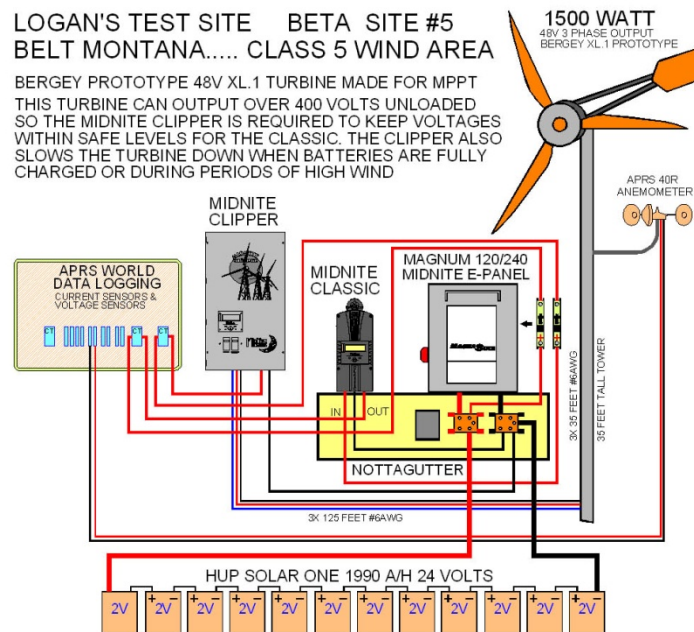# The Midnite Classic and Clipper

Preliminary description of Classic/Clipper operation - March/2010.

The Classic should begin limited production in May or June. We hope the "learning" firmware will be in the Classic by then, but if not, the Classic and Clipper are already fully programmable to suit most all battery charging turbines.

Below is a wiring diagram of one of our beta sites in Montana. The Clipper shown is the larger version (MidNite clipper) that can accept AC or DC. The retail price will be about $1700. The Clipper Jr. accepts AC only and will cost about half as much. The Midnite clipper should be available this summer. The Clipper Jr. late this year or early 2011.

Beta site in Montana
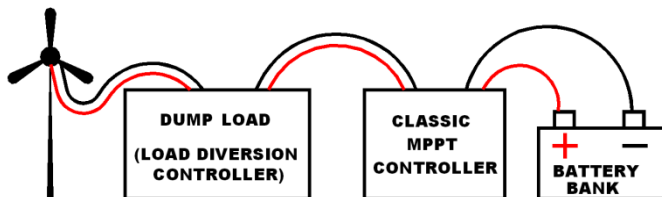
Simplified hook up of Clipper and Classic. The Clipper is the "dump load" in the picture.

The Turbine is always connected to both the Classic and Clipper. The Clipper does not disconnect the turbine from the Classic even when batteries are charged. When batteries are fully charged, the Classic

ceases to put current into the batteries. This condition would result in the turbine being unloaded if not for the Clipper. Most turbines would commence to free wheel at a speed that:

1. May be destructive to the turbine

2. Would be destructive to the Classic due to overvoltage. The Classic comes in three input voltages. 150, 200 and 250VDC. It doesn't take much wind to exceed 250 volts DC when batteries are fully charged, so a dump load connected to the output of the turbine is required (the Clipper). The MidNite Clipper can accept either 3 phase AC input or DC input. This Clipper rectifies the 3 phase ac using a 100 amp 1200V 3 phase bridge rectifier. It also has a stop switch. The Clipper is essentially a powerful PWM controller with an integral 2500 watt load bank. The PWM module is capable of driving an additional 3000 watts of load for increased power handling. The Clippers may also be stacked for additional power handling beyond the 5500 watt level. Stacking has not yet been added to the firmware, but is expected late 2010. Each Clipper comes with a graphical display that allows the Clipper to be customized for the application. Set up is accomplished using a wizard driven menu for ease of installation. The absolute maximum clip voltage is set when the Classic and Clipper are networked together via a phone cable. The Clip voltage may be set lower than what is established when connecting to each different Classic. For instance a Classic 200 connected to a Clipper would automatically be set for a maximum of 200VDC. The user may reduce the maximum clip voltage during set up. Additional set up parameters are: Maximum RPM allowed (AC turbines only), max current into the Classic, Shut down parameters to save wear and tear on the turbine during high wind conditions. (This is easier if an anemometer is connected to the Clipper, but not required. In addition to these Clip features, the Clipper will be able to profile the turbine when an anemometer is present. It will be able to output an excel type graph showing output power vs. wind speed. One of the status modes available on the graphical display is to turn the display into an oscilloscope for viewing turbine output voltage in real time. The display has 32 megs of memory for data logging and other features such as voice.

Another feature of the Classic is one that requires connection to the Classic. Three stage charging is possible. When the Classic determines that the batteries have achieved their full bulk and absorption charges, it sends a signal to the Clipper to load the turbine down to the point that now the Classic can float the batteries at a reduced charge voltage. All of this is adjustable during set up.

One of the best features is the ability to detect and react to high wind conditions. The Clipper cannot bring the turbine to a complete stop, but it will be turning about one revolution per second. This will increase reliability of the turbine.

The Classic is the first truly adjustable MPPT controller for wind. The Classic has the same graphical display as the Clipper. The display can also be an oscilloscope. We anticipate that since the Classic and Clipper have two way communications going on, we may as well let them actually talk to each other. We aren't sure what they may say, but it might be kind of amusing.

The Classic beta units have been in the field for about a year now. We have seen increased output power in all of the beta sites. Depending on the turbine installed we have seen about two to three times the power in low wind speeds to as much as 2.5 times the output power at the high end. High end

increases in power are achieved by spinning faster. The Clipper can limit the high end speed to fall within recommended limits. As time goes by we will accumulate MPPT profiles for each individual turbine. These parameters will be added into the Classic and Clipper as they become available. Set up will eventually be as simple as picking the correct model number. For those customers that wish to experiment, we provide the tools to customize and save up to ten charging profiles. No need to trust that we got it right, although with our learning software, we should be able to accurately create the proper charge profile. The user should be able to actually watch the charge profile graph morph as the learning software finds the optimum points.