



# Technical Bulletin #343

**Transmission:** 1993-96 4L60E and 1994-96 4L80E  
**Subject:** Lack of power, early shifts, late shifts or erratic shifting  
**Application:** GM  
**Issue Date:** 1996

## 1993-96 4L60E and 1994-96 4L80E

### Lack of Power, Early Shifts, Late Shifts or Erratic Shifting

Some 1993-96 4L60E or 1994-96 4L80E equipped pickups, sport utility vehicles, motorhomes or vans may exhibit one or more of the following concerns or symptoms.

- Lack of power, especially when carrying loads or during heavy acceleration.
- Early upshifts, no matter what the throttle opening.
- Late shifts in the 4WD-low range only.
- Erratic shifts (shifts which are early during one upshift sequence and normal during the next sequence or some of the upshifts during a shift sequence are early, while others are normal).
- Incorrect forced downshift shift points or no forced downshifts at normal road speeds.

These conditions may occur on either 2WD or 4WD vehicles, but are most prevalent on 4WD applications. In addition, these conditions will most likely be intermittent and will occur without any trouble codes being set.

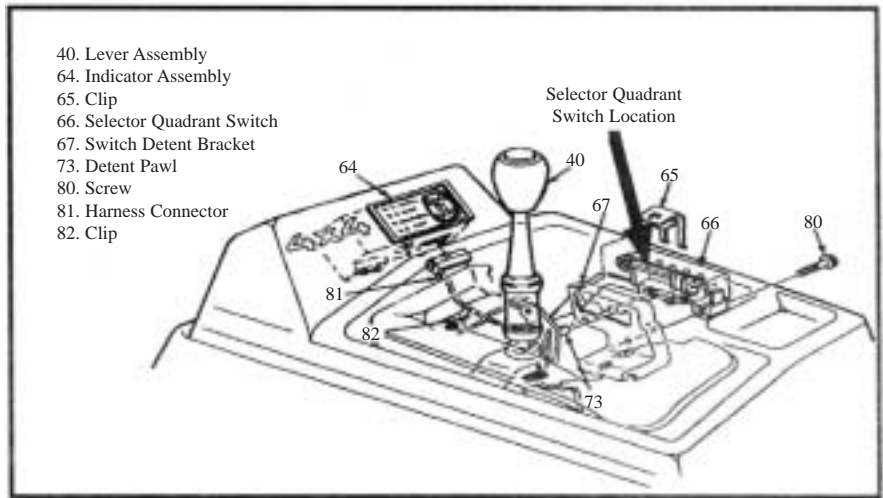


Figure 1—Manually shifted T truck 4WD low switch.

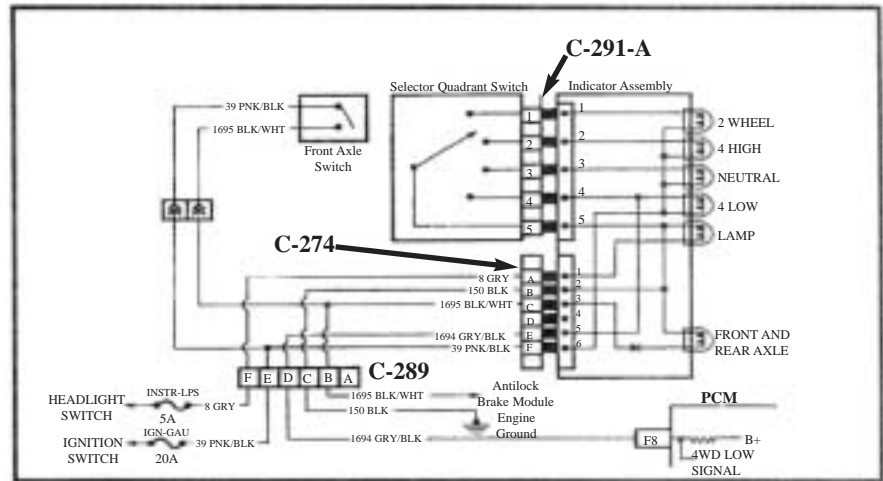


Figure 1A—T truck with manually shifted transfer case (1993-95).

**NOTE:** 1996 applications will set a code P1875 if a short to ground or an open in the 4WD circuit occurs. These conditions may occur on 2WD applications due to the fact that the PCM harness usually contains circuit 1694, even though it is not a 4WD vehicle.

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## Systems operation and diagnosis

All 4L60E, non passenger car applications and all 1994-96 4L80E applications use a discrete input to the PCM, TCCM or VCM to change the shift points of the transmission. This signal is provided to the PCM, TCCM, and VCM using one of the following methods:

T trucks with manually shifted transfer cases (NP 231) provide input via a switch which is mounted in the transfer case shift indicator (figures 1, 1A, 1B).

T trucks with electronic shifted transfer cases (NP 233) signal the PCM (or TCCM) via a signal from the transfer case control module ((TCCM) figures 2, 2A, 2B).

K trucks with a manually shifted (NP 243), signal the PCM, TCCM or VCM by using a switch which is mounted on the transfer case (figures 3, 3A).

**NOTE:** C/K truck applications are considered full size 1500-1/2 ton, 2500-3/4 ton or 3500-1 ton. K = 4WD, C = 2WD. S/T applications are known as Jimmys, Sonomas, S-10/15S or Blazers. S=2WD and T=4WD.

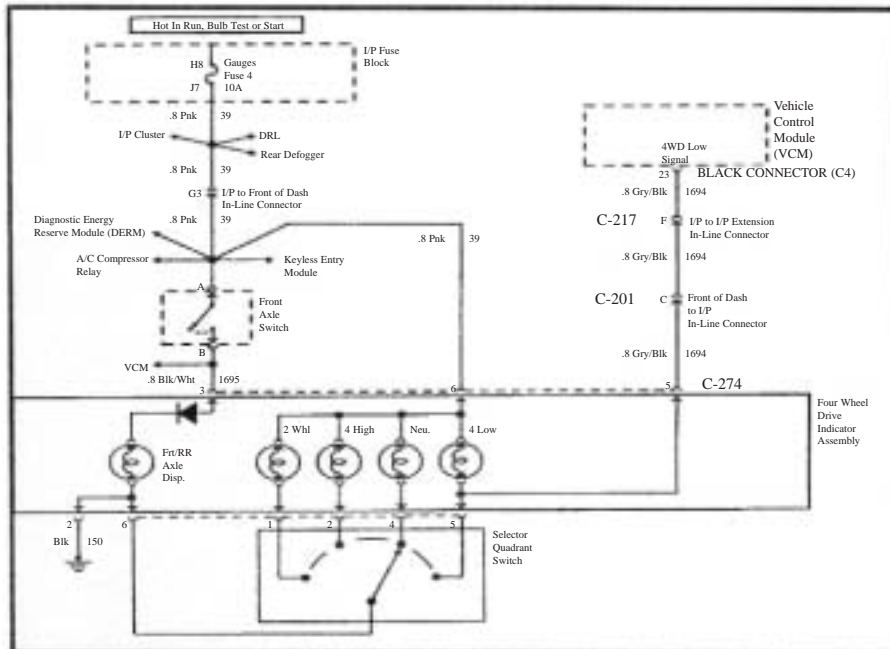
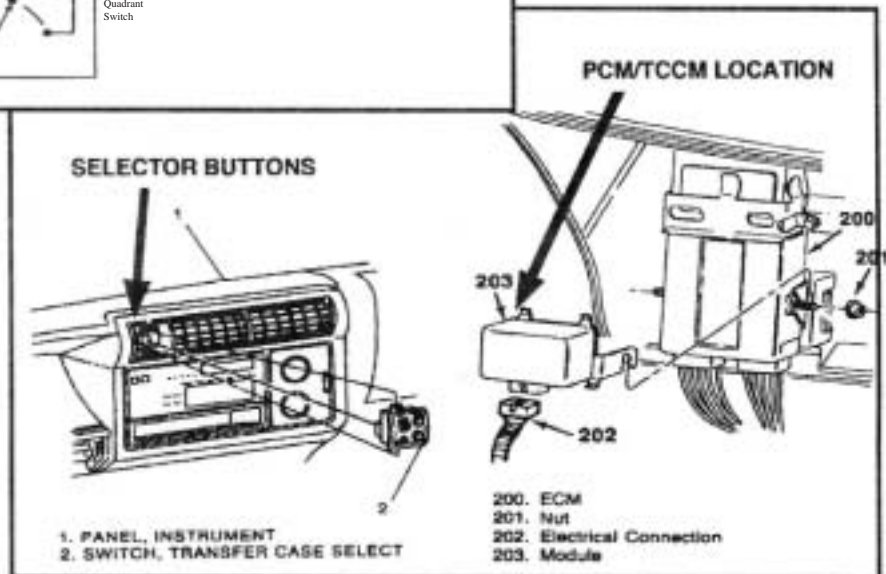


Figure 1B—7 truck with manual transfer case (1995-96 with VCM).

Figure 2—7 truck with electrically shifted transfer cases.



Manually shifted T trucks (1993-95) signal the PCM of the 4WD-low position by grounding circuit 1694. This ground is provided by the shift selector quadrant switch. When the shifter is placed in the 4WD-low range, the PCM will note that the voltage on circuit 1694 has dropped to near zero (figure 1, 1A, 1B).

Electronically shifted T truck transfer cases indicate 4WD-low range via the transfer case control module (TCCM). The customer selects 4WD-low by pressing the appropriate selector button (figure 2). This signals the TCCM of the drivers desire to engage the 4WD-low range. The TCCM engages the transfer case in 4WD-low, and also signals the PCM or VCM of its intentions by grounding pin C-1 of the TCCM. Grounding this pin drops the voltage on circuit 1694 to near zero volts at the 4WD-low input to the PCM (or VCM) (figures 1B, 2A).

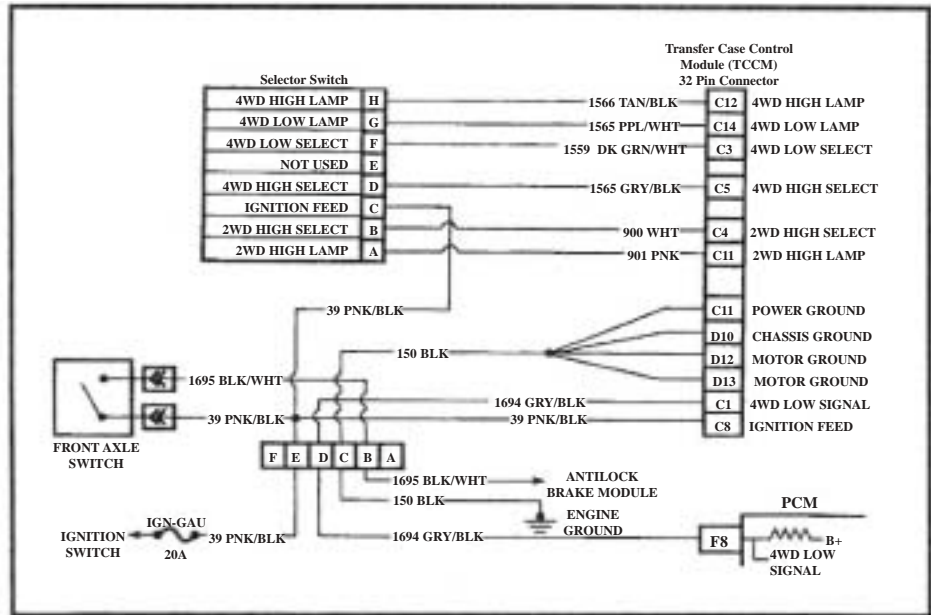


Figure 2A—T truck with electronically shifted transfer case (1993-95 with PCM).

Unlike the T trucks, K trucks indicate the 4WD-low range position using the same method, regardless of which type of transfer case the vehicle is equipped with. All K truck applications use a three position switch (figure 3A) which is wired to circuit 1694 or 1493 of the PCM, TCCM or VCM. When the 4WD-low range is selected, the transfer case switch will be moved the 4WD-low position. In this position, the switch provides a ground for the circuit 1694 or 1493, at the PCM or VCM (figure 3, 3A).

All K truck and T truck applications ground circuit 1694 or 1493 to provide input to the PCM or PCM when the 4WD-low range has been requested. Any range other than 4WD-low, results in circuit 1694 or 1493 remaining ungrounded and the pin voltage at the 4WD low input to the PCM staying high at source voltage (battery voltage).

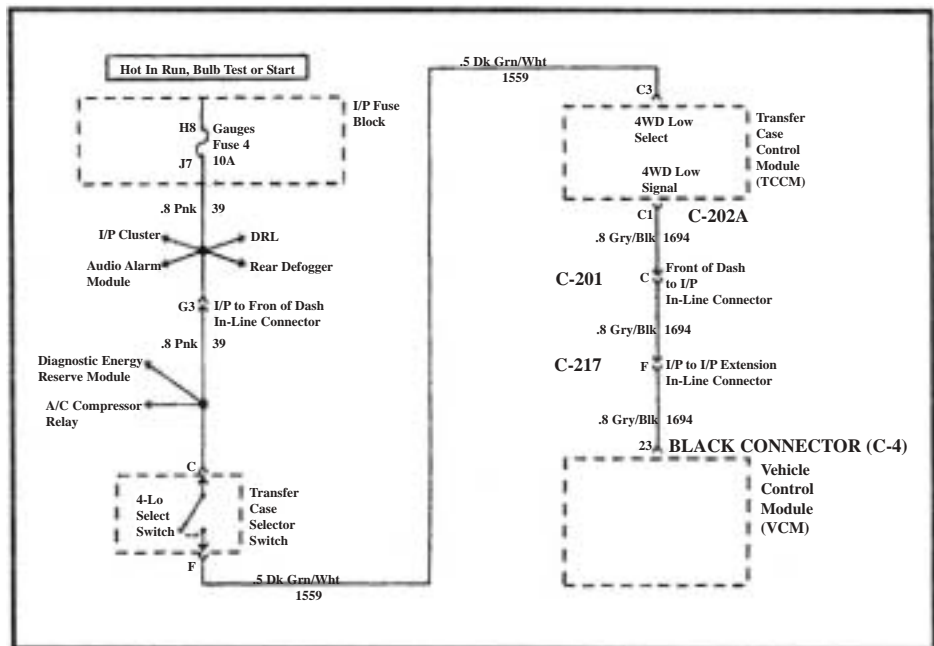


Figure 2B—T truck with electronically shifted transfer case (1995-96 with PCM).

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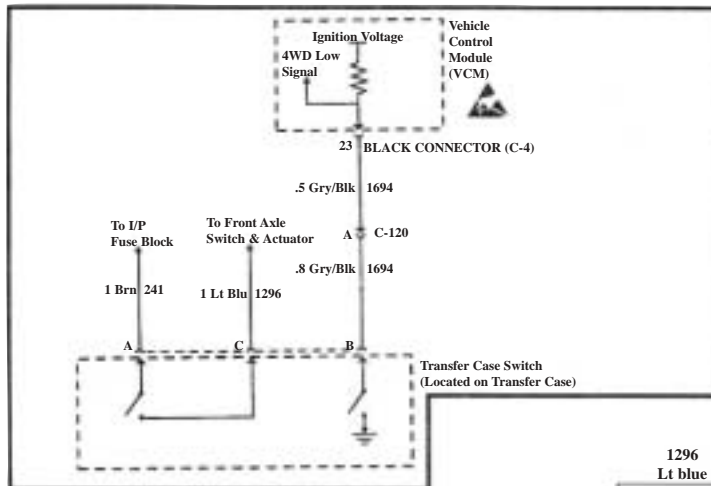


Figure 3—K Truck with a manually or electronically shifted transfer case (1996).

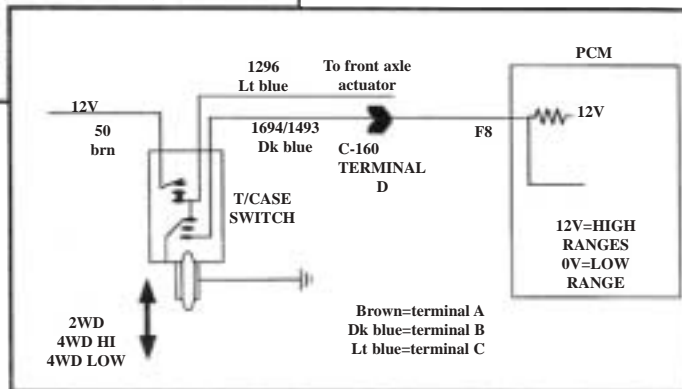


Figure 3A—K Truck with a manually shifted transfer case (1994-95 with PCM).

## Diagnosis

When the PCM or VCM 4WD-low input signal (circuit 1694 or 1493) is high (approximately 12 volts) the computer will assume the truck is in a range other than 4WD-low and will command the shift points based on the truck being in 4WD-high or 2WD-high. If the truck is really in four-low, the upshifts will be late for the given throttle opening. In addition, the truck will exhibit overly sensitive forced throttle downshifts.

In each case the truck will exhibit conditions which will be objectionable to the customer, but will not set any trouble codes (1993-95 models). Most 1996 models will set code P1875 if the circuit develops a problem. Code P1875 will set if:

- No TPS, VSS, shift solenoid or TCC codes are set.
- The TPS angle is 17-50%.
- Overdrive range (fourth gear) commanded.
- Transmission temperature 69-248° F.
- Engine temperature above 400° F.
- The front axle position feedback circuit (new for '96) indicates to the VCM that the front axle is in 4WD, and the VCM calculates the speed ratio (engine speed, transfer case output speed) is between .8 and 1.2 (indicating the truck is not in 4WD-low) for five seconds.

## OR

The front axle position feedback circuit indicates the front axle is not in 4WD, and the VCM calculates the speed ratio (engine speed, transfer case output speed) is between 2.5 and 2.9 (indicating the truck is in four-low) for ten seconds. If code P1875 is set on the VCM will respond by commanding the transmission to:

- Increase line pressure to maximum.
- Inhibit TCC.
- Shift to third gear only.
- Turn on the check engine light (MIL).
- The following illustration details the proper diagnostic routine.

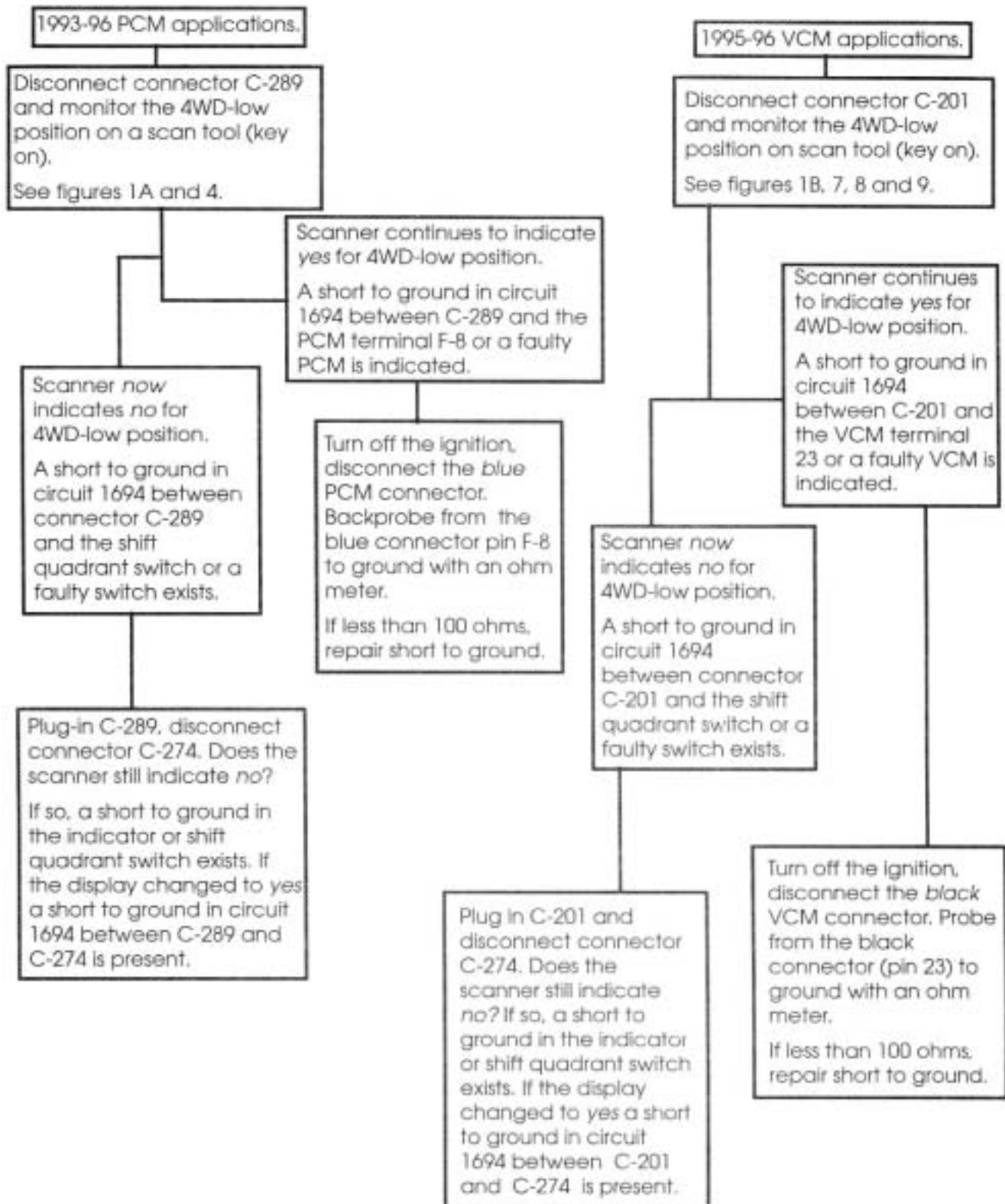


## Early, Late or Erratic Shifts



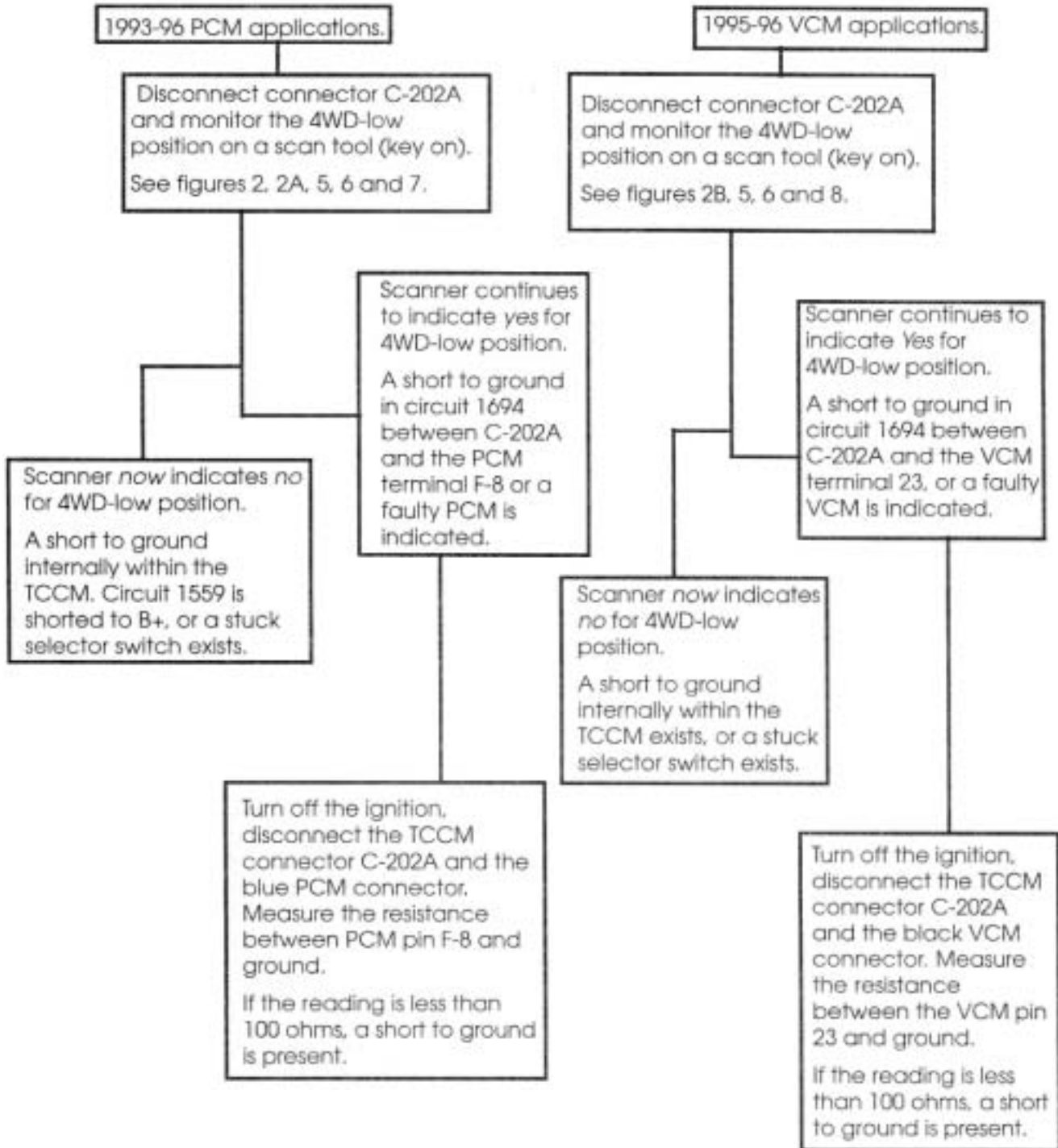
## 4WD-Low Diagnostic Routine

T Truck with a Manually Shifted Transfer Case  
Transfer Case in High-Range



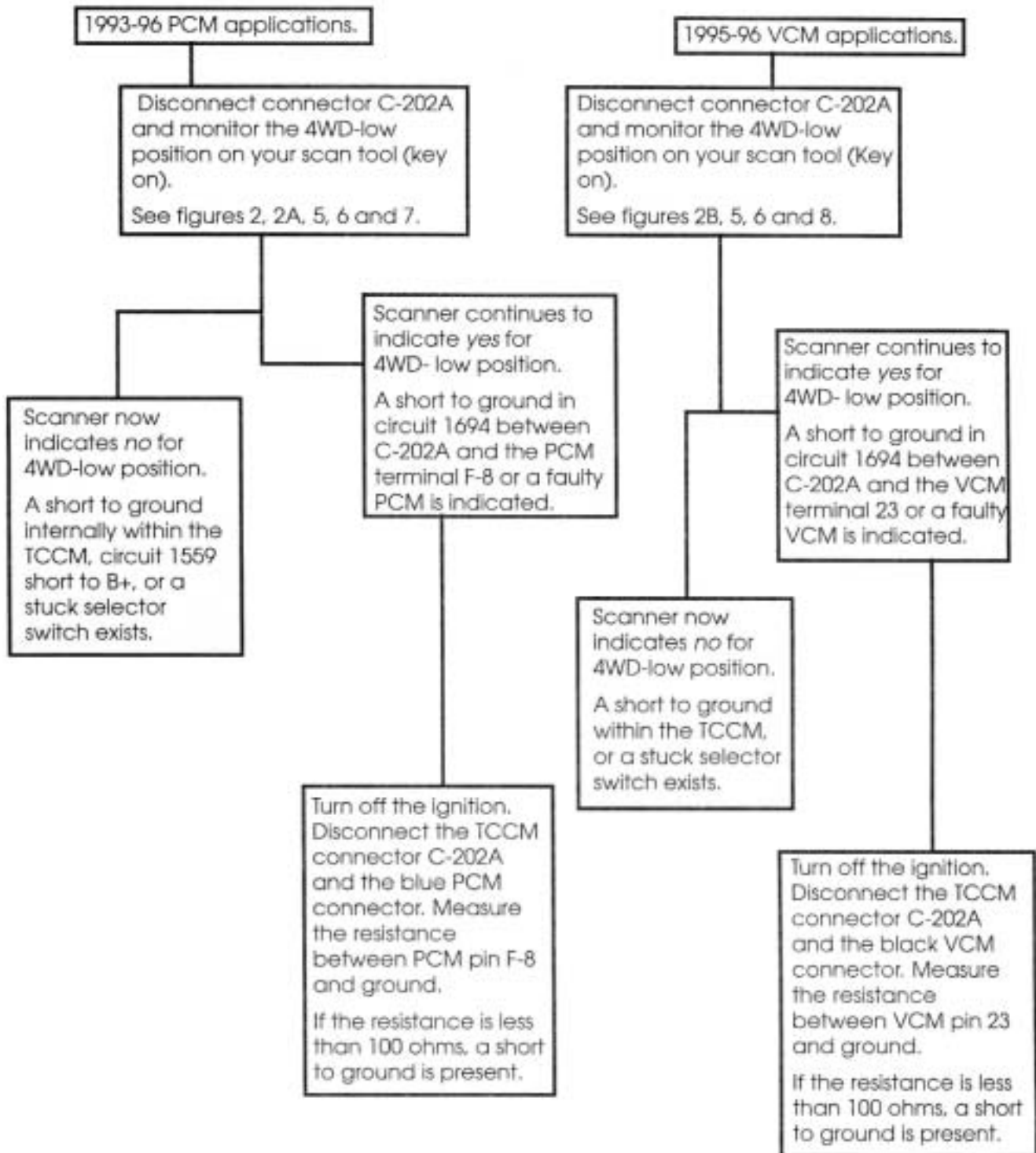
## 4WD-Low Diagnostic Strategy

T Truck with an Electronically Shifted Transfer Case  
Transfer Case in High-Range



## 4WD-Low Diagnostic Strategy

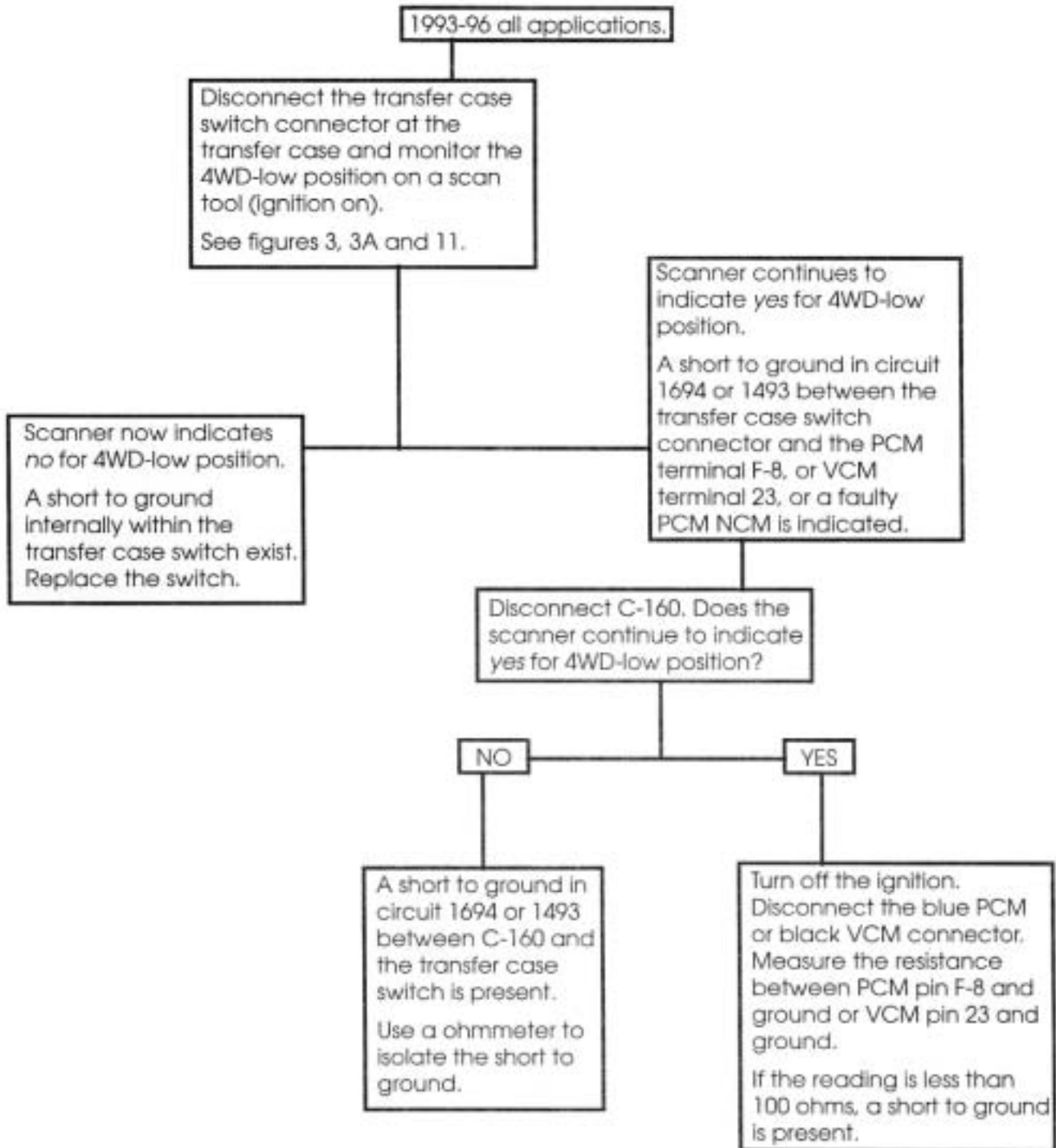
T Truck with an Electronically Shifted Transfer Case  
Transfer Case in High-Range





## 4WD-Low Diagnostic Strategy

All K Truck Applications  
Transfer Case in High-Range



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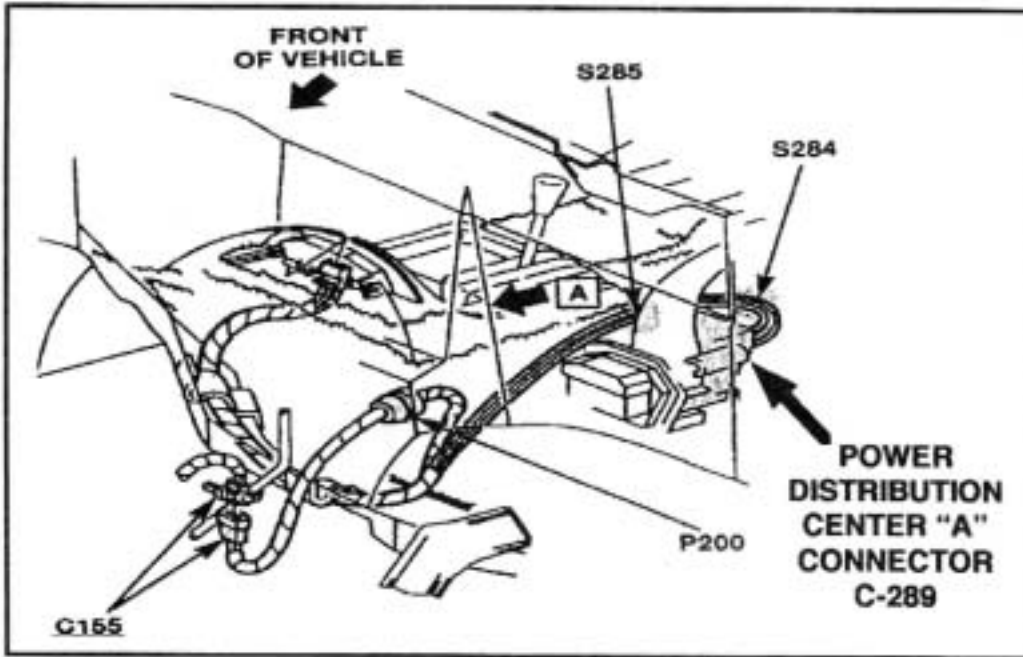


Figure 4—7 truck power distribution center A location, connector C-289.

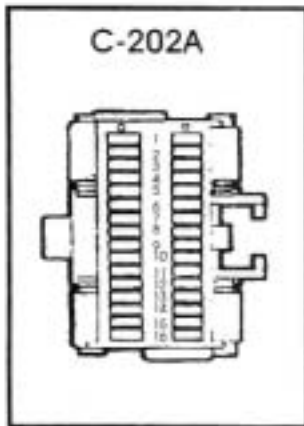


Figure 5—7 truck TCCM, C-202A pinouts

Circuit NO	Wire Size	Color	Cavity	Description
1894	0.5	GRY/BLK	C1	4 LO INPUT
			C2	NOT USED
1559	0.8	DK GRN/WHT	C3	4 LO SELECT
900	0.8	WHT	C4	2 HI SELECT
1564	0.5	GRY/BLK	C5	4 HI SELECT
40	0.8	ORN	C6	BATTERY 12V INPUT
			C7	NOT USED
39	0.8	PNK/BLK	C8	12V IGNITION INPUT
1554	0.8	BLK/WHT	C9	SIGNAL GROUND
150	0.8	BLK	C10	POWER GROUND
901	0.8	PNK	C11	2 HI INDICATOR LP OUTPUT
1566	0.5	TAN/BLK	C12	4 HI INDICATOR LP OUTPUT
			C13	NOT USED
1565	0.5	PPL/WHT	C14	4 LO INDICATOR LP OUTPUT
			C15	NOT USED
1522	3	BLK	C16	MOTOR CONTROL A
1523	2	RED	D1	MOTOR CONTROL B
1569	0.5	DK GRN	D2	PARK SIGNAL INPUT
1568	0.8	ORN	D3	DIAGNOSTIC
1555	0.8	SPR/WHT	D4	ENCODER CHANNEL - F
1556	0.8	RED/WHT	D5	ENCODER CHANNEL - C
1557	0.8	DK BLU/WHT	D6	ENCODER CHANNEL - A
1558	0.8	YEL/BLK	D7	ENCODER CHANNEL - B
1567	0.5	BRN	D8	SPEED SENSOR
			D9	NOT USED
150	0.8	BLK	D10	CHASSIS GROUND
			D11	NOT USED
150	1	BLK	D12	MOTOR GROUND
150	1	BLK	D13	MOTOR GROUND
740	1	ORN	D14	MOTOR SUPPLY
740	1	ORN	D15	MOTOR SUPPLY
1670	0.5	YEL	D16	PARK NEUTRAL OR NEUTRAL START SWITCH INPUT

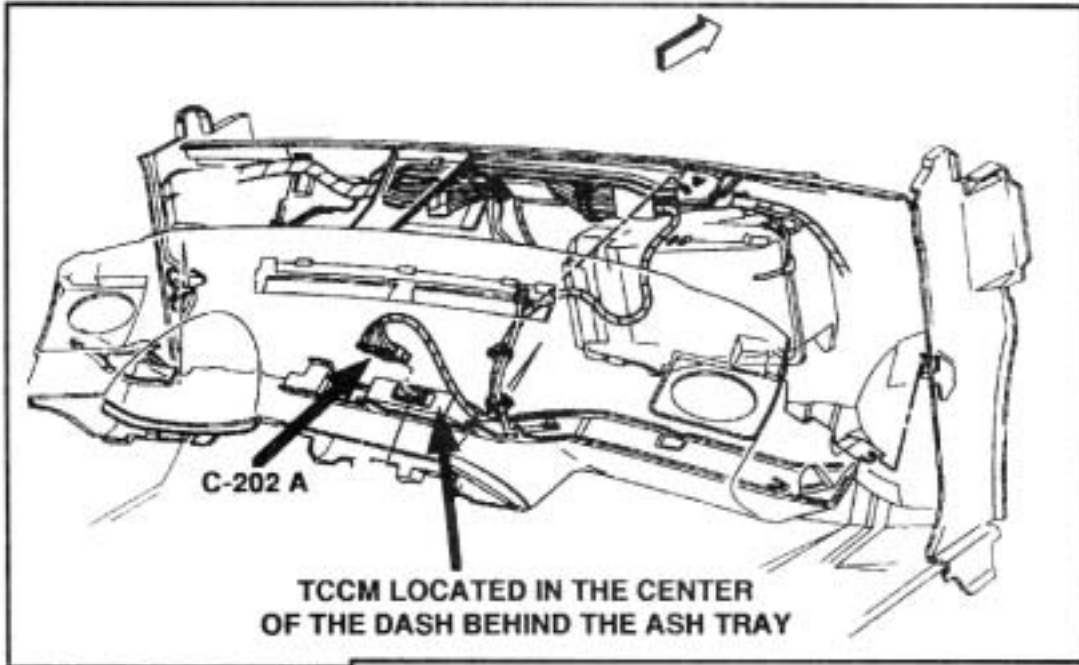


Figure 6—1994 1/2 thru 1996 7 truck TCCM and connector C-202A location (Note wire routing for TCCM and it's circuits).

Figure 7—1993-94 1/2 7 truck TCCM and connector C-202A location (Note wire routing for TCCM and it's circuits).

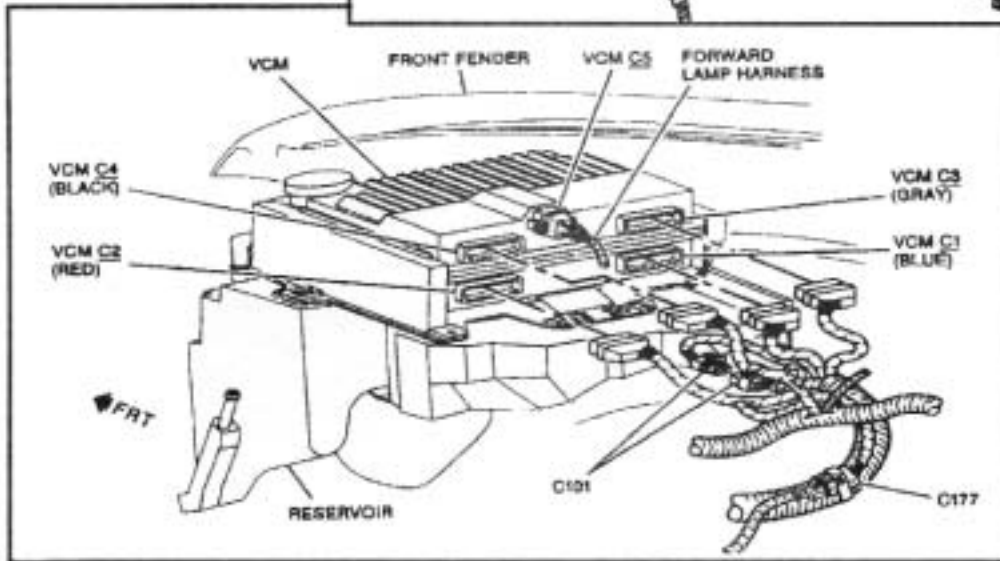
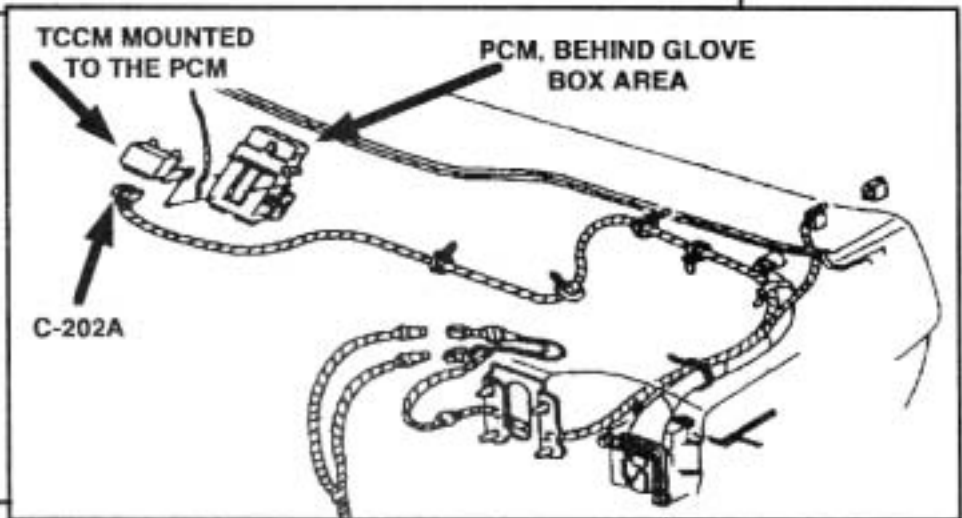


Figure 8—1995-96 7 truck VCM and it's connector loactions (right front fender) (96 K trucks on left front fender).

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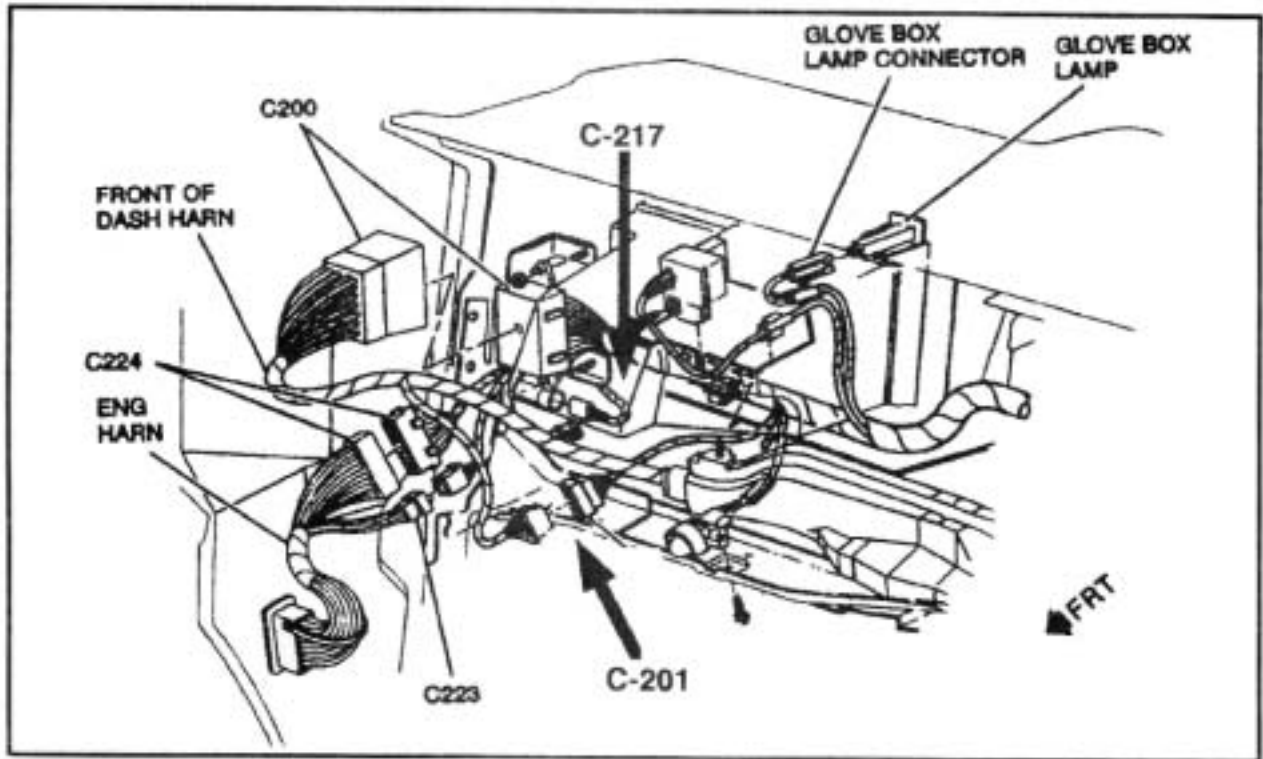


Figure 9—C-201, C-217 location, T truck application passenger side under dash.

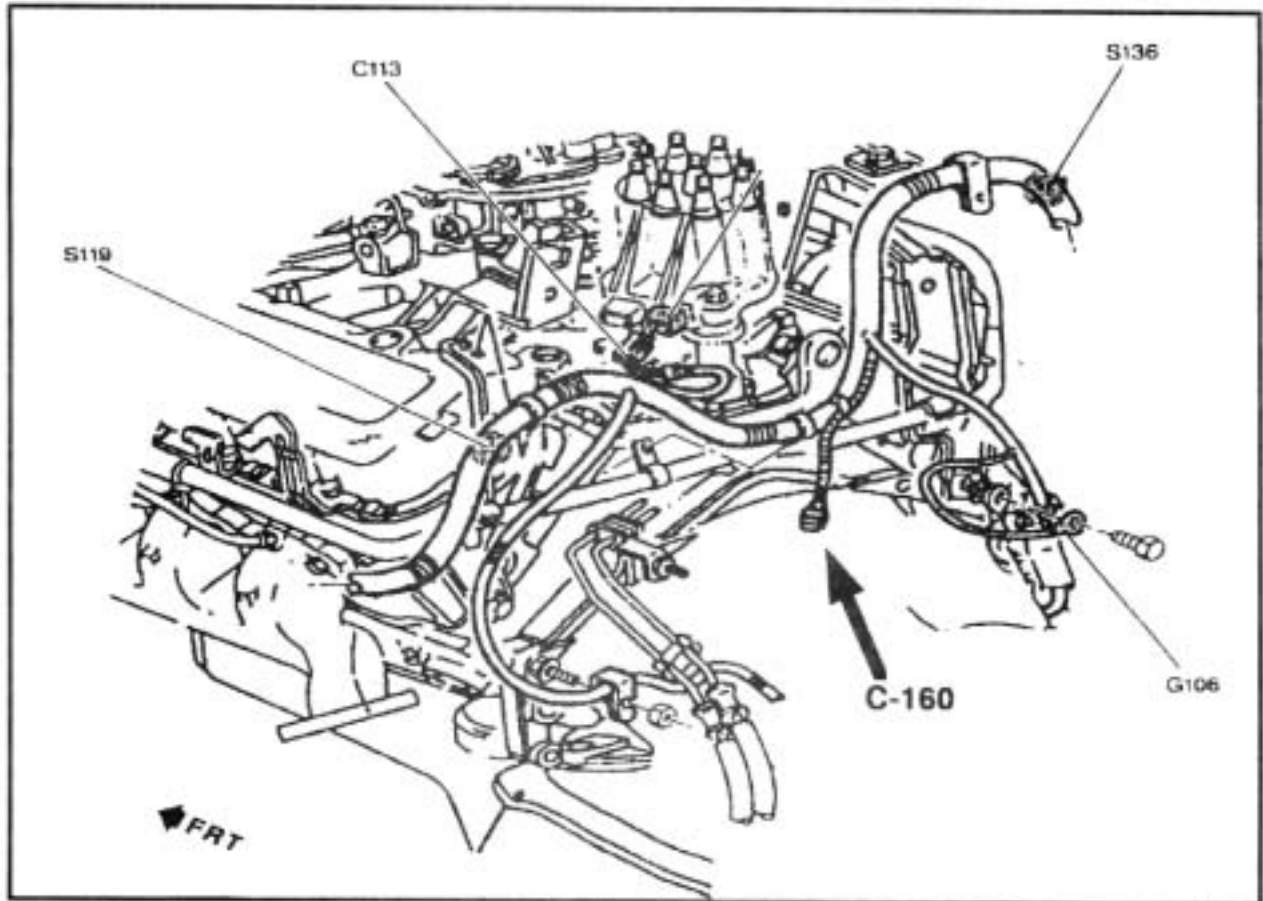


Figure 10—K truck connector C-160 location.



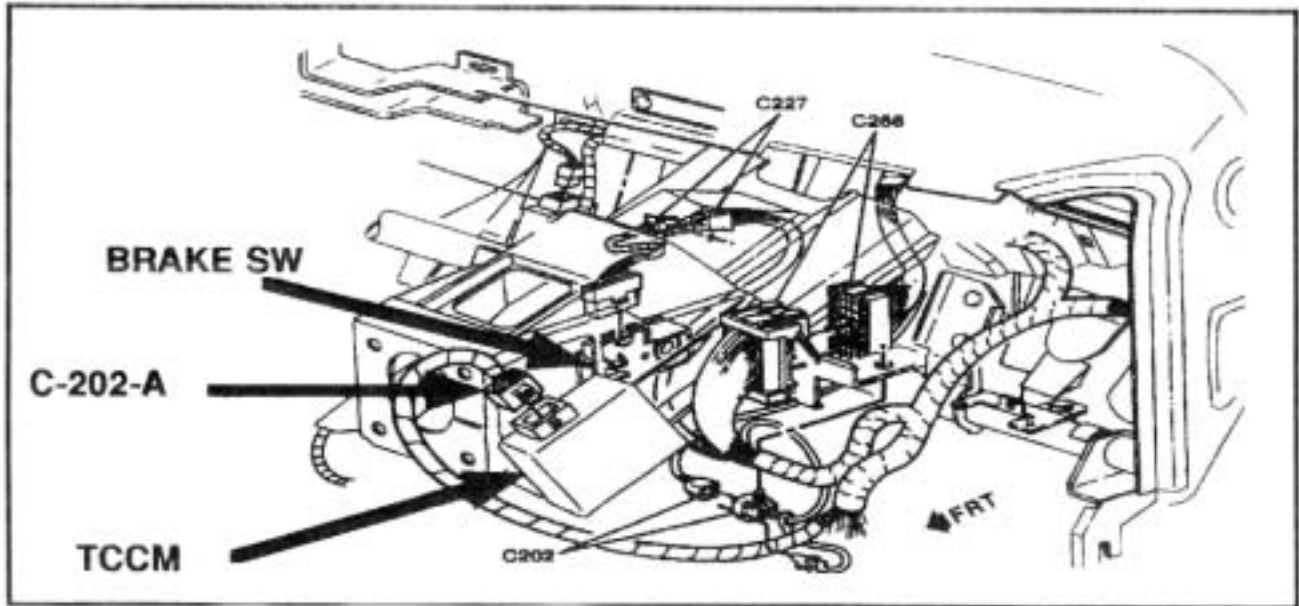


Figure 11—1996 K truck TCCM location, left side under dash.

## 4WD-Low Circuit Intermittents and Common Failures

### S/T Applications

- Connector pin tensions too loose.
- Circuit 1694 shorted to ground in the steering column area.
- Circuit 1964 shorted to ground at the pass through connector area, where the wiring harness travels through the bulkhead (VCM applications).
- 4WD switch (4WD indicator assembly) is stuck.
- Circuit 1694 shorted to ground (on a dash bracket) near C-217.
- Circuit 1559 shorted to voltage under the dash or at the 4WD indicator assembly (4WD shifter quadrant).

### C/K Applications

- Connector pin tensions too loose.
- Circuit 1694 shorted to ground at the pass-through connector area, where the wiring harness travels through the bulkhead (firewall).
- 4WD harness shorted to ground on the flange area of the transfer case.
- 4WD harness shorted to ground at the top of the bell housing and the engine block, at connector C-160.