

W12 CRCRC Power Supply Build Guide

This PCB is designed for Class A power amplifiers that require a dual rail power supply. This is for dual mono builds. It is effectively 2 CRCRC Power Supplies on one PCB. In automotive terms, imagine 2 V6 engines joined together to form a W12 engine. Each channel has a CRCRC filter per rail using a single capacitor, then a pair of filter resistors, followed by a single cap, another pair of filter resistors, and a final cap. Bleeder resistors are included in the circuit. This PCB is designed to be used with a pair dual secondary transformers, one per channel.

The grounding is configured as a “Star Ground” per channel. There is a connection from Audio Star Ground to Chassis / Earth Ground via a CL-60 Thermistor. The Chassis Ground connection point may be made either through a screw or wire.

The board accommodates LEDs and their associated dropping resistors. Oftentimes one LED is used on-board to indicate power supply operation, and other LED is installed via wires to be a front-panel “power on” display.

Project Difficulty: **NOVICE** **INTERMEDIATE** **EXPERT**



Questions?

You're probably not alone!

Post your question(s) on the DIYAudio forums.



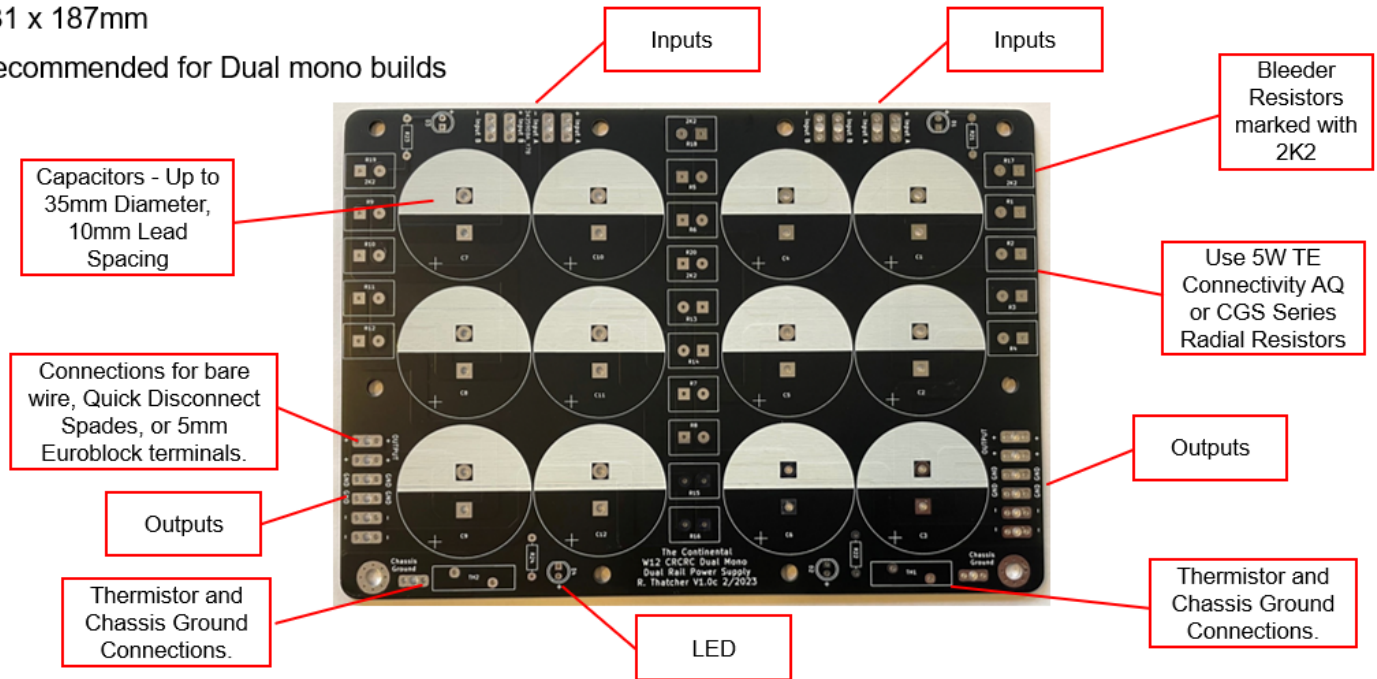
This project uses line/mains voltages and has large power supply capacitors. The voltages in this board can kill – even at miniscule current. If you are not competent / confident with working with these voltages, please seek advice from either a qualified electrician, or an audio DIYer who is competent and experienced in this area. Always work safe and work smart!

The PCBs are offered without any warranty, guarantee provided, or liability taken.

Version / Date		Revision History
V1.0a	24 March 2023	Original Release.
V1.0b	24 March 2023	Updated Resistor part number.
V1.0c	04 Sept 2024	Updated wiring concept for 240V builds
V1.0d	28 Jan 2025	Clarifications on wiring concepts, identifying wire pairs, and added checkout sheet
V1.0e	17 March 2025	Clarifications on wiring concepts

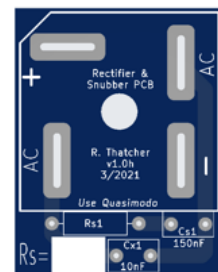
Getting to know the W12 CRCRC PCB

- Mounting holes compatible with 10x10 grid
- 131 x 187mm
- Recommended for Dual mono builds



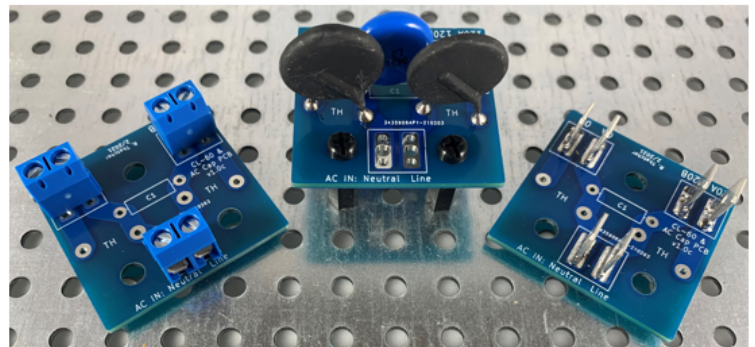
• Rectifier / Snubber Board

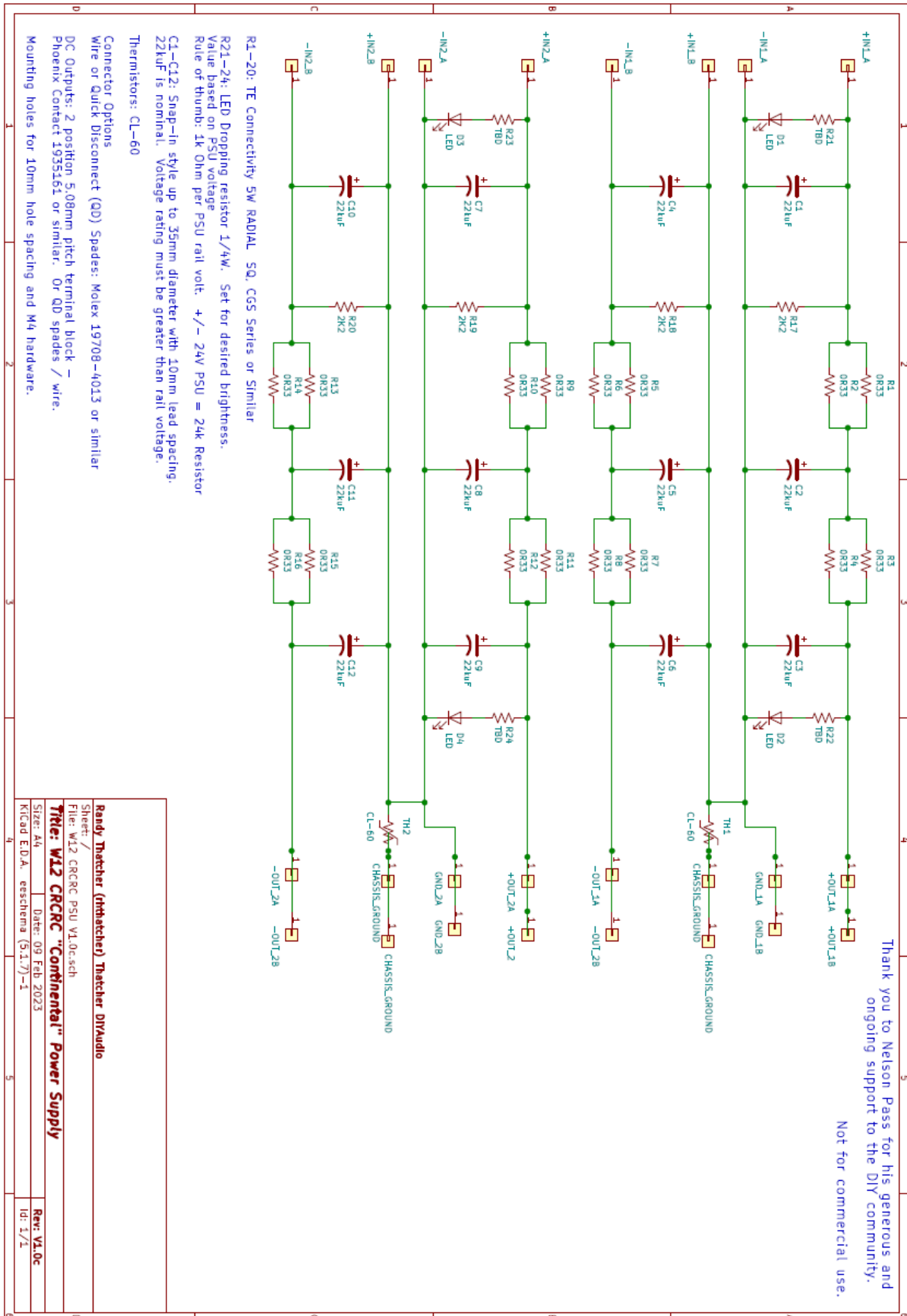
- Install on diode bridge with snubber resistor and caps
- Use your Quasimodo jig to calculate values based on transformer selection
- Convenient area to mark your Rs value



• CL-60 / AC Cap board

- CL60 Soft Start circuit and AC filter cap on one board
- Connect with solder, QD Spades, or Euroblocks





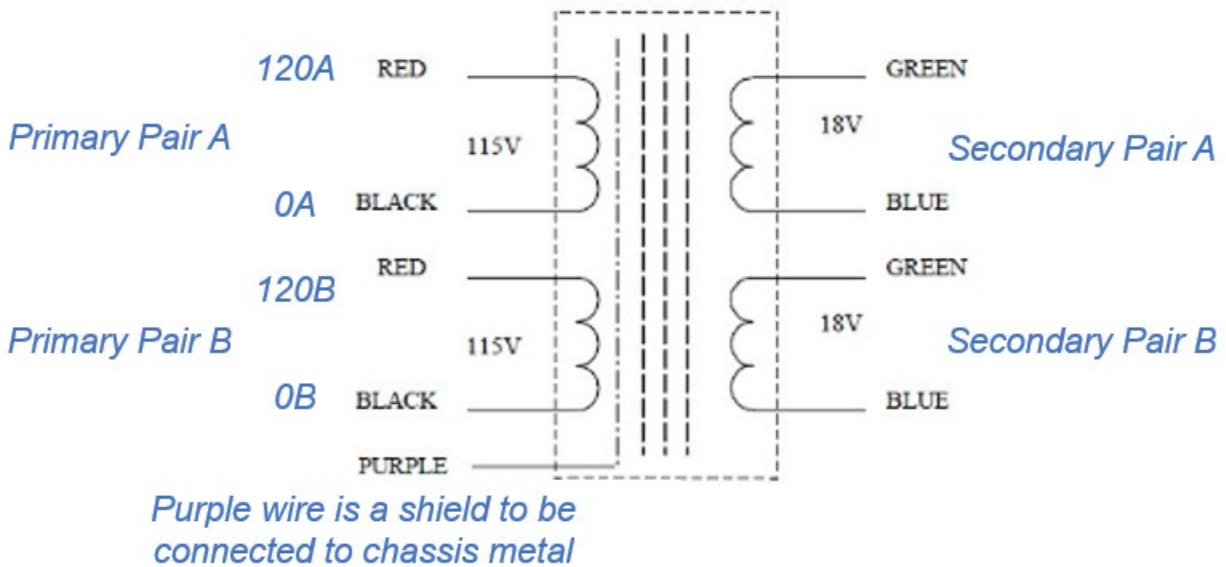
Power Supply BOM for V12 CRCRC Power Supply PCB

This table contains example part numbers and part recommendations. Any good quality similar parts will work with no detriment to the sound.

ID	Qty	Value	Digikey Part Number	Comment
Power Supply Board				
R1-16	16	0R22 – 0R33 5W	A103692-ND A137379-ND A102472-ND	Use TE Connectivity 5W Radial Resistors for this PCB 13.00mm x 9.00mm 5mm Lead Spacing
R17-20	4	2k2 5W (3k3 is also OK)	A102461-ND A131251-ND	Use TE Connectivity 5W Radial Resistors for this PCB 13.00mm x 9.00mm 5mm Lead Spacing
R21-24 (<25V Rails)	4	25k 1/4W	24.9KXBK-ND	"Rule of Thumb" - 1k Ohm per PSU volt Increase R for dimmer LED. No need to be exact.
R21-24 (25-35V Rails)	4	36k 1/4W	13-MFR-25FTE52-36KCT-ND	
R21-24 (35-50V Rails)	4	47k 1/4W	13-MFR-25FRF52-47KCT-ND	
Filter Capacitor Options - 10mm Lead Spacing, up to 35mm Diameter.				Voltage rating must be greater than rail voltage! Below are several options.
C1-12	12	22k uF, 25V	338-2431-ND	< 25V Rails
		27k uF, 25V	338-2255-ND	< 25V Rails
		33k uF, 25V	338-1613-ND	< 25V Rails
		47k uF, 25V	1189-3900-ND	< 25V Rails
		22k uF, 35V	338-1485-ND	< 35V Rails
		27k uF, 35V	1189-3914-ND	< 35V Rails
		33k uF, 35V	338-2260-ND	< 35V Rails
		22k uF, 50V	338-1599-ND	< 50V Rails
		33k uF, 50V	338-3814-ND	< 50V Rails
TH1-2	2	CL-60	KC006L-ND	
D1-4	4	Blue LED	732-5019-ND	LEDs are both on positive rail. Use one for on-board and another for front panel
Other		Screw Terminal Blocks 2 position	277-1667-ND	OPTIONAL - For connection to amp PCB and/or Bridges
Other	14+	Quick Disconnect Blades	WM14275CT-ND 36-1287-ST-ND	
CL-60 / AC Cap PCB				
C1	2	3300pF, X1 Safety Rated	399-9513-1-ND	
TH1-2	4	CL-60	KC006L-ND	
Other	6	Screw Terminal Blocks 2 position	277-1667-ND	Optional. Or use QD blades (next line item)
Other	12	Quick Disconnect Blades	WM14275CT-ND 36-1287-ST-ND	
Rectifiers / Snubber PCBs				
Rectifier Bridges	4		GBPC3510-E4/51GI-ND 641-1380-ND	
Snubber C	4	FILM 10000PF / 10nF / .01uF	495-4975-1-ND	
Snubber C	4	FILM 150nF / .15uF	495-77011-1-ND	
Snubber R	4	Metal Film 1/4W - Value TBD	TBD if not using Antek	Use Quasimodo test jig to determine value
Snubber R for Antek	4	Metal Film 1/4W – 20-22R for Antek Transformers	RNF14FTD20R0CT-ND	Antek Transformers – use 20-22R

Transformers – Preparing for Wiring the Amplifier

It is critical to identify transformer wire pairs for your build. Below is an example diagram for a shielded toroidal Antek Transformer (example: AS-3218) with added notes in blue text.

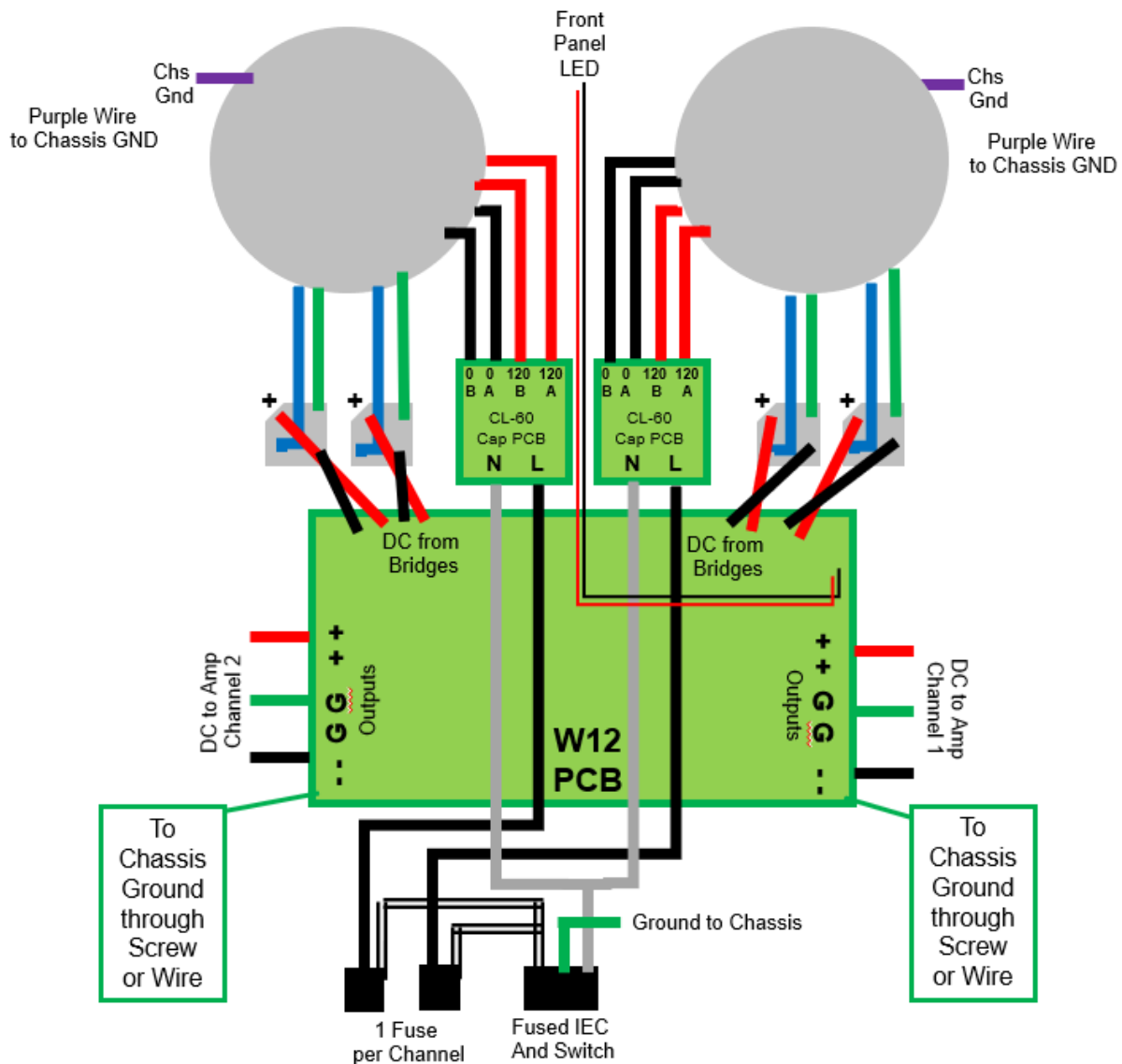


Identifying Wire Pairs

- Confirm transformer wiring pairs (120A / 0 A, 120B / 0B, secondary pairs)
 - How to identify which wires are pairs
 - Use DMM set to Ohms or Continuity “buzzer”.
 - Pairs will “buzz” or read as a few Ohms.
 - For Antek Transformers:
 - Find red / black pairs, twist each pair, and tape or heatshrink to hold together as a pair.
 - Find blue / green pairs, twist each pair, and tape or heatshrink to hold together as a pair.
 - Other transformers – refer to transformer datasheet and/or label on transformer for wire colors.
 - Verify pairs with DMM, twist each pair, and tape or heatshrink to hold together as a pair.

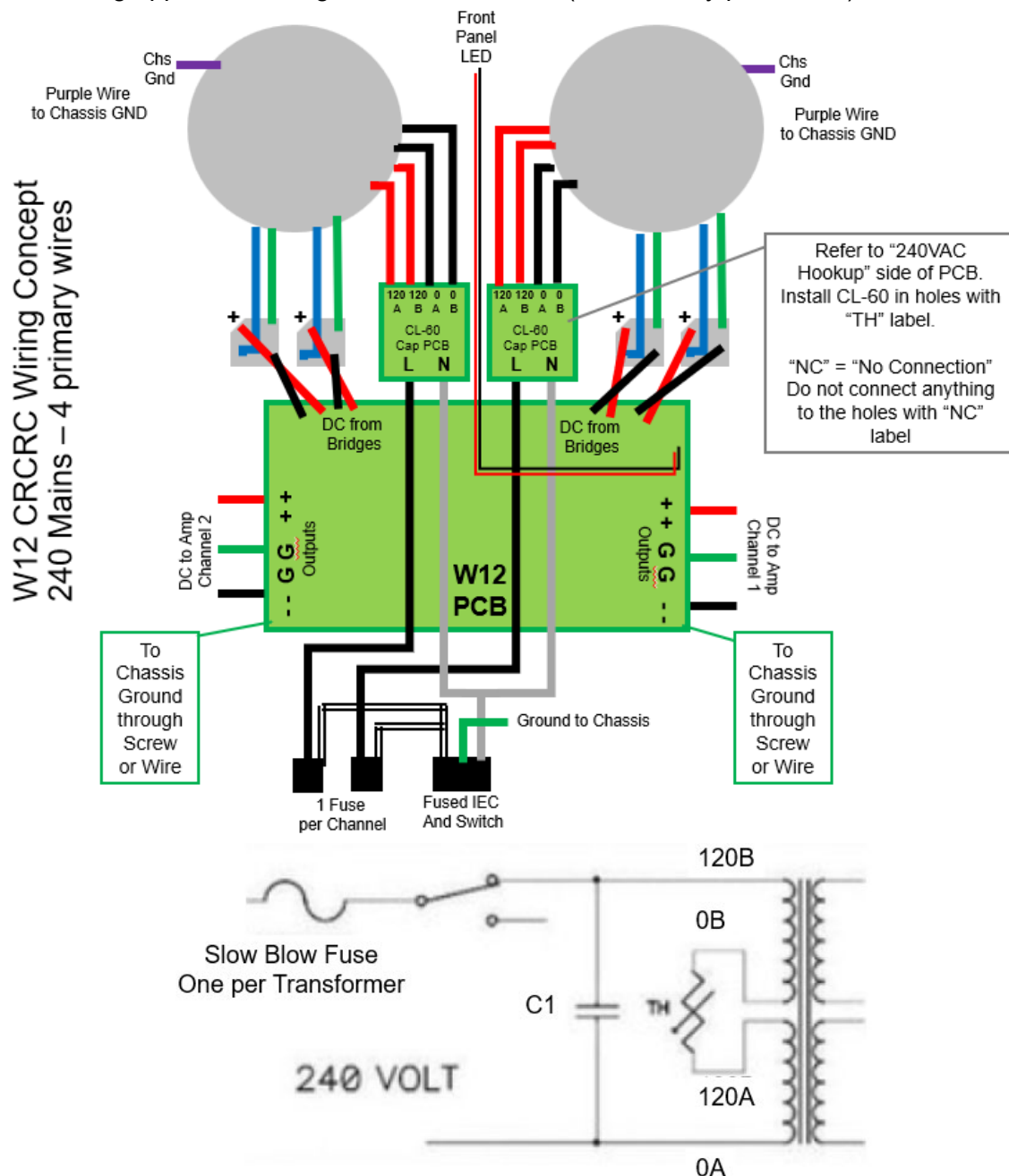
Amplifier Wiring Concept – Monoblock Configuration with W12 Power Supply PCB – 120V Mains

- Twist wires!!!
- If using Antek shielded transformers, attach purple wire to Chassis.
- Confirm transformer wiring pairs (120A / 0 A, 120B / 0B, secondary pairs)
 - Use DMM set to Ohms or Continuity “buzzer”. Pairs will “buzz” or read as a few Ohms.
 - For Antek Transformers:
 - Find red / black pairs, twist each pair, and tape or heatshrink to hold together as a pair.
 - Find blue / green pairs, twist each pair, and tape or heatshrink to hold together as a pair.
 - Other transformers – refer to transformer datasheet and/or label on transformer for wire colors.
- 120VAC wiring application using Antek transformers (2 secondary pairs each) is shown below.



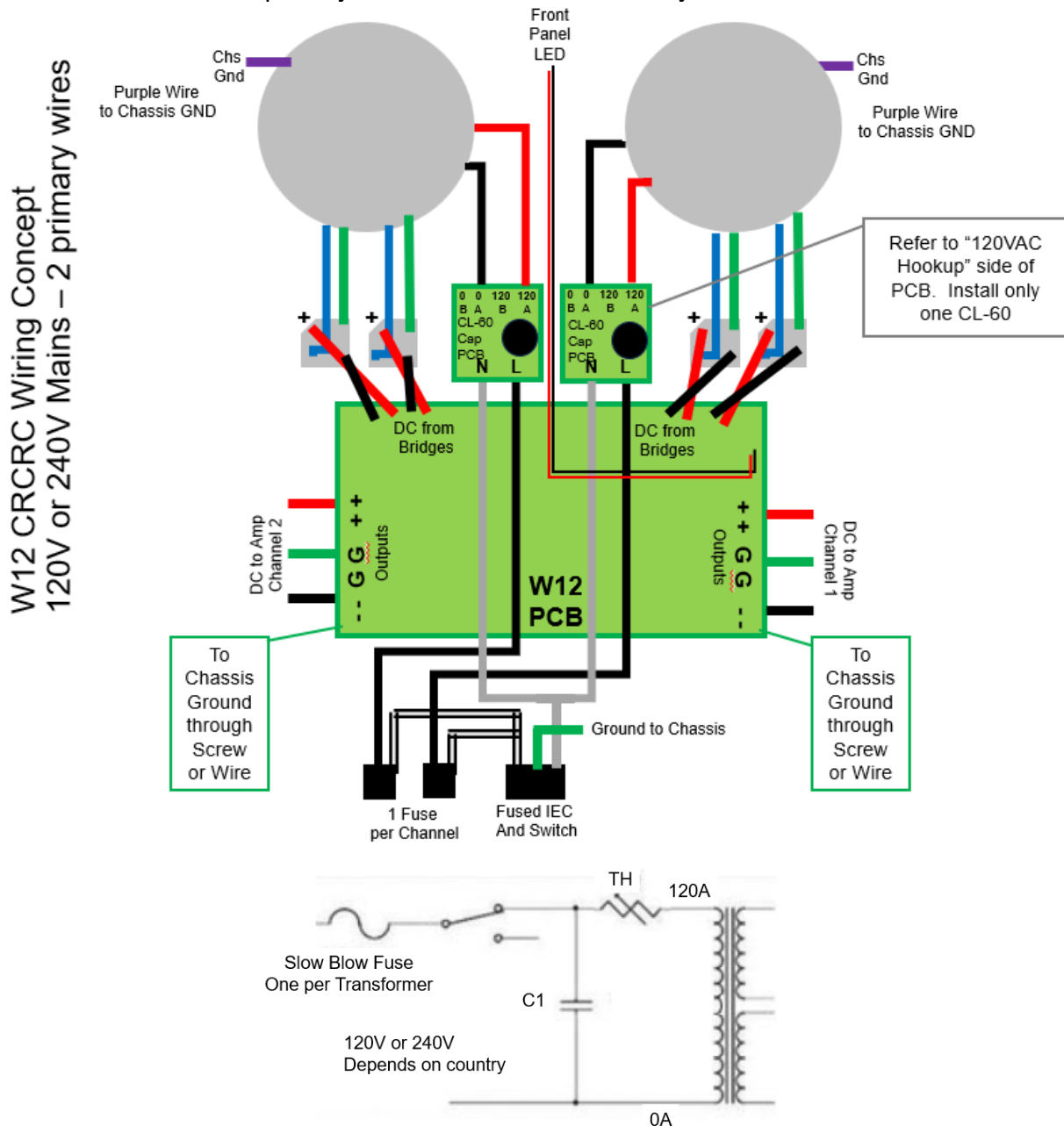
Amplifier Wiring Concept – Monoblock Configuration with W12 Power Supply PCB 240V Mains – Transformer with Two Pairs of Primary Wires

- Twist wires!!!
- If using Antek shielded transformers, attach purple wire to Chassis.
- Confirm transformer wiring pairs (120A / 0 A, 120B / 0B, secondary pairs)
 - Use DMM set to Ohms or Continuity “buzzer”. Pairs will “buzz” or read as a few Ohms.
 - For Antek Transformers:
 - Find red / black pairs, twist each pair, and tape or heatshrink to hold together as a pair.
 - Find blue / green pairs, twist each pair, and tape or heatshrink to hold together as a pair.
 - Other transformers – refer to transformer datasheet and/or label on transformer for wire colors.
- 240VAC wiring application using Antek transformers (2 secondary pairs each) is shown below.



Amplifier Wiring Concept – Monoblock Configuration with W12 Power Supply PCB 120 or 240V Mains – Transformer with One Pair of Primary Wires per transformer

- Twist wires!!!
- 240VAC wiring application with one pair of primary wires per transformer is shown below.
- For each CL-60/AC-Cap PCB
 - Install Line wire from dedicated fuse to CL-60 PCB
 - Install Neutral wire from IEC to CL-60 PCB
- CL-60 PCB Wiring – use “120VAC” hookup side of PCB
 - Install C1
 - Install CL-60 between “Line” and “120A” only.
 - Wire Transformer primary wires to “120A” and “0A” only.



Test / Checkout Sheet

Test	Result	Target
BEFORE POWER UP, amp boards <u>not</u> connected		
Measure Resistance from IEC Ground Pin to output GND connector		10-15 Ohms
Did you verify transformer wiring pairs with DMM then twist and tape/heatshrink them in pairs?		YES
Did you wire up the transformer wires as shown?		YES
Confirm rating of installed fuse. Some fuse holders ship without fuses by default. Some ship with HIGH values.		TBD – based on transformer and mains voltage
DO NOT PROCEED UNTIL ALL OF THE ABOVE TESTS HAVE PASSED		
POWER UP, amp boards <u>not</u> connected		
Set DMM to DC Volts (VDC) <ul style="list-style-type: none">Positive Rail: Measure + to GND for each set of outputsNegative Rail: Measure - to GND for each set of outputs		~1.4x transformer secondary voltage Example: 18V Transformer = +/- 25V rails
Unloaded voltage – Channel 1	+ Rail: - Rail:	
Unloaded voltage – Channel 2	+ Rail: - Rail:	
DO NOT PROCEED UNTIL ALL OF THE ABOVE TESTS HAVE PASSED		
POWER UP, amp boards connected		
Loaded voltage – Channel 1	+ Rail: - Rail:	~1.2-1.3x transformer secondary voltage Example: 18V Transformer = +/- 22-23V Rails
Loaded voltage – Channel 2	+ Rail: - Rail:	