SECTION 5—DIAGNOSTIC TROUBLE CODES (DTC)

5–1. DTC MEMORY

Diagnostic Trouble Codes (DTCs) are logged in a list in TCM memory. The DTCs contained in the list have information recorded as shown in Table 5–1 (DTC example). The TCM is capable of displaying all historical and active DTCs.

Table 5–1.	DTC List
------------	-----------------

	Active			Failure	
DTC	Indicator	Historic	Trans	Record	Description
P0713	Y	Y	N	Y	Transmission Fluid Temperature Sensor Circuit High Input

The following paragraphs define the different parts of the DTC list.

- A. DTC. The number assigned to a given fault condition in accordance with SAE J2012.
- **B.** Active Indicator. Indicates when a DTC is active. If a DTC is active, Allison DOC[™] For PC–Service Tool displays **Y**. If DTC is not active, **N** is displayed.
- **C. Historic.** Indicates when an active DTC has had sufficient activity to be stored to the TCM. If a DTC has been stored to the TCM, Allison DOC[™] For PC–Service Tool displays **Y**. If the DTC has not been stored to the TCM, **N** is displayed.
- D. Check Trans. Indicates if CHECK TRANS Light is illuminated.
- E. Failure Record. Indicates when a snapshot of transmission data has been stored in the TCM. The last five DTC failure can be viewed. If the DTC can be viewed as part of the failure record, Allison DOC[™] For PC–Service Tool displays Y. If the DTC cannot be displayed, N is displayed.
- **F. Description.** Name assigned to a given fault condition in accordance with SAE J2012.

5–2. FAILURE RECORDS

Failure records contain a snapshot of transmission data that is stored in the TCM when DTCs are logged. A limit of five failure records can be stored. When an additional DTC is logged, the new failure record pushes the oldest record from the TCM memory. Table 5–2 illustrates the failure record data stored in the TCM when a DTC is set.

Table 5–2. Failure Record Data

Data Description

Freeze Frame Diagnostic Trouble Code Distance at First Failure Distance at Last Failure Failure Record Fail Ignition Cycle Counter Failure Record Pass Ignition Cycle Counter Failure Record Not Run Ignition Cycle Counter Gear Selected Gear Commanded Current Gear Previous Gear TCM Battery Voltage Trans Fluid Temperature (TFT) Trans Input Shaft Speed Trans Output Shaft Speed Turbine Speed Diagnostic Transmission Gear Ratio Accelerator Effective Position Main Mod Solenoid Commanded Pressure PCS2 Commanded Pressure PCS1 Commanded Pressure TCC Pressure Control Solenoid Command Pressure Transmission Fluid Pressure Switch Status Shift Solenoid Status TCM Substrate Temperature Drive Demanded Engine Torque **Engine Torque Requested Torque** Normal Shift Pattern Cold Shift Pattern Hot Mode (Transmission) Trailering/Hauling Shift Pattern Engine in Default Mode Shift Pattern Main Modulation Solenoid Fail Shift Pattern Main Modulation Available Engine Run Time Driver Select Tap Up/Down Input AC Enabled Cruise Enabled IMS A IMS B IMS C IMS P Number of Current Malfunctions Transmission Input State #1 Transmission Input State #2 TCM Non-Volatile Inhibit Record

5-3. DTC READING AND DTC CLEARING

DTCs can be read and cleared by using Allison DOCTM For PC–Service Tool. The use of Allison DOCTM For PC–Service Tool is described in the instruction manual furnished with each tool.

A. Clearing DTCs

- DTCs will automatically clear after 40 code-free warm-up cycles.
- DTCs can be manually cleared by the Allison DOC[™] For PC–Service Tool.

B. Clearing Active Indicators

- A DTC's active indicator can be cleared, which removes the DTC's shift inhibitions while the DTC remains in the queue as inactive.
- The active indicator clearing method is to power down (all active indicators are cleared at TCM power down).

CAUTION: If an active indicator is cleared while the transmission is locked in a forward range or reverse (fail-to-range), the transmission will remain in the forward range or reverse after the clearing procedure is completed. N (Neutral) must be manually selected.

5-4. BEGINNING THE TROUBLESHOOTING PROCESS

A. Starting Procedure

NOTE: Review Paragraph 3–5, "Basic Troubleshooting Information" and check fluid level and ignition voltage before any troubleshooting is performed.

- 1. Begin troubleshooting by reading Paragraph 3–5, checking the transmission fluid level, and checking the TCM input voltage. Check for DTCs by using Allison DOC[™] For PC–Service Tool.
 - 2. When a problem exists, but a DTC is not indicated, refer to Section 7—General Troubleshooting Performance Complaint for a listing of various electrical and hydraulic problems, their causes, and remedies.
 - 3. If a DTC is found in the TCM memory, record all available DTC information and failure record data before clearing the DTC (refer to Paragraph 5–3).
 - 4. Test drive the vehicle to confirm a DTC or performance complaint.
 - If the DTC reappears, refer to the DTC paragraph (Paragraph 5–5) and the appropriate DTC table. The DTC section lists DTCs and their description. Locate the appropriate troubleshooting table and follow the instructions.
 - If the DTC does not reappear, it may be an intermittent problem. Use the Allison DOC[™] For PC–Service Tool and the DTC display procedure described in Section 5. Refer to the troubleshooting table for possible causes of the problem.
 - Appendix A deals with the identification of potential circuit problems. Refer to Appendix A if a circuit problem is suspected.

NOTE: Information concerning specific items is contained in the appendices located in the back of this manual. The appendices are referred to throughout the manual.

B. Solenoid Locations

Solenoid locations in the control module are as illustrated in Figure 5–1. Refer to Figure 5–1 as necessary when using the DTC schematics.

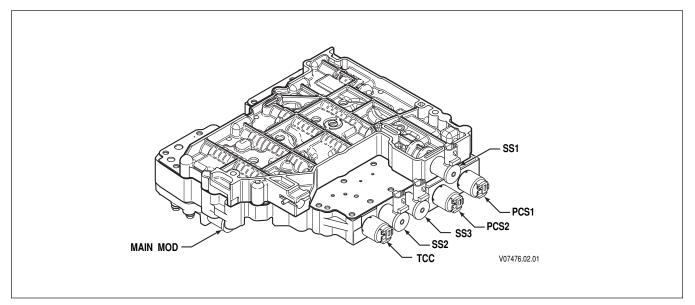


Figure 5–1. Solenoid Locations

C. Wire/Terminal Numbering Scheme

Allison Transmission recommended wire numbers (i.e. 112) consist of three digits, where the first digit indicates the TCM 80-way connector number, and the last two digits indicate the pin-out information (i.e. 12).

D. Available Diagnostic Adapters

Figures 5–2 and 5–3 show the J 47275 TCM Breakout Harness Adapter and J 47278 Transmission Breakout Harness that are available for use with the J 39700 Breakout Box. Figure 5–4 shows the J 47276 "T" Breakout and TCM Reflashing Harness.

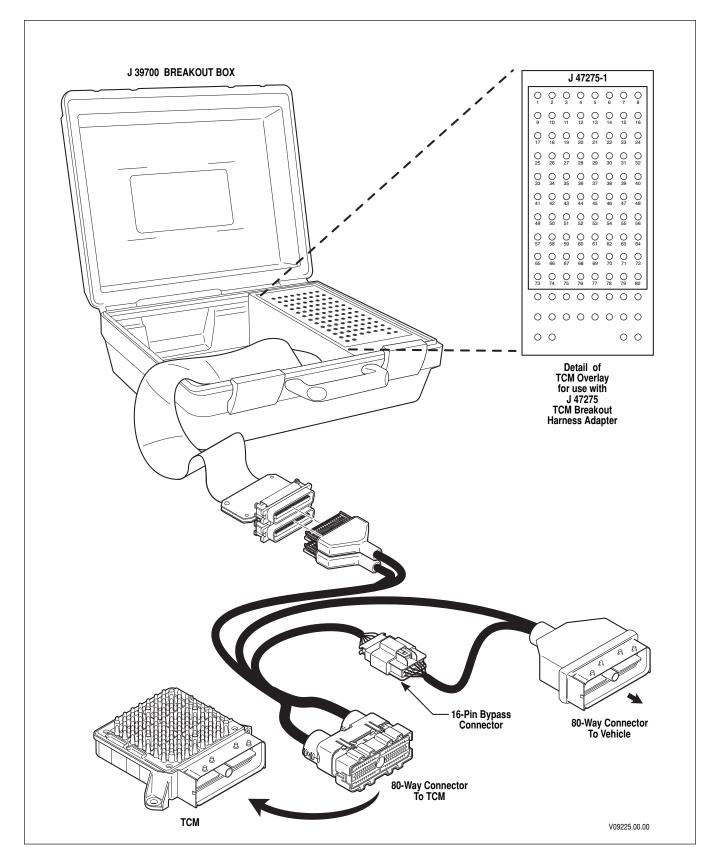


Figure 5–2. J 39700 Breakout Box and J 47275 TCM Breakout Harness Adapter

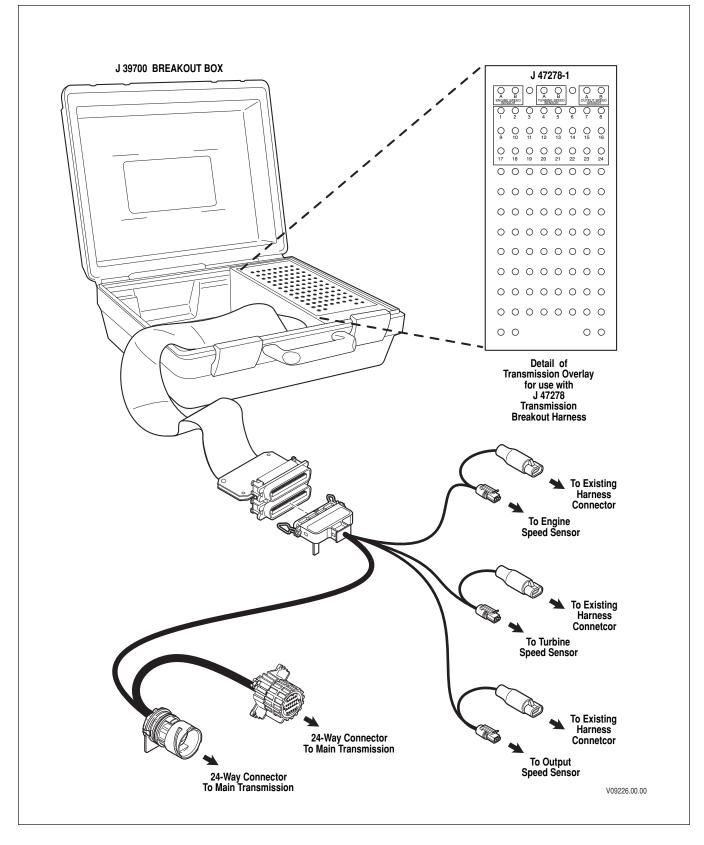


Figure 5–3. J 39700 Breakout Box and J 47278 Transmission Breakout Harness

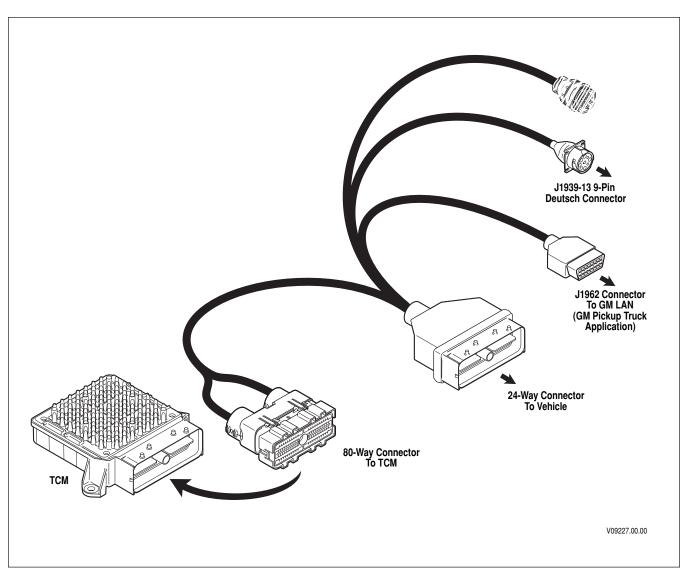


Figure 5–4. J 47276 "T" Breakout and TCM Reflashing Harness

1000 AND 2000 PRODUCT FAMILIES TROUBLESHOOTING MANUAL-ALLISON 4th GENERATION CONTROLS

DIAGNOSTIC TROUBLE CODES (DTC)

NOTES

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TRANSMISSION COMPONENT WIRING DIAGRAMS AND DIAGNOSTICS

5–5. DIAGNOSTIC TROUBLE CODES (DTCs)

Table 5–3. DTC LIST AND DESCRIPTION INDEX

DTC	Description	MIL (ODB II Strategy)	CHECK TRANS Light (Non-ODB II Strategy)	Page
P0122	Pedal Position Sensor Circuit—Low Voltage	—	On	5-19
P0123	Pedal Position Sensor Circuit—High Voltage		On	5-23
P0218	Transmission Fluid Overtemperature	Off	Off	5-27
P0561	System Voltage—Performance	Off	Off	5-30
P0562	System Voltage—Low	Off	Off	5-34
P0563	System Voltage—High	Off	Off	5-37
P0602	TCM Not Programmed	Off	Off	5-40
P0606	TCM Internal—Performance	—	Off	5-41
P0610	TCM Vehicle Options (TransID) Error	Off	On	5-42
P0613	TCM Processor		Off	5-44
P0614	Torque Control Data Mismatch—ECM/TCM		On	5-45
P0634	TCM Internal Temperature Too High	On	Off	5-48
P0658	Actuator Supply Voltage 1 (HSD1)—Low	On	On	5-50
P0659	Actuator Supply Voltage 1 (HSD1)—High (batt)	On	On	5-54
P0701	Transmission Control System—Performance	Off	Off	5-58
P0702	Transmission Control System Electrical (TransID)	Off	On	
P0703	Brake Switch Circuit	Off		5-63
P0706	Transmission Range Sensor Circuit—Performance	On	On	5-66
P0708	Transmission Range Sensor Circuit—High Input	On	On	5-70
P0711	Transmission Fluid Temperature (TFT) Sensor Circuit— Performance	On	Off	5–75
P0712	Transmission Fluid Temperature (TFT) Sensor Circuit— Low Input	On	Off	5-80
P0713	Transmission Fluid Temperature (TFT) Sensor Circuit— High Input	On	Off	5-85
P0716	Turbine Speed Sensor Circuit—Performance	On	On	5-89
P0717	Turbine Speed Sensor Circuit—No Signal	On	On	5-92
P0719	Brake Switch Circuit		Off	5–96
P0721	Output Speed Sensor Circuit—Performance	On	On	5–98
P0722	Output Speed Sensor Circuit—No Signal	On	On	5-102
P0726	Engine Speed Sensor Circuit—Performance	On	Off	5-106
P0727	Engine Speed Sensor Circuit—No Signal	On	Off	5-109
P0729	Incorrect 6th Gear Ratio	On	On	5-112
P0731	Incorrect 1st Gear Ratio	On	On	5-115
P0732	Incorrect 2nd Gear Ratio	On	On	5-118
P0733	Incorrect 3rd Gear Ratio	On	On	5-121
P0734	Incorrect 4th Gear Ratio	On	On	5-124
P0735	Incorrect 5th Gear Ratio	On	On	5-127
P0736	Incorrect Reverse Ratio	On	On	5-130
P0741	Torque Converter Clutch (TCC) System—Stuck Off	On	On	5-133
P0742	Torque Converter Clutch (TCC) System—Stuck On	On	On	5-135

T

Table 5–3. DTC LIST AND DESCRIPTION INDEX (cont'd)

	· · · · · · · · · · · · · · · · · · ·		-	
DTC	Description	MIL (ODB II Strategy)	CHECK TRANS Light (Non-ODB II Strategy)	Page
P0751	Shift Solenoid 1 (SS1) Valve Performance—Stuck Off	On	On	5-137
P0752	Shift Solenoid 1 (SS1) Valve Performance—Stuck On	On	On	5-142
P0756	Shift Solenoid 2 (SS2) Valve Performance—Stuck Off	On	On	5-147
P0757	Shift Solenoid 2 (SS2) Valve Performance—Stuck On	On	On	5-153
P0761	Shift Solenoid 3 (SS3) Valve Performance—Stuck Off	On	On	5-158
P0762	Shift Solenoid 3 (SS3) Valve Performance—Stuck On	On	On	5-164
P0776	Pressure Control Solenoid 2 (PCS2) Stuck Off	On	On	5-170
P0777	Pressure Control Solenoid 2 (PCS2) Stuck On	On	On	5-174
P0826	Up and Down Shift Switch Circuit	Off		5-178
P0827	Up and Down Shift Switch Circuit—Low	Off		5-181
P0828	Up and Down Shift Switch Circuit—High	Off		5-184
P0842	Transmission Pressure Switch 1 (PS1) Circuit—Low	On	On	5-187
P0843	Transmission Pressure Switch 1 (PS1) Circuit—High	On	On	5-192
P0847	Transmission Pressure Switch 2 (PS2) Circuit—Low	On	On	5-197
P0848	Transmission Pressure Switch 2 (PS2) Circuit—High	On	On	5-202
P0872	Transmission Pressure Switch 3 (PS3) Circuit—Low	On	On	5-207
P0873	Transmission Pressure Switch 3 (PS3) Circuit—High	On	On	5-212
P0877	Transmission Fluid Pressure Switch 4 (PS4) Circuit—Low	On	On	5-217
P0878	Transmission Fluid Pressure Switch 4 (PS4) Circuit—High	On	On	5-223
P0880	TCM Power Input Signal	Off	Off	5-229
P0881	TCM Power Input Signal—Performance	Off	On	5-232
P0882	TCM Power Input Signal—Low	Off	On	5-236
P0883	TCM Power Input Signal—High	Off	On	5-239
P0960	Pressure Control Solenoid Main Mod (MAIN MOD) Control Circuit—Open	On	On	5–242
P0962	Pressure Control Solenoid Main Mod (MAIN MOD) Control Circuit—Low	On	On	5–247
P0963	Pressure Control Solenoid Main Mod (MAIN MOD) Control Circuit—High	On	On	5–251
P0964	Pressure Control Solenoid 2 (PCS2) Control Circuit—Open	On	On	5-255
P0966	Pressure Control Solenoid 2 (PCS2) Control—Low	On	On	5-260
P0967	Pressure Control Solenoid 2 (PCS2) Control—High	On	On	5-265
P0972	Shift Solenoid 1 (SS1) Control Circuit—Open	On	On	5-270
P0973	Shift Solenoid 1 (SS1) Control Circuit—Low	On	On	5-275
P0974	Shift Solenoid 1 (SS1) Control Circuit—High	On	On	5-279
P0975	Shift Solenoid 2 (SS2) Control Circuit—Open	On	On	5-284
P0976	Shift Solenoid 2 (SS2) Control Circuit—Low	On	On	5-289
P0977	Shift Solenoid 2 (SS2) Control Circuit—High	On	On	5–294
P0978	Shift Solenoid 3 (SS3) Control Circuit—Open	On	On	5-299
P0979	Shift Solenoid 3 (SS3) Control Circuit—Low	On	On	5-304
P0980	Shift Solenoid 3 (SS3) Control Circuit—High	On	On	5-309
P1688	Unmanaged Engine Torque Delivered to TCM Signal	On	On	5-313
P1779	Engine Torque Delivered to TCM Signal	On	On	5-315

Table 5–3. DTC LIST AND DESCRIPTION INDEX (cont'd)

DTC	Description	MIL (ODB II Strategy)	CHECK TRANS Light (Non-ODB II Strategy)	Page
P1891	Throttle Position Sensor (TPS) PWM Signal—Low Input		Off	5-318
P1892	Throttle Position Sensor (TPS) PWM Signal—High Input	—	Off	5-321
P2637	Torque Management Feedback Signal—SEM	—	On	5-324
P2641	Torque Management Feedback Signal—LRTP	—	On	5-326
P2670	Actuator Supply Voltage 2 (HSD2)—Low	On	On	5-329
P2671	Actuator Supply Voltage 2 (HSD2)—High (batt)	On	On	5-333
P2723	Pressure Control Solenoid 1 (PCS1)—Stuck Off	On	On	5-338
P2724	Pressure Control Solenoid 1 (PCS1)—Stuck On	On	On	5-341
P2727	Pressure Control Solenoid 1 (PCS1) Control Circuit—Open	On	On	5-344
P2729	Pressure Control Solenoid 1 (PCS1) Control Circuit—Low	On	On	5-349
P2730	Pressure Control Solenoid 1 (PCS1) Control Circuit—High	On	On	5-354
P2761	TCC PCS Control Circuit—Open	On	On	5-359
P2763	TCC PCS Control Circuit—High	On	On	5-364
P2764	TCC PCS Control Circuit—Low	On	On	5-369
P2771	4-Wheel Drive Lo Switch Circuit	Off		5-374
U0010	CAN 1 Bus Reset Counter Overrun	On	Off	5-378
U0073	CAN 2 Bus Reset Counter Overrun	On	Off	5-382
U0100	Lost Communication with ECM/PCM (CAN 2)	Off	Off	5-386
U0115	Lost Communication with ECM/PCM (CAN 1)	Off	Off	5-391
U1016	Class 2 Powertrain Controller State of Health Failure	Off	Off	5-396
U1041	Class 2 Anti-lock Brake Controller (ABS) State of Health	Off	Off	5-399
U1064	Class 2 Truck Body Controller (TBC) State of Health	Off	Off	5-402
U1096	Class 2 Instrument Panel Controller (IPC) State of Health	Off	Off	5-405
U1300	Serial Data Communication Link Low (Class 2)	Off	Off	5-408
U1301	Serial Data Communication Link High (Class 2)	Off	Off	5-411

DTC REFERENCE TABLES

Table 5–4. Gear Ratio

Range	Close Ratio	Wide Ratio		
1	3.10:1	3.51:1		
2	1.81:1	1.90:1		
3	1.41:1	1.44:1		
4	1.00:1	1.00:1		
5	0.71:1	0.74:1		
6	0.61:1	N/A		
R	-4.49:1	-5.09:1		

Table 5–5. Main Pressure Schedule

Range	Main Pressure @ 600 rpm	Main Pressure @ 2100 rpm
Forward/Reverse Converter with Main Mod Active (viewable in Allison DOC TM)	590–720 kPa (85–105 psi)	634–758 kPa (92–110 psi)
Forward Converter with Main Mod Inactive	700–1380 kPa (101–200 psi)	1515–1795 kPa (220–260 psi)
Forward Lockup with Main Mod Active*		510–627 kPa (74–91 psi)
Forward Lockup with Main Mod Inactive*		1000–1170 kPa (145–170 psi)
Neutral/Park with Main Mod Active	590–720 kPa (85–105 psi)	
Neutral/Park with Main Mod Inactive	800–1655 kPa (130–240 psi)	1515–1795 kPa (220–260 psi)
* Medium duty gasoline engines only.		

Table 5–6. Allison DOC[™] For PC–Service Tool Internal Mode Switch (IMS) Status

	Selector	Α	В	С	Р	Neutral Start		
		Р		OFF	ON	ON	OFF	ON
		R		OFF	OFF	ON	ON	OFF
		Ν		ON	OFF	ON	OFF	ON
D	5	5	5	ON	OFF	OFF	ON	OFF
*M	3	4	4	OFF	OFF	OFF	OFF	OFF
1	2	2	3	OFF	ON	OFF	ON	OFF
Blocked	1	1	1	ON	ON	OFF	OFF	OFF

When using a DVOM to check the IMS switch status of A, B, C, and P switches, note that the physical switch states are the opposite of Allison DOCTM For PC–Service Tool status shown above.

When using a DVOM to check the switch sate of Neutral Start (NS), the switch state will be the same as the Allison DOC[™] For PC–Service Tool status shown above.

The IMS Switch has four positions available in forward. Therefore, one range position will be omitted at the selector. The omitted position can be 2^{nd} , 3^{rd} , or 4^{th} , depending upon chosen calibration.

*M mode allows tap-up tap-down feature functionally between 1st through 6th ranges.

		Clutch to							
Steady State	Upshifts	Main	PCS1	PCS2	SS1	SS2	SS3	тсс	Main Mod
R Steady State with Throttle			OFF; C3 Applied	ON; C5 Applied	ON	ON	ON	OFF	OFF/ON Solenoid Status is Calibration Dependent on Engine, Turbine, Output, and other factors
*R Steady State at Closed Throttle	R		OFF; C5 Applied	ON; C3 Applied	OFF	ON	ON	OFF	ON
	R–N		ON; C3 Exhausting	ON; C5 Applied	OFF	ON	ON	OFF	
	N–R		OFF; C3 Trimming on		ON	ON	ON	OFF	_
Ν			OFF; C5 Applied	OFF; — Exhausted	ON	ON	ON	OFF	ON at closed throttle
	N-1		OFF; C5 Applied	ON; C1 Trimming on	ON	ON	ON	OFF	
	1-N		OFF; C5 Applied	OFF; — Exhausted	ON	ON	ON	OFF	_
1		C1	OFF; C5 Applied	OFF; C4 Exhausted	OFF	ON	OFF	OFF	ON at closed throttle
	1–2	C1	ON; C5 Exhausting	ON; C4 Trimming on	OFF	ON	OFF	OFF	
	2-1	C1	OFF; C5 Trimming on		OFF	ON	OFF	OFF	
2		C1	ON; C3 Exhausted	ON; C4 Applied	OFF	OFF	OFF	ON; dependent on output speed	Vocation Dependent
	2–3	C1	OFF; C3 Trimming on	OFF; C4 Exhausting	OFF	OFF	OFF	ON	
	3–2	C1	ON; C3 Exhausting	ON; C4 Trimming on	OFF	OFF	OFF	ON	
3		C1	OFF; C3 Applied	OFF; C2 Exhausted	ON	OFF	OFF	ON	Vocation Dependent
	3–4	C1	ON; C3 Exhausting	ON; C2 Trimming on	ON	OFF		ON	
	4–3	C1	OFF; C3 Trimming on	-	ON	OFF	OFF	ON	
4		C2	ON; C3 Exhausted	ON; C1 Applied	ON	OFF	ON	ON	Vocation Dependent
	4–5	C2	OFF; C3 Trimming on	-	ON	OFF	ON	ON	
	5–4	C2	ON; C3 Exhausting	OFF; C1 Trimming on	ON	OFF	ON	ON	
5		C2	OFF; C3 Applied	OFF; C4 Exhausted	OFF	OFF	ON	ON	Vocation Dependent
	5-6	C2	ON; C3 Exhausting	ON; Trimming on	OFF	OFF	ON	OB	

Table 5–7. Solenoid and Clutch Apply

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		Clutch							
Steady State	Upshifts	to Main	PCS1	PCS2	SS1	SS2	SS3	тсс	Main Mod
	6–5	C2	OFF;	OFF;	OFF	OFF	ON	ON	
			Trimming on	Trimming					
				off					
6		C2	ON;	ON;	OFF	OFF	ON	ON	Vocation
			C4 Applied	C4 Applied					Dependent
* The following	g throttle dep	endent cor	nditions occur ir	n reverse range:					
At closed three	ottle (Idle) SS	S1 is OFF,	PCS1 controls	C5 clutch, PCS2	2 contro	ls C3 cl	utch.		
Above 20 per	Above 20 percent throttle* SS1 is ON, PCS1 controls C3, PCS2 controls C5.								
Under 10 per	cent throttle*	TCM rev	erts back to the	close throttle (Id	ile) sch	edule.			

Table 5–7. Solenoid and Clutch Apply (cont'd)

Table 5–8. Pressure Switch Status

	(N/O)			(N/O)		(N/O)	(N/C)		
	PS1		PS2			PS3	PS4		
Range	Switch Allison DOC™ Status Status		Switch Status	Allison DOC™ Status	Switch Allison DOC™ Status Status		Switch Status	Allison DOC™ Status	
R	Open	OFF*	Closed	ON	Closed	ON	Closed	ON	
Ν	Closed	ON	Closed	ON	Closed	ON	Open	OFF	
1	Open	OFF	Closed	ON	Open	OFF	Open	OFF	
2	Open	OFF	Open	OFF	Open	OFF	Open	OFF	
3	Closed	ON	Open	OFF	Open	OFF	Open	OFF	
4	Closed	ON	Open	OFF	Closed	ON	Open	OFF	
5	Open	OFF	Open	OFF	Closed	ON	Open	OFF	
6**	Open	OFF	Open	OFF	Closed	ON	Open	OFF	

N/O = Normally Open, N/C = Normally Closed

PS1 reverts to the CLOSED/ON state with throttle applied in reverse.

** For use in GM pickup truck application only.

Sump Temperature		тсо	C, PCS1, PCS2	2 (Ω)	SS1, SS2, SS3, MAIN MOD ($oldsymbol{\Omega}$)			
(°C)	(°F)	Minimum	Nominal	Maximum	Minimum	Nominal	Maximum	
-65	-85	3.23	3.36	3.50	13.98	14.65	15.32	
-40	-40	3.71	3.86	4.01	16.05	16.81	17.58	
-30	-22	3.90	4.06	4.22	16.87	17.68	18.48	
-20	-4	4.09	4.26	4.42	17.70	18.54	19.38	
-10	14	4.28	4.45	4.63	18.52	19.41	20.29	
0	32	4.47	4.65	4.84	19.35	20.27	21.19	
10	50	4.66	4.85	5.04	20.17	21.14	22.10	
20	68	4.85	5.05	5.25	21.00	22.00	23.00	
30	86	5.04	5.25	5.46	21.83	22.86	23.90	
40	104	5.23	5.45	5.66	22.65	23.73	24.81	
50	122	5.42	5.65	5.87	23.48	24.59	25.71	
60	140	5.61	5.84	6.08	24.30	25.46	26.62	
70	158	5.80	6.04	6.28	25.13	26.32	27.52	
80	176	5.99	6.24	6.49	25.95	27.19	28.42	
90	194	6.18	6.44	6.69	26.78	28.05	29.33	
100	212	6.37	6.64	6.90	27.60	28.92	30.23	
110	230	6.57	6.84	7.11	28.43	29.78	31.14	
120	248	6.76	7.03	7.31	29.25	30.65	32.04	
130	266	6.95	7.23	7.52	30.08	31.51	32.94	
140	284	7.14	7.43	7.73	30.90	32.38	33.85	
150	302	7.33	7.63	7.93	31.73	33.24	34.75	
160	320	7.52	7.83	8.14	32.55	34.10	35.65	
165	329	7.61	7.93	8.24	32.97	34.54	36.11	

Table 5–9. Calculated Solenoid Resistance vs. Temperature

T

Temperature		Resistance			
(°C)	(°F)	Minimum (Ω)	Minimum (Ω) Nominal (Ω)		
-25	-13	1929	2143	2358	
0	32	2157	2397	2637	
25	77	2340	2600	2860	
50	122	2614	2904	3195	
75	167	2842	3158	3474	
100	212	3071	3412	3753	
125	257	3299	3666	4032	
150	302	3483	3870	4257	

Table 5–10. Speed Sensor vs. Temperature

Table 5–11. Transmission Fluid Temperature (TFT) Sensor Resistance vs. Temperature

Temperature			Resistance		
(°C)	(°F)	Minimum (Ω)	Nominal (Ω)	Maximum (Ω)	
-45	-49	128 565	141 951	155 338	
-40	-40	95 826	100 735	105 644	
-35	-31	68 952	72 315	75 679	
-30	-22	50 153	52 480	54 807	
-25	-13	36 854	38 478	40 103	
-20	-4	27 345	28 488	29 631	
-15	5	20 476	21 286	22 097	
-10	14	15 467	16 045	16 624	
-5	23	11 781	12 197	12 612	
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	

Temperature			Resistance		
(°C)	(°F)	Minimum (Ω)	Nominal (Ω)	Maximum (Ω)	
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	
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	100.88	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	

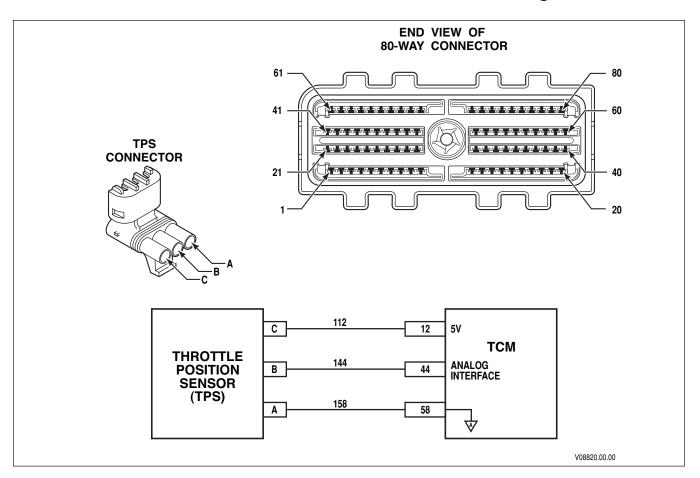
mm	Volts
0	0
1	0.110
2	0.220
3	0.329
4	0.439
5	0.549
6	0.659
7	0.768
8	0.878
9	0.988
10	1.098
11	1.207

mm	Volts
12	1.317
13	1.427
14	1.537
15	1.646
16	1.756
17	1.866
18	1.976
19	2.085
20	2.195
21	2.305
22	2.415
23	2.524

,			
mm	Volts		
24	2.634		
25	2.744		
26	2.854		
27	2.964		
28	3.073		
29	3.183		
30	3.293		
31	3.403		
32	3.512		
33	3.622		
34	3.732		
35	3.842		

mm	Volts
36	3.951
37	4.061
38	4.171
39	4.281
40	4.390
41	4.500
42	4.610
43	4.720
44	4.829
45	4.939
46	5.049

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DTC P0122 Pedal Position Sensor Circuit—Low Voltage

Circuit Description

The Transmission Control Module (TCM) receives input on throttle position from either a Throttle Position Sensor (TPS) or a signal transmitted by the engine electronic controls.

Vehicles not equipped with electronically-controlled engines have a TPS attached to the engine fuel control linkage. The TPS continuously sends the exact throttle position to the transmission TCM.

The TPS is a sliding resistor sensor (potentiometer) actuated by a mechanical linkage. The TCM delivers a constant voltage to one terminal of the TPS resistive strip. The other TPS terminal connects to ground. The resistor contacts of the TPS are connected to provide a regulated voltage signal input to the TCM.

When actuated by the mechanical throttle cable, the contacts of the resistor move along the resistive strip. As the contacts slide along the resistive strip, a voltage is sent to the TCM. At each increment of 0.178 mm (0.007 inch) along the resistive strip, the contacts deliver a different voltage to the TCM. The different voltages are interpreted as throttle sensor movement. The TCM converts travel distance (mm) into throttle opening percentage.

Conditions for Running the DTC

- The components are powered and ignition voltage is greater than 9V and less than 18V (12V TCM) or greater than 18V and less than 32V (24V TCM).
- DTC P0123 Pedal Position Sensor Circuit—High Voltage is not active.

Conditions for Setting the DTC

DTC P0122 sets when the TCM detects a throttle position sensor voltage less than 0.55V for 5 seconds.

Action Taken When the DTC Sets

- DTC P0122 is stored in the TCM history.
- The TCM uses the default throttle value, based on engine torque and speed.
- The TCM freezes shift adapts (DNA).
- The TCM inhibits TCC engagement.
- The CHECK TRANS light illuminates (Non-OBD II Strategy).

Conditions for Clearing the DTC/CHECK TRANS Light

Allison DOCTM For PC–Service Tool can be used to clear the DTC from the TCM history. The TCM automatically clears the DTC from the TCM history if the vehicle completes 40 warm-up cycles without the DTC recurring.

Diagnostic Aids

- Inspect the wiring for poor electrical connections at the TCM. Look 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 circuit condition, massage the wiring harness while watching the test equipment for a change.
- You may have to drive the vehicle in order to experience a fault.

Test Description

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

- 2. This step tests for the proper ignition voltage.
- 3. This step tests for the proper reference voltage from TCM.
- 4. This step tests shorting condition or opens in TPS harness.
- 5. This step tests for proper TPS adjustment.
- 6. This step tests for internal TPS intermittent shorts or open conditions.

DTC P0122 Pedal Position Sensor Circuit—Low Voltage

Step	Action	Value(s)	Yes	No
1	Was the Beginning the Troubleshooting Process (refer to Section 5–4) performed?		Go to Step 2	Go to Beginning the Troubleshooting Process (Section 5–4)
2	 Install Allison DOC[™]. Start the engine. Record the DTC Failure Record data. Using Allison DOC[™], measure ignition voltage. Is voltage within the specified value? 	9–18V (12V TCM) 18–32V (24V TCM)	Go to Step 3	Resolve voltage problem (Refer to DTC P0562 and P0563)
3	 Turn the ignition OFF. Disconnect the 80-way connector from the TCM and install J39700 Breakout Box and J 47275 TCM Breakout at the TCM. (To perform the following test the 16 pin bypass connector located on J 47275 TCM Breakout must be disconnected.) With the engine OFF turn the ignition to the RUN position. Using a digital volt/ohmmeter (DVOM), measure the voltage at pins 12 and 58. Is the voltage within the specified value? 	4.75–5.0V	Go to Step 4	Go to Step 10
4	 With the J 39700 Breakout Box and J 47275 TCM Breakout installed as in Step 3, reconnect the 16 pin breakout connector. With the engine OFF turn the ignition to the RUN position. Using a DVOM, measure the voltage at pins 12 and 58. Is the voltage reading within specified value? 	4.75–5.0V	Go to Step 5	Go to Step 7
5	 With the J 39700 Breakout box and J 47275 TCM Breakout installed as in Step 4, refer to Appendix F, Section B. Using a DVOM, measure the voltage at pins 44 and 58. Perform a voltage reading at Idle and full throttle. Is the voltage reading at Idle and Full Throttle within the specified value? 	Idle > 0.98 volts Full Throttle < 3.921 volts	Go to Step 6	Go to Step 8
6	 With the engine OFF and the ignition in the ON position, measure the voltage at pins 44 and 58. Slowly increase the throttle from Idle to Full throttle. The increase in voltage should be steady, without dropouts, as throttle is increased. Was the voltage steady? 		Go to Diagnostic Aids	Go to Step 9

DTC P0122 Pedal Position Sensor Circuit—Low Voltage (cont'd)

Step	Action	Value(s)	Yes	No
7	With the J 39700 Breakout Box and J 47275 TCM Breakout unplugged at the TCM and the TPS connector unplugged at the TPS, use a jumper wire between pins A, B, and C. Using a DVOM at J 39700 Breakout Box check the TPS harness continuity at pin locations 112, 144, and 158. Were there any opens or short between the three wires?		Go to Step 8	Go to Step 9
8	Repair the wiring harness (refer to OEM wiring harness repair procedure). Is the repair complete?		Go to Step 11	
9	Replace the (TPS) throttle position sensor. Is the repair complete?		Go to Step 11	
10	<i>NOTE:</i> In most cases, the TCM is not at fault. Investigate thoroughly before replacing the TCM. Refer to TCM diagnostic procedure (Section 3–6). Is Section 3–6 complete?		Go to Step 11	
11	In order to verify your repair:1. Clear the DTC.2. Operate the vehicle under normal driving conditions.Did the DTC return?		Begin the diagnosis again. Go to Step 1	System OK