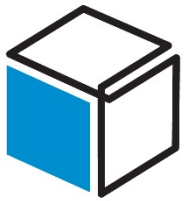
INFINITYBOX
INTELLIGENT WIRING

Infinitybox LLC
Diagnostics & Troubleshooting Guide

Updated February 2017



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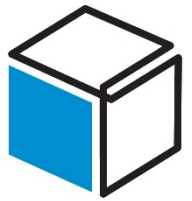
Topics

- System Basics
- Diagnostic Basics
- Error Log
- Specific Troubleshooting Techniques
- Override Headers



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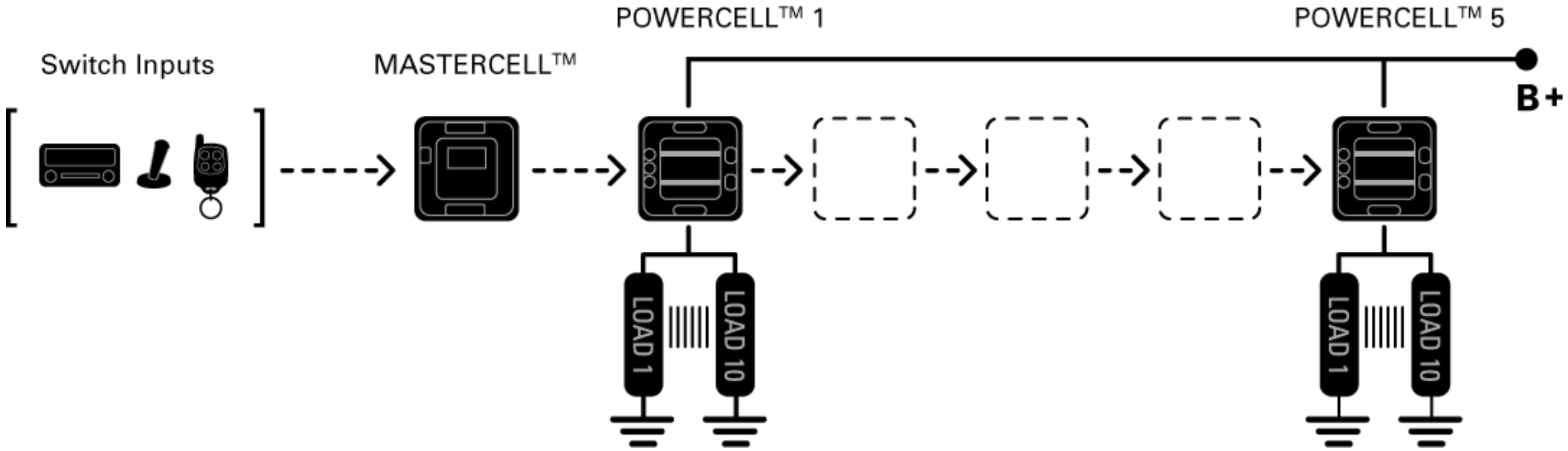
System Basics



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MASTERCELL Basics

- 48-Channel Input Module
- Connects to switches in the vehicle
- Send CAN commands to other modules on network
- All inputs work by being pulled to ground
  - DO NOT APPLY POSITIVE BATTERY VOLTAGE TO MASTERCELL INPUT. DAMAGE MAY OCCUR AND WILL VOID WARRANTY.
- All inputs will measure approximately 4.8 volts when off

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POWERCELL Basics

- 10-Output Module
- All outputs source current
- POWERCELL outputs supply voltage at battery voltage
- Each output is fused internally inside the POWERCELL
- Each output will nominally measure 2.8 volts when off and not connected to a load

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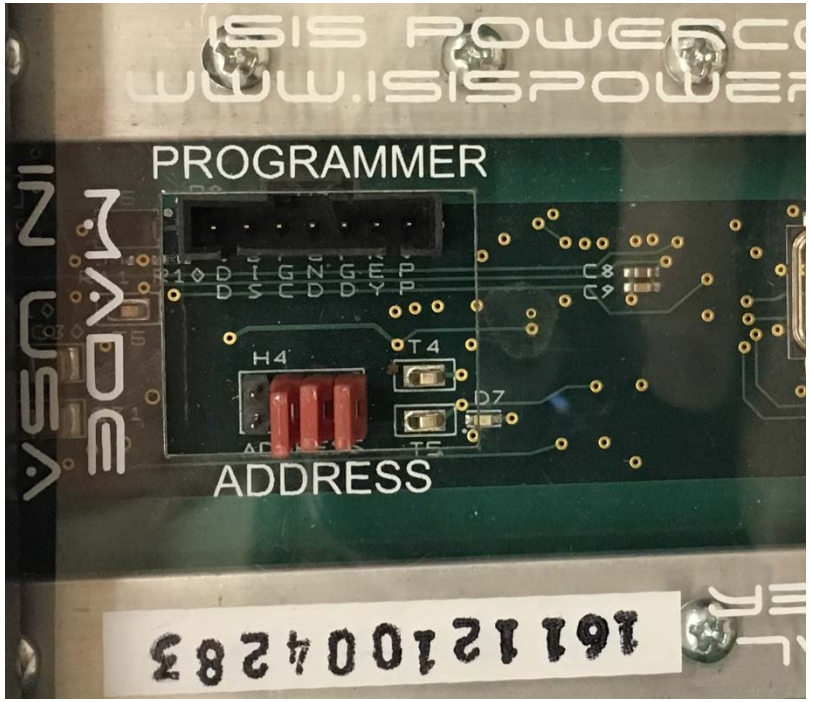
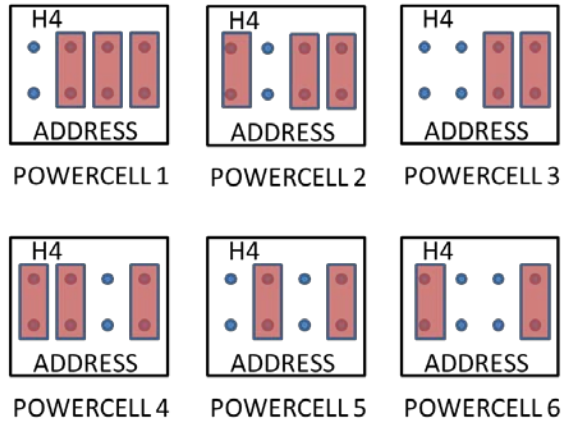
POWERCELL Address

- Each POWERCELL is individually addressed so that it knows which commands to respond to
- Set by jumpers under the POWERCELL cover
- POWERCELL learns address when powered up. Power to POWERCELL must be cycled if address headers are changed.
- Check the configuration sheet that came with your system for specific POWERCELL address assignments





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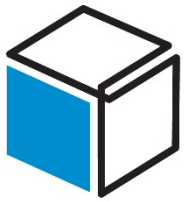
Built-In Diagnostic Features

- The Infinitybox system has many powerful diagnostic features built into the hardware
- No tools are required to access these features
- They will identify:
  - Details of switches turned on and off
  - State of CAN communications
  - State of POWERCELL outputs
  - Condition of loads attached to POWERCELL outputs



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MASTERCELL inSIGHT Screen

- Visual indication of system status
- Initial boot-up screen displays software revision and unit serial number
- Controlled by buttons below screen
  - HOME- Lists all cells on network
  - SCOLL UP/DOWN- Navigate through cell inventory
  - SELECT- Choose specific cell for diagnostics
  - TRAIN- Used to pair optional radio interfaces
- After successful power up, screen will display NORMAL status and backlight will turn off. Typically takes 6 to 10 seconds.

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MASTERCELL Indicator Lights

- COM Light
  - Indicates communication between MASTERCELL and other cells connected on the CAN network.
  - Should flash approximately once per second
  - Solid blue light indicates lack of communication with other cells on CAN network.
- CAN HI/LO Lights
  - Indicate data traffic on CAN bus.
  - Will flash approximately once per second with the COM light but will also flash when CAN commands are sent on the bus.

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MASTERCELL Normal Operation

- COM Light
  - Flashing approximately once per second
- CAN HI/LO Lights
  - Flashing approximately once per second
- Screen Display
  - Status Normal (ST=NORMAL)
  - Transmit Normal (TX=NORMAL)
  - Receive Normal (RX=NORMAL)
- Screen Backlight
  - Will turn off 10 to 20 seconds after system is running. Show on in this picture for clarity.

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MASTERCELL- Messaging Mode

- Messaging Mode reports any time an input is turned on or off
- Press “SCROLL UP” & “SELECT” buttons simultaneously, hold for one second then release simultaneously.
- MASTERCELL screen will report: “inSIGHT WILL DISPLAY INPUT CHANGES FROM ANY SOURCE”.
- Any time a switch is closed or opened, the screen will react
  - Input Number
  - Target Output Cell
  - Target Output Node
  - Proprietary Command (Use internally for diagnostics)
- MASTERCELL will stay in messaging mode until power is cycled or “SCROLL UP” & “SELECT” are pressed simultaneously again.
- Backlight will remain lit when in Messaging Mode
- Do not leave MASTERCELL in Messaging Mode for normal operation. This will cause system delays.

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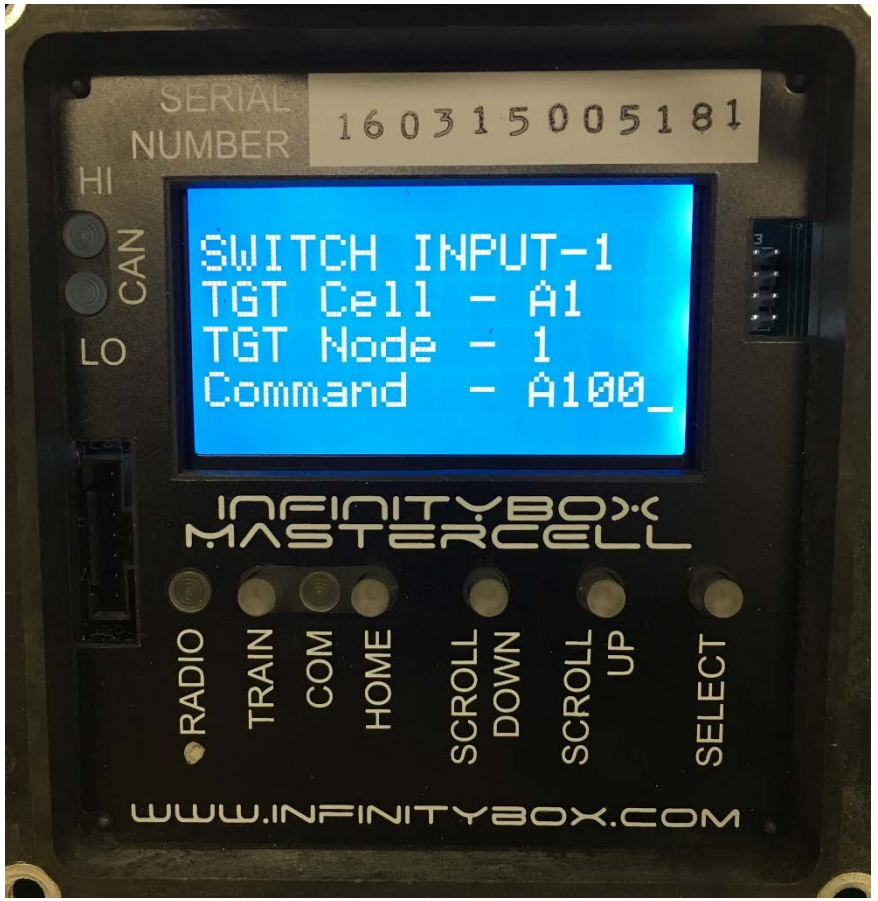
Messaging Mode- Example

- Switch input seen by MASTERCELL
  - Input 1
- POWERCELL command sent to:
  - POWERCELL 1
- Output to turn on:
  - Output 1

- NOTE: some custom functions or inputs associated with multiple outputs will read 11 as the target node. This is normal.



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MASTERCELL Inventory Polling

- When displaying system inventory, you can poll an individual cell to get key parameters
  - MASTERCELL (MS-T1)
    - Instantaneous state of all inputs
  - POWERCELL (PS-T23)
    - Primary Cell Voltage
    - Charge Pump Voltage
    - Cell Temperature
    - State of all outputs
  - inMOTION (MRS-T1)
    - Instantaneous current draw on all H-Bridge pairs
    - Total cycle count for all H-Bridge pairs
- Press HOME to get inventory
  - Press SCROLL UP and SCROLL DOWN to highlight target cell then press SELECT

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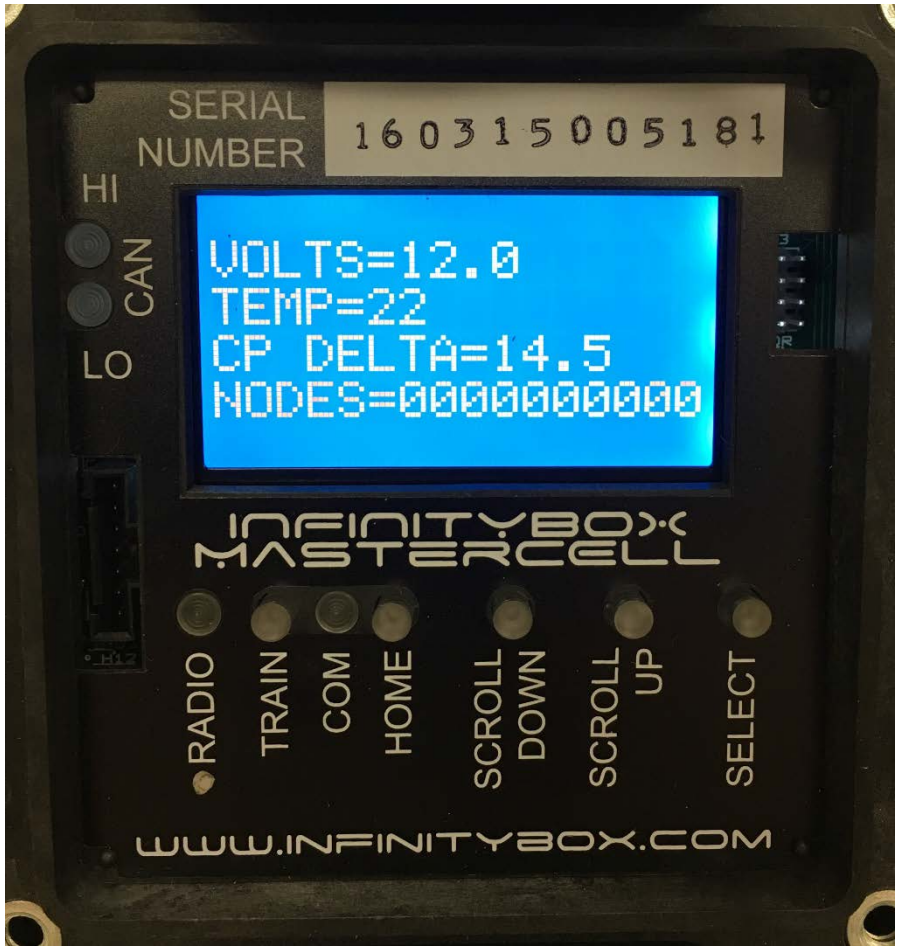
POWERCELL Polling Example

- From Inventory, scroll to A1 and press SELECT
- Primary Input Voltage is 12-volts
- Charge Pump Delta is 14.5-volts
  - This is an internal measurement of the cell health
- The temperature of the cell is 22 C
- Bottom line indicates the state of the outputs
  - 0 indicates output is off, 1 indicates output is on
  - Left to right, each digit indicates outputs 1 to 10
  - This indicates the state of the outputs when the SELECT button was pressed
  - All outputs are off in this example



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MASTERCELL Error Log

- MASTERCELL logs errors reported by all cells
  - Temperature events (> 125 C)
  - Voltage Events (<6 volts)
  - Charge Pump Events (CP Delta < 12 volts)
- Last 8 events recorded in MASTERCELL Memory
- Access by pressing “HOME” and “SCROLL DOWN” simultaneously, hold for one second then release simultaneously
- Press & hold “HOME” button to stop report of error log

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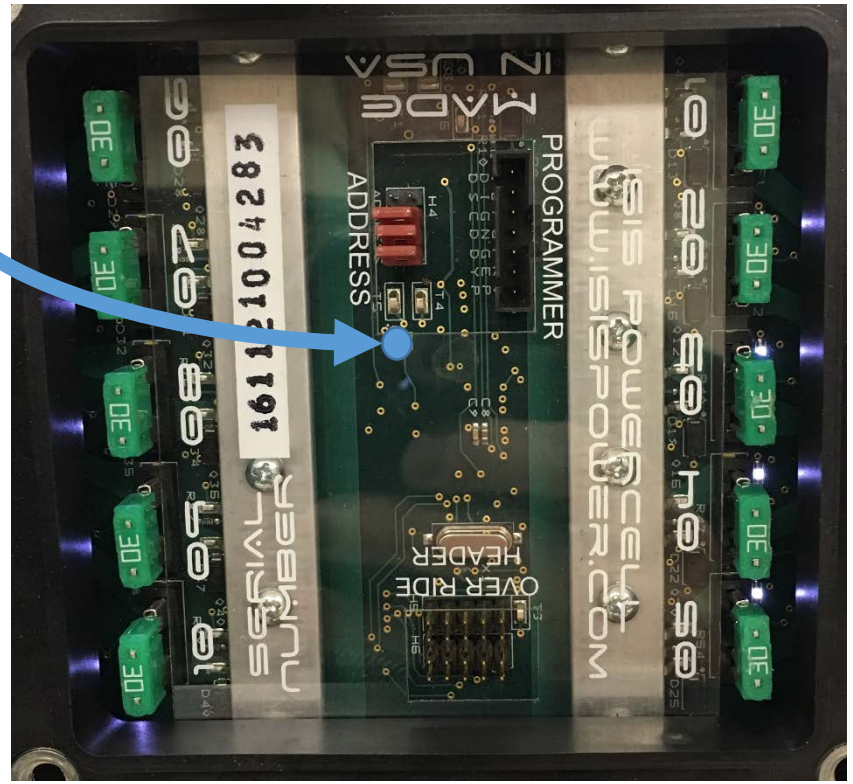
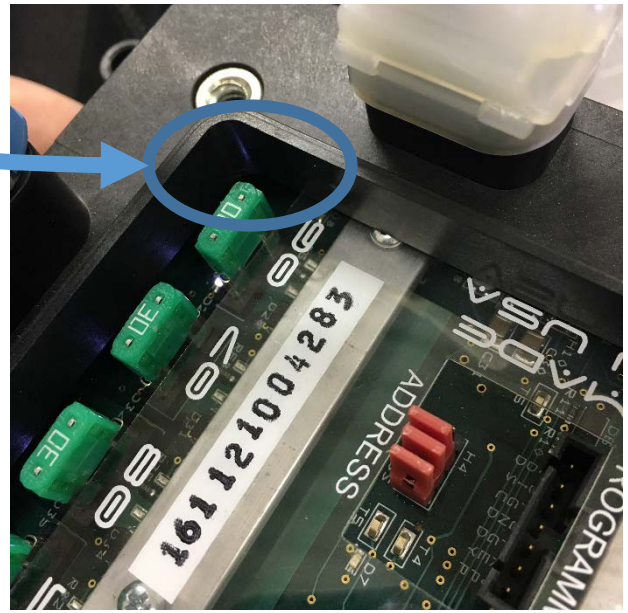
POWERCELL Normal Operation

- Blue COM Light in center of cell
  - Flashing approximately once per second
  - Solid blue light indicates lack of communication with other cells on CAN network.
- CAN HI/LO Lights (Red & Green)
  - Flashing approximately once per second





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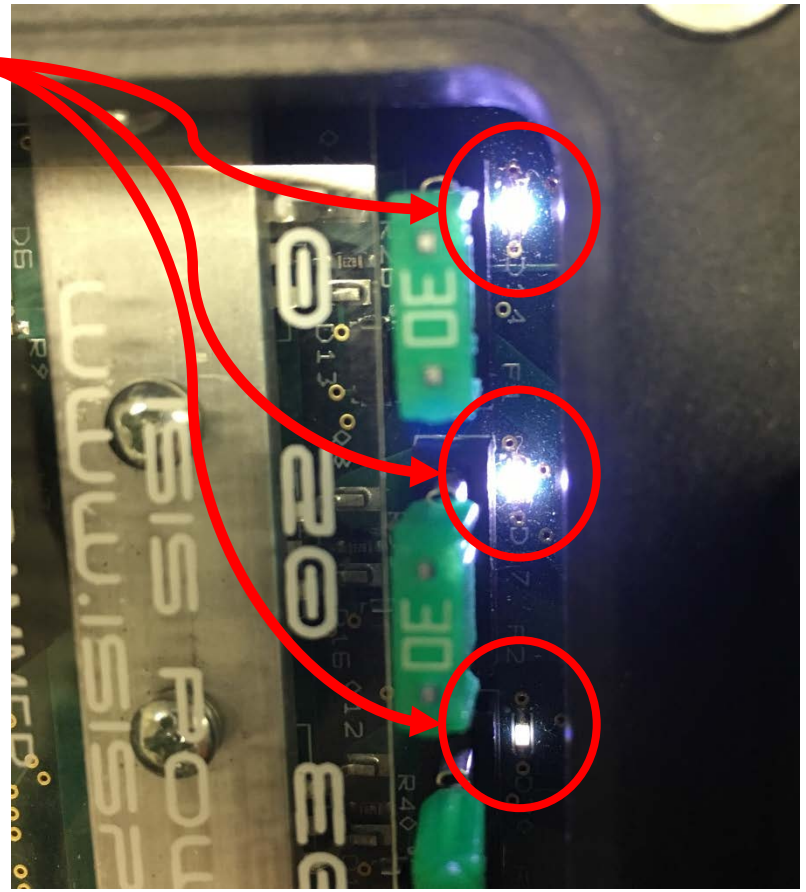
POWERCELL Output Indicator LEDs

- Each POWERCELL output has a white LED next to its corresponding fuse
- Each indicator light has 3 possible states
  - Dark- output is off and load is connected properly
  - Bright- output is on
  - Dim- output is off but load is not connected correctly
    - Each POWERCELL output measures continuity to ground through the output. If there is no ground path, the LED glows dimly.
      - Blown Fuse
      - Broken Wire
      - Blown light bulb
      - Load not connected properly
      - No ground connection



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POWERCELL Output Indicator OFF

- Example of POWERCELL output off and load connected correctly.
  - Output LED is off

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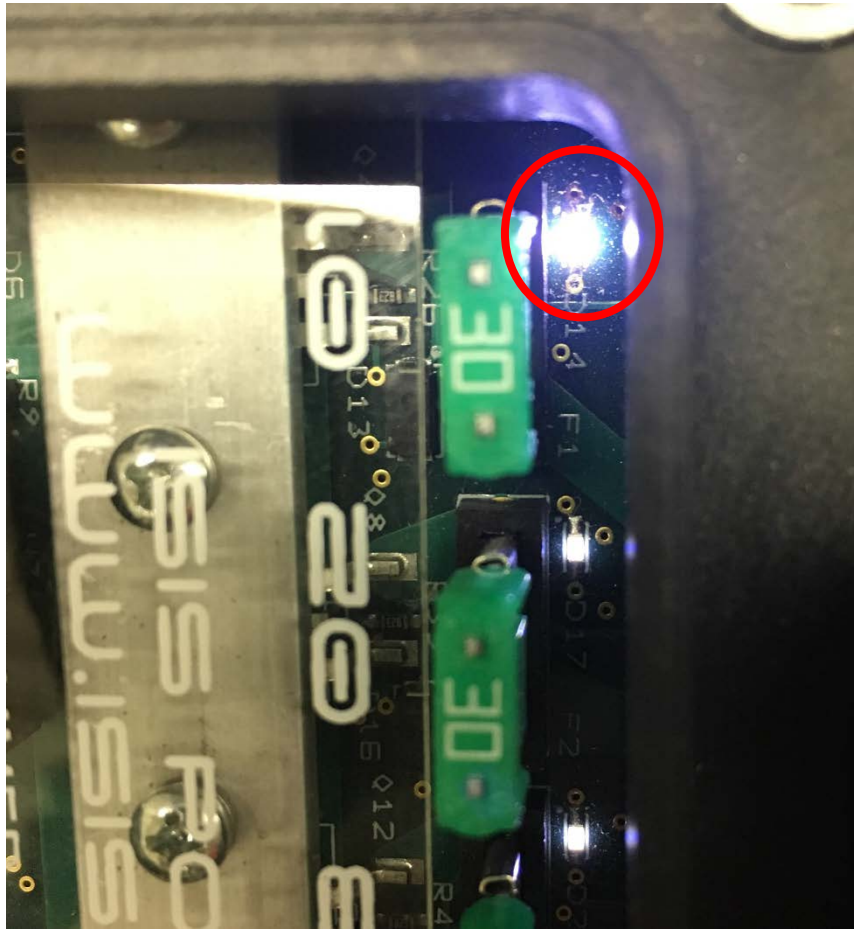
POWERCELL Output Indicator ON

- Example of POWERCELL output is on.
  - Output LED is bright



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POWERCELL Output Indicator DIM

- Example of POWERCELL output is off but no continuity from output to ground.
  - Output LED is dim
    - Check fuse
    - Check wiring
    - Check output connector
    - Check status of load
    - Check connection to ground
  - LED will glow dimly if the load is high-impedance. Examples include LED lights and some electronic controllers.

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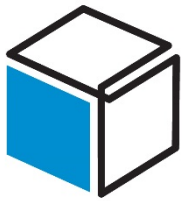
Infinitybox Troubleshooting Flow

- If an output does not turn on when the switch is activated…
  1. Check COM light on MASTERCELL and all attached cells. All should be blinking approximately once per second.
  2. Check MASTERCELL inventory to make sure all cells are found
  3. Put MASTERCELL in Messaging Mode and check that MASTERCELL is seeing the input turn on when the switch is activated
     a. Make sure that the correct switch input number is reported on the MASTERCELL screen
     b. Make sure that the correct target cell and node is displayed on the screen
  4. Check the status of the output on the POWERCELL
     a. Output LED should be dark when switch is turned off
     b. Output LED should turn on bright when switch is turned on
     c. Check fuses, harness, connector and load if the LED is dim when the switch is turned off



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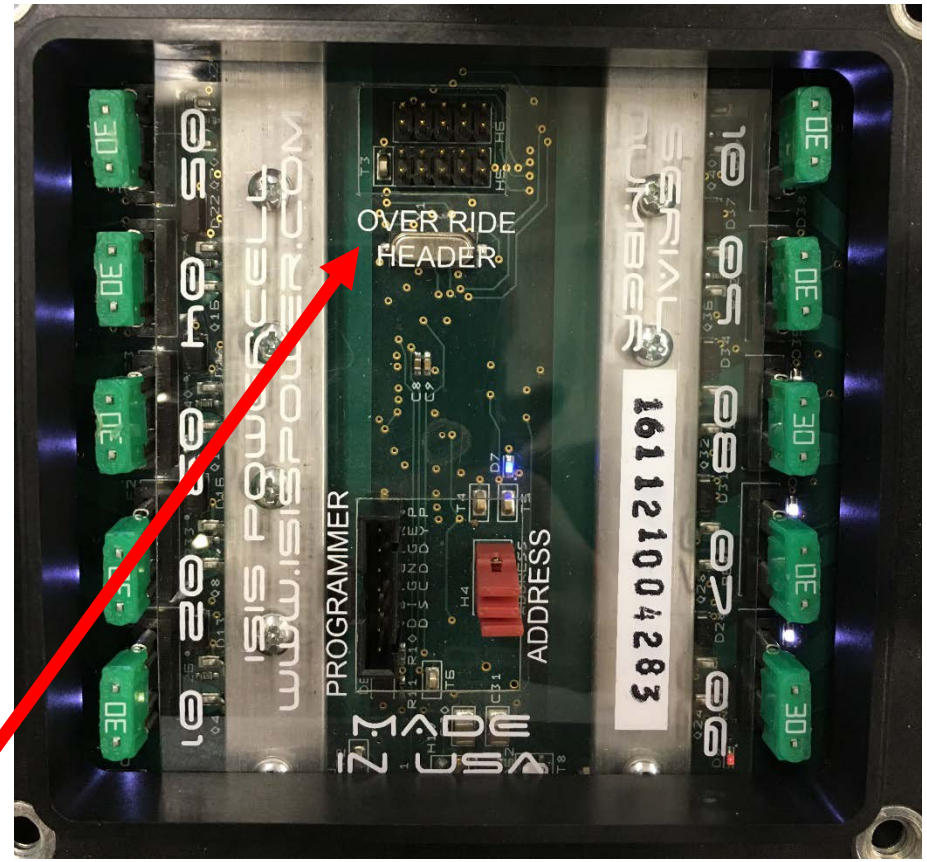
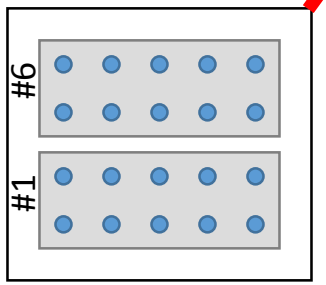
POWERCELL Over Ride Header

- Each POWERCELL has an over ride header that lets you manually actuate the outputs
- Bypasses all of the CAN control on the system
- Insert the Address Header jumpers on the Over Ride Header pins to turn an output on
- Outputs 1 through 5 are on the bottom row
- Outputs 6 through 10 are on the top row





OVER RIDE
HEADER