WELDON
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V-MUX® Troubleshooting Checklist

2015

Checklist for troubleshooting V-MUX communications

1. Verify how many nodes are installed in the system from the vehicle V-MUX Report or the Vista display.

2. 'Ping' the nodes from Diagnostics to determine which do or do not 'Reply'.

If a node does not Reply to a Ping

3. for the Input/Output nodes -- Hercules, Mini 4x12, 8x16 -- Check the Green and Red LED status lights
   - Green light (status: blinking = On) to verify Power/Ground
   - Green light (status: heartbeat pattern) to verify it is programmed
   - Check Red Receive (Rx) light for network activity; Rx light flickers at least every 4 seconds
   - Check Red Transmit (Tx) for a possible "OUT OF NETWORK" distress signal; Tx light flickers every four seconds.
4. for the Display nodes -- Vista III, Vista IV:
   - The Vista display nodes indicate readiness with their various menu screens.

Check the Tee junctions at the affected nodes (see next page)

5. Tee junction quality:
   - pinned properly -- A = White wire, B= Black wire, C = shield wire
   - no moisture/corrosion visible
   - all inserts are locked in place
6. Split the network into smaller segments at the Tees:
   - Measure with a meter that the harness wires (A,B,C) are open circuit when fully disconnected from Tees and nodes
   - At a single V-MUX node the A/B pins should have high node resistance (180K Ω or above)

   By node type, Third generation nodes will measure about 180K Ω between A/B
   - Hercules-04 about 180K Ω
   - 8x16 about 180 K Ω

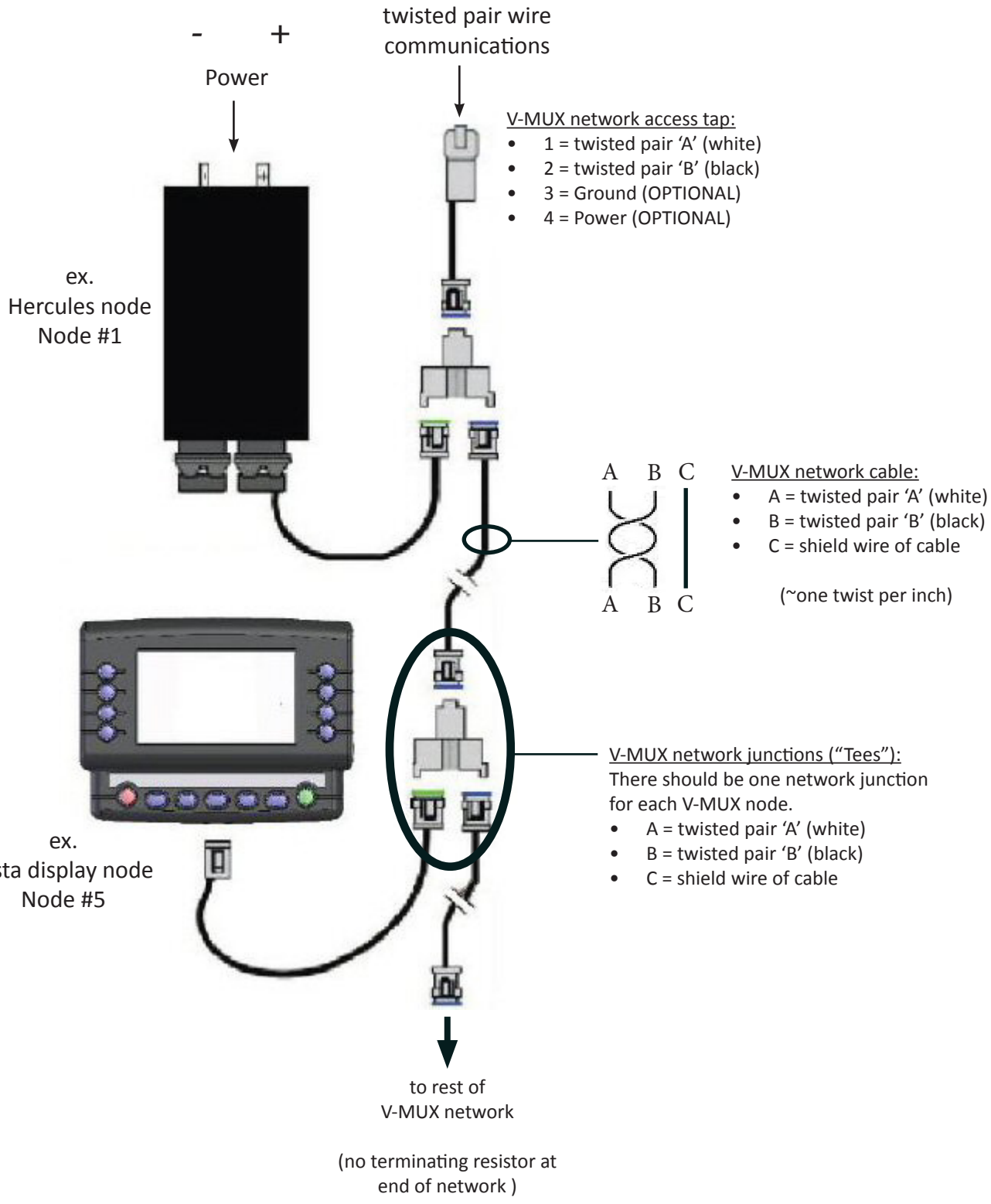
   By node type, Fourth generation nodes will measure above 300K Ω between A/B
   - Hercules 6060 about 315K Ω
   - Vista IV 6241 about 315 K Ω
   - VDR 6444 about 430 K Ω

   - In a network of nodes the A/B wires should <u>at a minimum</u> measure the following

     Network Resistance Ohms (Ω) $R_{TOTAL} = (180K\ \Omega) \div (\text{number of nodes})$

7. Verify that there is <u>no terminating resistor</u> in the V-MUX network. V-MUX is different from CAN networks and does not use cable termination.

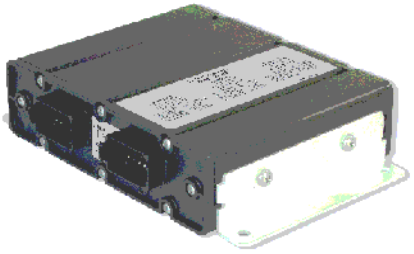
typical V-MUX layout with Tee junctions



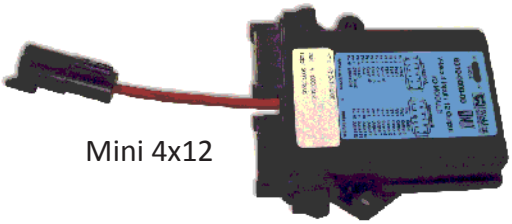
Identifying the basic V-MUX Node Types

General Input/Output nodes for switches and wired sensor inputs (Temperature, Pressure, etc...):
Hercules, Hercules HC, Mini 4x12, 8x16

Hercules



8x16



Mini 4x12

Hercules HC

Climate Control Module

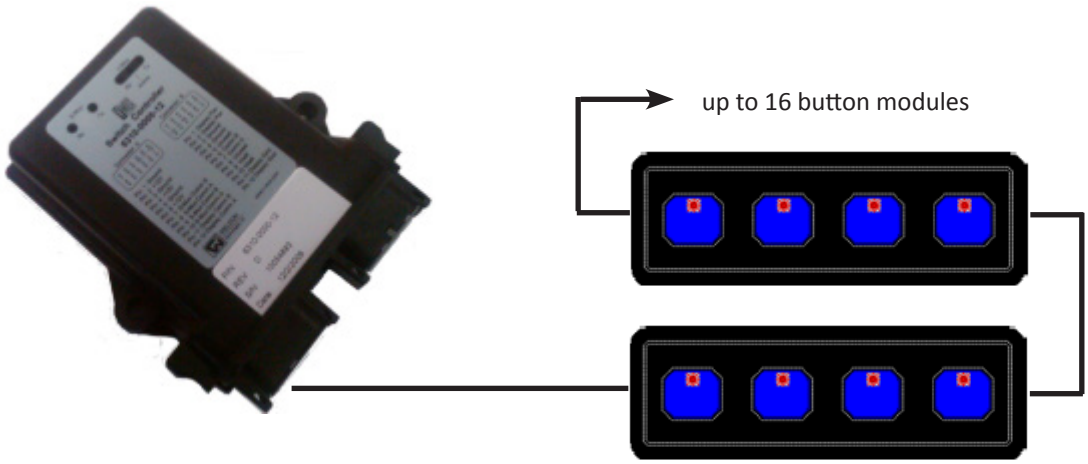
Vista IV Display interface, with pushbutton and/or Touchscreen housing:

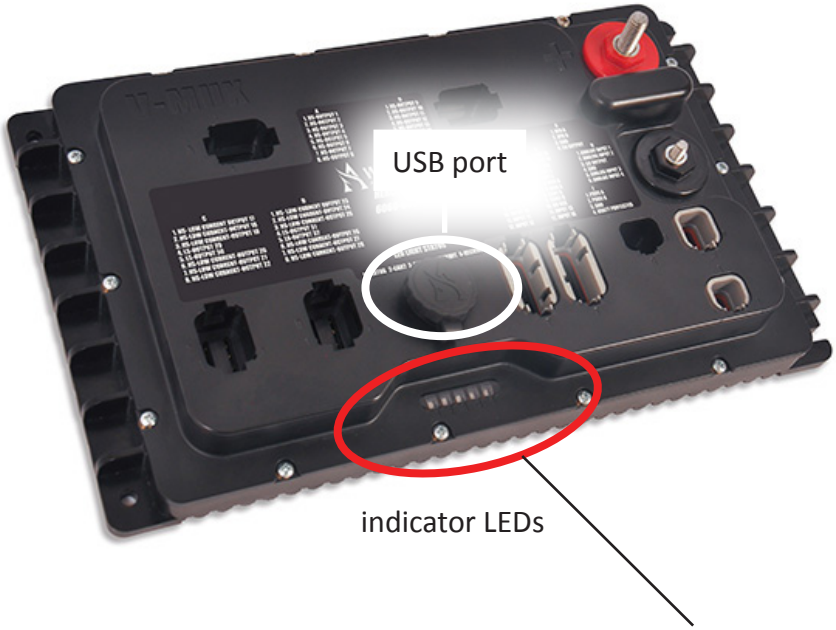
Vista IV
Standard housing

Vista IV
Touchscreen

6444 Vehicle Data Recorder and 6204 Occupant Indicator:

6310 PODS controller and button modules:





Indicator LEDs are located just under the USB program port.
The Green status light indicates if the node is programmed.

<u>Green light: three patterns</u>

1. **PROGRAMMED** -- A 'Heartbeat' flash pattern indicates the node has a program in memory. The programmed node will be able to communicate with other nodes and will reply to diagnostic Pings.
2. **UN-PROGRAMMED** -- A rapid 3-blink pattern, with a pause between each repeat, indicates there is no program in the node memory. The unprogrammed node will not communicate with other nodes and will not reply to diagnostic Pings.
3. PROGRAM LOADING -- A continuous very rapid blink for the duration of the program transfer -- which is about three seconds. A flash drive must be plugged into the USB port for the 'program loading' transfer to take place.

Any other behavior of the Green light, such as a solid light On or no light at all, indicates that the node is damaged or at extreme low Voltage.

<u>(5) indicator LEDs</u>

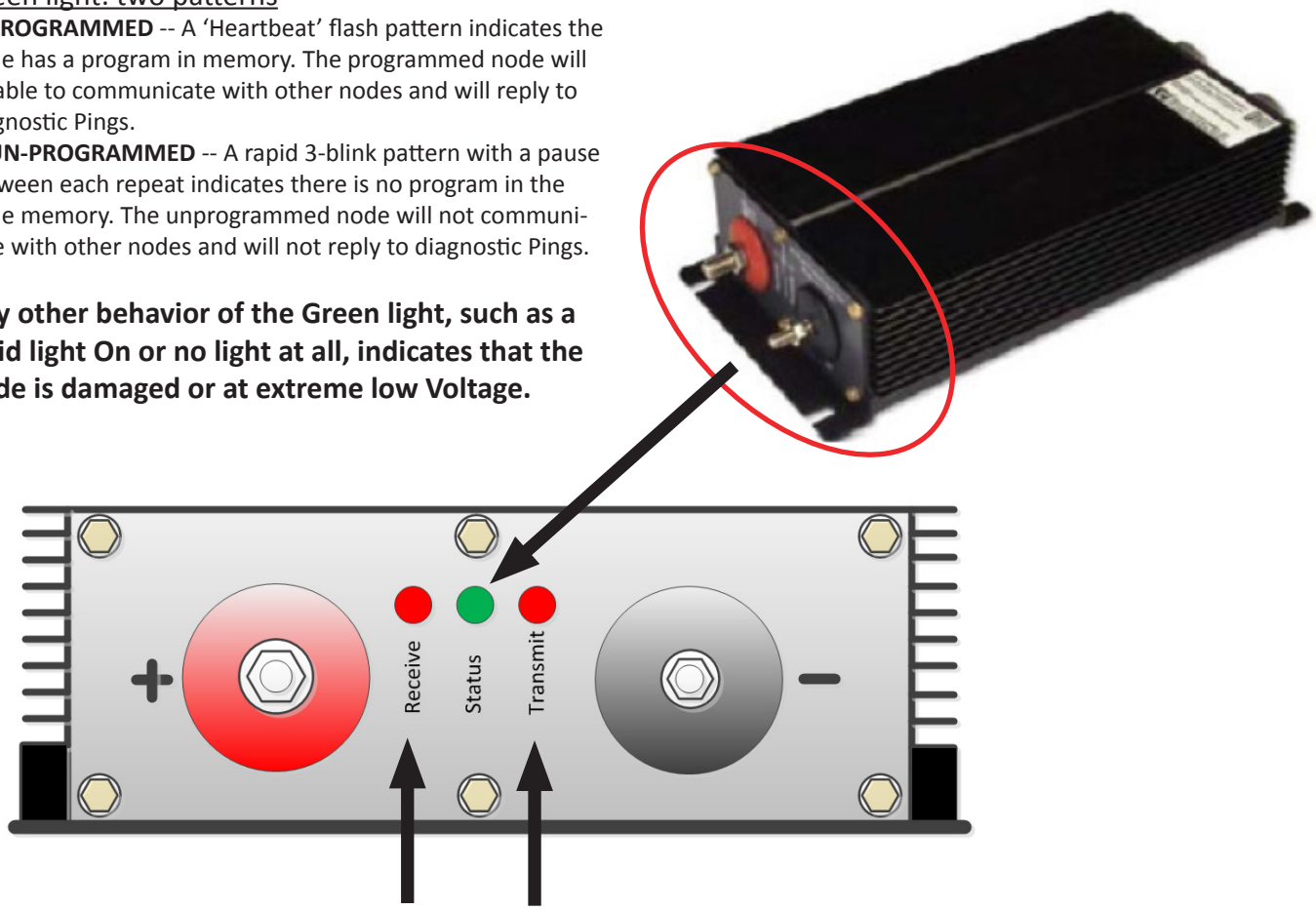
1. Green: program status
2. Red: CAN 1 activity
3. Red: CAN 2 activity
4. Red: V-MUX receive
5. Red: V-MUX transmit

Indicator LEDs are located between the node Power and Ground studs. The Green status light indicates if the node is programmed.

<u>Green light: two patterns</u>

1. **PROGRAMMED** -- A 'Heartbeat' flash pattern indicates the node has a program in memory. The programmed node will be able to communicate with other nodes and will reply to diagnostic Pings.
2. **UN-PROGRAMMED** -- A rapid 3-blink pattern with a pause between each repeat indicates there is no program in the node memory. The unprogrammed node will not communicate with other nodes and will not reply to diagnostic Pings.

Any other behavior of the Green light, such as a solid light On or no light at all, indicates that the node is damaged or at extreme low Voltage.



The two Red status lights (Transmit / Receive) indicate node communication with the V-MUX network.

Unlike the Green light which will have a set pattern, the Red 'Receive' and 'Transmit' lights should flicker intermittantly, depending on the amount of network traffic. The absolute minimum amount of network traffic on a normal V-MUX network is at least one message every four seconds.

There are two normal behaviors observable for the Red lights:
1. The lower Red receive light (Rx) flickers by itself due to network activity. The node is receiving network messages from other V-MUX nodes. There is no transmit involved so the Tx light will be Off.
2. Both the upper and lower Red lights (Rx/Tx) flicker together, indicating the node has transmitted a message. The reason for both Tx and Rx lighting at the same instant is that every Hercules node receives its own messages, known as the 'local echo'.
IMPORTANT: Every V-MUX node expects to hear the 'SYNC' message at least every four seconds. If the SYNC message is not heard the node will immediately issue an 'OUT OF NETWORK' distress message which causes both the RX and Tx Red lights to flicker every four seconds.

Any other behavior of the Red lights, such as a solid lights On or no lights at all, indicates that the node or network is damaged or at extreme low Voltage.

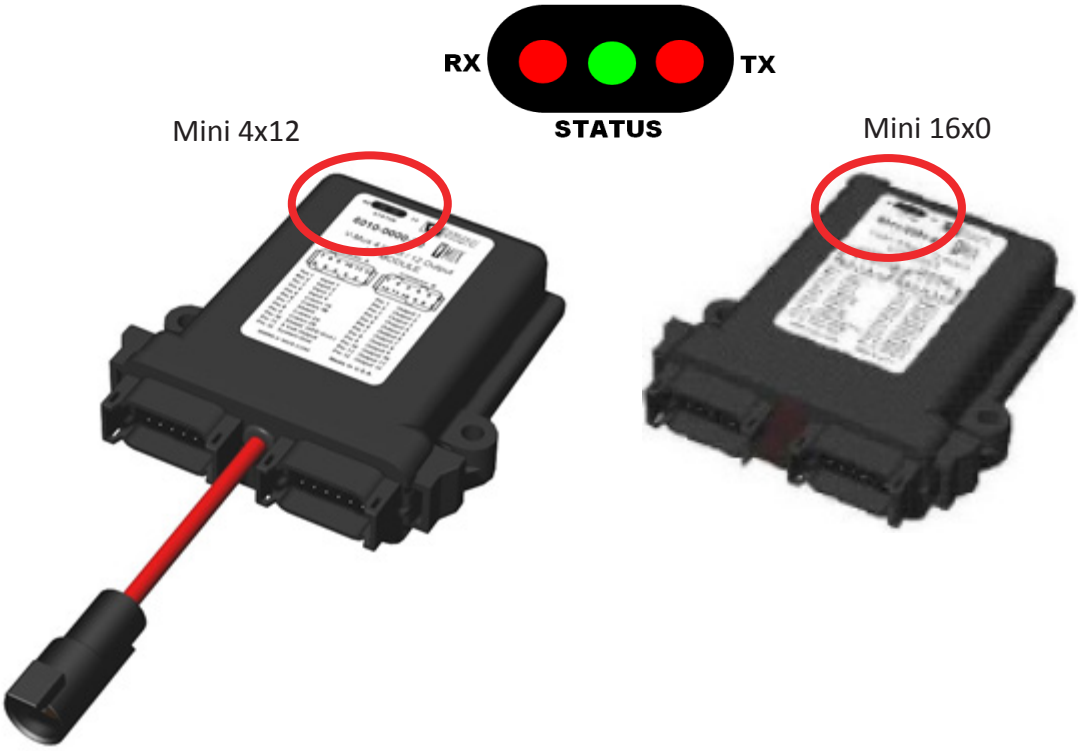
6010 Mini 4x12 and 6020 Mini 16x0 nodes

Indicator LEDs are located between the node Power and Ground studs. The Green status light indicates if the node is programmed.

Green light: two patterns

1. **PROGRAMMED** -- A 'Heartbeat' flash pattern indicates the node has a program in memory. The programmed node will be able to communicate with other nodes and will reply to diagnostic Pings.
2. **UN-PROGRAMMED** -- A rapid 3-blink pattern with a pause between each repeat indicates there is no program in the node memory. The unprogrammed node will not communicate with other nodes and will not reply to diagnostic Pings.

Any other behavior of the Green light, such as a solid light On or no light at all, indicates that the node is damaged or at extreme low Voltage.



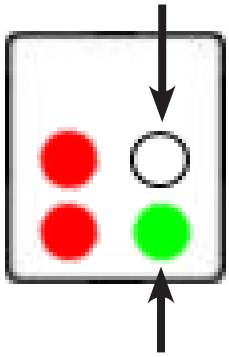
The two Red status lights (Tx / Rx) indicate node communication with the V-MUX network.

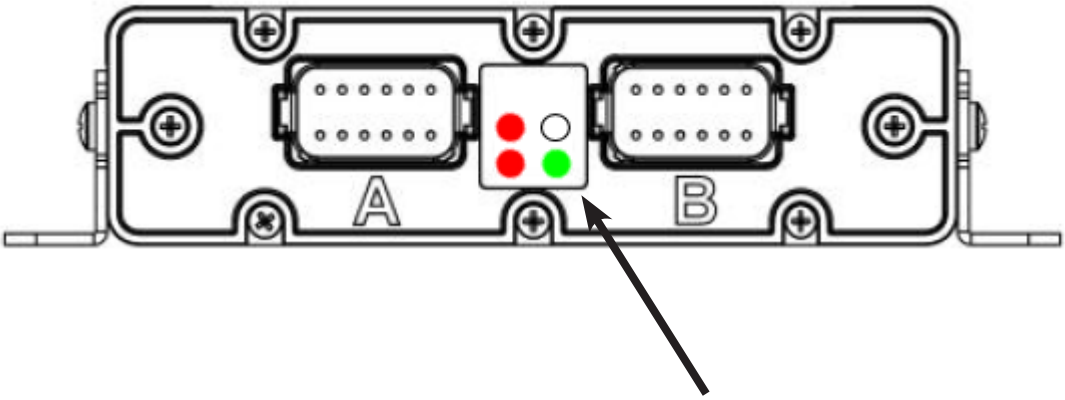
Unlike the Green light which will have a set pattern, the Red 'Receive' and 'Transmit' lights should flicker intermittantly, depending on the amount of network traffic. The absolute minimum amount of network traffic on a normal V-MUX network is at least one message every four seconds.

There are two normal behaviors observable for the Red lights:
1. The lower Red receive light (Rx) flickers by itself due to network activity. The node is receiving network messages from other V-MUX nodes. There is no transmit involved so the Tx light will be Off.
2. Both the upper and lower Red lights (Rx/Tx) flicker together, indicating the node has transmitted a message. The reason for both Tx and Rx lighting at the same instant is that every Hercules node receives its own messages, known as the 'local echo'.
IMPORTANT: Every V-MUX node expects to hear the 'SYNC' message at least every four seconds. If the SYNC message is not heard the node will immediately issue an 'OUT OF NETWORK' distress message which causes both the RX and Tx Red lights to flicker every four seconds.

Any other behavior of the Red lights, such as a solid lights On or no lights at all, indicates that the node or network is damaged or at extreme low Voltage.

V-MUX 8x16 Input/Output node
Green status light -- Power and Program status





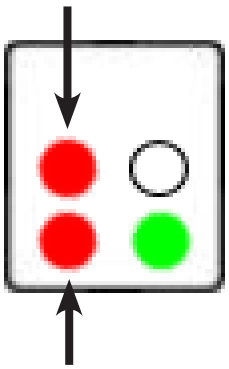
The Green status light (CPU) indicates the node is operating electrically.

There are two flash (blinking) patterns for the Green light:
1. PROGRAMMED -- A 'Heartbeat' flash pattern indicates the node has a program in memory. The programmed node will be able to communicate with other nodes and will reply to diagnostic Pings
2. UN-PROGRAMMED -- A rapid 3-blink pattern with a pause between each repeat indicates there is no program in the node memory. The unprogrammed node will not communicate with other nodes and will not reply to diagnostic Pings.

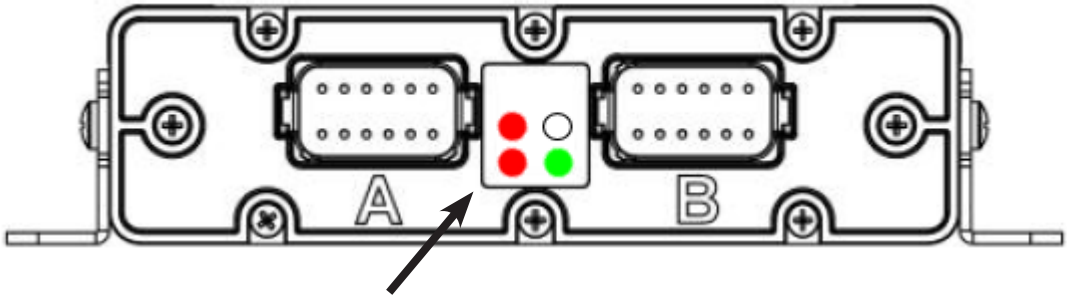
Any other behavior of the Green light, such as a solid light On or no light at all, indicates that the node is damaged or at extreme low Voltage.

V-MUX 8x16 Input/Output node
Red lights -- network activity

Red ‘Transmit’ light (Tx)
upper left



Red ‘Receive’ light (Rx)
lower left



The two Red status lights (Tx / Rx) indicate node communication with the V-MUX network.

Unlike the Green light which has a set flash pattern, the Red receive (Rx) and transmit (Tx) lights should flicker intermittantly, depending on the amount of network traffic. The absolute minimum amount of network traffic on a normal V-MUX network is at least one message every four seconds. So the Red Rx light should flicker at least once every four seconds.

There are two normal behaviors observable for the Red Tx and Rx lights:

1. The lower Red light (Rx = receive) flickers by itself due to the message activity of other nodes in the network. There is no transmit involved so the Tx light will be Off.
2. The upper Red light (Tx = transmit) flickers, indicating the node has transmitted a message.

IMPORTANT: Every V-MUX node expects to hear the network ‘SYNC’ message at least every four seconds. If the SYNC message is not heard the node will immediately issue an ‘OUT OF NETWORK’ distress message.

Any other behavior of the Red lights, such as a solid lights On or no lights at all, indicates that the node or network is damaged or at extreme low Voltage.

6444 Vehicle Data Recorder (VDR) with onboard CAN/J1939 Gateway:

Status CAN1

V-MUX CAN2

Indicator LEDs are located in the upper portion of the device housing. The Green status light indicates if the node is programmed.

Green light: two patterns

1. **PROGRAMMED** -- A 'heartbeat' flash pattern indicates the VDR has a program in memory. The programmed node will be able to communicate with other nodes and will reply to diagnostic Pings.
2. **UN-PROGRAMMED** -- A rapid 3-blink pattern with a pause between each pattern repeat indicates there is no program in the node memory. The unprogrammed node will not communicate with other nodes and will not reply to diagnostic Pings.

Any other behavior of the Green light, such as a solid light On or no light at all, indicates that the node is damaged or at extreme low Voltage.

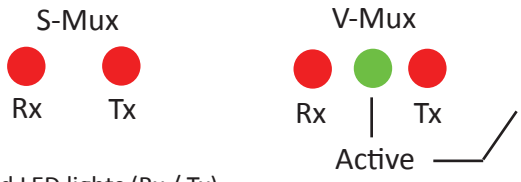
The Red 'V-MUX' light (left, lower) indicate node communication with the V-MUX network.

Unlike the Green light which has a set flash pattern, the Red 'V-MUX' light should flicker intermittantly, depending on the amount of network traffic. The light flickers on Received messages from other V-MUX nodes or Transmitted messagesThe absolute minimum amount of network traffic on a normal V-MUX network is at least one message every four seconds.

If within a 5-minute period the VDR does not detect any activity that it was programmed to record, the second by second onboard record log will pause with an END OF RECORD stamp. The device will remain in this sleep mode until it is either power recycled Off/On or it again detects recordable activity. Other background messages between the other V-MUX nodes will not start the device recording again although there will be flickering indicated on the Red V-MUX light and the Green status light will still indicate a heartbeat pattern.

There are two normal behaviors observable for the Red light:
1. The lower Red receive light (Rx) flickers by itself due to network activity. The node is receiving network messages from other V-MUX nodes. There is no transmit involved so the Tx light will be Off.
2. Both the upper and lower Red lights (Rx/Tx) flicker together, indicating the node has transmitted a message. The reason for both Tx and Rx lighting at the same instant is that every Hercules node receives its own messages, known as the 'local echo'.
IMPORTANT: Every V-MUX node expects to hear the 'SYNC' message at least every four seconds. If the SYNC message is not heard the node will immediately issue an 'OUT OF NETWORK' distress message which causes both the RX and Tx Red lights to flicker every four seconds.

Any other behavior of the Red lights, such as a solid lights On or no lights at all, indicates that the node or network is damaged or at extreme low Voltage.



S-Mux: The two Red LED lights (Rx / Tx) indicate node communication between the controller and the button modules.

PODS 'S-Mux' is the communications link to the button modules.

V-Mux:

Green LED ('Active') : two patterns

1. **PROGRAMMED** -- A 'Heartbeat' flash pattern indicates the node has a program in memory. The programmed node will be able to communicate with other nodes and will reply to diagnostic Pings.
2. **UN-PROGRAMMED** -- A rapid 3-blink pattern with a pause between each repeat indicates there is no program in the node memory. The unprogrammed node will not communicate with other nodes and will not reply to diagnostic Pings.

Any other behavior of the Green light, such as a solid light On or no light at all, indicates that the node is damaged or at extreme low Voltage.

Red LEDs:

The two Red status lights (Rx / Tx) indicate node communication with the V-MUX network.

Unlike the Green light which has a set flash pattern, the Red receive (Rx) and transmit (Tx) lights should flicker intermittantly, depending on the amount of network traffic. The absolute minimum amount of network traffic on a normal V-MUX network is at least one message every four seconds. So the Red Rx light should flicker at least once every four seconds.

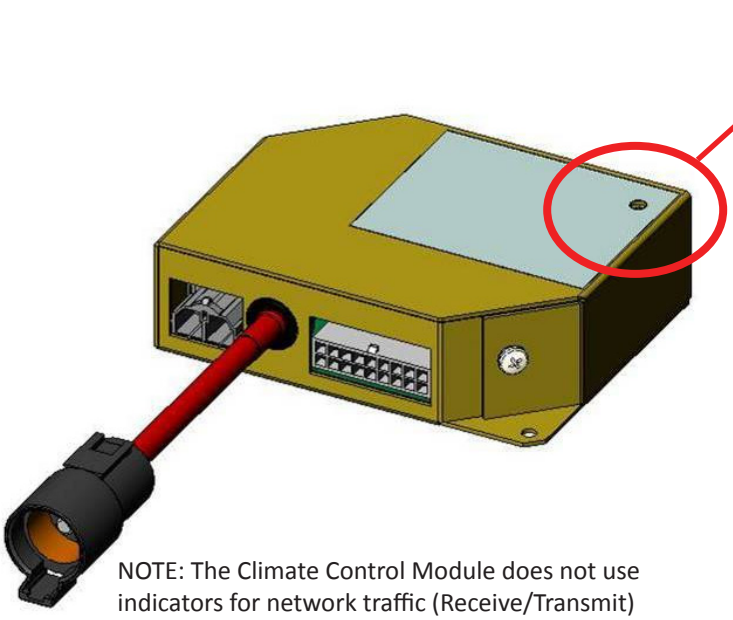
There are two normal behaviors observable for the Red Tx and Rx lights on the PODS:

1. The lower Red light (Rx = receive) flickers by itself due to the message activity of other nodes in the network. There is no transmit involved so the Tx light will be Off.
2. The upper Red light (Tx = transmit) flickers, indicating the node has transmitted a message.

IMPORTANT: Every V-MUX node expects to hear the network 'SYNC' message at least every four seconds. If the SYNC message is not heard the node will immediately issue an 'OUT OF NETWORK' distress message.

Any other behavior of the Red lights, such as a solid lights On or no lights at all, indicates that the node or network is damaged or at extreme low Voltage.

Climate Control Module



NOTE: The Climate Control Module does not use indicators for network traffic (Receive/Transmit)

Green light ('Active') : two patterns

1. **PROGRAMMED** -- A 'Heartbeat' flash pattern indicates the node has a program in memory. The programmed node will be able to communicate with other nodes and will reply to diagnostic Pings.
2. **UN-PROGRAMMED** -- A rapid 3-blink pattern with a pause between each repeat indicates there is no program in the node memory. The unprogrammed node will not communicate with other nodes and will not reply to diagnostic Pings.

Any other behavior of the Green light, such as a solid light On or no light at all, indicates that the node is damaged or at extreme low Voltage.