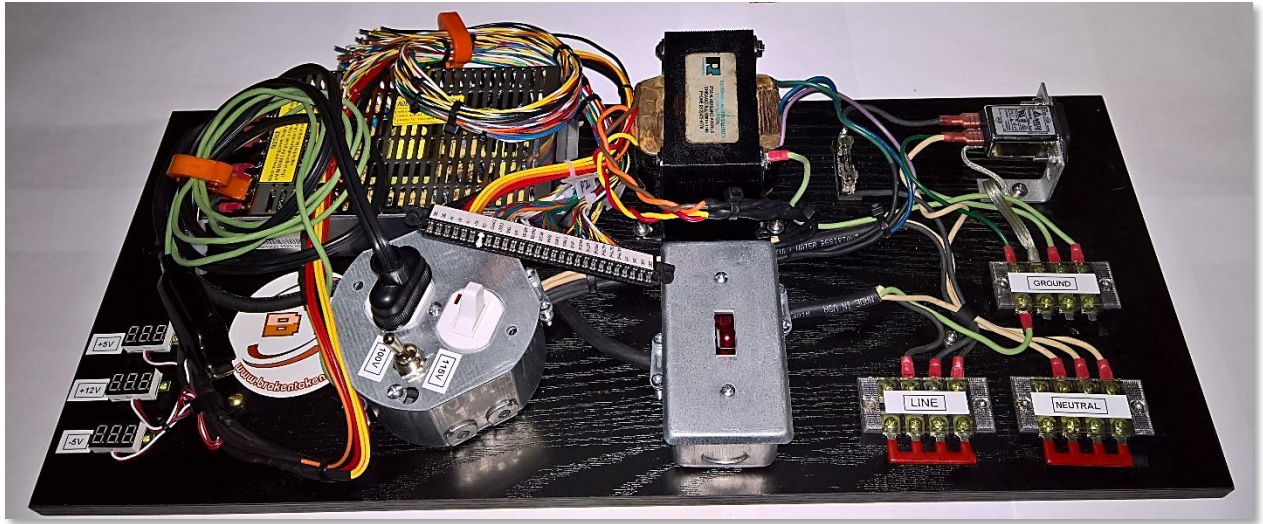


# The BT Beast Board



# Disclaimers & Acknowledgements

- ❖ You take all responsibility for this build, its quality, its safety and its use. Furthermore, you neither hold me, nor anyone else liable for the workmanship and final operation and application. If you hurt yourself, it's on you. If you hurt someone else, it's on you.

Test as you go and fix what you don't like. This board works for me and it *\*should\** work for you. That's all I can promise.

- ❖ This document is a "work in progress" and should not be considered final at any time. I will update the BOM and build notes as I continue to tweak and add to the board over time. Build it as it is and add to it as you go – that's what I'm doing!
- ❖ Special thanks go out to KLOV forum members Glitch and DarrenF. They helped me with some ideas for the build and answered some questions I had in regards to wiring this specific ISO for this application. Further info can be found in the following thread - <http://forums.arcade-museum.com/showthread.php?t=336433>
- ❖ Want to talk more about the board build and/or provide feedback? Awesome! Contact me – [whitney@brokentoken.com](mailto:whitney@brokentoken.com) and let's talk!

## Background

The goal of this document is to give you the Bill of Materials for building the "BT Beast Board" (herein called the BTBB for the sake of brevity) as shown at our 'Repair it, Restore it – Don't spend your money on it, spend Brent's instead!' panel discussion presented at the 2016 Southern-Fried Gameroom Expo in June 2016.

The video for this panel discussion is available on YouTube – <https://www.youtube.com/watch?v=lv9uoLFuS4s>

The PowerPoint presentation is available on our website - <http://www.brokentoken.com/events/sfge2016-panel-discussion-repair-it-restore-it-dont-spend-your-money-on-it-spend-brents-instead>

### **The purpose of the BTBB is multi-fold:**

- 1) Allow the beginner or experienced arcade collector/restorer to easily build a single bench-testing setup that powers both arcade PCB's and monitors independently of each other without having to wrangle separate electrical connectors and components.
- 2) Provide for powering both "normal" (i.e. WG, Electrohome, Vision Pro, etc.) arcade monitors that run on 110-115VAC as well as Sanyo monitors (normally found in Nintendo arcade games) that run on 100V AC.
- 3) Provide an extensible layout (via the JAMMA harness) for connecting not only PCB's but a slave control box (still in development as of this writing).

BT Beast Board – BOM – V1.1



# Assembly Notes

- I stripped commercial-grade interior (stranded, not romex) 16ga electrical cord (16/3) for all my wire runs. That supplied the black (line/load), white (common/neutral) and green (ground) wires for all the main power needs in the appropriate gauge and voltage ratings. I had that wire left over from another project and did not include it in the BOM – you can either buy 16ga wire rolls (black, white and green) from a big-box store (ensure it is 300V/600V rated for household current), secure like cord from an electrical supply company or find similar wire as spare.
- Take your time, and use the black/white/green color wires consistently across to board to indicate load, common and ground to avoid confusion.
- Can you build this cheaper? Probably. Should you economize? I don't believe so. Look around your parts stash and use what you can but don't cut any corners. We're working with electricity and you don't want to hurt yourself.
- The layout is what suits me, but lay it out however works for you. There is no wrong way to organize the components on the board. Just make it logical and pleasing to the eye.
- The purpose of the 0-30V LED displays is to wire them to the output rails on the switching power supply so that you have an always-on display of the voltage being produced by the switcher on each individual rail. It's a lot easier to look at those displays than to have a multimeter flopping around the power supply.
- The electrical switches are different on purpose. The red switch with the embedded pilot light (to be used for the switching power supply) is a good indicator of whether the board is 'hot' or not and to help give a visual on power connectivity. The white switch with the small red light is meant to tell you the power status of the ISO.
- I switch the ISO off to select between the output voltages. Not saying you HAVE to - it just feels right doing so.
- If you want, you can eliminate the termination blocks and the barrier strips and wire each of the 3 wires in the electrical circuit (load, neutral and ground) to individual single runs. I felt the termination blocks were a more elegant solution and allowed for easy tapping in case there are expansion plans in the future. 😊 V2, maybe!?!?!
- Shrink-wrap as much as possible, electric tape the rest. 😊 You'll see what I mean when you look through the pictures.
- Ground the ISO! I did this by connecting a few jumper wires from the ISO frame and mounting brackets back to the 'Ground' distribution block. Problem solved.

BT Beast Board – BOM – V1.1

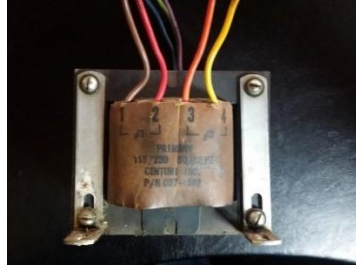


## Wiring the ISO

There are a couple of different ways to go about this. I did the research on the ISO and compiled the following from a few different threads on KLOV:

On the Primary side (ISO Input):

- #1 (Brown) & #3 (Orange) – wired to common (white)
- #2 (Red) & #4 (Yellow) – wired to load (black)



On the Secondary side (ISO Output):







- Connect #7 (Green) to one leg of your monitor power - consider this the neutral (what would normally be the white wire on the monitor power cord).
- Connect #5 and #6 (Blue and Purple) to the two throws of a SPDT switch.
  - Consider this the Line input (what would normally be the black wire on the switch)
  - On my ISO, the purple wire provides the 100V output and the blue wire provides the 115V output
- Connect the common terminal of the SPDT switch to the other leg of your monitor power (what would normally be the black wire on the monitor power cord).








Check the session presentation and the picture album for more details. You'll see exactly how to wire everything together by studying those two resources.



# Bill of Materials (BOM)





BOM Category	Item	Link	Cost	Picture
Basics	Fully-loaded JAMMA Harness	<a href="http://www.therealbobroberts.net/harn.html">http://www.therealbobroberts.net/harn.html</a>	\$36	
	15 AMP Heavy Duty switching power supply	<a href="http://www.arcadeshop.com/parts.htm#Power">http://www.arcadeshop.com/parts.htm#Power</a>	\$29	
	Ravenswood Dual-voltage Isolation Transformer	Unknown - scour some old Centuri games to find one... 	??	
<b>Electrical</b>				
	Spade terminals – Utilitech #0423953 (20ct)	<a href="http://www.lowes.com/pd/Utilitech-20-Count-Spade-Wire-Connectors/999953546">http://www.lowes.com/pd/Utilitech-20-Count-Spade-Wire-Connectors/999953546</a>	\$2.97	
	3AG Littlefuse fuse holder  Add a 125/250V 3A fuse, as well!	<a href="http://www.parts-express.com/littelfuse-3ag-agc-fuseholder--071-500">http://www.parts-express.com/littelfuse-3ag-agc-fuseholder--071-500</a>	\$1.97	



	Shrink Wrap – Hickory Tube Works - \$12	<a href="http://www.ebay.com/itm/170900471355">http://www.ebay.com/itm/170900471355</a>	\$12	
	25ft 16AWG 2-conductor black lamp cord (\$10.44)	<a href="http://www.lowes.com/pd/25-ft-16-AWG-2-Conductor-Black-Lamp-Cord/3128641">http://www.lowes.com/pd/25-ft-16-AWG-2-Conductor-Black-Lamp-Cord/3128641</a>	\$10.44	
	Project Source 15-Amp 125V Black 2-wire plug (\$1.97)	<a href="http://www.lowes.com/pd/Project-Source-15-Amp-125-Volt-Black-2-Wire-Plug/4068215">http://www.lowes.com/pd/Project-Source-15-Amp-125-Volt-Black-2-Wire-Plug/4068215</a>	\$1.97	
	5PCS Mini Blue DC 0-30V LED Panel Voltmeter 3-Digital Display Voltage Meter	<a href="http://www.ebay.com/itm/281478533527">http://www.ebay.com/itm/281478533527</a>	\$10.98	
	5 Pcs Dual Row 4 Position Covered Screw Terminal Strip 600V 25A	<a href="http://www.ebay.com/itm/5-Pcs-Dual-Row-4-Position-Covered-Screw-Terminal-Strip-600V-25A-/191790197991">http://www.ebay.com/itm/5-Pcs-Dual-Row-4-Position-Covered-Screw-Terminal-Strip-600V-25A-/191790197991</a>	\$8	








URBESTR400V 10A 8 Postions Pre Insulated Terminal Barrier Strip Red /Black 4 Pcs	<a href="http://www.ebay.com/itm/URBESTR400V-10A-8-Postions-Pre-Insulated-Terminal-Barrier-Strip-Red-Black-4-Pcs-/151952313351">http://www.ebay.com/itm/URBESTR400V-10A-8-Postions-Pre-Insulated-Terminal-Barrier-Strip-Red-Black-4-Pcs-/151952313351</a>	\$11.20	
603-1154-ND 7.11000 28.44 T FILTER IEC CONNECTOR 115/250VAC	<a href="http://www.digikey.com/product-search/en?keywords=603-1154-ND">http://www.digikey.com/product-search/en?keywords=603-1154-ND</a>	\$6.68	
STEEL CITY 22.5-cu in Metal Round Wall Electrical Box	<a href="http://www.lowes.com/pd/STEEL-CITY-22-5-cu-in-Metal-Round-Wall-Electrical-Box/3318544">http://www.lowes.com/pd/STEEL-CITY-22-5-cu-in-Metal-Round-Wall-Electrical-Box/3318544</a>	\$2.88	
STEEL CITY 14.5-cu in 1-Gang Metal Handy Wall Electrical Box	<a href="http://www.lowes.com/pd/STEEL-CITY-14-5-cu-in-1-Gang-Metal-Handy-Wall-Electrical-Box/3318606">http://www.lowes.com/pd/STEEL-CITY-14-5-cu-in-1-Gang-Metal-Handy-Wall-Electrical-Box/3318606</a>	\$1.88	



	STEEL CITY 1-Gang Rectangle Metal Electrical Box Cover	<a href="http://www.lowes.com/pd/STEEL-CITY-1-Gang-Rectangle-Metal-Electrical-Box-Cover/999912417">www.lowes.com/pd/STEEL-CITY-1-Gang-Rectangle-Metal-Electrical-Box-Cover/999912417</a>	\$0.64	
	STEEL CITY 1-Gang Round Metal Electrical Box Cover	<a href="http://www.lowes.com/pd/STEEL-CITY-1-Gang-Round-Metal-Electrical-Box-Cover/3333142">http://www.lowes.com/pd/STEEL-CITY-1-Gang-Round-Metal-Electrical-Box-Cover/3333142</a>	\$1.48	
	Eaton 15-Amp 125-Volt White Indoor Duplex Wall Outlet/Switch	<a href="http://www.lowes.com/pd/Eaton-15-Amp-125-Volt-White-Indoor-Duplex-Wall-Outlet-Switch/3411814">www.lowes.com/pd/Eaton-15-Amp-125-Volt-White-Indoor-Duplex-Wall-Outlet-Switch/3411814</a>	\$7.99	
	Hubbell 1-Switch 15/20-Amp Single Pole Red Indoor Toggle Light Switch	<a href="http://www.lowes.com/pd/Hubbell-1-Switch-15-20-Amp-Single-Pole-Red-Indoor-Toggle-Light-Switch/50179181">http://www.lowes.com/pd/Hubbell-1-Switch-15-20-Amp-Single-Pole-Red-Indoor-Toggle-Light-Switch/50179181</a>	\$9.99	





	SPDT SERVALITE Silver Metallic Light Switch	<a href="http://www.lowes.com/pd/SERVALITE-Silver-Metallic-Light-Switch/50107278">http://www.lowes.com/pd/SERVALITE-Silver-Metallic-Light-Switch/50107278</a>	\$4.94	
<b>Monitor</b>				
	WM1602-ND .37960 9.87 T CONN RECEPTACLE 2POS .093	<a href="http://www.digikey.com/product-search/en?keywords=WM1602-ND">www.digikey.com/product-search/en?keywords=WM1602-ND</a>	\$0.47	
	WM1687-ND .44800 11.65 T CONN PLUG 2POS .093	<a href="http://www.digikey.com/product-search/en?keywords=WM1687-ND">http://www.digikey.com/product-search/en?keywords=WM1687-ND</a>	\$0.47	



## BOM Revisions

Document Version	Date	Comments
1.0	8/28/2016	Initial Release
1.1	9/2/2016	Updated the 'Assembly Notes' section to better clarify the proper power cord/wire to use for the main power bus.

