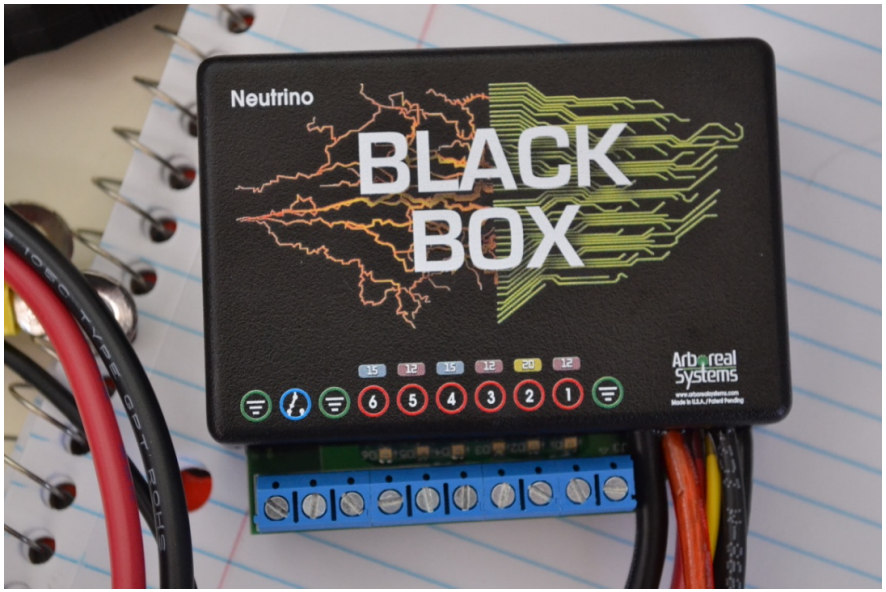
Neutrino Black Box Owner's Manual

Version 2
8/19/15



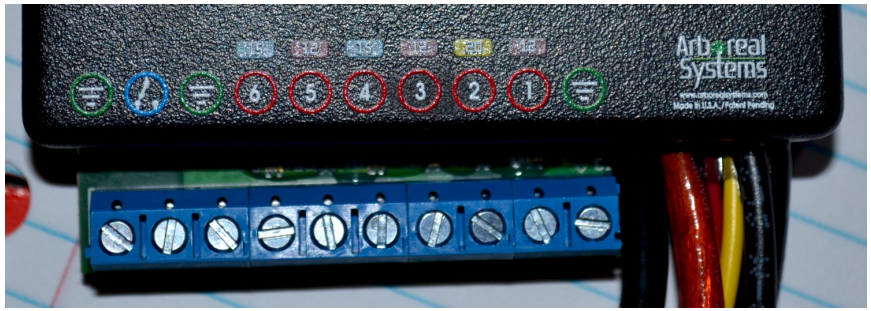
Congratulations on your purchase of the Neutrino Black Box integrated power distribution and control system. Not only does this product represent the state of the art in power distribution and control, but offers a range of essential information. Most importantly, the system will acquire additional talents over time as updated software is made available for download.

Installation of the system is covered under the quick installation guide shipped with the Neutrino module, so we won't cover that again here. The purpose of this manual is to show you how to use the system to its fullest capability.

Chapter 1: Configuration

Once your phone and Neutrino module are communicating, configuring the system is easy and fun. Note: your phone must be connected to Neutrino BB in order to program Neutrino BB. Settings are saved when the ignition is shut off. If you shut down the app before the ignition, settings won't be saved.

Step 1. Assigning circuits. Neutrino has 6 circuits, 3 ground terminals, a relay input, and a direct battery charger input in the main wiring bundle.



It's important to note that the 6 circuits have different capabilities.

Circuits 1,3, and 5 are each rated at 12 amps, circuits 4 and 6 at 15 amps, and circuit 2 at 20 amps. This is the maximum load that each circuit can handle, and the software won't let you set a level higher than this. This is done to optimize internal electrical paths within the unit.

Circuit 2 can actually handle peaks of significantly higher than 20 amps, so is ideal for devices such as HID lights that have very high starting current requirements, but quickly drop down to more moderate levels. For hard to start halogen lights we recommend using the ramped start feature built into the 20 amp setting on circuit 2.

Note on grounding. Unlike other products, Neutrino includes a ground plane. This allows you the flexibility to take ground from either the Neutrino module or from the chassis. This not only greatly simplifies installation, but it also allows for direct connection of sensitive audio equipment without the risking ground loop issues resulting from the use of chassis ground.

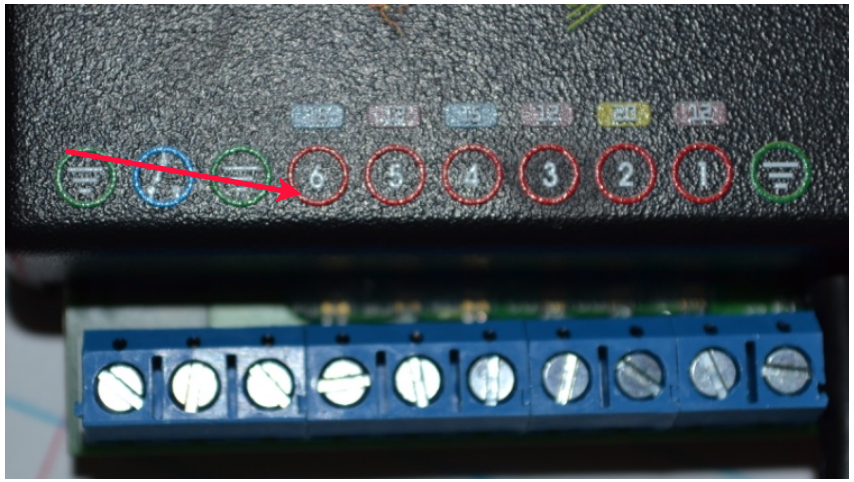
We include 3 ground connections on the module, one on either end of the connector strip and a third adjacent to the relay input. You can use any of these 3 ground points for any of your circuits.

The relay terminal, in between the 2 ground terminals on the left will accept an input from an external switch to trigger any combination of circuits on the NBB. The application updates to support this functionality are expected to be released in late July/August.

Step 2. Diagnostics: Now that you've got all your circuits hooked up it's time to talk about diagnostics.

The system includes diagnostics both on the module and in the phone app. Let's first talk about the on-board module diagnostics.

If you look at the base of the circuit board, where it exits the case, you will see 6 little LEDs. Each of these will tell you about the status of the corresponding circuit. If there is no light, the circuit is not energized. If there is an amber light, the circuit is energized and everything is normal. If there is a red light, however, this means that there is a short circuit.



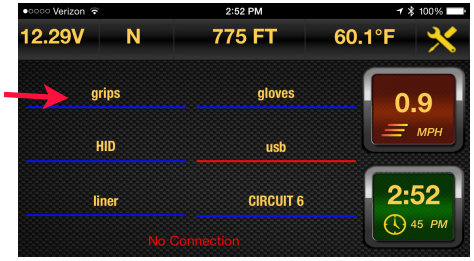
You can also get similar information from the application. When you turn on a circuit the bar will change from blue to red. If, however, there is a short circuit, the voltage indicator will turn red....a clear indicator that something is wrong.

The good news is that the circuit breakers will immediately shut the circuit down and will stay shut down until the short is rectified.
Please note that in the event you overload a circuit, say run a 6 amp load when the breaker is set for 3 amps, you will see a flashing red indicator.

Step 3. Configuring the circuits
In order to configure the circuits you will need to launch the Neutrino controller app on your phone and make sure you are connected either via USB or Bluetooth. In order to make a connection the ignition system of the host vehicle must be on.

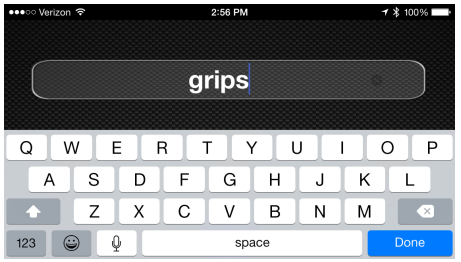
Once connected you can start the configuration process. Let's assume you are going to use all 6 circuits and you have a bunch of stuff to hook up. Our hypothetical example will include heated grips, a heated jacket, heated gloves, HID lights, LED lights, and a USB charger.

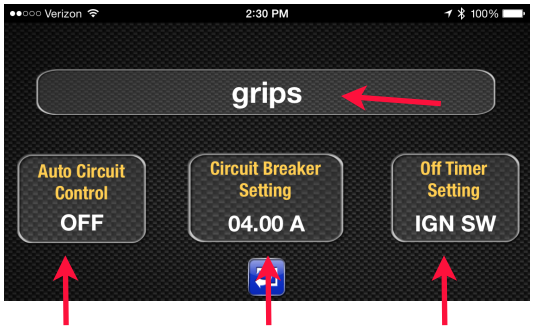
Since the only one of these that really needs a lot of power is the HIDs, these should be connected to circuit 2, and let's just assume that you connected the grips, jacket, gloves, LED lights, and USB charger to circuits 1,3,4,5, and 6.



So, let's get started with circuit 1, our heated grips.

To do this you tap circuit one from the opening page and you will be brought to the circuit adjust page.
The first thing to set here is whether you want circuit memory for this circuit on or off. If left in the off position, whenever you shut off the ignition and then restart, the circuit will be in the off state. If you set memory to be on the circuit will revert to wherever it was before the ignition was shut off.

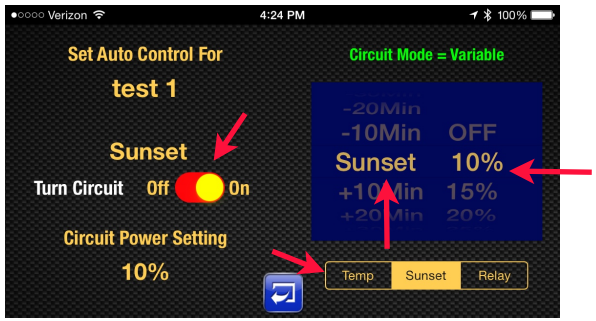




From here tap the gear icon on the right and this will take you to the configuration page. To name the circuit, just tap the default circuit name and a keyboard will appear.

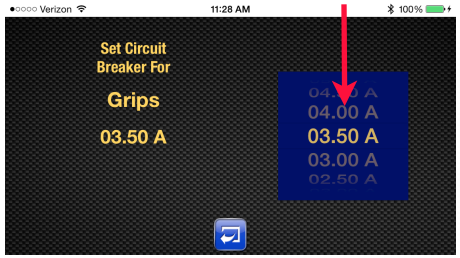
Type in the new name and tap "done". Since we're here, let's also set the other circuit attributes.

Starting from the left, decide if you want this circuit to be automatically activated based on either ambient temperature, sunset, or via relay switching. To do this tap the auto control box and you will be taken to the setup screen. To invoke any of these features first select the button at the lower right and then rotate the scroll wheels as desired. Note that you can also select whether you want a circuit to turn on or off when triggered via the switch on the left.



There are lots of options to choose from on this screen, including temperature, time offset, and for relay switching whether you want circuits to activate based on +12V, -12V, or float. What's really cool is that you are free to configure any number of controlled circuits with any of these automated features. Please give us a call for more information on this.

Going back to the previous screen, let's set the circuit breaker limit. Since heated grips typically take less that 3.5 amps, let's set the breaker for 3.5 amps. To do this simply tap the circuit breaker setting box and a scroll wheel will appear. Twirl the scroll wheel to 3.5 amps and press the return arrow.



It's that simple.

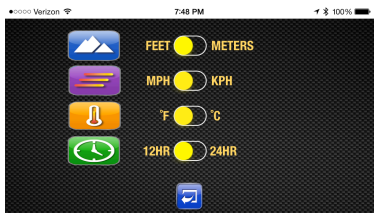
Finally, let's set the "ignition off" circuit behavior. This defines what you want this circuit to do when the vehicle is switched off. The default is for the circuit to shut down when the vehicle is off, but you have other choices. To set this tap the "Off Timer Setting" box and another scroll wheel will appear. Here you have a choice of "ignition", which means the circuit will shut down when the ignition is shut off, or you can set a specific number of seconds or minutes or hours that you want the circuit to remain live before it shuts down, or you can tell the circuit to shut down when the vehicle battery voltage drops to a certain level. This level is set on the master electrical page, which we will cover elsewhere, but if you want a voltage-dependent shutdown to happen (or the circuit to be live all the time), this is where you should make that selection.

Congratulations! You've now mastered circuit configuration and can apply the same concepts to the other 5 circuits.

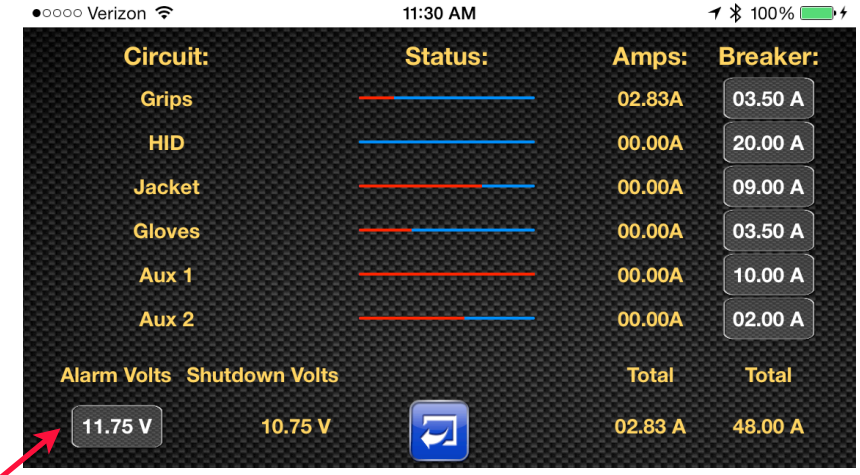
A really cool feature if Neutrino is that if you have multiple Neutrino modules on multiple vehicles each will remember it's own configuration. So, when you hook you phone up to the motorcycle all the settings that you had made will automatically pop up on the phone. If you

then hook the phone up to the Neutrino on your boat, a completely different group of settings would appear.

Step 4. Units of measure. If you tab back to the first page you will see an icon at the upper right of the screen that will allow you to set units of measure. When you tap it you will get a screen that allows you to choose between feet and meters, miles per hour or kilometers per hour, temperature in fahrenheit or centigrade, and time in either 12 or 24 hour format. You are free to mix and match any of these to your preference.



Step 5. Global electrical settings. All the electrical settings we've been making so far have been by circuit. There are, however, a few that are global. To access these tap the voltage indicator on the first page and you will be presented with a grid view of the entire electrical system. It shows you the status of each circuit, the current amperage draw by circuit, total amperage draw, and allows you to adjust the alarm voltage.



To do this, tap the alarm volts button on the lower left of the screen and you will get a scroll wheel where you can set a voltage at which you want the system to let you know that the vehicle voltage is below what you deem to be a safe level. This will also cause the automatic shutdown voltage to be set at 1 volt lower than the alarm setting. As discussed earlier, this shutdown voltage will be used to shut down a circuit where you have designated it as being voltage-dependent.

Chapter 2: Control

Now that the system is all set up the way you want it, it's time to use it to actually control circuits. Here's how it works.

From the main screen just tap any of the 6 circuit icons and you will activate the circuit adjustment page. Here you will see the circuit name and a bar with a blue button on the left and a red button on

the right. There's also a switch just below the amperage indicator that allows you to set the circuit to be variable or switched.

Let's assume we are wanting to control the heated grips we set up earlier. To do this you can either drag the white dot from left to right or tap the red button to advance the white dot and the blue button to retard it.

Please note that if a circuit is set to "VAR" the slider will move any amount you want, but if it's set to "Switched" when you touch either the while dot or the red/blue buttons, the circuit is either 100% on or 100% off.

Once you have adjusted the circuits as desired you can either leave the screen at that circuit so that you can quickly change it, or go back to the first screen. You will note that the environmental data is maintained on the adjustment screen so that you won't be missing much if you choose to stay there.

This brings us back to the subject of warning indicators/ messages.

As discussed earlier, if you overload a circuit you will get a flashing red indication. The fix for this is to set the circuit breaker level higher.

If you have a short circuit you will get a solid red and you will need to resolve this issue before being able to use the circuit.

If the vehicle voltage is less than the voltage alarm setting, you will see a flashing red indication on the voltage indicator. You can either choose to accept this as a message you need to know, turn off some electrical accessories, or lower the voltage alarm level.

Finally, the system won't allow you to exceed 60 amps total circuit breaker settings. If you attempt this you will get messages informing you of this and you will be forced to lower the overall settings to 60 amps or less before you can proceed.

Chapter 3. Specifications,etc.

Warnings:

1. Don't reverse polarity! As noted in the quick setup guide shipped with the Neutrino module, it's critically important that you don't reverse polarity when you connect the module to the battery. If you do, you will cause irreparable damage to the Neutrino module that cannot be repaired and will not be covered under the warranty

2. Don't connect a battery charger without proper fuse. Unlike the 6 controlled circuits , the battery charger input runs directly from the charger to the battery. There is no internal protection for this circuit, so it's critically important that you make sure to install a <3 amp fuse on the positive leg of this input. Failing to

take this precaution could result in disastrous consequences.

3. While we know this is motherhood and apple pie stuff, please don't make circuit adjustments and the like unless it's completely safe to do so. Operating a motor vehicle while distracted is extremely dangerous to you and every creature around you, so please be careful. We strongly recommend that circuit adjustments only be made when on the open road, far away from other vehicles, with flat terrain, and with minimal chance of animal interactions. Better yet, stop the vehicle and make the adjustments.

4. While the Black Box module is completely waterproof, if you mount it where water can get to the powered accessory connections it's important that you waterproof these connections. We recommend the use of silicone grease for this purpose as it's easily applied, easily removed, and will definitely keep water from affecting the circuit connections.

5. While we've gone to lengths to minimize the risk of damaging the NBB via electro static discharge, as with all microprocessor-controlled devices, if you zap it with enough voltage it's possible to damage the unit. This can easily be avoided by simply touching your finger to a metal part on the vehicle and doing the same with any wire you are about to insert into a NBB terminal before interacting with the terminals on the NBB.

Specifications:
Neutrino Black Box module is .9" thick, 3" wide, and 2" deep, exclusive of wires and connector strip. It is epoxy encapsulated and waterproof.
Weight 12 oz.

Electrical:
Total capacity is 60 amps at 12.5 volts.

Individual circuit capacities:
20 amps x 1
15 amps x 2
12 amps x 3

Parasitic losses:
Running w zero circuits on 29mA
Additional load per circuit activated is 16mA
Drain when unit is shut down is 1.1mA

Connectivity:
Data: USB socket on pigtail accepting USB> BTLE adapter.
Power outputs: 10 screw terminals capable of up to 14 AWG wire. 3 ground connections.
Inputs:
Direct battery charger input connections.
Remote thermosensor.
Ignition status sensor.

Just in case:
In the unlikely event of a software lockup please disconnect the positive lead from the Neutrino module to the battery momentarily. This should reset the module to normal operation.