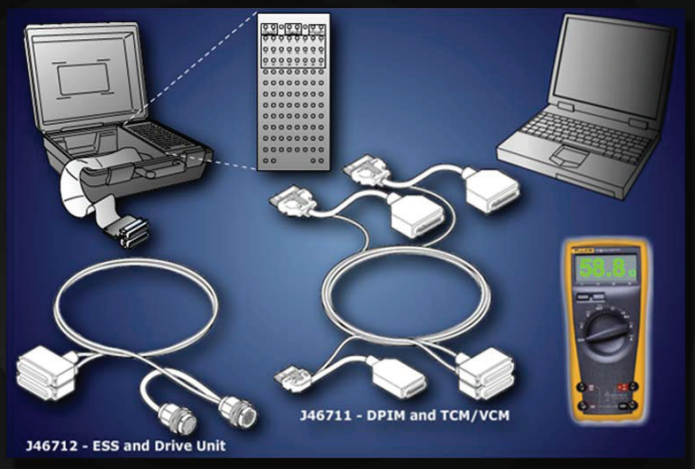
Allison Transmission Instructor Led Training

Diagnostics – Troubleshooting Scenarios

## Required Tools

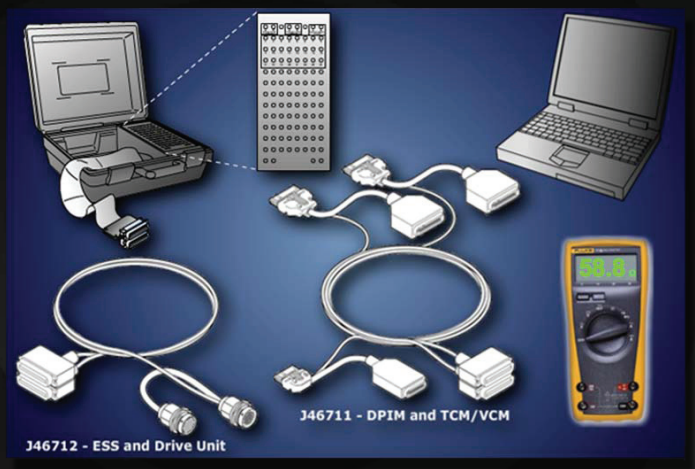
- **Allison DOC for PC (H 40/50 EP) installed on laptop with appropriate translator device.**
  - *Version 3.1 and above is required to connect to systems equipped with Allison 4th Generation Controls.*
- **Digital volt-ohmmeter.**
- **Troubleshooting Manual.**
- **Breakout box with appropriate overlays and harnesses**
  - *Harnesses and overlays share the same part number*




1 of 10

## Required Tools (cont'd)

- **For successful troubleshooting, technicians need to be familiar with the following Allison DOC™ features:**
  - *Diagnostic Trouble Codes*
  - *Failure Records*
  - *Data Monitor*
  - *ESS Data Monitor*
  - *Snapshots*
  - *Generating reports*

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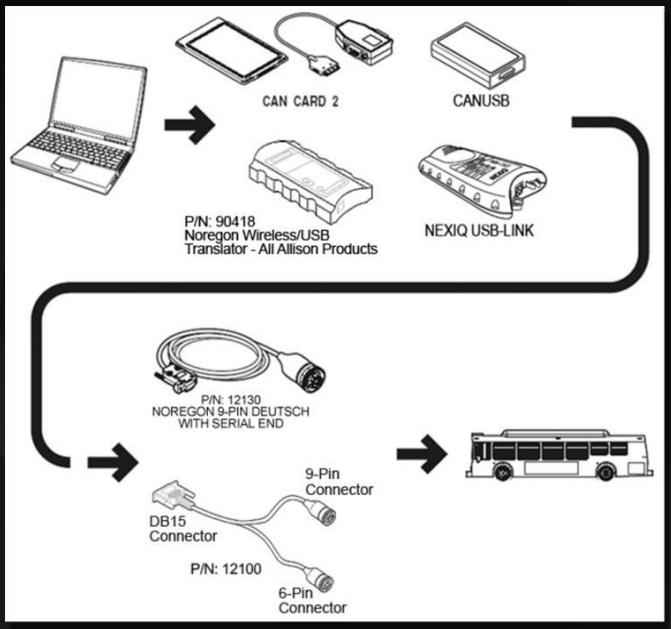
Allison Transmission Instructor Led Training

Diagnostics – Troubleshooting Scenarios

## Connecting Laptop To Vehicle

- **Connect one of the available translator devices to laptop**
  - *CAN Card 2*
  - *CANUSB*
  - *Noregon DLA+ Wireless/USB*
  - *NEXIQ USB-LINK*

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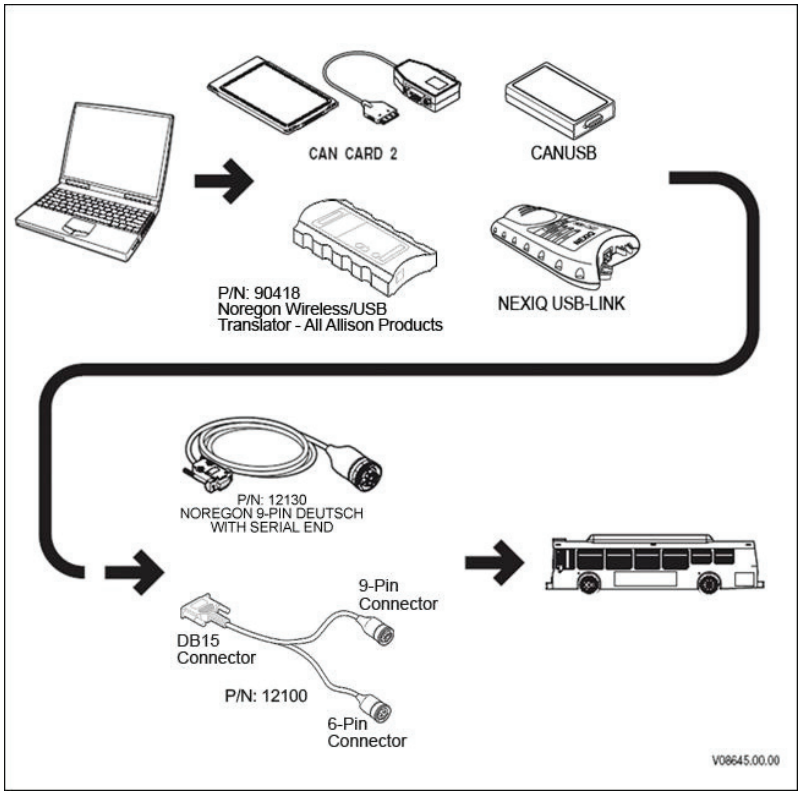
# RESOURCES: Connection Diagram

## 7. Connecting the PC to the Vehicle

An RP1210A compliant PC-to-vehicle translator is required. Allison DOC ® For PC (H 40/50 EP) currently supports the following translation devices:

- Softing CANusb® (USB port)
- Softing CANCard2® (PCMCIA)
- Softing CAN-AC2_PCI® (PCI bus)
- Nexiq usbLink (version 8.0.5.0 drivers or later)
- Noregon DLA+Wireless

Use the Noregon harness part number 12130 (or 12100) to connect the Softing (or usbLink, DLA+Wireless) translator device to the vehicle connector. The diagram below illustrates the hardware connections between the PC hosting Allison DOC ® For PC (H 40/50 EP), the Softing translator device or usbLink or DLA+Wireless, and the 12130 or 12100 harness.






Allison Transmission

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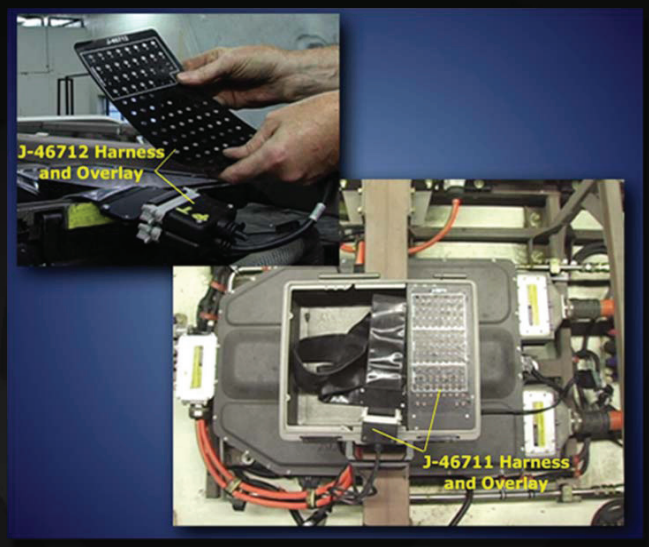
ALLISON HYBRID H40/50EP

Diagnostics – Troubleshooting Scenarios

## Connecting The Breakout Box

- **Continuity, voltage and resistance checks are often part of troubleshooting procedures.**
  - *These are sometimes called "pin out" checks.*
- **The breakout box eases pin out check procedures and minimizes the chance of damage to vehicle connectors.**
  - *The breakout box installs inline with system components.*
  - *Multiple "overlays" and harnesses are available so the breakout box can be used with the TCM/VCM, DPIM, Drive Unit and ESS.*




Harness J-4725 is required to connect to 4th Gen TCMs

View Video | View Video | View Video | View Graphic | View Graphic | View Graphic | View Graphic

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# RESOURCES: Breakout Box To TCM Connection

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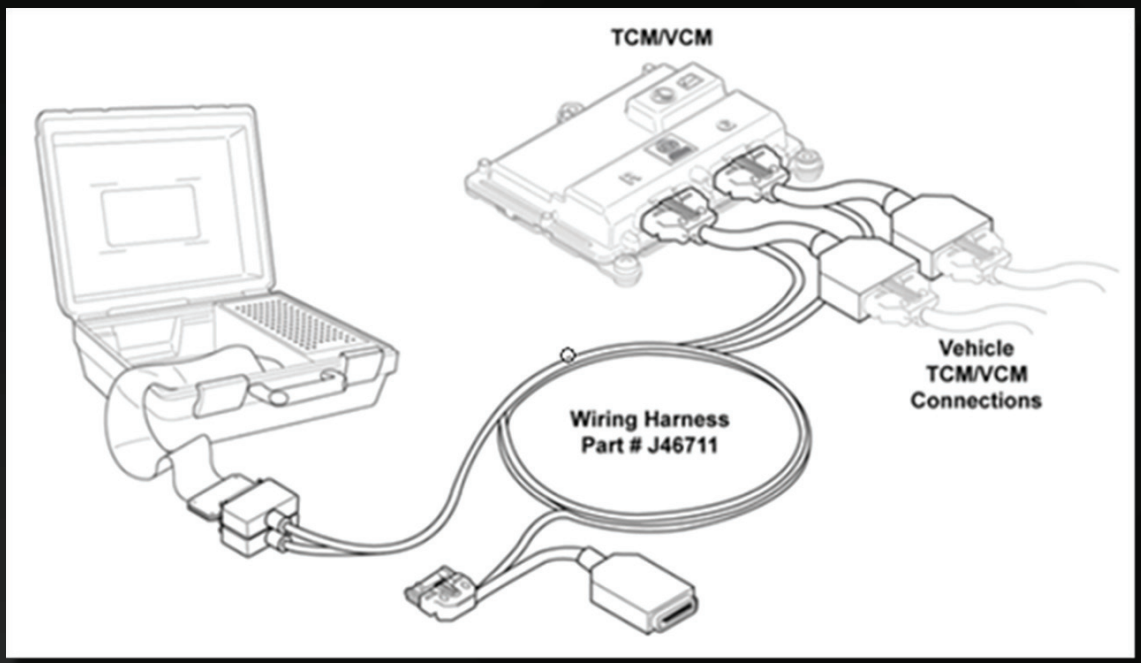
## Breakout Box To TCM Connection

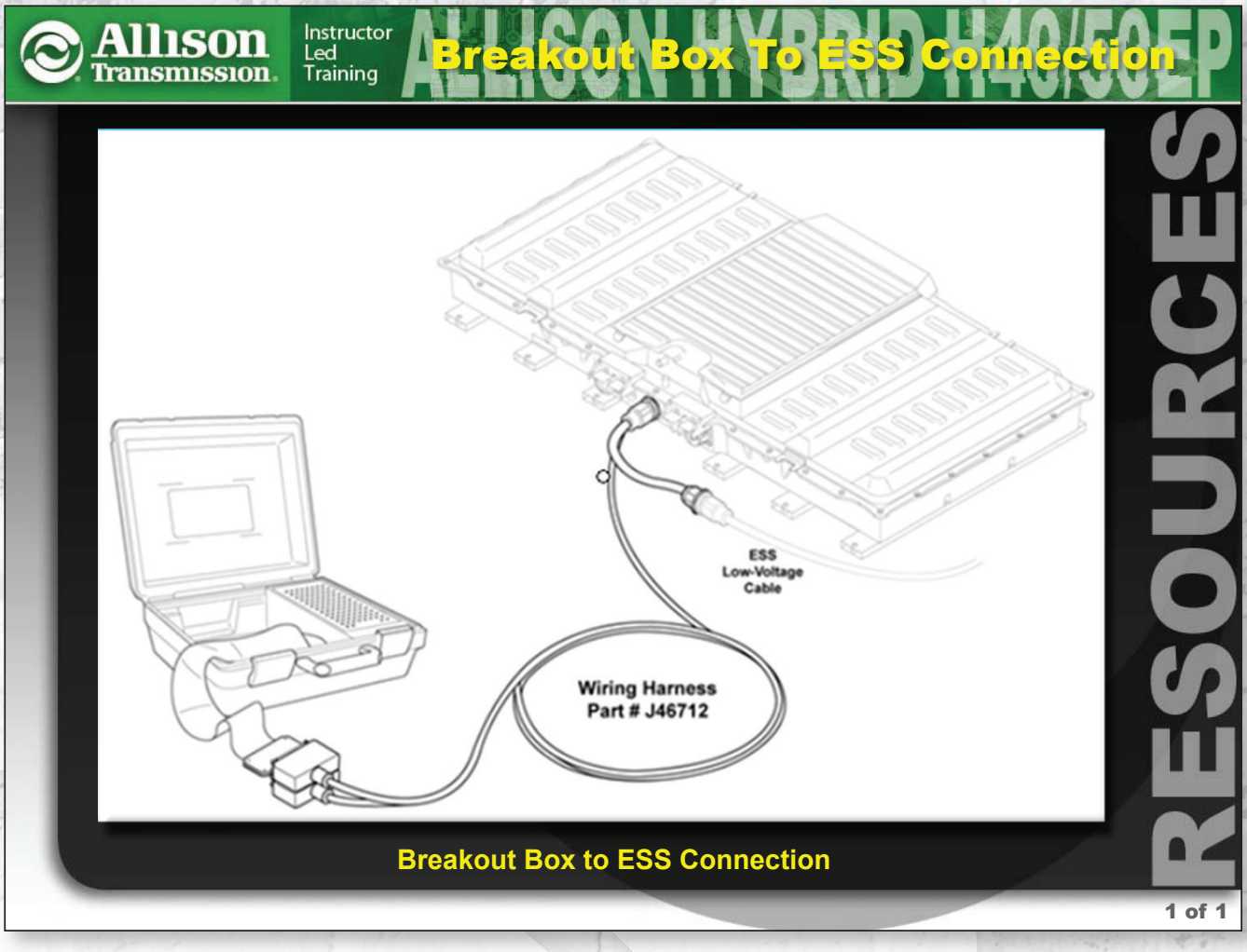
RESOURCES




Breakout Box to TCM Connection

1 of 1

# RESOURCES: Breakout Box To ESS Connection



# RESOURCES: Breakout Box To Drive Unit Connection

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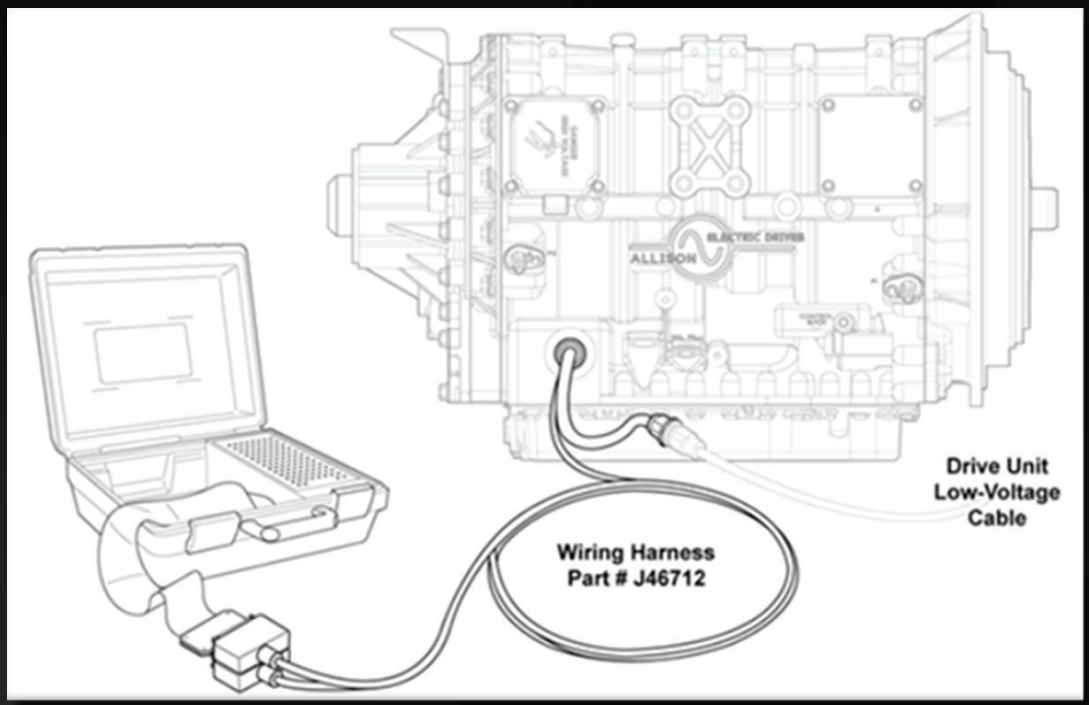
## Breakout Box To Drive Unit Connection




Breakout Box to Drive Unit Connection

RESOURCES

1 of 1

# RESOURCES: Breakout Box to DPIM Connection

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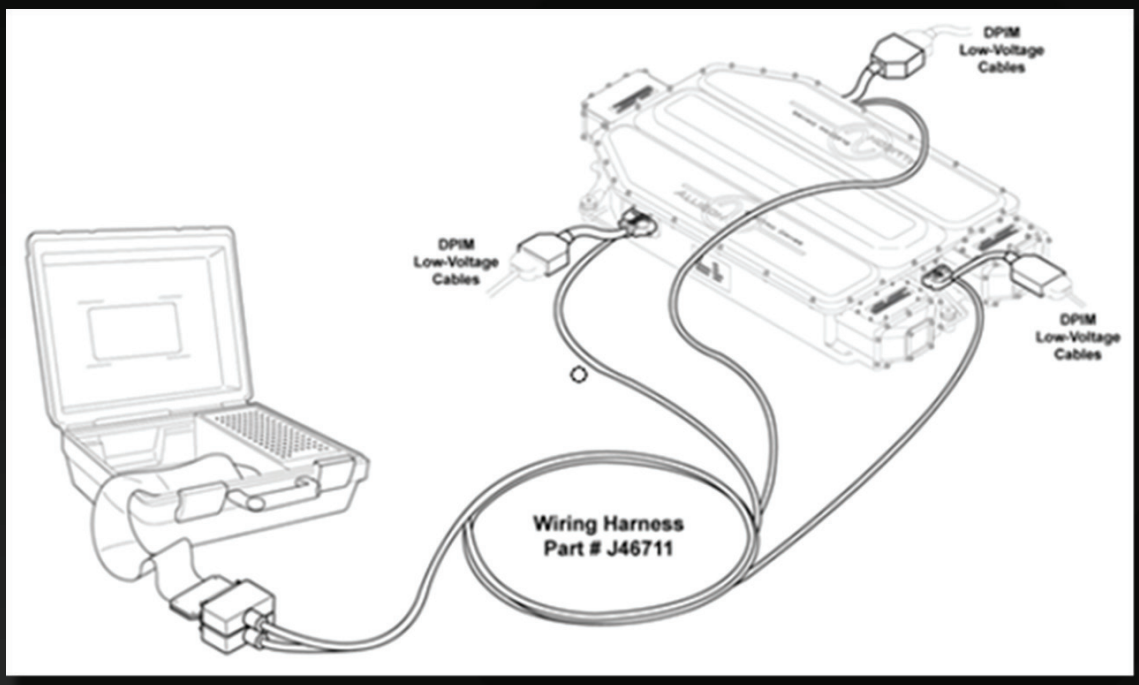
## Breakout Box To DPIM Connection

RESOURCES




Breakout Box to DPIM Connection

1 of 1

# DIAGNOSTICS — TROUBLESHOOTING SCENARIOS

Allison Transmission Instructor Led Training

## Diagnostics – Troubleshooting Scenarios

### Scenario #1

- **Diagnostic Codes:**
  - *17-21, 44-15, 66-21, 66-33.*
- **Codes with a 66 prefix are communications codes and should be diagnosed first.**
- **Use Allison DOC™ to:**
  - *Verify TCM is commanding signal over wire 323 in the Data Monitor.*
  - *Verify with the ESS Data Monitor that the ESS is awake and functioning.*
- **Perform pin out checks at the TCM and ESS with the breakout box.**
- **Troubleshoot harness wires for continuity problems.**


Code 66-21 in the TS Manual indicates starting with code 44-15 if present
Code 44-15 indicates a problem with the ESS Wakeup Signal
Wiring schematic shows TCM wire 323 carrying ESS Wakeup Signal

View Video | View Video | View Video | View Video | View PDF | View PDF | View PDF | View Graphic

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# RESOURCES: DTC 66-21 CAN Link Lost with Battery Controller

**NOTE: This resource link has multiple pages and information changes frequently. Reference the source document for complete, current information.**

E$^{P}$ 40/50 SYSTEM™ TROUBLESHOOTING MANUAL

## DIAGNOSTIC TROUBLE CODES (DTC)

### DTC 66–21 CAN Link Lost with Battery Controller

TCM has detected that the energy storage system is not communicating on the CAN link for more than 240 milliseconds. DTC will not display on the PBSS.

**Causes:**

- CAN wiring integrity
- Loss of power / intermittent power to ESS

**Tool Requirements:**

- Universal Electronic Breakout Box (J-39700)
- Breakout Harness (J-46711)
- Breakout Harness (J-46712)
- Multimeter
- Allison DOC™ For PC (AED)

**Table 5–137. DTC 66–21 CAN Link Lost With Battery Controller**

| Step | Action | Value(s) | Yes | No |
|---|---|---|---|---|
| 1 | Was the code logged in conjunction with DTC 44–15? | | *Follow troubleshooting procedure for DTC 44-15* | *Go to Step 2* |
| 2 | Was DTC 66–21 logged in conjunction with DTC 42–15? | | *Follow troubleshooting procedure for DTC 42-15* | *Go to Step 3* |
| 3 | Is the DTC active? | | *Go to Step 5* | *Go to Step 4* |
| 4 | Is there a vehicle performance complaint? | | *Go to Step 5* | *Clear code. Go to Step 15* |
| 5 | Check that all of the connectors are clean, the pins are good, and that their seals are intact. Clear codes.<br>Do the codes reappear? | | *Go to Step 6* | *Go to Step 15* |
| 6 | Check for +12V on pins F and P on the ESS 31-pin connector. Check for continuity to ground on pins G, H, and Z on the ESS 31-pin connector.<br>Is the wake-up signal acceptable? | | *Go to Step 8* | *Make repairs as necessary. If DTC returns, go to Step 8; otherwise, go to Step 15* |
| 7 | Check for ground wake-up signal on pin L of the ESS 31-pin connector.<br>Is the wake-up signal acceptable? | | *Go to Step 8* | *Make repairs as necessary. If DTC returns go to Step 8; otherwise, go to Step 15* |

# RESOURCES: DTC 44-15 Battery Controller Wake-Up Open or Short-to-Ground

**NOTE: This resource link has multiple pages and information changes frequently. Reference the source document for complete, current information.**

E$^{P}$ 40/50 SYSTEM™ TROUBLESHOOTING MANUAL

## DIAGNOSTIC TROUBLE CODES (DTC)

### DTC 44–15 Battery Controller Wake-up Open Or Short-to-Ground

If wire 323 is open, the code may be accompanied by CAN link lost with Battery Controller (DTC 66–21 and 66–33).

If wire 323 is shorted to ground, the ESS system controllers will remain on.

**Complaints:**

- Stopped vehicle (unable to start engine) if open
- Low 12V Battery if short-to-ground

**Cause:**

- Bad wiring or connectors

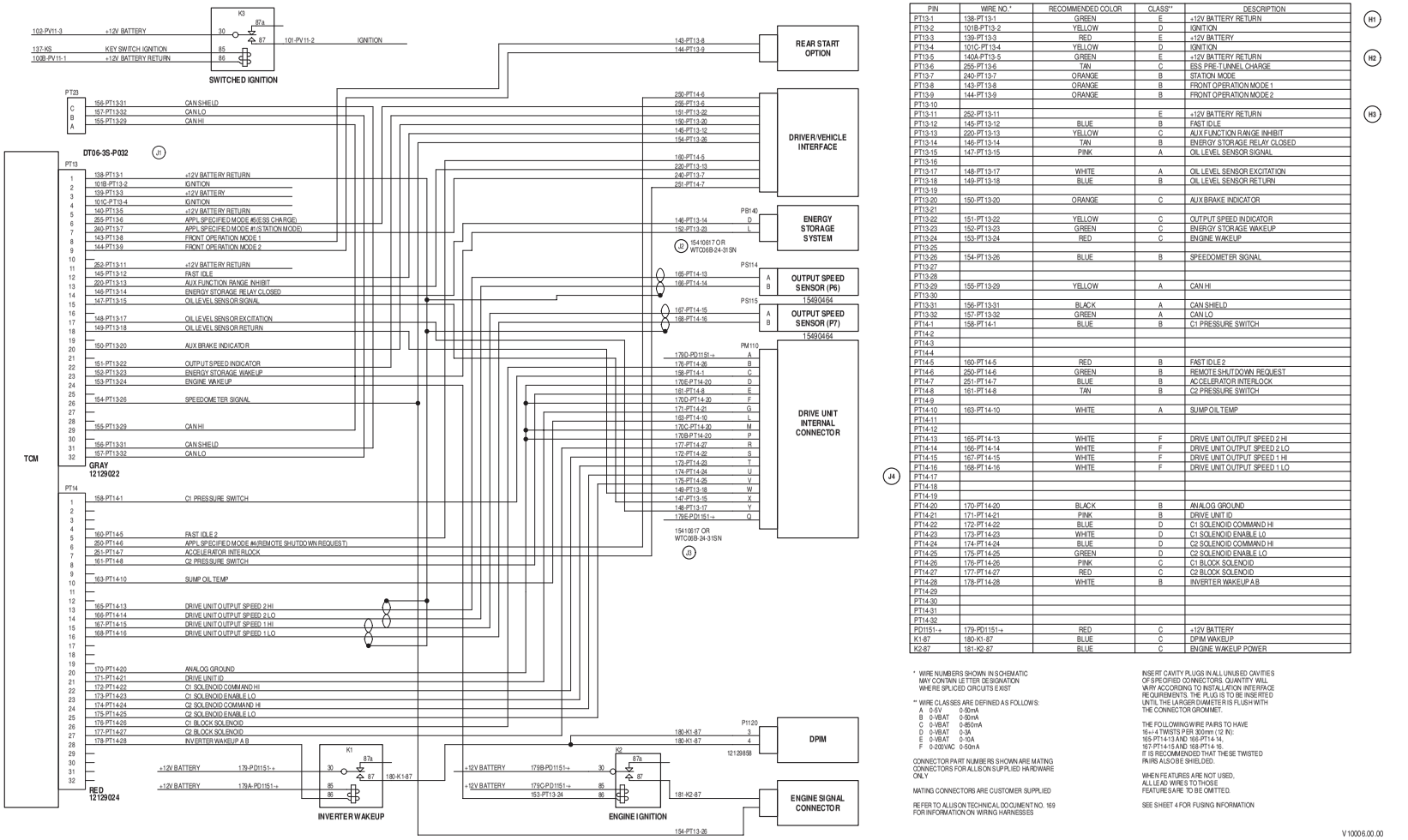
**Tool Requirements:**

- Universal Electronic Breakout Box (J-39700)
- Breakout Harness (J-46711)
- Breakout Harness (J-46712)
- Multimeter
- Allison DOC™ For PC (AED)
  - — Action Requests → Output Tests → Energy Storage Wake-up On

**Table 5–95. DTC 44–15 Battery Controller Wake-up Open Or Short-to-Ground**

| Step | Action | Value(s) | Yes | No |
|---|---|---|---|---|
| 1 | Is the code active? | | *Go to Step 3* | *Go to Step 2* |
| 2 | Is there a driver complaint? DTC 66–33 will often be logged in conjunction with DTC 44–15, resulting in a **Check System** light. | | *Go to Step 3* | *Possible intermittent fault.* |
| 3 | Connect Allison DOC™ For PC (AED) to the vehicle.<br>Clear DTCs.<br>Using the Action Requests → Output Tests → Energy Storage Wake-up On, turn Energy Storage Wake-up On **ON** and **OFF**, and see if the DTC comes back as active.<br>Did DTC 44–15 return active, or did the Output Test fail to complete? | | *Go to Step 4* | *Intermittent fault. Go to Step 4* |
| 4 | Be sure the harness is tightly connected. If connected properly, disconnect the wiring harness at the TCM and the Energy Storage System and check the connectors for corroded or damaged terminals. Clean or replace as necessary.<br>Were any repairs made? | | *Go to Step 7* | *Go to Step 5* |

# APPENDIX H—E$^P$ 40/50 SYSTEM™ WIRING SCHEMATIC




| PIN | WIRE NO.* | RECOMMENDED COLOR | CLASS** | DESCRIPTION | |
|---|---|---|---|---|---|
| PT13-1 | 138-PT13-1 | GREEN | E | +12V BATTERY RETURN | H1 |
| PT13-2 | 101B-PT13-2 | YELLOW | D | IGNITION | |
| PT13-3 | 139-PT13-3 | RED | E | +12V BATTERY | |
| PT13-4 | 101C-PT13-4 | YELLOW | D | IGNITION | |
| PT13-5 | 140A-PT13-5 | GREEN | E | +12V BATTERY RETURN | H2 |
| PT13-6 | 255-PT13-6 | TAN | C | ESS PRE-TUNNEL CHARGE | |
| PT13-7 | 240-PT13-7 | ORANGE | B | STATION MODE | |
| PT13-8 | 143-PT13-8 | ORANGE | B | FRONT OPERATION MODE 1 | |
| PT13-9 | 144-PT13-9 | ORANGE | B | FRONT OPERATION MODE 2 | |
| PT13-10 | | | | | |
| PT13-11 | 252-PT13-11 | | E | +12V BATTERY RETURN | H3 |
| PT13-12 | 145-PT13-12 | BLUE | B | FAST IDLE | |
| PT13-13 | 220-PT13-13 | YELLOW | C | AUX FUNCTION RANGE INHIBIT | |
| PT13-14 | 146-PT13-14 | TAN | B | ENERGY STORAGE RELAY CLOSED | |
| PT13-15 | 147-PT13-15 | PINK | A | OIL LEVEL SENSOR SIGNAL | |
| PT13-16 | | | | | |
| PT13-17 | 148-PT13-17 | WHITE | A | OIL LEVEL SENSOR EXCITATION | |
| PT13-18 | 149-PT13-18 | BLUE | B | OIL LEVEL SENSOR RETURN | |
| PT13-19 | | | | | |
| PT13-20 | 150-PT13-20 | ORANGE | C | AUX BRAKE INDICATOR | |
| PT13-21 | | | | | |
| PT13-22 | 151-PT13-22 | YELLOW | C | OUTPUT SPEED INDICATOR | |
| PT13-23 | 152-PT13-23 | GREEN | C | ENERGY STORAGE WAKEUP | |
| PT13-24 | 153-PT13-24 | RED | C | ENGINE WAKEUP | |
| PT13-25 | | | | | |
| PT13-26 | 154-PT13-26 | BLUE | B | SPEEDOMETER SIGNAL | |
| PT13-27 | | | | | |
| PT13-28 | | | | | |
| PT13-29 | 155-PT13-29 | YELLOW | A | CAN HI | |
| PT13-30 | | | | | |
| PT13-31 | 156-PT13-31 | BLACK | A | CAN SHIELD | |
| PT13-32 | 157-PT13-32 | GREEN | A | CAN LO | |
| PT14-1 | 158-PT14-1 | BLUE | B | C1 PRESSURE SWITCH | |
| PT14-2 | | | | | |
| PT14-3 | | | | | |
| PT14-4 | | | | | |
| PT14-5 | 160-PT14-5 | RED | B | FAST IDLE 2 | |
| PT14-6 | 250-PT14-6 | GREEN | B | REMOTE SHUTDOWN REQUEST | |
| PT14-7 | 251-PT14-7 | BLUE | B | ACCELERATOR INTERLOCK | |
| PT14-8 | 161-PT14-8 | TAN | B | C2 PRESSURE SWITCH | |
| PT14-9 | | | | | |
| PT14-10 | 163-PT14-10 | WHITE | A | SUMP OIL TEMP | |
| PT14-11 | | | | | |
| PT14-12 | | | | | |
| PT14-13 | 165-PT14-13 | WHITE | F | DRIVE UNIT OUTPUT SPEED 2 HI | |
| PT14-14 | 166-PT14-14 | WHITE | F | DRIVE UNIT OUTPUT SPEED 2 LO | |
| PT14-15 | 167-PT14-15 | WHITE | F | DRIVE UNIT OUTPUT SPEED 1 HI | |
| PT14-16 | 168-PT14-16 | WHITE | F | DRIVE UNIT OUTPUT SPEED 1 LO | J4 |
| PT14-17 | | | | | |
| PT14-18 | | | | | |
| PT14-19 | | | | | |
| PT14-20 | 170-PT14-20 | BLACK | B | ANALOG GROUND | |
| PT14-21 | 171-PT14-21 | PINK | B | DRIVE UNIT ID | |
| PT14-22 | 172-PT14-22 | BLUE | D | C1 SOLENOID COMMAND HI | |
| PT14-23 | 173-PT14-23 | WHITE | D | C1 SOLENOID ENABLE LO | |
| PT14-24 | 174-PT14-24 | BLUE | D | C2 SOLENOID COMMAND HI | |
| PT14-25 | 175-PT14-25 | GREEN | D | C2 SOLENOID ENABLE LO | |
| PT14-26 | 176-PT14-26 | PINK | C | C1 BLOCK SOLENOID | |
| PT14-27 | 177-PT14-27 | RED | C | C2 BLOCK SOLENOID | |
| PT14-28 | 178-PT14-28 | WHITE | B | INVERTER WAKEUP A,B | |
| PT14-29 | | | | | |
| PT14-30 | | | | | |
| PT14-31 | | | | | |
| PT14-32 | | | | | |
| PD1151-+ | 179-PD1151-+ | RED | C | +12V BATTERY | |
| K1-87 | 180-K1-87 | BLUE | C | DPIM WAKEUP | |
| K2-87 | 181-K2-87 | BLUE | C | ENGINE WAKEUP POWER | |

* WIRE NUMBERS SHOWN IN SCHEMATIC MAY CONTAIN LETTER DESIGNATION WHERE SPLICED CIRCUITS EXIST

** WIRE CLASSES ARE DEFINED AS FOLLOWS:
A 0-5V
B 0-VBAT 0-50mA
C 0-VBAT 0-850mA
D 0-VBAT 0-3A
E 0-VBAT 0-10A
F 0-200 VAC 0-50mA

CONNECTOR PART NUMBERS SHOWN ARE MATING CONNECTORS FOR ALLISON SUPPLIED HARDWARE ONLY

MATING CONNECTORS ARE CUSTOMER SUPPLIED

REFER TO ALLISON TECHNICAL DOCUMENT NO. 169 FOR INFORMATION ON WIRING HARNESSES

INSERT CAVITY PLUGS IN ALL UNUSED CAVITIES OF SPECIFIED CONNECTORS. QUANTITY WILL VARY ACCORDING TO INSTALLATION INTERFACE REQUIREMENTS. THE PLUG IS TO BE INSERTED UNTIL THE LARGER DIAMETER IS FLUSH WITH THE CONNECTOR GROMMET.

THE FOLLOWING WIRE PAIRS TO HAVE 16+/-4 TWISTS PER 300mm (12 IN):
165-PT14-13 AND 166-PT14-14,
167-PT14-15 AND 168-PT14-16.
IT IS RECOMMENDED THAT THESE TWISTED PAIRS ALSO BE SHIELDED.

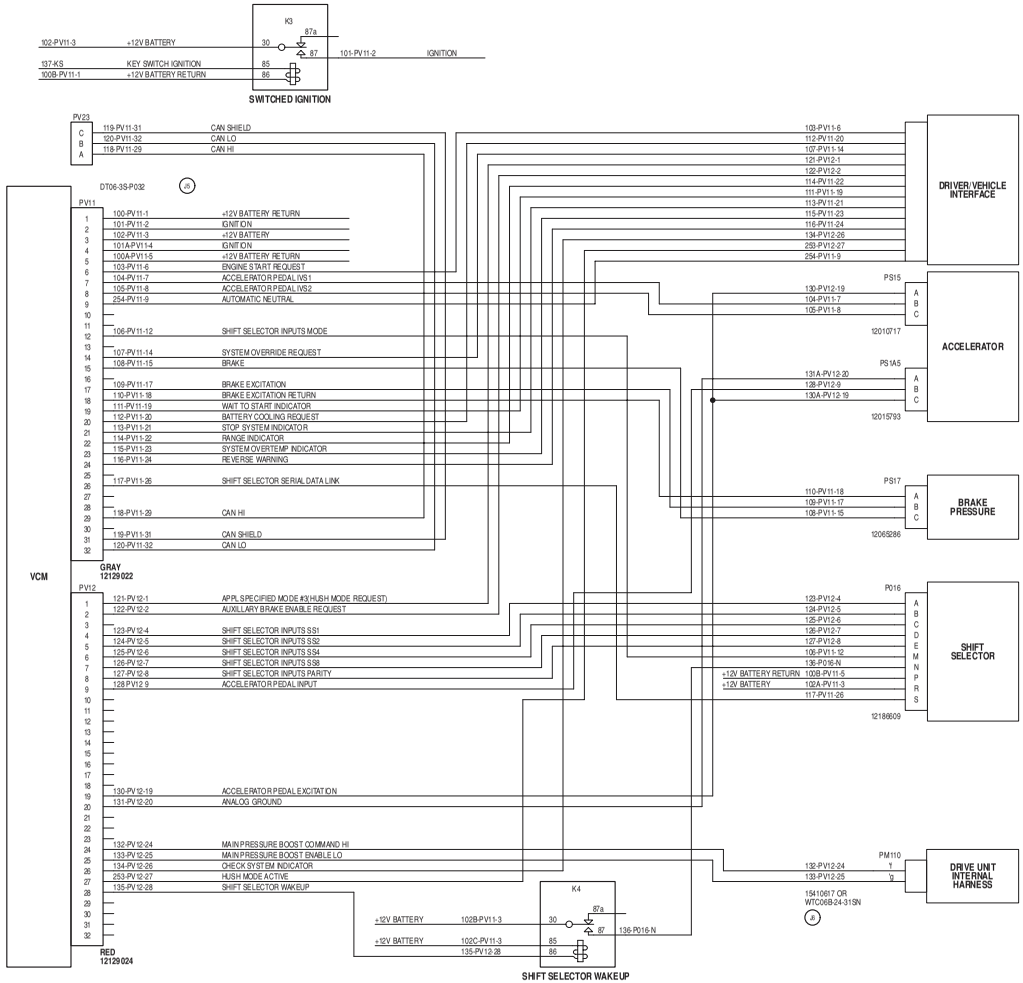
WHEN FEATURES ARE NOT USED, ALL LEAD WIRES TO THOSE FEATURES ARE TO BE OMITTED.

SEE SHEET 4 FOR FUSING INFORMATION

V1000.6.00.00

Figure H–1. Allison Electric Drive™ Wiring Schematic—TCM

# APPENDIX H—E$^P$ 40/50 SYSTEM™ WIRING SCHEMATIC




| PIN | WIRE NO* | RECOMMENDED COLOR | CLASS** | DESCRIPTION | |
|---|---|---|---|---|---|
| PV11-1 | 100-PV11-1 | GREEN | E | +12 V BATTERY RETURN | H4 |
| PV11-2 | 101-PV11-2 | YELLOW | D | IGNITION | |
| PV11-3 | 102-PV11-3 | RED | E | +12 V BATTERY | |
| PV11-4 | 101A-PV11-4 | YELLOW | D | IGNITION | |
| PV11-5 | 100A-PV11-5 | GREEN | E | +12 V BATTERY RETURN | |
| PV11-6 | 103-PV11-6 | WHITE | B | ENGINE START REQUEST | H5 |
| PV11-7 | 104-PV11-7 | ORANGE | A | ACCELERATOR PEDAL IVS 1 | |
| PV11-8 | 105-PV11-8 | ORANGE | A | ACCELERATOR PEDAL IVS 2 | |
| PV11-9 | 254-PV11-9 | BLUE | C | AUTOMATIC NEUTRAL | |
| PV11-10 | | | | | |
| PV11-11 | | | | | |
| PV11-12 | 106-PV11-12 | BLUE | B | SHIFT SELECTOR INPUTS MODE | |
| PV11-13 | | | | | |
| PV11-14 | 107-PV11-14 | TAN | B | SYSTEM OVERRIDE REQUEST | |
| PV11-15 | 108-PV11-15 | PINK | A | BRAKE | |
| PV11-16 | | | | | |
| PV11-17 | 109-PV11-17 | WHITE | A | BRAKE EXCITATION | |
| PV11-18 | 110-PV11-18 | BLUE | B | BRAKE EXCITATION RETURN | |
| PV11-19 | 111-PV11-19 | TAN | C | WAIT TO START INDICATOR | |
| PV11-20 | 112-PV11-20 | ORANGE | C | BATTERY COOLING REQUEST | |
| PV11-21 | 113-PV11-21 | GREEN | C | STOP SYSTEM INDICATOR | |
| PV11-22 | 114-PV11-22 | YELLOW | C | RANGE INDICATOR | |
| PV11-23 | 115-PV11-23 | GREEN | C | SYSTEM OVERTEMP INDICATOR | |
| PV11-24 | 116-PV11-24 | RED | C | REVERSE WARNING | |
| PV11-25 | | | | | |
| PV11-26 | 117-PV11-26 | BLUE | B | SHIFT SELECTOR SERIAL DATA LINK | |
| PV11-27 | | | | | |
| PV11-28 | | | | | |
| PV11-29 | 118-PV11-29 | YELLOW | A | CAN HI | |
| PV11-30 | | | | | |
| PV11-31 | 119-PV11-31 | BLACK | A | CAN SHIELD | |
| PV11-32 | 120-PV11-32 | GREEN | A | CAN LO | |
| PV12-1 | 121-PV12-1 | BLUE | B | HUSH MODE REQUEST | |
| PV12-2 | 122-PV12-2 | TAN | A | AUXILLARY BRAKE ENABLE REQUEST | |
| PV12-3 | | | | | |
| PV12-4 | 123-PV12-4 | YELLOW | B | SHIFT SELECTOR INPUTS SS1 | |
| PV12-5 | 124-PV12-5 | RED | B | SHIFT SELECTOR INPUTS SS2 | |
| PV12-6 | 125-PV12-6 | BLUE | B | SHIFT SELECTOR INPUTS SS4 | |
| PV12-7 | 126-PV12-7 | GREEN | B | SHIFT SELECTOR INPUTS SS8 | |
| PV12-8 | 127-PV12-8 | TAN | B | SHIFT SELECTOR INPUTS PARITY | |
| PV12-9 | 128-PV12-9 | PINK | A | ACCELERATOR PEDAL INPUT | |
| PV12-10 | | | | | |
| PV12-11 | | | | | |
| PV12-12 | | | | | |
| PV12-13 | | | | | |
| PV12-14 | | | | | |
| PV12-15 | | | | | |
| PV12-16 | | | | | |
| PV12-17 | | | | | |
| PV12-18 | | | | | |
| PV12-19 | 130-PV12-19 | RED | A | ACCLERATOR PEDAL EXCITATION | |
| PV12-20 | 131-PV12-20 | BLACK | B | ANALOG GROUND | |
| PV12-21 | | | | | |
| PV12-22 | | | | | |
| PV12-23 | | | | | |
| PV12-24 | 132-PV12-24 | BLUE | C | MAIN PRESSURE BOOST COMMAND HI | |
| PV12-25 | 133-PV12-25 | GREEN | C | MAIN PRESSURE BOOST ENABLE LO | |
| PV12-26 | 134-PV12-26 | PINK | B | CHECK SYSTEM INDICATOR | |
| PV12-27 | 253-PV12-27 | YELLOW | B | HUSH MODE ACTIVE | |
| PV12-28 | 135-PV12-28 | WHITE | B | SHIFT SELECTOR WAKEUP | |
| PV12-29 | | | | | |
| PV12-30 | | | | | |
| PV12-31 | | | | | |
| PV12-32 | | | | | |
| PO16-N | 136-PO16-N | RED | B | SHIFT SELECTOR WAKEUP POWER | |

* WIRE NUMBERS SHOWN IN SCHEMATIC MAY CONTAIN LETTER DESIGNATION WHERE SPLICED CIRCUITS EXIST

** WIRE CLASSES ARE DEFINED AS FOLLOWS:

| | | |
|---|---|---|
| A | 0-5V | 0-50mA |
| B | 0-VBAT | 0-50mA |
| C | 0-VBAT | 0-850mA |
| D | 0-VBAT | 0-3A |
| E | 0-VBAT | 0-10A |
| F | 0-200VAC | 0-50mA |

CONNECTOR PART NUMBERS SHOWN ARE MATING CONNECTORS FOR ALLISON SUPPLIED HARDWARE ONLY

MATING CONNECTORS ARE CUSTOMER SUPPLIED

REFER TO ALLISON TECHNICAL DOCUMENT NO. 169 FOR INFORMATION ON WIRING HARNESSES

INSERT CAVITY PLUGS IN ALL UNUSED CAVITIES OF SPECIFIED CONNECTORS. QUANTITY WILL VARY ACCORDING TO INSTALLATION INTERFACE REQUIREMENTS. THE PLUG IS TO BE INSERTED UNTIL THE LARGER DIAMETER IS FLUSH WITH THE CONNECTOR GROMMET.

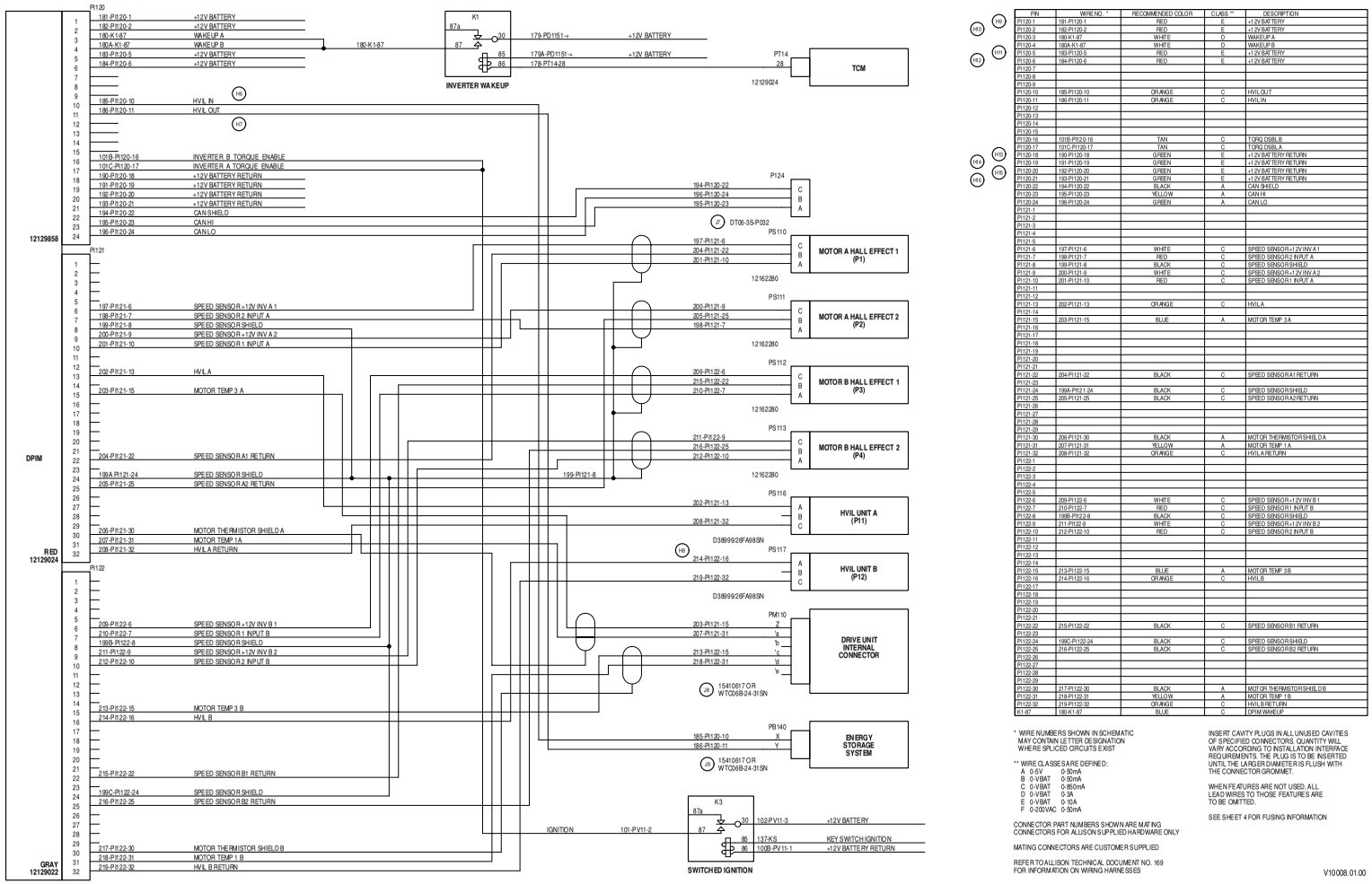
WHEN FEATURES ARE NOT USED, ALL LEAD WIRES TO THOSE FEATURES ARE TO BE OMITTED.

SEE SHEET 4 FOR FUSING INFORMATION

V10.007.00.00

Figure H–2. Allison Electric Drive™ Wiring Schematic—VCM

# APPENDIX H—E$^{P}$ 40/50 SYSTEM™ WIRING SCHEMATIC




| PIN | WIRE NO.. * | RECOMMENDED COLOR | CLASS ** | DESCRIPTION |
|---|---|---|---|---|
| P120-1 | 181-P120-1 | RED | E | +12V BATTERY |
| P120-2 | 182-P120-2 | RED | E | +12V BATTERY |
| P120-3 | 180-K1-87 | WHITE | D | WAKEUP A |
| P120-4 | 180A-K1-87 | WHITE | D | WAKEUP B |
| P120-5 | 183-P120-5 | RED | E | +12V BATTERY |
| P120-6 | 184-P120-6 | RED | E | +12V BATTERY |
| P120-7 | | | | |
| P120-8 | | | | |
| P120-9 | | | | |
| P120-10 | 185-P120-10 | ORANGE | C | HVIL OUT |
| P120-11 | 186-P120-11 | ORANGE | C | HVIL IN |
| P120-12 | | | | |
| P120-13 | | | | |
| P120-14 | | | | |
| P120-15 | | | | |
| P120-16 | 101B-P120-16 | TAN | C | TORQ DSBL B |
| P120-17 | 101C-P120-17 | TAN | C | TORQ DSBL A |
| P120-18 | 190-P120-18 | GREEN | E | +12V BATTERY RETURN |
| P120-19 | 191-P120-19 | GREEN | E | +12V BATTERY RETURN |
| P120-20 | 192-P120-20 | GREEN | E | +12V BATTERY RETURN |
| P120-21 | 193-P120-21 | GREEN | E | +12V BATTERY RETURN |
| P120-22 | 194-P120-22 | BLACK | A | CAN SHIELD |
| P120-23 | 195-P120-23 | YELLOW | A | CAN H |
| P120-24 | 196-P120-24 | GREEN | A | CAN LO |
| P121-1 | | | | |
| P121-2 | | | | |
| P121-3 | | | | |
| P121-4 | | | | |
| P121-5 | | | | |
| P121-6 | 197-P121-6 | WHITE | C | SPEED SENSOR +12V INV A 1 |
| P121-7 | 198-P121-7 | RED | C | SPEED SENSOR 2 INPUT A |
| P121-8 | 199-P121-8 | BLACK | C | SPEED SENSOR SHIELD |
| P121-9 | 200-P121-9 | WHITE | C | SPEED SENSOR +12V INV A 2 |
| P121-10 | 201-P121-10 | RED | C | SPEED SENSOR 1 INPUT A |
| P121-11 | | | | |
| P121-12 | | | | |
| P121-13 | 202-P121-13 | ORANGE | C | HVIL A |
| P121-14 | | | | |
| P121-15 | 203-P121-15 | BLUE | A | MOTOR TEMP 3 A |
| P121-16 | | | | |
| P121-17 | | | | |
| P121-18 | | | | |
| P121-19 | | | | |
| P121-20 | | | | |
| P121-21 | | | | |
| P121-22 | 204-P121-22 | BLACK | C | SPEED SENSOR A1 RETURN |
| P121-23 | | | | |
| P121-24 | 199A-P121-24 | BLACK | C | SPEED SENSOR SHIELD |
| P121-25 | 205-P121-25 | BLACK | C | SPEED SENSOR A2 RETURN |
| P121-26 | | | | |
| P121-27 | | | | |
| P121-28 | | | | |
| P121-29 | | | | |
| P121-30 | 206-P121-30 | BLACK | A | MOTOR THERMISTOR SHIELD A |
| P121-31 | 207-P121-31 | YELLOW | A | MOTOR TEMP 1 A |
| P121-32 | 208-P121-32 | ORANGE | C | HVIL A RETURN |
| P122-1 | | | | |
| P122-2 | | | | |
| P122-3 | | | | |
| P122-4 | | | | |
| P122-5 | | | | |
| P122-6 | 209-P122-6 | WHITE | C | SPEED SENSOR +12V INV B 1 |
| P122-7 | 210-P122-7 | RED | C | SPEED SENSOR 1 INPUT B |
| P122-8 | 199B-P122-8 | BLACK | C | SPEED SENSOR SHIELD |
| P122-9 | 211-P122-9 | WHITE | C | SPEED SENSOR +12V INV B 2 |
| P122-10 | 212-P122-10 | RED | C | SPEED SENSOR 2 INPUT B |
| P122-11 | | | | |
| P122-12 | | | | |
| P122-13 | | | | |
| P122-14 | | | | |
| P122-15 | 213-P122-15 | BLUE | A | MOTOR TEMP 3 B |
| P122-16 | 214-P122-16 | ORANGE | C | HVIL B |
| P122-17 | | | | |
| P122-18 | | | | |
| P122-19 | | | | |
| P122-20 | | | | |
| P122-21 | | | | |
| P122-22 | 215-P122-22 | BLACK | C | SPEED SENSOR B1 RETURN |
| P122-23 | | | | |
| P122-24 | 199C-P122-24 | BLACK | C | SPEED SENSOR SHIELD |
| P122-25 | 216-P122-25 | BLACK | C | SPEED SENSOR B2 RETURN |
| P122-26 | | | | |
| P122-27 | | | | |
| P122-28 | | | | |
| P122-29 | | | | |
| P122-30 | 217-P122-30 | BLACK | A | MOTOR THERMISTOR SHIELD B |
| P122-31 | 218-P122-31 | YELLOW | A | MOTOR TEMP 1 B |
| P122-32 | 219-P122-32 | ORANGE | C | HVIL B RETURN |
| K1-87 | 180-K1-87 | BLUE | C | DPIM WAKEUP |

* WIRE NUMBERS SHOWN IN SCHEMATIC MAY CONTAIN LETTER DESIGNATION WHERE SPLICED CIRCUITS EXIST

** WIRE CLASSES ARE DEFINED:
A 0-5 V
B 0-VBAT 0-50mA
C 0-VBAT 0-850mA
D 0-VBAT 0-3A
E 0-VBAT 0-10A
F 0-220VAC 0-50mA

CONNECTOR PART NUMBERS SHOWN ARE MATING CONNECTORS FOR ALLISON SUPPLIED HARDWARE ONLY

MATING CONNECTORS ARE CUSTOMER SUPPLIED

REFER TO ALLISON TECHNICAL DOCUMENT NO. 169 FOR INFORMATION ON WIRING HARNESSES

INSERT CAVITY PLUGS IN ALL UNUSED CAVITIES OF SPECIFIED CONNECTORS. QUANTITY WILL VARY ACCORDING TO INSTALLATION INTERFACE REQUIREMENTS. THE PLUG IS TO BE INSERTED UNTIL THE LARGER DIAMETER IS FLUSH WITH THE CONNECTOR GROMMET.

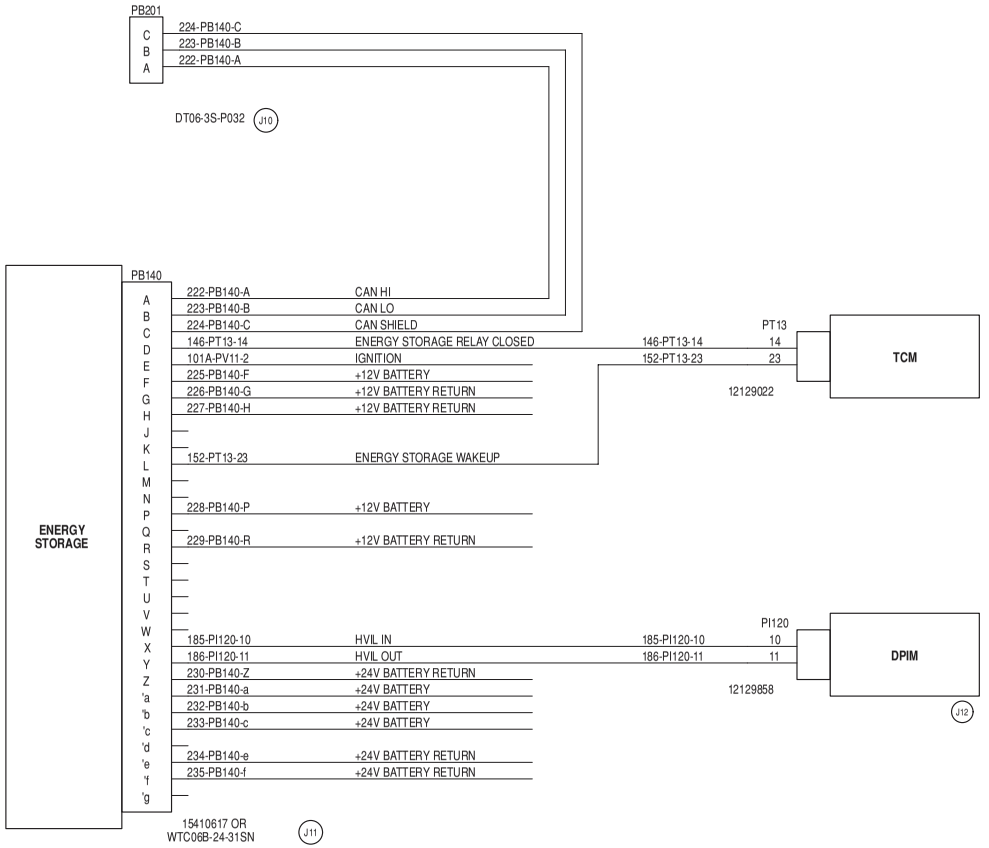
WHEN FEATURES ARE NOT USED, ALL LEAD WIRES TO THOSE FEATURES ARE TO BE OMITTED.

SEE SHEET 4 FOR FUSING INFORMATION

V10008.01.00

**Figure H–3. Allison Electric Drive™ Wiring Schematic—DPIM**

## APPENDIX H—E$^P$ 40/50 SYSTEM™ WIRING SCHEMATIC




| PIN | WIRE NO.* | | CLASS ** | DESCRIPTION |
|---|---|---|---|---|
| PB140-A | 222-PB140-A | YELLOW | A | CAN HI |
| PB140-B | 223-PB140-B | GREEN | A | CAN LO |
| PB140-C | 224-PB140-C | BLACK | A | CAN SHIELD |
| PB140-D | 146-PT13-14 | TAN | C | ENERGY STORAGE RELAY CLOSED |
| PB140-E | 101A-PB140-E | WHITE | D | IGNITION |
| PB140-F | 225-PB140-F | RED | E | +12V BATTERY |
| PB140-G | 226-PB140-G | BLACK | E | +12V BATTERY RETURN |
| PB140-H | 227-PB140-H | BLACK | E | +12V BATTERY RETURN |
| PB140-J | | | | |
| PB140-K | | | | |
| PB140-L | 152-PT13-23 | WHITE | C | ENERGY STORAGE WAKEUP |
| PB140-M | | | | |
| PB140-N | | | | |
| PB140-P | 228-PB140-P | RED | E | +12V BATTERY |
| PB140-Q | | | | |
| PB140-R | 229-PB140-R | BLACK | E | +12V BATTERY RETURN |
| PB140-S | | | | |
| PB140-T | | | | |
| PB140-U | | | | |
| PB140-V | | | | |
| | | | | |
| PB140-X | 185-PI120-10 | ORANGE | B | HVIL IN |
| PB140-Y | 186-PI120-11 | ORANGE | B | HVIL OUT |
| PB140-Z | 230-PB140-Z | BLACK | E | +24V BATTERY RETURN |
| PB140-a | 231-PB140-a | VIOLET | E | +24V BATTERY |
| PB140-b | 232-PB140-b | VIOLET | E | +24V BATTERY |
| PB140-c | 233-PB140-c | VIOLET | E | +24V BATTERY |
| PB140-d | | | | |
| PB140-e | 234-PB140-e | BLACK | E | +24V BATTERY RETURN |
| PB140-f | 235-PB140-f | BLACK | E | +24V BATTERY RETURN |
| PB140-g | | | | |

H17 H18 H19 H20 H21 H22 H23 H24 H25 H26 H27

* WIRE NUMBERS SHOWN IN SCHEMATIC MAY CONTAIN LETTER DESIGNATION WHERE SPLICED CIRCUITS EXIST

** WIRE CLASSES ARE DEFINED AS FOLLOWS:

| | | |
|---|---|---|
| A | 0-5V | 0-50mA |
| B | 0-VBAT | 0-50mA |
| C | 0-VBAT | 0-850mA |
| D | 0-VBAT | 0-3A |
| E | 0-VBAT | 0-10A |
| F | 0-200VAC | 0-50mA |

CONNECTOR PART NUMBERS SHOWN ARE MATING CONNECTORS FOR ALLISON SUPPLIED HARDWARE ONLY

MATING CONNECTORS ARE CUSTOMER SUPPLIED

REFER TO ALLISON TECHNICAL DOCUMENT NO. 169 FOR INFORMATION ON WIRING HARNESSES

INSERT CAVITY PLUGS IN ALL UNUSED CAVITIES OF SPECIFIED CONNECTORS. QUANTITY WILL VARY ACCORDING TO INSTALLATION INTERFACE REQUIREMENTS. THE PLUG IS TO BE INSERTED UNTIL THE LARGER DIAMETER IS FLUSH WITH THE CONNECTOR GROMMET.

WHEN FEATURES ARE NOT USED, ALL LEAD WIRES TO THOSE FEATURES ARE TO BE OMITTED.

| FUSING INFORMATION | |
|---|---|
| PI120 - 1,2,5, AND 6 18GA FUSED AT 10A TOGETHER | DPIM |
| (ONLY 1 FUSE) TO +12V BATTERY | |
| PV11 - 3 18GA FUSED AT 10A TO +12V BATTERY | VCM |
| PT13 - 3 18GA FUSED AT 10A TO +12V BATTERY | TCM |
| PX130 - B 18GA FUSED AT 10A TO +12V BATTERY | DIAGNOSTIC (CAN) |
| PM110 - A 18GA FUSED AT 10A TO +12V BATTERY | DRIVE UNIT |
| PM110 - Q 18GA FUSED AT 10A TO +12V BATTERY | DRIVE UNIT |
| PO16 - R 18GA FUSED AT 10A TO +12V BATTERY | PBSS |
| K1 - 30 18GA FUSED AT 10A TO +12V BATTERY | RELAY |
| K2 - 30 18GA FUSED AT 10A TO +12V BATTERY | RELAY |
| K3 - 30 18GA FUSED AT 10A TO +12V BATTERY | RELAY |
| K4 - 30 18GA FUSED AT 10A TO +12V BATTERY | RELAY |
| PB140 - F 16GA FUSED AT 15A TO +12V BATTERY | ESS |
| PB140 - P 16GA FUSED AT 15A TO +12V BATTERY | ESS |
| PB140 - a 16GA FUSED AT 15A TO +24V BATTERY | ESS |
| PB140 - b 16GA FUSED AT 15A TO +24V BATTERY | ESS |
| PB140 - c 16GA FUSED AT 15A TO +24V BATTERY | ESS |

V10009.00.00

Figure H–4. Allison Electric Drive™ Wiring Schematic—ESS

# RESOURCES: Wiring Schematic

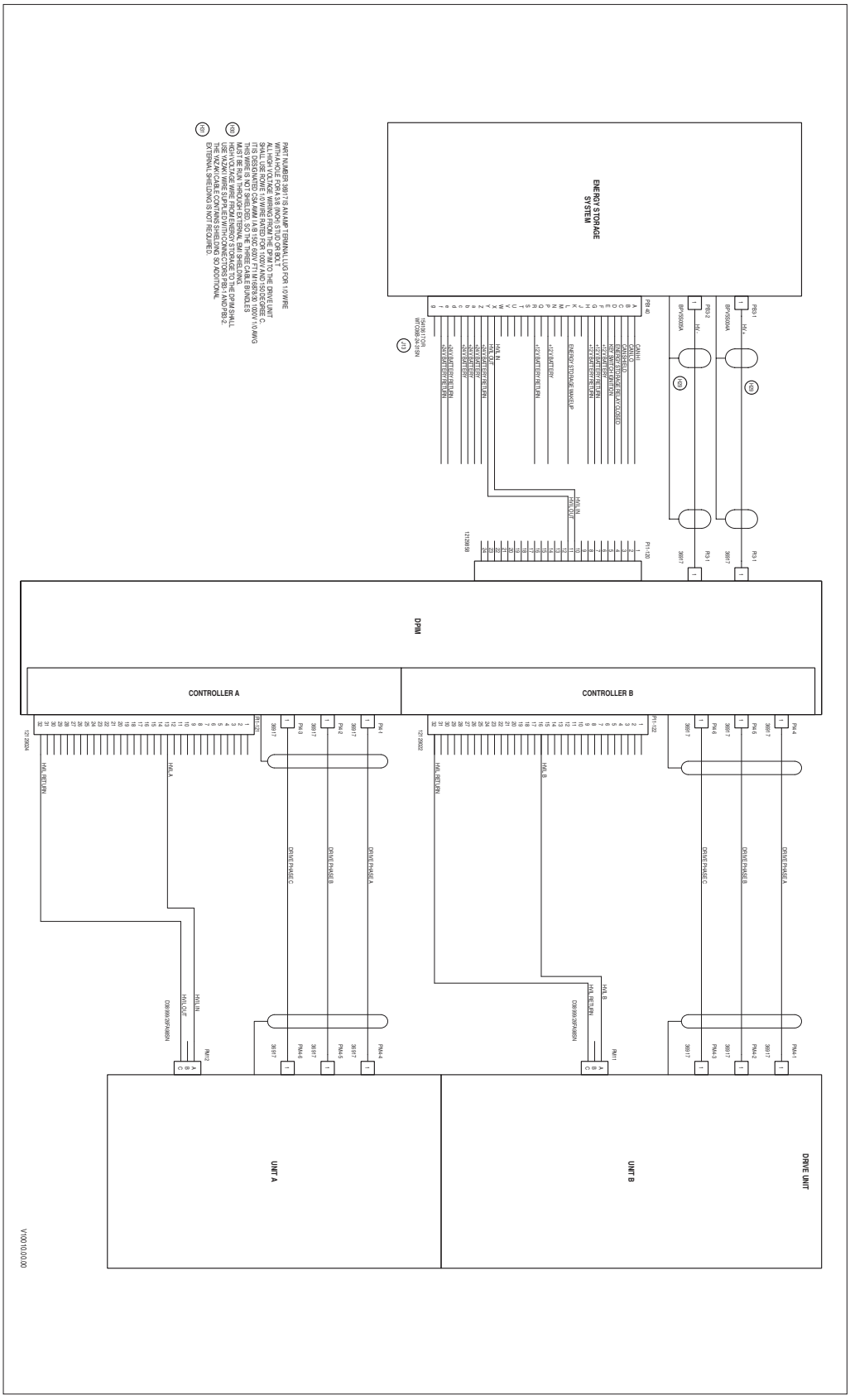



Figure H–5. Allison Electric Drive™ Wiring Schematic—HVIL

# RESOURCES: Wiring Schematic

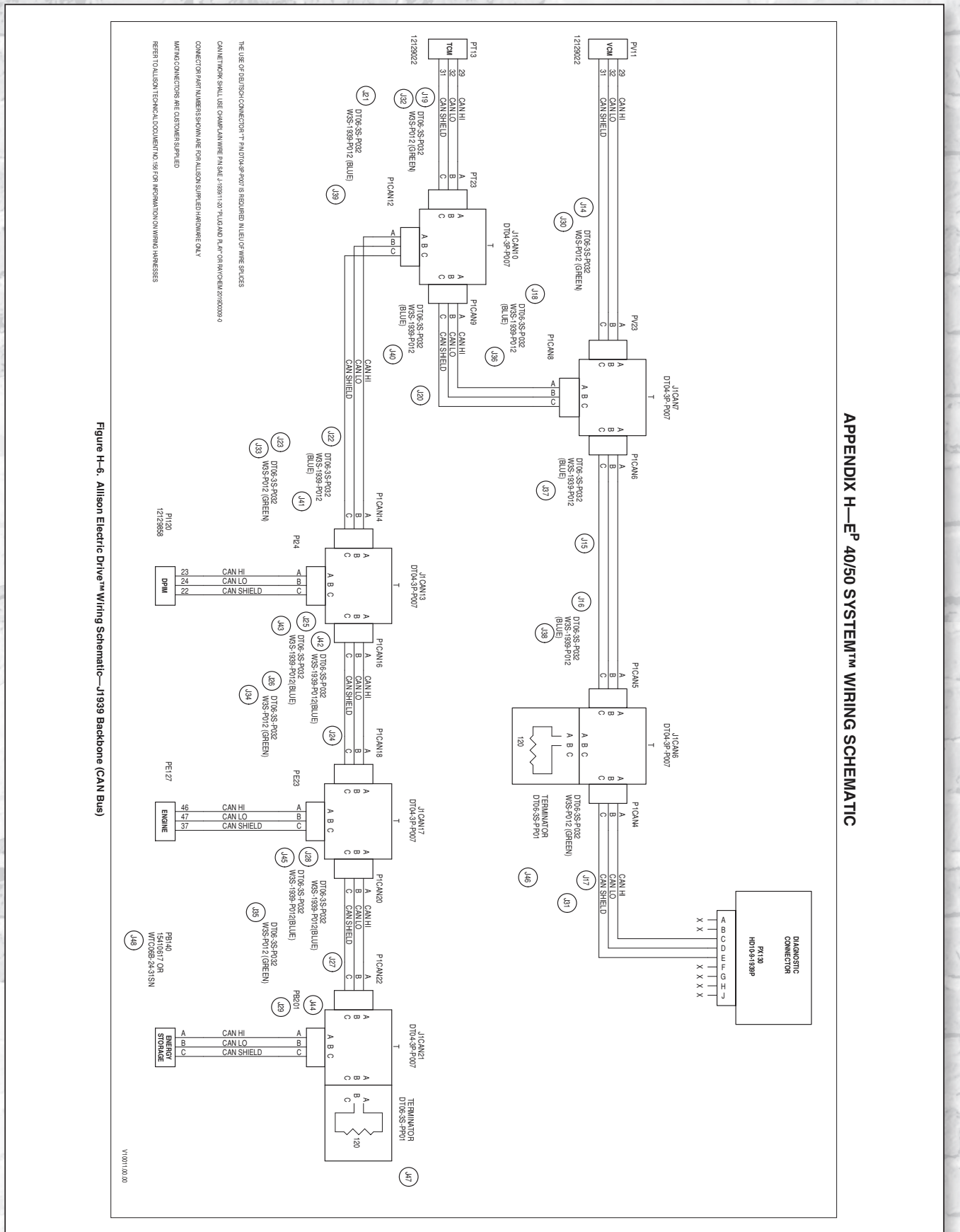
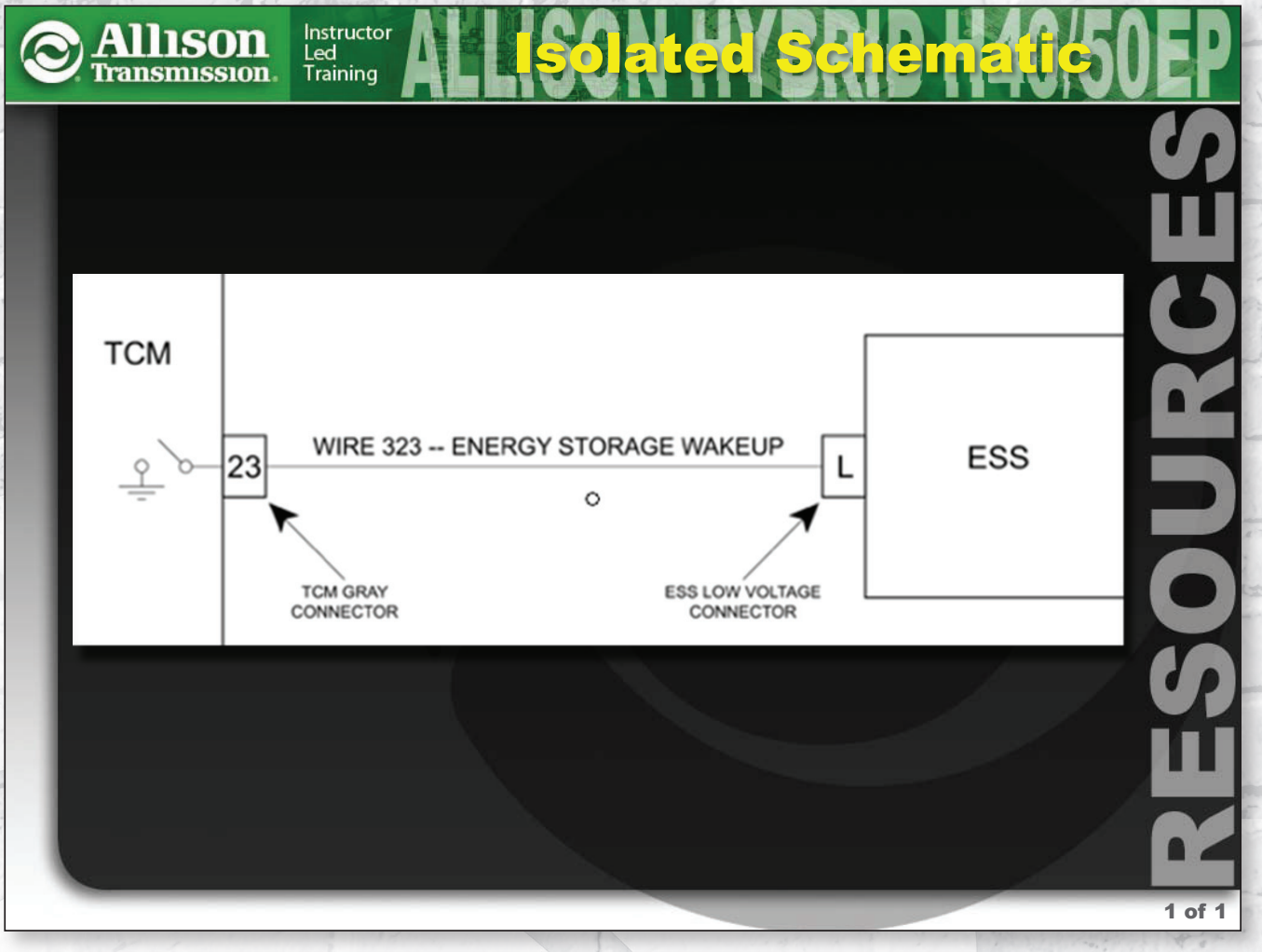



**Figure H–6. Allison Electric Drive™ Wiring Schematic—J1939 Backbone (CAN Bus)**

# RESOURCES: Isolated Schematic



# DIAGNOSTICS — TROUBLESHOOTING SCENARIOS

Allison Transmission Instructor Led Training

## Diagnostics – Troubleshooting Scenarios

## Scenario #2

- **Diagnostic Codes:**
  - *25-20, 44-19, 66-18, 66-19, 66-31, 66-32, 80-32.*
- **Codes with a 66 prefix are communications codes and should be diagnosed first.**
- **Use Allison DOC™ to:**
  - *Verify a missing wakeup signal.*
- **Perform pin out checks at the TCM and DPIM with the breakout box.**
- **Troubleshoot harness wires and relays for continuity problems.**


Code 66-18 in the TS Manual indicates starting with code 44-19 if present
Code 44-19 indicates a problem with TCM side of inverter wake-up relay
Wiring schematic shows TCM wire 428 carrying DPIM Wakeup Signal

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# RESOURCES: DTC 66-18 CAN Link Lost with Inverter A

**NOTE: This resource link has multiple pages and information changes frequently. Reference the source document for complete, current information.**

E$^{P}$ 40/50 SYSTEM™ TROUBLESHOOTING MANUAL

## DIAGNOSTIC TROUBLE CODES (DTC)

### DTC 66–18 CAN Link Lost With Inverter A

TCM has detected that Inverter A is not communicating on the CAN link for more than 120 milliseconds. The DTC will not be displayed on the PBSS.

**Causes:**

- CAN wiring integrity
- Loss of power / intermittent power to DPIM

**Tool Requirements:**

- Universal Electronic Breakout Box (J-39700)
- Breakout Harness (J-46711)
- Multimeter
- Allison DOC™ For PC (AED)

**Table 5–135. DTC 66–18 CAN Link Lost With Inverter A**

| Step | Action | Value(s) | Yes | No |
|---|---|---|---|---|
| 1 | Was the code logged in conjunction with DTC 44–19? | | *Follow troubleshooting procedure for DTC 44-19. DTC indicates a problem with the wake-up on the TCM side of the relay* | *Go to Step 2* |
| 2 | Was the code logged in conjunction with DTC 42–19? | | *Follow troubleshooting procedure for DTC 42-19. DTC indicates a problem with the wake-up on the TCM side of the relay* | *Go to Step 3* |
| 3 | Is the DTC active? | | *Go to Step 5* | *Go to Step 4* |
| 4 | Is there a customer complaint of disabled propulsion? | | *Go to Step 5* | *Clear code. Go to Step 15* |
| 5 | Check that all of the connectors are clean, the pins are good, and that their seals are intact. Clear codes.<br>Do the codes re-appear? | | *Go to Step 6* | *Go to Step 15* |
| 6 | Check for +12V on pins 1, 2, 5, and 6 on the DPIM 24-pin connector. Check for continuity to ground on pins 18, 19, 20, and 21 on the DPIM 24-pin connector.<br>Are both 12V and ground connections acceptable? | | *Go to Step 7* | *Make repairs as necessary. If DTC returns, go to Step 7; otherwise, go to Step 15* |

# RESOURCES: DTC 44-19 Inverter Wake Up Open or Short-to-Ground

**NOTE: This resource link has multiple pages and information changes frequently. Reference the source document for complete, current information.**

E$^{P}$ 40/50 SYSTEM™ TROUBLESHOOTING MANUAL

## DIAGNOSTIC TROUBLE CODES (DTC)

### DTC 44–19 Inverter Wake Up Open Or Short-to-Ground

If DTC 44–19 is associated with an open in the circuit, CAN link lost with Inverter controller A (DTCs 66–18 and 66–31) and Inverter controller B (DTCs 66–19 and 66–32) is expected. A short-to-ground may result in DPIM controllers remaining on.

**Complaints:**

- Vehicle propulsion disabled
- Low 12V if the problem is a short-to-ground

***NOTE:*** ***If DTC 44–19 is active at start-up and DTC 66–18 and 66–19 accompanies code, vehicle will not start.***

***NOTE:*** ***If DTC 44–19 occurs while driving, vehicle will continue to drive until the vehicle is keyed off.***

**Cause:**

- Bad wiring or connectors

**Tool Requirements:**

- Universal Electronic Breakout Box (J-39700)
- Breakout Harness (J-46711)
- Multimeter
- Allison DOC™ For PC (AED)
  - — Action Requests → Output Tests → Inverter Wake-up A and B

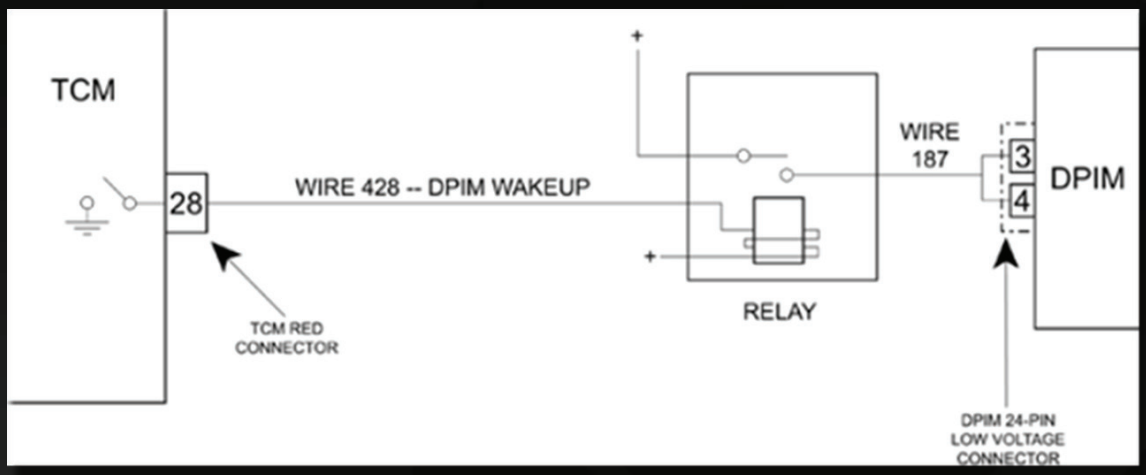
**Table 5–99. DTC 44–19 Inverter Wake-up Open Or Short-to-Ground**

| Step | Action | Value(s) | Yes | No |
|---|---|---|---|---|
| 1 | Is the code active? | | *Go to Step 3* | *Go to Step 2* |
| 2 | Is there a driver complaint? (DTC 66–31 and 66–32 will often be logged in conjunction with this code, both of which cause a **Check System** light) | | *Go to Step 3* | *Possible intermittent code. Go to Step 3* |
| 3 | Connect Allison DOC™ For PC (AED) to the vehicle.<br>Clear DTCs.<br>Using the Action Requests → Output Tests → Inverter Wake-up A and B, turn Inverter Wake-up A and B **ON** and **OFF**, and see if the DTC comes back as active.<br>Did DTC 44–19 return active, or did the Output Test fail to complete? | | *Go to Step 4* | *Intermittent fault. Go to Step 4* |
| 4 | Be sure the harness is tightly connected. If connected properly, disconnect the low voltage wiring harnesses at the TCM and the DPIM and check the connectors for corroded or damaged terminals. Clean or replace as necessary.<br>Were any repairs made? | | *Go to Step 7* | *Go to Step 5* |

# RESOURCES: Isolated Schematic

Allison Transmission Instructor Led Training

## Isolated Schematic




RESOURCES

1 of 1

Allison Transmission Instructor Led Training

Diagnostics – Troubleshooting Scenarios

## Scenario #3

- Diagnostic Code:
  - *73-32.*
- Use Allison DOC™ Data Monitor to view Motor A and B Temperature.
- Use the breakout box to perform pin out checks at the DPIM and Drive Unit.
- Use continuity checks to troubleshoot harness wires and relays.


The TS Manual recommends checking temperature values for Motors A & B

View Video | View Video | View Video | View Video | View PDF | View PDF

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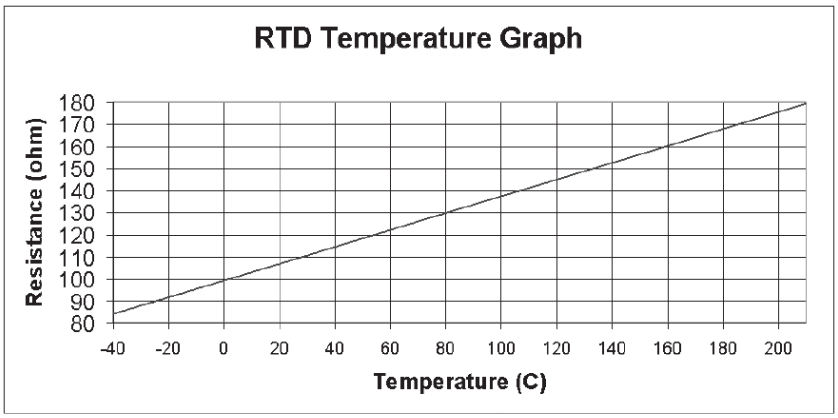
# RESOURCES: DTC 73-32 Inverter A Motor Temperature Out-of-Range High

**NOTE: This resource link has multiple pages and information changes frequently. Reference the source document for complete, current information.**

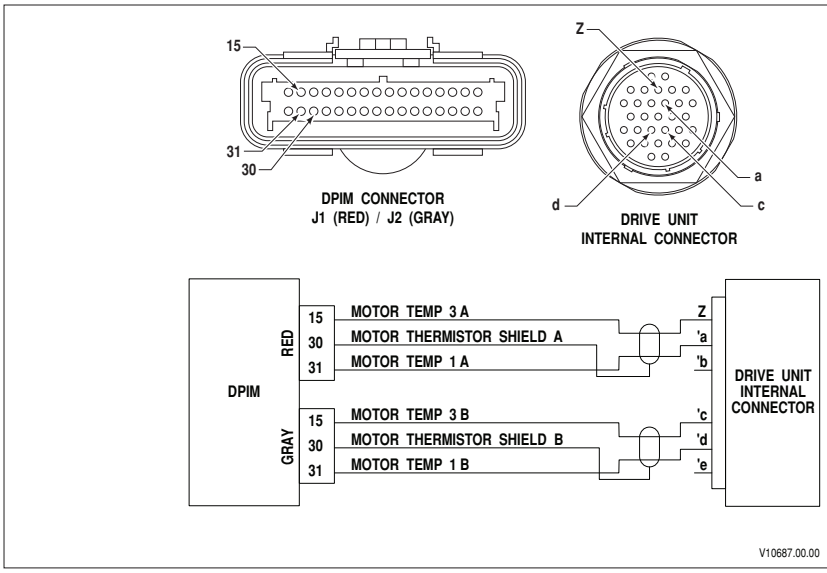
E$^{P}$ 40/50 SYSTEM™ TROUBLESHOOTING MANUAL

## DIAGNOSTIC TROUBLE CODES (DTC)

### DTC 73–32 Inverter A Motor Temperature Out-of-Range High




Resistance vs. Temperature




Chassis Harness

Allison Transmission

# DIAGNOSTICS — TROUBLESHOOTING SCENARIOS

# RESOURCES: DTC 76-61 Battery Subpack Software ID

E$^{P}$ 40/50 SYSTEM™ TROUBLESHOOTING MANUAL

## DIAGNOSTIC TROUBLE CODES (DTC)

### DTC 76–61 Battery Subpack Software ID

This code is triggered at start-up if any one of the BCIMs has a different software version than the rest of the controllers. Refer to the troubleshooting procedures for DTC 34–25.

**Table 5–264. DTC 76–61 Battery Subpack Software ID**

| Step | Action | Value(s) | Yes | No |
|---|---|---|---|---|
| 1 | Is the code active? | | *Refer to troubleshooting procedures for DTC 34–25* | *Contact AED Service Engineering* |

***NOTE:*** ***For additional troubleshooting procedures, refer to the Energy Storage System Service and Troubleshooting Manual (SM4162EN).***

# RESOURCES: DTC 34-25 BCIM Calibration ID Number Mismatch

E$^{P}$ 40/50 SYSTEM™ TROUBLESHOOTING MANUAL

## DIAGNOSTIC TROUBLE CODES (DTC)

### DTC 34–25 BCIM Calibration ID Number Mismatch

**Cause:**

- Software/calibration incompatibility. Incorrect component software or calibration loaded.

**Complaint:**

- Vehicle shutdown

**Tool Requirement:**

- TCM Reflashing Tool

**Table 5–69. DTC 34–25 BCIM Calibration ID Number Mismatch**

| Step | Action | Value(s) | Yes | No |
|---|---|---|---|---|
| 1 | Determine the correct SID for the vehicle.<br>Have you determined the correct SID? | | *Go to Step 2* | *Contact Allison Service Engineering for correct SID and then go to Step 2* |
| 2 | Connect TCM Reflashing Tool to the vehicle and recalibrate the entire system with the correct SID.<br>Did the code return? | | *Go to Step 3* | *System OK* |
| 3 | Is it only one code? | | *Go to Step 4* | *Go to Step 5* |
| 4 | Exchange controller that is triggering the code and recalibrate the vehicle.<br>Is this step complete? | | *Go to Step 6* | |
| 5 | If all of the codes have been triggered, swap out the TCM and recalibrate the vehicle.<br>Is this step complete? | | *Go to Step 6* | |
| 6 | In order to verify your repair:<br>1. Clear the DTC.<br>2. Did the DTC return? | | *Begin the diagnosis again. Go to Step 1* | *System OK* |

# DIAGNOSTICS — TROUBLESHOOTING SCENARIOS

Allison Transmission Instructor Led Training

## Diagnostics – Troubleshooting Scenarios

### Scenario #5

- Diagnostic Codes:
  - *23-14, 23-15, 23-18.*
- Vehicle is equipped with Allison 4th Generation Controls.
- Use SIL 20-EP-09 to troubleshoot.
- Use Allison DOC™ to:
  - *Verify missing PBSS signal.*
- Perform pin out checks at the PBSS wiring harness.
- Troubleshoot CAN Bus for problems.


Code 23-18 indicates PBSS signal loss of both CAN and PWM signals.

SIL 20-EP-09, Appendix C indicates wire 350 is used for PBSS wakeup signal on a 4th Gen TCM.

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View Graphic | View PDF | View PDF

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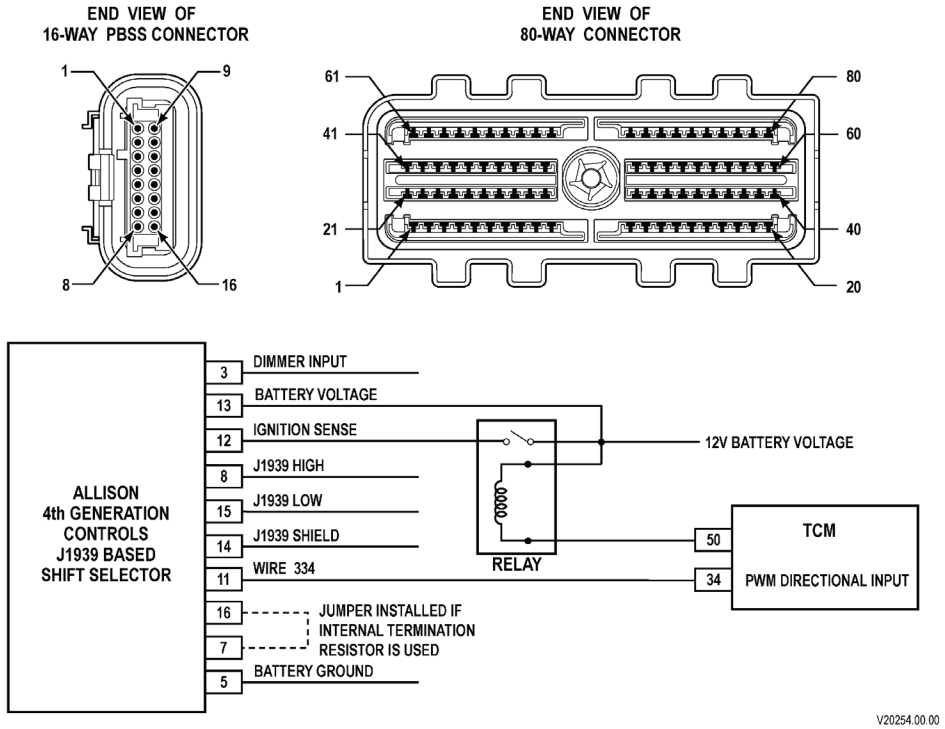
Allison Transmission

# RESOURCES: DTC 23-14 PBSS PWM Input Fault (No Range Info from PWM)

**NOTE: This resource link has multiple pages and information changes frequently. Reference the source document for complete, current information.**

SIL 20-EP-09, Rev. A
June, 2010
Product Code(s): 70, 71


## DTC 23-14 PBSS PWM Input Fault (No Range Info from PWM)




**Overview:**

Allison 4th Generation Controls shift selectors communicate with the Transmission Control Module (TCM) by exchanging standardized digital messages over the SAE J1939 Controller Area Network (CAN). The shift selectors are also equipped with a single wire backup to the J1939 CAN data link. Allison 4th Generation shift selectors transmit directional information (Forward, Neutral, and Reverse) in the form of an analog pulse-width modulated (PWM) signal via wire 334 to the TCM. The shift selector switches an internal driver **ON** and **OFF** to vary the duty cycle of the voltage on wire 334. When the driver in the shift selector is **ON**, the voltage on wire 334 is pulled to ground. When the driver is **OFF**, the driver's output is open and the voltage on wire 334 is high. Since duty cycle is measured when voltage is high, the driver's **OFF**-time determines the duty cycle. For example, if wire 334 duty cycle is 15 percent, the shift selector driver is **ON** (pulled low) 85 percent of the time and **OFF** (open) 15 percent of the time.

**Actions Taken When DTC Sets:**

When DTC 23-14 is active, the following conditions will occur:

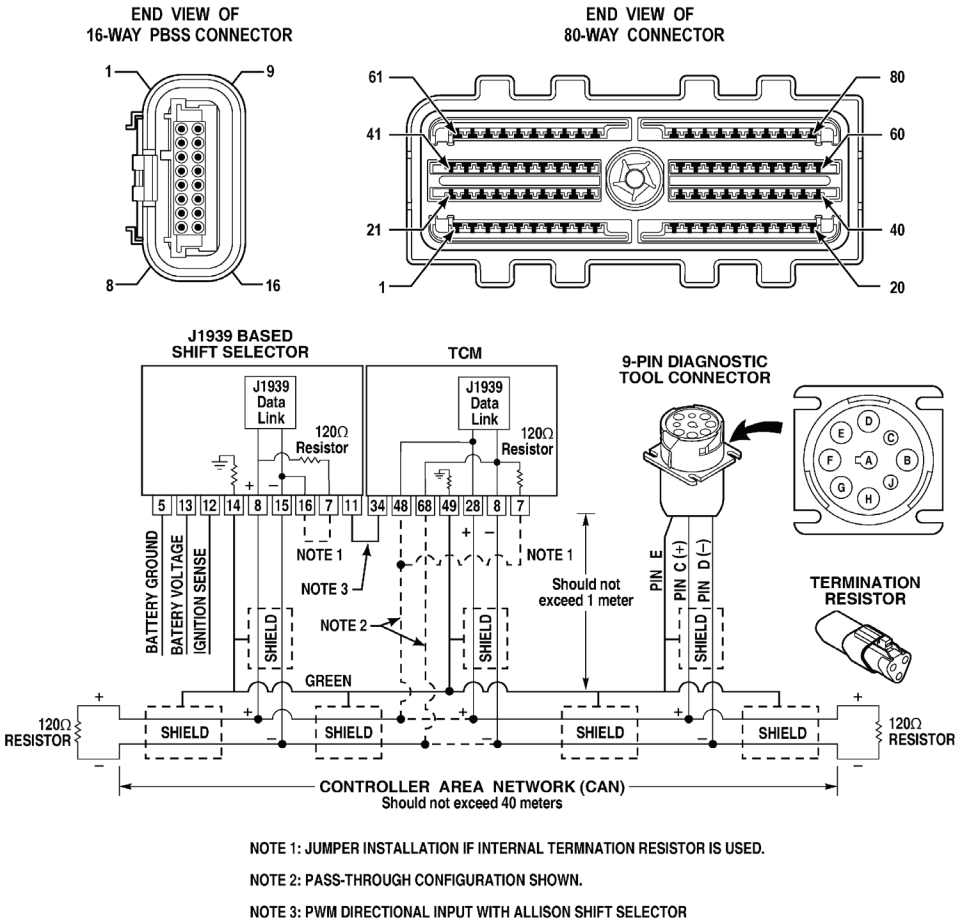
- **Check System** light illuminates

# RESOURCES: DTC 23-15 PBSS CAN Fault (No Range Info from CAN)

**NOTE: This resource link has multiple pages and information changes frequently. Reference the source document for complete, current information.**

SIL 20-EP-09, Rev. A
June, 2010
Product Code(s): 70, 71


## DTC 23-15 PBSS CAN Fault (No Range Info from CAN)




**Overview:**

The Push Button Shift Selector (PBSS) sends range selection data to the TCM via CAN communication. The PBSS also sends the range selection data to the TCM via a redundant PWM signal. PBSS TC1 fault means that no valid range could be determined from the TC1 message or that the TC1 message has timed out. CAN Link Lost with the PBSS or invalid CAN data.

**Actions Taken When DTC Sets:**

When DTC 23-15 is active, the following conditions will occur:

# RESOURCES: DTC 23-18 Communication Fault (No Range Info from CAN or PWM)

**NOTE: This resource link has multiple pages and information changes frequently. Reference the source document for complete, current information.**

SIL 20-EP-09, Rev. A
June, 2010
Product Code(s): 70, 71
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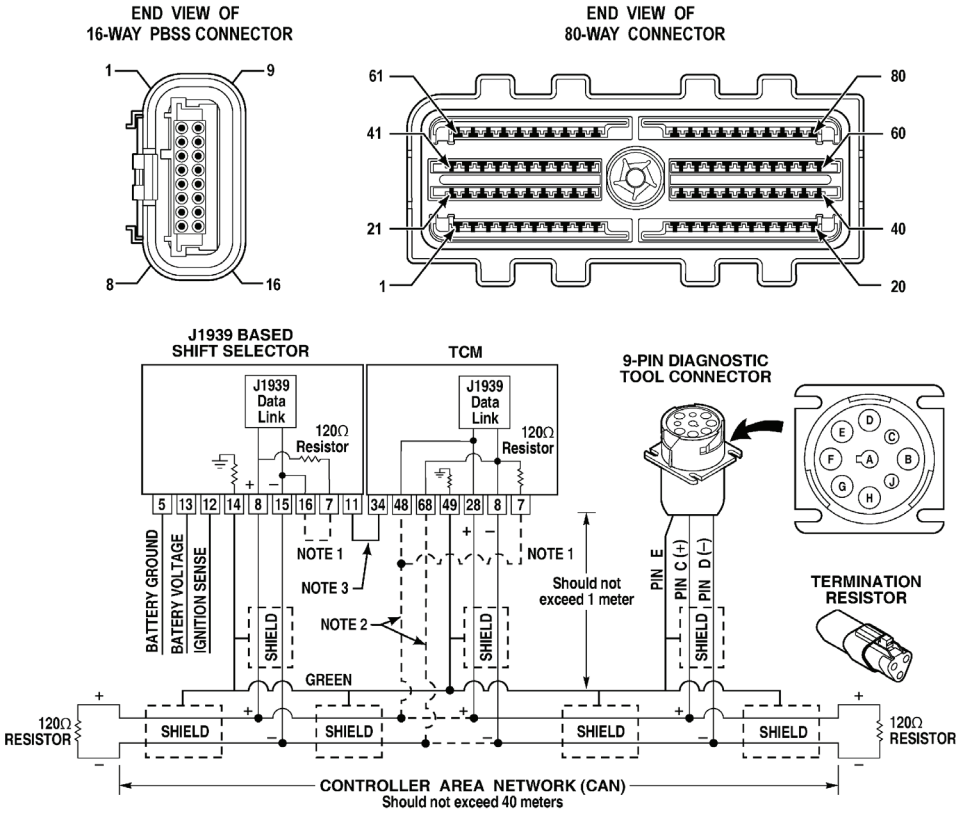
## DTC 23-18 PBSS Communication Fault (No Range Info from CAN or PWM)




NOTE 1: JUMPER INSTALLATION IF INTERNAL TERMNATION RESISTOR IS USED.

NOTE 2: PASS-THROUGH CONFIGURATION SHOWN.

NOTE 3: PWM DIRECTIONAL INPUT WITH ALLISON SHIFT SELECTOR

99796

**Overview:**

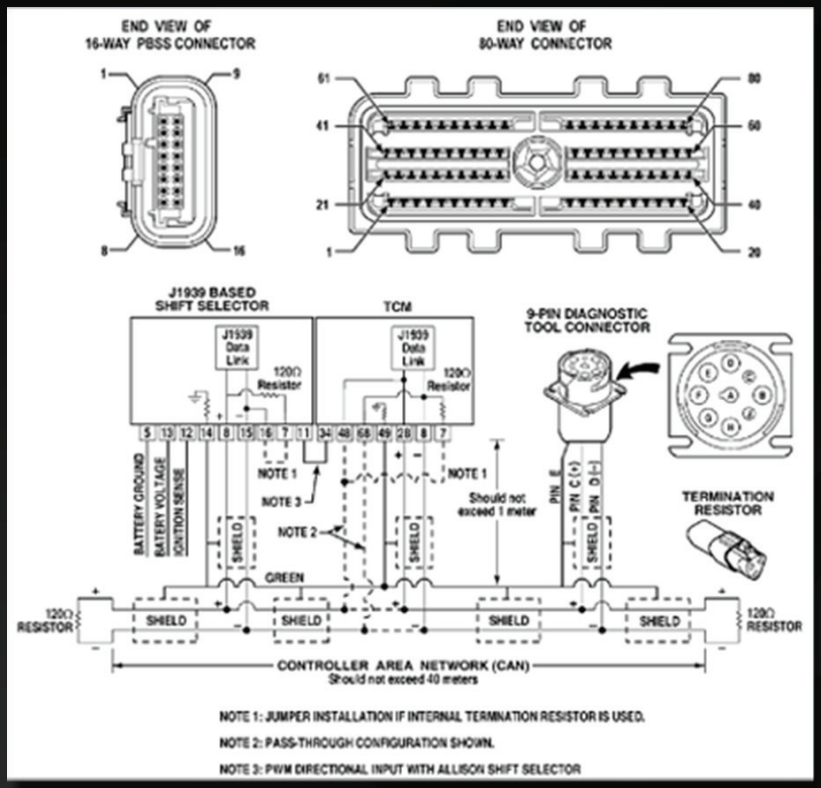
The Push Button Shift Selector (PBSS) sends range selection data to the TCM via CAN communication. The PBSS also sends the range selection data to the TCM via a redundant Pulse Width Modulated (PWM) signal. PBSS Communication fault means that no valid range could be determined from either the CAN signal or the PWM backup signal.

This code will set when DTC 23-14 and DTC 23-15 are active.

# RESOURCES: Isolated Schematic

Allison Transmission. Instructor Led Training

## Isolated Schematic




RESOURCES

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# RESOURCES: Allison Hybrid Wiring Reference Tables

**NOTE: This resource link has multiple pages and information changes frequently. Reference the source document for complete, current information.**

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## Appendix C. AED Wiring Reference Tables

**Table 6. TCM**

| DESCRIPTION | PRE 4TH GEN CONNECTOR | PRE 4TH GEN GM WIRE NO. | PRE 4TH GEN WIRE NO. | PRE 4TH GEN PIN NO. | 4TH GEN WIRE NO. | 4TH GEN PIN NO. |
|---|---|---|---|---|---|---|
| +12V BATTERY RETURN | Gray TCM | 138-PT13-1 | 301 | 1 | 309 | 9 |
| IGNITION | Gray TCM | 101B-PT13-2 | 302 | 2 | 363 | 63 |
| +12V BATTERY | Gray TCM | 139-PT13-3 | 303 | 3 | 310 | 10 |
| +12V BATTERY | NA | NA | NA | NA | 370 | 70 |
| IGNITION | Gray TCM | 101C-PT13-4 | 304 | 4 | NA | NA |
| TCM ID (+12V BATTERY RETURN) | Gray TCM | 252-PT13-11 | 311 | 11 | 362 | 62 |
| ESS PRE-TUNNEL CHARGE | Gray TCM | 255-PT13-6 | 306 | 6 | 323 | 23 |
| STATION MODE | Gray TCM | 240-PT13-7 | 307 | 7 | 302 | 2 |
| FRONT OPERATION MODE 1 | Gray TCM | 143-PT13-8 | 308 | 8 | 343 | 43 |
| FRONT OPERATION MODE 2 | Gray TCM | 144-PT13-9 | 309 | 9 | 322 | 22 |
| +12V BATTERY RETURN | Gray TCM | 140-PT13-5 | 305 | 5 | 362 | 62 |
| FAST IDLE | Gray TCM | 145-PT13-12 | 312 | 12 | 342 | 42 |
| AUX FUNCTION RANGE INHIBIT | Gray TCM | 220-PT13-13 | 313 | 13 | 301 | 1 |
| ENERGY STORAGE RELAY CLOSED | Gray TCM | 146-PT13-14 | 314 | 14 | 379 | 79 |
| OIL LEVEL SENSOR SIGNAL | Gray TCM | 147-PT13-15 | 315 | 15 | 316 | 16 |
| OIL LEVEL SENSOR EXCITATION (SUPPLY) | Gray TCM | 148-PT13-17 | 317 | 17 | 312 | 12 |
| OIL LEVEL SENSOR RETURN (ANALOG RETURN) | Gray TCM | 170-PT14-20 | 420 | 20 | 358 | 58 |
| AUX BRAKE INDICATOR | Gray TCM | 150-PT13-20 | 320 | 20 | 304 | 4 |
| OUTPUT SPEED INDICATOR | Gray TCM | 151-PT13-22 | 322 | 22 | 345 | 45 |
| ENERGY STORAGE WAKEUP | Gray TCM | 152-PT13-23 | 323 | 23 | 305 | 5 |
| ENGINE WAKEUP | Gray TCM | 153-PT13-24 | 324 | 24 | 324 | 24 |
| SPEEDOMETER SIGNAL | Gray TCM | 154-PT13-26 | 326 | 26 | 325 | 25 |
| CAN HI | Gray TCM | 155-PT13-29 | 329 | 29 | 328 | 28 |
| CAN SHIELD | Gray TCM | 156-PT13-31 | 331 | 31 | 349 | 49 |
| CAN LO | Gray TCM | 157-PT13-32 | 332 | 32 | 308 | 8 |
| C1 PRESSURE SWITCH | Red TCM | 158-PT14-1 | 401 | 1 | 357 | 57 |
| FAST IDLE 2 | Red TCM | 160-PT14-5 | 405 | 5 | 361 | 61 |

# RESOURCES: TCM 4th Generation Wiring

## Appendix D. 4th Gen Wiring

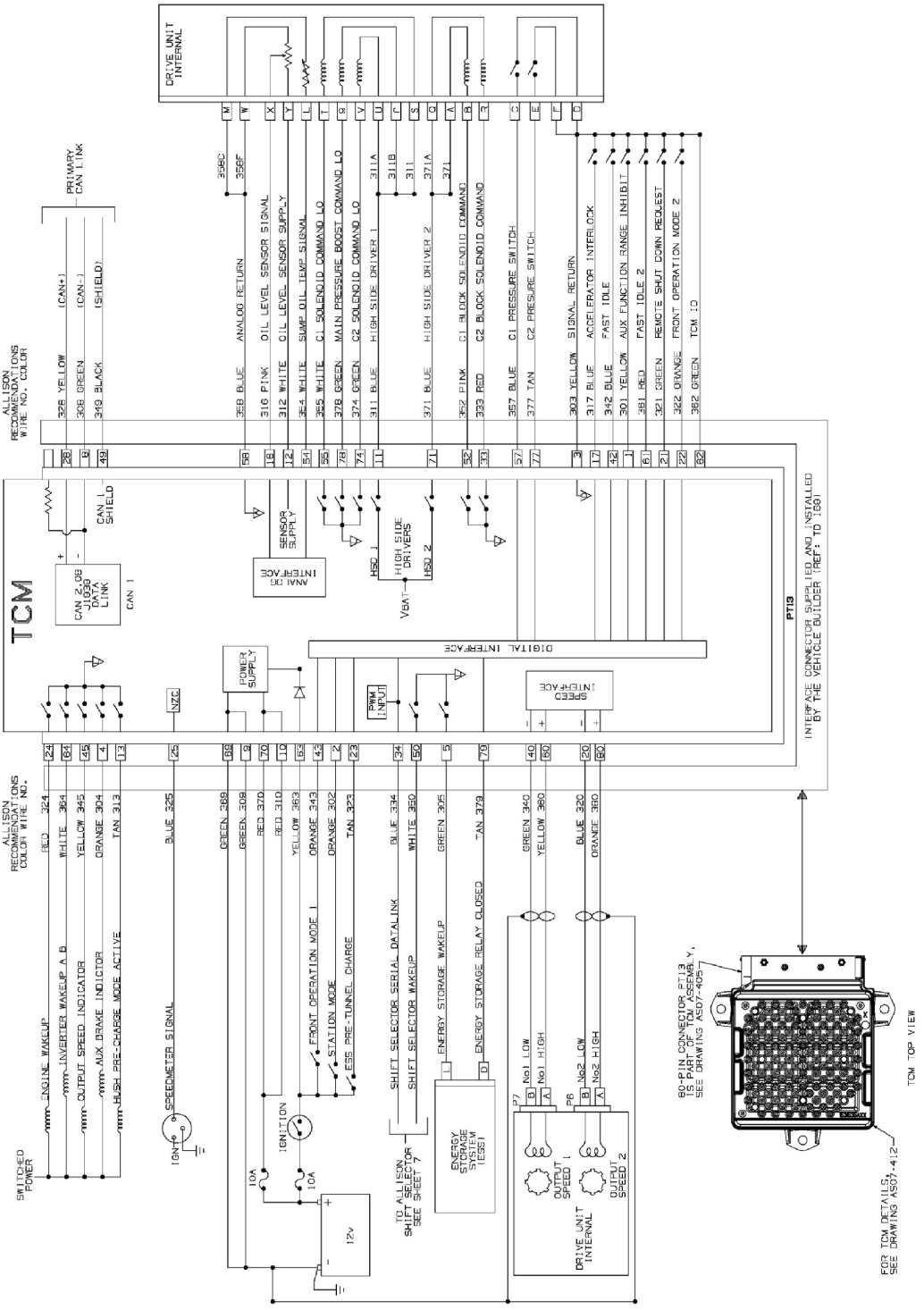


**Figure 8. TCM 4th Generation Wiring**

# RESOURCES: VCM 4th Generation Wiring

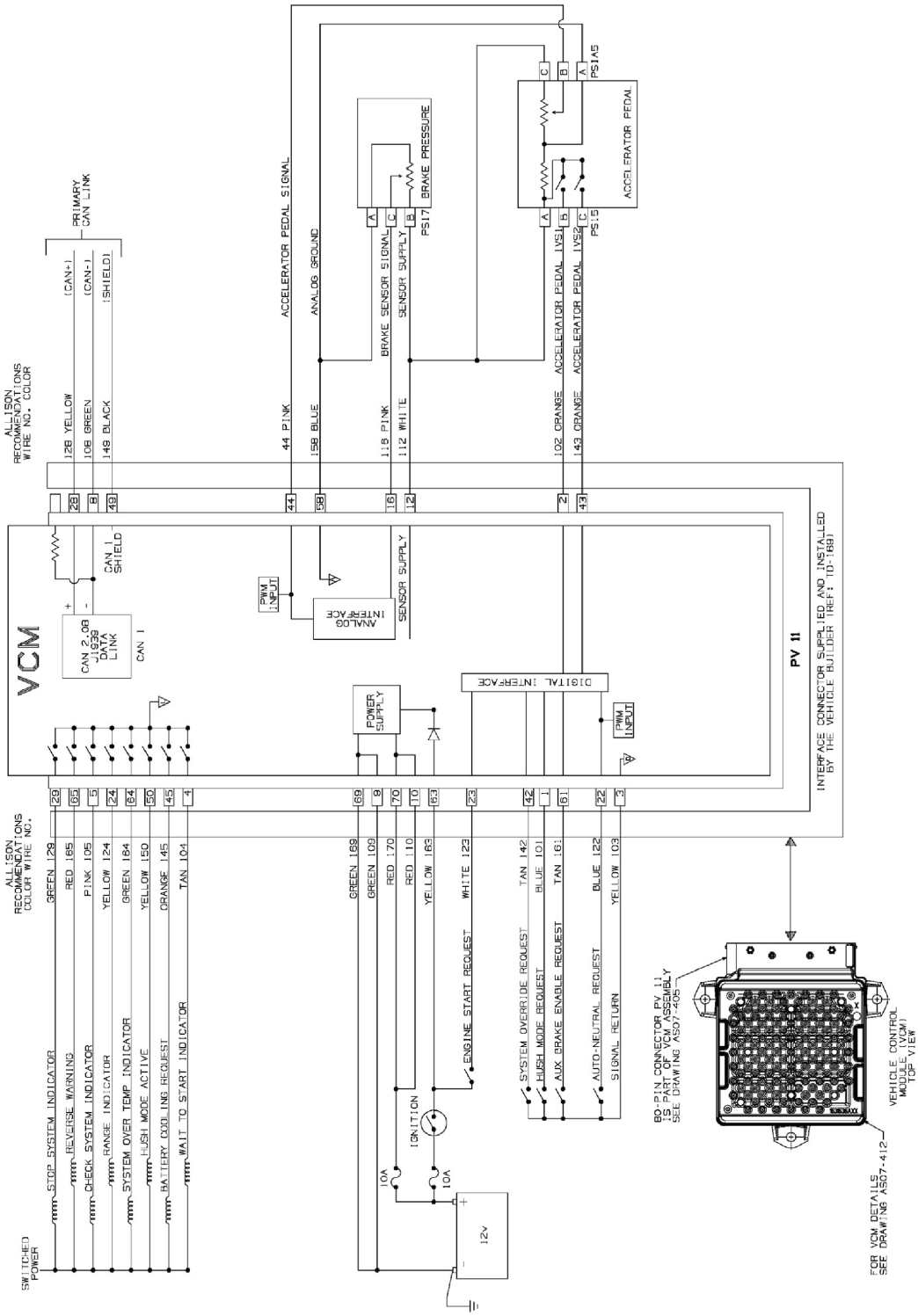


**Figure 9. VCM 4th Generation Wiring**

# RESOURCES: DPIM 4th Generation Wiring

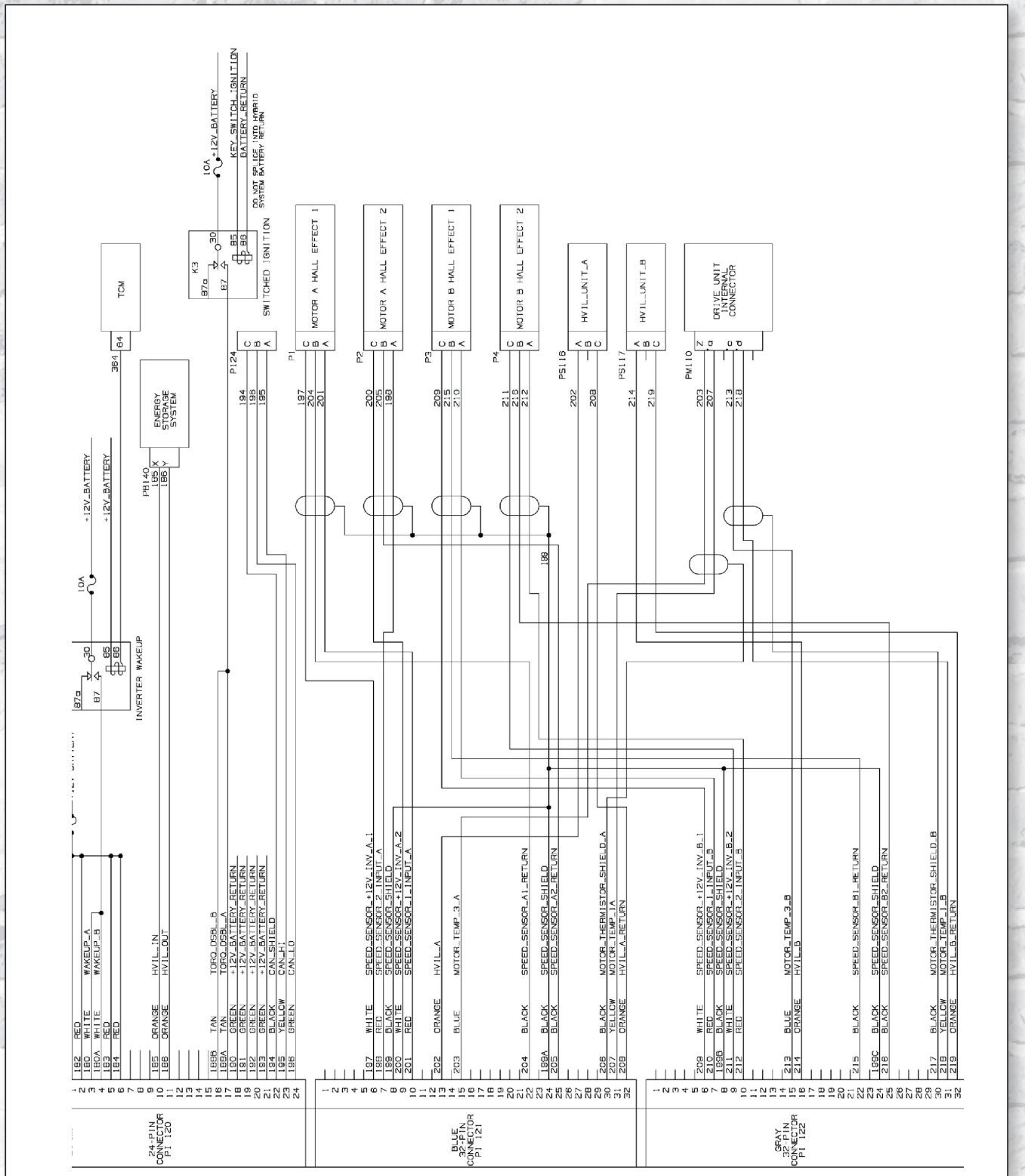


**Figure 10. DPIM 4th Generation Wiring**

# RESOURCES: ESS 4th Generation Wiring

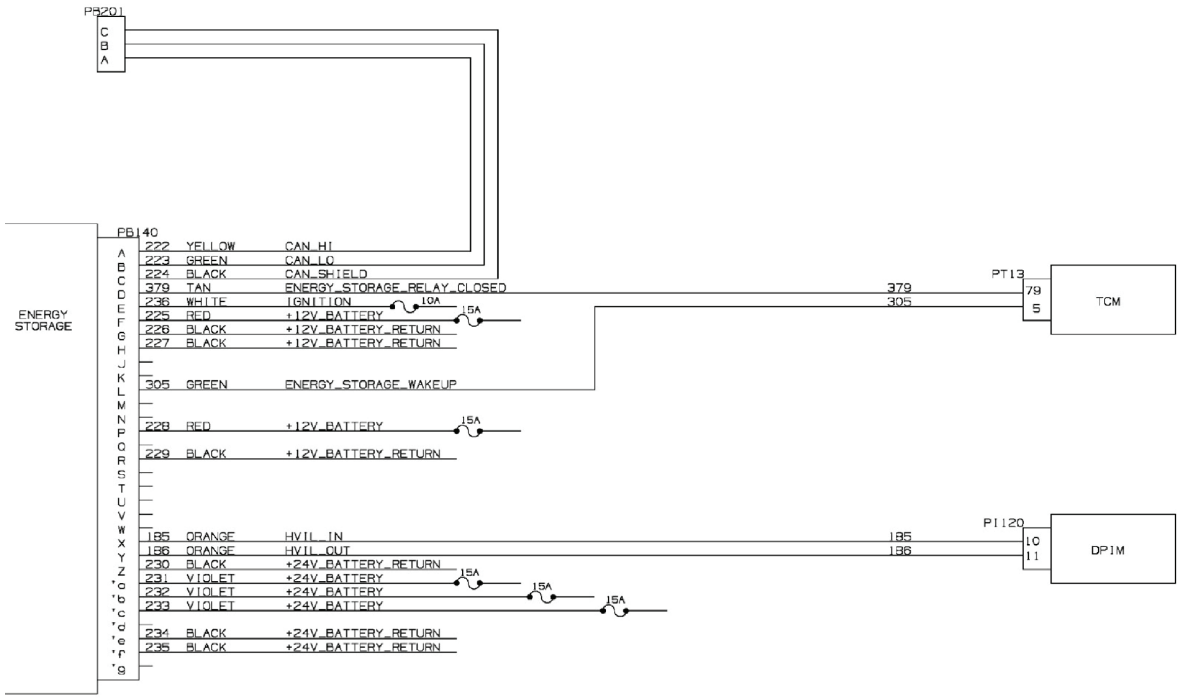


**Figure 11. ESS 4th Generation Wiring**

# RESOURCES: CAN & PBSS 4th Generation Wiring

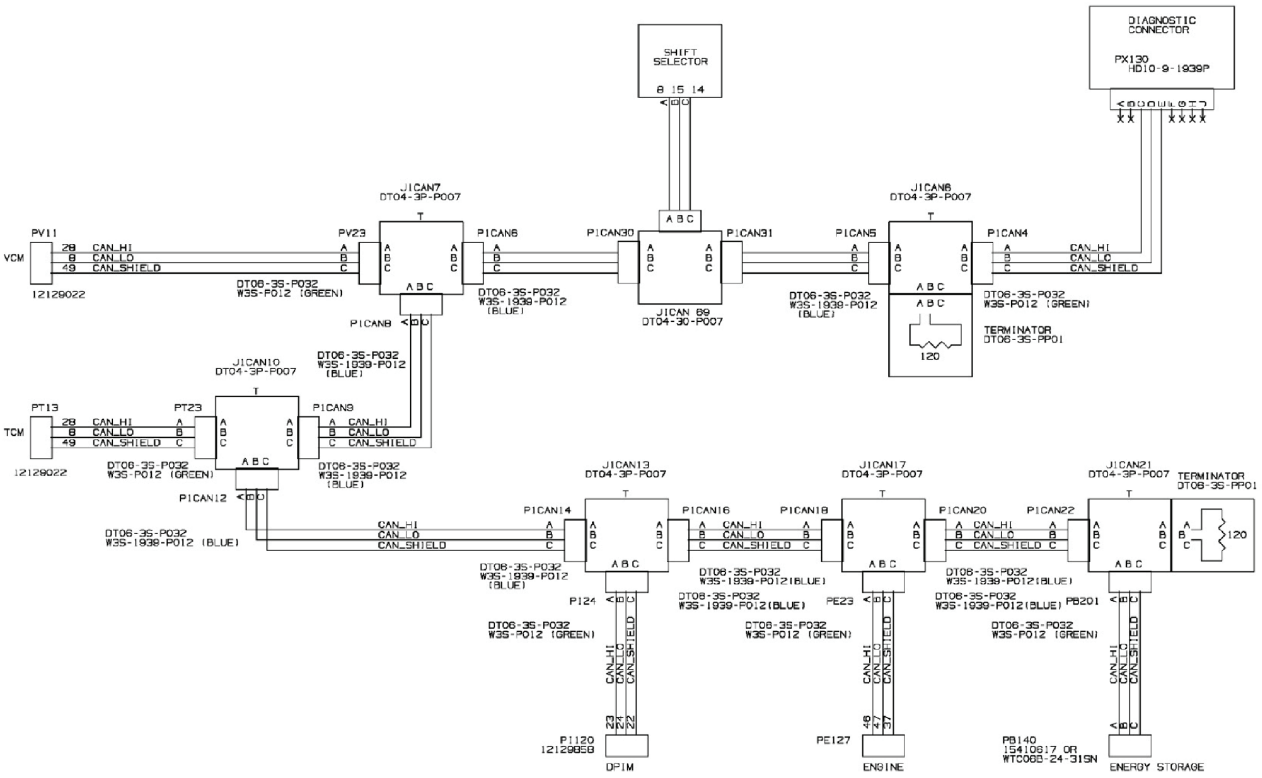


**Figure 12. CAN 4th Generation Wiring**

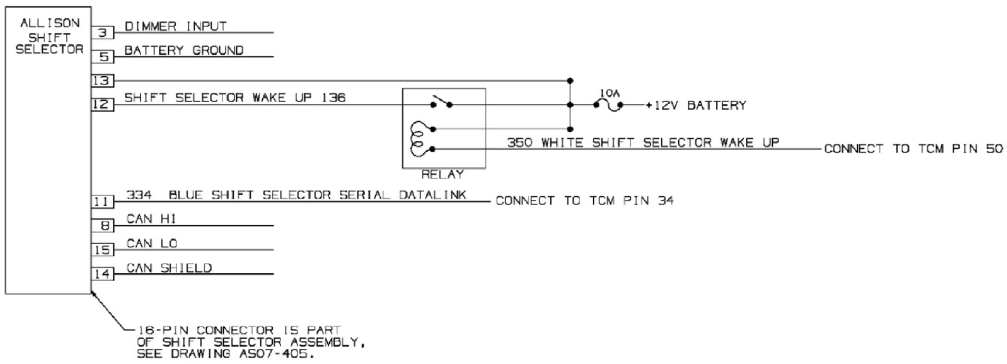


**Figure 13. PBSS 4th Generation Wiring**

Allison Transmission Instructor Led Training

ALLISON HYBRID H40/50EP

## Diagnostics – Troubleshooting Scenarios

### Scenario #6

- Diagnostic Codes:
  - *66-40.*
- Vehicle is equipped with Allison 4th Generation Controls.
- Use SIL 20-EP-09 to troubleshoot.
- Use Allison DOC™ to:
  - *Clear code and verify it remains active*
- Use TCM Reflash to reload system calibration.
- Inspect wiring at the Drive Unit fan controller.
- Perform CAN bus resistance checks.


Code 66-40 indicates CAN signal loss to OEM installed Drive Unit fan controller.

View Video | View Video | View Video | View Video | View PDF | View Graphic
View PDF | View PDF

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# RESOURCES: DTC 66-40 CAN Link Lost with Fan Drive Controller

**NOTE: This resource link has multiple pages and information changes frequently. Reference the source document for complete, current information.**

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## DTC 66-40 CAN Link Lost with Fan Drive Controller

**Overview:**

TCM has detected that the Fan Drive Controller is not communicating on the CAN link.

**Actions Taken When DTC Sets:**

- None

**Causes:**

- Loss of power or ground to the fan drive controller
- Incorrect SID
- CAN Wiring Integrity

**Tool Requirements:**

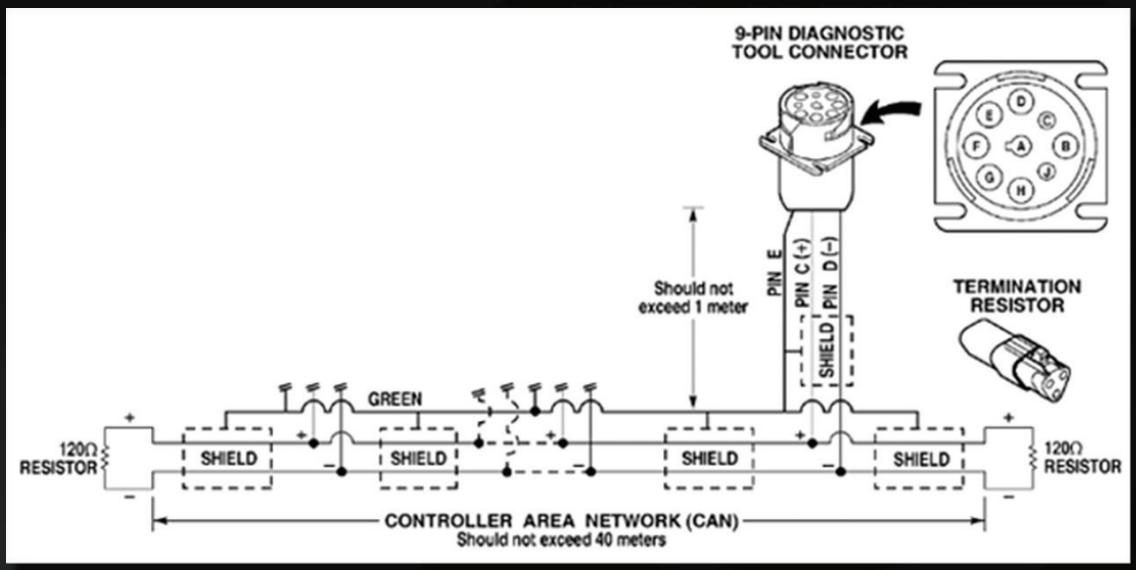
- Allison DOC® For PC (AED)
- J-39700 Universal Electronic Breakout Box
- J-47275 Breakout Harness 4th Gen TCM/VCM
- J-46708 Multimeter

| Step | Action | Value(s) | Yes | No |
|---|---|---|---|---|
| 1 | 1. Install Allison DOC® For PC (AED).<br>2. Start the engine.<br>3. Record the DTC failure record data.<br>4. Monitor TCM ignition voltage.<br>Is the voltage within the specified values? | 9–18V | *Go to Step 3* | *Resolve voltage problem. Go to Step 11* |
| 2 | Is code 66-40 active? | | *Go to Step 4* | *Go to Step 3* |
| 3 | 1. Clear the DTC.<br>2. Attempt to duplicate the conditions in the failure record (mode, temperature, etc.)<br>Does code 66-40 return? | | *Go to Step 4* | *System OK* |
| 4 | Determine the correct SID for the vehicle.<br>Does the vehicle contain the correct SID? | | *Go to Step 6* | *Go to Step 5* |
| 5 | Connect TCM Reflashing Tool to the vehicle and recalibrate the entire system with the correct SID.<br>Was the entire vehicle reflash successful? | | *Go to Step 11* | *Attempt a single device load for any components that failed to load.* |

# RESOURCES: Isolated Schematic

Allison Transmission. Instructor Led Training

## Isolated Schematic




RESOURCES

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Allison Transmission.