
“Buckeroo”

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Introduction

This document describes the Buckeroo power distribution board and how to assemble and install it.

Revision History

V0.1 – first pass – December 6, 2020

V 0.2 – adjusted connector designations, fixed typos December 7, 2020

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1 INTRODUCTION

The Buckeroo provides connectors to distribute up to 12 pairs of positive voltage and ground. Pads are provided for a bucking or boosting converter to develop any voltage from about 3 - 30 volts.

We often need to distribute power and ground for various devices under the layout and various power distribution boards have been offered over the years. This one fits our standard 7CM Tyco track ("Din Rail") but can also be mounted using #6 screws and standoffs.

Features:

- Takes power from either a 2.1 mm barrel jack or a 3.5mm two position screw terminal (I use this to take power from my 12 volt auxiliary bus and break it out for clusters of devices under the layout at whatever DC voltage is required).
- Connector pads provide up to 12 connections on 0.100 centers for +V and -V (Ground.) If you are assembling your own board and need less connections, you can use connectors with fewer positions.
- Pads for an LM2596 bucking (down) converter or an XL6009E boost (up) converter.
- Pads for 0.100 jumpers to be used if no buck or boost is required (distribution from layout aux power bus or from a wall wart of appropriate voltage).
- All components are through-hole technology for ease of assembly and repair.

Output connection pads and converter bypass jumpers are on 0.100" centers. This provides for a wide range of interconnect options and components. Connection options include screw terminal blocks, header pin connectors (male and female), right angle headers, and direct soldered wires.

Schematic, circuit board layouts and CAD files are available on the product page on our website and on my GitHub page <https://github.com/SethNeumann>.

2 IDENTIFICATION AND INFORMATION

2.1.BOARD LAYOUT

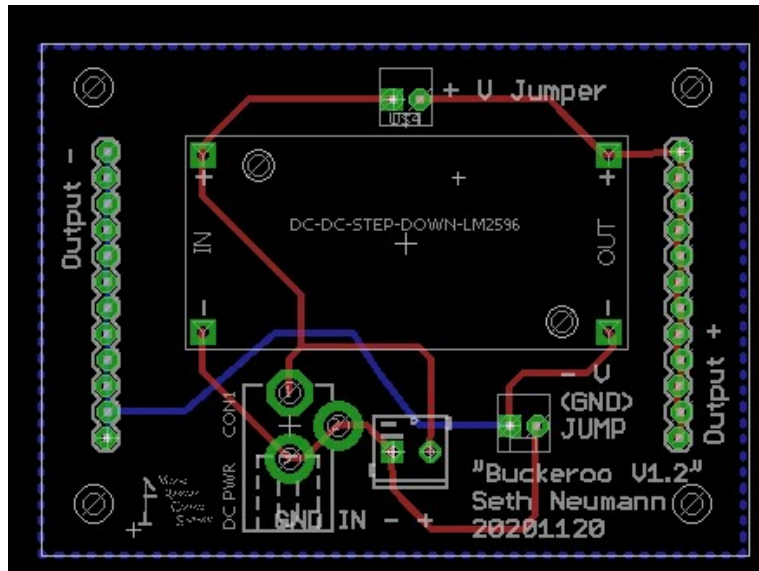


Figure 1 - Rev 1.2 Board Layout

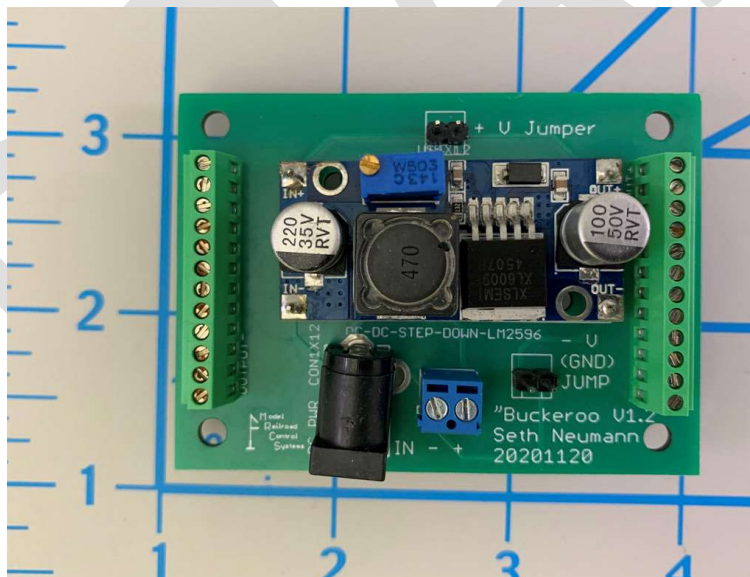


Figure 2 – Rev 1.2 Board (with boost converter) Top View

This board is sold as a single unit, assembled, and tested or as bare board, panel of 2. If you are interested in alternate connectors, large quantities, or custom modifications please contact us.

2.2.BILL OF MATERIALS

Qty	Value	Package	Parts	Description	Jameco	_1	Asian/eBay/AN Extd	
1	DC PWR	DCJ0202	CON1	DC POWER JACK	101178	\$ 0.50	\$ 0.08	\$ 0.08
1	DC PWR	SCREWTERMINAL-3.5MM-2_LOCK	CON2	PHOENIX CONNECTOR	2094506	\$ 0.35		\$ 0.35
1	DC-DC-STEP-DOWN-LM2596	DC-DC-STEP-DOWN-LM2596	U\$4	DC/DC Step-Down Regulator based on LM2596-ADJ chip			\$ 1.25	\$ 1.25
1	DC-DC-STEP-STEP UP-XL6009	DC-DC-STEP-DOWN-LM2596	U\$4	DC/DC Step-Up Regulator based on XL6009 chip			\$ 2.00	\$ 2.00
2	BYPASS	MOLEX-1X2_LOCK	CON3, CON4	PHOENIX CONNECTOR			\$ 0.01	\$ 0.02
2	OUTPUT+	1X12_LOCK	OUTPUT+, OUTPUT -	Screw Terminal			\$ 0.80	\$ 1.60
2		1x2		Berg jumper for bypass	19141		\$ 0.13	\$ 0.26
1	Printed Circuit Board						\$ 2.50	\$2.50

Table 1- Bill of Materials Rev 1.1

Note these costs are correct as of December 2020 but may change over time. I've given Jameco (www.jameco.com) part numbers and prices where available and used Amazon, eBay and various Asian suppliers. These prices are for 10s which is lowest quantity that's economical. For the bypass pins (CON3, CON4) I use 0.100 male headers. These can be purchased at about \$0.01 per pin in breakaway strips of 40. Search the suppliers above and buy a pack of 10, which should keep you for a few projects. Your cost per buckeroo (obviously you will have at least 2 as the board is a panel of 2) will vary from about \$4.00 for a straight distribution block to \$6.00 with a boost converter, depending on how you buy.

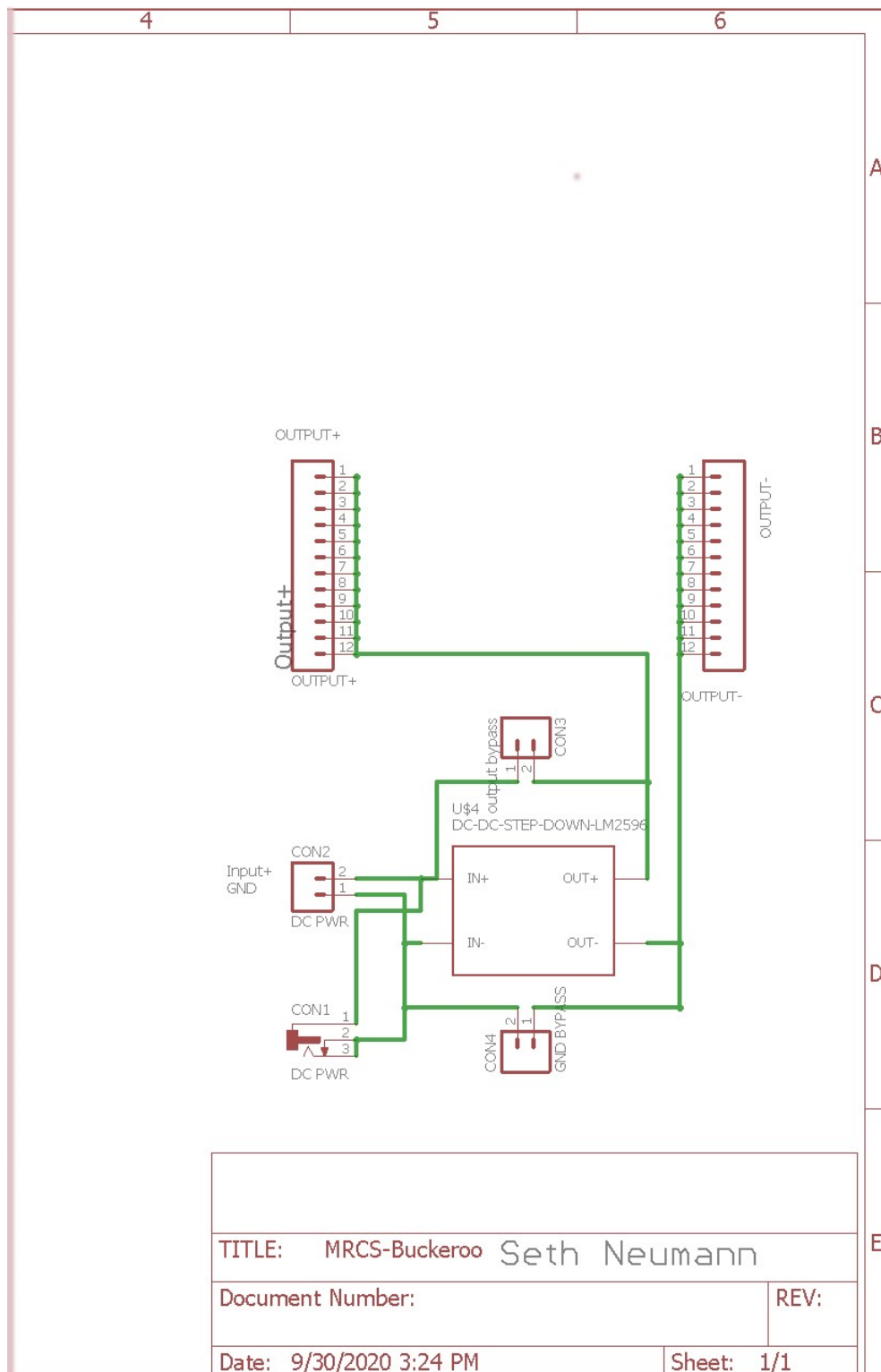


Figure 3 - Rev 1.2 Schematic

3 OPTIONS

3.1.CONNECTORS

- The distribution and bypass connectors are on 0.100 centers (staggered slightly to hold the connectors in place during assembly). While our standard connector is the 0.100 screw terminal, you may substitute any 0.100 connector you prefer. If you are ordering an assembled and tested unit from MRCS and you would prefer a different connector, please contact us at sales@modelrailroadcontrolsystems.com and indicate your preference and we'll provide a quotation.
- The Buckeroo has input pads for both a 2.1 mm barrel connector (usually used with a wall wart type power supply) and a 2 position 3.5mm screw terminal block. Either one or both may be used (for example if you want to daisy chain two Buckeroos together to get more outputs or two provide 2 voltages – one converter per Buckie).
- If you are using a buck or boost converter, you don't need the bypass jumpers and may omit them. Both the buck and boost converters have an internal connection between their INPUT- and OUTPUT – terminals.
- If you are looking to save a few cents, solder jumpers of 22 Ga wire in place of the bypass jumpers (if used) and only equip the number of output screw terminals required. The 0.100 screw terminals cost ~\$0.10 per terminal and are available in 2,3,4,6,8 and 12 pin configurations. If you only have (say) 4 devices needing power, you don't need to stuff all 12 outputs.

4 ASSEMBLY

All of the components are through-hole technology with wire leads. The general rule is installing the lowest components first, working towards components that are higher off the board. This enables you to support the low components as you solder them. The suggested order assumes you are using both input connectors, screw terminals for the outputs and male headers for the bypass jumpers. If you choose to use different connectors, check the heights, and vary the build order accordingly.

[] Male Headers

[] install the bypass jumpers, CON3, CON4, if used. Hint – use a spare board as a jig to hold them in place as you solder

[] If using a buck/boost converter, break off 4 header pins and solder them onto the bottom of the IN-, IN+, OUT- and OUT+ holes with the long side down. Use a bare board as jig. Solder from the top. You could also use pin and socket combinations or bare wire

[] Screw Terminals

[] Install the OUTPUT- and OUTPUT+ screw terminals. . If you need less than 12 connections, feel free to use a screw terminal with fewer positions. These are available in many sizes from 2 to 12 positions

[] Install the 3.5mm input connector (if used)

[] Barrel Jack

[] Install the barrel jack, if used

[] **Install the Buck/Boost converter, if used.** I used 0.100 header pins for the input and output pins in the corners. You could also use pin and socket combinations or bare wire.

[] slip the “Berg Jumpers” onto the bypass pins CON3, CON4 if not using a buck or booster.

5 TESTING

Testing your Buckeroo is quick and simple:

1. Using a voltmeter set to resistance (or continuity if has a beeper) put one lead on the input screw terminal – and check for continuity with the -V bypass jumper, do the same with + and the +V jumper.
2. Check from the other side of the bypass jumper to each of the screw terminals in use. I find I sometimes miss a pad when soldering these.
3. If not using a buckler/booster, connect your input voltage and install the jumpers and check that you see the same voltage on the outputs
4. If using a buckler/booster apply power to the input and connect your meter across OUTPUT + and OUTPUT - (clip leads will be handy). Adjust the output voltage to your desired voltage by turning the small screw on blue pot counterclockwise. It's a 20-turn pot, so it may take a while to see anything happen.

6 INSTALLATION AND CONNECTIONS

6.1 POWER CONNECTIONS

Note that 24 Ga wire can handle up to 0.6A (600 mA). So, the total current delivered over any conductor should not exceed 600 mA. Also note that the bucking converter can only source 3A, and since most of us buy these from inexpensive suppliers on major commerce and auction sites, it is wise to allow a little margin of safety.

If in doubt, contact us! sales@modelrailroadcontrolsystem.com