

**(((parks audio)))**

**ike 60W power amp manual**  
**the diy•tube series**



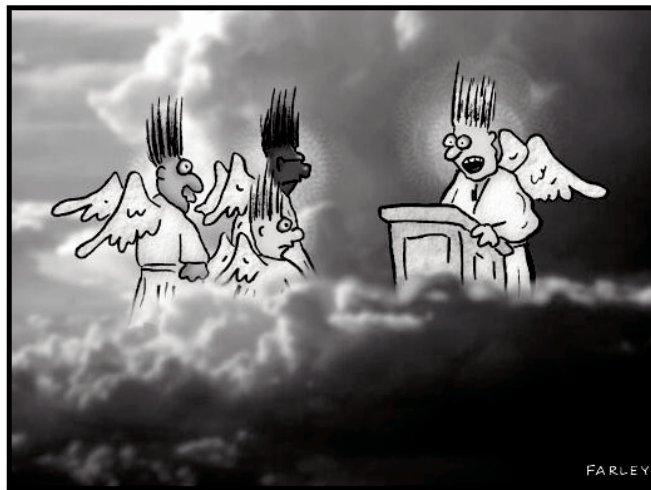
**Disclaimer**

Under no circumstances does Parks Audio LLC assume liability or responsibility for injury or damages sustained in the assembly, test or operation of this PCB design or for damages to any other equipment connected to it. Assembly and education is buyer's responsibility. Parks Audio LLC reserves the right to make design changes or improvements without the obligation to revise prior versions. All specifications are subject to change without notice.

- WARNING: Lethal voltages (greater than 500VDC) are present in this project.
- Use a Variac or isolation transformer while working on and testing the unit.
- Use a rubber mat to stand on while working on and testing the unit.
- Keep one hand in your back pocket if probing voltages with a DMM.
- Wrap a small piece of electrical tape around the test lead probe shaft to expose just the tip.
- Do not connect or disconnect wires to the terminal blocks when unit is powered or plugged in.
- Lethal voltages exist in the capacitors even after unit is powered down, so wait at least ten minutes after unplugging to allow charge to dissipate.

**Warranty Information**

All goods purchased from Parks Audio LLC have a thirty (30) day warranty against defects from the date of purchase.



"Welcome to the first meeting of guys who thought they could fix old television sets."

## Preparation

Before assembly some preparation needs to be done. Parts must be purchased, a work area needs set up and chassis decisions should be made. The axiom haste makes waste has never been more true. Make sure your chosen transformers and the board will fit comfortably using the chassis of your choice. Please use the bare PCB to make a template, or use the PCB directly on the chassis as shown on the website, for placing socket holes and mounting holes. Also, plan where RCA connectors, binding posts, standby & ON/OFF switches and the AC cord will be oriented on the chassis. Small-grid graph paper is a handy template. Physically lay out the parts in a space equal to your chassis to assure everything fits. Lastly, please note the PCB has two identical sets of silkscreens allowing mounting of parts on either side, according to your construction technique, **but the tube sockets can be mounted only on one side**. Typical construction is with the sockets and bias trim pots on the top side and all other components on the bottom side.

## Overview of the Schematic and Design

The design closely resembles the Eico HF-series which used a modified Mullard 5-20 circuit. The Ike, or Eiclone (pronounced “I clone”) uses the 12AX7 as the voltage gain stage tube, as did the classic Eico HF-87 and HF-89. This gain stage DC-couples to a 6SN7 long-tail pair phase splitter driving a pair of push-pull EL34 tubes. It is possible to build either a fixed bias or cathode biased unit using the uniquely configurable PCB. Also, the bias supply and grid resistors in the standard design are compatible with alternate power tubes such as 6550s and KT88s.

## Using the Assembly Drawing

The assembly drawing is a quick reference for locating components and the numbering scheme for the connectors. Currently, the assembly drawing is of the bottom side of the PCB where most of the components will be placed. The drawing also makes a good place to jot any notes during construction.

## Parts Selection

The stock components on the parts list will make a fine amplifier, but this hobby is DIY, so part subbing is not discouraged. In fact, it is fully expected that some experimenters will come up with great modifications – please share them with us when you do! Do keep any substitutions at the same rating or higher. Be aware that some footprint sizes must be strictly adhered to, especially the electrolytic capacitors. The power supply electrolytics in particular must have a diameter of 25mm or less. A height of 30mm is preferred as it allows use of a two inch high chassis.

## Soldering

This PCB is a double-sided, plated through-hole design on .094” FR4 material with LPI (liquid photo-imageable) solder mask and 2 ounce copper per side. When soldering these components, let the solder flow through the hole to form a “teepee” on both sides of the board for an optimum connection. Ground plane connections sink a lot of heat from the soldering iron, so take care to do these well and you may have to touch up from the opposite side. Don’t forget to use the checkboxes on the parts list sheet. ‘X’ through the box after you have stuffed the component in place.

### TIP: PCB Stuffing

You can use the flat end of the 10-pole connector as a lead bending tool. This works for most of the parts. Do take care to not damage the meniscus of the components. Insert all the components in each step before soldering, bending the leads down to hold them in place. This allows one to fix any placing errors that might occur very easily. Use a good pair of snips to remove the excess leads and then go to the next step.

1. Stuff all fixed value resistors onto the bottom of the PCB (diytube logo is lower left).
  - R27 & R28 can be substituted with a choke. A super-imposed footprint for a two-pole connector is available for easy connection via spade terminals.
2. D1 & D2 are each made of two diodes. Solder them together in series before soldering them to the PCB. Then stuff D1a-b, D2a-b & D3. Mind the orientation of the cathode, which is represented by a stripe on both the silkscreen and the diode's body.
3. Stuff variable resistors if you are building a fixed bias design. If you plan to adjust these from a hole in the top of the chassis, then place them on the top of the PCB (the socket side – diytube logo is lower right)
4. Stuff C9 through C14. Mind the polarity. The board has “+” symbols to show where the positive terminal from the capacitor should be placed even though it is the negative side that is usually marked on modern electrolytics. The black bar should be aligned where the silkscreen is marked ‘NEG BAR’.
5. Stuff C15, C16 & C17. Mind the polarity.
6. Stuff R46, the IRCL. Make sure it is not leaning on C10 or the terminal block because it gets hot. Leave 1/2” of the lead length showing on the component side – this allows you to bend the part away from C10 without damaging the meniscus.
7. Kink leads on C2, C3, C4, C7, C8 & C18 and stuff.
8. Before placing the ceramic tube sockets, prep the pin sockets with a junk box tube or small nail. Don't pry and break the socket, but you don't want to damage a favorite tube either. Then place and solder all the tube sockets – make sure they are mounted to the top of the PCB (diytube logo is lower right). Make sure to use enough solder.
9. V1 has multiple configurations and needs to have a set of jumpers soldered in place. Watch clearances around other pins. For a 12AX7 tube, solder a small, 1/4" piece of wire from the square pad marked “Z” to pin 7 of the nine pin socket and do the same from square pad “Y” to pin 6. For a 6SL7 tube, solder a 1/2” piece of wire from the square pad marked “Z” to pin 6 of the nine pin socket and a 1/4” from square pad “Y” to pin 7.

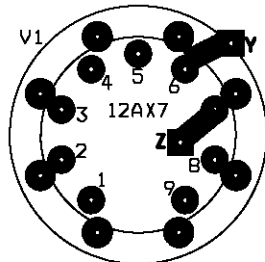


Fig 1. 12AX7 Jumpers

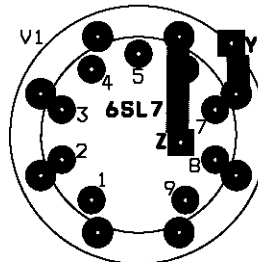


Fig 2. 6SL7 Jumpers

10. Place and solder the terminal blocks. As with the sockets, use enough solder. If you are planning to use a choke in the filter supply, I recommend using a two-pole block over-top of the R27/R28 footprints and spade connectors on the choke leads. The terminal blocks facilitate easy removal of the amplifier board for troubleshooting or tweaks.

11. Adjust the both R15 and R16 with a DMM so that Pin 1 (closest to edge of the board) and the wiper (the center pin) are within a few ohms of each other. You may hear a “clicking” when at this furthest extreme – that is normal. Now the bias will be at max voltage on first power up.
12. Connect Rx53 in series with Cx21 from the “8 ohm tap” to ground. This provides a constant load for the amplifier even into inductive loads.
13. Snip excess leads and compare your board to photos from the website. Carefully go over your work, looking for:
  - a. cold solder joints (these will look dull)
  - b. solder splashes and shorts between socket pins
  - c. connections in which solder didn’t flow to the other side (like ground plane connections)
  - d. proper capacitor orientation

### First Power Up

1. With the unit NOT plugged into mains AC, use the “Voltage & Resistance Chart” to ohm out the board.
2. Disconnect J4-8 (the B+ to the output transformer).
3. Insure you have a fuse installed, and power up unit without tubes.
4. Compare **J4 Main Terminal** voltages with chart. They should be similar, though the B+ will be higher (over 500V) as the circuit is not loaded.
5. Measure the bias voltage at test points TP1 and TP2. These should be at least -50V.
6. Power down and unplug the unit from AC mains. Let the residual B+ bleed off for ten minutes before reconnecting J4-8 and inserting the tubes.

### Adjusting Bias

WARNING: This is done while the unit is ON and IDLE. Take care and follow proper high voltage safety rules.

With an insulated adjustment tool and a DMM (at low voltage setting), adjust bias pots clockwise (up) or counter-clockwise (down) to get the voltage at TP1 and TP2 to be 550mV. This means the cathode current is 55mA. Plate dissipation at idle equates to around 27W.

$$485V \text{ Plate Voltage} * 55mA \text{ Cathode Current} = 26.7W$$

Check again after a few hours use and readjust if necessary. Check again after one week, then one month. It is highly recommended to place an in-line fuse, e.g. 1/2A Fast Blo, between the B+ center and ground. In case of a runaway tube or other catastrophic failure, this may protect your amp beyond the main fuse.

## Ike PCB parts (one monoblock)

Revised: 9/19/13

Tip: Put a dot in the checkbox if you have the part already as a quick reference when ordering parts. 'X' out the checkbox when you have installed the part on the PCB.

<i>Item</i>	<i>QTY</i>	<i>Reference</i>	<i>Part</i>	<i>Mouser Part</i>	<i>Cost</i>
<input type="checkbox"/>	1	R1	1K, 1/4W	71-RN60D-F-1K	.11
<input type="checkbox"/>	1	R2	475K, 1/4W	71-RN60D-F-475K	.11
<input type="checkbox"/>	3	R3,R17,R18	1K, 1/2W	71-RN65D-F-1.0K	.26
<input type="checkbox"/>	3	R4,R41,R42	100, 1/2W	71-RN65D-F-100	.26
<input type="checkbox"/>	9	R5,R13,R14,R31, R32,R33,R34,R35,R36	100K, 2W	594-5083NW100K0J	.10
<input type="checkbox"/>	1	R6	1M, 1/2W	71-RN65D-F-1.0M	.26
<input type="checkbox"/>	1	R7	18K, 2W	594-5083NW18K00J	.10
<input type="checkbox"/>	1	R8	2K, 1/2W	71-RN65D-F-2.0K	.33
<input type="checkbox"/>	1	R9	30K, 2W	594-5083NW30K00J	.10
<input type="checkbox"/>	1	R10	33K, 2W	594-5083NW33K00J	.32
<input type="checkbox"/>	2	R15,R16	25K Pot	72-T93YB-25K	1.59
<input type="checkbox"/>	2	R19,R20	15K, 1/2W	71-RN65D-F-15K	.26
<input type="checkbox"/>	2	R21,R22	10, 1/2W	71-RN65D-F-10	.26
<input type="checkbox"/>	2	R27,R28	100, 2W	594-5083NW100R0J	.10
<input type="checkbox"/>	1	R29	3.3K, 2W	594-5083NW3K300J	.10
<input type="checkbox"/>	1	R30	200K, 2W	594-5083NW200K0J	.10
<input type="checkbox"/>	1	R37	27K, 3W	283-27K-RC	.21
<input type="checkbox"/>	1	R38	10K, 1/2W	71-RN65D-F-10K	.26
<input type="checkbox"/>	2	R39,R40	wire jumper		
<input type="checkbox"/>	1	R43	390K, 2W	594-5083NW390K0J	.32
<input type="checkbox"/>	1	R46	IRCL	527-CL90	2.21
<input type="checkbox"/>	1	R49	3.3K, 1/4W	71-RN60D-F-3.3K	.11
<input type="checkbox"/>	1	Rx53	10, 3W	283-10-RC	.21
<input type="checkbox"/>	1	C2	.22uF, 250V	1431-2224K	1.03
<input type="checkbox"/>	2	C3,C4	.1uF, 630V	667-ECW-FA2J104J	0.55
<input type="checkbox"/>	1	C7	220pF, 500V	5982-15-500V220	.78
<input type="checkbox"/>	1	C8	470pF, 500V	5982-15-500V470	2.28
<input type="checkbox"/>	6	C9,C10,C11, C12,C13,C14	220uF, 400V	5985-380-400V221	4.32
<input type="checkbox"/>	1	C15	22uF, 450V	647-UVZ2W220MHD	1.23
<input type="checkbox"/>	2	C16,C17	47uF, 250V	647-UVZ2E470MHD	.93

<input type="checkbox"/>	1	C18	.1uF, 630V	5989-630V0.1-F	.77
<input type="checkbox"/>	1	Cx21	.1uF, 250V	1431-2104K	.64
<input type="checkbox"/>	5	D1a-b,D2a-b,D3	UF4007 Diode	625-UF4007-E3	.19
<input type="checkbox"/>	1	J1	3pin Term Block	571-14376645	1.39
<input type="checkbox"/>	2	J2,J3	2pin Term Block	571-14376644	.79
<input type="checkbox"/>	1	J4	10pin Term Block	571-114376644	5.23

**Choke Filter Mod:**

Omit R27 & R28. Add the following:

<input type="checkbox"/>	1	L1	1H, 240mA choke	553-C24X	8.77
<input type="checkbox"/>	1	J2	2pin Term Block	571-14376644	.79

**100W Edcor Mod** (not compatible w/ choke filter mod):

<input type="checkbox"/>	1	R8	1.3K, 1/2W	71-RN65D-F-1.3K	.33
<input type="checkbox"/>	2	R27,R28	50, 3W	594-AC03W50R00J	.10
<input type="checkbox"/>	1	R29	10K, 2W	594-5083NW10K00J	.10
<input type="checkbox"/>	1	R49	7.5K, 1/4W	71-RN60D-F-7.5K	.11
<input type="checkbox"/>	1	C7	.001uF, 630V	1431-6102K	0.41
<input type="checkbox"/>	1	C8	330pF, 500V	5982-19-500V330	2.76
<input type="checkbox"/>	1	C18	.12uF, 1kV	5989-1KV0.12-F	1.18

Go to [www.mouser.com](http://www.mouser.com) and log in to your account. Use Service & Tools > Parts List Importer. Paste list into window and Import to My Current Order. CTRL-C to copy. CTRL-V to paste.

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/* start cut-n-paste */
71-RN60D-F-1.0K 1
71-RN60D-F-475K 1
71-RN65D-F-1.0K 3
71-RN65D-F-100 3
594-5083NW100K0J 9
71-RN65D-F-1.0M 1
594-5083NW18K00J 1
71-RN65D-F-2.0K 1
594-5083NW30K00J 1
594-5083NW33K00J 1
72-T93YB-25K 2
71-RN65D-F-15K 2
71-RN65D-F-10 2
594-5083NW100R0J 2
594-5083NW10K00J 1
594-5083NW200K0J 1
283-27K-RC 1
71-RN65D-F-10K 1
594-5083NW390K0J 1
527-CL90 1
71-RN60D-F-3.3K 1
283-10-RC 1
1431-2224K 1

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667-ECW-FA2J104J 2
5982-15-500V220 1
5982-15-500V470 1
5985-380-400V221 6
647-UVZ2W220MHD 1
647-UVZ2E470MHD 2
5989-630V0.1-F 1
1431-2104K 1
625-UF4007-E3 5
571-14376645 1
571-14376644 2
571-114376644 1
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**Ike Chassis parts (one monoblock)**
**Revised: 9/19/13**

<i>Item</i>	<i>QTY</i>	<i>Reference</i>	<i>Part</i>	<i>Mouser Part</i>	<i>Cost</i>
<input type="checkbox"/>	1	SW1	Neon Power Switch	112-R13-66B-G	1.38
<input type="checkbox"/>	1		IEC Power w/ Fuse	161-R3014-E	2.19
<input type="checkbox"/>	1		2A Midget Fuse	504-GMA-2	0.48
<input type="checkbox"/>	1		3-Prong AC cord	545-P004-006	3.99
<input type="checkbox"/>	1		12X10X2 Chassis	546-1441-29BK3	25.60
<input type="checkbox"/>	1	(omit if FPE)	12X10 Bottom	546-1431-29BK3	11.90
<input type="checkbox"/>	1		RCA Red Jack	568-NYS367-2	1.88
<input type="checkbox"/>	2		Red binding post	164-R119R-EX	1.83
<input type="checkbox"/>	1		Blk binding post	164-R119B-EX	1.83
<input type="checkbox"/>	2		Red Test Points	530-105-0802-1	0.72
<input type="checkbox"/>	1		Black Test Points	530-105-0803-1	0.72
<input type="checkbox"/>	8		Standoffs 1/4X1/2	534-2210	0.33
<input type="checkbox"/>	4		.625" Bushings	836-2073	0.16

```

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112-R13-66B-G 1
161-R3014-E 1
504-GMA-2 1
545-P004-006 1
546-1441-29BK3 1
568-NYS367-2 1
164-R119R-EX 2
164-R119B-EX 1
530-105-0802-1 2
530-105-0803-1 1
534-2210 8
836-2073 4
/* end cut-n-paste */

```



**Ike Tubes, Transfomers, Nuts & Bolts (one monoblock)****Revised: 9/19/13**

Item	QTY	Reference	Part	Triode Part	Cost
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<input type="checkbox"/>	1	V1	12AX7/ECC83	12ax7tesla	\$10.95
<input type="checkbox"/>	1	V2	6SN7 types	6sn7	\$11.95
<input type="checkbox"/>	2	V3,V4	EL34/6550/KT88	JJ-EL34-MP	\$32.49
<input type="checkbox"/>	1	V1	9pin PCB Socket (0.750" diameter, ceramic)	9pinpccer	\$2.35
<input type="checkbox"/>	3	V2-V4	8pin PCB Socket (1" diameter, ceramic)	pccerotsckt	\$2.50

From [www.mouser.com](http://www.mouser.com):

<input type="checkbox"/>	1	T1	Hammond 274BX Power Transformer	\$87.95
<input type="checkbox"/>	1	T2	Hammond 1650N Output Transformer	\$127.50

or

From [www.edcorusa.com](http://www.edcorusa.com):

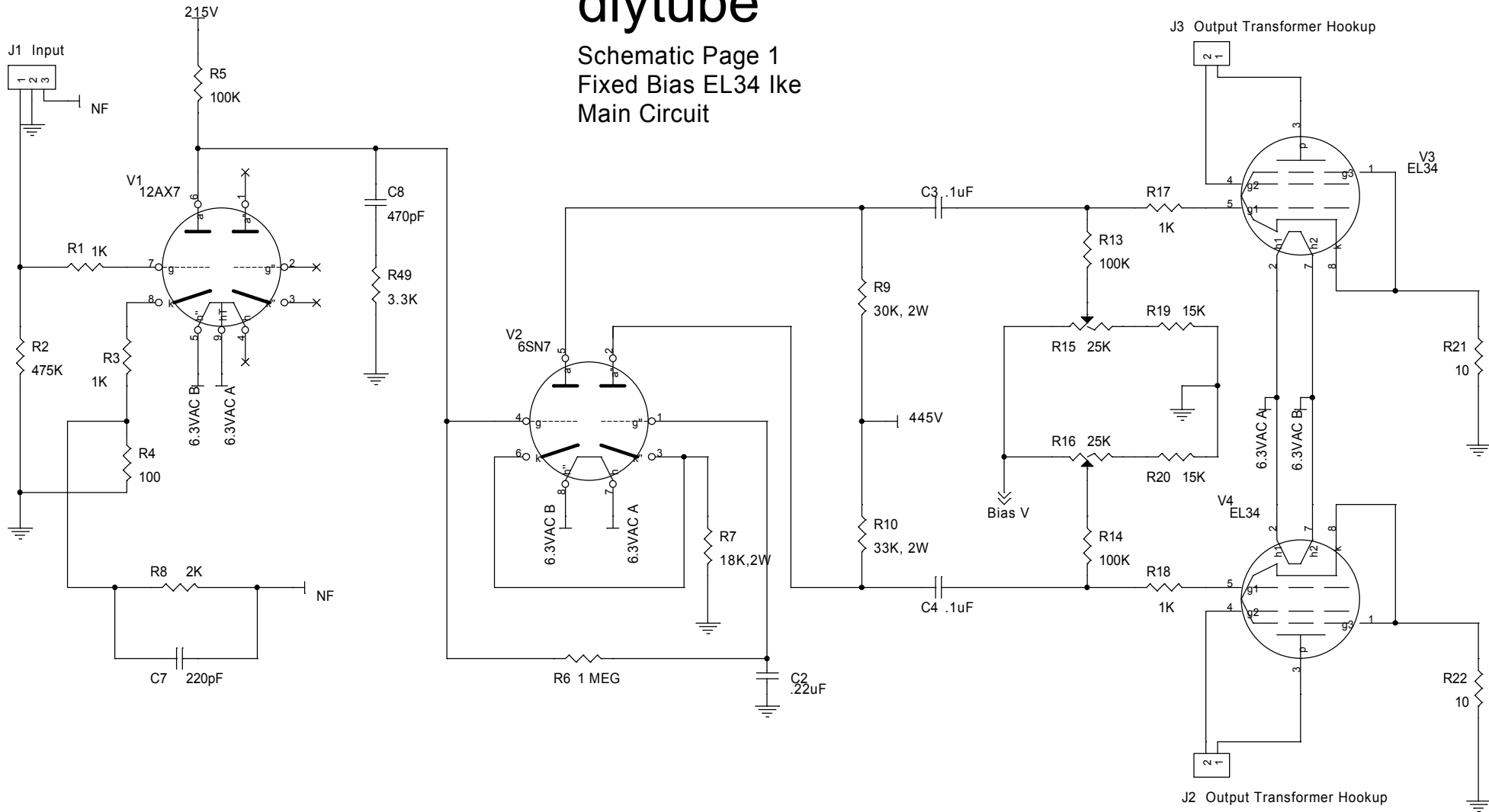
<input type="checkbox"/>	1	T1	Edcor XPWR036 Power Transformer	\$78.81
<input type="checkbox"/>	1	T2	Edcor CXPP60-MS-4.2K O.T.	\$73.02

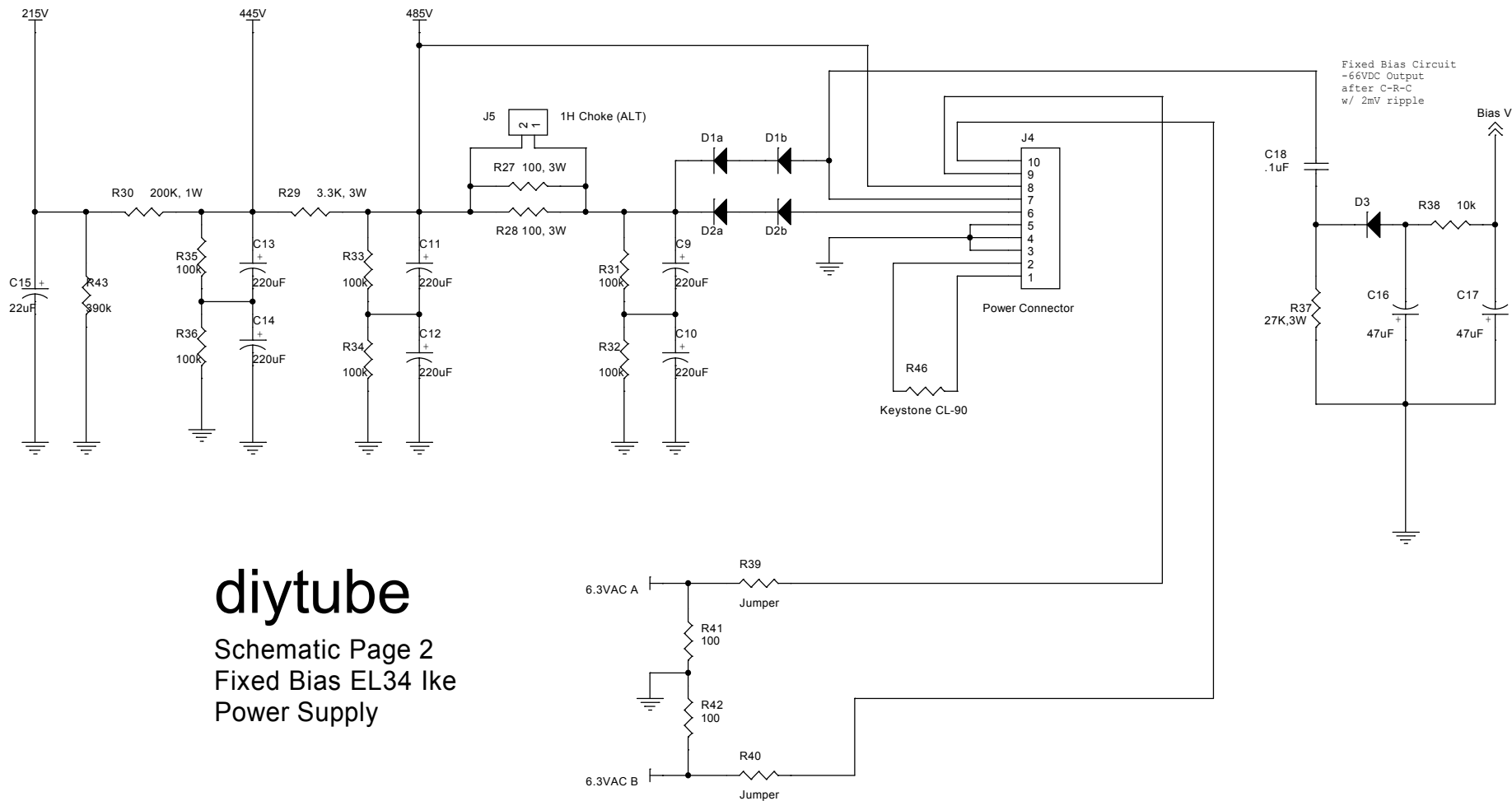
I source these locally at Ace Hardware, or use boltdepot.com (pn# included).

<input type="checkbox"/>	10	#6 x 1/2 sheet metal screw 18-8 SS	2300
<input type="checkbox"/>	16	#6-32 x 1/4 machine screw 18-8 SS	5316
<input type="checkbox"/>	8	#8-32 x 1/2 machine screw 18-8 SS	1346
<input type="checkbox"/>	8	#8 flat washers 18-8 SS	2943
<input type="checkbox"/>	8	#8 K-Lock nuts 18-8 SS	12020
<input type="checkbox"/>	2	#6-32 x 1/2 machine screw 18-8 SS	1336
<input type="checkbox"/>	2	#6 K-Lock nuts 18-8 SS	12019

# diytube

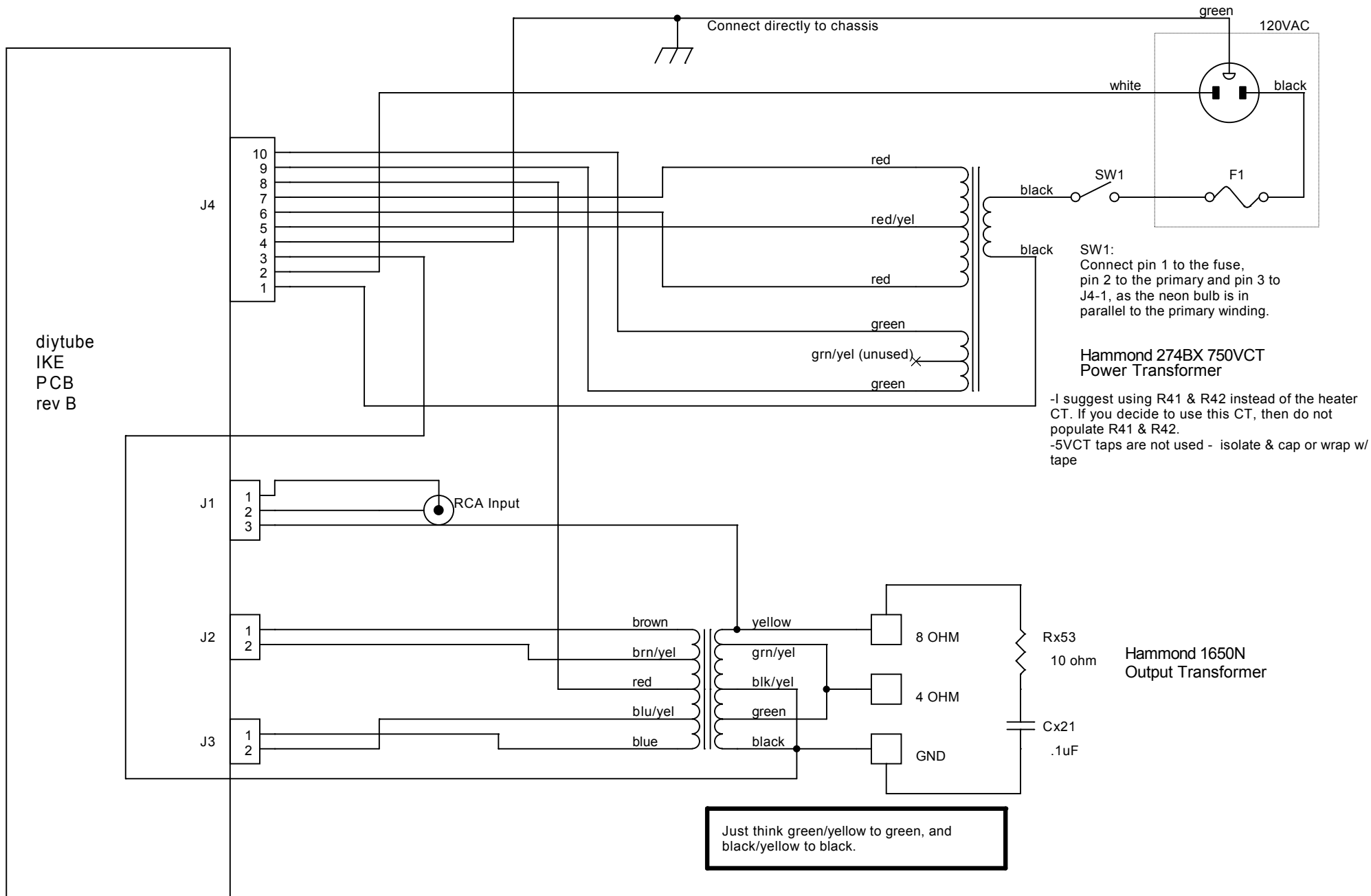
## Schematic Page 1 Fixed Bias EL34 lke Main Circuit



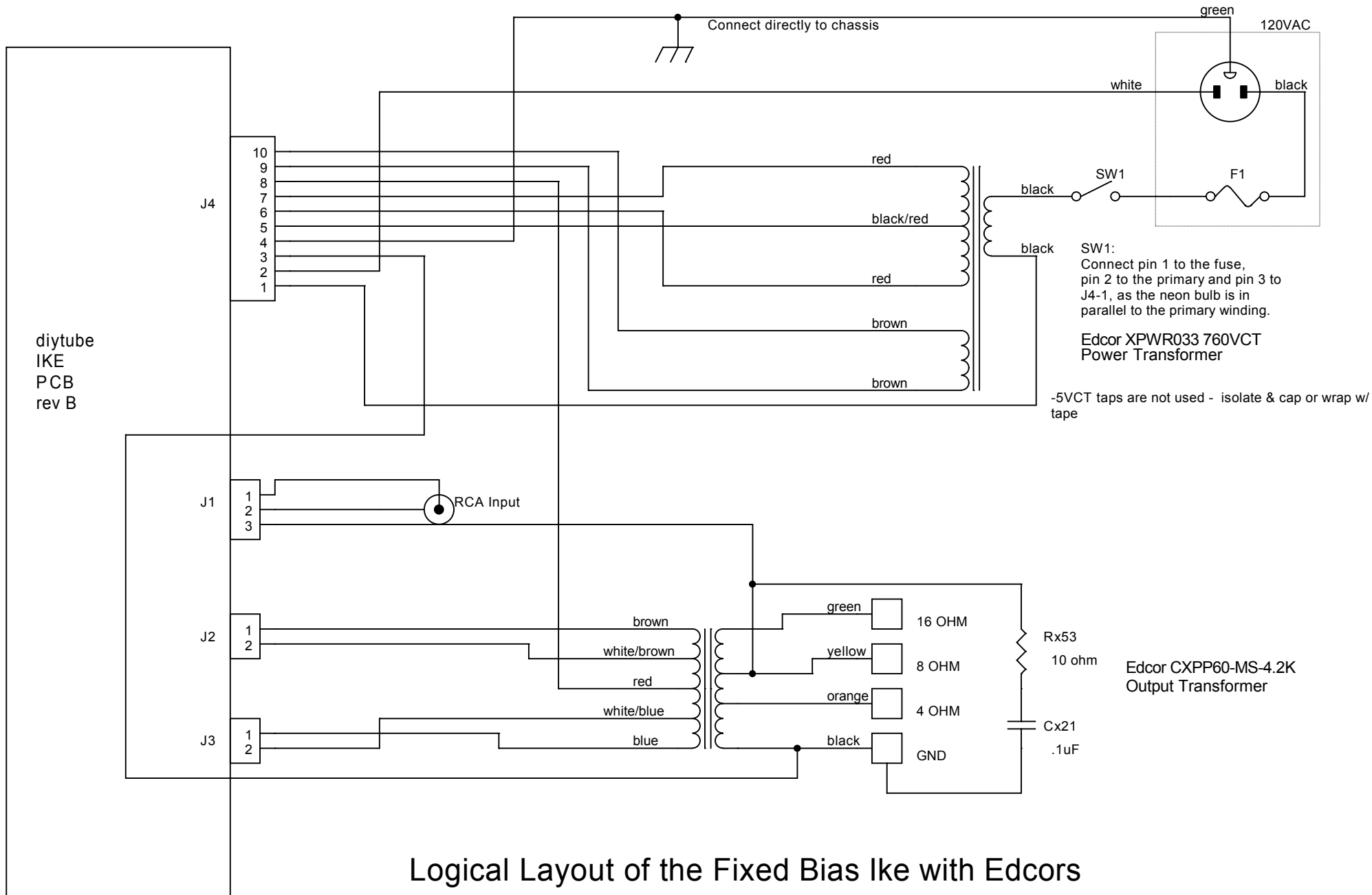


diytube

Schematic Page 2  
Fixed Bias EL34 Ikt  
Power Supply



Logical Layout of the Fixed Bias Ike with Hammonds



Logical Layout of the Fixed Bias Ike with Edcors