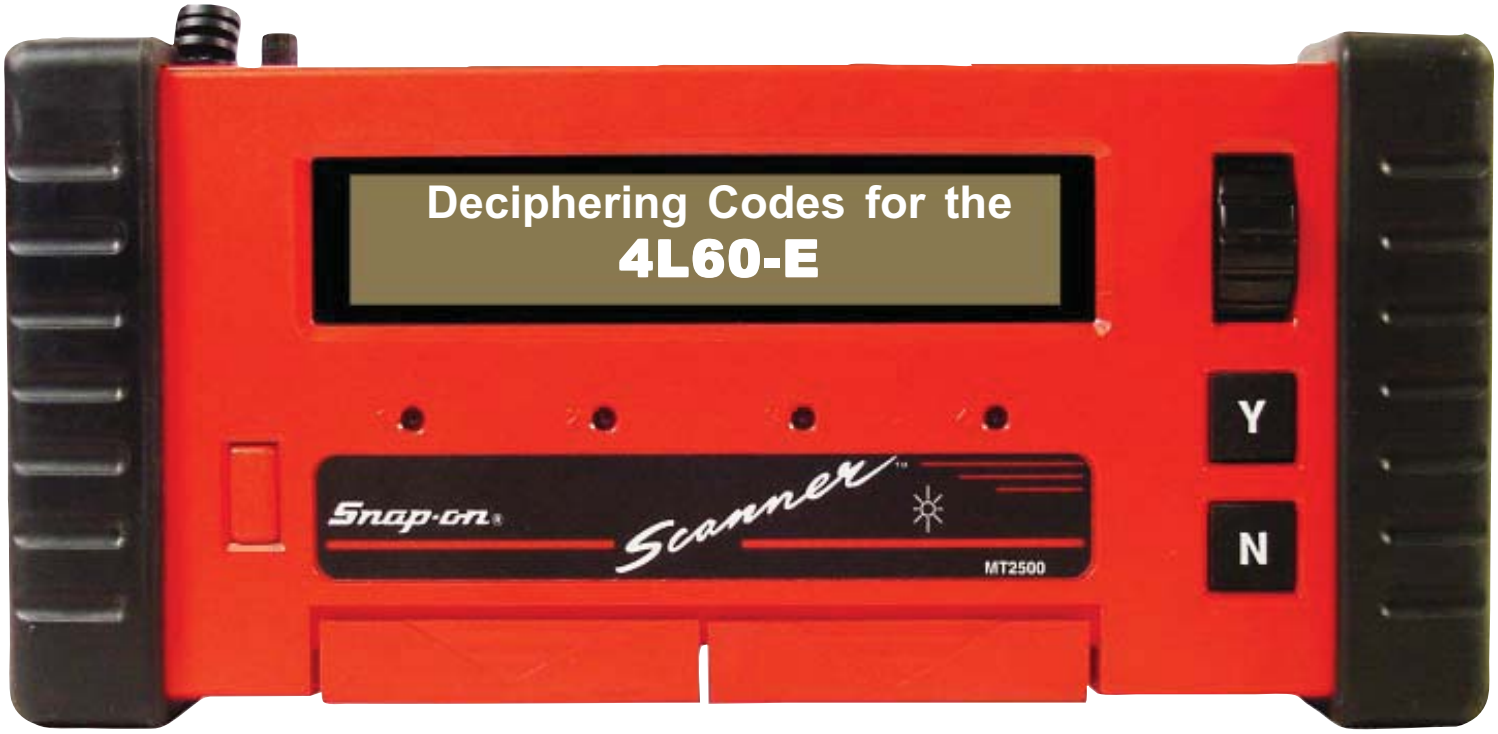


Contents

CODE ORDER

OBD-I

OBD-II

Revised - August, 2004


AAMCO
TRANSMISSIONS

4L60-E CODE: 28

Transmission Range Pressure Switch Assembly Fault

4L60-E Code 28
Transmission Range Pressure Switch Assembly Fault

Theory of Operation

The transmission range sensor assembly consists of three normally open and two normally closed pressure switches, and is attached to the valve body. The Powertrain Control Module (PCM) supplies battery voltage to each range signal wire. By grounding one or more of these circuits through various combinations of pressure switches, the PCM detects what manual valve position the vehicle operator has selected. When the pressure switch completes a circuit to ground the PCM sees 0 volts; when the switch is open the PCM sees 12 volts.

Condition for Setting the Code

Code 28 will set when the PCM detects:
- Range signals A and C are both zero volts for two seconds
- There are two possible invalid combinations **(see figure 1)**

Range Signal	A	B	C
Park	12	0	12
Reverse	0	0	12
Neutral	12	0	12
D4	12	0	0
D3	12	12	0
D2	12	12	12
D1	0	12	12
Illegal	**0**	**12**	**0**
Illegal	**0**	**0**	**0**

Figure 1—Range signal table.

Action Taken When Code Sets

The PCM will default to:
- Harsh shifts
- No Torque Converter Clutch (TCC)
- No 4th

Possible Causes

- Defective pressure switch assembly
- Shorts or opens in circuit wiring
- Bad PCM
- Hydraulic cross leaks

Diagnosis

Step 1

Connect the Snap-On scanner. In the transmission codes and data display you have to monitor the PRNDL SW and Range A, B and C parameters.
With the engine running, slowly move the manual selector through all the ranges.
Carefully watch the Range A, B and C parameters. Do the voltage readings match the chart in **figure 1**?
If yes, the problem is intermittent. Check the transmission case connector for corroded damaged or pushed out terminals. Try to duplicate the condition by shaking the vehicle wiring harness.
If no, go to step 2.

Step 2

While moving the manual selector did any of the Ranges A, B or C read 12 volts or 0 volts all the time?
If yes, go to step 4.
If no, go to step 3.

Step 3

While moving the manual selector did Range A, B and C read correctly in Park, Reverse and Drive 3?
If yes, the wiring and PCM are OK.
The problem is either a bad switch or hydraulic cross leak.

Step 4

With the ignition key off, disconnect the transmission case connector. Check the case and harness connectors for corroded, damaged or pushed out terminals.
Turn the ignition key on. On the scanner data display does Range A, B and C read 12 volts?
If yes, go to step 5.
If no, go to step 7.

Range Signal Circuits

CAV	COLOR	FUNCTION
N	PK	RANGE SIGNAL A
R	DB	RANGE SIGNAL B
P	RD	RANGE SIGNAL C

Harness side

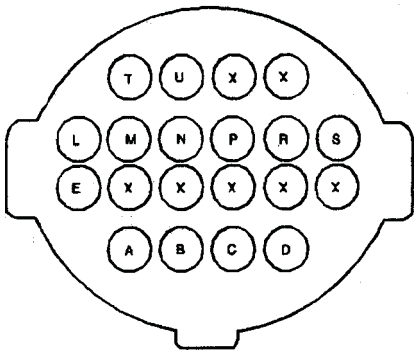


Figure 2—Range signal circuits.

STEP 5

With the ignition key on, check for voltage at the appropriate cavities of the transmission harness connector for Range signal A, B and C circuits **(see figure 2 for wire color and circuit location)**.
Do you have 10.5 volts or more at each terminal?
If yes, go to step 6.
If no, repair the open in the range signal circuit(s) wiring to the PCM.

STEP 6

With the ignition key on, ground the appropriate cavity for range signal A, B, and C **(see figure 2)** at the transmission harness connector.
Watch the scan data. Does the voltage change from 12 to 0 volts on only the range signal circuit that is grounded?
If yes, go to step 8.
If no, repair the short between the range signal circuit wiring.

STEP 7

With the ignition key off, disconnect the appropriate harness connector(s) from the PCM for the range signal A, B and C circuits **(see appendix F for connector, wire color and circuit location)**. Check the PCM and harness connector for corroded, damaged or pushed out terminals.
Measure the resistance between the appropriate cavities for range signal circuit A, B and C **(see figure 2)** at the transmission harness connector and ground.
Is the resistance 5 ohms of less?
If yes, repair the short to ground in the range signal circuit(s) wiring.
If no, replace the PCM.

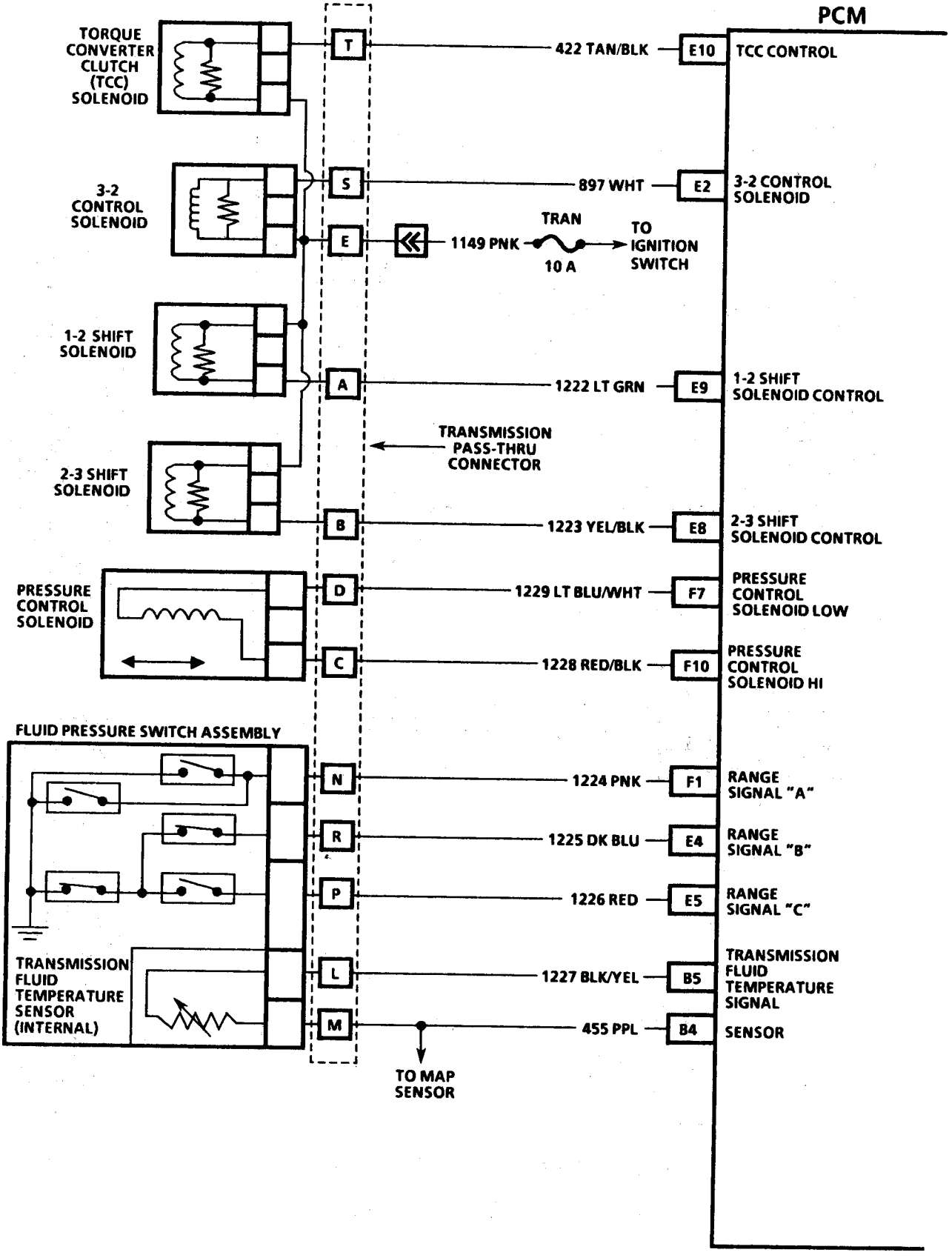
STEP 8

Remove the transmission pan.
Remove the internal transmission wiring harness. Check the harness and connectors for corroded, damaged or pushed out terminals. Also look for broken, chaffed or shorted wires.
Does the harness check OK?
If yes, replace the transmission range pressure switch assembly.
If no, replace the internal transmission wiring harness.

2

Wiring Diagram

(early)



4L60-E CODE: 66

3-2 Solenoid Circuit Fault

4L60-E Code 66
3-2 Control Solenoid Circuit Fault

Theory of Operation

The 4L60-E transmission uses a 3-2 control solenoid to coordinate the apply rate of the 2-4 band with hydraulic release, and the 3-4 clutch during 3-2 downshifts. The Powertrain Control Module (PCM) continually monitors the 3-2 circuit duty cycle depending on the commanded state of the circuit. When the transmission is in 1st gear the duty cycle of the solenoid is equal to zero. When the transmission is in 2nd gear or higher the duty cycle of the solenoid will be about 90%. When the transmission downshifts, 3-2, the duty cycle of the solenoid will drop. The PCM monitors voltage or “feed back” on the solenoid ground wire to determine if the circuit has continuity.

Circuit Description

The transmission shift and TCC, and 3-2 control solenoids receive voltage through a fuse from the ignition switch. The PCM controls the solenoids by opening or closing the ground path on the solenoid control circuit.

Conditions for Setting the Code

- The PCM commands the 3-2 control solenoid on, and the voltage remains high for 4 seconds
- The PCM commands the 3-2 control solenoid off, and the voltage remains low for 4 seconds

Action Taken When Code Sets

The PCM will default to:
- 3rd gear only
- Maximum line pressure
- No TCC
- May illuminate the malfunction indicator lamp

Possible Causes

- Wiring or connector problems in the transmission 3-2 control solenoid power or control circuits
- Defective solenoid
- Defective PCM
- Defective ignition switch
- Defective transmission power fuse

Diagnosis

STEP 1

With the Snap-On scanner, check and record all trouble codes. Clear codes and road test vehicle.
See if the code returns.
If the code does not return the problem is intermittent. Try shaking the wiring and connectors to duplicate the condition. Inspect connectors for corroded, damaged or pushed out pins.
If the code does return, are codes 67,81,82 and 83 (code 83 is for 1995 only) also present.
If yes, check the transmission power fuse. If the fuse is good, go to step 3.
If codes 67,81,82 and 83 are not present, and you have Kwik-Test Plus, go to step 2.
If you do not have a Kwik-Test plus, go to step 3.

STEP 2

Disconnect the vehicle wiring harness from the transmission case connector. Inspect the case and harness connectors for corroded, damaged or pushed out terminals.
Following the instructions in the Kwik-Test Plus manual, check the 3-2 control solenoid resistance, current and voltage.
Does the solenoid check OK?
If yes, go to step 3.
If no, go to step 7.

STEP 3

Disconnect the vehicle wiring harness from the transmission case connector. Inspect the case and harness connectors for corroded, damaged or pushed out terminals.
With the ignition key on, measure the voltage at cavity E of the transmission harness connector **(see figure 3 for wire color and circuit location)**.
Are there 10.5 volts or more?
If yes, go to step 4.
If no, repair open in the vehicle solenoid power circuit.

STEP4

With the ignition key off, disconnect the appropriate harness connector from the PCM for the 3-2 control solenoid circuit **(see appendix F for connector, wire color and circuit location)**.
Inspect the PCM and connector for corroded, damaged or pushed out terminals.
Measure resistance between the appropriate cavity for the 3-2 control solenoid of the PCM harness connector and cavity S of the transmission harness connector **(see figure 3)**.
Is the resistance 5 ohms or less?
If yes, go to step 5.
If no, repair open in the solenoid control circuit.

STEP 5

Remove the transmission power fuse.
Measure the resistance between cavity E and cavity S of the transmission harness connector **(see figure 3)**.
Is the resistance 5 ohms or less?
If yes, repair short to power in the solenoid control circuit.
If no, go to step 6.

STEP 6

Measure the resistance between cavity S of the transmission harness connector and ground **(see figure 3)**.
Is the resistance 5 ohms or less?
If yes, repair short to ground in the solenoid control circuit.
If no and you **DID** use the KwikTest Plus box to get to this point in your diagnosis, replace the PCM/TCM.
If no and you **DID NOT** use the KwikTest Plus box, go to Step 7.

STEP 7

Remove the transmission pan.
Disconnect the internal transmission wiring harness from the 3-2 control solenoid. Inspect the solenoid and the connector for corroded, damaged or pushed out terminals.
Measure the resistance between the two 3-2 control solenoid terminals.
Is the resistance 9–14 ohms?
If yes, go to step 8.
If no, replace solenoid.

STEP 8

Remove the internal transmission wiring harness. Inspect harness for broken wires, damaged insulation or connectors.
Check the solenoid power and ground wires for continuity through the case connector.
Does the internal harness test OK?
If yes, replace the PCM.
If no, replace harness.

CAV	COLOR	FUNCTION
E	PK	TRANSMISSION SOLENOID POWER
S	WT	3-2 SHIFT SOLENOID VALVE ASSEMBLY CONTROL

Harness side

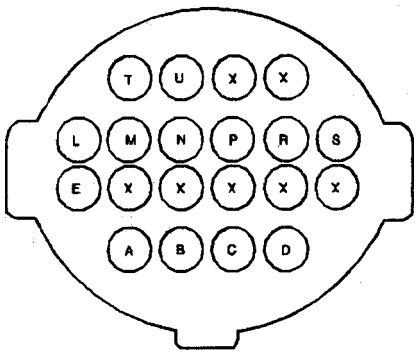
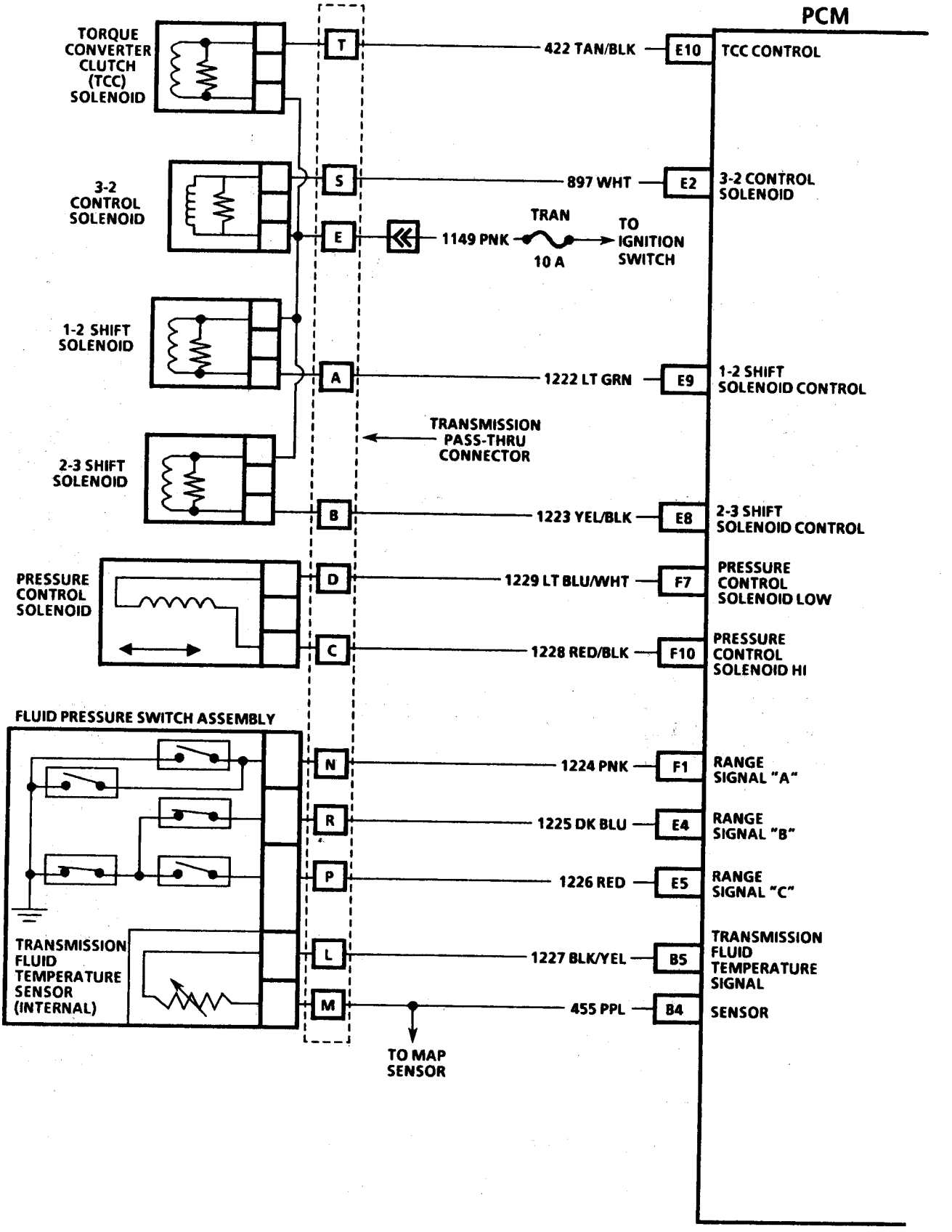


Figure 3—Solenoid power and control circuit ID.

Wiring Diagram

(early)




4L60-E CODE: 67
TCC Solenoid Circuit Fault

4L60-E Code 67
Torque Converter Clutch (TCC) Solenoid Circuit Fault

Theory of Operation

The 4L60-E transmission uses a TCC to provide a mechanical connection between the engine and transmission. This is done to improve drive line efficiency and fuel economy. The Powertrain Control Module (PCM) continually monitors and receives input signals from various electrical sensors. The PCM processes these signals and determines when to apply and release the TCC. It accomplishes this by turning the TCC solenoid on and off. The PCM monitors voltage or "feed back" on the solenoid ground wire to determine if the circuit has continuity.

Circuit Description

The transmission shift, TCC and 3-2 control solenoids receive voltage through a fuse from the ignition switch. The PCM controls the solenoids by opening or closing the ground path on the solenoid control circuit.

Conditions for Setting the Code

- The PCM commands the TCC solenoid on, and the voltage remains high for 2 seconds
- The PCM commands the TCC solenoid off, and the voltage remains low for 2 seconds

Action Taken When Code Sets

The PCM will default to:
- No 4th gear in hot mode
- No TCC
- May illuminate the malfunction indicator lamp

Possible Causes

- Wiring or connector problems in the transmission TCC solenoid power or control circuits
- Defective solenoid
- Defective PCM
- Defective ignition switch
- Defective transmission power fuse

Diagnosis

Step 1

With the Snap-On scanner, check and record all trouble codes. Clear codes and road test the vehicle.
See if the code returns. If the code does not return the problem is intermittent. Try shaking the wiring and connectors to duplicate the condition. Inspect connectors for corroded, damaged or pushed out pins.
If the code returns, are codes 66,81,82 and 83 (code 83 is for 1995 only) also present?
If yes, check the transmission power fuse.
If the fuse is good, go to step 3.
If codes 66,81,82 and 83 are not present, and you have a Kwik-Test Plus, go to step 2.
If you do not have a Kwik-Test plus, go to step 3.

Step 2

Disconnect the vehicle wiring harness from the transmission case connector. Inspect the case and harness connectors for corroded, damaged or pushed out terminals.
Following the instructions in the Kwik-Test Plus manual, check the TCC solenoid resistance, current and voltage.
Does the solenoid check OK?
If yes, go to step 3.
If no, go to step 7.

Step 3

Disconnect the vehicle wiring harness from the transmission case connector. Inspect the case and harness connectors for corroded, damaged or pushed out terminals.
With the ignition key on, measure the voltage at cavity E of the transmission harness connector **(see figure 4 for wire color and circuit location)**.
Is there 10.5 volts or more?
If yes, go to step 4.
If no, repair open in the vehicle solenoid power circuit.

Step4

With the ignition key off, disconnect the appropriate harness connector from the PCM for the TCC solenoid control circuit **(see appendix F for connector, wire color and circuit location)**.
Inspect the PCM and connector for corroded, damaged or pushed out terminals.
Measure resistance between the appropriate cavity for the TCC solenoid of the PCM harness connector and cavity T of the transmission harness connector **(see figure 4)**.
Is the resistance 5 ohms or less?
If yes, go to step 5.
If no, repair open in the TCC solenoid control circuit.

STEP 5

Remove the transmission power fuse.
Measure the resistance between cavity E and cavity T of the transmission harness connector **(see figure 4)**.
Is the resistance 5 ohms or less?
If yes, repair short to power in the TCC solenoid control circuit.
If no, go to step 6.

STEP 6

Measure the resistance between cavity T of the transmission harness connector and ground **(see figure 4)**.
Is the resistance 5 ohms or less?
If yes, repair short to ground in the solenoid control circuit.
If no and you **DID** use the KwikTest Plus box to get to this point in your diagnosis, replace the PCM/TCM.
If no and you **DID NOT** use the Kwik Test Plus box, go to Step 7.

STEP 7

Remove the transmission pan.
Remove the internal transmission wiring harness and TCC solenoid assembly. Inspect the solenoid and the harness for broken wires, damaged insulation or connectors.
Check the solenoid power and ground wires for continuity through the case connector.
Check the case connector for corroded, damaged or pushed out terminals.
Measure the resistance between pins E and T of the transmission case connector **(see page F-1 in appendix F)**.
Is the resistance 20-40 ohms?
If yes, replace the PCM.
If no, replace the solenoid and harness assembly.

CAV	COLOR	FUNCTION
E	PK	TRANSMISSION SOLENOID POWER
T	TN/BK	TCC SOLENOID

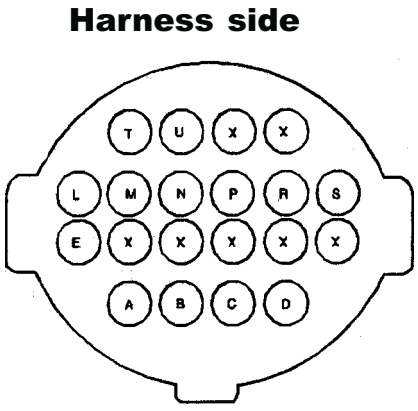
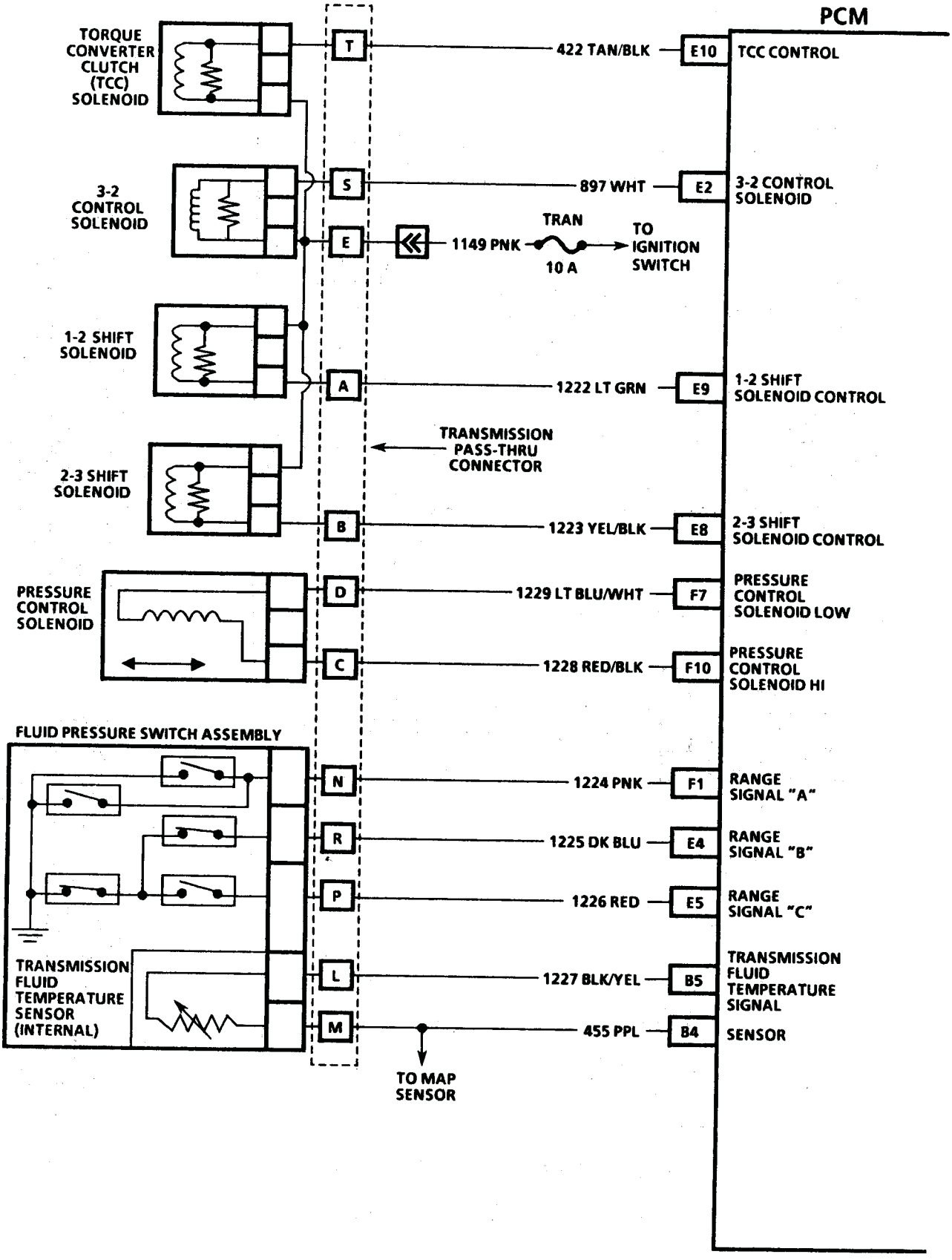


Figure 4—Solenoid power and control circuit ID.

Wiring Diagram

(early)



4L60-E CODE: 73

Pressure Control Solenoid Circuit Fault

4L60-E Code 73
Pressure Control Solenoid Circuit Fault

Theory of Operation

The 4L60-E transmission uses various solenoids to control shift timing and Torque Converter Clutch (TCC) engagement. It also uses a pressure control solenoid, which is a Powertrain Control Module (PCM) controlled device to regulate transmission main line pressure. The PCM compares TP voltage, engine RPM and other inputs to determine the line pressure appropriate for a given load. The PCM will regulate the line pressure by applying varying amperage to the pressure control solenoid. The applied amperage can vary from 0.1 to 1.1 amp. The PCM then monitors amperage on the return line.

Circuit Description

The transmission pressure control solenoid receives both voltage and ground from the PCM. There are two wires in this circuit that run directly from the PCM to the pressure control solenoid. The two circuits are called pressure control solenoid “high” and pressure control solenoid “low”.

Conditions for Setting the Code

- The return amperage monitored by the PCM varies greater than 0.16 amp from the commanded amperage for at least one second

Action Taken When Code Sets

- The PCM will default to full line pressure
- Harsh upshifts and downshifts
- May illuminate the malfunction indicator lamp

Possible Causes

- Wiring or connector problems in the pressure control solenoid circuit
- Defective solenoid
- Defective PCM

Diagnosis

STEP 1

With the Snap-On scanner, check and record all trouble codes. Clear codes and road test vehicle.
See if the code returns.
If the code does not return the problem is intermittent. Try shaking the wiring and connectors to duplicate the condition. Inspect connectors for corroded, damaged or pushed out pins.
If the code does return, and you have a Kwik-Test Plus, go to step 2.
If you do not have a Kwik-Test plus, go to step 3.

STEP 2

With the ignition key off, disconnect the vehicle wiring harness from the transmission case connector. Inspect the case and harness connectors for corroded, damaged or pushed out terminals.
Following the instructions in the Kwik-Test Plus manual, check the EPC solenoid resistance, current and voltage.
Does the EPC solenoid check OK?
If yes, go to step 3.
If no, go to step 9.

STEP3

With ignition key off, disconnect the appropriate PCM connector(s) for the EPC solenoid high and low circuits **(see appendix F for connector, wire color and circuit location)**.
Inspect the PCM and connector(s) for corroded, damaged or pushed out terminals.
Disconnect the transmission case connector harness. Inspect the case connector and harness connector for corroded, damaged or pushed out pins.
Measure resistance between the appropriate cavity for the EPC solenoid high circuit of the PCM harness connector **(see appendix F)** and cavity C of the transmission harness connector **(see figure 5 for wire color and circuit location)**.
Is the resistance 5 ohms or less?
If yes, go to step 4.
If no, the repair open in the EPC solenoid high circuit.

STEP 4

Measure resistance between the appropriate cavity for the EPC solenoid low circuit of the PCM harness connector **(see appendix F)** and cavity D of the transmission harness connector **(see figure 5)**.
Is the resistance 5 ohms or less?
If yes, go to step 5.
If no, repair the open in the EPC solenoid low circuit.

STEP 5

Remove the transmission power fuse.
Measure the resistance between cavity E and cavity C of the transmission harness connector **(see figure 5)**.
Is the resistance 5 ohms or less?
If yes, repair short to power in the EPC solenoid high circuit.
If no, go to step 6.

STEP 6

Measure the resistance between cavity E and cavity D, of the transmission harness connector **(see figure 5)**.
Is the resistance 5 ohms or less?
If yes, repair short to power in the EPC solenoid low circuit.
If no, go to step 7.

STEP 7

Measure the resistance between cavity C of the transmission harness connector and ground **(see figure 5)**.
Is the resistance 5 ohms or less?
If yes, repair the short to ground in the EPC solenoid high circuit.
If no, go to step 8.

STEP 8

Measure the resistance between cavity D of the transmission harness connector and ground **(see figure 5)**.
Is the resistance 5 ohms or less?
If yes, repair the short to ground in the EPC solenoid low circuit.
If no and you **DID** use the KwikTest Plus box to get to this point in your diagnosis, replace the PCM/TCM.
If no and you **DID NOT** use the KwikTest Plus box, go to Step 9.

STEP 9

Remove the transmission pan.
Disconnect the internal transmission wiring harness from the EPC solenoid. Inspect the solenoid and the connector for corroded, damaged or pushed out terminals.
Measure the resistance between the two EPC solenoid terminals.
Is the resistance 4- 8 ohms?
If yes, go to step 10.
If no, replace solenoid.

STEP 10

Remove the internal transmission wiring harness. Inspect the harness for broken wires, damaged insulation or connectors.
Check the solenoid power and ground wires for continuity through the case connector.
Does the internal harness test OK?
If yes, replace the PCM.
If no, replace the harness.

CAV	COLOR	FUNCTION
C	RD/BK	PRESSURE CONTROL SOLENOID HIGH
D	LB/WT	PC SOL. VALVE CONTROL LOW
E	PK	TRANSMISSION SOLENOID POWER

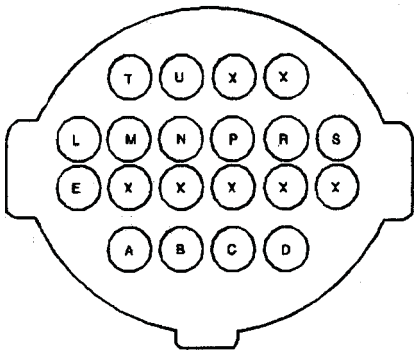
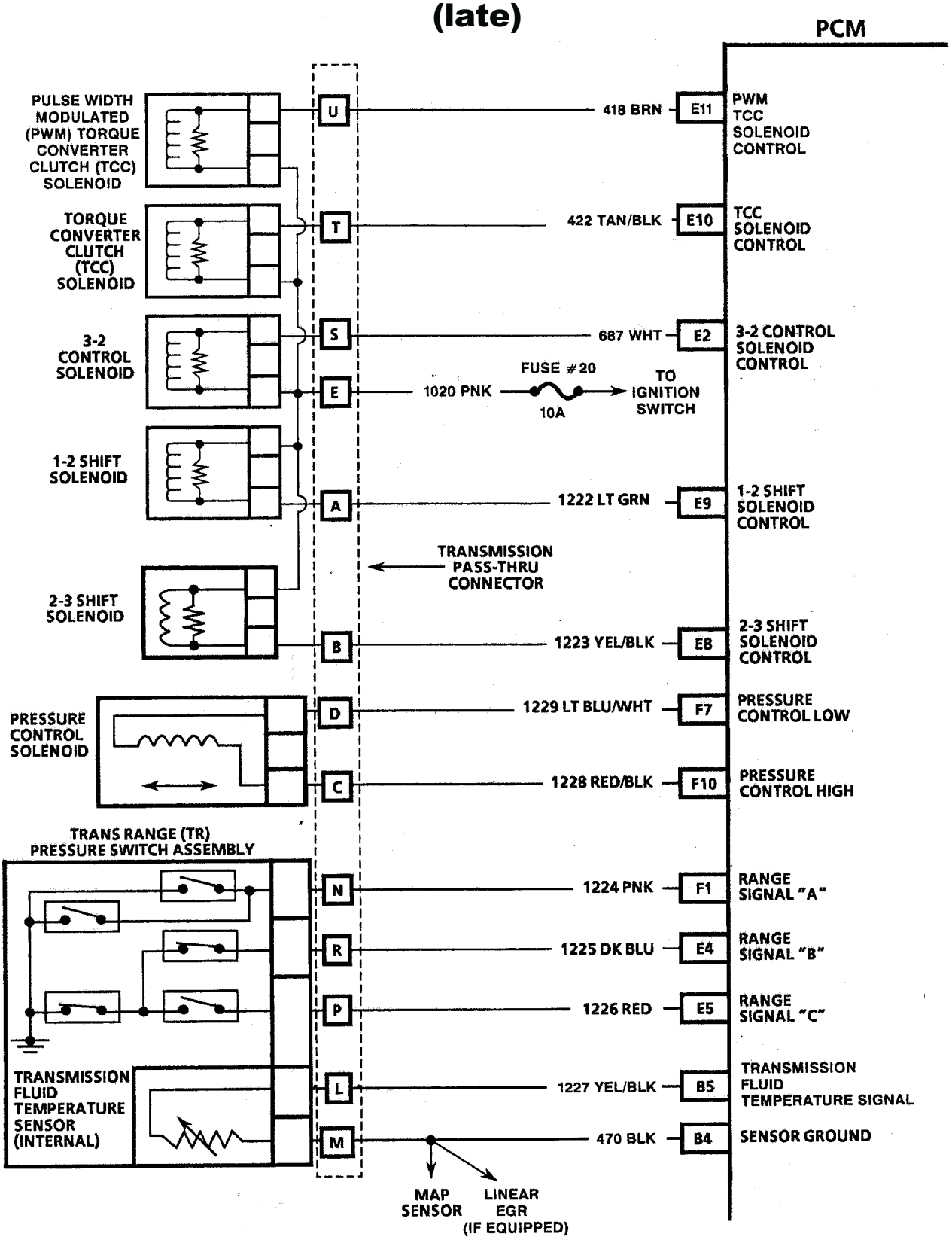


Figure 5—Solenoid power and control circuit ID.

Wiring Diagram

(late)




4L60-E CODE: 81
2-3 Shift Solenoid (B)
Circuit Fault

4L60-E Code 81
2-3 Shift Solenoid (B) Circuit Fault

Theory of Operation

The 4L60-E transmission uses two shift solenoids to control the upshifts and downshifts in all forward ranges. The solenoids work together in a combination of on and off sequences to control the position of the various shift valves. The Powertrain Control Module (PCM) monitors voltage or “feed back” on the solenoid ground wire to determine if the circuit has continuity.

Circuit Description

The transmission shift, Torque Converter Clutch (TCC), and 3-2 control solenoids receive voltage through a fuse from the ignition switch. The PCM controls the solenoids by opening or closing the ground path on the solenoid control circuit.

Conditions for Setting the Code

- The PCM commands the 2-3 solenoid on, and the voltage remains high for 2 seconds
- The PCM commands the 2-3 solenoid off, and the voltage remains low for 2 seconds

Action Taken When Code Sets

- Solenoid shorted on, the transmission will have 2nd gear only
- Solenoid shorted off, the transmission will have 3rd gear only
- Maximum line pressure
- No TCC
- May illuminate the malfunction indicator lamp

Possible Causes

- Wiring or connector problems in the transmission shift solenoid power or control circuits
- Defective solenoid
- Defective PCM
- Defective ignition switch
- Defective transmission power fuse

Diagnosis

STEP 1

With the Snap-On scanner, check and record all trouble codes.
Clear codes and road test vehicle.
See if the code returns.
If the code does not return the problem is intermittent. Try shaking the wiring and connectors to duplicate the condition. Inspect connectors for corroded, damaged or pushed out pins.
If code returns, are codes 66,67,82 and 83 (Code 83 is for 1995 only) also present?
If yes, check the transmission power fuse.
If the fuse is good, go to step 3.
If codes 66,67,82 and 83 are not present, and you have a Kwik-Test Plus, go to step 2.
If you do not have a Kwik-Test plus, go to step 3.

STEP 2

Disconnect the vehicle wiring harness from the transmission case connector. Inspect the case and harness connectors for corroded, damaged or pushed out terminals.
Following the instructions in the Kwik-Test Plus manual, check the 2-3 shift solenoid resistance, current and voltage.
Does the shift solenoid check OK?
If yes, go to step 3.
If no, go to step 7.

STEP 3

Disconnect the vehicle wiring harness from the transmission case connector. Inspect the case and harness connectors for corroded, damaged or pushed out terminals.
With the ignition key on, measure the voltage at cavity E of the transmission harness connector **(see figure 6 for wire color and circuit location)**.
Are there 10.5 volts or more?
If yes, go to step 4.
If no, repair open in the vehicle solenoid power circuit.

CAV	COLOR	FUNCTION
B	YL/BK	2-3 SHIFT SOLENOID CONTROL
E	PK	TRANSMISSION SOLENOID POWER

Harness side

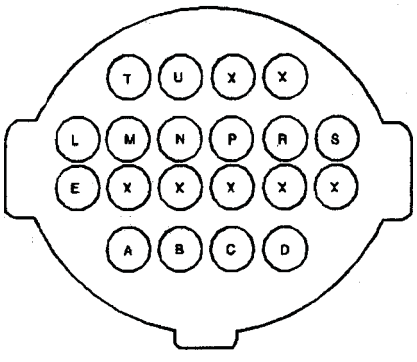


Figure 6—Solenoid power and control circuit ID.

STEP4

With the ignition key off, disconnect the appropriate harness connector from the PCM for the 2-3 solenoid control circuit **(see appendix F for connector, wire color and circuit location)**.
Inspect the PCM and connector for corroded, damaged or pushed out terminals.
Measure resistance between the appropriate cavity for the 2-3 shift solenoid of the PCM harness connector and cavity B of the transmission harness connector **(see figure 6)**.
Is the resistance 5 ohms or less?
If yes, go to step 5.
If no, repair open in the solenoid control circuit.

STEP 5

Remove the transmission power fuse.
Measure the resistance between cavity E and cavity B of the transmission harness connector **(see figure 6)**.
Is the resistance 5 ohms or less?
If yes, repair short to power in the solenoid control circuit.
If no, go to step 6.

STEP 6

Measure the resistance between cavity B of the transmission harness connector and ground **(see figure 6)**.
Is the resistance 5 ohms or less? If yes, repair short to ground in the solenoid control circuit.
If no and you **DID** use the KwikTest Plus box to get to this point in your diagnosis, replace the PCM/TCM.
If no and you **DID NOT** use the KwikTest Plus box, go to Step 7.

STEP 7

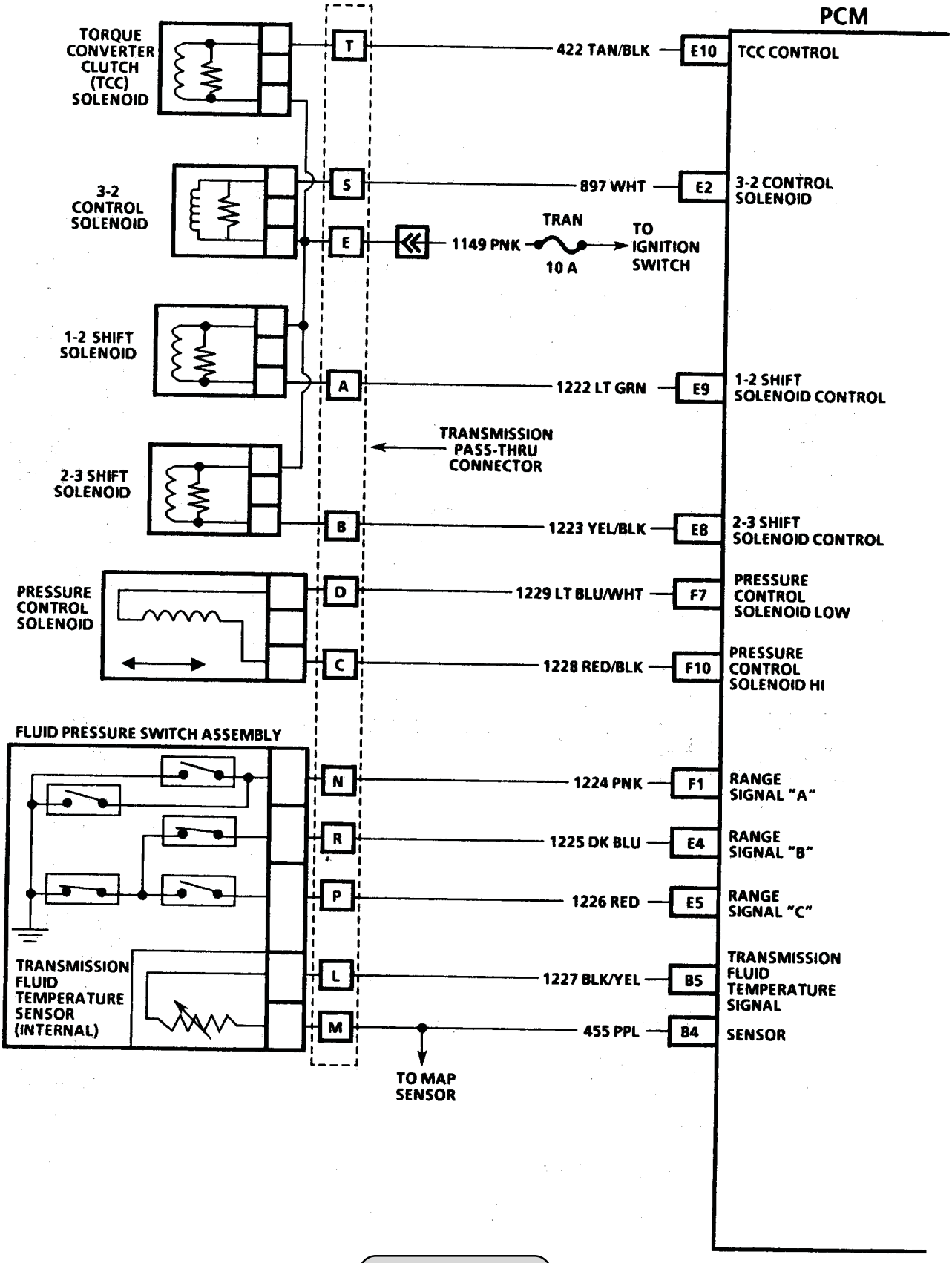
Remove the transmission pan.
Disconnect the internal transmission wiring harness from the 2-3 shift solenoid.
Inspect the solenoid and the connector for corroded, damaged or pushed out terminals.
Measure the resistance between the two shift solenoid terminals.
Is the resistance 20-40 ohms?
If yes, go to step 8.
If no, replace solenoid.

STEP 8

Remove the internal transmission wiring harness. Inspect harness for broken wires, damaged insulation or connectors.
Check the solenoid power and ground wires for continuity through the case connector.
Does the internal harness test OK?
If yes, replace the PCM.
If no, replace the harness.

Wiring Diagram

(early)




4L60-E CODE: 82
1-2 Shift Solenoid (A)
Circuit Fault

4L60-E Code 82
1-2 Shift Solenoid (A) Circuit Fault

Theory of Operation

The 4L60-E transmission uses two shift solenoids to control the upshifts and downshifts in all forward ranges. The solenoids work together in a combination of on and off sequences to control the position of the various shift valves. The Powertrain Control Module (PCM) monitors voltage or “feed back” on the solenoid ground wire to determine if the circuit has continuity.

Circuit Description

The transmission shift, Torque Converter Clutch (TCC), and 3-2 control solenoids receive voltage through a fuse from the ignition switch. The PCM controls the solenoids by opening or closing the ground path on the solenoid control circuit.

Conditions for Setting the Code

- The PCM commands the 1-2 solenoid on, and the voltage remains high for 2 seconds
- The PCM commands the 1-2 solenoid off, and the voltage remains low for 2 seconds

Action Taken When Code Sets

- Solenoid shorted on, the transmission will have 1st and 4th gears only
- Solenoid shorted off, the transmission will have 2nd and 3rd gears only
- Maximum line pressure
- No TCC
- May illuminate the malfunction indicator lamp

Possible Causes

- Wiring or connector problems in the transmission shift solenoid power or control circuits
- Defective solenoid
- Defective PCM
- Defective ignition switch
- Defective transmission power fuse

Diagnosis

STEP 1

With the Snap-On scanner, check and record all trouble codes. Clear codes and road test vehicle. See if the code returns.
If the code does not return the problem is intermittent. Try shaking the wiring and connectors to duplicate the condition. Inspect connectors for corroded, damaged or pushed out pins.
If the code returns, are codes 66,67,81 and 83 (code 83 is for 1995 only) also present?
If yes, check the transmission power fuse.
If the fuse is good, go to step 3.
If codes 66,67,82 and 83 are not present, and you have a Kwik-Test Plus, go to step 2.
If you do not have Kwik-Test Plus, go to step 3.

STEP 2

Disconnect the vehicle wiring harness from the transmission case connector. Inspect the case and harness connectors for corroded, damaged or pushed out terminals.
Following the instructions in the Kwik-Test Plus manual, check the 1-2 shift solenoid resistance, current and voltage.
Does the shift solenoid check OK?
If yes, go to step 3.
If no, go to step 7.

STEP 3

Disconnect the vehicle wiring harness from the transmission case connector. Inspect the case and harness connectors for corroded, damaged or pushed out terminals.
With the ignition key on, measure the voltage at cavity E of the transmission harness connector **(see figure 7 for wire color and circuit location)**.
Are there 10.5 volts or more?
If yes, go to step 4.
If no, repair open in the vehicle solenoid power circuit.

CAV	COLOR	FUNCTION
A	LG	1-2 SHIFT SOLENOID CONTROL
E	PK	TRANSMISSION SOLENOID POWER

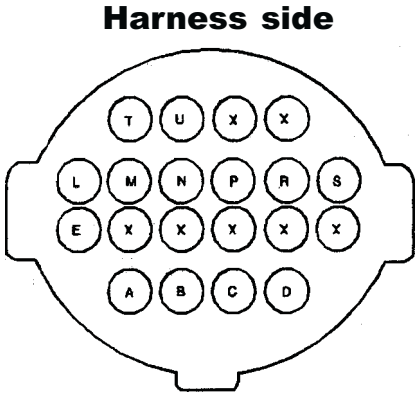


Figure 7—Solenoid power and control circuit ID.

STEP4

With the ignition key off, disconnect the appropriate harness connector from the PCM for the shift solenoid A control circuit **(see appendix F for connector, wire color and circuit location)**.
Inspect the PCM and connector for corroded, damaged or pushed out terminals.
Measure resistance between the appropriate cavity for the 1-2 shift solenoid of the PCM harness connector and cavity A of the transmission harness connector **(see figure 7)**.
Is the resistance 5 ohms or less?
If yes, go to step 5.
If no, repair open in the solenoid control circuit.

STEP 5

Remove the transmission power fuse.
Measure the resistance between cavity E and cavity A of the transmission harness connector **(see figure 7)**.
Is the resistance 5 ohms or less?
If yes, repair short to power in the solenoid control circuit.
If no, go to Step 7.

STEP 6

Measure the resistance between cavity A of the transmission harness connector and ground **(see figure 7)**.
Is the resistance 5 ohms or less?
If yes, repair short to ground in the solenoid control circuit.
If no and you **DID** use the KwikTest Plus box to get to this point in your diagnosis, replace the PCM/TCM.
If no and you **DID NOT** use the KwikTest Plus box, go to step 7.

STEP 7

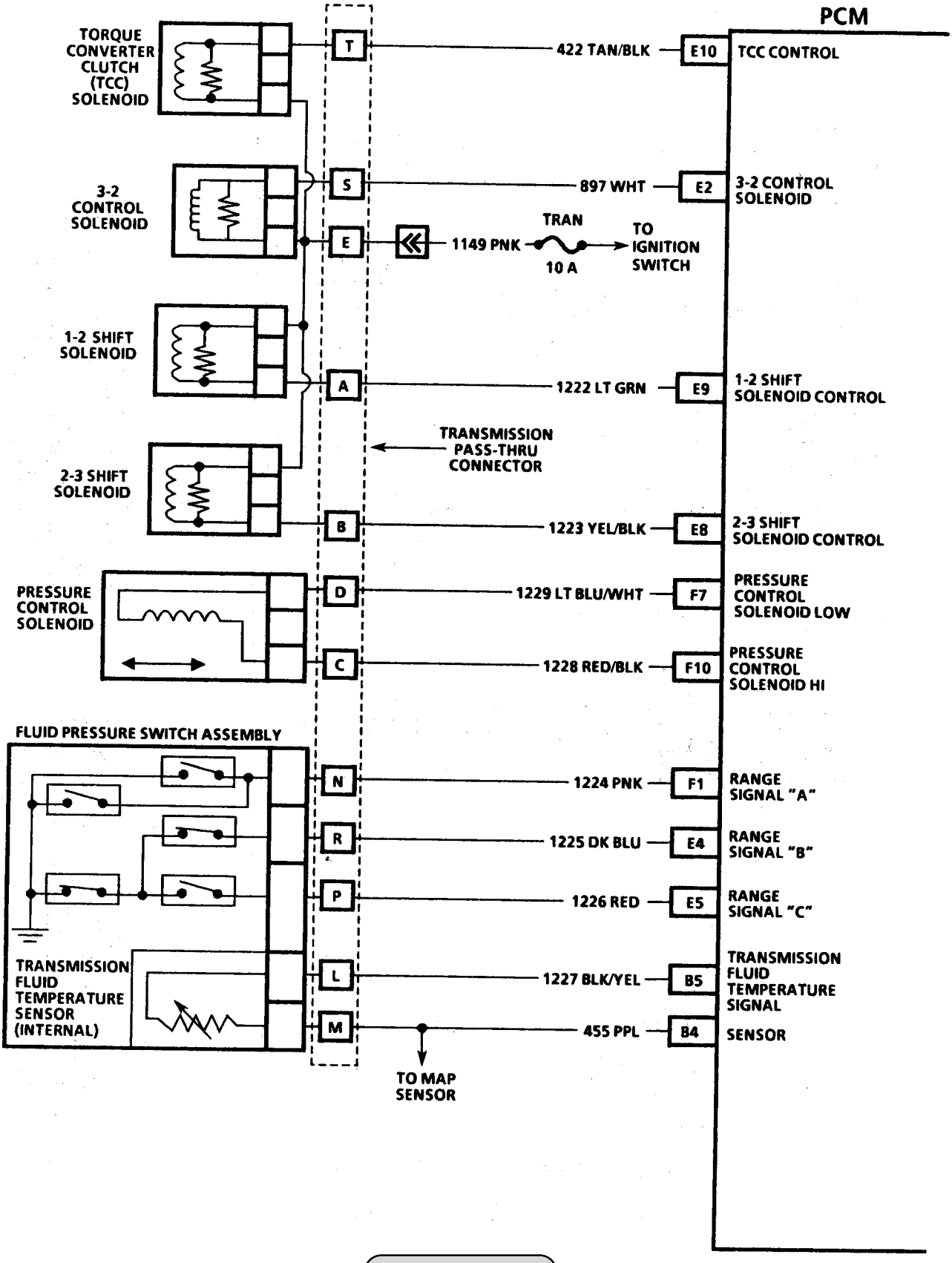
Remove the transmission pan.
Disconnect the internal transmission wiring harness from the 1-2 shift solenoid.
Inspect the solenoid and the connector for corroded, damaged or pushed out terminals.
Measure the resistance between the two shift solenoid terminals.
Is the resistance 20–40 ohms?
If yes, go to step 8.
If no, replace solenoid.

STEP 8

Remove the internal transmission wiring harness. Inspect harness for broken wires, damaged insulation or connectors.
Check the solenoid power and ground wires for continuity through the case connector.
Does the internal harness test OK?
If yes, replace the PCM.
If no, replace harness.

Wiring Diagram

(early)




4L60-E CODE: 83
TCC PWM Solenoid
Circuit Fault (1995 only)

4L60-E Code 83
Torque Converter Clutch (TCC) PWM Solenoid Circuit Fault (1995 only)

Theory of Operation

The 4L60-E transmission uses a TCC to provide a mechanical connection between the engine and transmission. This is done to improve drive line efficiency and fuel economy. The Powertrain Control Module (PCM) controls the TCC apply by using two solenoids. The TCC PWM solenoid is used to regulate the TCC apply pressure. It is used in combination with the TCC on/off solenoid to control fluid flow to the torque converter. The PCM supplies a ground allowing current to flow through the TCC PWM solenoid according to duty cycle (percentage of on and off time). This regulates the TCC signal fluid pressure acting on the TCC regulator valve. When the TCC on/off solenoid activates the TCC shift valve this regulated TCC apply pressure is directed to the TCC. The PCM monitors voltage or “feed back” on the solenoid ground wire to determine if the circuit has continuity.

Circuit Description

The transmission shift, TCC and 3-2 control solenoids receive voltage through a fuse from the ignition switch. The PCM controls the solenoids by opening or closing the ground path on the solenoid control circuit.

Conditions for Setting the Code

- The PCM commands the TCC PWM solenoid on, and the voltage remains high for 2 seconds
- The PCM commands the TCC PWM solenoid off, and the voltage remains low for 2 seconds

Action Taken When Code Sets

The PCM will default to:
- No 4th gear if in hot mode
- No TCC
- May illuminate the malfunction indicator lamp

Possible Causes

- Wiring or connector problems in the transmission TCC PWM solenoid power or control circuits
- Defective solenoid
- Defective PCM

Diagnosis

Step 1

With the Snap-On scanner, check and record all trouble codes. Clear codes and road test vehicle. See if the code returns.
If code does not return the problem is intermittent. Try shaking the wiring and connectors to duplicate the condition. Inspect connectors for corroded, damaged or pushed out pins.
If the code returns, are codes 66,67,81 and 82 also present?
If yes, check the transmission power fuse.
If the fuse is good, go to step 3.
If codes 66,67,81 and 82 are not present, and you have a Kwik-Test Plus, go to step 2.
If you do not have a Kwik-Test plus, go to step 3.

Step 2

Disconnect the vehicle wiring harness from the transmission case connector. Inspect the case and harness connectors for corroded, damaged or pushed out terminals.
Following the instructions in the Kwik-Test Plus manual, check the TCC PWM solenoid resistance, current and voltage.
Does the solenoid check OK?
If yes, go to step 3.
If no, go to step 7.

Step 3

Disconnect the vehicle wiring harness from the transmission case connector. Inspect the case and harness connectors for corroded, damaged or pushed out terminals.
With the ignition key on, measure the voltage at cavity E of the transmission harness connector **(see figure 8 for wire color and circuit location)**.
Are there 10.5 volts or more?
If yes, go to step 4.
If no, repair open in the vehicle solenoid power circuit.

Step 4

With the ignition key off, disconnect the appropriate harness connector from the PCM for the TCC PWM solenoid control circuit **(see appendix F for connector, wire color and circuit location)**.
Inspect the PCM and connector for corroded, damaged or pushed out terminals.
Measure resistance between the appropriate cavity for the TCC PWM solenoid of the PCM harness connector and cavity U of the transmission harness connector **(see figure 8)**.
Is the resistance 5 ohms or less?
If yes, go to step 5.
If no, repair open in the solenoid control circuit.

STEP 5

Remove the transmission power fuse.
Measure the resistance between cavity E and cavity U of the transmission harness connector **(see figure 8)**.
Is the resistance 5 ohms or less?
If yes, repair short to power in the solenoid control circuit.
If no, go to step 6.

STEP 6

Measure the resistance between cavity U of the transmission harness connector and ground **(see figure 8)**.
Is the resistance 5 ohms or less?
If yes, repair short to ground in the solenoid control circuit.
If no and you **DID** use the KwikTest Plus box to get to this point in your diagnosis, replace the PCM/TCM.
If no and you **DID NOT** use the KwikTest Plus box, go to Step 7.

STEP 7

Remove the transmission pan.
Disconnect the internal transmission wiring harness from the TCC PWM solenoid. Inspect the solenoid and the connector for corroded, damaged or pushed out terminals.
Measure the resistance between the two TCC PWM solenoid terminals.
Is the resistance 9-14 ohms?
If yes, go to step 8.
If no, replace solenoid.

STEP 8

Remove the internal transmission wiring harness. Inspect harness for broken wires, damaged insulation or connectors.
Check the solenoid power and ground wires for continuity through the case connector.
Does the internal harness test OK?
If yes, replace the PCM.
If no, replace harness.

CAV	COLOR	FUNCTION
U	BR	TCC PWM SOLENOID CONTROL
E	PK	TRANSMISSION SOLENOID POWER

Harness side

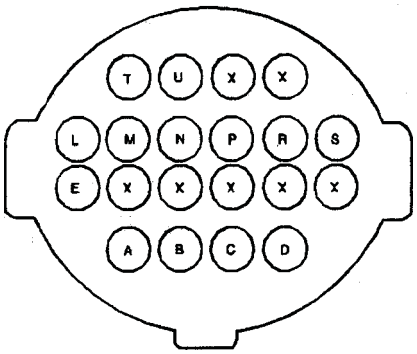
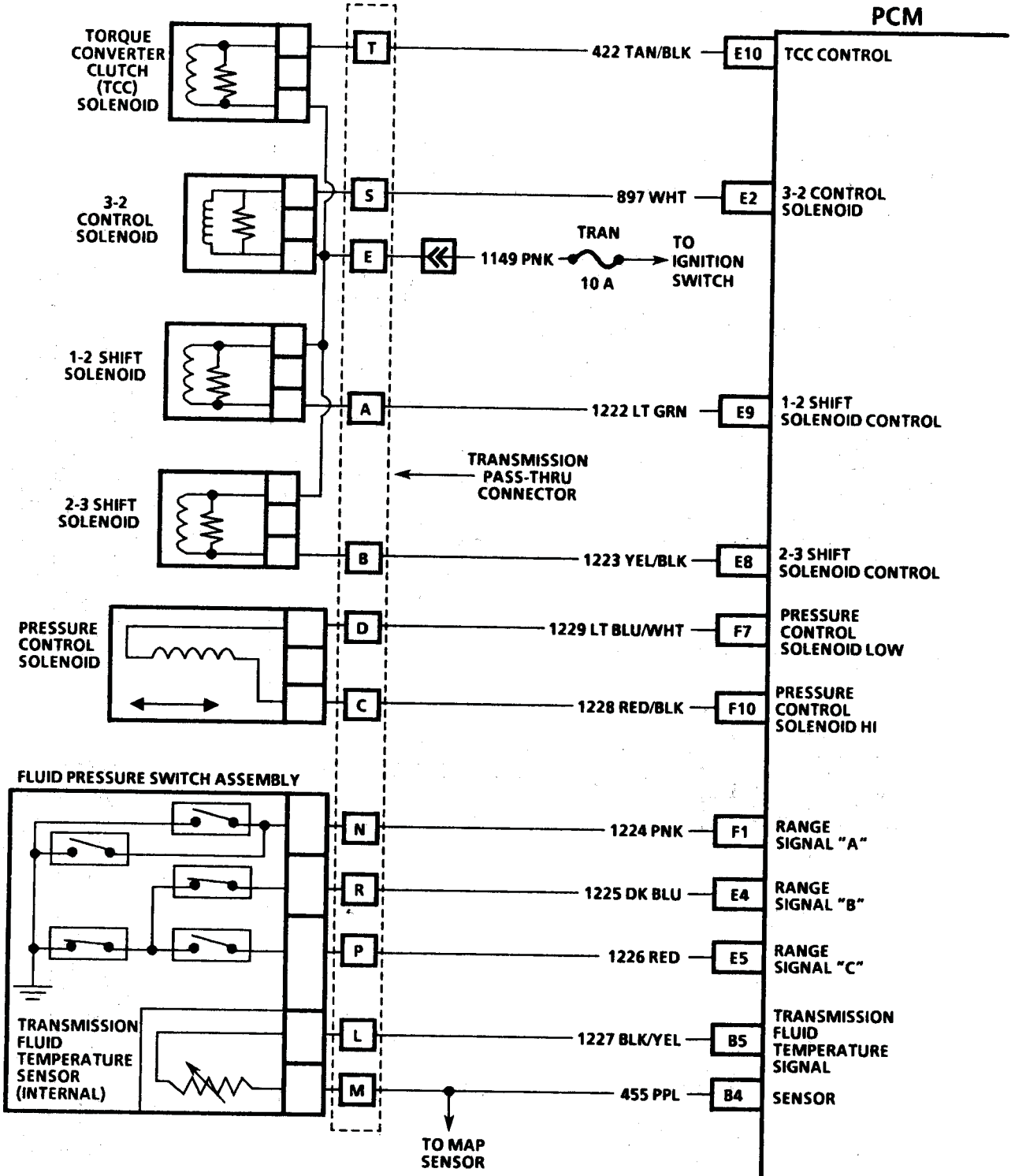


Figure 8—Solenoid power and control circuit ID.

Wiring Diagram

(early)

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4L60-E CODE: 88
3-2 Solenoid Circuit Fault
Y
N
Snap-on
Scanner
MT2500

4L60-E Code 88
3-2 Control Solenoid Circuit Fault

Theory of Operation

The 4L60-E transmission uses a 3-2 control solenoid to coordinate the apply rate of the 2-4 band with hydraulic release, and the 3-4 clutch during 3-2 downshifts. The Powertrain Control Module (PCM) continually monitors the 3-2 circuit duty cycle depending on the commanded state of the circuit. When the transmission is in 1st gear the duty cycle of the solenoid is equal to zero. When the transmission is in 2nd gear or higher the duty cycle of the solenoid will be about 90%. When the transmission downshifts, 3-2, the duty cycle of the solenoid will drop. The PCM monitors voltage or "feed back" on the solenoid ground wire to determine if the circuit has continuity.

Circuit Description

The transmission shift and TCC, and 3-2 control solenoids receive voltage through a fuse from the ignition switch. The PCM controls the solenoids by opening or closing the ground path on the solenoid control circuit.

Conditions for Setting the Code

- The PCM commands the 3-2 control solenoid on, and the voltage remains high for 4 seconds
- The PCM commands the 3-2 control solenoid off, and the voltage remains low for 4 seconds

Action Taken When Code Sets

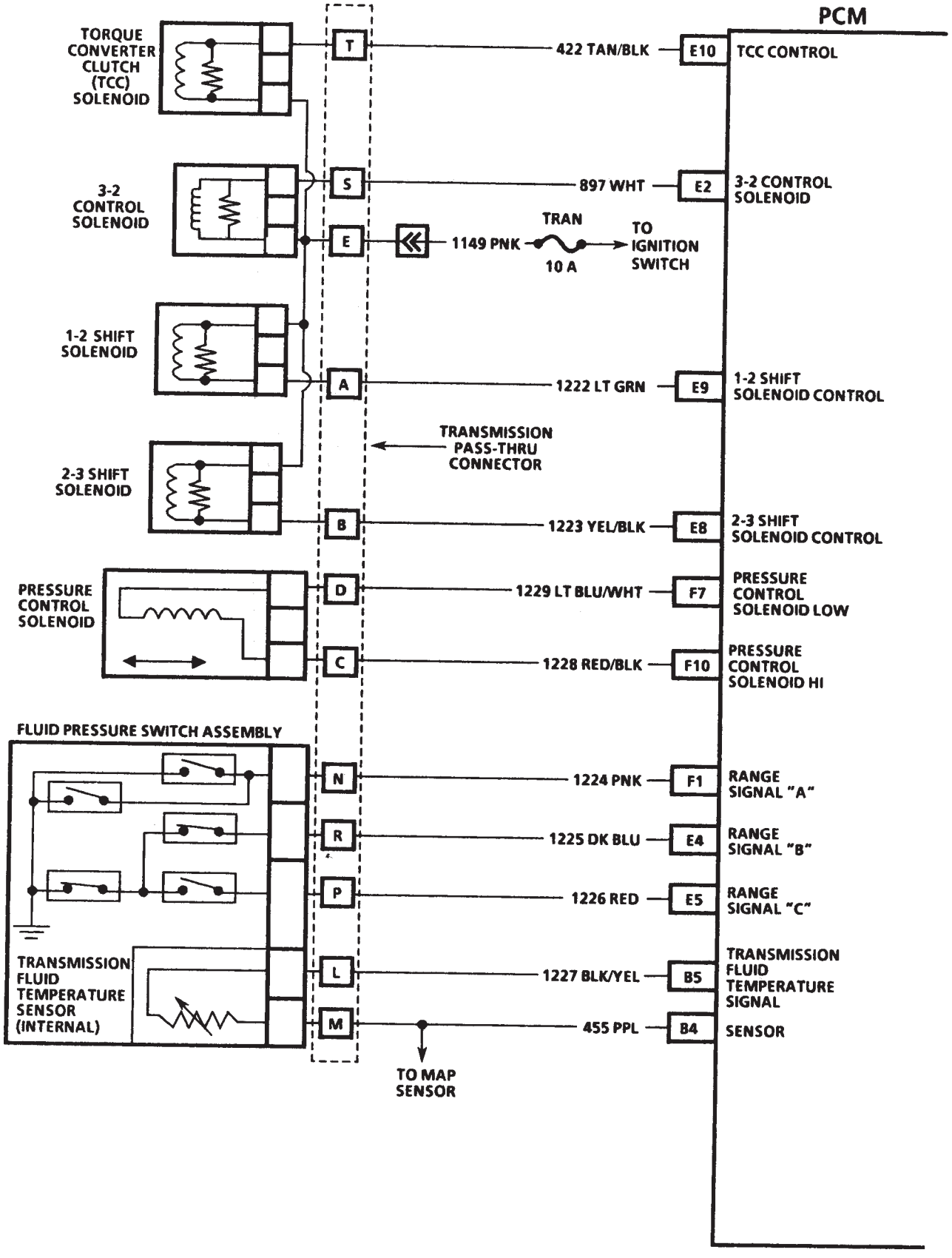
The PCM will default to:
- 3rd gear only
- Maximum line pressure
- No TCC
- May illuminate the malfunction indicator lamp

Possible Causes

- Wiring or connector problems in the transmission 3-2 control solenoid power or control circuits
- Defective solenoid
- Defective PCM
- Defective ignition switch
- Defective transmission power fuse

Wiring Diagram

(early)



Diagnosis

STEP 1

With the Snap-On scanner, check and record all trouble codes. Clear codes and road test vehicle.
See if the code returns.
If the code does not return the problem is intermittent. Try shaking the wiring and connectors to duplicate the condition. Inspect connectors for corroded, damaged or pushed out pins.
If the code does return, are codes 67,81,82 and 83 (code 83 is for 1995 only) also present.
If yes, check the transmission power fuse. If the fuse is good, go to step 3.
If codes 67,81,82 and 83 are not present, and you have Kwik-Test Plus, go to step 2.
If you do not have a Kwik-Test plus, go to step 3.

STEP 2

Disconnect the vehicle wiring harness from the transmission case connector. Inspect the case and harness connectors for corroded, damaged or pushed out terminals.
Following the instructions in the Kwik-Test Plus manual, check the 3-2 control solenoid resistance, current and voltage.
Does the solenoid check OK?
If yes, go to step 3.
If no, go to step 7.

STEP 3

Disconnect the vehicle wiring harness from the transmission case connector. Inspect the case and harness connectors for corroded, damaged or pushed out terminals.
With the ignition key on, measure the voltage at cavity E of the transmission harness connector **(See Figure 3 for wire color and circuit location)**.
Are there 10.5 volts or more?
If yes, go to step 4.
If no, repair open in the vehicle solenoid power circuit.

STEP4

With the ignition key off, disconnect the appropriate harness connector from the PCM for the 3-2 control solenoid circuit **(See Appendix F for connector, wire color and circuit location)**.
Inspect the PCM and connector for corroded, damaged or pushed out terminals.
Measure resistance between the appropriate cavity for the 3-2 control solenoid of the PCM harness connector and cavity S of the transmission harness connector **(See Figure 3)**.
Is the resistance 5 ohms or less?
If yes, go to step 5.
If no, repair open in the solenoid control circuit.

STEP 5

Remove the transmission power fuse.
Measure the resistance between cavity E and cavity S of the transmission harness connector **(See Figure 3)**.
Is the resistance 5 ohms or less?
If yes, repair short to power in the solenoid control circuit.
If no, go to step 6.

STEP 6

Measure the resistance between cavity S of the transmission harness connector and ground **(See Figure 3)**.
Is the resistance 5 ohms or less?
If yes, repair short to ground in the solenoid control circuit.
If no and you **DID** use the KwikTest Plus box to get to this point in your diagnosis, replace the PCM/TCM.
If no and you **DID NOT** use the KwikTest Plus box, go to Step 7.

STEP 7

Remove the transmission pan.
Disconnect the internal transmission wiring harness from the 3-2 control solenoid. Inspect the solenoid and the connector for corroded, damaged or pushed out terminals.
Measure the resistance between the two 3-2 control solenoid terminals.
Is the resistance 9–14 ohms?
If yes, go to step 8.
If no, replace solenoid.

STEP 8

Remove the internal transmission wiring harness. Inspect harness for broken wires, damaged insulation or connectors.
Check the solenoid power and ground wires for continuity through the case connector.
Does the internal harness test OK?
If yes, replace the PCM.
If no, replace harness.

CAV	COLOR	FUNCTION
E	PK	TRANSMISSION SOLENOID POWER
S	WT	3-2 SHIFT SOLENOID VALVE ASSEMBLY CONTROL

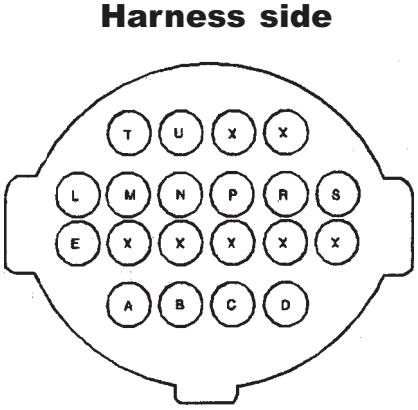


Figure 3—Solenoid power and control circuit ID.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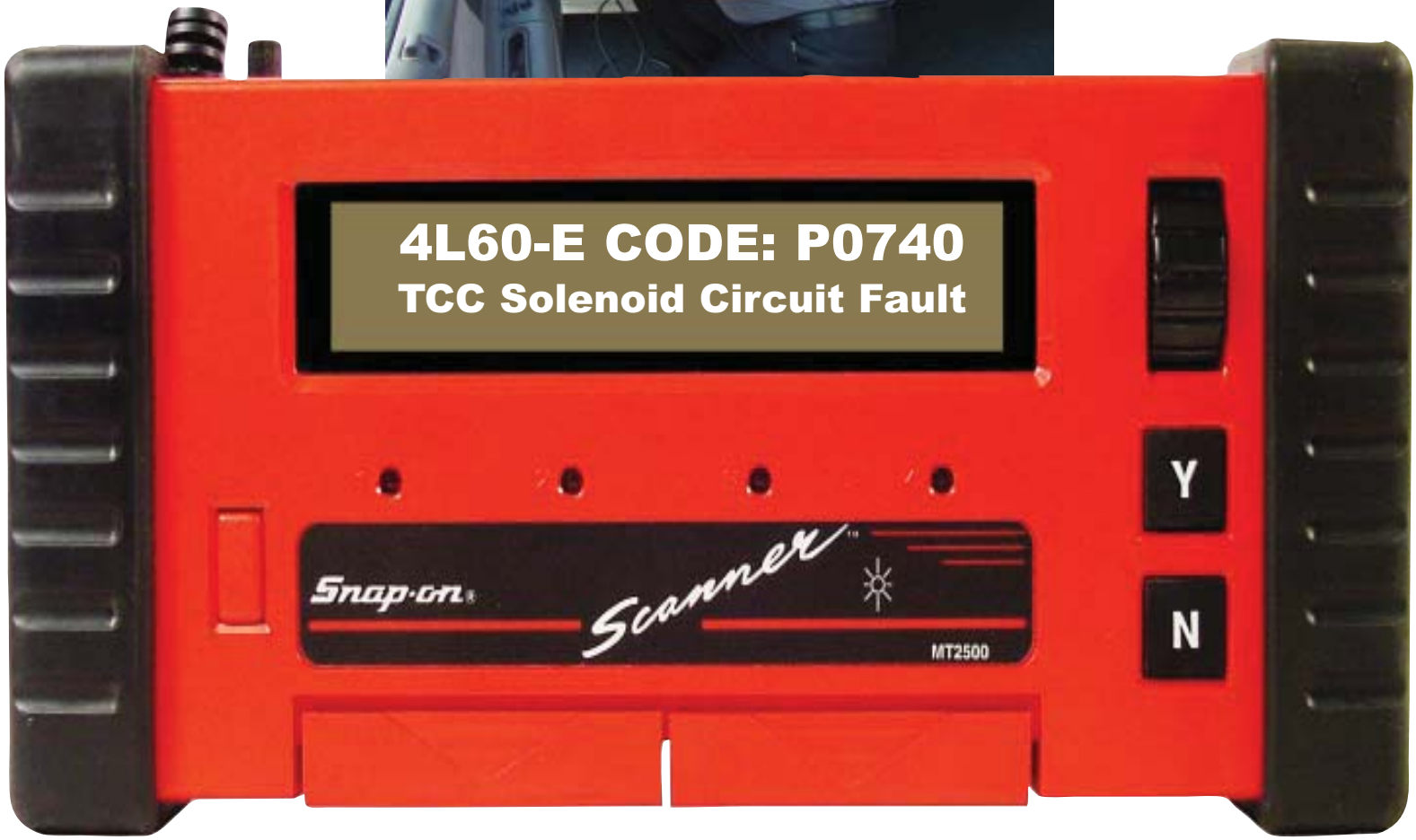
4L60-E CODE: P0740

TCC Solenoid Circuit Fault



4L60-E Code P0740
Torque Converter Clutch (TCC) Solenoid Circuit Fault

Theory of Operation

The 4L60-E transmission uses a torque converter clutch to provide a mechanical connection between the engine and transmission. This is done to improve drive line efficiency and fuel economy. The Powertrain Control Module or Vehicle Control Module (PCM/VCM) continually monitors and receives input signals from various electrical sensors. The PCM/VCM processes these signals and determines when to apply and release the torque converter clutch. It accomplishes this by turning the torque converter clutch solenoid on and off. The PCM/VCM monitors voltage or "feed back" on the solenoid ground wire to determine if the circuit has continuity.

Circuit Description

The transmission shift and TCC and 3-2 control solenoids receive voltage through a fuse from the ignition switch. The PCM/VCM controls the solenoids by opening or closing the ground path on the solenoid control circuit.

Conditions for Setting the Code

- The PCM commands the TCC solenoid on, and the voltage remains high for 2 seconds
- The PCM commands the TCC solenoid off, and the voltage remains low for 2 seconds

Action Taken When Code Sets

The PCM will default to:
- No 4th gear in hot mode
- No TCC
- May illuminate the malfunction indicator lamp

Possible Causes

- Wiring or connector problems in the transmission TCC solenoid power or control circuits
- Defective solenoid
- Defective PCM/VCM
- Defective ignition switch
- Defective transmission power fuse

Diagnosis

Step 1

With the Snap-On scanner, check and record all trouble codes. Clear codes and road test the vehicle.
See if the code returns. If the code does not return the problem is intermittent. Try shaking the wiring and connectors to duplicate the condition. Inspect connectors for corroded, damaged or pushed out terminal.
If the code returns, are codes P0785, P0758, P0753 and P1860 also present?
If yes, check the transmission power fuse.
If the fuse is good, go to step 3.
If codes P0785, P0758, P0753 and P1860 are not present, and you have a Kwik-Test Plus, go to step 2.
If you do not have a Kwik-Test plus, go to step 3.

Step 2

Disconnect the vehicle wiring harness from the transmission case connector. Inspect the case and harness connectors for corroded, damaged or pushed out terminals.
Following the instructions in the Kwik-Test Plus manual, check the TCC solenoid resistance, current and voltage.
Does the solenoid check OK?
If yes, go to step 3.
If no, go to step 7.

Step 3

Disconnect the vehicle wiring harness from the transmission case connector. Inspect the case and harness connectors for corroded, damaged or pushed out terminals.
With the ignition key on, measure the voltage at cavity E of the transmission harness connector **(see figure 9 for wire color and circuit location)**.
Is there 10.5 volts or more?
If yes, go to step 4.
If no, repair open in the vehicle solenoid power circuit.

Step 4

With the ignition key off, disconnect the appropriate harness connector from the PCM for the TCC solenoid control circuit **(see appendix F for connector, wire color and circuit location)**. Inspect the PCM and connector for corroded, damaged or pushed out terminals.
Measure resistance between the appropriate cavity for the TCC solenoid of the PCM harness connector and cavity T of the transmission harness connector **(see figure 9)**.
Is the resistance 5 ohms or less?
If yes, go to step 5.
If no, repair open in the TCC solenoid control circuit.

STEP 5

Remove the transmission power fuse.
Measure the resistance between cavity E and cavity T of the transmission harness connector **(see figure 9)**.
Is the resistance 5 ohms or less?
If yes, repair short to power in the TCC solenoid control circuit.
If no, go to step 6.

STEP 6

Measure the resistance between cavity T of the transmission harness connector and ground **(see figure 9)**.
Is the resistance 5 ohms or less?
If yes, repair short to ground in the solenoid control circuit.
If no and you **DID** use the KwikTest Plus box to get to this point in your diagnosis, replace the PCM/TCM.
If no and you **DID NOT** use the KwikTest Plus box, go to Step 7.

STEP 7

Remove the transmission pan.
Remove the internal transmission wiring harness and TCC solenoid assembly. Inspect the solenoid and the harness for broken wires, damaged insulation or connectors.
Check the solenoid power and ground wires for continuity through the case connector.
Check the case connector for corroded, damaged or pushed out terminals.
Measure the resistance between pins E and T of the transmission case connector **(see page F-1 in appendix F)**.
Is the resistance 20-40 ohms?
If yes, replace the PCM.
If no, replace the solenoid and harness assembly.

CAV	COLOR	FUNCTION
E	PK	TRANSMISSION SOLENOID POWER
T	TN/BK	TCC SOLENOID

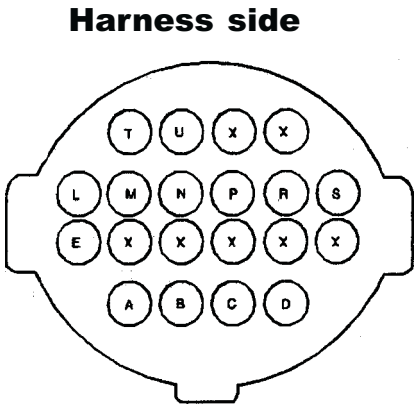
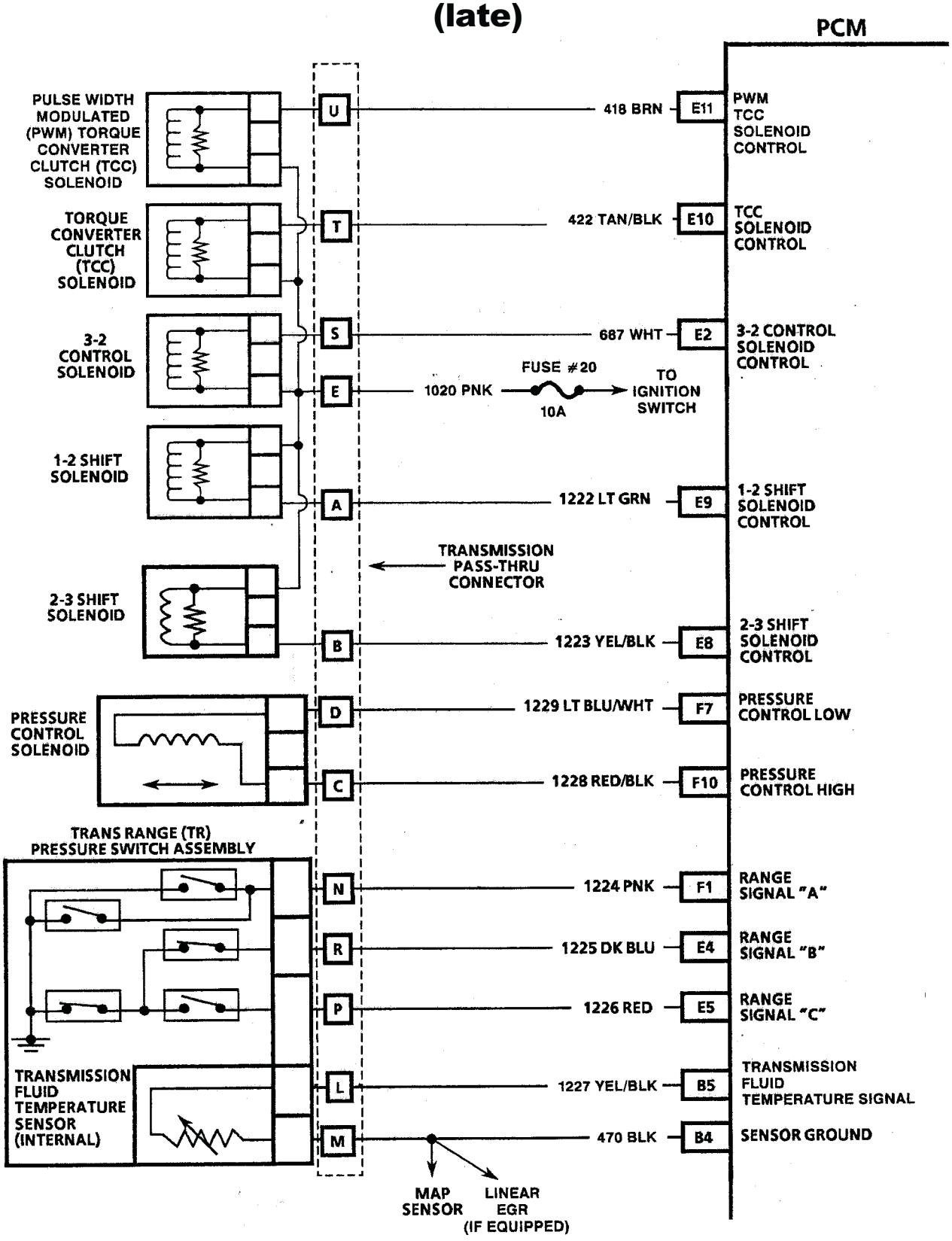


Figure 9—Solenoid power and control circuit ID.

Wiring Diagram

(late)



4L60-E CODE: P0748

Pressure Control Solenoid Circuit Fault

4L60-E Code P0748
Pressure Control Solenoid Circuit Fault

Theory of Operation

The 4L60-E transmission uses various solenoids to control shift timing and torque converter clutch engagement. It also uses a pressure control solenoid, which is a Powertrain Control Module or Vehicle Control Module (PCM/VCM) controlled device to regulate transmission main line pressure. The PCM/VCM compares TP voltage, engine RPM and other inputs to determine the line pressure appropriate for a given load. The PCM/VCM will regulate the line pressure by applying varying amperage to the pressure control solenoid. The applied amperage can vary from 0.1 to 1.1 amp. The PCM/VCM then monitors amperage on the return line.

Circuit Description

The transmission pressure control solenoid receives both voltage and ground from the PCM/VCM. There are two wires in this circuit that run directly from the PCM/VCM to the pressure control solenoid. The two circuits are called pressure control solenoid high (voltage) and pressure control solenoid low (ground).

Conditions for Setting the Code

- The return amperage monitored by the PCM/VCM varies greater than 0.16 amp from the commanded amperage for at least one second

Action Taken When Code Sets

- The PCM/VCM will default to full line pressure.
- Harsh upshifts and downshifts.
- May illuminate the malfunction indicator lamp.

Possible Causes

- Wiring or connector problems in the pressure control solenoid circuit.
- Defective solenoid
- Defective PCM/VCM

Diagnosis

Step 1

With the Snap-On scanner, check and record all trouble codes. Clear codes and road test vehicle.
See if the code returns.
If the code does not return the problem is intermittent. Try shaking the wiring and connectors to duplicate the condition. Inspect connectors for corroded, damaged or pushed out terminals.
If the code does return, and you have a Kwik-Test Plus, go to step 2.
If you do not have a Kwik-Test plus, go to step 3.

Step 2

With the ignition key off, disconnect the vehicle wiring harness from the transmission case connector. Inspect the case and harness connectors for corroded, damaged or pushed out terminals.
Following the instructions in the Kwik-Test Plus manual, check the EPC solenoid resistance, current and voltage.
Does the EPC solenoid check OK?
If yes, go to step 3.
If no, go to step 9.

Step3

With ignition key off, disconnect the appropriate PCM connector(s) for the EPC solenoid high and low circuits **(see appendix F for connector, wire color and circuit location)**.
Inspect the PCM and connector(s) for corroded, damaged or pushed out terminals.
Disconnect the transmission case connector harness. Inspect the case connector and harness connector for corroded, damaged or pushed out terminals.
Measure resistance between the appropriate cavity for the EPC solenoid high circuit of the PCM harness connector **(see appendix F)** and cavity C of the transmission harness connector **(see figure 10 for wire color and circuit location)**.
Is the resistance 5 ohms or less?
If yes, go to step 4.
If no, the repair open in the EPC solenoid high circuit.

Step 4

Measure resistance between the appropriate cavity for the EPC solenoid low circuit of the PCM harness connector **(see appendix F)** and cavity D of the transmission harness connector **(see figure 10)**.
Is the resistance 5 ohms or less?
If yes, go to step 5.
If no, repair the open in the EPC solenoid low circuit.

STEP 5

Remove the transmission power fuse.
Measure the resistance between cavity E and cavity C of the transmission harness connector **(see figure 10)**.
Is the resistance 5 ohms or less?
If yes, repair short to power in the EPC solenoid high circuit.
If no, go to step 6.

STEP 6

Measure the resistance between cavity E and cavity D, of the transmission harness connector **(see figure 10)**.
Is the resistance 5 ohms or less?
If yes, repair short to power in the EPC solenoid low circuit.
If no, go to step 7.

STEP 7

Measure the resistance between cavity C of the transmission harness connector and ground **(see figure 10)**.
Is the resistance 5 ohms or less?
If yes, repair the short to ground in the EPC solenoid high circuit.
If no, go to step 8.

STEP 8

Measure the resistance between cavity D of the transmission harness connector and ground **(see figure 10)**.
Is the resistance 5 ohms or less?
If yes, repair the short to ground in the EPC solenoid low circuit.
If no and you **DID** use the KwikTest Plus box to get to this point in your diagnosis, replace the PCM/TCM.
If no and you **DID NOT** use the KwikTest Plus box, go to Step 9.

STEP 9

Remove the transmission pan.
Disconnect the internal transmission wiring harness from the EPC solenoid. Inspect the solenoid and the connector for corroded, damaged or pushed out terminals.
Measure the resistance between the two EPC solenoid terminals.
Is the resistance 4- 8 ohms?
If yes, go to step 10.
If no, replace solenoid.

Step 10

Remove the internal transmission wiring harness. Inspect the harness for broken wires, damaged insulation or connectors.
Check the solenoid power and ground wires for continuity through the case connector.
Does the internal harness test OK?
If yes, replace the PCM.
If no, replace the harness.

CAV	COLOR	FUNCTION
C	RD/BK	PRESSURE CONTROL SOLENOID HIGH
D	LB/WT	PC SOL. VALVE CONTROL LOW
E	PK	TRANSMISSION SOLENOID POWER

Harness side

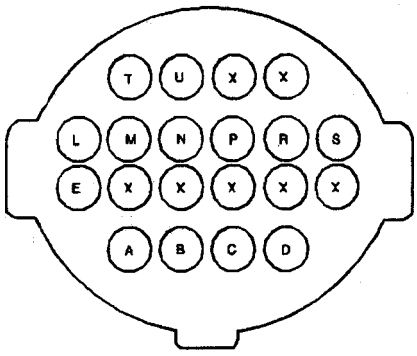
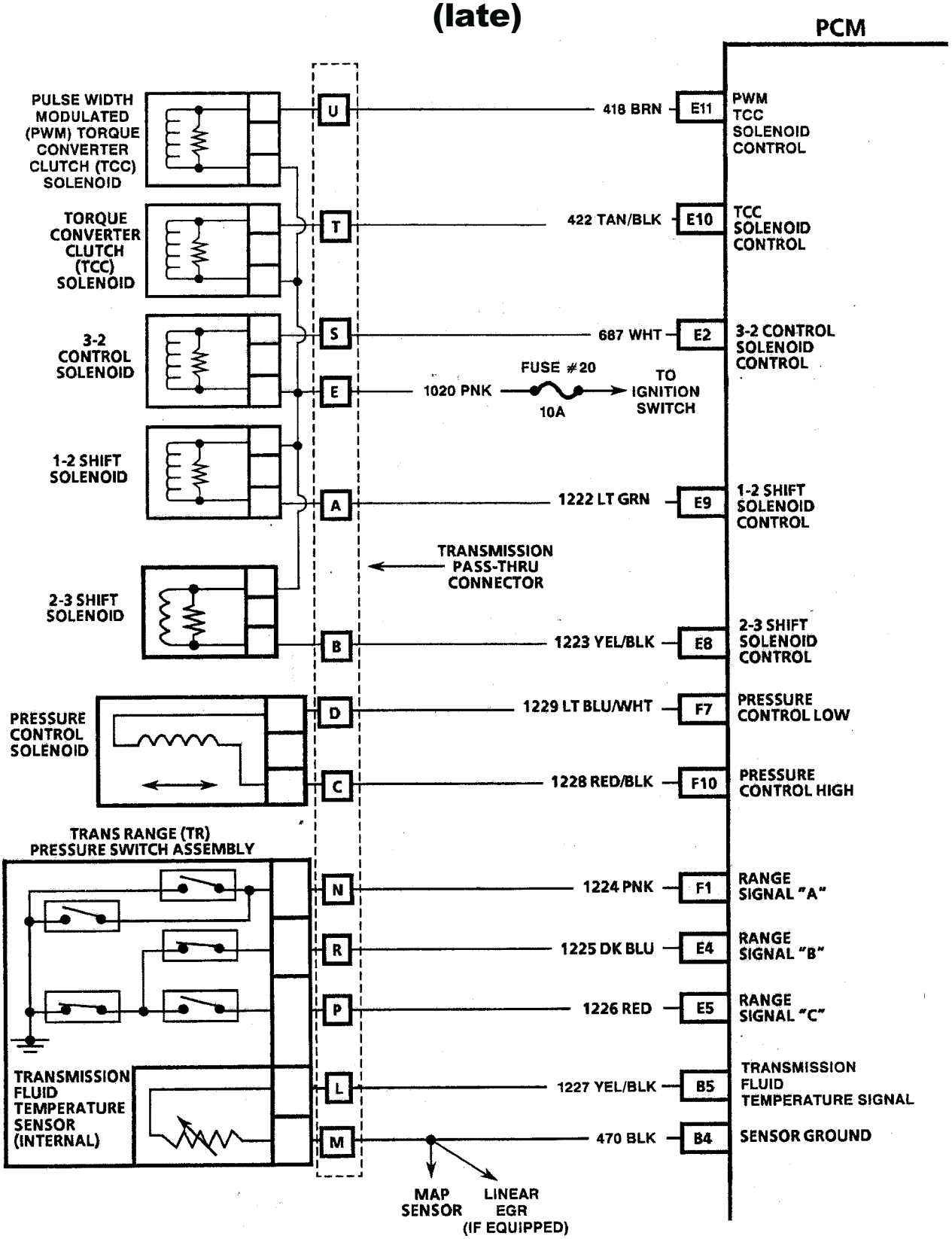


Figure 10—Solenoid power and control circuit ID.

Wiring Diagram

(late)



Revised 3/03

4L60-E Code P0751
1-2 Shift Solenoid Performance

Theory of Operation

The 1-2 shift solenoid controls the fluid flow acting on the 1-2 and 3-4 shift valves. The solenoid is a normally open type which allows fluid to exhaust to the pan when it is not energized by the PCM. The 1-2 shift solenoid working in conjunction with the 2-3 shift solenoid allows four different shifting combinations.

Code Description

This code refers to a mechanical problem with the solenoid or other internal transmission components. When the PCM detects a 1-1-4-4 (solenoid stuck closed) or a 2-2-3-3 (solenoid stuck open) shift pattern code P0751 sets.

Conditions for Setting the Trouble Code

- No TP codes P0122 or P0123.
- No VSS code P0502.
- No TCC code P0742.
- No 1-2 shift solenoid code P0753.
- No 2-3 shift solenoid code P0758.
- No PSM code P1810.
- No TCC PWM solenoid code P1860.
- No TCC solenoid code P1864.
- No 3-2 solenoid code P1886.
- The gear range is D4.
- The vehicle speed is greater than 5 mph.
- The engine speed is greater than 400 RPM for 8 seconds.
- The transmission fluid temperature is 68-266 °F.
- Not in fuel cut off.

All of the above conditions are met and the combination of cases 1,2,3 and 4 or 1,2,3 and 5 occurs two consecutive times.

P0751

Case #1

- The PCM commands a 1-2 shift.
- The vehicle speed is 5-35 MPH.
- The engine speed in 2nd gear is 100 RPM greater than the last speed in 1stgear.

Case #2

- The PCM commands a 2-3 shift.
- The vehicle speed is 20-50 MPH.
- The engine speed in 3rd gear is 150 RPM less than the last speed in 2nd gear.

Case #3

- The PCM commands a 3-4 shift.
- The vehicle speed is 30-65 MPH.
- The engine speed in 3rd gear is 20 RPM greater than the last speed in fourth gear.

Case #4

- The PCM commands 4th gear.
- The TCC is on.
- The speed ration is 0.85 to 1.2 (engine speed divided by output speed).
- The TCC slip is 200-1000 RPM.

Case #5

- The PCM commands fourth gear.
- The TCC is on.
- The speed ratio is 0.6-0.8 (engine speed divided by output speed).
- The TCC slip speed is –20 to +40 RPM.

Action taken when code sets

- The PCM illuminates the malfunction indicator lamp.
- The PCM commands D2 line pressure (not all models).

Possible causes:

- Mechanically stuck 1-2 shift solenoid.
- Missing or damaged solenoid seals.
- Sticking valves in valve body.
- Internal transmission components (clutches/bands).

Diagnosis

Step 1

Install the Snap-On Scanner. Record all trouble codes, freeze frame data and failure records.
Clear the codes and road test the vehicle in the D4 range.
Use either the scanner under the functional tests menu or the Kwik-Test Plus to shift the transmission 1-2-3-4.
Did you detect a 1-1-4-4 or 2-2-3-3 shift pattern?
If yes go to step 2.
If no go to step 3.

Step 2

Check the 1-2 shift solenoid for an internal malfunction (stuck open or closed) and missing or damaged seals.
Check the 1-2 and 3-4 shift valves for sticking.
Make necessary repairs and rerun diagnostics.

Step 3

If the transmission shifted 1-2-3-4 the problem is not present at this time.
If the transmission shifted erratically or was missing one or more gears other internal transmission concerns could be the cause.
A solenoid problem will always affect two gears as in the examples in step one.
Perform a complete EDS including a sump examination.
Possible valve body, clutch pack or band problem.

4L60-E CODE: P0753

1-2 Shift Solenoid (A) Circuit Fault

4L60-E Code P0753
1-2 Shift Solenoid (A) Circuit Fault

Theory of Operation

The 4L60-E transmission uses two shift solenoids to control the upshifts and downshifts in all forward ranges. The solenoids work together in a combination of on and off sequences to control the position of the various shift valves. The Powertrain Control Module or Vehicle Control Module (PCM/VCM) monitors voltage or “feed back” on the solenoid ground wire to determine if the circuit has continuity.

Circuit Description

The transmission shift and TCC solenoids receive voltage through a fuse from the ignition switch. The PCM/VCM controls the solenoids by opening or closing the ground path on the solenoid control circuit.

Conditions for Setting the Code

- The PCM/VCM commands the 1-2 solenoid on, and the voltage remains high for 2 seconds
- The PCM/VCM commands the 1-2 solenoid off, and the voltage remains low for 2 seconds

Action Taken When Code Sets

- Solenoid shorted on, the transmission will have 1st and 4th gears only.
- Solenoid shorted off, the transmission will have 2nd and 3rd gears only.
- Maximum line pressure
- No TCC
- May illuminate the malfunction indicator lamp

Possible Causes

- Wiring or connector problems in the transmission shift solenoid power or control circuits
- Defective solenoid
- Defective PCM/VCM
- Defective ignition switch
- Defective transmission power fuse

Diagnosis

Step 1

With the Snap-On scanner, check and record all trouble codes. Clear codes and road test vehicle. See if the code returns.
If the code does not return the problem is intermittent. Try shaking the wiring and connectors to duplicate the condition. Inspect connectors for corroded, damaged or pushed out pins.
If the code returns, are codes P0785, P0758, P0753 and P1860 also present?
If yes, check the transmission power fuse.
If the fuse is good, go to step 3.
If codes P0785, P0758, P0753 and P1860 are not present, and you have a Kwik-Test Plus, go to step 2.
If you do not have Kwik-Test Plus, go to step 3.

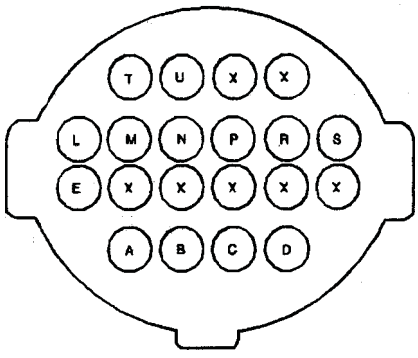
Step 2

Disconnect the vehicle wiring harness from the transmission case connector. Inspect the case and harness connectors for corroded, damaged or pushed out terminals.
Following the instructions in the Kwik-Test Plus manual, check the 1-2 shift solenoid resistance, current and voltage.
Does the shift solenoid check OK?
If yes, go to step 3.
If no, go to step 7.

Step 3

Disconnect the vehicle wiring harness from the transmission case connector. Inspect the case and harness connectors for corroded, damaged or pushed out terminals.
With the ignition key on, measure the voltage at cavity E of the transmission harness connector **(see figure 11 for wire color and circuit location)**.
Are there 10.5 volts or more?
If yes, go to step 4.
If no, repair open in the vehicle solenoid power circuit.

Harness side



CAV	COLOR	FUNCTION
A	LG	1-2 SHIFT SOLENOID CONTROL
E	PK	TRANSMISSION SOLENOID POWER

Figure 11—Solenoid power and control circuit ID.

STEP4

With the ignition key off, disconnect the appropriate harness connector from the PCM for the shift solenoid A control circuit **(see appendix F for connector, wire color and circuit location)**.
Inspect the PCM and connector for corroded, damaged or pushed out terminals.
Measure resistance between the appropriate cavity for the 1-2 shift solenoid of the PCM harness connector and cavity A of the transmission harness connector **(see figure 11)**.
Is the resistance 5 ohms or less?
If yes, go to step 5.
If no, repair open in the solenoid control circuit.

STEP 5

Remove the transmission power fuse.
Measure the resistance between cavity E and cavity A of the transmission harness connector **(see figure 11)**.
Is the resistance 5 ohms or less?
If yes, repair short to power in the solenoid control circuit.
If no, go to step 6.

STEP 6

Measure the resistance between cavity A of the transmission harness connector and ground **(see figure 11)**.
Is the resistance 5 ohms or less?
If yes, repair short to ground in the solenoid control circuit.
If no and you **DID** use the KwikTest Plus box to get to this point in your diagnosis, replace the PCM/TCM.
If no and you **DID NOT** use the KwikTest Plus box, go to Step 7.

STEP 7

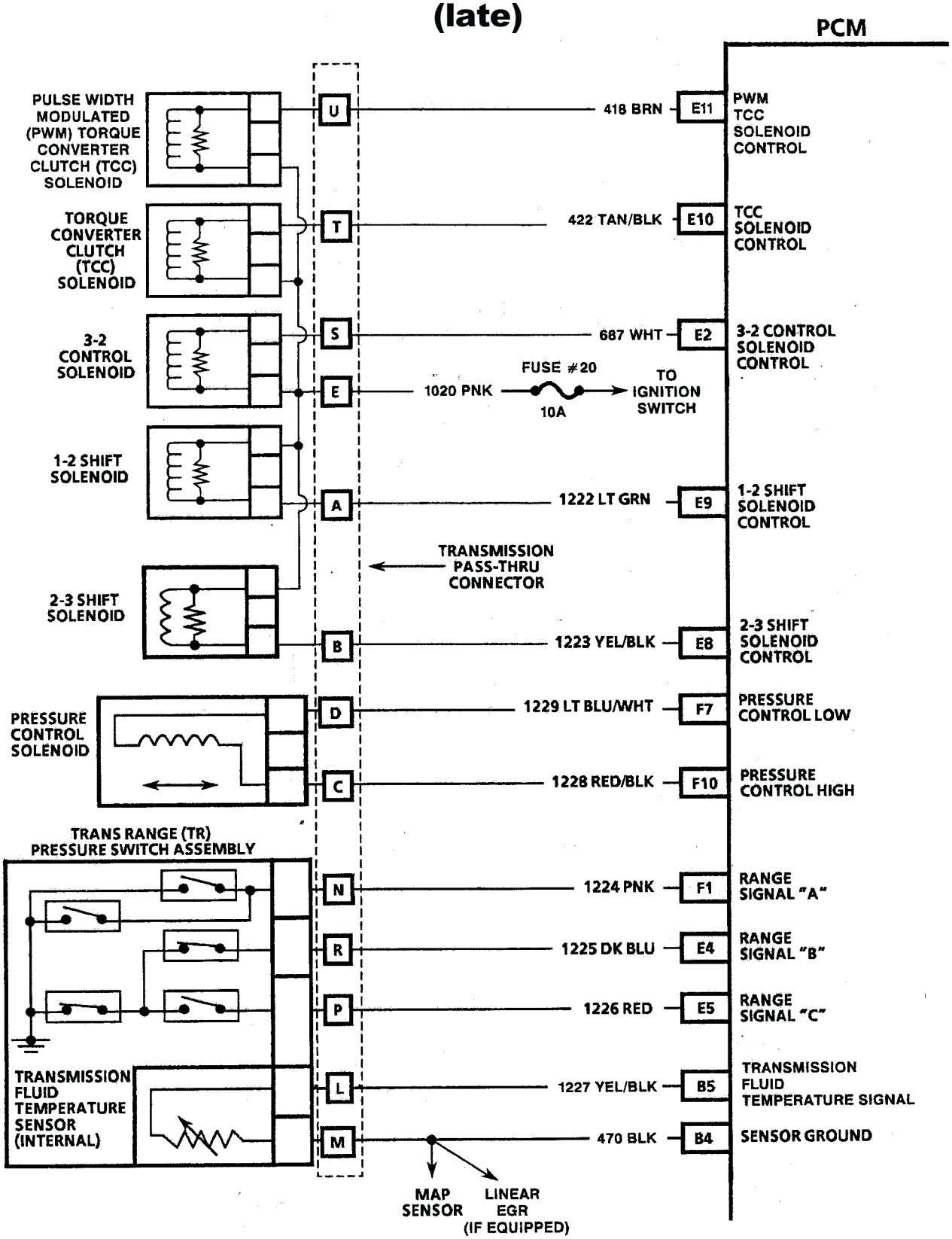
Remove the transmission pan.
Disconnect the internal transmission wiring harness from the 1-2 shift solenoid.
Inspect the solenoid and the connector for corroded, damaged or pushed out terminals.
Measure the resistance between the two shift solenoid terminals.
Is the resistance 20–40 ohms?
If yes, go to step 8.
If no, replace solenoid.

STEP 8

Remove the internal transmission wiring harness. Inspect harness for broken wires, damaged insulation or connectors.
Check the solenoid power and ground wires for continuity through the case connector.
Does the internal harness test OK?
If yes, replace the PCM.
If no, replace harness.

Wiring Diagram

(late)




4L60-E Code P0756
2-3 Shift Solenoid Performance
Y
N
Snap-on
Scanner
MT2500

Revised 3/03

4L60-E Code P0756
2-3 Shift Solenoid Performance

Theory of Operation

The 2-3 shift solenoid controls the fluid flow acting on the 2-3 shift valve. The solenoid is a normally open type which allows fluid to exhaust to the pan when it is not energized by the VCM. The 2-3 shift solenoid working in conjunction with the 1-2 shift solenoid allows four different shifting combinations.

Code Description

This code refers to a mechanical problem with the solenoid or other internal transmission components. When the PCM detects a 1-2-2-1 (solenoid stuck closed) or a 4-3-3-4 (solenoid stuck open) shift pattern code P0756 sets.

Conditions for Setting the Trouble Code

- No TP codes P0122 or P0123.
- No VSS code P0502.
- No TFT sensor codes P0712 or P0713.
- No TCC code P0742.
- No 1-2 shift solenoid code P0753.
- No 2-3 shift solenoid code P0758.
- No PSM code P1810.
- No TCC PWM solenoid code P1860.
- No TCC solenoid code P1864.
- No 3-2 solenoid code P1886.
- The gear range is D4.
- The vehicle speed is greater than 15 mph.
- The engine speed is greater than 450 RPM for 8 seconds.
- The transmission fluid temperature is 68-266 F.
- The TCC is off.

All of the above conditions are met and the combination of cases 2 and 3 or 1 and 3 occurs 2 consecutive times.

P0756

Case #1

- 1st gear is commanded.
- The speed ratio is 0.5-3.0 (engine speed divided by output speed).
- The transmission output speed is 600-1500 RPM.
- The TCC slip speed is –100 to –3000 RPM.

Case #2

- 3rd gear is commanded.
- The 3rd gear speed ratio is greater than the last 2nd gear speed ratio minus 0.25.
- The 3rd gear TCC slip speed is greater than or equal to the last 2nd gear TCC slip speed signal plus 300 RPM.

Case #3

- 4th gear is commanded.
- The speed ratio is 2.05-8.0.
- The transmission output speed is 1400-2500 RPM.
- The TCC slip speed is 1000-4000 RPM .

Action taken when code sets

- The PCM commands maximum line pressure.
- The PCM illuminates the malfunction indicator lamp.
- The PCM commands third gear only (not all models).
- The PCM inhibits TCC engagement (not all models).

Possible causes

- Mechanically stuck 2-3 shift solenoid.
- Missing or damaged solenoid seals.
- Sticking valves in valve body.
- Internal transmission components (clutches/bands).

Diagnosis

Step 1

Install the Snap-On Scanner. Record all trouble codes, freeze frame data and failure records.
Clear the codes and road test the vehicle in the D4 range.
Use either the scanner under the functional tests menu or the Kwik-Test Plus to shift the transmission 1-2-3-4. Did you detect a 1-2-2-1 or 4-3-3-4 shift pattern?
If yes go to step 2.
If no go to step 3.

Step 2

Check the 2-3 shift solenoid for an internal malfunction (stuck open or closed) and missing or damaged seals.
Check the 2-3 shift valve for sticking.
Make necessary repairs and rerun diagnostics.

Step 3

If the transmission shifted 1-2-3-4 the problem is not present at this time.
If the transmission shifted erratically or was missing one or more gears other internal transmission concerns could be the cause.
A solenoid problem will always affect two gears as in the examples in step one.
Perform a complete EDS including a sump examination.
Possible valve body, clutch pack or band problem.

4L60-E CODE: P0758

2-3 Shift Solenoid (B) Circuit Fault

4L60-E Code P0758
2-3 Shift Solenoid (B) Circuit Fault

Theory of Operation

The 4L60-E transmission uses two shift solenoids to control the upshifts and downshifts in all forward ranges. The solenoids work together in a combination of on and off sequences to control the position of the various shift valves. The Powertrain Control Module or Vehicle Control Module (PCM/VCM) monitors voltage or “feed back” on the solenoid ground wire to determine if the circuit has continuit.

Circuit Description

The transmission shift and TCC solenoids receive voltage through a fuse from the ignition switch. The PCM/VCM controls the solenoids by opening or closing the ground path on the solenoid control circuit.

Conditions for Setting the Code

- The PCM/VCM commands the 2-3 solenoid on, and the voltage remains high for 2 seconds
- The PCM/VCM commands the 2-3 solenoid off, and the voltage remains low for 2 seconds

Action Taken When Code Sets

- PCM/VCM commands third gear only
- PCM/VCM commands maximum line pressure
- PCM/VCM inhibits TCC engagement
- May illuminate the malfunction indicator lamp

Possible Causes

- Wiring or connector problems in the transmission shift solenoid power or control circuits
- Defective solenoid
- Defective PCM
- Defective ignition switch
- Defective transmission power fuse

Diagnosis

STEP 1

With the Snap-On scanner, check and record all trouble codes.
Clear codes and road test vehicle.
See if the code returns.
If the code does not return the problem is intermittent. Try shaking the wiring and connectors to duplicate the condition. Inspect connectors for corroded, damaged or pushed out pins.
If code returns, are codes P0785, P0758, P0753 and P1860 also present?
If yes, check the transmission power fuse.
If the fuse is good, go to step 3.
If codes P0785, P0758, P0753 and P1860 are not present, and you have a Kwik-Test Plus, go to step 2.
If you do not have a Kwik-Test plus, go to step 3.

STEP 2

Disconnect the vehicle wiring harness from the transmission case connector. Inspect the case and harness connectors for corroded, damaged or pushed out terminals.
Following the instructions in the Kwik-Test Plus manual, check the 2-3 shift solenoid resistance, current and voltage.
Does the shift solenoid check OK?
If yes, go to step 3.
If no, go to step 7.

STEP 3

Disconnect the vehicle wiring harness from the transmission case connector. Inspect the case and harness connectors for corroded, damaged or pushed out terminals.
With the ignition key on, measure the voltage at cavity E of the transmission harness connector **(see figure 12 for wire color and circuit location)**.
Are there 10.5 volts or more?
If yes, go to step 4.
If no, repair open in the vehicle solenoid power circuit.

CAV	COLOR	FUNCTION
B	YL/BK	2-3 SHIFT SOLENOID CONTROL
E	PK	TRANSMISSION SOLENOID POWER

Harness side

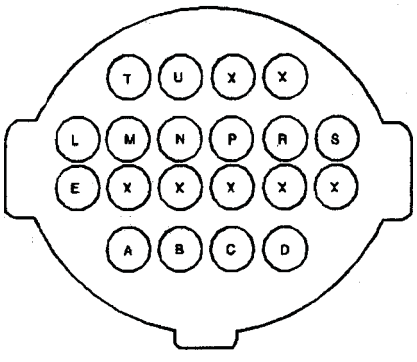


Figure 12—Solenoid power and control circuit ID.

STEP4

With the ignition key off, disconnect the appropriate harness connector from the PCM for the 2-3 solenoid control circuit **(see appendix F for connector, wire color and circuit location)**.
Inspect the PCM and connector for corroded, damaged or pushed out terminals.
Measure resistance between the appropriate cavity for the 2-3 shift solenoid of the PCM harness connector and cavity B of the transmission harness connector **(see figure 12)**.
Is the resistance 5 ohms or less?
If yes, go to step 5.
If no, repair open in the solenoid control circuit.

STEP 5

Remove the transmission power fuse.
Measure the resistance between cavity E and cavity B of the transmission harness connector **(see figure 12)**.
Is the resistance 5 ohms or less? If yes, repair short to power in the solenoid control circuit.
If no, go to step 6.

STEP 6

Measure the resistance between cavity B of the transmission harness connector and ground **(see figure 12)**.
Is the resistance 5 ohms or less?
If yes, repair short to ground in the solenoid control circuit.
If no and you **DID** used the KwikTest Plus box to get to this point in your diagnosis, replace the PCM/TCM.
If no and you **DID NOT** use the KwikTest Plus box, go to step 7.

STEP 7

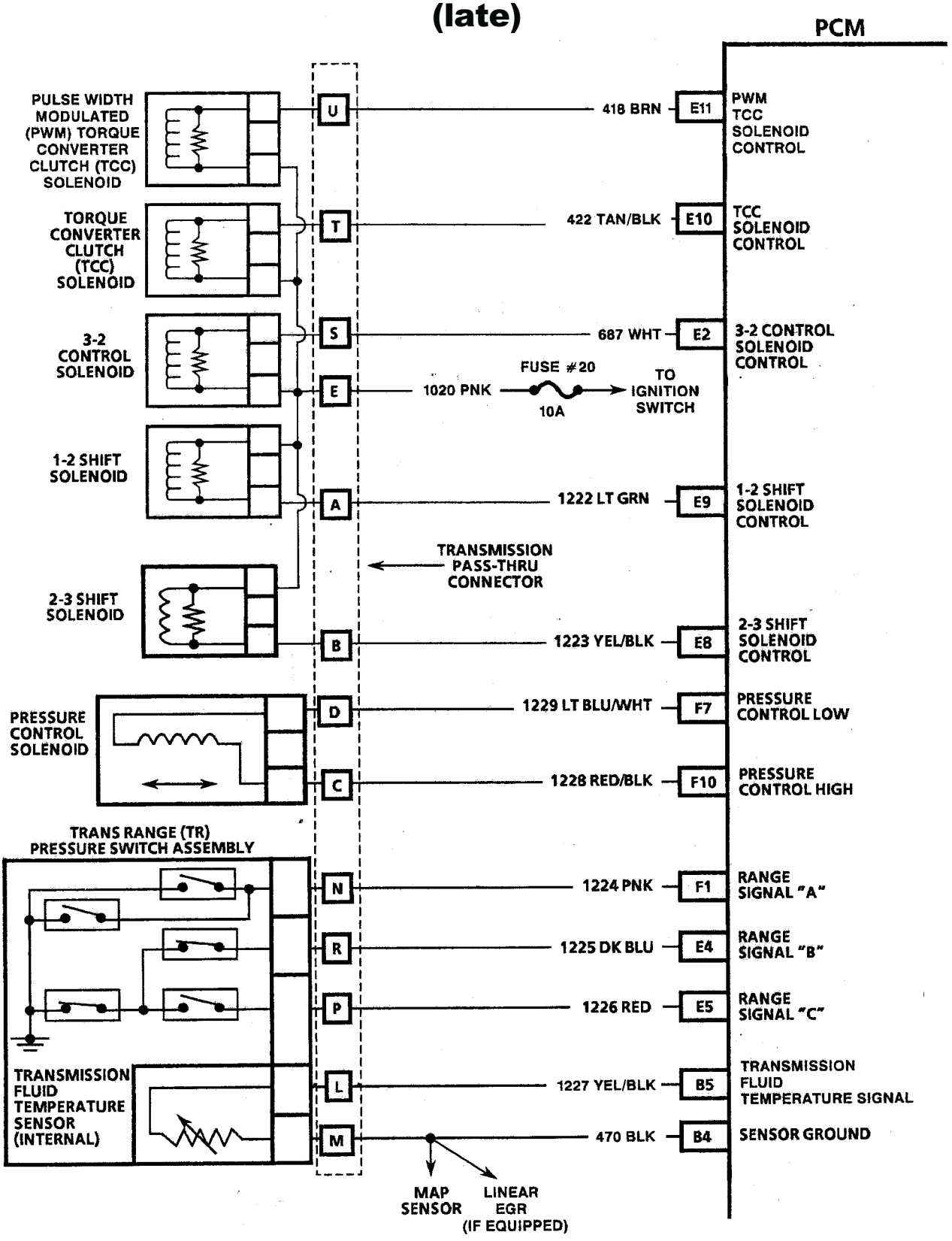
Remove the transmission pan.
Disconnect the internal transmission wiring harness from the 2-3 shift solenoid.
Inspect the solenoid and the connector for corroded, damaged or pushed out terminals.
Measure the resistance between the two shift solenoid terminals.
Is the resistance 20-40 ohms?
If yes, go to step 8.
If no, replace solenoid.

STEP 8

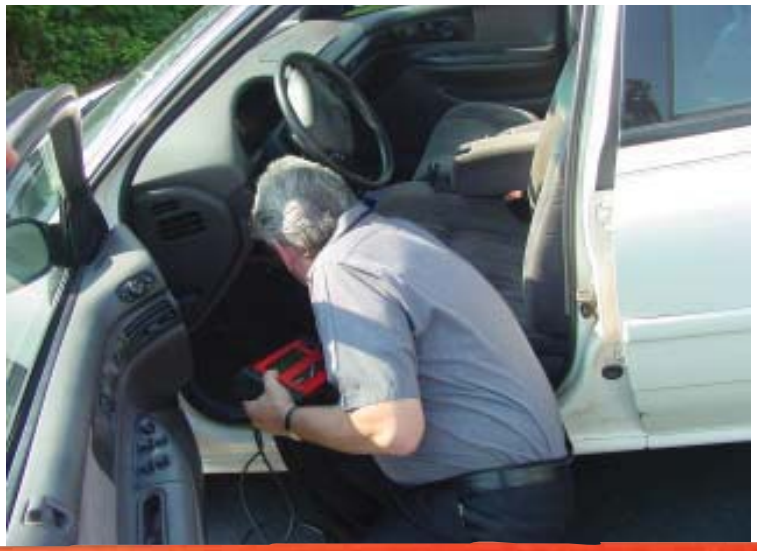
Remove the internal transmission wiring harness. Inspect harness for broken wires, damaged insulation or connectors.
Check the solenoid power and ground wires for continuity through the case connector.
Does the internal harness test OK?
If yes, replace the PCM.
If no, replace the harness.

Wiring Diagram

(late)



Revised 3/02



4L60-E CODE: P0785

3-2 Solenoid Circuit Fault

4L60-E Code P0785
3-2 Control Solenoid Circuit Fault

Theory of Operation

The 4L60-E transmission uses s 3-2 control solenoid to coordinate the apply rate of the 2-4 band with hydraulic release, of the 3-4 clutch during 3-2 downshifts. The Powertrain Control Module or Vehicle Control Module (PCM/VCM) monitors voltage or “feed back” on the solenoid ground wire to determine if the circuit has continuity. When the PCM/VCM detects a continuos open or short to ground in the 3-2 control solenoid or circuit, code P0785 sets.

Circuit Description

The transmission shift and TCC and 3-2 control solenoids receive voltage through a fuse from the ignition switch. The PCM/VCM controls the solenoid by opening or closing the ground path on the solenoid control circuit.

Conditions for Setting the Code

- The system voltage is 10-19 volts
- The engine speed is greater than 450 RPM for 8 seconds
- The PCM commands the 3-2 control solenoid on, and the voltage remains high (B+)
- The PCM commands the 3-2 control solenoid off, and the voltage remains low (0 volts)
- All conditions are met for 5 seconds

Action Taken When Code Sets

The PCM/VCM will default to:
- Third gear only
- Maximum line pressure
- No TCC
- May illuminate the malfunction indicator lamp

Possible Causes

- Wiring or connector problems in the transmission 3-2 control solenoid power or control circuits
- Defective solenoid
- Defective PCM/VCM
- Defective ignition switch
- Defective transmission power fuse

Diagnosis

Step 1

With the Snap-On scanner, check and record all trouble codes. Clear codes and road test vehicle.
See if the code returns.
If the code does not return the problem is intermittent. Try shaking the wiring and connectors to duplicate the condition. Inspect connectors for corroded, damaged or pushed out pins.
If the code does return, are codes P0785, P0758, P0753 and P1860 also present?
If yes, check the transmission power fuse. If the fuse is good, go to step 3.
If codes P0785, P0758, P0753 and P1860 are not present, and you have Kwik-Test Plus, go to step 2.
If you do not have a Kwik-Test plus, go to step 3.

Step 2

Disconnect the vehicle wiring harness from the transmission case connector. Inspect the case and harness connectors for corroded, damaged or pushed out terminals.
Following the instructions in the Kwik-Test Plus manual, check the 3-2 control solenoid resistance, current and voltage.
Does the solenoid check OK?
If yes, go to step 3.
If no, go to step 7.

Step 3

Disconnect the vehicle wiring harness from the transmission case connector. Inspect the case and harness connectors for corroded, damaged or pushed out terminals.
With the ignition key on, measure the voltage at cavity E of the transmission harness connector **(see figure 13 for wire color and circuit location)**.
Are there 10.5 volts or more?
If yes, go to step 4.
If no, repair open in the vehicle solenoid power circuit.

Step4

With the ignition key off, disconnect the appropriate harness connector from the PCM for the 3-2 control solenoid circuit **(see appendix F for connector, wire color and circuit location)**.
Inspect the PCM and connector for corroded, damaged or pushed out terminals.
Measure resistance between the appropriate cavity for the 3-2 control solenoid of the PCM harness connector and cavity S of the transmission harness connector **(see figure 13)**.
Is the resistance 5 ohms or less?
If yes, go to step 5.
If no, repair open in the solenoid control circuit.

STEP 5

Remove the transmission power fuse.
Measure the resistance between cavity E and cavity S of the transmission harness connector **(see figure 13)**.
Is the resistance 5 ohms or less?
If yes, repair short to power in the solenoid control circuit.
If no, go to step 6.

STEP 6

Measure the resistance between cavity S of the transmission harness connector and ground **(see figure 13)**.
Is the resistance 5 ohms or less?
If yes, repair short to ground in the solenoid control circuit.
If no and you **DID** use the KwikTest Plus box to get to this point in your diagnosis, replace the PCM/TCM.
If no and you **DID NOT** usre the KwikTest Plus box, go to Step 7.

STEP 7

Remove the transmission pan.
Disconnect the internal transmission wiring harness from the 3-2 control solenoid. Inspect the solenoid and the connector for corroded, damaged or pushed out terminals.
Measure the resistance between the two 3-2 control solenoid terminals.
Is the resistance 20–30 ohms?
If yes, go to step 8.
If no, replace solenoid.

STEP 8

Remove the internal transmission wiring harness. Inspect harness for broken wires, damaged insulation or connectors.
Check the solenoid power and ground wires for continuity through the case connector.
Does the internal harness test OK?
If yes, replace the PCM.
If no, replace harness.

CAV	COLOR	FUNCTION
E	PK	TRANSMISSION SOLENOID POWER
S	WT	3-2 SHIFT SOLENOID VALVE ASSEMBLY CONTROL

Harness side

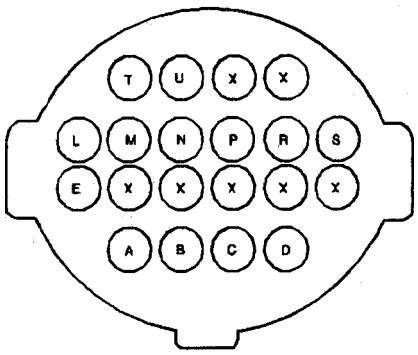
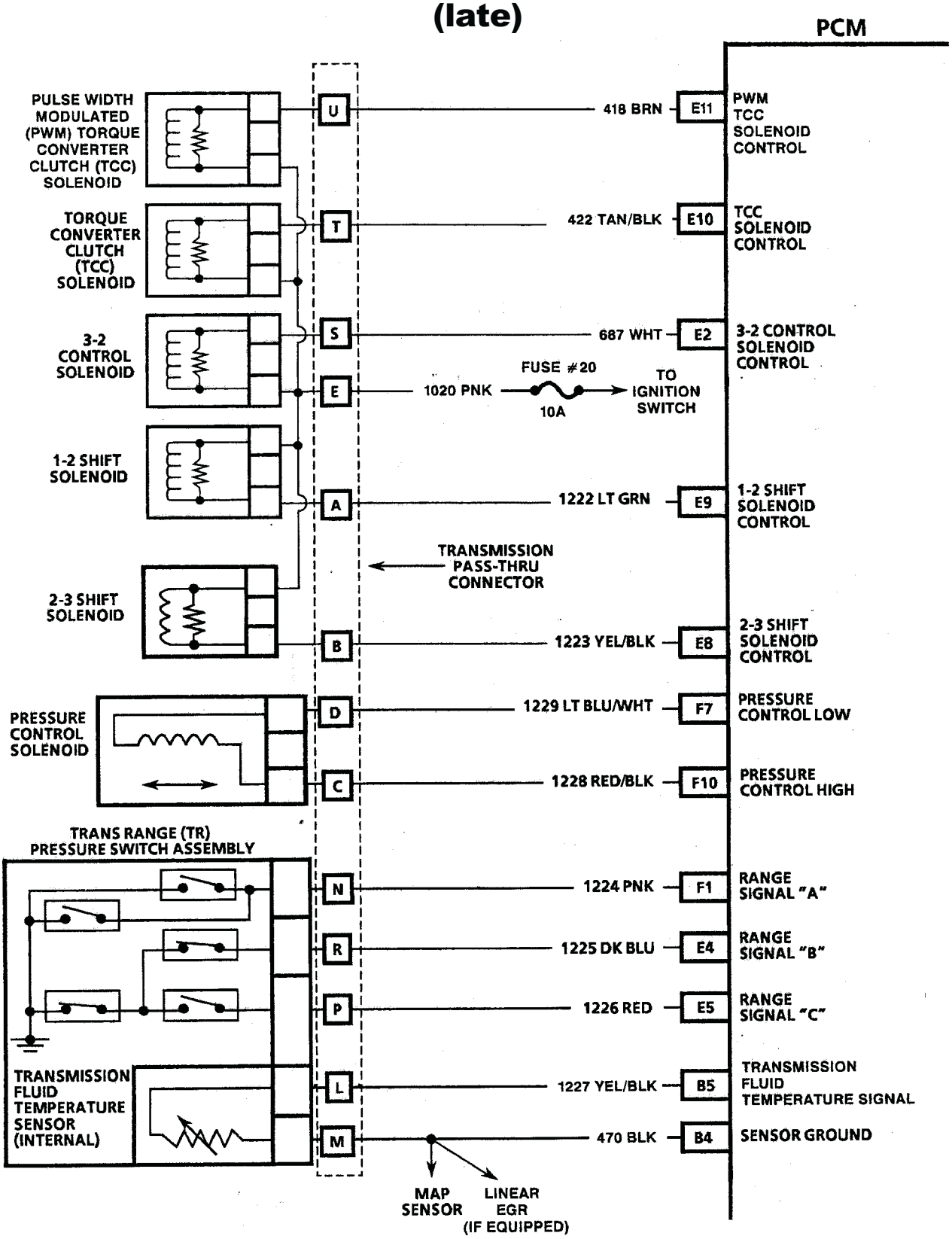
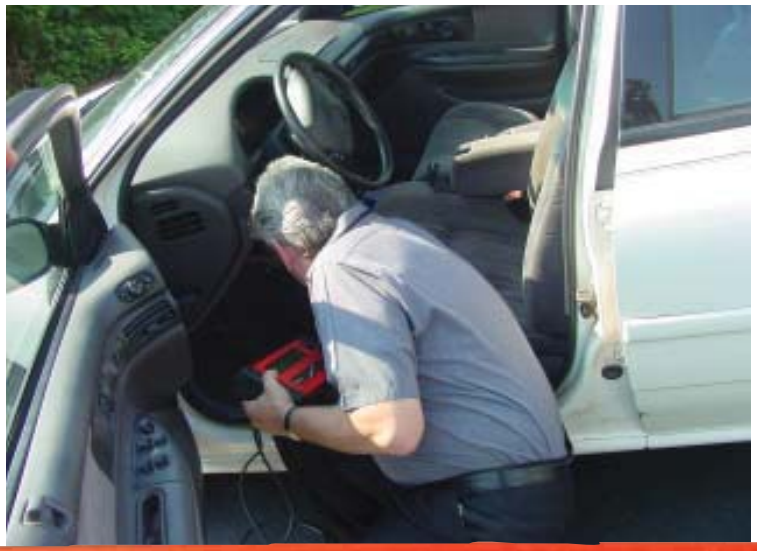


Figure 13—Solenoid power and control circuit ID.

Wiring Diagram

(late)





4L60-E CODE: P1810

Transmission Range Pressure Switch Assembly Fault

4L60-E Code P1810
Transmission Range Pressure Switch Assembly Fault

Theory of Operation

The transmission range sensor assembly consists of three normally open and two normally closed hydraulic pressure switches and is attached to the valve body. The Powertrain Control Module or Vehicle Control Module (PCM/VCM) supplies battery voltage to each range signal wire. By grounding one or more of these circuits through various combinations of pressure switches, the PCM/VCM detects what manual valve position the vehicle operator has selected. When the pressure switch completes a circuit to ground the PCM/VCM sees 0 volts, when the switch is open the PCM/VCM sees 12 volts.

Condition for Setting the Code

Code P1810 will set when the PCM/VCM detects:
- Range signals A and C are both zero volts for two seconds.
- There are two possible invalid combinations **(see figure 1)**

Range Signal	A	B	C
Park	12	0	12
Reverse	0	0	12
Neutral	12	0	12
D4	12	0	0
D3	12	12	0
D2	12	12	12
D1	0	12	12
Illegal	**0**	**12**	**0**
Illegal	**0**	**0**	**0**

Figure 14—Range signal table.

Action Taken When Code Sets

The PCM/VCM will default to:
- Harsh shifts
- PCM/VCM assumes D4 for the PRNDL shift pattern
- May illuminate the malfunction indicator lamp.

Possible Causes

- Defective pressure switch assembly
- Shorts or opens in circuit wiring
- Bad PCM
- Hydraulic cross leaks

Diagnosis

Step 1

Connect the Snap-On scanner. In the transmission codes and data display you have to monitor the PRNDL SW and Range A, B and C parameters.
With the engine running, slowly move the manual selector through all the ranges.
Carefully watch the Range A, B and C parameters. Do the voltage readings match the chart in **figure 14**?
If yes, the problem is intermittent. Check the transmission case connector for corroded damaged or pushed out terminals. Try to duplicate the condition by shaking the vehicle wiring harness.
If no, go to step 2.

Step 2

While moving the manual selector did any of the Ranges A, B or C read 12 volts or 0 volts all the time?
If yes, go to step 4.
If no, go to step 3.

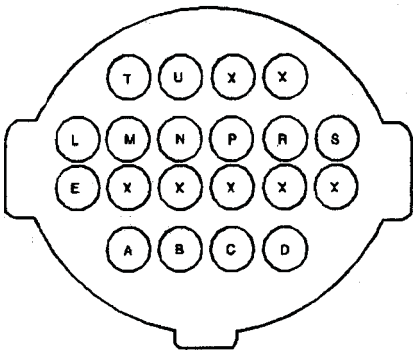
Step 3

While moving the manual selector did Range A, B and C read correctly in Park, Reverse and Drive 3?
If yes, the wiring and PCM are OK.
The problem is either a bad switch or hydraulic cross leak.

Step 4

With the ignition key off, disconnect the transmission case connector. Check the case and harness connectors for corroded, damaged or pushed out terminals.
Turn the ignition key on. On the scanner data display does Range A, B and C read 12 volts?
If yes, go to step 5.
If no, go to step 7.

Harness side



Range Signal Circuits		
CAV	COLOR	FUNCTION
N	PK	RANGE SIGNAL A
R	DB	RANGE SIGNAL B
P	RD	RANGE SIGNAL C

Figure 15—Range signal circuits.

Step 5

With the ignition key on, check for voltage at the appropriate cavities of the transmission harness connector for Range signal A, B and C circuits **(see figure 15 for wire color and circuit location)**.
Do you have 10.5 volts or more at each terminal?
If yes, go to step 6.
If no, repair the open in the range signal circuit(s) wiring to the PCM.

Step 6

With the ignition key on, ground the appropriate cavity for range signal A, B, and C **(see figure 15)** at the transmission harness connector.
Watch the scan data. Does the voltage change from 12 to 0 volts on only the range signal circuit that is grounded?
If yes, go to step 8.
If no, repair the short between the range signal circuit wiring.

Step 7

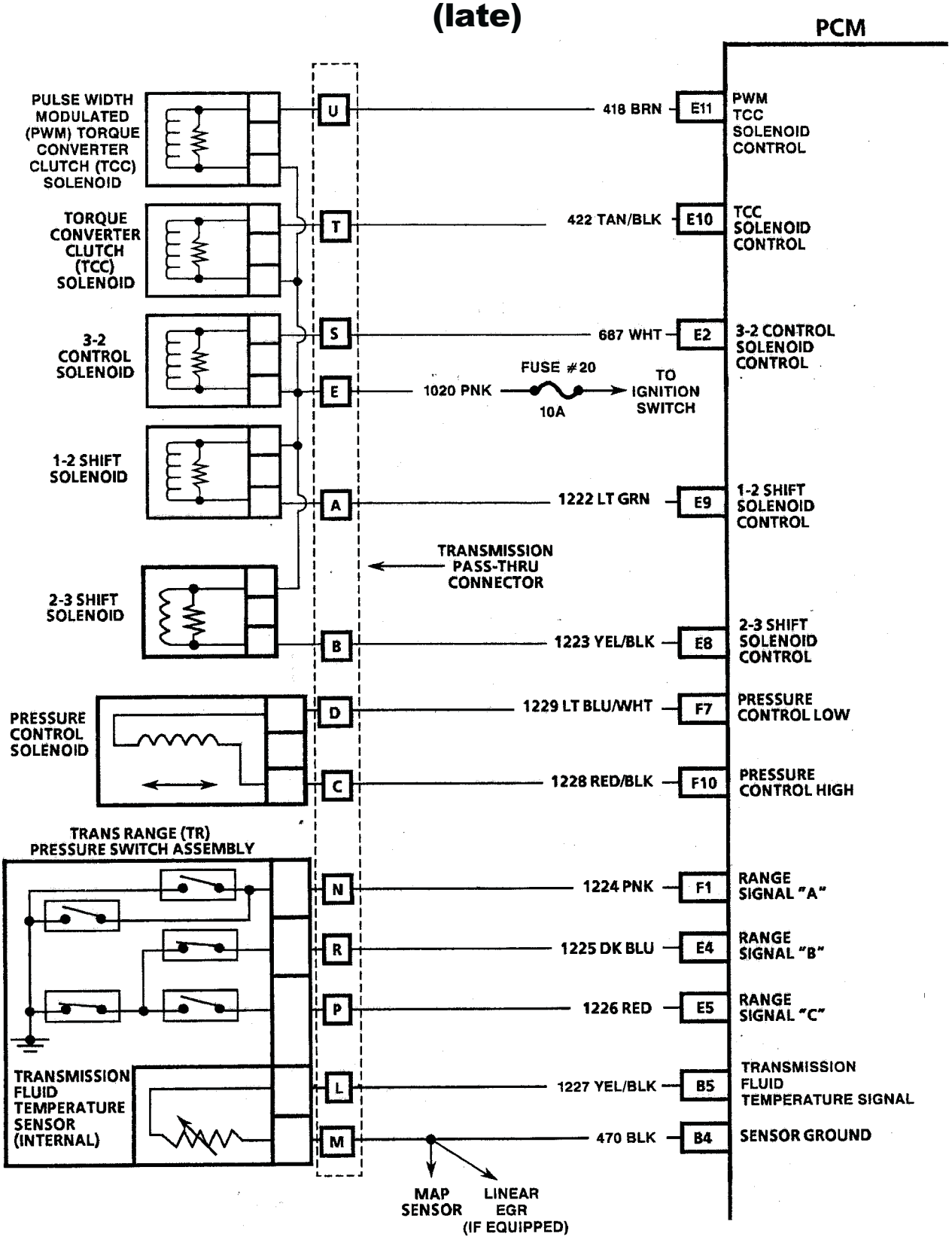
With the ignition key off, disconnect the appropriate harness connector(s) from the PCM for the range signal A, B and C circuits **(see appendix F for connector, wire color and circuit location)**. Check the PCM and harness connector for corroded, damaged or pushed out terminals.
Measure the resistance between the appropriate cavities for range signal circuit A, B and C **(see figure 15)** at the transmission harness connector and ground.
Is the resistance 5 ohms of less?
If yes, repair the short to ground in the range signal circuit(s) wiring.
If no, replace the PCM.

Step 8

Remove the transmission pan.
Remove the internal transmission wiring harness. Check the harness and connectors for corroded, damaged or pushed out terminals. Also look for broken, chaffed or shorted wires.
Does the harness check OK?
If yes, replace the transmission range pressure switch assembly.
If no, replace the internal transmission wiring harness.

Wiring Diagram

(late)



4L60-E CODE: P1860

TCC PWM Solenoid Circuit Fault

4L60-E Code P1860
Torque Converter Clutch (TCC) PWM Solenoid Circuit Fault

Theory of Operation

The 4L60-E transmission uses a torque converter clutch to provide a mechanical connection between the engine and transmission. This is done to improve drive line efficiency and fuel economy. The Powertrain Control Module or Vehicle Control Module (PCM/VCM) controls the torque converter clutch apply by using two solenoids. The TCC PWM solenoid is used to regulate the torque converter clutch apply pressure. It is used in combination with the TCC on/off solenoid to control fluid flow to the torque converter. The PCM/VCM supplies a ground allowing current to flow through the TCC PWM solenoid according to duty cycle (percentage of on and off time). This regulates the TCC signal fluid pressure acting on the TCC regulator valve. When the TCC on/off solenoid activates the TCC shift valve this regulated TCC apply pressure is directed to the torque converter clutch. The PCM/VCM monitors voltage or “feed back” on the solenoid ground wire to determine if the circuit has continuity.

Circuit Description

The transmission shift and TCC and 3-2 control solenoids receive voltage through a fuse from the ignition switch. The PCM/VCM controls the solenoids by opening or closing the ground path on the solenoid control circuit.

Conditions for Setting the Code

- The PCM/VCM commands the TCC PWM solenoid on, and the voltage remains high for 2 seconds
- The PCM/VCM commands the TCC PWM solenoid off, and the voltage remains low for 2 seconds

Action Taken When Code Sets

The PCM will default to:
- No 4th gear if in hot mode
- No TCC
- May illuminate the malfunction indicator lamp

Possible Causes

- Wiring or connector problems in the transmission TCC PWM solenoid power or control circuits
- Defective solenoid
- Defective PCM
- Defective ignition switch
- Defective transmission power fuse

Diagnosis

Step 1

With the Snap-On scanner, check and record all trouble codes. Clear codes and road test vehicle. See if the code returns.
If code does not return the problem is intermittent. Try shaking the wiring and connectors to duplicate the condition. Inspect connectors for corroded, damaged or pushed out pins.
If the code returns, are codes P0785 , P0740, P0758 and P0753 also present?
If yes, check the transmission power fuse.
If the fuse is good, go to step 3.
If codes P0785 , P0740, P0758 and P0753 are not present, and you have a Kwik-Test Plus, go to step 2.
If you do not have a Kwik-Test plus, go to step 3.

Step 2

Disconnect the vehicle wiring harness from the transmission case connector. Inspect the case and harness connectors for corroded, damaged or pushed out terminals.
Following the instructions in the Kwik-Test Plus manual, check the TCC PWM solenoid resistance, current and voltage.
Does the solenoid check OK?
If yes, go to step 3.
If no, go to step 7.

Step 3

Disconnect the vehicle wiring harness from the transmission case connector. Inspect the case and harness connectors for corroded, damaged or pushed out terminals.
With the ignition key on, measure the voltage at cavity E of the transmission harness connector **(see figure 16 for wire color and circuit location)**.
Are there 10.5 volts or more?
If yes, go to step 4.
If no, repair open in the vehicle solenoid power circuit.

Step 4

With the ignition key off, disconnect the appropriate harness connector from the PCM for the TCC PWM solenoid control circuit **(see appendix F for connector, wire color and circuit location)**. Inspect the PCM and connector for corroded, damaged or pushed out terminals.
Measure resistance between the appropriate cavity for the TCC PWM solenoid of the PCM harness connector and cavity U of the transmission harness connector **(see figure 16)**.
Is the resistance 5 ohms or less?
If yes, go to step 5.
If no, repair open in the solenoid control circuit.

STEP 5

Remove the transmission power fuse.
Measure the resistance between cavity E and cavity U of the transmission harness connector **(see figure 16)**.
Is the resistance 5 ohms or less?
If yes, repair short to power in the solenoid control circuit.
If no, go to step 6.

STEP 6

Measure the resistance between cavity U of the transmission harness connector and ground **(see figure 16)**.
Is the resistance 5 ohms or less?
If yes, repair short to ground in the solenoid control circuit.
If no and you **DID** use the KwikTest Plus box to get to this point in your diagnosis, replace the PCM/TCM.
If no and you **DID NOT** use the KwikTest Plus, go to Step 7.

STEP 7

Remove the transmission pan.
Disconnect the internal transmission wiring harness from the TCC PWM solenoid. Inspect the solenoid and the connector for corroded, damaged or pushed out terminals.
Measure the resistance between the two TCC PWM solenoid terminals.
Is the resistance 9-14 ohms?
If yes, go to step 8.
If no, replace solenoid.

STEP 8

Remove the internal transmission wiring harness. Inspect harness for broken wires, damaged insulation or connectors.
Check the solenoid power and ground wires for continuity through the case connector.
Does the internal harness test OK?
If yes, replace the PCM.
If no, replace harness.

CAV	COLOR	FUNCTION
U	BR	TCC PWM SOLENOID CONTROL
E	PK	TRANSMISSION SOLENOID POWER

Harness side

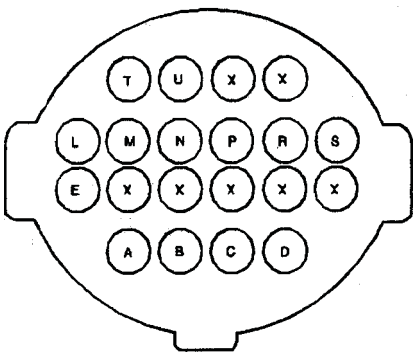
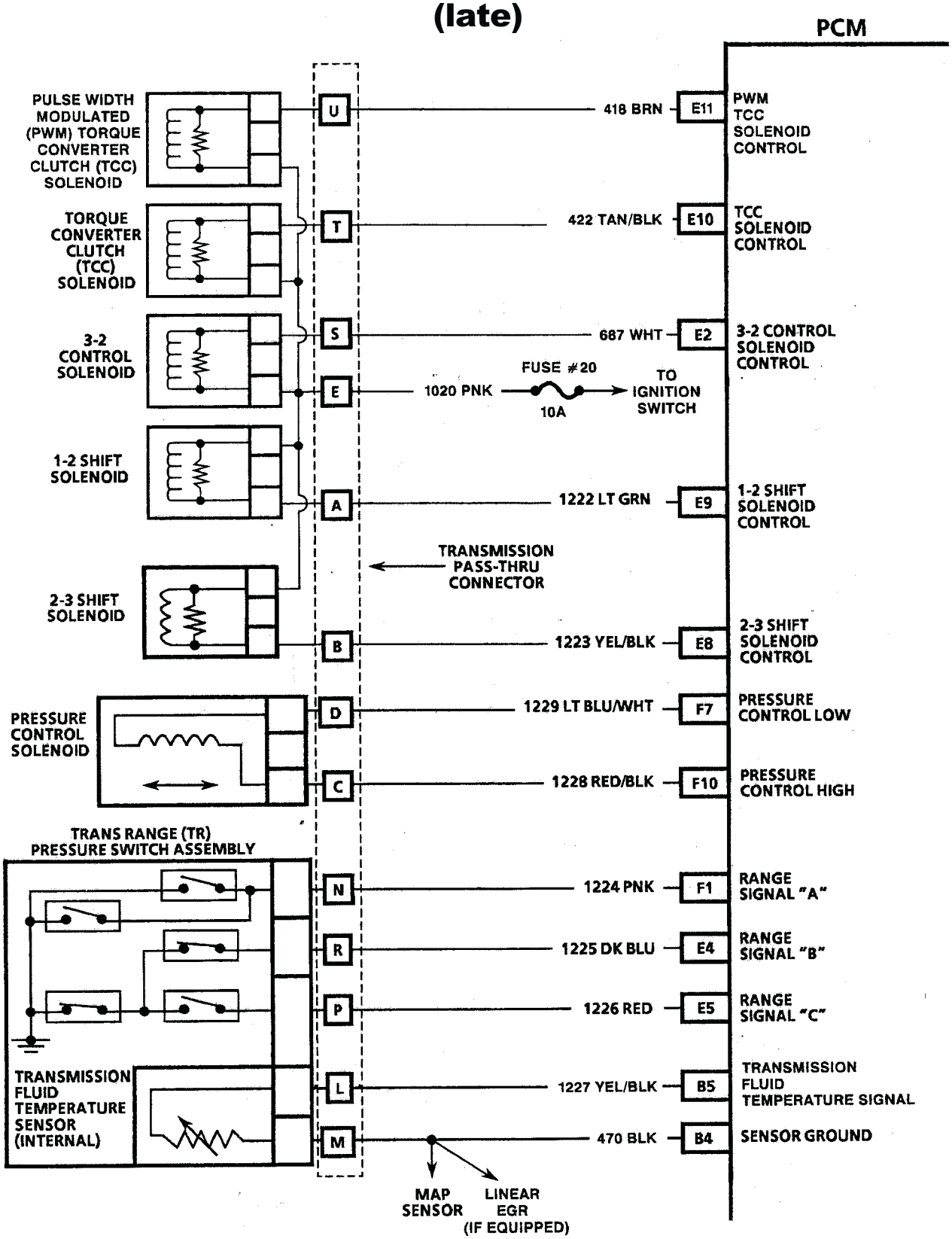


Figure 16—Solenoid power and control circuit ID.

Wiring Diagram

(late)



4L60-E CODE: P1870

Transmission Component Slipping

4L60-E Code P1870
Transmission Component Slipping

Theory of Operation

The Powertrain Control Module or Vehicle Control Module (PCM/VCM) closely monitors the difference in engine speed and transmission output speed. In D3 drive range with the torque converter engaged, the engine speed should closely match the transmission output shaft speed. In D4 range with the TCC engaged the TCC slip speed should be –20 to +20 RPM. If the PCM/VCM detects an excessive slip when the TCC should be engaged code 1870 sets.

Conditions for Setting the Code

The following conditions are met for 3 TCC cycles with reported excessive TCC slip conditions two consecutive times.

- No codes P0122/P0123 (TPS), P0502 (VSS), P0712/P0713 (TFT), P0740 (TCC electrical), P0751 (1-2 shift solenoid performance), P0753 (1-2 shift solenoid electrical), P0756 (2-3 shift solenoid performance), P0758 (2-3 shift solenoid electrical) or P1810 (transmission fluid pressure switch), 1860 (TCC PWM solenoid electrical) are present.
- The engine speed is greater than 450 RPM for 8 seconds
- Not in fuel cutoff.
- Not in 1st gear
- The transmission fluid pressure switch indicates D4
- The TCC is commanded on for 5 seconds.
- The TCC is at maximum apply for 5 seconds.
- The PCM/VCM commands maximum capacity
- The PCM/VCM detects the TCC slip speed is greater than 130 RPM
- All conditions are met for 7 seconds.

Action Taken When Code Sets

The PCM/VCM will respond by:

- Inhibits the TCC engagement
- Inhibits 4th gear if in hot mode
- May illuminate the malfunction indicator lamp

P1870

Possible Causes

- Worn TCC regulator valve in valve body **(Most common cause)**
- Defective pressure switch manifold (transmission fluid pressure switch)
- Mechanical failure of the shift solenoids
- Mechanical failure of the TCC PWM solenoid
- Mechanical failure of the TCC on/off solenoid
- Defective torque converter
- Worn stator bushings
- Excessive pump clearance
- Damaged turbine shaft “O” ring.
- Sticking shift valves
- Other internal transmission concerns

Diagnosis

The 4L60-E does not use an input speed sensor therefore the PCM/VCM can only rely on engine RPM as a measure of transmission input speed. Because of this, the computer cannot tell the difference between a TCC slip and another transmission component slipping. This means any slip in fourth gear can cause a code 1870 to set.

Step 1

Connect the Snap-On scanner. Check and record all trouble codes, freeze frame and failure Records for reference. Clear the codes and road test vehicle.
Drive the vehicle in 4th gear with the TCC engaged.
Monitor the TCC slip data parameter.
Is the TCC slip is greater than 130 RPM for 7 seconds?
If yes, go to step 2.
If no, the problem is intermittent. Try to duplicate the condition by shaking wiring and connectors. Also road test the vehicle both hot and cold. This problem will usually occur after a very long road test when the transmission is extremely hot.

Step 2

Continue with EDS including sump examination.
Does the driving, fluid and sump condition indicate a minor service may cure the problem?
If yes, check the TCC on/off, TCC PWM and shift solenoids for internal malfunctions (damaged seals, sticking or sediment damage).
Inspect the valve body for sticking or worn TCC regulator valve. If an internal problem is indicated check the torque converter and pump.
Inspect the input housing (3-4 clutch), 2-4 band and servo for circuit leaks and worn friction material.