

KIB Multi-Plex Control System V2

This guide is intended to assist Heartland Owners in understanding and operating the KIB Multi-Plex Lighting and Control System when so equipped on the Landmark product. This version deals with the updated KIB Multi-Plex Systems introduced in 2020.

Important Notices

Who created this document?

This document has been created by Heartland Owners independently of the Heartland RV Company, and is posted to the Heartland Owners Forum as a service to the owner community.

Errors and Omissions

Because the authors are Heartland owners, not engineers or service technicians, it's possible that this document could contain errors or omissions. Readers are advised to also review the manufacturers' product documentation for more complete information and guidance.

Additional Resources

The heartlandowners.org website has a collection of owner-written user guides, including information on water systems, heating and cooling, winterizing, residential refrigerator, water heater and other topics. This information is available at <http://manuals.heartlandowners.org/?man=User%20Guides>.

Limitations on Using this Document

- This document may not be modified or sold.
- It may not be posted on the internet without permission.
- Other websites may link to the page from which the document may be downloaded, but may not link directly to the document without permission (search engines excluded).

Contact Information

Questions and comments may be directed to manuals@heartlandowners.org

KIB Multi-Plex Control System V2

Table of Contents

Overview	3
2020 KIB Updated Controls.....	3
Operation.....	4
LED Lighting.....	4
M-Plex Master Off.....	4
Water Pump Switches.....	4
Water Heater Switches.....	5
Generator Switches.....	5
Tank Level and Battery Level Indicators	5
How the Multi-Plex Control System Works	6
Bluetooth Connectivity	6
Control Boards Location.....	7
Wiring of Switches, Controllers, and Devices	8
12V DC Wiring.....	8
120V AC Wiring	8
Generator Controls	9
Air Conditioning and Furnace Controls.....	9
Awning Controls.....	10
Control Board Power and Ground Wiring.....	10
Block Diagram of Major Components and Connections – 2020.....	11
KIB V-Bus and Switch Panel Power and Ground	12
Troubleshooting and Repair	12
Fuses and Circuit Breakers.....	12
Lost Function Due to Loss of 12V DC Power	13
Lost Function Due to the Power Converter Not Working.....	14
Lost Function Due to the 12V DC Manual-Reset Mini-Circuit Breaker Tripping.....	14
Partial Failures.....	14
Temporary Workarounds.....	15

Customizing the Control System..... 15
 Adding Additional Devices or Additional Controllers 15
Revision History 16

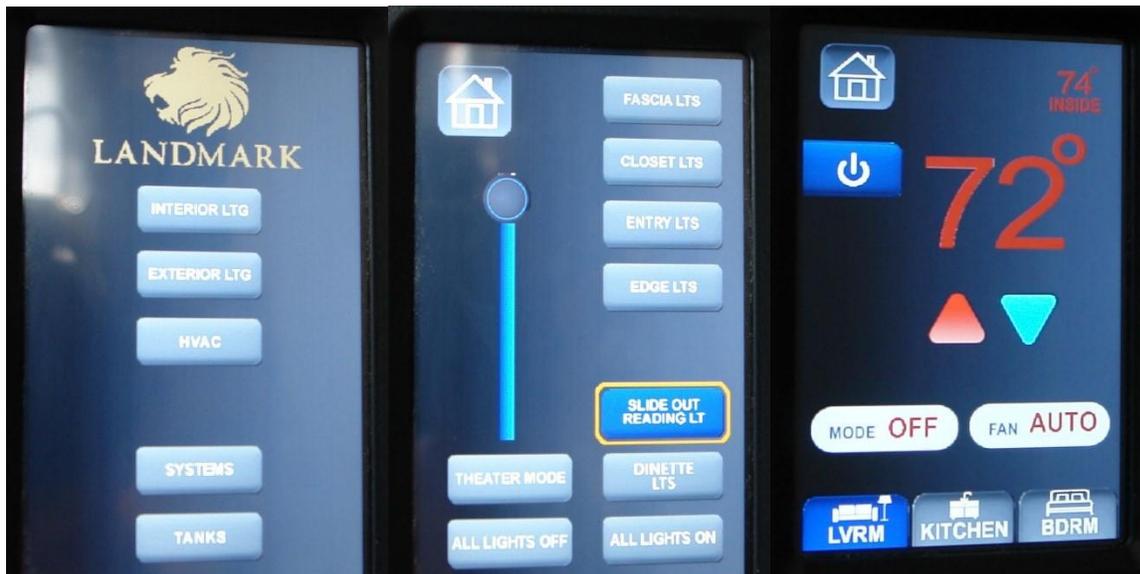
Overview

Heartland has partnered with KIB Electronics to introduce an intelligent lighting and device control system with new capabilities. The system uses simplified control wiring along with a message passing system that allows redundant controls to be located in various parts of the coach without the complexity of 3-way wiring. The control system is capable of operating a variety of lights and devices and includes dimming capability for LED lights, and status indicators to show when a device is ON.

Beginning with 2017 models, from a user perspective, the heart of the system was the physical Convenience Control Panel, along with several other point-of-use switch panels located in various parts of the coach.

2020 KIB Updated Controls

On 2020 models, the Convenience Control Panel has been replaced by a touchscreen tablet, along with a Bluetooth interface that allows all controls to be operated from a smartphone (Android or iOS) by installing an app on the phone and pairing the phone to the coach electronics. In 2020, air conditioning, heating and awning controls were integrated into the system.



KIB Home Screen, Lighting Control Screen, and Thermostat with A/C and Heat Control



KIB Awning Control Screen, Awning Local Switches, Tank and Battery Levels, Water Heater, Pump and Generator Controls.

Operation

KIB Multi-Plex system controllable loads (electrical devices) have switches located on the touchscreen, tablet located in the living area or on the phone app. Additionally, some loads (typically lighting) may have smaller point-of-use convenience switch panels. These additional switch panel locations are often in the living room slide, on the rear wall, in the bedroom and bathroom.

LED Lighting

With individual switches, pressing a switch momentarily turns the light or other device ON, or if it's already ON, a press will turn it OFF. In the case of LED lighting, the touchscreen tablet or phone app has a slider that allows dimming of lights.

M-Plex Master Off

The lighting control screen has buttons to turn all lights ON or OFF with a single keypress, leaving only the floor-level night lights illuminated (if they were previously turned ON using the night light switches). This allows you to turn off all lights with a single button press when leaving the coach. There may also be a point of use switch in the bedroom, with which all lights can be turned OFF with a single button press when retiring for the night.

Water Pump Switches

The **Water Pump** switch on the Tanks Screen powers up the water pump. An additional convenience switch is located in the Universal Docking Center (UDC). The UDC switch sends a ground signal to the control board to toggle the operation of the water pump. If OFF, it will toggle ON. If ON, it will toggle OFF.



Water Heater Switches

The water heater can be operated by pressing either the **LP Water HTR** button (propane and 12V DC), or the **Electric Water HTR** button, or both, for faster recovery time. Note that the **LP Water Heater** function operates the water heater using propane to heat the water while the **Electric Water HTR** function uses only electric. Before using the electric function, to avoid burning out the electric heating element, be sure there is water in the water heater tank. [The Water Heater Usage Guide](#) provides additional information on how to check for water in the tank.

Next to the two water heater switches is an LED marked “DSI Fault”. This will illuminate if the LP Water HTR function fails to successfully ignite the propane.

Generator Switches

To start the generator, press and hold the **GENERATOR START/STOP** button to prime the generator with fuel. If after five seconds of priming the generator does not begin cranking, press the **GENERATOR START** button a second time to start the unit.

While the generator is running, pressing the **GENERATOR START/STOP** button again will stop it.

Tank Level and Battery Level Indicators

Holding tank water levels are shown on the TANKS screen. Note that levels are approximate. The sensors may give misleading readings if the paper or crud in the tanks sticks to the sensors, or if the coach is not level.

Battery level indicators are also grouped with the water heater, water pump and generator controls. When not connected to a tow vehicle or plugged into shore power, a reading of 12.6V DC indicates fully charged batteries. Below 12V is considered depleted for traditional lead acid batteries.

Note that if plugged into shore power, the battery voltage shows the output of the Power Converter.



How the Multi-Plex Control System Works

The 2020 control system consists of switches (both on screen and physical) and control boards. With the KIB Multi-Plex System, the switching is electronically controlled rather than being mechanical, and is activated indirectly when the touchscreen tablet, phone app, or point-of-use switch sends a message to the control boards.

The switches and control boards chips are programmed with specific identifiers and functions. The switch sends a message on the buss (also known as the V-bus) that connects the switches and control boards. When a control board chip sees a message with its ID, the chip responds appropriately by sending power through one of the board's controller ports and on to the device. The control board chip will respond to a message with its identifying code, regardless of whether sent by the touchscreen tablet, phone app, or point-of-use switch.

A simple 3-wire trunk cable called a V-bus connects the touchscreen tablet and switches to the control boards, allowing the tablet or switches to send the messages to the control boards, and to receive feedback. Messages and feedback travel on one of the three wires in the trunk cable. The other two wires carry 12 Volt DC power and ground for the switch panels.

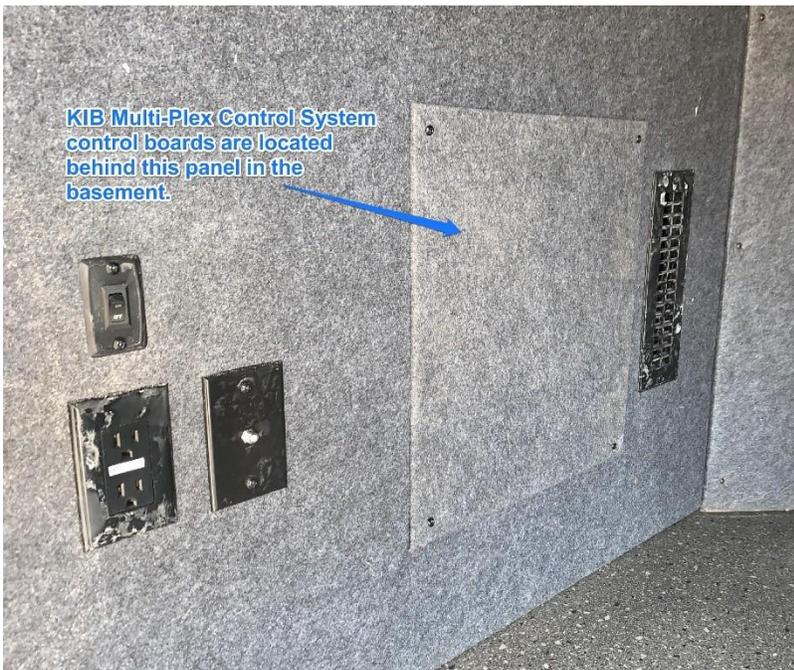
Bluetooth Connectivity

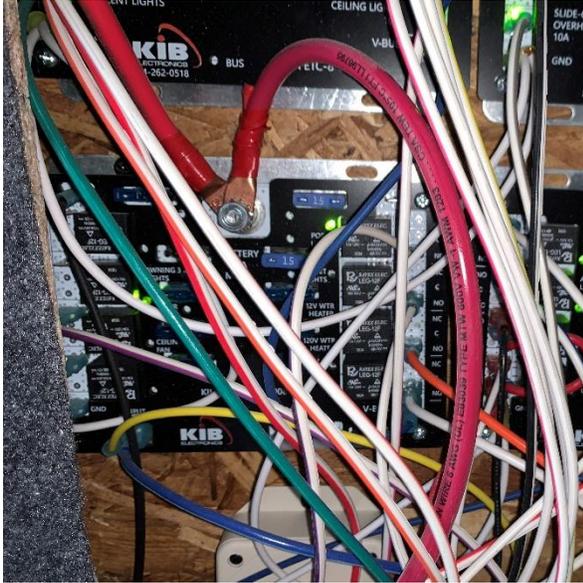
A KIB-Net module is installed in a cabinet in the living area so that your smart phone may be connected to the V-bus via Bluetooth. The KIB-Net module acts as a wireless connection between the phone app and the control boards.



Control Boards Location

The control boards are located behind a cover panel on the rear wall of the pass through basement storage. The 2020 system includes two 8-device Field Effect Transistor (FET) control boards along with two 8-device Relay control boards.





KIB Relay Control Board

Generator Controls

The generator can be primed and started, and stopped, from the switches on the touchscreen tablet or phone app, as described earlier. The switches communicate with a module that signals the generator, which is where the start relay and priming circuitry are located.

Air Conditioning and Furnace Controls

The 2020 KIB system includes controls for operating the air conditioning and furnace. The switches on the touchscreen tablet or phone app act as a replacement for a physical thermostat. The operator selects the thermostat by location in the coach, and sets the target temperature and fan speed. Temperature sensors at three locations in the coach provide feedback on ambient temperature in their respective areas, in the same way that a temperature sensor within a thermostat would do.

Below the control boards, there is an attached HVAC module that interfaces between the control boards and the A/C units and furnace, as well as the thermostat sensors.

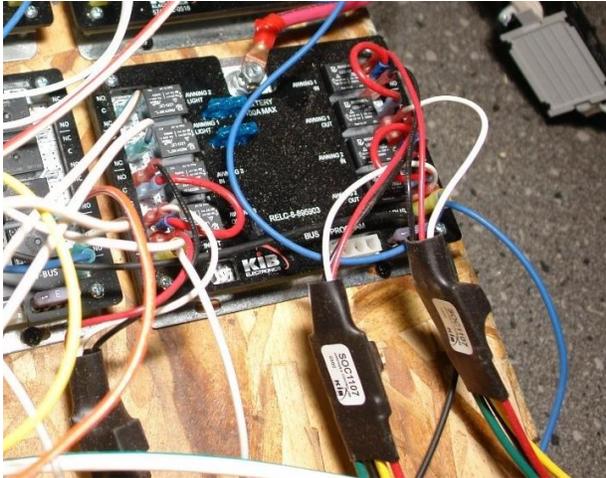




The combination of on-screen controls and a thermostat sensor replace the traditional wall thermostat.

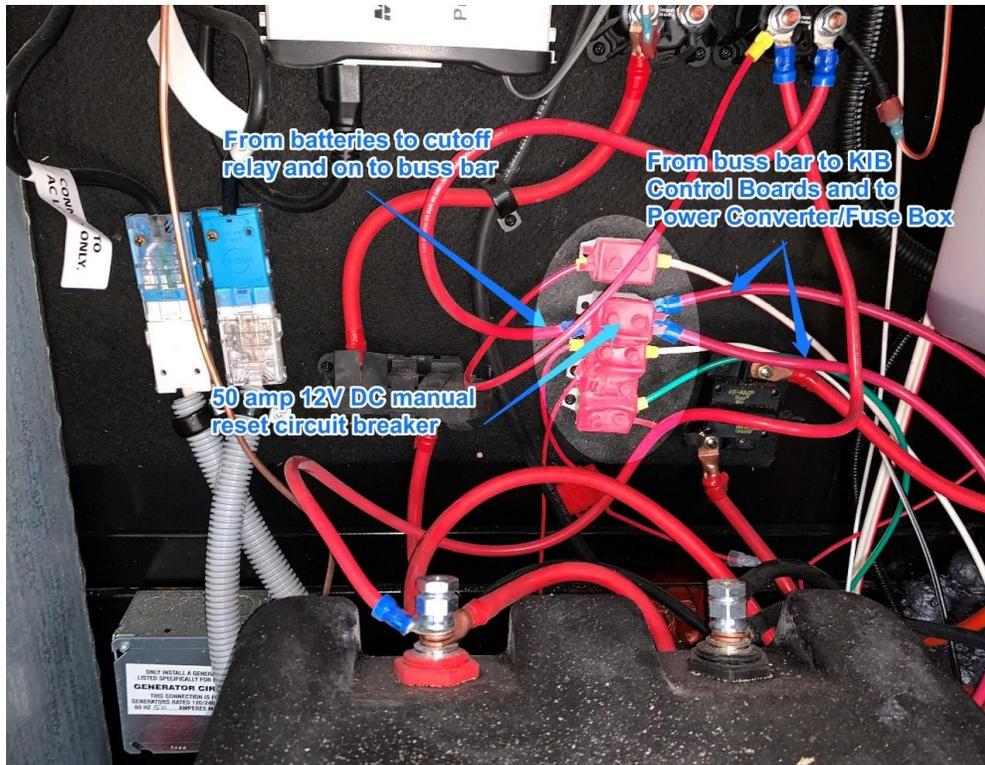
Awning Controls

Additional components are required to control awning motors in order to reverse the polarity of power to the motor. Below the Control Boards are several KIB SOC-1107 modules that allow reversing direction.



Control Board Power and Ground Wiring

The controller boards are powered from a 50 amp 12V DC manual-reset circuit breaker near the batteries (after the battery cutoff switch).

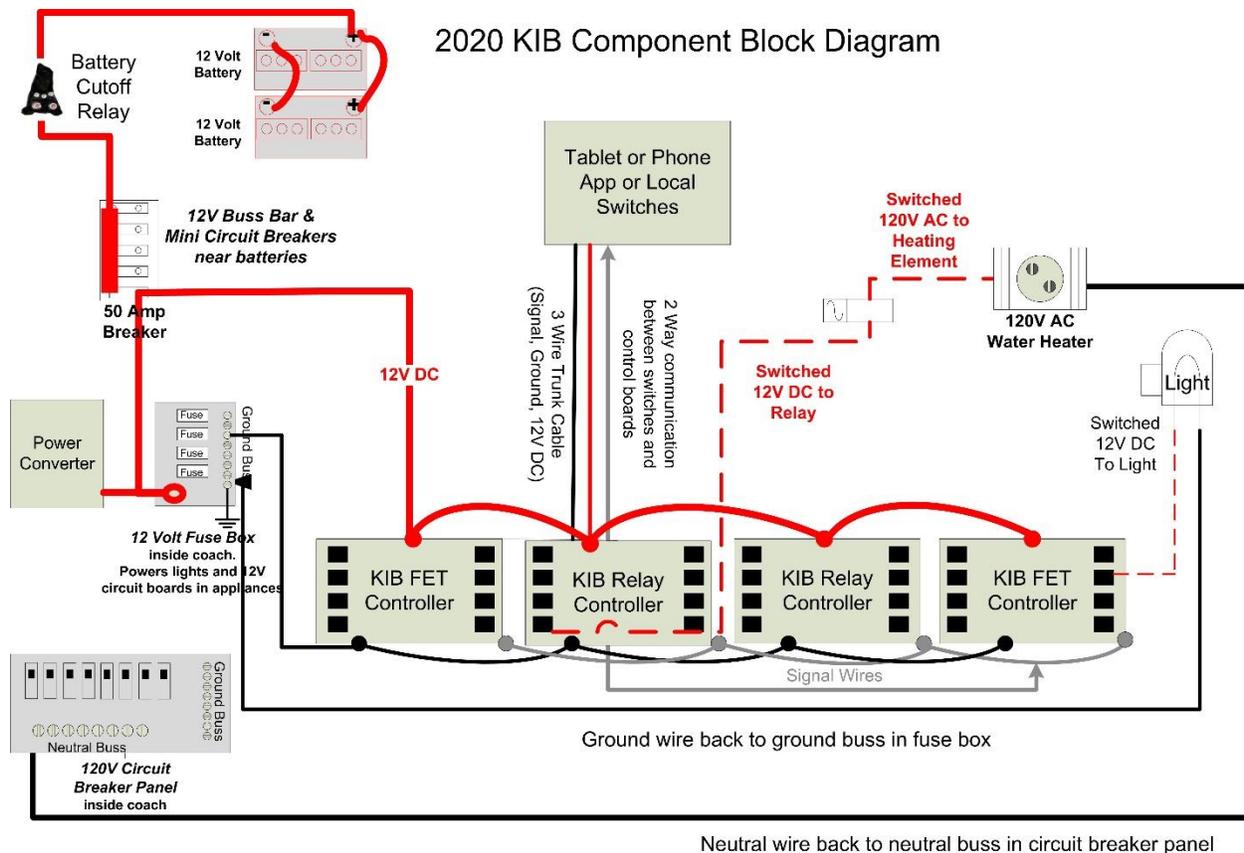


Each controller's ground connection is to frame ground by way of the KIB V-bus wiring.

Block Diagram of Major Components and Connections – 2020

On the 2020 KIB System, in order to support additional devices, there are 4 control boards instead of 3 on the older version.

Heartland has also changed the power source on 2020 builds. Power comes from the buss bar located near the batteries. The KIB system is powered either by the batteries, via a 50 amp 12V DC manual-reset mini-circuit breaker, or by the Power Converter, when plugged into shore power. Note that when unplugged from shore power, if the 50 amp mini-circuit breaker is tripped, it does not automatically reset. In that condition, the KIB system will go dark and nothing controlled by it will operate until the mini-circuit breaker is reset.



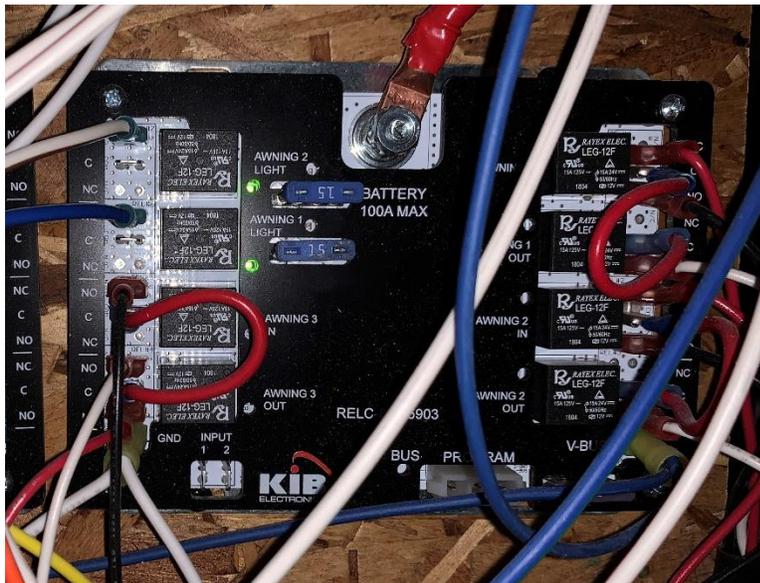
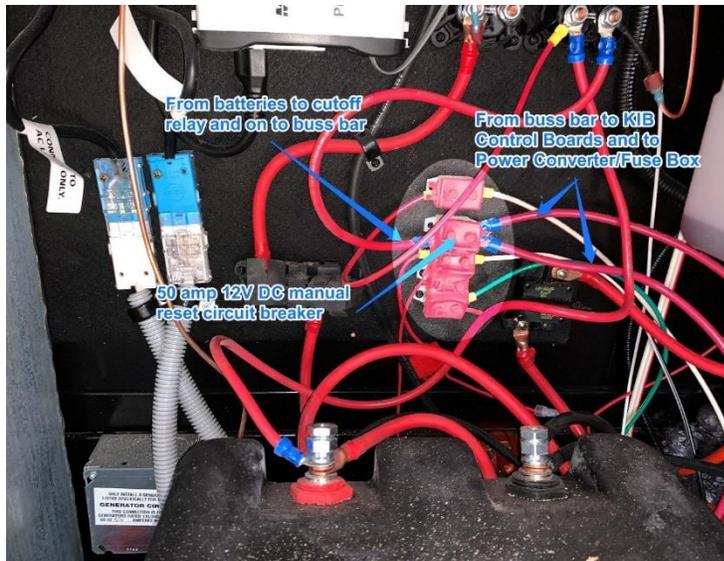
KIB V-Bus and Switch Panel Power and Ground

The touchscreen tablet, KIB-Net device, and point-of-use switches get their 12V DC and ground from connections on the control boards, by way of a 3 wire cable that is called the V-Bus. The V-Bus connects these components to the Control Boards.

Troubleshooting and Repair

Fuses and Circuit Breakers

The KIB Multi-Plex system depends on both the Power Converter, the batteries, and a 50 amp manual-reset 12V DC circuit breaker near the batteries to provide power to the KIB components and to operate the controlled devices. The control boards use either a 10-15 amp automotive style blade fuse or auto-reset electronic circuit breakers to protect against short circuits or overloads on supported devices



Lost Function Due to Loss of 12V DC Power

There are several circumstances that can result in loss of 12V DC power to the KIB System.

If the batteries are depleted, normally, the KIB system will still function while on shore power because the output of the Power Converter flows to the KIB control boards and other components. But, if the 12V DC manual-reset mini-circuit breaker is tripped, electricity from the Power Converter will not reach the batteries and they will become depleted. As soon as shore power is disconnected, the KIB System will go dark. With shore power disconnected, and the 50 amp 12V DC breaker tripped, power from the batteries will not reach the KIB System. Even after resetting the breaker, because the batteries are depleted and cannot supply enough power to keep the KIB System running, the system may remain dark. In order to regain operations, if you cannot reconnect shore power, it will be necessary to connect your tow vehicle to the trailer for power to flow to the batteries and the KIB system. However, on most tow vehicles, the power going through the umbilical to the trailer may be insufficient to operate

everything in the coach. You may need to run in high idle for 30 minutes or so to recharge the batteries. And of course, the 12V DC mini-circuit breaker must be reset (see [12V Block Diagram and Troubleshooting](#) guide).

Note: If you don't have shore power available, as soon as the batteries are depleted, the KIB System will go dark. To restore function, you'll need to connect an external power source.

Lost Function Due to the Power Converter Not Working

While on shore power, if the Power Converter fails, the batteries will not be recharged. Once depleted, the KIB System will go dark.

Lost Function Due to the 12V DC Manual-Reset Mini-Circuit Breaker Tripping

A manual reset 12V DC mini-circuit breaker connects the electrical path between Power Converter and batteries.



If that breaker is tripped, the KIB system will not receive any power from the batteries. In that condition, it relies entirely on the Power Converter.

If the Power Converter fails, or shore power is disconnected, the KIB system will not function until the breaker is reset.

Partial Failures

If a single device fails to operate, after switching the device ON via the touchscreen tablet or phone app, check power at the device itself. If power is present at the device, the problem is internal to the device, or perhaps a problem with the ground wiring.

If there is no power at the device, the next step would be to examine the [control boards](#).

When you use the touchscreen tablet, phone app, or switch to turn on the device, and look at the control board outputs, the one labeled the same (or similar) to the switch label should have a green LED

illuminated. If not illuminated, but the switch LED is illuminated, there may be a malfunction on the controller.

If the controller LED is illuminated, but there is a 0V reading at the controller output, there may be a malfunction on the controller. On the relay controller, if the device is switched ON and the LED is illuminated, the on-board fuse may be blown.

If the controller LED is illuminated, and there is 12V DC at the controller output, you may have a break in the wiring between controller and device. You'll want to check for junction boxes and other locations where there may be wire connections.

Temporary Workarounds

If you have a single switch malfunction, it may be possible to use another switch to temporarily control the device that isn't operating. For example, if the Kitchen Lights switch fails, you may be able to go to the controller for the kitchen lights, move the kitchen light wire from its normal position on the controller to the position for the fascia lights. Then you could use the Fascia Lights switch to operate the kitchen lights. Movement of wires must only be to a controller port on the same board, with the same fuse rating and output. And of course, movement is limited by how much slack is in the wiring.

Customizing the Control System

Adding Additional Devices or Additional Controllers

Because each switch and controller port must be programmed with unique IDs and command functions, it's not possible to extend the system by adding new devices or additional controllers, beyond what Heartland offers.

Revision History

08/08/2020 Initial Release of Version 2, reflecting the 2020 KIB implementation.