

2004 4T80-E transmission TRANSMISSION DIAGNOSTIC PARAMETERS

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SENSED PARAMETER	FAULT CODE	ACCEPTABLE OPERATING RANGE and RATIONALITY	PRIMARY MALFUNCTION DETECTION PARAMETERS	SECONDARY MALFUNCTION PARAMETERS and CONDITIONS	TIME LENGTH and FREQUENCY	DTC TYPE A (MIL), B (MIL NIC), C (No MIL)
Vehicle Speed Sensor: Low Input	P0502	Detects no vehicle speed when vehicle has large turbine speed in a [Drive] range.	Raw OSS \leq 90 RPM NOTE: Raw OSS = OSS/FDR	No TOSS, TISS, or TransTPS DTC s No Engine Torque default 450 \leq Engine RPM \leq 7500 for 5.0 sec. 1000 \leq ISS \leq 5000 RPM TPS \geq 12.0% 60.0 N-m \leq Engine Torque \leq 395.0 N-m 8.0 \leq System Voltage \leq 18.0	\geq 3.0 sec. Continuous	Type B Fault active
Vehicle Speed Sensor Circuit Intermittent/Erratic	P0503	Detects unrealistically large Δ VSS with no gear range change.	Drop in raw OSS \geq 350 RPM loop-to-loop	No TOSS, TISS, or TransTPS DTC s No Engine Torque default 450 \leq Engine RPM \leq 7500 for 5.0 sec Last manual range change \geq 6.0 sec Raw OSS $>$ 400 \geq 2.0 sec $+\Delta$ OSS \leq 500 \geq 2.0 sec Δ ISS, loop-to-loop, \leq 500 for \geq 4.8 sec	\geq 1.0 sec Continuous	Type B Fault Active
Transmission Temperature Sensor (TTS) Circuit: Range/Performance	P0711	Detects an unrealistically large change in TTS or value which remains constant for a period of time in which a measurable change is expected.	<u>Fail Cases 1 & 2</u> TTS has changed \leq 2.0° C (absolute value) since start. <u>Fail Case 3</u> TTS changes \geq 20.0° C loop-to-loop (absolute value)	<u>Fail Cases 1 & 2</u> No ECT, TOSS, or TISS DTCs P0711 \neq PASS this ignition cycle 8.0 {A} \leq System Voltage \leq 18.0 450 \leq Engine Speed \leq 7500 RPM \geq 5.0 sec -38° C. \leq TTS \leq 143° C. <u>Fail Case 1</u> Coolant Temp \geq 70° C. \geq 5.0 sec start-up delay TCC Slip \geq 120 RPM cumul. for \geq 900 sec. Δ Coolant Temp \geq 50° C. since start -38° C. \leq TTS at start \leq 21° C. Veh Spd \geq 8.0 kph cumul. \geq 900 sec. \geq 1 this ign cycle <u>Fail Case 2</u> Coolant Temp \geq 70° C. Δ Coolant Temp \geq 50° C. since start \geq 5.0 sec start-up delay TCC Slip \geq 120 RPM cumul. for \geq 900 sec. 129° C. \leq TTS at start \leq 143° C. Veh Spd \geq 8.0 kph cumul. \geq 900 sec. <u>Fail Case 3</u> 8.0 \leq System Voltage \leq 18.0 450 \leq Engine Speed \leq 7500 RPM \geq 5.0 sec.	<u>Fail Case 1</u> 100.0 sec. <u>Fail Case 2</u> 100.0 sec. continuous <u>Fail Case 3</u> in 200 msec & occurs \geq 14 times in 7 sec.	Type C Fault Active
Transmission Temperature Sensor Circuit: Low Input	P0712	Detects continuous short to GND in TTS signal ckt/sensor	TTS \geq 149° C.	No TransTemp DTCs 8.0 \leq System Voltage \leq 18.0 450 \leq Engine RPM \leq 7500 \geq 5.0 sec.	\geq 10.0 sec Continuous	Type C Fault Active
Transmission Temperature Sensor Circuit: High Input	P0713	Detects continuous open/short to high in TTS signal ckt/sensor	TTS \leq -39.5° C.	No TOSS, TISS, or TranTemp DTCs 8.0 \leq System Voltage \leq 18.0 450 \leq Engine RPM \leq 7500 \geq 5.0 sec. OSS \geq 200 RPM \geq 300 sec. , cumulative TCC slip \geq 50 RPM \geq 400 sec. , cumulative	\geq 6.0 sec Continuous	Type C Fault Active

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Input/Turbine Speed Sensor Circuit Range/Performance	P0716	Detects large Δ ISS	Raw ISS drops \geq 1000 RPM , loop-to-loop	No TOSS, No SSP (Shift Solenoid Perf.), No SSE (Shift Solenoid Elect.), No TISS, No TransTPS DTCs 450 \leq Engine RPM \leq 7500 \geq 5.0 sec. TPS \geq 12.0% Vehicle speed \geq 16.0 kph Raw ISS > 1050 RPM {F} \geq 2.0 sec. Raw + Δ ISS \leq 500 \geq 2.0 sec. 8.0 \leq System Voltage \leq 18.0	\geq 1.0 sec Continuous	Type B Fault Active
Input/Turbine Speed Sensor Circuit: No Signal	P0717	Detects low ISS for large Vehicle Speed	Raw ISS \leq 50 RPM	No TOSS, DTCs 450 \leq Engine RPM \leq 7500 \geq 5.0 sec Vehicle Speed \geq 16.0 kph 8.0 \leq System Voltage \leq 18.0	\geq 6.0 sec. Continuous	Type B Fault Active
Torque Converter Clutch Stuck OFF	P0741	Detects high torque converter slip when TCC commanded on.	TCC Slip \geq KiTCCD_n_StuckOffFailLimit table RPM	No VSS, No TOSS, No TCC Elec, No SSP (Shift Solenoid Perf) No SSE (Shift Solenoid Elect), No TISS, No TransTPS DTCs 2nd, 3rd or 4th gear ratio observed Transmission Range = D4, D3, or D2 TCC Mode = ON or LOCKED 450 \leq Engine RPM \leq 7500 \geq 5.0 sec. 10.0% \leq TPS \leq 50.0% TCC capacity \geq 0 \geq 5.0 sec. TCC pressure \geq 450 kPa \geq 5.0 sec. 20.0° C. \leq TTS \leq 133.0° C. Last manual range change \geq 6.0 sec. 43.0 N-m \leq Engine Torque \leq 215 N-m	\geq 5.0 sec. Fail test counter = 1	Type B Fault Active
Torque Converter Clutch Stuck ON	P0742	Detects low converter slip when TCC commanded OFF	-20 \leq TCC Slip \leq 150	No VSS, No TOSS, No TCC Elec, No SSP (Shift Solenoid Perf) No SSE (Shift Solenoid Elect), No TISS, No TransTPS DTCs TCC off D4 range indicated, not in 1st gear 450 \leq Engine RPM \leq 7500 \geq 5.0 sec. 20.0% \leq TPS \leq 90.0% 20.0° C. \leq TTS \leq 133.0° C. 155 N-m \leq Engine Torque \leq 294 N-m 500 \leq Engine RPM \leq 5500 16.0 kph \leq Vehicle Speed \leq 130.0 kph 0.65 \leq Diag Trans Ratio \leq 1.05	\geq 4.5 sec. Fail test counter = 2	Type B Fault Active
Shift Solenoid A Stuck Off	P0751	Detects 2-2-3-3 shift pattern (Stuck OFF)	<u>Fail Case 1</u> Commanded Gear = 1 1.54 \leq Diag Trans Ratio \leq 1.71 <u>Fail Case 2</u> Commanded Gear = 4 0.95 \leq Diag Trans Ratio \leq 1.05 Valve stuck count = 2 (1 & 2) = TRUE Fails	No TOSS, No TISS, No TransTPS, No TCC, No SSE (Shift Solenoid Elect), DTCs No Engine Torque Default Transmission range = D4, D3, D2, or D1 450 \leq Engine RPM \leq 7500 \geq 5.0 sec. {C} 20.0° C. \leq TTS \leq 133.0° C. Vehicle speed \geq 8.0 kph TPS \geq 7.5% 80.0 N-m \leq Engine Torque \leq 395 N-m	<u>Fail Case 1</u> \geq 1.5 sec. <u>Fail Case 2</u> \geq 4.0 sec. Continuous	Type B Fault Active

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Shift Solenoid A Stuck On	P0752	Detects 1-1-4-4 shift pattern (Stuck ON)	<u>Fail Case 1</u> Commanded Gear = 2 $2.87 \leq \text{Diag Trans Ratio} \leq 3.11$ <u>Fail Case 2</u> Commanded Gear = 3 $0.65 \leq \text{Diag Trans Ratio} \leq 0.71$ Valve stuck count = 2 (1 & 2) = TRUE Fails	No TOSS, No TISS, No TransTPS, No TCC, No SSE (Shift Solenoid Elect), DTCs No Engine Torque Default Transmission range = D4, D3, D2, or D1 $450 \leq \text{Engine RPM} \leq 7500 \geq 5.0 \text{ sec.}$ $20.0^\circ \text{ C.} \leq \text{TTS} \leq 133.0^\circ \text{ C.}$ Vehicle speed $\geq 8.0 \text{ kph}$ TPS $\geq 7.5\%$ $80.0 \text{ N-m} \leq \text{Engine Torque} \leq 395 \text{ N-m}$	<u>Fail Case 1</u> $\geq 2.0 \text{ sec.}$ <u>Fail Case 2</u> $\geq 4.0 \text{ sec.}$	Type B Fault Active Continuous
Shift Solenoid B Stuck On	P0756	Detects 4-3-3-4 shift pattern (Stuck ON)	<u>Fail Case 1</u> Commanded Gear = 1 $0.65 \leq \text{Diag Trans Ratio} \leq 0.71$ <u>Fail Case 2</u> Commanded Gear = 2 $0.95 \leq \text{Diag Trans Ratio} \leq 1.05$ Stuck-on count = 2 (1 & 2) = TRUE Fails	No TOSS, No TISS, No TransTPS, No TCC, No SSE (Shift Solenoid Elect), DTCs No Engine Torque Default Transmission range = D4, D3, D2, or D1 $450 \leq \text{Engine RPM} \leq 7500 \geq 5.0 \text{ sec.}$ $20.0^\circ \text{ C.} \leq \text{TTS} \leq 133.0^\circ \text{ C.}$ Vehicle speed $\geq 8.0 \text{ kph}$ $10.0\% \leq \text{TPS} \leq 100\%$ $80.0 \text{ N-m} \leq \text{Engine Torque} \leq 395 \text{ N-m}$	<u>Fail Case 1</u> $\geq 1.0 \text{ sec.}$ <u>Fail Case 2</u> $\geq 0.5 \text{ sec.}$ Continuous	Type A Fault Active Continuous
Shift Solenoid B Stuck Off	P0757	Detects 1-2-2-1 shift pattern (Stuck OFF)	<u>Fail Case 1</u> Commanded Gear = 3 $1.54 \leq \text{Diag Trans Ratio} \leq 1.71$ <u>Fail Case 2</u> Commanded Gear = 4 $2.87 \leq \text{Diag Trans Ratio} \leq 3.11$ Stuck-off count = 2 (1 & 2) = TRUE Fails	No TOSS, No TISS, No TransTPS, No TCC, No SSE (Shift Solenoid Elect), DTCs No Engine Torque Default Transmission range = D4, D3, D2, or D1450 \leq $\text{Engine RPM} \leq 7500 \geq 5.0 \text{ sec.}$ $20.0^\circ \text{ C.} \leq \text{TTS} \leq 133.0^\circ \text{ C.}$ Vehicle speed $\geq 8.0 \text{ kph}$ TPS $\geq 10.0\%$ FC1: $80.0 \text{ N-m} \leq \text{Engine Torque} \leq 395 \text{ N-m}$ FC2: $10.0 \text{ N-m} \leq \text{Engine Torque} \leq 395 \text{ N-m}$	<u>Fail Case 1</u> $\geq 3.0 \text{ sec.}$ <u>Fail Case 2</u> $\geq 2.0 \text{ sec.}$ Continuous	Type A Fault Active Continuous
Internal Mode Switch Mode A Circuit Low	P1820	Mode A circuit = 0 V when should be 12	Mode A has always been LOW In [Park] $\geq 2.0 \text{ sec.}$ {G}, then later in [Transitional_1] $\geq 5.0 \text{ sec.}$	No Engine Torque default $450 \text{ {A}} \leq \text{Engine RPM} \leq 7500 \text{ {B}} \geq 5.0 \text{ sec.}$ {C} $8.0 \text{ {D}} \leq \text{System Voltage} \leq 18.0 \text{ {E}}$ $40.0 \text{ N-m {H}} \leq \text{Engine Torque} \leq 200 \text{ N-m {I}}$	Fail count = 1	Type B Fault Active
Internal Mode Switch Mode B Circuit High	P1822	Mode B circuit = 12 V when should be 0	Mode B has always been HIGH (12 V) In [Park] $\geq 2.0 \text{ sec.}$ {G}, then [Transitional_13] $\geq 5.0 \text{ sec.}$ {J}	No Engine Torque default $450 \text{ {A}} \leq \text{Engine RPM} \leq 7500 \text{ {B}} \geq 5.0 \text{ sec.}$ {C} $8.0 \text{ {D}} \leq \text{System Voltage} \leq 18.0 \text{ {E}}$ $40.0 \text{ N-m {H}} \leq \text{Engine Torque} \leq 200 \text{ N-m {I}}$	Fail count = 1	Type B Fault Active
Internal Mode Switch Mode P Circuit Low	P1823	Mode P circuit = 0 V when should be 12	Mode P has always been LOW (0 V) In [Park] $\geq 2.0 \text{ sec.}$ {G}, then [Transitional_8] $\geq 5.0 \text{ sec.}$ {J}	No Engine Torque default $450 \text{ {A}} \leq \text{Engine RPM} \leq 7500 \text{ {B}} \geq 5.0 \text{ sec.}$ {C} $8.0 \text{ {D}} \leq \text{System Voltage} \leq 18.0 \text{ {E}}$ $40.0 \text{ N-m {H}} \leq \text{Engine Torque} \leq 200 \text{ N-m {I}}$	Fail count = 1	Type B Fault Active
Transmission Range Sensor Malfunction	P1825	Range Switch = Illegal (PRNDL code =15)	Mode Switches A, B, and C are OPEN; Mode Switch P is shorted to power	$450 \text{ {A}} \leq \text{Engine RPM} \leq 7500 \text{ {B}} \geq 5.0 \text{ sec.}$ {C} $8.0 \text{ {D}} \leq \text{System Voltage} \leq 18.0 \text{ {E}}$	Illegal state $\geq 5.0 \text{ sec.}$	Type B Fault Active
Shift Solenoid A: Open/Short to GND	P1842/P0973	Detects cont. open or short to GND in SSA ckt/sensor	Shift Solenoid A short to ground bit is set OR (solenoid commanded ONn AND open bit is set)	$450 \text{ {A}} \leq \text{Engine RPM} \leq 7500 \text{ {B}} \geq 5.0 \text{ sec.}$ {C} $8.0 \text{ {D}} \leq \text{System Voltage} \leq 18.0 \text{ {E}}$ High Side Driver 2 enabled	Fail test = TRUE 43 times of possible 50	Type B Fault Active

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Shift Solenoid A Short to Power	P1843/P0974	Detects cont. short to 12 V in SSA ckt/sensor	Shift Solenoid A short to power bit is set	Shift Solenoid A commanded ON 450 {A} ≤ Engine RPM ≤ 7500 {B} ≥ 5.0 sec. {C} 8.0 {D} ≤ System Voltage ≤ 18.0 {E} High Side Driver 2 enabled	Fail test = TRUE 43 times of possible 50	Type B Fault Active
Shift Solenoid B Open/Short to GND	P1845/P0976	Detects cont. open/short to GND in SSB ckt/sensor	Shift Solenoid B short to ground bit is set OR (solenoid commanded ON and open bit is set)	450 {A} ≤ Engine RPM ≤ 7500 {B} ≥ 5.0 sec. {C} 8.0 {D} ≤ System Voltage ≤ 18.0 {E} High Side Driver 2 enabled	Fail test = TRUE 43 times of possible 50	Type A Fault Active
Shift Solenoid B Short to Power	P1847/P0977	Detects cont. short to 12 V in SSB ckt/sensor	Shift Solenoid B short to power bit is set	Shift Solenoid B commanded ON 450 {A} ≤ Engine RPM ≤ 7500 {B} ≥ 5.0 sec. {C} 8.0 {D} ≤ System Voltage ≤ 18.0 {E} High Side Driver 2 enabled	Fail test = TRUE 43 times of possible 50	Type A Fault Active
Torque Converter Clutch Pulse Width Modulator Solenoid Electrical	P1860/P1887	Detects cont. open/short to GND in TCC PWM ckt/sensor	TCC solenoid short to ground, open, or short to power	8.0 {A} ≤ System Voltage ≤ 18.0 {B} 450 {C} ≤ Engine RPM ≤ 7500 {D} ≥ 5.0 sec. {E} Solenoid DC ≤ 10.0% {F} or ≥ 90.0% {G} High Side Driver 2 enabled	Fail test = TRUE 43 times of possible 50	Type B Fault Active

* Use the following to calculate a Default Transmission Temperature upon a Transmission Temperature Sensor diagnostic code failure:

NOTE: KbTRNS_UseEstTransTemp must be set = 1 (TRNSKTRN)

- 1) IF Engine Coolant Sensor is NOT available, set Trans.Temp. to 132° C. {AC}
- 2) IF Engine Coolant Temp. DTC is set, Default Trans.Temp. is 132° C. {AD}
- 3) ELSE IF Engine Coolant Temperature ≥ 115° C. {AE}, substitute 132° C. {AF} for Trans. Temp.
- 4) ELSE IF Engine Run Time is < 180 sec. {AG}, substitute Manifold Air Temp.-saved-at-startup for Trans. Temp. (If MAT is not available or any MAT codes are set, substitute 0° C. {AH} for Trans. Temp.).
- 5) ELSE IF Engine Run Time ≥ 180 sec and Coolant Temp. is between 45° C. {AI} and 115° C. {AE}, Default Trans. Temp. to one of the following:
 - Coolant Temp. Maximum by -10° C. {AK}, if startup MAT is < 27° C. {AJ}
 - Coolant Temp. Maximum by 10° C. {AM}, if startup MAT is > 27° C. {AL}
 - a) ELSE IF MAT is not available, any MAT codes are set, or -10° C. {AK} ≤ MAT-at-start-up ≤ 10° C. {AM}, substitute Engine Coolant Temperature for Trans. Temp
- 6) ELSE IF Engine Run Time ≥ 180 sec {AG} and Engine Coolant Temp. < 27° C. {AJ}, substitute 12° C. {AN} for Trans. Temp.

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KtTCCD_n_StuckOffFailLimit

SLIP, rpm	TORQUE, N-m
48	0
80	64
200	128
252	192
271	256
280	320
280	384
280	448
280	512

Mode switch settings for the various Transitional positions:

	PRNDL Code	IMS Switch A	IMS Switch B	IMS Switch C	IMS Switch P
Transitional_1	1	0	0	0	1
Transitional_2	2	0	0	1	0
Transitional_4	4	0	1	0	0
Transitional_7	7	0	1	1	1
Transitional_8	8	1	0	0	0
Transitional_11	11	1	0	1	1
Transitional_13	13	1	1	0	1