# SECTION 5—TROUBLESHOOTING—DIAGNOSTIC CODES PRESENT

## 5–1.

## 5–2. DIAGNOSTIC CODE MEMORY

Diagnostic codes are logged in a list in memory (sometimes referred to as the queue), listing the most recently occurring code first and logging up to five codes. The codes contained in the list have information recorded as shown in the table below (codes are examples). Access to the code list position, main code, subcode and active indicator is through either the shift selector display, Allison DOC™ For PC–Service Tool, or the Pro-Link® 9000 diagnostic tool. Access to ignition cycle counter and event counter information is through either of the diagnostic tools only. Further detail on the use of Allison DOC™ For PC–Service Tool or Pro-Link® 9000 diagnostic tools is presented in Appendix J of this manual.

**Table 5–1. Code List**

| Code List Position | Main Code | Subcode | Active Indicator | Ignition Cycle Counter | Event Counter |
|---|---|---|---|---|---|
| d1 | 21 | 12 | YES | 00 | 10 |
| d2 | 45 | 12 | YES | 00 | 04 |
| d3 | 23 | 12 | YES | 08 | 02 |
| d4 | 34 | 12 | YES | 13 | 01 |
| d5 | 56 | 11 | YES | 22 | 02 |
| Displayed on shift selector and diagnostic tool<br>d = “diagnostic” | | | YES = LED indicator illuminated | Not available on shift selector display | |

The following paragraphs define the different parts of the code list.

**A. Code List Position.** The position which a code occupies in the code list. Positions are displayed as “d1” through “d5” (Code List Position #1 through Code List Position #5).

**B. Main Code.** The general condition or area of fault detected by the ECU.

**C. Subcode.** The specific area or condition related to the main code in which a fault is detected.

**D. Active Indicator.** Indicates when a diagnostic code is active. The MODE indicator LED on the shift selector is illuminated or the diagnostic tool displays **YES**.

**E. Ignition Cycle Counter.** Determines when inactive diagnostic codes are automatically cleared from the code list. The counter is increased by one each time a normal ECU power down occurs (ignition turned off). Inactive codes are cleared from the code list after the counter exceeds 25.

**F. Event Counter.** Counts the number of occurrences of a diagnostic code. If a code is already in the code list and the code is again detected, that code is moved to position d1, the active indicator is turned on, the Ignition Cycle Counter is cleared, and 1 is added to the Event Counter.

## 5–3. CODE READING AND CODE CLEARING

Diagnostic codes can be read and cleared by the following methods:

- Allison DOC™ For PC–Service Tool (Allison preferred diagnostic tool)
- Pro-Link® 9000 diagnostic tool (limited support only)
- By entering the diagnostic display mode and using the shift selector display.

The use of Allison DOC™ For PC–Service Tool and Pro-Link® 9000 diagnostic tool is described in the instruction manual furnished with each tool or briefly in Appendix J of this manual. The method for reading and clearing codes

# TROUBLESHOOTING—DIAGNOSTIC CODES PRESENT

described in this section refers to entering the diagnostic display mode by the proper button movements on the shift selector.

The diagnostic display mode may be entered for viewing of codes at any speed. Active codes can only be cleared when the output speed = 0 and no output speed sensor failure is active.

**A. Reading Codes.** Enter the diagnostic display mode by pressing the ↑ (Up) and ↓ (Down) arrow buttons at the same time on a pushbutton selector, or by momentarily pressing the **DISPLAY MODE** button on a lever shift selector.

***NOTE: If a DO NOT SHIFT condition is present (CHECK TRANS light illuminated) at this time, the shift selector may or may not respond to requested range changes.***

The code list or queue position is the first item displayed, followed by the main code and the subcode. Each item is displayed for about one second. The display cycles continuously until the next code list position is accessed by pressing the **MODE** button. The following list represents the display cycle using code 25 11 as an example:

1. Code list position—**d**, **1**
2. Main code—**2**, **5**
3. Subcode —**1**, **1**
4. Cycle repeats—**d**, **1**, **2**, **5**, **1**, **1**

To view the second, third, fourth, and fifth positions (d2, d3, d4, and d5), momentarily press the **MODE** button as explained above.

Momentarily press the **MODE** button after the fifth position is displayed to restart the sequence of code list positions.

An active code is indicated by the illumination of the LED indicator when a code position is displayed while in the diagnostic display mode.

Any code position which does not have a diagnostic code logged will display "–" for both the main and subcodes. No diagnostic codes are logged after an empty code position.

**B. Clearing Active Indicators.** A diagnostic code's active indicator can be cleared, which allows the code inhibit to be cleared but remains in the queue as inactive.

The active indicator clearing methods are:

1. Power down—All active indicators, except code 69 34 (refer to the code chart), are cleared at ECU power down.
2. Self-clearing—Some codes will clear their active indicator when the condition causing the code is no longer detected by the ECU.
3. Manual—Some active indicators can be cleared manually, while in the diagnostic display mode, after the condition causing the code is corrected.

| | |
|---|---|
| **CAUTION:** | If an active indicator is cleared while the transmission is locked in a forward range (lock-to-range), the transmission will remain in the forward range after the clearing procedure is completed. Neutral **must be** manually selected. |

# TROUBLESHOOTING—DIAGNOSTIC CODES PRESENT

**C. Manually Clearing Codes and Active Indicators from the Code List.** To clear active indicators or all codes:

1. Enter the diagnostic display mode.
2. Press and hold the **MODE** button for approximately three seconds until the LED indicator flashes. All active indicators are cleared. To remove all inactive codes, press and hold the **MODE** button for about ten seconds until the LED indicator flashes again. All active indicators will be cleared at ECU power down.
3. Codes that cannot be manually cleared will remain.

**D. Exiting the diagnostic display mode.** Exit the diagnostic display mode using one of the following procedures:

1. On a pushbutton shift selector, press the ↑ (Up) and ↓ (Down) arrow buttons at the same time or press any range button, **D**, **N**, or **R**. The shift (**D**, **N**, or **R**) is commanded if not inhibited by an active code.
2. On a lever shift selector, momentarily press the **DISPLAY MODE** button or move the shift lever to any shift position other than the one it was in when the diagnostic display mode was activated. If the shift is inhibited, the ECU will continue to command the current transmission range attained and the lever should be returned to its original position.
3. Wait until timeout (approximately 10 minutes) and the system will automatically return to the normal operating mode.
4. Turn off power to the ECU (turn off the vehicle engine at the ignition switch).

## 5–4. DIAGNOSTIC CODE RESPONSE

The following ECU responses to a fault provide for safe transmission operation:

- **D**o **N**ot **S**hift (DNS) Response
  - — Release lockup clutch and inhibit lockup operation.
  - — Inhibit all shifts.
  - — Turn on the **CHECK TRANS** light.
  - — Shift selector display flashes the range selected.
  - — Ignore any range selection inputs from the pushbutton or lever shift selector.
- **SOL**enoid **OFF** (SOL OFF) Response
  - — All solenoids are commanded off.

## 5–5. SHIFT SELECTOR DISPLAYS RELATED TO ACTIVE CODES

- “Cateye”—The forward slash segments and the middle horizontal segments (-/-) may be on under the following conditions:
  - — RSI link fault is active (code 23 12 or 23 14)
  - — Shift selector display line fault is active (23 16)
  - — When two COP timeouts occur within two seconds of each other (reference code 69 33)
  - — Range verification ratio test–Neutral (56 99)

# TROUBLESHOOTING—DIAGNOSTIC CODES PRESENT

- All Segments Displayed—All display segments will be illuminated if a severity 1 diagnostic code is present during initialization, or if an electrical code for any solenoid is logged before initialization completes.

## 5–6. DIAGNOSTIC CODE LIST AND DESCRIPTION

**Table 5–2. CEC2 Diagnostic Codes**

| Main Code | Sub-code | Description | CHECK TRAN Light | Inhibited Operation Description |
|---|---|---|---|---|
| 13 (pg 5–12) | 12 | ECU input voltage, low | Yes | DNS |
| | 23 | ECU input voltage, high | Yes | DNS |
| 21 (pg 5–16) | 12 | Throttle position sensor, failed low | Yes | Use throttle default values |
| | 23 | Throttle position sensor, failed high | Yes | Use throttle default values |
| 22 (pg 5–20) | 14 | Engine speed sensor reasonableness test | Yes | Use default engine speed |
| | 15 | Turbine speed sensor reasonableness test | Yes | DNS, lock in current range |
| | 16 | Output speed sensor reasonableness test | Yes | DNS, lock in current range |
| 23 (pg 5–24) | 12 | Primary shift selector or RSI link fault | Yes | Hold in last valid direction. May cause “cateye” (-/-) display. |
| | 13 | Primary shift selector mode function fault | No | Mode change not permitted |
| | 14 | Secondary shift selector or RSI link fault | Yes | Hold in last valid direction. May cause “cateye” (-/-) display. |
| | 15 | Secondary shift selector mode function fault | No | Mode change not permitted |
| | 16 | Shift Selector display line fault | Yes | None. May cause “cateye” (-/-) display. |
| 24 (pg 5–26) | 12 | Sump fluid temperature, cold | Yes | DNS, lock-to-range |
| | 23 | Sump fluid temperature, hot | Yes | No upshifts above a calibration range |
| 25 (pg 5–30) | 11 | Output speed sensor, detected at 0 output rpm, 1st | Yes | DNS, lock in current range (1st) |
| | 22 | Output speed sensor, detected at 0 output rpm, 2nd | Yes | DNS, lock in current range (2nd) |
| | 33 | Output speed sensor, detected at 0 output rpm, 3rd | Yes | DNS, lock in current range (3rd) |
| | 44 | Output speed sensor, detected at 0 output rpm, 4th | Yes | DNS, lock in current range (4th) |

# TROUBLESHOOTING—DIAGNOSTIC CODES PRESENT

**Table 5–2. CEC2 Diagnostic Codes *(cont'd)***

| Main Code | Sub-code | Description | CHECK TRAN Light | Inhibited Operation Description |
|---|---|---|---|---|
| 25 *(cont'd)* | 55 | Output speed sensor, detected at 0 output rpm, 5th | Yes | DNS, lock in current range (5th) |
| | 66 | Output speed sensor, detected at 0 output rpm, 6th | Yes | DNS, lock in current range (6th) |
| | 77 | Output speed sensor, detected at 0 output rpm, 7th | Yes | DNS, lock in current range (7th) |
| | 88 | Output speed sensor, detected at 0 output rpm, 8th | Yes | DNS, lock in current range (8th) |
| 26 (pg 5–33) | 00 | Throttle source not detected | No | Use throttle default values |
| 33 (pg 5–34) | 12 | Sump fluid temperature sensor failed low | Yes | Use default value of 93˚C (200˚F) |
| | 23 | Sump fluid temperature sensor failed high | Yes | Use default value of 93˚C (200˚F) |
| 34 (pg 5–37) | 12 | Factory calibration compatibility number wrong | Yes | DNS, SOL OFF |
| | 13 | Factory calibration fault | Yes | DNS, SOL OFF |
| | 14 | Power off fault | Yes | Use previous location, or factory calibration |
| | 15 | Diagnostic queue fault | Yes | Use previous location, or clear diagnostic queue |
| | 16 | Real time fault | Yes | DNS, SOL OFF |
| | 17 | Customer modifiable constants fault | Yes | DNS, SOL OFF |
| 35 (pg 5–38) | 00 | Power interruption (code set after power restored) | No | None (hydraulic default during interruption) |
| | 16 | Real time write interruption | Yes | DNS, SOL OFF |
| 36 (pg 5–41) | 00 | Hardware/software not compatible | Yes | DNS, SOL OFF |
| 45 (pg 5–42) | 12 | General solenoid failure—F | Yes | DNS |
| | 13 | General solenoid failure—K | Yes | DNS, Inhibit lockup |
| | 14 | General solenoid failure—B | Yes | DNS, Inhibit Reverse |
| | 15 | General solenoid failure—G | Yes | DNS |

# TROUBLESHOOTING—DIAGNOSTIC CODES PRESENT

**Table 5–2. CEC2 Diagnostic Codes *(cont'd)***

| Main Code | Sub-code | Description | CHECK TRAN Light | Inhibited Operation Description |
|---|---|---|---|---|
| 45 *(cont'd)* | 16 | General solenoid failure—E | Yes | DNS |
| | 21 | General solenoid failure—H/J | Yes | Turn off trim boost J, DNS H |
| | 22 | General solenoid failure—A | Yes | No action taken |
| | 23 | General solenoid failure—D | Yes | DNS |
| | 24 | General solenoid failure—I | Yes | No action taken |
| | 26 | General solenoid failure—C | Yes | DNS |
| 46 (pg 5–46) | 21 | Hi side overcurrent, H/J solenoid | Yes | Turn off H/J solenoid, DNS 8610, 9810 |
| | 26 | Hi side overcurrent, C, D, E solenoid circuit | Yes | Turn off C, D, E solenoids |
| | 27 | Hi side overcurrent, A, B, F, G, I, K solenoid circuit | Yes | DNS. Turn off A, B, F, G, I, K solenoids. |
| 56 (pg 5–48) | 11 | Range verification ratio test, 1st | Yes | DNS |
| | 22 | Range verification ratio test, 2nd | Yes | DNS |
| | 33 | Range verification ratio test, 3rd | Yes | DNS |
| | 44 | Range verification ratio test, 4th | Yes | DNS |
| | 55 | Range verification ratio test, 5th | Yes | DNS |
| | 66 | Range verification ratio test, 6th | Yes | DNS |
| | 77 | Range verification ratio test, 7th or R1 | Yes | DNS |
| | 88 | Range verification ratio test, 8th or R2 | Yes | DNS |
| | 99 | Neutral verification ratio test, N | Yes | DNS, "cateye" (-/-) display |
| 65 (pg 5–50) | 00 | Engine rating too high | Yes | DNS, Lock-in-neutral |
| 66 (pg 5–52) | 00 | Serial communications interface fault | No | Use default throttle values |
| 69 (pg 5–54) | 27 | ECU, inoperative A, B, F, G, I, K solenoid | Yes | DNS, SOL OFF |
| | 28 | ECU, inoperative H/J solenoid | Yes | DNS, SOL OFF |
| | 29 | ECU, inoperative C, D, E solenoid | Yes | DNS, SOL OFF |
| | 33 | ECU, Computer Operating Properly (COP) fault | Yes | Reset ECU, shutdown ECU on 2nd occurrence (power loss; hydraulic defaults). May cause "cateye" (-/-) display or all segments blank display |

# TROUBLESHOOTING—DIAGNOSTIC CODES PRESENT

**Table 5–2. CEC2 Diagnostic Codes *(cont'd)***

| Main Code | Sub-code | Description | CHECK TRAN Light | Inhibited Operation Description |
|---|---|---|---|---|
| 69 *(cont'd)* | 34 | ECU, EEPROM, fault | Yes | DNS, SOL OFF |
| | 35 | ECU, EEPROM, fault | Yes | Reset ECU |
| | 39 | Communication chip addressing error | Yes | Use defaults for J1939 data |
| | 42 | SPI output failure | No | GPO 1–8 and reverse warning inoperable |
| | 43 | SPI input failure | Yes | DNS, lock-in-range |

# CODE 13 XX—ECU INPUT VOLTAGE

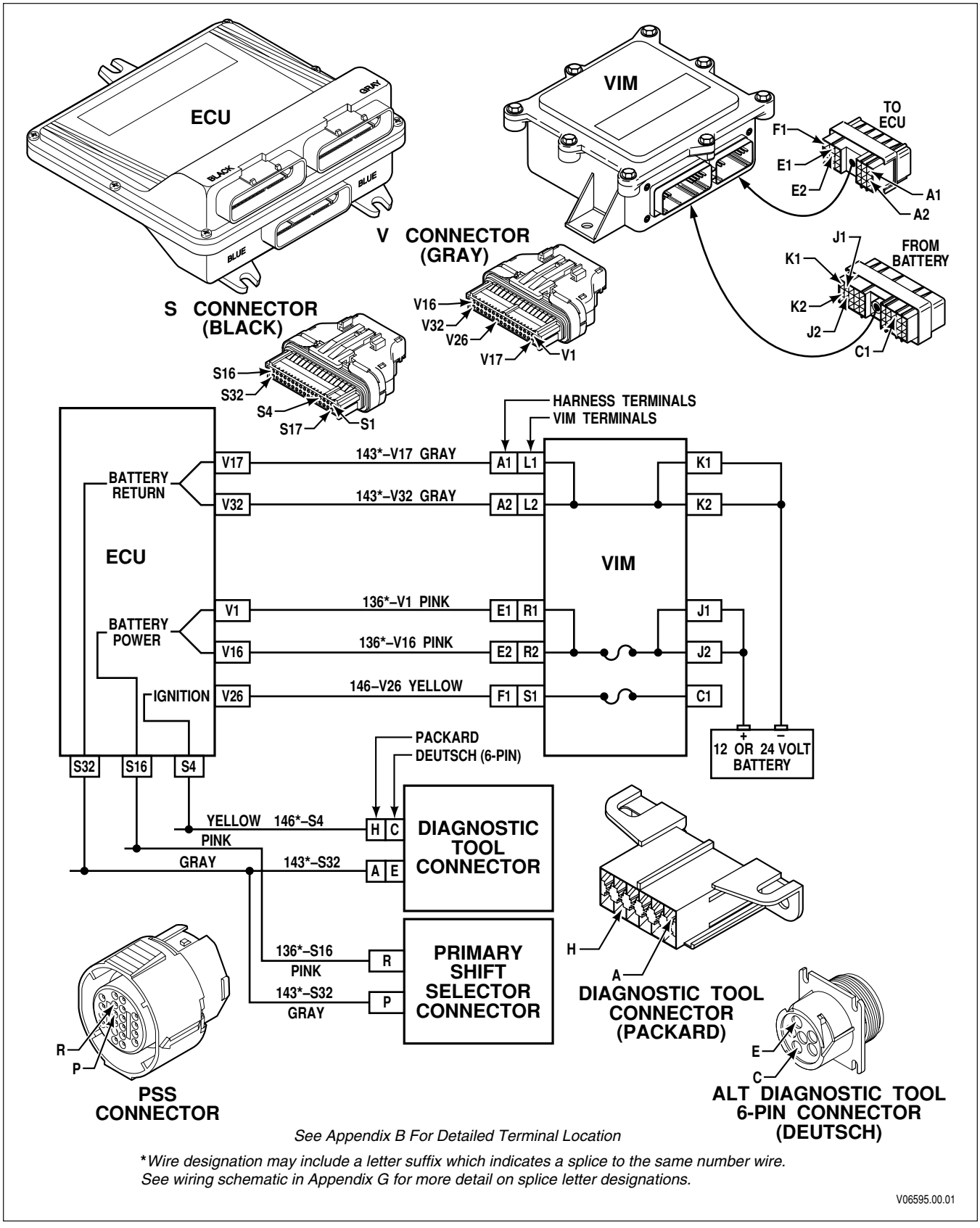



**Figure 5–1. Code 13 Schematic Drawing**

# CODE 13 XX—ECU INPUT VOLTAGE *(Figure 5–1)*

Main code 13 indicates either a high or low input voltage. Low voltage is less than 8 volts. High voltage is over 33 volts.

Common causes for a low voltage code are:

- Bad batteries
- Faulty vehicle charging system
- No dedicated power and ground connection directly to the battery or through an electronic bus bar to the battery

Common causes for the high voltage code are:

- Faulty vehicle alternator
- Faulty vehicle voltage regulator

| Main Code | Subcode | Meaning |
|---|---|---|
| 13 | 12 | Battery voltage to the ECU too low |
| 13 | 23 | Battery voltage to the ECU too high |

**A. Active Indicator Clearing Procedure:**

- Power down
- Manual
- Self-clearing

**B. Troubleshooting:**

1. Connect a diagnostic tool and turn on vehicle ignition. Select Diagnostic Data to find input voltage. Record reading.
2. Turn off vehicle ignition and remove the connectors from the ECU.
3. Test the system voltage at wire 136A and 136C, pin V1 and V16. If power is low or high at this point, and the diagnostic tool reading is also low or high, the vehicle wiring is suspect. Test for fuse problems, lack of battery-direct power and ground, faulty charging system/batteries, and loose or dirty connections (refer to Appendix A). Power may also be low or high at pins V1 and V16 (system power) if the batteries/charging system is faulty. Bad grounds may also cause incorrect input power readings.
4. If power is correct but the diagnostic tool reading indicates incorrect voltage, closely inspect terminals V1 and V16 or S16; make sure they are not corroded or deformed. Clean or replace as necessary (refer to Appendix C, Paragraph C–1).
5. If the voltage condition is intermittent, closely inspect the vehicle wiring for transmission system power and grounds. Inspect for loose, dirty, or painted connections. Inspect the VIM for loose, incorrect, or overheating relays or fuses (refer to APPENDIX E—WELDING ON VEHICLE/ VEHICLE INTERFACE MODULE). Inspect for wires that are chafed and touching other components.
6. If no other cause is found, replace the ECU. If replacing the ECU corrects the problem, reinstall the original (bad) ECU to confirm that the problem is in the ECU. If the original ECU now works,

## CODE 13 XX—ECU INPUT VOLTAGE *(Figure 5–1)*

inspect the ECU connectors for any corrosion or damage which may cause an intermittent condition. If the original problem recurs, reinstall the replacement ECU.

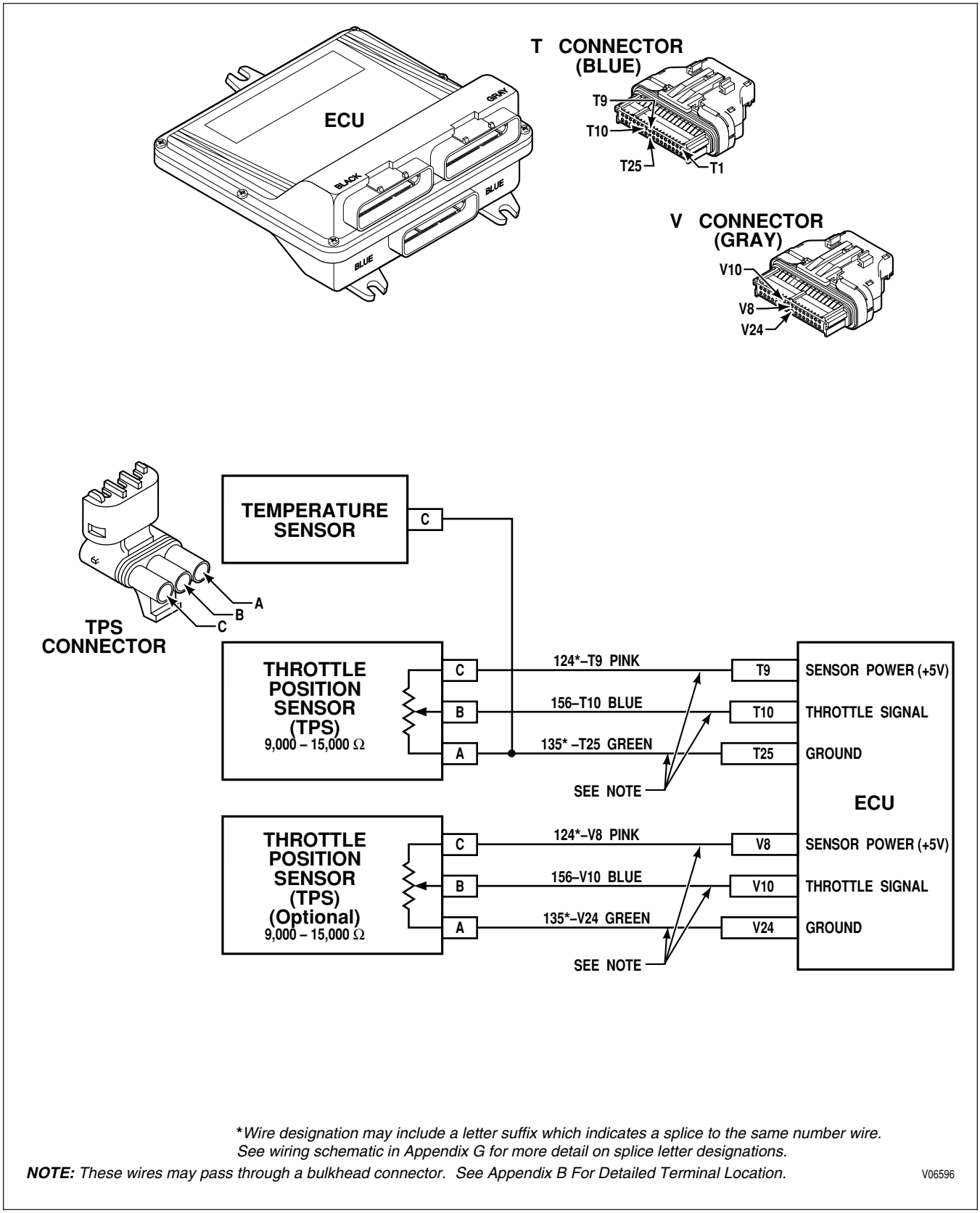
**Table 5–3. Voltage Chart**

| Voltage | Condition |
|---|---|
| 33.0<br>(High Set Point) | High Fail Limit, Set Code, DNS |
| 32.0 | Maximum Continuous ECU Voltage |
| 8.0<br>(Low Set Point) | Low Voltage Fail Limit, Set Code, DNS |
| 7.0 | Software Off (ECU loses power) |
| 4.5 | Neutral Start Off |

# TROUBLESHOOTING—DIAGNOSTIC CODES PRESENT

**NOTES**

# CODE 21 XX—THROTTLE FAULT




*****Wire designation may include a letter suffix which indicates a splice to the same number wire. See wiring schematic in Appendix G for more detail on splice letter designations.

***NOTE:*** *These wires may pass through a bulkhead connector. See Appendix B For Detailed Terminal Location.*

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**Figure 5–2. Code 21 Schematic Drawing**

## CODE 21 XX—THROTTLE FAULT *(Figure 5–2)*

The throttle position sensor (TPS) **must have been** recognized by autodetect or manually selected using Allison DOC™ For PC–Service Tool or Pro-Link® 9000 diagnostic tool (refer to the manual supplied with the diagnostic tool being used) before these codes can be logged. See Paragraph 1–9 for further information.

Main code 21 indicates the throttle position sensor has been retracted or extended by its linkage into an error zone. This may be due to a fault with the sensor, or a fault in the wiring to the sensor or to the ECU. Code 21 12 is set when the ECU receives TPS counts of 14 or less. Code 21 23 is set when the ECU senses TPS counts of 233–255. Whenever a code 21 XX condition is detected, the system uses default throttle values.

***NOTE: Code 21 XX in conjunction with code 33 XX indicates the potential loss of common ground wire 135 between the throttle and temperature sensor.***

| Main Code | Subcode | Meaning |
|---|---|---|
| 21 | 12 | Throttle position sensor failed low |
| 21 | 23 | Throttle position sensor failed high |

**A. Active Indicator Clearing Procedure:**

- Power down
- Manual
- Self-clearing

***NOTE: Before troubleshooting, read Paragraph 4–1. Also, measure the ECU input voltage.***

**B. Troubleshooting:**

1. Plug in a diagnostic tool, select Diagnostic Data, and read throttle counts and percent. If the TPS failed high (code 21 23), the problem may be toward the full throttle end of the TPS travel. If the TPS failed low (code 21 12), the problem may be at the closed throttle end of the TPS travel.

***NOTE: Code 21 12 may occur when the throttle source is J1587 or J1939 and an analog throttle source is falsely detected. This condition may be due to a problem in an unused TPS branch of a universal external harness. To prevent this occurrence, remove wire 156 from the ECU connector and insert a cavity plug in the space vacated by the wire. Be sure that the unused TPS branch is routed away from potential induced voltage sources and the connector is protected from external contamination.***

***NOTE: Code 21 12 can result when the +5V line (wire 124) which powers the analog sensor is shorted to ground. Wire 124 also powers the shift selector and is present in all three ECU connectors.***

2. If counts are high but the percentage never reaches 100 percent, TPS linkage may have bound up and overstroked the TPS to set a false 100 percent reading. After TPS overstroking ceases, the TPS will not automatically return to 100 percent. After the TPS is correctly installed and adjusted, use Allison DOC™ For PC–Service Tool or Pro-Link® 9000 diagnostic tool to reset throttle calibration or cycle the ignition 5 times to reset the 0 percent and 100 percent settings. Refer to the TPS section of this book (Appendix D) for installation and adjustment procedures.

3. If the throttle counts do not change or are erratic, test the throttle sensor wiring for opens, shorts between wires, or shorts-to-ground. Also test for correct TPS voltages using test wiring harness J 41339. If wiring problems are found, isolate and repair the fault (refer to Appendix C for repair information).

## CODE 21 XX—THROTTLE FAULT *(Figure 5–2)*

4. If the wiring is satisfactory, replace the throttle position sensor and adjust its linkage so the counts are not in the error zones (refer to Appendix D).

5. If the TPS and its linkage adjustment are correct and the wiring to the sensor is satisfactory, the condition is intermittent. Replace the sensor and properly adjust the new sensor.

6. If the condition recurs, use a spare wire, if available, or provide a new wire (St. Clair P/N 200153 may be used for this purpose) for the TPS circuit. Refer to Appendix C for connector repair information.

7. If the condition persists, replace the ECU. If replacing the ECU corrects the problem, reinstall the original (bad) ECU to confirm that the problem is in the ECU. If the original ECU now works, inspect the ECU connectors for any corrosion or damage which may cause an intermittent condition. If the original problem recurs, reinstall the replacement ECU.

***NOTE: A good throttle position sensor should have resistance of:***

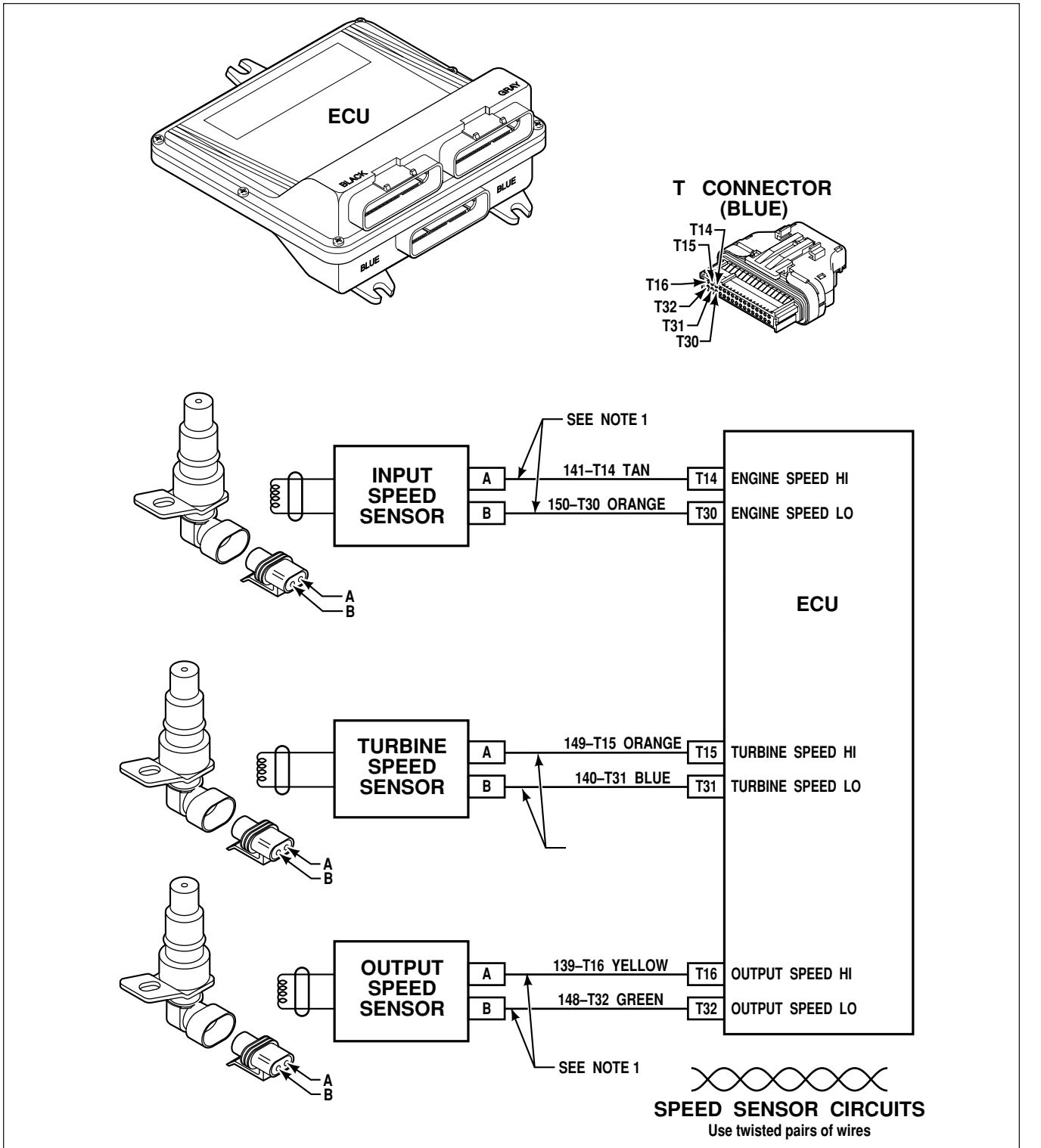
***(1) 9000–15,000 Ohms across terminals A and C.***

***(2) 500 Ohms, moving to 9000–15,000 Ohms as TPS is moved from the fully retracted to the fully extended position, measured across terminals A and B (refer to Figure 1–6).***

# TROUBLESHOOTING—DIAGNOSTIC CODES PRESENT

**NOTES**

# CODE 22 XX—SPEED SENSOR/CIRCUITRY FAULT




*See Appendix B For Detailed Terminal Location.*

***NOTE 1:*** *These wires may pass through a bulkhead connector.*

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**Figure 5–3. Code 22 Schematic Drawing**

## CODE 22 XX—SPEED SENSOR/CIRCUITRY FAULT *(Figure 5–3)*

Main code 22 indicates a fault within a speed sensor, the wiring to a speed sensor, incorrect speed sensor gap, or damaged bumps or teeth which create the speed signal. This fault is determined by the reasonableness of a speed sensor signal when compared with the other two speed sensors and the commanded range. A speed sensor will not pass the reasonableness test if there is no signal at all from that sensor when a signal should be present.

***NOTE: If the input (engine) speed sensor code (22 14) is active and a range verification test is failed, the range verification code will not be set but a DO NOT SHIFT response is commanded.***

| Main Code | Subcode | Failed Sensor |
|---|---|---|
| 22 | 14 | Input (Engine) Speed |
| 22 | 15 | Turbine Speed |
| 22 | 16 | Output Speed |

**A. Active Indicator Clearing Procedure:**

- Power down
- Manual
- Self-clearing

***NOTE: Before troubleshooting, read Paragraph 4–1. Also, measure the ECU input voltage.***

**B. Troubleshooting:**

1. Determine if the sensor is loose, missing, or disconnected. If not, disconnect the wiring harness from the sensor and measure the resistance of the sensor (see chart below). Also inspect the terminals for dirt, corrosion, or damage. If resistance is not correct, replace the sensor.

| Current Resistance (Ohms) January, 2006 | Former Resistance (Ohms) Before January, 2006 | Temp ˚F | Temp ˚C |
|---|---|---|---|
| 250 | 200 | –40 | –40 |
| 340 | 300 | 68 | 20 |
| 450 | 400 | 230 | 110 |

2. Remove the transmission harness connector from the ECU. Test the sensor circuit (in the external harness) for open wires, shorts between wires, or shorts-to-ground. Isolate and repair any faults (refer to Appendix C for repair information).
3. If no opens or shorts are found, the condition must be intermittent. Replace the sensor indicated by the trouble code. Before replacing a speed sensor, inspect the sensor for physical damage or contamination. Refer to the appropriate transmission service manual for proper replacement procedure.
4. If the condition recurs, install new wiring (twisted-pair) for the sensor circuit between the ECU and the transmission. Use St. Clair P/N 200153 Service Harness Twisted Pair for this purpose.

## CODE 22 XX—SPEED SENSOR/CIRCUITRY FAULT *(Figure 5–3)*

5. If the condition again recurs, connect the diagnostic tool and select the speed signal indicated by the trouble code. Drive the vehicle and watch the speed reading on the diagnostic tool. If the signal is erratic, the following may be inducing the erratic signal:

   - Sensor gap
   - Vehicle vibration
   - External AC signal source
   - Intermittent connector contact.

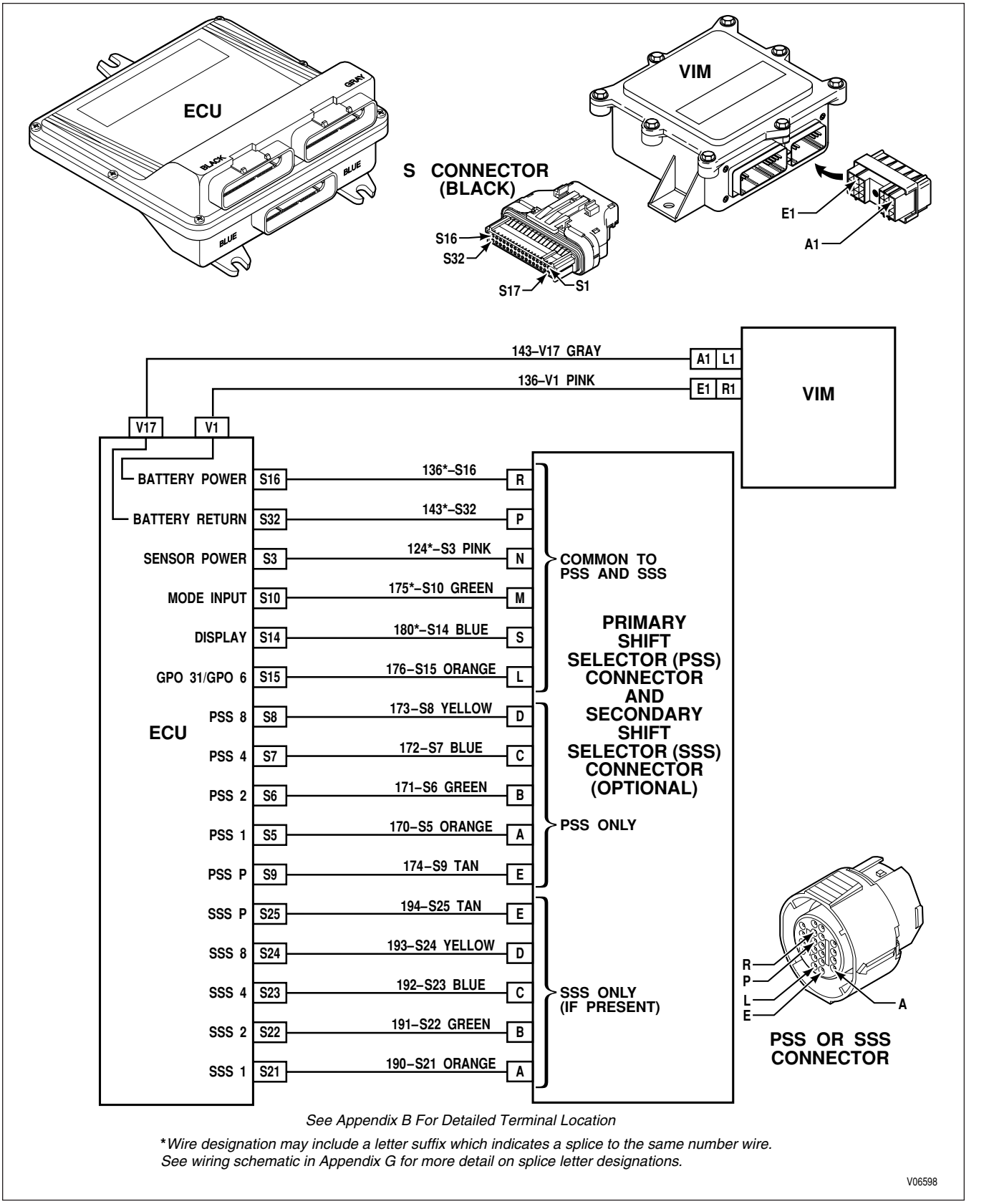
   Inspect the sensor and its surroundings for irregularities that would affect sensor gap. Isolate and correct any abnormal vehicle vibrations, particularly driveline and abnormal engine torsionals. Refer to the Off-Highway Tech Data on the Allison Transmission extranet through an Allison distributor, dealer, or OEM. Also refer to the Applications Manual, Section C. Re-test the sensor wiring for intermittent conditions (refer to Appendix A).

6. If the condition persists, replace the ECU. If replacing the ECU corrects the problem, reinstall the original (bad) ECU to confirm that the problem is in the ECU. If the original ECU now works, inspect the ECU connectors for any corrosion or damage which may cause an intermittent condition. If the original problem recurs, reinstall the replacement ECU.

# TROUBLESHOOTING—DIAGNOSTIC CODES PRESENT

**NOTES**

# CODE 23 XX—SHIFT SELECTOR




*See Appendix B For Detailed Terminal Location*

**Wire designation may include a letter suffix which indicates a splice to the same number wire. See wiring schematic in Appendix G for more detail on splice letter designations.*

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**Figure 5–4. Code 23 Schematic Drawing**

## CODE 23 XX—SHIFT SELECTOR *(Figure 5–4)*

Main code 23 indicates a fault with a shift selector or the wiring between a shift selector and the ECU.

| Main Code | Subcode | Meaning |
|---|---|---|
| 23 | 12 | Primary shift selector fault—a “cateye” (-/-) type display may occur |
| 23 | 13 | Primary shift selector mode function fault. Mode change not permitted |
| 23 | 14 | Secondary shift selector fault—a “cateye” (-/-) type display may occur |
| 23 | 15 | Secondary shift selector mode function fault. Mode change not permitted |
| 23 | 16 | Shift selector display line fault |

**A. Active Indicator Clearing Procedure:**

- Power down
- Manual
- Self-clearing

***NOTE: Before troubleshooting, read Paragraph 4–1.***

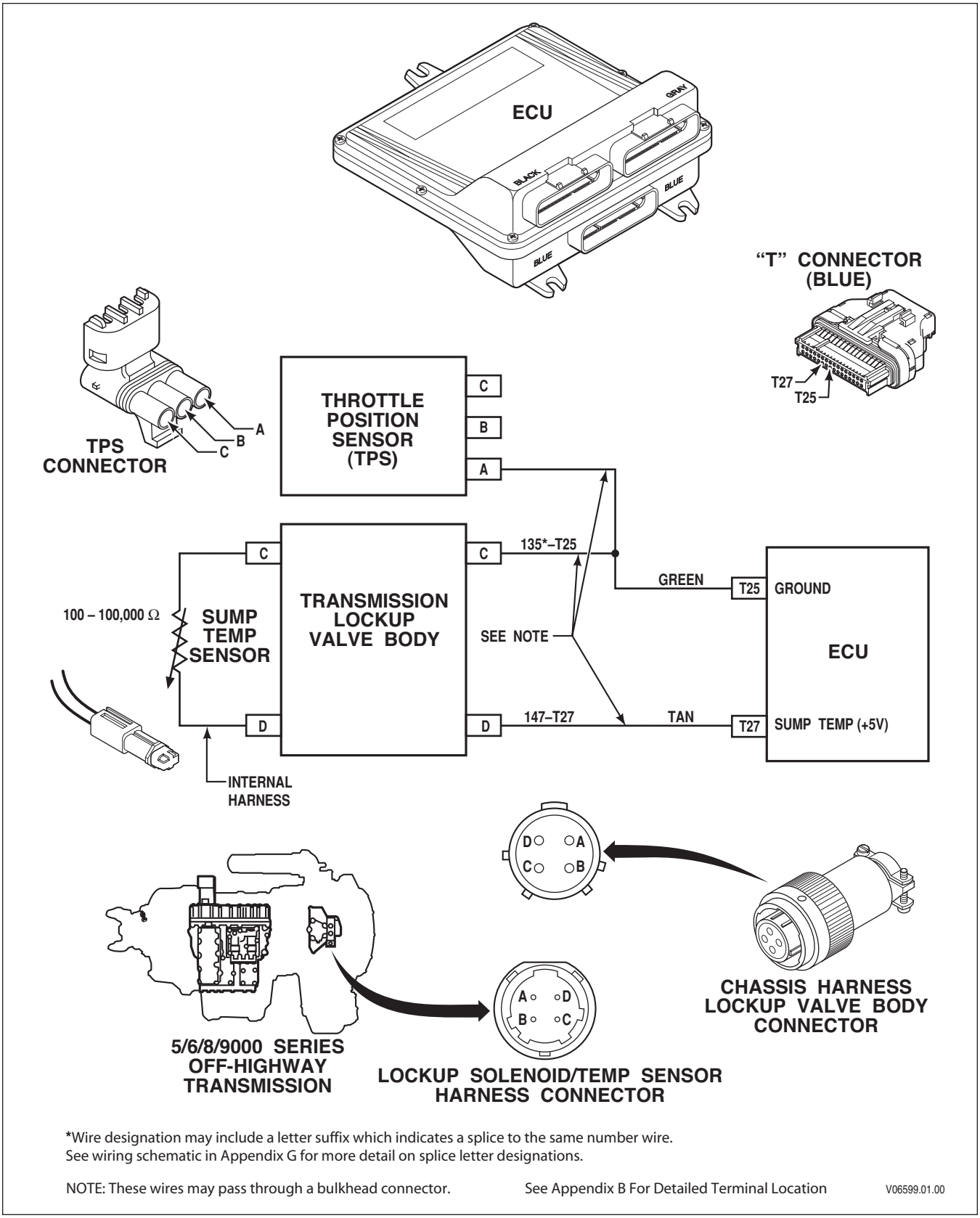
**B. Troubleshooting:**

1. Clear the active indicator for code 23 XX. If code recurs, continue to Step (2).
2. Inspect for a poor connection at the shift selector.

***NOTE: Code 23 12 can result when the +5V line (wire 124) which powers the shift selector is shorted to ground. Wire 124 also powers the TPS and is present in all three ECU connectors.***

3. Disconnect the selector “S” harness connector from the ECU and from the shift selector and test for opens, shorts, and shorts-to-ground between the shift selector and ECU (refer to Section 3). Repair as needed (refer to Appendix C).
4. If no problem is found with the shift selector connection or wiring, replace the shift selector.
5. If the condition persists, replace the ECU. If replacing the ECU corrects the problem, reinstall the original (bad) ECU to confirm that the problem is in the ECU. If the original ECU now works, inspect the ECU connectors for any corrosion or damage which may cause an intermittent condition. If the original problem recurs, reinstall the replacement ECU.

# CODE 24 XX—SUMP FLUID TEMPERATURE




*Wire designation may include a letter suffix which indicates a splice to the same number wire.
See wiring schematic in Appendix G for more detail on splice letter designations.

NOTE: These wires may pass through a bulkhead connector. See Appendix B For Detailed Terminal Location V06599.01.00

**Figure 5–5. Code 24 Schematic Drawing**

# CODE 24 XX—SUMP FLUID TEMPERATURE *(Figure 5–5)*

Main code 24 indicates the ECU has detected either a high or low fluid temperature in the transmission (via the sump temperature sensor in the internal lockup valve body harness). All shifts are inhibited when code 24 12 is set (only Neutral range operation is allowed). No upshifts are allowed above a calibration range when code 24 23 is set. All inhibits are cleared when the temperature conditions are normal. A related code is 33 12 which indicates a temperature reading outside the usable range of the sensor and indicates a probable sensor failure.

Detailed troubleshooting information for the sump thermistor is shown in Appendix L.

| Main Code | Subcode | Meaning |
|---|---|---|
| 24 | 12 | Sump fluid temperature cold |
| 24 | 23 | Sump fluid temperature hot |

**A. Active Indicator Clearing Procedure:**

- Power down
- Manual
- Self-clearing

***NOTE: Before troubleshooting, read Paragraph 4–1. Also, measure the ECU input voltage.***

**B. Troubleshooting:**

**Code 24 12:**

1. If the outside temperature is between –25˚F (–32˚C) and +20˚F (–7˚C), the ECU will allow reverse, neutral, and limited forward drive operation. Only hold override upshifts are allowed (refer to Table 5–4 on next page.) The sump **must be warmed** to an acceptable temperature to avoid logging codes and transmission diagnostic response.

***NOTE: Code 24 12 can result when the +5V line (wire 147) which powers the sump temperature sensor is shorted to ground.***

2. After allowing the temperatures to normalize, if ambient temperature does not match the sump temperature reading (test using a diagnostic tool), compare resistance versus sump fluid temperature. Refer to Appendix L. If resistance measurement is acceptable, then test the sensor wiring for opens, shorts, or shorts-to-ground.
3. If the sensor wiring is satisfactory, remove the lockup body cover and replace the temperature sensor which is in the internal lockup harness (refer to appropriate transmission service manual).
4. If the condition persists, replace the ECU. If replacing the ECU corrects the problem, reinstall the original (bad) ECU to confirm that the problem is in the ECU. If the original ECU now works, inspect the ECU connectors for any corrosion or damage that may cause an intermittent condition. If the original problem recurs, reinstall the replacement ECU.

# CODE 24 XX—SUMP FLUID TEMPERATURE

**Table 5–4. Transmission Operation as a Function of Temperature**

| Condition | ˚F | ˚C |
|---|---|---|
| Temperature sensor failed high (refer to code 33 23) | 350* | 177 |
| Hot fluid (code 24 23) maximum range limited | 250* | 121 |
| Medium cold fluid R, N, D allowed (hold override upshifts only) | 20* | –7 |
| Temperature sensor failed low (refer to code 33 12) | –55* | –48 |

**Code 24 23:**

1. Install temperature gauges for transmission temperature and engine water temperature. Drive the vehicle. Verify that the code can be reproduced and verify the reading shown on the diagnostic tool. Observe the gauges and test for hot fluid when the code is produced.
2. If the fluid is not hot when the code is produced, remove the transmission "T" harness connector at the ECU and the transmission. Test the fluid temperature sensor wiring for opens, shorts, and shorts-to-ground. Compare the resistance readings of the sensor and the actual temperature shown on the gauge with the chart information in Figure 5–6. If wiring problems or a great difference between temperature and resistance compared with the chart are found, remove the lockup valve body cover and replace the temperature sensor which is part of the internal lockup harness (refer to the appropriate transmission service manual). If wiring problems are found, repair or replace as necessary.
3. If the fluid is hot when the code is produced, observe the gauges to see if the engine became hot before the transmission. If the engine cooling system is overheating and heating the transmission, the problem is with the engine or its cooling system.
4. If the transmission became hot before the engine, allow the vehicle to idle for 3–5 minutes and determine the transmission fluid level. Correct the fluid level if necessary.
5. If no problems are found in the transmission, remove the transmission and disassemble, inspecting for causes of overheating (stuck stator, plugged orifices, dragging clutches, etc.). Refer to the appropriate transmission service manual.

### C. Resistance Vs. Temperature Characteristics

Figure 5–6 is a graph of the temperature indicated by the resistance measured in the thermistor. The thermistor has a negative temperature coefficient which means the indicated temperature increases as the measured resistance decreases within a range of about 200,000 Ohms down to about 50 Ohms.

* This is a programmed value subject to change.

# CODE 24 XX—SUMP FLUID TEMPERATURE

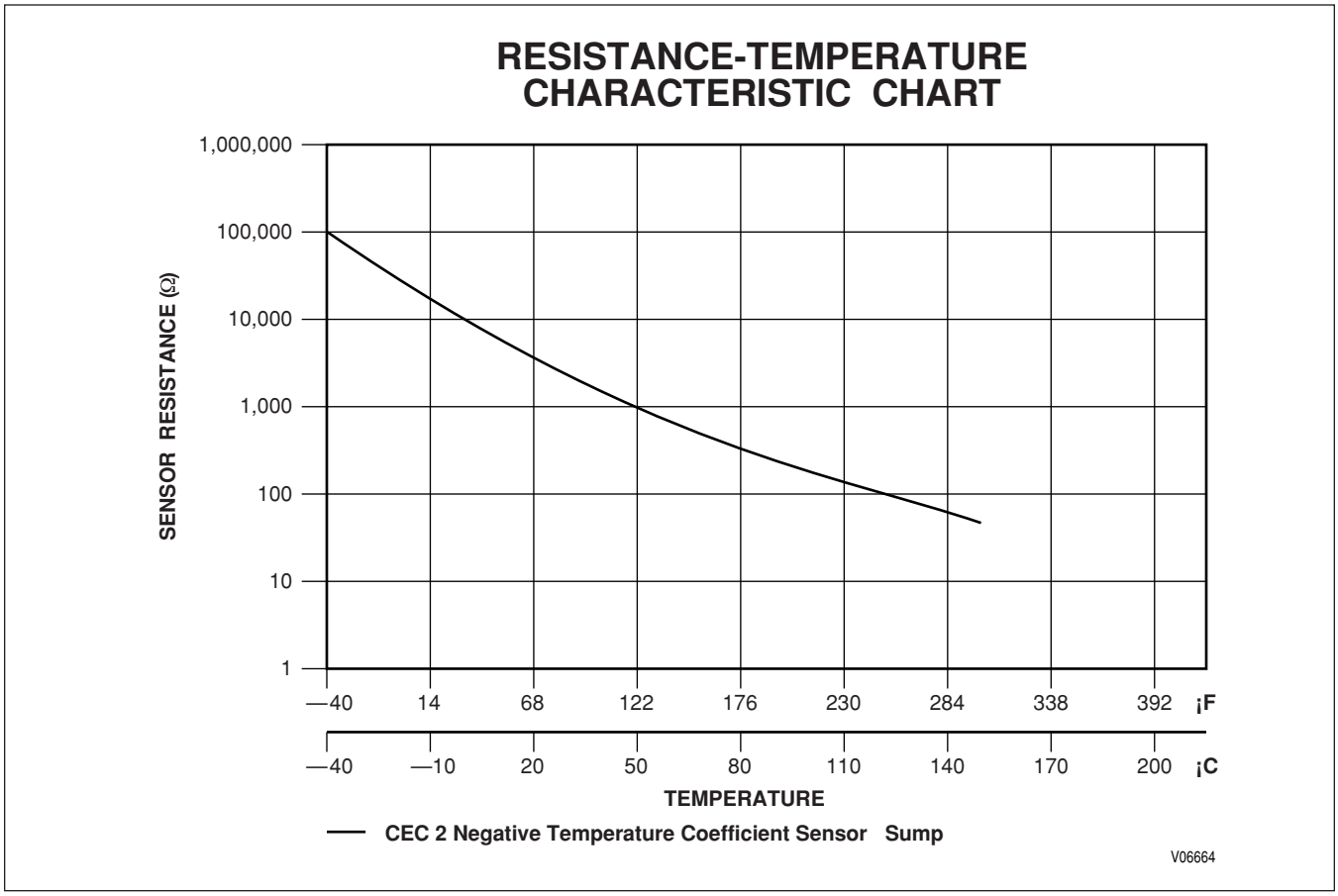



**Figure 5–6. Temperature Sensor Chart**

***NOTE:*** ***Look carefully at the graph. The scale for the resistance (on the left side) is not constant (linear). It is logarithmic which means it can display a great range of values within a small space. Each section of the graph is ten units, but the units vary from 1 to 100,000 Ohms.***

The following table shows the range of resistance values that correspond to the sump fluid temperature shown in one degree increments over the operating range of the thermistors.

**Table 5–5. Sump Thermistor—Resistance (Ohms) vs. Temperature**

| Sump Thermistor | | | | | Sump Thermistor | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Degree C | Degree F | Lo Ohms | Nominal Ohms | Hi Ohms | Degree C | Degree F | Lo Ohms | Nominal Ohms | Hi Ohms |
| –50 | –58 | 202642 | 182288 | 226183 | –11 | 12.2 | 17043 | 16424 | 17900 |
| –49 | –56.2 | 188561 | 169859 | 210206 | –10 | 14 | 16120 | 15540 | 16924 |
| –48 | –54.4 | 175549 | 158357 | 195459 | –9 | 15.8 | 15251 | 14709 | 16006 |
| –47 | –52.6 | 163519 | 147708 | 181840 | –8 | 17.6 | 14434 | 13927 | 15143 |
| –46 | –50.8 | 152390 | 137844 | 169255 | –7 | 19.4 | 13666 | 13190 | 14331 |
| –45 | –49 | 142089 | 128702 | 157621 | –6 | 21.2 | 12942 | 12497 | 13567 |
| –44 | –47.2 | 132550 | 120224 | 146860 | –5 | 23 | 12261 | 11844 | 12848 |
| –43 | –45.4 | 123711 | 112359 | 136900 | –4 | 24.8 | 11619 | 11228 | 12171 |
| –42 | –43.6 | 115517 | 105057 | 127678 | –3 | 26.6 | 11014 | 10648 | 11533 |

# CODE 24 XX—SUMP FLUID TEMPERATURE

**Table 5–5. Sump Thermistor—Resistance (Ohms) vs. Temperature *(cont'd)***

| Sump Thermistor | | | | | Sump Thermistor | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Degree C | Degree F | Lo Ohms | Nominal Ohms | Hi Ohms | Degree C | Degree F | Lo Ohms | Nominal Ohms | Hi Ohms |
| –41 | –41.8 | 107917 | 98276 | 119134 | –2 | 28.4 | 10444 | 10101 | 10932 |
| –40 | –40 | 100865 | 95956 | 107181 | –1 | 30.2 | 9906 | 9585 | 10365 |
| –39 | –38.2 | 94317 | 89769 | 100181 | 0 | 32 | 9399 | 9098 | 9831 |
| –38 | –36.4 | 88235 | 84019 | 93681 | 1 | 33.8 | 8921 | 8638 | 9329 |
| –37 | –34.6 | 82582 | 78674 | 87642 | 2 | 35.6 | 8470 | 8203 | 8854 |
| –36 | –32.8 | 77326 | 73701 | 82030 | 3 | 37.4 | 8044 | 7793 | 8407 |
| –35 | –31 | 72437 | 69073 | 76811 | 4 | 39.2 | 7643 | 7406 | 7985 |
| –34 | –29.2 | 67886 | 64764 | 71956 | 5 | 41 | 7263 | 7041 | 7587 |
| –33 | –27.4 | 63649 | 60749 | 67497 | 6 | 42.8 | 6905 | 6696 | 7211 |
| –32 | –25.6 | 59702 | 57008 | 63228 | 7 | 44.6 | 6567 | 6369 | 6855 |
| –31 | –23.8 | 56024 | 53520 | 59308 | 8 | 46.4 | 6247 | 6061 | 6519 |
| –30 | –22 | 52594 | 50266 | 55654 | 9 | 48.2 | 5944 | 5769 | 6202 |
| –29 | –20.2 | 49394 | 47229 | 52247 | 10 | 50 | 5658 | 5493 | 5902 |
| –28 | –18.4 | 46408 | 44394 | 49069 | 11 | 51.8 | 5387 | 5231 | 5618 |
| –27 | –16.6 | 43620 | 41746 | 46102 | 12 | 53.6 | 5131 | 4984 | 5349 |
| –26 | –14.8 | 41016 | 39271 | 43332 | 13 | 55.4 | 4888 | 4750 | 5095 |
| –25 | –13 | 38583 | 36958 | 40745 | 14 | 57.2 | 4659 | 4528 | 4854 |
| –24 | –11.2 | 36308 | 34794 | 38328 | 15 | 59 | 4441 | 4318 | 4626 |
| –23 | –9.4 | 34181 | 32770 | 36088 | 16 | 60.8 | 4235 | 4118 | 4410 |
| –22 | –7.6 | 32190 | 30875 | 33954 | 17 | 62.6 | 4039 | 3929 | 4205 |
| –21 | –5.8 | 30327 | 29101 | 31976 | 18 | 64.4 | 3854 | 3750 | 4011 |
| –20 | –4 | 28582 | 27439 | 30125 | 19 | 66.2 | 3678 | 3580 | 3827 |
| –19 | –2.2 | 26948 | 25881 | 28391 | 20 | 68 | 3511 | 3418 | 3653 |
| –18 | –0.4 | 25417 | 24420 | 26767 | 21 | 69.8 | 3353 | 3265 | 3487 |
| –17 | 1.4 | 23981 | 23051 | 25245 | 22 | 71.6 | 3202 | 3120 | 3330 |
| –16 | 3.2 | 22634 | 21766 | 23818 | 23 | 73.4 | 3060 | 2981 | 3180 |
| –15 | 5 | 21371 | 20660 | 22480 | 24 | 75.2 | 2924 | 2850 | 3039 |
| –14 | 6.8 | 20185 | 19427 | 21225 | 25 | 77 | 2795 | 2725 | 2904 |
| –13 | 8.6 | 19072 | 18363 | 20046 | 26 | 78.8 | 2673 | 2606 | 2776 |
| –12 | 10.4 | 18026 | 17363 | 18940 | 27 | 80.6 | 2556 | 2493 | 2655 |
| 28 | 82.4 | 2445 | 2385 | 2540 | 67 | 152.6 | 520.9 | 509.8 | 540.9 |
| 29 | 84.2 | 2340 | 2282 | 2430 | 68 | 154.4 | 502.8 | 492.1 | 522.2 |
| 30 | 86 | 2240 | 2185 | 2326 | 69 | 156.2 | 485.4 | 475.2 | 504.1 |
| 31 | 87.8 | 2144 | 2092 | 2227 | 70 | 158 | 468.7 | 458.9 | 486.8 |
| 32 | 89.6 | 2053 | 2003 | 2132 | 71 | 159.8 | 452.7 | 443.2 | 470.2 |
| 33 | 91.4 | 1967 | 1919 | 2043 | 72 | 161.6 | 437.3 | 428.2 | 454.2 |
| 34 | 93.2 | 1884 | 1839 | 1957 | 73 | 163.4 | 422.5 | 413.7 | 438.9 |
| 35 | 95 | 1806 | 1763 | 1875 | 74 | 165.2 | 408.3 | 399.8 | 424.1 |
| 36 | 96.8 | 1731 | 1690 | 1797 | 75 | 167 | 394.6 | 386.5 | 410 |

# CODE 24 XX—SUMP FLUID TEMPERATURE

**Table 5–5. Sump Thermistor—Resistance (Ohms) vs. Temperature *(cont'd)***

| Sump Thermistor | | | | | Sump Thermistor | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Degree C | Degree F | Lo Ohms | Nominal Ohms | Hi Ohms | Degree C | Degree F | Lo Ohms | Nominal Ohms | Hi Ohms |
| 37 | 98.6 | 1660 | 1620 | 1723 | 76 | 168.8 | 381.5 | 373.6 | 396.3 |
| 38 | 100.4 | 1592 | 1554 | 1653 | 77 | 170.6 | 368.9 | 361.3 | 383.2 |
| 39 | 102.2 | 1527 | 1491 | 1585 | 78 | 172.4 | 356.7 | 349.4 | 370.6 |
| 40 | 104 | 1465 | 1430 | 1521 | 79 | 174.2 | 345 | 338 | 358.5 |
| 41 | 105.8 | 1406 | 1373 | 1459 | 80 | 176 | 333.8 | 327 | 346.8 |
| 42 | 107.6 | 1349 | 1318 | 1401 | 81 | 177.8 | 322.9 | 316.4 | 335.6 |
| 43 | 109.4 | 1296 | 1265 | 1345 | 82 | 179.6 | 312.5 | 306.2 | 324.7 |
| 44 | 111.2 | 1244 | 1215 | 1291 | 83 | 181.4 | 302.5 | 296.4 | 314.3 |
| 45 | 113 | 1195 | 1167 | 1240 | 84 | 183.2 | 292.8 | 288.9 | 304.3 |
| 46 | 114.8 | 1148 | 1122 | 1192 | 85 | 185 | 283.5 | 277.8 | 294.6 |
| 47 | 116.6 | 1103 | 1078 | 1145 | 86 | 186.8 | 274.5 | 269 | 285.4 |
| 48 | 118.4 | 1060 | 1036 | 1100 | 87 | 188.6 | 265.9 | 260.5 | 276.5 |
| 49 | 120.2 | 1019 | 996.3 | 1058 | 88 | 190.4 | 257.6 | 253.3 | 268 |
| 50 | 122 | 980.3 | 958.1 | 1017 | 89 | 192.2 | 249.5 | 244.3 | 259.7 |
| 51 | 123.8 | 942.9 | 921.6 | 978.4 | 90 | 194 | 241.8 | 236.7 | 251.7 |
| 52 | 125.6 | 907.1 | 886.7 | 941.4 | 91 | 195.8 | 234.4 | 229.4 | 244 |
| 53 | 127.4 | 872.9 | 853.3 | 905.9 | 92 | 197.6 | 227.2 | 222.3 | 236.6 |
| 54 | 129.2 | 840.1 | 821.4 | 871.9 | 93 | 199.4 | 220.2 | 215.5 | 229.5 |
| 55 | 131 | 808.8 | 790.8 | 839.4 | 94 | 201.2 | 213.5 | 208.9 | 222.6 |
| 56 | 132.8 | 778.8 | 761.5 | 808.3 | 95 | 203 | 207.1 | 202.5 | 215.9 |
| 57 | 134.6 | 750 | 733.5 | 778.5 | 96 | 204.8 | 200.9 | 196.4 | 209.5 |
| 58 | 136.4 | 722.5 | 706.6 | 750 | 97 | 206.6 | 194.8 | 190.5 | 203.3 |
| 59 | 138.2 | 696.2 | 680.9 | 722.7 | 98 | 208.4 | 189 | 184.8 | 197.3 |
| 60 | 140 | 670.9 | 656.2 | 696.5 | 99 | 210.2 | 183.4 | 179.2 | 191.5 |
| 61 | 141.8 | 646.7 | 632.6 | 671.4 | 100 | 212 | 178 | 173.9 | 185.9 |
| 62 | 143.6 | 623.5 | 609.9 | 647.3 | 101 | 213.8 | 172.8 | 168.8 | 180.5 |
| 63 | 145.4 | 601.2 | 588.2 | 624.2 | 102 | 215.6 | 167.8 | 163.8 | 175.3 |
| 64 | 147.2 | 579.9 | 567.4 | 602.1 | 103 | 217.4 | 162.9 | 159 | 170.3 |
| 65 | 149 | 559.4 | 547.4 | 580.8 | 104 | 219.2 | 158.2 | 154.4 | 165.4 |
| 66 | 150.8 | 539.8 | 528.2 | 560.5 | 105 | 221 | 159.6 | 149.9 | 160.7 |
| 106 | 222.8 | 149.2 | 145.6 | 156.2 | 129 | 264.2 | 79.56 | 77.35 | 83.77 |
| 107 | 224.6 | 145 | 141.4 | 151.8 | 130 | 266 | 77.54 | 75.37 | 81.65 |
| 108 | 226.4 | 140.9 | 137.4 | 147.5 | 131 | 267.8 | 75.58 | 73.46 | 79.6 |
| 109 | 228.2 | 136.9 | 133.5 | 143.4 | 132 | 269.6 | 73.67 | 71.6 | 77.61 |
| 110 | 230 | 133.1 | 129.7 | 139.4 | 133 | 271.4 | 71.82 | 69.8 | 75.68 |
| 111 | 231.8 | 129.4 | 126.1 | 135.6 | 134 | 273.2 | 70.03 | 68.05 | 73.8 |
| 112 | 233.6 | 125.8 | 122.6 | 131.9 | 135 | 275 | 68.29 | 66.35 | 71.98 |
| 113 | 235.4 | 122.3 | 119.2 | 128.2 | 136 | 276.8 | 66.6 | 64.7 | 70.21 |
| 114 | 237.2 | 118.9 | 115.9 | 124.8 | 137 | 278.6 | 64.96 | 63.11 | 68.5 |

# CODE 24 XX—SUMP FLUID TEMPERATURE

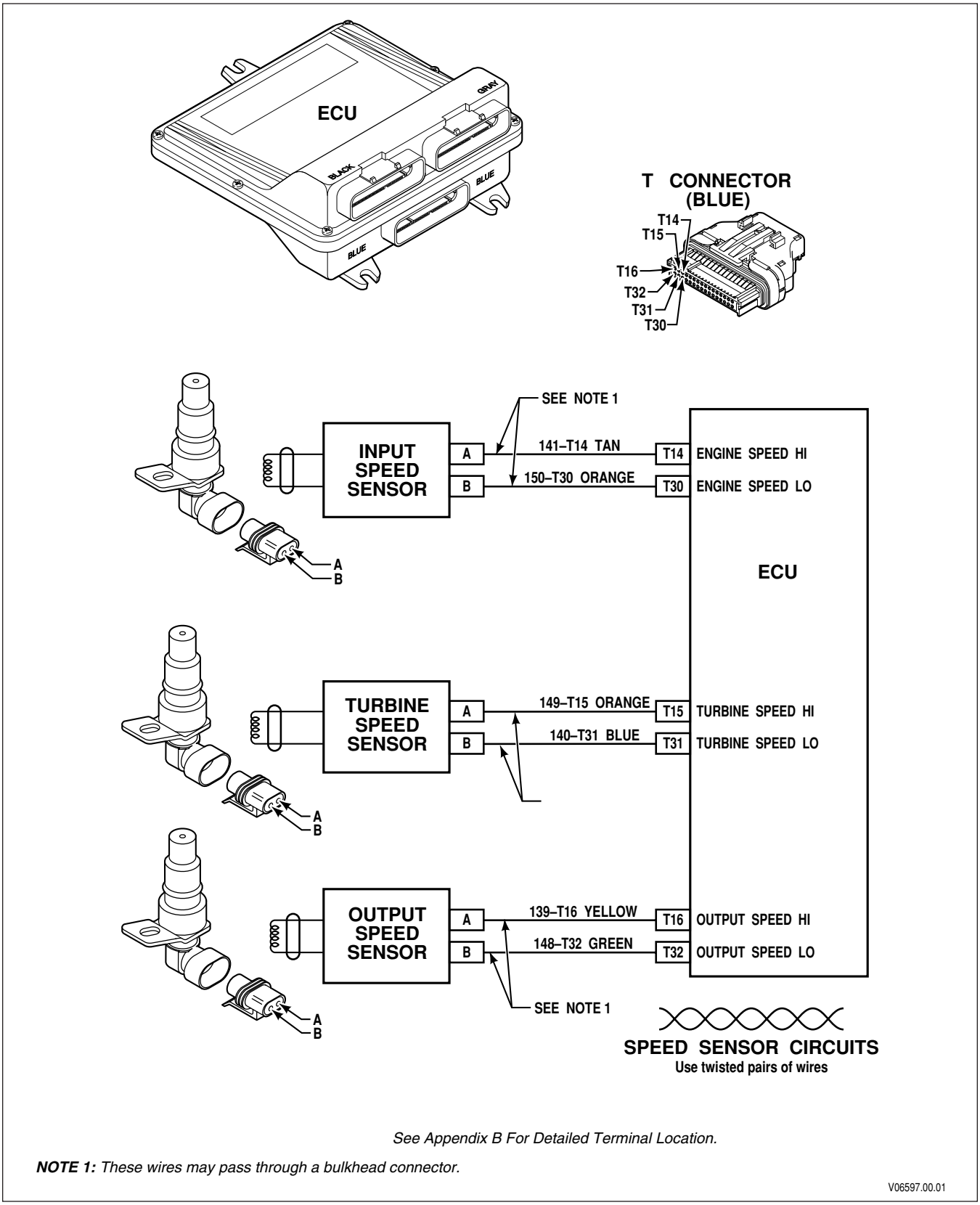
**Table 5–5. Sump Thermistor—Resistance (Ohms) vs. Temperature *(cont'd)***

| Sump Thermistor | | | | | Sump Thermistor | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Degree C** | **Degree F** | **Lo Ohms** | **Nominal Ohms** | **Hi Ohms** | **Degree C** | **Degree F** | **Lo Ohms** | **Nominal Ohms** | **Hi Ohms** |
| 115 | 239 | 115.7 | 112.7 | 121.4 | 138 | 280.4 | 63.37 | 61.56 | 66.83 |
| 116 | 240.8 | 112.5 | 109.6 | 118.1 | 139 | 282.2 | 61.82 | 60.05 | 65.21 |
| 117 | 242.6 | 109.5 | 106.6 | 114.9 | 140 | 284 | 60.32 | 58.59 | 63.64 |
| 118 | 244.4 | 106.5 | 103.7 | 111.9 | 141 | 285.8 | 58.86 | 57.17 | 62.11 |
| 119 | 246.2 | 103.7 | 100.91 | 108.9 | 142 | 287.6 | 57.45 | 55.79 | 60.63 |
| 120 | 248 | 100.9 | 98.2 | 106 | 143 | 289.4 | 56.07 | 54.45 | 59.18 |
| 121 | 249.8 | 98.23 | 95.58 | 103.2 | 144 | 291.2 | 54.73 | 53.15 | 57.78 |
| 122 | 251.6 | 95.63 | 93.04 | 100.5 | 145 | 293 | 53.43 | 51.89 | 56.42 |
| 123 | 253.4 | 93.12 | 90.58 | 97.9 | 146 | 294.8 | 52.17 | 50.66 | 55.09 |
| 124 | 255.2 | 90.68 | 88.2 | 95.36 | 147 | 296.6 | 50.94 | 49.47 | 53.81 |
| 125 | 257 | 88.32 | 85.89 | 92.9 | 148 | 298.4 | 49.75 | 48.31 | 52.55 |
| 126 | 258.8 | 86.03 | 83.65 | 90.51 | 149 | 300.2 | 48.59 | 47.18 | 51.34 |
| 127 | 260.6 | 83.8 | 81.49 | 88.19 | 150 | 302 | 47.46 | 46.09 | 50.15 |
| 128 | 262.4 | 81.65 | 79.38 | 85.95 | — | — | — | — | — |

# TROUBLESHOOTING—DIAGNOSTIC CODES PRESENT

**NOTES**

# CODE 25 XX—OUTPUT SPEED SENSOR, DETECTED AT ZERO SPEED, X RANGE




*See Appendix B For Detailed Terminal Location.*

***NOTE 1:*** *These wires may pass through a bulkhead connector.*

V06597.00.01

**Figure 5–7. Code 25 Schematic Drawing**

# CODE 25 XX—OUTPUT SPEED SENSOR, DETECTED AT ZERO SPEED, X RANGE *(Figure 5–7)*

Main code 25 occurs if the output speed sensor reports a zero speed reading while both engine and turbine speeds are approximately equal, turbine speed is above a calibration value, and neutral is not selected or commanded. Main code 25 indicates either the output speed sensor has failed or the required oncoming clutch or clutches did not come on. Code 25 11 can be generated by a false turbine speed reading. This may be due to crosstalk between solenoid and turbine speed sensor circuits caused by direct wire-to-wire short or by water in the electrical connectors. See Section 4 for corrective action.

***NOTE: If code 25 XX is in memory at ECU initialization (ignition on), all display segments are illuminated.***

| Main Code | Subcode | Meaning |
|---|---|---|
| 25 | 11 | Output speed sensor, detected at zero speed, 1st range |
| 25 | 22 | Output speed sensor, detected at zero speed, 2nd range |
| 25 | 33 | Output speed sensor, detected at zero speed, 3rd range |
| 25 | 44 | Output speed sensor, detected at zero speed, 4th range |
| 25 | 55 | Output speed sensor, detected at zero speed, 5th range |
| 25 | 66 | Output speed sensor, detected at zero speed, 6th range |
| 25 | 77 | Output speed sensor, detected at zero speed, 7th range |
| 25 | 88 | Output speed sensor, detected at zero speed, 8th range |

**A. Active Indicator Clearing Procedure:**

- Power down
- Manual
- Self-clearing

***NOTE: Before troubleshooting, read Paragraph 4–1. Also, measure battery and ECU input voltages.***

***NOTE: Intermittent connections or lack of battery-direct power and ground connections can cause this and other codes.***

**B. Troubleshooting:**

1. Determine transmission fluid level to be sure it is correct.
2. Determine if code 22 16 is present. If code 22 16 is in the code list, go to code 22 XX section and follow troubleshooting steps for code 22 16.
3. Connect the Allison DOC™ For PC–Service Tool or Pro-Link® 9000 diagnostic tool with ignition on, engine off, and determine if there are turbine speed indications. If turbine speed is indicated, refer to Paragraph 4–2 for corrective action.
4. This code requires accurate output and turbine speed readings. If there were no transmission problems detected, use the diagnostic tool and watch the speed readings for noise (erratic signals) from low speed to high speed in the range indicated by the code.
5. If a noisy sensor is found, measure the sensor resistance (refer to the following sensor resistance chart) and test its wiring for opens, shorts, and shorts-to-ground (refer to code 22 XX). Also closely inspect the terminals in the connectors for corrosion, contamination, or damage. Be sure the wiring to the sensors is a properly twisted wire pair. Remove sensor and inspect for damage at the tone wheel end. Inspect for looseness of the tone wheel. Refer to the appropriate service manual if repair of a loose tone wheel is necessary. Replace the sensor if it is damaged or if its

## CODE 25 XX—OUTPUT SPEED SENSOR, DETECTED AT ZERO SPEED, X RANGE *(Figure 5–7)*

resistance is incorrect (refer to appropriate service manual for proper procedure) and isolate and repair any noted wiring problems. (Use St. Clair P/N 200153 Service Harness Twisted Pair for this procedure.)

| Current Resistance (Ohms) January, 2006 | Former Resistance (Ohms) Before January, 2006 | Temp ˚F | Temp ˚C |
|---|---|---|---|
| 250 | 200 | –40 | –40 |
| 340 | 300 | 68 | 20 |
| 450 | 400 | 230 | 110 |

6. If no apparent cause for the code can be located, replace the turbine and output speed sensors. Refer to the appropriate transmission service manual for proper procedure.
7. If the condition persists, replace the ECU. If replacing the ECU corrects the problem, reinstall the original (bad) ECU to confirm that the problem is in the ECU. If the original ECU now works, inspect the ECU connectors for any corrosion or damage which may cause an intermittent condition. If the original problem recurs, reinstall the replacement ECU.
8. If the output speed sensor and wiring are satisfactory, install pressure gauges into the appropriate clutch pressure taps (refer to appropriate transmission service manual) and make the shift again. See if the clutches have low or no pressure.
9. If a clutch is leaking pressure, remove the valve body and check for damaged valve body gaskets and stuck or sticky valves. If no problems are found, replace the solenoids for the clutches used in the range indicated by the code. Refer to the appropriate transmission service manual for replacement procedure.
10. If, after detecting leaking pressure and replacing solenoids, the problem persists, inspect clutch or piston seals for wear. Remove the transmission and repair or replace as necessary (refer to the proper transmission service manual).

# CODE 26 XX—THROTTLE SOURCE NOT DETECTED

Main code 26 occurs when the ECU has not detected a throttle source. This is a new code related to the autodetect feature which is described in Paragraph 1–9.

| Main Code | Subcode | Meaning |
|---|---|---|
| 26 | 00 | Throttle source not detected |

Code 26 00 means that the ECU has not detected the presence of engine throttle data or analog circuitry. For details about autodetect, refer to Paragraph 1–9. For information about the use of Allison DOC™ For PC–Service Tool, refer to Allison Transmission publication GN3433EN, User Guide or Appendix J. For information about the use of Pro-Link® 9000 diagnostic tool, refer to the User's Manual, GN2928EN, or Appendix J.

## A. Active Indicator Clearing Procedure

- Power down
- Manual

## B. Troubleshooting

When code 26 00 is logged and an analog TPS is known to be installed, refer to code 21 XX for troubleshooting steps. If a J1587 or J1939 throttle signal is used, refer to code 66 00 for troubleshooting steps.

## C. Autodetect Feature

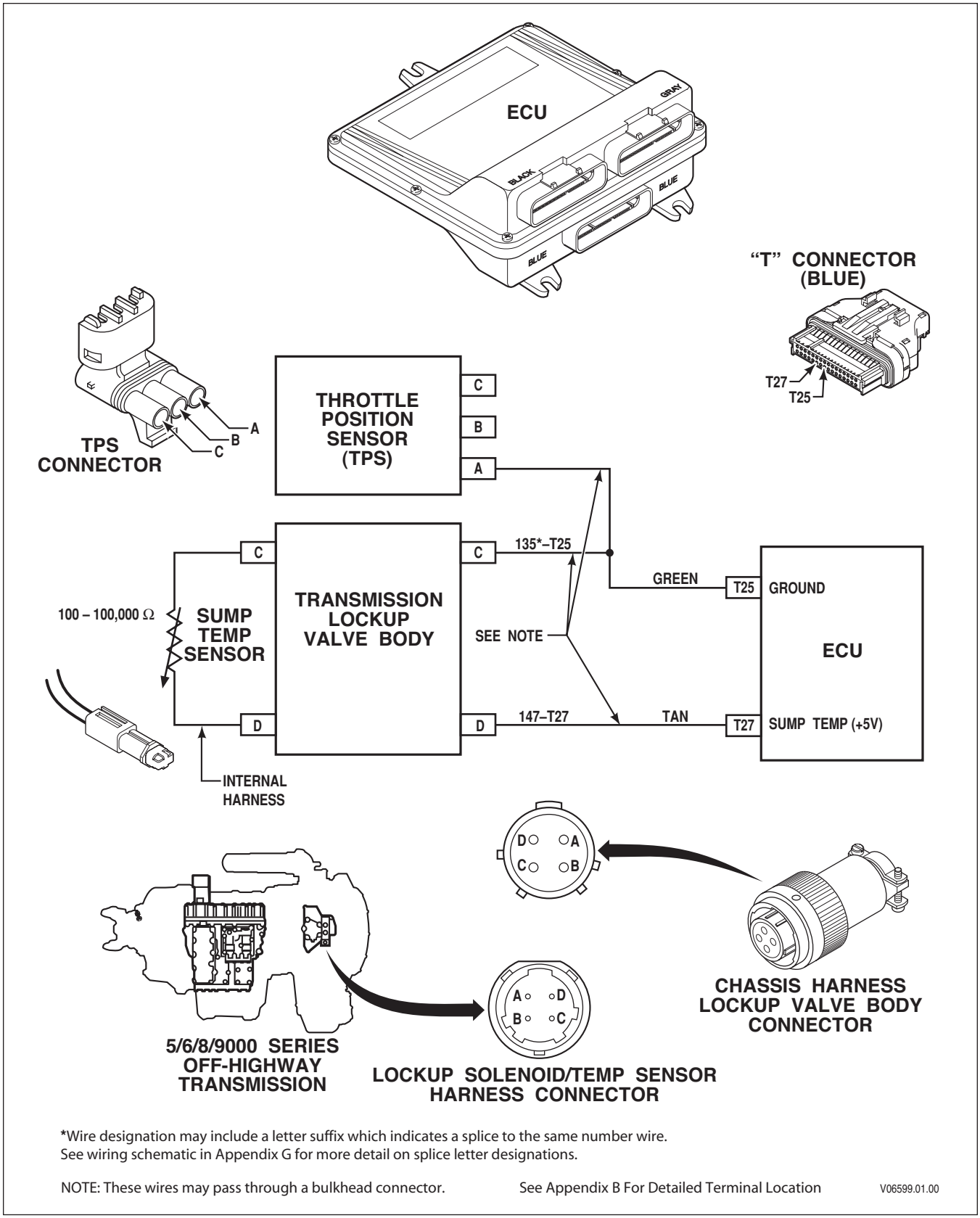
Autodetect is active on the first 10* engine starts. Autodetect takes place within the first 5–25* seconds of each engine start monitored. For CEC2, autodetect searches for the presence of a throttle information source. Autodetect searches for a TPS (analog) source or a data link source via J1939 or J1587.

Even after autodetect has been completed, it can be reset to monitor an additional group of engine starts. Reset may be necessary if a device known to be present is not detected or if an autodetectable component or sensor was added after the initial vehicle build. Reset is accomplished by using the Allison DOC™ For PC–Service Tool or Pro-Link® 9000 diagnostic tool. If using the CEC2 compatible Pro-Link® 9000 diagnostic tool, select "RESET AUTODETECT." The Allison DOC™ For PC–Service Tool or CEC2 Pro-Link® diagnostic tool can also be used to override autodetect and manually enter the component or sensor to be recognized by the ECU by changing appropriate "customer modifiable constants". The throttle source is the only customer modifiable constant (CMC) that is autodetected. Other CMCs can be changed at any time and are not related to autodetect. Consult the Pro-Link® 9000 diagnostic tool manual for detailed instructions related to CEC2 "customer modifiable constants." Additional details for the autodetectable throttle feature is given below.

Whenever autodetect is functioning and no throttle source is found, a code 26 00 is logged. If a datalink throttle source (J1939 or J1587) is detected, autodetect stops looking for that function. However, if no analog throttle source was detected prior to engine start 10*, autodetect continues for engine starts 10* through a calibration number. Autodetect for analog throttle stops as soon as a device is detected or when the calibration number of starts is reached. If an analog throttle source is known to be present, but is not detected, troubleshooting of the analog throttle circuit is required. After the analog throttle circuit is repaired, reset autodetect or manually select the analog throttle function using Allison DOC™ For PC–Service Tool or Pro-Link® diagnostic tool. An engine throttle source **must be** present.

* This is a programmed value subject to change.

# CODE 33 XX—SUMP FLUID TEMPERATURE SENSOR




*Wire designation may include a letter suffix which indicates a splice to the same number wire.
See wiring schematic in Appendix G for more detail on splice letter designations.

NOTE: These wires may pass through a bulkhead connector. See Appendix B For Detailed Terminal Location V06599.01.00

**Figure 5–8. Code 33 Schematic Drawing**

## CODE 33 XX—SUMP FLUID TEMPERATURE SENSOR *(Figure 5–8)*

Detailed troubleshooting information for the sump temperature thermistor is shown in Figure 5–9.

Main code 33 indicates the sump temperature sensor is providing a signal outside the usable range of the ECU. This code indicates the sensor failed showing abnormally high or low temperature readings. Main code 33 can be caused by a component or circuit failure or by extremely high or low temperatures. There are no operational inhibits related to main code 33. The ECU assumes a hardware failure and that transmission temperatures are normal (200ºF; 93ºC). Temperatures above or below normal may cause inhibited range operation.

***NOTE: Code 33 23 in conjunction with code 21 23 indicates the loss of common ground (wire 135) between the throttle and temperature sensors.***

| Main Code | Subcode | Meaning |
|---|---|---|
| 33 | 12 | Sump oil temperature sensor failed low (–55ºF; –48ºC) |
| 33 | 23 | Sump oil temperature sensor failed high (350ºF; 177ºC) |

**A. Active Indicator Clearing Procedure:**

- Power down
- Manual
- Self-clearing

***NOTE: Before troubleshooting, read Paragraph 4–1. Also, determine the transmission fluid level.***

**B. Troubleshooting:**

***NOTE: Code 33 12 can be caused when the +5V power line (wire 147) is shorted to ground or open.***

1. If possible, measure the sump temperature using the fastest sample rate available on the Allison DOC™ For PC–Service Tool or Pro-Link® 9000 diagnostic tool. This is necessary to catch momentary changes due to an intermittent open or short to ground. If Allison DOC™ For PC–Service Tool or Pro-Link® 9000 diagnostic tool is not available, use the shift selector display to determine if the code is active (refer to Paragraph 5–2). Disconnect the transmission "T" harness at the ECU and check resistance of the sensor and compare with Figure 5–9.
2. If Step (1) reveals that the extreme temperature indication is no longer present, the temperature limit could have been reached due to operational or ambient temperature extremes. Also, you may be experiencing an intermittent problem and the code will not be active. Proceed cautiously, it is unlikely there is a sensor hardware fault.
3. Disconnect the external harness at the transmission. Inspect the connectors and terminals for dirt, corrosion, or damage. Clean or replace as necessary.
4. Test the sensor wires in the external harness for opens (code 33 23), shorts between wires, or shorts-to-ground (code 33 12—refer to Section 4). If wiring problems are found, isolate and repair as described in Appendix C, in this manual.
5. Inspect for chafing of the sensor wires. Eliminate the chafe point. If no chafe point is found, replace the sensor (refer to Paragraph 1–3 or Appendix C in this manual or the appropriate service manual for the transmission being serviced).

## CODE 33 XX—SUMP OIL TEMPERATURE SENSOR *(Figure 5–8)*

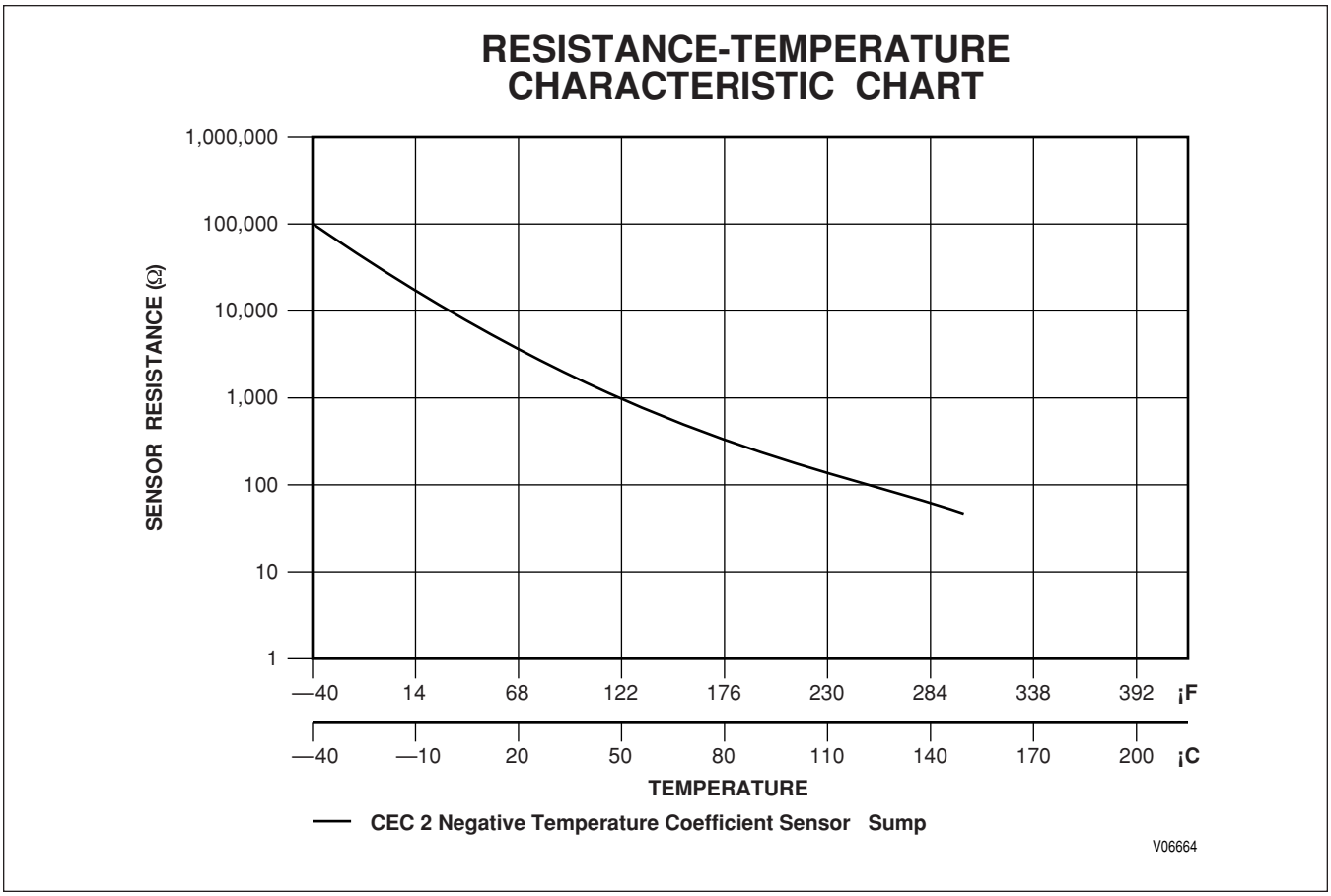



**Figure 5–9. Temperature Sensor Chart**

6. If the problem recurs, use a spare wire, if available, or provide a new wire (St. Clair P/N 200153 may be used for this purpose) for the temperature sensor circuit.
7. If the condition persists, replace the ECU. If replacing the ECU corrects the problem, reinstall the original (bad) ECU to confirm that the problem is in the ECU. If the original ECU now works, inspect the ECU connectors for any corrosion or damage which may cause an intermittent condition. If the original problem recurs, reinstall the replacement ECU.

# CODE 34 XX—CALIBRATION COMPATIBILITY OR CHECKSUM FAULT

Main code 34 indicates there is a problem with the calibration.

| Main Code | Subcode | Meaning |
|---|---|---|
| 34 | 12 | Factory calibration compatibility number wrong |
| 34 | 13 | Factory calibration checksum |
| 34 | 14 | Power off block checksum |
| 34 | 15 | Diagnostic queue block checksum |
| 34 | 16 | Real-time block checksum |
| 34 | 17 | Customer modifiable constants checksum |

**A. Active Indicator Clearing Procedure:**

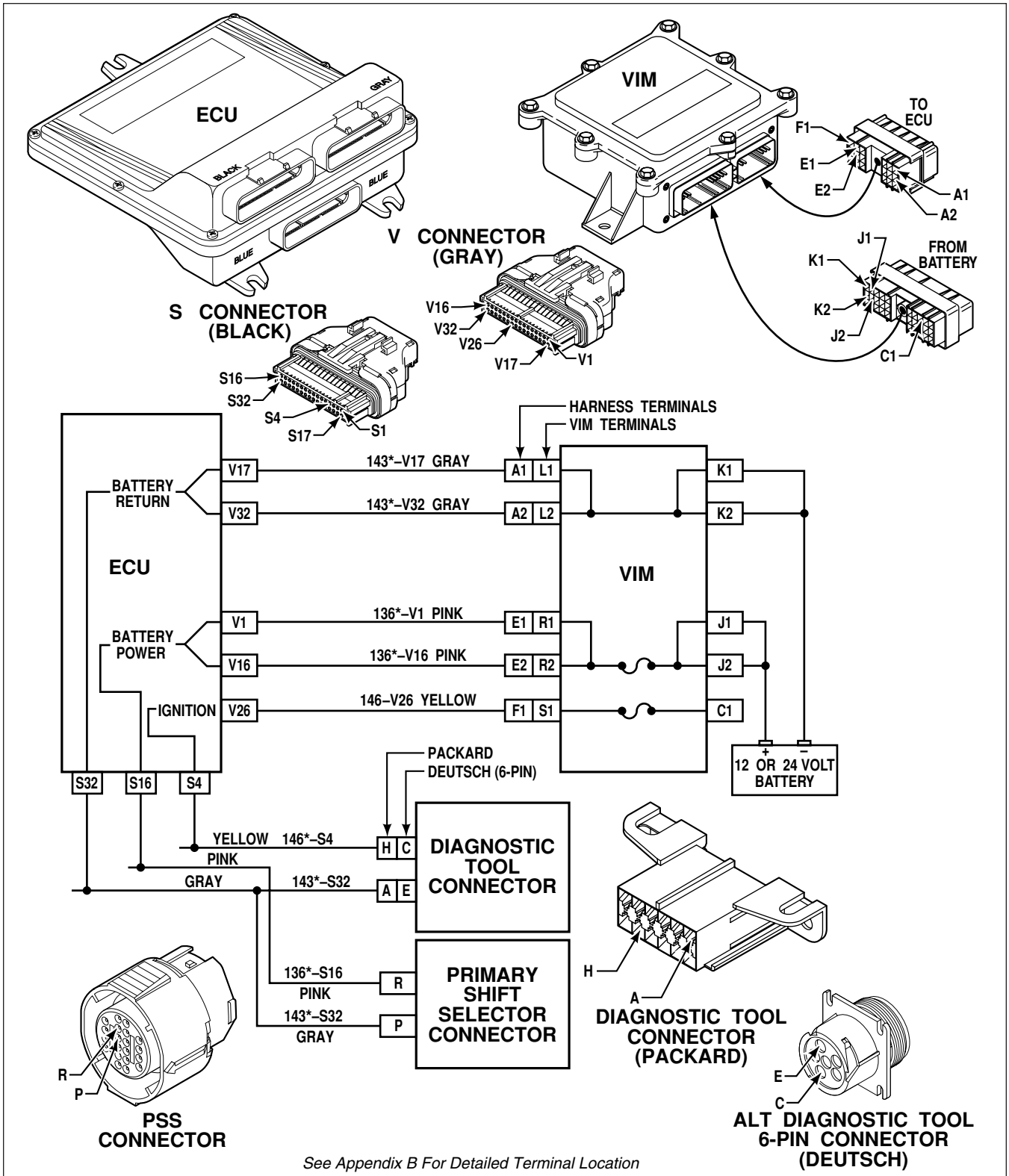
- Power down

***NOTE:*** ***Copying the current calibration from the ECU and reloading it will not correct the fault. The calibration must be downloaded directly from PCCS.***

**B. Troubleshooting:**

1. If the code set is 34 14 and it occurs in conjunction with code 35 00 (Power Interruption), proceed to find the cause for code 35 00 and correct it.
2. After the cause for code 35 00 has been corrected, drive the vehicle to see if code 34 14 recurs. If code 34 14 recurs, proceed to Step (3).
3. Reprogram the correct calibration. Contact Allison Transmission to do recalibration. Be certain the calibration and the software level are compatible.
4. If the code recurs after reprogramming, replace the ECU.
5. If the code set is 34 17, reprogram the GPI/GPO package after re-calibration of the ECU.

# CODE 35 XX—POWER INTERRUPTION




*See Appendix B For Detailed Terminal Location*

**Wire designation may include a letter suffix which indicates a splice to the same number wire.*
*See wiring schematic in Appendix G for more detail on splice letter designations.*

V06595.00.01

**Figure 5–10. Code 35 Schematic Drawing**

## CODE 35 XX—POWER INTERRUPTION *(Figure 5–10)*

Main code 35 indicates the ECU has detected a complete power loss before the ignition was turned off or before ECU shutdown is completed. When this happens, the ECU is not able to save the current operating parameters in memory before turning itself off.

| Main Code | Subcode | Meaning |
|---|---|---|
| 35 | 00 | Power interruption. (Not an active code; only appears after power is restored.) During power interruption, **CHECK TRANS** light is not illuminated and the transmission will not shift. |
| 35 | 16 | Real-time write interruption. (Power interruption at the same time the ECU is recording a critical code to the real-time section.) |

**A. Active Indicator Clearing Procedure:**

- Power down
- Manual—except code 35 16

***NOTE: Before troubleshooting, read Paragraph 4–1. Also, measure battery and ECU input voltages.***

**B. Troubleshooting:**

1. If the vehicle has a master switch controlling battery power to the ECU and an ignition switch, turning the master switch off before turning the ignition switch off can cause this code. Turning the master switch off before ECU shutdown is completed will also cause this code. No troubleshooting is necessary.
2. If improper switch sequencing is not the cause, test ECU power and ground for opens, shorts, and shorts-to-ground. Not using battery-direct power and battery ground connections can cause this code. A defective charging system, or open battery fuse or fusible link can also cause this code. The battery fuse or fusible link may be at the battery or in the VIM. Dirty, corroded, or painted power and ground connections can also cause this code.
3. If all system power and ground connections are satisfactory and the problem persists, replace the ECU. If replacing the ECU corrects the problem, reinstall the original (bad) ECU to confirm that the problem is in the ECU. If the original ECU now works, inspect the ECU connectors for any corrosion or damage which may cause an intermittent condition. If the original problem reoccurs, reinstall the replacement ECU.

# CODE 36 XX—HARDWARE AND SOFTWARE NOT COMPATIBLE

Main code 36 indicates the system has detected a mismatch between the ECU hardware and the ECU software.

| Main Code | Subcode | Meaning |
|---|---|---|
| 36 | 00 | Mismatch between ECU hardware and software |

**A. Active Indicator Clearing Procedure:**

- Power down

**B. Troubleshooting:**

Correction for code 36 00 requires the installation of software that is compatible with the ECU hardware involved. If a different calibration is required, update the ECU hardware to be compatible.

# TROUBLESHOOTING—DIAGNOSTIC CODES PRESENT

**NOTES**

# CODE 45 XX—GENERAL SOLENOID FAILURE

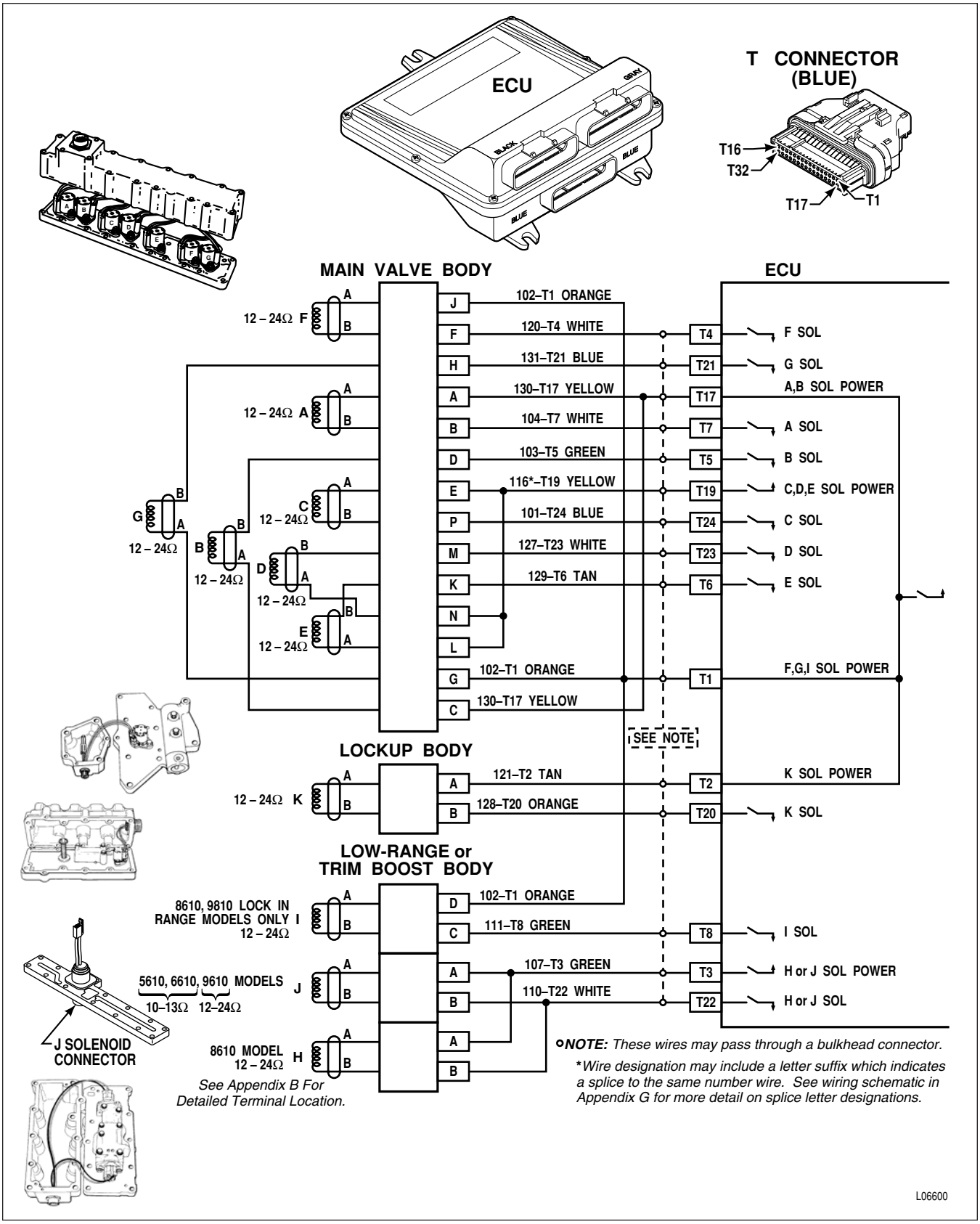



**Figure 5–11. Code 45 Schematic Drawing**

# CODE 45 XX—GENERAL SOLENOID FAILURE *(Figure 5–11)*

Main code 45 indicates the ECU has detected either an open circuit condition in a solenoid coil or the wiring to that solenoid. The **DO NOT SHIFT** response is activated when some subcodes are detected and the **CHECK TRANS** light is illuminated.

| Main Code | Subcode | Meaning |
|---|---|---|
| 45 | 12 | General Failure, F Solenoid Circuit |
| 45 | 13 | General Failure, K Solenoid Circuit |
| 45 | 14 | General Failure, B Solenoid Circuit |
| 45 | 15 | General Failure, G Solenoid Circuit |
| 45 | 16 | General Failure, E Solenoid Circuit |
| 45 | 21 | General Failure, H/J Solenoid Circuit |
| 45 | 22 | General Failure, A Solenoid Circuit |
| 45 | 23 | General Failure, D Solenoid Circuit |
| 45 | 24 | General Failure, I Solenoid Circuit |
| 45 | 26 | General Failure, C Solenoid Circuit |

**A. Active Indicator Clearing Procedure:**

- Power down
- Manual

***NOTE: Intermittent connections or lack of battery-direct power and ground connections may cause this and other codes.***

***NOTE: Before troubleshooting, read Paragraph 4–1. Also, measure battery and ECU input voltages.***

## PROBING THE CONNECTOR

When testing the control system with the internal harness connected, the resistance of each solenoid can be checked using a VOM.

**B. Troubleshooting:**

1. Inspect the valve body connector and make sure it is tightly connected. Clean or replace as necessary (Appendix C).

2. If the connector is connected, clean, and not damaged, test the solenoid circuit in the valve body for opens. Refer to the system schematic and/or chart to identify wires in the internal harness which are connected. If the open circuit is found, replace the faulty component (refer to the appropriate transmission service manual), and eliminate the open. The fault may be in the solenoid itself.

3. If the open is not found at the transmission connector, disconnect the transmission harness connector at the ECU and inspect the terminals in the connector and the ECU for damage or contamination. Clean or replace as necessary. If the terminals are satisfactory, test the wires of the solenoid circuit in the transmission harness for continuity. If the open is found in one of the wires, isolate and repair it. If this is not feasible, use a spare wire, if available, or provide a new wire (St. Clair P/N 200153 may be used for this purpose). Refer to Appendix C for information on connector/wire repair.

## CODE 45 XX—GENERAL SOLENOID FAILURE *(Figure 5–11)*

4. If multiple code 45s occur (45 12, 45 13, 45 14, 45 15, 45 22, and 45 24), and wiring and solenoids test okay, a common solenoid driver is probably failed open.
5. Replace the ECU. If replacing the ECU corrects the problem, reinstall the original (bad) ECU to confirm that the problem is in the ECU. If the problem recurs, reinstall the new ECU to complete the repair.
6. If code 45 21 occurs repeatedly and the H/J solenoid and wiring test okay, the solenoid driver may be failed open. Follow Step (5) above.
7. If codes 45 16, 45 23, and 45 26 occur repeatedly and solenoids and wiring test okay, the solenoid driver may be failed open. Follow Step (5) above.
8. If the open is not found in either the transmission or the harness or the ECU drivers, the condition must be intermittent.
9. Use a spare wire, if available, or provide a new wire (St. Clair P/N 200153 may be used for this purpose) for the solenoid circuit indicated by the diagnostic code. Refer to Appendix C for information on connector assembly/disassembly.
10. If the condition persists, replace the ECU. If replacing the ECU corrects the problem, reinstall the original (bad) ECU to confirm that the problem is in the ECU. If the original ECU now works, inspect the ECU connectors for any corrosion or damage which may cause an intermittent condition. If the original problem recurs, reinstall the replacement ECU.
11. If condition persists, remove the solenoid cover and closely inspect the solenoid and internal harness for damage. Repair or replace as necessary (refer to the appropriate transmission service manual).

# TROUBLESHOOTING—DIAGNOSTIC CODES PRESENT

**NOTES**

# CODE 46 XX—HI SIDE OVERCURRENT FAULT

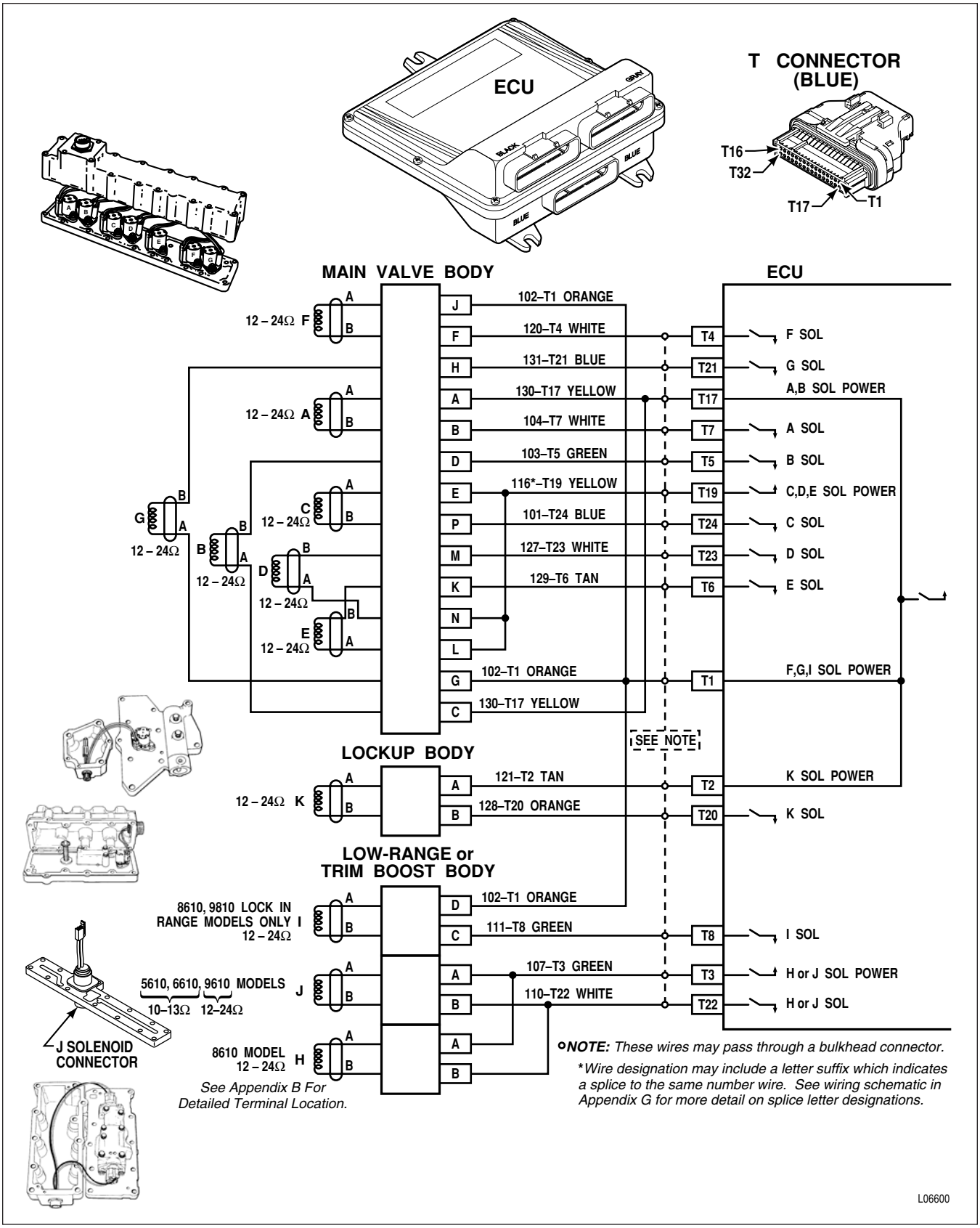



**Figure 5–12. Code 46 Schematic Drawing**

## CODE 46 XX—HI SIDE OVERCURRENT FAULT *(Figure 5–12)*

Main code 46 indicates that an overcurrent condition exists in one of the switches sending power to the transmission control solenoids.

| Main Code | Subcode | Meaning |
|---|---|---|
| 46 | 21 | High side overcurrent, H/J solenoid circuit |
| 46 | 26 | High side overcurrent, C, D, E solenoid circuit |
| 46 | 27 | High side overcurrent, A, B, F, G, I, K solenoid circuit |

**A. Active Indicator Clearing Procedure:**

- Power down
- Manual

**B. Troubleshooting:**

1. Probable cause is a wiring problem. A solenoid wire is probably shorted to ground or the solenoid has a shorted coil which would cause an overcurrent condition. May also be an ECU problem.
2. Follow the troubleshooting steps for code 45 XX.

# CODE 56 XX—RANGE VERIFICATION RATIO TEST (BETWEEN SHIFTS)

Main code 56 indicates either a failed **Range** verification speed sensor ratio test or a failed **Neutral** verification speed sensor ratio test.

The **Range** ratio test occurs after a shift and determines if a clutch has lost torque carrying capability. If the output speed is above a programmed output speed for a range, but the correct speed sensor ratio is not present, the **DO NOT SHIFT** response is commanded and a code (one of 56 11 to 56 88) is logged. A range that can carry the torque without damage is commanded or attempted. Turbine and output speed sensor readings are used to calculate the actual ratio that is compared to the commanded ratio. (Refer to Sections B and D below.)

The **Neutral** ratio test occurs when Neutral is selected. If a minimum turbine speed is not detected after Neutral is selected, the **DO NOT SHIFT** response is commanded, code 56 99 is logged, and the shift selector will display a flashing "cateye" (-/-) to warn the operator that the transmission may be in gear. (See Section C and D below.)

| Main Code | Subcode | Meaning |
|---|---|---|
| 56 | 11 | Range verification ratio test (between shifts) 1 |
| 56 | 22 | Range verification ratio test (between shifts) 2 |
| 56 | 33 | Range verification ratio test (between shifts) 3 |
| 56 | 44 | Range verification ratio test (between shifts) 4 |
| 56 | 55 | Range verification ratio test (between shifts) 5 |
| 56 | 66 | Range verification ratio test (between shifts) 6 |
| 56 | 77 | Range verification ratio test (between shifts) 7 |
| 56 | 88 | Range verification ratio test (between shifts) 8 |
| 56 | 99 | Neutral verification ratio test, N |

### A. Active Indicator Clearing Procedure:

- Power down
- Manual

***NOTE:*** ***When a code 22 16 (output speed fault) is also present, follow the troubleshooting sequence for code 22 16 first. After completing the 22 16 sequence, drive the vehicle to see if a code 56 XX recurs.***

***NOTE:*** ***Before troubleshooting, measure battery and ECU input voltages.***

***NOTE:*** ***Intermittent connections or lack of battery-direct power and ground connections may cause this and other codes.***

### B. Troubleshooting 56 11 to 56 88 Codes:

Erratic shifting and intermittent 56xx codes have resulted from false output speed sensor readings. A loose transmission output nut allows the output speed sensor pickup gear to slip giving false readings.

Remove the output speed sensor and be sure the pickup gear is tight by using a pry tool. If the gear can be moved by hand, tighten the transmission output nut. Follow the output nut installation procedures in the service manual.

# CODE 56 XX—RANGE VERIFICATION RATIO TEST (BETWEEN SHIFTS)

**C. Troubleshooting 56 99 Codes:**

Code 56 99 was introduced in J03 calibrations starting in January 2003. The presence of code indicates low turbine speed when Neutral is selected. This indicates a "lock in range" condition to the ECU.

The following have all been associated with this code:

- Main control valve body solenoid stuck open from debris allowing clutch to engage.
- Main control valve body shift valve stuck open from debris allowing clutch to engage.
- Broken turbine or splitter input shafts
- Faulty turbine speed sensor
- Damaged chassis harness to the turbine speed sensor.

**D. General Troubleshooting 56 11 to 56 99 Codes:**

1. After the transmission is at operating temperature, allow vehicle engine to idle on level ground for 3–4 minutes. Determine the transmission fluid level. If improper fluid level is found, correct as necessary. Improper fluid level could be the cause of the code. Not enough or too much fluid may produce inadequate clutch pressure.
2. This code requires accurate output and turbine speed readings. If there were no transmission problems detected, use the Allison DOC™ For PC–Service Tool or Pro-Link® 9000 diagnostic tool and test speed sensor signals for noise (erratic signals) from low speed to high speed in the range indicated by the code.
3. If a noisy sensor is found, test the resistance of the sensor (refer to the temperature variation chart below) and its wiring for opens, shorts, and shorts-to-ground (refer to code 22 XX). Carefully inspect the terminals in the connectors for corrosion, contamination, or damage. Be sure the wiring to the sensors is a properly twisted wire pair. Replace a speed sensor if its resistance is incorrect. Isolate and repair any wiring problems. Use a twisted-pair if a new speed sensor circuit is needed—Service Harness Twisted Pair P/N 200153 is available from St. Clair Technologies for this purpose.

| Current Resistance (Ohms) January, 2006 | Former Resistance (Ohms) Before January, 2006 | Temp ˚F | Temp ˚C |
|---|---|---|---|
| 250 | 200 | –40 | –40 |
| 340 | 300 | 68 | 20 |
| 450 | 400 | 230 | 110 |

4. If no apparent cause for the code can be found, replace the turbine and output speed sensors (refer to the appropriate transmission service manual for proper procedure).
5. If the condition persists, replace the ECU. If replacing the ECU corrects the problem, reinstall the original (bad) ECU to confirm that the problem is in the ECU. If the original ECU now works, inspect the ECU connectors for any corrosion or damage which may cause an intermittent condition. If the original problem recurs, reinstall the replacement ECU.
6. Connect a pressure gauge and test main pressure. If the pressure is not adequate, the pump is probably worn. Refer to the appropriate service manual for main pressure specifications.
7. If main pressure is adequate, test clutch pressure for the range indicated by following the procedure in the appropriate service manual. The transmission range indicated by the trouble code can be found by referring to the solenoid and clutch chart on the hydraulic schematic in

# CODE 56 XX—RANGE VERIFICATION RATIO TEST (BETWEEN SHIFTS)

Appendix F. Drive the vehicle or use Allison DOC™ For PC–Service Tool or Pro-Link® 9000 diagnostic tool clutch test mode and test clutch pressure.

8. If a clutch is leaking pressure, remove the main control valve body and inspect for damaged valve body gaskets and stuck or sticking valves (refer to the transmission service manual). If no problems are found, replace the solenoids for the clutches used in the range indicated by the code.
9. If replacing solenoids does not correct the pressure problem, a worn clutch or worn piston seals are probably the source of the pressure leak. Remove the transmission and repair or replace as necessary (refer to the appropriate transmission service manual).

# CODE 65 00—ENGINE RATING HIGH

Main code 65 indicates the vehicle's engine horsepower/governor speed rating is too high. This code is set only when computer-controlled engines are used. Code 65 means the engine computer is able to tell the transmission, the engine horsepower and/or governor speed is beyond the transmission rating or does not match the transmission shift calibration.

When a code 65 is set, no shifts out of neutral are allowed. It is possible the transmission calibration selected for this engine is improper. Contact Allison Transmission for assistance in selecting a proper calibration.

If the engine is beyond transmission ratings, contact the vehicle OEM for correction.

This code cannot be cleared until the proper level engine is installed or the transmission is properly calibrated.

## CODE 66 00—SCI (SERIAL COMMUNICATION INTERFACE) FAULT *(Figure 5–13)*

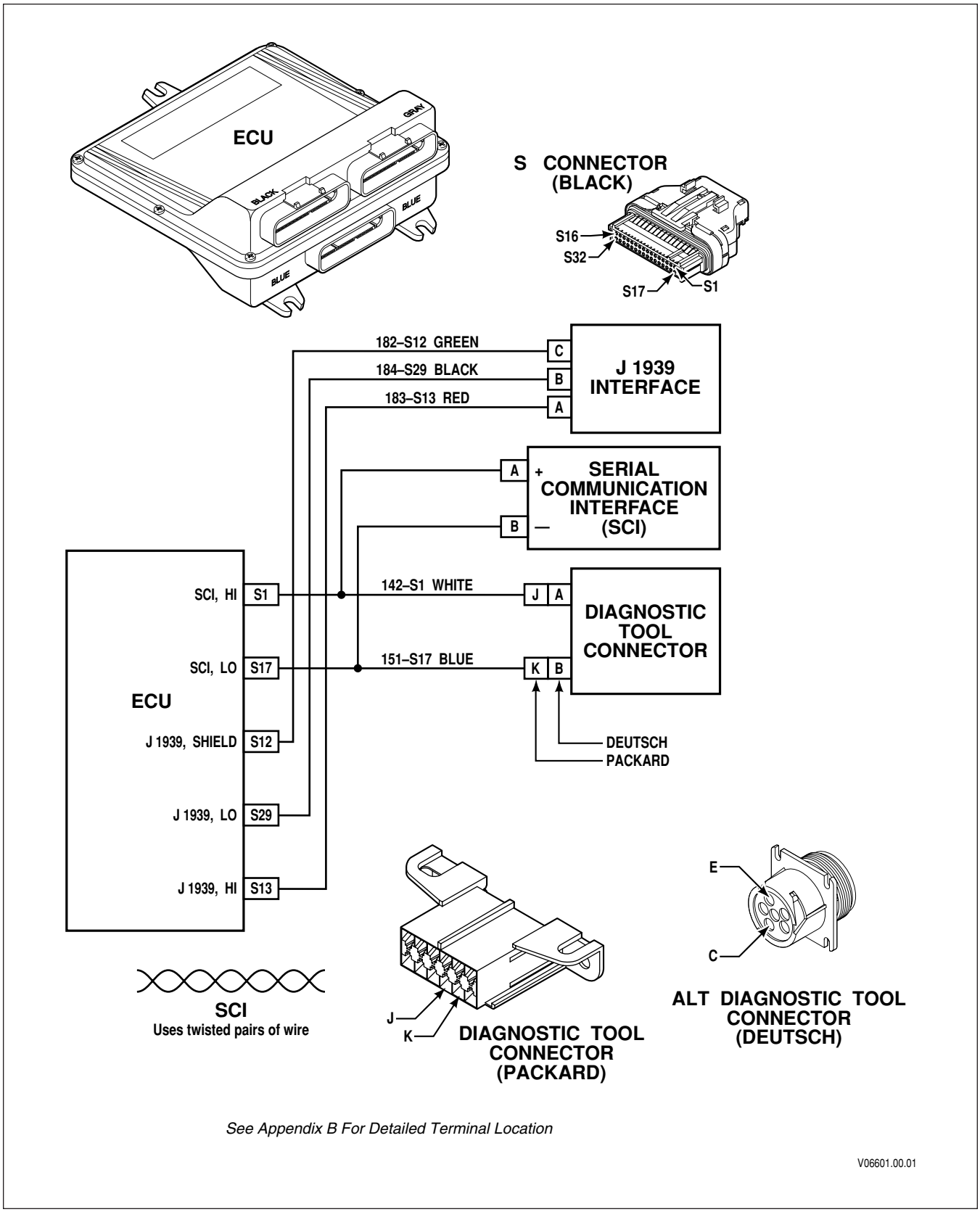



**Figure 5–13. Code 66 Schematic Drawing**

# CODE 66 00—SCI (SERIAL COMMUNICATION INTERFACE) FAULT

The datalink for the throttle position sensor (TPS) **must have been** recognized by autodetect or manually selected using the Allison DOC™ For PC–Service Tool or Pro-Link® 9000 diagnostic tool (refer to Allison Transmission publication GN3433EN, User's Guide, for the Allison DOC™ For PC–Service Tool or CEC2 Pro-Link® 9000 User's Manual, GN2928EN) before these codes can be logged. See Paragraph 1–9 for further information.

Main code 66 indicates the ECU is expecting to get its throttle position signal across a serial communication interface from a computer-controlled engine. Either the engine computer is not sending the throttle information or the wiring between the engine and transmission computers has failed.

Code 66 00 can occur when the transmission ECU remains powered when the engine ECM is powered down. The transmission sees this as a communication link failure.

**A. Active Indicator Clearing Procedure:**

- Power down
- Manual
- Self-clearing

**B. Troubleshooting:**

1. Test for a throttle signal from the engine to the transmission, an engine computer malfunction, or an engine throttle fault.

***NOTE:*** ***Throttle position data sent from a computer-controlled engine may register a low number of counts on Allison DOC™ For PC–Service Tool or Pro-Link® 9000 diagnostic tool, but the counts will not change as throttle percentage is changed.***

2. Test wires 142 and 151 between the engine and transmission ECU for an open or short. Inspect all connectors and make sure they are clean and tightly connected.

***NOTE:*** ***These codes can also be set if J1939 communications fail. Test wires 183-S13, 184-S29, and 182-S12 for opens or shorts.***

3. Use the Allison DOC™ For PC–Service Tool or Pro-Link® 9000 diagnostic tool to determine that the ECU is receiving power when it should not.

# CODE 69 XX—ECU MALFUNCTION

Main code 69 indicates a problem which has been identified as being from within the ECU.

A “cateye” (-/-) display or a blank display may occur with subcode 33.

| Main Code | Subcode | Meaning |
|---|---|---|
| 69 | 27 | ECU, Inoperative A, B, F, G, I, K solenoid switch |
| 69 | 28 | ECU, Inoperative H/J solenoid switch |
| 69 | 29 | ECU, Inoperative C, D, E solenoid switch |
| 69 | 33 | ECU, computer operating properly fault |
| 69 | 34 | ECU EEPROM, fault |
| 69 | 35 | ECU EEPROM, fault |
| 69 | 39 | Communication chip addressing error |
| 69 | 42 | SPI output failure |
| 69 | 43 | SPI input failure |

**A. Active Indicator Clearing Procedure:**

- Power down
- Manual—except subcodes 33, 35, 42, and 43
- Self-clearing—subcode 42 and subcodes 33 and 35; after an ECU reset

***NOTE: Subcode 34 cannot be cleared.***

**B. Troubleshooting:**

1. For subcodes 27, 28, and 29, test for shorts to battery before replacing the ECU. Follow the troubleshooting steps for code 45 XX for testing for shorts to battery. If no shorts are found, replace the ECU. If replacing the ECU corrects the problem, reinstall the original (bad) ECU to confirm that the problem is in the ECU. If the problem recurs, reinstall the new ECU to complete the repair.
2. For all other subcodes, replace the ECU.