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SENSED PARAMETER	FAULT CODE	ACCEPTABLE OPERATING RANGE AND RATIONALITY	PRIMARY MALF DETECTION PARAMETERS	SECONDARY MONITORING PARAMETERS AND CONDITIONS	MONITORING TIME LENGTH AND FREQUENCY OF CHECK	DTC TYPE
TCM ROM Test	P0601	This DTC detects an error in the flash memory containing the program and calibration.	Checksum calculation algorithm of flash memory, fail counter >= 5 counts	Ignition is On	Continuous	A
TCM Not programmed	P0602	This DTC indicates the flash memory has not been programmed.	KbINFD_NoStartCal = TRUE	Ignition is On	Continuous	A
Power up copy of NVM to RAM	P0603	This DTC detects an error in the RAM copy of NVM @ power up	Checksum calculation algorithm of NVM copy	Ignition is On	Continuous	A
RAM Test	P0604	This DTC tests the read/write capability of each RAM location	Read and write each RAM location	Ignition is On	Continuous	A
Trans Fluid Temp Sensor Circuit Range/ Performance	P0711	The DTC detects two failure modes of the TFT: 1) A sensor that remains at a value. (Stuck Sensor) 2) an unrealistically large change in Transmission Temperature.	<u>Fail case 1:</u> Trans fluid temp has not changed => 2.0 deg C <u>Fail case 2:</u> Trans fluid temp has not changed => 2.0 deg C <u>Fail case 3:</u> Trans fluid temp changes => 20 deg C	<u>For fail case 1 and 2:</u> Common ignition voltage enable, Common engine speed enable, No Engine Coolant DTC's, No OSS P0722, P0723 DTCs, No ISS P0716, P0717 DTCs, P0711 has not passed this ignition cycle, -40 deg C <= trans fluid temp <= 150 deg C <u>Fail case 1:</u> -40 deg C <= trans fluid temp <= +21 C at startup, Engine coolant => 70 deg C, Engine Coolant has changed => 50 deg C since startup, Vehicle speed since startup => 8 KPH for time => 750 seconds (cumulative timer) TCC slip speed => 120 RPM for time => 500 seconds (cumulative timer) <u>Fail case 2:</u> +129 deg C <= trans fluid temp <= +150 C at startup, Engine coolant => 70 deg C, Engine Coolant has changed => 50 deg C since startup, Vehicle speed since startup => 8 KPH for time => 750 seconds (cumulative timer) TCC slip speed => 120 RPM for time => 500 seconds (cumulative timer) <u>For fail case 3:</u> Common engine speed enable,	<u>Fail case 1:</u> Time => 100 seconds Continuous Veh Spd>8 300Sec Slip >100 300seconds <u>Fail case 2:</u> Time => 100 seconds Veh Spd>8 for 300seconds Slip>120rpm for 300seconds Continuous <u>Fail case 3:</u> delta fail counter >= 14 counts in 7 second time sample	C
Trans Fluid Temp Sensor Circuit - Low Input (High Temperature)	P0712	0 ohms to 134217728 ohms The DTC detects a low resistance in the transmission fluid temperature sensor circuit.	Transmission fluid temperature sensor circuit resistance <= 41.37 ohms	Common ignition voltage enable, Common engine speed enable	10 seconds	C
Trans Fluid Temp. Sensor Circuit - High Input (Low Temperature)	P0713	0 ohms to 134217728 ohms The DTC detects a high resistance in the transmission fluid temperature sensor circuit.	Transmission fluid temperature sensor circuit resistance >= 116060.6 ohms	Common ignition voltage enable, Common engine speed enable, Transmission output speed >= 200 RPM for time >= 200 seconds, Transmission torque converter slip >= 120 RPM for time >= 200 seconds, No P0716, P0717, P0722, P0723 DTCs active	400 seconds	C
Brake Switch Circuit High Input (Stuck On)	P0719	0V to 12.0V This DTC detects a open brake switch during accelerations.	Accel counts > 8	**This Code Has not passed this ingnition cycle.** No OSS DTC's **I**ncrement Accel counter when Brake Switch is High and Vehicle Speed < 8 KPH then 8 KPH <Vehicle Speed< 40 KPH for ≤ 6 sec then Vehicle Speed > 40 KPH for 7.0 sec. P0724 not passed.	8 test failures within 8 test samples AND Brake is On for = > 900 seconds Continuous	C

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Output Speed Sensor - Low Input	P0722	0 RPM to 8192 RPM This DTC detects a low output speed when the vehicle has a large Input speed in a driving gear range with a high Engine Torque value.	Output Speed <= 50 RPM	Common ignition voltage enable, Comon engine speed enable, PRNDL Range is not Park/Neutral, Power Take Off (PTO) is not active, -40 DegC <= transmission temperature <= 150 DegC, 50 Nm <= Engine Torque <= 882 Nm and toque valid from ECM, Throttle Position => 10%, 1400 <= Input Speed <= 5000 RPM, TCC slip speed >= -5 RPM, No OSS P0722, P0723 DTCs, No ISS P0716, P0717 DTCs, No PSA P1810, P1815, P1816, P1818 DTCs	Fail timer >= 3.5 seconds Continuous	B
Output Speed Sensor - Intermittent	P0723	0 RPM to 8192 RPM This DTC detects an unrealistic large DROP in Output Shaft speed.	Output Speed DROP => 1000 RPM	Common ignition voltage enable, Comon engine speed enable, PRNDL range change timer >= 6 seconds, 4WD range change timer >= 6 seconds, N0 P0716, P0717, P0974 DTCs Input speed delta < 300 RPM for time >= 2 seconds, Output speed raw >= 900 RPM for time >= 2 seconds, Output speed change <= 250 RPM for time >= 2 seconds	Fail timer >= 3.4 seconds Continuous	B
Brake Switch Circuit Low Input (Stuck Off)	P0724	.0V to 12.0V This DTC detects an open circuit in the brake switch or brake switch wiring during decelerations.	Decel counts => 8	**This Code Has not passed this ingnition cycle.** Common ignition voltage enable, Power Take Off (PTO) is not active, Brake switch signal indicates brake OFF, No OSS P0722, P0723 DTCs, No brake switch P0719 DTC, Increment Decel Counter when brake switch signal = brake OFF and Vehicle Speed >= 40 KPH for 7 seconds then, 40 KPH > Vehicle Speed > 8 KPH for time < 4.75 seconds then, Vehicle Speed < 8 KPH	8 test failures within 8 test samples Continuous	C
TCC System Stuck OFF	P0741	This DTC detects high torque converter slip when the TCC is commanded ON in 2nd and/or 3rd Gear.	TCC slip speed => 125 RPM Fail counter >= 4 counts	Common ignition voltage enable, Comon engine speed enable, Throttle position => 10 % and throttle valid from ECM, 50 Nm <= enginre torque <= 1492 Nm and toque valid from ECM, Transmission fluid tmperature >= 20 DegC, No TCC electrical P1866 or P1867 DTCs, Power Take Off (PTO) is not active, No ISS P0716, P0717 DTC's, No OSS P0722, P0723 DTC's, No TCC stuck on P0742 DTC, 1.41 <= gear ratio <= 1.56 (2^{nd} gear) or 0.95 <= gear ratio <= 1.05 (3^{rd} gear), TCC on or locked, TCC capacity (PWM duty cycle) => 60 % TCC on time => 0.1 second	Fail timer >= 3.0 seconds Continuous	B
TCC System Stuck ON	P0742	This DTC detects low torque converter slip when the TCC is commanded off.	-15 RPM <= TCC slip speed <= 15 RPM Fail counter >= 4 counts	Common ignition voltage enable, Comon engine speed enable, Throttle position => 10 % and throttle valid from ECM, 156 Nm <= enginre torque <= 1492 Nm and toque valid from ECM, 10 <= Transmission fluid tmperature <= 130 DegC, Power Take Off (PTO) is not active, No ISS P0716, P0717 DTC's, No OSS P0722, P0723 DTC's, No TCC electrical P1866 or P1867 DTCs, No TCC stuck off P0741 DTC, 800 RPM <= engine speed <= 4400 RPM, 11 KPH <= vehicle speed <= 121 KPH, 0.95 <= gear ratio <= 1.56 (2^{nd}, 3^{rd} gear), commanded gear <> 1st TCC commanded off	Fail timer >= 3 second Continuous	B

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Shift Solenoid A Performance Normal shift pattern 1234 Failure mode shift pattern 2233	P0751	This DTC detects incorrect gear ratios when 1st gear and 4th gear are commanded.	Fail case 1 AND Fail case 2 Are TRUE, increment fail counter P0751 set when fail counter >= 2 counts	Common ignition voltage enable, Comon engine speed enable, Throttle position valid from ECM, Engine torque valid from ECM, No ISS P0716, P0717 DTC's, No OSS P0722, P0723 DTC's, No P0973, P0974, P0976, P0977 DTCs, No P0742 or P0894 DTCs, 20 DegC <= transmission fluid temperature <= 130 DegC, 150 RPM <= input speed <= 6500 RPM Transmission output speed >= 150 RPM Power Take Off (PTO) is not active, Throttle position => 10%, 50 Nm <= engine torque <= 1492 Nm <u>Fail case 1:</u> Command gear = 1st 1.23 <= measured gear ratio <= 1.84 (2nd gear) <u>Fail case 2:</u> Command gear = 4th 0.95 <= measured gear ratio <= 1.15 (3rd gear)	<u>Fail case 1:</u> Fail timer >= .5 seconds continuous <u>Fail case 2:</u> Fail timer >= 1.0 seconds continuous	B
Shift Solenoid A Performance Normal shift pattern 1234 Failure mode shift pattern 1144	P0752	This DTC detects incorrect gear ratio when 2nd gear is commanded.	Fail case 3 fail counter >= 5 counts	Common ignition voltage enable, Comon engine speed enable, Throttle position valid from ECM, Engine torque valid from ECM, No ISS P0716, P0717 DTC's, No OSS P0722, P0723 DTC's, No P0973, P0974, P0976, P0977 DTCs, No P0742 or P0894 DTCs, 20 DegC ≥ transmission fluid temperature < 130 DegC, 150 RPM ≤ input speed <= 6500 RPM Transmission output speed >= 150 RPM Power Take Off (PTO) is not active, Throttle position => 10%, 50 Nm <= engine torque <= 1492 Nm <u>Fail case 3:</u> Command gear = 2nd 2.88 <= measured gear ratio <= 3.33 (1st gear)	<u>Fail case 3:</u> Fail Timer 2.0 Fail timer >= 2.25 seconds continuous	B
Shift Solenoid B Performance Normal shift pattern 1234 Failure mode shift pattern 4334	P0756	This DTC detects incorrect gear ratios when 1st gear and 2nd gear are commanded.	Fail case 1 AND Fail case 2 Are TRUE, increment fail counter P0756 set when fail counter >= 2 counts	Common ignition voltage enable, Comon engine speed enable, Throttle position valid from ECM, Engine torque valid from ECM, No ISS P0716, P0717 DTC's, No OSS P0722, P0723 DTC's, No P0973, P0974, P0976, P0977 DTCs, No P0742 or P0894 DTCs, 20 DegC <= transmission fluid temperature <= 130 DegC, 150 RPM ≥ input speed ≤ 6500 RPM Transmission output speed >= 150 RPM Power Take Off (PTO) is not active, Throttle position => 10%, 50 Nm <= engine torque <= 1492 Nm <u>Fail case 5:</u> Command gear = 1st 0.69 <= measured gear ratio <= 1.14 (4th gear) <u>Fail case 6:</u> Command gear = 2nd 0.698 <= measured gear ratio <= 1.2 (3rd gear)	<u>Fail case 5:</u> Fail timer >= 1.0 seconds continuous <u>Fail case 6:</u> Fail timer >= 2.0 seconds continuous	A

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Shift Solenoid B Performance Normal shift pattern 1234 Failure mode shift pattern 1221	P0757	This DTC detects incorrect gear ratio when 3rd gear is commanded.	Fail case 7 fail counter >= 2 counts	Common ignition voltage enable, Comon engine speed enable, Throttle position valid from ECM, Engine torque valid from ECM, No ISS P0716, P0717 DTC's, No OSS P0722, P0723 DTC's, No P0973, P0974, P0976, P0977 DTCs, No P0742 or P0894 DTCs, 20 DegC <= transmission fluid temperature <= 130 DegC, 150 RPM <= input speed <= 6500 RPM Transmission output speed >= 150 RPM Power Take Off (PTO) is not active, Throttle position => 10%, 50 Nm <= engine torque <= 1492 Nm <u>Fail case 7:</u> Command gear = 3rd 1.59 <= measured gear ratio <= 1.8 (1st gear)	<u>Fail case 7:</u> Fail timer >= 1.0 seconds continuous	A
3-2 Downshift Solenoid Circuit Low Voltage (Short to Ground or Open)	**P0787**	0V to 12V This DTC detects a continuous open or short to ground in the 3-2 DS circuit or the 3-2 DS solenoid.	Output State is invalid	Engine RPM between 475 & 6200 for 5 sec.System Voltage is between 8 & 18 Vehicle Speed less than 200 KPH	43 out of 50 counts. Continuous	A
3-2 Downshift Solenoid Circuit High Voltage (Short to 12 Volts)	**P0788**	0V to 12V This DTC detects a continuous short to battery in the 3-2 DS circuit or the 3-2 DS solenoid.	Output State is invalid	Engine RPM between 475 & 6200 for 5 sec.System Voltage is between 8 & 18 Vehicle Speed less than 200 KPH	43 out of 50 counts. Continuous	A
Transmission Component Slipping	P0894	This DTC detects Slip in the Torque Converter Clutch and/or the Forth gear Clutch Pack with the TCC in an apply or locked mode.	**<u>Fail case 1:</u>** Throttle position => 10%, 100 RPM <= TCC slip speed <= 550 RPM, **<u>Fail case 2.1:</u>** Fail case 1 fail counter > 0 counts, Throttle position => 10%, 100 RPM <= TCC slip speed <= 550 RPM **<u>Fail case 2.2:</u>** Throttle position => 10%, 100 RPM <= TCC slip speed <= 550 RPM **<u>Fail case 2.3:</u>** Throttle position => 10%, 100 RPM <= TCC slip speed <= 550 RPM **Set P0894 if fail case 1 complete = TRUE or if fail case 2 complete flag = TRUE**	Common engine speed enable, Power Take Off (PTO) is not active, Throttle position valid from ECM, Engine torque valid from ECM, Engine speed valid from ECM, Given 3rd or 4th gear and speed ratio = engine RPM / trans output RPM, then 0.70 <= speed ratio <= 2.25 TCC commanded "on" or at "full lock" and TCC capacity (PWM DC) >= 75 % for time >= 5 seconds, 20 DegC <= transmission fluid temperature <= 130 DegC, 50 Nm <= engine torque <= 1492 Nm, 1200 RPM <= engine speed <= 3750 RPM, 48 KPH <= vehicle speed <= 177 KPH, No ISS P0716, P0717 DTC's, No OSS P0722, P0723 DTC's, No P0973, P0974, P0976, P0977 DTCs, No P0751, P0752, P0756, P0757 DTCs, No P1866 or P1867 DTCs, No P0741 or P0742 DTCs, No P1810, P1815, P1816, or P1818 DTCs, All of the above criteria must be met to run any part of P0894 fail case logic	**<u>Fail case 1:</u>** Fail case 1 fail time >= 10 seconds And TCC cycled from "off" to "on" Then increment fail case 1 fail counter Set fail case 1 complete flag = TRUE if fail case 1 fail counter >= 3 counts **<u>Fail case 2.1:</u>** Fail time >= 10 seconds, Freeze adapt and command maximum line pressure, Proceed to fail case 2.2 **<u>Fail case 2.2:</u>** Fail time >= 12.5 seconds, Freeze adapt and command TCC "off" for time >= 2 seconds, Proceed to fail case 2.3 **<u>Fail case 2.3:</u>** Fail time >= 15 seconds, Set fail case 2 complete flag = TRUE	B
Shift Solenoid A Electrical (1-2 Shift Solenoid)	P0973	0V to 12V This DTC detects a continuous open or ground short in the SSA circuit or the SSA solenoid.	Hardware detects output state is invalid	Common ignition voltage enable, Comon engine speed enable,	43 out of 50 counts. Continuous	B
Shift Solenoid A Electrical (1-2 Shift Solenoid)	P0974	0V to 12V This DTC detects a continuous short to power in the SSA circuit or the SSA solenoid.	Hardware detects output state is invalid	Common ignition voltage enable, Comon engine speed enable,	43 out of 50 counts. Continuous	B
Shift Solenoid B Electrical (2-3 Shift Solenoid)	P0976	0V to 12V This DTC detects a continuous open or ground short in the SSB circuit or the SSB solenoid.	Hardware detects output state is invalid	Common ignition voltage enable, Comon engine speed enable,	43 out of 50 counts. Continuous	A

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Shift Solenoid B Electrical (2-3 Shift Solenoid)	P0977	0V to 12V This DTC detects a continuous short to power in the SSB circuit or the SSB solenoid.	Hardware detects output state is invalid	Common ignition voltage enable, Comon engine speed enable,	43 out of 50 counts. Continuous	A
PSA Circuit Malfunction – PSA indcates an illegal range value	P1810	0V to 12V This DTC detects an invalid state of the PSA sensor or the PSA circuit by deciphering the PSA inputs.	PSA range = illegal value	Common ignition voltage enable,Common engine speed enable, Power Take Off (PTO) is not active, No PSA P1810 DTC	60 seconds Continuous	B
PSA Start in Wrong Range	**P1815**	0V to 12V This DTC detects an invalid state of the PSA sensor or the PSA circuit by deciphering the PSA inputs.	PSA indicates D2 (ONLY) before and after Engine Start-up (625 RPM)	System Voltage is between 8.0 & 18.0 No VSS DTC's Engine Speed Transition: Below 50 RPM for => 1.0 sec. then, between 50 and 610 RPM > 0.075 sec. then => 625 RPM. (RPM must remain above the 625 RPM cal) Output Speed <= 250 RPM	7.0seconds Continuous	B
PSA Circuit Malfunction – PSA indicates P/N with drive gear ratio	P1816	0V to 12V This DTC detects an invalid state of the PSA sensor or the PSA circuit by deciphering the PSA inputs.	PSA range = P/N And 3.33 >= gear ratio >= 2.33 or 1.52 >= gear ratio >= 1.23 or 1.02 >= gear ratio >= 0.95 or 0.9 >= gear ratio >= 0.64 NOTE: Ratio is measured NI/NO	Common ignition voltage enable, Common engine speed enable, Power Take Off (PTO) is not active, Throttle position valid from ECM, Engine torque valid from ECM, No ISS P0716, P0717 DTC's, No OSS P0722, P0723 DTC's, No P0973, P0974, P0976, P0977 DTCs, No P0751, P0752, P0756, P0757 DTCs, No P1810, P1815, P1816, or P1818 DTCs, Transmission output speed >= 350 RPM, Throttle position => 10%, 50 Nm <= engine torque <= 1492 Nm	12.75 seconds Continuous	B
TCC PWM Solenoid Electrical	P2764	0V to 12V This DTC detects a continuous open or ground short in TCC PWM circuit or the TCC PWM solenoid.	Hardware detects output state is invalid	Common ignition voltage enable, Comon engine speed enable,	43 out of 50 counts. Continuous	B
TCC PWM Solenoid Electrical	P2763	0V to 12V This DTC detects a continuous short to power in the TCC PWM circuit or the TCC PWM solenoid.	Hardware detects output state is invalid	Common ignition voltage enable, Comon engine speed enable,	43 out of 50 counts. Continuous	B
TCC Enable Solenoid Circuit Low Voltage Short to Ground or Open	**P2769**	0V to 12V This DTC detects a continuous open or short to ground in the TCC Enable Solenoid circuit or the TCC Enable Solenoid.	Output State is invalid	Engine RPM between 475 & 6200 for 5 sec.System Voltage is between 8 & 18 Vehicle Speed less than 200 KPH	43 out of 50 counts. Continuous	B
TCC Enable Solenoid Circuit High Voltage Short to 12 Volts (Sol with very low res)	**P2770**	0V to 12V This DTC detects a continuous short to battery in the TCC Enable Solenoid circuit or the TCC Enable Solenoid.	Output State is invalid	Engine RPM between 475 & 6200 for 5 sec.System Voltage is between 8 & 18 Vehicle Speed less than 200 KPH	43 out of 50 counts. Continuous	B
Four Wheel Drive Low - Switch Input Malfunction Fail Case 2: Switch Stuck On.	**P2771**	This DTC detects the continuous short to ground in the Four Wheel Drive Low Switch Circuit	4WD Lo Switch indicates ON and Measured Transfer Case Ratio =>0.95 and <= 1.05 in any one gear. Measured Transfer case ratio = NI / NO / commanded gear ratio	Same as Fail Case 1	=> 5.0 seconds in any one gear. (Usually 4th gear) 2 Fail Counts	B
Power down copy of NVM to RAM	P1621	This DTC detects an error in the RAM copy of NVM @ power down	Checksum calculation algorithm of NVM copy	Ignition is On	Continuous	A
CAN Bus Error ECU	U2105	This DTC detects a communication problem between the TCM and ECU	No valid ECU CAN message for 2.0 seconds	Common ignition voltage enable	Continuous	B

LOOK-UP TABLES

CLASS 2 Override Abort Calibrations

Function	Calibration
Max Engine Speed for overall overrides	3200 RPM
Max KPH for Solenoid override	100 KPH
Max 2-1 downshift request	40 KPH
Max 3-2 downshift request	60 KPH
Max Engine Speed for Force Motor Override	2500 RPM (Actual is 1/2 this value on the vehicle)
Min Force Motor AMP override	0.0 AMPS
Max Force Motor AMP override	1.1 AMPS
TCC Commanded Off Time Override	300 sec.

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System Voltage Malfunction

Logic	MODIFICATION / ACTION	DRIVER MAY HAVE COMMENT/COMPLAINT	Requirement
SYSTEM VOLTAGE OUT OF RANGE. 8.0 volts < ignition voltage < 18.0 volts for time >= 10.0 seconds	Normal transmission control		
ignition voltage <= 8.0 volts or ignition voltage >= 18.0 volts for time >= 10.0 seconds **Unrelated to the P0562 and/or P0563 System Voltage DTC's**	Inhibit pressure control solenoid, Inhibit TCC solenoid, soft land to 2nd, freeze adapts	Transmission will not shift. (Customer may comment of one gear only) (The controller should have a P0562 or P0563 stored in history)	Protection of Transmission Solenoids