5R55E Electronic Controls

DESCRIPTION & OPERATION

Input signals from sensors are sent to the Powertrain Control Module (PCM). The PCM can determine when the time and conditions are right for a shift or converter clutch application.

The PCM controls transmission operation through 6 electronic solenoids. Four On/Off solenoids for shifting. One Pulse-Width Modulator (PWM) solenoid for Torque Converter Clutch (TCC) control. One Electronic Pressure Control (EPC) solenoid for line pressure control. The PCM has built-in self-diagnosis, fail-safe operations mode and warning code display for the main input sensors and solenoid valves.

NOTE: For engine-related DTCs, see appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE section. These DTCs pertain to engine performance and must be repaired first, as engine performance and related component signals will affect transmission operation and diagnosis.

INPUT SENSORS

Anti-Lock Brake Speed Sensor

The Programmable Speedometer/Odometer Module (PSOM) receives input signal from rear anti-lock brake sensor. After processing input signal, the PSOM relays signal to PCM and speedometer control module. PCM uses input signal to help determine vehicle speed.

Air Conditioning Clutch (ACC)

On factory installed A/C system, PCM receives signal voltage from ACC switch indicating that the air conditioning compressor clutch is engaged. The PCM uses the ACC switch signal to adjust line pressure to compensate for additional engine load. If the ACC switch fails with closed contacts, line pressure will be slightly low with air conditioning off. If the ACC switch fails with open contacts, line pressure will be slightly higher with air conditioning on.

Brake On/Off (BOO) Switch

The PCM receives a signal from the BOO switch when the brake switch is operated. Torque converter clutch is disengaged when brakes are applied. Malfunctioning switch will affect torque converter operation.

Crankshaft Position (CKP) Sensor/Ignition Control Module(ICM)

The CKP sensor sends crankshaft position information to the ICM, which sends an engine speed signal to the PCM. Signal received by the PCM affects line pressure, shift scheduling and torque converter clutch control. Engine speed signal malfunction may result in harsh engagements, firm shifts, TCC lock-up and/or late WOT shifts.

Engine Coolant Temperature (ECT) Sensor

Engine temperature signal is sent to PCM. Malfunctioning ECT will affect torque converter clutch operation.

Intake Air Temperature (IAT) Sensor

Intake air temperature signal is sent to PCM. Malfunctioning IAT will affect EPC pressure, causing either harsh or soft shifts.

Overdrive Drum Speed (ODS) Sensor

1997 vehicles are equipped with a ODS sensor. ODS sensor provides PCM with front drum speed. The PCM uses this sensor to determine EPC pressure, shift and torque converter schedules.

4WD Low Range Switch

Switch is mounted on transfer case cover. Switch controls shift scheduling in 4WD. If low range switch fails with open contacts, delayed shifts in 4WD-Low will occur. If low range switch fails with closed contacts, 4WD-High shift schedule will be early.

Mass Airflow Sensor (MAF)

The MAF signal is used for Electronic Pressure Control (EPC), shift and TCC operation. MAF malfunction will affect transmission performance.

Transmission Control Switch (TCS)

Switch is mounted on shift lever handle. Switch controls operation of 5th gear. If TCS fails with open contacts no 5th gear disable or coast braking in 3nd and 4rd gear is possible.

Transmission Fluid Temperature (TFT) Sensor

The TFT sensor is located on the solenoid valve body. The PCM monitors voltage across the TFT thermistor to determine transaxle fluid temperature. Depending on temperature, the PCM controls line pressure, shift scheduling and TCC operation. Malfunction of sensor will cause incorrect line pressure and possible lack of TCC operation.

Throttle Position (TP) Sensor

The TP sensor is a potentiometer mounted to the engine throttle body. The PCM receives a signal from the TPS relaying throttle plate position. TP sensor failure will cause PCM to operate in fail safe mode and raise line pressure to prevent transaxle damage. This condition will result in harsh engagements, firm shift feel, abnormal shift schedule and TCC not engaging or cycling.

Transmission Range (TR) Sensor

The PCM monitors a series of step down resistors in the TR sensor that act as a voltage divider. The voltage signal corresponds with position of the transmission range selector lever. The TR sensor also contains the neutral/start and backup light circuits. Malfunction of the TR sensor may cause harsh engagements and firm shift feel. Improper shifting or shift selection and no engine cranking may also result.

Turbine Shaft Speed (TSS) Sensor

The TSS sensor is a magnetic pickup that sends turbine shaft speed signal to the PCM. The TSS sensor is located in the transmission, on the center support. Malfunction of sensor may cause increased engine RPM on engagements, harsh shifts or delayed shifts with hard apply.

Vehicle Speed Sensor (VSS)

The VSS (also called the Output Shaft Speed (OSS) Sensor) is a magnetic pickup that sends output speed signal to the PCM. Malfunction of sensor may cause high EPC pressure, harsh engagements, firm shift feel or abnormal shift schedule. Unexpected downshifts may occur at closed throttle. TCC will not engage.

OUTPUT DEVICES

Solenoid Valve Body Assembly

The solenoid valve body assembly contains Electronic Pressure Control (EPC) solenoid, Shift Solenoid No. 1 (SS1), Shift Solenoid No. 2 (SS2), Shift Solenoid No. 3 (SS3), Shift Solenoid No. 4 (SS4) and Torque Converter Clutch (TCC) solenoid. See SHIFT SOLENOID OPERATION table.

SHIFT SOLENOID OPERATION

Gear Selector Position	SS1	SS2	SS3	SS4	Engine Braking
"P" Or "N"	On	Off	Off	Off	No
"R"	On	Off	Off	Off	No
"D" (O/D ON)					
1st Gear	On	Off	Off	Off	No
2nd Gear (1)	On	Off	On	Off	No
3rd Gear	On	On	Off	Off	No
4th Gear	Off	Off	Off	Off	No
5th Gear	Off	Off	On	Off	No
"D" (O/D OFF)					
1st Gear	On	Off	Off	Off	No
2nd Gear (1)	On	Off	On	Off	No
3rd Gear	On	On	Off	On	Yes
4th Gear	Off	Off	Off	On	Yes
"2" (Manual Select)	On	On	Off	On	Yes
"1" (Manual Select)	On	Off	Off	On	Yes
(1) PCM controlled.					

Shift Solenoid Assemblies

1. When shift solenoid is always off, failure could be due to the PCM and/or vehicle wiring malfunction, and/or solenoid electrically or mechanically stuck off. Check shift solenoid operations. See **Fig. 1**.
2. When shift solenoid is always on, failure could be due to the PCM and/or vehicle wiring malfunction, and/or solenoid electrically or mechanically stuck on. Check shift solenoid operations. See **Fig. 2**.

SS1 Always "OFF":	Transmission Range Selector Lever Position		
	OD	2	1
PCM Gear Commanded	Actual Gear Obtained		
1	4	3	3
2	5	Ratio 1.1	Ratio 1.1
3	3	3	3
4	4	3	3
5	5	Ratio 1.1	Ratio 1.1

SS2 Always "OFF":	Transmission Range Selector Lever Position		
	OD	2	1
PCM Gear Commanded	Actual Gear Obtained		
1	1	3	1
2	2	Ratio 1.1	2
3	1[1] (2[2])	3	1
4	4	3	3
5	5	Ratio 1.1	Ratio 1.1

[1] During Downshift Only [2] During Upshift Only

SS3 Always "OFF":	Transmission Range Selector Lever Position		
	OD	2	1
PCM Gear Commanded	Actual Gear Obtained		
1	1	3	1
2	1	3	1
3	3	3	3
4	4	3	3
5	4	3	3

SS4 Always "OFF":	Transmission Range Selector Lever Position		
	OD	2	1
PCM Gear Commanded	Actual Gear Obtained		
1	1	3	1
2	2	Ratio 1.1	2
3	3	3	3
4	4	3	3
5	5	Ratio 1.1	Ratio 1.1

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Fig. 1: Shift Solenoid Failed Off
Courtesy of FORD MOTOR CO.

SS1 Always "ON":	Transmission Range Selector Lever Position		
	OD	2	1
PCM Gear Commanded	Actual Gear Obtained		
1	1	3	1
2	2	Ratio 1.1	2
3	3	3	3
4	1	3	1
5	2	Ratio 1.1	2

SS2 Always "ON":	Transmission Range Selector Lever Position		
	OD	2	1
PCM Gear Commanded	Actual Gear Obtained		
1	3	3	3
2	Ratio 1.1	Ratio 1.1	Ratio 1.1
3	3	3	3
4	3	3	3
5	Ratio 1.1	Ratio 1.1	Ratio 1.1

SS3 Always "ON":	Transmission Range Selector Lever Position		
	OD	2	1
PCM Gear Commanded	Actual Gear Obtained		
1	2	3	1
2	2	Ratio 1.1	2
3	Ratio 1.1	3	3
4	5	3	3
5	5	Ratio 1.1	Ratio 1.1

SS4 Always "ON":	Transmission Range Selector Lever Position		
	OD	2	1
PCM Gear Commanded	Actual Gear Obtained		
1	1	3	1
2	1	3	1
3	3	3	3
4	4	3	3
5	4	3	3

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Fig. 2: Shift Solenoid Failed On
Courtesy of FORD MOTOR CO.

Torque Converter Clutch (TCC) Solenoid

The TCC receives signal from the PCM. The TCC controls application, modulation and release of torque converter clutch. If solenoid fails in ON position, vehicle engine will run rough (shudder) and engine may stall in Drive at low idle speeds. If solenoid fails in OFF position, torque converter clutch will not engage.

Electronic Pressure Control (EPC) Solenoid

The EPC receives signal from the PCM. The EPC controls transmission line pressure and line modulator pressure. If EPC pressure goes to maximum, shifts and engagements will be harsh. If EPC pressure goes to zero, no 2nd and 4th gear will exist and 1st and 3rd gear will slip with high input torque.

TROUBLE SHOOTING

PRELIMINARY INSPECTION

Check transmission fluid level and condition. Check for non-factory installed equipment wired into transmission or PCM harness. Ensure shift linkage is properly adjusted. Check PCM, sensors and actuators for physical damage. Check engine coolant level.

NOTE: In addition to transmission fault codes, engine-related fault codes may also be present. These fault codes must be repaired first as engine performance will greatly affect transmission operation. For information and testing procedures of engine-related fault codes and components, see appropriate TESTS W/CODES article in ENGINE PERFORMANCE section.

SYMPTOM DIAGNOSIS

Harsh Reverse Only Engagement

Perform QUICK TEST and record DTCs. Perform PINPOINT TESTS A and E. Repair as necessary. Clear codes and perform TRANSMISSION DRIVE CYCLE TEST. Re-run QUICK TEST and ensure DTCs are not present.

Harsh Forward Only Engagement

Perform QUICK TEST and record DTCs. Perform PINPOINT TEST E. Repair as necessary. Clear codes and perform TRANSMISSION DRIVE CYCLE TEST. Re-run QUICK TEST and ensure DTCs are not present.

Delayed Or Soft Reverse Engagement

Perform QUICK TEST and record DTCs. Perform PINPOINT TEST E. Repair as necessary. Clear codes and perform TRANSMISSION DRIVE CYCLE TEST. Re-run QUICK TEST and ensure DTCs are not present.

Delayed Or Soft Forward Engagement

Perform QUICK TEST and record DTCs. Perform PINPOINT TEST E. Repair as necessary. Clear codes and perform TRANSMISSION DRIVE CYCLE TEST. Re-run QUICK TEST and ensure DTCs are not present.

No Forward In "OD" & No Reverse Engagement

Perform QUICK TEST and record DTCs. Perform PINPOINT TEST E. Repair as necessary. Clear codes and perform TRANSMISSION DRIVE CYCLE TEST. Re-run QUICK TEST and ensure DTCs are not present.

Harsh Forward & Reverse Engagement

Perform QUICK TEST and record DTCs. Perform PINPOINT TESTS A, B, D, E and F. Repair as necessary. Clear codes and perform TRANSMISSION DRIVE CYCLE TEST. Re-run QUICK TEST and ensure DTCs are not present.

Some Or All Shifts Missing

Perform SHIFT SPEED ROAD TEST. See FORD 5R55E overhaul article. Perform QUICK TEST and record DTCs. Perform PINPOINT TESTS A, D, E and F. Repair as necessary. Clear codes and perform TRANSMISSION DRIVE CYCLE TEST. Re-run QUICK TEST and ensure DTCs are not present.

Some Or All Shifts Early Or Late

Perform SHIFT SPEED ROAD TEST. See FORD 5R55E overhaul article. Perform QUICK TEST and record DTCs. Perform PINPOINT TESTS A, B and E. Repair as necessary. Clear codes and perform TRANSMISSION DRIVE CYCLE TEST. Re-run QUICK TEST and ensure DTCs are not present.

Erratic Or Hunting Shifts

Perform SHIFT SPEED ROAD TEST. See FORD 5R55E overhaul article. Perform TCC ENGAGEMENT TEST. Perform QUICK TEST and record DTCs. Perform PINPOINT TESTS A, B, D, E and F. Repair as necessary. Clear codes and perform TRANSMISSION DRIVE CYCLE TEST. Re-run QUICK TEST and ensure DTCs are not present.

Soft Or Slipping Shifts (Some Or All)

Perform SHIFT SPEED ROAD TEST. See FORD 5R55E overhaul article. Perform TCC ENGAGEMENT TEST. Perform QUICK TEST and record DTCs. Perform PINPOINT TESTS B, D and E. Repair as necessary. Clear codes and perform TRANSMISSION DRIVE CYCLE TEST. Re-run QUICK TEST and ensure DTCs are not present.

Harsh Shifts (Some Or All)

Perform QUICK TEST and record DTCs. Perform PINPOINT TESTS A, B, D, E and F. Repair as necessary. Clear codes and perform TRANSMISSION DRIVE CYCLE TEST. Re-run QUICK TEST and ensure DTCs are not present.

No 1st Gear In "D"

Perform SHIFT SPEED ROAD TEST. See FORD 5R55E overhaul article. Perform TCC ENGAGEMENT TEST. Perform QUICK TEST and record DTCs. Perform PINPOINT TESTS A, D and E. Repair as necessary. Clear codes and perform TRANSMISSION DRIVE CYCLE TEST. Re-run QUICK TEST and ensure DTCs are not present.

No 1st Gear In "1" Position

Perform QUICK TEST and record DTCs. Perform PINPOINT TEST A. Repair as necessary. Clear codes and perform TRANSMISSION DRIVE CYCLE TEST. Re-run QUICK TEST and ensure DTCs are not present.

No 1-2 Or 2-3 Upshift (Automatic)

Perform SHIFT SPEED ROAD TEST. See FORD 5R55E overhaul article. Perform QUICK TEST and record DTCs. Perform PINPOINT TESTS A, D and E. Repair as necessary. Clear codes and perform TRANSMISSION DRIVE CYCLE TEST. Re-run QUICK TEST and ensure DTCs are not present.

No 3-4 Upshift (Automatic)

Perform SHIFT SPEED ROAD TEST. See FORD 5R55E overhaul article. Perform QUICK TEST and record DTCs. Perform PINPOINT TEST A. Repair as necessary. Clear codes and perform TRANSMISSION DRIVE CYCLE TEST. Re-run QUICK TEST and ensure DTCs are not present.

No 4-5 Upshift (Automatic)

Perform SHIFT SPEED ROAD TEST. See FORD 5R55E overhaul article. Perform QUICK TEST and record DTCs. Perform PINPOINT TESTS A, E and F. Repair as necessary. Clear codes and perform TRANSMISSION DRIVE CYCLE TEST. Re-run QUICK TEST and ensure DTCs are not present.

No 5-4 Downshift (Manual)

Perform SHIFT SPEED ROAD TEST. See FORD 5R55E overhaul article. Use manufacturer provided transmission tester overlay and perform static tests. Perform QUICK TEST and record DTCs. Perform PINPOINT TEST A. Repair as necessary. Clear codes and perform TRANSMISSION DRIVE CYCLE TEST. Re-run QUICK TEST and ensure DTCs are not present.

Soft Or Slipping 1-2 Shift Only

Perform QUICK TEST and record DTCs. Perform PINPOINT TEST E. Repair as necessary. Clear codes and perform TRANSMISSION DRIVE CYCLE TEST. Re-run QUICK TEST and ensure DTCs are not present.

Soft Or Slipping 2-3 Shift Only

Perform QUICK TEST and record DTCs. Perform PINPOINT TESTS A and E. Repair as necessary. Clear codes and perform TRANSMISSION DRIVE CYCLE TEST. Re-run QUICK TEST and ensure DTCs are not present.

Soft Or Slipping 3-4 Shift Only

Perform QUICK TEST and record DTCs. Perform PINPOINT TESTS A and E. Repair as necessary. Clear codes and perform TRANSMISSION DRIVE CYCLE TEST. Re-run QUICK TEST and ensure DTCs are not present.

Soft Or Slipping 4-5 Shift Only

Perform QUICK TEST and record DTCs. Perform PINPOINT TEST E. Repair as necessary. Clear codes and perform TRANSMISSION DRIVE CYCLE TEST. Re-run QUICK TEST and ensure DTCs are not present.

Soft Or Slipping 4-3 Shift Only

Perform QUICK TEST and record DTCs. Perform PINPOINT TESTS A and E. Repair as necessary. Clear codes and perform TRANSMISSION DRIVE CYCLE TEST. Re-run QUICK TEST and ensure DTCs are not present.

Harsh 1-2 Shift Only

Perform QUICK TEST and record DTCs. Repair as necessary. Clear codes and perform TRANSMISSION DRIVE CYCLE TEST. Re-run QUICK TEST and ensure DTCs are not present.

Harsh 2-3 Shift Only

Perform QUICK TEST and record DTCs. Perform PINPOINT TEST A. Repair as necessary. Clear codes and perform TRANSMISSION DRIVE CYCLE TEST. Re-run QUICK TEST and ensure DTCs are not present.

Harsh 3-4 Shift Only

Perform TCC ENGAGEMENT TEST. Perform QUICK TEST and record DTCs. Perform PINPOINT TEST A. Repair as necessary. Clear codes and perform TRANSMISSION DRIVE CYCLE TEST. Re-run QUICK TEST and ensure DTCs are not present.

Harsh 4-5 Shift Only

Perform TCC ENGAGEMENT TEST. Perform QUICK TEST and record DTCs. Perform PINPOINT TEST A. Repair as necessary. Clear codes and perform TRANSMISSION DRIVE CYCLE TEST. Re-run QUICK TEST and ensure DTCs are not present.

Harsh 4-3 Shift Only

Perform SHIFT SPEED ROAD TEST. See FORD 5R55E overhaul article. Perform TCC ENGAGEMENT TEST. Perform QUICK TEST and record DTCs. Perform PINPOINT TEST E. Repair as necessary. Clear codes and perform TRANSMISSION DRIVE CYCLE TEST. Re-run QUICK TEST and ensure DTCs are not present.

No TCC Engagement

Perform TCC ENGAGEMENT TEST. Perform QUICK TEST and record DTCs. Perform PINPOINT TESTS A and F. Repair as necessary. Clear codes and perform TRANSMISSION DRIVE CYCLE TEST. Re-run QUICK TEST and ensure DTCs are not present.

TCC Always Engaged

Check engine idle speed. See appropriate TESTS W/CODES article in ENGINE PERFORMANCE section. Perform TCC ENGAGEMENT TEST. Perform QUICK TEST and record DTCs. Perform PINPOINT TEST A. Repair as necessary. Clear codes and perform TRANSMISSION DRIVE CYCLE TEST. Re-run QUICK TEST and ensure DTCs are not present.

TCC Cycling Or Shuddering

Perform TCC ENGAGEMENT TEST. Perform QUICK TEST and record DTCs. Perform PINPOINT TEST A. Repair as necessary. Clear codes and perform TRANSMISSION DRIVE CYCLE TEST. Re-run QUICK TEST and ensure DTCs are not present.

Poor Vehicle Performance Only

Check for poor engine performance. See appropriate TESTS W/CODES article in ENGINE

PERFORMANCE section. Perform SHIFT SPEED ROAD TEST with "OD" off. See FORD 5R55E overhaul article. Perform TCC ENGAGEMENT TEST. Perform QUICK TEST and record DTCs. Perform PINPOINT TEST A. Repair as necessary. Clear codes and perform TRANSMISSION DRIVE CYCLE TEST. Re-run QUICK TEST and ensure DTCs are not present.

Incorrect Gear Ratio In "D", "2" Or "1"

Perform SHIFT SPEED ROAD TEST. See FORD 5R55E overhaul article. Perform TCC ENGAGEMENT TEST. Perform QUICK TEST and record DTCs. Perform PINPOINT TEST A. Repair as necessary. Clear codes and perform TRANSMISSION DRIVE CYCLE TEST. Re-run QUICK TEST and ensure DTCs are not present.

Engine Will Not Crank

Perform QUICK TEST and record DTCs. Perform PINPOINT TEST D. Repair as necessary. Clear codes and perform TRANSMISSION DRIVE CYCLE TEST. Re-run QUICK TEST and ensure DTCs are not present.

Transmission Overheating

Perform TCC ENGAGEMENT TEST. Perform QUICK TEST and record DTCs. Perform PINPOINT TESTS A and B. Repair as necessary. Clear codes and perform TRANSMISSION DRIVE CYCLE TEST. Re-run QUICK TEST and ensure DTCs are not present.

No Engine Braking With "OD" Off (3rd & 4th Gears)

Perform SHIFT SPEED ROAD TEST. See FORD 5R55E overhaul article. Perform QUICK TEST and record DTCs. Perform PINPOINT TEST A. Repair as necessary. Clear codes and perform TRANSMISSION DRIVE CYCLE TEST. Re-run QUICK TEST and ensure DTCs are not present. Check no engine braking in 1st or 2nd gear. See TROUBLE SHOOTING in FORD 5R55E overhaul article.

Harsh Engagement & Shifts (FMEM Mode)

Perform QUICK TEST and record DTCs. Perform PINPOINT TESTS A, B, D, E and F. Repair as necessary. Clear codes and perform TRANSMISSION DRIVE CYCLE TEST. Re-run QUICK TEST and ensure DTCs are not present.

SELF-DIAGNOSTIC SYSTEM

DIAGNOSTIC PROCEDURE

1. Perform QUICK TEST and record all DTCs. If no DTCs are set, go to step 4). If any engine-related DTCs are set, repair them first. See appropriate SELF-DIAGNOSTICS in ENGINE PERFORMANCE article section. If no continuous memory codes were set, go to step 4).
2. If any DTCs set in previous step were continuous codes, clear all codes. See CLEARING CODES. Perform TRANSMISSION DRIVE CYCLE TEST. If continuous memory codes are set during drive cycle, go to next step. If continuous memory codes are not set during drive cycle, go to step 4).
3. Perform pinpoint test corresponding to code set. See DTC IDENTIFICATION table. If problem is not corrected, go to next step. If problem is corrected, go to step 7).
4. Diagnose problem by symptom. See SYMPTOM DIAGNOSIS. If electronic trouble symptoms exist, go to next step. If no electronic trouble symptoms exist, go to step 6).

5. Follow pinpoint tests corresponding to electronic trouble symptom. Perform static and drive tests. Use manufacturer provided transmission tester overlay to perform static tests. If drive tests do not correct problem, go to next step. If drive tests correct problem, check for intermittent code. Check transmission circuit wiring harnesses and connectors for damage or poor connection.
6. Diagnose problem by mechanical symptom. See TROUBLE SHOOTING in FORD 5R55E overhaul article. Perform any recommended overhaul procedures. Perform TRANSMISSION DRIVE CYCLE TEST.
7. Perform QUICK TEST and ensure no DTCs and no mechanical problems exist. If any DTCs exist, go to step 1). If no DTCs exist, clear memory code. See CLEARING CODES.

DIAGNOSTIC TROUBLE CODES (DTCS)

During QUICK TEST, 3 types of diagnostic trouble codes are retrieved: KOEO, KOER and Continuous Memory codes. See QUICK TEST for self-test procedures. Codes may be cleared from PCM memory after they have been recorded or repaired. See CLEARING CODES.

KOEO & KOER Codes (Hard Faults)

These codes indicate faults are present at time of testing. A hard fault may cause CHECK ENGINE or Malfunction Indicator Light (MIL) to go on and remain on until fault is repaired. If KOEO or KOER codes are retrieved during KOEO SELF-TEST or KOER SELF-TEST, use DTC IDENTIFICATION table to find correct testing and repair procedures.

Continuous Memory Codes (Intermittent Faults)

These codes are used to diagnose intermittent problems. Continuous Memory Codes are retrieved after KOEO SELF-TEST. These codes indicate a fault that may or may not be present at time of testing.

After noting and/or repairing fault, clear codes from memory. See CLEARING CODES. Intermittent faults may be caused by a sensor, connector or wiring-related problem.

CAUTION: Continuous Memory Codes should be recorded when retrieved. These codes may be used to identify intermittent problems that exist after all KOEO and KOER codes have been repaired. Some Continuous Memory Code faults may not be valid after KOEO and KOER codes are serviced.

DTC IDENTIFICATION

NOTE: For transmission fault codes perform appropriate circuit or pinpoint test. See DTC IDENTIFICATION table. For engine-related fault codes output during QUICK TEST procedure, see appropriate TESTS W/CODES article in ENGINE PERFORMANCE section. These fault codes pertain to engine performance and must be repaired first as engine performance will greatly affect transmission operation.

DTC IDENTIFICATION

Fault Code (1)	Pinpoint Test Code	Definition	Transmission Symptom
P1000	N/A	Incomplete OBD-II Testing	N/A

P1111	N/A	System Pass Code	N/A
P0102	(2)	MAF Sensor Malfunction	High Or Low EPC Pressure, Incorrect Torque Converter Clutch Engagement
P0103	(2)	MAF Sensor Malfunction	High Or Low EPC Pressure, Incorrect Torque Converter Clutch Engagement
P0112	(2)	IAT Indicates 254° F (125° C)	High Or Low EPC Pressure
P0113	(2)	IAT Indicates -40° F (-40° C)	High Or Low EPC Pressure
P0114	(2)	IAT Out Of Range	Re-run Diagnostic At Normal Operating Temp.
P0117	(2)	ECT Indicates 254° F (125° C)	TCC Will Always Be Off
P0118	(2)	ECT Indicates -40° F (-40° C)	TCC Will Always Be Off
P0122	(2)	TP Sensor Malfunction	Harsh Shifts, Abnormal Shift Patterns, TCC Does Not Engage, TCC Cycling
P0123	(2)	TP Sensor Malfunction	Harsh Shifts, Abnormal Shift Patterns, TCC Does Not Engage, TCC Cycling
P0300	(2)	EI System Malfunction	Harsh Shifts, Late WOT Shifts, No TCC Engagement
P0301	(2)	EI System Malfunction	Harsh Shifts, Late WOT Shifts, No TCC Engagement
P0302	(2)	EI System Malfunction	Harsh Shifts, Late WOT Shifts, No TCC Engagement
P0303	(2)	EI System Malfunction	Harsh Shifts, Late WOT Shifts, No TCC Engagement
P0304	(2)	EI System Malfunction	Harsh Shifts, Late WOT Shifts, No TCC Engagement
P0305	(2)	EI System Malfunction	Harsh Shifts, Late WOT Shifts, No TCC Engagement
P0306	(2)	EI System Malfunction	Harsh Shifts, Late WOT Shifts, No TCC Engagement

P0307	(2)	EI System Malfunction	Harsh Shifts, Late WOT Shifts, No TCC Engagement
P0308	(2)	EI System Malfunction	Harsh Shifts, Late WOT Shifts, No TCC Engagement
P0320	(2)	EI System Malfunction	Harsh Shifts, Late WOT Shifts, No TCC Engagement
P0340	(2)	EI System Malfunction	Harsh Shifts, Late WOT Shifts, No TCC Engagement
P0500	(2)	Insufficient VSS Input	TCC Engages, Hunting Shifts On Grades
P0501	(2)	Insufficient VSS Input	TCC Engages, Hunting Shifts On Grades
P0503	(2)	Insufficient VSS Input	TCC Engages, Hunting Shifts On Grades
P0705	**D**	TR Sensor Voltage Low	Increase In EPC Pressure
P0707	**D**	TR Sensor Voltage Low	Increase In EPC Pressure
P0708	**D**	TR Sensor Voltage High	Increase In EPC Pressure
P0712	**B**	TFT Indicates 315° F (157° C)	Firm Shift Feel
P0713	**B**	TFT Indicates -40° F (-40° C)	Firm Shift Feel
P0720	**F**	Insufficient Input From OSS	Harsh Shifts, No TCC Engagement
P0721	**F**	Erratic OSS Signal	Harsh Shifts, No TCC Engagement
P0741	(3)	TCC Engagement Error	No TCC Operation Or TCC Slips
P0743	**A**	TCC Solenoid Circuit Failure	If Short Circuit, Engine Stalls At Low Idle,If Open Circuit, TCC Does Not Engage
P0750	**A**	SS1 Solenoid Circuit Failure	Improper Gear Selection
P0751	**A**	SS1 Solenoid Failure	Improper Gear Selection
P0755	**A**	SS2 Solenoid Circuit Failure	Improper Gear Selection
P0756	**A**	SS2 Solenoid Failure	Improper Gear Selection
P0761	**A**	SS3 Solenoid Failure	Improper Gear Selection
P0781	**A**	1-2 Shift Error	Improper Or No Gear Shift
P0782	**A**	2-3 Shift Error	Improper Or No Gear

			Shift
P0783	**A**	3-4 Shift Error	Improper Or No Gear Shift
P1100	(2)	MAF Sensor Malfunction	High Or Low EPC Pressure, Incorrect Torque Converter Clutch Engagement
P1101	(2)	MAF Sensor Malfunction	High Or Low EPC Pressure, Incorrect Torque Converter Clutch Engagement
P1116	(2)	ECT Temperature Low Or High	Re-run Diagnostics With Vehicle At Operating Temp.
P1117	(2)	Intermittent ECT Signal	Incorrect EPC Pressure
P1120	(2)	TP Sensor Malfunction	Harsh Shifts, Abnormal Shift Patterns, TCC Does Not Engage, TCC Cycling
P1124	(2)	TP Sensor Voltage High/Low	Re-run Diagnostic With TP Sensor In Correct Position
P1351	(2)	EI System Malfunction	Harsh Shifts, Late WOT Shifts, No TCC Engagement
P1352	(2)	EI System Malfunction	Harsh Shifts, Late WOT Shifts, No TCC Engagement
P1353	(2)	EI System Malfunction	Harsh Shifts, Late WOT Shifts, No TCC Engagement
P1354	(2)	EI System Malfunction	Harsh Shifts, Late WOT Shifts, No TCC Engagement
P1355	(2)	EI System Malfunction	Harsh Shifts, Late WOT Shifts, No TCC Engagement
P1359	(2)	EI System Malfunction	Harsh Shifts, Late WOT Shifts, No TCC Engagement
P1364	(2)	EI System Malfunction	Harsh Shifts, Late WOT Shifts, No TCC Engagement
P1460	(2)	A/C Switch Error	Re-run Diagnostics With A/C Off, If Stuck On, EPC Pressure Will Be Low
P1500	(2)	Intermittent VSS Input	TCC Engages, Hunting Shifts On Grades

P1501	(2)	Intermittent VSS Input	TCC Engages, Hunting Shifts On Grades
P1701	(4)	Reverse Engagement Error	EPC Pressure Low, SS1 Is Off, Engine Lacks Power.
P1703	(2)	BOO Switch Malfunction	If Stuck On Or Not Connected, TCC Will Not Engage At 1/3 Or Less Throttle, If Stuck Off Or Not Connected, TCC Will Not Disengage When Brake Is Applied
P1704	**D**	TR Sensor Malfunction	Increase In EPC Pressure
P1705	**D**	TR Sensor Not In "P" Or "N"	Re-run Diagnostics In "P" Or "N"
P1711	**B**	TFT Sensor Out Of Range	Vehicle Cold Or Overheated
P1714	**H**	SS1 Solenoid Failure	Solenoid Mechanical Failure
P1715	**H**	SS2 Solenoid Failure	Solenoid Mechanical Failure
P1728	(3)	Transmission Slip Detected	No TCC Operation Or Transmission Slips
P1729	**TG**	4WD Low Circuit Failure	Early Or Late Shifts
P1740	**H**	TCC Malfunction	If Stuck On, Engine StallsAt Low Idle, If Stuck Off, No TCC Engagement
P1744	(3)	TCC Engagement Error	No TCC Operation Or TCC Slips
P1746	**E**	EPC Solenoid Circuit Failure	Maximum EPC Pressure, Harsh Shifts
P1747	**E**	EPC Solenoid Circuit Failure	No 2nd Or 4th Gear, Slips In 1st And 3rd Gear
P1762	(3)	SS3, SS4 Or Front Band Failure	No 2nd Or 5th Gear
P1780	**TB**	TCS Malfunction	"OD" Not Canceled With Switch During KOER Test
P1781	**TG**	4WD Low Switch Failure	Early Or Late Shifts
P1783	**B**	Transmission Overtemp	Increase In EPC Pressure

(1) Only engine performance fault codes that may affect transmission operation are listed. For

complete list of engine performance fault codes, see appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE section.

(2) See appropriate TESTS W/CODES article in ENGINE PERFORMANCE section.

(3) Diagnose fault code by symptom. See SYMPTOM DIAGNOSIS.

(4) Diagnose fault by symptom. See 5R55E OVERHAUL article.

RETRIEVING CODES

Fault codes are retrieved from EEC-V system through Data Link Connector (DLC). DLC is located below instrument panel. Self-diagnostic test procedures are for use with New Generation Star (NGS) scan tool. If a generic scan tool is used, ensure tool is certified OBD-II standard and refer to scan tool manufacturers operating procedures.

READING CODES

NOTE: For engine-related DTCs, see appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE section. These DTCs pertain to engine performance and must be repaired first, as engine performance and related component signals will affect transmission operation and diagnosis.

KOEO & KOER Self-Test Codes

Record codes in order received. These codes indicate current faults in system and should be serviced in order of appearance. Use DTC IDENTIFICATION table to identify correct PINPOINT TEST to perform.

NOTE: If self-test will not activate or TOOL COMMUNICATION ERROR is received, see appropriate TESTS W/CODES article in ENGINE PERFORMANCE section.

Pass Codes

SYSTEM PASS indicates no diagnostic trouble codes were recorded in that portion of test. If SYSTEM PASS is not retrieved in KOEO SELF-TEST, codes retrieved during KOER SELF-TEST may not be valid.

Continuous Memory Codes

These codes result from information stored by PCM during normal driving operations. These codes are retained for 40 warm-up cycles. Use these codes for diagnosis only when KOEO SELF-TEST and KOER SELF-TEST result in SYSTEM PASS and all steps under QUICK TEST are successfully completed. These codes indicate faults previously recorded. Fault may or may not be currently present. See DTC IDENTIFICATION table.

CLEARING CODES

PCM Reset

After a PCM reset procedure, the following conditions will be met:

- All DTCs cleared from PCM memory.

- All freeze frame data cleared from PCM memory.
- All oxygen sensor test data cleared from PCM memory.
- OBD-II system monitor status is reset.
- DTC P1000 set in PCM memory.

To perform PCM reset using NGS scan tool, ensure connectors are properly connected. Program scan tool using the following steps:

- Select vehicle and engine selection menu.
- Select year, engine, model and any additional information requested by scan tool (optional).
- Follow operating instructions from scan tool menu.
- Select GENERIC OBD-II FUNCTIONS. Press CONT button if monitors are not complete.
- Turn ignition on.
- Select Clear Diagnostic Codes.

All codes should now be cleared from PCM memory. If problem has not been corrected or fault is still present, hard code will immediately be reset in PCM memory.

CAUTION: DO NOT disconnect vehicle battery to clear codes. This will erase operating information from Keep-Alive Memory (KAM). To clear KAM, disconnect negative battery terminal for at least 5 minutes.

CAUTION: When battery is disconnected, vehicle computer may lose memory data. Driveability problems may exist until computer systems have completed a relearn cycle. See COMPUTER RELEARN PROCEDURES article in APPLICATIONS & IDENTIFICATION section before disconnecting battery.

QUICK TEST

Description

Following procedures are functional tests of EEC-V system. These basic test steps must be followed in sequence to avoid misdiagnosis:

- Visual Check
- Equipment Hookup
- KOEO (Key On Engine Off) Self-Test
- Continuous Memory Self-Test
- KOER (Key On Engine Running) Self-Test

After each service or repair procedure has been completed, repeat QUICK TEST to ensure all EEC-V systems work properly and diagnostic trouble codes are no longer present.

Visual Check

Complete all steps in PRELIMINARY INSPECTION before proceeding to self-diagnostic tests. Ensure

vacuum hoses and EEC-V wiring harnesses are properly connected.

Equipment Hookup

Apply parking brake, and place shift lever in "P" position. Block drive wheels. Turn off all electrical accessories. Connect appropriate test equipment to vehicle.

Generic Scan Tool

Ensure scan tool meets or exceeds OBD-II standard. Follow manufacturer's instructions to hook up equipment and record diagnostic trouble codes.

New Generation Star (NGS) Scan Tool

Turn ignition switch to OFF position. Connect adapter cable lead to diagnostic tester. See **Fig. 3**. Connect service connectors of adapter cable to vehicle Data Link Connector (DLC). Go to KOEO SELF-TEST.

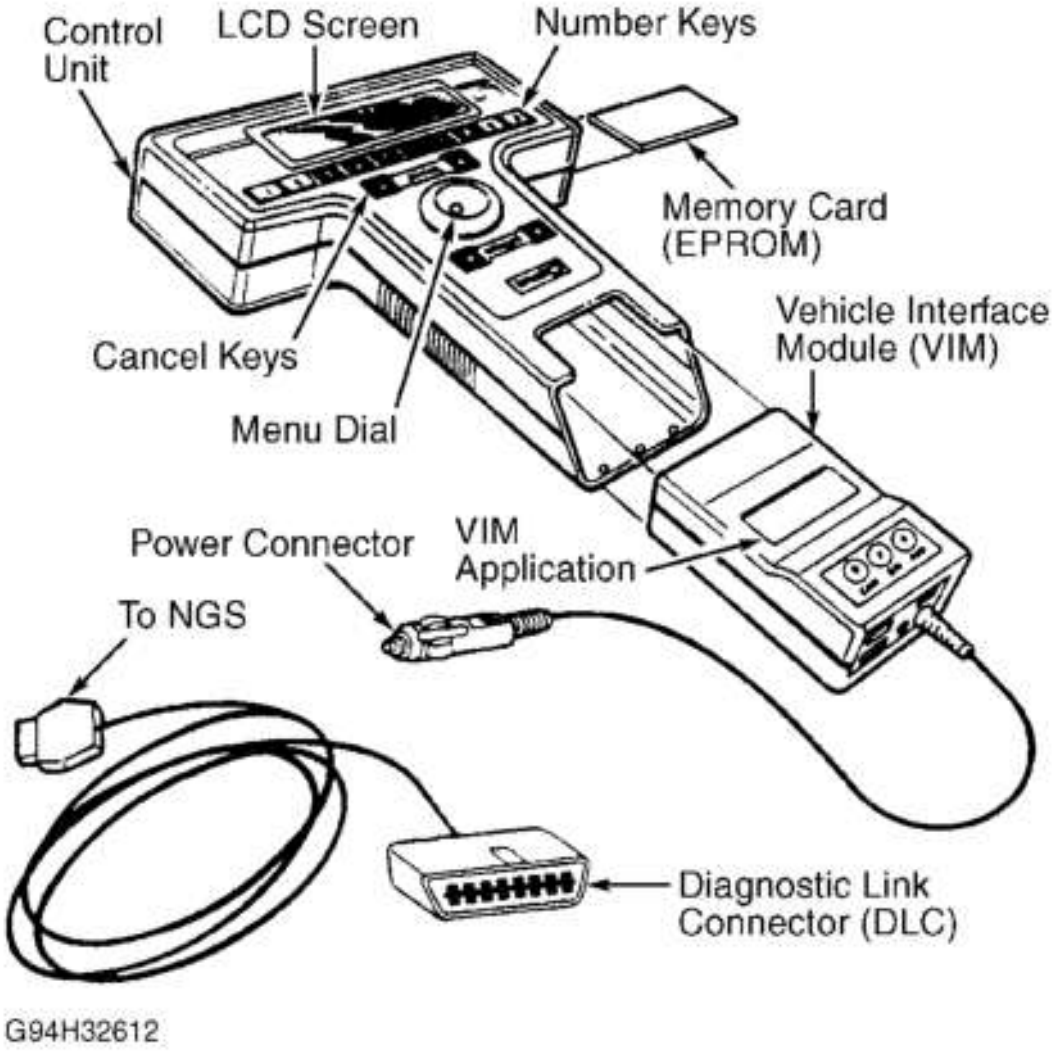

Fig. 3: Identifying New Generation Star (NGS) Scan Tool

Courtesy of FORD MOTOR CO.

KOEO Self-Test

Ensure engine is warmed to normal operating temperature. If engine does not start (or stalls after starting), continue KOEO SELF-TEST. Turn ignition switch to OFF position. Ensure test equipment is properly attached. Program scan tool using the following steps:

- Select vehicle and engine selection menu.
- Select year, engine, model and any additional information requested by scan tool.
- Select Diagnostic Data Link.
- Select PCM - Powertrain Control Module.
- Select Diagnostic Test Mode.
- Select KOEO On-Demand Self-Test.
- Turn ignition on.
- Follow operating instructions from scan tool menu.

Continuous Memory Self-Test

Turn ignition switch to OFF position. Ensure test equipment is properly attached. Program scan tool using the following steps:

- Select vehicle and engine selection menu.
- Select year, engine, model and any additional information requested by scan tool.
- Select Diagnostic Data Link.
- Select PCM - Powertrain Control Module.
- Select Diagnostic Test Modes.
- Select Retrieve/Clear Continuous DTCs.
- Turn ignition on.
- Follow operating instructions from scan tool menu.

KOER Self-Test

Ensure engine is warmed to normal operating temperature. Turn ignition switch to OFF position. Ensure test equipment is properly attached. Program scan tool using the following steps:

- Select vehicle and engine selection menu.
- Select year, engine, model and any additional information requested by scan tool.
- Select Diagnostic Data Link.
- Select PCM - Powertrain Control Module.
- Select Diagnostic Test Mode.
- Select KOER On-Demand Self-Test.
- Start engine and allow to idle.
- Follow operating instructions from scan tool menu.
- Perform BOO and TCS cycling (if equipped).

OUTPUT STATE CONTROL (OSC) MODES

NOTE: Transmission Range (TR) sensor and Vehicle Speed Sensor (VSS) must be operational to enter OSC modes. No DTCs may be present for TR and VSS sensors before entering OSC modes.

OSC modes allow control of some parameters for specific operation. OSC has 2 modes of operation: Bench Mode and Drive Mode. Each mode has a unique set of vehicle operation requirements that must be met before OSC operation will be allowed. If vehicle requirements are not met an error message will be displayed and OSC mode will be aborted. Follow OSC PRELIMINARY PROCEDURES before entering into OSC modes.

OSC Preliminary Procedures

Perform the following procedures in order before entering into OSC modes:

- Select Vehicle and Engine Selection.
- Select Diagnostic Data Link.
- Select PCM - Powertrain Control Module.
- Select Diagnostic Test Mode.
- Select KOEO On-Demand Self Test and KOER On-Demand Self Tests.
- Perform test and record DTCs.
- Repair all non-transmission related DTCs.
- Repair all VSS and TR sensor DTCs.
- Ensure VSS and TR sensors are functional.
- Select Active Command Modes.
- Select Trans-Bench Mode or Trans-Drive Mode.

TCC & Shift Solenoids (Bench Mode)

This procedure ensures TCC and shift solenoids may be turned on or off. Ensure transmission is in "P" position, with ignition on and engine off. Follow the procedure in order to test appropriate solenoid.

- Select OSC mode.
- Select Trans-Bench Mode.
- Select PIDs to be monitored.
- Monitor all selected PIDs during test.
- Select Parameters - SS1, SS2, SS3, SS4 or TCC.
- Press on then SEND to turn solenoid on.
- Press off then SEND to turn solenoid off.
- Press "XXX" then SEND at any time to cancel any command sent.

EPC Solenoid (Bench Mode)

EPC solenoid pressure may be set from 0-90 PSI in increments of 15 PSI. With transmission in "P" position, install pressure gauge in EPC pressure port. See FORD 5R55E overhaul article. Start engine and run to 1500 RPM.

- Select OSC mode.
- Select Trans-Bench Mode.
- Select PIDs to be monitored.
- Monitor all selected PIDs during test.
- Select Parameter - EPC.
- Select value 0-90 then press SEND. 00 - sets EPC pressure to 0 PSI 15 - sets EPC pressure to 15 PSI 30 - sets EPC pressure to 30 PSI 45 - sets EPC pressure to 45 PSI 60 - sets EPC pressure to 60 PSI 75 - sets EPC pressure to 75 PSI 90 - sets EPC pressure to 90 PSI
- Select "XXX" then SEND at any time to cancel any command sent.

GR _ CM Mode (Drive Mode)

GR _ CM mode is used to test transmission shift operation. In this mode transmission can be commanded into any forward gear. With tranmission selector lever in "OD", vehicle speed must be more than 2 MPH. TCC solenoid must be Off.

- Select OSC mode.
- Select Trans-Drive Mode.
- Select PIDs to be monitored.
- Monitor all selected PIDs during test.
- Select Parameters - GR _ CM
- Select value 1-5 then press SEND. 1 - PCM selects 1st gear 2 - PCM selects 2nd gear 3 - PCM selects 3rd gear 4 - PCM selects 4th gear 5 - PCM selects 5th gear
- Select "XXX" then SEND at any time to cancel any command sent.

TCC Mode (Drive Mode)

This mode is used to test TCC engagement and disengagement. With TCC solenoid on or off, ensure transmission selector lever is in "OD" and vehicle speed is more than 2 MPH. If TCC solenoid is on, ensure transmission is in 2nd gear or higher, TFT is 60-275° F, brakes are not applied at 20 MPH or less and engine load is not excessive (ie. engine lugging).

- Select OSC mode.
- Select Trans-Drive Mode.
- Select PIDs to be monitored.
- Monitor all selected PIDs during test.
- Select Parameters - TCC.
- Press on then SEND to turn solenoid on.
- Press off then SEND to turn solenoid off.
- Press "XXX" then SEND at any time to cancel any command sent.

EPC Mode (Drive Mode)

This procedure is used to increase EPC pressure while testing transmission shift operation. This function only allows EPC pressure to be increased from normal PCM commanded pressure. An increase in EPC pressure should create harsher shifts. With transmission in "P" position, install pressure gauge in EPC

pressure port. See FORD 5R55E overhaul article. Start engine. Place transmission lever in "OD" and ensure vehicle speed is more than 2 MPH.

- Select OSC mode.
- Select Trans-Drive mode.
- Select PIDs to be monitored.
- Monitor all selected PIDs during test.
- Select Parameter - EPC.
- Select value 0-90 then press SEND. 00 - sets EPC pressure to 0 PSI 15 - sets EPC pressure to 15 PSI 30 - sets EPC pressure to 30 PSI 45 - sets EPC pressure to 45 PSI 60 - sets EPC pressure to 60 PSI 75 - sets EPC pressure to 75 PSI 90 - sets EPC pressure to 90 PSI
- Re-Select a value 0-90 then press SEND.
- Select "XXX" then SEND at any time to cancel any command sent.

ADDITIONAL SYSTEM FUNCTIONS

NOTE: Additional diagnostic system features are available to help diagnose driveability problems and service EEC-V systems.

Generic OBD-II Parameter Identification (PID)

Turn ignition off. Ensure test equipment is properly attached. Program scan tool using the following steps:

- Select vehicle and engine selection menu.
- Select year, engine, model and any additional information requested by scan tool (optional).
- Select Generic OBD-II Options. Press CONT button if monitors are not complete.
- Select PID/DATA Monitor.
- Turn ignition on or start engine and allow to idle.
- Follow operating instructions from scan tool menu.
- Select PIDs and press Start.

Non-Generic OBD-II Parameter Identification (PID)

Turn ignition switch to OFF position. Ensure test equipment is properly attached. Program scan tool using the following steps:

- Select vehicle and engine selection menu.
- Select year, engine, model and any additional information requested by scan tool.
- Select Generic OBD-II Options. Press CONT button if monitors are not complete.
- Select Diagnostic Data Link.
- Select PCM - Powertrain Control Module.
- Select Diagnostic Test Modes.
- Select PID Data Monitor and Record.
- Turn ignition on or start engine and allow to idle.
- Follow operating instructions from scan tool menu.

- Select PIDs and press Start.

On-Board System Readiness (OSR) Test Mode

All OBD-II scan tools must display OSR test. The OSR will display monitors on the vehicle and status of all monitors; complete or not complete. If not complete, the scan tool will display which monitor has not completed. To enter OSR, turn ignition switch to OFF position. Ensure test equipment is properly attached. Program scan tool using the following steps:

- Select vehicle and engine selection menu (optional).
- Select year, engine, model and any additional information requested by scan tool.
- Follow operating instructions from scan tool menu.
- Select Generic OBD-II Functions. Press Test button if all OBD-II monitors are not complete.
- Start engine and allow to idle.
- Select On-Board System Readiness.

Freeze Frame Data Mode

This mode allows access to emission related data values from some generic PIDs. These values are immediately stored in continuous memory when an emission related fault occurs. This provides a snapshot of the conditions that were present when the fault occurred. Freeze frame will be stored until PCM memory is erased. To access Freeze Frame Data Mode, turn ignition switch to OFF position. Ensure test equipment is properly attached. Program scan tool using the following steps:

- Select vehicle and engine selection menu (optional).
- Select year, engine, model and any additional information requested by scan tool (optional).
- Follow operating instructions from scan tool menu.
- Select Generic OBD-II Functions. Press CONT button if OBD-II monitors are not complete.
- Turn ignition on.
- Select Freeze Frame PID Tests.

Oxygen Sensor Test Mode

This mode allows access to on-board sensor fault limits and actual values during test cycle. The test cycle has specific engine operating conditions that must be met for completion. This information is used to determine the efficiency of the catalytic converter. To access OXYGEN SENSOR TEST mode, turn ignition switch to OFF position. Ensure test equipment is properly attached. Program scan tool using the following steps:

- Select vehicle and engine selection menu (optional).
- Select year, engine, model and any additional information requested by scan tool (optional).
- Follow operating instructions from scan tool menu.
- Select Generic OBD-II Functions.
- Select Oxygen Sensor Tests.
- Select appropriate oxygen sensor test and follow menu instructions.

Failure Mode Effects Management (FMEM)

FMEM mode allows system operation when sensors fail or transmit signals that are out of normal operating range. During FMEM mode, PCM substitutes a mid-range signal for defective sensor while continuing to monitor sensor. If faulty sensor signals return to normal operating range, PCM will use those signals. Depending on specific failure, a fault code may be set in PCM memory.

TCC ENGAGEMENT TEST

Connect tachometer. Warm engine to normal operating temperature. Ensure transmission fluid level is correct. Drive vehicle and maintain approximately 50 MPH. Release throttle for about 2 seconds, then reapply to previous setting. Engine RPM should increase when throttle is released and decrease in about 5 seconds after throttle is reapplied. If torque converter clutch operation is not as specified, see TROUBLE SHOOTING in FORD 5R55E overhaul article.

TRANSMISSION DRIVE CYCLE TEST

NOTE: The transmission drive cycle test must be followed exactly. Malfunctions have to occur 4 times consecutively for codes P0731, P0732, P0733 and P0734 to be set and 5 times consecutively for continuous codes P0741 and P1741.

1. After repairing any engine performance related DTCs, erase remaining transmission codes. Warm engine to normal operating temperature. Ensure transmission fluid level is correct.
2. Accelerate from stop to 50 mph (80 km/hr). Hold speed for at least 15 seconds (30 seconds above 4000 ft.). Press TCS and accelerate to 40 mph (64 km/hr). Hold speed for at least 15 seconds (30 seconds above 4000 ft.). Hold speed and throttle position steady for at least 15 seconds.
3. While maintaining speed with transaxle in 4th gear, lightly depress brake pedal and release (to operate stoplights). Hold speed for at least an additional 5 seconds. Bring vehicle to stop for at least 20 seconds with transmission in drive "D".
4. Repeat steps 1) - 3) at least 5 times. Perform Quick Test and record any continuous codes.

NOTE: PINPOINT TESTS are diagnostic procedures used to test and service EEC-V system. QUICK TEST allows technician to identify problems and retrieve service codes. PINPOINT TESTS check transaxle circuits, sensors and actuators.

PINPOINT TEST PROCEDURES

NOTE: Procedures in PINPOINT TESTS are written for the use of the following Ford Motor Co. test equipment:

- New Generation Star (NGS) Scan Tool (007-00500)
- 104-Pin Breakout Box (014-00950)
- Transmission Tester (007-0085C or 007-0085D) Terminal pin references are based on this equipment and appropriate overlays. All references to "test pins", "test terminals" or "jacks" refer to test equipment. When aftermarket test equipment is used, always follow test equipment manufacturers procedures.

HOW TO USE PINPOINT TESTS

1. Ensure all non-EEC related faults found while performing TROUBLE SHOOTING steps in FORD 5R55E overhaul article have been corrected. DO NOT perform any PINPOINT TEST unless specifically instructed by a QUICK TEST procedure. Follow each test step in order until fault is found. DO NOT replace any part unless directed to do so. When more than one code is retrieved, start with first code displayed.
2. PINPOINT TESTS ensure electrical circuits are okay before sensors or other components are replaced. Always test circuits for continuity between sensor and PCM. Test all circuits for short to power, opens or short to ground. Voltage Reference (VREF) and Voltage Power (VPWR) circuits should be tested with KOEO or as specified in PINPOINT TESTS.
3. DO NOT measure voltage or resistance at PCM. DO NOT connect any test light unless specified in testing procedure. All measurements are made by probing rear of connector. Isolate both ends of a circuit and turn ignition off when checking for shorts or continuity, unless instructed otherwise.
4. Disconnect solenoids and switches from harness before measuring continuity and resistance or applying voltage. After each repair, check all component connections and repeat QUICK TEST.
5. An open circuit is defined as a resistance reading of greater than 5 ohms. This specification tolerance may be too high for some items in EEC-V system. If resistance approaches 5 ohms, always clean suspect connector and coat it with protective dielectric silicone grease. A short is defined as a resistance reading of less than 10 k/ohms to ground, unless stated otherwise in PINPOINT TEST.

Diagnostic Aids

Fuel-contaminated engine oil may set some codes and effect engine performance. If oil is suspect, remove PCV valve from valve cover and repeat QUICK TEST. If problem is corrected, change engine oil.

PINPOINT TESTS

NOTE: PINPOINT TESTS are diagnostic procedures used to test and service EEC-V system. PINPOINT TESTS check transmission circuits, sensors and actuators. Procedures in PINPOINT TESTS are written for the use of the following Ford Motor Co. test equipment:

- New Generation Star (NGS) Scan Tool (007-00500)
- 104-Pin Breakout Box (014-00950)
- Transmission Tester (007-0085C or 007-0085D) Terminal pin references are based on this equipment and appropriate overlays. All references to "test pins", "test terminals" or "jacks" refer to test equipment. When aftermarket test equipment is used, always follow equipment manufacturers test procedures.

TEST A: SHIFT SOLENOID ELECTRICAL CIRCUIT

1. Electronic Diagnostics With ignition off and transmission in "P" position, ensure transmission wiring harness and harness connector is in good condition. Repair as necessary. Connect scan tester DLC. Turn ignition on. Select the following modes in order: Diagnostic Data Link, PCM, Active Command Modes, Output State Control (OSC), Trans-Bench Mode. If vehicle enters Trans-Bench Mode, go to next step. If vehicle will not enter Trans-Bench Mode, diagnose fault in PCM or scan tool. See appropriate TESTS W/CODES article in ENGINE PERFORMANCE section.
2. Wiggle Test While in Trans-Bench Mode, select Parameter Identification (PID) Access Mode. Select a shift solenoid to monitor. Select ON then SEND to operate selected solenoid. While monitoring solenoid output state, wiggle transmission wiring harness and connector. Repeat for each shift

solenoid and TCC solenoid. If solenoid output state does not change, go to next step. If solenoid output state changes, repair open or short in wiring harness and/or connector.

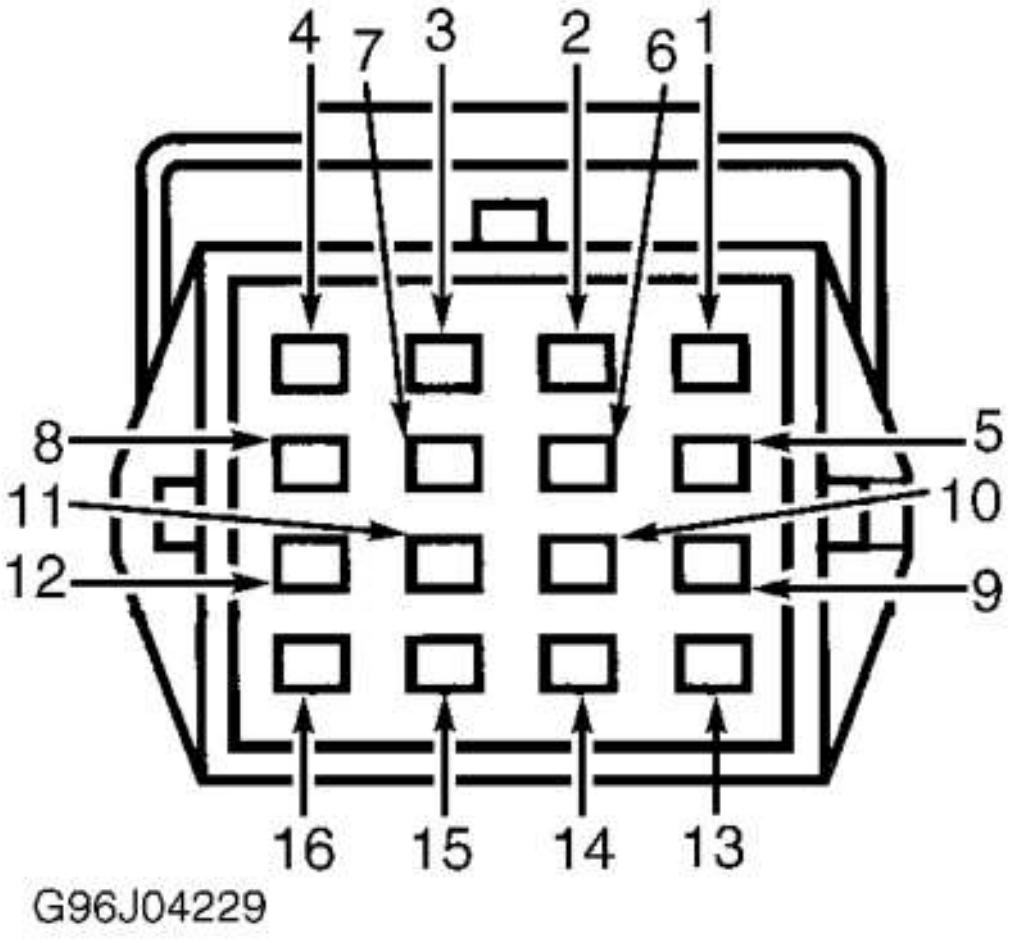

Fig. 4: Identifying Transmission Harness Connector
Courtesy of FORD MOTOR CO.

WIRE COLOR IDENTIFICATION

Terminal No.	Wire Color	Circuit
1	Red (1) Light Blue/Orange (2)	TCC Power
2	Green/White	TSS Signal (+)
3	Gray/Red	TSS Signal Return (-)
4	Orange/Black	TFT Sensor Signal (+)
5	Purple/Yellow	TCC Solenoid
6	N/A	Not Used
7	Pink/Black	Shift Solenoid No. 3
8	Green/Red	TFT Signal Return (-)

9	Brown/Orange	Shift Solenoid No. 4
10	Red (1) Light Blue/Orange (2)	Shift Solenoid Power
11	Red (1) Light Blue/Orange (2)	EPC Solenoid Power
12	White/Yellow	EPC Solenoid
13	N/A	Not Used
14	Purple/Orange	Shift Solenoid No. 2
15	N/A	Not Used
16	Orange/Yellow	Shift Solenoid No. 1
(1) Applies to 1997 models.		
(2) Applies to 1998 models.		

3. Solenoid Functional Test Using scan tool, turn each solenoid on and off. If each solenoid can be heard changing state, go to next step. If any solenoid could not be heard changing state, go to step 5).
4. Output State Control (OSC) Mode Perform OSC TRANSMISSION DRIVE MODE. See OSC TRANSMISSION DRIVE MODE. Perform TCC DRIVE MODE. See OSC TRANSMISSION MODE. If transmission does not shift properly or TCC does not engage properly, go to next step. If transmission shifts properly and TCC engages properly, clear all DTCs. Test drive vehicle and verify no problems exist. If any problems still exist, diagnose by symptom. See SYMPTOM DIAGNOSIS.
5. Power Supply Remove transmission fluid pan. Check solenoid wiring harness and connectors for damage. Turn ignition on. Using DVOM, measure voltage between transmission solenoid connector terminal No. 1 and ground. If battery voltage exists, go to next step. If battery voltage does not exist, check for open or short in wiring harness and connectors.
6. Electrical Signal Test Using DVOM, connect positive lead to transmission wiring harness connector terminal No. 1. See **Fig. 4**. Connect DVOM negative lead to each shift solenoid and TCC connector terminal. See TRANSMISSION CONNECTOR TERMINAL IDENTIFICATION table. With scan tool in Trans-Bench Mode, turn each solenoid on and off. Monitor DVOM and listen for solenoid state to change. If voltage and solenoid state changes, go to next step. If voltage or solenoid state does not change, check for open or short in wiring harness or connectors between PCM and transmission.
7. Check Solenoid Resistance Disconnect each solenoid (SS1, SS2, SS3, SS4, TCC) wire connector. Measure resistance between solenoid terminals. Resistance should be 22-48 ohms for shift solenoids No. 1-4 and 9-16 ohms for TCC solenoid. If resistance is as specified, go to next step. If resistance is not as specified, replace appropriate solenoid.
8. Check Solenoid For Short To Ground Disconnect each solenoid (SS1, SS2, SS3, SS4, TCC) wire connector. Using DVOM, measure resistance between solenoid terminals. Infinite resistance should exist. If resistance is not as specified, replace solenoid. If resistance is as specified, diagnose problem by symptom. See SYMPTOM DIAGNOSIS.

TEST B: TRANSMISSION FLUID TEMPERATURE (TFT) SENSOR CIRCUIT

1. Electronic Diagnostics Check transmission harness connector for damaged pins, corrosion and loose wires. Ensure transmission connector is fully seated. Repair as necessary. Install scan tool and turn ignition on. Select following modes in order: Diagnostic Data Link, PCM, PID/Data Monitor and Record. Select TFT then TFTV modes to monitor. If scan tool enters PID/Data Monitor And Record mode, go to next step. If scan tool does not enter PID/Data Monitor And Record mode, diagnose problem in PCM or scan tool. See appropriate TESTS W/CODES article in ENGINE PERFORMANCE section.
2. Wiggle Test While in PID mode, wiggle transmission harness connector and solenoid connectors. If

TFT sensor output state does not change, go to next step. If TFT sensor output state changes, repair open or short in wiring harness or connectors.

3. Warm Up & Cool Down Cycle If transmission is cool, run transmission to normal operating temperature. If transmission is warm, allow transmission to cool down. Monitor TFT sensors PID value. PID value should increase during warm up and decrease during cool down. If TFT sensor does not operate as specified, go to next step. If TFT sensor operates as specified, clear all DTCs and road test to verify problem still exists. If problem still exists, check wiring harness and connectors. Diagnose problem by symptom. See SYMPTOM DIAGNOSIS.
4. Check Signal Circuit Remove transmission fluid pan. Check transmission wiring harness and connectors for damage or poor connection. Using DVOM, measure voltage between transmission wiring connector terminal No. 4 and ground. See **Fig. 4**. If voltage exists, go to next step. If voltage does not exist, check for open or short in transmission wiring harness. If wiring is okay, check for problem with PCM. See appropriate TESTS W/CODES article in ENGINE PERFORMANCE section.

NOTE: DTC P0713 is set if temperature is less than -40°F (-40°C) (open circuit). DTC P0712 is set if temperature is more than 315°F (157°C) (short circuit).

5. Check Resistance Of TFT Sensor Disconnect transmission wiring connector. Using DVOM, measure resistance between transmission connector terminals No. 4 and No. 8. See **Fig. 4**. Compare resistance and temperature with specifications. See TFT SENSOR RESISTANCE SPECIFICATIONS table. If resistance is not as specified, replace TFT sensor (with wiring). If resistance is as specified, diagnose problem by symptom. See SYMPTOM DIAGNOSIS.

TFT SENSOR RESISTANCE SPECIFICATIONS

Temperature °F (°C)	Resistance (k/Ohms)
32-68 (0-20)	37-100
69-104 (21-40)	16-37
105-158 (41-70)	5-16
159-194 (71-90)	2.7-5
195-230 (91-110)	1.5-2.7
231-266 (111-130)	.8-1.5
267-302 (131-150)	.5-.8

TEST D: TRANSMISSION RANGE (TR) SENSOR

1. TR Sensor Alignment With ignition off and transmission in "P" position, ensure TR sensor harness connector is fully seated and in good condition. Repair as necessary. Turn ignition on and apply parking brake. Place transmission in "OD" position and ensure shift linkage is properly adjusted. Place transmission in "N" position. Install TR sensor alignment tool and ensure sensor is aligned correctly. TR sensor alignment tool will not install properly if sensor is not aligned. If TR sensor is aligned correctly, go to next step. If TR sensor is not adjusted correctly, adjust TR sensor and clear DTCs. Repeat QUICK TEST.
2. Check Electrical Signal Operation Ensure ignition is off. Disconnect TR sensor connector, and inspect it for damaged pins, corrosion and loose wires. If connector is damaged, repair as necessary and clear DTCs. Repeat QUICK TEST. If pinpoint test is being performed because of DTC, go to next step. If pinpoint test is being performed because of a no-start condition, backup light failure or 4WD low failure condition, go to step 8).

3. Check TR Sensor System Operation Turn ignition off. Connect scan tool to DLC. Reconnect TR sensor connector. Turn ignition on. Select TR sensor PIDs TR and TR_D. Move transmission gear selector to each range position and stop. Gear selection should be as specified. See TR SENSOR PID OUTPUT SPECIFICATIONS table. While monitoring selected PIDs, wiggle TR sensor connector and lightly tap TR sensor. If TR sensor PIDs are not as specified or change state when tapped, go to next step. If TR sensor PIDs are as specified and do not change state when tapped, system is okay. Diagnose problem by symptom. See SYMPTOM DIAGNOSIS.

NOTE: If PID TR _ D changes during step 3), problem may be intermittent.

TR SENSOR PID OUTPUT SPECIFICATIONS

Selector Position	TR PID	TR _ D PID
"P"	P/N	0000
"R"	REV	1100
"N"	NTRL	0110
"D"	OD	1111
"2"	MAN2	1001
"1"	MAN1	0011

4. Check TR Sensor Operation Disconnect TR sensor connector. Connect TR-E cable to transmission tester. Connect TR-E cable to TR sensor. Perform TR sensor test. See TR SENSOR under COMPONENT TESTING. If TR sensor operates as specified, go to next step. If TR sensor does not operate as specified, replace sensor and realign. Clear DTCs and perform QUICK TEST.
5. Check PCM Harness For Open Circuit Turn ignition off. Disconnect PCM connector and inspect for damage pins, corrosion and loose wires. Repair as necessary. Install breakout box. Using DVOM, measure resistance between breakout box and TR sensor connector at specified terminals. See PCM HARNESS RESISTANCE SPECIFICATIONS table. See **Fig. 5**. If resistances are as specified, go to next step. If resistances are not as specified, repair open circuit. Clear DTCs and perform QUICK TEST.

PCM HARNESS RESISTANCE SPECIFICATIONS

Measure Between Breakout Box & TR Sensor Harness Connector (1)	Resistance Ohms
3 & 4	Less Than 5
49 & 5	Less Than 5
50 & 6	Less Than 5
64 & 3	Less Than 5
91 & 2	Less Than 5
Measure Between Breakout Box Terminals (2)	
3 & (3)	More Than 10,000
49 & (3)	More Than 10,000
50 & (3)	More Than 10,000
64 & (3)	More Than 10,000

(1) Measuring for open circuit.

(2) Measuring for short circuit.

(3) Measure between specified terminal and breakout box terminals No. 51, 71, 76, 77, 91, 97, 103 and ground.

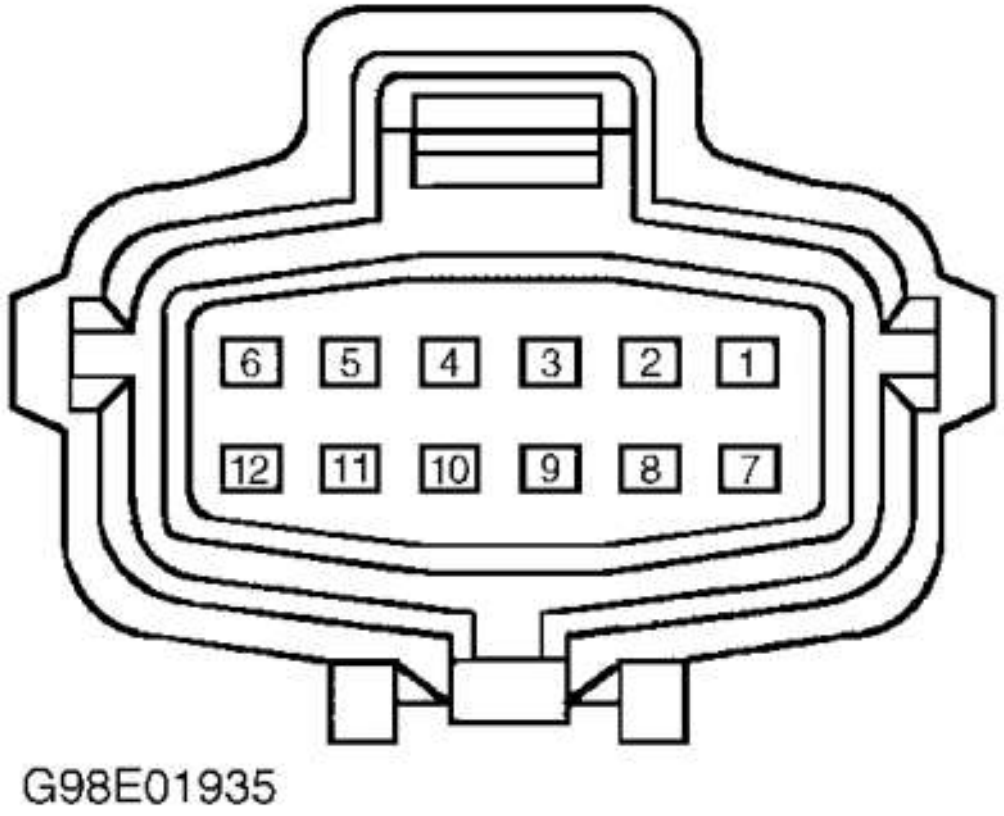

Fig. 5: Identifying TR Sensor Harness Connector
Courtesy of FORD MOTOR CO.

6. Check PCM Harness For Short Circuit Measure and record resistance between breakout box terminals No. 91 and No. 71, then between terminals No. 91 and No. 97. Resistance should be more than 10,000 ohms. Measure and record resistance between breakout box terminals specified. See PCM HARNESS RESISTANCE SPECIFICATIONS table. If resistance is as specified, go to next step. If resistance is not as specified, repair short circuit. Clear DTCs and perform QUICK TEST.
7. Check TR Sensor & PCM Input Circuit Using DVOM, measure resistance between breakout box terminals No. 3, 49, 50 and 64. Resistance between all terminals should be 10,000 ohms. If resistance is as specified, replace PCM and reconnect PCM and TR sensor connectors. Clear DTCs and perform QUICK TEST. If resistance is not as specified, repair short circuit. Reconnect PCM and TR sensor connectors. Clear DTCs and perform QUICK TEST.
8. Check TR Sensor Connect TR Sensor "E" Cable (007-00111) to transmission tester and TR sensor. Place Transmission Tester Digital TR Sensor Overlay (007-00131) onto transmission tester. See **Fig. 6**. Perform SWITCH TEST as described on overlay. If transmission tester indicates sensor does not operate correctly, replace TR sensor and adjust. Clear DTCs and perform QUICK TEST. If

transmission tester indicates sensor operates correctly, TR sensor is okay. Check starting or back-up light circuits. See appropriate STARTERS article in STARTING & CHARGING SYSTEMS section.

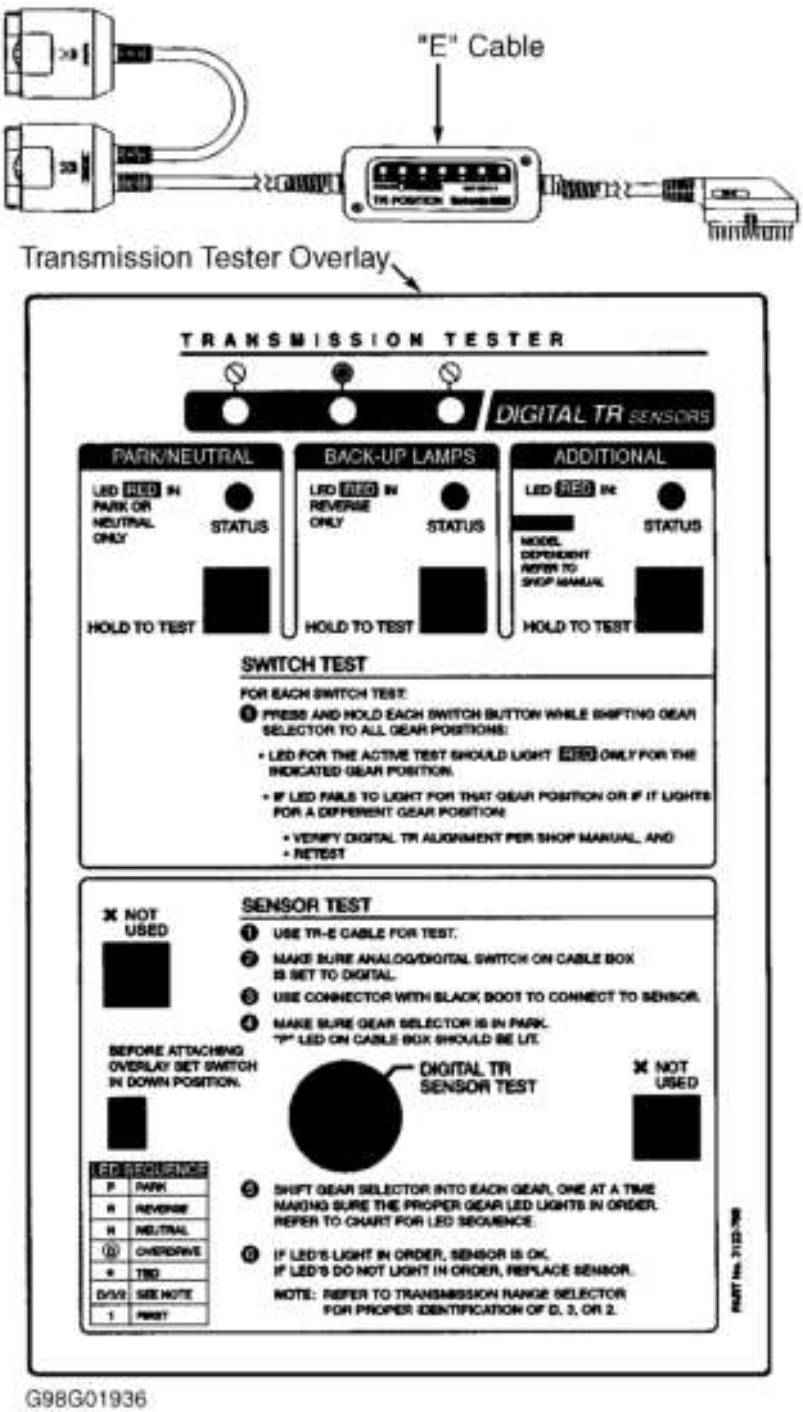

Fig. 6: Identifying TR Sensor "E" Cable & Transmission Tester Digital TR Sensor Overlay
Courtesy of FORD MOTOR CO.

TEST E: EPC SOLENOID

NOTE: All TR sensor and VSS DTCs must be repaired before entering Output State Control (OCS) mode.

NOTE: Enter "XXX" and press SEND after each step in which a command was sent to transmission. This will clear any commands sent.

1. Electronic Diagnostics Ensure transmission harness connector is in acceptable condition. Repair as necessary. Connect scan tool to data link connector. Turn ignition on. Select the following modes in order: Diagnostic Data Link; PCM; Active Command Modes; Output State Control; Trans-Bench Mode. If scan tool enters Trans-Bench Mode, go to next step. If scan tool does not enter Trans-Bench Mode, repeat step once. If scan tool fails again, diagnose problem with PCM or scan tool operation. See appropriate TESTS W/CODES article in ENGINE PERFORMANCE section.
2. Wiggle Test With scan tool in Trans-Bench mode, select PID-EPC mode. Enter a value between 0-90 and press SEND. While monitoring scan tool, wiggle transmission harness connector. If EPC state does not change, go to next step. If EPC state changes, repair open or short in transmission wiring harness or connector.
3. Check EPC Solenoid Operation Install a 300 psi gauge to EPC pressure port. See FORD 5R55E overhaul article. With transmission in "P" position, start engine. While monitoring gauge, select a value 15-90, in increments of 15 and press SEND. Select a different value between 0-90 and press send. If value sent and gauge pressure do not match, go to next step. If value sent and gauge pressure match, clear DTCs and perform QUICK TEST.
4. Check EPC Solenoid Power Circuit Turn engine off. Raise and support vehicle. Drain and remove transmission fluid pan. Inspect transmission wiring and connectors for damage. Repair as necessary. Turn ignition on. Using DVOM, measure voltage between transmission wiring harness connector terminal No. 11 and ground. See **Fig. 4**. If battery voltage exists, go to next step. If battery voltage does not exist, repair open or short in wiring harness. See WIRING DIAGRAMS.
5. Electrical Signal Test Connect DVOM to transmission wiring harness connector terminals No. 11 and No. 12. See **Fig. 4**. Select TRANS-BENCH mode. Select PID EPC mode. While monitoring DVOM, select a value between 0-90 and press SEND. Select another value between 0-90 and press SEND. If voltage and solenoid state change, go to next step. If voltage and solenoid state does not change, check and repair open or short circuit in wiring harness or PCM.
6. Check Resistance Of Solenoid Disconnect transmission wiring harness. Measure resistance between transmission wiring connector terminals No. 11 and No. 12. See **Fig. 4**. Resistance should be 3.1-5.7 ohms. If resistance is as specified, go to next step. If resistance is not as specified, replace EPC solenoid. Clear DTCs and perform QUICK TEST.
7. Check Solenoid For Short To Ground Check continuity between EPC solenoid terminals and ground. If continuity exists at either terminal, replace solenoid. If continuity does not exist, diagnose problem by symptom. See SYMPTOM DIAGNOSIS.

TEST F: TURBINE SHAFT SPEED (TSS) SENSOR

1. Electronic Diagnostics Ensure transmission harness connector is in acceptable condition. Repair as necessary. Connect scan tool to DLC. Turn ignition on. Select the following modes in order: Diagnostic Data Link; PCM; PID/Data Monitor and Record. Select TSS, OSS or ODS (if equipped) PIDs to monitor. If scan tool enters PID mode, go to next step. If scan tool does not enter PID mode, check problem in scan tool or PCM. See appropriate BASIC-DIAGNOSTICS PROCEDURES article in ENGINE PERFORMANCE section.
2. Wiggle Test While monitoring each sensors output state, wiggle wiring harness connector. If any sensors output state changes, repair open or short in transmission wiring harness and connector. If

sensors output state does not change, go to next step.

3. Drive Cycle Test While monitoring each sensor, drive vehicle through all gears. Ensure transmission also downshifts through all gears. If sensor output state increases and decreases with engine and vehicle speed, clear all DTCs. Road test vehicle to verify problem still exists. See QUICK TEST. If sensor output state does not increase or decrease with engine or vehicle speed, check and repair open or short in wiring harness. Check PCM or internal hardware problem. If sensor output state is steady, go to next step.
4. Check Sensor Resistance Disconnect appropriate wiring harness connector. On OSS (and ODS if equipped), measure resistance between connector terminals. On TSS, measure resistance between transmission wiring harness connector terminals No. 2 and No. 3. See **Fig. 4**. OSS and ODS resistance should be 305-735 ohms. TSS resistance should be 64-126 ohms. If resistances are as specified, diagnose problem by symptom. See SYMPTOM DIAGNOSIS. If resistances are not as specified, replace sensor. Clear DTCs and perform QUICK TEST.

TEST H: SOLENOID MECHANICAL FAILURE

NOTE: Before repairing DTCs P1714, P1715, P1716, P1717 or P1740, all other DTCs must be repaired and cleared.

1. Electronic Diagnostics Connect scan tool to DLC. Turn ignition on. Perform KOEO test until continuous DTCs are displayed. If any codes other than P1714, P1715, P1716, P1717 or P1740 are set, repair them first. Clear DTCs and perform QUICK TEST. If only codes P1714, P1715, P1716, P1717 or P1740 are set, replace appropriate solenoid and go to next step.
2. Transmission Drive Cycle Test Perform transmission drive cycle test. See TRANSMISSION DRIVE CYCLE TEST. If transmission shifts normally, go to next step. If transmission does not shift normally, diagnose problem by symptom. See SYMPTOM DIAGNOSIS.
3. Retrieve DTCs Perform KOEO test again until continuous DTCs are displayed. If DTCs P1714, P1715, P1716, P1717 or P1740 are set again, replace PCM and perform transmission drive cycle. Also perform QUICK TEST. If DTCs P1714, P1715, P1716, P1717 or P1740 are not set, no problems should exist. If problems still exist, diagnose by symptom. See SYMPTOM DIAGNOSIS.

TEST TB: TRANSMISSION CONTROL SWITCH (TCS), TRANSMISSION CONTROL INDICATOR LAMP (TCIL)

NOTE: Start at Step 6) for testing TCIL circuit.

1. Check TCS Operation Turn ignition off. Connect scan tool to Data Link Connector (DLC). Start engine and allow to idle. Using scan tool, access TCS PID. Cycle TCS switch, then hold depressed. If TCS PID is on, go to next step. If TCS PID is off, repeat KOER self-test to cycle TCS.
2. Check TCS Circuit Voltage Turn ignition off. Disconnect PCM 104-pin connector. Inspect pins for damage. Install breakout box, leaving PCM disconnected. Turn ignition on. While cycling TCS, measure voltage between breakout box terminal No. 29 (TCS) and terminals No. 24 and 77 (PWR GND). If voltmeter reading does not cycle when TCS is cycled, go to next step. If voltmeter reading cycles when TCS is cycled, replace PCM and repeat QUICK TEST.
3. Check Circuit For Short To Ground Turn ignition off. Disconnect TCS. Inspect pins for damage and repair if necessary. Measure resistance between breakout box terminal No. 29 (TCS) and terminals No. 24 and 77 (PWR GND). If resistance is 10,000 ohms or more, go to next step. If resistance is less than 10,000 ohms, repair short circuit and repeat QUICK TEST.
4. Check Continuity Of TCS Circuits Leave ignition off. Connect ohmmeter positive lead to TCS key

power at the fuse panel. See WIRING DIAGRAMS. Connect negative lead to power terminal of TCS wiring harness connector. Note resistance measurement. Measure resistance of Tan/White wire between breakout box terminal No. 29 (TCS) and TCS connector. If both resistance measurements are less than 5 ohms, go to next step. If either resistance measurement is 5 ohms or more, repair open circuit and repeat QUICK TEST.

5. Check Circuit For Short To Power Leave ignition off. Measure resistance between breakout box terminal No. 29 (TCS) and terminals No. 71 and 97 (VPWR). If resistance is 10,000 ohms or more, replace TCS switch and repeat QUICK TEST. If resistance is less than 10,000 ohms, repair short circuit and repeat QUICK TEST.
6. Check TCIL Operation Turn ignition off. With scan tool connected to DLC, access TCIL PID. Cycle TCS switch. If TCIL PID changes from ON to OFF, fault is intermittent. See appropriate TROUBLE SHOOTING - NO CODES article in ENGINE PERFORMANCE. If TCIL PID does not change as specified, go to next step.
7. Check For Short to Ground In TCIL Circuit Turn ignition off. Disconnect PCM 104-pin connector. Inspect pins for damage. Repair as necessary. Turn ignition on. If TCIL goes off, replace PCM. If TCIL remains on, repair TCIL circuit short to ground.
8. Check For DTC P1780 Perform KOER self-test. If DTC P1780 is not present, go to next step. If DTC P1780 is present, go to step 1).
9. Check TCIL Circuit Voltage Turn ignition on. Measure voltage between TCIL terminal and terminals No. 24 and 76 (PWR GND) at breakout box. If voltage is 2 volts or more, replace PCM. If voltage is less than 2 volts, check indicator bulb and fuse. If bulb and fuse are okay, repair open circuit between terminal No. 79 and ignition switch.

TEST TG: 4WD LOW RANGE SWITCH

1. Check 4WD Low Position DTC P1729 indicates 4WD switch open or short circuit. DTC P1781 indicates 4WD Low switch position closed during QUICK TEST. If switch position was not in 2WD or 4WD High during KOEO QUICK TEST, select 2WD or 4WD High and repeat QUICK TEST. If switch position was as specified, go to next step.
2. Check Intermittent Circuit Failure Turn ignition off. Connect scan tool to DLC. Using scan tool, access 4WD Low PID. Turn ignition on. Cycle switch to 2WD. Shake and bend sections of wiring harness between generic electronic module and transfer case wiring harness connector. Shake and bend sections of wiring harness between generic electronic module and PCM. Tap wiring harness connector to simulate road shock. If scan tool voltage fluctuates, isolate fault and repair as necessary. If scan tool voltage does not fluctuate, go to next step.
3. Check Signal From PCM Turn ignition off. Disconnect PCM 104-pin connector. Inspect pins for damage and repair if necessary. Install breakout box, leaving PCM disconnected. Turn ignition on. While cycling switch, measure voltage between breakout box terminal No. 14 and No. 24 (PWR GND). If voltage cycles, replace PCM and repeat QUICK TEST. If voltage does not cycle, go to next step.
4. Check Circuit Continuity Turn ignition off. Disconnect electronic shift control module. Inspect pins for damage and repair if necessary. Measure resistance between breakout box terminal No. 14 and 4WD Low switch wiring harness connector terminal No. 2. See **Fig. 7** or **Fig. 8**. If resistance is 5 ohms or less, go to next step. If resistance is more than 5 ohms, repair open circuit and repeat QUICK TEST.
5. Check For Short To Power Or Ground Leave ignition off. Reconnect electronic shift control module. Measure resistance between breakout box terminal No. 14 and No. 24. Measure resistance between breakout box terminal No. 14 and terminals No. 71 (VPWR). If any resistance measurement is more than 10,000 ohms, repair transfer case mechanical fault. See appropriate TRANSFER CASES article.

If any resistance measurement is 10,000 ohms or less, repair short circuit and repeat QUICK TEST.

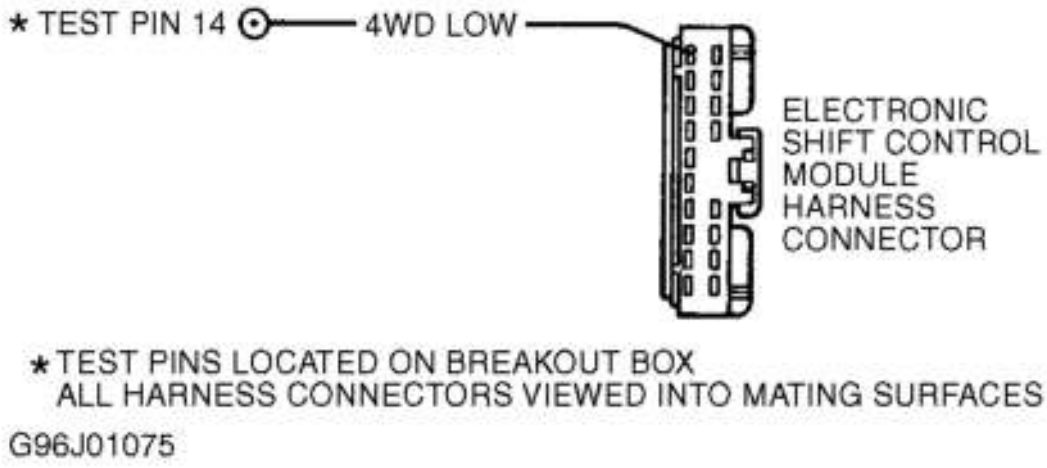

Fig. 7: Identifying Electronic Shift Control Module Test Circuit (Electronic Shift)
Courtesy of FORD MOTOR CO.

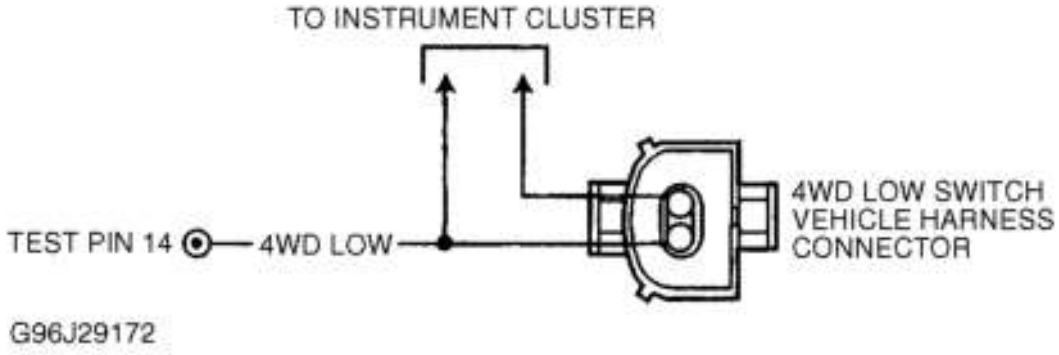

Fig. 8: Identifying 4WD Low Switch Test Circuit & Connector Terminals (Mechanical Shift)
Courtesy of FORD MOTOR CO.

WIRING DIAGRAMS

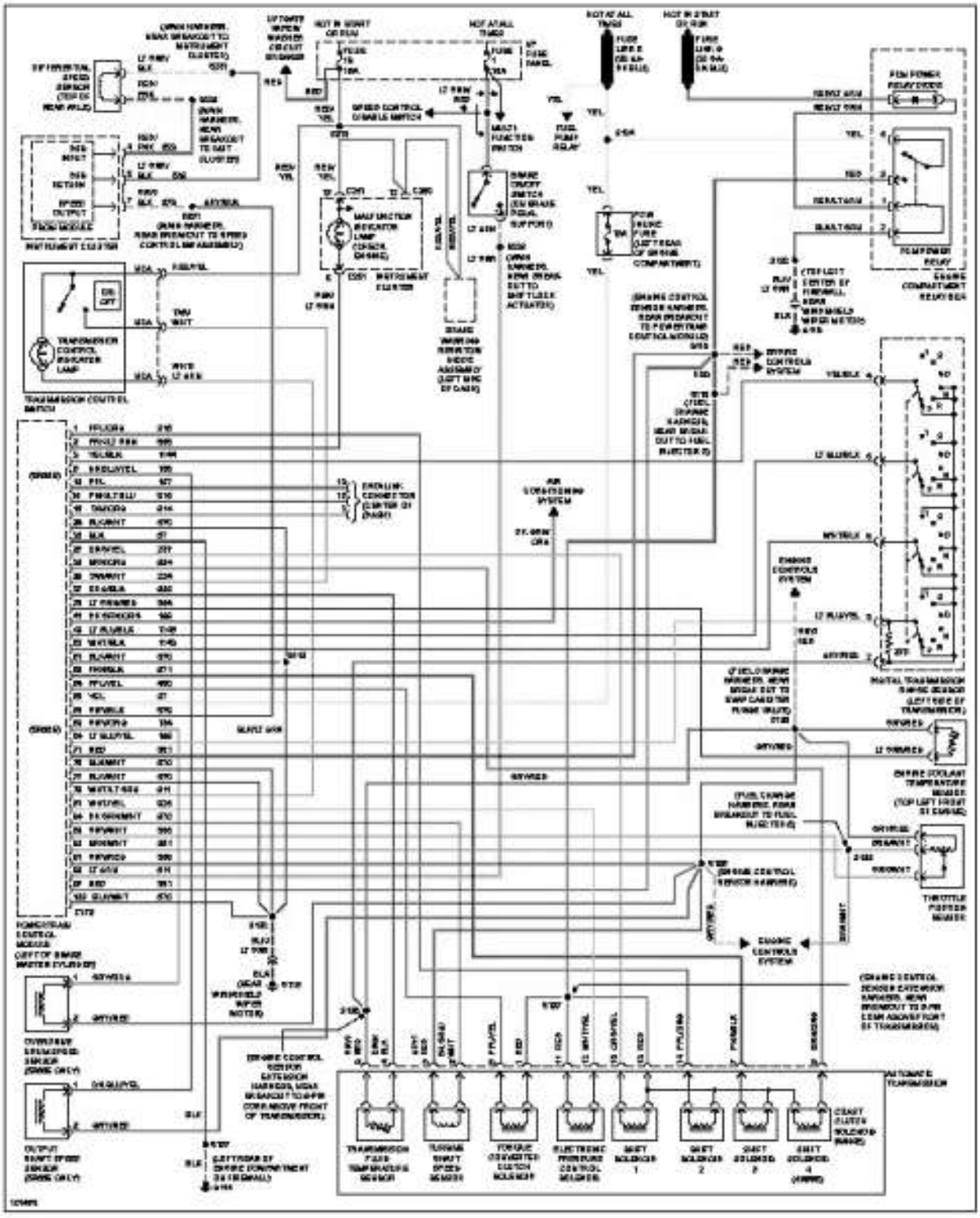

Fig. 9: 1997 Aerostar 5R55E Transmission Wiring Diagram

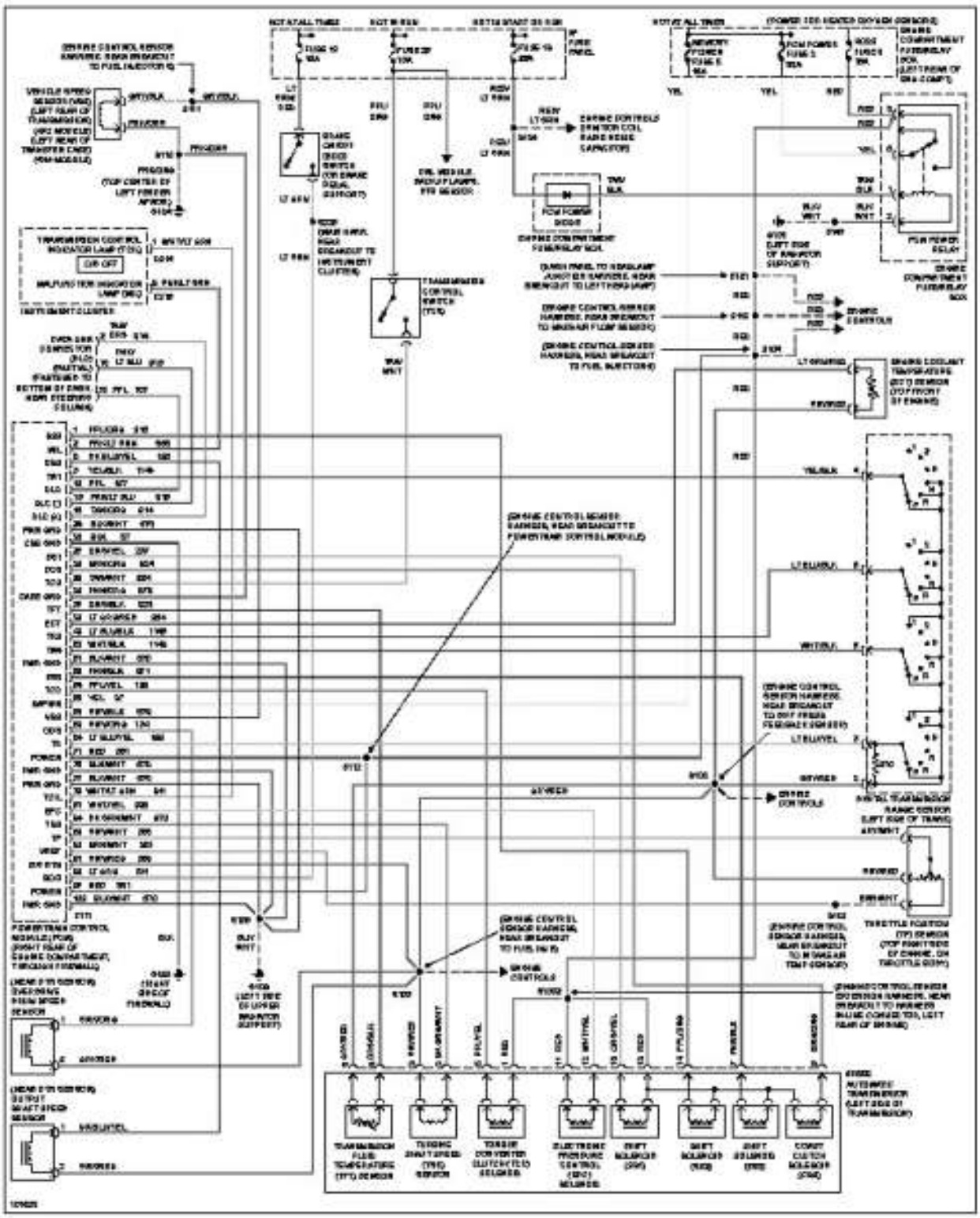

Fig. 10: 1997 Ranger 5R55E Transmission Wiring Diagram

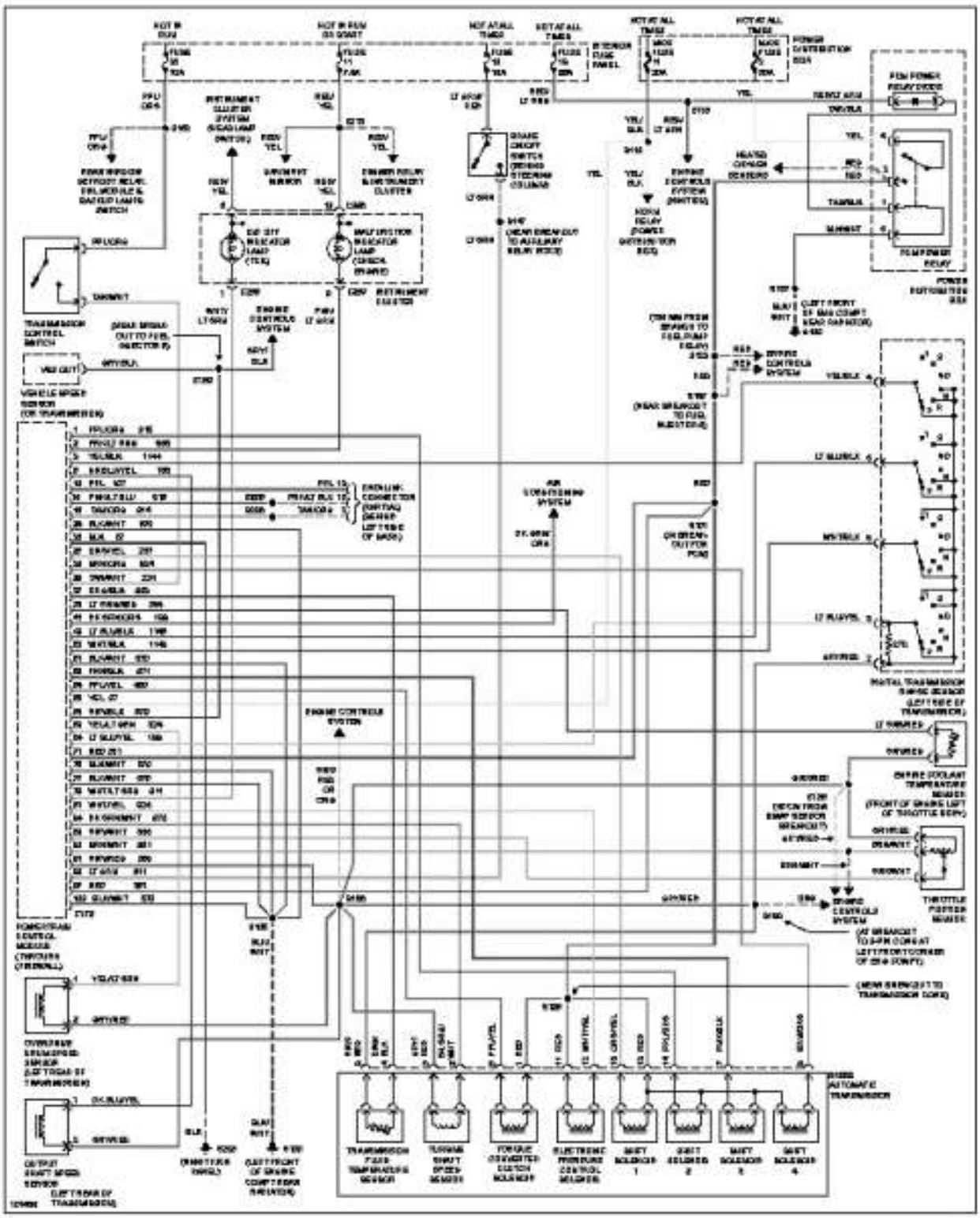

Fig. 11: 1997 Explorer & Mountaineer 5R55E Transmission Wiring Diagram

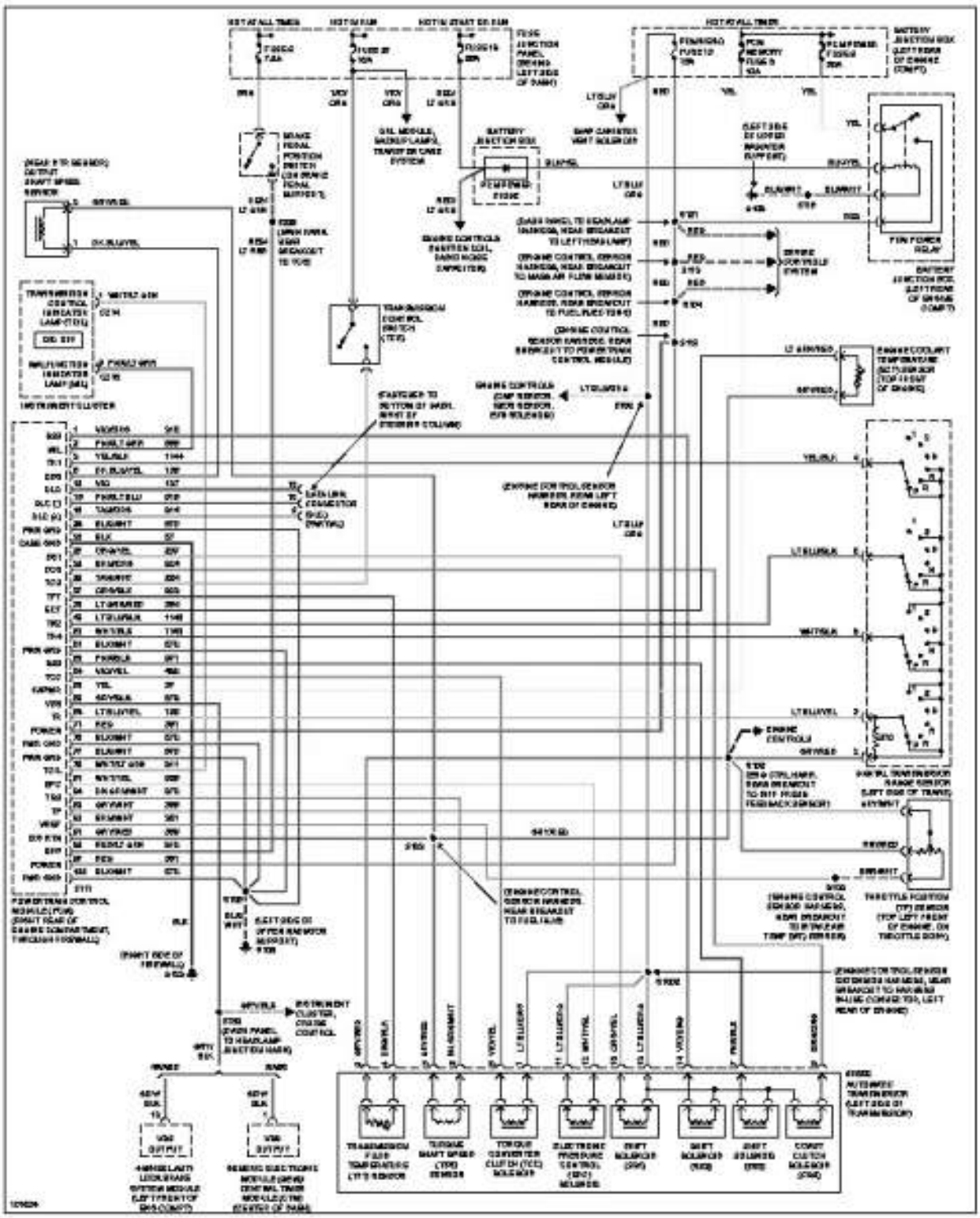

Fig. 12: 1998 Ranger 5R55E Transmission Wiring Diagram

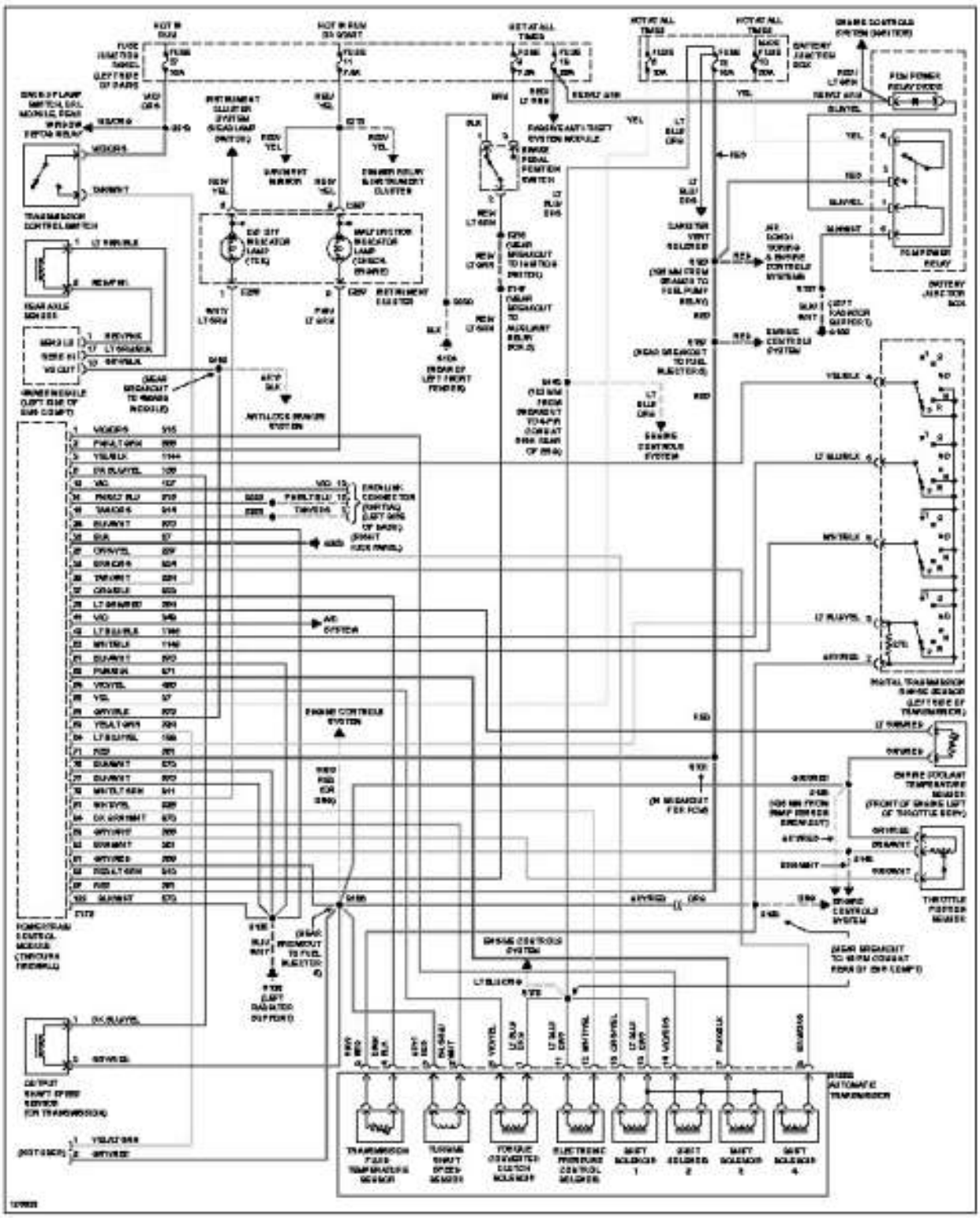

Fig. 13: 1998 Explorer & Mountaineer 5R55E Transmission Wiring Diagram