Thanks for beta testing this unit. I think it works quite well and have been upgrading all of my locomotives to this device. However, since I designed and built it, I'm too close to it's operations to give it a good objective testing so I really appreciate your help. Most of my documentation will be on my web site: http://blueridgeengineering.net/

Bluetooth Widget

The best way to think of this device is that it's like a standard R/C receiver. It just accepts wireless commands from a smart phone app instead of the normal sort of R/C transmitter box. It has the same sort of three pin servo connector output pins on it, here is how they are mapped out:

```
Servo and Logic Connections

8  7  6  5  4  3  2  1  0  P
|  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  -------- Power Connector
|  |  |  |  |  |  |  |  ----------- Servo 0 (Throttle/ESC)
|  |  |  |  |  |  |  -------------- Servo 1
|  |  |  |  |  |  ----------------- Servo 2
|  |  |  |  |  -------------------- DCC logic signal OUT
|  |  |  |  ----------------------- Digital Output 1
|  |  |  -------------------------- Digital Output 2
|  |  ----------------------------- Reserved
|  -------------------------------- Reserved
---------------------------------- Reserved
```

Servo 0 is connected to the slider on the smart phone apps, so it is sort of 'hard-wired' to the throttle function. The DCC throttle output follows servo 0 as well which allows you to combine DCC, servos and Electronic Speed Controls.

The device is dependent on the Android App to function. Once the app is loaded and this board is selected, a 'keep alive' is generated by the app to the device. This is in there so that if your phone dies or gets turned off, etc, the locomotive will come to a stop. The servo goes to it's far off position and the DCC output stream sends a zero.

Operating Scenarios

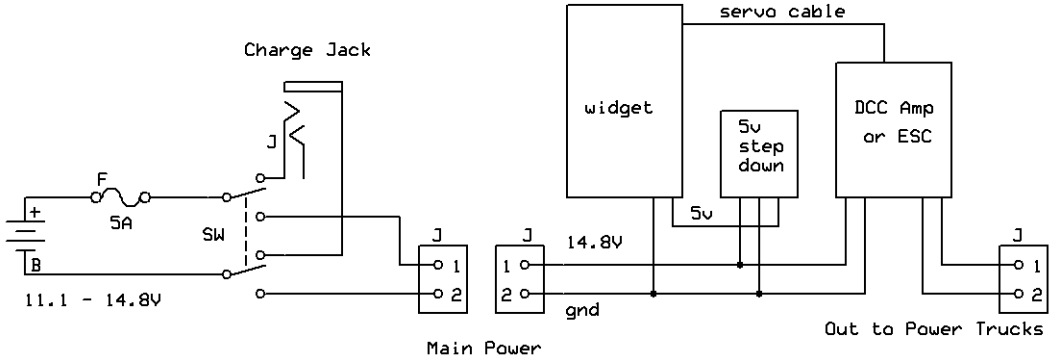
For Steam locomotives you can use the servo outputs to control the speed and direction and use the aux servo for whatever other function you need. The digital outputs can then turn on lights or trigger sounds. You could also hook up the DCC stuff for sound and lights.

For battery operated locomotives, you can use the main servo output to drive an electronic speed control and the other two servos to control the couplers. The digital outs can then trigger sounds or lights or what-have-you.

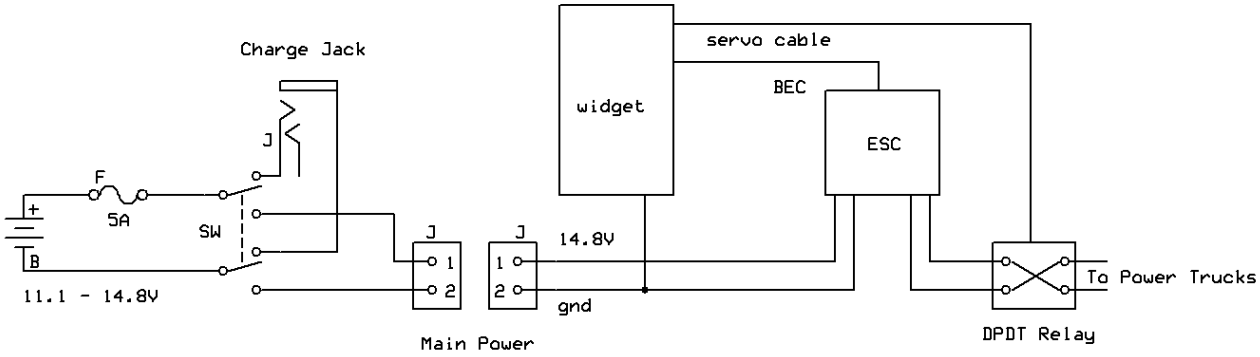
Another option is to use the servo output to control an electronic speed control, then have a small less expensive DCC controller provide the lights and sound. You can use the 8A DPDT relay to reverse direction triggered by one of the outputs if you wish.

Complete DCC Battery Powered The widget also supports a complete DCC Battery system using one of the Large Scale DCC decoders like the Economi400, the TCSWow or the QSI to handle all the locomotive functions.

Here is the basic wiring diagram for using the Widget. The '5v Step Down' may or may not be needed depending on the method you want to use. If you have an ESC with BEC (battery elimination Circuit) you can power the widget logic with that. If not, you will need something to convert the high voltage of the batter down to 5v. The Pololu D24V22F5 is a good inexpensive choice for this.



Above shows with the step down



Here is pretty much the same diagram but a BEC is shown. This also shows the relay that is used to switch the direction of the locomotive.

The relay may or not be relevant to the type of operation the ESC supports. There are two types of ESC operation. The first is the servo throw goes full left for full stop and full right for full speed. A power relay is used to switch the polarity to the motors to control the direction. The other is the middle range of the servo throw is stop and all the way left is full speed reverse and all the way right is full speed forward.

DCC and hybrid operations

One of the goals of this design is to make everything a module to give the maximum amount of flexibility. In this regard, I have created another widget, not much bigger than a servo, that outputs DCC commands using a battery as power.

The DCC functions of this receiver cover the basic operations for most decoders. Base and 128 step throttle control, the extended packet format for Functions 0 – 28 and the CV programming functions.

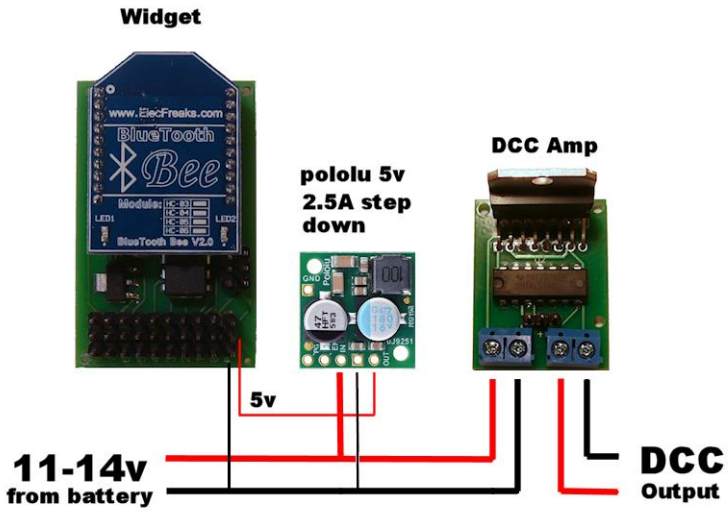
Also, and this is very important if you are using a decoder that has been previously programmmed, ONLY ADDRESS #3, the default address, works with this unit.

Hybrid operation

The DCC throttle output tracks the servo 0 output. This lets you do combinations of things like using a small HO size decoder in a large scale locomotive by routing the servo 0 output to a large ESC and then using the small decoder to drive the sounds and lights (depending on the decoders capabilities of course)

The module must be plugged into the proper output on the receiver to function- output 3 on the widget is the only one that will work.

Here is the basic power setup for the DCC module:



Note that the logic signal from output 3 on the receiver has to be connected to the 3 pin logic input on the DCC device, this is not shown in the above diagram.

Range

This is a very subjective sort of measurement. With a new BLU smart phone ($50 phone with no cell service), I get a solid 100ft of range. Other devices, particularly older ones, may not get this (or may get better range, I don't know). So this is one of the data points I hope to evaluate as more folks try out this board.

Again, thanks for testing this- I probably need more info on this set of instructions but for now please direct any questions to:

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or visit my web page for this project at:

http://blueridgeengineering.net/