**PRECISION CIRCUITS INC**

Overview: Fully automatic Power Control System which requires little to no user interface. The display is there to help the RV user understand power management and the function of the MIDI-PCS. The MIDI-PCS monitors the total AC current of an RV and prevents circuit breaker tripping by momentarily shedding up to five loads. As the user turns on additional appliances (such as a microwave, coffee pot, or hair dryer), the MIDI-PCS can shed the loads that it controls, (such as the water heater & air conditioner). As the user's selected appliances are turned off, and a minimum of 2 minutes has expired, the MIDI-PCS will automatically turn power back on each of the shed loads in reverse sequence, . The MIDI-PCS will constantly monitor 120VAC RV power and shed and restore power to the five controlled loads. The display panel has all the brains, a data connector to the I/O module, and an additional connector to control the air conditioners through low voltage signals. The I/O Module houses a current sensor, two relays to control 120VAC powered appliances, and Service Type detect circuitry.
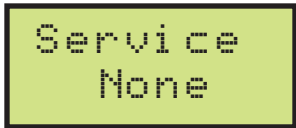
Display Panel: PCI# 00-10050-000
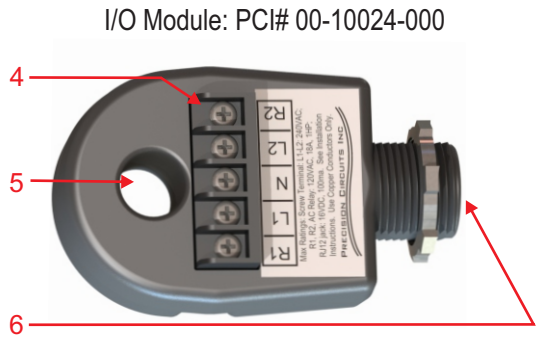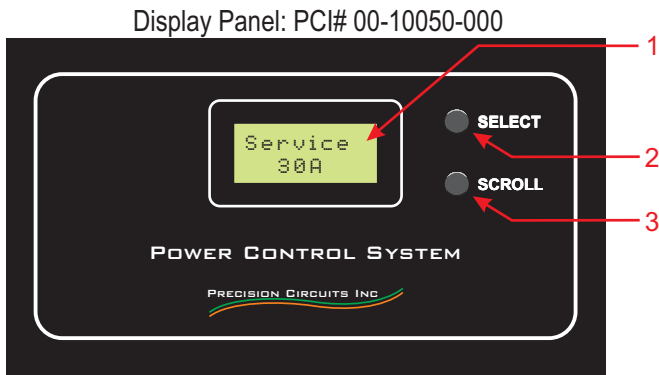
1 Display Screen
2 Select Button
3 Scroll Button

I/O Module: PCI# 00-10024-000

4 Screw Terminal
5 Current Sensor
6 Connector to Data Cable

As the Scroll Button is pressed, different information will become available on the Display Screen.

Service Type: One of several options will be displayed indicating the power available to the RV.

| Service None | When the RV is not receiving any external power the Display Screen will indicate that there is no service. |

| Service 50A | MIDI-PCS automatically senses 240VAC between L1 and L2 to determine this mode of operation. It assumes enough power is available, turns on power to all appliances, and does not perform any energy management functions. |

| Service 30A | MIDI-PCS automatically senses 0VAC between L1 and L2, and 120VAC between L1 and Neutral, to determine 30A Service. The I/O Module has a current sensor which monitors total RV current. When the current exceeds the 30-amp limit, the MIDI-PCS will limit current by shedding appliances that it controls. Once the RV current has dropped, the procedure will be reversed and power will be restored to the shed appliance. |

| Service 20A | Service 15A | While on the above 30A Display, the Select button is pressed to move to either 20A, 15A, or 30A Service, to match the power source the RV is plugged into, i.e. at a state campground, or at the house. The MIDI-PCS operates the same as above, except the current limit is adjusted to match the power source. |

| Generatr 45A | MIDI-PCS senses the Generator Hour Meter signal to know the Generator is running. When the generator first starts, Midi-PCS performs a soft start, shedding all the appliances, and turning them back on one at a time, after a 2-minite delay. The MIDI-PCS operates the same as above, except the current limit is adjusted to match the size of Generator. |

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Load Status: After Service Type, pressing Scroll Button will scroll through all the appliances MIDI-PCS controls.

```
WaterHtr
Powered
```

MIDI-PCS controls up to 5 appliances or loads. This is an example of one of the appliances the MIDI-PCS may shed, should it sense over-current. The user can press SCROLL to view all of the appliances the MIDI-PCS controls. If the RV is not trying to use too much current, then the load will have power available and displayed as such. Note: this does not mean the appliance is on, just that power is available.

```
WaterHtr
Shed
```

If MIDI-PCS has sensed an over-current condition, for example the Microwave has been turned on, it will shed power to the first appliance in the list, and display as such. As the user turns on more appliances, such as a hair dryer, the MIDI-PCS will continue down the list shedding power to the next appliance on the list. When the user turns off the hair dryer, MIDI-PCS will sense available power and begin to restore appliances in reverse order (First off, will be last back on.)

```
Waiting
Amps>Max
```

While on any of the Load Status screens, if the Select button is pressed, an overall status of all the Loads can be seen. There are three options:
1. Waiting Amps>Max means that turning the next appliance back on would cause the Amps that the RV is drawing to go over the Max allowed for the Service Type. (30A = 30 amps Max)

```
Waiting
120 secs
```

2. #1 condition above does not exist, turning on the next appliance would be OK. However, if any appliance is shed, then a minimum of 2 minutes or 120 secs must pass before power is restored. This is required for things like A/C compressor pressure to decrease. The user can then watch a countdown, in seconds, of when power will be restored. When the countdown concludes, the screen below will appear.

```
No Loads
Shed
```

3. This lets the user know that all MIDI-PCS controlled appliances are running.

Diagnostics: While on any of the Load Status Screens, pressing and holding Select button provides Learned Load current.

```
WaterHtr
Shed=10A
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MIDI-PCS displays Learned current for a specific appliance. This is the current the appliance was drawing when MIDI-PCS shed its power. If the appliance happened to be off, MIDI-PCS will learn and display Shed= 0A. This display of current is not live and only a picture in time, at the instant the appliance was shed. MIDI-PCS uses this value to determine when it is safe to restore power to this appliance. Displaying Amps>Max above means restoring the Learned current would put the RV over the Service Type Max limit, and MIDI-PCS is Waiting for another appliance to be turned off.

```
WaterHtr
Not Shed
```

Not Shed, is displayed when power to the appliance is available, and no recent Learned current is available to display.

Viewing the current on the Amp Display below when is goes above the Service Type Max and then again when a Load is Shed, is how the Learned current above is calculated.

AMPS Display: After scrolling thru each Load Status the next press of the Scroll button will display RV current.

```
Amps=25A
```

MIDI-PCS displays total RV 120VAC amps or current being drawn by the entire RV, including MIDI-PCS controlled appliances, other RV appliances, and appliances plugged into any outlet of the RV. This current is live, constantly monitored and updated. If RV current goes above the max limit for the Service type, it can be seen here for about a second before MIDI-PCS begins to shed appliances.

The good news is the user needs very little interaction with the MIDI-PCS. It sheds loads and restores power all by itself. The user no longer has to do manual energy management of the RV, but can relax and let the MIDI-PCS do its job. The only time the user needs to perform a function with the MIDI-PCS is after plugging the RV into a 20A to 15A receptacle, since the MIDI-PCS can not sense these two Service types automatically.