shift selector is returned to DRIVE, the transmission will shift to NEUTRAL or 1st range.
- DTC P0742 is stored in TCM history.
- The TCM inhibits TCC engagement.
- The TCM freezes shift adapts.

Conditions for Clearing the DTC

A scan tool can clear the code from TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

- Inspect the wiring for poor electrical connections at the TCM. Inspect for the following conditions:
  – A bent terminal
  – A backed-out terminal
  – A damaged terminal

  - Poor terminal tension
  - A chafed wire
  - A broken wire inside the insulation
- When diagnosing for an intermittent short or open, massage the wiring harness while watching the test equipment for a change.
- You may have to drive the vehicle in order to experience a condition.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

2. This step tests for TCC application at startup, stuck on.
3. This step inspects for internal damage.
4. This step inspects for 3 possible causes for the TCC being stuck on.

DTC P0742			
Step	**Action**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics			
1	Did you perform the Diagnostic System Check – Vehicle?	Go to Step 2	Go to Diagnostic System Check - Vehicle

DTC P0742			
Step	**Action**	**Yes**	**No**
2	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** *Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.* 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Start the engine. 6. Apply the vehicle brakes and select DRIVE. Did the engine stall?	Go to Step 3	Go to Diagnostic Aids
3	1. Remove the transmission oil pan. Refer to Automatic Transmission Fluid/Filter Replacement . 2. Inspect for contaminated fluid and/or excessive material in the pan. Is the fluid contaminated or excessive material found in the pan?	Go to Step 5	Go to Step 4
4	This condition indicates the TCC is mechanically stuck ON. Inspect for the following conditions: 1. Faulty TCC solenoid 2. Stuck or sticking TCC valve 3. Restricted transmission cooler lines Did you find and repair a condition?	Go to Step 6	—
5	Remove the transmission for overhaul or replacement. Refer to Transmission Replacement . Did you complete the repair or replacement?	Go to Step 6	—

DTC P0742			
Step	**Action**	**Yes**	**No**
6	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Start the engine. 3. Using the scan tool, monitor TCC slip speed. The TCC must engage/disengage when commanded. 4. Select Specific DTC. 5. Enter DTC P0742. Has the test run and passed?	Go to Step 7	Go to Step 2
7	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P0751

Circuit Description

The pressure switch manifold (PSM) is a multiple-switch assembly made up of 3 normally open (N/O) and 1 normally closed (N/C) pressure switches. The pressure switch 1 (PS1) monitors shift solenoid valve 1 (SS1) positioning and relays it to the transmission control module (TCM). When PS1 is in the open state, SS1 should be in the destroked position.

DTC P0751 is a type A DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P0751 Shift Solenoid (SS) 1 Valve Performance - Stuck Off

Conditions for Running the DTC

- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.
- Engine speed is greater than 200 RPM and less than 7,500 RPM for 5 seconds.
- SS1 is commanded to the ON, stroked, position.

Conditions for Setting the DTC

DTC P0751 sets when SS1 is commanded ON and PS1 status remains OFF for 5 seconds, depending on fluid temperature.

Action Taken When the DTC Sets

- The TCM illuminates the malfunction indicator lamp (MIL).
- When in a forward range and shifting is completed, the transmission will fail to another forward range, unless the transmission is compromised by overspeeding or direction change, then the transmission will shift to

NEUTRAL.

- When in a forward range and the shift is in process, the transmission will return to a previous range, except for 1-2 shifts and 2-1 shifts where the shifts will be completed.
- When in NEUTRAL or REVERSE, the transmission will fail to NEUTRAL.
- While diagnostic response is active, the shift selector is moved from a forward range to NEUTRAL or from a forward range to REVERSE, the transmission will shift to NEUTRAL.
- DTC P0751 is stored in TCM history.
- The TCM freezes shift adapts.
- The TCM inhibits torque converter clutch (TCC) engagement.

Conditions for Clearing the DTC

A scan tool can clear the code from TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

- Inspect the wiring for poor electrical connections at the TCM. Inspect for the following conditions:
  – A bent terminal
  – A backed-out terminal
  – A damaged terminal
  – Poor terminal tension
  – A chafed wire
  – A broken wire inside the insulation
- When diagnosing for an intermittent short or open, massage the wiring harness while watching the test equipment for a change.
- You may have to drive the vehicle in order to experience a condition.
- This DTC may indicate that SS1 is mechanically defective or the shift valve is stuck in the destroked state.
- When DTC P0751 and P0843 are set in combination, this may indicate an open circuit condition is present at the pressure switch circuit or the shift valve is stuck in the destroked position.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

5. This step tests the TCM response function.
6. This step tests the transmission wiring harness integrity.
7. This step tests and evaluates the internal wiring harness.
8. This step tests the PSM for a failed condition.

DTC P0751			
Step	**Action**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics			
1	Did you perform the Diagnostic System Check - Vehicle?	Go to Step 2	Go to Diagnostic System Check - Vehicle
2	Measure the transmission fluid level. Refer to Transmission Fluid Checking . Is the transmission fluid level correct?	Go to Step 3	Go to Transmission Fluid Checking
3	Measure line pressure. Refer to Line Pressure Check . Is the pressure within the specified value?	Go to Step 4	Go to Symptoms - Automatic Transmission
4	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** ***Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.*** 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Start the engine. 6. Using the scan tool, monitor PS1 status. Does the scan tool indicate PS1 status is LOW?	Go to Diagnostic Aids	Go to Step 5
5	1. Turn the ignition OFF. 2. Disconnect the 80-way connector at the TCM. 3. Install the J 39700 breakout box, the J-47275 breakout box adapter and the J 47275-1 magnetic overlay. 4. Turn ON the ignition, with the engine OFF. 5. Connect terminal 17 to ground. Does the scan tool indicate PS1 status is LOW when grounded and HIGH when open?	Go to Step 6	Go to Step 15

DTC P0751			
Step	**Action**	**Yes**	**No**
6	1. Turn the ignition OFF. 2. Disconnect the AT inline 20-way connector. Additional DTCs may set. 3. Install the J 44152 jumper harness (20 pins) on the engine side of the AT inline 20-way connector. 4. Turn ON the ignition, with the engine OFF. 5. Using the J 35616 GM terminal test kit, connect a fused jumper wire connect terminal D of the J 44152 to ground. Refer to Automatic Transmission Inline Harness Connector End View . Does the scan tool indicate PS1 status is LOW when grounded and HIGH when open?	Go to Step 7	Go to Step 14
7	1. Connect the transmission AT inline 20-way connector. 2. Remove the transmission oil pan. Refer to Oil Pan Replacement . 3. Disconnect the AT internal wiring harness from the PSM and ground terminal A. Does the scan tool indicate PS1 status is LOW when grounded and HIGH when open?	Go to Step 8	Go to Step 13
8	1. Remove the PSM from the control valve body and leave the internal harness connected. Refer to Pressure Switch Manifold Replacement . 2. Provide a ground connection for the PSM to either the control valve body or the transmission main case. 3. Using the eraser end of a pencil, push gently on the PS1 membrane. Does the scan tool indicate PS1 status is LOW when depressed and HIGH when open?	Go to Step 9	Go to Step 12
9	Remove the control valve body and inspect for a stuck or sticking shift valve 1. Refer to Control Valve Body Disassemble . Was the shift valve 1 stuck or sticking?	Go to Step 11	Go to Step 10
10	Replace SS1 and install the control valve body. Refer to Control Valve Body Replacement. Did you replace the solenoid and install the valve body?	Go to Step 16	—
11	Clean and inspect the related valves, bores and the valve body for debris or contamination. Refer to Control Valve Body Cleaning and Inspection . Did you complete the repair?	Go to Step 16	—

DTC P0751			
Step	**Action**	**Yes**	**No**
12	Replace the PSM. Refer to Pressure Switch Manifold Replacement . Did you complete the replacement?	Go to Step 16	—
13	Replace the AT internal wiring harness. Refer to Wiring Harness Replacement. Did you complete the replacement?	Go to Step 16	—
14	Test the PS1 circuit between the TCM and AT inline 20-way connector for an open or short condition. Refer to Circuit Testing . Did you find and correct the condition?	Go to Step 16	—
15	**IMPORTANT:** *Prior to replacing the TCM, swap the TCM with a known good TCM. In most cases, the TCM is not at fault. Investigate thoroughly before replacing the TCM.* Replace the TCM. Refer to Control Module References for replacement, setup, and programming. Did you complete the replacement?	Go to Step 16	—
16	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Start the engine. 3. Using the scan tool, monitor the PS1 status. 4. Select Specific DTC. 5. Enter DTC P0751. Has the test run and passed?	Go to Step 17	Go to Step 1
17	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P0752

Circuit Description

The pressure switch manifold (PSM) is a multiple-switch assembly made up of 3 normally open (N/O) and 1 normally closed (N/C) pressure switches. The pressure switch 1 (PS1) monitors shift solenoid valve 1 (SS1) positioning and relays it to the transmission control module (TCM). When PS1 is in the open state, SS1 should be in the destroked position.

DTC P0752 is a type A DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P0752 Shift Solenoid (SS) 1 Valve Performance – Stuck On

Conditions for Running the DTC

- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.
- Engine speed is greater than 200 RPM and less than 7,500 RPM for 5 seconds.
- SS1 is commanded to the OFF, destroked, position.

Conditions for Setting the DTC

DTC P0752 sets when SS1 is commanded OFF and PS1 status remains ON for 2-16 seconds depending on fluid temperature.

Action Taken When the DTC Sets

- The TCM illuminates the malfunction indicator lamp (MIL).
- When in a forward range and shifting is completed, the transmission will fail to another forward range, unless the transmission is compromised by overspeeding or direction change, then the transmission will shift to NEUTRAL.
- When in a forward range and the shift is in process, the transmission will return to a previous range, except for 1-2 shifts and 2-1 shifts which will be completed.
- When in NEUTRAL or REVERSE, the transmission will fail to NEUTRAL.
- While diagnostic response is active, the shift selector is moved from a forward range to NEUTRAL or from a forward range to REVERSE, the transmission will shift to NEUTRAL.
- DTC P0752 is stored in TCM history.
- The TCM freezes shift adapts.
- The TCM inhibits torque converter clutch (TCC) engagement.

Conditions for Clearing the DTC

A scan tool can clear the code from TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

- Inspect the wiring for poor electrical connections at the TCM. Inspect for the following conditions:
  – A bent terminal
  – A backed-out terminal
  – A damaged terminal

– Poor terminal tension
– A chafed wire
– A broken wire inside the insulation

- When diagnosing for an intermittent short or open, massage the wiring harness while watching the test equipment for a change.
- You may have to drive the vehicle in order to experience a condition.
- This DTC may indicate that SS1 is mechanically defective or the shift valve is stuck in the stroked state.
- When DTC P0752 and P0842 are set in combination, this may indicate a short to ground is present at the pressure switch circuit or the shift valve is stuck in the stroked state.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

5. This step tests the TCM response function.
6. This step tests the transmission wiring harness integrity.
7. This step tests and evaluates the internal wiring harness.
8. This step tests the PSM for a failed condition.

DTC P0752			
Step	**Action**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics			
1	Did you perform the Diagnostic System Check - Vehicle?	Go to Step 2	Go to Diagnostic System Check - Vehicle

DTC P0752			
Step	**Action**	**Yes**	**No**
2	Measure the transmission fluid level. Refer to Transmission Fluid Checking . Is the transmission fluid level correct?	Go to Step 3	Go to Transmission Fluid Checking
3	Measure line pressure. Refer to Line Pressure Check . Is the pressure within the specified value?	Go to Step 4	Go to Symptoms - Automatic Transmission
4	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** *Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.* 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Start the engine. 6. Using the scan tool, monitor PS1 status. Does the scan tool indicate PS1 status is LOW?	Go to Diagnostic Aids	Go to Step 5
5	1. Turn the ignition OFF. 2. Disconnect the 80-way connector at the TCM. 3. Install the J 39700 breakout box, the J-47275 breakout box adapter and the J 47275-1 magnetic overlay. 4. Turn ON the ignition, with the engine OFF. 5. Connect terminal 17 to ground. Does the scan tool indicate PS1 status is LOW when grounded and HIGH when open?	Go to Step 6	Go to Step 15

DTC P0752			
Step	**Action**	**Yes**	**No**
6	1. Turn the ignition OFF. 2. Disconnect the AT inline 20-way connector. Additional DTCs may set. 3. Install the J 44152 jumper harness (20 pins) on the engine side of the AT inline 20-way connector. 4. Turn ON the ignition, with the engine OFF. 5. Using the J 35616 GM terminal test kit, connect a fused jumper wire connect terminal D of the J 44152 to ground. Refer to Automatic Transmission Inline Harness Connector End View . Does the scan tool indicate PS1 status is LOW when grounded and HIGH when open?	Go to Step 7	Go to Step 14
7	1. Connect the transmission AT inline 20-way connector. 2. Remove the transmission oil pan. Refer to Oil Pan Replacement . 3. Disconnect the AT internal wiring harness from the PSM and ground terminal A. Does the scan tool indicate PS1 status is LOW when grounded and HIGH when open?	Go to Step 8	Go to Step 13
8	1. Remove the PSM from the control valve body and leave the internal harness connected. Refer to Pressure Switch Manifold Replacement . 2. Provide a ground connection for the PSM to either the control valve body or the transmission main case. 3. Using the eraser end of a pencil, push gently on the PS1 membrane. Does the scan tool indicate PS1 status is LOW when depressed and HIGH when open?	Go to Step 9	Go to Step 12
9	Remove the control valve body and inspect for a stuck or sticking SS1. Refer to Control Valve Body Disassemble . Was the SS1 stuck or sticking?	Go to Step 11	Go to Step 10
10	Replace SS1 and install the control valve body. Refer to Control Valve Body Replacement. Did you replace the solenoid and install the valve body?	Go to Step 16	—
11	Clean and/or polish the sticking valve in order to restore free movement or replace the control valve body assembly. Refer to Control Valve Body Cleaning and Inspection . Did you restore free movement or replace the valve body?	Go to Step 16	—

DTC P0752			
Step	**Action**	**Yes**	**No**
12	Replace the PSM. Refer to Pressure Switch Manifold Replacement . Did you complete the replacement?	Go to Step 16	—
13	Replace the AT internal wiring harness. Refer to Wiring Harness Replacement. Did you complete the replacement?	Go to Step 16	—
14	Test the PS1 circuit between the TCM and AT inline 20-way connector for an open or short condition. Refer to Circuit Testing . Did you find and correct the condition?	Go to Step 16	—
15	**IMPORTANT:** *Prior to replacing the TCM, swap the TCM with a known good TCM. In most cases, the TCM is not at fault. Investigate thoroughly before replacing the TCM.* Replace the TCM. Refer to Control Module References for replacement, setup, and programming. Did you complete the replacement?	Go to Step 16	—
16	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Start the engine. 3. Using the scan tool, monitor PS1 status. 4. Select Specific DTC. 5. Enter DTC P0752. Has the test run and passed?	Go to Step 17	Go to Step 2
17	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P0756

Circuit Description

The pressure switch manifold (PSM) is a multiple-switch assembly made up of 3 normally open (N/O) and 1 normally closed (N/C) pressure switches. The pressure switch 2 (PS2) monitors shift solenoid valve 2 (SS2) positioning and relays it to the transmission control module (TCM). When PS2 is in the open state, shift solenoid valve 2 (SS2) should be in the destroked position.

DTC P0756 is a type A DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P0756 Shift Solenoid (SS) 2 Valve Performance - Stuck Off

Conditions for Running the DTC

- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.
- Engine speed is greater than 200 RPM and less than 7,500 RPM for 5 seconds.
- SS2 is commanded to the ON, stroked, position.

Conditions for Setting the DTC

DTC P0756 sets when SS2 is commanded ON and PS2 status remains OFF for 5 seconds, depending on fluid temperature.

Action Taken When the DTC Sets

- The TCM illuminates the malfunction indicator lamp (MIL).
- When in a forward range and shifting is completed, the transmission will fail to another forward range, unless the transmission is compromised by overspeeding or direction change, then the transmission will shift to NEUTRAL.
- When in a forward range and the shift is in process, the transmission will return to a previous range, except for 1-2 shifts and 2-1 shifts where the shifts will be completed.
- When in NEUTRAL or REVERSE, the transmission will fail to NEUTRAL.
- While diagnostic response is active, the shift selector is moved from a forward range to NEUTRAL or from a forward range to REVERSE, the transmission will shift to NEUTRAL.
- DTC P0756 is stored in TCM history.
- The TCM freezes shift adapts.
- The TCM inhibits torque converter clutch (TCC) engagement.

Conditions for Clearing the DTC

A scan tool can clear the code from TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

- Inspect the wiring for poor electrical connections at the TCM. Inspect for the following conditions:
  – A bent terminal
  – A backed-out terminal

– A damaged terminal
– Poor terminal tension
– A chafed wire
– A broken wire inside the insulation

- When diagnosing for an intermittent short or open, massage the wiring harness while watching the test equipment for a change.
- You may have to drive the vehicle in order to experience a condition.
- This DTC may indicate that SS2 is mechanically defective or the shift valve is stuck in the destroked state.
- When DTC P0756 and P0848 are set in combination, this may indicate an open circuit condition is present at the pressure switch circuit or the shift valve is stuck in the destroked position.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

5. This step tests the TCM response function.
6. This step tests the transmission wiring harness integrity.
7. This step tests and evaluates the internal wiring harness.
8. This step tests the PSM for a failed condition.

DTC P0756			
Step	**Action**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics			
1	Did you perform the Diagnostic System Check - Vehicle?	Go to Step 2	Go to Diagnostic System Check - Vehicle

DTC P0756			
Step	**Action**	**Yes**	**No**
2	Measure the transmission fluid level. Refer to Transmission Fluid Checking . Is the transmission fluid level correct?	Go to Step 3	Go to Transmission Fluid Checking
3	Measure line pressure. Refer to Line Pressure Check . Is the pressure within the specified value?	Go to Step 4	Go to Symptoms - Automatic Transmission
4	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** ***Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.*** 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Start the engine. 6. Using the scan tool, monitor PS2 status. Does the scan tool indicate PS2 status is LOW?	Go to Diagnostic Aids	Go to Step 5
5	1. Turn the ignition OFF. 2. Disconnect the 80-way connector at the TCM. 3. Install the J 39700 breakout box, the J-47275 breakout box adapter and the J 47275-1 magnetic overlay. 4. Turn ON the ignition, with the engine OFF. 5. Connect terminal 79 to ground. Does the scan tool indicate PS2 status is LOW when grounded and HIGH when open?	Go to Step 6	Go to Step 15

DTC P0756			
Step	**Action**	**Yes**	**No**
6	1. Turn the ignition OFF. 2. Disconnect the AT inline 20-way connector. Additional DTCs may set. 3. Install the J 44152 jumper harness (20 pins) on the engine side of the AT inline 20-way connector. 4. Turn ON the ignition, with the engine OFF. 5. Using the J 35616 GM terminal test kit and a fused jumper wire, connect terminal F of the J 44152 to ground. Refer to Automatic Transmission Inline Harness Connector End View. Does the scan tool indicate PS2 status is LOW when grounded and HIGH when open?	Go to Step 7	Go to Step 14
7	1. Connect the transmission AT inline 20-way connector. 2. Remove the transmission oil pan. Refer to Oil Pan Replacement . 3. Disconnect the AT internal wiring harness from the PSM and ground terminal B. Does the scan tool indicate PS2 status is LOW when grounded and HIGH when open?	Go to Step 8	Go to Step 13
8	1. Remove the PSM from the control valve body and leave the internal harness connected. Refer to Pressure Switch Manifold Replacement . 2. Provide a ground connection for the PSM to either the control valve body or the transmission main case. 3. Using the eraser end of a pencil, push gently on the PS2 membrane. Does the scan tool indicate PS2 status is LOW when depressed and HIGH when open?	Go to Step 9	Go to Step 12
9	Remove the control valve body and inspect for a stuck or sticking SS2. Refer to Control Valve Body Disassemble . Was the SS2 stuck or sticking?	Go to Step 11	Go to Step 10
10	Replace the SS2 and install the control valve body. Refer to Control Valve Body Replacement . Did you replace the solenoid and install the valve body?	Go to Step 16	—
11	Clean and inspect the related valves, bores and the valve body for debris or contamination. Refer to Control Valve Body Cleaning and Inspection . Did you complete the repair?	Go to Step 16	—

DTC P0756			
Step	**Action**	**Yes**	**No**
12	Replace the PSM. Refer to Pressure Switch Manifold Replacement . Did you complete the replacement?	Go to Step 16	—
13	Replace the AT internal wiring harness. Refer to Wiring Harness Replacement . Did you complete the replacement?	Go to Step 16	—
14	Test the PS2 circuit between the TCM and AT inline 20-way connector for an open or short condition. Refer to Circuit Testing . Did you find and correct the condition?	Go to Step 16	—
15	**IMPORTANT:** ***Prior to replacing the TCM, swap the TCM with a known good TCM. In most cases, the TCM is not at fault. Investigate thoroughly before replacing the TCM.*** Replace the TCM. Refer to Control Module References for replacement, setup, and programming. Did you complete the replacement?	Go to Step 16	—
16	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Start the engine. 3. Using the scan tool, monitor the PS2 status. 4. Select Specific DTC. 5. Enter DTC P0756. Has the test run and passed?	Go to Step 17	Go to Step 2
17	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P0757

Circuit Description

The pressure switch manifold (PSM) is a multiple-switch assembly made up of 3 normally open (N/O) and 1 normally closed (N/C) pressure switches. The pressure switch 2 (PS2) monitors shift solenoid valve 2 (SS2) positioning and relays it to the transmission control module (TCM). When PS2 is in the open state, SS2 should be in the destroked position.

DTC P0757 is a type A DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P0757 Shift Solenoid (SS) 2 Valve Performance - Stuck On

Conditions for Running the DTC

- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.
- Engine speed is greater than 200 RPM and less than 7,500 RPM for 5 seconds.
- SS2 is commanded to the OFF, destroked, position.

Conditions for Setting the DTC

DTC P0757 sets when SS2 is commanded OFF and PS2 status remains ON for 2-16 seconds, depending on fluid temperature.

Action Taken When the DTC Sets

- The TCM illuminates the malfunction indicator lamp (MIL).
- When in a forward range and shifting is completed, the transmission will fail to another forward range, unless the transmission is compromised by overspeeding or direction change, then the transmission will shift to NEUTRAL.
- When in a forward range and the shift is in process, the transmission will return to a previous range, except for 1-2 shifts and 2-1 shifts which will be completed.
- When in NEUTRAL or REVERSE, the transmission will fail to NEUTRAL.
- While diagnostic response is active, the shift selector is moved from a forward range to NEUTRAL or from a forward range to REVERSE, the transmission will shift to NEUTRAL.
- DTC P0757 is stored in TCM history.
- The TCM freezes shift adapts.
- The TCM inhibits torque converter clutch (TCC) engagement.

Conditions for Clearing the DTC

A scan tool can clear the code from TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

- Inspect the wiring for poor electrical connections at the TCM. Inspect for the following conditions:
  – A bent terminal
  – A backed-out terminal
  – A damaged terminal

– Poor terminal tension
– A chafed wire
– A broken wire inside the insulation

- When diagnosing for an intermittent short or open, massage the wiring harness while watching the test equipment for a change.
- You may have to drive the vehicle in order to experience a condition.
- This DTC may indicate that SS2 is mechanically defective or the shift valve is stuck in the stroked state.
- When DTC P0757 and P0847 are set in combination, this may indicate a short to ground is present at the pressure switch circuit or the shift valve is stuck in the stroked state.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

5. This step tests the TCM response function.
6. This step tests the transmission wiring harness integrity.
7. This step tests and evaluates the internal wiring harness.
8. This step tests the PSM for a failed condition.

DTC P0757			
Step	**Action**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics			
1	Did you perform the Diagnostic System Check - Vehicle?	Go to Step 2	Go to Diagnostic System Check - Vehicle

DTC P0757			
Step	**Action**	**Yes**	**No**
2	Measure the transmission fluid level. Refer to Transmission Fluid Checking . Is the transmission fluid level correct?	Go to Step 3	Go to Transmission Fluid Checking
3	Measure line pressure. Refer to Line Pressure Check . Is the pressure within the specified value?	Go to Step 4	Go to Symptoms - Automatic Transmission
4	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** *Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.* 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Start the engine. 6. Using the scan tool, monitor PS2 status. Does the scan tool indicate PS2 status is LOW?	Go to Diagnostic Aids	Go to Step 5
5	1. Turn the ignition OFF. 2. Disconnect the 80-way connector at the TCM. 3. Install the J 39700 breakout box, the J-47275 breakout box adapter and the J 47275-1 magnetic overlay. 4. Turn ON the ignition, with the engine OFF. 5. Connect terminal 79 to ground. Does the scan tool indicate PS2 status is LOW when grounded and HIGH when open?	Go to Step 6	Go to Step 15

DTC P0757			
Step	**Action**	**Yes**	**No**
6	1. Turn the ignition OFF. 2. Disconnect the AT inline 20-way connector. Additional DTCs may set. 3. Install the J 44152 jumper harness (20 pins) on the engine side of the AT inline 20-way connector. 4. Turn ON the ignition, with the engine OFF. 5. Using the J 35616 GM terminal test kit and a fused jumper wire, connect terminal F of the J 44152 to ground. Refer to Automatic Transmission Inline Harness Connector End View. Does the scan tool indicate PS2 status is LOW when grounded and HIGH when open?	Go to Step 7	Go to Step 14
7	1. Connect the AT inline 20-way connector. 2. Remove the transmission oil pan. Refer to Oil Pan Replacement. 3. Disconnect the AT internal wiring harness from the PSM and ground terminal B. Does the scan tool indicate PS2 status is LOW when grounded and HIGH when open?	Go to Step 8	Go to Step 13
8	1. Remove the PSM from the control valve body and leave the internal harness connected. Refer to Pressure Switch Manifold Replacement . 2. Provide a ground connection for the PSM to either the control valve body or the transmission main case. 3. Using the eraser end of a pencil, push gently on the PS2 membrane. Does the scan tool indicate PS2 status is LOW when grounded and HIGH when open?	Go to Step 9	Go to Step 12
9	Remove the control valve body and inspect for a stuck or sticking SS2. Refer to Control Valve Body Disassemble . Was the SS2 stuck or sticking?	Go to Step 11	Go to Step 10
10	Replace the SS2 and install the control valve body. Refer to Control Valve Body Replacement . Did you replace the solenoid and install the valve body?	Go to Step 16	—
11	Clean and/or polish the sticking valve in order to restore free movement or replace the control valve body assembly. Refer to Control Valve Body Cleaning and Inspection . Was free movement restored or the valve body replaced?	Go to Step 16	—

DTC P0757			
Step	**Action**	**Yes**	**No**
12	Replace the PSM. Refer to Pressure Switch Manifold Replacement . Did you complete the replacement?	Go to Step 16	—
13	Replace the AT internal wiring harness. Refer to Wiring Harness Replacement . Did you complete the replacement?	Go to Step 16	—
14	Test the PS2 circuit between the TCM and AT inline 20-way connector for an open or short condition. Refer to Circuit Testing . Did you find and correct the condition?	Go to Step 16	—
15	**IMPORTANT:** ***Prior to replacing the TCM, swap the TCM with a known good TCM. In most cases, the TCM is not at fault. Investigate thoroughly before replacing the TCM.*** Replace the TCM. Refer to Control Module References for replacement, setup, and programming. Did you complete the replacement?	Go to Step 16	—
16	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Start the engine. 3. Using the scan tool, monitor the PS2 status. 4. Select Specific DTC. 5. Enter DTC P0757. Has the test run and passed?	Go to Step 17	Go to Step 2
17	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P0761

Circuit Description

The pressure switch manifold (PSM) is a multiple-switch assembly made up of 3 normally open (N/O) and 1 normally closed (N/C) pressure switches. The pressure switch 3 (PS3) monitors shift solenoid valve 3 (SS3) positioning and relays it to the transmission control module (TCM). When PS3 is in the open state, SS3 should be in the destroked position.

DTC P0761 is a type A DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P0761 Shift Solenoid (SS) 3 Valve Performance - Stuck Off

Conditions for Running the DTC

- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.
- Engine speed is greater than 200 RPM and less than 7,500 RPM for 5 seconds.
- SS3 is commanded to the ON, stroked, position.

Conditions for Setting the DTC

DTC P0761 sets when SS3 is commanded ON and PS3 status remains OFF for 5 seconds, depending on fluid temperature.

Action Taken When the DTC Sets

- The TCM illuminates the malfunction indicator lamp (MIL).
- When in a forward range and shifting is completed, the transmission will fail to another forward range, unless the transmission is compromised by overspeeding or direction change, then the transmission will shift to NEUTRAL.
- When in a forward range and the shift is in process, the transmission will return to a previous range, except for 1-2 shifts and 2-1 shifts where the shifts will be completed.
- When in NEUTRAL or REVERSE, the transmission will fail to NEUTRAL.
- While diagnostic response is active, the shift selector is moved from a forward range to NEUTRAL or from a forward range to REVERSE, the transmission will shift to NEUTRAL.
- DTC P0761 is stored in TCM history.
- The TCM freezes shift adapts.
- The TCM inhibits torque converter clutch (TCC) engagement.

Conditions for Clearing the DTC

A scan tool can clear the code from TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

- Inspect the wiring for poor electrical connections at the TCM. Inspect for the following conditions:
  – A bent terminal
  – A backed-out terminal
  – A damaged terminal

– Poor terminal tension
– A chafed wire
– A broken wire inside the insulation

- When diagnosing for an intermittent short or open, massage the wiring harness while watching the test equipment for a change.
- You may have to drive the vehicle in order to experience a condition.
- This DTC may indicate that SS3 is mechanically defective or the shift valve is stuck in the destroked state.
- When DTC P0761 and P0873 are set in combination, this may indicate an open circuit condition is present at the pressure switch circuit or the shift valve is stuck in the destroked position.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

5. This step tests the TCM response function.
6. This step tests the transmission wiring harness integrity.
7. This step tests and evaluates the internal wiring harness.
8. This step tests the PSM for a failed condition.

DTC P0761			
Step	**Action**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics			
1	Did you perform the Diagnostic System Check - Vehicle?	Go to Step 2	Go to Diagnostic System Check - Vehicle

DTC P0761			
Step	**Action**	**Yes**	**No**
2	Measure the transmission fluid level. Refer to Transmission Fluid Checking . Is the transmission fluid level correct?	Go to Step 3	Go to Transmission Fluid Checking
3	Measure line pressure. Refer to Line Pressure Check . Is the pressure within the specified value?	Go to Step 4	Go to Symptoms - Automatic Transmission
4	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** ***Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.*** 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Start the engine. 6. Using the scan tool, monitor PS3 status. Does the scan tool indicate PS3 status is LOW?	Go to Diagnostic Aids	Go to Step 5
5	1. Turn the ignition OFF. 2. Disconnect the 80-way connector at the TCM. 3. Install the J 39700 breakout box, the J-47275 breakout box adapter and the J 47275-1 magnetic overlay. 4. Turn ON the ignition, with the engine OFF. 5. Connect terminal 57 to ground. Does the scan tool indicate PS3 status is LOW when grounded and HIGH when open?	Go to Step 6	Go to Step 15

DTC P0761			
Step	**Action**	**Yes**	**No**
6	1. Turn the ignition OFF. 2. Disconnect the AT inline 20-way connector. Additional DTCs may set. 3. Install the J 44152 jumper harness (20 pins) on the engine side of the AT inline 20-way connector. 4. Turn ON the ignition, with the engine OFF. 5. Using the J 35616 GM terminal test kit and a fused jumper wire, connect terminal E of the J 44152 to ground. Refer to Automatic Transmission Inline Harness Connector End View . Does the scan tool indicate PS3 status is LOW when grounded and HIGH when open?	Go to Step 7	Go to Step 14
7	1. Connect the AT inline 20-way connector. 2. Remove the transmission oil pan. Refer to Oil Pan Replacement. 3. Disconnect the AT internal wiring harness from the PSM and ground terminal C. Does the scan tool indicate PS3 status is LOW when grounded and HIGH when open?	Go to Step 8	Go to Step 13
8	1. Remove the PSM from the control valve body and leave the internal harness connected. Refer to Pressure Switch Manifold Replacement. 2. Provide a ground connection for the PSM to either the control valve body or the transmission main case. 3. Using the eraser end of a pencil, push gently on the PS3 membrane. Does the scan tool indicate PS3 status is LOW when depressed and HIGH when open?	Go to Step 9	Go to Step 12
9	Remove the control valve body and inspect for a stuck or sticking SS3. Refer to Control Valve Body Disassemble . Was the SS3 stuck or sticking?	Go to Step 11	Go to Step 10
10	Replace the SS3 and install the control valve body. Refer to Control Valve Body Replacement . Did you replace the solenoid and install the valve body?	Go to Step 16	—
11	Clean and inspect the related valves, bores and the valve body for debris or contamination. Refer to Control Valve Body Cleaning and Inspection . Did you complete the repair?	Go to Step 16	—

DTC P0761			
Step	**Action**	**Yes**	**No**
12	Replace the PSM. Refer to Pressure Switch Manifold Replacement . Did you complete the replacement?	Go to Step 16	—
13	Replace the AT internal wiring harness. Refer to Wiring Harness Replacement . Did you complete the replacement?	Go to Step 16	—
14	Test the PS3 circuit between the TCM and AT inline 20-way connector for an open or short condition. Refer to Circuit Testing . Did you find and correct the condition?	Go to Step 16	—
15	**IMPORTANT:** *Prior to replacing the TCM, swap the TCM with a known good TCM. In most cases, the TCM is not at fault. Investigate thoroughly before replacing the TCM.* Replace the TCM. Refer to Control Module References for replacement, setup, and programming. Did you complete the replacement?	Go to Step 16	—
16	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Start the engine. 3. Using the scan tool, monitor the PS3 status. 4. Select Specific DTC. 5. Enter DTC P0761. Has the test run and passed?	Go to Step 17	Go to Step 2
17	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P0762

Circuit Description

The pressure switch manifold (PSM) is a multiple-switch assembly made up of 3 normally open (N/O) and 1 normally closed (N/C) pressure switches. The pressure switch 3 (PS3) monitors shift solenoid valve 3 (SS3) positioning and relays it to the transmission control module (TCM). When PS3 is in the open state, SS3 should be in the destroked position.

DTC P0762 is a type A DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P0762 Shift Solenoid (SS) 3 Valve Performance - Stuck On

Conditions for Running the DTC

- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.
- Engine speed is greater than 200 RPM and less than 7,500 RPM for 5 seconds.
- SS3 is commanded to the OFF, destroked, position.

Conditions for Setting the DTC

DTC P0762 sets when SS3 is commanded OFF and PS3 status remains ON for 2-16 seconds, depending on fluid temperature.

Action Taken When the DTC Sets

- The TCM illuminates the malfunction indicator lamp (MIL).
- When in a forward range and shifting is completed, the transmission will fail to another forward range, unless the transmission is compromised by overspeeding or direction change, then the transmission will shift to NEUTRAL.
- When in a forward range and the shift is in process, the transmission will return to a previous range, except for 1-2 shifts and 2-1 shifts which will be completed.
- When in NEUTRAL or REVERSE, the transmission will fail to NEUTRAL.
- While diagnostic response is active, the shift selector is moved from a forward range to NEUTRAL or from a forward range to REVERSE, the transmission will shift to NEUTRAL.
- DTC P0762 is stored in TCM history.
- The TCM freezes shift adapts.
- The TCM inhibits torque converter clutch (TCC) engagement.

Conditions for Clearing the DTC

A scan tool can clear the code from TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

- Inspect the wiring for poor electrical connections at the TCM. Inspect for the following conditions:
  – A bent terminal
  – A backed-out terminal
  – A damaged terminal

– Poor terminal tension
– A chafed wire
– A broken wire inside the insulation

- When diagnosing for an intermittent short or open, massage the wiring harness while watching the test equipment for a change.
- You may have to drive the vehicle in order to experience a condition.
- This DTC may indicate that SS3 is mechanically defective or the shift valve is stuck in the stroked state.
- When DTC P0762 and P0872 are set in combination, this may indicate a short to ground is present at the pressure switch circuit or the shift valve is stuck in the stroked state.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

5. This step tests the TCM response function.
6. This step tests the transmission wiring harness integrity.
7. This step tests and evaluates the internal wiring harness.
8. This step tests the PSM for a failed condition.

DTC P0762			
Step	**Action**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics			
1	Did you perform the Diagnostic System Check - Vehicle?	Go to Step 2	Go to Diagnostic System Check - Vehicle

DTC P0762			
Step	**Action**	**Yes**	**No**
2	Measure the transmission fluid level. Refer to Transmission Fluid Checking . Is the transmission fluid level correct?	Go to Step 3	Go to Transmission Fluid Checking
3	Measure line pressure. Refer to Line Pressure Check . Is the pressure within the specified value?	Go to Step 4	Go to Symptoms - Automatic Transmission
4	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** *Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.* 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Start the engine. 6. Using the scan tool, monitor PS3 status. Does the scan tool indicate PS3 status is ON?	Go to Diagnostic Aids	Go to Step 5
5	1. Turn the ignition OFF. 2. Disconnect the AT inline 20-way connector. Additional DTCs may set. 3. Install the J 44152 jumper harness (20 pins) on the engine side of the AT inline 20-way connector. 4. Turn ON the ignition, with the engine OFF. 5. Using the J 35616 GM terminal test kit and a fused jumper wire, connect terminal E of the J 44152 to ground. Refer to Automatic Transmission Inline Harness Connector End View . Does the scan tool indicate PS3 status is LOW when grounded and HIGH when open?	Go to Step 6	Go to Step 14

DTC P0762			
Step	**Action**	**Yes**	**No**
6	1. Turn the ignition OFF. 2. Disconnect the 80-way connector at the TCM. 3. Install the J 39700 breakout box, the J-47275 breakout box adapter and the J 47275-1 magnetic overlay. 4. Turn ON the ignition, with the engine OFF. 5. Connect terminal 57 to a known good ground. Does the scan tool indicate PS3 status is LOW when grounded and HIGH when open?	Go to Step 7	Go to Step 15
7	1. Connect the AT inline 20-way connector. 2. Remove the transmission oil pan. Refer to Oil Pan Replacement. 3. Disconnect the AT internal wiring harness from the PSM and ground terminal C. Does the scan tool indicate PS3 status is LOW when grounded and HIGH when open?	Go to Step 8	Go to Step 13
8	1. Remove the PSM from the control valve body and leave the internal harness connected. Refer to Pressure Switch Manifold Replacement. 2. Provide a ground connection for the PSM to either the control valve body or the transmission main case. 3. Using the eraser end of a pencil, push gently on the PS3 membrane. Does the scan tool indicate PS3 status is LOW when depressed and HIGH when open?	Go to Step 9	Go to Step 12
9	Remove the control valve body and inspect for a stuck or sticking SS3. Refer to Control Valve Body Disassemble . Was the SS3 stuck or sticking?	Go to Step 11	Go to Step 10
10	Replace the SS3 and install the control valve body. Refer to Control Valve Body Replacement . Did you replace the solenoid and install the valve body?	Go to Step 16	—
11	Clean and/or polish the sticking valve in order to restore free movement or replace the control valve body assembly. Refer to Control Valve Body Cleaning and Inspection. Did you restore free movement or replace the valve body?	Go to Step 16	—

DTC P0762			
Step	**Action**	**Yes**	**No**
12	Replace the PSM. Refer to Pressure Switch Manifold Replacement . Did you complete the replacement?	Go to Step 16	—
13	Replace the AT internal wiring harness. Refer to Wiring Harness Replacement . Did you complete the replacement?	Go to Step 16	—
14	Test the PS3 circuit between the TCM and AT inline 20-way connector for an open or short condition. Refer to Circuit Testing . Did you find and correct the condition?	Go to Step 16	—
15	**IMPORTANT:** *Prior to replacing the TCM, swap the TCM with a known good TCM. In most cases, the TCM is not at fault. Investigate thoroughly before replacing the TCM.* Replace the TCM. Refer to Control Module References for replacement, setup, and programming. Did you complete the replacement?	Go to Step 16	—
16	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Start the engine. 3. Using the scan tool, monitor the PS3 status. 4. Select Specific DTC. 5. Enter DTC P0762. Has the test run and passed?	Go to Step 17	Go to Step 2
17	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P0776

Circuit Description

Pressure control solenoid 2 (PCS2) is used to control on-coming, off-going, and holding pressure in any 1 of 5 clutches. This solenoid is referred to as a pressure proportional to current (PPC) solenoid since the output hydraulic pressure supplied by this solenoid is proportional to the controlled current command.

The transmission control module (TCM) uses information from the turbine and output speed sensors (OSS) to detect if a clutch is slipping. The clutch being controlled by PCS2 will vary, depending on the shift that was being completed.

DTC P0776 is a type A DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P0776 Pressure Control Solenoid 2 (PCS2) Stuck Off

Conditions for Running the DTC

- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.
- Turbine speed is greater than 60 RPM.
- Output speed is greater than 125 RPM.
- The transmission is at normal operating temperature.

Conditions for Setting the DTC

DTC P0776 sets when the TCM detects an incorrect oncoming ratio, during a forward range shift, for an accumulated number of occurrences.

Action Taken When the DTC Sets

- The TCM illuminates the malfunction indicator lamp (MIL).
- When failure occurs in a forward range, the transmission will go to the previous range. If failure occurs in NEUTRAL or REVERSE, the transmission will lock in NEUTRAL while diagnostic response is active.
- If the shift selector is moved to NEUTRAL, the transmission will shift to NEUTRAL and in some cases, may lock in NEUTRAL.
- If the shift selector is moved to REVERSE, the transmission will shift to REVERSE or NEUTRAL.
- If the shift selector is returned to a forward range and the transmission is compromised by overspeeding or direction change, the transmission will shift to NEUTRAL.
- DTC P0776 is stored in TCM history.
- The TCM freezes shift adapts.
- The TCM inhibits torque converter clutch (TCC) engagement.

Conditions for Clearing the DTC

A scan tool can clear the code from TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

- Inspect the wiring for poor electrical connections at the

TCM. Inspect for the following conditions:
– A bent terminal
– A backed-out terminal
– A damaged terminal
– Poor terminal tension
– A chafed wire
– A broken wire inside the insulation

- When diagnosing for an intermittent short or open, massage the wiring harness while watching the test equipment for a change.
- You may have to drive the vehicle in order to experience a condition.
- This DTC indicates the on-coming clutch being controlled by PCS2 is not applied or applied too slowly. This could indicate a leak or obstruction in a specific clutch apply circuit. Observe scan tool failure record data for previous or current range information when the DTC was set, in order to determine the specific shift when the DTC was set. Refer to Solenoid and Clutch Chart to determine which clutch circuit is suspect.

IMPORTANT:
Clutch failure due to installation of an engine power upgrade is not covered under the transmission manufacturers warranty.

Inspect for the presence of an add-on engine power package. When engine horsepower or torque is increased over factory rating, a shift flare condition may occur.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

3. This step tests for proper ignition voltage.
4. This step tests for erratic speed sensor readings.
5. This step tests for internal hydraulic leakage.
6. This step tests for clutch capacity.

DTC P0776				
Step	**Action**	**Value**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics				
1	Did you perform the Diagnostic System Check - Vehicle?	—	Go to Step 2	Go to Diagnostic System Check - Vehicle
2	Measure the transmission fluid level. Refer to Transmission Fluid Checking . Is the transmission fluid level correct?	—	Go to Step 3	Go to Transmission Fluid Checking
3	1. Install the scan tool. 2. Start the engine. **IMPORTANT:** *Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.* 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Using the scan tool, measure ignition voltage. Is the voltage within the specified range?	9-18 V	Go to Step 4	Go to DTC P0562 for low voltage or DTC P0563 for high voltage
4	1. Start the engine. 2. Drive the vehicle under normal operating conditions. 3. Using the scan tool, monitor engine, turbine and OSS readings. Is the speed sensor data erratic?	—	Go to the appropriate speed sensor DTC	Go to Step 5
5	1. Connect a 2 000 kPa (300 psi) pressure gage to the line pressure tap. Refer to Line Pressure Check Procedure . 2. Using the scan tool in clutch test mode, cycle through all transmission ranges with the engine at idle and vehicle brakes applied. Record line pressure in each range. Was the line pressure low in a specific range or in ranges where the same clutch was applied?	—	Go to Low Main Line Pressure in All Ranges	Go to Step 6

DTC P0776				
Step	**Action**	**Value**	**Yes**	**No**
6	Refer to Transmission Stall Test Notice . Conduct a clutch test for all forward ranges. Refer to Clutch Test . Did turbine speed remain at zero in all ranges?	—	Go to Diagnostic Aids	Go to Step 7
7	1. Remove the transmission oil pan. Refer to Automatic Transmission Fluid/Filter Replacement . 2. Inspect for signs of clutch failure. Are there signs of clutch failure?	—	Go to Step 8	Go to Step 9
8	Remove the transmission for overhaul or replacement. Refer to Transmission Replacement . Did you complete the repair or replacement?	—	Go to Step 11	—
9	Inspect for a stuck or sticking PCS2 valve. Refer to Control Valve Body Cleaning and Inspection . Did you find and correct a condition?	—	Go to Step 11	Go to Step 10
10	Replace PSC2. Refer to Control Valve Solenoid Replacement . Did you complete the replacement?	—	Go to Step 11	—
11	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Start the engine. 3. Use the scan tool to reset adaptive values for all shifts. 4. Operate the vehicle in all ranges under normal driving conditions. 5. Select Specific DTC. 6. Enter DTC P0776. Has the test run and passed?	—	Go to Step 12	Go to Step 2
12	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	—	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P0777

Circuit Description

Pressure control solenoid 2 (PCS2) is used to control on-coming, off-going, and holding pressure to any 1 of the 5 clutches. This solenoid is referred to as a pressure proportional to current (PPC) solenoid since the output hydraulic pressure supplied by this solenoid is proportional to the controlled current command.

The transmission control module (TCM) uses information from the turbine and output speed sensors (OSS) to detect if a clutch is in a tie-up condition or 3 clutches are applied. The clutch being controlled by PCS2 will vary, depending on the shift being made.

DTC P0777 is a type A DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P0777 Pressure Control Solenoid 2 (PCS2) Stuck On

Conditions for Running the DTC

- DTCs P0716, P0717, P0721, P0722, P0875, and P0876 are not active.
- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.
- Output speed is greater than 200 RPM.
- Turbine speed is greater than 200 RPM.

Conditions for Setting the DTC

DTC P0777 sets when the TCM detects the off-going clutch, controlled by PCS2, remains engaged during a forward range shift.

Action Taken When the DTC Sets

- The TCM illuminates the malfunction indicator lamp (MIL).
- When failure occurs in a forward range, the transmission will go to the previous range. If failure occurs in NEUTRAL or REVERSE, the transmission will lock in NEUTRAL while diagnostic response is active.
- If the shift selector is moved to NEUTRAL, the transmission will shift to NEUTRAL.
- If the shift selector is moved to REVERSE, the transmission will shift to REVERSE or NEUTRAL or in some cases may lock in NEUTRAL.
- If the shift selector is returned to a forward range and the transmission is compromised by overspeeding or direction change, the transmission will shift to NEUTRAL.
- DTC P0777 is stored in TCM history.
- The TCM freezes shift adapts.
- The TCM inhibits torque converter clutch (TCC) engagement.

Conditions for Clearing the DTC

A scan tool can clear the code from TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

- Inspect the wiring for poor electrical connections at the

TCM. Inspect for the following conditions:
- – A bent terminal
- – A backed-out terminal
- – A damaged terminal
- – Poor terminal tension
- – A chafed wire
- – A broken wire inside the insulation

- When diagnosing for an intermittent short or open, massage the wiring harness while watching the test equipment for a change.
- You may have to drive the vehicle in order to experience a condition.
- This DTC indicates the off-going clutch, being controlled by PCS2, is not releasing or is slow to release. This could indicate a leak or obstruction in a specific clutch apply circuit. Observe scan tool failure record data for previous or current range information when the DTC was set, to determine the specific shift when the DTC was set. Refer to the Solenoid and Clutch Chart to determine which clutch circuit is suspect.

IMPORTANT:
Clutch failure due to installation of an engine power upgrade is not covered under the transmission manufacturers warranty.

Inspect for the presence of an add-on engine power package. When engine horsepower or torque is increased over factory rating, a shift flare condition may occur.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

3. This step tests for proper ignition voltage.
4. This step tests for erratic speed sensor readings or signal dropout.
5. This step tests for internal hydraulic leakage.
6. This step tests for clutch capacity.

DTC P0777				
Step	**Action**	**Value**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics				
1	Did you perform the Diagnostic System Check - Vehicle?	—	Go to Step 2	Go to Diagnostic System Check - Vehicle
2	Measure the transmission fluid level. Refer to Transmission Fluid Checking . Is the transmission fluid level correct?		Go to Step 3	Go to Transmission Fluid Checking
3	1. Install the scan tool. 2. Start the engine. **IMPORTANT:** *Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.* 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Using the scan tool, measure ignition voltage. Is the voltage within the specified range?	9-18 V	Go to Step 4	Go to DTC P0562 for low voltage or DTC P0563 for high voltage
4	1. Start the engine. 2. Drive the vehicle under normal operating conditions. 3. Using the scan tool, monitor engine, turbine and OSS readings. Is speed sensor data erratic?	—	Go to the appropriate speed sensor DTC	Go to Step 5
5	1. Connect a 2 000 kPa (300 psi) pressure gage to the line pressure tap. Refer to Line Pressure Check Procedure. 2. Using the scan tool in clutch test mode, cycle through all transmission ranges with the engine at idle and vehicle brakes applied. Record line pressure in each range. Was the line pressure low in a specific range or in ranges where the same clutch was applied?	—	Go to Low Main Line Pressure in All Ranges	Go to Step 6

DTC P0777				
Step	**Action**	**Value**	**Yes**	**No**
6	Refer to Transmission Stall Test Notice . Conduct a clutch test for all forward ranges. Refer to Clutch Test . Did turbine speed remain at zero in all ranges?	—	Go to Diagnostic Aids	Go to Step 7
7	1. Remove the transmission oil pan. Refer to Automatic Transmission Fluid/Filter Replacement . 2. Inspect for signs of clutch failure. Are there signs of clutch failure?	—	Go to Step 8	Go to Step 9
8	Remove the transmission for overhaul or replacement. Refer to Transmission Replacement . Did you complete the repair or replacement?	—	Go to Step 11	—
9	Inspect for a stuck or sticking PCS2 valve. Refer to Control Valve Body Cleaning and Inspection . Did you find and correct a condition?	—	Go to Step 11	Go to Step 10
10	Replace PSC2. Refer to Control Valve Solenoid Replacement . Did you complete the replacement?	—	Go to Step 11	—
11	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Start the engine. 3. Use the scan tool to reset adaptive values for all shifts. 4. Operate the vehicle in all ranges under normal driving conditions. 5. Select Specific DTC. 6. Enter DTC P0777. Has the test run and passed?	—	Go to Step 12	Go to Step 2
12	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	—	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P0826

Circuit Description

The transmission adaptive pressure (TAP) up/down shift system allows the driver to manually shift gears by using the TAP shift switch located on the automatic transmission shift lever. Pushing the switch forward will command an upshift and pushing the switch rearward will command a downshift. The TAP shift system is activated when the gear selector is in the manual (M) position.

DTC P0826 is a type B DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P0826 TAP Up and Down Shift Switch Circuit

Conditions for Running the DTC

- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.
- The engine, input, speed is greater than 200 RPM and less than 7,500 RPM for 5 seconds.
- The output speed is greater than 200 RPM.
- Driver shift request is commanded.

Conditions for Setting the DTC

DTC P0826 sets when the transmission control module (TCM) detects an open condition in the TAP up/down shift switch circuit for greater than 6 seconds when driver shift request is commanded.

Action Taken When the DTC Sets

- The TCM illuminates the malfunction indicator lamp (MIL) during the second consecutive trip in which the Conditions for Setting the DTC are met.
- DTC P0826 is stored in TCM history.
- The TCM disables driver shift request operations.

Conditions for Clearing the DTC

A scan tool can clear the code from TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

- Inspect the wiring for poor electrical connections at the TCM. Inspect for the following conditions:
  – A bent terminal
  – A backed-out terminal
  – A damaged terminal
  – Poor terminal tension
  – A chafed wire
  – A broken wire inside the insulation
- When diagnosing for an intermittent short or open, massage the wiring harness while watching the test equipment for a change.
- You may have to drive the vehicle in order to experience a condition.

Test Description

The numbers below refer to the step numbers on the

diagnostic table.

3. This step tests signal voltage to the TCM.
4. This step tests supply voltage to the driver shift request switch.
5. This step tests resistance of the driver shift request switch.

DTC P0826				
Step	**Action**	**Value**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics				
1	Did you perform the Diagnostic System Check - Vehicle?	—	Go to Step 2	Go to Diagnostic System Check - Vehicle
2	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** *Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.* 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Using the scan tool, measure ignition voltage. Is the voltage within the specified range?	9-18 V	Go to Step 3	Go to DTC P0562 for low voltage or DTC P0563 for high voltage
3	1. Turn the ignition OFF. 2. Disconnect the 80-way connector at the TCM. 3. Install the J 39700 breakout box, the J-47275 breakout box adapter and the J 47275-1 magnetic overlay. 4. Turn ON the ignition, with the engine OFF. 5. Using the DMM, measure voltage at terminal 56 and a known good ground. 6. Operate the driver shift request switch in the TAP up and TAP down position. Is the voltage within the specified value?	2.5 V	Go to Diagnostic Aids	Go to Step 4

DTC P0826				
Step	**Action**	**Value**	**Yes**	**No**
4	1. Turn the ignition OFF. 2. Disconnect terminals 20 and 21 at the driver shift request switch. 3. Using the J 35616 GM terminal test kit, connect the DMM to terminal 21 and a known good ground. 4. Turn ON the ignition, with the engine OFF. Is the voltage within the specified range?	11.75-12.75 V	Go to Step 5	Go to Step 6
5	1. Turn the ignition OFF. 2. Using the J 35616 , connect the DMM to terminals 20 and 21 of the driver shift request switch. 3. Operate the driver shift request switch in the Tap up and Tap down position. Is the resistance within the specified value?	OFF: 6.84 K ohms Tap up: 1.87 K ohms Tap down: 3.97 K ohms	Go to Step 7	Go to Step 9
6	**IMPORTANT:** *The condition that affects this circuit may exist in other connecting branches of the circuit. Refer to Power Distribution Schematics for complete circuit distribution.* 1. Inspect the ignition 0 voltage circuit for an open. Refer to Circuit Protection - Fuses . 2. Replace the fuse if necessary. Was the fuse open?	—	Go to Step 11	Go to Step 8
7	Test the signal circuit of the AT driver shift request switch for an open between the AT driver shift request switch and the TCM. Refer to Testing for Continuity and Wiring Repairs . Did you find and correct the condition?	—	Go to Step 11	Go to Step 10
8	Test the ignition 0 voltage circuit of the AT driver shift request switch for an open between the fuse block and the AT driver shift request switch. Refer to Testing for Continuity and Wiring Repairs . Did you find and correct the condition?	—	Go to Step 11	—

DTC P0826				
Step	**Action**	**Value**	**Yes**	**No**
9	Replace the AT driver shift request switch. Refer to Shift Lever Replacement . Did you complete the replacement?	—	Go to Step 11	—
10	**IMPORTANT:** *In most cases, the TCM is not at fault. Investigate thoroughly before replacing the TCM.* Replace the TCM. Refer to Control Module References for replacement, setup, and programming. Did you complete the replacement?	—	Go to Step 11	—
11	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Operate the vehicle while using the driver shift request switch. 3. Select Specific DTC. 4. Enter DTC P0826. Has the test run and passed?	—	Go to Step 12	Go to Step 2
12	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	—	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P0827

Circuit Description

The transmission adaptive pressure (TAP) up/down shift system allows the driver to manually shift gears by using the TAP shift switch located on the automatic transmission shift lever. Pushing the switch forward will command an upshift and pushing the switch rearward will command a downshift. The TAP shift system is activated when the gear selector is in the manual (M) position.

DTC P0827 is a type B DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P0827 TAP Up and Down Shift Switch Circuit Low

Conditions for Running the DTC

- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.
- The engine, input, speed is greater than 200 RPM and less than 7,500 RPM for 5 seconds.
- The output speed is greater than 200 RPM.
- Driver shift request is commanded.

Conditions for Setting the DTC

DTC P0827 sets when the transmission control module (TCM) detects a short to ground condition in the TAP up/down shift switch circuit for greater than 6 seconds when driver shift request is commanded.

Action Taken When the DTC Sets

- The TCM illuminates the malfunction indicator lamp (MIL) during the second consecutive trip in which the Conditions for Setting the DTC are met.
- DTC P0827 is stored in TCM history.
- The TCM disables driver shift request operations.

Conditions for Clearing the DTC

A scan tool can clear the code from TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

- Inspect the wiring for poor electrical connections at the TCM. Inspect for the following conditions:
  – A bent terminal
  – A backed-out terminal
  – A damaged terminal
  – Poor terminal tension
  – A chafed wire
  – A broken wire inside the insulation
- When diagnosing for an intermittent short or open, massage the wiring harness while watching the test equipment for a change.
- You may have to drive the vehicle in order to experience a condition.

Test Description

The numbers below refer to the step numbers on the

diagnostic table.

3. This step tests signal voltage to the TCM.
4. This step tests supply voltage to the driver shift request switch.
5. This step tests resistance of the driver shift request switch.

DTC P0827				
Step	**Action**	**Value**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics				
1	Did you perform the Diagnostic System Check - Vehicle?	—	Go to Step 2	Go to Diagnostic System Check - Vehicle
2	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** *Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.* 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Using the scan tool, measure ignition voltage. Is the voltage within the specified range?	9-18 V	Go to Step 3	Go to DTC P0562 for low voltage or DTC P0563 for high voltage
3	1. Turn the ignition OFF. 2. Disconnect the 80-way connector at the TCM. 3. Install the J 39700 breakout box, the J-47275 breakout box adapter and the J 47275-1 magnetic overlay. 4. Turn ON the ignition, with the engine OFF. 5. Using the DMM, measure voltage at terminal 56 and a known good ground. 6. Operate the driver shift request switch in the TAP up and TAP down position. Is the voltage within the specified value?	2.5 V	Go to Diagnostic Aids	Go to Step 4

DTC P0827				
Step	**Action**	**Value**	**Yes**	**No**
4	1. Turn the ignition OFF. 2. Disconnect terminals 20 and 21 at the driver shift request switch. 3. Using the J 35616 GM terminal test kit, connect the DMM to terminal 21 and a known good ground. 4. Turn ON the ignition, with the engine OFF. Is the voltage within the specified range?	11.75-12.75 V	Go to Step 5	Go to Step 6
5	1. Turn the ignition OFF. 2. Using the J 35616 , connect the DMM to terminals 20 and 21 of the driver shift request switch. 3. Operate the driver shift request switch in the Tap up and Tap down position. Is the resistance within the specified value?	OFF: 6.84 K ohms Tap up: 1.87 K ohms Tap down: 3.97 K ohms	Go to Step 7	Go to Step 9
6	**IMPORTANT:** *The condition that affects this circuit may exist in other connecting branches of the circuit. Refer to Power Distribution Schematics for complete circuit distribution.* 1. Inspect the ignition 0 voltage circuit for an open. Refer to Circuit Protection - Fuses . 2. Replace the fuse if necessary. Was the fuse open?	—	Go to Step 11	Go to Step 7
7	Test the signal circuit of the AT driver shift request switch for a short to ground between the AT driver shift request switch and the TCM. Refer to Testing for Short to Ground and Wiring Repairs. Did you find and correct the condition?	—	Go to Step 11	Go to Step 10
8	Test the ignition 0 voltage circuit of the AT driver shift request switch for a short to ground between the fuse block and the AT driver shift request switch. Refer to Testing for Short to Ground and Wiring Repairs . Did you find and correct the condition?	—	Go to Step 11	—

DTC P0827				
Step	**Action**	**Value**	**Yes**	**No**
9	Replace the AT driver shift request switch. Refer to Shift Lever Replacement . Did you complete the replacement?	—	Go to Step 11	—
10	**IMPORTANT:** *In most cases, the TCM is not at fault. Investigate thoroughly before replacing the TCM.* Replace the TCM. Refer to Control Module References for replacement, setup, and programming. Did you complete the replacement?	—	Go to Step 11	—
11	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Operate the vehicle while using the driver shift request switch. 3. Select Specific DTC. 4. Enter DTC P0827. Has the test run and passed?	—	Go to Step 12	Go to Step 2
12	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	—	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P0828

Circuit Description

The transmission adaptive pressure (TAP) up/down shift system allows the driver to manually shift gears by using the TAP shift switch located on the automatic transmission shift lever. Pushing the switch forward will command an upshift and pushing the switch rearward will command a downshift. The TAP shift system is activated when the gear selector is in the manual (M) position.

DTC P0828 is a type B DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P0828 TAP Up and Down Shift Switch Circuit High

Conditions for Running the DTC

- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.
- The engine, input, speed is greater than 200 RPM and less than 7,500 RPM for 5 seconds.
- The output speed is greater than 200 RPM.
- Driver shift request is commanded.

Conditions for Setting the DTC

DTC P0828 sets when the transmission control module (TCM) detects a short to ground condition in the TAP up/down shift switch circuit for greater than 6 seconds when driver shift request is commanded.

Action Taken When the DTC Sets

- The TCM illuminates the malfunction indicator lamp (MIL) during the second consecutive trip in which the Conditions for Setting the DTC are met.
- DTC P0828 is stored in TCM history.
- The TCM disables driver shift request operations.

Conditions for Clearing the DTC

A scan tool can clear the code from TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

- Inspect the wiring for poor electrical connections at the TCM. Inspect for the following conditions:
  – A bent terminal
  – A backed-out terminal
  – A damaged terminal
  – Poor terminal tension
  – A chafed wire
  – A broken wire inside the insulation
- When diagnosing for an intermittent short or open, massage the wiring harness while watching the test equipment for a change.
- You may have to drive the vehicle in order to experience a condition.

Test Description

The numbers below refer to the step numbers on the

diagnostic table.

3. This step tests signal voltage to the TCM.
4. This step tests supply voltage to the driver shift request switch.
5. This step tests resistance of the driver shift request switch.

DTC P0828				
Step	**Action**	**Value**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics				
1	Did you perform the Diagnostic System Check - Vehicle?	—	Go to Step 2	Go to Diagnostic System Check - Vehicle
2	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** *Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.* 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Using the scan tool, measure ignition voltage. Is the voltage within the specified range?	9-18 V	Go to Step 3	Go to DTC P0562 for low voltage or DTC P0563 for high voltage
3	1. Turn the ignition OFF. 2. Disconnect the 80-way connector at the TCM. 3. Install the J 39700 breakout box, the J-47275 breakout box adapter and the J 47275-1 magnetic overlay. 4. Turn ON the ignition, with the engine OFF. 5. Using the DMM, measure voltage at terminal 56 and a known good ground. 6. Operate the driver shift request switch in the TAP up and TAP down position. Is the voltage within the specified value?	2.5 V	Go to Diagnostic Aids	Go to Step 4

DTC P0828				
Step	**Action**	**Value**	**Yes**	**No**
4	1. Turn the ignition OFF. 2. Disconnect terminals 20 and 21 at the driver shift request switch. 3. Using the J 35616 GM terminal test kit, connect the DMM to terminal 21 and a known good ground. 4. Turn ON the ignition, with the engine OFF. Is the voltage within the specified range?	11.75-12.75 V	Go to Step 5	Go to Step 6
5	1. Turn the ignition OFF. 2. Using the J 35616 , connect the DMM to terminals 20 and 21 of the driver shift request switch. 3. Operate the driver shift request switch in the Tap up and Tap down position. Is the resistance within the specified value?	OFF: 6.84 K ohms Tap up: 1.87 K ohms Tap down: 3.97 K ohms	Go to Step 7	Go to Step 9
6	**IMPORTANT:** *The condition that affects this circuit may exist in other connecting branches of the circuit. Refer to Power Distribution Schematics for complete circuit distribution.* 1. Inspect the ignition 0 voltage circuit for an open. Refer to Circuit Protection - Fuses . 2. Replace the fuse if necessary. Was the fuse open?	—	Go to Step 11	Go to Step 7
7	Test the signal circuit of the AT driver shift request switch for a short to voltage between the AT driver shift request switch and the TCM. Refer to Testing for a Short to Voltage and Wiring Repairs . Did you find and correct the condition?	—	Go to Step 11	Go to Step 10
8	Test the ignition 0 voltage circuit of the AT driver shift request switch for a short to voltage between the fuse block and the AT driver shift request switch. Refer to Testing for a Short to Voltage and Wiring Repairs . Did you find and correct the condition?	—	Go to Step 11	—

DTC P0828				
Step	**Action**	**Value**	**Yes**	**No**
9	Replace the AT driver shift request switch. Refer to Shift Lever Replacement . Did you complete the replacement?	—	Go to Step 11	—
10	**IMPORTANT:** *In most cases, the TCM is not at fault. Investigate thoroughly before replacing the TCM.* Replace the TCM. Refer to Control Module References for replacement, setup, and programming. Did you complete the replacement?	—	Go to Step 11	—
11	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Operate the vehicle while using the driver shift request switch. 3. Select Specific DTC. 4. Enter DTC P0828. Has the test run and passed?	—	Go to Step 12	Go to Step 2
12	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	—	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P0842

Circuit Description

The pressure switch manifold (PSM) is a multiple-switch assembly made up of 3 normally open (N/O) pressure switches and 1 normally closed (N/C) pressure switch. Pressure switch 1 (PS1) monitors shift valve 1 positioning and relays it to the transmission control module (TCM).

DTC P0842 is a type A DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P0842 Transmission Pressure Switch 1 Circuit Low

Conditions for Running the DTC

- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.
- Engine speed is greater than 200 RPM and less than 7,500 RPM for 5 seconds.
- Shift valve 1 is commanded to the OFF, destroked, position.

Conditions for Setting the DTC

DTC P0842 sets during steady state operation when PS1 indicates ON for 125 milliseconds after shift solenoid 1 (SS1) has been commanded OFF.

Action Taken When the DTC Sets

- The TCM illuminates the malfunction indicator lamp (MIL).
- When in a forward range, the transmission will fail to another forward range, unless the transmission is compromised by overspeeding or direction change, then the transmission will shift to NEUTRAL while diagnostic response is active.
- If the shift selector is moved from a forward range to NEUTRAL or from a forward range to REVERSE, then the transmission will shift to NEUTRAL.
- If the shift selector is moved to REVERSE, the transmission will shift to REVERSE if it is not compromised by overspeeding or a direction change. If compromised, the transmission will shift to NEUTRAL.
- DTC P0842 is stored in TCM history.
- The TCM freezes shift adapts.
- The TCM inhibits torque converter clutch (TCC) engagement.

Conditions for Clearing the DTC

A scan tool can clear the code from TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

- Inspect the wiring for poor electrical connections at the TCM. Inspect for the following conditions:
  - A bent terminal
  - A backed-out terminal
  - A damaged terminal
  - Poor terminal tension
  - A chafed wire
  - A broken wire inside the insulation

- When diagnosing for an intermittent short or open, massage the wiring harness while watching the test equipment for a change.
- You may have to drive the vehicle in order to experience a condition.
- This DTC may indicate that SS1 is mechanically defective or the shift valve is stuck in the stroked state.
- When DTC P0752 and P0842 are set in combination, this may indicate a short to ground at the pressure switch circuit or the shift valve is stuck in the stroked state.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

5. This step tests the TCM response function.
6. This step tests the transmission wiring harness integrity.
7. This step tests and evaluates the internal wiring harness.
8. This step tests the PSM for a failed condition.

DTC P0842			
Step	**Action**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics			
1	Did you perform the Diagnostic System Check - Vehicle?	Go to Step 2	Go to Diagnostic System Check - Vehicle
2	Measure the transmission fluid level. Refer to Transmission Fluid Checking . Is the transmission fluid level correct?	Go to Step 3	Go to Transmission Fluid Checking
3	Measure line pressure. Refer to Line Pressure Check . Is the pressure within the specified value?	Go to Step 4	Go to Symptoms - Automatic Transmission

DTC P0842			
Step	**Action**	**Yes**	**No**
4	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** *Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.* 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Start the engine. 6. Using the scan tool, monitor PS1 status. Does the scan tool indicate PS1 status is LOW?	Go to Diagnostic Aids	Go to Step 5
5	1. Turn the ignition OFF. 2. Disconnect the 80-way connector at the TCM. 3. Install the J 39700 breakout box, the J-47275 breakout box adapter and the J 47275-1 magnetic overlay to the TCM. 4. Turn ON the ignition, with the engine OFF. 5. Connect terminal 17 to ground. Does the scan tool indicate PS1 status is LOW when grounded and HIGH when open?	Go to Step 6	Go to Step 12
6	1. Turn the ignition OFF. 2. Disconnect the AT inline 20-way connector. Additional DTCs may set. 3. Install the J 44152 jumper harness (20 pins) on the engine side of the AT inline 20-way connector. 4. Turn ON the ignition, with the engine OFF. 5. Using the J 35616 GM terminal test kit and a fused jumper wire, connect terminal D of the J 44152 to ground. Refer to Automatic Transmission Inline Harness Connector End View. Does the scan tool indicate PS1 status is LOW when grounded and HIGH when open?	Go to Step 7	Go to Step 11

DTC P0842			
Step	**Action**	**Yes**	**No**
7	1. Connect the AT inline 20-way connector. 2. Remove the transmission oil pan. Refer to Oil Pan Replacement . 3. Disconnect the AT internal wiring harness from the PSM and ground terminal A. Does the scan tool indicate PS1 status is LOW when grounded and HIGH when open?	Go to Step 8	Go to Step 10
8	1. Remove the PSM from the control valve body and leave the internal harness connected. Refer to Pressure Switch Manifold Replacement . 2. Provide a ground connection for the PSM to either the control valve body or the transmission main case. 3. Using the eraser end of a pencil, push gently on the PS1 membrane. Does the scan tool indicate PS1 status is LOW when grounded and HIGH when open?	Go to Diagnostic Aids	Go to Step 9
9	Replace the PSM. Refer to Pressure Switch Manifold Replacement . Did you complete the replacement?	Go to Step 13	—
10	Replace the AT internal wiring harness. Refer to Wiring Harness Replacement . Did you complete the replacement?	Go to Step 13	—
11	Test the PS1 circuit between the TCM and AT inline 20-way connector for an open or short condition. Refer to Circuit Testing . Did you find and correct the condition?	Go to Step 13	—
12	**IMPORTANT:** *Prior to replacing the TCM, swap the TCM with a known good TCM. In most cases, the TCM is not at fault. Investigate thoroughly before replacing the TCM.* Replace the TCM. Refer to Control Module References for replacement, setup, and programming. Did you complete the replacement?	Go to Step 13	—

DTC P0842			
Step	**Action**	**Yes**	**No**
13	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Start the engine. 3. Using the scan tool, monitor PS1 status. 4. Select Specific DTC. 5. Enter DTC P0842. Has the test run and passed?	Go to Step 14	Go to Step 2
14	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P0843

Circuit Description

The pressure switch manifold (PSM) is a multiple-switch assembly made up of 3 normally open (N/O) pressure switches and 1 normally closed (N/C) pressure switch. Pressure switch 1 (PS1) monitors shift valve 1 positioning and relays it to the transmission control module (TCM).

DTC P0843 is a type A DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P0843 Transmission Pressure Switch 1 Circuit High

Conditions for Running the DTC

- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.
- Engine speed is greater than 200 RPM and less than 7,500 RPM for 5 seconds.
- Shift valve 1 is commanded to the ON, stroked, position.

Conditions for Setting the DTC

DTC P0843 sets during steady state operation when shift solenoid 1 (SS1) is commanded ON and PS1 indicates OFF for 0.1 second.

Action Taken When the DTC Sets

- The TCM illuminates the malfunction indicator lamp (MIL).
- When in a forward range and shifting is completed, the transmission will fail to another forward range, unless the transmission is compromised by overspeeding or direction change, then the transmission will shift to NEUTRAL.
- When in a forward range and the shift is in process, the transmission will return to a previous range, except for 1-2 shifts and 2-1 shifts which will be completed.
- When in NEUTRAL or REVERSE, the transmission will fail to NEUTRAL.
- While diagnostic response is active, the shift selector is moved from a forward range to NEUTRAL or from a forward range to REVERSE, then the transmission will shift to NEUTRAL.
- DTC P0843 is stored in TCM history.
- The TCM freezes shift adapts.
- The TCM inhibits torque converter clutch (TCC) engagement.

Conditions for Clearing the DTC

A scan tool can clear the code from TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

- Inspect the wiring for poor electrical connections at the TCM. Inspect for the following conditions:
  – A bent terminal
  – A backed-out terminal
  – A damaged terminal
  – Poor terminal tension

– A chafed wire

– A broken wire inside the insulation

- When diagnosing for an intermittent short or open, massage the wiring harness while watching the test equipment for a change.
- You may have to drive the vehicle in order to experience a condition.
- When DTC P0751 and P0843 are set in combination, this may indicate an open circuit condition is present at the pressure switch circuit or the shift valve 1 is stuck in the destroked position.
- This DTC may indicate that SS1 is mechanically defective.
- This DTC can be caused by a loss of prime.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

5. This step tests the TCM response function.
6. This step tests the transmission wiring harness integrity.
7. This step tests and evaluates the internal wiring harness.
8. This step tests the PSM for a failed condition.

DTC P0843			
Step	**Action**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics			
1	Did you perform the Diagnostic System Check – Vehicle?	Go to Step 2	Go to Diagnostic System Check - Vehicle

DTC P0843			
Step	**Action**	**Yes**	**No**
2	Measure the transmission fluid level. Refer to Transmission Fluid Checking . Is the transmission fluid level correct?	Go to Step 3	Go to Transmission Fluid Checking
3	Measure line pressure. Refer to Line Pressure Check . Is the pressure within the specified value?	Go to Step 4	Go to Symptoms - Automatic Transmission
4	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** *Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.* 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Start the engine. 6. Using the scan tool, monitor PS1 status. Does the scan tool indicate PS1 status is LOW?	Go to Diagnostic Aids	Go to Step 5
5	1. Turn the ignition OFF. 2. Disconnect the 80-way connector at the TCM. 3. Install the J 39700 breakout box, the J-47275 breakout box adapter and the J 47275-1 magnetic overlay. 4. Turn ON the ignition, with the engine OFF. 5. Connect terminal 17 to ground. Does the scan tool indicate PS1 status is LOW when grounded and HIGH when open?	Go to Step 6	Go to Step 15

DTC P0843			
Step	**Action**	**Yes**	**No**
6	1. Turn the ignition OFF. 2. Disconnect the AT inline 20-way connector. Additional DTCs may set. 3. Install the J 44152 jumper harness (20 pins) on the engine side of the AT inline 20-way connector. 4. Turn ON the ignition, with the engine OFF. 5. Using the J 35616 GM terminal test kit and a fused jumper wire, connect terminal D of the J 44152 to ground. Refer to Automatic Transmission Inline Harness Connector End View . Does the scan tool indicate PS1 status is LOW when grounded and HIGH when open?	Go to Step 7	Go to Step 14
7	1. Connect the AT inline 20-way connector. 2. Remove the transmission oil pan. Refer to Oil Pan Replacement . 3. Disconnect the AT internal wiring harness from the PSM and ground terminal A. Does the scan tool indicate PS1 status is LOW when grounded and HIGH when open?	Go to Step 8	Go to Step 13
8	1. Remove the PSM from the control valve body and leave the internal harness connected. Refer to Pressure Switch Manifold Replacement . 2. Provide a ground connection for the PSM to either the control valve body or the transmission main case. 3. Using the eraser end of a pencil, push gently on the PS1 membrane. Does the scan tool indicate PS1 status is LOW when grounded and HIGH when open?	Go to Step 9	Go to Step 12
9	Remove the control valve body and inspect for a stuck or sticking shift valve 1. Refer to Control Valve Body Disassemble. Was the shift valve 1 stuck or sticking?	Go to Step 11	Go to Step 10
10	Replace the SS1 and install the control valve body. Refer to Control Valve Body Replacement . Did you replace the solenoid and install the control valve body?	Go to Step 16	—
11	Clean and inspect the related valves, bores, and the valve body for debris or contamination. Refer to Control Valve Body Cleaning and Inspection . Did you complete the repair?	Go to Step 16	—

DTC P0843			
Step	**Action**	**Yes**	**No**
12	Replace the PSM. Refer to Pressure Switch Manifold Replacement . Did you complete the replacement?	Go to Step 16	—
13	Replace the AT internal wiring harness. Refer to Wiring Harness Replacement . Did you complete the replacement?	Go to Step 16	—
14	Test the PS1 circuit between the TCM and AT inline 20-way connector for an open or short condition. Refer to Circuit Testing . Did you find and correct the condition?	Go to Step 16	—
15	**IMPORTANT:** *Prior to replacing the TCM, swap the TCM with a known good TCM. In most cases, the TCM is not at fault. Investigate thoroughly before replacing the TCM.* Replace the TCM. Refer to Control Module References for replacement, setup, and programming. Did you complete the replacement?	Go to Step 16	—
16	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Start the engine. 3. Using the scan tool, monitor PS1 status. 4. Select Specific DTC. 5. Enter DTC P0843. Has the test run and passed?	Go to Step 17	Go to Step 1
17	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P0847

Circuit Description

The pressure switch manifold (PSM) is a multiple-switch assembly made up of 3 normally open (N/O) pressure switches and 1 normally closed (N/C) pressure switch. Pressure switch 2 (PS2) monitors shift valve 2 positioning and relays it to the transmission control module (TCM).

DTC P0847 is a type A DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P0847 Transmission Pressure Switch 2 Circuit Low

Conditions for Running the DTC

- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.
- Engine speed is greater than 200 RPM and less than 7,500 RPM for 5 seconds.
- Shift valve 2 is commanded to the OFF, destroked, position.

Conditions for Setting the DTC

DTC P0847 sets when shift solenoid 2 (SS2) is commanded OFF and PS2 status remains ON for 2-16 seconds, depending on fluid temperature.

Action Taken When the DTC Sets

- The TCM illuminates the malfunction indicator lamp (MIL).
- When in a forward range and shifting is completed, the transmission will fail to another forward range, unless the transmission is compromised by overspeeding or direction change, then the transmission will shift to NEUTRAL.
- When in a forward range and the shift is in process, the transmission will return to a previous range, except for 1-2 shifts and 2-1 shifts which will be completed.
- When in NEUTRAL or REVERSE, the transmission will fail to NEUTRAL.
- While diagnostic response is active, the shift selector is moved from a forward range to NEUTRAL or from a forward range to REVERSE, then the transmission will shift to NEUTRAL.
- DTC P0847 is stored in TCM history.
- The TCM freezes shift adapts.
- The TCM inhibits torque converter clutch (TCC) engagement.

Conditions for Clearing the DTC

A scan tool can clear the code from TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

- Inspect the wiring for poor electrical connections at the TCM. Inspect for the following conditions:
  – A bent terminal
  – A backed-out terminal
  – A damaged terminal
  – Poor terminal tension

- A chafed wire
- A broken wire inside the insulation

- When diagnosing for an intermittent short or open, massage the wiring harness while watching the test equipment for a change.
- When DTC P0757 and P0847 are set in combination, this may indicate a short to ground is present at the pressure switch circuit or the shift valve is stuck in the stroked state.
- You may have to drive the vehicle in order to experience a condition.
- This DTC may indicate that SS2 is mechanically defective or shift valve 2 is stuck in the stroked state.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

5. This step tests the TCM response function.
6. This step tests the transmission wiring harness integrity.
7. This step tests and evaluates the internal wiring harness.
8. This step tests the PSM for a failed condition.

DTC P0847			
Step	**Action**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics			
1	Did you perform the Diagnostic System Check - Vehicle?	Go to Step 2	Go to Diagnostic System Check - Vehicle

DTC P0847			
Step	**Action**	**Yes**	**No**
2	Measure the transmission fluid level. Refer to Transmission Fluid Checking. Is the transmission fluid level correct?	Go to Step 3	Go to Transmission Fluid Checking
3	Measure line pressure. Refer to Line Pressure Check . Is the pressure within the specified value?	Go to Step 4	Go to Symptoms - Automatic Transmission
4	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** *Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.* 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Start the engine. 6. Using the scan tool, monitor PS2 status. Does the scan tool indicate PS2 status is LOW?	Go to Diagnostic Aids	Go to Step 5
5	1. Turn the ignition OFF. 2. Disconnect the 80-way connector at the TCM. 3. Install the J 39700 breakout box, the J-47275 breakout box adapter and the J 47275-1 magnetic overlay. 4. Turn ON the ignition, with the engine OFF. 5. Connect terminal 79 to ground. Does the scan tool indicate PS2 status is LOW when grounded and HIGH when open?	Go to Step 6	Go to Step 15

DTC P0847			
Step	**Action**	**Yes**	**No**
6	1. Turn the ignition OFF. 2. Disconnect the AT inline 20-way connector. Additional DTCs may set. 3. Install the J 44152 jumper harness (20 pins) on the engine side of the AT inline 20-way connector. 4. Turn ON the ignition, with the engine OFF. 5. Using the J 35616 GM terminal test kit and a fused jumper wire, connect terminal F of the J 44152 to ground. Refer to Automatic Transmission Inline Harness Connector End View. Does the scan tool indicate PS2 status is LOW when grounded and HIGH when open?	Go to Step 7	Go to Step 14
7	1. Connect the AT inline 20-way connector. 2. Remove the transmission oil pan. Refer to Oil Pan Replacement . 3. Disconnect the AT internal wiring harness from the PSM and ground terminal B. Does the scan tool indicate PS2 status is LOW when grounded and HIGH when open?	Go to Step 8	Go to Step 13
8	1. Remove the PSM from the control valve body and leave the internal harness connected. Refer to Pressure Switch Manifold Replacement . 2. Provide a ground connection for the PSM to either the control valve body or the transmission main case. 3. Using the eraser end of a pencil, push gently on the PS2 membrane. Does the scan tool indicate PS2 status is LOW when grounded and HIGH when open?	Go to Step 9	Go to Step 12
9	Remove the control valve body and inspect for a stuck or sticking shift valve 2. Refer to Control Valve Body Disassemble . Was the shift valve 1 stuck or sticking?	Go to Step 11	Go to Step 10
10	Replace the SS2 and install the control valve body. Refer to Control Valve Body Replacement . Did you replace the solenoid and install the control valve body?	Go to Step 16	—
11	Clean and/or polish the sticking valve to restore free movement, or replace the control valve body assembly. Refer to Control Valve Body Cleaning and Inspection . Did you restore free movement or replace the valve body?	Go to Step 16	—

DTC P0847			
Step	**Action**	**Yes**	**No**
12	Replace the PSM. Refer to Pressure Switch Manifold Replacement . Did you complete the replacement?	Go to Step 16	—
13	Replace the AT internal wiring harness. Refer to Wiring Harness Replacement . Did you complete the replacement?	Go to Step 16	—
14	Test the PS2 circuit between the TCM and AT inline 20-way connector for an open or short condition. Refer to Circuit Testing . Did you find and correct the condition?	Go to Step 16	—
15	**IMPORTANT:** ***Prior to replacing the TCM, swap the TCM with a known good TCM. In most cases, the TCM is not at fault. Investigate thoroughly before replacing the TCM.*** Replace the TCM. Refer to Control Module References for replacement, setup, and programming. Did you complete the replacement?	Go to Step 16	—
16	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Start the engine. 3. Using the scan tool, monitor PS2 status. 4. Select Specific DTC. 5. Enter DTC P0847. Has the test run and passed?	Go to Step 17	Go to Step 2
17	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P0848

Circuit Description

The pressure switch manifold (PSM) is a multiple-switch assembly made up of 3 normally open (N/O) pressure switches and 1 normally closed (N/C) pressure switch. Pressure switch 2 (PS2) monitors shift valve 2 positioning and relays it to the transmission control module (TCM).

DTC P0848 is a type A DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P0848 Transmission Pressure Switch 2 Circuit High

Conditions for Running the DTC

- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.
- Engine speed is greater than 200 RPM and less than 7,500 RPM for 5 seconds.
- Shift valve 2 is commanded to the ON, stroked, position.

Conditions for Setting the DTC

DTC P0848 sets during steady state operation, when shift solenoid 2 (SS2) is commanded ON and PS2 indicates OFF for 125 milliseconds.

Action Taken When the DTC Sets

- The TCM illuminates the malfunction indicator lamp (MIL).
- When in a forward range and shifting is completed, the transmission will fail to another forward range, unless the transmission is compromised by over speeding or direction change, then the transmission will shift to NEUTRAL.
- When in a forward range and the shift is in process, the transmission will return to a previous range, except for 1-2 shifts and 2-1 shifts which will be completed.
- When in NEUTRAL or REVERSE, the transmission will fail to NEUTRAL.
- While diagnostic response is active, the shift selector is moved from a forward range to NEUTRAL or from a forward range to REVERSE, then the transmission will shift to NEUTRAL.
- DTC P0848 is stored in TCM history.
- The TCM freezes shift adapts.
- The TCM inhibits torque converter clutch (TCC) engagement.

Conditions for Clearing the DTC

A scan tool can clear the code from TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

- Inspect the wiring for poor electrical connections at the TCM. Inspect for the following conditions:
  – A bent terminal
  – A backed-out terminal
  – A damaged terminal
  – Poor terminal tension

- A chafed wire
- A broken wire inside the insulation

- When diagnosing for an intermittent short or open, massage the wiring harness while watching the test equipment for a change.
- You may have to drive the vehicle in order to experience a condition.
- This DTC may indicate that SS2 is mechanically defective.
- When DTC P0756 and P0848 are set in combination, this may indicate an open circuit is present at the pressure switch circuit or the shift valve is stuck in the destroked position.
- This DTC can be caused by a loss of prime.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

5. This step tests the TCM response function.
6. This step tests the transmission wiring harness integrity.
7. This step tests and evaluates the internal wiring harness.
8. This step tests the PSM for a failed condition.

DTC P0848			
Step	**Action**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics			
1	Did you perform the Diagnostic System Check – Vehicle?	Go to Step 2	Go to Diagnostic System Check - Vehicle

DTC P0848			
Step	**Action**	**Yes**	**No**
2	Measure the transmission fluid level. Refer to Transmission Fluid Checking . Is the transmission fluid level correct?	Go to Step 3	Go to Transmission Fluid Checking
3	Measure line pressure. Refer to Line Pressure Check . Is the pressure within the specified value?	Go to Step 4	Go to Symptoms - Automatic Transmission
4	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** *Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.* 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Start the engine. 6. Using the scan tool, monitor PS2 status. Does the scan tool indicate PS2 status is LOW?	Go to Diagnostic Aids	Go to Step 5
5	1. Turn the ignition OFF. 2. Disconnect the 80-way connector at the TCM. 3. Install the J 39700 breakout box, the J-47275 breakout box adapter and the J 47275-1 magnetic overlay. 4. Turn ON the ignition, with the engine OFF. 5. Connect terminal 79 to ground. Does the scan tool indicate PS2 status is LOW when grounded and HIGH when open?	Go to Step 6	Go to Step 15

DTC P0848			
Step	**Action**	**Yes**	**No**
6	1. Turn the ignition OFF. 2. Disconnect the AT inline 20-way connector. Additional DTCs may set. 3. Install the J 44152 jumper harness (20 pins) on the engine side of the AT inline 20-way connector. 4. Turn ON the ignition, with the engine OFF. 5. Using the J 35616 GM terminal test kit and a fused jumper wire, connect terminal F of the J 44152 to ground. Refer to Automatic Transmission Inline Harness Connector End View. Does the scan tool indicate PS2 status is LOW when grounded and HIGH when open?	Go to Step 7	Go to Step 14
7	1. Connect the AT inline 20-way connector. 2. Remove the transmission oil pan. Refer to Oil Pan Replacement . 3. Disconnect the AT internal wiring harness from the PSM and ground terminal B. Does the scan tool indicate PS2 status is LOW when grounded and HIGH when open?	Go to Step 8	Go to Step 13
8	1. Remove the PSM from the control valve body and leave the internal harness connected. Refer to Pressure Switch Manifold Replacement . 2. Provide a ground connection for the PSM to either the control valve body or the transmission main case. 3. Using the eraser end of a pencil, push gently on the PS2 membrane. Does the scan tool indicate PS2 status is LOW when grounded and HIGH when open?	Go to Step 9	Go to Step 12
9	Remove the control valve body and inspect for a stuck or sticking shift valve 2. Refer to Control Valve Body Disassemble . Was the shift valve 2 stuck or sticking?	Go to Step 11	Go to Step 10
10	Replace the SS2 and install the control valve body. Refer to Control Valve Body Replacement . Did you replace the solenoid and install the control valve body?	Go to Step 16	—
11	Replace the control valve body assembly. Refer to Control Valve Body Replacement . Did you complete the replacement?	Go to Step 16	—

DTC P0848			
Step	**Action**	**Yes**	**No**
12	Replace the PSM. Refer to Pressure Switch Manifold Replacement . Did you complete the replacement?	Go to Step 16	—
13	Replace the AT internal wiring harness. Refer to Wiring Harness Replacement . Did you complete the replacement?	Go to Step 16	—
14	Test the PS2 circuit between the TCM and AT inline 20-way connector for an open or short condition. Refer to Circuit Testing . Did you find and correct the condition?	Go to Step 16	—
15	**IMPORTANT:** *Prior to replacing the TCM, swap the TCM with a known good TCM. In most cases, the TCM is not at fault. Investigate thoroughly before replacing the TCM.* Replace the TCM. Refer to Control Module References for replacement, setup, and programming. Did you complete the replacement?	Go to Step 16	—
16	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Start the engine. 3. Using the scan tool, monitor PS2 status. 4. Select Specific DTC. 5. Enter DTC P0848. Has the test run and passed?	Go to Step 17	Go to Step 2
17	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P0851 OR 0852

Diagnostic Instructions

- Perform the Diagnostic System Check - Vehicle prior to using this diagnostic procedure.
- Review Strategy Based Diagnosis for an overview of the diagnostic approach.
- Diagnostic Procedure Instructions provide an overview of each diagnostic category.

DTC Descriptors

- DTC P0851: Park/Neutral Position (PNP) Switch Circuit Low Voltage
- DTC P0852: Park/Neutral Position (PNP) Switch Circuit High Voltage

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Park/Neutral Signal	P0852	P0851	P0851	--

Typical Scan Tool Data

PNP SWITCH - ECM/PCM

Circuit	Short to Ground	Open/High Resistance	Short to volt-age
Operating Conditions: Engine running, normal operating temperature Parameter Normal Range: In-Gear, Park/Neutral			
Park/Neutral Signal	Park/Neutral	In-Gear	In-Gear

Circuit/System Description

The engine control module (ECM)/powertrain control module (PCM) provides 12 volts to the park/neutral position (PNP) switch. The switch consists of 5 separate circuits, 4 of which indicate gear selector position to the transmission control module (TCM), and one that indicates park/neutral position to the ECM/PCM. When the transmission is in Park or Neutral, the switch closes and pulls the ECM/PCM voltage low, 0 volts. When the transmission is not in Park or Neutral, the ECM/PCM voltage is high, 12 volts. The ECM/PCM uses the switch in order to enable starter operation.

Conditions for Running the DTC

DTC P0851

- Ignition voltage is between 11-18 volts.
- The ignition is ON.
- DTC P0852 is not active.

DTC P0852

- Ignition voltage is between 11-18 volts.
- Ignition is ON.
- DTC P0851 is not active.
- No GMLAN error messages.
- Engine speed is more than 650 RPM.
- Actual engine torque is more than 120 N·m (89 lb ft).
- Accelerator pedal position is more than 6 percent.
- Vehicle speed is more than 24 km/h (15 mph).

Conditions for Setting the DTC

DTC P0851

The ECM/PCM detects the Park/Neutral switch signal equals 12 volts (high) when the IMS reports a Park/Neutral range for 5 seconds.

DTC P0852

The ECM/PCM detects the Park/Neutral switch signal equals 0 volts (low) when the IMS reports a Drive range for 5 seconds and the following conditions are present:

- TP is equal to or greater than 6 percent.
- Engine torque is equal to or greater than 120 N·m (89 lb ft).
- Vehicle speed is equal or greater than 24 km/h (15 mph).

Action Taken When the DTC Sets

- DTCs P0851 and P0852 are Type C DTCs.
- The ECM/PCM uses IMS range for engine start-up.

Conditions for Clearing the DTC

DTCs P0851 and P0852 are Type C DTCs.

Diagnostic Aids

It is possible for this DTC to set due to a stack-up or misalignment issue between the IMS and the P/N Switch, where no electrical fault is present. Ensure the gear shift selector cable is properly adjusted and there are no service bulletins that address this concern before replacing parts.

Reference Information

- Schematic Reference

Automatic Transmission Controls Schematics

CONNECTOR END VIEW REFERENCE

- Automatic Transmission Inline Harness Connector End View
- Automatic Transmission Internal Connector End Views
- Automatic Transmission Related Connector End Views
- Powertrain Control Module Connector End Views for 8.1L (L18)

DTC TYPE REFERENCE

- Diagnostic Trouble Code (DTC) Type Definitions
- Diagnostic Trouble Code (DTC) List/Type

ELECTRICAL INFORMATION REFERENCE

- Circuit Testing
- Connector Repairs
- Testing for Intermittent Conditions and Poor Connections
- Wiring Repairs

SCAN TOOL REFERENCE

- Scan Tool Data List
- Scan Tool Data Definitions

Circuit/System Verification

If there are any other engine or transmission related DTCs set, diagnose those DTCs first. With a scan tool observe the Park/Neutral switch parameter in the engine controls data list and move the gear shift lever from Park, to Reverse and through all the ranges and observe the parameter as you move the shift lever. The parameter should display Park/Neutral when in Park or Neutral and In-Gear when in Reverse, Drive or Drive Low. It is especially important to closely observe the Park and Neutral to Drive transitional positions while moving the shift lever and observing for possible misalignment or slack in the shifter mechanism.

Circuit/System Testing

1. Ignition OFF, transmission in Park or Neutral, disconnect the transmission 20-way connector.
2. Test for less than 1 ohm of resistance between the Park/Neutral signal circuit terminal 18 on the transmission side and ground.
   - If greater than the specified range, test the signal circuit between the connector and the IMS for an open/high resistance. If the circuit tests normal, replace the IMS.
3. Ignition On, verify the Park/Neutral parameter displays In-gear.
   - If not the specified value, test the signal circuit for a short to ground. If the circuit tests normal, replace the ECM/PCM.
4. Install a fused jumper between the signal circuit and ground. Verify the Park/Neutral parameter displays Park/Neutral.
   - If not the specified value, test the signal circuit for a short to voltage or an open/high resistance. If the circuit tests normal, replace the ECM/PCM.

Repair Instructions

Perform the Diagnostic Repair Verification after completing the diagnostic procedure.

1. ECM/PCM replacement. Refer to Control Module References for replacement, setup, and programming.
2. IMS replacement. Refer to Manual Shift Shaft, Detent Lever, and Position Switch Assembly Replacement .

DTC P0872

Circuit Description

The pressure switch manifold (PSM) is a multiple-switch assembly made up of 3 normally open (N/O) pressure switches and 1 normally closed (N/C) pressure switch. Pressure switch 3 (PS3) monitors shift valve 3 positioning and relays it to the transmission control module (TCM).

DTC P0872 is a type A DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P0872 Transmission Pressure Switch 3 Circuit Low

Conditions for Running the DTC

- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.
- Engine speed is greater than 200 RPM and less than 7,500 RPM for 5 seconds.
- Shift valve 3 is commanded to the OFF, destroked, position.

Conditions for Setting the DTC

DTC P0872 sets when PS3 indicates ON for 20 milliseconds after shift solenoid 3 (SS3) has been commanded OFF.

Action Taken When the DTC Sets

- The TCM illuminates the malfunction indicator lamp (MIL).
- When in a forward range, the transmission will fail to another forward range, unless the transmission is compromised by overspeeding or direction change, then the transmission will shift to NEUTRAL while diagnostic response is active.
- If the shift selector is moved from a forward range to NEUTRAL or from a forward range to REVERSE, then the transmission will shift to NEUTRAL.
- If the shift selector is moved to REVERSE, the transmission will shift to REVERSE if it is not compromised by overspeeding or a direction change. If compromised, the transmission will shift to NEUTRAL.
- DTC P0872 is stored in TCM history.
- The TCM freezes shift adapts.
- The TCM inhibits torque converter clutch (TCC) engagement.

Conditions for Clearing the DTC

A scan tool can clear the code from TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

- Inspect the wiring for poor electrical connections at the TCM. Inspect for the following conditions:
  - – A bent terminal
  - – A backed-out terminal
  - – A damaged terminal
  - – Poor terminal tension
  - – A chafed wire
  - – A broken wire inside the insulation
- When diagnosing for an intermittent short or open, massage the wiring harness while watching the test equipment for a change.
- You may have to drive the vehicle in order to experience a condition.
- When DTC P0762 and P0872 are set in combination, this may indicate a short to ground is present at the pressure switch circuit.
- This DTC may indicate that SS3 is mechanically defective.
- This DTC can be set by a loss of prime.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

5. This step tests the TCM response function.
6. This step tests the transmission wiring harness integrity.
7. This step tests and evaluates the internal wiring harness.
8. This step tests the PSM for a failed condition.

DTC P0872			
Step	**Action**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics			
1	Did you perform the Diagnostic System Check - Vehicle?	Go to Step 2	Go to Diagnostic System Check - Vehicle
2	Measure the transmission fluid level. Refer to Transmission Fluid Checking . Is the transmission fluid level correct?	Go to Step 3	Go to Transmission Fluid Checking
3	Measure line pressure. Refer to Line Pressure Check . Is the pressure within the specified value?	Go to Step 4	Go to Symptoms - Automatic Transmission
4	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** ***Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.*** 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Start the engine. 6. Using the scan tool, monitor PS3 status. Does the scan tool indicate PS3 status is LOW?	Go to Diagnostic Aids	Go to Step 5
5	1. Turn the ignition OFF. 2. Disconnect the 80-way connector at the TCM. 3. Install the J 39700 breakout box, the J-47275 breakout box adapter and the J 47275-1 magnetic overlay. 4. Turn ON the ignition, with the engine OFF. 5. Connect terminal 57 to ground. Does the scan tool indicate PS3 status is LOW when grounded and HIGH when open?	Go to Step 6	Go to Step 12

DTC P0872			
Step	**Action**	**Yes**	**No**
6	1. Turn the ignition OFF. 2. Disconnect the AT inline 20-way connector. Additional DTCs may set. 3. Install the J 44152 jumper harness (20 pins) on the engine side of the AT inline 20-way connector. 4. Turn ON the ignition, with the engine OFF. 5. Using the J 35616 GM terminal test kit and a fused jumper wire, connect terminal E of the J 44152 to ground. Refer to Automatic Transmission Inline Harness Connector End View . Does the scan tool indicate PS3 status is LOW when grounded and HIGH when open?	Go to Step 7	Go to Step 11
7	1. Connect the AT inline 20-way connector. 2. Remove the transmission oil pan. Refer to Oil Pan Replacement . 3. Disconnect the AT internal wiring harness from the PSM and ground terminal C. Does the scan tool indicate PS3 status is LOW when grounded and HIGH when open?	Go to Step 8	Go to Step 10
8	1. Remove the PSM from the control valve body and leave the internal harness connected. Refer to Pressure Switch Manifold Replacement . 2. Provide a ground connection for the PSM to either the control valve body or the transmission main case. 3. Using the eraser end of a pencil, push gently on the PS3 membrane. Does the scan tool indicate PS3 status is LOW when depressed and HIGH when open?	Go to Diagnostic Aids	Go to Step 9
9	Replace the PSM. Refer to Pressure Switch Manifold Replacement . Did you complete the replacement?	Go to Step 13	—
10	Replace the AT internal wiring harness. Refer to Wiring Harness Replacement . Did you complete the replacement?	Go to Step 13	—
11	Test the PS3 circuit between the TCM and AT inline 20-way connector for an open or short condition. Refer to Circuit Testing . Did you find and correct the condition?	Go to Step 13	—

DTC P0872			
Step	**Action**	**Yes**	**No**
12	**IMPORTANT:** *Prior to replacing the TCM, swap the TCM with a known good TCM. In most cases, the TCM is not at fault. Investigate thoroughly before replacing the TCM.* Replace the TCM. Refer to Control Module References for replacement, setup, and programming. Did you complete the replacement?	Go to Step 13	—
13	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Start the engine. 3. Using the scan tool, monitor PS3 status. 4. Select Specific DTC. 5. Enter DTC P0872. Has the test run and passed?	Go to Step 14	Go to Step 2
14	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P0873

Circuit Description

The pressure switch manifold (PSM) is a multiple-switch assembly made up of 3 normally open (N/O) pressure switches and 1 normally closed (N/C) pressure switch. Pressure switch 3 (PS3) monitors shift valve 3 positioning and relays it to the transmission control module (TCM).

DTC P0873 is a type A DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P0873 Transmission Pressure Switch 3 Circuit High

Conditions for Running the DTC

- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.
- Engine speed is greater than 200 RPM and less than 7,500 RPM for 5 seconds.
- Shift valve 3 is commanded to the ON, stroked, position.

Conditions for Setting the DTC

DTC P0873 sets during steady state operation when shift solenoid 3 (SS3) is commanded ON and PS3 fails to switch ON after 0.1 second.

Action Taken When the DTC Sets

- The TCM illuminates the malfunction indicator lamp (MIL).
- When in a forward range and shifting is completed, the transmission will fail to another forward range, unless the transmission is compromised by overspeeding or direction change, then the transmission will shift to NEUTRAL.
- When in a forward range and the shift is in process, the transmission will return to a previous range, except for 1-2 shifts and 2-1 shifts which will be completed.
- When in NEUTRAL or REVERSE, the transmission will fail to NEUTRAL.
- While diagnostic response is active, the shift selector is moved from a forward range to NEUTRAL or from a forward range to REVERSE, then the transmission will shift to NEUTRAL.
- DTC P0873 is stored in TCM history.
- The TCM freezes shift adapts.
- The TCM inhibits torque converter clutch (TCC) engagement.

Conditions for Clearing the DTC

A scan tool can clear the code from TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

- Inspect the wiring for poor electrical connections at the TCM. Inspect for the following conditions:
  – A bent terminal
  – A backed-out terminal
  – A damaged terminal
  – Poor terminal tension

– A chafed wire

– A broken wire inside the insulation

- When diagnosing for an intermittent short or open, massage the wiring harness while watching the test equipment for a change.
- You may have to drive the vehicle in order to experience a condition.
- When DTC P0761 and DTC P0873 are set in combination, this may indicate an open circuit condition is present in PS3.
- This DTC may indicate that SS3 is mechanically defective.
- This DTC can be caused by a loss of prime.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

5. This step tests the TCM response function.
6. This step tests the transmission wiring harness integrity.
7. This step tests and evaluates the internal wiring harness.
8. This step tests the PSM for a failed condition.

DTC P0873			
Step	**Action**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics			
1	Did you perform the Diagnostic System Check - Vehicle?	Go to Step 2	Go to Diagnostic System Check - Vehicle

DTC P0873			
Step	**Action**	**Yes**	**No**
2	Measure the transmission fluid level. Refer to Transmission Fluid Checking . Is the transmission fluid level correct?	Go to Step 3	Go to Transmission Fluid Checking
3	Measure line pressure. Refer to Line Pressure Check . Is the pressure within the specified value?	Go to Step 4	Go to Symptoms - Automatic Transmission
4	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** *Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.* 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Start the engine. 6. Using the scan tool, monitor PS3 status. Does the scan tool indicate PS3 status is LOW?	Go to Diagnostic Aids	Go to Step 5
5	1. Turn the ignition OFF. 2. Disconnect the 80-way connector at the TCM. 3. Install the J 39700 breakout box, the J-47275 breakout box adapter and the J 47275-1 magnetic overlay. 4. Turn ON the ignition, with the engine OFF. 5. Connect terminal 57 to ground. Does the scan tool indicate PS3 status is LOW when grounded and HIGH when open?	Go to Step 6	Go to Step 15

DTC P0873			
Step	**Action**	**Yes**	**No**
6	1. Turn the ignition OFF. 2. Disconnect the AT inline 20-way connector. Additional DTCs may set. 3. Install the J 44152 jumper harness (20 pins) on the engine side of the AT inline 20-way connector. 4. Turn ON the ignition, with the engine OFF. 5. Using the J 35616 GM terminal test kit and a fused jumper wire, connect terminal E of the J 44152 to ground. Refer to Automatic Transmission Inline Harness Connector End View . Does the scan tool indicate PS3 status is LOW when grounded and HIGH when open?	Go to Step 7	Go to Step 14
7	1. Connect the AT inline 20-way connector. 2. Remove the transmission oil pan. Refer to Oil Pan Replacement . 3. Disconnect the AT internal wiring harness from the PSM and ground terminal C. Does the scan tool indicate PS3 status is LOW when grounded and HIGH when open?	Go to Step 8	Go to Step 13
8	1. Remove the PSM from the control valve body and leave the internal harness connected. Refer to Pressure Switch Manifold Replacement . 2. Provide a ground connection for the PSM to either the control valve body or the transmission main case. 3. Using the eraser end of a pencil, push gently on the PS3 membrane. Does the scan tool indicate PS3 status is LOW when grounded and HIGH when open?	Go to Step 9	Go to Step 12
9	Remove the control valve body and inspect for a stuck or sticking shift valve 3. Refer to Control Valve Body Disassemble. Was the shift valve 3 stuck or sticking?	Go to Step 11	Go to Step 10
10	Replace the SS3 and install the control valve body. Refer to Control Valve Body Replacement . Did you complete the solenoid replacement and installation of the valve body?	Go to Step 16	—
11	Clean and/or polish the sticking valve to restore free movement or replace the control valve body assembly. Refer to Control Valve Body Replacement . Did you restore free movement or replace the valve body?	Go to Step 16	—

DTC P0873			
Step	**Action**	**Yes**	**No**
12	Replace the PSM. Refer to Pressure Switch Manifold Replacement . Did you complete the replacement?	Go to Step 16	—
13	Replace the AT internal wiring harness. Refer to Wiring Harness Replacement . Did you complete the replacement?	Go to Step 16	—
14	Test the PS3 circuit between the TCM and the AT inline 20-way connector for an open or short condition. Refer to Circuit Testing . Did you find and correct the condition?	Go to Step 16	—
15	**IMPORTANT:** ***Prior to replacing the TCM, swap the TCM with a known good TCM. In most cases, the TCM is not at fault. Investigate thoroughly before replacing the TCM.*** Replace the TCM. Refer to Control Module References for replacement, setup, and programming. Did you complete the replacement?	Go to Step 13	—
16	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Start the engine. 3. Using the scan tool, monitor PS3 status. 4. Select Specific DTC. 5. Enter DTC P0873. Has the test run and passed?	Go to Step 17	Go to Step 2
17	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P0873

Circuit Description

The pressure switch manifold (PSM) is a multiple-switch assembly made up of 3 normally open (N/O) pressure switches and 1 normally closed (N/C) pressure switch. Pressure switch 3 (PS3) monitors shift valve 3 positioning and relays it to the transmission control module (TCM).

DTC P0873 is a type A DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P0873 Transmission Pressure Switch 3 Circuit High

Conditions for Running the DTC

- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.
- Engine speed is greater than 200 RPM and less than 7,500 RPM for 5 seconds.
- Shift valve 3 is commanded to the ON, stroked, position.

Conditions for Setting the DTC

DTC P0873 sets during steady state operation when shift solenoid 3 (SS3) is commanded ON and PS3 fails to switch ON after 0.1 second.

Action Taken When the DTC Sets

- The TCM illuminates the malfunction indicator lamp (MIL).
- When in a forward range and shifting is completed, the transmission will fail to another forward range, unless the transmission is compromised by overspeeding or direction change, then the transmission will shift to NEUTRAL.
- When in a forward range and the shift is in process, the transmission will return to a previous range, except for 1-2 shifts and 2-1 shifts which will be completed.
- When in NEUTRAL or REVERSE, the transmission will fail to NEUTRAL.
- While diagnostic response is active, the shift selector is moved from a forward range to NEUTRAL or from a forward range to REVERSE, then the transmission will shift to NEUTRAL.
- DTC P0873 is stored in TCM history.
- The TCM freezes shift adapts.
- The TCM inhibits torque converter clutch (TCC) engagement.

Conditions for Clearing the DTC

A scan tool can clear the code from TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

- Inspect the wiring for poor electrical connections at the TCM. Inspect for the following conditions:
  – A bent terminal
  – A backed-out terminal
  – A damaged terminal
  – Poor terminal tension

– A chafed wire

– A broken wire inside the insulation

- When diagnosing for an intermittent short or open, massage the wiring harness while watching the test equipment for a change.
- You may have to drive the vehicle in order to experience a condition.
- When DTC P0761 and DTC P0873 are set in combination, this may indicate an open circuit condition is present in PS3.
- This DTC may indicate that SS3 is mechanically defective.
- This DTC can be caused by a loss of prime.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

5. This step tests the TCM response function.
6. This step tests the transmission wiring harness integrity.
7. This step tests and evaluates the internal wiring harness.
8. This step tests the PSM for a failed condition.

DTC P0873			
Step	**Action**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics			
1	Did you perform the Diagnostic System Check - Vehicle?	Go to Step 2	Go to Diagnostic System Check - Vehicle

DTC P0873			
Step	**Action**	**Yes**	**No**
2	Measure the transmission fluid level. Refer to Transmission Fluid Checking . Is the transmission fluid level correct?	Go to Step 3	Go to Transmission Fluid Checking
3	Measure line pressure. Refer to Line Pressure Check . Is the pressure within the specified value?	Go to Step 4	Go to Symptoms - Automatic Transmission
4	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** ***Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.*** 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Start the engine. 6. Using the scan tool, monitor PS3 status. Does the scan tool indicate PS3 status is LOW?	Go to Diagnostic Aids	Go to Step 5
5	1. Turn the ignition OFF. 2. Disconnect the 80-way connector at the TCM. 3. Install the J 39700 breakout box, the J-47275 breakout box adapter and the J 47275-1 magnetic overlay. 4. Turn ON the ignition, with the engine OFF. 5. Connect terminal 57 to ground. Does the scan tool indicate PS3 status is LOW when grounded and HIGH when open?	Go to Step 6	Go to Step 15

DTC P0873			
Step	**Action**	**Yes**	**No**
6	1. Turn the ignition OFF. 2. Disconnect the AT inline 20-way connector. Additional DTCs may set. 3. Install the J 44152 jumper harness (20 pins) on the engine side of the AT inline 20-way connector. 4. Turn ON the ignition, with the engine OFF. 5. Using the J 35616 GM terminal test kit and a fused jumper wire, connect terminal E of the J 44152 to ground. Refer to Automatic Transmission Inline Harness Connector End View . Does the scan tool indicate PS3 status is LOW when grounded and HIGH when open?	Go to Step 7	Go to Step 14
7	1. Connect the AT inline 20-way connector. 2. Remove the transmission oil pan. Refer to Oil Pan Replacement . 3. Disconnect the AT internal wiring harness from the PSM and ground terminal C. Does the scan tool indicate PS3 status is LOW when grounded and HIGH when open?	Go to Step 8	Go to Step 13
8	1. Remove the PSM from the control valve body and leave the internal harness connected. Refer to Pressure Switch Manifold Replacement . 2. Provide a ground connection for the PSM to either the control valve body or the transmission main case. 3. Using the eraser end of a pencil, push gently on the PS3 membrane. Does the scan tool indicate PS3 status is LOW when grounded and HIGH when open?	Go to Step 9	Go to Step 12
9	Remove the control valve body and inspect for a stuck or sticking shift valve 3. Refer to Control Valve Body Disassemble . Was the shift valve 3 stuck or sticking?	Go to Step 11	Go to Step 10
10	Replace the SS3 and install the control valve body. Refer to Control Valve Body Replacement . Did you complete the solenoid replacement and installation of the valve body?	Go to Step 16	—
11	Clean and/or polish the sticking valve to restore free movement or replace the control valve body assembly. Refer to Control Valve Body Replacement . Did you restore free movement or replace the valve body?	Go to Step 16	—

DTC P0873			
Step	**Action**	**Yes**	**No**
12	Replace the PSM. Refer to Pressure Switch Manifold Replacement . Did you complete the replacement?	Go to Step 16	—
13	Replace the AT internal wiring harness. Refer to Wiring Harness Replacement . Did you complete the replacement?	Go to Step 16	—
14	Test the PS3 circuit between the TCM and the AT inline 20-way connector for an open or short condition. Refer to Circuit Testing . Did you find and correct the condition?	Go to Step 16	—
15	**IMPORTANT:** *Prior to replacing the TCM, swap the TCM with a known good TCM. In most cases, the TCM is not at fault. Investigate thoroughly before replacing the TCM.* Replace the TCM. Refer to Control Module References for replacement, setup, and programming. Did you complete the replacement?	Go to Step 13	—
16	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Start the engine. 3. Using the scan tool, monitor PS3 status. 4. Select Specific DTC. 5. Enter DTC P0873. Has the test run and passed?	Go to Step 17	Go to Step 2
17	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P0877

Circuit Description

The pressure switch manifold (PSM) is a multiple-switch assembly made up of 3 normally open (N/O) pressure switches and 1 normally closed (N/C) pressure switch for reverse pressure. Fluid pressure is supplied to the pressure switch 4 (PS4) when the manual selector valve is in any position except REVERSE. When the manual selector valve is moved to REVERSE, pressure to PS4 is cut off, causing the switch to close.

DTC P0877 is a type B DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P0877 Transmission Pressure Switch 4 Circuit Low

Conditions for Running the DTC

- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.
- Engine speed is greater than 200 RPM and less than 7,500 RPM for 5 seconds.
- The transmission fluid temperature (TFT) is greater than 0°C (32°F).
- DTC P0708 and P0878 is not active.

Conditions for Setting the DTC

DTC P0877 sets when P (PARK), N (NEUTRAL), or a forward range is selected and the PS4 state remains in the mechanically closed/electrically ON position for greater than 1.0 second.

Action Taken When the DTC Sets

- The transmission control module (TCM) illuminates the malfunction indicator lamp (MIL) during the second consecutive trip in which the Conditions for Setting the DTC are met.
- The transmission will lock in NEUTRAL.
- DTC P0877 is stored in TCM history.
- The TCM freezes shift adapts.
- The TCM inhibits torque converter clutch (TCC) engagement.

Conditions for Clearing the DTC

A scan tool can clear the code from TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

- Inspect the wiring for poor electrical connections at the TCM. Inspect for the following conditions:
  – A bent terminal
  – A backed-out terminal
  – A damaged terminal
  – Poor terminal tension
  – A chafed wire
  – A broken wire inside the insulation
- When diagnosing for an intermittent short or open, massage the wiring harness while watching the test equipment for a change.
- You may have to drive the vehicle in order to experience

a condition.

- This DTC could indicate a hydraulic leak path exhausting pressure from the reverse PS4.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

5. This step tests the TCM response function.
6. This step tests the transmission wiring harness integrity.
7. This step tests and evaluates the internal wiring harness.
8. This step tests the PSM for a failed condition.

DTC P0877			
Step	**Action**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics			
1	Did you perform the Diagnostic System Check - Vehicle?	Go to Step 2	Go to Diagnostic System Check - Vehicle
2	Measure the transmission fluid level. Refer to Transmission Fluid Checking . Is the transmission fluid level correct?	Go to Step 3	Go to Transmission Fluid Checking
3	Measure line pressure. Refer to Line Pressure Check . Is the pressure within the specified value?	Go to Step 4	Go to Symptoms - Automatic Transmission

DTC P0877			
Step	**Action**	**Yes**	**No**
4	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** *Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.* 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Start the engine. 6. Using the scan tool, monitor PS4 status. Does the scan tool indicate PS4 status is HIGH?	Go to Diagnostic Aids	Go to Step 5
5	1. Turn the ignition OFF. 2. Disconnect the 80-way connector at the TCM. 3. Install the J 39700 breakout box, the J-47275 breakout box adapter and the J 47275-1 magnetic overlay. 4. Turn ON the ignition, with the engine OFF. 5. Connect terminal 77 to ground. Does the scan tool indicate PS4 status is LOW when grounded and HIGH when open?	Go to Step 6	Go to Step 12
6	1. Turn the ignition OFF. 2. Disconnect the AT inline 20-way connector. Additional DTCs may set. 3. Install the J 44152 jumper harness (20 pins) on the engine side of the AT inline 20-way connector. 4. Turn ON the ignition, with the engine OFF. 5. Using the J 35616 GM terminal test kit and a fused jumper wire, connect terminal K of the J 44152 to ground. Refer to Automatic Transmission Inline Harness Connector End View. Does the scan tool indicate PS4 status is LOW when grounded and HIGH when open?	Go to Step 7	Go to Step 11

DTC P0877			
Step	**Action**	**Yes**	**No**
7	1. Connect the AT inline 20-way connector. 2. Remove the transmission oil pan. Refer to Oil Pan Replacement . 3. Disconnect the AT internal wiring harness from the PSM and ground terminal D. Does the scan tool indicate PS4 status is LOW when grounded and HIGH when open?	Go to Step 8	Go to Step 10
8	1. Remove the PSM from the control valve body and leave the internal harness connected. Refer to Pressure Switch Manifold Replacement . 2. Provide a ground connection for the PSM to either the control valve body or the transmission main case. 3. Using the eraser end of a pencil, push gently on pressure switch R membrane. Does the scan tool indicate PS4 status is LOW when grounded and HIGH when open?	Go to Step 9	Go to Diagnostic Aids
9	Replace the PSM. Refer to Pressure Switch Manifold Replacement . Did you complete the replacement?	Go to Step 13	Go to Step 10
10	Replace the AT internal wiring harness. Refer to Wiring Harness Replacement . Did you complete the replacement?	Go to Step 13	
11	Test the PS4 circuit between the TCM and the AT inline 20-way connector for an open or short condition. Refer to Circuit Testing . Did you find and correct the condition?	Go to Step 13	
12	**IMPORTANT:** *Prior to replacing the TCM, swap the TCM with a known good TCM. In most cases, the TCM is not at fault. Investigate thoroughly before replacing the TCM.* Replace the TCM. Refer to Control Module References for replacement, setup, and programming. Did you complete the replacement?	Go to Step 13	

DTC P0877			
Step	**Action**	**Yes**	**No**
13	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Start the engine. 3. Using the scan tool, monitor PS4 status. 4. Select Specific DTC. 5. Enter DTC P0877. Has the test run and passed?	Go to Step 14	Go to Step 2
14	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P0878

Circuit Description

The pressure switch manifold (PSM) is a multiple-switch assembly made up of 3 normally open (N/O) pressure switches and 1 normally closed (N/C) pressure switch for reverse pressure. Fluid pressure is supplied to the pressure switch 4 (PS4) when the manual selector valve is in any position except REVERSE. When the manual selector valve is moved to REVERSE, pressure to PS4 is cut off, causing the switch to close.

DTC P0878 is a type B DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P0878 Transmission Pressure Switch 4 Circuit High

Conditions for Running the DTC

- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.
- Engine speed is greater than 200 RPM and less than 7,500 RPM for 5 seconds.
- The transmission fluid temperature (TFT) is greater than 0°C (32°F).
- DTC P0708 and P0877 is not active.

Conditions for Setting the DTC

DTC P0878 sets when P (PARK), N (NEUTRAL), or a forward range is selected and the PS4 state remains in the mechanically closed/electrically ON position for greater than 1.0 second.

Action Taken When the DTC Sets

- The transmission control module (TCM) illuminates the malfunction indicator lamp (MIL) during the second consecutive trip in which the Conditions for Setting the DTC are met.
- The transmission will lock in NEUTRAL.
- DTC P0878 is stored in TCM history.
- The TCM freezes shift adapts.
- The TCM inhibits torque converter clutch (TCC) engagement.

Conditions for Clearing the DTC

A scan tool can clear the code from TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

- Inspect the wiring for poor electrical connections at the TCM. Inspect for the following conditions:
  – A bent terminal
  – A backed-out terminal
  – A damaged terminal
  – Poor terminal tension
  – A chafed wire
  – A broken wire inside the insulation
- When diagnosing for an intermittent short or open, massage the wiring harness while watching the test equipment for a change.
- You may have to drive the vehicle in order to experience

a condition.

- This DTC could indicate a hydraulic leak path exhausting pressure from the reverse PS4.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

5. This step tests the TCM response function.
6. This step tests the transmission wiring harness integrity.
7. This step tests and evaluates the internal wiring harness.
8. This step tests the PSM for a failed condition.

DTC P0878			
Step	**Action**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics			
1	Did you perform the Diagnostic System Check - Vehicle?	Go to Step 2	Go to Diagnostic System Check - Vehicle
2	Measure the transmission fluid level. Refer to Transmission Fluid Checking . Is the transmission fluid level correct?	Go to Step 3	Go to Transmission Fluid Checking
3	Measure line pressure. Refer to Line Pressure Check . Is the pressure within the specified value?	Go to Step 4	Go to Symptoms - Automatic Transmission

DTC P0878			
Step	**Action**	**Yes**	**No**
4	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** *Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.* 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Start the engine. 6. Using the scan tool, monitor PS4 status. Does the scan tool indicate PS4 status is HIGH?	Go to Diagnostic Aids	Go to Step 5
5	1. Turn the ignition OFF. 2. Disconnect the 80-way connector at the TCM. 3. Install the J 39700 breakout box, the J-47275 breakout box adapter and the J 47275-1 magnetic overlay. 4. Turn ON the ignition, with the engine OFF. 5. Connect terminal 77 to ground. Does the scan tool indicate PS4 status is LOW when grounded and HIGH when open?	Go to Step 6	Go to Step 12
6	1. Turn the ignition OFF. 2. Disconnect the AT inline 20-way connector. Additional DTCs may set. 3. Install the J 44152 jumper harness (20 pins) on the engine side of the AT inline 20-way connector. 4. Turn ON the ignition, with the engine OFF. 5. Using the J 35616 GM terminal test kit and a fused jumper wire, connect terminal K of the J 44152 to ground. Refer to Automatic Transmission Inline Harness Connector End View . Does the scan tool indicate PS4 status is LOW when grounded and HIGH when open?	Go to Step 7	Go to Step 11

DTC P0878			
Step	**Action**	**Yes**	**No**
7	1. Connect the AT inline 20-way connector. 2. Remove the transmission oil pan. Refer to Oil Pan Replacement . 3. Disconnect the AT internal wiring harness from the PSM and ground terminal D. Does the scan tool indicate PS4 status is LOW when grounded and HIGH when open?	Go to Step 8	Go to Step 10
8	1. Remove the PSM from the control valve body and leave the internal harness connected. Refer to Pressure Switch Manifold Replacement . 2. Provide a ground connection for the PSM to either the control valve body or the transmission main case. 3. Using the eraser end of a pencil, push gently on pressure switch R membrane. Does the scan tool indicate PS4 status is LOW when grounded and HIGH when open?	Go to Step 9	Go to Diagnostic Aids
9	Replace the PSM. Refer to Pressure Switch Manifold Replacement . Did you complete the replacement?	Go to Step 13	Go to Step 10
10	Replace the internal wiring harness. Refer to Wiring Harness Replacement . Did you complete the replacement?	Go to Step 13	—
11	Replace the AT internal wiring harness. Refer to Wiring Harness Replacement . Did you complete the replacement?	Go to Step 13	—
12	**IMPORTANT:** ***Prior to replacing the TCM, swap the TCM with a known good TCM. In most cases, the TCM is not at fault. Investigate thoroughly before replacing the TCM.*** Replace the TCM. Refer to Control Module References for replacement, setup, and programming. Did you complete the replacement?	Go to Step 13	—

DTC P0878			
Step	**Action**	**Yes**	**No**
13	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Start the engine. 3. Using the scan tool, monitor PS4 status. 4. Select Specific DTC. 5. Enter DTC P0878. Has the test run and passed?	Go to Step 14	Go to Step 2
14	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P0880

Circuit Description

DTC P0880 will set if an abnormal power-down sequence has occurred. This condition means the transmission control module (TCM) has lost battery positive voltage circuit, supply voltage, before it has finished saving information from that drive cycle. This process is usually completed in less than 10 seconds.

DTC P0880 is a type C DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P0880 Transmission Control Module (TCM) Power Input Signal

Conditions for Running the DTC

- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.
- Loss of TCM supply voltage before drive cycle data is saved.

Conditions for Setting the DTC

DTC P0880 sets during the next ignition cycle if the TCM loses TCM supply voltage less than 10 seconds after the ignition voltage has been turned off.

Action Taken When the DTC Sets

- The TCM does not illuminate the malfunction indicator lamp (MIL).
- DTC P0880 is stored in TCM history.
- Loss of adaptive information for drive cycle. Revert to previous adaptive settings.
- The TCM inhibits torque converter clutch (TCC)

engagement.

Conditions for Clearing the DTC

A scan tool can clear the code from TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

- Inspect the wiring for poor electrical connections at the TCM. Inspect for the following conditions:
  – A bent terminal
  – A backed-out terminal
  – A damaged terminal
  – Poor terminal tension
  – A chafed wire
  – A broken wire inside the insulation
- When diagnosing for an intermittent short or open, massage the wiring harness while watching the test equipment for a change.
- You may have to drive the vehicle in order to experience a condition.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

2. This step tests the system voltage.
4. This step tests the vehicle charging system.
5. This step tests the wiring harness for opens or shorts.

DTC P0880				
Step	**Action**	**Value**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics				
1	Did you perform the Diagnostic System Check - Vehicle?	—	Go to Step 2	Go to Diagnostic System Check - Vehicle
2	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** *Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.* 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. **IMPORTANT:** *If other DTCs are present, refer to the applicable diagnostic tables before continuing.* 5. Using the DMM, measure and record the voltage at the battery terminals. Is voltage within the specified value?	B+	Go to Step 3	Go to Battery Inspection/Test
3	Start the engine and warm to normal operating temperature. Is the Alternator/Check Engine lamp ON?	—	Go to Charging System Test	Go to Step 4
4	1. Increase the engine speed to 1,000-1,500 RPM. 2. Observe the system voltage on the scan tool. Is voltage within the specified range?	13-15 V	Go to Step 5	Go to Charging System Test

DTC P0880				
Step	**Action**	**Value**	**Yes**	**No**
5	1. Turn the ignition OFF. 2. Disconnect the 80-way connector at the TCM. 3. Install the J 39700 breakout box, the J-47275 breakout box adapter and the J 47275-1 magnetic overlay. 4. Turn the ignition ON, with the engine OFF. 5. Using the DMM, measure the voltage between connector terminal 9 and terminal 63. 6. Turn the ignition OFF. 7. Measure the voltage between connector terminal 63 and terminal 69. 8. Subtract the voltage reading obtained in sub-step 5 from the voltage reading obtained in sub-step 3. Is the voltage greater than the specified value?	0.5 V	Go to Step 6	Go to Step 8
6	1. Turn the ignition ON, with the engine OFF. 2. Using the DMM, measure the voltage between connector terminal 9 and terminal 10. 3. Measure the voltage between connector terminal 9 and terminal 70. 4. Turn the ignition OFF, monitoring the system voltage during shut-down. Was a loss of voltage detected?	—	Go to Step 7	Go to Step 8
7	1. Inspect the transmission wiring harness assembly. 2. Repair the transmission wiring harness assembly. Refer to Circuit Tsting and Wiring Repairs . Did you complete the repair?	—	Go to Step 9	—
8	**IMPORTANT:** *In most cases, the TCM is not at fault. Investigate thoroughly before replacing the TCM. Swap the TCM with a known good TCM to confirm diagnosis.* Replace the TCM. Refer to Control Module References for replacement, setup, and programming. Did you complete the replacement?	—	Go to Step 9	—

DTC P0880				
Step	**Action**	**Value**	**Yes**	**No**
9	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Using the scan tool, monitor system voltage. 3. Select Specific DTC. 4. Enter DTC P0880. Has the test run and passed?		Go to Step 10	Go to Step 2
10	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?		Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P0881

Circuit Description

The transmission control module (TCM) requires direct battery voltage to operate properly.

DTC P0881 is a type C DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P0881 Transmission Control Module (TCM) Power Input Signal Performance

Conditions for Running the DTC

- Engine speed is greater than 400 RPM for 0.5 second.

Conditions for Setting the DTC

DTC P0881 sets when the TCM detects a battery direct voltage variation of 4.0 volts or greater for 30 seconds.

Action Taken When the DTC Sets

- The TCM does not illuminate the malfunction indicator lamp (MIL).
- Hydraulic default is commanded. Shift selector position and hydraulic state of logic valves determine range.
- The TCM inhibits main modulation.
- The TCM inhibits torque converter clutch (TCC) engagement.

Conditions for Clearing the DTC

A scan tool can clear the code from TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

- Inspect the wiring for poor electrical connections at the TCM. Inspect for the following conditions:
  – A bent terminal
  – A backed-out terminal

– A damaged terminal

– Poor terminal tension

– A chafed wire

– A broken wire inside the insulation

- When diagnosing for an intermittent short or open, massage the wiring harness while watching the test equipment for a change.
- You may have to drive the vehicle in order to experience a condition.
- Vehicle accessories imposing a large load on the battery circuit could also cause this DTC to set.
- Loose or corroded battery cables could allow this DTC to set.
- An internal TCM failure, due to a burn up circuit trace, could allow this DTC to set.
- Vehicle charging system failure may cause this DTC to set under certain circumstances.
- A defective vehicle battery may induce this DTC.
- Running the engine with a battery charger attached may cause this DTC to set.

Test Description

The number below refers to the step number on the diagnostic table.

3. This step tests for proper TCM battery direct voltage.

DTC P0881				
Step	**Action**	**Value**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics				
1	Did you perform the Diagnostic System Check - Vehicle?	—	Go to Step 2	Go to Diagnostic System Check - Vehicle
2	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** *Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.* 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Using the scan tool, monitor TCM input voltage. Is voltage within the specified value?	B+	Go to Diagnostic Aids	Go to Step 3
3	1. Turn the ignition OFF. 2. Disconnect the 80-way connector at the TCM. 3. Install the J 39700 breakout box, the J-47275 breakout box adapter and the J 47275-1 magnetic overlay. 4. Use the DMM, and in sequence, measure voltage at connector terminals 10 and 70 and a known good ground. Is the voltage greater than the specified value?	B+	Go to Testing for Intermittent Conditions and Poor Connections	Go to Step 4
4	Test the battery positive voltage circuit or the engine control module (ECM) B voltage circuit for loose or corroded connectors. Did you find and correct a condition?	—	Go to Step 6	Go to Step 5
5	**IMPORTANT:** *In most cases, the TCM is not at fault. Investigate thoroughly before replacing the TCM.* Replace the TCM. Refer to Control Module References for replacement, setup, and programming. Did you complete the replacement?	—	Go to Step 6	—

DTC P0881				
Step	**Action**	**Value**	**Yes**	**No**
6	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Using the scan tool, monitor TCM voltage. 3. Select Specific DTC. 4. Enter DTC P0881. Has the test run and passed?	—	Go to Step 7	Go to Step 2
7	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	—	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P0882

Circuit Description

The transmission control module (TCM) requires direct battery voltage to operate properly.

DTC P0882 is a type C DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P0882 Transmission Control Module (TCM) Power Input Signal Low

Conditions for Running the DTC

- Engine speed is greater than 400 RPM for 5 seconds.

Conditions for Setting the DTC

DTC P0882 sets when the TCM detects a battery direct voltage below 8 volts at 0°C (32°F) for a total of 5 out of 7 seconds. The voltage threshold is temperature dependent varying from 5 volts at -60° C (-75°F) to 9 volts at 20° C (68°F).

Action Taken When the DTC Sets

- The TCM does not illuminate the malfunction indicator lamp (MIL).
- Hydraulic default is commanded. Shift selector position and hydraulic state of logic valves determine range.
- The TCM inhibits main modulation.
- The TCM inhibits torque converter clutch (TCC) engagement.

Conditions for Clearing the DTC

A scan tool can clear the code from TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

- Inspect the wiring for poor electrical connections at the TCM. Inspect for the following conditions:
  – A bent terminal
  – A backed-out terminal
  – A damaged terminal
  – Poor terminal tension
  – A chafed wire
  – A broken wire inside the insulation
- When diagnosing for an intermittent short or open, massage the wiring harness while watching the test equipment for a change.
- You may have to drive the vehicle in order to experience a condition.
- A defective vehicle battery may allow this DTC to set. Test the vehicle battery to verify proper voltage and load capacity.
- A defective vehicle charging system may cause this DTC to set.

DTC P0882				
Step	**Action**	**Value**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics				
1	Did you perform the Diagnostic System Check - Vehicle?	—	Go to Step 2	Go to Diagnostic System Check - Vehicle
2	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** ***Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.*** 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Using the scan tool, monitor TCM battery direct voltage. Is voltage within the specified value?	B+	Go to Diagnostic Aids	Go to Step 3
3	1. Start the engine. 2. Observe the charge indicator on the instrument cluster. Refer to Charging System Test . Does the charge indicator illuminate or the driver information center (DIC) display a charging system message?	—	Go to Step 5	Go to Step 4
4	Replace the battery or resolve the battery condition. Refer to Battery Inspection/Test . Did you replace the battery or resolve the battery condition?	—	Go to Step 6	—
5	Repair the charging system. Refer to Charging System Test or Generator Replacement . Did you complete the repair?	—	Go to Step 6	—

DTC P0882				
Step	**Action**	**Value**	**Yes**	**No**
6	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Using the scan tool, monitor TCM voltage. 3. Select Specific DTC. 4. Enter DTC P0882. Has the test run and passed?	—	Go to Step 7	Go to Step 2
7	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	—	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P0883

Circuit Description

The transmission control module (TCM) requires direct battery voltage to operate properly.

DTC P0883 is a type C DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P0883 Transmission Control Module (TCM) Power Input Signal High

Conditions for Running the DTC

- Engine speed is greater than 400 RPM for 1 second.

Conditions for Setting the DTC

DTC P0883 sets when the TCM detects battery direct voltage greater than 18 volts for 6 out of 10 seconds.

Action Taken When the DTC Sets

- The TCM does not illuminate the malfunction indicator lamp (MIL).
- Hydraulic default is commanded. Shift selector position and hydraulic state of logic valves determine range.
- The TCM inhibits main modulation.
- The TCM inhibits torque converter clutch (TCC) engagement.

Conditions for Clearing the DTC

A scan tool can clear the code from TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

- Inspect the wiring for poor electrical connections at the TCM. Inspect for the following conditions:
  – A bent terminal
  – A backed-out terminal
  – A damaged terminal
  – Poor terminal tension
  – A chafed wire
  – A broken wire inside the insulation
- When diagnosing for an intermittent short or open, massage the wiring harness while watching the test equipment for a change.
- You may have to drive the vehicle in order to experience a condition.
- This DTC is normally set due to vehicle charging system concerns.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

2. This step tests for proper TCM battery direct voltage.
3. This step tests the vehicle charging system.

DTC P0883				
Step	**Action**	**Value**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics				
1	Did you perform the Diagnostic System Check - Vehicle?	—	Go to Step 2	Go to Diagnostic System Check - Vehicle
2	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** *Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.* 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Start the engine.Start the engine. 6. Using the scan tool, monitor TCM battery direct voltage. Is voltage within the specified value?	B+	Go to Diagnostic Aids	Go to Step 3
3	Monitor the vehicle charging system for voltage spikes. Refer to Charging System Test . Is the vehicle charging system operating properly?	B+	Go to Testing for Intermittent Conditions and Poor Connection	Go to Step 4
4	Repair the charging system. Refer to Charging System Test or Generator Replacement . Did you complete the repair?	—	Go to Step 5	—
5	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Using the scan tool, monitor TCM voltage. 3. Select Specific DTC. 4. Enter DTC P0883. Has the test run and passed?	—	Go to Step 6	Go to Step 2

DTC P0883				
Step	**Action**	**Value**	**Yes**	**No**
6	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	—	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P0960

Circuit Description

The pressure control solenoid main modulation (MAIN MOD) is a normally closed (N/C) solenoid used to modulate transmission main pressure. The transmission control module (TCM) commands the solenoid ON when specific transmission and engine conditions are met. When solenoid MAIN MOD is commanded ON, hydraulic pressure is routed to the main pressure regulator valve, lowering transmission main pressure.

The TCM provides voltage to the MAIN MOD, torque converter clutch (TCC) and pressure control solenoid 1 (PCS1) through a separate solid-state device called high side driver 1 (HSD1). The TCM uses a low side driver to switch MAIN MOD ON and OFF.

DTC P0960 is a type A DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P0960 Pressure Control Solenoid (PCS) Main Modulation (MAIN MOD) Circuit Open

Conditions for Running the DTC

- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.
- TCM initialization is in process or engine speed is greater than 200 RPM and less than 7,500 RPM for less than 5 seconds.
- The TCM must auto-detect the MAIN MOD solenoid for this test to run.

Conditions for Setting the DTC

DTC P0960 sets when the TCM detects an open condition on the MAIN MOD circuit for greater than 2 seconds.

Action Taken When the DTC Sets

- The TCM illuminates the malfunction indicator lamp (MIL).
- DTC P0960 is stored in TCM history.
- The TCM inhibits MAIN MOD.

Conditions for Clearing the DTC

A scan tool can clear the code from TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

- Inspect the wiring for poor electrical connections at the TCM. Inspect for the following conditions:
  - A bent terminal
  - A backed-out terminal
  - A damaged terminal
  - Poor terminal tension
  - A chafed wire
  - A broken wire inside the insulation
- When diagnosing for an intermittent short or open, massage the wiring harness while watching the test equipment for a change.
- You may have to drive the vehicle in order to experience a condition.
- DTC P0960, set in combination with DTC P2727 and P2761, may indicate an open in the high side driver circuit.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

3. This step tests the command signal from the TCM.
4. This step tests the resistance value of the external harness and solenoid.
5. This step tests the resistance value of the solenoid and tests the internal wiring harness for opens.
6. This step tests the resistance value of the solenoid.

DTC P0960				
Step	**Action**	**Value**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics				
1	Did you perform the Diagnostic System Check - Vehicle?	—	Go to Step 2	Go to Diagnostic System Check - Vehicle
2	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** ***Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.*** 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Using the scan tool, measure ignition voltage. Is voltage within the specified value?	9-18 V	Go to Step 3	Go to DTC P0562 for low voltage or DTC P0563 for high voltage
3	1. Turn the ignition OFF. 2. Disconnect the 80-way connector at the TCM. 3. Install the J 39700 breakout box, the J-47275 breakout box adapter and the J 47275-1 magnetic overlay. 4. Turn ON the ignition. 5. Using the DMM, measure voltage between connector terminal 74 and ground. 6. Using the scan tool, command solenoid MAIN MOD to ON. Is the voltage within the specified value when solenoid MAIN MOD is commanded ON?	B+	Go to Diagnostic Aids	Go to Step 4
4	1. Turn the ignition OFF. 2. Using the DMM, measure resistance at terminals 11 and 74. Is the resistance reading within the specified value?	22.0 ohms at 20°C (68°F)	Go to Testing for Intermittent Conditions and Poor Connections	Go to Step 5

DTC P0960				
Step	**Action**	**Value**	**Yes**	**No**
5	1. Turn the ignition OFF. 2. Disconnect the AT inline 20-way connector. Additional DTCs may set. 3. Install the J 44152 jumper harness (20 pins) on the engine side of the AT inline 20-way connector. 4. Using the DMM and the J 35616 GM terminal test kit, measure the resistance between terminals L and S of the J 44152 . Refer to Automatic Transmission Inline Harness Connector End View . Is the resistance within the specified value?	22.0 ohms at 20°C (68°F)	Go to Step 7	Go to Step 6
6	1. Remove the transmission oil pan. Refer to Oil Pan Replacement. 2. Remove the AT internal wiring harness at the solenoid MAIN MOD connector. 3. Using the DMM, measure the resistance of the MAIN MOD solenoid. Is the solenoid resistance within the specified value?	22.0 ohms at 20°C (68°F)	Go to Step 8	Go to Step 9
7	Test the MAIN MOD circuit between the TCM and the AT inline 20-way connector for an open condition. Refer to Testing for Continuity . Did you find and correct the condition?	—	Go to Step 11	Go to Step 10
8	Replace the AT internal wiring harness. Refer to Wiring Harness Replacement . Did you complete the replacement?	—	Go to Step 11	—
9	Replace the MAIN MOD solenoid. Refer to Control Valve Solenoid Replacement . Did you complete the replacement?	—	Go to Step 11	—
10	**IMPORTANT:** *In most cases, the TCM is not at fault. Investigate thoroughly before replacing the TCM.* Replace the TCM. Refer to Control Module References for replacement, setup, and programming. Did you complete the replacement?	—	Go to Step 11	—

DTC P0960				
Step	**Action**	**Value**	**Yes**	**No**
11	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Drive the vehicle under normal operating conditions. 3. Select Specific DTC. 4. Enter DTC P0960. Has the test run and passed?	—	Go to Step 12	Go to Step 2
12	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	—	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P0962

Circuit Description

The pressure control solenoid main modulation (MAIN MOD) is a normally closed (N/C) solenoid used to modulate transmission main pressure. The transmission control module (TCM) commands the solenoid ON when specific transmission and engine conditions are met. When solenoid MAIN MOD is commanded ON, hydraulic pressure is routed to the main pressure regulator valve, lowering transmission main pressure.

The TCM provides voltage to the MAIN MOD, torque converter clutch (TCC) and pressure control solenoid 1 (PCS1) through a separate solid-state device called high side driver 1 (HSD1). The TCM uses a low side driver to switch MAIN MOD ON and OFF.

DTC P0962 is a type A DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P0962 Pressure Control Solenoid (PCS) Main Modulation (MAIN MOD) Circuit Low

Conditions for Running the DTC

- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.
- TCM initialization is in process or engine speed is greater than 200 RPM and less than 7,500 RPM for less than 5 seconds.
- The TCM must auto-detect the MAIN MOD solenoid for this test to run.

Conditions for Setting the DTC

DTC P0962 sets when the TCM detects a short to ground condition in the MAIN MOD solenoid return circuit for greater than 2 seconds.

Action Taken When the DTC Sets

- The TCM illuminates the malfunction indicator lamp (MIL).
- DTC P0962 is stored in TCM history.
- The TCM inhibits MAIN MOD.

Conditions for Clearing the DTC

A scan tool can clear the code from TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

- Inspect the wiring for poor electrical connections at the TCM. Inspect for the following conditions:
  – A bent terminal
  – A backed-out terminal
  – A damaged terminal
  – Poor terminal tension
  – A chafed wire
  – A broken wire inside the insulation
- When diagnosing for an intermittent short or open, massage the wiring harness while watching the test equipment for a change.
- You may have to drive the vehicle in order to experience a condition.

DTC P0962				
Step	**Action**	**Value**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics				
1	Did you perform the Diagnostic System Check - Vehicle?	—	Go to Step 2	Go to Diagnostic System Check - Vehicle
2	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** *Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.* 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Using the scan tool, measure ignition voltage. Is voltage within the specified value?	9-18 V	Go to Step 3	Go to DTC P0562 for low voltage or DTC P0563 for high voltage
3	1. Turn the ignition OFF. 2. Disconnect the 80-way connector at the TCM. 3. Install the J 39700 breakout box, the J-47275 breakout box adapter and the J 47275-1 magnetic overlay. 4. Turn ON the ignition, with the engine OFF. 5. Using the DMM, measure voltage between connector terminal 74 and ground. 6. Using the scan tool, command MAIN MOD solenoid to OFF. Is the voltage within the specified value when MAIN MOD solenoid is commanded OFF?	B+	Go to Testing for Intermittent Conditions and Poor Connections	Go to Step 4
4	1. Turn OFF the ignition. 2. Disconnect the TCM from the J 39700 . Additional DTCs may set. 3. Using the DMM, measure resistance at terminals 11 and 74. Is the resistance reading within the specified value?	22.0 ohms at 20°C (68°F)	Go to Step 10	Go to Step 5

DTC P0962				
Step	**Action**	**Value**	**Yes**	**No**
5	1. Disconnect the AT inline 20-way connector. 2. Install the J 44152 jumper harness (20 pins) on the transmission side of the AT inline 20-way connector. 3. Using the DMM and the J 35616 GM terminal test kit, measure the resistance at terminal L and S of the J 44152 . Refer to Automatic Transmission Inline Harness Connector End View . Is the resistance within the specified value?	22.0 ohms at 20°C (68°F)	Go to Step 7	Go to Step 6
6	1. Remove the transmission oil pan. Refer to Oil Pan Replacement. 2. Remove the AT internal wiring harness at the MAIN MOD solenoid connector. 3. Using the DMM, measure the resistance of the MAIN MOD solenoid. Is the solenoid resistance within the specified value?	22.0 ohms at 20°C (68°F)	Go to Step 8	Go to Step 9
7	Test the MAIN MOD solenoid circuit between the TCM and the AT inline 20-way connector for a short to ground. Refer to Testing for Short to Ground . Did you find and correct the condition?	—	Go to Step 11	Go to Step 10
8	Replace the AT internal wiring harness. Refer to Wiring Harness Replacement . Did you complete the replacement?	—	Go to Step 11	—
9	Replace the MAIN MOD solenoid. Refer to Control Valve Solenoid Replacement . Did you complete the replacement?	—	Go to Step 11	—
10	**IMPORTANT:** *In most cases, the TCM is not at fault. Investigate thoroughly before replacing the TCM.* Replace the TCM. Refer to Control Module References for replacement, setup, and programming. Did you complete the replacement?	—	Go to Step 11	—

DTC P0962				
Step	**Action**	**Value**	**Yes**	**No**
11	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Drive the vehicle under normal operating conditions. 3. Select Specific DTC. 4. Enter DTC P0962. Has the test run and passed?	—	Go to Step 12	Go to Step 2
12	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	—	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P0963

Circuit Description

The pressure control solenoid (PCS) main modulation (MAIN MOD) is a normally closed (N/C) solenoid used to modulate transmission main pressure. The transmission control module (TCM) commands the solenoid ON when specific transmission and engine conditions are met. When solenoid MAIN MOD is commanded ON, hydraulic pressure is routed to the main pressure regulator valve, lowering transmission main pressure. The TCM provides voltage to the MAIN MOD, torque converter clutch (TCC) and pressure control solenoid 1 (PCS1) through a separate solid-state device called high side driver 1 (HSD1). The TCM uses a low side driver to switch MAIN MOD ON and OFF. DTC P0963 is a type A DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P0963 Pressure Control Solenoid (PCS) Main Modulation (MAIN MOD) Circuit High

Conditions for Running the DTC

- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.
- TCM initialization is in process or engine speed is greater than 200 RPM and less than 7,500 RPM for less than 5 seconds.
- The TCM must auto-detect the MAIN MOD solenoid for this test to run.

Conditions for Setting the DTC

DTC P0963 sets when the TCM detects a short to voltage in the MAIN MOD solenoid return circuit for greater than 2 seconds.

Action Taken When the DTC Sets

- The TCM illuminates the malfunction indicator lamp (MIL).
- DTC P0963 is stored in TCM history.
- The TCM inhibits MAIN MOD.

Conditions for Clearing the DTC

A scan tool can clear the code from TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

- Inspect the wiring for poor electrical connections at the TCM. Inspect for the following conditions:
  – A bent terminal
  – A backed-out terminal
  – A damaged terminal
  – Poor terminal tension
  – A chafed wire
  – A broken wire inside the insulation
- When diagnosing for an intermittent short or open, massage the wiring harness while watching the test equipment for a change.
- You may have to drive the vehicle in order to experience a condition.

DTC P0963				
Step	**Action**	**Value**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics				
1	Did you perform the Diagnostic System Check - Vehicle?	—	Go to Step 2	Go to Diagnostic System Check - Vehicle
2	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** *Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.* 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Using the scan tool, measure ignition voltage. Is voltage within the specified value?	9-18 V	Go to Step 3	Go to DTC P0562 for low voltage or DTC P0563 for high voltage
3	1. Turn the ignition OFF. 2. Disconnect the 80-way connector at the TCM. 3. Install the J 39700 breakout box, the J-47275 breakout box adapter and the J 47275-1 magnetic overlay. 4. Turn ON the ignition, with the engine OFF. 5. Using the DMM, measure voltage between connector terminal 74 and ground. 6. Using the scan tool, command MAIN MOD solenoid ON. Is the voltage within the specified value when MAIN MOD solenoid is commanded ON?	Less than battery voltage	Go to Testing for Intermittent Conditions and Poor Connections	Go to Step 4
4	1. Turn OFF the ignition. 2. Disconnect the TCM from the J 39700 . Additional DTCs may set. 3. Turn ON the ignition, with the engine OFF. 4. Using the DMM, measure voltage at terminal 74 and ground. Is the voltage greater than the specified value?	0 V	Go to Step 5	Go to Testing for Intermittent Conditions and Poor Connections

DTC P0963				
Step	**Action**	**Value**	**Yes**	**No**
5	1. Turn the ignition OFF. 2. Disconnect the AT inline 20-way connector. Additional DTCs may set. 3. Install the J 44152 jumper harness (20 pins) on the engine side of the AT inline 20-way connector. 4. Turn ON the ignition, with the engine OFF. 5. Using the DMM and the J 35616 GM terminal test kit, measure for voltage at terminal S and ground of the J 44152 . Refer to Automatic Transmission Inline Harness Connector End View . Is the voltage greater than the specified value?	0 V	Go to Step 8	Go to Step 6
6	1. Connect the AT inline 20-way connector. 2. Remove the transmission oil pan. Refer to Oil Pan Replacement . 3. Remove the AT internal wiring harness at the MAIN MOD connector. 4. Using the DMM, measure for voltage at terminal 2 of the MAIN MOD solenoid and ground. Is the voltage greater than the specified value?	0 V	Go to Step 9	Go to Step 7
7	1. Disconnect the torque converter clutch pressure control solenoid (TCC PCS) from the internal wiring harness. 2. Using the DMM, measure MAIN MOD solenoid resistance. Is resistance within the specified value?	5.05 ohms at 20°C (68°F)	Go to Testing for Intermittent Conditions and Poor Connections	Go to Step 10
8	Test the MAIN MOD solenoid circuit between the TCM and the AT inline 20-way connector for a short to voltage. Refer to Testing for a Short to Voltage . Did you find and correct the condition?	—	Go to Step 11	—
9	Replace the AT internal wiring harness. Refer to Wiring Harness Replacement . Did you complete the replacement?	—	Go to Step 11	—
10	Replace the MAIN MOD solenoid. Refer to Control Valve Solenoid Replacement . Did you complete the replacement?	—	Go to Step 11	—

DTC P0963				
Step	**Action**	**Value**	**Yes**	**No**
11	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Drive the vehicle under normal operating conditions. 3. Select Specific DTC. 4. Enter DTC P0963. Has the test run and passed?	—	Go to Step 12	Go to Step 2
12	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	—	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P0964

Circuit Description

The pressure control solenoid 2 (PCS2) is a pressure proportional to current (PCC) solenoid used to control on-coming, off-going and holding pressure to any 1 of the 5 clutches. The transmission control module (TCM) provides voltage to the PCS2, shift solenoid 1, 2, and 3 (SS1, SS2, and SS3) through a separate solid-state device called high side driver 2 (HSD2). The TCM regulates the amount of current to the PCS2 by switching the low side driver ON and OFF.

DTC P0964 is a type A DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P0964 Pressure Control Solenoid 2 (PCS2) Control Circuit Open (B)

Conditions for Running the DTC

- DTC P2670 and P2671 are not active.
- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.
- TCM initialization is in process or engine speed is greater than 200 RPM and less than 7,500 RPM for less than 5 seconds.
- TCM initialization is in process.
- Engine crank time is not extended.

Conditions for Setting the DTC

DTC P0964 sets when the TCM detects an open circuit on the PCS2 return circuit for greater than 2 seconds.

Action Taken When the DTC Sets

- The TCM illuminates the malfunction indicator lamp (MIL).

- If the failure occurs while in a forward range, a shift to 1st, 3rd or 5th range is made.
- While diagnostic response is active, if the shift selector is moved to NEUTRAL, the transmission will shift to NEUTRAL. If the shift selector is moved to REVERSE, the transmission will shift to REVERSE. If the shift selector is moved to a forward range or to REVERSE and the transmission is compromised by overspeeding or direction change, the transmission will shift to NEUTRAL.
- DTC P0964 is stored in TCM history.
- Main modulation (MAIN MOD) is inhibited.
- The TCM freezes shift adapts.
- The TCM inhibits torque converter clutch (TCC) engagement.

Conditions for Clearing the DTC

A scan tool can clear the code from TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

- Inspect the wiring for poor electrical connections at the TCM. Inspect for the following conditions:
  – A bent terminal
  – A backed-out terminal
  – A damaged terminal
  – Poor terminal tension
  – A chafed wire
  – A broken wire inside the insulation
- When diagnosing for an intermittent short or open, massage the wiring harness while watching the test equipment for a change.
- You may have to drive the vehicle in order to experience a condition.
- DTC P0964 set in combination with DTC P0972, P0975 and P0978 may indicate an open in the HSD2 circuit.

DTC P0964				
Step	**Action**	**Value**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics				
1	Did you perform the Diagnostic System Check - Vehicle?	—	Go to Step 2	Go to Diagnostic System Check - Vehicle
2	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** *Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.* 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Using the scan tool, measure ignition voltage. Is voltage within the specified value?	9-18 V	Go to Step 3	Go to DTC P0562 for low voltage or DTC P0563 for high voltage
3	1. Turn the ignition OFF. 2. Disconnect the 80-way connector at the TCM. 3. Install the J 39700 breakout box, the J-47275 breakout box adapter and the J 47275-1 magnetic overlay. Do not reconnect the TCM. 4. Using the DMM, measure resistance at terminals 36 and 71. Is the resistance reading within the specified value?	5.05 ohms at 20°C (68°F)	Go to Testing for Intermittent Conditions and Poor Connections	Go to Step 4
4	1. Turn OFF the ignition. 2. Disconnect the AT inline 20-way connector. Additional DTCs may set. 3. Install the J 44152 jumper harness (20 pins) on the transmission side of the AT inline 20-way connector. 4. Using the DMM and the J 35616 GM terminal test kit, measure the resistance between terminals N and P of the J 44152 . Refer to Automatic Transmission Inline Harness Connector End View. Is the resistance within the specified value?	5.05 ohms at 20°C (68°F)	Go to Step 6	Go to Step 5

DTC P0964				
Step	**Action**	**Value**	**Yes**	**No**
5	1. Remove the transmission oil pan. Refer to Oil Pan Replacement 2. Remove the AT internal wiring harness at the PCS2 connector. 3. Using the DMM, measure the resistance of the PCS2. Is the solenoid resistance within the specified value?	5.05 ohms at 20°C (68°F)	Go to Step 7	Go to Step 8
6	Test the PCS2 circuit between the TCM and the AT inline 20-way connector for an open condition. Refer to Testing for Continuity . Did you find and correct the condition?	—	Go to Step 10	Go to Step 9
7	Replace the AT internal wiring harness. Refer to Wiring Harness Replacement . Did you complete the replacement?	—	Go to Step 10	—
8	Replace the PCS2. Refer to Control Valve Solenoid Replacement . Did you complete the replacement?	—	Go to Step 10	—
9	**IMPORTANT:** *In most cases, the TCM is not at fault. Investigate thoroughly before replacing the TCM.* Replace the TCM. Refer to Control Module References for replacement, setup, and programming. Did you complete the replacement?	—	Go to Step 10	—
10	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Drive the vehicle under normal operating conditions. 3. Select Specific DTC. 4. Enter DTC P0964. Has the test run and passed?	—	Go to Step 11	Go to Step 2

DTC P0964				
Step	Action	Value	Yes	No
11	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	—	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P0966

Circuit Description

The pressure control solenoid 2 (PCS2) is a pressure proportional to current (PCC) solenoid used to control on-coming, off-going and holding pressure to any 1 of the 5 clutches. The transmission control module (TCM) provides voltage to the PCS2, shift solenoid 1, 2, and 3 (SS1, SS2, and SS3) through a separate solid-state device called high side driver 2 (HSD2). The TCM regulates the amount of current to the PCS2 by switching the low side driver ON and OFF.

DTC P0966 is a type A DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P0966 Pressure Control Solenoid 2 (PCS2) Control Circuit Low (B)

Conditions for Running the DTC

- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.
- TCM initialization is in process or engine speed is greater than 200 RPM and less than 7,500 RPM for 5 seconds.
- Engine crank time is not extended.
- Associated HSD2 is enabled and no HSD2 codes are active.

Conditions for Setting the DTC

DTC P0966 sets when the TCM detects a short to ground on the PCS2 circuit for greater than 2 seconds.

Action Taken When the DTC Sets

- The TCM illuminates the malfunction indicator lamp (MIL).
- If the failure occurs while in a forward range, a shift to 1st, 3rd or 5th range is made.
- While diagnostic response is active, if the shift selector is moved to NEUTRAL, the transmission will shift to NEUTRAL. If the shift selector is moved to REVERSE, the transmission will shift to REVERSE. If the shift selector is moved to a forward range or to REVERSE and the transmission is compromised by overspeeding or direction change, the transmission will shift to NEUTRAL.
- DTC P0966 is stored in TCM history.
- Main modulation (MAIN MOD) is inhibited.
- The TCM freezes shift adapts.
- The TCM inhibits torque converter clutch (TCC) engagement.

Conditions for Clearing the DTC

A scan tool can clear the code from TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

- Inspect the wiring for poor electrical connections at the TCM. Inspect for the following conditions:
  - A bent terminal
  - A backed-out terminal
  - A damaged terminal
  - Poor terminal tension
  - A chafed wire
  - A broken wire inside the insulation
- When diagnosing for an intermittent short or open, massage the wiring harness while watching the test equipment for a change.
- You may have to drive the vehicle in order to experience a condition.

DTC P0966				
Step	**Action**	**Value**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics				
1	Did you perform the Diagnostic System Check - Vehicle?	—	Go to Step 2	Go to Diagnostic System Check - Vehicle

DTC P0966				
Step	**Action**	**Value**	**Yes**	**No**
2	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** *Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.* 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Using the scan tool, measure ignition voltage. Is voltage within the specified value?	9-18 V	Go to Step 3	Go to DTC P0562 for low voltage or DTC P0563 for high voltage
3	1. Turn the ignition OFF. 2. Disconnect the 80-way connector at the TCM. 3. Install the J 39700 breakout box, the J-47275 breakout box adapter and the J 47275-1 magnetic overlay. 4. Turn ON the ignition. 5. Using the DMM, measure the voltage between connector terminal 36 and ground. 6. Using the scan tool, command the PCS2 OFF. Is the voltage within the specified value when the PCS2 is commanded OFF?	B+	Go to Diagnostic Aids	Go to Step 4
4	1. Turn the ignition OFF. 2. Using the DMM, measure resistance at terminals 36 and 71. Is the resistance reading within the specified value?	5.05 ohms at 20°C (68°F)	Go to Step 10	Go to Step 5

DTC P0966

Step	Action	Value	Yes	No
5	1. Turn the ignition OFF. 2. Disconnect the AT inline 20-way connector. Additional DTCs may set. 3. Install the J 44152 jumper harness (20 pins) on the engine side of the AT inline 20-way connector. 4. Using the DMM and the J 35616 GM terminal test kit, measure the resistance between terminals N and P of the J 44152 . Refer to Automatic Transmission Inline Harness Connector End View . Is the resistance within the specified value?	5.05 ohms at 20°C (68°F)	Go to Step 7	Go to Step 6
6	1. Remove the transmission oil pan. Refer to Oil Pan Replacement. 2. Remove the AT internal wiring harness at the PCS2 connector. 3. Using the DMM, measure the resistance of the PCS2. Is the solenoid resistance within the specified value?	5.05 ohms at 20°C (68°F)	Go to Step 8	Go to Step 9
7	Test the PCS2 circuit between the TCM and the AT inline 20-way connector for a short to ground condition. Refer to Testing for Short to Ground . Did you find and correct the condition?	—	Go to Step 11	—
8	Replace the AT internal wiring harness. Refer to Wiring Harness Replacement . Did you complete the replacement?	—	Go to Step 11	—
9	Replace the PCS2. Refer to Control Valve Solenoid Replacement . Did you complete the replacement?	—	Go to Step 11	—
10	**IMPORTANT:** *In most cases, the TCM is not at fault. Investigate thoroughly before replacing the TCM.* Replace the TCM. Refer to Control Module References for replacement, setup, and programming. Did you complete the replacement?	—	Go to Step 11	—

DTC P0966				
Step	**Action**	**Value**	**Yes**	**No**
11	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Drive the vehicle under normal operating conditions. 3. Select Specific DTC. 4. Enter DTC P0966. Has the test run and passed?	—	Go to Step 12	Go to Step 2
12	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	—	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P0967

Circuit Description

The pressure control solenoid 2 (PCS2) is a pressure proportional to current (PCC) solenoid used to control on-coming, off-going and holding pressure to any 1 of the 5 clutches. The transmission control module (TCM) provides voltage to the PCS2, shift solenoid 1, 2, and 3 (SS1, SS2, and SS3) through a separate solid-state device called high side driver 2 (HSD2). The TCM regulates the amount of current to the PCS2 by switching the low side driver ON and OFF.

DTC P0967 is a type A DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P0967 Pressure Control Solenoid 2 (PCS2) Control Circuit High (B)

Conditions for Running the DTC

- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.
- TCM initialization is in process or engine speed is greater than 200 RPM and less than 7,500 RPM for 5 seconds.
- Engine crank time is not extended.
- Associated HSD2 is enabled and no HSD2 codes are active.

Conditions for Setting the DTC

DTC P0967 sets when the TCM detects a short to power on the PCS2 circuit for greater than 2 seconds.

Action Taken When the DTC Sets

- The TCM illuminates the malfunction indicator lamp (MIL).
- If the failure occurs while in a forward range, a shift to 1st, 3rd or 5th range is made.

- While diagnostic response is active, if the shift selector is moved to NEUTRAL, the transmission will shift to NEUTRAL. If the shift selector is moved to REVERSE, the transmission will shift to REVERSE. If the shift selector is moved to a forward range or to REVERSE and the transmission is compromised by overspeeding or direction change, the transmission will shift to NEUTRAL.
- DTC P0967 is stored in TCM history.
- Main modulation (MAIN MOD) is inhibited..
- The TCM freezes shift adapts.
- The TCM inhibits torque converter clutch (TCC) engagement.

Conditions for Clearing the DTC

A scan tool can clear the code from TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

- Inspect the wiring for poor electrical connections at the TCM. Inspect for the following conditions:
  – A bent terminal
  – A backed-out terminal
  – A damaged terminal
  – Poor terminal tension
  – A chafed wire
  – A broken wire inside the insulation
- When diagnosing for an intermittent short or open, massage the wiring harness while watching the test equipment for a change.
- You may have to drive the vehicle in order to experience a condition.

DTC P0967				
Step	**Action**	**Value**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics				
1	Did you perform the Diagnostic System Check - Vehicle?	—	Go to Step 2	Go to Diagnostic System Check - Vehicle
2	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** *Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.* 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Using the scan tool, measure ignition voltage. Is voltage within the specified value?	9-18 V	Go to Step 3	Go to DTC P0562 for low voltage or DTC P0563 for high voltage
3	1. Turn the ignition OFF. 2. Disconnect the 80-way connector at the TCM. 3. Install the J 39700 breakout box, the J-47275 breakout box adapter and the J 47275-1 magnetic overlay. 4. Turn ON the ignition, with the engine OFF. 5. Using the DMM, measure the voltage between connector terminal 36 and ground. 6. Using the scan tool, command the PCS2 ON. Is the voltage within the specified value when the PCS2 is commanded ON?	Less than battery voltage	Go to Testing for Intermittent Conditions and Poor Connections	Go to Step 4
4	1. Turn the ignition OFF. 2. Disconnect the TCM from the J 39700 . Additional DTCs may set. 3. Turn ON the ignition, with the engine OFF. 4. Using the DMM, measure voltage at terminals 36 and ground. Is the voltage greater than the specified value?	0 V	Go to Step 5	Go to Testing for Intermittent Conditions and Poor Connections

DTC P0967				
Step	**Action**	**Value**	**Yes**	**No**
5	1. Turn the ignition OFF. 2. Disconnect the AT inline 20-way connector. Additional DTCs may set. 3. Install the J 44152 jumper harness (20 pins) on the engine side of the AT inline 20-way connector. 4. Turn ON the ignition, with the engine OFF. 5. Using the DMM and the J 35616 GM terminal test kit, measure for voltage at terminal P and ground of the J 44152 . Refer to Automatic Transmission Inline Harness Connector End View. Is the voltage greater than the specified value?	0 V	Go to Step 8	Go to Step 6
6	1. Connect the AT inline 20-way connector. 2. Remove the transmission oil pan. Refer to Oil Pan Replacement. 3. Remove the AT internal wiring harness at the pressure control solenoid 1 (PCS1) connector. 4. Using the DMM, measure for voltage at terminal 2 of the PCS2 and ground. Is the voltage greater than the specified value?	0 V	Go to Step 9	Go to Step 7
7	1. Disconnect the PCS2 from the internal wiring harness. 2. Using the DMM, measure PCS2 resistance. Is resistance within the specified value?	5.05 ohms at 20°C (68°F)	Go to Testing for Intermittent Conditions and Poor Connections	Go to Step 10
8	Test the PCS2 circuit between the TCM and the AT inline 20-way connector for a short to voltage. Refer to Testing for a Short to Voltage . Did you find and correct the condition?	—	Go to Step 11	—
9	Replace the AT internal wiring harness. Refer to Wiring Harness Replacement . Did you complete the replacement?	—	Go to Step 11	—
10	Replace the PCS2. Refer to Control Valve Solenoid Replacement . Did you complete the replacement?	—	Go to Step 11	—

DTC P0967				
Step	Action	Value	Yes	No
11	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Drive the vehicle under normal operating conditions. 3. Select Specific DTC. 4. Enter DTC P0967. Has the test run and passed?	—	Go to Step 12	Go to Step 2
12	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	—	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P0972

Circuit Description

Shift solenoid 1 (SS1) is a normally closed (N/C) solenoid that provides control main pressure to stroke shift valve 1. The transmission control module (TCM) determines the proper solenoid command logic to move shift valve 1 to attain a particular range.

The TCM provides voltage to pressure control solenoid 2 (PCS2) and shift solenoid 1, 2, and 3 (SS1, SS2, and SS3) through a separate solid-state device called high side driver 2 (HSD2). The TCM uses a low side driver to switch SS1 ON and OFF.

Since the valve state, stroked or unstroked, is critical to providing the correct transmission range, the shift valve has a pressure switch, located in the pressure switch manifold, to provide feedback to the TCM about the position of the valve.

DTC P0972 is a type A DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P0972 Shift Solenoid 1 (SS1) Control Circuit Open

Conditions for Running the DTC

- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.
- TCM initialization is in process or engine speed is greater than 200 RPM and less than 7,500 RPM for 5 seconds.

Conditions for Setting the DTC

DTC P0972 sets when the TCM detects an open condition in the SS1 return circuit for greater than 2 seconds.

Action Taken When the DTC Sets

- The TCM illuminates the malfunction indicator lamp (MIL).
- If the failure occurs while in a forward range, a shift to 1st, 3rd or 5th range is made.
- While diagnostic response is active, if the shift selector is moved to NEUTRAL, the transmission will shift to NEUTRAL. If the shift selector is moved to REVERSE, the transmission will shift to REVERSE. If the shift selector is moved to a forward range or to REVERSE and the transmission is compromised by overspeeding or direction change, the transmission will shift to NEUTRAL.
- DTC P0972 is stored in TCM history.
- Main modulation (MAIN MOD) is inhibited..
- The TCM freezes shift adapts.
- The TCM inhibits torque converter clutch (TCC) engagement.

Conditions for Clearing the DTC

A scan tool can clear the code from TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

- Inspect the wiring for poor electrical connections at the TCM. Inspect for the following conditions:
  – A bent terminal
  – A backed-out terminal
  – A damaged terminal
  – Poor terminal tension
  – A chafed wire
  – A broken wire inside the insulation
- When diagnosing for an intermittent short or open, massage the wiring harness while watching the test equipment for a change.
- You may have to drive the vehicle in order to experience a condition.
- DTC P0972, when set in combination with DTC P0964, P0975 and P0978, may indicate an open in the actuator supply voltage 2 circuit.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

3. This step tests the command signal from the TCM.
4. This step tests the resistance value of the external harness and solenoid.
5. This step tests the resistance value of the solenoid, and tests the internal wiring harness for opens.
6. This step tests the resistance value of the solenoid.

DTC P0972				
Step	**Action**	**Value**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics				
1	Did you perform the Diagnostic System Check - Vehicle?	—	Go to Step 2	Go to Diagnostic System Check - Vehicle
2	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** *Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.* 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Test drive the vehicle while collecting a snapshot and verify that the code becomes active. Did the code become active?	Code Active	Go to Step 3	Go to Testing for Intermittent Conditions and Poor Connections
3	1. Turn the ignition OFF. 2. Disconnect the 80-way connector at the TCM. 3. Install the J 39700 breakout box, the J-47275 breakout box adapter and the J 47275-1 magnetic overlay. 4. Turn ON the ignition, with the engine OFF. 5. Using the DMM, measure the voltage between connector terminal 52 and terminal 9. 6. Using the scan tool, command SS1 to OFF. Is the voltage within the specified value when SS1 is commanded OFF?	B+	Go to Step 4	Go to Step 5
4	Using the scan tool, command the SS1 to ON. Did you get less than 0.5 volts with the solenoid commanded ON?	< 0.5 volts	Go to Testing for Intermittent Conditions and Poor Connections	Go to Step 10

DTC P0972				
Step	**Action**	**Value**	**Yes**	**No**
5	1. Disconnect the AT inline 20-way connector. 2. Install the J 44152 jumper harness (20 pins) on the transmission side of the AT inline 20-way connector. 3. Using the DMM and the J 35616 GM terminal test kit, measure the resistance at terminal A and N of the J 44152 . Refer to Automatic Transmission Inline Harness Connector End View . Is the resistance within the specified value?	22.0 ohms at 20°C (68°F)	Go to Step 7	Go to Step 6
6	1. Remove the transmission oil pan. Refer to Oil Pan Replacement. 2. Remove the AT internal wiring harness at the SS1 connector. 3. Using the DMM, measure the resistance of SS1. Is the solenoid resistance within the specified value?	22.0 ohms at 20°C (68°F)	Go to Step 8	Go to Step 9
7	Test the SS1 circuit between the TCM and the AT inline 20-way connector for an open condition. Refer to Testing for Continuity . Did you find and correct the condition?	—	Go to Step 11	—
8	Replace the AT internal wiring harness. Refer to Wiring Harness Replacement . Did you complete the replacement?	—	Go to Step 11	—
9	Replace the SS1. Refer to Control Valve Solenoid Replacement . Did you complete the replacement?	—	Go to Step 11	—
10	**IMPORTANT:** *In most cases, the TCM is not at fault. Investigate thoroughly before replacing the TCM. Swap the TCM with a known good TCM to confirm diagnosis.* Replace the TCM. Refer to Control Module References for replacement, setup and programming. Did you complete the replacement?	—	Go to Step 11	—

DTC P0972				
Step	**Action**	**Value**	**Yes**	**No**
11	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Drive the vehicle under normal operating conditions. 3. Select Specific DTC. 4. Enter DTC P0972. Has the test run and passed?	—	Go to Step 12	Go to Step 2
12	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	—	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P0973

Circuit Description

Shift solenoid 1 (SS1) is a normally closed (N/C) solenoid that provides control main pressure to stroke shift valve 1. The transmission control module (TCM) determines the proper solenoid command logic to move shift valve 1 to attain a particular range.

The TCM provides voltage to pressure control solenoid 2 (PCS2) and shift solenoid 1, 2, and 3 (SS1, SS2, and SS3) through a separate solid-state device called high side driver 2 (HSD2). The TCM uses a low side driver to switch SS1 ON and OFF.

Since the valve state, stroked or unstroked, is critical to providing the correct transmission range, the shift valve has a pressure switch, located in the pressure switch manifold, to provide feedback to the TCM about the position of the valve.

DTC P0973 is a type A DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P0973 Shift Solenoid 1 (SS1) Control Circuit Low

Conditions for Running the DTC

- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.
- TCM initialization is in process or engine speed is greater than 200 RPM and less than 7,500 RPM for 5 seconds.

Conditions for Setting the DTC

DTC P0973 sets when the TCM detects a short to ground in the SS1 return circuit for greater than 2 seconds.

Action Taken When the DTC Sets

- The TCM illuminates the malfunction indicator lamp (MIL).
- If the failure occurs while in a forward range, a shift to 1st, 3rd or 5th range is made.
- While diagnostic response is active, if the shift selector is moved to NEUTRAL, the transmission will shift to NEUTRAL. If the shift selector is moved to REVERSE, the transmission will shift to REVERSE. If the shift selector is moved to a forward range or to REVERSE and the transmission is compromised by overspeeding or direction change, the transmission will shift to NEUTRAL.
- DTC P0973 is stored in TCM history.
- Main modulation (MAIN MOD) is inhibited..
- The TCM freezes shift adapts.
- The TCM inhibits torque converter clutch (TCC) engagement.

Conditions for Clearing the DTC

A scan tool can clear the code from TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

- Inspect the wiring for poor electrical connections at the TCM. Inspect for the following conditions:
  – A bent terminal
  – A backed-out terminal
  – A damaged terminal
  – Poor terminal tension
  – A chafed wire
  – A broken wire inside the insulation
- When diagnosing for an intermittent short or open, massage the wiring harness while watching the test equipment for a change.
- You may have to drive the vehicle in order to experience a condition.

DTC P0973				
Step	**Action**	**Value**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics				
1	Did you perform the Diagnostic System Check - Vehicle?	—	Go to Step 2	Go to Diagnostic System Check - Vehicle
2	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** ***Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.*** 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Using the scan tool, measure ignition voltage. Is voltage within the specified value?	9-18 V	Go to Step 3	Go to DTC P0562 for low voltage or DTC P0563 for high voltage
3	1. Turn the ignition OFF. 2. Disconnect the 80-way connector at the TCM. 3. Install the J 39700 breakout box, the J-47275 breakout box adapter and the J 47275-1 magnetic overlay. 4. Turn ON the ignition, with the engine OFF. 5. Using the DMM, measure the voltage between connector terminal 52 and ground. 6. Using the scan tool, command SS1 to OFF. Is the voltage within the specified value when SS1 is commanded OFF?	B+	Go to Testing for Intermittent Conditions and Poor Connections	Go to Step 4
4	1. Turn the ignition OFF. 2. Disconnect the TCM from the J 39700 . Additional DTCs may set. 3. Using the DMM, measure resistance at terminals 52 and 71. Is the resistance reading within the specified value?	22.0 ohms at 20°C (68°F)	Go to Step 10	Go to Step 5

DTC P0973				
Step	**Action**	**Value**	**Yes**	**No**
5	1. Disconnect the AT inline 20-way connector. 2. Install the J 44152 jumper harness (20 pins) on the transmission side of the AT inline 20-way connector. 3. Using the DMM and the J 35616 GM terminal test kit, measure the resistance at terminal A and N of the J 44152 . Refer to Automatic Transmission Inline Harness Connector End View. Is the resistance within the specified value?	22.0 ohms at 20°C (68°F)	Go to Step 7	Go to Step 6
6	1. Remove the transmission oil pan. Refer to Oil Pan Replacement. 2. Remove the AT internal wiring harness at the SS1 connector. 3. Using the DMM, measure the resistance of SS1. Is the solenoid resistance within the specified value?	22.0 ohms at 20°C (68°F)	Go to Step 8	Go to Step 9
7	Test the SS1 circuit between the TCM and the AT inline 20-way connector for a short to ground condition. Refer to Testing for Short to Ground . Did you find and correct the condition?	—	Go to Step 11	—
8	Replace the AT internal wiring harness. Refer to Wiring Harness Replacement . Did you complete the replacement?	—	Go to Step 11	—
9	Replace the SS1. Refer to Control Valve Solenoid Replacement . Did you complete the replacement?	—	Go to Step 11	—
10	**IMPORTANT:** *In most cases, the TCM is not at fault. Investigate thoroughly before replacing the TCM. Swap the TCM with a known good TCM to confirm diagnosis.* Replace the TCM. Refer to Control Module References for replacement, setup and programming. Did you complete the replacement?	—	Go to Step 11	—

DTC P0973				
Step	**Action**	**Value**	**Yes**	**No**
11	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Drive the vehicle under normal operating conditions. 3. Select Specific DTC. 4. Enter DTC P0973. Has the test run and passed?	—	Go to Step 12	Go to Step 2
12	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	—	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P0974

Circuit Description

Shift solenoid 1 (SS1) is a normally closed (N/C) solenoid that provides control main pressure to stroke shift valve 1. The transmission control module (TCM) determines the proper solenoid command logic to move shift valve 1 to attain a particular range.

The TCM provides voltage to pressure control solenoid 2 (PCS2) and shift solenoid 1, 2, and 3 (SS1, SS2, and SS3) through a separate solid-state device called high side driver 2 (HSD2). The TCM uses a low side driver to switch SS1 ON and OFF.

Since the valve state, stroked or unstroked, is critical to providing the correct transmission range, the shift valve has a pressure switch, located in the pressure switch manifold, to provide feedback to the TCM about the position of the valve.

DTC P0974 is a type A DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P0974 Shift Solenoid 1 (SS1) Control Circuit High

Conditions for Running the DTC

- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.
- TCM initialization is in process or engine speed is greater than 200 RPM and less than 7,500 RPM for 5 seconds.

Conditions for Setting the DTC

DTC P0974 sets when the TCM detects a short to power in the SS1 return circuit for greater than 2 seconds.

Action Taken When the DTC Sets

- The TCM illuminates the malfunction indicator lamp (MIL).

- If the failure occurs while in a forward range, a shift to 1st, 3rd or 5th range is made.
- While diagnostic response is active, if the shift selector is moved to NEUTRAL, the transmission will shift to NEUTRAL. If the shift selector is moved to REVERSE, the transmission will shift to REVERSE. If the shift selector is moved to a forward range or to REVERSE and the transmission is compromised by overspeeding or direction change, the transmission will shift to NEUTRAL.
- DTC P0974 is stored in TCM history.
- Main modulation (MAIN MOD) is inhibited..
- The TCM freezes shift adapts.
- The TCM inhibits torque converter clutch (TCC) engagement.

Conditions for Clearing the DTC

A scan tool can clear the code from TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

- Inspect the wiring for poor electrical connections at the TCM. Inspect for the following conditions:
  – A bent terminal
  – A backed-out terminal
  – A damaged terminal
  – Poor terminal tension
  – A chafed wire
  – A broken wire inside the insulation
- When diagnosing for an intermittent short or open, massage the wiring harness while watching the test equipment for a change.
- You may have to drive the vehicle in order to experience a condition.

DTC P0974				
Step	**Action**	**Value**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics				
1	Did you perform the Diagnostic System Check - Vehicle?	—	Go to Step 2	Go to Diagnostic System Check - Vehicle
2	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** *Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.* 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Using the scan tool, measure ignition voltage. Is voltage within the specified value?	9-18 V	Go to Step 3	Go to DTC P0562 for low voltage or DTC P0563 for high voltage
3	1. Turn the ignition OFF. 2. Disconnect the 80-way connector at the TCM. 3. Install the J 39700 breakout box, the J-47275 breakout box adapter and the J 47275-1 magnetic overlay. 4. Turn ON the ignition, with the engine OFF. 5. Using the DMM, measure the voltage between connector terminal 52 and ground. 6. Using the scan tool, command SS1 to ON. Is the voltage within the specified value when SS1 is commanded ON?	Less than battery voltage	Go to Testing for Intermittent Conditions and Poor Connections	Go to Step 4
4	1. Turn the ignition OFF. 2. Disconnect the TCM from the J 39700 . Additional DTCs may set. 3. Turn ON the ignition, with the engine OFF. 4. Using the DMM, measure voltage at terminal 52 and ground. Is the voltage greater than the specified value?	0 V	Go to Step 5	Go to Testing for Intermittent Conditions and Poor Connections

DTC P0974				
Step	**Action**	**Value**	**Yes**	**No**
5	1. Turn the ignition OFF. 2. Disconnect the AT inline 20-way connector. Additional DTCs may set. 3. Install the J 44152 jumper harness (20 pins) on the engine side of the AT inline 20-way connector. 4. Turn ON the ignition, with the engine OFF. 5. Using the DMM and the J 35616 GM terminal test kit, measure for voltage at terminal A and ground of the J 44152 . Refer to Automatic Transmission Inline Harness Connector End View . Is the voltage greater than the specified value?	0 V	Go to Step 8	Go to Step 6
6	1. Connect the AT inline 20-way connector. 2. Remove the transmission oil pan. Refer to Oil Pan Replacement . 3. Remove the AT internal wiring harness at the SS1 connector. 4. Using the DMM, measure for voltage at terminal B of SS1 and ground. Is the voltage greater than the specified value?	0 V	Go to Step 9	Go to Step 7
7	1. Disconnect SS1 from the internal wiring harness. 2. Using the DMM, measure SS1 resistance. Is resistance within the specified value?	22.0 ohms at 20°C (68°F)	Go to Testing for Intermittent Conditions and Poor Connections	Go to Step 10
8	Test the SS1 circuit between the TCM and the AT inline 20-way connector for a short to voltage. Refer to Testing for a Short to Voltage . Did you find and correct the condition?	—	Go to Step 11	—
9	Replace the AT internal wiring harness. Refer to Wiring Harness Replacement . Did you complete the replacement?	—	Go to Step 11	—
10	Replace the SS1. Refer to Control Valve Solenoid Replacement . Did you complete the replacement?	—	Go to Step 11	—

DTC P0974				
Step	Action	Value	Yes	No
11	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Drive the vehicle under normal operating conditions. 3. Select Specific DTC. 4. Enter DTC P0974. Has the test run and passed?	—	Go to Step 12	Go to Step 2
12	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	—	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P0975

Circuit Description

Shift solenoid 2 (SS2) is a normally closed (N/C) solenoid that provides control main pressure to stroke shift valve 2. The transmission control module (TCM) determines the proper solenoid command logic to move shift valve 2 to attain a particular range.

The TCM provides voltage to pressure control solenoid 2 (PCS2) and shift solenoid 1, 2, and 3 (SS1, SS2, and SS3) through a separate solid-state device called high side driver 2 (HSD2). The TCM uses a low side driver to switch SS2 ON and OFF.

Since the valve state, stroked or unstroked, is critical to providing the correct transmission range, the shift valve has a pressure switch, located in the pressure switch manifold, to provide feedback to the TCM about the position of the valve.

DTC P0975 is a type A DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P0975 Shift Solenoid 2 (SS2) Control Circuit Open

Conditions for Running the DTC

- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.
- TCM initialization is in process or engine speed is greater than 200 RPM and less than 7,500 RPM for 5 seconds.

Conditions for Setting the DTC

DTC P0975 sets when the TCM detects an open condition in the SS2 return circuit for greater than 2 seconds.

Action Taken When the DTC Sets

- The TCM illuminates the malfunction indicator lamp (MIL).
- If the failure occurs while in a forward range, a shift to 1st, 3rd or 5th range is made.
- While diagnostic response is active, if the shift selector is moved to NEUTRAL, the transmission will shift to NEUTRAL. If the shift selector is moved to REVERSE, the transmission will shift to REVERSE. If the shift selector is moved to a forward range or to REVERSE and the transmission is compromised by overspeeding or direction change, the transmission will shift to NEUTRAL.
- DTC P0975 is stored in TCM history.
- Main modulation (MAIN MOD) is inhibited..
- The TCM freezes shift adapts.
- The TCM inhibits torque converter clutch (TCC) engagement.

Conditions for Clearing the DTC

A scan tool can clear the code from TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

- Inspect the wiring for poor electrical connections at the TCM. Inspect for the following conditions:
  – A bent terminal
  – A backed-out terminal
  – A damaged terminal
  – Poor terminal tension
  – A chafed wire
  – A broken wire inside the insulation
- When diagnosing for an intermittent short or open, massage the wiring harness while watching the test equipment for a change.
- You may have to drive the vehicle in order to experience a condition.
- DTC P0975, when set in combination with DTC P0964, P0972 and P0978, may indicate an open in the actuator supply voltage 2 circuit

Test Description

The numbers below refer to the step numbers on the diagnostic table.

3. This step tests the command signal from the TCM.
4. This step tests the resistance value of the external harness and solenoid.
5. This step tests the resistance value of the solenoid, and tests the internal wiring harness for opens.
6. This step tests the resistance value of the solenoid.

DTC P0975				
Step	**Action**	**Value**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics				
1	Did you perform the Diagnostic System Check - Vehicle?	—	Go to Step 2	Go to Diagnostic System Check - Vehicle
2	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** *Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.* 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Test drive the vehicle while collecting a snapshot and verify that the code becomes active. Did the code become active?	Code Active	Go to Step 3	Go to Testing for Intermittent Conditions and Poor Connections
3	1. Turn the ignition OFF. 2. Disconnect the 80-way connector at the TCM. 3. Install the J 39700 breakout box, the J-47275 breakout box adapter and the J 47275-1 magnetic overlay. 4. Turn ON the ignition, with the engine OFF. 5. Using the DMM, measure the voltage between connector terminal 33 and ground. 6. Using the scan tool, command SS2 to OFF. Is the voltage within the specified value when SS2 is commanded OFF?	B+	Go to Step 4	Go to Step 5
4	Using the scan tool, command the SS2 to ON. Did you get less than 0.5 volts with the solenoid commanded ON?	< 0.5 volts	Go to Testing for Intermittent Conditions and Poor Connections	Go to Step 10

DTC P0975				
Step	**Action**	**Value**	**Yes**	**No**
5	1. Disconnect the AT inline 20-way connector. 2. Install the J 44152 jumper harness (20 pins) on the transmission side of the AT inline 20-way connector. 3. Using the DMM and the J 35616 GM terminal test kit, measure the resistance at terminal B and N of the J 44152 . Refer to Automatic Transmission Inline Harness Connector End View . Is the resistance within the specified value?	22.0 ohms at 20°C (68°F)	Go to Step 7	Go to Step 6
6	1. Remove the transmission oil pan. Refer to Oil Pan Replacement. 2. Remove the AT internal wiring harness at the SS2 connector. 3. Using the DMM, measure the resistance of SS2. Is the solenoid resistance within the specified value?	22.0 ohms at 20°C (68°F)	Go to Step 8	Go to Step 9
7	Test the SS2 circuit between the TCM and the AT inline 20-way connector for an open condition. Refer to Testing for Continuity . Did you find and correct the condition?	—	Go to Step 11	—
8	Replace the AT internal wiring harness. Refer to Wiring Harness Replacement . Did you complete the replacement?	—	Go to Step 11	—
9	Replace the SS2. Refer to Control Valve Solenoid Replacement . Did you complete the replacement?	—	Go to Step 11	—
10	**IMPORTANT:** *In most cases, the TCM is not at fault. Investigate thoroughly before replacing the TCM. Swap the TCM with a known good TCM to confirm diagnosis.* Replace the TCM. Refer to Control Module References for replacement, setup and programming. Did you complete the replacement?	—	Go to Step 11	—

DTC P0975				
Step	**Action**	**Value**	**Yes**	**No**
11	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Drive the vehicle under normal operating conditions. 3. Select Specific DTC. 4. Enter DTC P0975. Has the test run and passed?	—	Go to Step 12	Go to Step 2
12	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	—	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P0976

Circuit Description

Shift solenoid 2 (SS2) is a normally closed (N/C) solenoid that provides control main pressure to stroke shift valve 2. The transmission control module (TCM) determines the proper solenoid command logic to move shift valve 2 to attain a particular range.

The TCM provides voltage to pressure control solenoid 2 (PCS2) and shift solenoid 1, 2, and 3 (SS1, SS2, and SS3) through a separate solid-state device called high side driver 2 (HSD2). The TCM uses a low side driver to switch SS2 ON and OFF.

Since the valve state, stroked or unstroked, is critical to providing the correct transmission range, the shift valve has a pressure switch, located in the pressure switch manifold, to provide feedback to the TCM about the position of the valve.

DTC P0976 is a type A DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P0976 Shift Solenoid 2 (SS2) Control Circuit Low

Conditions for Running the DTC

- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.
- TCM initialization is in process or engine speed is greater than 200 RPM and less than 7,500 RPM for 5 seconds.

Conditions for Setting the DTC

DTC P0976 sets when the TCM detects a short to ground in the SS2 return circuit for greater than 2 seconds.

Action Taken When the DTC Sets

- The TCM illuminates the malfunction indicator lamp (MIL).
- If the failure occurs while in a forward range, a shift to 1st, 3rd or 5th range is made.
- While diagnostic response is active, if the shift selector is moved to NEUTRAL, the transmission will shift to NEUTRAL. If the shift selector is moved to REVERSE, the transmission will shift to REVERSE. If the shift selector is moved to a forward range or to REVERSE and the transmission is compromised by overspeeding or direction change, the transmission will shift to NEUTRAL.
- DTC P0976 is stored in TCM history.
- Main modulation (MAIN MOD) is inhibited..
- The TCM freezes shift adapts.
- The TCM inhibits torque converter clutch (TCC) engagement.

Conditions for Clearing the DTC

A scan tool can clear the code from TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

- Inspect the wiring for poor electrical connections at the TCM. Inspect for the following conditions:
  – A bent terminal
  – A backed-out terminal
  – A damaged terminal
  – Poor terminal tension
  – A chafed wire
  – A broken wire inside the insulation
- When diagnosing for an intermittent short or open, massage the wiring harness while watching the test equipment for a change.
- You may have to drive the vehicle in order to experience a condition.

DTC P0976				
Step	**Action**	**Value**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics				
1	Did you perform the Diagnostic System Check - Vehicle?	—	Go to Step 2	Go to Diagnostic System Check - Vehicle
2	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** ***Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.*** 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Using the scan tool, measure ignition voltage. Is voltage within the specified value?	9-18 V	Go to Step 3	Go to DTC P0562 for low voltage or DTC P0563 for high voltage
3	1. Turn the ignition OFF. 2. Disconnect the 80-way connector at the TCM. 3. Install the J 39700 breakout box, the J-47275 breakout box adapter and the J 47275-1 magnetic overlay. 4. Turn ON the ignition, with the engine OFF. 5. Using the DMM, measure the voltage between connector terminal 33 and ground. 6. Using the scan tool, command SS2 to OFF. Is the voltage within the specified value when SS2 is commanded OFF?	B+	Go to Testing for Intermittent Conditions and Poor Connections	Go to Step 4
4	1. Turn the ignition OFF. 2. Disconnect the TCM from the J 39700 . Additional DTCs may set. 3. Using the DMM, measure resistance at terminals 33 and 71. Is the resistance reading within the specified value?	22.0 ohms at 20°C (68°F)	Go to Step 10	Go to Step 5

DTC P0976				
Step	**Action**	**Value**	**Yes**	**No**
5	1. Disconnect the AT inline 20-way connector. 2. Install the J 44152 jumper harness (20 pins) on the transmission side of the AT inline 20-way connector. 3. Using the DMM and the J 35616 GM terminal test kit, measure the resistance at terminal B and N of the J 44152 . Refer to Automatic Transmission Inline Harness Connector End View. Is the resistance within the specified value?	22.0 ohms at 20°C (68°F)	Go to Step 7	Go to Step 6
6	1. Remove the transmission oil pan. Refer to Oil Pan Replacement. 2. Remove the AT internal wiring harness at the SS2 connector. 3. Using the DMM, measure the resistance of SS2. Is the solenoid resistance within the specified value?	22.0 ohms at 20°C (68°F)	Go to Step 8	Go to Step 9
7	Test the SS2 circuit between the TCM and the AT inline 20-way connector for a short to ground. Refer to Testing for Short to Ground . Did you find and correct the condition?	—	Go to Step 11	—
8	Replace the AT internal wiring harness. Refer to Wiring Harness Replacement . Did you complete the replacement?	—	Go to Step 11	—
9	Replace the SS2. Refer to Control Valve Solenoid Replacement . Did you complete the replacement?	—	Go to Step 11	—
10	**IMPORTANT:** *In most cases, the TCM is not at fault. Investigate thoroughly before replacing the TCM. Swap the TCM with a known good TCM to confirm diagnosis.* Replace the TCM. Refer to Control Module References for replacement, setup and programming. Did you complete the replacement?	—	Go to Step 11	—

DTC P0976				
Step	**Action**	**Value**	**Yes**	**No**
11	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Drive the vehicle under normal operating conditions. 3. Select Specific DTC. 4. Enter DTC P0976. Has the test run and passed?	—	Go to Step 12	Go to Step 2
12	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	—	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P0977

Circuit Description

Shift solenoid 2 (SS2) is a normally closed (N/C) solenoid that provides control main pressure to stroke shift valve 2. The transmission control module (TCM) determines the proper solenoid command logic to move shift valve 2 to attain a particular range.

The TCM provides voltage to pressure control solenoid 2 (PCS2) and shift solenoid 1, 2, and 3 (SS1, SS2, and SS3) through a separate solid-state device called high side driver 2 (HSD2). The TCM uses a low side driver to switch SS2 ON and OFF.

Since the valve state, stroked or unstroked, is critical to providing the correct transmission range, the shift valve has a pressure switch, located in the pressure switch manifold, to provide feedback to the TCM about the position of the valve.

DTC P0977 is a type A DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P0977 Shift Solenoid 2 (SS2) Control Circuit High

Conditions for Running the DTC

- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.
- TCM initialization is in process or engine speed is greater than 200 RPM and less than 7,500 RPM for 5 seconds.

Conditions for Setting the DTC

DTC P0977 sets when the TCM detects a short to power in the SS2 return circuit for greater than 2 seconds.

Action Taken When the DTC Sets

- The TCM illuminates the malfunction indicator lamp (MIL).
- If the failure occurs while in a forward range, a shift to 1st, 3rd or 5th range is made.
- While diagnostic response is active, if the shift selector is moved to NEUTRAL, the transmission will shift to NEUTRAL. If the shift selector is moved to REVERSE, the transmission will shift to REVERSE. If the shift selector is moved to a forward range or to REVERSE and the transmission is compromised by overspeeding or direction change, the transmission will shift to NEUTRAL.
- DTC P0977 is stored in TCM history.
- Main modulation (MAIN MOD) is inhibited..
- The TCM freezes shift adapts.
- The TCM inhibits torque converter clutch (TCC) engagement.

Conditions for Clearing the DTC

A scan tool can clear the code from TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

- Inspect the wiring for poor electrical connections at the TCM. Inspect for the following conditions:
  – A bent terminal
  – A backed-out terminal
  – A damaged terminal
  – Poor terminal tension
  – A chafed wire
  – A broken wire inside the insulation
- When diagnosing for an intermittent short or open, massage the wiring harness while watching the test equipment for a change.
- You may have to drive the vehicle in order to experience a condition.

DTC P0977				
Step	**Action**	**Value**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics				
1	Did you perform the Diagnostic System Check - Vehicle?	—	Go to Step 2	Go to Diagnostic System Check - Vehicle
2	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** ***Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.*** 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Using the scan tool, measure ignition voltage. Is voltage within the specified value?	9-18 V	Go to Step 3	Go to DTC P0562 for low voltage or DTC P0563 for high voltage
3	1. Turn the ignition OFF. 2. Disconnect the 80-way connector at the TCM. 3. Install the J 39700 breakout box, the J-47275 breakout box adapter and the J 47275-1 magnetic overlay. 4. Turn ON the ignition, with the engine OFF. 5. Using the DMM, measure the voltage between connector terminal 33 and ground. 6. Using the scan tool, command SS2 to ON. Is the voltage within the specified value when SS2 is commanded ON?	Less than battery voltage	Go to Testing for Intermittent Conditions and Poor Connections	Go to Step 4
4	1. Turn the ignition OFF. 2. Disconnect the TCM from the J 39700 . Additional DTCs may set. 3. Turn ON the ignition, with the engine OFF. 4. Using the DMM, measure voltage at terminal 33 and ground. Is the voltage greater than the specified value?	0 V	Go to Step 5	Go to Testing for Intermittent Conditions and Poor Connections

DTC P0977				
Step	**Action**	**Value**	**Yes**	**No**
5	1. Turn the ignition OFF. 2. Disconnect the AT inline 20-way connector. Additional DTCs may set. 3. Install the J 44152 jumper harness (20 pins) on the engine side of the AT inline 20-way connector. 4. Turn ON the ignition, with the engine OFF. 5. Using the DMM and the J 35616 GM terminal test kit, measure for voltage at terminal B and ground of the J 44152 . Refer to Automatic Transmission Inline Harness Connector End View . Is the voltage greater than the specified value?	0 V	Go to Step 8	Go to Step 6
6	1. Connect the AT inline 20-way connector. 2. Remove the transmission oil pan. Refer to Oil Pan Replacement. 3. Remove the AT internal wiring harness at the SS2 connector. 4. Using the DMM, measure for voltage at terminal B of SS2 and ground. Is the voltage greater than the specified value?	0 V	Go to Step 9	Go to Step 7
7	1. Disconnect SS2 from the internal wiring harness. 2. Using the DMM, measure SS2 resistance. Is resistance within the specified value?	22.0 ohms at 20°C (68°F)	Go to Testing for Intermittent Conditions and Poor Connections	Go to Step 10
8	Test the SS2 circuit between the TCM and the AT inline 20-way connector for a short to voltage. Refer to Testing for a Short to Voltage . Did you find and correct the condition?	—	Go to Step 11	—
9	Replace the AT internal wiring harness. Refer to Wiring Harness Replacement . Did you complete the replacement?	—	Go to Step 11	—
10	Replace the SS2. Refer to Control Valve Solenoid Replacement . Did you complete the replacement?	—	Go to Step 11	—

DTC P0977				
Step	Action	Value	Yes	No
11	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Drive the vehicle under normal operating conditions. 3. Select Specific DTC. 4. Enter DTC P0977. Has the test run and passed?	—	Go to Step 12	Go to Step 2
12	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	—	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P0978

Circuit Description

Shift solenoid 3 (SS3) is a normally closed (N/C) solenoid that provides control main pressure to stroke shift valve 3. The transmission control module (TCM) determines the proper solenoid command logic to move shift valve 3 to attain a particular range.

The TCM provides voltage to pressure control solenoid 2 (PCS2) and shift solenoid 1, 2, and 3 (SS1, SS2, and SS3) through a separate solid-state device called high side driver 2 (HSD2). The TCM uses a low side driver to switch SS3 ON and OFF.

Since the valve state, stroked or unstroked, is critical to providing the correct transmission range, the shift valve has a pressure switch, located in the pressure switch manifold, to provide feedback to the TCM about the position of the valve.

DTC P0978 is a type A DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P0978 Shift Solenoid 3 (SS3) Control Circuit Open

Conditions for Running the DTC

- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.
- TCM initialization is in process or engine speed is greater than 200 RPM and less than 7,500 RPM for 5 seconds.

Conditions for Setting the DTC

DTC P0978 sets when the TCM detects an open condition in the SS3 return circuit for greater than 2 seconds.

Action Taken When the DTC Sets

- The TCM illuminates the malfunction indicator lamp (MIL).
- If the failure occurs while in a forward range, a shift to 1st, 3rd or 5th range is made.
- While diagnostic response is active, if the shift selector is moved to NEUTRAL, the transmission will shift to NEUTRAL. If the shift selector is moved to REVERSE, the transmission will shift to REVERSE. If the shift selector is moved to a forward range or to REVERSE and the transmission is compromised by overspeeding or direction change, the transmission will shift to NEUTRAL.
- DTC P0978 is stored in TCM history.
- Main modulation (MAIN MOD) is inhibited..
- The TCM freezes shift adapts.
- The TCM inhibits torque converter clutch (TCC) engagement.

Conditions for Clearing the DTC

A scan tool can clear the code from TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

- Inspect the wiring for poor electrical connections at the TCM. Inspect for the following conditions:
  – A bent terminal
  – A backed-out terminal
  – A damaged terminal
  – Poor terminal tension
  – A chafed wire
  – A broken wire inside the insulation
- When diagnosing for an intermittent short or open, massage the wiring harness while watching the test equipment for a change.
- You may have to drive the vehicle in order to experience a condition.
- DTC P0978, when set in combination with DTC P0964, P0972 and P0975, may indicate an open in the actuator supply voltage 2 circuit.

Test Description

The number below refers to the step number on the diagnostic table.

3. This step tests the command signal from the TCM.

DTC P0978				
Step	**Action**	**Value**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics				
1	Did you perform the Diagnostic System Check - Vehicle?	—	Go to Step 2	Go to Diagnostic System Check - Vehicle
2	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** *Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.* 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Test drive the vehicle while collecting a snapshot and verify that the code becomes active during the drive. Did the code become active?	Code Active	Go to Step 3	Go to Testing for Intermittent Conditions and Poor Connections
3	1. Turn the ignition OFF. 2. Disconnect the 80-way connector at the TCM. 3. Install the J 39700 breakout box, the J-47275 breakout box adapter and the J 47275-1 magnetic overlay. 4. Turn ON the ignition, with the engine OFF. 5. Using the DMM, measure the voltage between connector terminal 51 and ground. 6. Using the scan tool, command SS3 to OFF. Is the voltage within the specified value when SS3 is commanded OFF?	B+	Go to Step 4	Go to Step 5
4	Command the solenoid ON. Did you get less than 5 volts with the solenoid commanded ON?	< 5.0 volts	Go to Testing for Intermittent Conditions and Poor Connections	Go to Step 10

DTC P0978				
Step	**Action**	**Value**	**Yes**	**No**
5	1. Disconnect the AT inline 20-way connector. 2. Install the J 44152 jumper harness (20 pins) on the transmission side of the AT inline 20-way connector. 3. Using the DMM and the J 35616 GM terminal test kit, measure the resistance at terminal C and N of the J 44152 . Refer to Automatic Transmission Inline Harness Connector End View . Is the resistance within the specified value?	22.0 ohms at 20°C (68°F)	Go to Step 7	Go to Step 6
6	1. Remove the transmission oil pan. Refer to Oil Pan Replacement. 2. Remove the AT internal wiring harness at the SS3 connector. 3. Using the DMM, measure the resistance of SS3. Is the solenoid resistance within the specified value?	22.0 ohms at 20°C (68°F)	Go to Step 8	Go to Step 9
7	Test the SS3 circuit between the TCM and the AT inline 20-way connector for an open condition. Refer to Testing for Continuity . Did you find and correct the condition?	—	Go to Step 11	—
8	Replace the AT internal wiring harness. Refer to Wiring Harness Replacement . Did you complete the replacement?	—	Go to Step 11	—
9	Replace the SS3. Refer to Control Valve Solenoid Replacement . Did you complete the replacement?	—	Go to Step 11	—
10	**IMPORTANT:** *In most cases, the TCM is not at fault. Investigate thoroughly before replacing the TCM. Swap the TCM with a known good TCM to confirm diagnosis.* Replace the TCM. Refer to Control Module References for replacement, setup and programming. Did you complete the replacement?	—	Go to Step 11	—

DTC P0978				
Step	**Action**	**Value**	**Yes**	**No**
11	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Drive the vehicle under normal operating conditions. 3. Select Specific DTC. 4. Enter DTC P0978. Has the test run and passed?	—	Go to Step 12	Go to Step 2
12	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	—	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P0979

Circuit Description

Shift solenoid 3 (SS3) is a normally closed (N/C) solenoid that provides control main pressure to stroke shift valve 3. The transmission control module (TCM) determines the proper solenoid command logic to move shift valve 3 to attain a particular range.

The TCM provides voltage to pressure control solenoid 2 (PCS2) and shift solenoid 1, 2, and 3 (SS1, SS2, and SS3) through a separate solid-state device called high side driver 2 (HSD2). The TCM uses a low side driver to switch SS3 ON and OFF.

Since the valve state, stroked or unstroked, is critical to providing the correct transmission range, the shift valve has a pressure switch, located in the pressure switch manifold, to provide feedback to the TCM about the position of the valve.

DTC P0979 is a type A DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P0979 Shift Solenoid 3 (SS3) Control Circuit Low

Conditions for Running the DTC

- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.
- TCM initialization is in process or engine speed is greater than 200 RPM and less than 7,500 RPM for 5 seconds.

Conditions for Setting the DTC

DTC P0979 sets when the TCM detects a short to ground in the SS3 return circuit for greater than 2 seconds.

Action Taken When the DTC Sets

- The TCM illuminates the malfunction indicator lamp (MIL).
- If the failure occurs while in a forward range, a shift to 1st, 3rd or 5th range is made.
- While diagnostic response is active, if the shift selector is moved to NEUTRAL, the transmission will shift to NEUTRAL. If the shift selector is moved to REVERSE, the transmission will shift to REVERSE. If the shift selector is moved to a forward range or to REVERSE and the transmission is compromised by overspeeding or direction change, the transmission will shift to NEUTRAL.
- DTC P0979 is stored in TCM history.
- Main modulation (MAIN MOD) is inhibited..
- The TCM freezes shift adapts.
- The TCM inhibits torque converter clutch (TCC) engagement.

Conditions for Clearing the DTC

A scan tool can clear the code from TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

- Inspect the wiring for poor electrical connections at the TCM. Inspect for the following conditions:
  – A bent terminal
  – A backed-out terminal
  – A damaged terminal
  – Poor terminal tension
  – A chafed wire
  – A broken wire inside the insulation
- When diagnosing for an intermittent short or open, massage the wiring harness while watching the test equipment for a change.
- You may have to drive the vehicle in order to experience a condition.

DTC P0979				
Step	**Action**	**Value**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics				
1	Did you perform the Diagnostic System Check - Vehicle?		Go to Step 2	Go to Diagnostic System Check - Vehicle
2	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** *Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.* 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Using the scan tool, measure ignition voltage. Is voltage within the specified value?	9-18 V	Go to Step 3	Go to DTC P0562 for low voltage or DTC P0563 for high voltage
3	1. Turn the ignition OFF. 2. Disconnect the 80-way connector at the TCM. 3. Install the J 39700 breakout box, the J-47275 breakout box adapter and the J 47275-1 magnetic overlay. 4. Turn ON the ignition, with the engine OFF. 5. Using the DMM, measure the voltage between connector terminal 51 and ground. 6. Using the scan tool, command SS3 to OFF. Is the voltage within the specified value when SS3 is commanded OFF?	B+	Go to Testing for Intermittent Conditions and Poor Connections	Go to Step 4
4	1. Turn the ignition OFF. 2. Disconnect the TCM from the J 39700 . Additional DTCs may set. 3. Using the DMM, measure resistance at terminals 51 and 71. Is the resistance reading within the specified value?	22.0 ohms at 20°C (68°F)	Go to Step 10	Go to Step 5

DTC P0979				
Step	**Action**	**Value**	**Yes**	**No**
5	1. Disconnect the AT inline 20-way connector. 2. Install the J 44152 jumper harness (20 pins) on the transmission side of the AT inline 20-way connector. 3. Using the DMM and the J 35616 GM terminal test kit, measure the resistance at terminal C and N of the J 44152 . Refer to Automatic Transmission Inline Harness Connector End View . Is the resistance within the specified value?	22.0 ohms at 20°C (68°F)	Go to Step 7	Go to Step 6
6	1. Remove the transmission oil pan. Refer to Oil Pan Replacement. 2. Remove the AT internal wiring harness at the SS3 connector. 3. Using the DMM, measure the resistance of SS3. Is the solenoid resistance within the specified value?	22.0 ohms at 20°C (68°F)	Go to Step 8	Go to Step 9
7	Test the SS3 circuit between the TCM and the AT inline 20-way connector for a short to ground. Refer to Testing for Short to Ground . Did you find and correct the condition?	—	Go to Step 11	—
8	Replace the AT internal wiring harness. Refer to Wiring Harness Replacement . Did you complete the replacement?	—	Go to Step 11	—
9	Replace the SS3. Refer to Control Valve Solenoid Replacement . Did you complete the replacement?	—	Go to Step 11	—
10	**IMPORTANT:** *In most cases, the TCM is not at fault. Investigate thoroughly before replacing the TCM. Swap the TCM with a known good TCM to confirm diagnosis.* Replace the TCM. Refer to Control Module References for replacement, setup and programming. Did you complete the replacement?	—	Go to Step 11	—

DTC P0979				
Step	Action	Value	Yes	No
11	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Drive the vehicle under normal operating conditions. 3. Select Specific DTC. 4. Enter DTC P0979. Has the test run and passed?	—	Go to Step 12	Go to Step 2
12	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	—	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P0980

Circuit Description

Shift solenoid 3 (SS3) is a normally closed (N/C) solenoid that provides control main pressure to stroke shift valve 3. The transmission control module (TCM) determines the proper solenoid command logic to move shift valve 3 to attain a particular range.

The TCM provides voltage to pressure control solenoid 2 (PCS2) and shift solenoid 1, 2, and 3 (SS1, SS2, and SS3) through a separate solid-state device called high side driver 2 (HSD2). The TCM uses a low side driver to switch SS3 ON and OFF.

Since the valve state, stroked or unstroked, is critical to providing the correct transmission range, the shift valve has a pressure switch, located in the pressure switch manifold, to provide feedback to the TCM about the position of the valve.

DTC P0980 is a type A DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P0980 Shift Solenoid 3 (SS3) Control Circuit High

Conditions for Running the DTC

- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.
- TCM initialization is in process or engine speed is greater than 200 RPM and less than 7,500 RPM for 5 seconds.

Conditions for Setting the DTC

DTC P0980 sets when the TCM detects a short to power in the SS3 return circuit for greater than 2 seconds.

Action Taken When the DTC Sets

- The TCM illuminates the malfunction indicator lamp (MIL).
- If the failure occurs while in a forward range, a shift to 1st, 3rd or 5th range is made.
- While diagnostic response is active, if the shift selector is moved to NEUTRAL, the transmission will shift to NEUTRAL. If the shift selector is moved to REVERSE, the transmission will shift to REVERSE. If the shift selector is moved to a forward range or to REVERSE and the transmission is compromised by overspeeding or direction change, the transmission will shift to NEUTRAL.
- DTC P0980 is stored in TCM history.
- Main modulation (MAIN MOD) is inhibited..
- The TCM freezes shift adapts.
- The TCM inhibits torque converter clutch (TCC) engagement.

Conditions for Clearing the DTC

A scan tool can clear the code from TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

- Inspect the wiring for poor electrical connections at the TCM. Inspect for the following conditions:
  – A bent terminal
  – A backed-out terminal
  – A damaged terminal
  – Poor terminal tension
  – A chafed wire
  – A broken wire inside the insulation
- When diagnosing for an intermittent short or open, massage the wiring harness while watching the test equipment for a change.
- You may have to drive the vehicle in order to experience a condition.

DTC P0980				
Step	**Action**	**Value**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics				
1	Did you perform the Diagnostic System Check - Vehicle?	—	Go to Step 2	Go to Diagnostic System Check - Vehicle
2	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** *Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.* 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Using the scan tool, measure ignition voltage. Is voltage within the specified value?	9-18 V	Go to Step 3	Go to DTC P0562 for low voltage or DTC P0563 for high voltage
3	1. Turn the ignition OFF. 2. Disconnect the 80-way connector at the TCM. 3. Install the J 39700 breakout box, the J-47275 breakout box adapter and the J 47275-1 magnetic overlay. 4. Turn ON the ignition, with the engine OFF. 5. Using the DMM, measure the voltage between connector terminal 51 and ground. 6. Using the scan tool, command SS3 to ON. Is the voltage within the specified value when SS3 is commanded ON?	Less than battery voltage	Go to Testing for Intermittent Conditions and Poor Connections	Go to Step 4
4	1. Turn the ignition OFF. 2. Disconnect the TCM from the J 39700 . Additional DTCs may set. 3. Turn ON the ignition, with the engine OFF. 4. Using the DMM, measure voltage at terminal 51 and ground. Is the voltage greater than the specified value?	0 V	Go to Step 5	Go to Testing for Intermittent Conditions and Poor Connections

DTC P0980				
Step	**Action**	**Value**	**Yes**	**No**
5	1. Turn the ignition OFF. 2. Disconnect the AT inline 20-way connector. Additional DTCs may set. 3. Install the J 44152 jumper harness (20 pins) on the engine side of the AT inline 20-way connector. 4. Turn ON the ignition, with the engine OFF. 5. Using the DMM and the J 35616 GM terminal test kit, measure for voltage at terminal B and ground of the J 44152 . Refer to Automatic Transmission Inline Harness Connector End View . Is the voltage greater than the specified value?	0 V	Go to Step 8	Go to Step 6
6	1. Connect the AT inline 20-way connector. 2. Remove the transmission oil pan. Refer to Oil Pan Replacement. 3. Remove the AT internal wiring harness at the SS3 connector. 4. Using the DMM, measure for voltage at terminal B of SS3 and ground. Is the voltage greater than the specified value?	0 V	Go to Step 9	Go to Step 7
7	1. Disconnect SS3 from the internal wiring harness. 2. Using the DMM, measure SS3 resistance. Is resistance within the specified value?	22.0 ohms at 20°C (68°F)	Go to Testing for Intermittent Conditions and Poor Connections	Go to Step 10
8	Test the SS3 circuit between the TCM and the AT inline 20-way connector for a short to voltage. Refer to Testing for a Short to Voltage . Did you find and correct the condition?	—	Go to Step 11	—
9	Replace the AT internal wiring harness. Refer to Wiring Harness Replacement . Did you complete the replacement?	—	Go to Step 11	—
10	Replace the SS3. Refer to Control Valve Solenoid Replacement . Did you complete the replacement?	—	Go to Step 11	—

DTC P0980				
Step	**Action**	**Value**	**Yes**	**No**
11	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Drive the vehicle under normal operating conditions. 3. Select Specific DTC. 4. Enter DTC P0980. Has the test run and passed?	—	Go to Step 12	Go to Step 2
12	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	—	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P1688

Circuit Description

Vehicles currently using the 8.1 liter gas engine use a 3 wire system to communicate engine torque data/ requests between the engine control module (ECM) and the transmission control module (TCM).

DTC P1688 is a type B DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

DTC P1688 Unmanaged Engine Torque Delivered to Transmission Control Module (TCM) Signal.

Conditions for Running the DTC

- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.
- Engine speed is greater than 200 RPM and less than 7,500 RPM for 5 seconds.

Conditions for Setting the DTC

DTC P1688 sets if unmanaged engine torque, gross, signal is less than 1.5 percent or greater than 98.5 percent for greater than a 2 seconds.

Action Taken When the DTC Sets

- The TCM illuminates the malfunction indicator lamp (MIL) during the second consecutive trip in which the Conditions for Setting the DTC are met.
- DTC 1688 is stored in TCM history.
- The TCM defaults to a calculated unmanaged torque, gross, input value using throttle and engine speed.
- The TCM inhibits torque converter clutch (TCC) engagement.

Conditions for Clearing the DTC

A scan tool can clear the code from TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

- Inspect the wiring for poor electrical connections at the TCM. Inspect for the following conditions:
  - A bent terminal
  - A backed-out terminal
  - A damaged terminal
  - Poor terminal tension
  - A chafed wire
  - A broken wire inside the insulation
- When diagnosing for an intermittent short or open, massage the wiring harness while watching the test equipment for a change.
- You may have to drive the vehicle in order to experience a condition.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

2. This step tests for a damaged terminal or connector in the TCM connector.

4 This step tests for an open/short.

DTC P1688			
Step	**Action**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics			
1	Did you perform the Diagnostic System Check - Vehicle?	Go to Step 2	Go to Diagnostic System Check - Vehicle
2	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** ***Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records. The Clear Info function will erase the data.*** 3. Record the DTC Failure Records. 4. Clear the DTC. 5. Disconnect the 80-way connector at the TCM. 6. Inspect terminal 22 for a pulled back, unlocked, terminal or visible terminal damage. Did you find and correct a condition?	Go to Step 8	Go to Step 3
3	1. Disconnect the ECM. 2. Inspect the unmanaged torque signal circuit for a pulled back, unlocked, terminal or visible terminal damage. Did you find and correct a condition?	Go to Step 8	Go to Step 4
4	Test the unmanaged torque signal circuit between the TCM and ECM for an open or short to ground. Refer to Circuit Testing and Wiring Repairs . Did you find and correct a condition?	Go to Step 8	Go to Step 5
5	Verify that the ECM has the proper model year software and calibration. This wiring option is only used with the 8.1L gas engine. Was the software and calibration current and proper for the engine?	Go to Step 7	Go to Step 6
6	Install the correct ECM calibration. Refer to Control Module References for replacement, setup, and programming. Is the calibration complete?	Go to Step 8	—

DTC P1688			
Step	**Action**	**Yes**	**No**
7	Replace the ECM. Refer to Control Module References for replacement, setup, and programming. Did you complete the replacement?	Go to Step 8	—
8	Perform the following procedure in order to verify the repair: 1. Select DTC. 2. Select Clear Info. 3. Operate the vehicle under the following conditions: – Vehicle at operating temperature – Engine speed greater than 200 RPM – All conditions are met for 2 seconds 4. Select Specific DTC. 5. Enter DTC P1688. Has the test run and passed?	Go to Step 9	Go to Step 2
9	With the scan tool, observe the stored information, capture info and DTC info. Does the scan tool display any DTCs that you have not diagnosed?	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P1779

Circuit Description

Vehicles currently using the 8.1 liter gas engine use a 3 wire system to communicate engine torque data/ requests between the engine control module (ECM) and the transmission control module (TCM).

DTC P1779 is a type B DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

DTC P1779 Engine Torque Delivered to Transmission Control Module (TCM) Signal

Conditions for Running the DTC

- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.
- Engine speed is greater than 200 RPM and less than 7,500 RPM for 5 seconds.

Conditions for Setting the DTC

DTC P1779 sets if managed engine torque, net, signal is less than 1.5 percent or greater than 98.5 percent for greater than 2 seconds.

Action Taken When the DTC Sets

- The TCM illuminates the malfunction indicator lamp (MIL) during the second consecutive trip in which the Conditions for Setting the DTC are met.
- DTC 1779 is stored in TCM history.
- The TCM defaults to a calculated managed torque, net, input value using throttle and engine speed.
- The TCM defaults to a calculated unmanaged torque, gross, input value using throttle and engine speed.
- The TCM inhibits torque converter clutch (TCC) engagement.

Conditions for Clearing the DTC

A scan tool can clear the code from TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

- Inspect the wiring for poor electrical connections at the TCM. Inspect for the following conditions:
  – A bent terminal
  – A backed-out terminal
  – A damaged terminal
  – Poor terminal tension
  – A chafed wire
  – A broken wire inside the insulation
- When diagnosing for an intermittent short or open, massage the wiring harness while watching the test equipment for a change.
- You may have to drive the vehicle in order to experience a condition.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

2. This step tests for a damaged terminal or connector.

4 This step tests for an open/short.

DTC P1779			
Step	**Action**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics			
1	Did you perform the Diagnostic System Check - Vehicle?	Go to Step 2	Go to Diagnostic System Check - Vehicle
2	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** *Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records. The Clear Info function will erase the data.* 3. Record the DTC Freeze Frame and Failure Records. 4. Turn the ignition OFF. 5. Disconnect the 80-way connector at the TCM. 6. Inspect the terminal 44 for a pulled back, unlocked, terminal or visible terminal damage. Did you find and correct a condition?	Go to Step 8	Go to Step 3
3	1. Disconnect the ECM. 2. Inspect the delivered torque signal circuit for a pulled back, unlocked, terminal or visible terminal damage. Did you find and correct a condition?	Go to Step 8	Go to Step 4
4	Test the unmanaged torque signal circuit between the TCM and ECM for an open or short to ground. Refer to Circuit Testing and Wiring Repairs . Did you find and correct a condition?	Go to Step 8	Go to Step 5
5	Verify that the ECM has the proper model year software and calibration. This wiring option is only used with the 8.1L gas engine. Was the software and calibration current and proper for the engine?	Go to Step 7	Go to Step 6
6	Install the correct ECM calibration. Refer to Control Module References for replacement, setup, and programming. Is the calibration complete?	Go to Step 8	—

DTC P1779

Step	Action	Yes	No
7	Replace the ECM. Refer to Control Module References for replacement, setup, and programming. Did you complete the replacement?	Go to Step 8	—
8	Perform the following procedure in order to verify the repair: 1. Select DTC. 2. Select Clear Info. 3. Operate the vehicle under the following conditions: – Vehicle at operating temperature – Engine speed greater than 200 RPM – All conditions are met for 2 seconds 4. Select Specific DTC. 5. Enter DTC P1779. Has the test run and passed?	Go to Step 9	Go to Step 2
9	With the scan tool, observe the stored information, capture info and DTC info. Does the scan tool display any DTCs that you have not diagnosed?	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P2670

Circuit Description

The transmission control module (TCM) provides voltage to shift solenoid 1, 2, and 3 (SS1, SS2, and SS3) and pressure control solenoid 2 (PCS2) through a separate solid-state device called high side driver 2 (HSD2). HSD2 is continuously ON during normal operation, except during a brief circuit test. The TCM regulates control current to the solenoids by switching the appropriate low side driver ON and OFF.

DTC P2670 is a type A DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P2670 Actuator Supply Voltage 2 Low

Conditions for Running the DTC

- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.
- HSD2 is commanded ON.

Conditions for Setting the DTC

DTC P2670 sets when the TCM detects a low voltage condition, less than 6.0 volts, in 3 solenoids in the HSD2 circuit.

Action Taken When the DTC Sets

- The TCM illuminates the malfunction indicator lamp (MIL).
- If the failure occurs while in a forward range, a shift to 1st, 3rd or 5th range is made.
- While diagnostic response is active, if the shift selector is moved to NEUTRAL, the transmission will shift to NEUTRAL. If the shift selector is moved to REVERSE, the transmission will shift to REVERSE. If the shift selector is moved to a forward range or to REVERSE and the transmission is compromised by overspeeding or direction change, the transmission will shift to NEUTRAL.
- DTC P2670 is stored in TCM history.
- The TCM inhibits main modulation (MAIN MOD).
- The TCM freezes shift adapts.
- The TCM inhibits torque converter clutch (TCC) engagement.

Conditions for Clearing the DTC

A scan tool can clear the code from TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

- Inspect the wiring for poor electrical connections at the TCM. Inspect for the following conditions:
  – A bent terminal
  – A backed-out terminal
  – A damaged terminal
  – Poor terminal tension
  – A chafed wire
  – A broken wire inside the insulation
- When diagnosing for an intermittent short or open, massage the wiring harness while watching the test equipment for a change.

- You may have to drive the vehicle in order to experience a condition.

Test Description

The number below refers to the step number on the diagnostic table.

3. This step tests HSD2 supply voltage.

DTC P2670				
Step	**Action**	**Value**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics				
1	Did you perform the Diagnostic System Check - Vehicle?	—	Go to Step 2	Go to Diagnostic System Check - Vehicle
2	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** *Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.* 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Using the scan tool, measure ignition voltage. Is voltage within the specified value?	9-18 V	Go to Step 3	Go to DTC P0562 for low voltage or DTC P0563 for high voltage
3	1. Turn the ignition OFF. 2. Disconnect the 80-way connector at the TCM. 3. Install the J 39700 breakout box, the J-47275 breakout box adapter and the J 47275-1 magnetic overlay. 4. Turn ON the ignition, with the engine OFF. 5. Using the DMM, measure the voltage at terminal 71 and ground. Is the voltage within the specified value?	B+	Go to Diagnostic Aids	Go to Step 4

DTC P2670				
Step	**Action**	**Value**	**Yes**	**No**
4	1. Turn the ignition OFF. 2. Disconnect the AT inline 20-way connector. 3. Turn ON the ignition, with the engine OFF. Additional DTCs may set. 4. Using the DMM, measure voltage on the engine side of the AT inline 20-way connector terminal N and ground. Is the voltage within the specified value?	B+	Go to Step 5	Go to Step 7
5	1. Connect the AT inline 20-way connector. 2. Remove the transmission oil pan. Refer to Oil Pan Replacement . 3. Remove the connectors to the PCS2 and the SS1, SS2 and SS3. 4. Using the DMM, measure the supply voltage of each solenoid connector. Is the voltage within the specified value at each solenoid terminal?	B+	Go to Step 6	Go to Step 8
6	Test the PCS2 and the SS1, SS2 and SS3 for an open or shorted condition. Refer to Temperature vs Resistance Solenoid. Refer to Testing for Continuity and Testing for Short to Ground . Did you find a condition?	—	Go to Step 9	Go to Step 10
7	Test the HSD2 circuit between the TCM and AT inline 20-way connector for an open or short to ground. Refer to Testing for Continuity and Testing for Short to Ground . Did you find and correct the condition?	—	Go to Step 11	—
8	Replace the AT internal wiring harness. Refer to Wiring Harness Replacement . Did you complete the replacement?	—	Go to Step 11	—
9	Replace the open or shorted solenoid. Refer to Control Valve Solenoid Replacement . Did you complete the replacement?	—	Go to Step 11	—

DTC P2670				
Step	Action	Value	Yes	No
10	**IMPORTANT:** *In most cases, the TCM is not at fault. Investigate thoroughly before replacing the TCM. Swap the TCM with a known good TCM to confirm diagnosis.* Replace the TCM. Refer to Control Module References for replacement, setup and programming. Did you complete the replacement?	—	Go to Step 11	—
11	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Drive the vehicle under normal operating conditions. 3. Select Specific DTC. 4. Enter DTC P2670. Has the test run and passed?	—	Go to Step 12	Go to Step 2
12	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	—	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P2671

Circuit Description

The transmission control module (TCM) provides voltage to shift solenoid 1, 2, and 3 (SS1, SS2, and SS3) and pressure control solenoid 2 (PCS2) through a separate solid-state device called high side driver 2 (HSD2). HSD2 is continuously ON during normal operation, except during a brief circuit test. The TCM regulates control current to the solenoids by switching the appropriate low side driver ON and OFF.

DTC P2671 is a type A DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P2671 Actuator Supply Voltage 2 High

Conditions for Running the DTC

- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.

- HSD2 is commanded ON.

Conditions for Setting the DTC

DTC P2671 sets when the TCM detects greater than 6.0 volts at the HSD2 terminal prior to commanding HSD2 ON.

Action Taken When the DTC Sets

- The TCM illuminates the malfunction indicator lamp (MIL).
- If the failure occurs while in a forward range, a shift to 1st, 3rd or 5th range is made.
- While diagnostic response is active, if the shift selector is moved to NEUTRAL, the transmission will shift to NEUTRAL. If the shift selector is moved to REVERSE, the transmission will shift to REVERSE. If the shift selector is moved to a forward range or to REVERSE and the transmission is compromised by overspeeding or direction change, the transmission will shift to NEUTRAL.
- DTC P2671 is stored in TCM history.
- Main modulation (MAIN MOD) is inhibited.
- The TCM freezes shift adapts.
- The TCM inhibits torque converter clutch (TCC) engagement.

Conditions for Clearing the DTC

A scan tool can clear the code from TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

- Inspect the wiring for poor electrical connections at the TCM. Inspect for the following conditions:
  - A bent terminal
  - A backed-out terminal
  - A damaged terminal
  - Poor terminal tension
  - A chafed wire
  - A broken wire inside the insulation
- When diagnosing for an intermittent short or open, massage the wiring harness while watching the test equipment for a change.
- You may have to drive the vehicle in order to experience a condition.

DTC P2671				
Step	**Action**	**Value**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics				
1	Did you perform the Diagnostic System Check - Vehicle?	—	Go to Step 2	Go to Diagnostic System Check - Vehicle
2	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** *Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.* 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Using the scan tool, measure ignition voltage. Is voltage within the specified value?	9-18 V	Go to Step 3	Go to DTC P0562 for low voltage or DTC P0563 for high voltage
3	1. Turn the ignition OFF. 2. Disconnect the 80-way connector at the TCM. 3. Install the J 39700 breakout box, the J-47275 breakout box adapter and the J 47275-1 magnetic overlay. Do not reconnect the TCM. Additional DTCs may set. 4. Turn ON the ignition, with the engine OFF. 5. Using the DMM, measure the voltage at terminal 71 and ground. Is the voltage within the specified value?	6 V	Go to Step 4	Go to Step 8
4	1. Turn the ignition OFF. 2. Disconnect the AT inline 20-way connector. 3. Turn ON the ignition, with the engine OFF. Additional DTCs may set. 4. Using the DMM, measure voltage on the engine side of the AT inline 20-way connector terminal N and ground. Is the voltage within the specified value?	6 V	Go to Step 6	Go to Step 5

DTC P2671				
Step	**Action**	**Value**	**Yes**	**No**
5	1. Connect the AT inline 20-way connector. 2. Remove the transmission oil pan. Refer to Oil Pan Replacement . 3. Remove the connectors to the PCS2 and the SS1, SS2 and SS3. 4. Using the DMM, measure the voltage at each of the solenoid connectors. Is the voltage greater than the specified value?	6 V	Go to Step 7	Go to Diagnostic Aids
6	Test the HSD2 circuit between the TCM and AT inline 20-way connector for a short to voltage. Refer to Testing for a Short to Voltage . Did you find and correct the condition?	—	Go to Step 10	—
7	Replace the AT internal wiring harness. Refer to Wiring Harness Replacement . Did you complete the replacement?	—	Go to Step 10	—
8	**IMPORTANT:** *In most cases, the TCM is not at fault. Investigate thoroughly before replacing the TCM. Swap the TCM with a known good TCM to confirm diagnosis.* Replace the TCM. Refer to Control Module References for replacement, setup and programming. Did you complete the replacement?	—	Go to Step 10	—
9	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Start the engine. 3. Select Specific DTC. 4. Enter DTC P2671. Has the test run and passed?	—	Go to Step 10	Go to Step 2
10	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	—	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P2723

Circuit Description

Pressure control solenoid 1 (PCS1) is used to control on-coming, off-going, and holding pressure in any 1 of 5 clutches. This solenoid is referred to as a pressure proportional to current (PPC) solenoid, since the output hydraulic pressure supplied by this solenoid is proportional to the controlled current command.

The transmission control module (TCM) uses information from the turbine and output speed sensors to detect if a clutch is slipping. The clutch being controlled by PCS1 will vary depending on the shift that was being completed.

DTC P2723 is a type A DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P2723 Pressure Control Solenoid 1 (PCS1) Controlled Clutch Stuck Off

Conditions for Running the DTC

- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.
- Turbine speed is greater than 60 RPM.
- Output speed is greater than 125 RPM.
- The transmission is at normal operating temperature.

Conditions for Setting the DTC

DTC P2723 sets when the TCM detects an incorrect on-coming ratio for an accumulated number of occurrences during a forward range shift.

Action Taken When the DTC Sets

- The TCM illuminates the malfunction indicator lamp (MIL).
- When failure occurs in a forward range, the transmission will go to the previous range. If failure occurs in NEUTRAL or REVERSE, the transmission will lock in NEUTRAL while diagnostic response is active.
- If the shift selector is moved to NEUTRAL, the transmission will shift to NEUTRAL, and in some cases may lock in NEUTRAL.
- If the shift selector is moved to REVERSE, the transmission will shift to REVERSE or NEUTRAL.
- If the shift selector is returned to a forward range and the transmission is compromised by overspeeding or direction change, the transmission will shift to NEUTRAL.
- DTC P2723 is stored in TCM history.
- The TCM freezes shift adapts.
- The TCM inhibits torque converter clutch (TCC) engagement.

Conditions for Clearing the DTC

A scan tool can clear the code from TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

- Inspect the wiring for poor electrical connections at the TCM. Inspect for the following conditions:
  – A bent terminal
  – A backed-out terminal
  – A damaged terminal
  – Poor terminal tension
  – A chafed wire
  – A broken wire inside the insulation
- When diagnosing for an intermittent short or open, massage the wiring harness while watching the test equipment for a change.
- You may have to drive the vehicle in order to experience a condition.
- This DTC indicates the on-coming clutch being controlled by PCS1 is not applied or applied too slowly. This could indicate a leak or obstruction in a specific clutch apply circuit. Observe scan tool failure record data for previous or current range information when the DTC was set, in order to determine the specific shift when the DTC was set. Refer to the Solenoid and Clutch Chart to determine which clutch circuit is suspect.

IMPORTANT:
Clutch failure due to installation of an engine power upgrade is not covered under the manufacturers warranty.

Inspect for the presence of an add-on engine power package. When engine horsepower or torque is increased over factory rating, a shift flare condition may occur.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

3. This step tests for proper ignition voltage.
4. This step tests for erratic speed sensor readings.
5. This step tests for internal hydraulic leakage.
6. This step tests for clutch capacity.

DTC P2723				
Step	**Action**	**Value**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics				
1	Did you perform the Diagnostic System Check - Vehicle?	—	Go to Step 2	Go to Diagnostic System Check - Vehicle
2	Measure the transmission fluid level. Refer to Transmission Fluid Checking Procedure . Is the transmission fluid level correct?	—	Go to Step 3	Go to Transmission Fluid Checking Procedure
3	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** ***Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.*** 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Using the scan tool, measure ignition voltage. Is voltage within the specified value?	9-18 V	Go to Step 4	Go to DTC P0562 for low voltage or DTC P0563 for high voltage
4	1. Start the engine. 2. Drive the vehicle under normal operating conditions. 3. Using the scan tool, monitor engine, turbine, and output speed sensor readings. Is speed sensor data erratic?	—	Go to the appropriate speed sensor DTC	Go to Step 5
5	1. Connect a 2 000 kPa (300 psi) pressure gage to the line pressure tap. Refer to Line Pressure Check Procedure . 2. Use the scan tool, in clutch test mode, to cycle through all transmission ranges with the engine at idle and vehicle brakes applied. Record line pressure in each range. Was the line pressure low in a specific range or in ranges where the same clutch was applied?	—	Go to Low Main Line Pressure in All Ranges	Go to Step 6

DTC P2723				
Step	**Action**	**Value**	**Yes**	**No**
6	**NOTICE:** *Refer to Transmission Stall Test Notice in Cautions and Notices.* Conduct a clutch test for all forward ranges. Refer to Clutch Test . Did turbine speed remain at zero in all ranges?	—	Go to Diagnostic Aids	Go to Step 7
7	1. Remove the transmission oil pan. Refer to Oil Pan Replacement . 2. Inspect for signs of clutch failure. Are there signs of clutch failure?	—	Go to Step 8	Go to Step 9
8	Remove the transmission for overhaul or replacement. Refer to Transmission Replacement . Did you complete the repair or replacement?	—	Go to Step 11	—
9	Inspect for a stuck or sticking pressure control valve 1. Refer to Control Valve Body Cleaning and Inspection . Did you find and correct a condition?	—	Go to Step 11	Go to Step 10
10	Replace the PCS1. Refer to Control Valve Solenoid Replacement . Did you complete the replacement?	—	Go to Step 11	—
11	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Start the engine. 3. Use the scan tool to reset adaptive values for all shifts. 4. Operate the vehicle in all ranges under normal driving conditions. 5. Select Specific DTC. 6. Enter DTC P2723. Has the test run and passed?	—	Go to Step 12	Go to Step 2
12	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	—	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P2724

Circuit Description

Pressure control solenoid 1 (PCS1) is used to control on-coming, off-going, and holding pressure in any 1 of 5 clutches. This solenoid is referred to as a pressure proportional to current (PPC) solenoid, since the output hydraulic pressure supplied by this solenoid is proportional to the controlled current command.

The transmission control module (TCM) uses information from the turbine and output speed sensors to detect if a clutch is slipping. The clutch being controlled by PCS1 will vary depending on the shift that was being completed.

DTC P2724 is a type A DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P2724 Pressure Control Solenoid 1 (PCS1) Controlled Clutch Stuck On

Conditions for Running the DTC

- DTCs P0716, P0717, P0721, P0722, P0875, and P0876 are not active.
- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.
- Output speed is greater than 200 RPM.
- Turbine speed is greater than 200 RPM.

Conditions for Setting the DTC

DTC P2724 sets when the TCM determines the off-going clutch controlled by pressure control solenoid 3 (PCS3) remains engaged during a forward range shift.

Action Taken When the DTC Sets

- The TCM illuminates the malfunction indicator lamp (MIL).
- When failure occurs in a forward range, the transmission will go to the previous range. If failure occurs in NEUTRAL or REVERSE, the transmission will lock in NEUTRAL while diagnostic response is active.
- If the shift selector is moved to NEUTRAL, the transmission will shift to NEUTRAL.
- If the shift selector is moved to REVERSE, the transmission will shift to REVERSE or NEUTRAL or in some cases may lock in NEUTRAL.
- If the shift selector is returned to a forward range and the transmission is compromised by overspeeding or direction change, the transmission will shift to NEUTRAL.
- DTC P2724 is stored in TCM history.
- The TCM freezes shift adapts.
- The TCM inhibits torque converter clutch (TCC) engagement.

Conditions for Clearing the DTC

A scan tool can clear the code from TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

- Inspect the wiring for poor electrical connections at the

TCM. Inspect for the following conditions:
– A bent terminal
– A backed-out terminal
– A damaged terminal
– Poor terminal tension
– A chafed wire
– A broken wire inside the insulation

- When diagnosing for an intermittent short or open, massage the wiring harness while watching the test equipment for a change.
- You may have to drive the vehicle in order to experience a condition.
- This DTC indicates the off-going clutch being controlled by PCS1 is not releasing or is slow to release. This could indicate a leak or obstruction in a specific clutch apply circuit. Observe scan tool failure record data for previous or current range information when the DTC was set, in order to determine the specific shift when the DTC was set. Refer to the Solenoid and Clutch Chart to determine which clutch circuit is suspect.

IMPORTANT:
Clutch failure due to installation of an engine power upgrade is not covered under the manufacturers warranty.

Inspect for the presence of an add-on engine power package. When engine horsepower or torque is increased over factory rating, a shift flare condition may occur.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

3. This step tests for proper ignition voltage.
4. This step tests for erratic speed sensor readings.
5. This step tests for internal hydraulic leakage.
6. This step tests for clutch capacity.

DTC P2724				
Step	**Action**	**Value**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics				
1	Did you perform the Diagnostic System Check - Vehicle?	—	Go to Step 2	Go to Diagnostic System Check - Vehicle
2	Measure the transmission fluid level. Refer to Transmission Fluid Checking Procedure . Is the transmission fluid level correct?	—	Go to Step 3	Go to Transmission Fluid Checking Procedure
3	1. Install the scan tool. 2. Start the engine. **IMPORTANT:** *Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.* 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Using the scan tool, measure ignition voltage. Is voltage within the specified value?	9-18 V	Go to Step 4	Go to DTC P0562 for low voltage or DTC P0563 for high voltage
4	1. Start the engine. 2. Drive the vehicle under normal operating conditions. 3. Using the scan tool, monitor engine, turbine, and output speed sensor readings. Is speed sensor data erratic?	—	Go to the appropriate speed sensor DTC	Go to Step 5
5	1. Connect a 2 000 kPa (300 psi) pressure gage to the line pressure tap. Refer to Line Pressure Check Procedure . 2. Use the scan tool, in clutch test mode, to cycle through all trans-mission ranges with the engine at idle and vehicle brakes applied. Record line pressure in each range. Was the line pressure low in a specific range or in ranges where the same clutch was applied?	—	Go to Low Main Line Pressure in All Ranges	Go to Step 6

DTC P2724				
Step	**Action**	**Value**	**Yes**	**No**
6	**NOTICE:** *Refer to Transmission Stall Test Notice in Cautions and Notices.* Conduct a clutch test for all forward ranges. Refer to Clutch Test . Did turbine speed remain at zero in all ranges?	—	Go to Diagnostic Aids	Go to Step 7
7	1. Remove the transmission oil pan. Refer to Oil Pan Replacement . 2. Inspect for signs of clutch failure. Are there signs of clutch failure?	—	Go to Step 8	Go to Step 9
8	Remove the transmission for overhaul or replacement. Refer to Transmission Replacement . Did you complete the repair or replacement?	—	Go to Step 11	—
9	Inspect for a stuck or sticking pressure control valve 1. Refer to Control Valve Body Cleaning and Inspection . Did you find and correct a condition?	—	Go to Step 11	Go to Step 10
10	Replace the PCS1. Refer to Control Valve Solenoid Replacement . Did you complete the replacement?	—	Go to Step 11	—
11	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Start the engine. 3. Use the scan tool to reset adaptive values for all shifts. 4. Operate the vehicle in all ranges under normal driving conditions. 5. Select Specific DTC. 6. Enter DTC P2724. Has the test run and passed?	—	Go to Step 12	Go to Step 2

DTC P2724				
Step	**Action**	**Value**	**Yes**	**No**
12	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	—	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P2727

Circuit Description

The pressure control solenoid 1 (PCS1) is a pressure proportional to current (PCC) solenoid used to control on-coming, off-going and holding pressure to any 1 of the 5 clutches. The transmission control module (TCM) provides voltage to the main modulation (MAIN MOD), torque converter clutch (TCC) and PCS1 through a separate solid-state device called high side driver 1 (HSD1). The TCM regulates the amount of current to the PCS1 by switching the low side driver ON and OFF.

DTC P2727 is a type A DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P2727 Pressure Control Solenoid 1 (PCS1) Control Circuit Open (A)

Conditions for Running the DTC

- DTC P0658 and P0659 are not active.
- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.
- Engine speed is greater than 200 RPM and less than 7,500 RPM for 5 seconds.
- TCM initialization is in process.
- Engine crank time is not extended.

Conditions for Setting the DTC

DTC P2727 sets when the TCM detects an open circuit on the PCS1 circuit for greater than 2 seconds.

Action Taken When the DTC Sets

- The TCM illuminates the malfunction indicator lamp (MIL).
- If the failure occurs while in a forward range, a shift to 1st, 3rd or 5th range is made.
- While diagnostic response is active, if the shift selector is moved to NEUTRAL, the transmission will shift to NEUTRAL. If the shift selector is moved to REVERSE, the transmission will shift to REVERSE. If the shift selector is moved to a forward range or to REVERSE and the transmission is compromised by overspeeding or direction change, the transmission will shift to NEUTRAL.
- DTC P2727 is stored in TCM history.
- The TCM inhibits MAIN MOD.
- The TCM inhibits torque converter clutch (TCC) engagement.

Conditions for Clearing the DTC

A scan tool can clear the code from TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

- Inspect the wiring for poor electrical connections at the TCM. Inspect for the following conditions:
  - A bent terminal
  - A backed-out terminal
  - A damaged terminal
  - Poor terminal tension
  - A chafed wire
  - A broken wire inside the insulation
- When diagnosing for an intermittent short or open, massage the wiring harness while watching the test equipment for a change.
- You may have to drive the vehicle in order to experience a condition.

DTC P2727				
Step	**Action**	**Value**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics				
1	Did you perform the Diagnostic System Check - Vehicle?	—	Go to Step 2	Go to Diagnostic System Check - Vehicle

DTC P2727				
Step	**Action**	**Value**	**Yes**	**No**
2	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** *Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.* 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Using the scan tool, measure ignition voltage. Is voltage within the specified value?	9-18 V	Go to Step 3	Go to DTC P0562 for low voltage or DTC P0563 for high voltage
3	1. Turn the ignition OFF. 2. Disconnect the 80-way connector at the TCM. 3. Install the J 39700 breakout box, the J-47275 breakout box adapter and the J 47275-1 magnetic overlay. Do not reconnect the TCM. 4. Using the DMM, measure the resistance at terminals 11 and 55. Is the resistance reading within the specified value?	5.05 ohms at 20°C (68°F)	Go to Testing for Intermittent Conditions and Poor Connections	Go to Step 4
4	1. Turn the ignition OFF. 2. Disconnect the AT inline 20-way connector. Additional DTCs may set. 3. Install the J 44152 jumper harness (20 pins) on the transmission side of the AT inline 20-way connector. 4. Using the DMM and the J 35616 GM terminal test kit, measure the resistance between terminals L and M of the J 44152 . Refer to Automatic Transmission Inline Harness Connector End View . Is the resistance within the specified value?	5.05 ohms at 20°C (68°F)	Go to Step 6	Go to Step 5
5	1. Remove the transmission oil pan. Refer to Oil Pan Replacement . 2. Remove the AT internal wiring harness at the PCS1 connector. 3. Using the DMM, measure the resistance of the PCS1. Is the solenoid resistance within the specified value?	5.05 ohms at 20°C (68°F)	Go to Step 7	Go to Step 8

DTC P2727				
Step	**Action**	**Value**	**Yes**	**No**
6	Test the PCS1 circuit between the TCM and the AT inline 20-way connector for an open condition. Refer to Testing for Continuity . Did you find and correct the condition?	—	Go to Step 10	Go to Step 9
7	Replace the AT internal wiring harness. Refer to Wiring Harness Replacement . Did you complete the replacement?	—	Go to Step 10	—
8	Replace the PCS1. Refer to Control Valve Solenoid Replacement . Did you complete the replacement?	—	Go to Step 10	—
9	**IMPORTANT:** ***In most cases, the TCM is not at fault. Investigate thoroughly before replacing the TCM.*** Replace the TCM. Refer to Control Module References for replacement, setup, and programming. Did you complete the replacement?	—	Go to Step 10	—
10	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Drive the vehicle under normal operating conditions. 3. Select Specific DTC. 4. Enter DTC P2727. Has the test run and passed?	—	Go to Step 11	Go to Step 2
11	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	—	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P2729

Circuit Description

The pressure control solenoid 1 (PCS1) is a pressure proportional to current (PCC) solenoid used to control on-coming, off-going and holding pressure to any 1 of the 5 clutches. The transmission control module (TCM) provides voltage to the main modulation (MAIN MOD), torque converter clutch (TCC) and PCS1 through a separate solid-state device called high side driver 1 (HSD1). The TCM regulates the amount of current to the PCS1 by switching the low side driver ON and OFF.

DTC P2729 is a type A DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P2729 Pressure Control Solenoid 1 (PCS1) Control Circuit Low (A)

Conditions for Running the DTC

- DTC P0658 and P0659 are not active.
- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.
- Engine speed is greater than 200 RPM and less than 7,500 RPM for 5 seconds.
- TCM initialization is in process.
- Engine crank time is not extended.

Conditions for Setting the DTC

DTC P2729 sets when the TCM detects a short to ground on the PCS1 circuit for greater than 2 seconds.

Action Taken When the DTC Sets

- The TCM illuminates the malfunction indicator lamp (MIL).
- If the failure occurs while in a forward range, a shift to 1st, 3rd or 5th range is made.
- While diagnostic response is active, if the shift selector is moved to NEUTRAL, the transmission will shift to NEUTRAL. If the shift selector is moved to REVERSE, the transmission will shift to REVERSE. If the shift selector is moved to a forward range or to REVERSE and the transmission is compromised by overspeeding or direction change, the transmission will shift to NEUTRAL.
- DTC P2729 is stored in TCM history.
- The TCM inhibits MAIN MOD.
- The TCM inhibits torque converter clutch (TCC) engagement.

Conditions for Clearing the DTC

A scan tool can clear the code from TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

- Inspect the wiring for poor electrical connections at the TCM. Inspect for the following conditions:
  – A bent terminal
  – A backed-out terminal
  – A damaged terminal
  – Poor terminal tension
  – A chafed wire

– A broken wire inside the insulation

- When diagnosing for an intermittent short or open, massage the wiring harness while watching the test equipment for a change.
- You may have to drive the vehicle in order to experience a condition.

DTC P2729				
Step	**Action**	**Value**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics				
1	Did you perform the Diagnostic System Check - Vehicle?	—	Go to Step 2	Go to Diagnostic System Check - Vehicle
2	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** *Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.* 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Using the scan tool, measure ignition voltage. Is voltage within the specified value?	9-18 V	Go to Step 3	Go to DTC P0562 for low voltage or DTC P0563 for high voltage
3	1. Turn the ignition OFF. 2. Disconnect the 80-way connector at the TCM. 3. Install the J 39700 breakout box, the J-47275 breakout box adapter and the J 47275-1 magnetic overlay. Do not reconnect the TCM. 4. Turn ON the ignition. 5. Using the DMM, measure voltage between connector terminal 55 and ground. 6. Using the scan tool, command PCS1 OFF. Is the voltage within the specified value when the PCS1 is commanded OFF?	B+	Go to Diagnostic Aids	Go to Step 4

DTC P2729				
Step	**Action**	**Value**	**Yes**	**No**
4	1. Turn the ignition OFF. 2. Using the DMM, measure resistance at terminals 11 and 55. Is the resistance reading within the specified value?	5.05 ohms at 20°C (68°F)	Go to Step 10	Go to Step 5
5	1. Turn the ignition OFF. 2. Disconnect the AT inline 20-way connector. Additional DTCs may set. 3. Install the J 44152 jumper harness (20 pins) on the transmission side of the AT inline 20-way connector. 4. Using the DMM and the J 35616 GM terminal test kit, measure the resistance between terminals L and M of the J 44152 . Refer to Automatic Transmission Inline Harness Connector End View . Is the resistance within the specified value?	5.05 ohms at 20°C (68°F)	Go to Step 7	Go to Step 6
6	1. Remove the transmission oil pan. Refer to Oil Pan Replacement. 2. Remove the AT internal wiring harness at the PCS1 connector. 3. Using the DMM, measure the resistance of the PCS1. Is the solenoid resistance within the specified value?	5.05 ohms at 20°C (68°F)	Go to Step 8	Go to Step 9
7	Test the PCS1 circuit between the TCM and the AT inline 20-way connector for a short to ground condition. Refer to Testing for Short to Ground . Did you find and correct the condition?	—	Go to Step 11	—
8	Replace the AT internal wiring harness. Refer to Wiring Harness Replacement . Did you complete the replacement?	—	Go to Step 11	—
9	Replace the PCS1. Refer to Control Valve Solenoid Replacement . Did you complete the replacement?	—	Go to Step 11	—

DTC P2729				
Step	**Action**	**Value**	**Yes**	**No**
10	**IMPORTANT:** *In most cases, the TCM is not at fault. Investigate thoroughly before replacing the TCM.* Replace the TCM. Refer to Control Module References for replacement, setup, and programming. Did you complete the replacement?	—	Go to Step 11	—
11	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Drive the vehicle under normal operating conditions. 3. Select Specific DTC. 4. Enter DTC P2729. Has the test run and passed?	—	Go to Step 12	Go to Step 2
12	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	—	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P2730

Circuit Description

The pressure control solenoid 1 (PCS1) is a pressure proportional to current (PCC) solenoid used to control on-coming, off-going and holding pressure to any 1 of the 5 clutches. The transmission control module (TCM) provides voltage to the main modulation (MAIN MOD), torque converter clutch (TCC) and PCS1 through a separate solid-state device called high side driver 1 (HSD1). The TCM regulates the amount of current to the PCS1 by switching the low side driver ON and OFF.

DTC P2730 is a type A DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P2730 Pressure Control Solenoid 1 (PCS1) Control Circuit High (A)

Conditions for Running the DTC

- DTC P0658 and P0659 are not active.
- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.
- Engine speed is greater than 200 RPM and less than 7,500 RPM for 5 seconds.

- TCM initialization is in process.
- Engine crank time is not extended.

Conditions for Setting the DTC

DTC P2730 sets when the TCM detects a short to voltage on the PCS1 circuit for greater than 2 seconds.

Action Taken When the DTC Sets

- The TCM illuminates the malfunction indicator lamp (MIL).
- If the failure occurs while in a forward range, a shift to 1st, 3rd or 5th range is made.
- While diagnostic response is active, if the shift selector is moved to NEUTRAL, the transmission will shift to NEUTRAL. If the shift selector is moved to REVERSE, the transmission will shift to REVERSE. If the shift selector is moved to a forward range or to REVERSE and the transmission is compromised by overspeeding or direction change, the transmission will shift to NEUTRAL.
- DTC P2730 is stored in TCM history.
- The TCM inhibits MAIN MOD.
- The TCM inhibits torque converter clutch (TCC) engagement.

Conditions for Clearing the DTC

A scan tool can clear the code from TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

- Inspect the wiring for poor electrical connections at the TCM. Inspect for the following conditions:
  – A bent terminal
  – A backed-out terminal
  – A damaged terminal
  – Poor terminal tension
  – A chafed wire
  – A broken wire inside the insulation
- When diagnosing for an intermittent short or open, massage the wiring harness while watching the test equipment for a change.
- You may have to drive the vehicle in order to experience a condition.

DTC P2730				
Step	**Action**	**Value**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics				
1	Did you perform the Diagnostic System Check - Vehicle?	—	Go to Step 2	Go to Diagnostic System Check - Vehicle
2	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** *Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.* 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Using the scan tool, measure ignition voltage. Is voltage within the specified value?	9-18 V	Go to Step 3	Go to DTC P0562 for low voltage or DTC P0563 for high voltage
3	1. Turn the ignition OFF. 2. Disconnect the 80-way connector at the TCM. 3. Install the J 39700 breakout box, the J-47275 breakout box adapter and the J 47275-1 magnetic overlay. 4. Turn ON the ignition, with the engine OFF. 5. Using the DMM, measure voltage between connector terminal 55 and ground. 6. Using the scan tool, command PCS1 ON. Is the voltage within the specified value when the PCS1 is commanded ON?	Less than battery voltage	Go to Testing for Intermittent Conditions and Poor Connections	Go to Step 4
4	1. Turn the ignition OFF. 2. Disconnect the TCM from the J 39700 . Additional DTCs may set. 3. Turn ON the ignition, with the engine OFF. 4. Using the DMM, measure voltage at terminal 55 and ground. Is the voltage greater than the specified value?	0 V	Go to Step 5	Go to Testing for Intermittent Conditions and Poor Connections

DTC P2730				
Step	**Action**	**Value**	**Yes**	**No**
5	1. Turn the ignition OFF. 2. Disconnect the AT inline 20-way connector. Additional DTCs may set. 3. Install the J 44152 jumper harness (20 pins) on the engine side of the AT inline 20-way connector. 4. Turn ON the ignition, with the engine OFF. 5. Using the DMM and the J 35616 GM terminal test kit, measure for voltage at terminal M and ground of the J 44152 . Refer to Automatic Transmission Inline Harness Connector End View. Is the resistance within the specified value?	0 V	Go to Step 8	Go to Step 6
6	1. Connect the AT inline 20-way connector. 2. Remove the transmission oil pan. Refer to Oil Pan Replacement . 3. Remove the AT internal wiring harness at the PCS1 connector. 4. Using the DMM, measure for voltage at terminal 2 of the PCS1 and ground. Is the voltage greater than the specified value?	0 V	Go to Step 9	Go to Step 7
7	1. Disconnect the PCS1 from the internal wiring harness. 2. Using the DMM, measure PCS1 resistance. Is the resistance within the specified value?	5.05 ohms at 20°C (68°F)	Go to Testing for Intermittent Conditions and Poor Connections	Go to Step 10
8	Test the PCS1 circuit between the TCM and the AT inline 20-way connector for a short to voltage. Refer to Testing for a Short to Voltage . Did you find and correct the condition?	—	Go to Step 11	—
9	Replace the AT internal wiring harness. Refer to Wiring Harness Replacement . Did you complete the replacement?	—	Go to Step 11	—
10	Replace the PCS1. Refer to Control Valve Solenoid Replacement . Did you complete the replacement?	—	Go to Step 11	—

DTC P2730				
Step	Action	Value	Yes	No
11	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Drive the vehicle under normal operating conditions. 3. Select Specific DTC. 4. Enter DTC P2730. Has the test run and passed?	—	Go to Step 12	Go to Step 2
12	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	—	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P2761

Circuit Description

The torque converter clutch (TCC) pressure control solenoid (PCS) is a pressure proportional to current (PCC) solenoid used to control the TCC apply and release. The transmission control module (TCM) provides voltage to the main modulation (MAIN MOD), TCC and pressure control solenoid 1 (PCS1) through a separate solid-state device called high side driver 1 (HSD1). The TCM regulates the amount of current to the TCC PCS by switching the low side driver ON and OFF. DTC P2761 is a type A DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P2761 Torque Converter Clutch (TCC) Pressure Control Solenoid (PCS) Control Circuit Open

Conditions for Running the DTC

- DTC P0716, P0717, P0721 and P0722 are not active.
- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.
- TCM initialization is in process or engine speed is greater than 200 RPM and less than 7,500 RPM for 5 seconds.
- The TCC is commanded ON.

Conditions for Setting the DTC

DTC P2761 sets when the TCM detects an open circuit on the TCC PCS return circuit for greater than 6 seconds.

Action Taken When the DTC Sets

- The TCM illuminates the malfunction indicator lamp (MIL).
- If the failure occurs while in a forward range, a shift to 1st, 3rd or 5th range is made.

- While diagnostic response is active, if the shift selector is moved to NEUTRAL, the transmission will shift to NEUTRAL. If the shift selector is moved to REVERSE, the transmission will shift to REVERSE. If the shift selector is moved to a forward range or to REVERSE and the transmission is compromised by overspeeding or direction change, the transmission will shift to NEUTRAL.
- DTC P2761 is stored in TCM history.
- The TCM inhibits MAIN MOD.
- The TCM inhibits REVERSE operation.
- The TCM freezes shift adapts.
- The TCM inhibits TCC engagement.

Conditions for Clearing the DTC

A scan tool can clear the code from TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

- Inspect the wiring for poor electrical connections at the TCM. Inspect for the following conditions:
  – A bent terminal
  – A backed-out terminal
  – A damaged terminal
  – Poor terminal tension
  – A chafed wire
  – A broken wire inside the insulation
- When diagnosing for an intermittent short or open, massage the wiring harness while watching the test equipment for a change.
- You may have to drive the vehicle in order to experience a condition.
- DTC P2761 set in combination with DTC P0960 and P2727 may indicate an open in the HSD circuit.

DTC P2761				
Step	**Action**	**Value**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics				
1	Did you perform the Diagnostic System Check - Vehicle?	—	Go to Step 2	Go to Diagnostic System Check - Vehicle
2	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** ***Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.*** 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Using the scan tool, measure ignition voltage. Is voltage within the specified value?	9-18 V	Go to Step 3	Go to DTC P0562 for low voltage or DTC P0563 for high voltage
3	1. Turn the ignition OFF. 2. Disconnect the 80-way connector at the TCM. 3. Install the J 39700 breakout box, the J-47275 breakout box adapter and the J 47275-1 magnetic overlay. Do not reconnect the TCM. 4. Using the DMM, measure the resistance at terminals 11 and 78. Is the resistance reading within the specified value?	5.05 ohms at 20°C (68°F)	Go to Testing for Intermittent Conditions and Poor Connections	Go to Step 4
4	1. Turn the ignition OFF. 2. Disconnect the AT inline 20-way connector. Additional DTCs may set. 3. Install the J 44152 jumper harness (20 pins) on the transmission side of the AT inline 20-way connector. 4. Using the DMM and the J 35616 GM terminal test kit, measure the resistance between terminals L and J of the J 44152 . Refer to Automatic Transmission Inline Harness Connector End View . Is the resistance within the specified value?	5.05 ohms at 20°C (68°F)	Go to Step 6	Go to Step 5

DTC P2761				
Step	**Action**	**Value**	**Yes**	**No**
5	1. Remove the transmission oil pan. Refer to Oil Pan Replacement. 2. Remove the AT internal wiring harness at the TCC PCS connector. 3. Using the DMM, measure the resistance of the TCC PCS. Is the solenoid resistance within the specified value?	5.05 ohms at 20°C (68°F)	Go to Step 7	Go to Step 8
6	Test the TCC PCS circuit between the TCM and the AT inline 20-way connector for an open condition. Refer to Testing for Continuity . Did you find and correct the condition?	—	Go to Step 10	Go to Step 9
7	Replace the AT internal wiring harness. Refer to Wiring Harness Replacement . Did you complete the replacement?	—	Go to Step 10	—
8	Replace the TCC PCS. Refer to Control Valve Solenoid Replacement . Did you complete the replacement?	—	Go to Step 10	—
9	**IMPORTANT:** *In most cases, the TCM is not at fault. Investigate thoroughly before replacing the TCM.* Replace the TCM. Refer to Control Module References for replacement, setup, and programming. Did you complete the replacement?	—	Go to Step 10	—
10	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Drive the vehicle under normal operating conditions. 3. Select Specific DTC. 4. Enter DTC P2761. Has the test run and passed?	—	Go to Step 11	Go to Step 2

DTC P2761				
Step	**Action**	**Value**	**Yes**	**No**
12	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	—	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P2763

Circuit Description

The torque converter clutch (TCC) pressure control solenoid (PCS) is a pressure proportional to current (PCC) solenoid used to control the TCC apply and release. The transmission control module (TCM) provides voltage to the main modulation (MAIN MOD), TCC and pressure control solenoid 1 (PCS1) through a separate solid-state device called high side driver 1 (HSD1). The TCM regulates the amount of current to the TCC PCS by switching the low side driver ON and OFF.

DTC P2763 is a type A DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P2763 Torque Converter Clutch (TCC) Pressure Control Solenoid (PCS) Control Circuit High

Conditions for Running the DTC

- DTC P0716, P0717, P0721 and P0722 are not active.
- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.
- Engine speed is greater than 200 RPM and less than 7,500 RPM for 5 seconds.
- TCM initialization is in process.
- The TCC is commanded ON.

Conditions for Setting the DTC

DTC P2763 sets when the TCM detects a short to voltage on the TCC PCS return circuit for greater than 6 seconds.

Action Taken When the DTC Sets

- The TCM illuminates the malfunction indicator lamp (MIL).
- If the failure occurs while in a forward range, a shift to 1st, 3rd or 5th range is made.
- While diagnostic response is active, if the shift selector is moved to NEUTRAL, the transmission will shift to NEUTRAL. If the shift selector is moved to REVERSE, the transmission will shift to REVERSE. If the shift selector is moved to a forward range or to REVERSE and the transmission is compromised by overspeeding or direction change, the transmission will shift to NEUTRAL.
- DTC P2763 is stored in TCM history.
- The TCM inhibits MAIN MOD.
- The TCM inhibits REVERSE operation.
- The TCM freezes shift adapts.
- The TCM inhibits TCC engagement.

Conditions for Clearing the DTC

A scan tool can clear the code from TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

- Inspect the wiring for poor electrical connections at the TCM. Inspect for the following conditions:
  – A bent terminal
  – A backed-out terminal
  – A damaged terminal
  – Poor terminal tension
  – A chafed wire
  – A broken wire inside the insulation
- When diagnosing for an intermittent short or open, massage the wiring harness while watching the test equipment for a change.
- You may have to drive the vehicle in order to experience a condition.

DTC P2763				
Step	**Action**	**Value**	**Yes**	**No**
Schematic Reference: Automatic Transmission Controls Schematics				
1	Did you perform the Diagnostic System Check - Vehicle?	—	Go to Step 2	Go to Diagnostic System Check - Vehicle

DTC P2763				
Step	**Action**	**Value**	**Yes**	**No**
2	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** *Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.* 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Using the scan tool, measure ignition voltage. Is voltage within the specified value?	9-18 V	Go to Step 3	Go to DTC P0562 for low voltage or DTC P0563 for high voltage
3	1. Turn the ignition OFF. 2. Disconnect the 80-way connector at the TCM. 3. Install the J 39700 breakout box, the J-47275 breakout box adapter and the J 47275-1 magnetic overlay. 4. Turn ON the ignition, with the engine OFF. 5. Using the DMM, measure voltage between connector terminal 78 and ground. 6. Using the scan tool, command TCC PCS ON. Is the voltage within the specified value when the TCC PCS is commanded ON?	Less than battery voltage	Go to Testing for Intermittent Conditions and Poor Connections	Go to Step 4
4	1. Turn the ignition OFF. 2. Disconnect the TCM from the J 39700 . Additional DTCs may set. 3. Turn ON the ignition, with the engine OFF. 4. Using the DMM, measure voltage at terminal 78 and ground. Is the voltage greater than the specified value?	0 V	Go to Step 5	Go to Testing for Intermittent Conditions and Poor Connections

DTC P2763				
Step	**Action**	**Value**	**Yes**	**No**
5	1. Turn the ignition OFF. 2. Disconnect the AT inline 20-way connector. Additional DTCs may set. 3. Install the J 44152 jumper harness (20 pins) on the engine side of the AT inline 20-way connector. 4. Turn ON the ignition, with the engine OFF. 5. Using the DMM and the J 35616 GM terminal test kit, measure for voltage at terminal L and ground of the J 44152 . Refer to Automatic Transmission Inline Harness Connector End View . Is voltage greater than the specified value?	0 V	Go to Step 8	Go to Step 6
6	1. Connect the AT inline 20-way connector. 2. Remove the transmission oil pan. Refer to Oil Pan Replacement . 3. Remove the AT internal wiring harness at the TCC PCS connector. 4. Using the DMM, measure for voltage at terminal 2 of the TCC PCS and ground. Is the voltage greater than the specified value?	0 V	Go to Step 9	Go to Step 7
7	1. Disconnect the TCC PCS from the internal wiring harness. 2. Using the DMM, measure TCC PCS resistance. Is the resistance within the specified value?	5.05 ohms at 20°C (68°F)	Go to Testing for Intermittent Conditions and Poor Connections	Go to Step 10
8	Test the TCC PCS circuit between the TCM and the AT inline 20-way connector for a short to voltage. Refer to Testing for a Short to Voltage . Did you find and correct the condition?	—	Go to Step 11	—
9	Replace the AT internal wiring harness. Refer to Wiring Harness Replacement . Did you complete the replacement?	—	Go to Step 11	—
10	Replace the TCC PCS. Refer to Control Valve Solenoid Replacement . Did you complete the replacement?	—	Go to Step 11	—

DTC P2763				
Step	**Action**	**Value**	**Yes**	**No**
11	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Drive the vehicle under normal operating conditions. 3. Select Specific DTC. 4. Enter DTC P2763. Has the test run and passed?	—	Go to Step 12	Go to Step 2
12	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	—	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P2764

Circuit Description

The torque converter clutch (TCC) pressure control solenoid (PCS) is a pressure proportional to current (PCC) solenoid used to control the TCC apply and release. The transmission control module (TCM) provides voltage to the main modulation (MAIN MOD), TCC and pressure control solenoid 1 (PCS1) through a separate solid-state device called high side driver 1 (HSD1). The TCM regulates the amount of current to the TCC PCS by switching the low side driver ON and OFF. DTC P2764 is a type A DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P2764 Torque Converter Clutch (TCC) Pressure Control Solenoid (PCS) Control Circuit Low

Conditions for Running the DTC

- DTC P0716, P0717, P0721, and P0722 are not active.
- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.
- Engine speed is greater than 200 RPM and less than 7,500 RPM for 5 seconds.
- The TCM initialization is in process.
- The TCC is commanded ON.

Conditions for Setting the DTC

DTC P2764 sets when the TCM detects a short to ground condition on the TCC PCS return circuit for greater than 6 seconds.

Action Taken When the DTC Sets

- The TCM illuminates the malfunction indicator lamp (MIL).
- If the failure occurs while in a forward range, a shift to

1st, 3rd or 5th range is made.

- While diagnostic response is active, if the shift selector is moved to NEUTRAL, the transmission will shift to NEUTRAL. If the shift selector is moved to REVERSE, the transmission shifts to REVERSE. If the shift selector is moved to forward range or REVERSE and the transmission is compromised by overspeeding or direction change, the transmission shifts to NEUTRAL.
- DTC P2764 is stored in TCM history.
- The TCM inhibits MAIN MOD.
- The TCM inhibits REVERSE operation.
- The TCM freezes shift adapts.
- The TCM inhibits TCC engagement.

Conditions for Clearing the DTC

A scan tool can clear the code from TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

- Inspect the wiring for poor electrical connections at the TCM. Inspect for the following conditions:
  – A bent terminal
  – A backed-out terminal
  – A damaged terminal
  – Poor terminal tension
  – A chafed wire
  – A broken wire inside the insulation
- When diagnosing for an intermittent short or open, massage the wiring harness while watching the test equipment for a change.
- You may have to drive the vehicle in order to experience a condition.

DTC P2764				
Step	Action	Value	Yes	No
Schematic Reference: Automatic Transmission Controls Schematics				
1	Did you perform the Diagnostic System Check - Vehicle?	—	Go to Step 2	Go to Diagnostic System Check - Vehicle
2	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** ***Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.*** 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Using the scan tool, measure ignition voltage. Is voltage within the specified value?	9-18 V	Go to Step 3	Go to DTC P0562 for low voltage or DTC P0563 for high voltage
3	1. Turn the ignition OFF. 2. Disconnect the 80-way connector at the TCM. 3. Install the J 39700 breakout box, the J-47275 breakout box adapter and the J 47275-1 magnetic overlay. 4. Turn ON the ignition. 5. Using the DMM, measure voltage between connector terminal 78 and ground. 6. Using the scan tool, command the TCC solenoid OFF. Is the voltage within the specified value when the TCC solenoid is commanded OFF?	B+	Go to Diagnostic Aids	Go to Step 4
4	1. Turn the ignition OFF. 2. Using the DMM, measure resistance at terminals 11 and 78. Is the resistance reading within the specified value?	5.05 ohms at 20°C (68°F)	Go to Step 10	Go to Step 5

DTC P2764				
Step	Action	Value	Yes	No
5	1. Turn the ignition OFF. 2. Disconnect the AT inline 20-way connector. Additional DTCs may set. 3. Install the J 44152 jumper harness (20 pins) on the transmission side of the AT inline 20-way connector. 4. Using the DMM and the J 35616 GM terminal test kit, measure the resistance between terminals L and J of the J 44152 . Refer to Automatic Transmission Inline Harness Connector End View . Is the resistance within the specified value?	5.05 ohms at 20°C (68°F)	Go to Step 7	Go to Step 6
6	1. Remove the transmission oil pan. Refer to Oil Pan Replacement . 2. Remove the AT internal wiring harness at the TCC solenoid connector. 3. Using the DMM, measure the resistance of the TCC solenoid. Is the solenoid resistance within the specified value?	5.05 ohms at 20°C (68°F)	Go to Step 8	Go to Step 9
7	Test the TCC circuit between the TCM and the AT inline 20-way connector for a short to ground condition. Refer to Testing for Short to Ground . Did you find and correct the condition?	—	Go to Step 11	—
8	Replace the AT internal wiring harness. Refer to Wiring Harness Replacement . Did you complete the replacement?	—	Go to Step 11	—
9	Replace the TCC solenoid. Refer to Control Valve Solenoid Replacement . Did you complete the replacement?	—	Go to Step 11	—
10	**IMPORTANT:** *In most cases, the TCM is not at fault. Investigate thoroughly before replacing the TCM.* Replace the TCM. Refer to Control Module References for replacement, setup, and programming. Did you complete the replacement?	—	Go to Step 11	—

DTC P2764				
Step	**Action**	**Value**	**Yes**	**No**
11	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Drive the vehicle under normal operating conditions. 3. Select Specific DTC. 4. Enter DTC P2764. Has the test run and passed?	—	Go to Step 12	Go to Step 2
12	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	—	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

DTC P2771

Circuit Description

The four-wheel drive (4WD) low signal circuit is used to notify the transmission control module (TCM) that the vehicle is in 4WD low range.

DTC P2771 is a type B DTC.

DTC Descriptor

This diagnostic procedure supports the following DTC:

- DTC P2771 4WD Low Switch Circuit

Conditions for Running the DTC

- DTCs P0721 and P0722 are not active.
- The components are powered and ignition voltage is greater than 9.0 volts and less than 18 volts.
- Engine speed is greater than 200 RPM and less than 7,500 RPM for 5 seconds.
- Output speed is greater than 60 RPM.
- Transmission fluid temperature (TFT) is between 20-130°C (68-266°F).
- The shift is complete and NEUTRAL range is not selected.

Conditions for Setting the DTC

DTC P2771 sets when one of the following conditions occur:

- The transfer case switch indicates high range, and the calculated range is low range for 5 seconds or greater.
- The transfer case switch indicates low range, and the calculated range is high range for 5 seconds or greater.

Action Taken When the DTC Sets

- The TCM illuminates the malfunction indicator lamp (MIL) during the second consecutive trip in which the Conditions for Setting the DTC are met.

- DTC P2771 is stored in TCM history.
- The TCM inhibits torque converter clutch (TCC) engagement.

Conditions for Clearing the DTC

A scan tool can clear the code from TCM history. The TCM automatically clears the DTC from TCM history if the vehicle completes 40 warm-up cycles without failure.

Diagnostic Aids

- Inspect the wiring for poor electrical connections at the TCM. Inspect for the following conditions:
  – A bent terminal
  – A backed-out terminal
  – A damaged terminal
  – Poor terminal tension
  – A chafed wire
  – A broken wire inside the insulation
- When diagnosing for an intermittent short or open, massage the wiring harness while watching the test equipment for a change.
- You may have to drive the vehicle in order to experience a condition.
- Inspect for any transmission DTCs that may have set again.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

2. This step tests the status of the 4WD low switch.
3. This step tests for a 4WD switch failure to ground.
4. This step tests for a short in the wiring harness.
9. This step tests for a 4WD switch failure to an open state.
10. This step tests for an open in the wiring harness.

DTC P2771

Step	Action	Yes	No
Schematic Reference: Automatic Transmission Controls Schematics			
1	Did you perform the Diagnostic System Check - Vehicle?	Go to Step 2	Go to Diagnostic System Check - Vehicle
2	1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** *Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.* 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Using the scan tool, monitor 4WD low status and select 4HI followed by 4LO with the transfer case selector. Does the scan tool indicate 4WD low status as NO when 4HI is selected, and YES when 4LO is selected?	Go to Diagnostic Aids	Go to Step 3
3	Using the transfer case selector, select 4HI followed by 4LO. Does the scan tool indicate 4WD low status as YES for both selector positions?	Go to Step 4	Go to Step 9
4	Remove the connector at the transfer case selector. Does the scan tool indicate 4WD low status as YES?	Go to Step 5	Go to Step 7
5	Inspect the 4WD low signal circuit for a short to ground. Did you find a condition?	Go to Step 6	Go to Step 15
6	Inspect and repair the short to ground in the 4WD low signal circuit. Refer to Circuit Testing and Wiring Repairs . Did you complete the repair?	Go to Step 16	—
7	Inspect the transfer case switch for proper operation or a short to ground. Refer to Circuit Testing and Wiring Repairs . Did you find a condition?	Go to Step 8	Go to Step 15

DTC P2771			
Step	**Action**	**Yes**	**No**
8	Replace the transfer case control module. Refer to Transfer Case Shift Control Module Replacement . Did you complete the replacement?	Go to Step 16	—
9	Using the transfer case selector, select 4HI followed by 4LO. Does the scan tool indicate 4WD low status as NO for both selector positions?	Go to Step 10	Go to Step 15
10	1. Remove the connector at the transfer case switch. 2. Ground the 4WD low signal circuit to a known ground. Does the scan tool indicate 4WD low status as NO?	Go to Step 11	Go to Step 13
11	Inspect the short to ground in the brake switch signal circuit. Refer to Circuit Testing and Wiring Repairs . Did you find a condition?	Go to Step 12	Go to Step 15
12	Repair the open condition in the 4WD low signal circuit. Refer to Circuit Testing and Wiring Repairs . Did you complete the repair?	Go to Step 16	—
13	Inspect the transfer case switch for an open condition. Did you find an open condition?	Go to Step 14	Go to Step 15
14	Replace the transfer case switch. Refer to Transfer Case Shift Control Switch Replacement . Did you complete the replacement?	Go to Step 16	—
15	**IMPORTANT:** *In most cases, the TCM is not at fault. Investigate thoroughly before replacing the TCM.* Replace the TCM. Refer to Control Module References for replacement, setup, and programming. Did you complete the replacement?	Go to Step 16	—

DTC P2771			
Step	**Action**	**Yes**	**No**
16	Perform the following procedure in order to verify the repair: 1. Clear the DTC. 2. Drive the vehicle under normal operating conditions. Monitor the 4WD low status with the scan tool. The 4WD low status must indicate NO when 4WD HI is selected, and YES when 4WD LO is selected. 3. Select Specific DTC. 4. Enter DTC P2771. Has the test run and passed?	Go to Step 17	Go to Step 2
17	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK

SYMPTOMS - AUTOMATIC TRANSMISSION

The following table consists of six diagnostic categories that are located in the left-hand column. Using this column, choose the appropriate category based on the operating conditions of the vehicle or transmission. After selecting a category, use the right-hand column to locate the specific symptom diagnostic information.

Diagnostic Category	Diagnostic Information
IMPORTANT: *The Functional Test Procedure should be performed before beginning any diagnosis. If this procedure has not already been performed, refer to Functional Test Procedure.*	

Diagnostic Category	Diagnostic Information
Fluid Diagnosis This category contains the following topics: • Fluid condition - appearance, contaminants, smell, overheating • Line pressure - high or low • Low lubrication pressure • Fluid leaks	• Refer to Transmission Fluid Checking Procedure . • Refer to Transmission Overheats . • Refer to Low Main Line Pressure in All Ranges . • Refer to Low Main Line Pressure in specific Ranges, Normal Pressure in Other Ranges . • Refer to Low Lubrication Pressure . • Refer to Fluid Leak Diagnosis . • Refer to Fluid Leaks from Fluid Fill Tube and/or Vent . • Refer to Fluid Leaks from Transmission Input . • Refer to Fluid Leaks from Transmission Output . • Refer to Contaminated Transmission Fluid . • Refer to Intermittent Buzzing Noise .
Noise and Vibration Diagnosis This category contains the following topics: • Noise - drive gear, final drive, whine, growl, rattle, buzz, popping • Vibration	• Refer to Noise and Vibration Analysis . • Refer to Flexplate/Torque Converter Vibration Test.
Range Performance Diagnosis This category contains the following topics: • Drives in Neutral • Excessive creep • Will not shift to Forward or Reverse • Will not stay in Forward or Reverse • Will not make a specific shift	• Refer to Abnormal Activities or Responses . • Refer to Transmission Will Not Shift to Forward or Reverse . • Refer to Transmission Will Not Stay in Forward or Reverse . • Refer to Transmission Will Not Make a Specific Shift .
Shift Quality - Feel Diagnosis This category contains the following topics: • Erratic shifts • Harsh, soft, delayed or slipping shifts • Harsh, soft, or delayed engagement	• Refer to Transmission Does Not Shift Properly . • Refer to Excessive Slippage and Clutch Chatter . • Refer to Excessive Flare - Engine Overspeed on Wide-Open Throttle

<table>
<tr><th>Diagnostic Category</th><th>Diagnostic Information</th></tr>
<tr><td>Shift Speed Diagnosis

This category contains the following topic:

• Inaccurate or inconsistent shift points</td><td>• Refer to Transmission Does Not Shift Properly .</td></tr>
<tr><td>Torque Converter Diagnosis

This category contains the following topics:
• Poor performance
• Noise during converter operation
• TCC shudder
• Shudder after TCC apply
• Vibration during converter operation</td><td>• Refer to Torque Converter Diagnosis Procedure.
• Refer to Flexplate/Torque Converter Vibration Test.</td></tr>
</table>

FUNCTIONAL TEST

Functional Test Procedure

Functional Test Procedure			
Step	Action	Yes	No
The Functional Test Procedure is the first step in diagnosing mechanical or hydraulic transmission conditions. The Functional Test Procedure provides procedures and references to the symptom diagnosis table for specific diagnostic information.			
1	**IMPORTANT:** *Engine performance can strongly affect transmission performance. Ensure the condition is not the result of poor engine performance before continuing.* Verify the customer concern. Has the customer concern been verified?	Go to Step 2	--
2	**IMPORTANT:** *Many transmissions have default actions that take place once a DTC fault is detected. These actions may appear to be transmission concerns.* Perform the Diagnostic System Check - Vehicle in Vehicle DTC Information. Did you perform the Diagnostic System Check - Vehicle?	Go to Step 3	Go to Diagnostic System Check - Vehicle in Vehicle DTC Information

Functional Test Pr	
Step	Action
3	Inspect for the following conditions: • Vehicle damage • Transmission oil pan damage. Refer to Oil Pan Replacement. • Transmission range selector cable damaged or out of adjustment. Ref mission Range Selector Lever Cable Adjustment or Automatic Transmi Lever Cable Replacement. • Inspect for loose, worn, damaged or missing: – Mounts or struts – Brackets – Mounting hardware – Refer to Transmission Replacement. • Transmission cooler or cooler line restrictions. Refer to Automatic Tra Flushing and Flow Test. • Fluid leaks. Refer to Fluid Leak Diagnosis. Did you find a condition?
4	Perform the Transmission Fluid Checking. Did you perform the Transmi
5	Perform the Road Test. Did the vehicle exhibit any objectionable perfor
6	Did the vehicle exhibit objectionable torque converter operation?
7	Did the vehicle produce any objectionable noise condition?
8	Did the vehicle exhibit a vibration condition?
9	Did the vibration occur only during torque converter clutch (TCC) apply
10	Did the vehicle exhibit a shift speed condition, such as low or high shift

Functional Test Procedure			
Step	**Action**	**Yes**	**No**
11	Inspect for the following unacceptable shift qualities: • Harsh, soft, delayed or no engagement • Harsh, soft or delayed shifts • Shift shudder, flare or tie-up. Did the vehicle exhibit any of these shift quality conditions?	Go to Step 12	Go to Step 13
12	Perform the Line Pressure Check. Is the line pressure within specification?	Go to Symptoms - Automatic Transmission	Go to Symptoms - Automatic Transmission
13	Inspect for the following unacceptable shift pattern conditions: • No upshift or downshift • Only one or two forward ranges • No first range, second range, third range, fourth range or fifth range • Slipping • Non first range start Did the vehicle exhibit any of these shift pattern conditions?	Go to Symptoms - Automatic Transmission	Go to Step 14
14	Inspect for the following unacceptable range performance conditions: • No PARK, REVERSE or DRIVE • No engine braking • No gear selection • Incorrect gear selection Did the vehicle exhibit any of these range performance conditions?	Go to Symptoms - Automatic Transmission	System OK

Functional Test Procedure	
Step	**Action**
15	Inspect for the following specific torque converter or TCC malfunctions? • Stuck ON or OFF • Early or late engagement • Incorrect apply or release • Soft or harsh apply • Clunk or shudder • No torque multiplication • Excessive slip • Poor acceleration • Engine stalls Did the vehicle exhibit any of these torque converter or TCC conditions?

TRANSMISSION FLUID CHECKING

ocedure	Yes	No
?	Go to Torque Converter Diagnosis Procedure	System OK

Cold Fluid Check

The purpose of the cold check is to determine if the transmission has enough fluid to be operated safely until a hot check can be made.

IMPORTANT:

The fluid level rises as fluid temperature increases. DO NOT fill above the COLD CHECK band if the transmission fluid is below normal operating temperatures.

Bring the vehicle to a complete stop on a level surface using the service brakes.

1. Ensure that the engine is at low idle RPM (500-800 RPM).
2. With the service brakes applied, put the transmission in the P, PARK, position.
3. Engage the park pawl by slowly releasing the service brakes. The vehicle may move slightly as the pawl engages.
4. Apply the parking brake and ensure it is properly engaged.
5. Run the engine for at least one minute. Apply the service brakes and shift to D, DRIVE, then to N, NEUTRAL, and then shift to R, REVERSE, in order to fill the hydraulic system.
6. Ensure that the engine is at low idle RPM (500-800 RPM).
7. With the service brakes applied, put the transmission in the P, PARK, position.
8. Engage the park pawl by slowly releasing the service brakes. The vehicle may move slightly as the pawl engages.
9. With the engine running, remove the fluid level indicator from the fill tube and wipe the indicator clean.

IMPORTANT:

- If the fluid level is within the COLD CHECK band, the transmission may be operated until the fluid is hot enough to perform a HOT RUN check. If the fluid level is not within the COLD CHECK band, add or drain as necessary to bring it to the middle of the COLD CHECK band.
- Always check the fluid level at least twice using the procedure described above. Consistent readings are important in order to maintaining proper fluid level. If inconsistent readings persist, inspect the transmission vent assembly to be sure that it is clean and unclogged. If readings are still inconsistent, contact your nearest Allison distribution or dealer.

Insert the fluid level indicator into the fill tube and remove. Check the fluid level reading. Repeat the check procedure to verify the reading.

10. Perform a hot check at the first opportunity after the normal operating sump temperature of 71-93°C (160-200°F) is reached.

Hot Fluid Check

IMPORTANT:
The fluid must be hot to ensure an accurate check. The fluid level rises as temperature increases.

Operate the transmission in D, DRIVE, range until normal operating temperature is reached. Normal operating temperature is any of the following:

- Sump temperature 71-93°C (160-200°F)
- Converter-out temperature 82-104°C (180-220°F)
- If a transmission temperature gage is not present, check the fluid level when the engine water temperature gage has stabilized and the transmission has been operated under load for at least one hour.

1. Bring the vehicle to a complete stop on a level surface using the service brake.
2. Ensure that the engine is at low idle RPM, 500-800 RPM.
3. With the service brakes applied, place the transmission in the P, PARK, position.
4. Engage the park pawl by slowly releasing the service brakes. The vehicle may move slightly as the pawl engages.
5. Apply the parking brake and ensure it is properly engaged.
6. With the engine running, remove the fluid level indicator from the fill tube and wipe the indicator clean.

IMPORTANT:
Always check the fluid level at least twice using the procedure described above. Consistent readings are important to maintaining proper fluid level. If inconsistent readings persist, inspect the transmission vent assembly to be sure it is clean and unclogged. If readings are still inconsistent, contact your nearest Allison distribution or dealer.

Insert the fluid level indicator into fill the tube and remove. Check fluid level reading. Repeat the check procedure to verify the reading.

IMPORTANT:
Safe operating level is within the HOT RUN band on the fluid level indicator. The width of the HOT RUN band represents approximately 1.0 liter (1.06 quarts) of fluid at normal operating sump temperature.

If the fluid level is not within the HOT RUN band, add or drain as necessary to bring the fluid level to within the HOT RUN band.

Fluid Inspection

IMPORTANT
Transmission fluid must be changed whenever there is evidence of dirt or a high temperature condition. High temperature causes the transmission fluid to be discolored or to have a strong odor. Local conditions, severity of operation, or duty cycle may require more or less frequent fluid or filter change intervals.

Examine the drained fluid for evidence of dirt.

IMPORTANT:
Cooler water may be contaminated by engine oil if an engine oil cooler is present; be sure to locate the correct source of cooler water contamination.

Examine the drained fluid for evidence of water. Obvious water contamination of the transmission fluid or transmission fluid in the cooling water from the heat exchanger indicates a leak between the water and fluid areas of the cooler. Inspect and pressure test the cooler to confirm the leak. Replace leaking coolers.

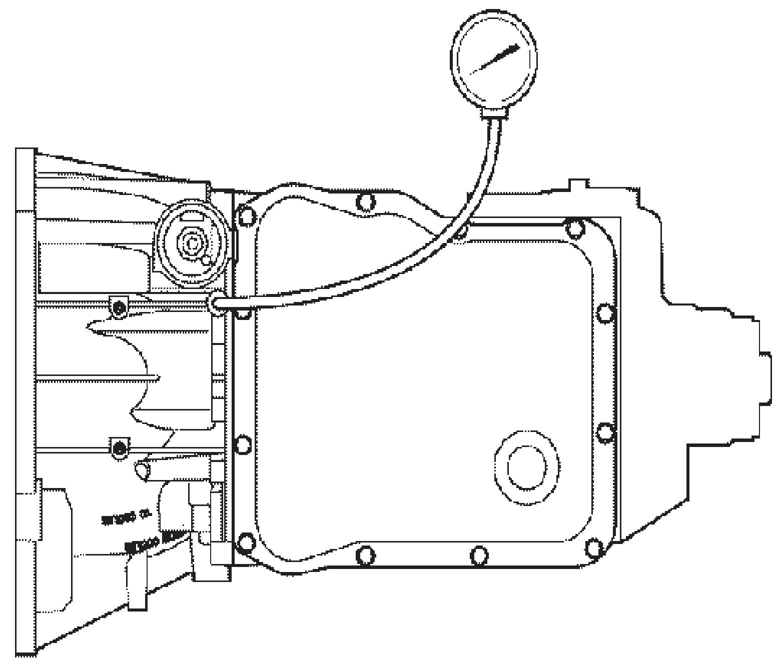
NOTICE:
Engine coolant in the transmission hydraulic system requires immediate action. Failure to clean or replace all contaminated components may result in premature transmission failure.

1. Examine the drained fluid for evidence of engine coolant.
2. Examine the drained fluid for evidence of metal. Metal particles in the fluid, other than minute particles normally trapped in the oil filter, indicate internal transmission damage. When this occurs, inspect the inside of the oil pan for excessive metal particles. Refer to Oil Pan Replacement .
3. Metal contamination requires complete transmission disassembly.

NOTICE:
Flush the transmission cooling system and inspect for restrictions following a transmission failure. Failure to repair or replace restricted oil cooling system components may result in premature transmission failure.

4. Clean all internal and external hydraulic circuits, cooler, and all other areas where the particles could lodge. Refer to Automatic Transmission Oil Cooler Flushing and Flow Test .

LINE PRESSURE CHECK



Checking main line pressure helps to determine if a transmission malfunction is due to a mechanical or an electrical condition. Properly making these pressure checks requires transmission and vehicle, or test stand, preparation, recording of data, and comparing recorded data against specifications provided.

CAUTION:

Keep the brakes applied at all times in order to prevent unexpected vehicle motion. Personal injury may result if the vehicle moves unexpectedly.

1. Remove the oil pressure tap plug. Refer to Automatic Transmission Fluid Pressure Test Hole Plug Replacement .
2. Install J 45056 pressure test adapter fitting prior to connecting the oil pressure gage.
3. All transmission fluid level and pressure checks must be made at normal operating temperatures 71-93°C (160-200°F) sump; 82-104°C (180-220°F) converter-out. Check the transmission fluid level.
4. Connect a 0-2070 kPa (0-300 PSI) oil pressure gage to the pressure test adapter fitting. Use the scan tool to check the engine RPM. Refer to Line Pressure for pressure level specifications.
5. With the brakes applied, record the line pressure values at 600 RPM engine speed in NEUTRAL and REVERSE range. The transmission will be in converter mode, torque converter clutch not applied.
6. With the brakes applied, record the line pressure values with the engine running at 2,100 RPM in NEUTRAL. The transmission will be in converter mode, torque converter clutch not applied.
7. With the brakes applied, use the following scan tool settings to check pressures in FIRST through FIFTH gear ranges at 600 RPM. The transmission will be in converter mode, torque converter clutch not applied, at 600 RPM.
   A. Select F0: Diagnostics and press ENTER.
   B. Select Model Year, i.e. 6 (2006).
   C. Select Workhorse.
   D. Select F0: Powertrain, press ENTER.
   E. Select Engine size, i.e. (G) 8.1L V8 L18, press ENTER.
   F. Select 6 Speed Automatic, press ENTER.
   G. Select F2: Special Functions, press ENTER.
   H. Select F1: Transmission Output Controls.
   I. Select Shift transmission. This will allow the technician to shift the transmission and check line pressure in each forward gear range.
8. Compare the data recorded to the line pressure specifications. Refer to Line Pressure .
9. Disconnect the oil pressure gage and remove the J 45056 pressure test adapter fitting.
10. Install the oil pressure tap plug again. Refer to Automatic Transmission Fluid Pressure Test Hole Plug Replacement .

OBTAINING DIAGNOSTIC TROUBLE CODES

A microcomputer controls the transmission by receiving and processing signals from various switches and sensors. The microcomputer determines shift sequences, shift timing, and clutch apply and release characteristics. The microcomputer is an independent controller and is referred to as a transmission control module (TCM). The pressure switch manifold (PSM) and the park/neutral position (PNP) switch provide operator input to the TCM. Other data sent to the TCM include throttle position, engine, turbine, and output speeds, and sump temperature. Any active special function, such as anti-lock brakes or power take-off, is also an input to the TCM. The TCM processes this data to determine proper shift points, to monitor the current range, to perform ratio tests, and to compile diagnostic data. The TCM is programmed to protect the transmission and other vehicle driveline components by inhibiting actions, such as full-throttle NEUTRAL-to-range shifts and high-speed direction changes. The TCM determines if a system malfunction exists and stores diagnostic codes related to the malfunction. The codes accessed by the service technician are used in diagnosing persistent or intermittent trouble in the system.

To obtain transmission diagnostic trouble codes (DTCs), install the scan tool and follow the menu selections listed below:

1. From the title screen, press ENTER.
2. Select F0: Diagnostics. Press ENTER.
3. Select Model Year, i.e. (6) 2006. Press ENTER.
4. Select Workhorse. Press ENTER.
5. Select Product Make, i.e. (C) Chevrolet Truck, (T) GMC Truck. Press ENTER.
6. Select Product Line, i.e. (C) or (K). Press ENTER.
7. Select F0: Powertrain. Press ENTER.
8. Select Engine size, i.e. (G) 8.1L V8 L18. Press ENTER.
9. Select 6 Speed Automatic. Press ENTER.
10. Select F0: Diagnostic Trouble Codes (DTC). Press ENTER.
11. Select F1: DTC (s) (Transmission). Press ENTER.
12. Select F0: DTC Information. Press ENTER.
13. Select F0: DTC Info. Press ENTER.

IMPORTANT:
Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data.

CLUTCH TEST

Clutch Test allows a technician to manually select each of the 6 forward ranges with the vehicle stopped. The intent of this procedure is to verify the ability of all 5 clutches to transmit torque without slipping. Refer to the table in Adapt Function , which shows the clutches applied in each gear range.

Clutch Test

Use the scan tool in order to perform the clutch test. Select the following information when setting up the tool for running the test. Use the Shift Transmission feature on the scan tool to complete the clutch test.

1. Select F0: Diagnostics and press ENTER.
2. Select Model Year, i.e. 6 (2006).
3. Select LDTrk, MPV, Incomplete.
4. Select F0: Powertrain, press ENTER.
5. Select Engine size, i.e. (G) 8.1L V8 L18, press ENTER.
6. Select 6 Speed Automatic, press ENTER.
7. Select F2: Special Functions, press ENTER.
8. Select F1: Transmission Output Controls.
9. Select Shift Transmission. This allows the technician

to shift the transmission and observe the integrity of each clutch/range in the transmission.

Attach the transmission pressure gage as described in the Line Pressure Check Procedure. Refer to Line Pressure Check Procedure . Apply the parking brake. Hold the service brakes with your left foot and move the gear selector to DRIVE. Increase engine speed to 1,400 RPM with your right foot. With soft keys, select UPSHIFT and shift the transmission from FIRST gear to SIXTH gear while observing turbine speed. Turbine speed should increase momentarily and then drop to 0 RPM when each gear is attained. Line pressure should drop momentarily, then gain pressure again when each gear is attained.

Maintain 1,400 RPM and select the DOWNSHIFT soft key. Downshift the transmission from SIXTH gear sequentially to FIRST gear while observing turbine speed. Turbine speed should increase momentarily and then drop to 0 RPM when each gear is attained.

To further investigate a suspected leak in a clutch circuit, the clutch test should be repeated, keeping the engine at idle speed. While performing the clutch test at 600 RPM, main pressure should drop momentarily, then gain pressure again when each gear range is attained. If main pressure remains low, suspect damaged seal in that range. If low pressure is in FIRST range only, suspect Low and Reverse piston seal damage.

FASTLEARN PROCEDURE

Overview

In general, FastLearn is a procedure for Allison 1000 Series transmissions in which a series of tests are run to allow the transmission control module (TCM) to learn individual clutch characteristics. Once the clutch data is learned, FastLearn translates it to the adaptive data cells, which the TCM uses for clutch control during range shifts. FastLearn is used at GM assembly plants, and allows the vehicle to be driven out of the assembly plant in a near-fully-adapted state to minimize any customer shift concerns. The scan tool version of FastLearn is intended to provide the same benefit following transmission repair or replacement at GM Dealerships.

FastLearn must be used when one of the following repairs have been made to the vehicle:

- Transmission replacement or internal service/overhaul
- Valve body repair or replacement, including replacement of the pressure control solenoids
- TCM replacement
- TCM software/calibration update
- Any service in response to a shift quality concern

The scan tool is used to initiate FastLearn by selecting the following commands:

- F3: Special Functions
- F1: Transmission Output Controls
- FastLearn

IMPORTANT:
When performing FastLearn, the following conditions must be met:

- Block the drive wheels.
- Apply the parking brake.
- Apply the service brake during DRIVE and REVERSE.
- 0 percent throttle and engine at idle RPM
- Transmission sump temperature is between 40-100°C (104-212°F) - Ref temp bargraph on screen.

IMPORTANT:
If at any time during the procedure, required conditions are not met, FastLearn may abort and the process will need to be started again from the beginning.

Three steps are required to successfully complete the FastLearn procedure:

1. PARK Mode
2. DRIVE Mode
3. REVERSE Mode

PARK Mode

While the transmission is in PARK, with the engine idling, FastLearn will cycle through a series of tests where the 3rd, 5th and reverse clutch and the 2nd clutch is repeatedly applied to learn their clutch characteristics. During the 3rd, 5th and reverse clutch and 2-6 clutch apply/release procedure, FastLearn is able to characterize the pressure control solenoid 1 (PCS1) and pressure control solenoid 2 (PCS2) pressures corresponding to clutch return springs, and is also able to learn the volumes for the 3rd, 5th and reverse clutch and 2-6 clutch packs. In addition, the low and reverse clutch is repeatedly applied and released in PARK to purge out air for later learning of the clutch volume.

DRIVE Mode

CAUTION:

Block the wheels before selecting DRIVE. While in DRIVE, if the Scan Tool loses communication or becomes disconnected, the vehicle could move forward. Failure to block the wheels could result in personal injury or property damage.

Once all of the PARK test data have converged, the scan tool instructs the driver to select DRIVE. Once DRIVE is selected, the TCM engages the 1-2-3-4 clutch to obtain DRIVE and learn 1-2-3-4 clutch volume. The TCM repeats this test until the volume learned for the 1-2-3-4 clutch has converged. The TCM then engages 4-5-6 clutch until the volume is learned and 4-5-6 clutch has converged.

REVERSE Mode

CAUTION:

Block the wheels before selecting REVERSE. While in REVERSE, if the Scan Tool loses communication or becomes disconnected, the vehicle could move backward. Failure to block the wheels could result in personal injury or property damage.

Next, the scan tool instructs the driver to select REVERSE. Once REVERSE is selected, the TCM engages the low and reverse clutch to obtain REVERSE and to learn the low and reverse clutch volume. The TCM repeats this test until the volume learned for the low and reverse clutch has converged.

IMPORTANT:
All shifts will be left in fast adaptive mode at this point.

After learning the 1-2-3-4 and the low and reverse clutch volume, FastLearn updates the adaptive volume data for all shifts with either the 1-2-3-4 or the low and reverse on-coming clutch.

Troubleshooting

If FastLearn will not run and the above stated conditions have been met, ensure the following:

- Transmission fluid temperature is between 40-100°C (104-212°F).
- Closed throttle and engine at warm idle RPM
- No active DTCs
- All speed sensors are connected and functioning properly.
- Internal mode switch is functioning properly
- Main pressure is within specification.
- TCC slip speed less than 100 RPM at idle in PARK/ NEUTRAL

LIMP HOME MODE

Principle of Operation

The Allison transmission incorporates control logic that enables the transmission to revert to a limited total hydraulic operation. The hydraulic system provides a Limp Home Mode, allowing the operator to drive the vehicle to a service location. If power is interrupted while the transmission is operating in R, REVERSE, or N, NEUTRAL, the transmission defaults to or continues NEUTRAL operations. The operator may turn off the engine and start the engine again. The shift selector provides REVERSE/NEUTRAL/DRIVE capability regardless of the range where the failure occurred.
In this state, pressure control solenoid 1 (PCS1), de-energized, allows the 3rd, 5th and reverse clutch to be applied. If the selector valve is moved to the REVERSE position, main pressure is routed to the low and reverse clutch, allowing REVERSE operation. If the selector valve is moved to the DRIVE position, main pressure is routed to the 1-2-3-4 clutch, allowing THIRD range operation.

Test Procedure

If a No Forward, No REVERSE, or Will Not Move condition occurs:

1. Set the parking brake.
2. With the ignition OFF, disconnect the 80-way connector at the transmission control module (TCM).
3. Using a fused jumper wire, connect terminal R of the automatic transmission inline 20-way connector to a known good ground.
4. Start the engine and move the range selector to REVERSE position.
5. The transmission should engage REVERSE range.

Move the range selector to the D position. The transmission should engage THIRD range.

If REVERSE and THIRD range are available in Limp Home Mode, an electrical failure may be indicated. If only 1 of the 2 ranges, or neither, was obtainable, this may indicate an internal hydraulic failure such as one of the following:

- Failed clutch
- Stuck valve
- Solenoid failure

The clutches that could possibly have an indicated failure in Limp Home are the 1-2-3-4 clutch, the 3rd, 5th and reverse clutch, and the low and reverse clutch.

ROAD TEST

IMPORTANT:
The Road Test Procedure should be performed only as part of the Functional Test Procedure. Refer to Functional Test .

The following test provides a method of evaluating the condition of the automatic transmission. The test is structured so that most driving conditions would be achieved. The test is divided into the following parts:

- Electrical Function Check
- Upshift Control and Torque Converter Clutch (TCC) Apply
- Part Throttle Detent Downshifts
- Full Throttle Detent Downshifts
- Manual Downshifts
- Coasting Downshifts
- Manual Range Selection
  – REVERSE
  – Manual FIRST
  – Manual SECOND
  – Manual THIRD

IMPORTANT:
Complete the test in the sequence given. Incomplete testing cannot guarantee an accurate evaluation.

Before the road test, ensure the following conditions are met:

- The engine is performing properly.
- Transmission fluid level is correct.
- Tire pressure is correct.

During the road test:

- Perform the test only when traffic conditions permit.
- Operate the vehicle in a controlled, safe manner.
- Observe all traffic regulations.
- View the scan tool data while conducting this test. Take along qualified help in order to operate the vehicle safely.
- Observe any unusual sounds or smells.

After the road test, inspect the following conditions:

- Transmission fluid level. Refer to Transmission Fluid Checking.
- Diagnostic trouble codes (DTCs) that may have set during the testing. Refer to the applicable DTC.
- Scan tool data for any abnormal readings or data.

Electrical Function Check

Perform this check first, in order to ensure the electronic transmission components are connected and functioning properly. If these components are not checked, a simple electrical condition could be mis-diagnosed.

1. Install the scan tool.
2. Ensure the shift selector is in PARK and set the parking brake.
3. Start the engine.
4. Verify that the following scan tool data can be obtained and is functioning properly. Refer to Scan Tool Data List for typical data values. Data that is questionable may indicate a concern.
   - Engine speed
   - Transmission input speed, turbine
   - Transmission output speed

- Vehicle speed
- C, D, E and REVERSE pressure switch states
- Transmission range, engine list
- 4WD low
- Commanded range, current range
- A and B solenoid reference current
- A and B solenoid actual current
- A and B solenoid duty cycle
- Brake switch
- Engine coolant temperature
- Transmission fluid temperature
- Throttle angle
- Ignition voltage
- C shift solenoid ON/OFF
- D shift solenoid ON/OFF
- E shift solenoid ON/OFF
- TCC solenoid duty cycle
- TCC slip speed

5. Monitor the brake switch signal while depressing and releasing the brake pedal. The scan tool should display the following:
   - Closed when the brake pedal is released
   - Open when the brake pedal is depressed
6. Check the garage shifts.
   A. Apply the brake pedal and ensure the parking brake is set.
   B. Move the shift selector through the following ranges:
      i. PARK to REVERSE
      ii. REVERSE to NEUTRAL
      iii. NEUTRAL to DRIVE
   C. Pause 2 to 3 seconds in each selector position.

IMPORTANT:
Harsh engagement may be caused by any of the following conditions:

- High idle speed. Compare engine idle speed to desired idle speed.
- Commanded low A or B solenoid current. Compare A and B solenoid reference current to A and B solenoid actual current.
- A default condition caused by certain DTCs that result in maximum full throttle shift points
- Shift is not fully adapted

IMPORTANT:
Soft or delayed engagement may be caused by any of the following conditions:

- Low idle speed. Compare engine idle speed to desired idle speed.
- Low fluid level
- Cold transmission fluid. Inspect for low transmission fluid temperature.

Verify the range engagements are immediate and not harsh.

7. Monitor the transmission range on the scan tool engine list.
   A. Apply the brake pedal and ensure the parking brake is set.
   B. Move the shift selector through all ranges.

C. Pause 2 to 3 seconds in each range.

D. Return the shift selector to PARK.

E. Verify that all of the selector positions match the scan tool display.

8. Inspect the throttle angle input.

A. Apply the brake pedal and ensure the parking brake is set.

B. Ensure the shift selector is in PARK.

C. Monitor the throttle angle while increasing and decreasing the engine speed with the throttle pedal. The scan tool throttle angle should increase and decrease with the engine speed.

If any of the above checks do not perform properly, record the result for reference after the completion of the Road Test Procedure.

Upshift Control and Torque Converter Clutch (TCC) Apply

The transmission control module (TCM) calculates the upshift points based on the throttle angle and the engine, turbine and output speed. When the TCM determines that conditions are met for a shift to occur, the TCM commands the shift, and controls A and B solenoid current to proper control clutch pressures during the shift.

Perform the following steps:

1. Choose a throttle position of 10 percent, 25 percent or 50 percent. All throttle angles shown should be tested to cover the normal driving range.
2. Monitor the following scan tool parameters:
   - Throttle angle
   - Vehicle speed
   - Engine speed
   - Output shaft speed
   - Commanded range
   - Slip speed
   - Solenoid states
3. Place the shift selector in DRIVE.
4. Using the chosen throttle angle, accelerate the vehicle. Hold the throttle steady.
5. As the transmission upshifts, note the vehicle speed when the shift occurs for each range change. There should be a noticeable shift feel or engine speed change within 1 to 2 seconds of the commanded range change.
6. Shift speeds may vary slightly due to transmission fluid temperature or hydraulic delays in responding to the electronic controls.
   - Note any harsh, soft or delayed shifts or slipping.
   - Note any noise or vibration.
7. Repeat steps 1-6 to complete all throttle angles.

IMPORTANT:
The TCC will not engage until the engine is in closed loop operation. The vehicle must be in a near cruise condition, not accelerating or coasting, and on a level road surface.

Inspect for TCC apply in SECOND, THIRD, FOURTH and FIFTH range.

- Note the TCC apply point. When the TCC applies there should be a noticeable drop in engine speed and a drop in slip speed to below 100 RPM. If the TCC apply can not be detected inspect for DTCs. Refer to Torque Converter Diagnosis Procedure .

- Lightly tap and release the brake pedal. The TCC will release on most applications.

Part Throttle Detent Downshift

1. Place the shift selector in DRIVE.
2. Accelerate the vehicle to a speed just above the FOURTH to FIFTH shift point, using less than 50 percent throttle.
3. Quickly increase throttle angle to greater than 63 percent.
4. Verify the following conditions:
   - The TCC releases.
   - The transmission downshifts immediately to FOURTH range.

Manual Downshifts

Manual 5-3 Downshift

1. Place the shift selector in DRIVE.
2. Accelerate the vehicle to obtain FIFTH range.
3. Release the throttle while moving the shift selector to THIRD.
4. Verify the following conditions:
   - The TCC releases.
   - The transmission downshifts immediately to FOURTH range and then to THIRD range.
   - The engine slows the vehicle.

Manual 5-2 Downshift

1. Place the shift selector in DRIVE.
2. Accelerate the vehicle to obtain FIFTH range.
3. Release the throttle while moving the shift selector to SECOND.
4. Verify the following conditions:
   - The TCC releases.
   - The transmission downshifts immediately to FOURTH range, then to THIRD, then to SECOND.
   - The engine slows the vehicle.

Manual 2-1 Downshift

1. Place the shift selector in DRIVE.
2. Accelerate the vehicle until the 1-2 shift occurs.
3. Go to 8 km/h (5 mph) above the 1-2 shift point.
4. Release the throttle while moving the shift selector to FIRST.
5. Verify the following conditions:
   - The TCC releases.
   - The transmission immediately downshifts to FIRST range.
   - The engine slows the vehicle.

Coasting Downshifts

1. Place the shift selector in DRIVE.
2. Accelerate the vehicle to FIFTH range with the TCC applied.
3. Release the throttle and lightly apply the brakes.
4. Verify the following conditions:
   - The TCC releases.
   - Downshifts occur in normal sequence and the transmission returns to FIRST range before the vehicle comes to a stop.

Manual Range Selection

The shift solenoids control the upshifts in the manual ranges.

Perform the following tests, using 10-15 percent throttle angle.

Reverse

1. With the vehicle stopped, move the shift selector to REVERSE.
2. Slowly accelerate the vehicle.
3. Verify that there is no noticeable slip, noise or vibration.

Manual FIRST

1. With the vehicle stopped, move the shift selector to FIRST.
2. Accelerate the vehicle to maximum speed.
3. Verify the following conditions:
   - No upshifts occur.
   - The TCC does not apply.
   - There is no noticeable slip, noise, or vibration.

Manual SECOND

1. With the vehicle stopped, move the shift selector to SECOND.
2. Accelerate the vehicle to maximum speed.
3. Verify the following conditions:
   - The 1-2 shift occurs.
   - The 2-3 shift does not occur.
   - There is no noticeable slip, noise, or vibration.

Manual THIRD

1. With the vehicle stopped, move the shift selector to THIRD.
2. Accelerate the vehicle to maximum speed.
3. Verify the following conditions:
   - The 1-2 shift occurs.
   - The 2-3 shift occurs.
   - There is no noticeable slip, noise, or vibration.

TORQUE CONVERTER DIAGNOSIS

The torque converter clutch (TCC) is applied by fluid pressure, which is controlled through the converter flow valve by the TCC variable bleed solenoid. The converter flow valve and the TCC variable bleed solenoid are located inside the automatic transmission assembly.

Torque Converter Stator

The torque converter stator assembly can have 2 different malfunctions.

- The stator assembly freewheels in both directions.
- The stator assembly remains locked up at all times.

Poor Acceleration at Low Speed

If the stator is freewheeling at all times, the car tends to have poor acceleration from a standstill. At speeds above 50-55 km/h (30-35 mph), the car may perform normally. For poor acceleration, you should first determine that the exhaust system is not blocked, and the transmission is in FIRST range when starting out.

If the engine freely accelerates to a high RPM in NEUTRAL, you can assume that the engine and the exhaust system are normal. Inspect for poor performance in DRIVE and REVERSE in order to help determine if the stator is freewheeling at all times.

Poor Acceleration at High Speed

If the stator is locked up at all times, performance is normal when accelerating from a standstill. Engine RPM and vehicle speed are limited or restricted at high speeds. Visual examination of the converter may reveal a blue color caused by overheating.

You should be able to turn the race clockwise, but should have difficulty in moving the race counterclockwise, or you may be unable to move the race at all.

Whine Noise

IMPORTANT:
Do not confuse this noise with pump whine noise, which is usually noticeable in PARK, NEUTRAL and all other gear ranges. Pump whine will vary with line pressure.

You may notice a torque converter whine when the vehicle is stopped and the transmission is in DRIVE or REVERSE. This noise will increase as you increase the engine RPM. The noise will stop when the vehicle is moving or when you apply the torque converter clutch, 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. Bring the vehicle to a complete stop using the service brake.
2. Ensure that the engine is at low idle RPM.
3. Put the transmission in P, PARK.
4. Engage the P, PARK, range by slowly releasing the service brake.
5. Apply the emergency brake and/or parking brake, if present, and ensure it is properly engaged.
6. If the vehicle will be unoccupied with the engine running, chock the wheels and take any other steps necessary to keep the vehicle from moving.
7. Place your foot on the brake.
8. Place the range selector in DRIVE.

NOTICE:
You may damage the transmission if you depress the accelerator for more than 6 seconds.

9. Depress the accelerator to approximately 1,200 RPM for no greater than 6 seconds. Listen for torque converter noise. A torque converter noise will increase under this load.

Torque Converter Clutch Shudder

The key to diagnosing TCC shudder is to note when it happens and under what conditions.

TCC shudder which is caused by the transmission, should only occur during the apply or release of the converter clutch. Shudder should never occur after the TCC piston is fully applied.

If the shudder occurs while the TCC is applying, the condition could be within the transmission or the torque converter. Something is causing one of the following conditions to occur:

- Something is not allowing the clutch to become fully engaged.
- Something is not allowing the clutch to release.
- The clutch is releasing and applying at the same time.

One of the following may be causing the conditions to occur:

- Leaking turbine shaft seal rings
- A restricted release orifice
- Defective friction material on the TCC piston

If Shudder Occurs After the TCC has Applied

IMPORTANT:
If shudder occurs after the TCC has applied, most likely there is nothing wrong with the transmission.

As mentioned above, the TCC is not likely to slip after the TCC has been applied. Engine conditions may go unnoticed under light throttle and load, but they become noticeable after the TCC apply when going up a hill or accelerating. This is due to the mechanical coupling between the engine and the transmission.

Once the TCC is applied, there is no torque converter, fluid coupling, assistance. Engine or driveline vibrations could be unnoticeable before TCC engagement.

Inspect the following components in order to avoid misdiagnosis of TCC shudder. An inspection also avoids the unnecessary disassembly of a transmission or the unnecessary replacement of a torque converter.

- Spark plugs
- Inspect for cracks, high resistance or a broken insulator.
- Plug wires – Look in each end. If there is red ozone dust or a black carbon substance present, the wires are bad. Also, inspect for a white discoloration of the wire. This indicates arcing during hard acceleration.
- Coil – Inspect for black discoloration on the bottom of the coil. This indicates arcing while the engine is misfiring.
- Fuel injector – The filter may be plugged.
- Vacuum leak – The engine will not get the correct amount of fuel. The mixture may run rich or lean depending on where the leak occurs.
- Exhaust gas recirculation (EGR) valve – The valve may let in too much or too little unburnable exhaust gas and could cause the engine to run rich or lean.
- Manifold absolute pressure (MAP) or mass air flow (MAF) sensor for possible vacuum leak – The engine will not receive the correct amount of fuel for proper engine operation.
- Carbon on the intake valves – Carbon restricts the proper flow of air/fuel mixture into the cylinders.
- Flat cam – Valves do not open far enough to let the proper fuel/air mixture into the cylinders.
- Oxygen sensor – This sensor may command the engine rich or lean for too long.
- Fuel pressure – Fuel pressure may be too low.
- Engine mounts – Vibration of the mounts can be multiplied by TCC engagement.
- Axle joints – Inspect for vibration.
- Throttle position (TP) sensor – The TCC apply and release depends on the TP sensor in many engines. If the TP sensor is out of specification, the TCC may remain applied during initial engine loading.
- Cylinder balance – Malfunctioning piston rings or poorly sealed valves can cause low power in a cylinder.
- Fuel contamination – Fuel contamination causes poor engine performance.

Torque Converter Evaluation and Diagnosis

Replace the torque converter if any of the following conditions exist:

- External leaks appear in the hub weld area
- The converter hub is scored or damaged

- The converter pilot is broken, damaged, or fits poorly into the crankshaft
- You discover steel particles after flushing the cooler and the cooler lines
- The pump is damaged, or you discover steel particles in the converter
- The vehicle has TCC shudder and/or no TCC apply – Replace the torque converter only after all hydraulic and electrical diagnoses have been made. The converter clutch material may be glazed.
- The converter has an imbalance which cannot be corrected – Refer to Flexplate/Torque Converter Vibration Test .
- The converter is contaminated with engine coolant which contains antifreeze
- An internal failure occurs in the stator race
- Overheating produces heavy debris in the clutch
- You discover steel particles or clutch lining material in the control main filter or suction filter, or on the magnets, when no internal parts in the unit are worn or damaged
- This condition indicates that lining material came from the converter.

Do Not Replace the Torque Converter if you discover any of the following symptoms:

- The oil has an odor or the oil is discolored, even though metal or clutch facing particles are not present
- The threads in one or more of the converter bolt holes are damaged
- Correct the condition with a new thread insert.
- Transmission failure did not display evidence of damaged or worn internal parts, steel particles or clutch plate lining material in the unit and in the control main filter or suction filter

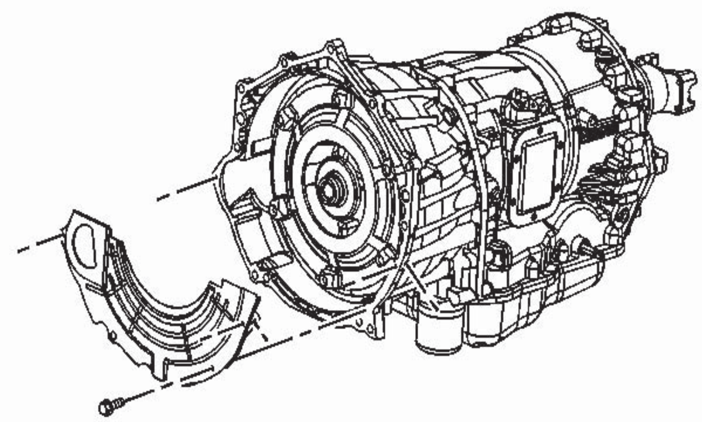
FLEXPLATE/TORQUE CONVERTER VIBRATION TEST (8.1L)

To determine and correct a torque converter vibration, use the following general procedure to achieve the best possible torque converter-to-flywheel balance. Refer to Transmission Replacement for detailed procedure steps as appropriate.

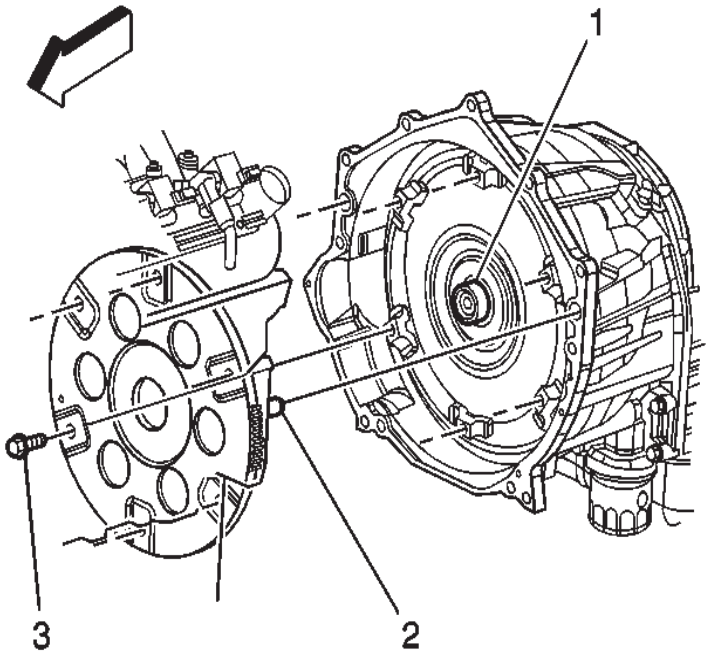
CAUTION:

Before servicing any electrical component, the ignition and start switch must be in the OFF or LOCK position and all electrical loads must be OFF, unless instructed otherwise in these procedures. If a tool or equipment could easily come in contact with a live exposed electrical terminal, also disconnect the negative battery cable. Failure to follow these precautions may cause personal injury and/or damage to the vehicle or its components.

1. Disconnect the battery.
2. Raise the vehicle. Refer to Lifting and Jacking the Vehicle in General Information.
3. Remove the starter motor bolts and position the starter motor aside. Refer to Starter Motor Replacement in Engine Electrical.



4. Remove the converter housing inspection cover.
5. Repeat this procedure until you obtain the best possible balance.
   - Unless already removed, remove the starter motor bolts and position the starter motor aside. Refer to Starter Motor Replacement in Engine Electrical.



- Remove the torque converter bolts.
- Rotate the torque converter one bolt position.

NOTICE:
Use the correct fastener in the correct location. Replacement fasteners must be the correct part number for that application. Fasteners requiring replacement or fasteners requiring the use of thread locking compound or sealant are identified in the service procedure. Do not use paints, lubricants, or corrosion inhibitors on fasteners or fastener joint surfaces unless specified. These coatings affect fastener torque and joint clamping force and may damage the fastener. Use the correct tightening sequence and specifications when installing fasteners in order to avoid damage to parts and systems.

- Install the torque converter bolts and tighten the bolts to 60 N•m (44 lb ft).
- Install the starter motor and starter motor bolts. Refer to Starter Motor Replacement in Engine Electrical.

CAUTION:
Before servicing any electrical component, the ignition and start switch must be in the OFF or LOCK position and all electrical loads must be OFF, unless instructed otherwise in these procedures. If a tool or equipment could easily come in contact with a live exposed electrical terminal, also disconnect the negative battery cable. Failure to follow these precautions may cause personal injury and/or damage to the vehicle or its components.

- Connect the battery.
- Start the vehicle and test for vibration again.

CAUTION:
Before servicing any electrical component, the ignition and start switch must be in the OFF or LOCK position and all electrical loads must be OFF, unless instructed otherwise in these procedures. If a tool or equipment could easily come in contact with a live exposed electrical terminal, also disconnect the negative battery cable. Failure to follow these precautions may cause personal injury and/or damage to the vehicle or its components.

6. Disconnect the battery.
7. Raise the vehicle. Refer to Lifting and Jacking the

Vehicle in General Information.

8. Remove the starter motor bolts and position the starter motor aside. Refer to Starter Motor Replacement in Engine Electrical.
9. Install the converter housing inspection cover.
10. Install the starter motor and starter motor bolts. Refer to Starter Motor Replacement in Engine Electrical.
11. Lower the vehicle.

CAUTION:

Before servicing any electrical component, the ignition and start switch must be in the OFF or LOCK position and all electrical loads must be OFF, unless instructed otherwise in these procedures. If a tool or equipment could easily come in contact with a live exposed electrical terminal, also disconnect the negative battery cable. Failure to follow these precautions may cause personal injury and/or damage to the vehicle or its components.

12. Connect the battery.

NOISE AND VIBRATION ANALYSIS

A noise or vibration that is noticeable when the vehicle is in motion MAY NOT be the result of the transmission.

If noise or vibration is noticeable in PARK and NEUTRAL with the engine at idle, but is less noticeable as RPM increases, the condition may be caused by unsatisfactory engine performance.

- Inspect the tires for the following conditions:
  - Uneven wear Refer to Tire Diagnosis - Irregular or Premature Wear .
  - Imbalance
  - Mixed sizes
  - Mixed radial and bias ply
- Inspect the suspension components for the following conditions:
  - Alignment and wear
  - Loose fasteners Refer to Fastener Tightening Specifications .
- Inspect the engine and transmission mounts for damage and loose bolts.
- Inspect the transmission case mounting holes for the following conditions:
  - Missing bolts, nuts, and studs
  - Stripped threads
  - Cracks
- Inspect the flywheel for the following conditions:
  - Missing or loose bolts
  - Cracks
  - Imbalance
- Inspect the torque converter for the following conditions:
  - Missing or loose bolts or lugs
  - Missing or loose balance weights
  - Imbalance

FLUID LEAK DIAGNOSIS

TOOLS REQUIRED

- J 28431-6 Fluorescent Oil Dye - 6 1 oz
- J 42220 Universal 12V Leak Detection Lamp Dye and Black Light Method

Use the J 42220 and the J 28431-6 to isolate the leak point. Fluid dye and black light kits are also available from various tool manufacturers. All transmissions that are diagnosed, that require replacement due to leakage, must be diagnosed with the leak dye and black light method.

1. Follow the manufacturer's instructions in order to determine the amount of dye to use.
2. Detect the leak with the black light.
3. Make the necessary repairs.

GENERAL METHOD

1. Verify that the leak is transmission fluid.
2. Thoroughly clean the suspected leak area.
3. Operate the vehicle for 24 km (15 mi), or until normal operating temperatures are reached.
4. Park the vehicle over clean paper or cardboard.
5. Shut OFF the engine.
6. Look for fluid spots on the paper.
7. Make the necessary repairs.

POWDER METHOD

1. Thoroughly clean the suspected leak area with solvent.
2. Apply an aerosol type powder, such as foot powder, to the suspected leak area.
3. Operate the vehicle for 24 km (15 mi), or until normal operating temperatures are reached.
4. Shut OFF the engine.
5. Inspect the suspected leak area.
6. Trace the leak path through the powder in order to find the source of the leak.
7. Make the necessary repairs.

FIND THE CAUSE OF THE LEAK

Pinpoint the leak and trace the leak back to the source. You must determine the cause of the leak in order to repair the leak properly. For example, if you replace a gasket, but the sealing flange is bent, the new gasket will not repair the leak. You must also repair the bent flange. Before you attempt to repair a leak, check for the following conditions, and make repairs as necessary:

- Gaskets Fluid level/pressure is too high
- Plugged vent or drain-back holes
- Improperly tightened fasteners
- Dirty or damaged threads
- Warped flanges or sealing surface
- Scratches, burrs, or other damage to the sealing surface
- Damaged or worn gasket
- Cracking or porosity of the component
- Improper sealant used, where applicable
- Incorrect gasket
- Seals Fluid level/pressure is too high
- Plugged vent or drain-back holes
- Damaged seal bore

- Damaged or worn seal
- Improper installation
- Cracks in component
- Manual or output shaft surface is scratched, nicked, or damaged
- Loose or worn bearing causing excess seal wear

CASE POROSITY REPAIR

Some external leaks are caused by case porosity in non-pressurized areas. You can usually repair these leaks with the transmission in the vehicle.

1. Thoroughly clean the area to be repaired with a cleaning solvent. Air dry the area.

CAUTION:

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

2. Using instructions from the manufacturer, mix a sufficient amount of an epoxy to make the repair.
3. While the transmission case is still hot, apply the epoxy. You can use a clean, dry soldering acid brush to clean the area and also to apply the epoxy cement. Ensure the area to be repaired is fully covered.
4. Allow the epoxy cement to cure for 3 hours before starting the engine.
5. Repeat the fluid leak diagnosis procedures.

AUTOMATIC TRANSMISSION OIL COOLER

FLUSHING AND FLOW TEST

GM studies indicate that plugged or restricted transmission oil coolers and pipes cause insufficient transmission lubrication and elevated operating temperatures which can lead to premature transmission wear-out. Many cases could have been prevented by following published procedures for transmission oil cooler flushing and flow checking. This procedure includes flushing and flow checking the auxiliary transmission oil cooler, if equipped. GM requires that transmission oil cooler flushing and flow checking be performed whenever a transmission is removed from the vehicle for service within warranty, including:

- Goodwrench SRTA
- Major overhaul
- Torque converter replacement
- Oil pump replacement

Only GM Goodwrench DEXRON® VI automatic transmission fluid should be used when doing warranty repair on GM transmissions.

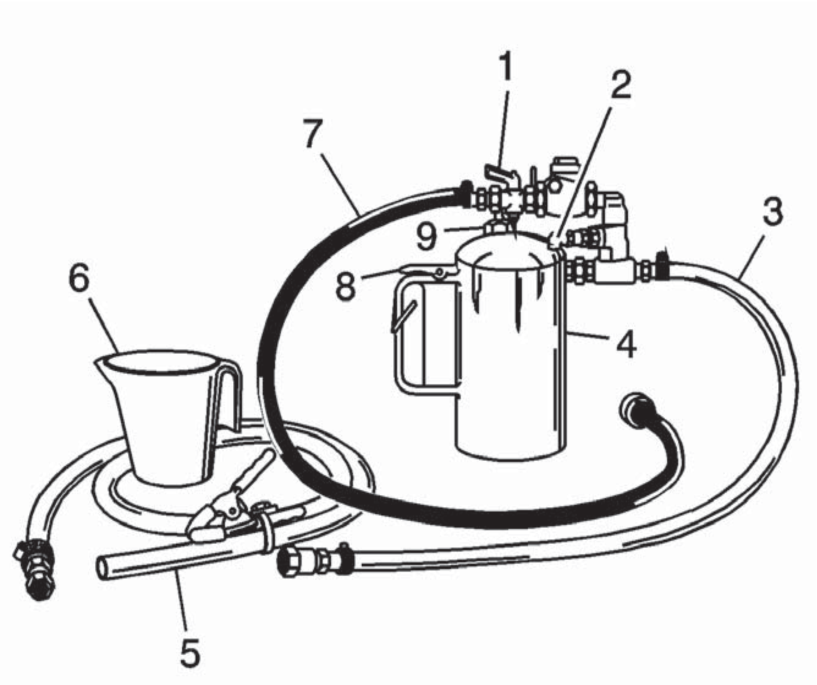
TOOLS REQUIRED

- J 35944-A Transmission Oil Cooler and Line Flusher
- J 35944-22 Transmission Oil Cooler Flushing Fluid
- J-44835-1 Transmission Oil Cooler Flusher Adapters
- Measuring cup
- Funnel
- Water supply - hot water recommended
- Water hose at least 16 mm (5/8 in) ID

- Shop air supply - with water/oil filters, regulator and pressure gage
- Air chuck with clip, if available
- Oil drain container
- Minimum 19 L (5 gallon) pail or similar container with lid
- Eye protection
- Rubber gloves

PREPARATION

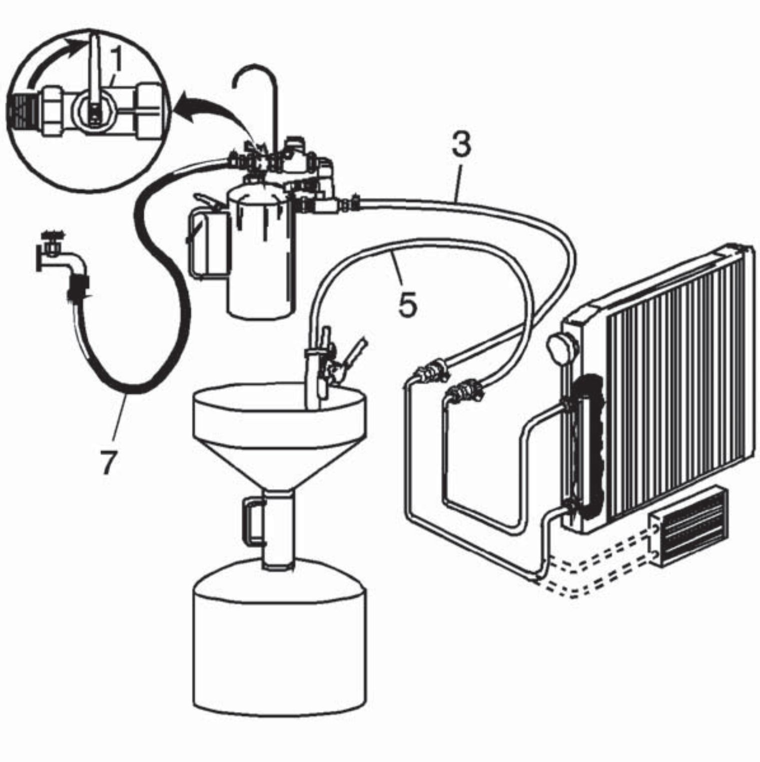
1. After the repair or replacement transmission is installed in the vehicle, do not connect the oil cooler pipes again.



IMPORTANT:

- Do not substitute with solutions that contain alcohol or glycol. Use of solutions that contain alcohol or glycol may damage the J 35944-A , oil cooler components or transmission components.
- The J 35944-22 flushing fluid is environmentally safe, yet powerful enough to cut through transmission fluid to dislodge any contaminants from the cooler. The safety precautions on the label regarding potential skin and eye irritations associated with prolonged exposure, are typical precautions that apply to many similar cleaning solutions. It should be noted that according to GM, use of other non-approved fluids for cooler flushing can have an adverse reaction to the seals inside the transmission.

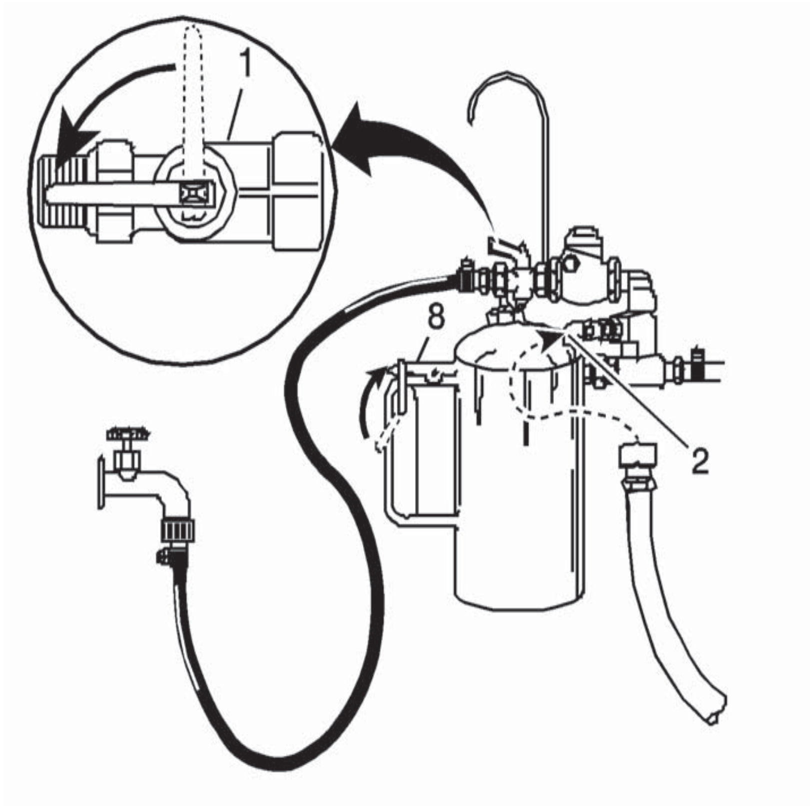
2. Remove the fill cap (9) on the J 35944-A and fill the flusher tank (4) with 0.6 L (20-21 oz) of J 35944-22 flushing solution using the measuring cup (6). Do not overfill.
3. Install the fill cap (9) on the J 35944-A and pressurize the flusher tank (4) to 550-700 kPa (80-100 psi), using the shop air supply at the tank air valve (9).



4. Connect the J-44835-1 adapters to the transmission oil cooler lines.
5. Connect the J 35944-A discharge hose (5) to the oil cooler return pipe, top connector.
6. Clip the discharge hose (5) onto the oil drain container.
7. Attach the J 35944-A to the undercarriage of the vehicle with the hook provided and connect the flushing system feed supply hose (3) from the J 35944-A to the oil cooler feed pipe, bottom connector.
8. With the water supply valve (1) on the J 35944-A in the OFF position, connect the water supply hose from the J 35944-A to the water supply at the faucet.
9. Turn ON the water supply at the faucet.

INITIAL FLUSH

1. Turn the J 35944-A water supply valve (1) to the ON position and allow water to flow through the oil cooler and pipes for 10 seconds in order to remove any remaining transmission fluid. If water does not flow through the oil cooler and pipes, the cause of the blockage must be diagnosed and the plugged component must be repaired or replaced. Continue with the cooler flushing and flow check procedure once the blockage is corrected.
2. Turn the J 35944-A water supply valve (1) to the OFF position and clip the discharge hose (5) onto a suitable container, preferably with a lid, to avoid splashback.



3. Turn the J 35944-A water supply valve (1) to the ON position and depress the trigger (8) to mix cooler flushing solution into the water flow. Use the clip provided on the handle to hold the trigger (8) down. The discharge will foam vigorously when the solution is introduced into the water stream.

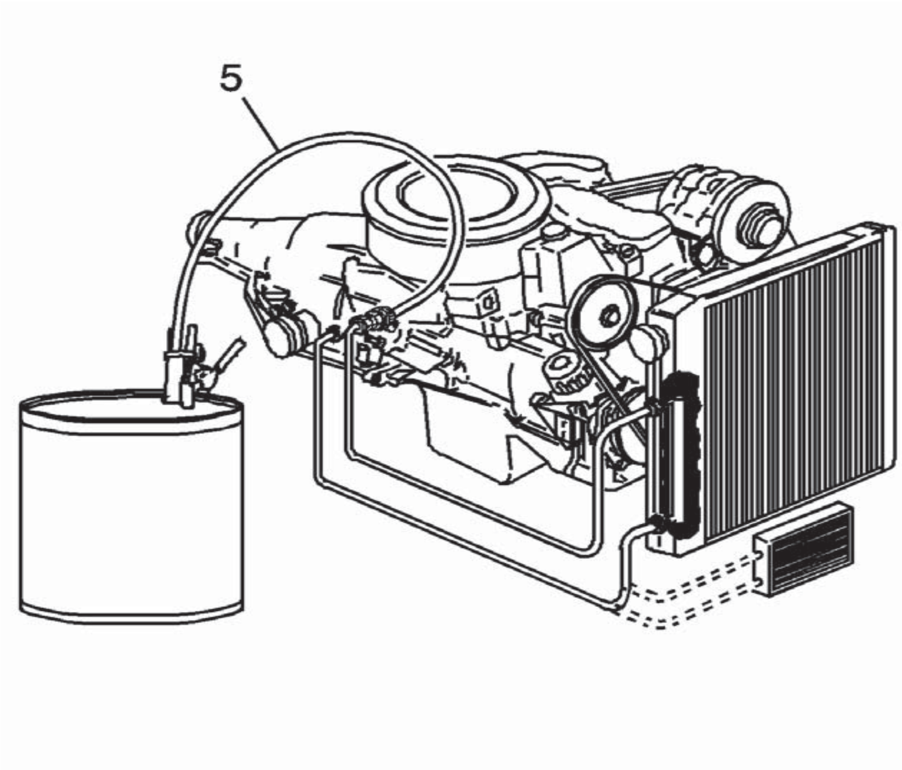
IMPORTANT:
Flushing for approximately 2 minutes in each cooler line direction will result in a total of about 31-38 L (8-10 gallons) of waste fluid. This mixture of water and flushing fluid is to be captured in a suitable container, preferably with a lid.

4. Flush the oil cooler and pipes with water and solution for 2 minutes. During this flush, attach the shop air supply 825 kPa (120 psi) to the flushing system feed air valve (2) located on the J 35944-A for 3-5 seconds at the end of every 15-20 second interval to create a surging action.
5. Release the trigger (8) and turn the J 35944-A water supply valve (1) to the OFF position.

BACK FLUSH

1. Disconnect both hoses from the oil cooler pipes and then connect them to the opposite oil cooler pipe. This will allow the oil cooler and pipes to be back flushed.
2. Repeat steps 3 and 4 of the INITIAL FLUSH procedure.
3. Release the trigger (8) of the J 35944-A and allow water only to rinse the oil cooler and pipes for 1 minute.
4. Turn the J 35944-A water supply valve (1) to the OFF position and turn OFF the water supply at the faucet.
5. Attach the shop air supply to the flushing system feed air valve (2) on the J 35944-A and blow out the water from the oil cooler and pipes. Continue until no water comes out of the discharge hose (5).

FLOW CHECK



1. Disconnect both hoses from the oil cooler pipes. Connect the oil cooler feed pipe, bottom connector, to the transmission. Connect the return pipe, top connector, to the discharge hose (5). This will require the use of J-44835-1 . Clip the discharge hose (5) onto an empty oil drain container.
2. Confirm the transmission is filled with automatic transmission fluid.
3. Start the engine with the transmission in PARK range and run for 5 seconds at 2,400 RPM. A minimum of 2.2 L (2.3 quarts) must be discharged during this 5 second run time.
   - If fluid flow is greater than 2.2 L (2.3 quarts) in 5 seconds at 2,400 RPM, go to step 4.
   - If fluid flow is less than 2.2 L (2.3 quarts) in 5 seconds at 2,400 RPM, perform the following diagnosis: Disconnect the oil cooler feed line at the radiator. Connect the discharge hose (5) to the cooler feed line. Clip the discharge hose (5) to the empty oil drain container. Start the engine with the transmission in PARK range and run for 5 seconds at 2,400 RPM. A minimum of 2.2 L (2.3 quarts) must be discharged during this 5 second run time at 2,400 RPM. Do the following according to the flow rate:
   - Insufficient feed flow: Inspect the transmission.
   - Sufficient feed flow: Inspect the oil cooler return pipe, the oil cooler located in the radiator, and the auxiliary oil cooler.
4. Remove the discharge hose (5), connect the cooler feed and return pipes to the transmission and fill the unit to the proper fluid level. Inspect the transmission oil cooler pipe connections at the radiator, the auxiliary cooler and the transmission for leaks.

CLEAN-UP

1. Disconnect the water supply hose (7) from the J 35944-A and bleed any remaining air pressure from the flusher tank (4).
2. Remove the fill cap (9) from the J 35944-A and return any unused flushing solution to its container. Rinse the J 35944-A with water. Do not store the J 35944-A with flushing solution in it.
3. After every third use, clean the J 35944-A as described in the instructions included with the tool.

4. Dispose of any waste water/solution and transmission fluid in accordance with local regulations.

EXCESSIVE SLIPPAGE AND CLUTCH CHATTER

Condition	Action
Incorrect speed sensor readings	See speed sensor DTCs.
Incorrect fluid level	Correct the fluid level. Refer to Transmission Fluid Checking Procedure.
Main pressure low	Repair the transmission.
TCC clutch not applied	Inspect the torque converter clutch system wiring, pressure, and controls. Repair as necessary.
Ranges 1, 2, 3, 4 Only	
1-2-3-4 clutch slipping, leaks at rotating clutch seals, leaks at piston seals, 1-2-3-4 clutch plates worn	Inspect the 1-2-3-4 clutch plates, and piston and rotating seals. Replace/rebuild as necessary.
Ranges 4, 5, 6 Only	
4-5-6 clutch slipping, leaks at rotating clutch seals, leaks at piston seals, 4-5-6 clutch plates worn	Inspect the 4-5-6 clutch plates, and piston and rotating seals. Replace/rebuild as necessary.
Ranges 3, 5, R Only	
3rd, 5th and Reverse clutch slipping, leaks at piston seals, 3rd, 5th and Reverse clutch plates worn	Inspect the 3rd, 5th and Reverse clutch plates and piston seals. Replace/rebuild as necessary.
Range 2, 6 Only	
2-6 clutch slipping, leaks at piston seals, 2nd clutch plates worn	Inspect the 2-6 clutch plates and piston seals. Replace/rebuild as necessary.
Ranges 1, R Only	
Low and Reverse clutch slipping, leaks at piston seals, Low and Reverse clutch plates worn	Inspect the Low and Reverse clutch plates and piston seals. Replace/rebuild as necessary.

FLUID LEAKS FROM FLUID FILL TUBE AND/OR VENT

Condition	Action
Dipstick loose	Tighten the cap. Replace the cap if necessary.
Fluid level too high	Drain the fluid to the proper level. Refer to Transmission Fluid Checking Procedure.
Fluid level too low	Add fluid to the proper level. Refer to Transmission Fluid Checking Procedure.
Breather stopped up - clogged	Clean or replace the breather.
Dipstick or fill tube seal worn	Replace the seals or dipstick.
Incorrect dipstick marking	Calibrate the dipstick.
Fluid contaminated with engine coolant or water	Drain and replace fluid. Locate and fix source of additional fluid. Refer to Transmission Fluid Checking Procedure and Automatic Transmission Fluid/ Filter Replacement.

FLUID LEAKS FROM TRANSMISSION INPUT

Condition	Action
Torque converter seal leaks	Replace the torque converter seal. Refer to Seal Replacement - Torque Converter .
Front support bolt seals leaking	Replace the bolt seals. Refer to Torque Converter Housing Bolt Seal Replacement .
Converter leaks	Inspect the converter seals, cracked converter pump tangs, converter cover, or converter housing porosity. Replace the parts as required.
Spin-on filter leaking	Replace the filter. Refer to Automatic Transmission Fluid/Filter Replacement.
Main pressure plug leak	Replace or torque the main pressure plug. Refer to Oil Pressure Test Plug Replacement.
Pump bushing shows excessive wear	Rebuild and repair the pump.

FLUID LEAKS FROM TRANSMISSION OUTPUT

Condition	Action
Faulty or missing seal at output flange/yoke	Install a new seal assembly in the transmission rear cover. Refer to Seal Replacement - Rear Propshaft
Machine lead on output flange/yoke seal surface	Replace the flange/yoke. Refer to Output Flange/Yoke Replacement.
Rear cover porosity	Repair or replace the cover.
Flange/yoke worn at seal surface	Replace the flange/yoke. Refer to Output Flange/Yoke Replacement.
Insufficient sealant around seal OD	Install a new seal assembly in the transmission rear cover. Refer to Seal Replacement - Rear Propshaft.
Damaged or missing output bolt washer seal	Replace the output bolt sealing washer. Refer to Output Flange/Yoke Replacement.
Damaged, missing, or loose output flange bolt	Replace and/or torque the output flange bolt. Refer to Output Flange/Yoke Replacement.

INTERMITTENT BUZZING NOISE

Condition	Action
Low fluid level	Add fluid to the proper level. Refer to Transmission Fluid Checking Procedure.
Air leak in oil suction filter canister	Replace the oil suction filter. Refer to Oil Pan Replacement .
Clogged suction filter	Replace the filter. Refer to Oil Pan Replacement .
Aerated fluid causes noisy pump	Correct the fluid level. Refer to Transmission Fluid Checking Procedure .
Low main pressure causes main regulator valve to oscillate	Refer to Low Main Line Pressure in All Ranges and Low Main Line Pressure in specific Ranges, Normal Pressure in Other Ranges .

LOW MAIN LINE PRESSURE IN ALL RANGES

Condition	Action
Incorrect fluid level	Correct the fluid level. Refer to Transmission Fluid Checking Procedure.
Plugged or faulty suction filter	Clean or replace the oil suction filter element. Refer to Oil Pan Replacement.
Main pressure regulator valve sticking	Overhaul the control module assembly.
Leaking solenoids in control valve body assembly	Replace the solenoids. Refer to Control Valve Solenoid Replacement.
Main pressure regulator valve spring weak, broken, or missing	Inspect the spring and replace, if necessary.
Control module body leakage - separator plate not flat, loose control valve body bolts	Replace or rebuild the control module assembly. Care should be taken when removing and labeling shift springs.
Faulty or incorrect fluid pressure gage	Repair or replace the gage.
Oil pump worn or damaged	Replace or rebuild the oil pump.
Leak in suction circuit	Inspect the suction circuit for leaking seal, gasket, or mating surface.

LOW MAIN LINE PRESSURE IN SPECIFIC RANGES, NORMAL PRESSURE IN OTHER RANGES

Condition	Action
Seal leak	Replace the seals that are causing low pressure in a particular range.

LOW LUBRICATION PRESSURE

Condition	Action
Incorrect fluid level	Correct the fluid level. Refer to Transmission Fluid Checking Procedure.
Plugged suction filter	Clean or replace the oil suction filter. Refer to Oil Pan Replacement.
Plugged control main filter	Replace the filter.
Excessive internal fluid leakage	• Inspect other pressures. Refer to Low Main Line Pressure in All Ranges and Low Main Line Pressure in specific Ranges, Normal Pressure in Other Ranges. • Inspect the control module mounting bolts. • Inspect the lubrication valve and spring. • Inspect the converter housing to separator plate gasket.
Cooler lines restricted or leaking	Inspect for kinks and leakage. Reroute or replace lines as necessary.
Lubrication regulator valve sticking	Clean or replace the regulator valve.
Converter relief valve sticking	Clean or replace the converter relief valve.
Cooler plugged	Clean or replace the cooler.
Faulty gage	Repair or replace the gage.

CONTAMINATED TRANSMISSION FLUID

Condition	Action
Failure to change fluid and filters	Change the fluid and install new filters. Refer to Automatic Transmission Fluid/Filter Replacement.
Excessive heat	Inspect the cooling system for restrictions and proper capacity.
Substandard fluid	Use recommended fluid. Refer to Transmission General Specifications.
Clutch/transmission failure	Overhaul the transmission.

EXCESSIVE FLARE - ENGINE OVERSPEED ON WIDE-OPEN THROTTLE

Condition	Action
Incorrect fluid level	Add fluid to the proper level. Refer to Transmission Fluid Checking Procedure .
Sticking valves in control valve body assembly	Rebuild the control valve body assembly. Refer to Control Valve Body Replacement .
Low main pressure	Refer to Low Main Line Pressure in All Ranges and Low Main Line Pressure in specific Ranges, Normal Pressure in Other Ranges .
Leaking pressure control solenoids	Repair or replace the pressure control solenoids. Refer to Control Valve Solenoid Replacement .
Erratic speed sensor signal	Refer to the speed sensor DTCs.Piston seals leaking or clutch plates slipping in range involved
Piston seals leaking or clutch plates slipping in range involved	Overhaul the transmission.

HIGH STALL SPEEDS (STALL IN RANGES 1-6)

Condition	Action
Not in gear	Select D, DRIVE.
Low fluid level, aerated fluid	Add fluid to the proper level. Refer to Transmission Fluid Checking Procedure.
Faulty torque converter	Replace the torque converter. Refer to Torque Converter Replacement.
Incorrect torque converter	Replace the torque converter. Refer to Torque Converter Replacement.
Clutch pressure low	Refer to Low Main Line Pressure in specific Ranges, Normal Pressure in Other Ranges.
1-2-3-4 clutch or Low and Reverse clutch or 2-6 clutch slipping Use the diagnostic tool to measure turbine speed.	Rebuild the 1-2-3-4 clutch or the Low and Reverse clutch or the 2-6 clutch.
Higher power engine	Confirm proper engine match.

LOW STALL SPEEDS (STALL IN RANGES 1-6)

Condition	Action
Engine not performing efficiently • Plugged or restricted injectors • High altitude conditions • Dirty air filters • Incorrect fuel/valve timing • Throttle linkage broken or not adjusted correctly • Electronic engine controls condition	Refer to the Engine section of this manual. The following specific sections should be helpful in defining the condition: • Refer to Diagnostic System Check - Vehicle . • Refer to Symptoms - Engine Mechanical in Engine Mechanical - 8.1L.
Stall speeds of 33% of normal implies freewheeling stator	Replace the converter assembly. Refer to Torque Converter Replacement .
Engine smoke controls	Compare lugback vs. static stall speed.
Incorrect torque converter	Install the correct torque converter. Refer to Torque Converter Replacement.

TRANSMISSION WILL NOT MAKE A SPECIFIC SHIFT

Condition	Action
Low engine power	Correct the engine condition.
Extreme fluid temperature	Inspect the cooling system and fluid level. Refer to Transmission Fluid Checking Procedure .
Faulty speed sensor/circuit	Repair the circuit or replace the speed sensor or sensors. Refer to Speed Sensor Replacement .
Faulty temperature sensor/circuit	Inspect for a temperature reading which inhibits shifts.
Faulty or misadjusted shift selector	Repair the shift selector.

TRANSMISSION WILL NOT STAY IN FORWARD OR REVERSE

Condition	Action
Low fluid	Adjust the fluid level. Refer to Transmission Fluid Checking Procedure.
Leaking at solenoid assembly	Replace the solenoid assembly. Refer to Control Valve Solenoid Replacement.
Low pressure	Repair the transmission.
Faulty solenoid - leaking	Replace the solenoid. Refer to Control Valve Solenoid Replacement.

TRANSMISSION WILL NOT SHIFT TO FORWARD OR REVERSE

Condition	Action
Engine RPM too high	Reduce the engine RPM. It may be necessary to select NEUTRAL, and then D or R again.
Low fluid level	Add fluid to the proper level. Refer to Transmission Fluid Checking Procedure.
Faulty throttle signal from engine	Correct the engine throttle signal.
Shift selector is not functioning properly	Repair the shift selector.
Speed sensor or sensors not functioning properly	Repair or replace the speed sensor or sensors or circuitry. Refer to Speed Sensor Replacement.
Mechanical failure to Low and Reverse clutch	Repair the transmission.
Mechanical failure in transmission torque converter, shafts, or planetaries.	Repair the transmission.
Low pressure	Repair the transmission.
Faulty wiring in transmission control module (TCM) input/output function circuits	Correct the circuit wiring.

TRANSMISSION OVERHEATS

Condition	Action
Aerated fluid - incorrect fluid level	• Adjust fluid to the proper level. Refer to Transmission Fluid Checking Procedure . • Inspect for a defective pump.
Air flow to cooler obstructed	Remove the air flow obstruction.
Engine overheat	Correct the overheating condition. Refer to Symptoms - Engine Cooling in Engine Cooling.
Inaccurate temperature gauge or sending unit	Replace the gauge and/or sending unit.
Inaccurate sump temperature sensor	Replace the pressure switch manifold (PSM) or internal harness. Refer to Pressure Switch Manifold Replacement or Wiring Harness Replacement.
Excessive cooler circuit pressure drop	Inspect for plugged cooler, lines too small, collapsed hose, too many elbows in circuit.
Transmission cooler lines reversed	Connect the cooler lines properly. Oil and water should flow in opposite directions.
Fluid cooler lines restricted	Remove restrictions and clean or replace the lines. Refer to Transmission Fluid Cooler Hose/Pipe Replacement.
Torque converter - wrong converter, no torque converter clutch, stuck stator, or slipping stator	Replace or repair the converter assembly. Refer to Torque Converter Replacement . A stuck stator will not allow cool down in Neutral.
Cooler flow loss due to internal transmission leakage	Overhaul the transmission.

TRANSMISSION DOES NOT SHIFT PROPERLY

Condition	Action
Engine idle speed too fast during NEUTRAL to range shift	Adjust to correct idle speed.
Faulty throttle sensor/circuit	Repair or replace the sensor or circuit.
Faulty or sticking bleed ball in 1-2-3-4 clutch piston housing	Repair the transmission.
Excessive clutch running clearance	Rebuild the transmission and adjust clearances.
Shift adaptives not converged	Refer to FastLearn Procedure.
Instrument panel tachometer incorrect	Repair or replace the tachometer.
Incorrectly calibrated electronic speedometer	Calibrate the electronic speedometer.
Faulty speed sensor/circuit	Repair the circuit or replace the speed sensor. Refer to the speed sensor DTCs.
Loose speed sensor	Tighten the speed sensor retaining bracket bolt. Refer to Speed Sensor Replacement.
Degraded fluid	Change the transmission fluid and filter. Refer to Automatic Transmission Fluid/Filter Replacement.
Incorrect fluid level	Correct the fluid level. Refer to Transmission Fluid Checking Procedure.
Low main pressure	Repair the transmission.
Intermittent conditions	Inspect the wiring harnesses and connectors.
Loose or damaged speed gear	Tighten the output flange bolt or replace the speed gear.
Sticking valves in the control valve body	Overhaul the control valve body assembly.
Leaking pressure control solenoids	Repair or replace the pressure control solenoids.

ABNORMAL ACTIVITIES OR RESPONSES

Condition	Action
Excessive Creep in First and Reverse Gears	
Engine idle speed too high	Adjust to the correct idle speed.
Vehicle Moves Forward in Neutral	
1-2-3-4 clutch failed or not released	Rebuild the 1-2-3-4 clutch
Vehicle Moves Backward in Neutral	
3rd, 5th and reverse clutch failed or not released	Rebuild the 3rd, 5th and reverse clutch assembly.

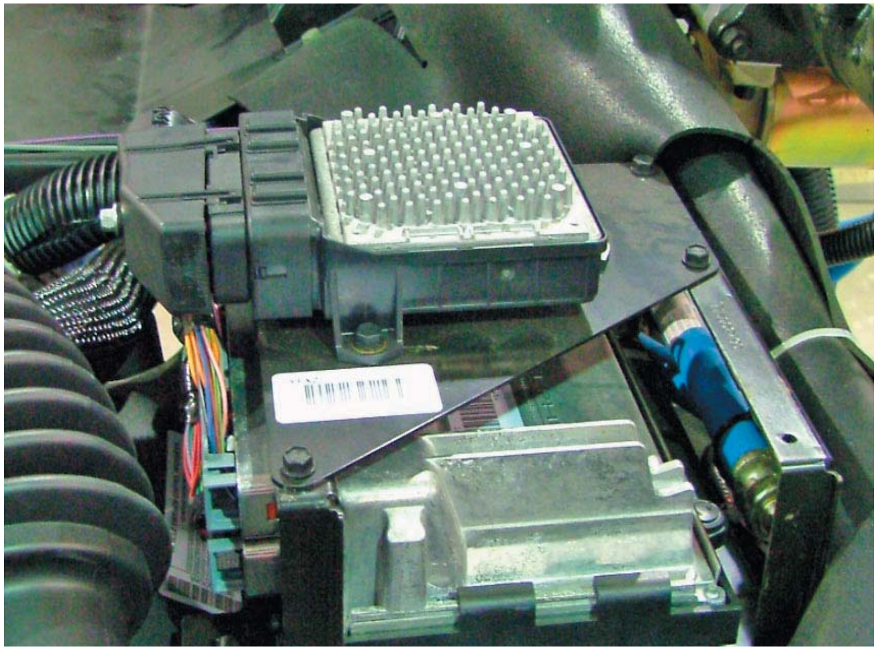
REPAIR INSTRUCTIONS

TRANSMISSION CONTROL MODULE REPLACEMENT

Removal Procedure

IMPORTANT:

- Remove any debris from the transmission control module (TCM) connector surfaces before servicing the TCM. Inspect the TCM module connector gaskets when diagnosing or replacing the TCM. Ensure that the gaskets are installed correctly. The gaskets prevent contaminant intrusion into the TCM.
- The ignition must be OFF when disconnecting or reconnecting power to the TCM.



1. Disconnect the negative battery cable. Refer to Battery Negative Cable Disconnection and Connection .
2. Remove the TCM cover bolts (1) located on the left side of the radiator shroud.
3. Push up on the retainers (1) in order to remove the TCM from the cover.
4. Disconnect the TCM electrical connectors (2) and remove the TCM from the vehicle.

Installation Procedure

1. Connect the TCM electrical connectors (2) to the TCM.
2. Install the TCM.

NOTICE:
Refer to Fastener Notice in Cautions and Notices.

3. Install the TCM cover bolts (1) to the radiator shroud

and tighten the bolts to 9 N·m (80 lb in).

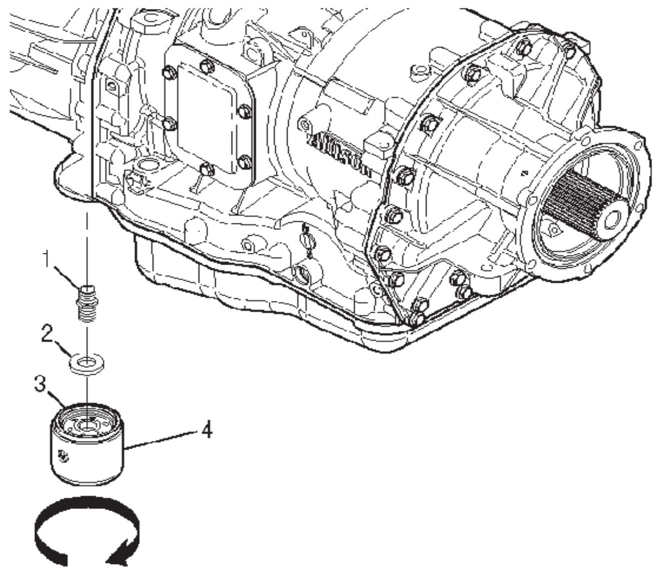
4. Connect the negative battery cable. Refer to Battery Negative Cable Disconnection and Connection .
5. Reprogram the TCM. Refer to Control Module References .

IMPORTANT:
The FastLearn (adapt) procedure must be performed. This can be done in one step using a scan tool. If this procedure is not done, the TCM adaptive values will be at the settings that it learned for the old components. and will be in slow adaptive mode. Under these conditions, it would take an unacceptably long time for the adaptive values to converge to levels suitable for the new transmission.

6. Perform the FastLearn procedure. Refer to FastLearn Procedure .

TRANSMISSION FLUID FILTER ADAPTER REPLACEMENT

Removal Procedure



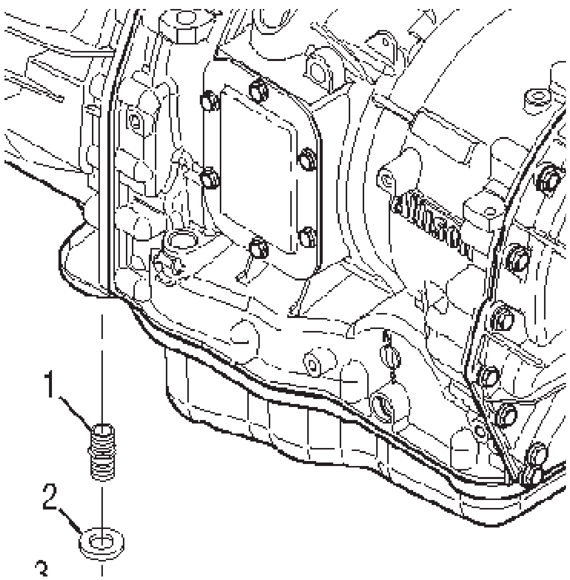
IMPORTANT:
- *DO NOT drain the fluid if only the transmission external oil filter adapter is being replaced.*
- *Use a standard strap-type filter wrench to remove or install the transmission external oil filter.*

1. Remove the transmission external oil filter (4) by rotating in the counterclockwise direction.
2. Remove the magnet (2) from the transmission external oil filter adapter (1) in the converter housing or from the filter element.
3. Clean any metal debris from the magnet. Presence of any metal pieces larger than dust may indicate

that transmission replacement or overhaul is required.

4. Remove the filter adapter (1) from the converter housing.

Installation Procedure



NOTICE:
Refer to Fastener Notice in Cautions and Notices.

1. Install the transmission external oil filter adapter (1) and tighten the adapter to 30 N·m (22 lb ft).
2. Reinstall the magnet (2) onto the filter adapter (1).
3. Lubricate the gasket (3) on the transmission external oil filter with transmission fluid.
4. Install, by hand, the transmission external oil filter (4) until the gasket on the filter touches the converter housing.

NOTICE:
Turning the transmission external oil filter more than ONE FULL TURN after gasket contact will damage the filter and may cause fluid leakage.

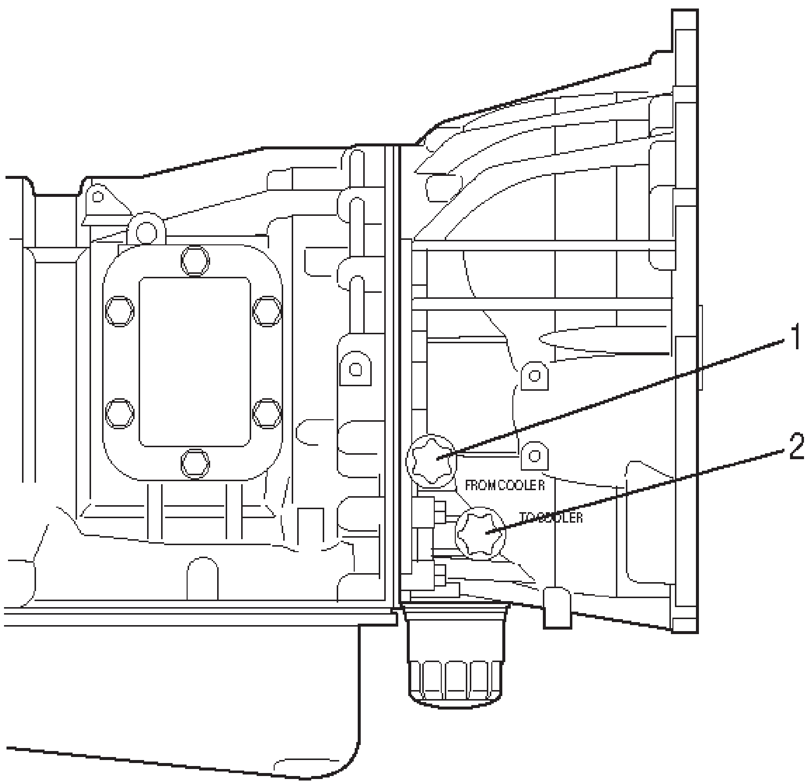
5. Turn the filter ONE FULL TURN ONLY after gasket contact.

NOTICE:
Use only clean and approved transmission fluid.

6. Check the transmission fluid level. Refer to Transmission Fluid Checking Procedure .

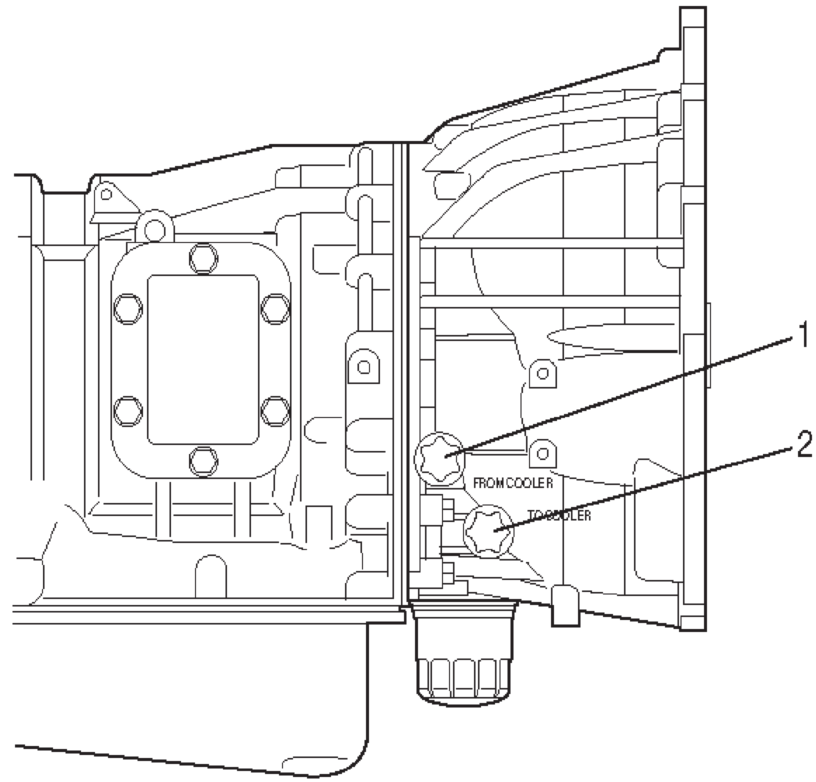
TRANSMISSION FLUID COOLER HOSE/PIPE CONNECTOR REPLACEMENT

Removal Procedure



1. Disconnect the hose from the transmission oil cooler pipe connector being replaced.
2. Remove the transmission oil cooler pipe connectors (1) and (2).

Installation Procedure

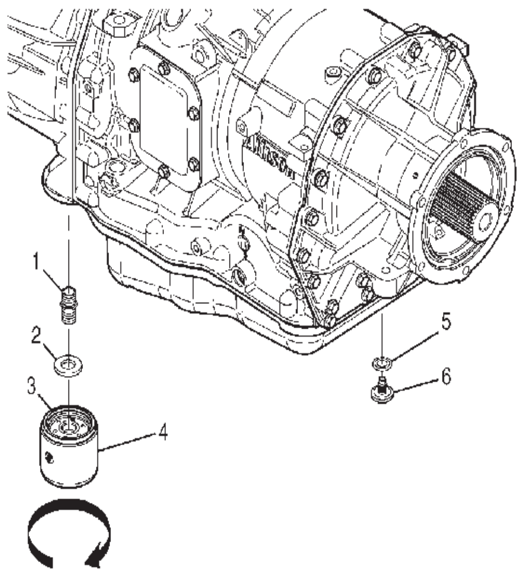


NOTICE:
Refer to Fastener Notice in Cautions and Notices.

1. Install new transmission oil cooler pipe connectors (1) and (2) and tighten the fittings to 25 N·m (18 lb ft).
2. Connect the hose to the transmission oil cooler pipe connectors.

AUTOMATIC TRANSMISSION FLUID AND FILTER REPLACEMENT

Removal Procedure



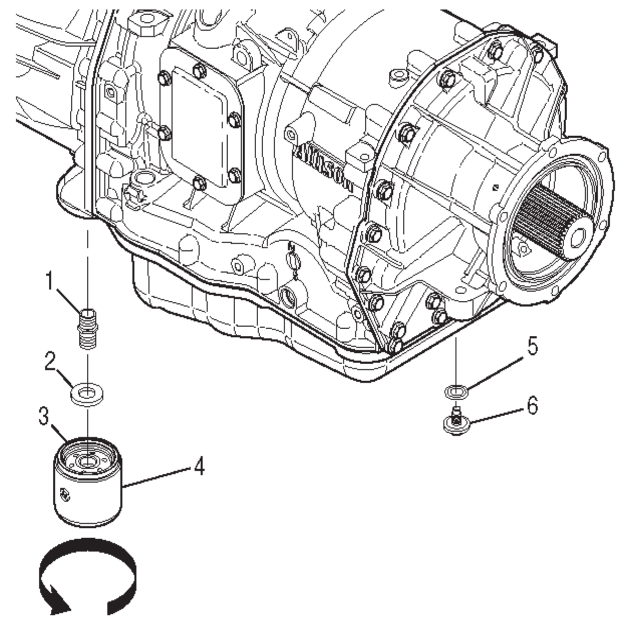
IMPORTANT:
DO NOT drain the fluid if only the transmission external oil filter is being replaced.

1. Remove the drain plug (6) and drain plug seal (5). Drain the transmission fluid into a suitable container.
2. Inspect the drained fluid. Refer to Transmission Fluid Checking Procedure .

IMPORTANT:
Use a standard strap-type filter wrench to remove the transmission external oil filter.

3. Remove the filter (4) by rotating in the counterclockwise direction.
4. Remove the magnet (2) from the filter adapter (1) in the converter housing or from the top of the transmission external oil filter (3).
5. Clean any metal debris from the magnet. Presence of any metal pieces larger than dust may indicate that transmission replacement or overhaul is required.

Installation Procedure



1. Install the magnet (2) onto the filter adapter (1) which is in the converter housing.
2. Lubricate the gasket (3) on the transmission external oil filter with transmission fluid.
3. Install, by hand, the transmission external oil filter (4) until the gasket on the filter touches the converter housing.

NOTICE:
Turning the transmission external oil filter more than ONE FULL TURN after gasket contact will damage the filter and may cause fluid leakage.

4. Turn the filter ONE FULL TURN ONLY after gasket contact.

NOTICE:
Refer to Fastener Notice in Cautions and Notices.

5. Install the drain plug (6) and drain plug seal (5) and tighten the drain plug to 35 N·m (26 lb ft).
6. Refill Transmission with Transynd Automatic Transmission Fluid. Refer to Fluid Capacity Specifications .

IMPORTANT:
DTC P0701 may often set following fluid service. Cycling the ignition clears the code and allows Drive or Reverse range to be attained.

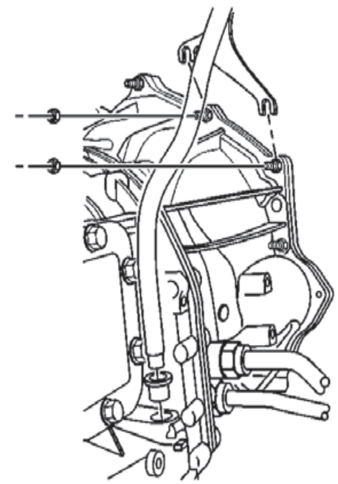
7. Cycle the ignition until Drive or Reverse range is attained.

IMPORTANT:
Fluid remains in the external circuits and transmission cavities after draining the transmission.

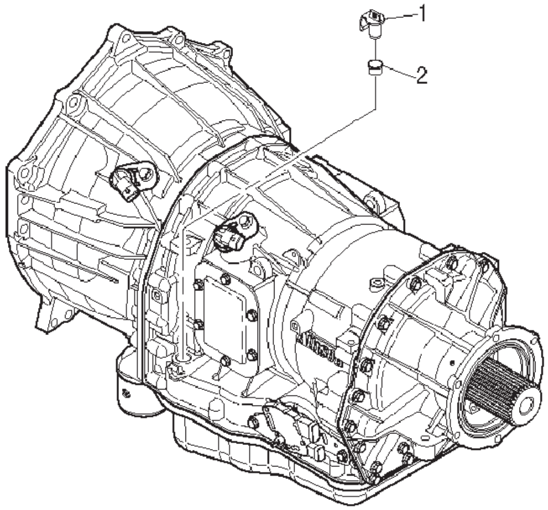
8. Check the transmission fluid level. Refer to Transmission Fluid Checking Procedure .

FILLER TUBE AND SEAL REPLACEMENT

Removal Procedure

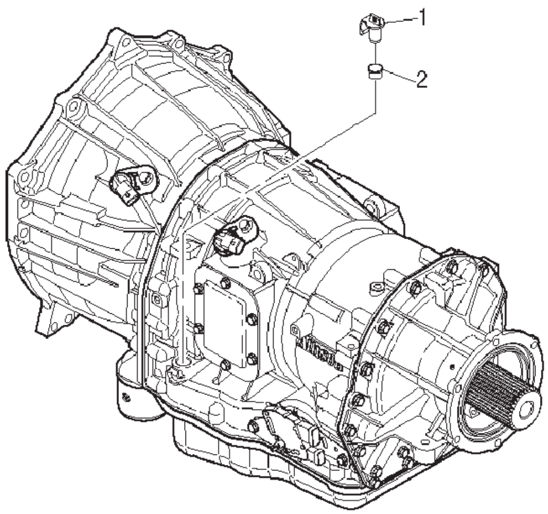


1. The transmission case has provisions that enable the fill tube to be installed on either the right or left side of the transmission. Proceed to step 9 if servicing the plug and/or seal opposite the fill tube.
2. If the vehicle is equipped with a diesel engine, the transmission must be removed to service the fill tube and/or seal. Refer to Transmission Replacement .
3. Remove the transmission fluid level indicator.
4. Raise and suitably support the vehicle. Refer to Lifting and Jacking the Vehicle .
5. Remove the fill tube nuts.
6. Place a drain pan under the transmission to catch any dripping fluid.
7. Loosen the fill tube from the transmission.
8. Remove the fill tube and seal from the vehicle.

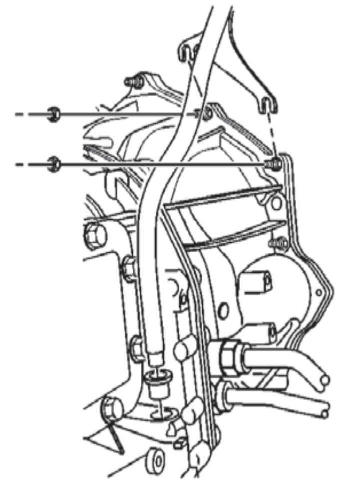


9. Remove the fill tube plug (1).
10. Remove the fill tube plug seal (2).

Installation Procedure



1. Install a new fill tube plug seal (2) into the main housing.
2. Align the tab on the fill tube plug (1) with the tang on the main housing.
3. Install the fill tube plug (1). Press the plug into the seal (2) until the tab on the fill tube plug locks into place in the notch on the main housing.



4. Install a NEW fill tube seal.

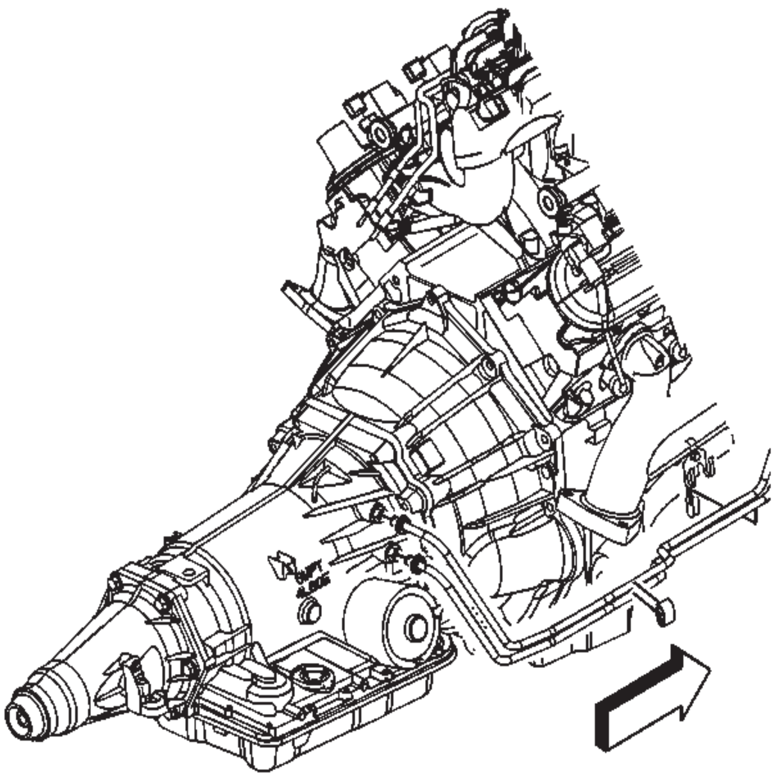
NOTICE:
Refer to Fastener Notice in Cautions and Notices.

5. Install the fill tube. Ensure that the fill tube bracket is positioned properly on the studs.
6. Install the fill tube nuts and tighten the nuts to 18 N·m (13 lb ft).
7. Lower the vehicle.
8. Fill the transmission to the proper level with approved fluid.

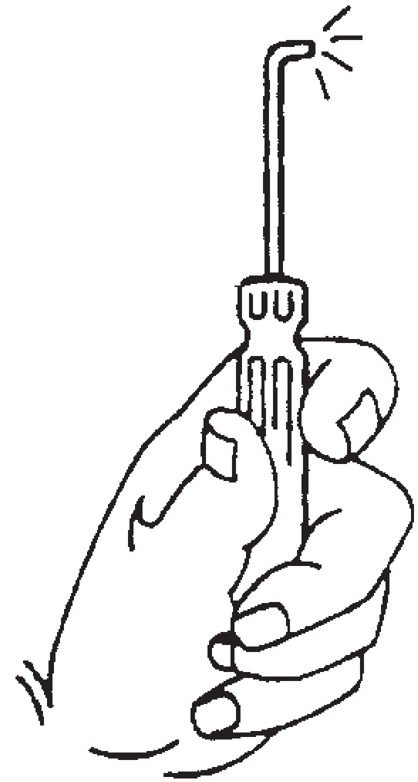
TRANSMISSION FLUID COOLER HOSE/PIPE REPLACEMENT

Removal Procedure

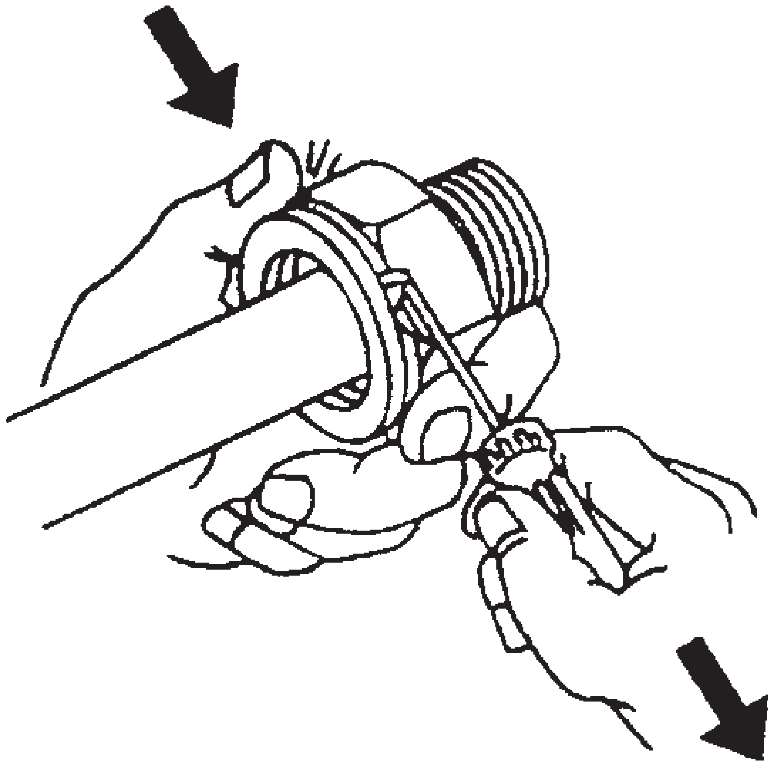
1. Raise the vehicle. Refer to Lifting and Jacking the Vehicle .
2. Pull the plastic cap back from the quick connect fitting.

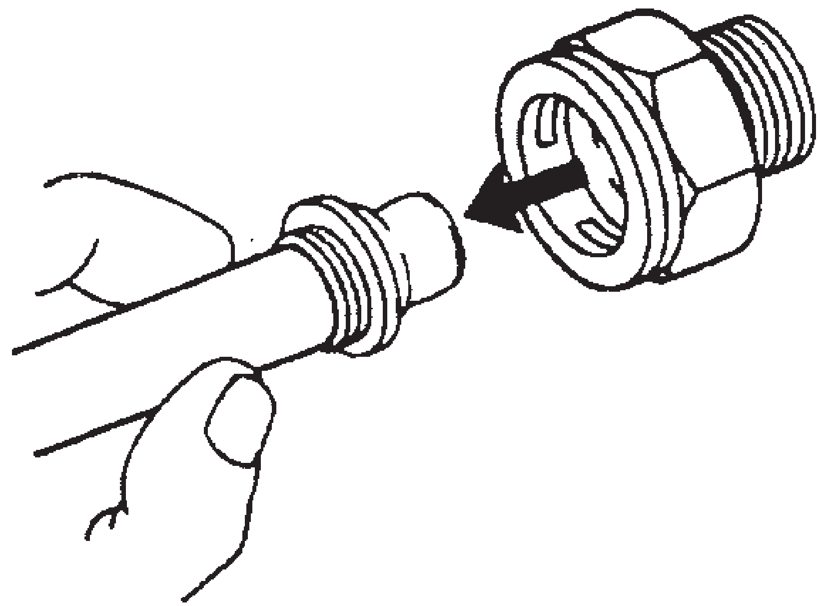


3. Remove the cooling lines from the clips.
4. Remove the two retaining rings securing the two cooling lines to the transmission.



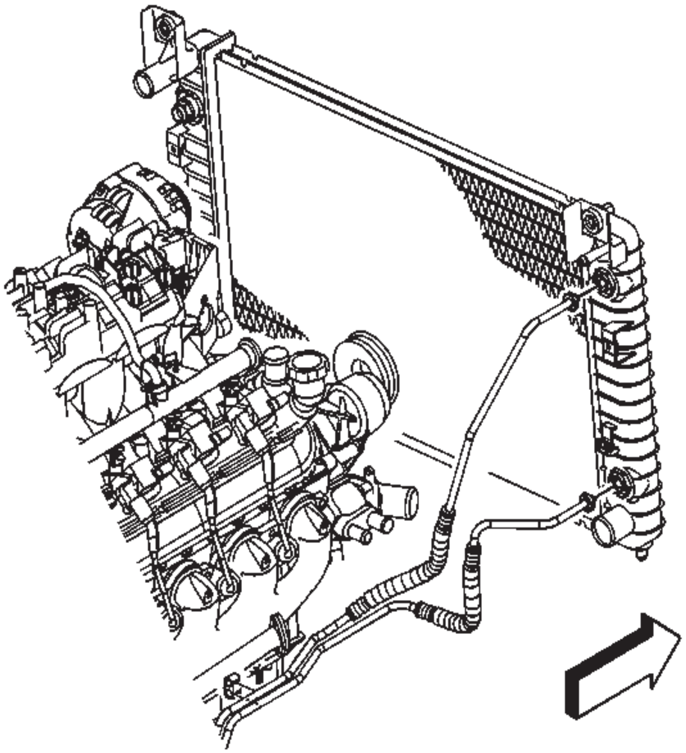
5. Use a bent tip screwdriver.



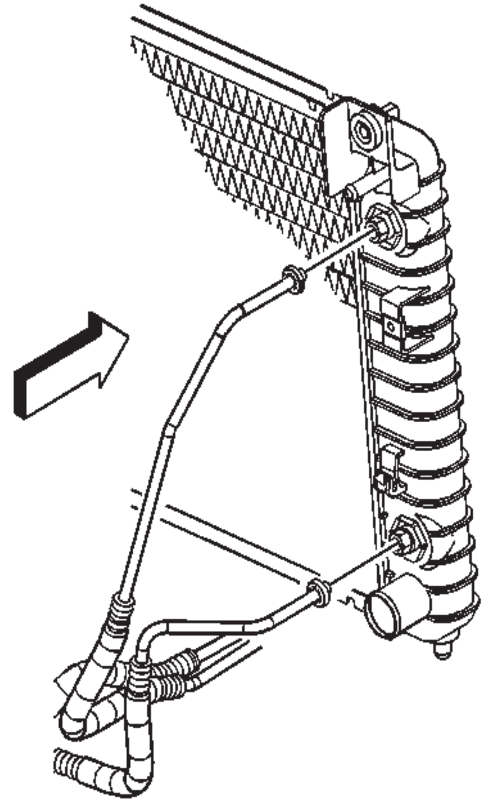


6. Pull on the open ends of the retaining ring in order to rotate the retaining ring around the quick connect fitting until the retaining ring is out of the fitting. Discard the retaining ring.

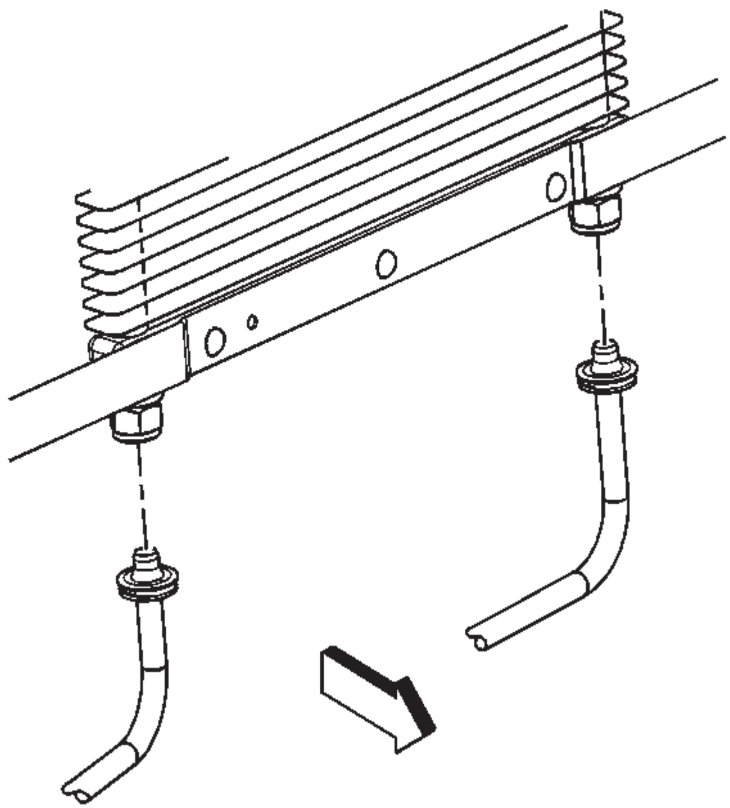
7. Pull the cooling line straight out from the quick connect fitting.
8. Repeat this procedure to remove all the remaining cooling lines from quick connect fittings.



9. For vehicles without an auxiliary cooler, remove the cooling lines from the radiator.



10. For vehicles with auxiliary cooling, remove the cooling lines from the radiator.



11. Remove the oil cooling lines from the auxiliary oil cooler.

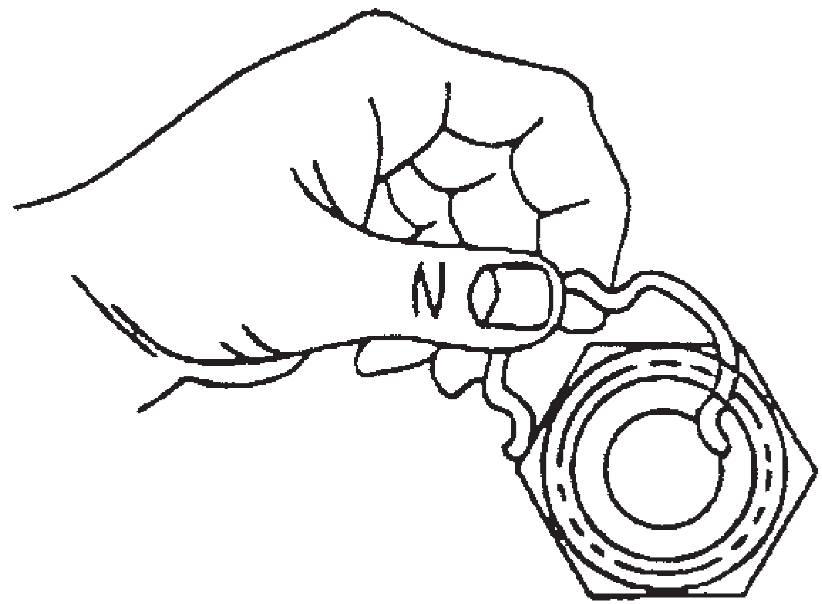
Installation Procedure

1. Install the transmission oil cooler lines to the vehicle.

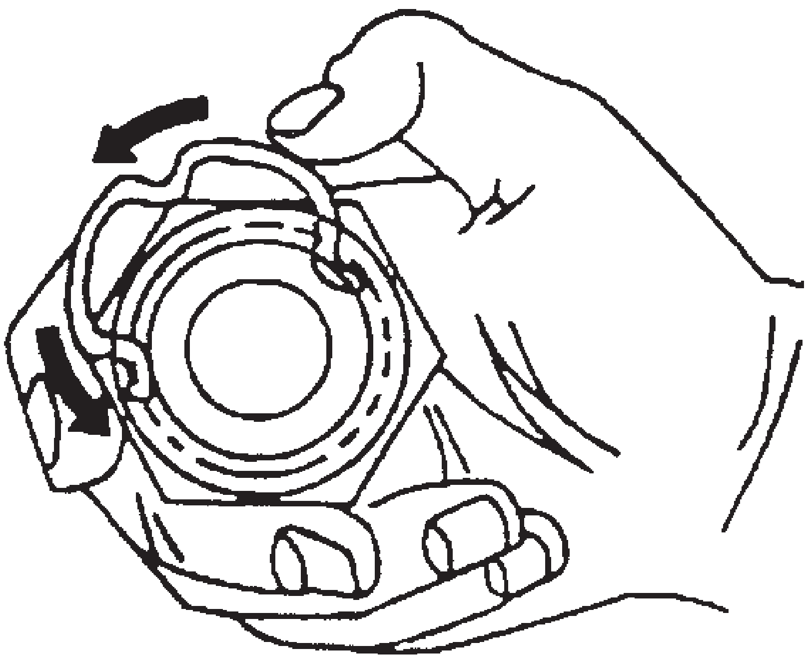
IMPORTANT:

- Do not reuse any of the existing oil lines or oil line fittings if there is excessive corrosion.
- Do not reuse any of the existing retaining rings that were removed from the existing quick connect fittings. All retaining rings being installed must be new.
- Ensure the following procedures are performed when installing the new retaining rings onto the fittings.

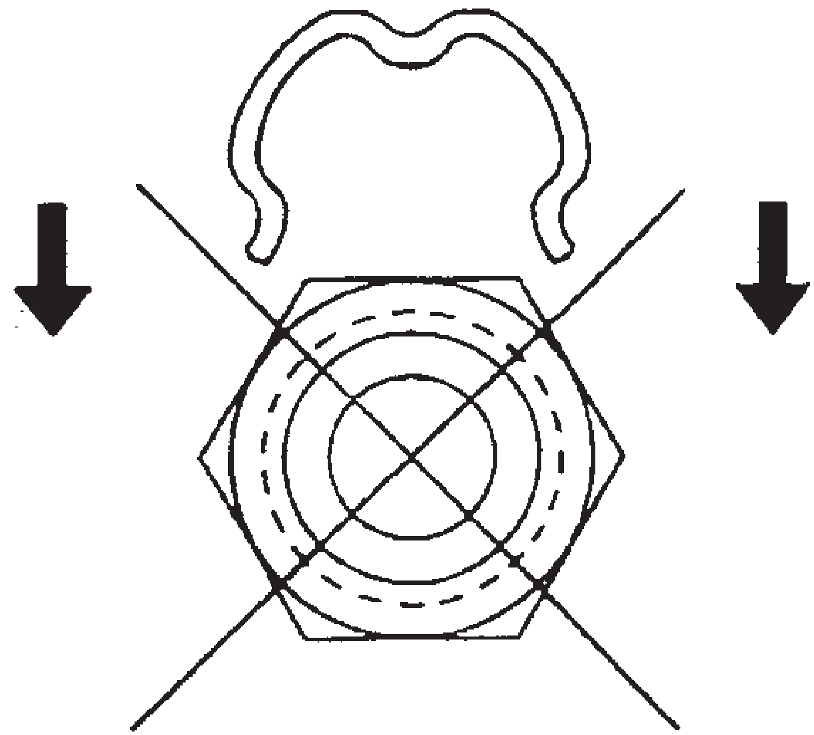
2. Install a NEW retaining ring (E-clip) into the quick connect fitting using the following procedure:



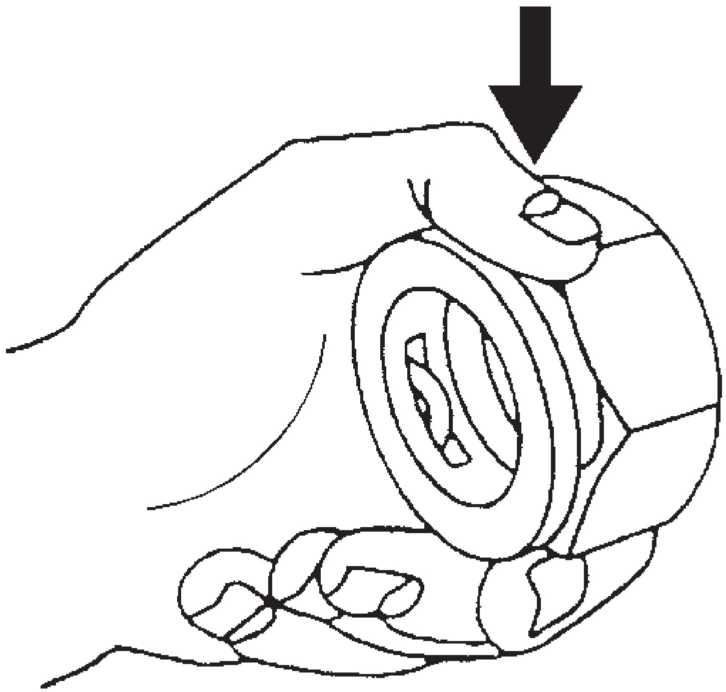
3. Hook one of the open ends of the retaining ring in one of the slots in the quick connect fitting.

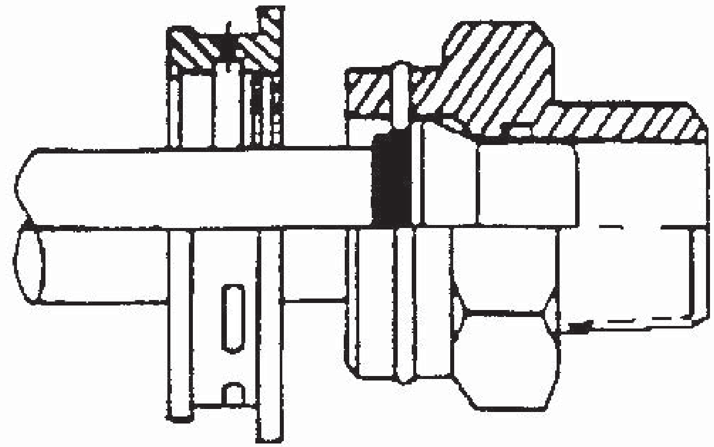


4. Rotate the retaining ring around the fitting until the retaining ring is positioned with all three ears through the three slots on the fitting.

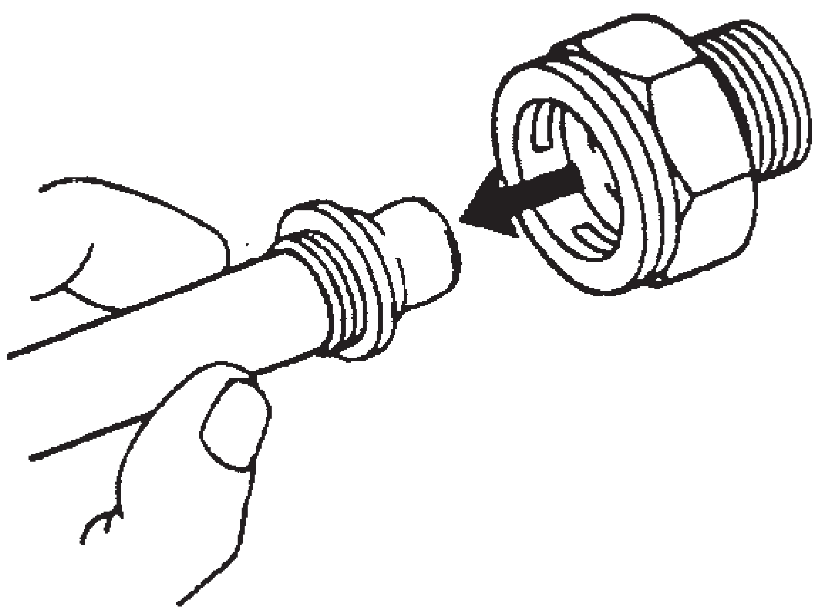


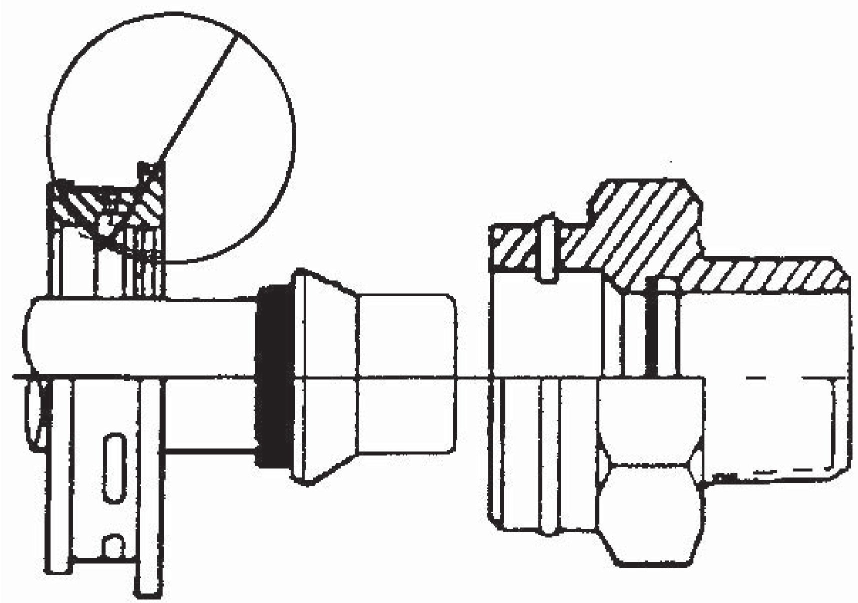
5. Do not install the new retaining ring onto the fitting by pushing the retaining ring.





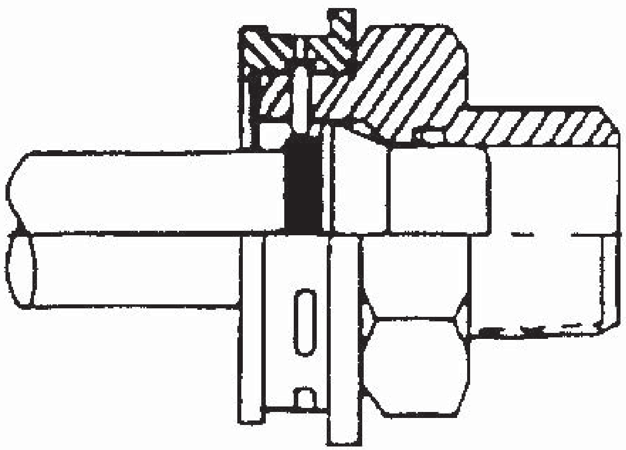
6. Ensure that the three retaining ring ears are seen from inside the fitting and that the retaining ring moves freely in the fitting slots.
7. Install the NEW retaining ring (E-clip) into the remaining quick connect fittings.
8. Install the cooler line into the quick connect fitting.
9. Insert the cooler line end into the quick connect fitting until a click is either heard or felt.

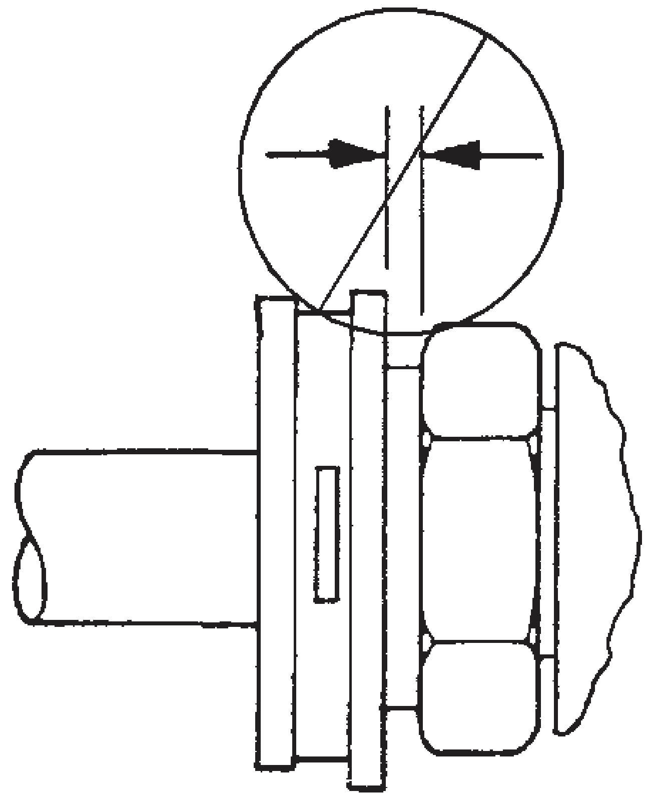




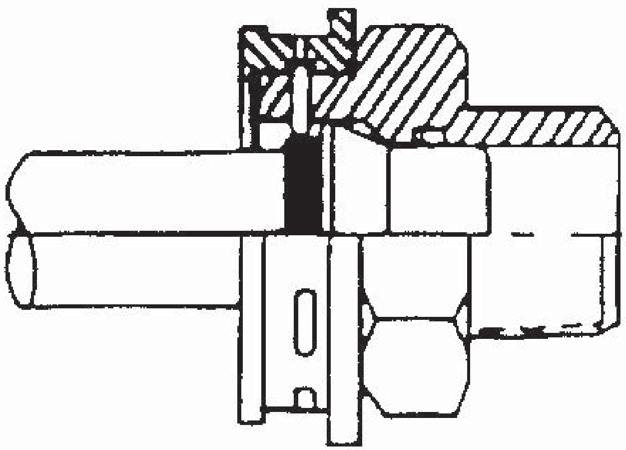
10. Install the cooler lines to the vehicle.

11. Do not use the plastic cap on the cooler line in order to install the cooler line into the fitting.
12. Pull back sharply on the cooler line in order to ensure that the cooler line is fastened into the quick connect fitting.

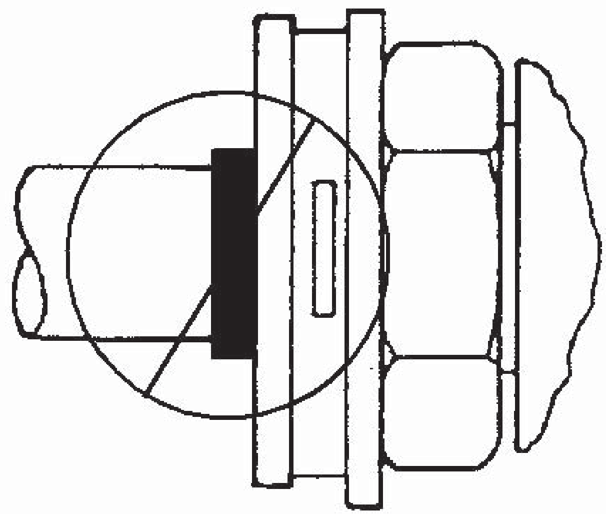




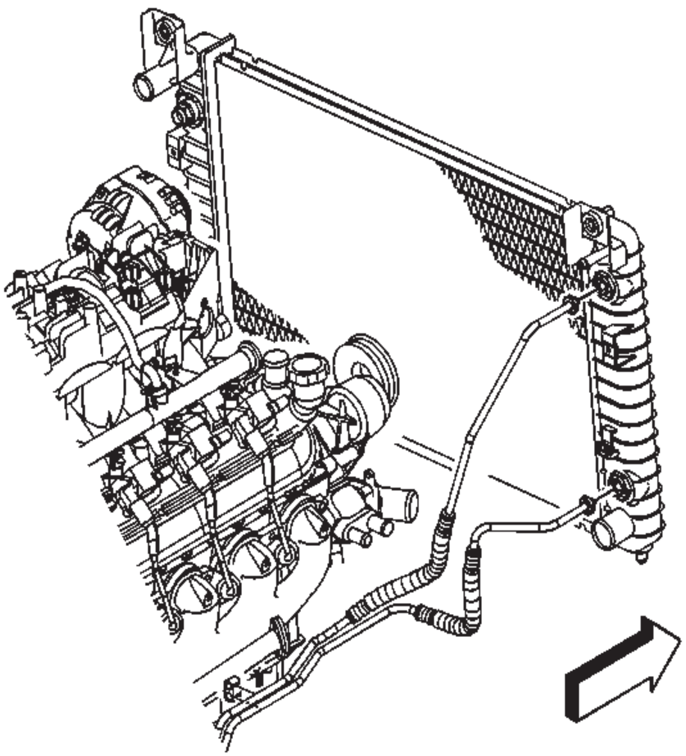
13. Position (snap) the plastic cap onto the fitting. Do not manually depress the retaining ring when installing the plastic cap onto the quick connect fitting.
14. Ensure that the plastic cap is fully seated against the fitting.
15. Ensure that no gap is present between the cap and the fitting.

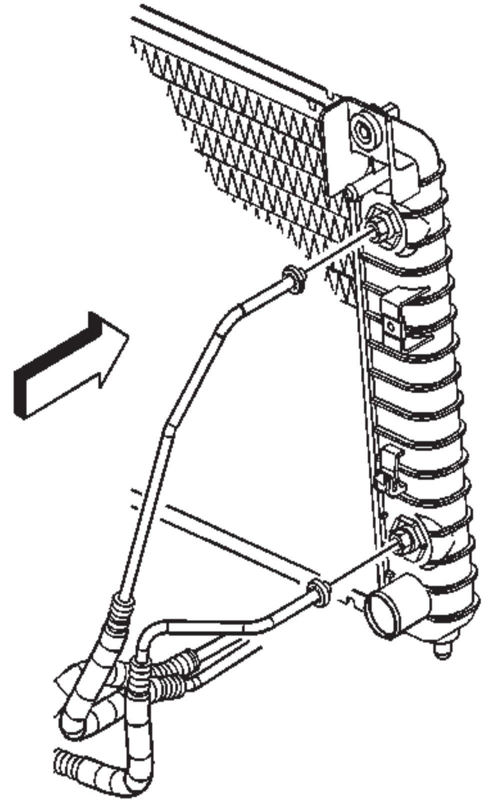


16. Ensure that the yellow identification band on the tube is hidden within the quick connect fitting. A hidden yellow identification band indicates proper joint seating.



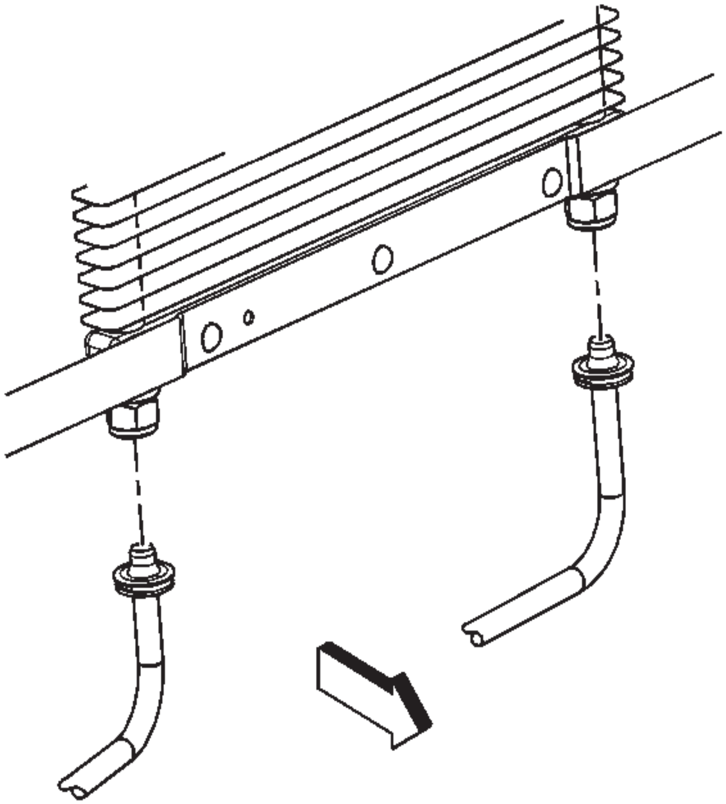
17. Do not install the cooler line end into the fitting incorrectly.
18. If you cannot position the plastic cap against the fitting, remove the retaining ring from the quick connect fitting. Check the retaining ring and the tube end in order to ensure neither is bent. Replace the cooler line or the retaining ring if necessary, and reinstall the cooler line per the installation procedure.



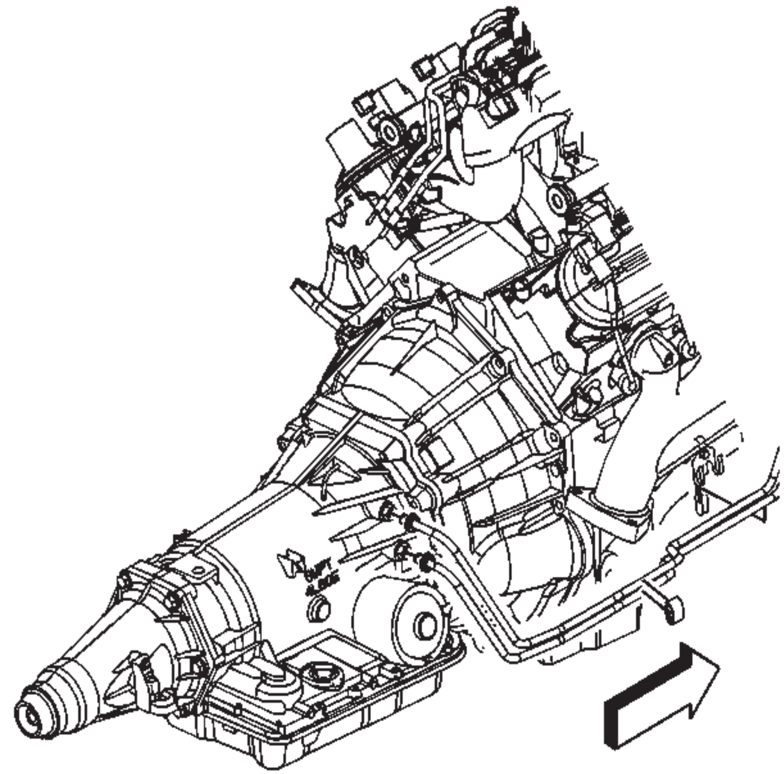


19. For vehicles without auxiliary cooling, install the cooling lines to the radiator.

20. For vehicles with auxiliary cooling, install the cooling lines to the radiator.



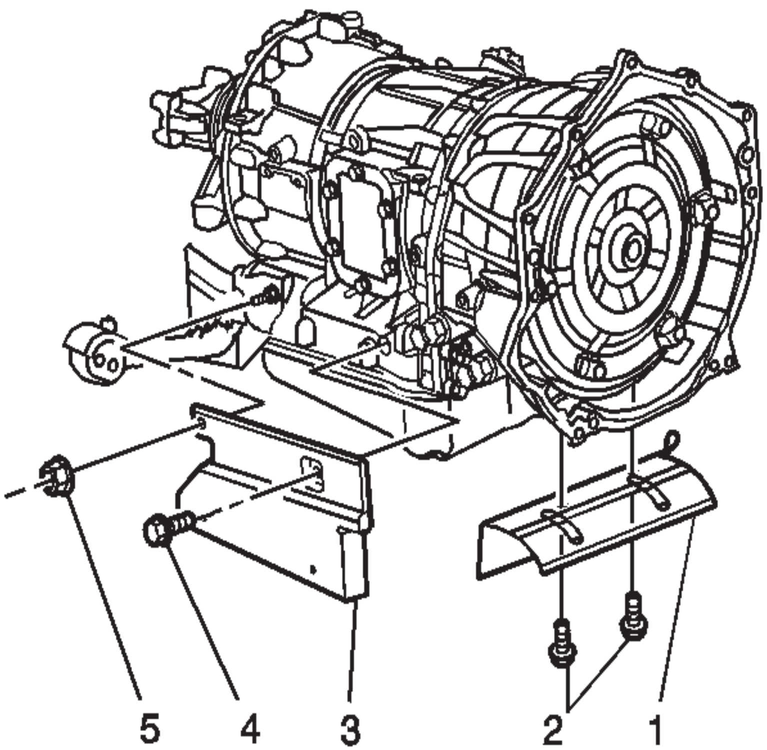
21. For vehicles with auxiliary cooling, install the oil cooling lines to the auxiliary oil cooler.



22. Install the cooling lines to the transmission.
23. Install the cooling lines to the clips.
24. Ensure all of the protective plastic caps are positioned over all of the quick connect fittings.
25. Lower the vehicle.
26. Check and add fluid as necessary.

TRANSMISSION HEAT SHIELD REPLACEMENT

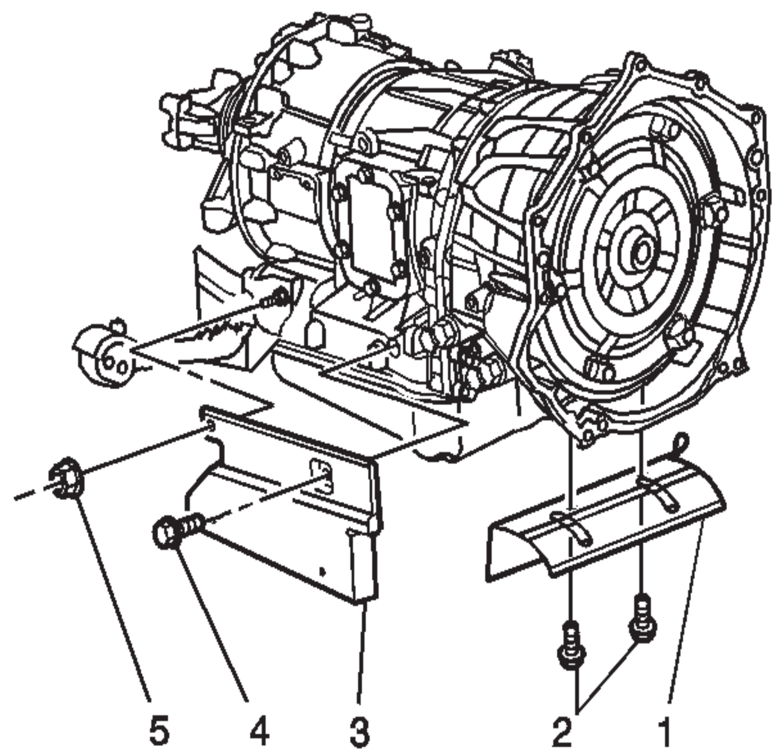
Removal Procedure



1. Raise and suitably support the vehicle. Refer to Lifting and Jacking the Vehicle .
2. Remove the front heat shield bolts (2).
3. Remove the front heat shield (1).
4. Remove the side heat shield bolt (4) and nut (5).
5. Remove the side heat shield (3).

Installation Procedure

NOTICE:
Refer to Fastener Notice in Cautions and Notices.

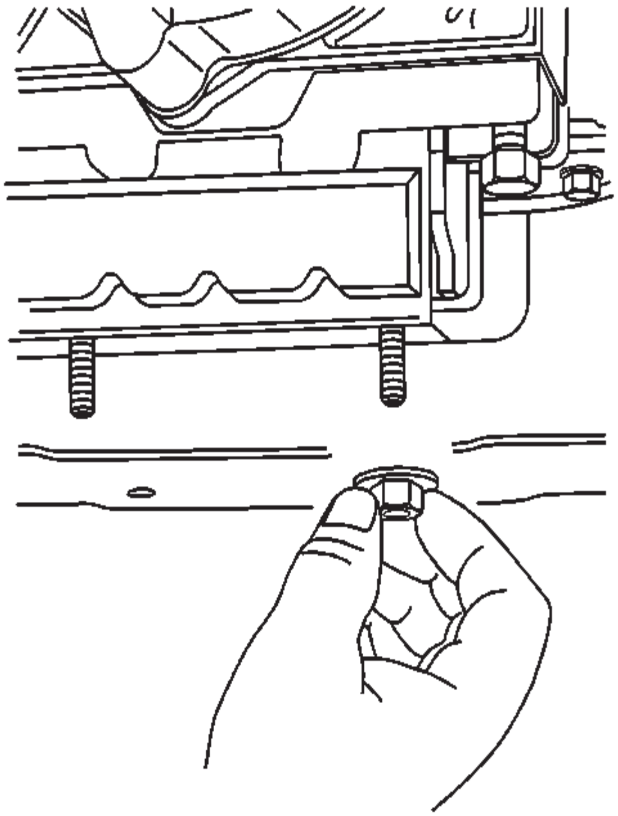


1. Install the side heat shield (3).
2. Install the side heat shield bolt (4) and nut (5).
   - Tighten the bolt (4) to 17 N·m (13 lb ft).
   - Tighten the nut (5) to 25 N·m (18 lb ft).
3. Install the front heat shield (1).
4. Install the front heat shield bolts (2) and tighten the bolts (2) to 17 N·m (13 lb ft).

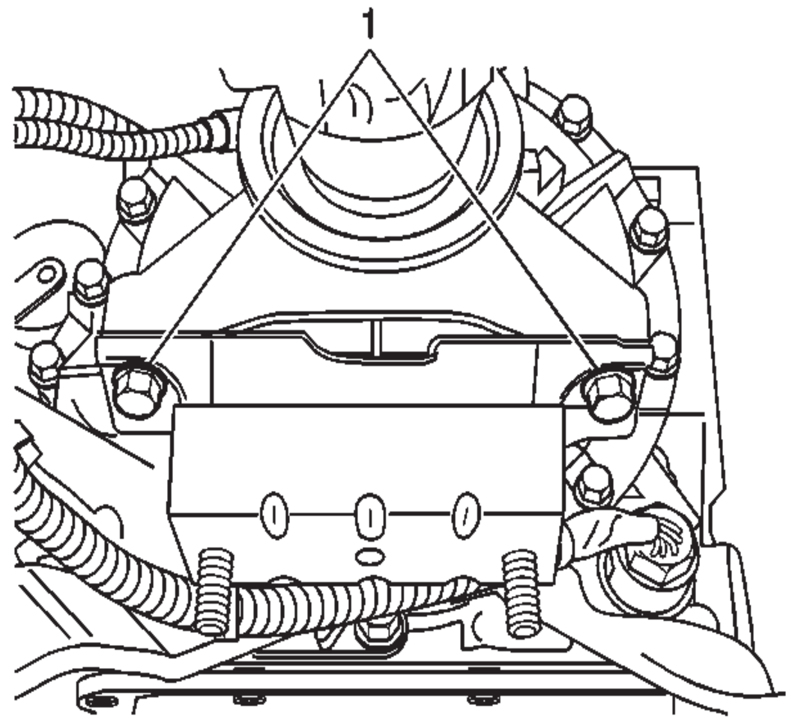
5. Lower the vehicle.

TRANSMISSION MOUNT REPLACEMENT

Removal Procedure

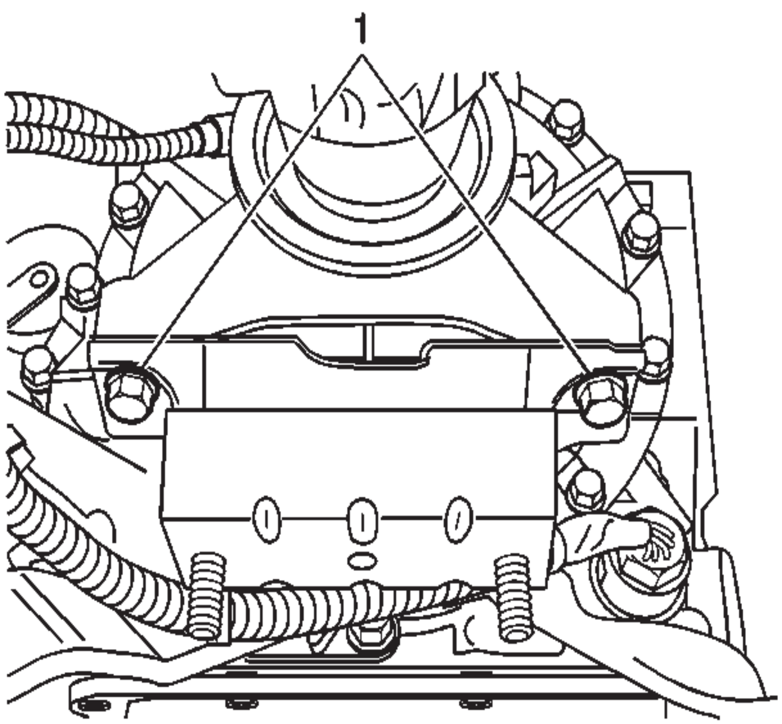


1. Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle .
2. Support the transmission with a transmission jack.
3. Remove the transmission mount to the transmission support retaining nut or nuts.



4. Raise the transmission to take the weight off of the mount.
5. Remove the transmission mount to the transmission or transfer case adapter mounting bolts (1).
6. Raise the transmission just enough to remove the transmission mount.
7. Remove the transmission mount from the vehicle.

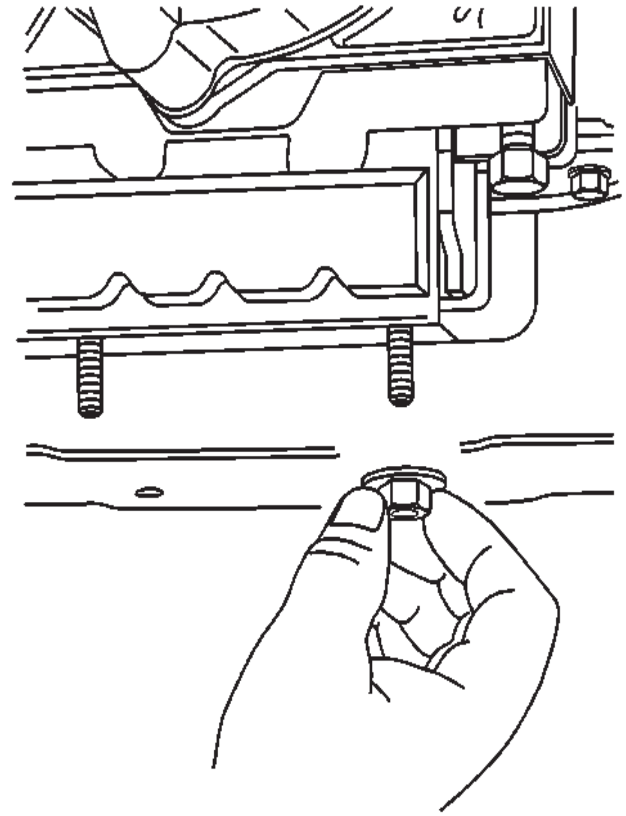
Installation Procedure



1. Install the transmission mount to the vehicle.

NOTICE:
Refer to Fastener Notice in Cautions and Notices.

2. Install the transmission mount to the transmission or transfer case adapter mounting bolts (1) and tighten the bolts to 50 N·m (37 lb ft).



3. Lower the transmission.
4. Install the transmission mount to the transmission support retaining nut or nuts and tighten the nut or nuts to 40 N·m (30 lb ft).
5. Remove the transmission jack.
6. Lower the vehicle.

TRANSMISSION REPLACEMENT (WITH 8.1L (L18) ENGINE)

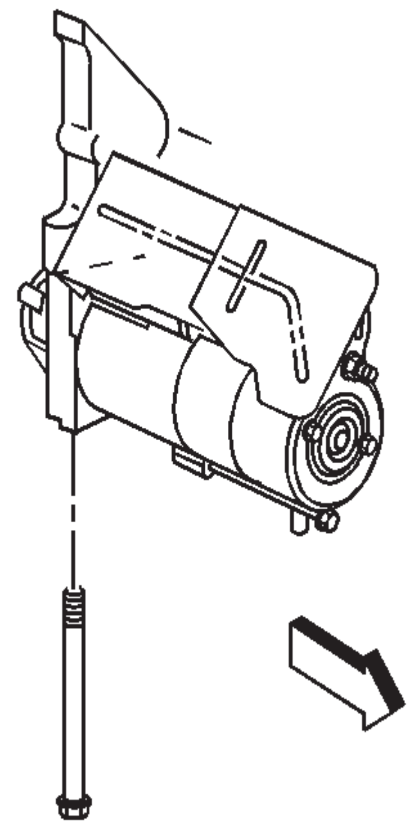
Tools Required

- J 21366 Converter Holding Strap
- J 44257 Connector Removal Tool

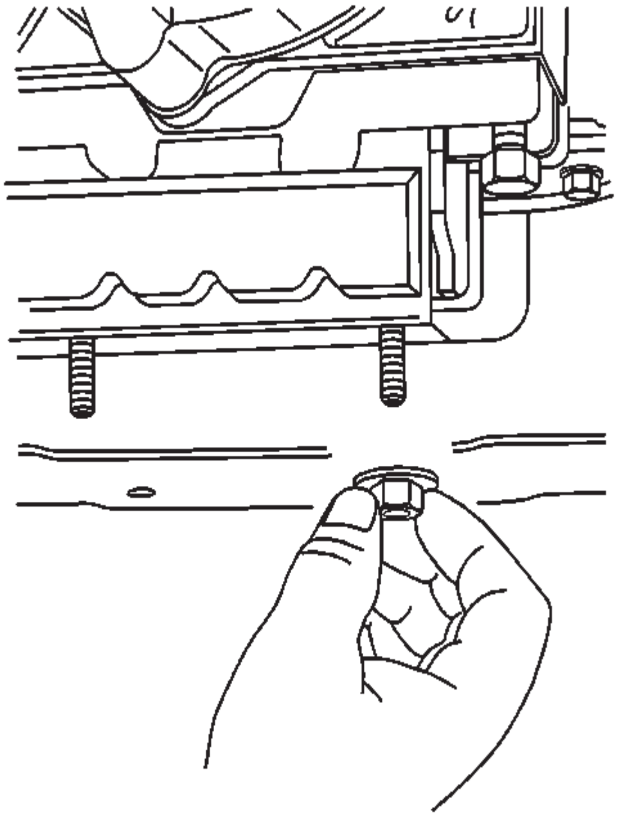
Removal Procedure

IMPORTANT:
If replacing a failed transmission, the “FastLearn” (adapt) procedure must be performed. This can be done in one step using a scan tool. If this procedure is not done, the transmission control module’s (TCM’s) adaptive valves will be at the settings that it learned for the old transmission, and will be in slow adaptive mode. Under these conditions, it would take an unacceptably long time for the adaptive values to converge to levels suitable for the new transmission.

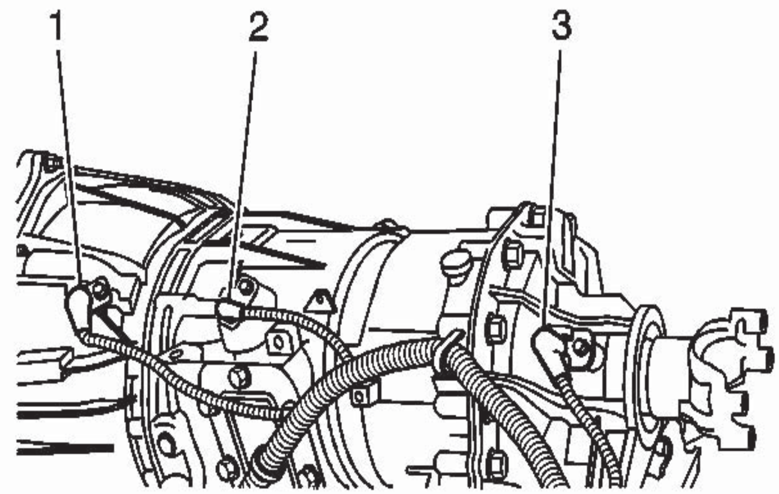
1. Disconnect the negative battery cable. Refer to Battery Negative Cable Disconnection and Connection .
2. Remove the transmission fluid level indicator.
3. Raise and suitably support the vehicle. Refer to Lifting and Jacking the Vehicle .
4. Remove the engine protection shield bolts and shield.



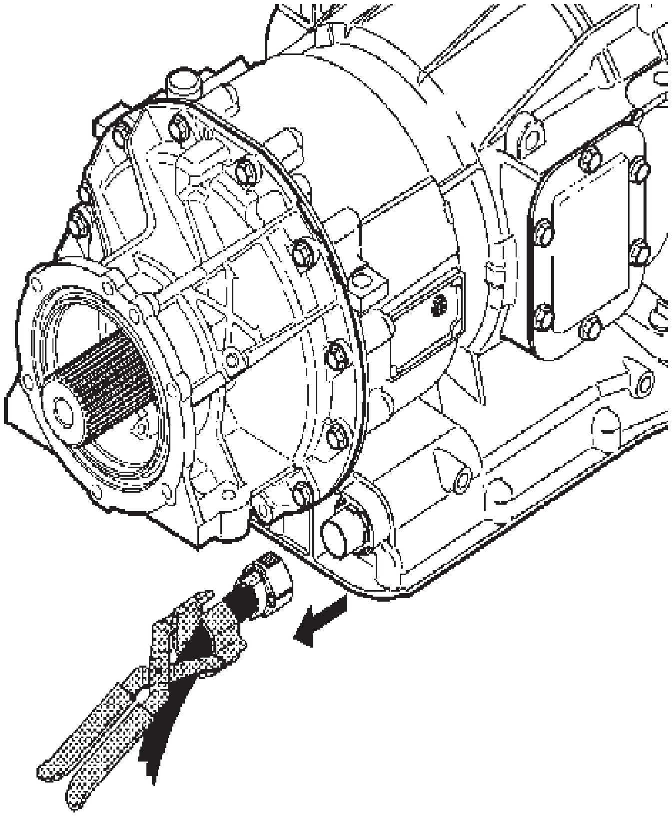
5. Remove the starter motor bolts and position the starter motor aside.
6. Drain the transmission fluid, if necessary.
7. Remove the propeller shaft. Refer to Propeller Shaft Replacement.



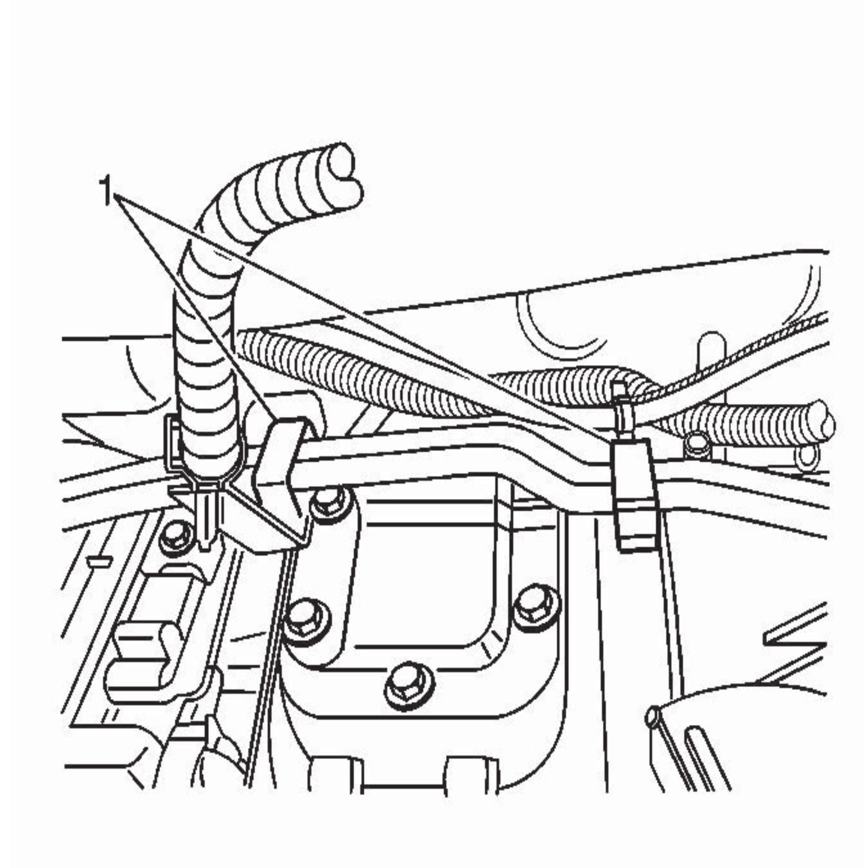
8. Support the transmission with a transmission jack.
9. Remove the transmission mount nuts.
10. Remove the transmission support bracket bolts.
11. Remove the transmission support bolts and nuts.
12. Remove the transmission support.
13. Remove the transmission mount bolts (1).
14. Remove the transmission mount.
15. Disconnect the shift cable from the selector lever ball stud (5) and remove the cable from the bracket (3).
16. Remove the shift cable bracket bolts and bracket (2) from the transmission.



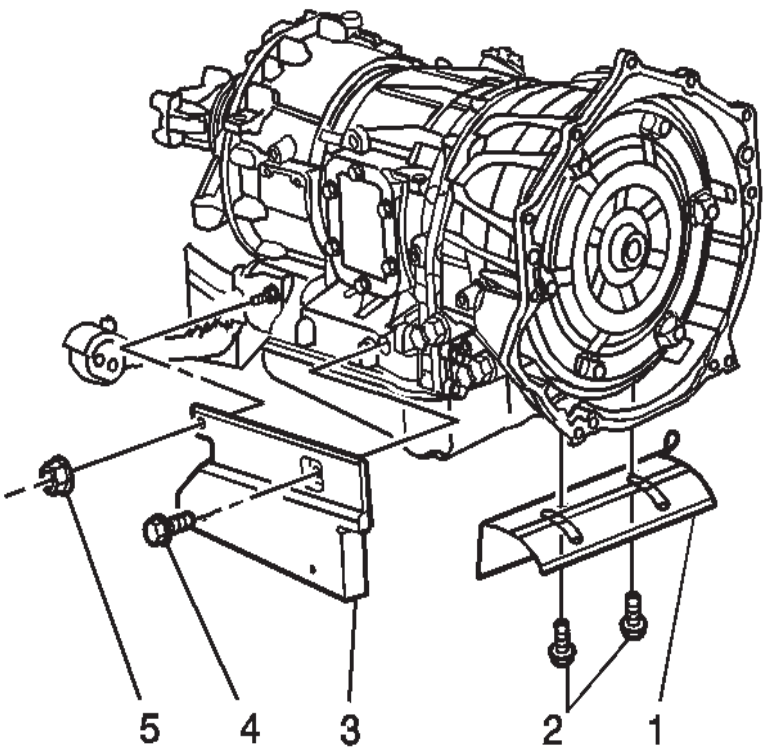
17. Disconnect the turbine speed sensor (1) and input speed sensor (2) electrical connectors.
18. Disconnect the output speed sensor (3) electrical connector.



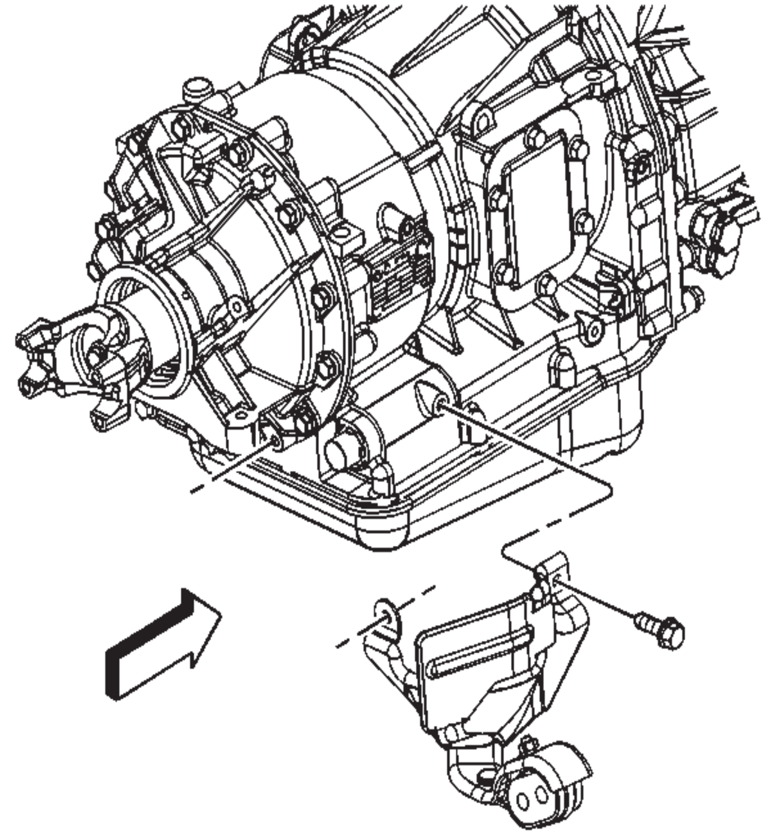
19. Disconnect the transmission main electrical connector. J 44257 may be used, but is not required.
20. Disconnect the park neutral position (PNP) switch electrical connector.



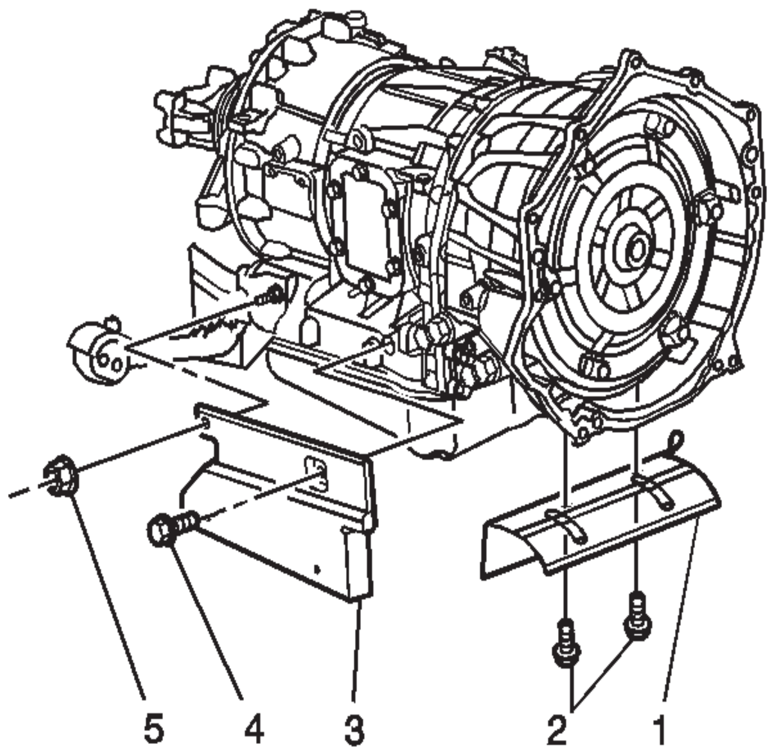
21. Remove the fuel line retainer (1) bolts on the left side of the transmission.



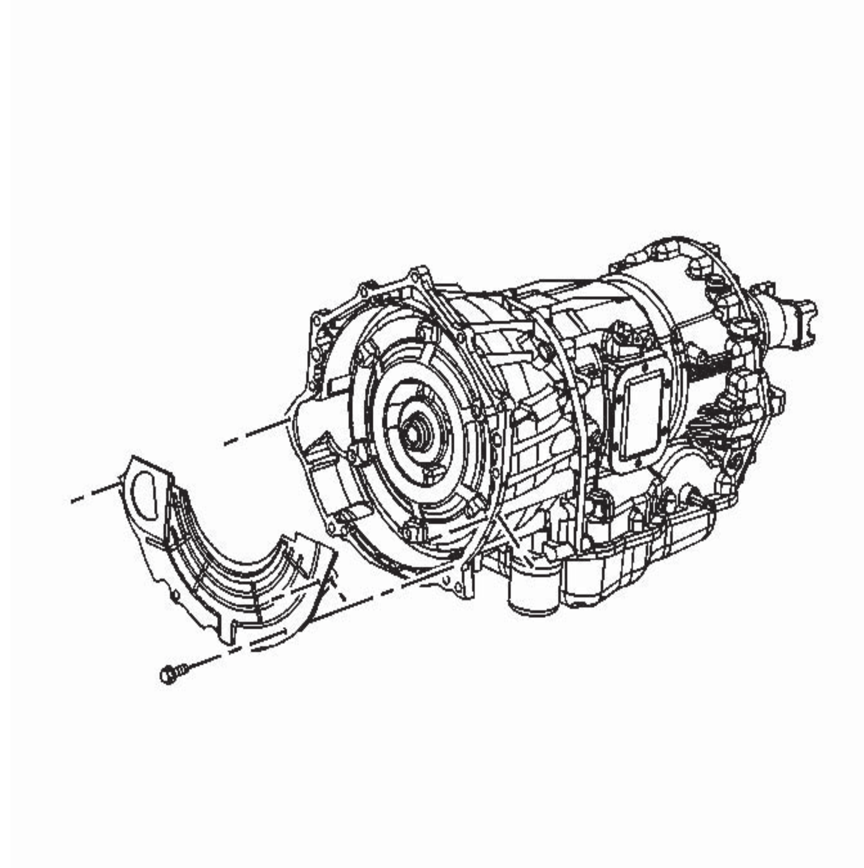
22. Remove the transmission heat shield bolt and nut (4, 5) and shield (3).



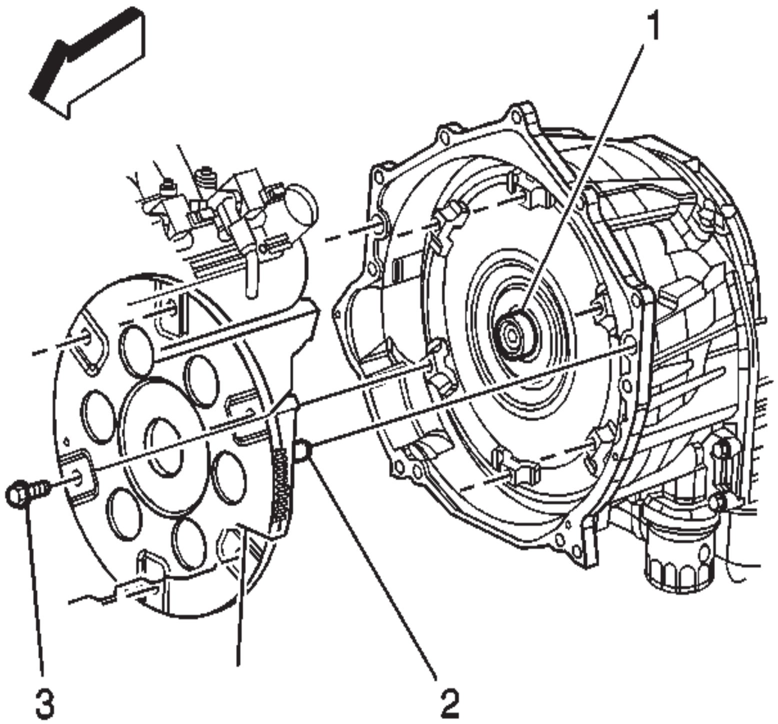
23. Remove the exhaust pipe hanger bolts and reposition the hanger.

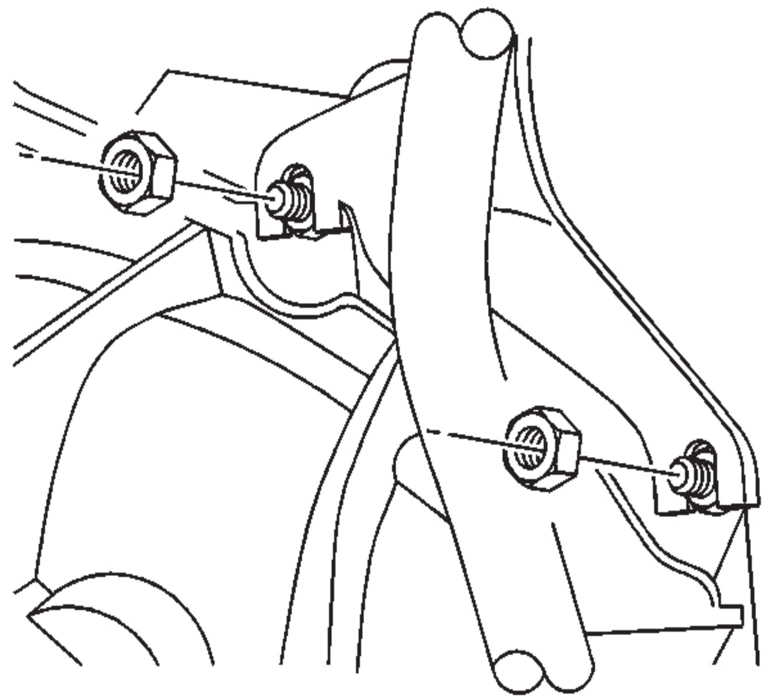


24. Remove the transmission heat shield bolts (2) and shield (1).



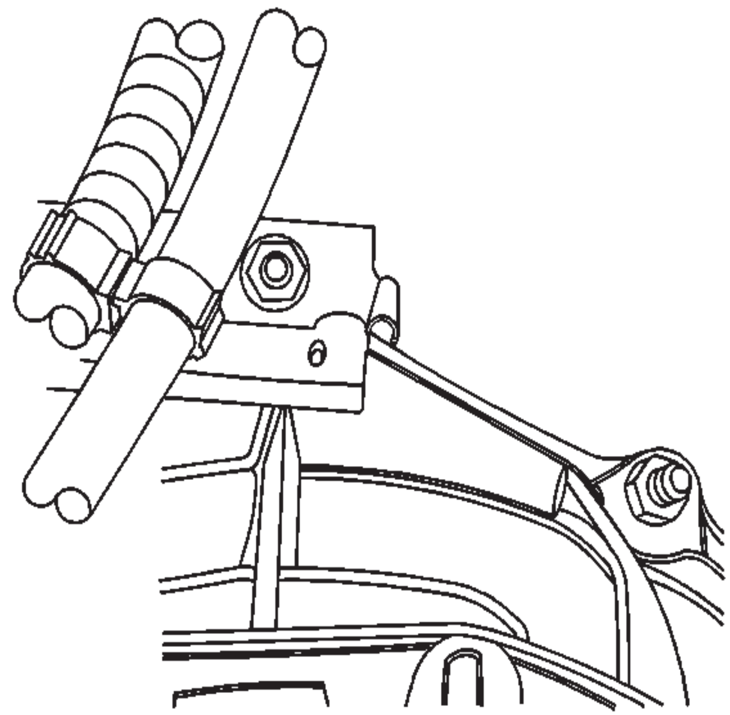
25. Remove the converter housing inspection cover bolts and cover.



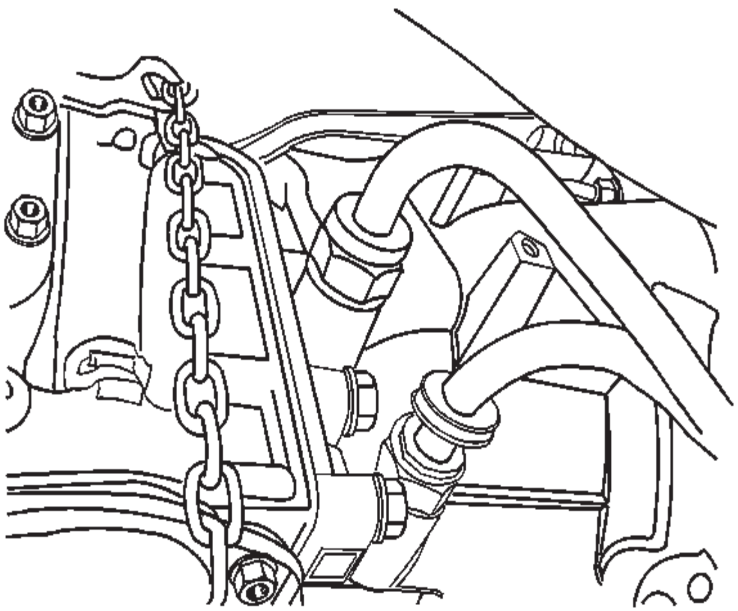


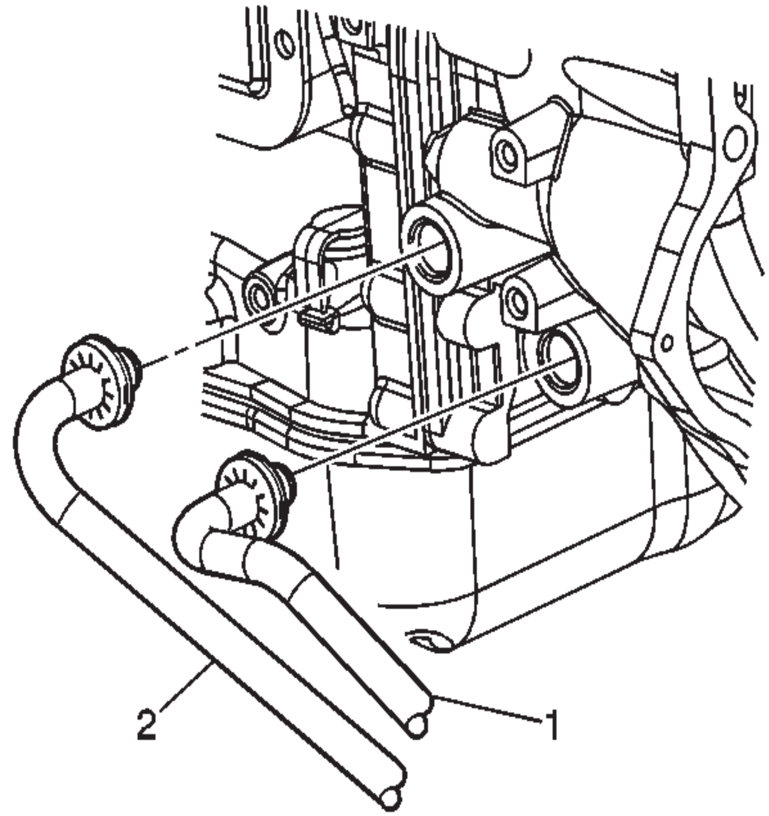
26. Rotate the engine clockwise, using the crankshaft bolt in order to access the torque converter bolts through the starter opening. Have an assistant rotate the engine while aligning the bolts.
27. Remove the torque converter bolts (3).
28. Remove the transmission fill tube nuts from the converter housing studs.

29. Remove the fuel line bracket nut from the converter housing stud.



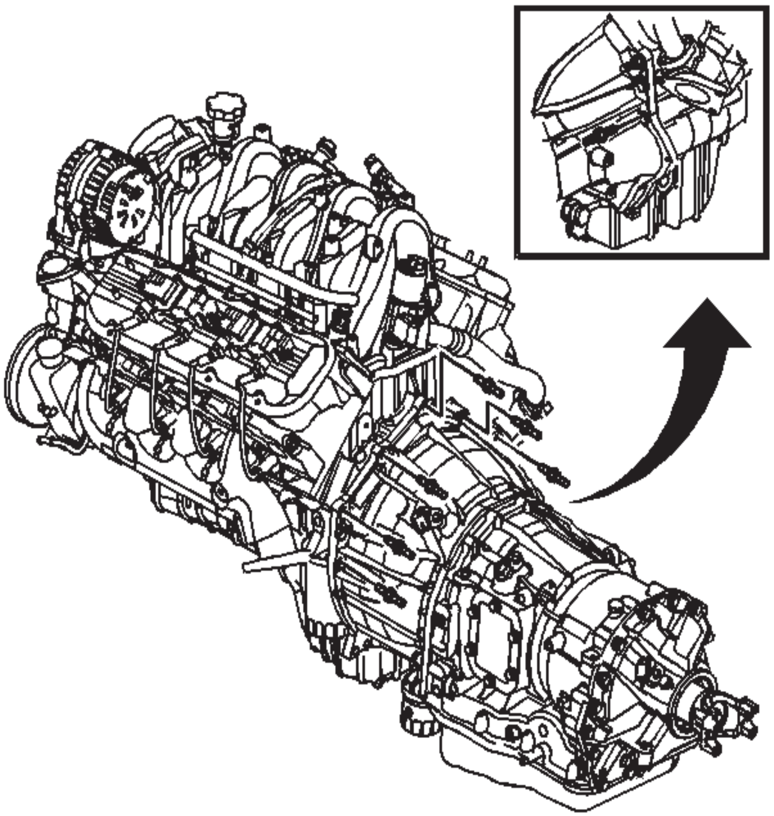
30. Remove the wire harness/vent tube bracket nut from the converter housing stud and reposition the bracket.



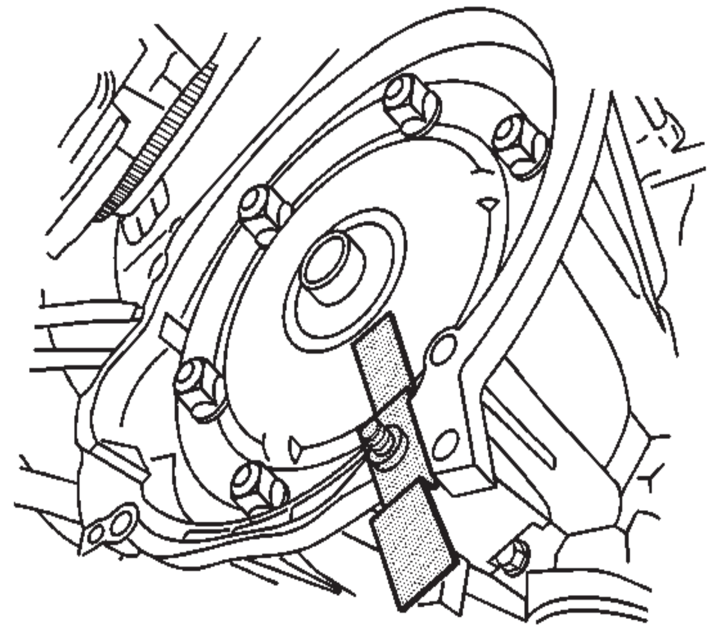


31. Secure a safety chain around the transmission. Use care not to overlap any wiring, fuel lines, or other related components.

32. Disconnect the transmission oil cooler lines (1, 2) from the transmission.
33. Plug the transmission oil cooler line fittings in the transmission case.
34. If the vehicle is equipped with a power take off (PTO) unit , disconnect and/or remove any necessary components to facilitate transmission removal.

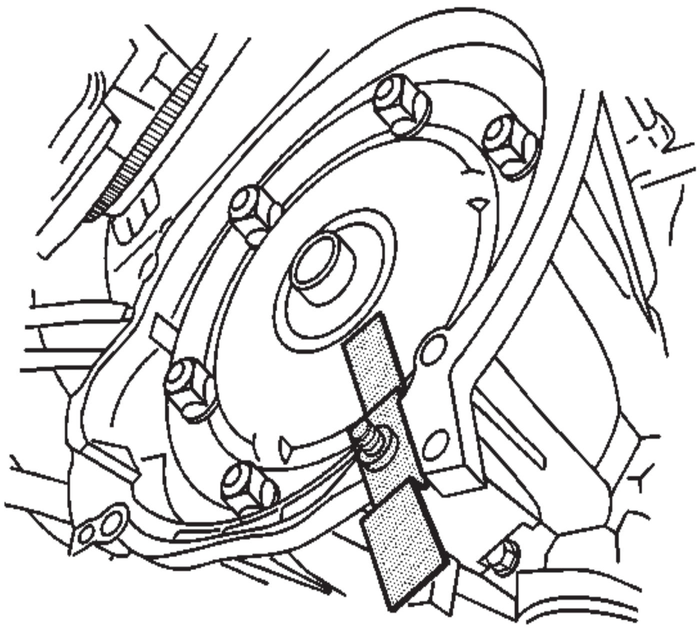


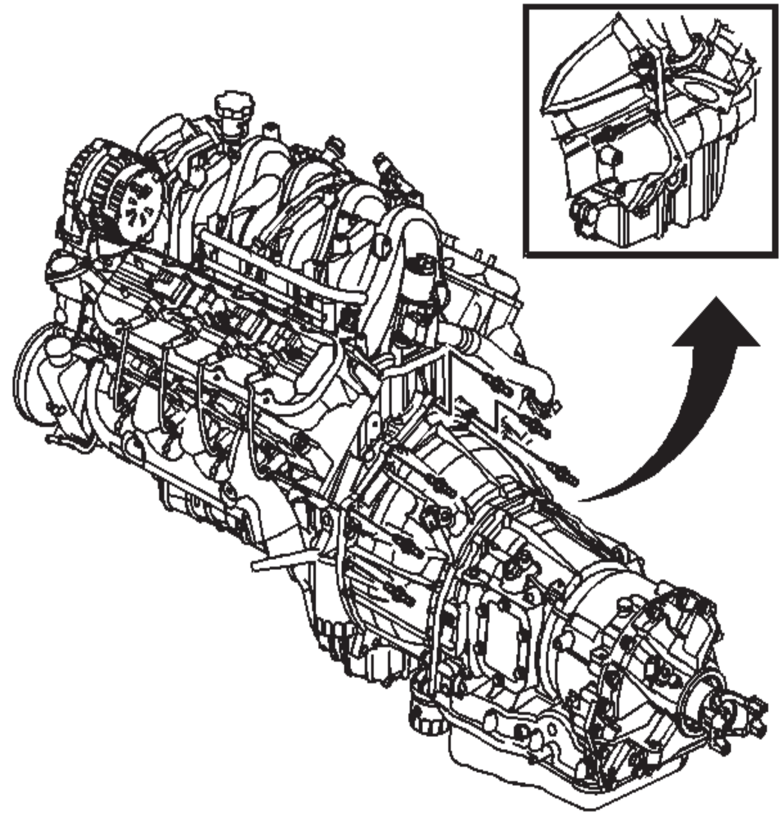
35. Remove the remaining converter housing bolts and studs.
36. Separate the transmission from the engine.



37. Install J 21366 to the converter housing in order to keep the torque converter from sliding off of the turbine shaft.
38. Carefully lower the transmission from the vehicle while simultaneously removing the fill tube.
39. Remove the J 21366 .

Installation Procedure



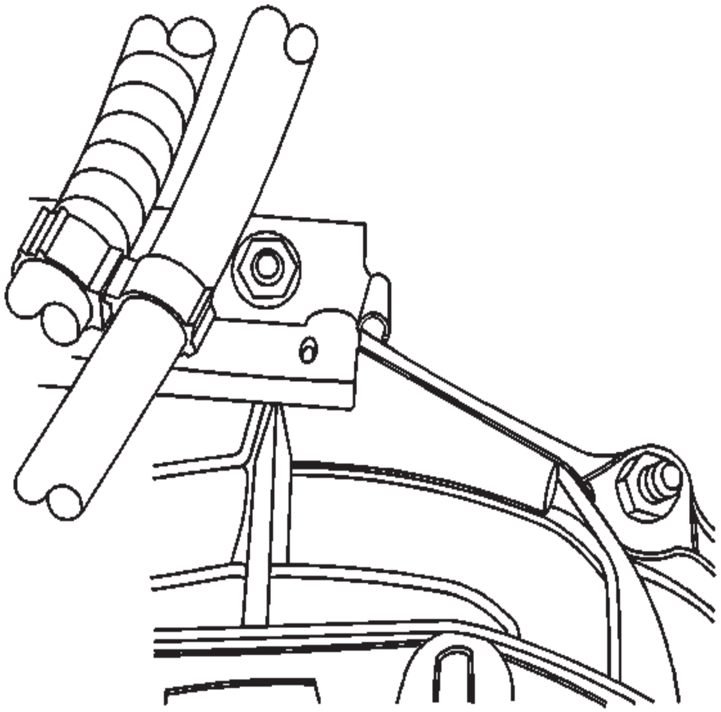


1. Install J 21366 to the converter housing in order to keep the torque converter from sliding off of the turbine shaft.
2. Raise the transmission into place while simultaneously installing the fill tube.
3. Remove the J 21366 .

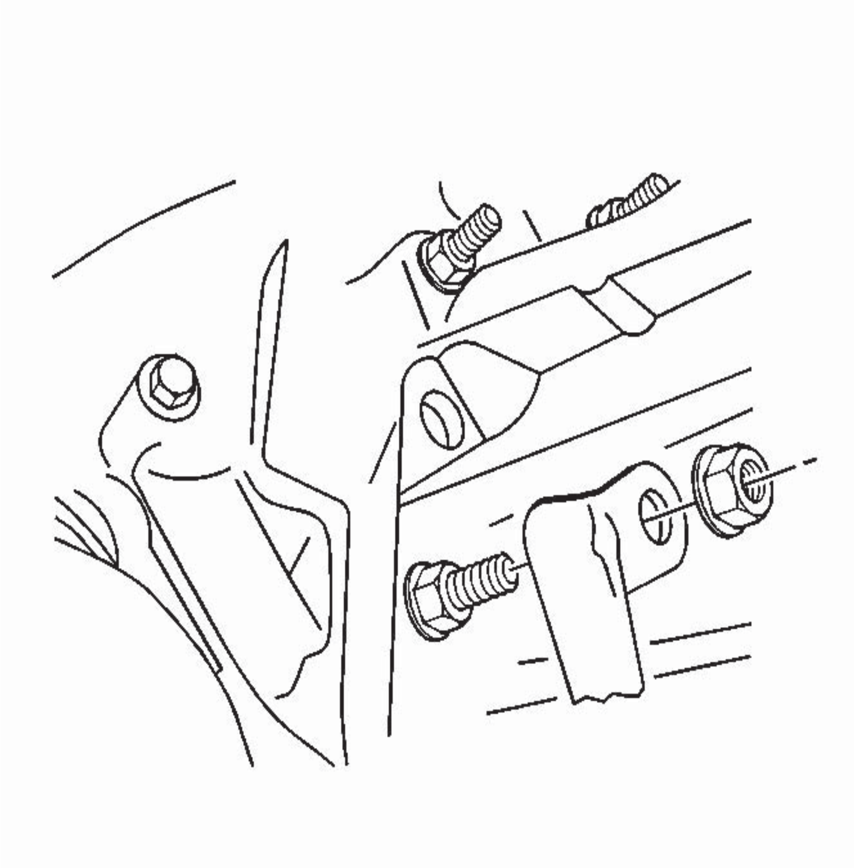
NOTICE:
Refer to Fastener Notice in Cautions and Notices.

IMPORTANT:
Do not install the transmission by drawing it to the engine using the studs and bolts.

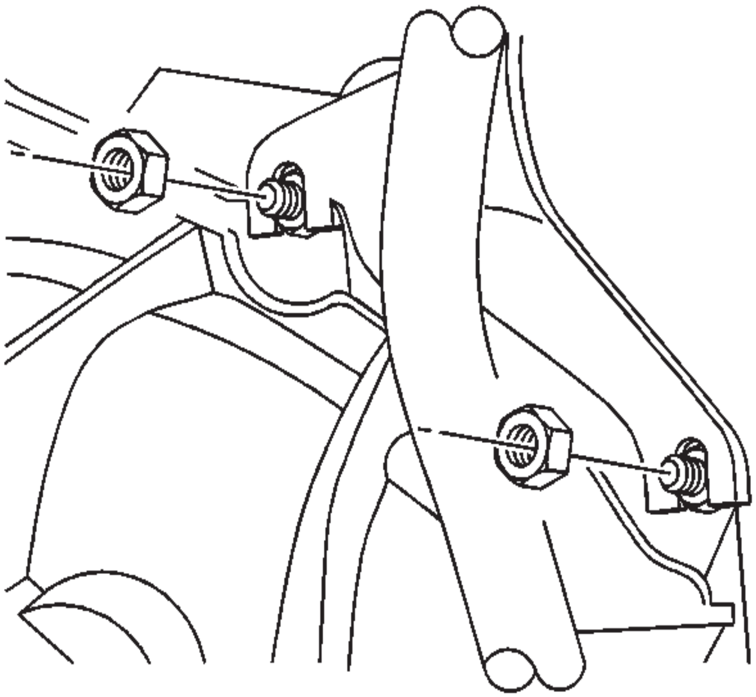
4. Align the transmission with the engine using the alignment dowels located at the rear of the engine.
5. Install the converter housing bolts and studs and tighten the bolts/studs to 50 N·m (37 lb ft).

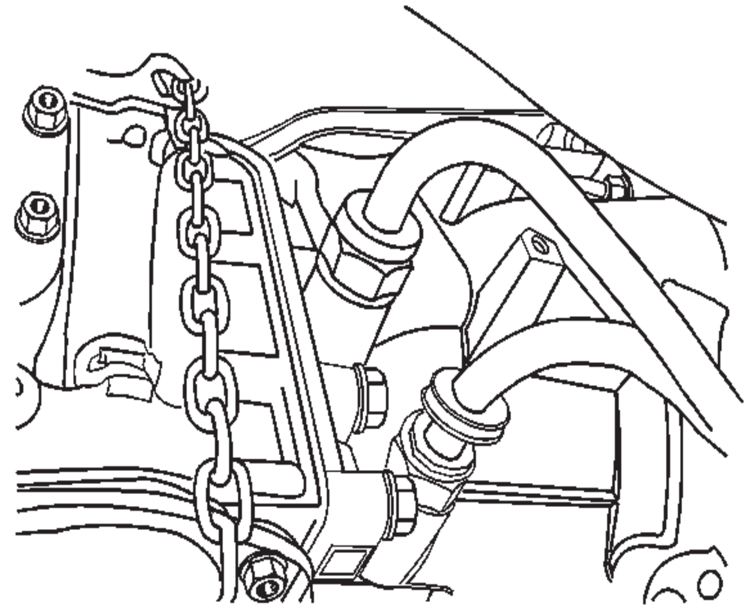


6. Position the wire harness/vent tube bracket and install the wire harness/vent tube bracket nut to the converter housing stud and tighten the nut to 18 N·m (13 lb ft).



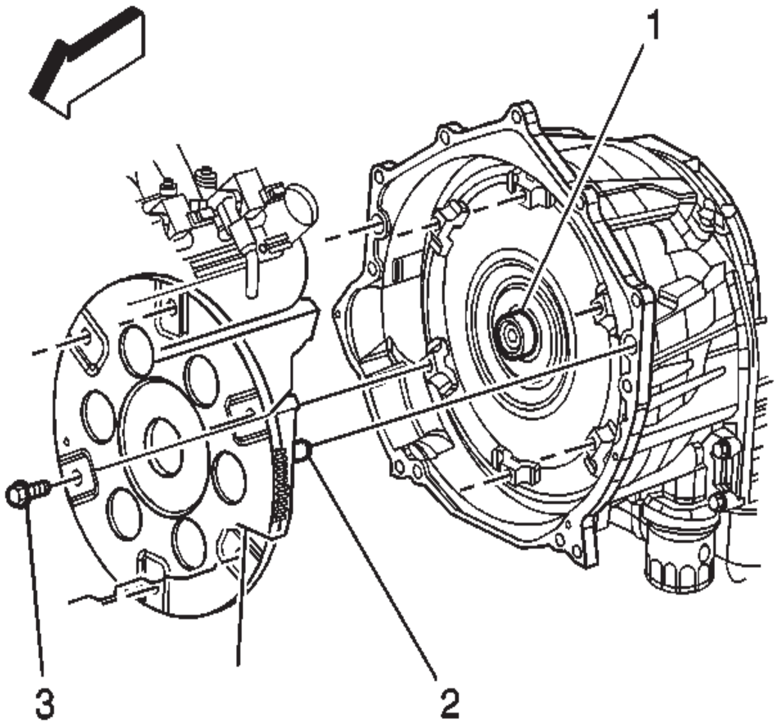
7. Install the fuel line bracket nut to the converter housing stud and tighten the nut to 18 N·m (13 lb ft).



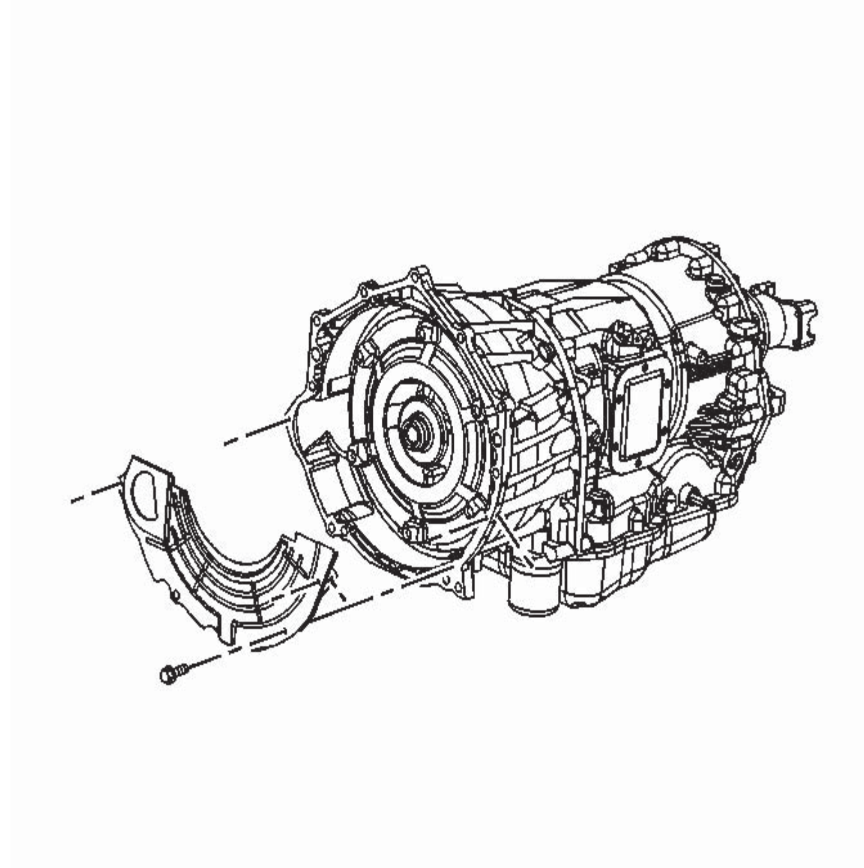


8. Install the transmission fill tube nuts to the converter housing studs and tighten the nuts to 18 N·m (13 lb ft).

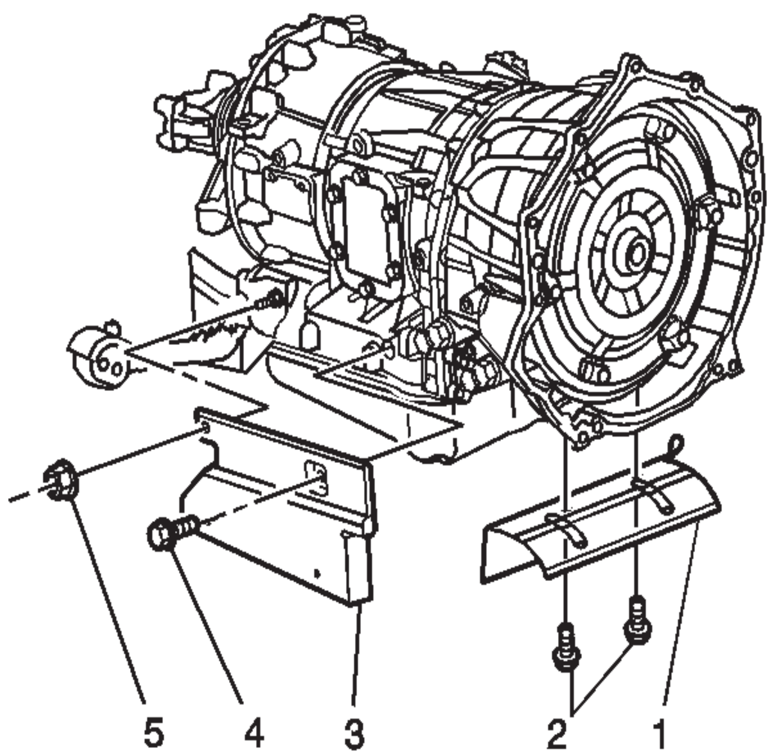
9. Remove the safety chain from around the transmission.



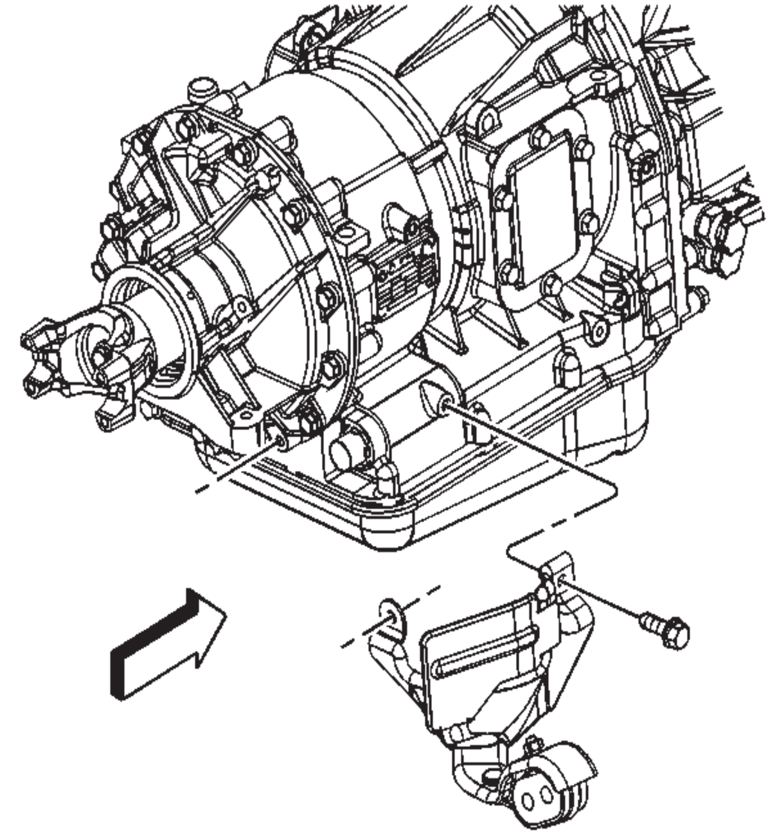
10. Rotate the engine clockwise, using the crankshaft bolt in order to access the torque converter bolts through the starter opening. Have an assistant rotate the engine while aligning the bolts.
11. If reusing the torque converter bolts, clean the bolt threads and apply Loctite 242 GM P/N 12345382 (Canadian P/N 10953489), or equivalent to the threads prior to installation.
12. Install the torque converter bolts (3) and tighten the bolts to 60 N·m (44 lb ft).



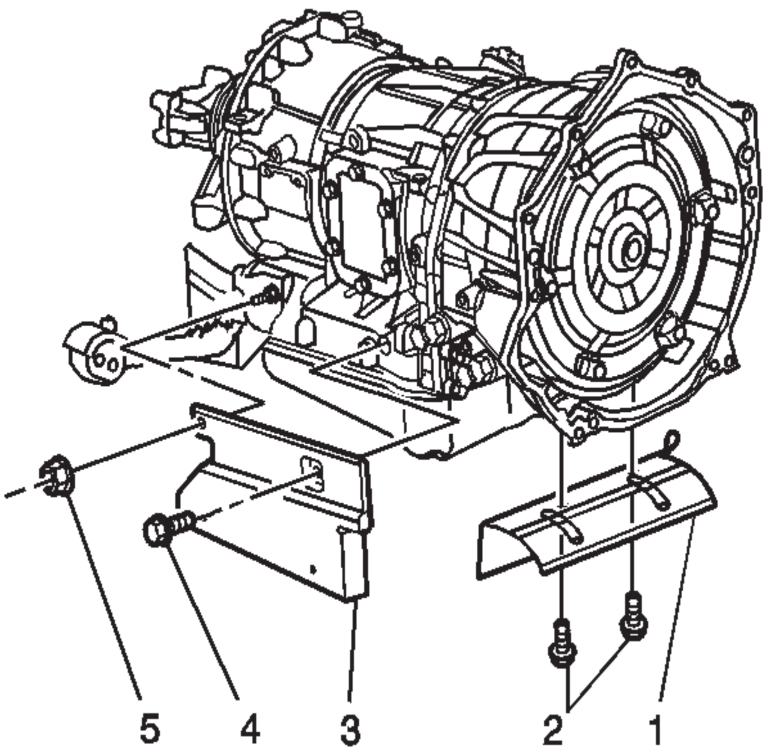
13. Install the converter housing inspection cover and bolts and tighten the bolts to 10 N·m (89 lb in).



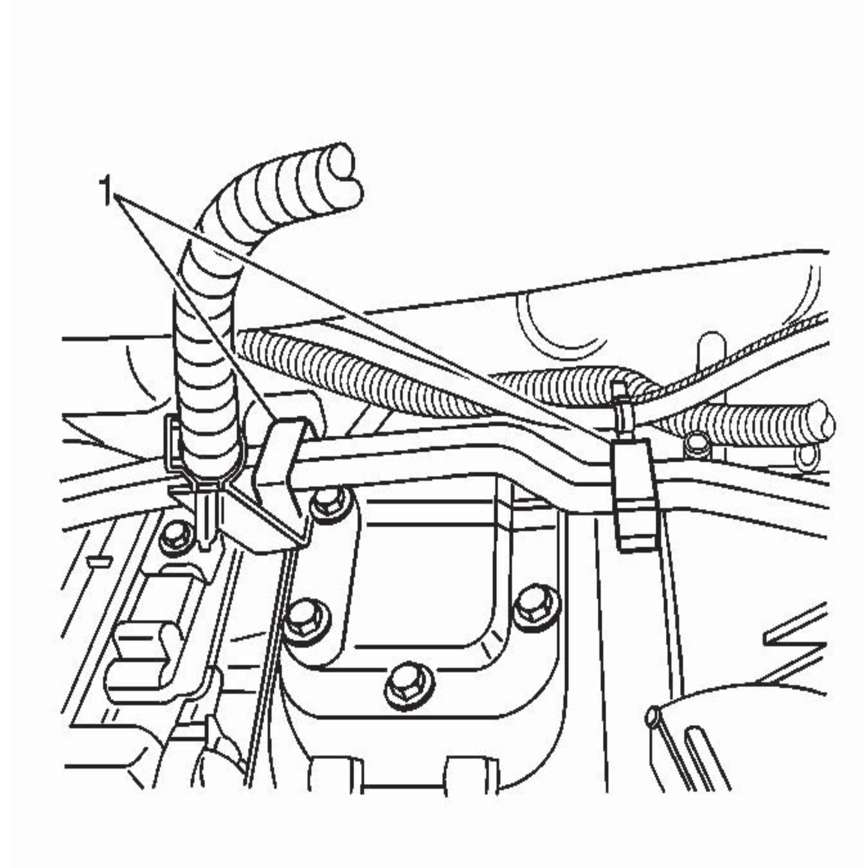
14. Install the transmission heat shield (1) and bolts (2) and tighten the bolts to 17 N·m (13 lb ft).



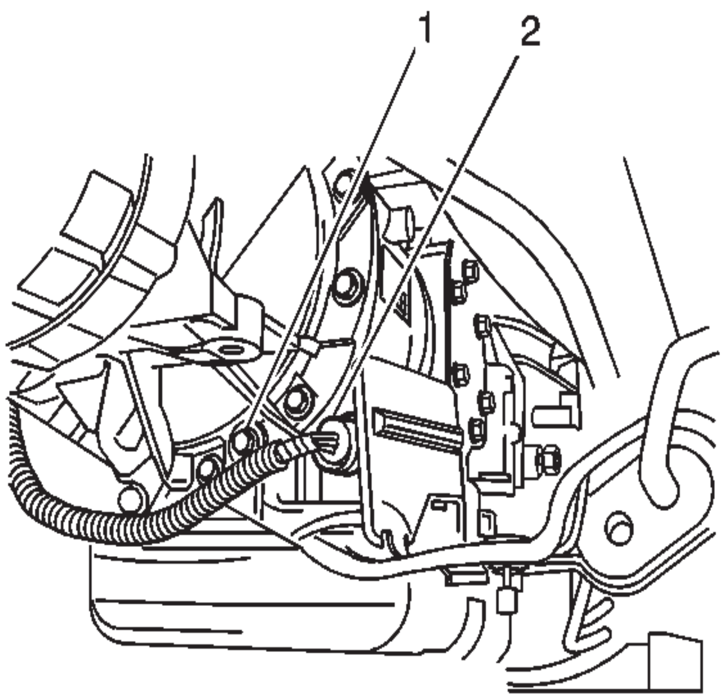
15. Position the hanger and install the exhaust pipe hanger bolts and tighten the bolts to 12 N·m (106 lb in).



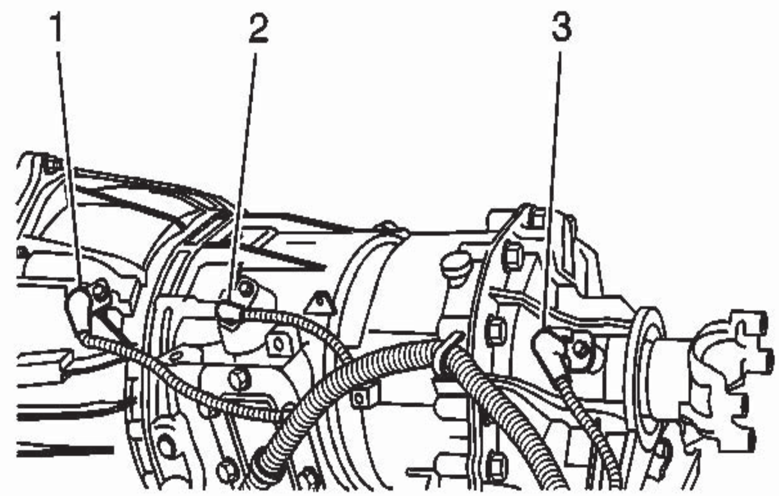
16. Install the transmission heat shield (3) and bolt/nut (4, 5) and tighten the bolt/nut to 17 N·m (13 lb ft).



17. Install the fuel line retainer (1) bolts to the left side of the transmission and tighten the bolts to 2.5 N·m (22 lb in).



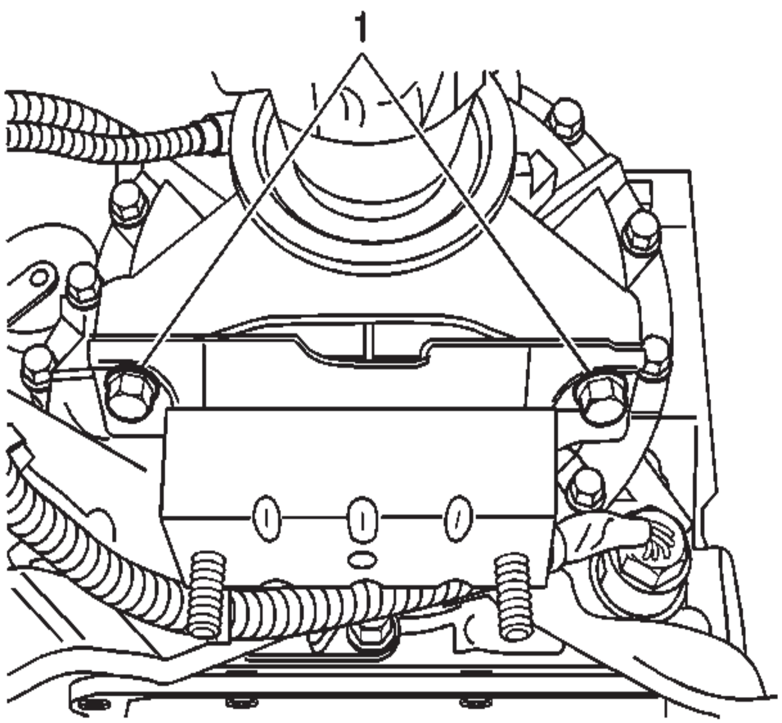
18. Connect the PNP switch electrical connector.
19. Disconnect the transmission main electrical connector (2).



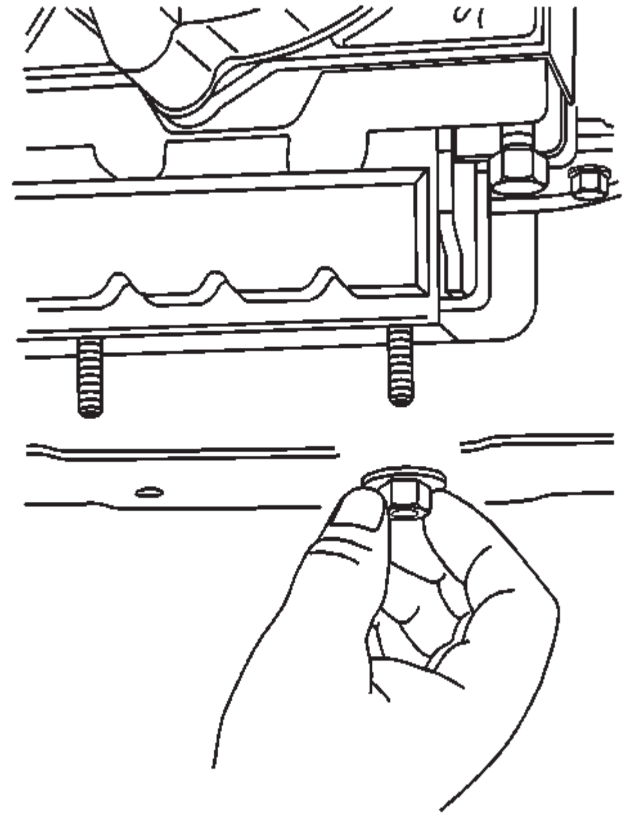
20. Connect the output speed sensor (3) electrical connector. If the vehicle is equipped with 4WD, the output speed sensor is located on the transfer case and will be disconnected later.
21. Connect the turbine speed sensor (1) and input speed sensor (2) electrical connectors.

22. Install the shift cable bracket (2) and bolts to the transmission and tighten the bolts to 25 N·m (18 lb ft).

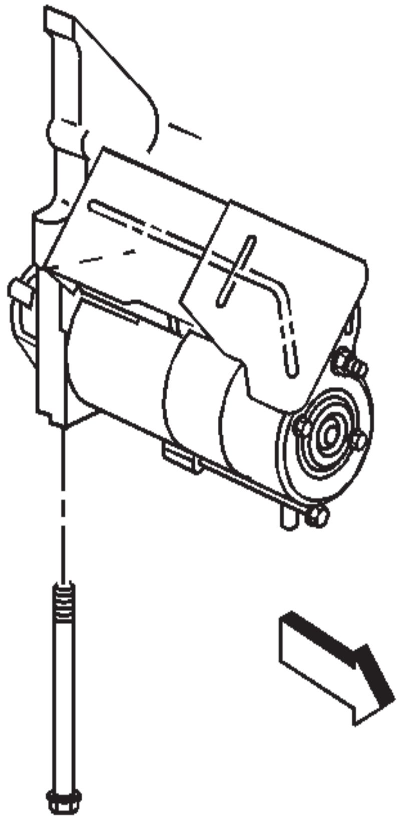
23. Connect the shift cable to the selector lever ball stud (5) and install the cable to the bracket (3).

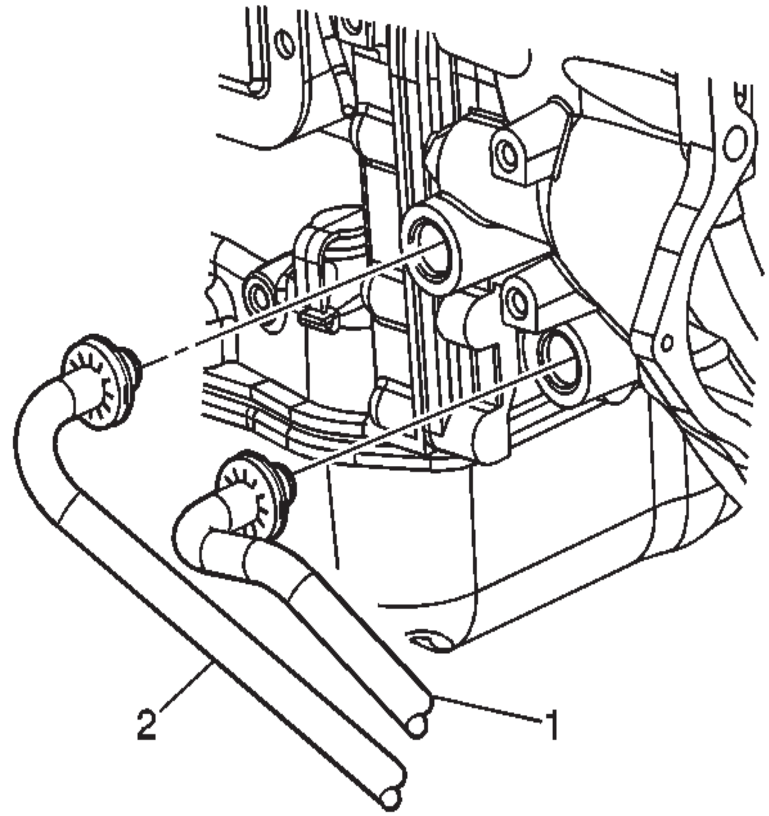


24. Install the transmission mount.
25. Install the transmission mount bolts (1) and tighten the bolts to 50 N·m (37 lb ft).
26. Install the transmission support.
27. Install the transmission support bolts and nuts.
28. Install the transmission support bracket bolts and tighten the bolts/nuts to 95 N·m (70 lb ft).



29. Install the transmission mount nuts and tighten the nuts to 40 N·m (30 lb ft).
30. Remove the transmission jack from the transmission.
31. Install the propeller shaft. Refer to Propeller Shaft Replacement.





32. Position the starter motor and install the starter motor bolts.
33. Tighten the starter motor bolts to 50 N·m (37 lb ft).

Object Number: 310119 Size: SH

Click here for detailed picture of above image.

34. Install the engine protection shield and bolts.
35. Tighten the engine protection shield bolts to 20 N·m (15 lb ft).
36. Remove the plugs from the transmission oil cooler line fittings in the transmission case.
37. Flush the transmission oil cooler and lines, if necessary. Refer to Automatic Transmission Oil Cooler Flushing and Flow Test .
38. Connect the transmission oil cooler lines (1, 2) to the transmission.
39. Lower the vehicle.
40. Connect the negative battery cable. Refer to Battery Negative Cable Disconnection and Connection .
41. Fill the transmission with new transmission fluid.

42. Install the transmission fluid level indicator.
43. If a replacement transmission was installed, perform the “FastLearn” procedure using a scan tool. Refer to FastLearn Procedure .

EMERGENCY REMOVAL FROM PARK

In the event that a vehicle must be towed, and the ECS system cannot be activated to move the vehicle’s transmission out of Park, the following must be done.

- Connect tow vehicle to disabled vehicle in such a manner that the disabled vehicle cannot move in either direction when it is removed from Park.
- Set the tow vehicle’s brakes.
- Chock the tow vehicle’s wheels.

- Set the disabled vehicle’s brakes.

- Chock the disable vehicle’s wheels.
- Remove plug from rear of ECS actuator.
- Insert a 3/16” hex key (allen wrench) into the rear of the ECS actuator and turn in a clockwise direction until the transmission comes out of park.
- Be sure to replace the moisture protection plug.

NOTE:
Vehicle can be returned to Park with this feature.

WARNING:
When performing this operation all of the above must be done in the proper order to prevent possible injury from unexpected movement of the tow or disabled vehicles.

NOTE:
Refer to the Allison service information for complete information on towing the chassis.

ELECTRONIC SHIFT CONTROLLER (ECS) ACTUATOR INITIAL INSTALLATION

This is the Initial Installation Procedure for a new ECS Actuator.

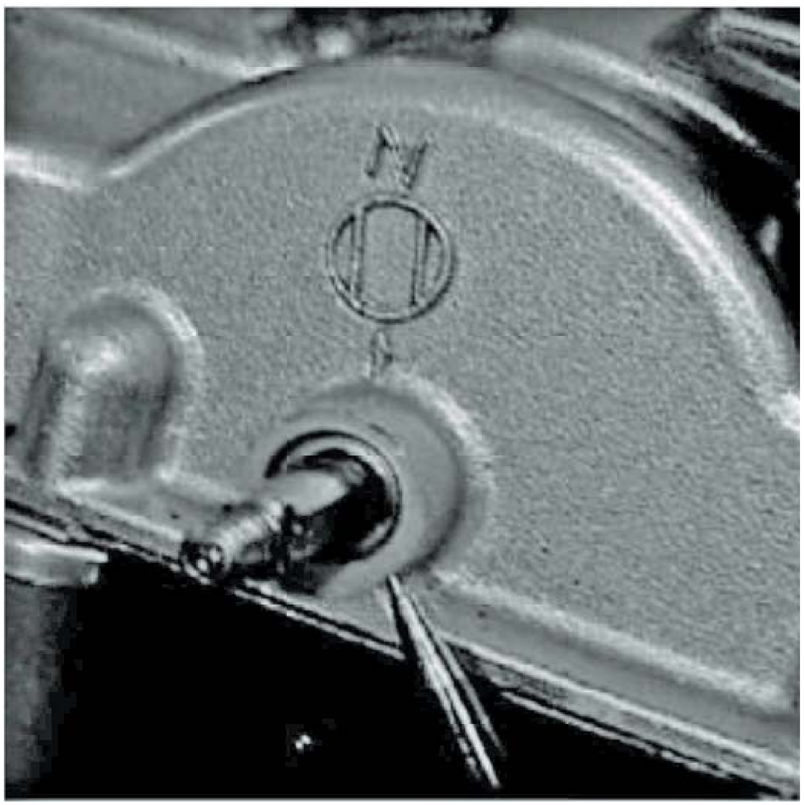
Note: If this is not a “first time” installation of a new actuator, please refer to Arens Controls “ AES-123-C, Re-Calibration Procedure”.

WARNING:
If the transmission is installed in a chassis, do the following. Park the vehicle on level ground. Set the emergency brake and chock/block the tires to prevent the vehicle from moving unexpectedly. Turn off the engine.

1. Place the transmission manual shaft in the Neutral position. This can be done one of two ways.
   A. Line-up the flats on the Selector Shaft with the figure cast into the side of the transmission (Figure #1 and reference illustration #1). This figure will be behind the PNP switch. Do not remove the PNP switch. Removal of the PNP switch may result in loss of its calibration. If either of the flats on the selector shaft or the NEUTRAL figure that is cast into the side of the transmission is not visible, use step “B” to place the transmission into Neutral. Figure 7-4 (shown with PNP switch removed for clarity).
   B. Using an adjustable end wrench (Crescent Wrench)

turn the selector shaft clock-wise until it stops. Do not force the selector shaft when it reaches the end of its travel. This could damage the transmission. The transmission is now in PARK. Next, slowly and carefully rotate the selector shaft back counterclockwise 2 detents. The transmission is now in NEUTRAL.

IMPORTANT:
When moving the selector shaft in the counterclockwise direction from PARK, the tendency is to move it too fast. This may result in moving past the NEUTRAL (the 2 detents) position.

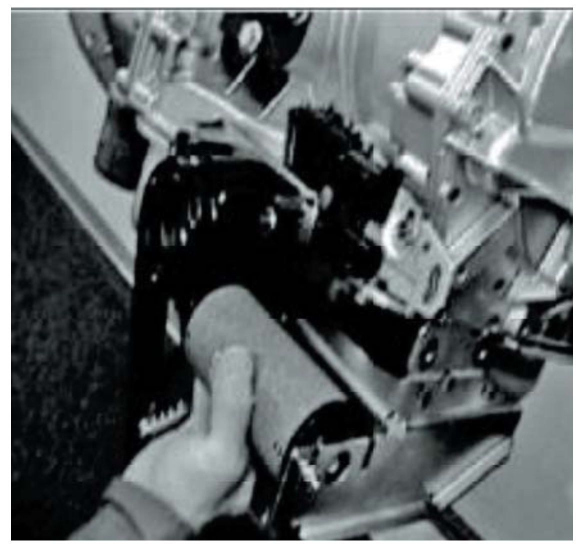


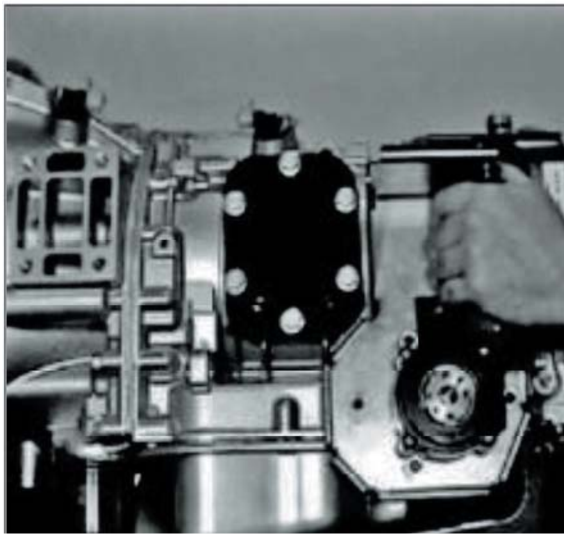
The transmission MUST be in NEUTRAL for proper installation. A simple check that the NEUTRAL position has been correctly obtained on operational vehicles and/or chassis's is to try and start the vehicle. If the vehicle is in NEUTRAL it will start, if it is not in NEUTRAL it will not start.

CAUTION:

When performing this check, make sure that the vehicle's emergency brake is set, the wheels are chocked, and foot pressure is maintained on the service brake pedal. Failure to do so may result in injury or death.

DEFINITION: Throughout this document, reference will be made to HORIZONTALLY mounted Actuators and VERTICALLY mounted Actuators. The following two graphics illustrate the difference between the two: HORIZONTALLY Mounted Actuator VERTICALLY Mounted Actuator.

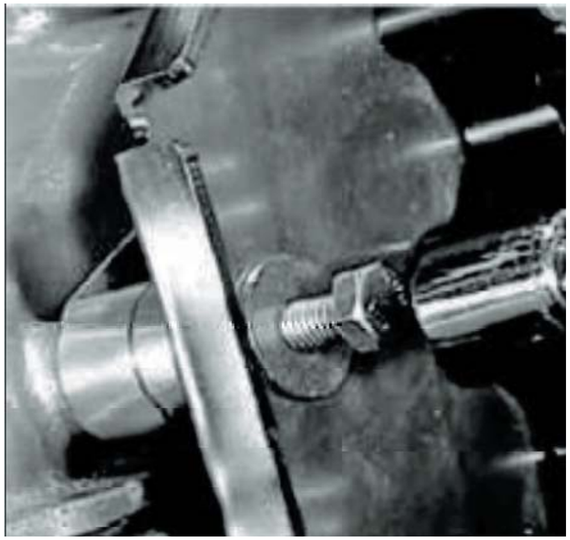




2. For Horizontally mounted actuators remove the 2 lower left-hand bolts from the rear transmission cover. For Vertically mounted actuators remove the 2 upper left-hand bolts from the rear transmission cover.

NOTE:
These 2 bolts are not adjacent to each other.

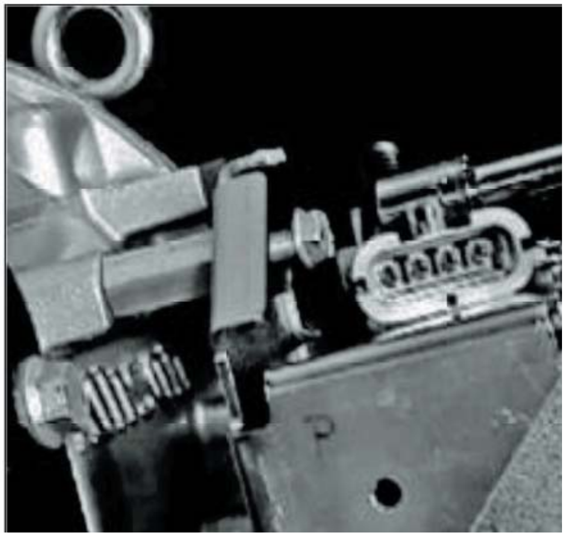
3. Check to insure that the rear PNP switch mounting bolt is tight.
4. Carefully remove the front PNP switch mounting bolt. This Allison bolt will be replaced with an Arens supplied bolt. Be sure not to disturb the switch's position.
5. For Horizontally mounted actuator, place the ECS actuator and bracket assembly on the Allison transmission,
6. Loosely install the 2 rear cover bolts removed in step 2.
7. For both the horizontally and vertically mounted actuators, place the Round Spacer, MT1246 (supplied with Actuator) between the actuator bracket and the front PNP mount; again do not disturb the PNP switch's position. See Figure 7-7.
8. Place the Flat Washer, WA984 (M8 WASHER, 24 mm O.D.) on to the M8 x 55mm hex bolt, SC508. See reference figure 7-8. For Vertically Mounted Actuators, be sure that the M8 x 55mm hex bolt is used here, not the M8 x 60mm, flanged head, thread forming bolt; they are very similar.
9. Place the washer and hex bolt through the front slot in the actuator bracket, spacer, front PNP bracket and thread into the transmission. Tighten to Allison specifications (see Allison manual for proper tightening torque). This M8 x 55mm hex bolt replaces the



10. For Vertically mounted actuators only, install the Hexagon Spacer, M8 x 60mm, flanged head, thread forming bolt and M8 washer as shown in Figure 7-9. Be sure that the M8 x 60mm, flanged head, thread forming bolt is used here not the M8 x 55mm hex

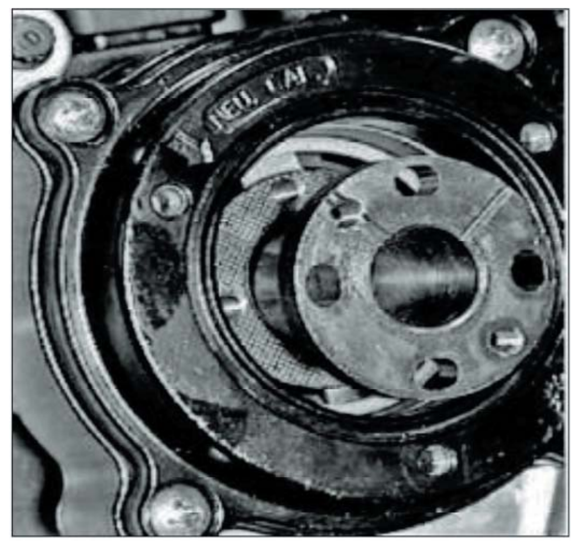
bolt; they are very similar. Tighten the top M8 thread forming bolt to 20 to 28 pound-feet (27N•m to 38 N•m).

11. Tighten rear cover bolts that were loosely installed in step 7.



12. Align the witness marks on the shift shaft adapter with the witness marks on the actuator housing. For Horizontally mounted Actuators use the single groove witness mark on the Shift Shaft Adapter as shown in the following graphic.

For Vertically mounted Actuators use the double groove witness mark on the Shift Shaft Adapter as shown the following graphic.



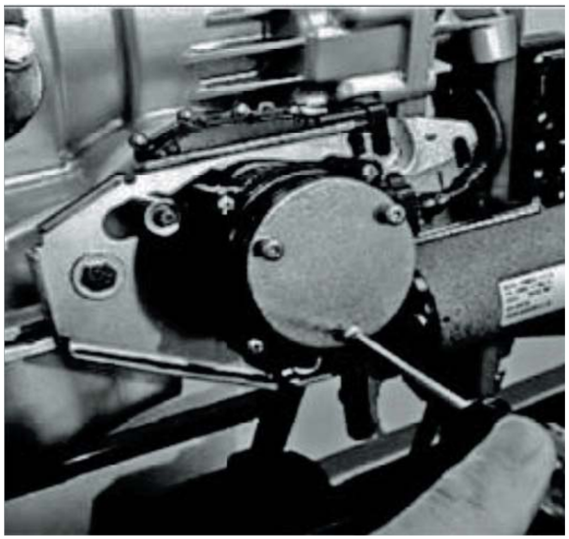
Place the shift shaft adapter into the center of the actuator. Be sure that the Shift Shaft Adapter properly engages the end of elector Shaft of the transmission.

13. For both Horizontally and Vertically mounted Actuators, insert the 4 - #10-32 x ½" long S.H.C.S. into the Shift Shaft Adapter.
14. Place your thumb over the center of the shift shaft adapter. Press the shift shaft adapter inward while tightening all 4 screws that secure the shift shaft adapter to 20 lb in.

IMPORTANT:

Place the Cap Nut through the Shift Shaft Adapter and thread on to the end of the Transmission Selector Shaft. Tighten to 18 lb in. Holding the cap nut with a wrench, tighten the socket head cap screw that goes through the center of the cap nut to 5 lb ft.

15. Attach the Cover Plate with the 3 Cover Plate Screws. Tighten the 3 screws to 5 lb ft.



System Checks:

CAUTION:

When performing the following system checks, make sure that the vehicle's emergency brake is set, the wheels are chocked, and foot pressure is maintained on the service brake pedal. Failure to do so may result in injury or death.

CAUTION:

The installation of the ECS system was done with the transmission in NEUTRAL; as such, the transmission should still be in NEUTRAL. To confirm this, power-up the system with the ignition switch without starting the engine. The "Monitor" side (right hand side) of the display should indicate "N" for NEUTRAL. If it does not, select NEUTRAL by depressing the "N" button on the PBSS (Push Button Shift Selector). The display should now show "NN" for NEUTRAL. Attempt to start the engine. If the installation was done correctly the engine should start. Turn OFF the engine and proceed to the next system check.

CAUTION:

If chassis/vehicle is equipped with PARK, power-up the system with the ignition switch without starting the engine. Select "P" for PARK. The "Monitor" side (right hand side) of the display should indicate "P" for PARK. Attempt to start the engine. If the installation was done correctly the engine should start.

Turn OFF the engine and proceed to the next system check. – Power-up the system with the ignition switch without starting the engine. Select DRIVE, the ECS system will place the transmission in the DRIVE position. The display should indicate “DN” for CAN equipped vehicles or “DD” for non-CAN equipped vehicles for DRIVE position.

NOTE: With the ignition ON, and the engine not running, the CAN message from the Allison TCM (Transmission Control Module) to the Arens Controls PBSS (Push Button Shift Selector) will result in an “N” indication on the “Monitor” side of the display for any gear (e.g.: DRIVE, REVERSE, etc.). This is normal. Once the engine is running the Display for DRIVE will indicate “D1” through “D6”, depending on the vehicles speed, or “DD” if CAN is not utilized; for REVERSE the display will indicate “RR”. Attempt to start the engine. If the installation was done correctly the engine should NOT start.

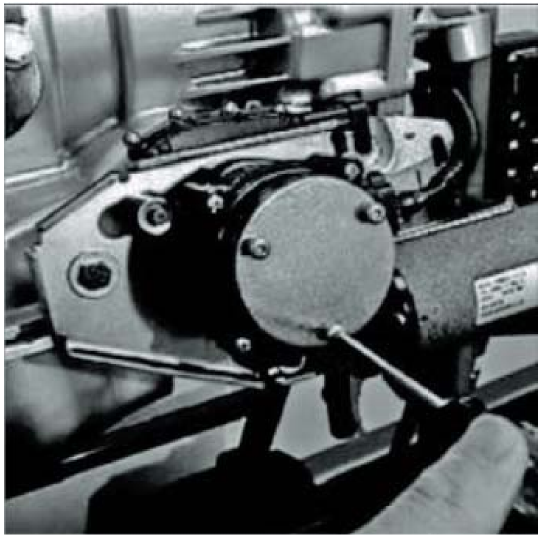
Shifter Calibration

This is the ECS Calibration Procedure for actuators that are already installed onto vehicles:

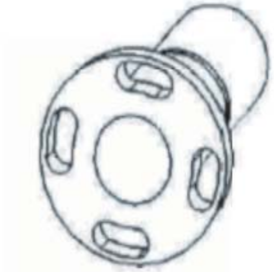
WARNING:

Park the vehicle on level ground. Set the emergency brake and chock/block the tires to prevent the vehicle from moving unexpectedly.

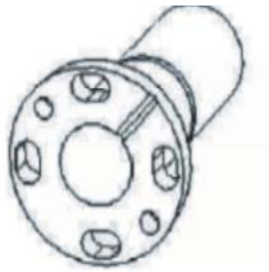
1. Remove the 3 screws that hold the cover plate on.



2. Loosen but don’t remove the socket head cap screw that goes down through the center of the cap nut.
3. Loosen and remove the cap nut.
4. Notice the shift shaft adapter. If it looks like “Figure A”, proceed to Step 5. If it looks like the one in “Figure B”, proceed to Step 17.



Shift Shaft Adapter A
Figure A



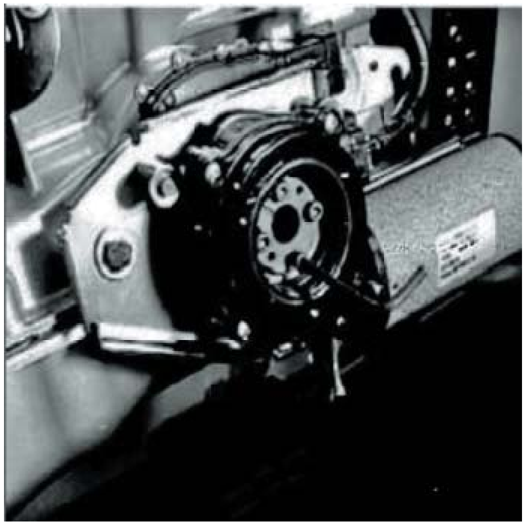
Shift Shaft Adapter B
Figure B

Calibration Using Shift Shaft Adapter A.

5. Turn the ignition ON, and select NEUTRAL
6. Turn the Ignition OFF. The Shift Selector will stay

ON supplying power to the Actuator, holding it in NEUTRAL. This is the desired condition.

7. Loosen (but do not remove) the 4 Socket Head Cap Screws that hold the shift shaft adapter in place.
8. Remove 2 of the 4 socket heads crews in Step 7.
9. Place 2 long (1" to 1-1/2" long) #10-32 screws in to the 2 threaded holes of the removed screws.
10. Pull out away from the transmission, putting the actuator into the "calibration" position.
11. Using the push button shift selector (PBSS), cycle the actuator (with the Shift Shaft Adapter Bolts Loose) in the following sequence:
    - from N (Neutral) into R (Reverse),
    - from R (Reverse), into D (Drive),
    - from D (Drive) back into N (Neutral).



12. Remove the 2 long #10-32 Socket Head Cap Screws used to pull the actuator into the "calibration" position.
13. Replace the 2 - #10-32 x _" long that were removed in Step 8.
14. Tighten all 4 of the screws that secure the shift shaft adapter to 20 inch-pounds.
15. Put Loctite on the female threads of the cap nut.

IMPORTANT:
Replace the cap nut and tighten. As this cap nut is being tightened, the center portion of the actuator will move inward (from the calibration position into the operation position). This is normal. Back the cap nut off 1/16 to 1/8 of a turn. Holding the cap nut with a wrench, tighten the socket head cap screw that goes through the center of the cap nut to 20 inch-pounds.

16. Replace the cover plate with the 3 cover plate screws. Torque to 5 lb ft. At this point the actuator assembly is calibrated to the transmission.

Calibration Using Shift Shaft Adapter B

17. Turn the ignition ON, and select NEUTRAL
18. Turn the Ignition OFF. This should turn off engine but not the Shift Selector. The shift selector will stay ON supplying power to the Actuator, holding it in NEUTRAL. This is the desired condition.
19. Remove the 4 Socket Head Cap Screws that hold the Shift Shaft Adapter in place, figure 7-15.
20. Place 2 long (1-3/4" to 2-1/2") #10-32 screws in the 2 threaded holes (not the slot) of the Shift Shaft Adapter.
21. The following steps are to confirm that the transmission is truly in NEUTRAL.

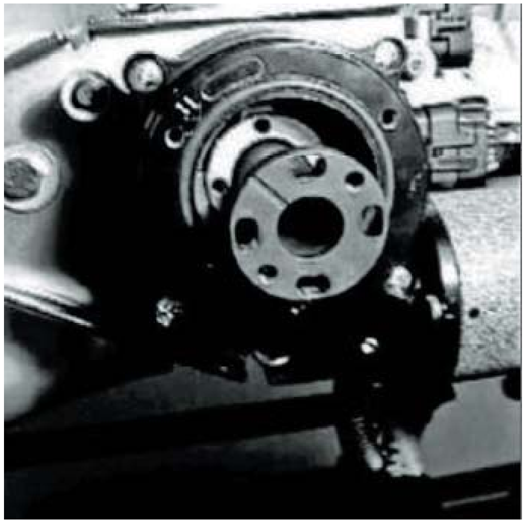
IMPORTANT:
Performing these steps incorrectly will result in calibrating the transmission in a position other than NEUTRAL.

A. Using a long substantial screwdriver wedged between the 2 long screws, rotate the shift shaft adapter clockwise. Do not force the selector shaft when it reaches the end of its travel. This could damage the transmission. The transmission is now in PARK.

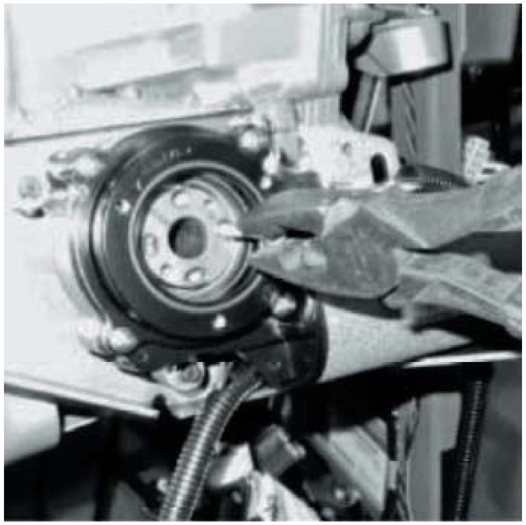
B. Next, slowly and carefully rotate the selector shaft back counterclockwise 2 detents. The transmission is now in NEUTRAL.

IMPORTANT:
When moving the selector shaft in the counterclockwise direction from PARK, the tendency is to move it too fast. This may result in moving past the NEUTRAL (the 2 detents) position. The transmission MUST be in NEUTRAL for proper calibration

22. Remove the shift shaft adapter from the actuator.



23. Place a #10-32 screw partially into 1 of the 4 holes in the lost motion wheel. Grasp the head of the socket head cap screw with a pair of pliers and pull the lost motion wheel outward to place the actuator into the "calibration" position.



24. While in calibration position press "R" then "N" on the Push Button Shift Selector.
25. Replace the shift shaft adapter and the 4 - #10-32 x 1" long S.H.C.S. that were removed in step 20.
26. Place your thumb over the center of the shift shaft adapter. Press the shift shaft adapter inward while tightening all 4 screws that secure the shift shaft adapter to 20 lb in.
27. IMPORTANT – Replace the cap nut and tighten to 18 lb in. Holding the cap nut with a wrench, tighten the socket head cap screw that goes through the center of the cap nut to 5 lb ft.
28. Replace the cover plate with the 3 cover plate screws. Torque to 5 lb ft.

At this point the actuator assembly is calibrated to the transmission.