THM 4T65-E

DTC P0742 TCC STUCK "ON"

COMPLAINT: Before or after overhaul, a vehicle equipped with the THM 4T65E automatic transaxle, logs OBDII code P0742 “TCC Stuck On”. When this code is set, the PCM will command TCC on at full capacity, and also freeze the shift adapt strategy.

CAUSE:

(1) This condition may be caused ***mechanically*** by a sticking or defective TCC release switch located in the pressure switch assembly

(2) This problem may be caused ***electrically*** by a short to ground of the TCC release switch, or the external wire from PCM to terminal "U" at the case connector, or the internal wire from terminal "U" to terminal "B" on the pressure switch assembly.

(3) This condition may be caused ***hydraulically*** by a clogged TCC PWM solenoid.
Note: Installing a TCC PWM solenoid from a 4L60E on this vehicle will react the same as a clogged solenoid. (TCC immeadiately on top of 2nd gear).

CORRECTION: ***To correct this problem it must first be established whether the trouble is mechanical, hydraulic, or electrical in nature before the problem can be resolved and most scanners no longer give you TCC release switch information.***

Pressure Switch Operation And Function:

The pressure switch assembly located on the valve body of the 4T65E transaxle, is a switch assembly containing six fluid pressure switches. Three of these pressure switches; (D4, LO, and REV), are normally open switches, while the other three switches; (D3, D2, and TCC Release) are normally closed switches. These switches with the exception of the TCC Release switch are used by the PCM to determine the position of the Manual Valve in the transmission. The TCC Release switch, which is the one we are interested in, is normally closed and completed to ground and is used as an additional aid for the PCM to confirm the ON/OFF status of the Torque Converter Clutch during operation of the vehicle.

Diagnosis Procedure:

(1) Back probe terminal "U" with the positive lead from DVOM, as shown in Figure 1, and the negative lead from DVOM to a known good ground.

(2) Observe the DVOM. We should have continuity at this point, since we now know that the TCC Switch is normally closed and completed to ground.

(3) Start the engine leaving the selector lever in the Park position. TCC release oil should now open the normally closed switch and we should show no continuity on the DVOM. This would mean that the switch and wiring is operating properly and the most likely problem is the TCC/PWM solenoid clogged or restricted. If you still show continuity, with the engine running, continue to step (4).

(4) Turn the engine off and disconnect the vehicle harness connector from the transaxle. Locate the vehicles PCM, locate and disconnect the “Clear” C1 connector at the PCM.
(Refer to appropriate service manual for exact location of PCM as location will vary model to model).

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Diagnosis Procedure:

(5) Connect the positive lead from DVOM to terminal "U" on the vehicle harness connector, as shown in Figure 2, and the negative lead from DVOM to a known good ground.

(6) There should be no continuity on the DVOM. If you do have continuity, the wire from the transaxle case connector to the PCM is grounded and ***must*** be repaired or replaced. If you do not have continuity, continue to step (7).

(7) You now have it narrowed down to the Pressure Switch Assembly (PSA) with a defective TCC switch, or an internal wiring harness that is grounded internally. Either way we have to take it apart.

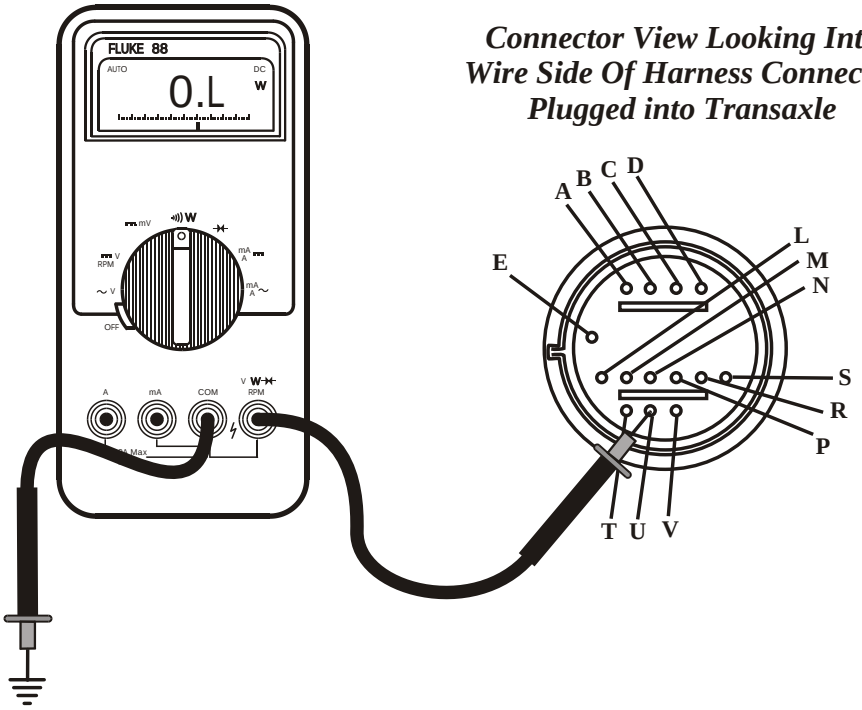
(8) To check the internal harness for a short to ground, refer to Figure 3. To check the Pressure Switch Assembly, refer to Figure 4.

SPECIAL NOTE:

1. For Pressure Switch Assembly description and operation, refer to Figure 5.
2. If you are trying to diagnos the TCC Release switch using a scanner, refer to Figure 6, as all scanners are not capable of viewing the TCC switch.
3. Refer to Figure 7, 8, and 9 for hydraulic schematics of the TCC circuit in various configurations.

SERVICE INFORMATION:

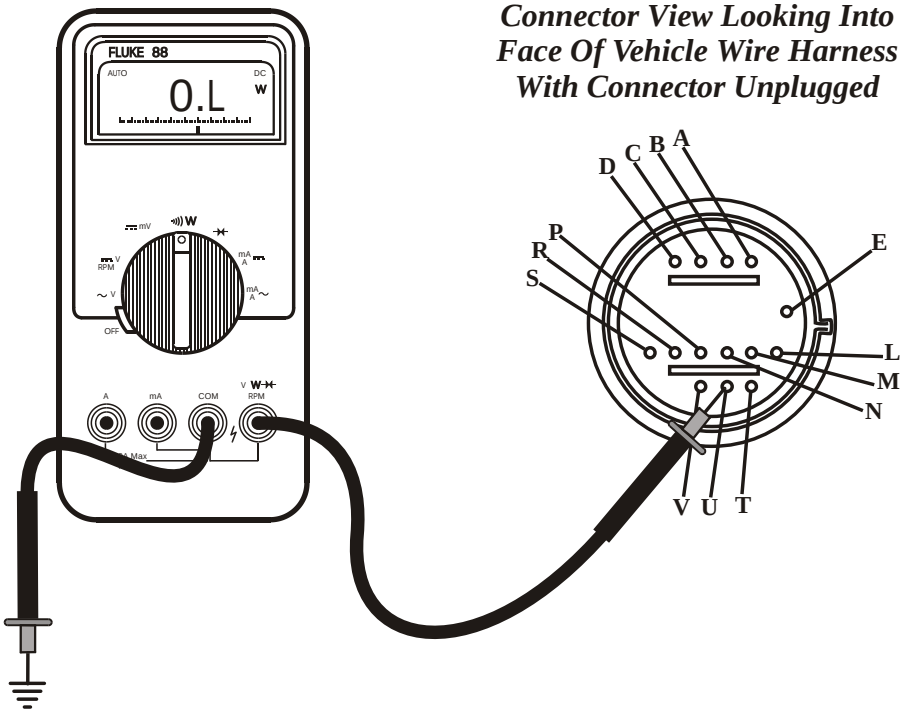
TCC/PWM Solenoid (Purple Paint I.D.) 24214974



Connector View Looking Into Wire Side Of Harness Connector Plugged into Transaxle

Figure 1

CHECKING FOR GROUNDED WIRE FROM PCM TO TRANSAXLE CASE CONNECTOR



Connector View Looking Into Face Of Vehicle Wire Harness With Connector Unplugged

Figure 2

CHECKING INTERNAL WIRE HARNESS

Diagnosis Procedure:

(1) Disconnect the Pressure Switch Assembly (PSA) connector from the Pressure Switch Assembly, as shown below.

(2) Connect the positive lead from DVOM to terminal "B" on the PSA connector, as shown below, and the negative lead from DVOM to a good ground, such as valve body or oil pump.

(3) There should not be continuity. If you do have continuity, it will be necessary to replace the Internal Wire Harness. If there is no continuity Internal harness is OK.

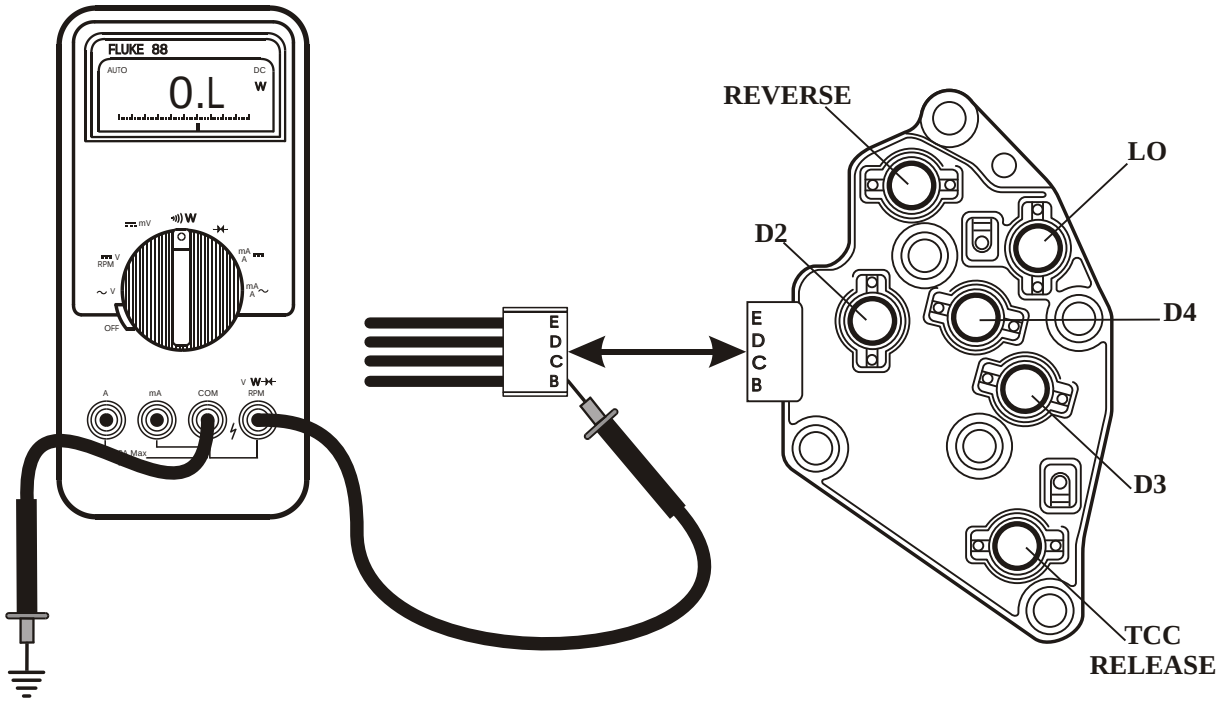


Figure 3

CHECKING THE PRESSURE SWITCH ASSEMBLY

Diagnosis Procedure:

(1) Remove the Pressure Switch Assembly (PSA) and place it on a flat work surface, as shown below.

(2) Using the DVOM, set the meter to check for continuity or resistance, place the positive lead of the meter on Terminal "B" at the PSA connector and place the negative lead of the meter to the metal contact of the TCC Release Switch, as shown below.

(3) The meter should indicate continuity, or approximately .5 ohms resistance. Press down firmly in the center of the switch contact, using the eraser end of a pencil, and check the meter again. The meter should now indicate no continuity, or an open circuit. If the meter does not indicate an open circuit, after pressing the switch contact, replace the Pressure Switch Assembly.

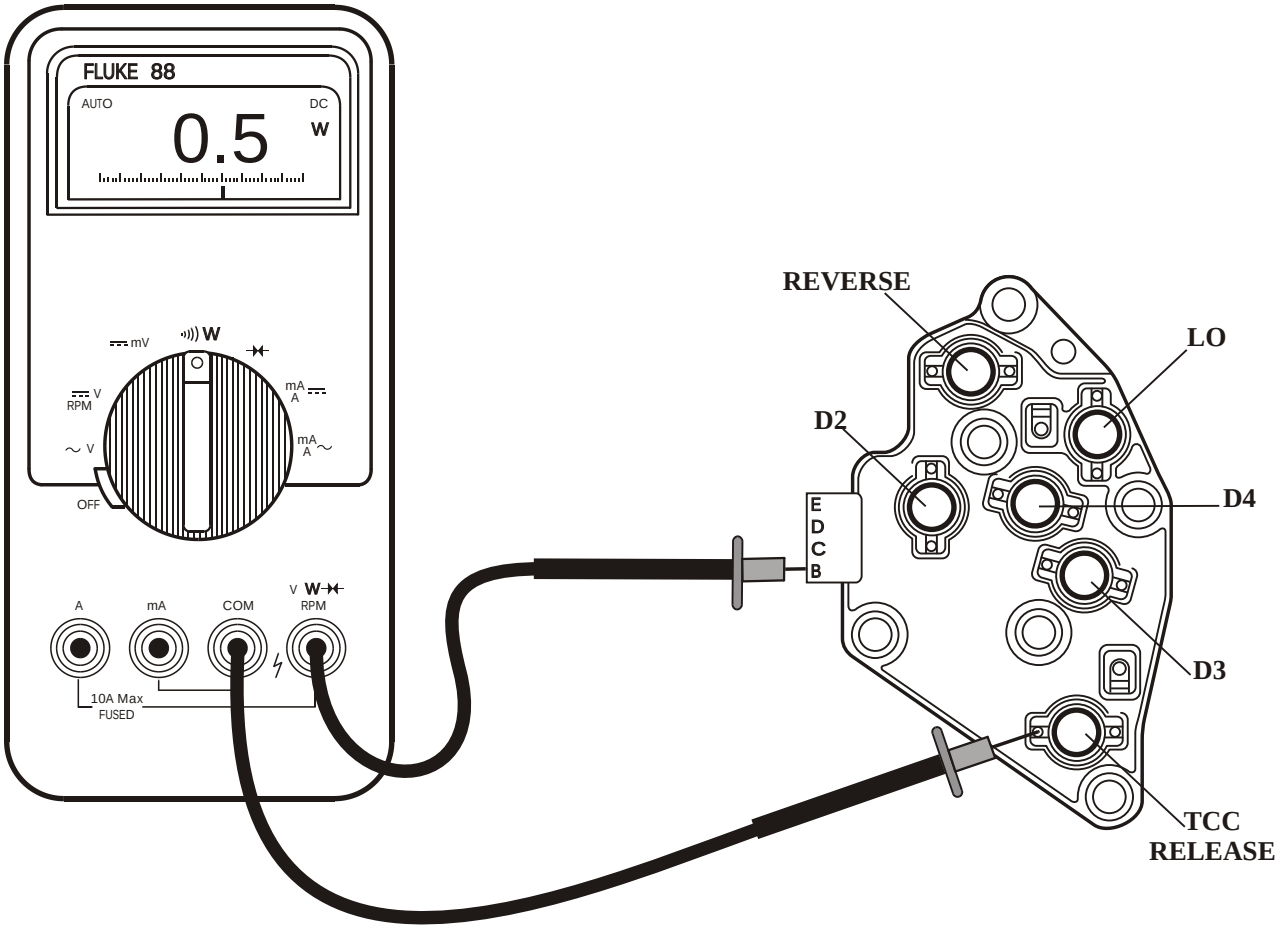


Figure 4

PRESSURE SWITCH ASSEMBLY DESCRIPTION AND OPERATION

The Pressure Switch Assembly (PSA) located on the valve body of the 4T65E transaxle, is a switch assembly containing six fluid pressure switches. Three of these pressure switches; (D4, LO, and REV), are normally open switches, while the other three switches; (D3, D2, and TCC Release) are normally closed switches. These switches with the exception of the TCC Release switch are used by the PCM to determine the position of the Manual Valve in the transmission. The TCC Release switch, which is the one we are interested in, is used as an additional aid for the PCM to confirm the ON/OFF status of the Torque Converter Clutch during operation of the vehicle.
Figure 6 on the following page illustrates the indications shown on a scan tool in each range when checking the range parameters E, D, C, and TCC Release. "HI" indicates the switch is open, while "LO" indicates the switch is closed when viewing the datastream on the scanner.

All scanners do not have the capability of viewing the TCC Release Switch!!!

Note: When viewing scanner parameter for TCC Release, the indication on the scan tool may show a; ("0" open) and ("1" closed), or ("P2" open) and ("P1" closed), or ("HI" open) and ("LO" closed), depending on the scanner manufacturer.

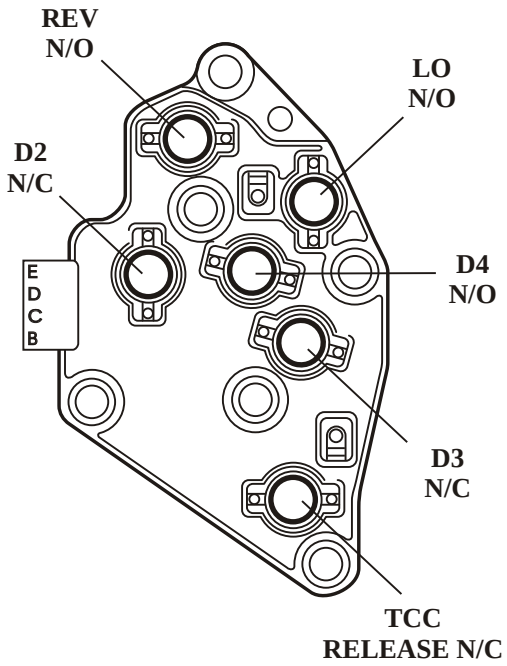


Figure 5

RANGE INDICATOR	CIRCUIT			
	E	D	C	TCC
PARK/NEUTRAL	HI	LO	HI	HI
REVERSE	LO	LO	HI	HI
OVERDRIVE	HI	LO	LO	*
MANUAL THIRD	HI	HI	LO	*
MANUAL SECOND	HI	HI	HI	*
MANUAL FIRST	LO	HI	HI	HI

TCC Release Switch information is not available on all scanners.

HI = Indicates an open switch as identified on the scanner.
LO = Indicates a closed switch as identified on the scanner.
**** = Indicates wether TCC release oil is present (HI), or not present (LO).***
TCC On will = (LO).
TCC Off will = (HI).

Connect the scanner and locate the parameter for TCC release. The TCC release switch in the pressure switch assembly is a normally closed switch. The switch is held open by the presence of torque converter release pressure at the switch. Refer to Figure 5 for description and operation of the PSA. With the scanner connected and the vehicle started in park, the indication on the scanner should show the switch to be open, as release oil should be present. Depending on the scanner, the indication shown may : (“0”-open) and (”1”-closed), (”P2”-open) and (”P1”-closed) or (”HI"-open) and (”LO”-closed). Refer to the chart above for the pressure switch assembly readings on the scanner.

If the scanner shows the switch to be closed, the trouble will be caused by either a stuck TCC release switch, or a short to ground on the signal wire from the TCC release switch to the computer. Refer to Figure 2 to check for a shorted wire in the TCC release switch circuit. Refer to Figure 3 to check for shorted internal harness Refer to Figure 4 to check for a stuck TCC release switch.

If the indication on the scanner shows the switch to be open, hold the brake and place the selector lever in the drive position. Allow the wheels to spin and watch the scanner as the vehicle up-shifts into second gear. If the indication on the scanner changes from open to closed with the shift into second gear, check the parameter for TCC duty cycle and see what the reading shows. A reading of 0% duty cycle would indicate that the computer has not commanded lock-up. If the computer has not commanded lock-up, but TCC release oil has exhausted, (noted by the change in state of the TCC release switch on the scanner) this could indicate a clogged TCC PWM solenoid. Refer to Figures 7, 8, and 9 for TCC PWM hydraulic circuit description.

CAUTION:

A vehicle equipped with ABS "CANNOT" be run on a lift.

Figure 6

The hydraulic diagram shown in Figure 7 represents the transmission in either; Park, Reverse, Neutral, or Drive 1st. Gear, including Manual Low. When you look at the feed from second gear to the TCC PWM solenoid, you will notice the lack of oil pressure in the circuit. This is because oil pressure is present only when the second clutch is applied, which would be 2nd, 3rd, and 4th gears on this transaxle. With no oil pressure at the second clutch, the TCC control valve stays at rest in it's bore away from the spring. This results in oil pressure being present at the TCC Release Switch in the Pressure Switch Assembly, keeping the Release Switch open.

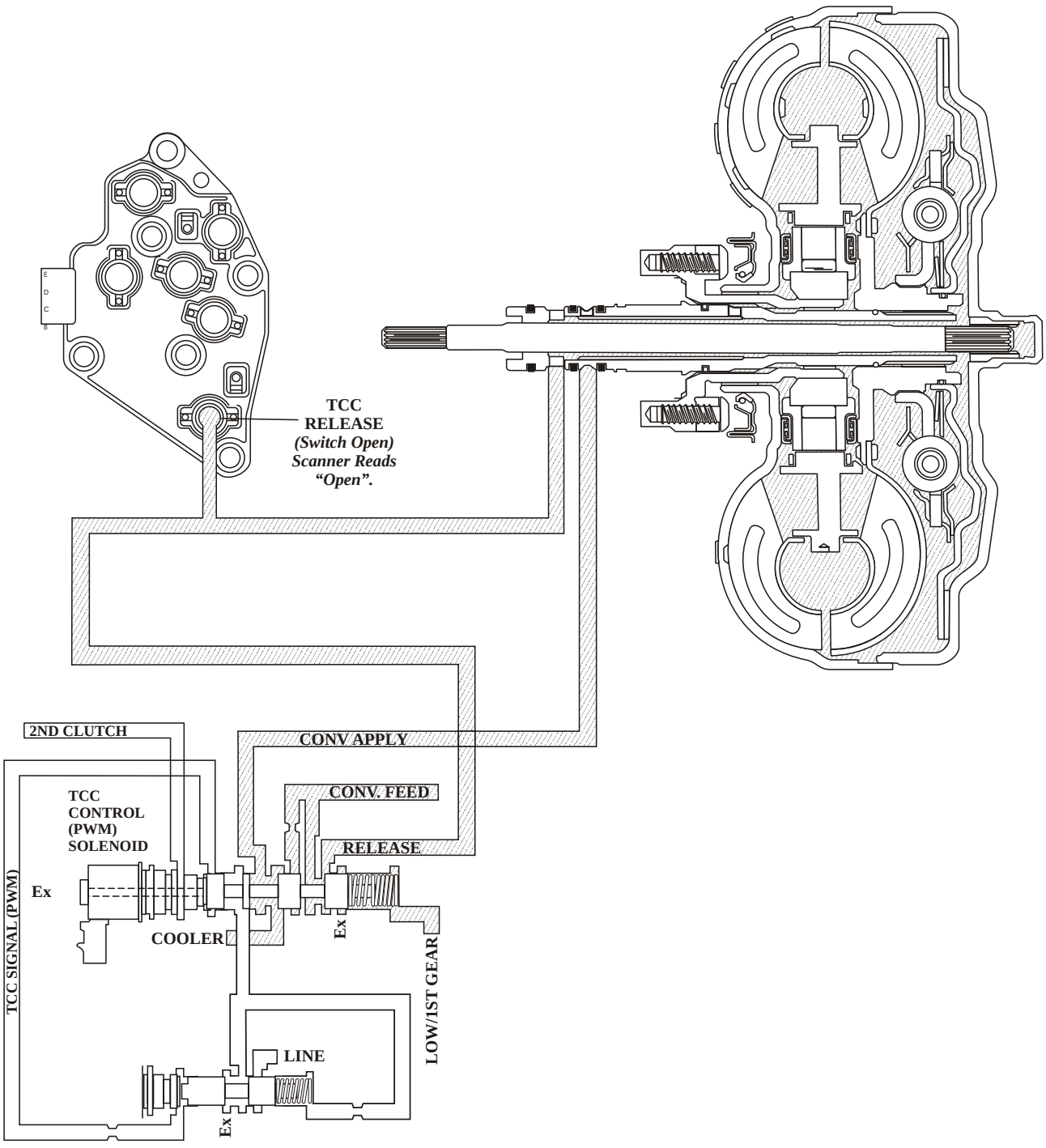
The hydraulic diagram shown in Figure 8 represents the transmission in Drive 2nd. Gear, 3rd. Gear, and 4th. Gear. Notice the presence of 2nd gear oil pressure in the circuit. With the solenoid "OFF" and not energized, the solenoid should exhaust 2nd clutch pressure so that the pressure in the solenoid doesn't become great enough to cause the TCC valve to stroke inward against the spring. Lock-up will not be engaged at this time.

The hydraulic diagram shown in Figure 9 also represents the transmission in Drive 2nd. Gear, 3rd. Gear, and 4th. Gear, lock-up clutch applied. If for some reason the TCC solenoid is not capable of exhausting 2nd clutch oil pressure, the result will be the TCC control valve overcoming spring tension and moving into the lock-up position. Lock-up release oil will exhaust through the valve, the converter clutch will engage with the shift into second gear. Replacing the TCC PWM solenoid should correct the problem.

It has been found that although identical in appearance, a new factory TCC PWM solenoid for the 4L60E has been used in the 4T65E in different instances. Even though the solenoids look identical, they ***"Will Not" interchange.***

CAUTION:
Use "ONLY" the TCC PWM Solenoid for a 4T65-E transaxle, identified by a purple splotch of paint on the canister for identification, and available under OEM part number 24214974.

TCC HYDRAULIC CIRCUIT IN PARK, REVERSE, NEUTRAL AND DRIVE 1ST. GEAR

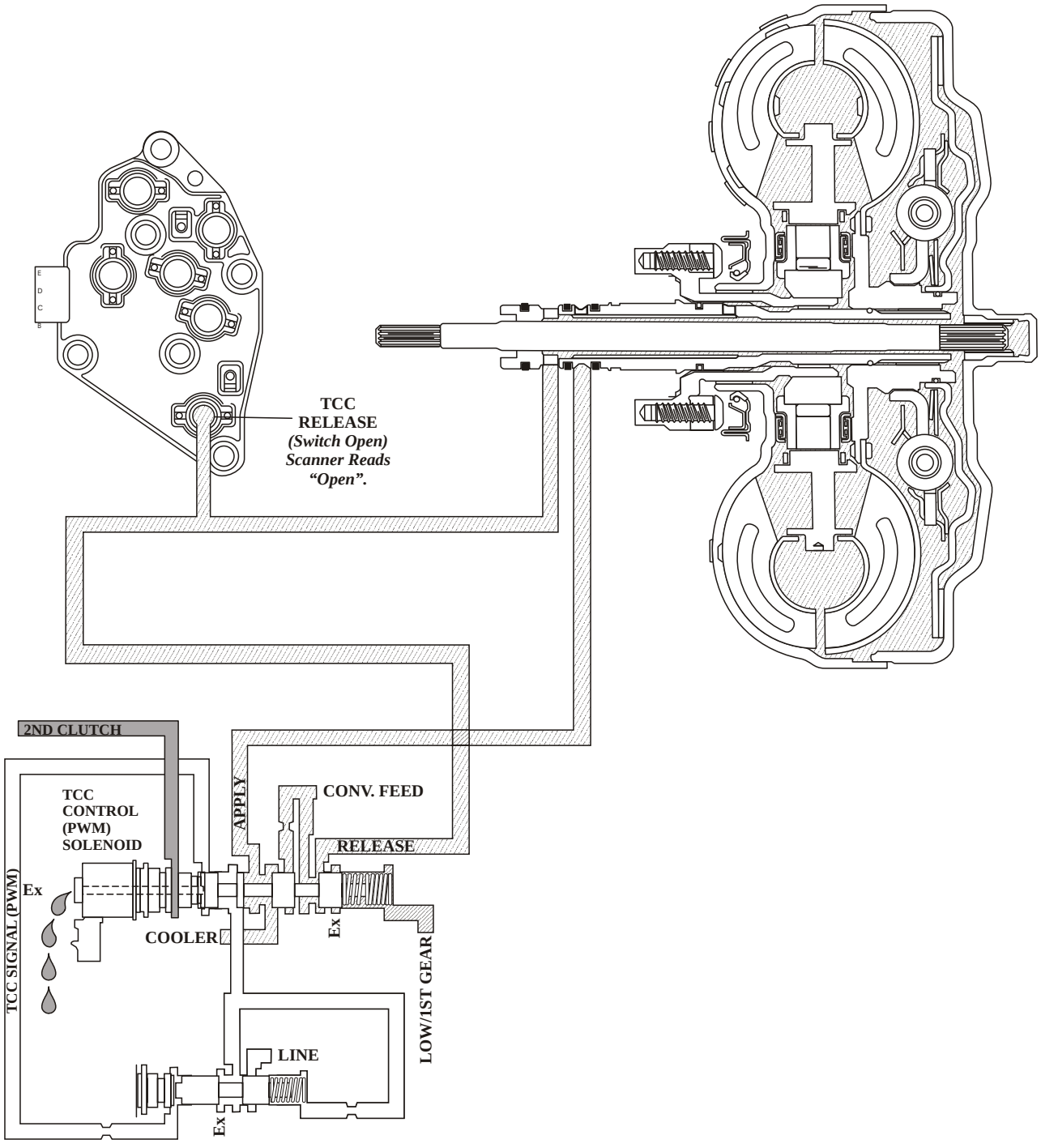


This diagram shows the transmission in either Park, Reverse, Neutral, or Drive 1st gear including Manual Low.

Notice that Lo/1st oil is routed to the spring side of the TCC valve and with no second clutch oil fed to the TCC/PWM solenoid, converter clutch apply is prevented

Figure 7

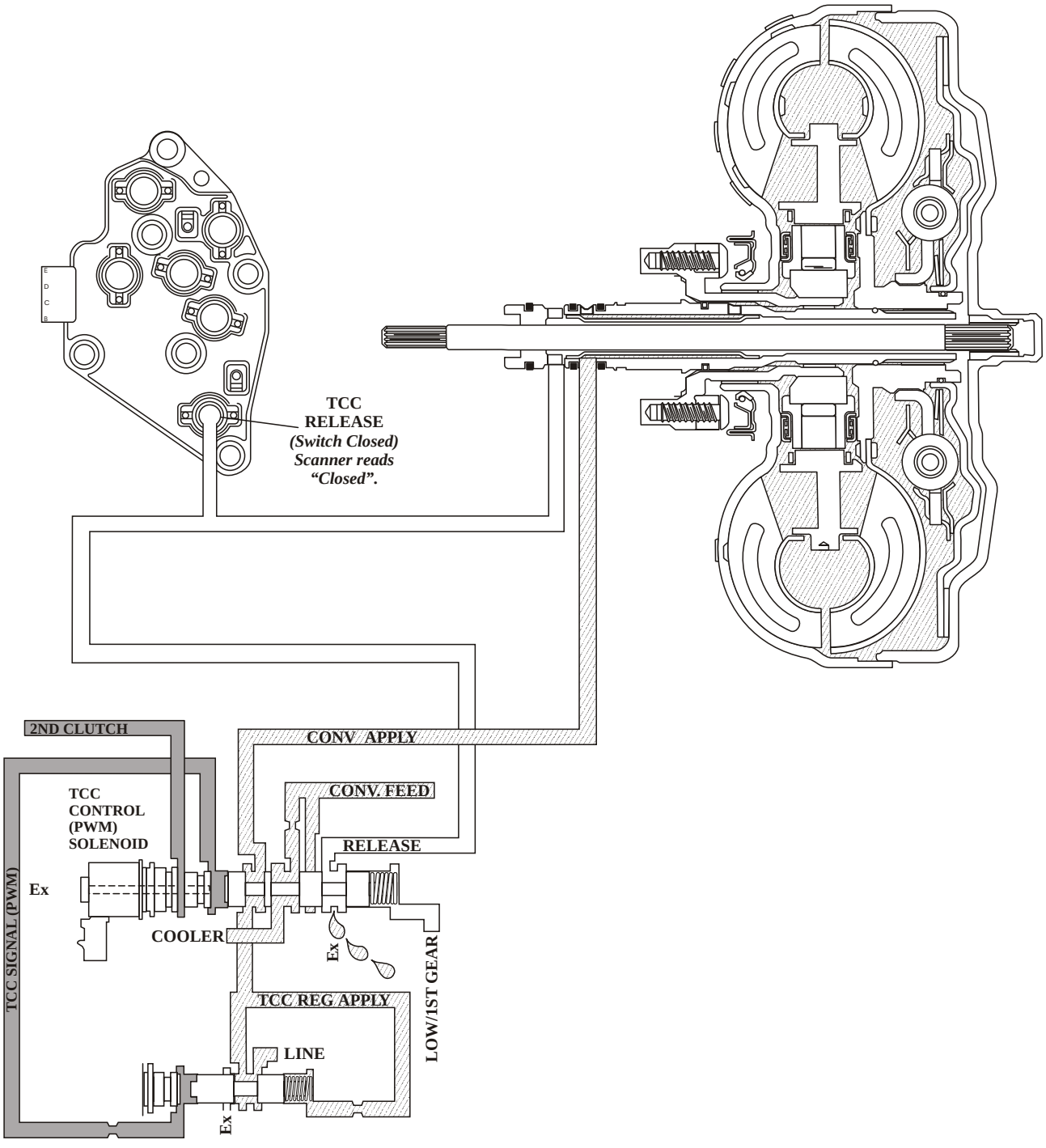
TCC HYDRAULIC CIRCUIT IN DRIVE 2ND 3RD AND 4TH GEARS (Converter Clutch Released)



This diagram shows the transmission in 2nd, 3rd, or, 4th gear, with converter clutch released. Notice the TCC PWM solenoid is exhausting the TCC signal oil (2nd Clutch) and pressure is not high enough to overcome spring pressure on the TCC valve, so the release oil is not exhausted.

Figure 8

TCC HYDRAULIC CIRCUIT IN DRIVE 2ND 3RD AND 4TH GEARS (Converter Clutch Applied)



This diagram shows the transmission in 2nd, 3rd, or, 4th gear, with converter clutch applied. Notice the TCC PWM Solenoid is energized and not exhausting the TCC signal oil, (2nd Clutch) and TCC signal oil is pushing TCC valve to the right, causing release oil to exhaust at the valve.

Figure 9