SECTION 7D1A

TRANSFER CASE ELECTRONIC CONTROLS

CAUTION: This vehicle is equipped with Supplemental Inflatable Restraint (SIR). Refer to CAUTIONS in Section 9J under "ON-VEHICLE SERVICE" and the SIR Component and Wiring Location View in Section 9J before performing service on or around SIR components or wiring. Failure to follow CAUTIONS could result in possible air bag deployment, personal injury, or otherwise unneeded SIR system repairs.

NOTICE: ***Always use the correct fastener in the correct location. When you replace a fastener, use ONLY the exact part number for that application. General Motors will call out those fasteners that require a replacement after removal. General Motors will also call out the fasteners that require thread lockers or thread sealant. UNLESS OTHERWISE SPECIFIED, do not use supplemental coatings (paints, greases, or other corrosion inhibitors) on threaded fasteners or fastener joint interfaces. Generally, such coatings adversely affect the fastener torque and joint clamping force, and may damage the fastener. When you install fasteners, use the correct tightening sequence and specifications. Following these instructions can help you avoid damage to parts and systems.***

CONTENTS

CONTENTS (cont'd)

GENERAL DESCRIPTION

The New Venture Gear Model NV233 is an option on models with four wheel drive. Internally, the Model NV233 transfer case is identical to the Model NV231 transfer case. Externally, however, the NV233 transfer case is unlike most other transfer cases in that it is electronically actuated.

The lubrication, front drive overhaul, and transfer case assembly and reassembly procedures for the Model NV233 transfer case are the same as for the four-wheel drive T-Truck with the Model NV231 transfer case.

The four-wheel drive system, operation, and power-flow description for the electronic shift T-Truck are the same for the mechanical-shift T-Truck. The electronic-shift controls and electrical diagnosis of the Model NV233 transfer case are covered in this section.

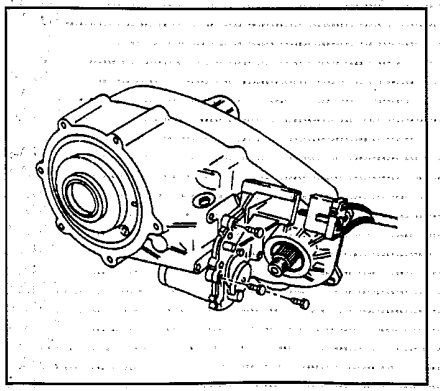

Figure 1—NV233 Transfer Case Electric Shift Motor

ELECTRIC SHIFT MOTOR

The Model NV233 transfer case has an electric shift motor attached to the transfer case in the area where the shift lever is mounted (Figures 1 and 2).

TRANSFER CASE CONTROL MODULE (TCCM)

A Transfer Case Control Module (TCCM) (Figure 3) controls the electric shift motor in response to command signals initiated by the vehicle operator. The shift motor rotates the sector shaft within the transfer case in response to commands from the vehicle operator through the TCCM.

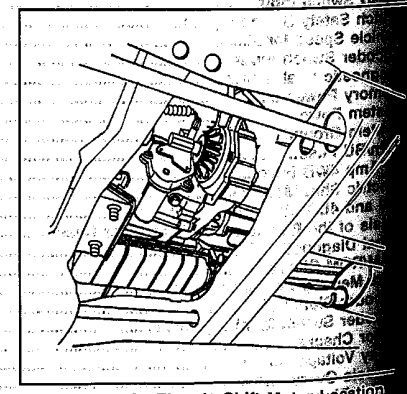

Figure 2—Electric Shift Motor Location

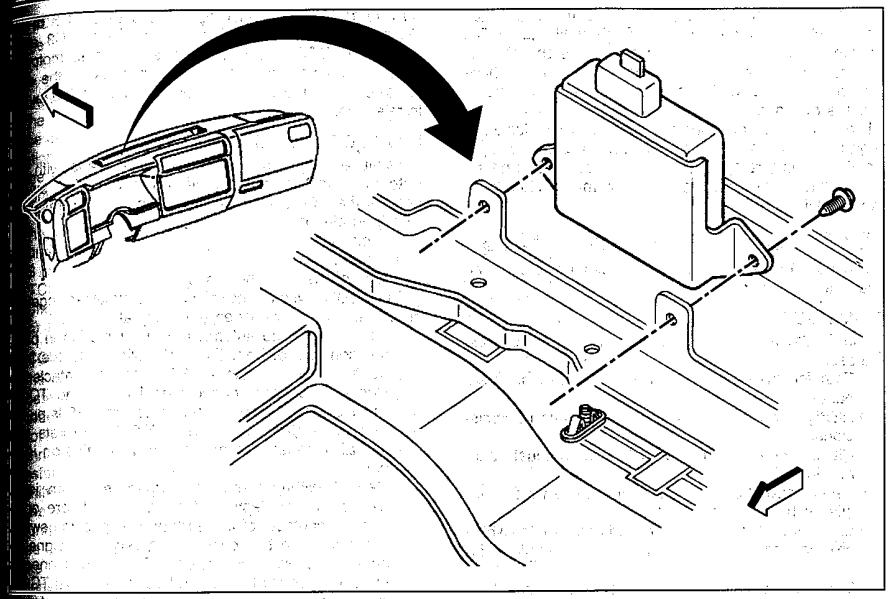

Figure 3—Transfer Case Control Module

ELECTRONIC 4WD SHIFTING

On vehicles equipped with the Model NV233 transfer case, there is no transfer case selector lever inside the vehicle. The operator selects 2HI, 4HI or 4LO by pushing one of three switches mounted on the instrument panel (Figure 4). During normal driving the transfer case is in the 2HI mode. When the transfer case is in 2HI both the 4HI and 4LO switch circuits are open, and both lights are off. When four-wheel drive has been selected, the four-wheel drive indicator lamp on the switch turns on when the front axle has engaged. The lamp will blink while the front axle is engaging. This is normal.

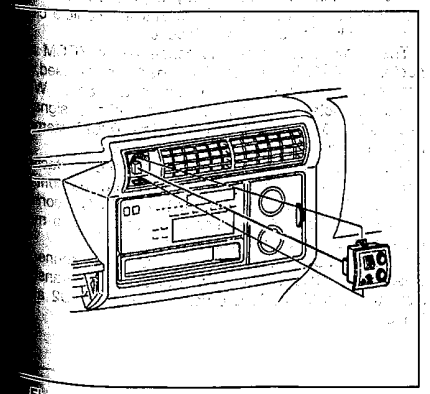

Figure 4—Transfer Case 4WD Selector Switch

MODE SHIFTS

Mode shifts are shifts from:

- 2HI to 4HI
- 4HI to 2HI

A mode shift can be accomplished in any gear position and at any vehicle speed.

If the system is in 2HI, the operator can shift into 4HI merely by pressing and releasing the 4HI selector switch. The 4HI status lamp flashes whenever a 2HI or 4HI shift is initiated and continues to flash until the TCCM completes the shift (or until 30 seconds elapses). After the shift into 4HI is accomplished, the 4HI status lamp remains lit to indicate that the system is in 4HI.

The operator can shift from 4HI back to 2HI by pressing the 2HI selector switch. The 2HI status lamp flashes until the shift to 2HI is complete, and remains on once the shift is complete.

RANGE SHIFTS

Range shifts are shifts between the HI and LO ranges, from:

- 2HI to 4LO
- 4HI to 4LO
- 4LO to 4HI
- 4LO to 2HI

A range shift can only be made with the automatic transmission in neutral or with the manual transmission clutch fully depressed. The vehicle speed must also be below three miles per hour before the shift can occur.

CONTENTS (cont'd)

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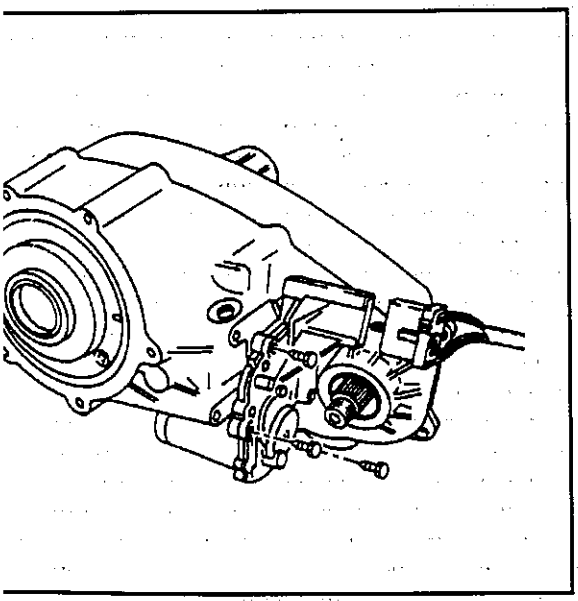

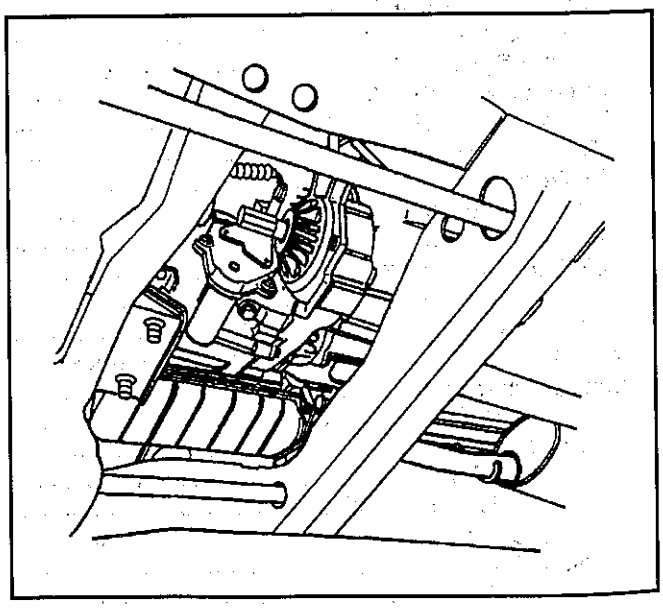

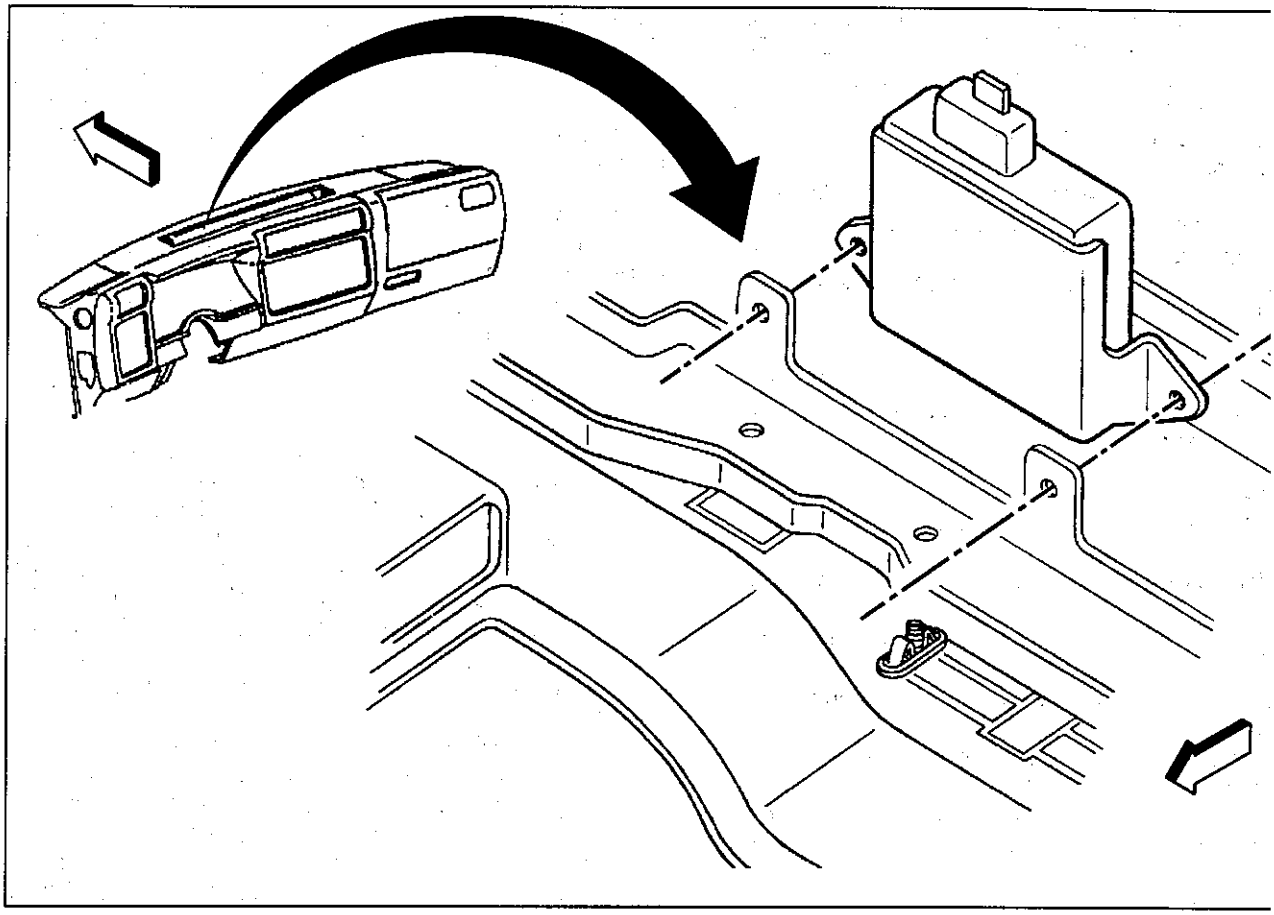

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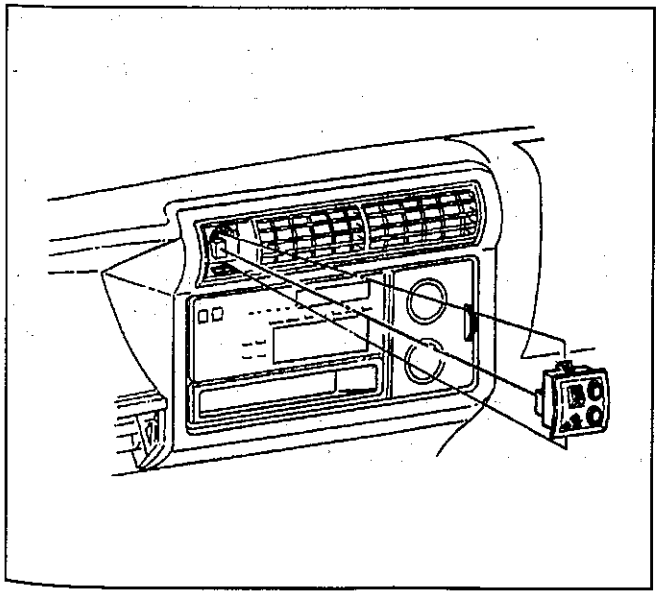

Figure 4—Transfer Case 4WD Selector Switch

MODE SHIFTS

Mode shifts are shifts from:

- 2HI to 4HI
- 4HI to 2HI

A mode shift can be accomplished in any g tion and at any vehicle speed.

If the system is in 2HI, the operator can shift merely by pressing and releasing the 4HI switch. The 4HI status lamp flashes whenever 4HI shift is initiated and continues to flash TCCM completes the shift (or until 30 seconds After the shift into 4HI is accomplished, the 4 lamp remains lit to indicate that the system is

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RANGE SHIFTS

Range shifts are shifts between the HI and es, from:

- 2HI to 4LO
- 4HI to 4LO
- 4LO to 4HI
- 4LO to 2HI

A range shift can only be made with the a transmission in neutral or with the manual tran clutch fully depressed. The vehicle speed must below three miles per hour before the shift car

Whenever a shift into 4LO is initiated, the 4LO status lamp flashes and continues to flash until the TCCM completes the shift (or until 30 seconds elapses). The 4LO status lamp must glow steadily before the vehicle transmission is shifted into gear or before the clutch pedal is released.

If a range shift is initiated when the transmission is engaged or when the vehicle speed is above 3 mph, the 4LO status lamp flashes for 30 seconds and no range shift actually occurs; the system will shift to or stay in 4HI.

TCCM INPUTS AND OUTPUTS

The TCCM receives inputs, processes them, and then issues the proper outputs.

TCCM INPUTS

The TCCM receives input signals from the following sources:

- Transfer case selector switches on the instrument panel.
- NSBU switch on vehicles with automatic transmissions.
- Clutch safety switch on vehicles with manual transmissions.
- Vehicle speed sensor calibrator module which supplies vehicle speed signals.
- Encoder switch within the electric-shift motor which provides actual mode and range information signals.
- Diagnostic pigtail at TCCM for diagnostic enable.

TCCM OUTPUTS

After processing the input information, the TCCM outputs signals to the following:

- Electric shift motor to effect mode and range shifts.
- Selector switch status lamps to provide transfer case status information.
- Diagnostic trouble codes (DTC) which are output via the selector switch status lamps.

2HI TO 4HI SELECTOR SWITCH INPUT

When the transfer case is in 2HI and the operator presses the 4HI selector switch, the 4HI contacts of the selector switch close, connecting circuits 39 and 1564, and furnishing 12-volts to pin C5 of the TCCM connector. The 12-volt signal at pin C5 commands the TCCM to signal the electric-shift motor to shift into 4HI. The contacts return to the open position as soon as the switch is released.

4HI TO 2HI SELECTOR SWITCH INPUT

If the transfer case is in 4HI and the operator presses the 2HI selector switch, the 2HI contacts of the selector switch close, connecting circuits 39 and 900 and furnishing 12-volts to pin C4 of the TCCM connector. The 12-volt signal at pin C4 commands the TCCM to signal the electric-shift motor to shift into 2HI. Again, the contacts return to the open position as soon as the switch is released.

2HI or 4HI to 4LO SELECTOR SWITCH INPUT

When the operator presses the 4LO selector switch while the transfer case is in either 2HI or 4HI, the 4LO contacts of the selector switch close, connecting circuits 39 and 1559, and furnishing 12-volts to pin C3 of the TCCM connector. The 12-volt signal at pin C3 commands the TCCM to signal the electric-shift motor to shift the transfer case into 4LO. Once more, the contacts return to the open position as soon as the switch is released.

NSBU SWITCH INPUTS

Because range shift should only be made with the automatic transmission in neutral, the NSBU switch informs the TCCM that the vehicle automatic transmission is in either:

- Park
- Neutral
- One of the drive positions

The NSBU switch consists of three switches together in one unit, and it provides three signals:

- Park—When the automatic transmission is in park, the contacts of both the park switch and the park neutral switch are closed. When these contacts are closed, a battery voltage signal is sent to TCCM connector pin D2, while connector pin D16 is pulled to ground (0 voltage). The TCCM interprets this signal to mean the automatic transmission is in park.
- Neutral—When the automatic transmission is in neutral, the contacts of the park switch are open and the contacts of the park neutral position switch are closed. In this condition, a 0-voltage signal is sent to TCCM connector pin D2, while connector pin D16 is pulled to ground (0 volts). The TCCM interprets this signal to mean the automatic transmission is in neutral.
- In gear—When the automatic transmission is in any other gear position, the contacts of both the park switch and park neutral switch are open. In this condition, a 0-voltage signal is sent to TCCM connector pin D16. The TCCM interprets this signal to mean the automatic transmission is neither in park or neutral.

CLUTCH SAFETY SWITCH INPUTS

Because range shifts should only be made with the manual transmission clutch fully depressed, the clutch safety switch informs the TCCM that the vehicle clutch pedal is fully depressed or released.

The clutch safety switch is connected to TCCM connector pin D16. When the clutch pedal is released, the contacts of the clutch safety switch are open. When these contacts are open, a battery voltage signal is seen at TCCM connector pin D16. The TCCM interprets this signal to mean the clutch is released.

When the clutch is fully depressed, the contacts of the clutch safety switch are closed. When the contacts are closed, voltage is pulled low to 0 at TCCM connector pin D16. The TCCM interprets this signal to mean the clutch pedal is fully depressed.

Because TCCM connector pin D2 is not connected when the vehicle is equipped with a manual transmission, the TCCM reads a 0-volt signal at pin D2 at all times.

VEHICLE SPEED INPUT

The vehicle speed sensor calibrator module informs the TCCM about the speed of the vehicle in miles per hour. Such information is essential to inform the TCCM to prohibit range shifts at speeds above 3 mph.

The vehicle speed sensor (VSS) is a variable-reluctance magnetic sensing device that converts tone wheel rotation into a frequency and voltage output proportional to the vehicle speed. The frequency and voltage signal is sent to the VSS calibrator module which converts the speed sensor output into a useful pulse signal.

The VSS calibrator module then pulses circuit 834 to ground at a rate of 4000 pulses per mile. Whenever the VSS calibrator module grounds circuit 8457, the voltage at TCCM connector pin D8 returns to 5 volts. The TCCM reads the 4000 pulses-per-mile (1.11 Hz per mph) signal to determine vehicle speed.

ENCODER SWITCH INPUTS

The four-channel encoder switch indicates the current transfer case mode and range to the TCCM. The encoder switch is located inside the encoder itself and is not servicable. The TCCM reads the status of the four channels to determine the range and mode in which the transfer case is operating or whether the transfer case is shifting between modes and/or ranges (Figure 5).

The encoder assembly is composed of an inner ground ring in contact with a three-leg wiper arm. The three legs of the wiper, spaced 120 degrees apart, make contact with the conductive areas of the four channels. When any leg of the wiper arm is in contact with the conductive area of any channel, a path to ground is provided to the inner ground ring (Figure 5).

DIAGNOSTIC ENABLE INPUT

When the diagnostic pigtail is connected to a good ground while the ignition is on, the diagnostic routine of the TCCM is activated. When the diagnostics routine is activated, the transfer case selector switch status lamps flash the diagnostic codes.

MEMORY POWER

Trouble code memory power is protected by a 20-amp T/L CTSY fuse. Memory power is supplied to TCCM connector pin C6 through circuit 40.

SYSTEM POWER

Operating power is controlled by the ignition switch and is protected by a 20-amp gauges fuse. System power is supplied to TCCM connector pin C8 through circuit 39. This fuse also supplies voltage to pin A of the transfer case switch. The system power will shut down if either the 20-amp T/L CTSY fuse or the 20-amp gauges fuse are removed or blown (Figure 6).

SYSTEM GROUND

System ground is supplied to TCCM connector pin C10 through circuit 150. Circuit 150 is connected to the bus bar ground located on the left side of the steering column support.

TURN/BU FUSE

A 15-amp TURN/BU fuse supplies ignition voltage to the park/neutral position switch. This voltage enables the park switch to send a park signal to TCCM connector pin D2.

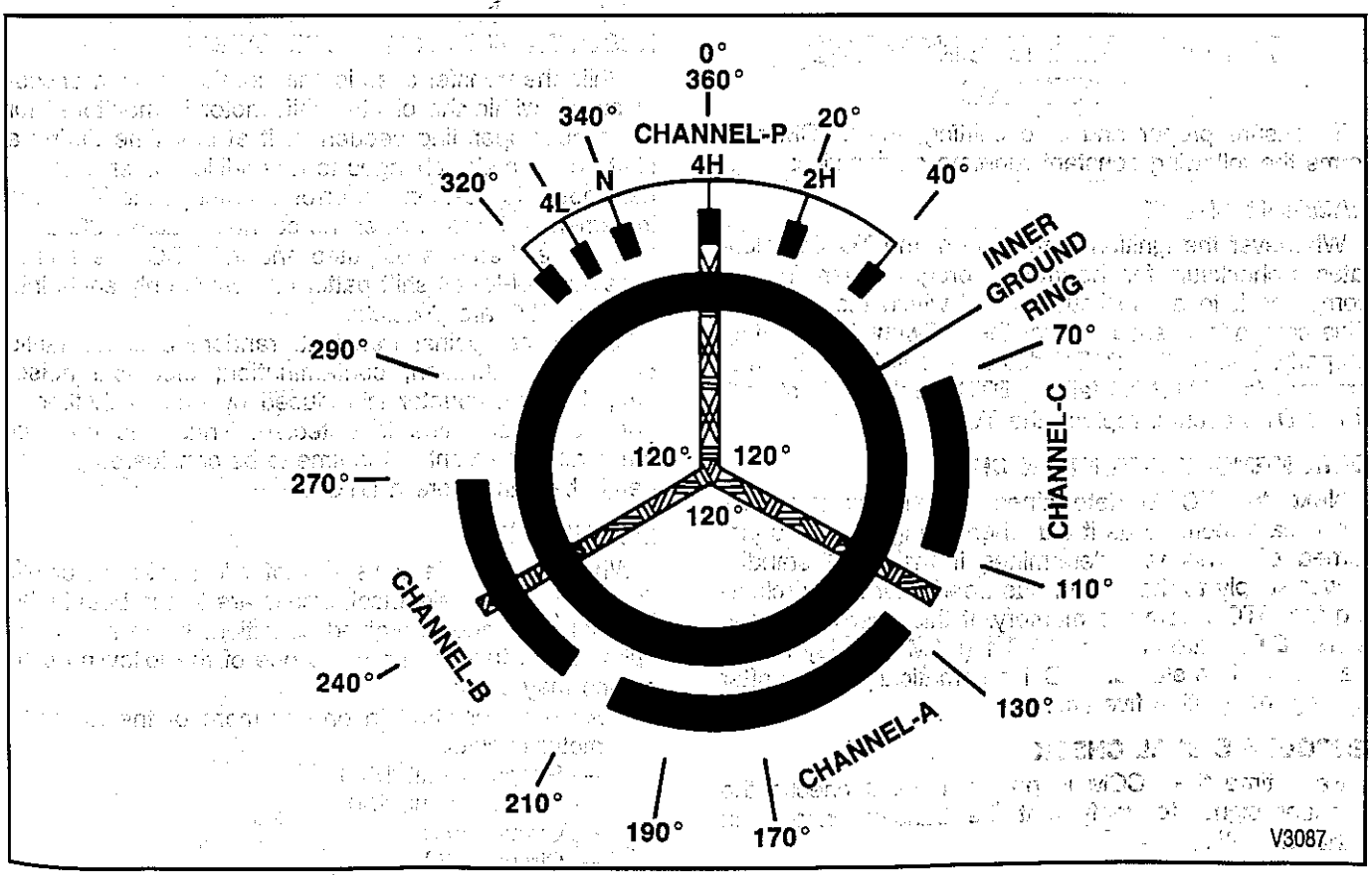

Figure 5—Electric-Shift Encoder Switch Layout

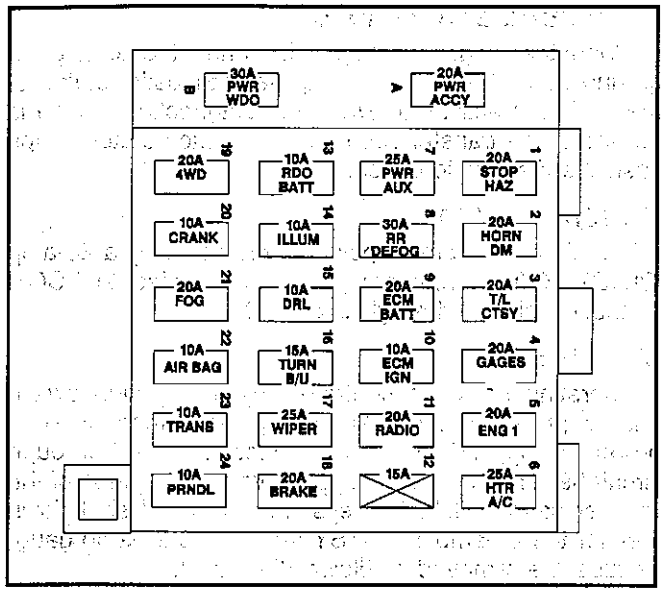

Figure 6—Fuse Block and Cavity Location

20 AMP 4WD FUSE

The 20-amp 4WD fuse supplies ignition voltage to TCCM connector pins D14 and D15. This voltage controls the electric-shift motor circuit.

ELECTRIC-SHIFT MOTOR OUTPUTS

The TCCM provides the output for the electric shift motor.

- Motor control is achieved by energizing one of the two motor control relays located in the TCCM, by way of the transfer case selector switch.

The TCCM operates the motor in one direction by energizing one relay while the second relay is de-energized. The TCCM operates the motor in the reverse direction by energizing the second relay while the first relay is de-energized.

- Motor power to actuate the motor drive relays is input at TCCM connector pins D14 and D15. This power is supplied by the ignition through the 20-amp 4WD fuse.
- Motor ground is input at TCCM connector pins D12 and D13 to provide the return line for the motor drive relays.

4HI AND 4LO STATUS LAMPS OUTPUTS

The TCCM controls the operation of the 4HI and 4LO status lamps in the transfer case selector switch. The status lamps also show the transfer case mode and range of operation. The status lamps also provide a self-test when the ignition is first turned on. Additionally, the status lamps are used to alert the driver that there is a problem somewhere in the four-wheel drive system, and also to flash diagnostic trouble codes (DTC's).

DIAGNOSIS OF THE ELECTRONIC SHIFT TRANSFER CASE

INTERNAL DIAGNOSTIC CHECKS

To ensure proper and safe shifting, the TCCM performs the following constant run-time diagnostics:

RAM/ROM CHECK

Whenever the ignition is turned on, the TCCM calculates a checksum for the internal program memory and compares it to a checksum stored within the program. This comparison ensures that the software is operating properly. Should the TCCM detect a fault in the internal program (a RAM/ROM failure) DTC number 4 is stored. If this DTC occurs, replace the TCCM.

DATA MEMORY RETENTION CHECK

Next, the TCCM determines if RAM contains the same data memory as it did when the ignition was last turned off. This test determines if the RAM standby power supply to the TCCM has been interrupted, clearing the DTC's from the memory. If this check fails, the stored DTC's are cleared. DTC 1 (RAM Standby Power Failure) is then stored. DTC 1 automatically clears after cycling the ignition five times.

ENCODER SIGNAL CHECK

Each time the TCCM is powered up, it checks the encoder signal to verify that the transfer case is in either 2HI, 4HI, or 4LO.

ENCODER SWITCH MONITOR CHECK

While the transfer case is shifting, the position encoder switch within the electric-shift motor is monitored for the proper operating sequence. If at any time during a shift, the encoder changes to a condition other than the next possible position, an error counter in the TCCM is incremented by four. After the counter reaches 32, DTC 2 (Encoder Fault) is outputed and the TCCM reverts to a default rail-to-rail shift pattern in which only shifts into 2HI and 4LO are possible.

To protect against transient, random encoder faults caused by vibration, contamination, electrical noise, etc., the fault counter is reduced by one each time a good encoder value is detected. Thus, the encoder must fail 25 percent of the time to be considered permanently bad and store a DTC 2.

MOTOR CHECKS

Whenever the electric-shift motor is turned on or off, the motor and its electrical circuits are tested both in the de-energized and energized condition. If the motor circuits do not function properly, one of the following conditions may exist:

- An open or short in one or more of the following motor circuits:
  - — Supply circuit 1540
  - — Ground circuit 150
  - — Circuit 1552
  - — Circuit 1553
  - — Associated connections

DIAGNOSTIC TROUBLE CODE	NUMBER OF STATUS LAMP FLASHES	DIAGNOSTIC TROUBLE CODE CONDITION
1	1	RAM STANDBY POWER LOST
2	2	ENCODER FAULT
3	3	TCCM MOTOR CIRCUIT
4	4	RAM/ROM FAILURE

Figure 7—Diagnostic Trouble Code Condition

- An open or short within the motor itself
- One of the motor relays not energizing or de-energizing

RELAY VOLTAGE CHECK

If either or both relays fail to detect the proper voltage after energizing or de-energizing, the shift is aborted and DTC 3 (TCCM Motor Circuit) is stored.

If either or both relays fail to detect the proper voltage after de-energizing, both relays are turned on by the TCCM (even with the ignition off) to prevent the motor from running. The TCCM then flags DTC 3 (TCCM Motor Circuit). The status lamps flash to alert the vehicle operator that a condition that must be corrected immediately exists. Such a condition causes the battery to drain when the ignition is off.

DIAGNOSIS OVERVIEWS

To request the transfer case selector switch status lamps to flash and indicate the DTC, perform the following sequence:

Important

To avoid possible misdiagnosis, always perform the functional test first when diagnosing a problem.

1. Perform the functional test as described in the following diagnosis charts.
2. Follow the appropriate diagnostic flow chart for the suspected fault.
3. Make repairs to correct the DTC and/or other faults.
4. Clear the TCCM code memory.
5. Cycle the vehicle ignition on and off five times to clear DTC 1.
6. Repeat the functional test.

READING DIAGNOSTIC TROUBLE CODES (DTC's)

To cause the transfer case switch status lamps to flash and indicate the DTC's:

1. Install a jumper wire between the diagnostic pigtail and a good ground.
2. Turn the ignition switch to the RUN position.
3. Wait approximately three seconds.
4. Observe the status lamps.

The transfer case status lamps flash to indicate the stored DTC's. If only one DTC is stored in the memory, that code flashes repeatedly with an approximately three-second delay between flash sequences. If more than one DTC is stored, the first DTC flash then an approximately three-second delay occ the next code is flashed. Such sequences conti the jumper wire is disconnected.

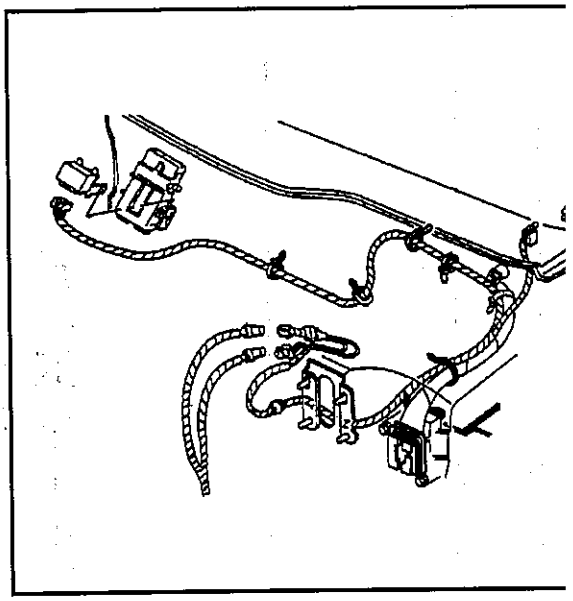

Figure 8—Electric Shift Transfer Case W Harness and Component Location

READING STATUS LAMP FLASHES

When reading DTC's the number of status la es will indicate the DTC number. The DTC n status lamp flashes, and DTC conditions, are in Figure 7.

CLEARING DIAGNOSTI TROUBLE CODES (DTC'

To clear the TCCM DTC memory, proceed a

1. Turn the ignition off.
2. Remove the 20-amp T/L CTSY fuse.
3. Wait at least 2 minutes and 30 seco replace the fuse.
4. Cycle the ignition on and off five times.

Important

The DTC's do not clear if the 20-amp T/L C is not removed for at least 2 minutes and 30

DTC number 1 continues to occur until the i cycled five times.

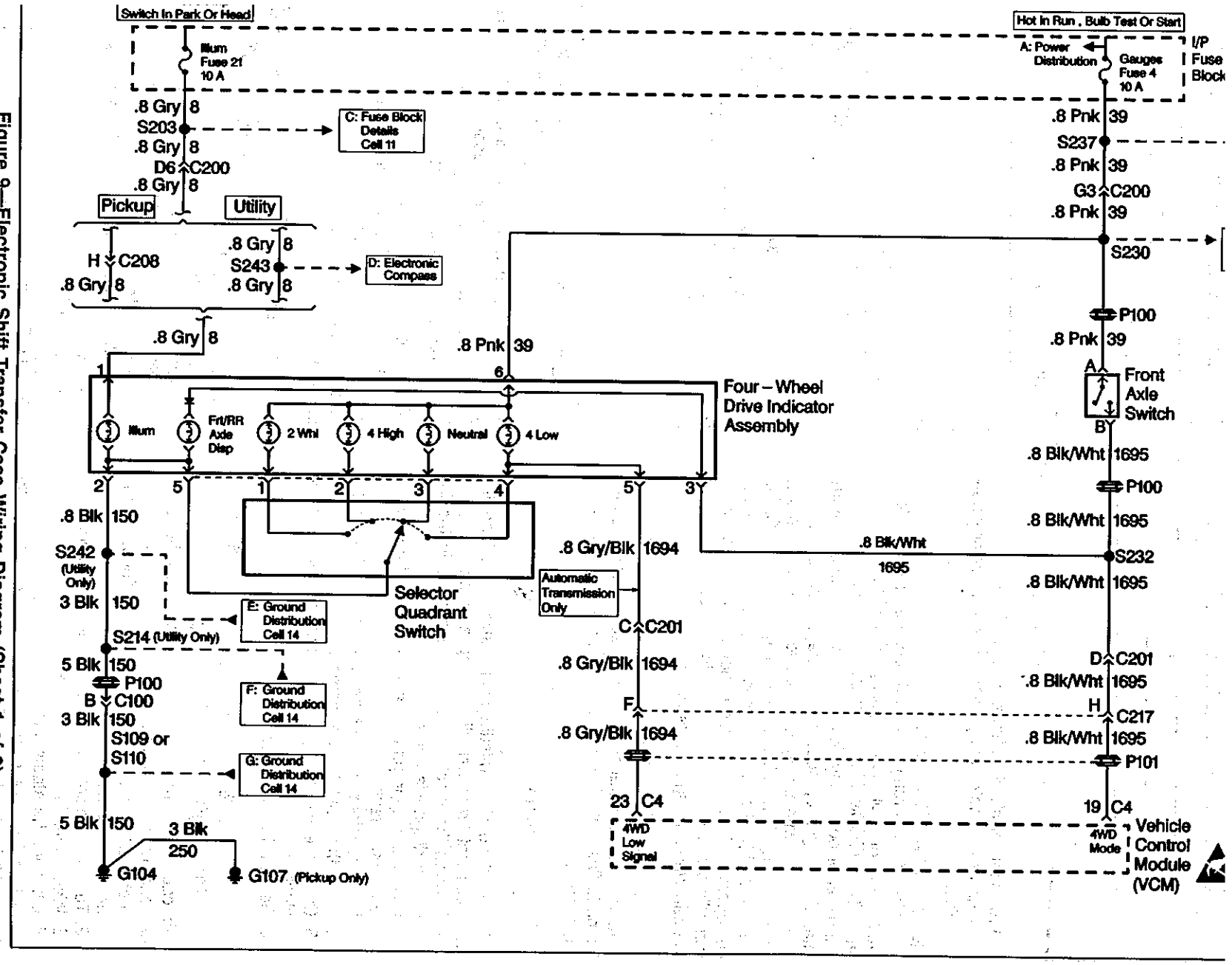

Figure 9—Electronic Shift Transfer Case Wiring Diagram (Sheet 1 of 2)

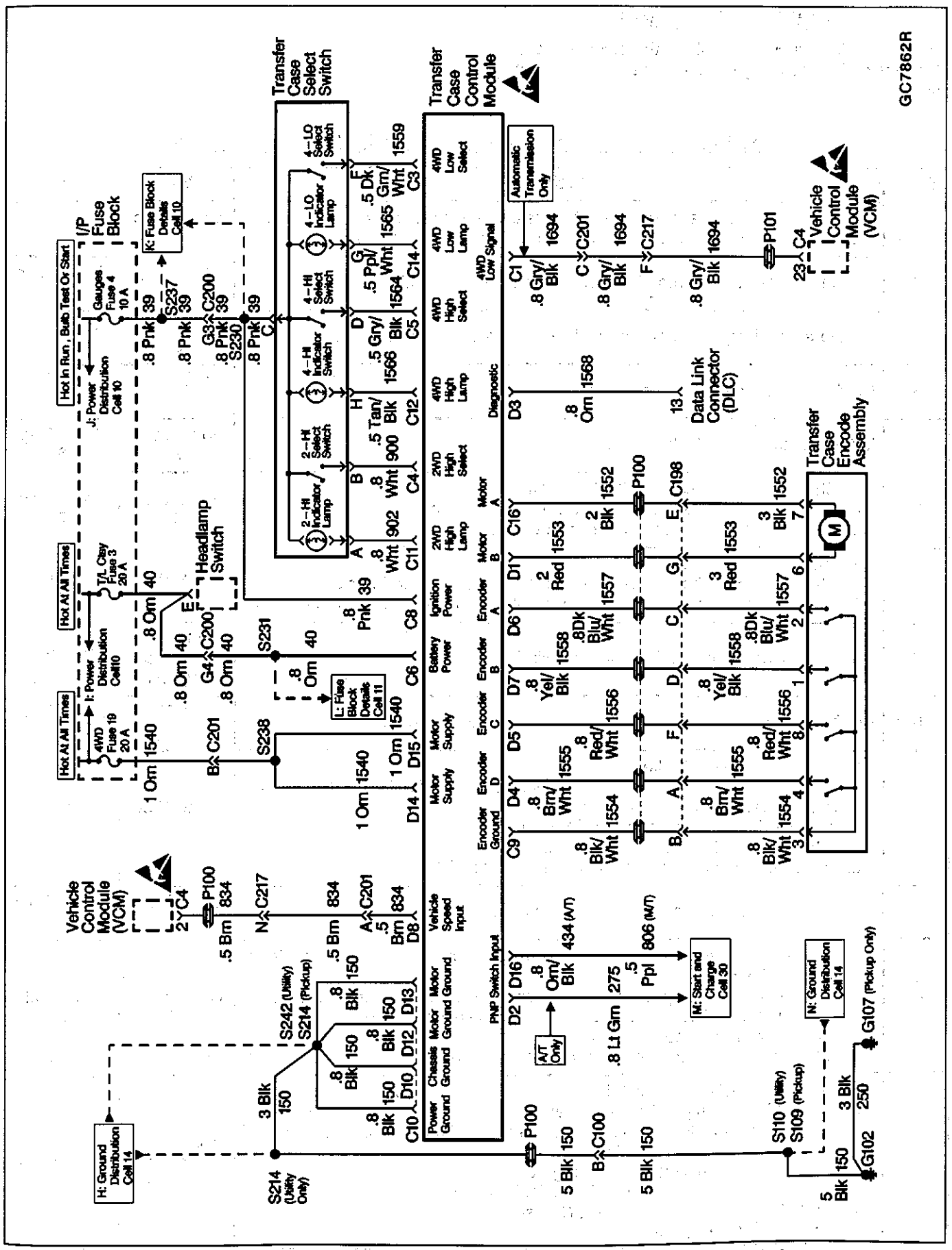

Figure 10—Electronic Shift Transfer Case Wiring Diagram (Sheet 2 of 2)

DIAGNOSIS CHARTS

e following charts to aid in the diagnosis of the
and electronic systems of the NV233 transfer

Electronic Transfer Case Diagnostic System Check

Action	Yes	No
1. Turn the ignition switch to the ON position and note the status lamps. 2. Do all status lamps turn ON for the one second power up?	Go to Step 3	Go to Step 2
Did any of the status lamps turn on for the power up test?	Go to Table C	Go to Table B
Do the status lamps turn on and indicate a transfer case position?	Go to Step 5	Go to Step 4
Do the status lamps flash on and off more than once?	Go to Table A	Go to Table C
Is the transfer case stuck in 4 LO?	Go to Table G	Go to Step 6
1. Shift the transfer case to 2 HI or 4 HI. 2. Attempt to shift the transfer case between 2 HI and 4 HI. 3. Does the transfer case perform mode shifts?	Go to Step 9	Go to Step 7
1. Move the vehicle 5 feet. 2. Attempt to shift the transfer case from 2 HI to 4 HI and back. 3. Does the transfer case perform mode shifts from 2 HI to 4 HI and back?	Go to Step 8	Go to Table E
Does a binding or hard shift condition exist?	Go to Mechanical Diagnosis	Go to Step 1
Do the status lamps indicate more than one position at a time?	Go to Table D	Go to Step 10
1. Apply the parking brake. 2. Make sure the automatic transmission is in the PARK position or the manual transmission is in first gear. 3. Turn the ignition switch to the ON position. 4. Attempt to shift the transfer case into 4 LO. 5. Does the 4 LO status lamp flash for 30 seconds?	Go to Step 12	Go to Step 11
Does the transfer case perform a range shift to 4 LO?	Go to Table H	Go to Table F
1. Repeat the attempt to shift the transfer case into 4 LO while the status lamp is flashing. 2. If the vehicle is equipped with a manual transmission, depress the clutch pedal. If the vehicle is equipped with an automatic transmission, move the shift lever to the Neutral position. 3. Does the transfer case perform a range shift to 4 LO?	Go to Step 13	Go to Table F
1. Shift the transfer case to 2 HI. 2. For vehicles equipped with a manual transmission, release the clutch pedal. If the vehicle is equipped with an automatic transmission, move the shift lever to the Park position. 3. Prepare a jumper wire to a good ground. 4. Install the grounded jumper wire to DLC pin 13. 5. Turn the ignition switch to the ON position. 6. Are any DTCs present?	Go to the appropriate DTC table	System OK

T3241

Table A - Status Lamps Flash

Note: When measurements are requested, use J 39200 DVM. When a check for proper connection is r refer to *Intermittents and Poor Connections* in Section 8A.

Step	Action	Yes	
1	Were you sent here from the *Diagnostic System Check*?	Go to Step 2	D
2	1. Prepare a jumper wire to a good ground. 2. Install the grounded jumper wire to DLC pin 13. 3. Turn the ignition switch to the ON position. 4. Note if any DTCs flash. 5. Did any DTCs flash?	Go to the appropriate DTC table	G
3	1. Check for proper connections at the TCCM harness connector. 2. Is the TCCM harness connector damaged or corroded?	Go to Step 4	G
4	1. Repair the connection as needed. Refer to *Wiring Repair* in Section 8A. 2. Reconnect all system components. 3. Is the connection repair completed?	Go to Diagnostic System Check	
5	1. Replace the TCCM. Refer to *TCCM Replacement.* 2. Reconnect all system components. 3. Is the replacement complete?	Go to Diagnostic System Check	

Table B - Status Lamps Did Not Turn On for the Power-Up Tes

Note: When measurements are requested, use J 39200 DVM. When a check for proper connection is refer to *Intermittents and Poor Connections* in Section 8A.

Step	Action	Yes	
1	Were you sent here from the *Diagnostic System Check*?	Go to Step 2	[
2	1. Check the condition of the 20-amp Gauges fuse. 2. Is the 20-amp Gauges fuse blown?	Go to Step 3	C
3	1. Replace the Gauges fuse. 2. Turn the ignition switch to the ON position. 3. Check the operation of the TCCM. 4. Recheck the 20-amp Gauges fuse. 5. Is the 20-amp Gauges fuse blown?	Go to Step 4	[
4	1. Repair the short to ground condition in CKT 39. Refer to *Wiring Repair* in Section 8A. 2. Replace the Gauges fuse. 3. Is the circuit repair complete?	Go to Diagnostic System Check	
5	1. Check the condition of the 20-amp T/L CTSY fuse. 2. Is the 20-amp T/L CTSY fuse blown?	Go to Step 6	C

Table B - Status Lamps Did Not Turn On for the Power-Up Test

Note: When measurements are requested, use J 39200 DVM. When a check for proper connection is requested, refer to *Intermittents and Poor Connections* in Section 8A.

Step	Action	Yes	No
6	1. Replace the T/L CTSY fuse. 2. Turn the ignition switch to the ON position. 3. Check the operation of the TCCM. 4. Recheck the 20-amp T/L CTSY fuse. 5. Is the 20-amp T/L CTSY fuse blown?	Go to Step 7	Go to Diagnostic System Check
7	1. Repair the short to ground condition in CKT 40. Refer to *Wiring Repair* in Section 8A. 2. Replace the T/L CTSY fuse. 3. Is the circuit repair complete?	Go to Diagnostic System Check	—
8	1. Disconnect the TCCM harness connector. 2. Check for proper connections at the TCCM harness connector. 3. Is the TCCM harness connector damaged or corroded?	Go to Step 9	Go to Step 10
9	1. Repair the TCCM harness connector as needed. Refer to *Wiring Repair* in Section 8A. 2. Reconnect all system components. 3. Is the TCCM connector repair completed?	Go to Diagnostic System Check	—
10	1. Turn the ignition switch to the ON position. 2. Measure the voltage at TCCM harness connector terminal C6. 3. Does the DVM display battery voltage?	Go to Step 12	Go to Step 11
11	1. Repair the open circuit condition in CKT 40. Refer to *Wiring Repair* in Section 8A. 2. Reconnect all system components. 3. Is the repair to CKT 40 completed?	Go to Diagnostic System Check	—
12	1. Turn the ignition switch to the ON position. 2. Measure the voltage at TCCM harness connector terminal C8. 3. Does the DVM display battery voltage?	Go to Step 14	Go to Step 13
13	1. Repair the open circuit condition in CKT 39 between the Gauges fuse and the TCCM. Refer to *Wiring Repair* in Section 8A. 2. Reconnect all system components. 3. Is the repair to CKT 39 completed?	Go to Diagnostic System Check	—
14	1. Turn the ignition switch to the ON position. 2. Measure the voltage at TCCM harness connector terminals C11, C12, and C14. 3. Does the DVM display battery voltage at each terminal?	Go to Step 15	Go to Step 18
15	1. Turn the ignition switch to the OFF position. 2. Measure the resistance between TCCM harness connector terminals C10 and D10 to a known good ground. 3. Is the resistance more than 2 ohms?	Go to Step 16	Go to Step 17
16	1. Repair the open circuit condition or high resistance condition in CKT 150. Refer to *Wiring Repair* in Section 8A. 2. Reconnect all system components. 3. Is the repair to CKT 150 completed?	Go to Diagnostic System Check	—
17	1. Check all system connections. 2. Replace the TCCM. Refer to *TCCM Replacement.* 3. Reconnect all system components. 4. Is the repair to CKT 39 completed?	Go to Diagnostic System Check	—

Table B - Status Lamps Did Not Turn On for the Power-Up Test

Note: When measurements are requested, use J 39200 DVM. When a check for proper connection is requested, refer to *Intermittents and Poor Connections* in Section 8A.

Step	Action	Yes	No
18	1. Disconnect the status lamp switch harness connector. 2. Check for proper connections at the status lamp harness connector. 3. Is the status lamp harness connector damaged or corroded?	Go to Step 19	Go to Step 20
19	1. Repair the status lamp harness connector as needed. Refer to *Wiring Repair* in Section 8A. 2. Reconnect all system components. 3. Is the repair to the status lamp harness connector completed?	Go to Diagnostic System Check	—
20	1. Turn the ignition switch to the ON position. 2. Measure the voltage at status lamp harness connector terminal C. 3. Does the DVM display battery voltage?	Go to Step 21	Go to Step 22
21	1. Replace the status lamp switch. Refer to *Status Lamp Switch Replacement.* 2. Reconnect all system components. 3. Is the replacement completed?	Go to Diagnostic System Check	—
22	1. Repair the open circuit condition in CKT 39. Refer to *Wiring Repair* in Section 8A. 2. Reconnect all system components. 3. Is the repair to CKT 39 completed?	Go to Diagnostic System Check	—

T3242

Table C - 1 or 2 Status Lamps Fail to Illuminate During Power-Up Test

Note: When measurements are requested, use J 39200 DVM. When a check for proper connection is requested, refer to *Intermittents and Poor Connections* in Section 8A.

Step	Action	Yes	No
1	Were you sent here from the *Diagnostic System Check*?	Go to Step 2	Go to Diagnostic System Check
2	1. Prepare a jumper wire to a good ground. 2. Install the grounded jumper wire to DLC pin 13. 3. Turn the ignition switch to the ON position. 4. Note if any DTCs flash. 5. Did any DTCs flash?	Go to the appropriate DTC table	Go to Step 3
3	1. Disconnect the TCCM harness connector. 2. Check for proper connections at the TCCM harness connector. 3. Is the TCCM harness connector damaged or corroded?	Go to Step 4	Go to Step 5
4	1. Repair the connection as needed. Refer to *Wiring Repair* in Section 8A. 2. Reconnect all system components. 3. Is the connection repair completed?	Go to Diagnostic System Check	—
5	1. Turn the ignition switch to the ON position. 2. Measure the voltage at TCCM harness connector terminals C11, C12, and C14. 3. Turn the ignition switch to the OFF position. 4. Did the DVM display battery voltage at each terminal?	Go to Step 6	Go to Step 9

Table C - 1 or 2 Status Lamps Fail to Illuminate During Power-Up Test

Note: When measurements are requested, use J 39200 DVM. When a check for proper connection is requested, refer to *Intermittents and Poor Connections* in Section 8A.

Step	Action	Yes	No
6	1. Disconnect the status lamp switch harness connector. 2. Turn the ignition switch to the ON position. 3. Measure the voltage at status lamp switch harness connector terminals A, H, and G. 4. Turn the ignition switch to the OFF position. 5. Did the DVM display one volt or more at each terminal?	Go to Step 7	Go to Step 8
7	1. Repair the short to voltage condition in CKT 902, CKT 1566, and CKT 1565 as needed. Refer to *Wiring Repair* in Section 8A. 2. Reconnect all system components. 3. Is the connection repair completed?	Go to Diagnostic System Check	—
8	1. Replace the TCCM. Refer to *TCCM Replacement.* 2. Reconnect all system components. 3. Is the replacement complete?	Go to Diagnostic System Check	—
9	1. Disconnect the status lamp switch harness connector. 2. Check for proper connections at the status lamp switch harness connector. 3. Is the status lamp switch harness connector damaged or corroded?	Go to Step 10	Go to Step 11
10	1. Repair the connection as needed. Refer to *Wiring Repair* in Section 8A. 2. Reconnect all system components. 3. Is the connection repair completed?	Go to Diagnostic System Check	—
11	1. Measure resistance in the following circuits: • CKT 902 from the status lamp harness connector terminal A to TCCM harness connector terminal C11. • CKT 1566 from the status lamp harness connector terminal H to TCCM harness connector terminal C12. • CKT 1565 from the status lamp harness connector terminal G to TCCM harness connector terminal C14. 2. Was the resistance measurement of any circuit more than one ohm?	Go to Step 12	Go to Step 13
12	1. Repair the open condition or high resistance condition in CKT 902, CKT 1566, and CKT 1565 as needed. Refer to *Wiring Repair* in Section 8A. 2. Reconnect all system components. 3. Is the connection repair completed?	Go to Diagnostic System Check	—
13	1. Replace the status lamp switch. Refer to *Status Lamp Switch Replacement.* 2. Reconnect all system components. 3. Is the replacement complete?	Go to Diagnostic System Check	—

T3243

Table D - More than 1 Status Lamp Stays On

Note: When a check for proper connection is requested, refer to *Intermittents and Poor Connections* in Section 8A.

Step	Action	Yes	No
1	Were you sent here from the *Diagnostic System Check*?	Go to Step 2	Go to Diagnostic System Check
2	1. Disconnect the TCCM harness connector. 2. Turn the ignition switch to the ON position. 3. Observe the status lamps. 4. Turn the ignition switch to the OFF position. 5. Did any status lamps turn ON?	Go to Step 3	Go to Step 4
3	1. Repair the short to ground condition in CKT 902, CKT 1565, and CKT 1566 depending on which status lamp turns on. Refer to *Wiring Repair* in Section 8A. 2. Reconnect all system components. 3. Is the connection repair completed?	Go to Diagnostic System Check	—
4	1. Replace the TCCM. Refer to *TCCM Replacement.* 2. Reconnect all system components. 3. Is the replacement complete?	Go to Diagnostic System Check	—

T3244

Table E - Transfer Case Will Not Perform a Mode Shift

Note: If a binding or hard condition exists, refer to Section 7D for mechanical diagnosis of the transfer case.

Note: When measurements are requested, use J 39200 DVM. When a check for proper connection is requested, refer to *Intermittents and Poor Connections* in Section 8A.

Step	Action	Yes	No
1	Were you sent here from the *Diagnostic System Check*?	Go to Step 2	Go to Diagnostic System Check
2	1. Prepare a jumper wire to a good ground. 2. Install the grounded jumper wire to DLC pin 13. 3. Turn the ignition switch to the ON position. 4. Note if any DTCs flash. 5. Turn the ignition switch to the OFF position. 6. Did any DTCs flash?	Go to the appropriate DTC table	Go to Step 3
3	1. Turn the ignition switch to the ON position. 2. Move the vehicle 5 feet. 3. Try to shift the transfer case between 2 HI and 4 HI. 4. Turn the ignition switch to the OFF position. 5. Does the transfer case shift?	Go to Diagnostic System Check	Go to Step 4
4	1. Disconnect the TCCM harness connector. 2. Check for proper connections at the TCCM harness connector. 3. Is the TCCM harness connector damaged or corroded?	Go to Step 5	Go to Step 6
5	1. Repair the connection as needed. Refer to *Wiring Repair* in Section 8A. 2. Reconnect all system components. 3. Is the connection repair completed?	Go to Diagnostic System Check	—

Table E - Transfer Case Will Not Perform a Mode Shift

Note: If a binding or hard condition exists, refer to Section 7D for mechanical diagnosis of the transfer case.

Note: When measurements are requested, use J 39200 DVM. When a check for proper connection is requested, refer to *Intermittents and Poor Connections* in Section 8A.

Step	Action	Yes	No
6	1. Turn the ignition switch to the ON position. 2. Measure the voltage at TCCM harness connector terminal C4. 3. Measure the voltage at TCCM harness connector terminal C5. 4. Turn the ignition switch to the OFF position. 5. Did the DVM display battery voltage at each terminal?	Go to Step 7	Go to Step 8
7	1. Repair the short to voltage condition in CKT 900, CKT 1565, and/or inside the status lamp switch as needed. Refer to *Wiring Repair* in Section 8A. 2. Reconnect all system components. 3. Is the short to voltage repair completed?	Go to Diagnostic System Check	—
8	1. Turn the ignition switch to the ON position. 2. Measure the voltage at TCCM harness connector terminal C4 and C5 with the 2 HI and 4 HI switch depressed. 3. Turn the ignition switch to the OFF position. 4. Did the DVM display battery voltage at each terminal when the switch was depressed?	Go to Step 9	Go to Step 12
9	1. Measure the resistance at TCCM harness connector terminals C10, D10, D12, and D13 to a known good ground. 2. Did the DVM display a resistance value greater than 2 ohms for any circuit?	Go to Step 10	Go to Step 11
10	1. Repair the open or high resistance condition in CKT 150. Refer to *Wiring Repair* in Section 8A. 2. Reconnect all system components. 3. Is the repair to CKT 150 completed?	Go to Diagnostic System Check	—
11	1. Replace the TCCM. Refer to *TCCM Replacement.* 2. Reconnect all system components. 3. Is the replacement complete?	Go to Diagnostic System Check	—
12	1. Measure the resistance of CKT 900 from status lamp switch connector terminal B to TCCM harness connector terminal C4. 2. Measure the resistance of CKT 1564 from status lamp switch connector terminal D to TCCM harness connector terminal C5. 3. Did the DVM display a resistance value greater than one ohm for either circuit?	Go to Step 13	Go to Step 14
13	1. Repair the open or high resistance condition in CKT 900 and/or CKT 1564. Refer to *Wiring Repair* in Section 8A. 2. Reconnect all system components. 3. Is the repair to CKT 900 and/or CKT 1564 completed?	Go to Diagnostic System Check	—
14	1. Replace the status lamp switch. Refer to *Status Lamp Switch Replacement.* 2. Reconnect all system components. 3. Is the replacement complete?	Go to Diagnostic System Check	—

T3245

Table F - Transfer Case Will Not Perform a Range Shift

Note: If a binding or hard condition exists, refer to Section 7D for mechanical diagnosis of the transfer case.

Note: When measurements are requested, use J 39200 DVM. When a check for proper connection is requested, refer to *Intermittents and Poor Connections* in Section 8A.

Step	Action	Yes	No
1	Were you sent here from the *Diagnostic System Check*?	Go to Step 2	Go to Diagnostic System Check
2	1. Prepare a jumper wire to a good ground. 2. Install the grounded jumper wire to DLC pin 13. 3. Turn the ignition switch to the ON position. 4. Note if any DTCs flash. 5. Turn the ignition switch to the OFF position. 6. Did any DTCs flash?	Go to the appropriate DTC table	Go to Step 3
3	1. Turn the ignition switch to the ON position. 2. Move the vehicle 5 feet. 3. Try to shift the transfer case into 4 LO. 4. Does the transfer case shift?	Go to Diagnostic System Check	Go to Step 4
4	1. Remove the ground from the diagnostic connector. 2. Again, try to shift the transfer case to 4 LO. 3. Turn the ignition switch to the OFF position. 4. Does the 4 LO status lamp flash for 30 seconds?	Go to Step 5	Go to Step 6
5	1. Check for an open circuit condition in CKT 834 and/or CKT1694 and reapir as needed. Refer to *Wiring Repair* in Section 8A. 2. If an open condition cannot be located, refer to *Park/Neutral Switch or Clutch Safety Switch Diagnosis* in Section 8A. 3. Was an open condition located and repaired?	Go to Diagnostic System Check	Go to Section 8A
6	1. Disconnect the TCCM harness connector. 2. Check for proper connections at the TCCM harness connector. 3. Is the TCCM harness connector damaged or corroded?	Go to Step 7	Go to Step 8
7	1. Repair the TCCM harness connector as needed. Refer to *Wiring Repair* in Section 8A. 2. Reconnect all system components. 3. Is the TCCM harness connector repair completed?	Go to Diagnostic System Check	—
8	1. Turn the ignition switch to the ON position. 2. Measure the voltage at TCCM harness connector terminal C3 with the 4 LO switch depressed. 3. Turn the ignition switch to the OFF position. 4. Did the DVM display battery voltage when the switch was depressed?	Go to Step 9	Go to Step 12
9	1. Measure the resistance at TCCM harness connector terminals C10, D10, D12, and D13 to a known good ground. 2. Did the DVM display a resistance value greater than 2 ohms for any circuit?	Go to Step 10	Go to Step 11
10	1. Repair the open or high resistance condition in CKT 150. Refer to *Wiring Repair* in Section 8A. 2. Reconnect all system components. 3. Is the repair to CKT 150 completed?	Go to Diagnostic System Check	—

Table F - Transfer Case Will Not Perform a Range Shift

Note: If a binding or hard condition exists, refer to Section 7D for mechanical diagnosis of the transfer case.

Note: When measurements are requested, use J 39200 DVM. When a check for proper connection is requested, refer to *Intermittents and Poor Connections* in Section 8A.

Step	Action	Yes	No
11	1. Replace the TCCM. Refer to *TCCM Replacement.* 2. Reconnect all system components. 3. Is the replacement complete?	Go to Diagnostic System Check	—
12	1. Measure the resistance of CKT 1559 from status lamp switch connector terminal E to TCCM harness connector terminal C3. 2. Did the DVM display a resistance value greater than one ohm?	Go to Step 13	Go to Step 14
13	1. Repair the open or high resistance condition in CKT 1559. Refer to *Wiring Repair* in Section 8A. 2. Reconnect all system components. 3. Is the repair to CKT 1559 completed?	Go to Diagnostic System Check	—
14	1. Replace the status lamp switch. Refer to *Status Lamp Switch Replacement.* 2. Reconnect all system components. 3. Is the replacement complete?	Go to Diagnostic System Check	—

T3246

Table G - Transfer Case Stuck in 4 LO

Note: If a binding or hard shifting condition exists, refer to Section 7D for mechanical diagnosis of the transfer case.

Note: When measurements are requested, use J 39200 DVM. When a check for proper connection is requested, refer to *Intermittents and Poor Connections* in Section 8A.

Step	Action	Yes	No
1	Were you sent here from the *Diagnostic System Check*?	Go to Step 2	Go to Diagnostic System Check
2	1. Prepare a jumper wire to a good ground. 2. Install the grounded jumper wire to DLC pin 13. 3. Turn the ignition switch to the ON position. 4. Note if any DTCs flash. 5. Turn the ignition switch to the OFF position. 6. Did any DTCs flash?	Go to the appropriate DTC table	Go to Step 3
3	1. Turn the ignition switch to the ON position. 2. Move the vehicle 5 feet. 3. Try to shift the transfer case into 4 HI. 4. Does the transfer case shift?	Go to Diagnostic System Check	Go to Step 4
4	1. Remove the ground from the diagnostic connector. 2. Again, try to shift the transfer case to 4 HI. 3. Turn the ignition switch to the OFF position. 4. Does the 4 LO status lamp flash for 30 seconds?	Go to Step 5	Go to Step 6

Table G - Transfer Case Stuck in 4 LO

Note: If a binding or hard shifting condition exists, refer to Section 7D for mechanical diagnosis of the case.

Note: When measurements are requested, use J 39200 DVM. When a check for proper connection is req refer to *Intermittents and Poor Connections* in Section 8A.

Step	Action	Yes	
5	1. Check for an open circuit condition in CKT 834 and/or CKT1694 and reapir as needed. Refer to *Wiring Repair* in Section 8A. 2. If an open condition cannot be located, refer to *Park/Neutral Switch or Clutch Safety Switch Diagnosis* in Section 8A. 3. Was an open condition located and repaired?	Go to Diagnostic System Check	Go t tic
6	1. Disconnect the TCCM harness connector. 2. Check for proper connections at the TCCM harness connector. 3. Is the TCCM harness connector damaged or corroded?	Go to Step 7	Go t
7	1. Repair the TCCM harness connector as needed. Refer to *Wiring Repair* in Section 8A. 2. Reconnect all system components. 3. Is the TCCM harness connector repair completed?	Go to Diagnostic System Check	
8	1. Turn the ignition switch to the ON position. 2. Measure the voltage at TCCM harness connector terminal C3. 3. Turn the ignition switch to the OFF position. 4. Did the DVM display any voltage?	Go to Step 9	Go
9	1. Repair the short to voltage condition in CKT 1559 and or internal short to voltage in the status lamp switch. Refer to *Wiring Repair* in Section 8A. 2. Reconnect all system components. 3. Is the short to voltage repair completed?	Go to Diagnostic System Check	
10	1. Turn the ignition switch to the ON position. 2. Measure the voltage at TCCM harness connector terminals C4 and C5 with the 2 HI and 4 HI switch depressed. 3. Turn the ignition switch to the OFF position. 4. Did the DVM display battery voltage when the switch was depressed?	Go to Step 11	Go
11	1. Measure the resistance from TCCM harness connector terminals C10, D10, D12, and D13 to a good known ground. 2. Did the DVM display a resistance value greater than two ohms for any circuit?	Go to Step 12	Go
12	1. Repair the open or high resistance condition in CKT 150. Refer to *Wiring Repair* in Section 8A. 2. Reconnect all system components. 3. Is the TCCM harness connector repair completed?	Go to Diagnostic System Check	
13	1. Replace the TCCM. Refer to *TCCM Replacement.* 2. Reconnect all system components. 3. Is the replacement complete?	Go to Diagnostic System Check	
14	1. Measure the resistance of CKT 900 from status lamp switch connector terminal B to TCCM harness connector terminal C4. 2. Measure the resistance of CKT 1564 from status lamp switch connector terminal D to TCCM harness connector terminal C5. 3. Did the DVM display a resistance value greater than one ohm for either circuit?	Go to Step 15	Go

Table G - Transfer Case Stuck in 4 LO

Note: If a binding or hard shifting condition exists, refer to Section 7D for mechanical diagnosis of the transfer case.

Note: When measurements are requested, use J 39200 DVM. When a check for proper connection is requested, refer to *Intermittents and Poor Connections* in Section 8A.

Step	Action	Yes	No
15	1. Repair the open or high resistance condition in CKT 900 and/or CKT 1564. Refer to *Wiring Repair* in Section 8A. 2. Reconnect all system components. 3. Is the open or high resistance condition repair completed?	Go to Diagnostic System Check	—
16	1. Replace the status lamp switch. Refer to *Status Lamp Switch Replacement.* 2. Reconnect all system components. 3. Is the replacement complete?	Go to Diagnostic System Check	—

T3247

Table H - Transfer Case Switches into 4 LO Without Being in Neutral

Note: When measurements are requested, use J 39200 DVM. When a check for proper connection is requested, refer to *Intermittents and Poor Connections* in Section 8A.

Step	Action	Yes	No
1	Were you sent here from the *Diagnostic System Check*?	Go to Step 2	Go to Diagnostic System Check
2	1. Check for an open circuit condition in CKT 834 and/or CKT1694 and reapir as needed. Refer to *Wiring Repair* in Section 8A. 2. If an open condition cannot be located, refer to *Park/Neutral Switch or Clutch Safety Switch Diagnosis* in Section 8A. 3. Was an open condition located and repaired?	Go to Diagnostic System Check	Go to Section 8A

T3248

DIAGNOSTIC TROUBLE CODE (DTC) DESCRIPTION AND DIAGNOSIS

DIAGNOSTIC TROUBLE CODE (DTC) 1

When the ignition is turned on, the TCCM conducts a self-test to determine that it retains the same memory that it had when the ignition was last turned off. This self-test indicates whether or not the RAM standby power supply to the TCCM connector pin C6 was interrupted, which would result in clearing of the trouble code memory. If the self-test fails, the stored DTC's are cleared and the "RAM Standby Power Loss", DTC #1 is flagged. DTC #1 automatically clears after five successive ignition cycles.

Diagnostic Trouble Code - 1

Note: When measurements are requested, use J 39200 DVM. When a check for proper connection is requested, refer to *Intermittents and Poor Connections* in Section 8A.

Step	Action	Yes	No
1	Were you sent here from the *Diagnostic System Check*?	Go to Step 2	Go to Diagnostic System Check
2	1. Turn the ignition switch to the ON position and back to the OFF position 5 times. Wait 5 seconds between each cycle. 2. Recheck for DTC 1. 3. Is DTC 1 still present?	Go to Step 3	Go to Diagnostic System Check
3	1. Check for an intermittent open circuit condition in CKT 40. 2. Repair CKT 40 as needed. Refer to *Wiring Repair* in Section 8A. 3. Was the condition found and repaired?	Go to Step 5	Go to Step 4
4	1. Replace the TCCM. Refer to *TCCM Replacement*. 2. Is the replacement complete?	Go to Step 5	—
5	1. Reconnect all system components. 2. Clear DTCs. 3. Are the DTCs cleared from memory?	Go to Diagnostic System Check	—

T3249

DIAGNOSTIC TROUBLE CODE (DTC) 2 OR 1 AND 2

During electronic shifting, the encoder switch circuit is monitored for the proper operating sequence. If at any time during a shift, the encoder changes from one position to any position other than the next possible position, an error counter in the TCCM is incremented by four. After the counter reaches 32, a permanent "Encoder Fault", DTC 2 is flagged and the TCCM reverts to a 2HI to 4LO or a 4LO to 2HI shift pattern only. To guard against transient, random encoder fault due to vibration, dirt, electrical noise, etc., the fault counter is reduced by one each time a good encoder value is detected. The encoder, therefore, must intermittently fail 25 percent of the time to be considered permanently bad and store the DTC 2.

Diagnostic Trouble Code - 2 or Diagnostic Trouble Codes 1 and 2

Note: When measurements are requested, use J 39200 DVM. When a check for proper connection is requested, refer to *Intermittents and Poor Connections* in Section 8A.

Step	Action	Yes	No
1	Were you sent here from the *Diagnostic System Check*?	Go to Step 2	Go to Diagnostic System Check
2	1. Disconnect the transfer case harness connector. 2. Turn the ignition switch to the ON position. 3. Measure the voltage at the following transfer case harness connector terminals: • Transfer case harness connector terminal 1. • Transfer case harness connector terminal 2. • Transfer case harness connector terminal 4. • Transfer case harness connector terminal 8. 4. Turn the ignition switch to the OFF position. 5. Did the DVM display 5 volts at each terminal?	Go to Step 3	Go to Step 6
3	1. Measure the resistance between transfer case harness connector terminal 3 and a good ground. 2. Is the resistance value less than 2 ohms?	Go to Step 4	Go to Step 5
4	1. Replace the encoder and shift motor assembly. Refer to *Encoder and Shift Motor Assembly Replacement.* 2. Is the replacement complete?	Go to Step 9	—
5	1. Repair the open circuit condiction or high resistance condition in CKT 1554. Refer to *Wiring Repair* in Section 8A. 2. Is the repair to CKT 1554 complete?	Go to Step 9	—
6	1. Check for open circuit conditions or short to ground conditions in CKT 1555, CKT 1556, CKT 1557, and CKT 1558. 2. Were any open circuit conditions or short to ground conditions located?	Go to Step 7	Go to Step 8
7	1. Repair the open circuit condition or high resistance condition. Refer to *Wiring Repair* in Section 8A. 2. Is the repair complete?	Go to Step 9	—
8	1. Replace the TCCM. Refer to *TCCM Replacement.* 2. Is the replacement complete?	Go to Step 9	—
9	1. Reconnect all system components. 2. Clear DTCs. 3. Are the DTCs cleared from memory?	Go to Diagnostic System Check	—

T3250

DIAGNOSTIC TROUBLE CODE (DTC) 3 OR 1 AND 3

Each time the electric-shift motor is turned on or off, it and its electrical circuits are tested, both in the de-energized and energized conditions. If the motor circuits are not functioning properly, one of the following exists:

- An open or short circuit in one or more of the following:
- Motor supply circuit 1540
- Motor ground circuit 150
- Motor circuit 1552
- Motor circuit 1553
- Motor circuit connections
- A short and/or open within the motor itself
- A malfunctioning motor relay (not energizing or not de-energizing)

If one or both of the relays fail to detect the voltage after energizing, the shift is aborted fault counter counts in 4 part increments, when counter reaches 16 increments the "TCCM Circuit" DTC 3 is flagged. After the conditi caused the fault code to be flagged has been cc the fault code must be cleared by removing the T/L CTSY fuse for 2 minutes and 30 seconds.

If one or both relays fail to detect the proper after de-energizing (condition 4), both relays ar on even with the ignition turned off to prevent th from running. The TCCM then flags a "TCCM Circuit" DTC 3, and flashes the status lamps t the vehicle driver that a condition that must be ed immediately exists. This condition also cau battery to drain when the ignition is off.

Diagnostic Trouble Code - 3 or Diagnostic Trouble Codes - 1 and 3

Note: When measurements are requested, use J 39200 DVM. When a check for proper connection is req refer to *Intermittents and Poor Connections* in Section 8A.

Step	Action	Yes	I
1	Were you sent here from the *Diagnostic System Check*?	Go to Step 2	Go t nc Sy Cl
2	1. Check the condition of the 20-amp 4WD fuse. 2. Is the 20-[illegible] 4WD fuse blown?	Go to Step 3	Go t
3	1. Replac[illegible]WD fuse. 2. Turn the ignition switch to the ON position. 3. Attempt to shift the transfer case. 4. Recheck the 20-amp 4WD fuse. 5. Turn the ignition switch to the OFF position. 6. Is the 20-amp 4WD fuse blown?	Go to Step 4	Go t
4	1. Disconnect the transfer case encoder assembly harness connector. 2. Check for proper connection of the encoder assembly harness connector. 3. Is the harness connector damaged or corroded?	Go to Step 5	Go t
5	1. Repair the encoder assembly harness connector. Refer to *Wiring Repair* in Section 8A. 2. Replace the 4WD fuse. 3. Is the connector repair complete?	Go to Step 17	
6	1. Replace the 4WD fuse (if it is blown). 2. Turn the ignition switch to the ON position. 3. Connect the leads of the DVM to encoder assembly harness connector terminals 6 and 7. 4. Attempt to shift the transfer case between 4 HI and 4 LO. 5. Does the DVM voltage display alternate from positive to negative when the switches are depressed?	Go to Step 7	Go t
7	1. Remove the transfer case encoder assembly. Refer to *Transfer Case Encoder Assembly Replacement.* 2. Make sure that there are no mechanical problems with the transfer case. Refer to *Transfer Case Diagnosis* in Section 7D. 3. Replace the transfer case shift motor. Refer to *Transfer Case Shift Motor Replacement.* 4. Is the replacement complete?	Go to Step 17	

Diagnostic Trouble Code - 3 or Diagnostic Trouble Codes - 1 and 3

Note: When measurements are requested, use J 39200 DVM. When a check for proper connection is requested, refer to *Intermittents and Poor Connections* in Section 8A.

Step	Action	Yes	No
8	1. Disconnect the TCCM harness connector. 2. Check for proper connections at the TCCM harness connector. 3. Is the TCCM harness connector damaged or corroded?	Go to Step 9	Go to Step 10
9	1. Repair the TCCM harness connector as needed. Refer to *Wiring Repair* in Section 8A. 2. Reconnect all system components. 3. Is the TCCM connector repair completed?	Go to Step 17	—
10	1. Turn the ignition switch to the ON position. 2. Measure the voltage at TCCM harness connector terminals D14 and D15. 3. Turn the ignition switch to the OFF position. 4. Did the DVM display battery voltage?	Go to Step 12	Go to Step 11
11	1. Repair the open circuit condition or short to ground condition in CKT 1540. Refer to *Wiring Repair* in Section 8A. 2. Is the repair to CKT 1540 completed?	Go to Step 17	—
12	1. Check the motor CKT 1552 and CKT 1553 for an open condition or short to ground condition. 2. Were there any circuit conditions in CKT 1552 and/or CKT 1553?	Go to Step 13	Go to Step 14
13	1. Repair the open circuit condition or short to ground condition in CKT 1552 and/or CKT 1553. Refer to *Wiring Repair* in Section 8A. 2. Is the circuit repair completed?	Go to Step 17	—
14	1. Check ground CKT 150 for an open circuit condition or a high resistance condition. 2. Does CKT have an open circuit condition or high resistance condition?	Go to Step 15	Go to Step 16
15	1. Repair the open circuit condition or short to ground condition in CKT 150. Refer to *Wiring Repair* in Section 8A. 2. Is the circuit repair completed?	Go to Step 17	—
16	1. Replace the TCCM. Refer to *TCCM Replacement.* 2. Is the replacement complete?	Go to Step 17	—
17	1. Reconnect all system components. 2. Clear DTCs. 3. Are the DTCs cleared from memory?	Go to Diagnostic System Check	—

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DIAGNOSTIC TROUBLE CODE (DTC) 4 OR 1 AND 4

Each time the ignition is turned on, the TCCM calculates a checksum for the internal program memory and compares it to a checksum stored within the program. This ensures that the software is operating properly. If the TCCM detects a fault with the internal program, a "RAM/ROM Failure" DTC 4 is flagged.

Diagnostic Trouble Code - 4 or Diagnostic Trouble Codes 1 and 4

Note: When measurements are requested, use J 39200 DVM. When a check for proper connection is requested, refer to *Intermittents and Poor Connections* in Section 8A.

Step	Action	Yes	No
1	Were you sent here from the *Diagnostic System Check*?	Go to Step 2	Go to Diagnostic System Check
2	1. Turn the ignition switch to the ON position and back to the OFF position 5 times. Wait 5 seconds between each cycle. 2. Recheck for DTC 4. 3. Is DTC 4 still present?	Go to Step 3	Go to Diagnostic System Check
3	1. Replace the TCCM. Refer to *TCCM Replacement*. 2. Is the replacement complete?	Go to Step 4	—
4	1. Reconnect all system components. 2. Clear DTCs. 3. Are the DTCs cleared from memory?	Go to Diagnostic System Check	—

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