

175B / 176
drip seven

designed by gregory lomayeva copyright 2020

HIGH VOLTAGE

PIN2
PIN3
BYP

RATIO VOLTAGE

310V

63V

10000UF/10V

10000UF/10V

1/400V

HIGH VOLTAGE
USE CAUTION

RATIO
VU+
TIME IN
TIME OUT
+AC 9

BYP
PIN3
PIN2
SEC HI
SEC LO
GND
RATIO
VU+
TIME IN
TIME OUT

IIISCHAFNER
RN22E-4-02-5M3
40/100/56
300V/4A @ 40°C

RAY
6BC8/6BE6

MADE IN

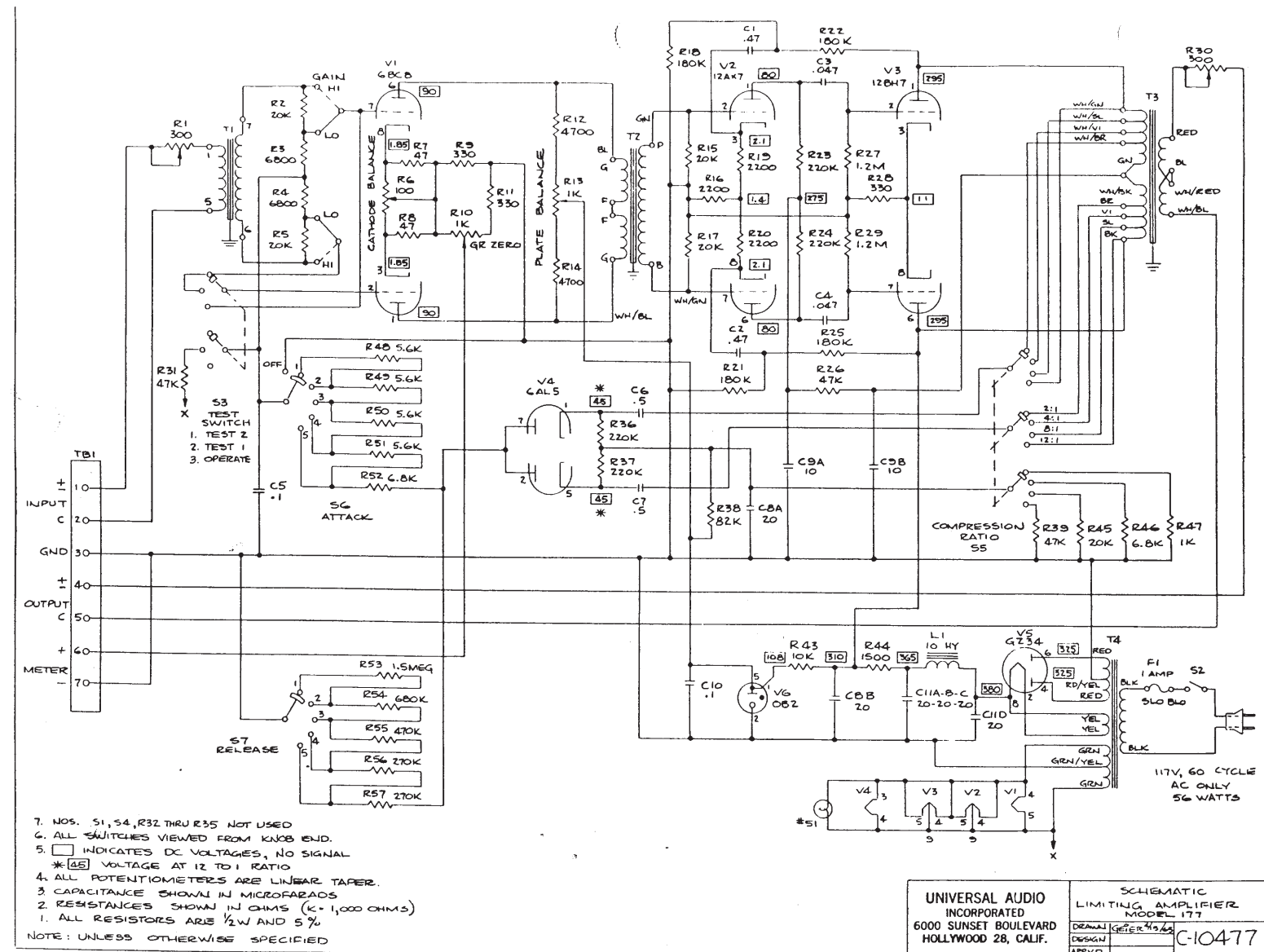
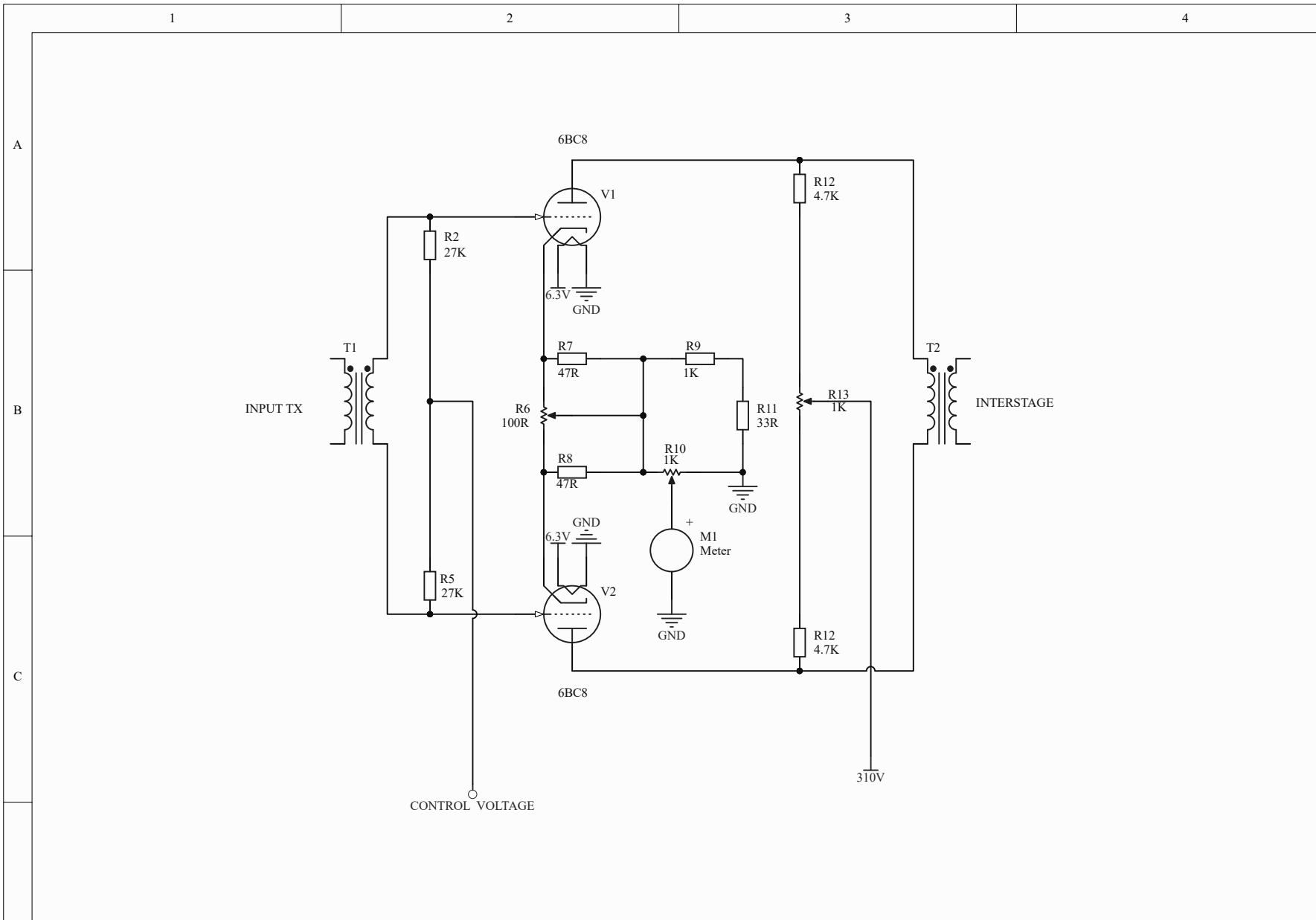
12B

mu cc

D STATES OF
in Kigotismov

HIGH VOLTAGE

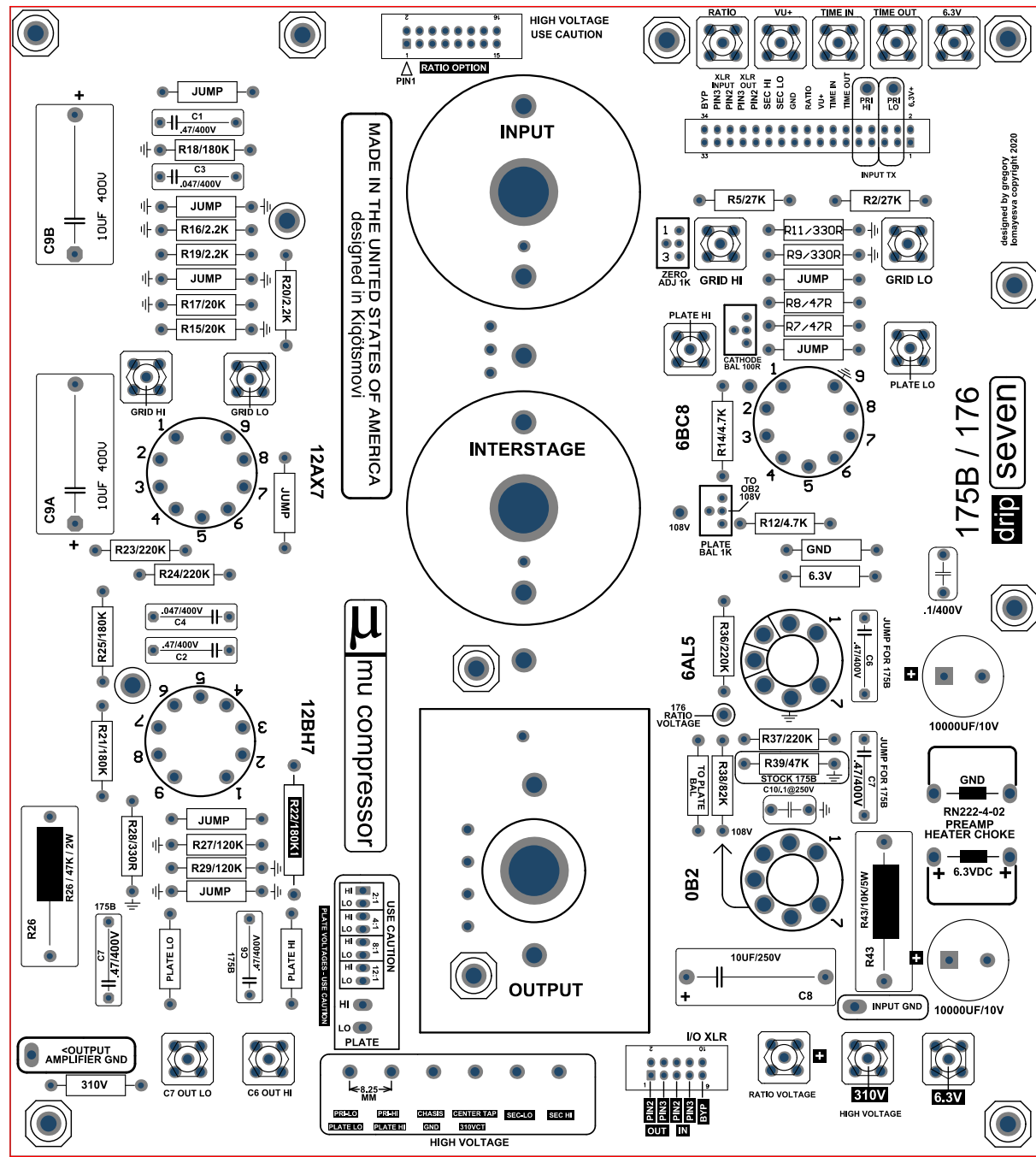
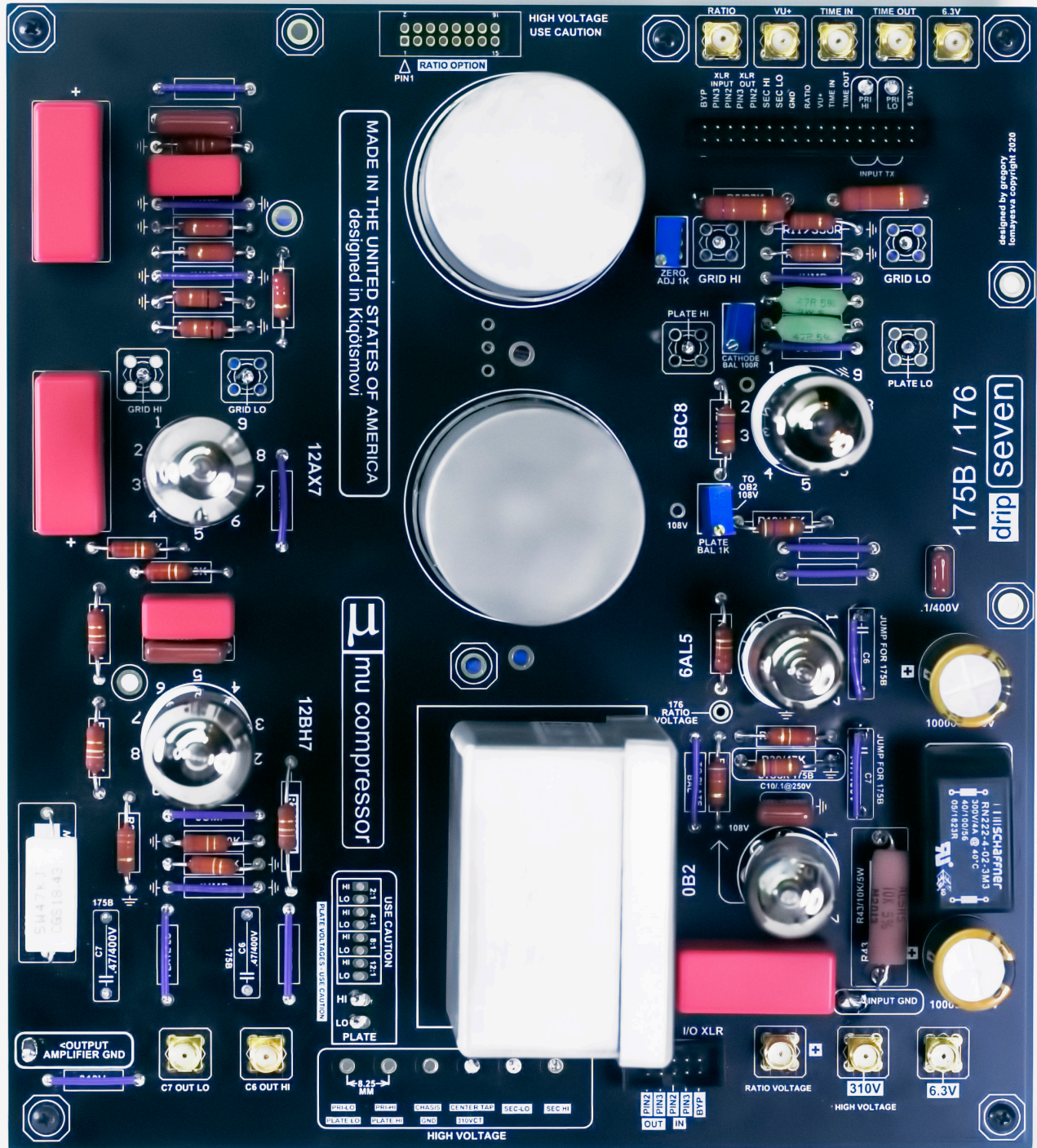
RATIO
VU+
TIME IN
TIME OUT
+AC 9



7. NOS. S1, S4, R32 THRU R35 NOT USED
 6. ALL SWITCHES VIEWED FROM KNOB END.
 5. [] INDICATES DC VOLTAGES, NO SIGNAL
 * [45] VOLTAGE AT 12 TO 1 RATIO
 4. ALL POTENTIOMETERS ARE LINEAR TAPER.
 3. CAPACITANCE SHOWN IN MICROFARADS
 2. RESISTANCES SHOWN IN OHMS (K=1,000 OHMS)
 1. ALL RESISTORS ARE 1/2W AND 5%

NOTE: UNLESS OTHERWISE SPECIFIED

UNIVERSAL AUDIO INCORPORATED 6000 SUNSET BOULEVARD HOLLYWOOD 28, CALIF.	SCHEMATIC LIMITING AMPLIFIER MODEL 177 DESIGN GETER 4/5/54 APPROV
	C-10477



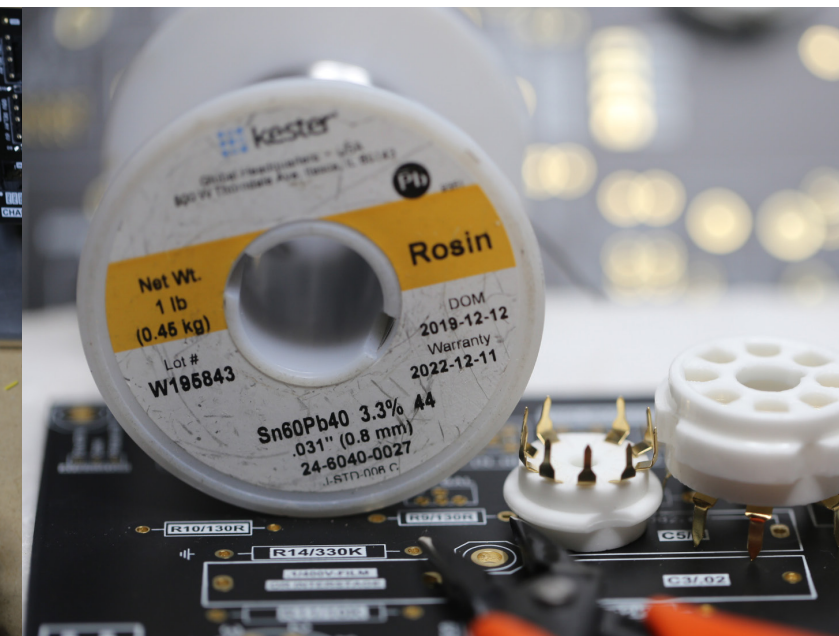


FLUKE 107 CAT III 600V DMM ESP

AC/DC Voltage to 600V
 AC/DC Current to 10A
 CAT Rating III
 Resistance 40MΩ
 Data hold & backlit display to keep you working safe and fast
 Resistance & Continuity to check for broken wires

this meter is about 99\$
 there are lots of choices and prices for these on amazon
 make sure it is CAT III or better
 1000v rated is best for safety

a multimeter rated minimum of cat III (600v)



recommended hardware : most all are available at home depot and amazon etc.

weller WE-1010 (this is a high quality 100\$ soldering station works very well for this design)

crescent side cutters and pliers

thin mechanics gloves (will help from cuts and accidental shock etc)

stepper bit for making larger holes

60/40 tin lead rosin core solder (works the best if available in your country)

on solder - thinner is better. a recommended size is 0.8 mm (.031")

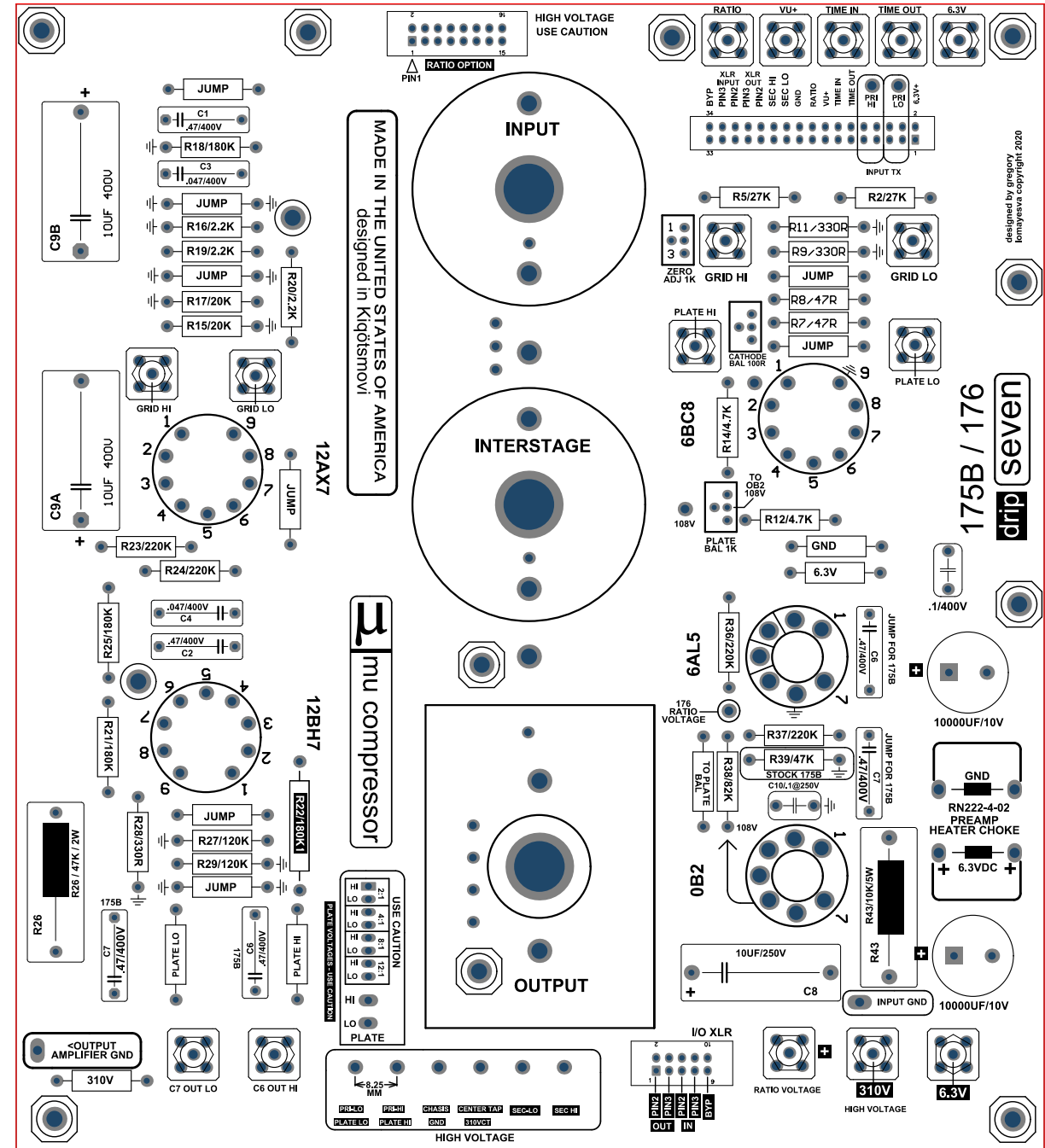
main board components :

digkey cart : <https://www.digikey.com/short/43to83>

this cart does not include tubes or transformers- only main board components
thos will be in a seperate section

order 2 carts - this cart is for 1 channel only (1 pcb) estimated price per cart : \$76.92





Index	Quantity	Part Number	Manufacturer Part Number	Description
1	2	PPC27KW-3JCT-ND	PR03000202702JAC00	RES 27K OHM 3W 5% AXIAL
2	3	BC4790CT-ND	PR02000203300JA100	RES 330 OHM 5% 2W AXIAL
3	2	PPC47W-2CT-ND	PR02000204709JR500	RES 47 OHM 2W 5% AXIAL
4	2	BC4802CT-ND	PR02000204701JA100	RES 4.7K OHM 5% 2W AXIAL
5	4	BC4781CT-ND	PR02000202203JA100	RES 220K OHM 5% 2W AXIAL
6	1	BC4821CT-ND	PR02000208202JA100	RES 82K OHM 5% 2W AXIAL
7	4	BC4775CT-ND	PR02000201803JA100	RES 180K OHM 5% 2W AXIAL
8	3	BC4779CT-ND	PR02000202201JA100	RES 2.2K OHM 5% 2W AXIAL
9	2	BC4763CT-ND	PR02000201203JA100	RES 120K OHM 5% 2W AXIAL
10	2	PPC20KW-2CT-ND	PR02000202002JR500	RES 20K OHM 2W 5% AXIAL
11	2	987-1794-5-ND	67YR1KLTB	TRIMMER 1K OHM 0.5W PC PIN TOP
12	1	CT94EY101-ND	CT94EY101	TRIMMER 100 OHM 0.5W PC PIN TOP
13	2	EF4104-ND	ECQ-E4104KF	CAP FILM 0.1UF 10% 400VDC RADIAL
14	1	732-5399-ND	61203421621	CONN HEADER VERT 34POS 2.54MM
15	1	A137402-ND	SQPR547KJ	RES 47.0K OHM 5W 5% AXIAL
16	10	0190730019-12-G9-ND	0190730019-12-G9	12" JUMPER 3075 GR001 GREEN
17	3	1928-DCP4H151006DD2KSSD-ND	DCP4H151006DD2KSSD	CAP FILM 10UF 10% 500VDC RADIAL
18	1	S9169-ND	SBH11-PBPC-D05-ST-BK	CONN HEADER VERT 10POS 2.54MM
19	1	S9171-ND	SBH11-PBPC-D08-ST-BK	CONN HEADER VERT 16POS 2.54MM
20	1	RSD-10KRCT-ND	RS01010K00FE73	RES 10K OHM 10W 1% WW AXIAL
21	25	36-9900-ND	9900	MACHINE SCREW PAN PHILLIPS 4-40
22	10	36-2203-ND	2203	HEX STANDOFF #4-40 ALUMINUM 1/2"
23	1	BC4803CT-ND	PR02000204702JA100	RES 47K OHM 5% 2W AXIAL
24	2	2197-SK-7PINPC-ND	SK-7PINPC	7 PIN PC MOUNT SOCKET
25	3	2197-SK-9PINPCG-ND	SK-9PINPCG	9 PIN PC MOUNT GOLD SOCKET
26	2	493-10964-ND	UFW1A103MHD	CAP ALUM 10000UF 20% 10V RADIAL
27	1	ED10566-ND	OSTVN08A150	TERM BLK 8P SIDE ENT 2.54MM PCB
28	2	P14563-ND	ECQ-E4474JF	CAP FILM 0.47UF 5% 400VDC RADIAL
29	2	EF4473-ND	ECQ-E4473KF	CAP FILM 0.047UF 10% 400VDC RAD



main board components :

tubes / sockets and accesories (per channel) order two sets

tubes and more

Products	SKU	Qty	Price	Total
 Vacuum Tube - 12AX7 / ECC83, JJ Electronics • Pin Type: Regular	T-12AX7-S-JJ Item ID: 004452	<input type="text" value="1"/>	\$10.95	\$10.95
 Vacuum Tube - 12BH7-A, JJ Electronics	T-12BH7-A-JJ Item ID: 040142	<input type="text" value="1"/>	\$16.95	\$16.95
Vacuum Tube - 6AL5 / 6EB5, Dual Diode	T-6AL5_6EB5 Item ID: 004623	<input type="text" value="1"/>	\$4.90	\$4.90
Vacuum Tube - 0B2, Voltage Regulator, Diode, Glow-Discharge	T-0B2 Item ID: 004418	<input type="text" value="1"/>	\$5.90	\$5.90
Vacuum Tube - 6BC8 / 6BZ8, Dual Triode	T-6BC8_6BZ8 Item ID: 004639	<input type="text" value="1"/>	\$5.90	\$5.90
 Socket - 9 Pin, Ceramic, PC Mount, bottom or PC mount • Pin Type: Gold	P-ST9-217G Item ID: 003386	<input type="text" value="3"/>	\$2.45	\$7.35
 Socket - 7 Pin, Miniature, Standoff Ceramic PC Mount	P-ST7-222 Item ID: 040656	<input type="text" value="2"/>	\$2.19	\$4.38
			Subtotal:	\$56.33

these are in the digikey cart - however the tube depot 7 pin is better then the tubesandmore 7 pin socket

on the otherhand the tubes and more goldplated fender type 9 pin socket is better then the tube depot 9 pin socket (in my opinion)

antique electronic supply (tubesandmore.com)

Vacuum Tube - 12AX7 / ECC83, JJ Electronics

Pin Type: Regular
T-12AX7-S-JJ
Item ID: 004452
Quantity * 1
\$10.95 Total:\$10.95
Save for Later

Vacuum Tube - 12BH7-A, JJ Electronics T-12BH7-A-JJ

Item ID: 040142
Quantity * 1
\$16.95 Total:\$16.95
Save for Later

Vacuum Tube - 6AL5 / 6EB5, Dual Diode T-6AL5_6EB5

Item ID: 004623
Quantity *1
\$4.90 Total:\$4.90
Save for Later

Vacuum Tube - oB2, Voltage Regulator, Diode, Glow-Discharge T-oB2

Item ID: 004418
Quantity *1
\$5.90 Total:\$5.90
Save for Later

Vacuum Tube - 6BC8 / 6BZ8, Dual Triode T-6BC8_6BZ8

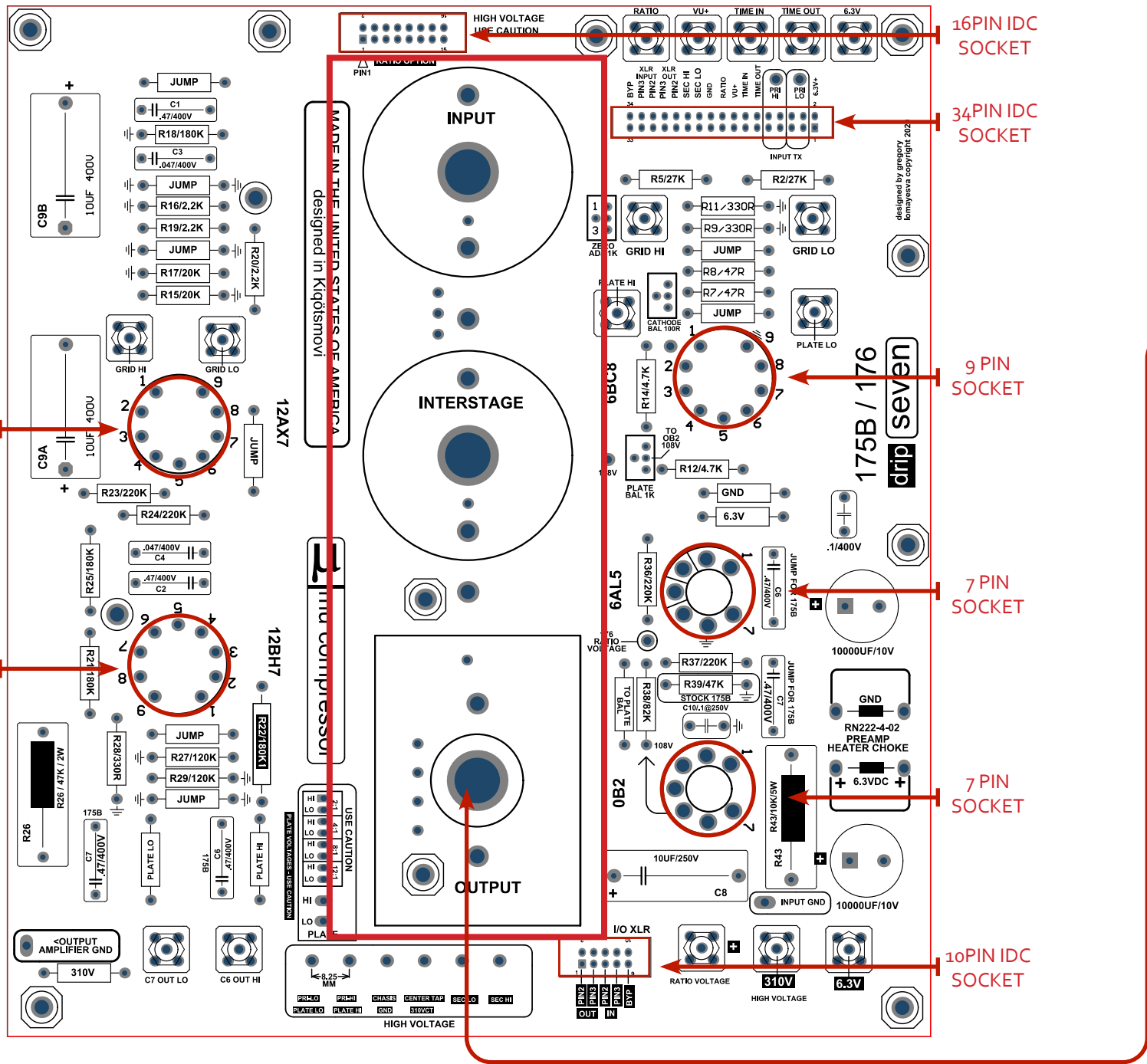
Item ID: 004639
Quantity *1
\$5.90 Total:\$5.90
Save for Later
Pin Type: Gold

Socket - 9 Pin, Ceramic, PC Mount, bottom or PC mount

P-ST9-217G
Item ID: 003386
Quantity *3
\$2.45 Total:\$7.35
Save for Later

Socket - 7 Pin, Miniature, Standoff Ceramic PC Mount P-ST7-222

Item ID: 040656
Quantity *2
\$2.19 Total:\$4.38



IF USING SOWTER TRANSFORMERS FULL COMPLIMENT
<https://www.sowter.co.uk/vintage-audio-transformers.php>

audio transformers

EXPECT 90DAY LEAD TIME OR CONTACT SOWTER (DON AUDIO CARRIES THE OUTPUT 176 TX)

SOWTER INPUT 1449
 Input (was 1009)
 Similar to UTC A-10 1:9.1:1 600/50K 75 Ohms +12 dBu

Interstage SOWTER 1133
 UTC A19
 2.3:1 180K/15K 4K +40 dBu

SOWTER 176 MULTI TAP OUTPUT TRANSFORMER
 1285
 Output PP triode with attenuator 9CT:1 50K/600 1050 +48 dBu

DESCRIPTION	PRICE
1285 UA-176 Push-Pull triode to balanced line 9CT:1 with attenuator.	£131.42
- Package options: Mumetal Can with threaded grommet ¹	£42.03
1133E UA175 Interstage transformer	£117.77
1449 UA 175 / Teletronix LA-2A Original Input transformer	£71.78
Package options: Threaded Grommet ¹	£3.78

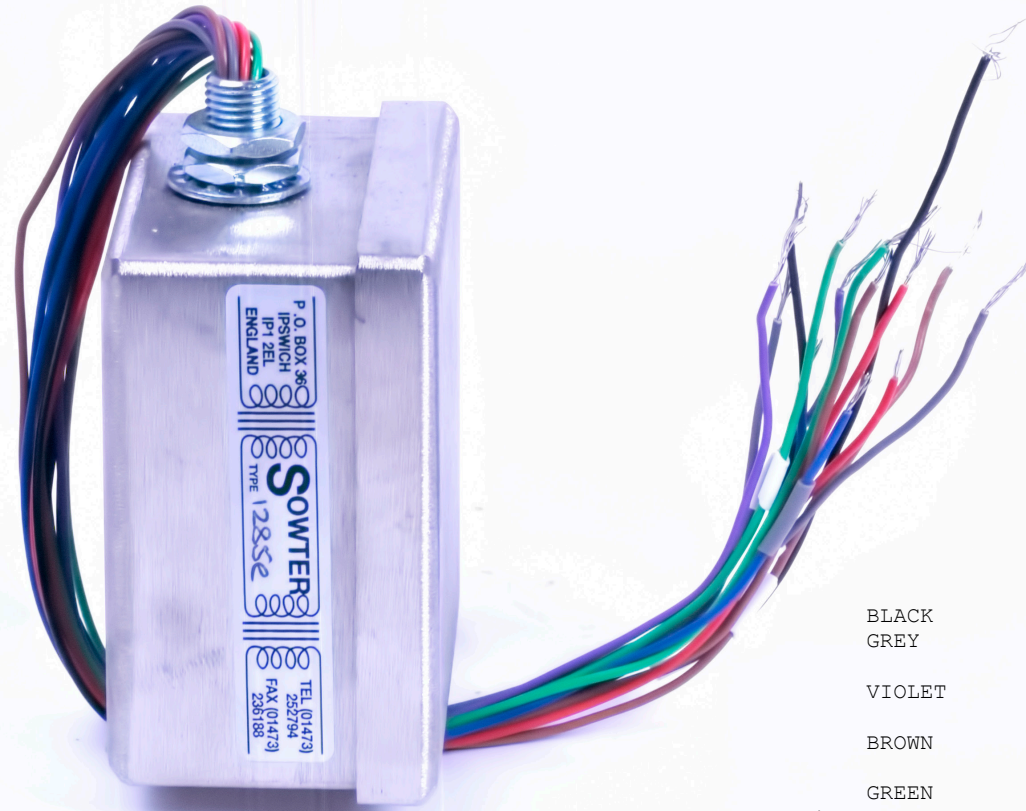
Subtotal	£366.78
VAT	£73.36
Total	£440.14

all transformers must be E-type 3/8 grommet mount (meaning it has a 3/8 post with wires coming out of the post) this matches the pcb foot print. - if asked to select configuration select E-type or grommet - unless E is in the part number which means it IS an E type mount transformer.

optional input and interstage retransformers are discussed later in the manual)

(607.91 United States Dollars)
 per channel

1285 UA-176 Push-Pull triode to balanced line 9CT:1 with attenuator.
 15k/185 ohm output transformer for driving a balanced ohm line from push-pull 6SN7, ECC83 etc. 50% Mumetal core for high bandwidth and dynamic range, Max output level at 50 Hz +28 dBu (19 volts). Includes primary taps for UA 176. Total dc resistance ref secondary 14 ohms. Colour coded leads. Size A. In Mumetal can with threaded grommet



1285e

primary	BLACK	100%) (•	RED		
	GREY	60%) (
	VIOLET	32%) (
	BROWN	13%) (
	GREEN	B+) (RED/WHITE		
	BLACK/WHITE	B+) (•	BLUE		secondary
	BROWN/WHITE	13%) (
	VIOLET/WHITE	32%) (
	GREY/WHITE	60%) (
	GREEN/WHITE	100%) (BLUE/GREY		

front panel control board bill of materials

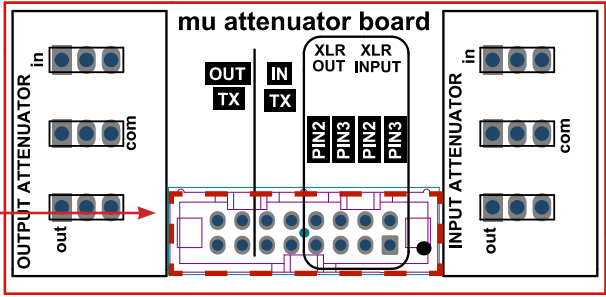


front panel control board bill of materials

digkey cart link :

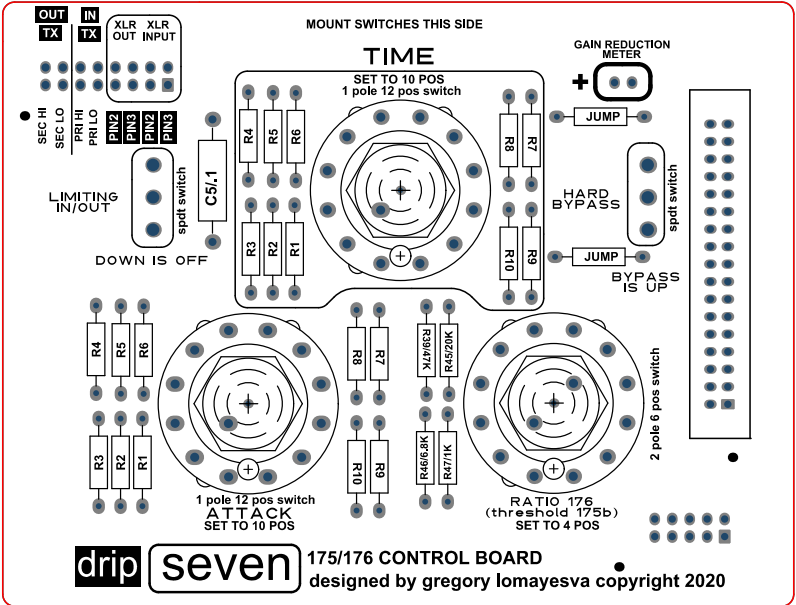
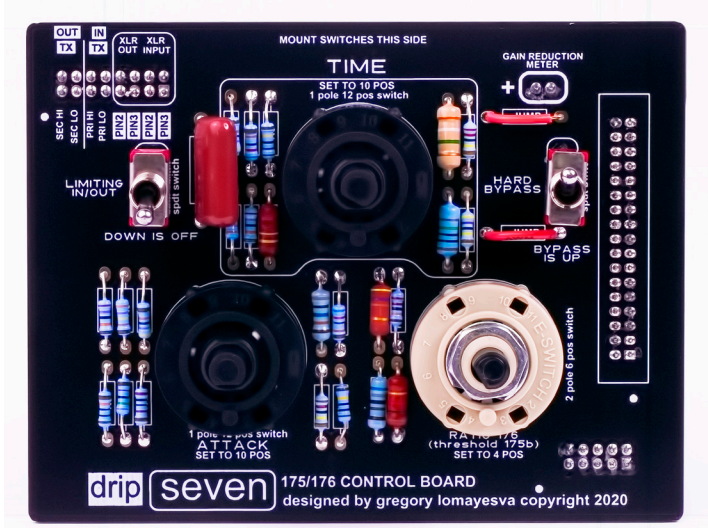
<https://www.digikey.com/short/43qmdo>

contains 1 extra 16pos idc socket for attenuator board
 order x2 this is for **one channel**



Index	Quantity	Part Number	Manufacturer Part Number	Description
1	1	A33159-ND	5103308-1	CONN HEADER VERT 10POS 2.54MM
2	2	S9171-ND	SBH11-PBPC-D08-ST-BK	CONN HEADER VERT 16POS 2.54MM
3	1	A98333-ND	282834-2	TERM BLK 2P SIDE ENT 2.54MM PCB
4	2	EG2354-ND	100SP1T1B1M51REH	SWITCH TOGGLE SPDT 0.4VA 20V
5	1	732-5399-ND	61203421621	CONN HEADER VERT 34POS 2.54MM
6	1	EF4104-ND	ECQ-E4104KF	CAP FILM 0.1UF 10% 400VDC RADIAL
7	2	CKN10199-ND	A11203RNCB	SWITCH ROTARY 12POS 0.4VA 20V
8	1	KC26A9.501NPF-ND	KC26A9.501NPF	SWITCH ROTARY 6POS 350MA 125V
9	3	1722-1142-ND	2300BM	KNOB SMOOTH 0.250" PHENOLIC
10	1	PPC6.81KXCT-ND	SFR16S0006811FR500	RES 6.81K OHM 1/2W 1% AXIAL
11	1	BC4391CT-ND	SFR25H0001001FR500	RES 1K OHM 1/2W 1% AXIAL
12	1	BC4405CT-ND	SFR25H0002002FR500	RES 20K OHM 1/2W 1% AXIAL
13	1	56-SFR25H0004702FR500CT-ND	SFR25H0004702FR500	RES 47K OHM 1/2W 1% AXIAL
14	1	PPC6.81KXCT-ND	SFR16S0006811FR500	RES 6.81K OHM 1/2W 1% AXIAL
15	1	PPC18.2KXCT-ND	SFR16S0001822FR500	RES 18.2K OHM 1/2W 1% AXIAL
16	1	PPC22.1KXCT-ND	SFR16S0002212FR500	RES 22.1K OHM 1/2W 1% AXIAL
17	1	PPC24.9KXCT-ND	SFR16S0002492FR500	RES 24.9K OHM 1/2W 1% AXIAL
18	1	BC4402CT-ND	SFR25H0001502FR500	RES 15K OHM 1/2W 1% AXIAL
19	1	BC4393CT-ND	SFR25H0001002FR500	RES 10K OHM 1/2W 1% AXIAL
20	1	PPC4.75KXCT-ND	SFR16S0004751FR500	RES 4.75K OHM 1/2W 1% AXIAL
21	1	56-SFR25H0002201FR500CT-ND	SFR25H0002201FR500	RES 2.2K OHM 1/2W 1% AXIAL
22	1	PPCHF2.20MCT-ND	HVR3700002204FR500	RES 2.2M OHM 1/2W 1% AXIAL
23	1	BC4898CT-ND	VR37000001004FR500	RES 1M OHM 1% 1/2W AXIAL
24	1	PPCHF470KCT-ND	HVR3700004703FR500	RES 470K OHM 1/2W 1% AXIAL
25	1	PPCHF680KCT-ND	HVR3700006803FR500	RES 680K OHM 1/2W 1% AXIAL
26	1	PPCHF4.70MCT-ND	HVR3700004704FR500	RES 4.7M OHM 1/2W 1% AXIAL
27	1	PPC220KXCT-ND	SFR16S0002203FR500	RES 220K OHM 1/2W 1% AXIAL
28	3	0.0EBK-ND	ZOR-12-B-52-0R	RES 0 OHM 1/6W JUMP AXIAL

Unit Price	Extended Price USD
1.43	1.43
0.42	0.84
1.27	1.27
2.87	5.74
1.54	1.54
0.35	0.35
12.86	25.72
12.29	12.29
2.03	6.09
0.19	0.19
0.17	0.17
0.17	0.17
0.17	0.17
0.19	0.19
0.19	0.19
0.19	0.19
0.17	0.17
0.17	0.17
0.19	0.19
0.17	0.17
0.49	0.49
0.54	0.54
0.49	0.49
0.49	0.49
0.49	0.49
0.19	0.19
0.12	0.36



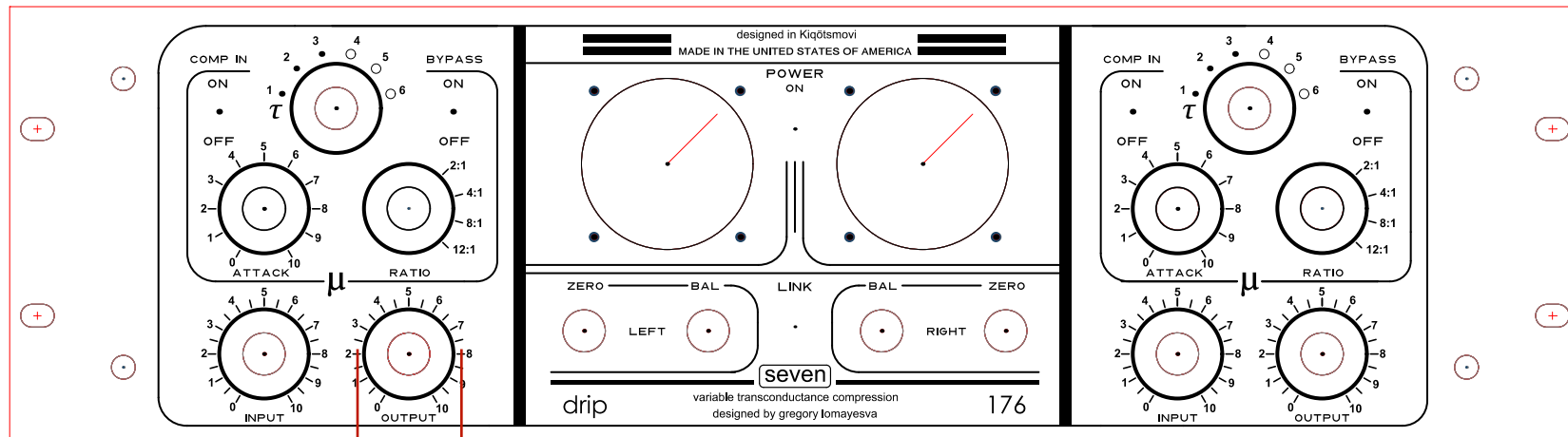
60.48 total per channel

ratio winding switch bill of materials and digikey cart

<https://www.digikey.com/short/43qrtd>

Index	Quantity	Part Number	Manufacturer Part Number	Description	Customer Reference	Available	Backorder	Unit Price	Extended Price USD
1	4	ED90433-ND	110-43-316-10-003000	CONN IC DIP SOCKET 16POS GOLD		4	0	1.73	6.92
2	1	S9169-ND	SBH11-PBPC-D05-ST-BK	CONN HEADER VERT 10POS 2.54MM	AC THRESH SOCKET	1	0	0.42	0.42
3	4	ED90433-ND	110-43-316-10-003000	CONN IC DIP SOCKET 16POS GOLD		4	0	1.73	6.92
4	2	36-2203-ND	2203	HEX STANDOFF #4-40 ALUMINUM 1/2"	AGC SUPPORT	2	0	0.46	0.92
5	1	S9171-ND	SBH11-PBPC-D08-ST-BK	CONN HEADER VERT 16POS 2.54MM	OUTPUT/AGC SOCKET	1	0	0.42	0.42
6	1	ED10564-ND	OSTVN05A150	TERM BLK 5P SIDE ENT 2.54MM PCB		1	0	1.73	1.73
7	4	1N4148FSCT-ND	1N4148TR	DIODE GEN PURP 100V 200MA DO35		4	0	0.1	0.40
8	1	ED10566-ND	OSTVN08A150	TERM BLK 8P SIDE ENT 2.54MM PCB		1	0	2.36	2.36
9	10	PCF1592CT-ND	ECW-FD2W474J4	CAP FILM 0.47UF 5% 450VDC RADIAL		10	0	0.427	4.27

Subtotal \$24.36

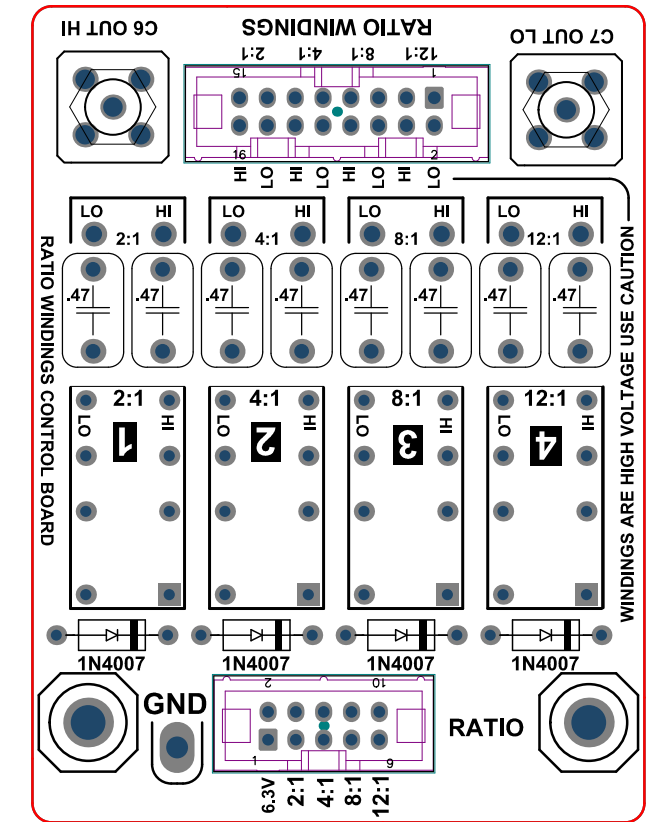


diameter for knob 1.250 inch

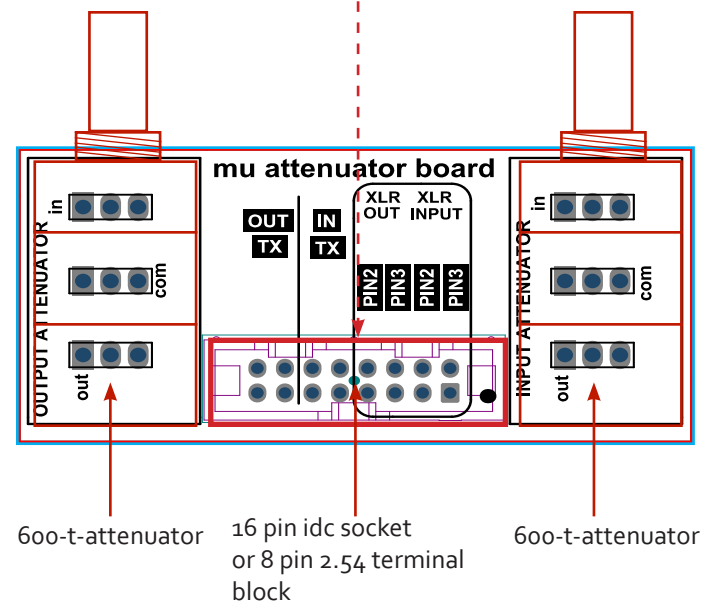
front panel bill of materials (optional)

<https://www.digikey.com/short/43qnrh>

Index	Quantity	Part Number	Manufacturer Part Number	Description	Customer Reference	Available	Backorder	Unit Price	Extended Price USD
1	2	RV4L102C-ND	RV4LAYS102A	POT 1K OHM 2W CARBON LINEAR		2	0	13.7	27.40
2	2	RV4L101C-ND	RV4LAYS101A	POT 100 OHM 2W CARBON LINEAR		0	2	16.02	32.04
3	1	432-1216-ND	110-73	SWITCH TOGGLE SPST 6A 125V		1	0	5.52	5.52
4	1	EG2352-ND	100SP1T1B1M2QEH	SWITCH TOGGLE SPDT 5A 120V		1	0	2	2.00



SBH11-PBPC-D08-ST-BK
 Digi-Key Part Number
 S9171-ND
 Manufacturer
 Sullins Connector Solutions
 Manufacturer Product Number
 SBH11-PBPC-D08-ST-BK
 Supplier
 Sullins Connector Solutions
 Description
 CONN HEADER VERT 16POS 2.54MM
 Manufacturer Standard Lead Time
 5 Weeks
 Detailed Description
 Connector Header Through Hole 16 position
 0.100" (2.54mm)



<https://www.hairballaudio.com/catalog/parts-store/panel-meters/8020-vu-meter>

8020 VU Meter
 \$40.00 (each) order 2 pcs



in some circuits -
 if the meter cannot be set to zero
 and the needle is shallow .

you should bridge the internal
 resistors on the little green pcb inside the meter -
 one side has diodes and one side has some resistors
 . the diodes are needed
 if you are going to monitor the input or output
 signal.

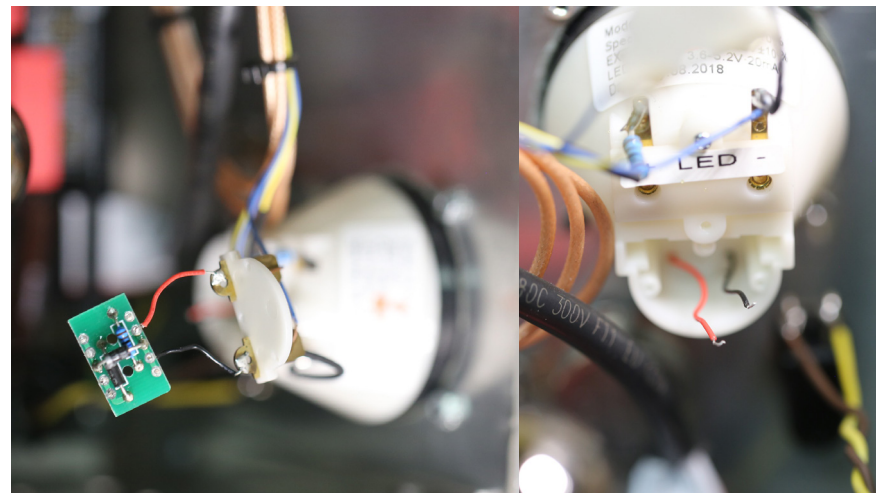
however in this design
 it is a default to gain reduction only .
 (can be modified later)

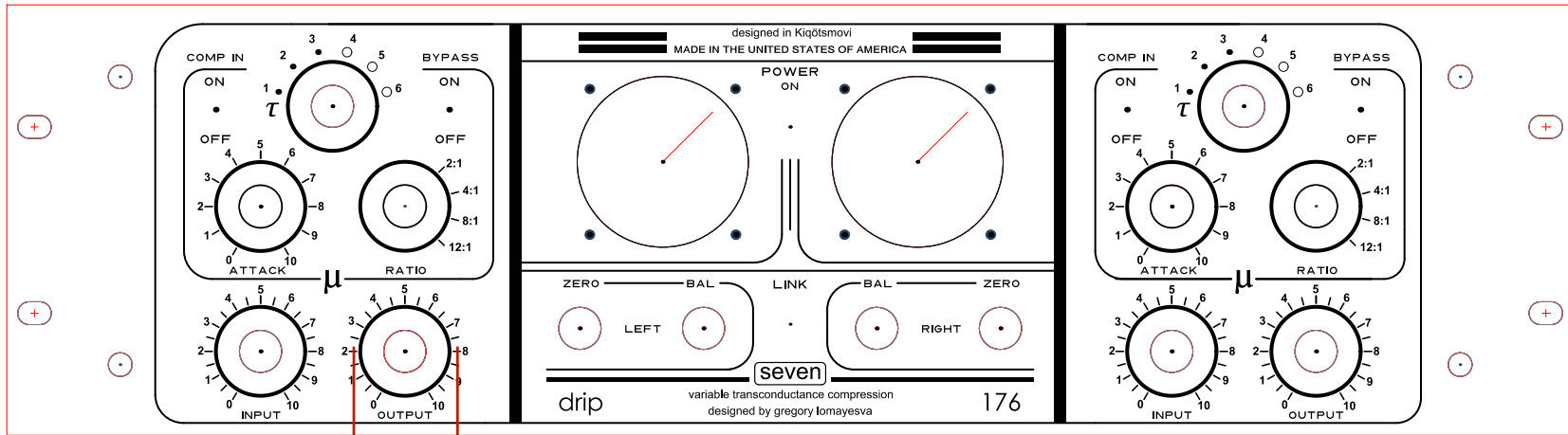
if just monitoring gain reduction - remove the green
 pcb inside the meter
 solder the wires to the corresponding +/- tabs and
 close it up -
 you have now made it a dc micro amp meter.

<https://www.hairballaudio.com/catalog/parts-store/attenuators/bourns-600-t-pad-attenuator-14-shaft>

\$29.15 (order 2 pcs)
 Custom BI Technologies 600Ω T-pad attenuator with 1/4" shaft and 3/8" bushing. Made from a custom 3 deck potentiometer, this unit provides the same attenuation as the original bridged T-pad found in the FET compressor with more dependability and smooth operation.

you will need a led dropping resistor
 if you chose an led model -
 some models have incandescent light bulbs
 .
 which do not need a dropping resistor
 when powering the meter from 6.3vdc.
 choose the incandescent if available .

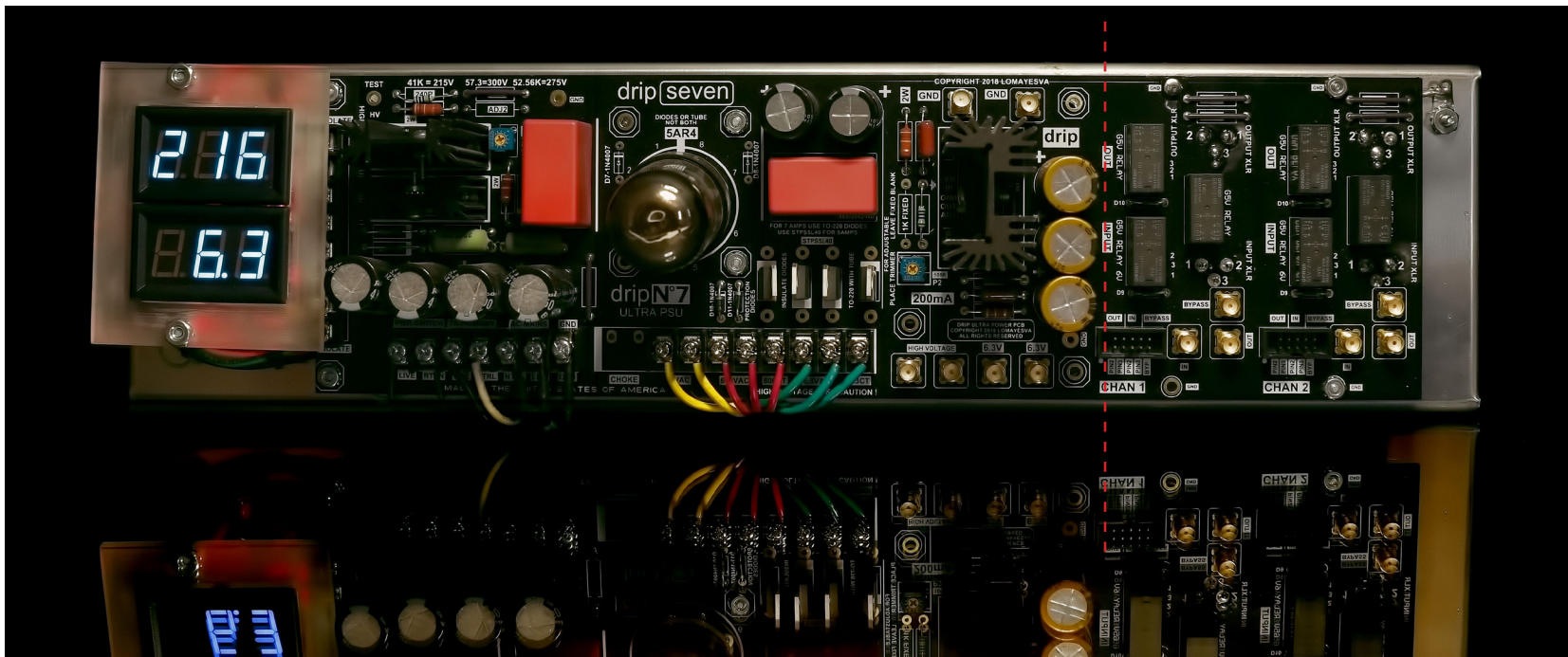




diameter for knob 1.250 inch

front panel layout

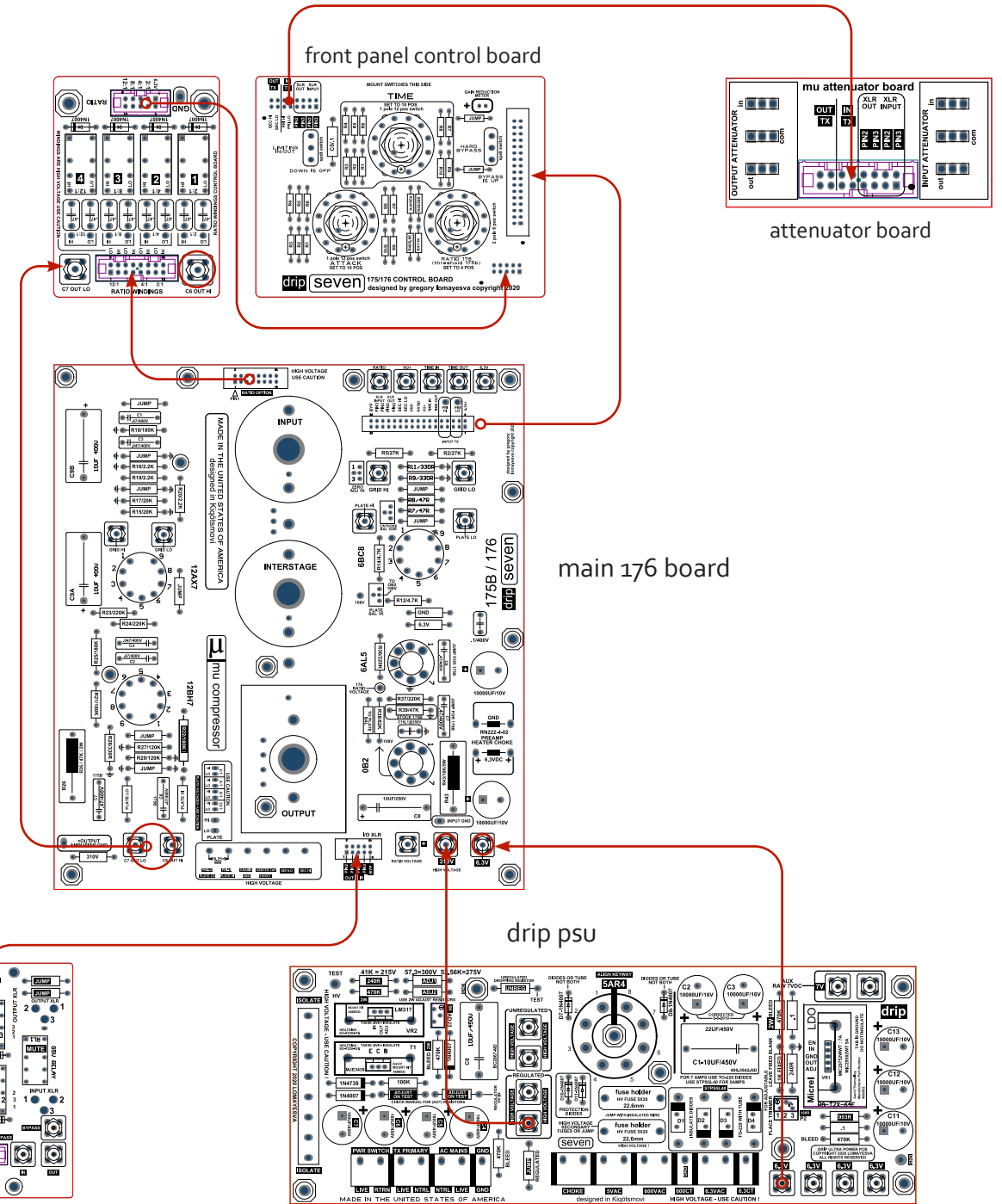
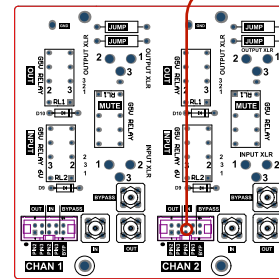
PSU EXAMPLE - note the new psu rev 1.2 - the xlr board and the psu are separated for convenience

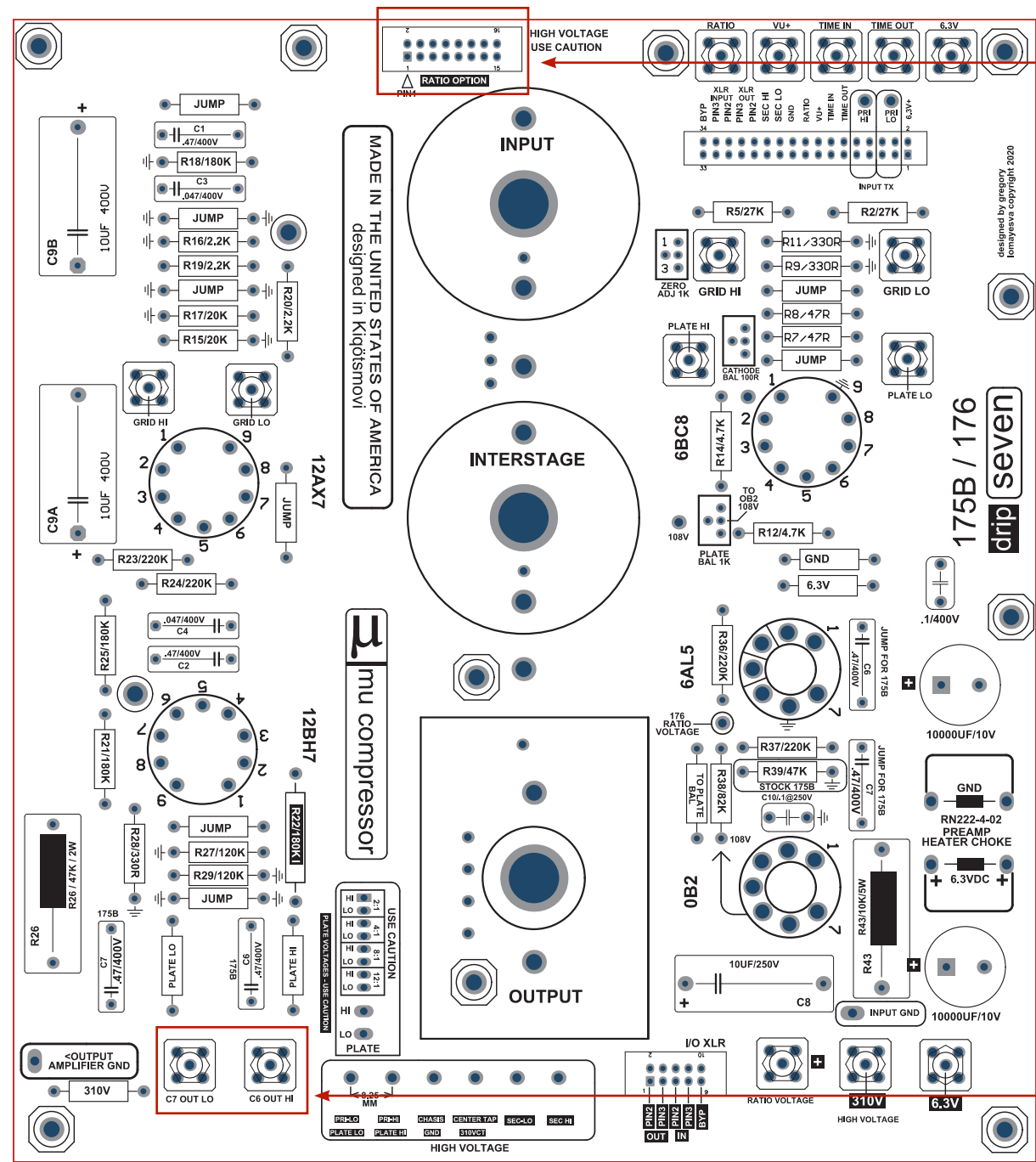


ratio winding switcher

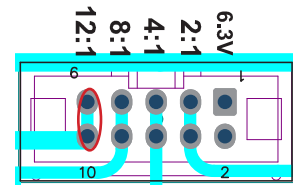
drip 176 theory of operation connection legend

xlr i/o board





CONNECT TO FRONT PANEL CONTROL BOARD (10 POS IDC SOCKET) OR USE a 5 POS 2.54 TERMINAL BLOCK AND USE DISCREET WIRE



top and bottom pins are connected

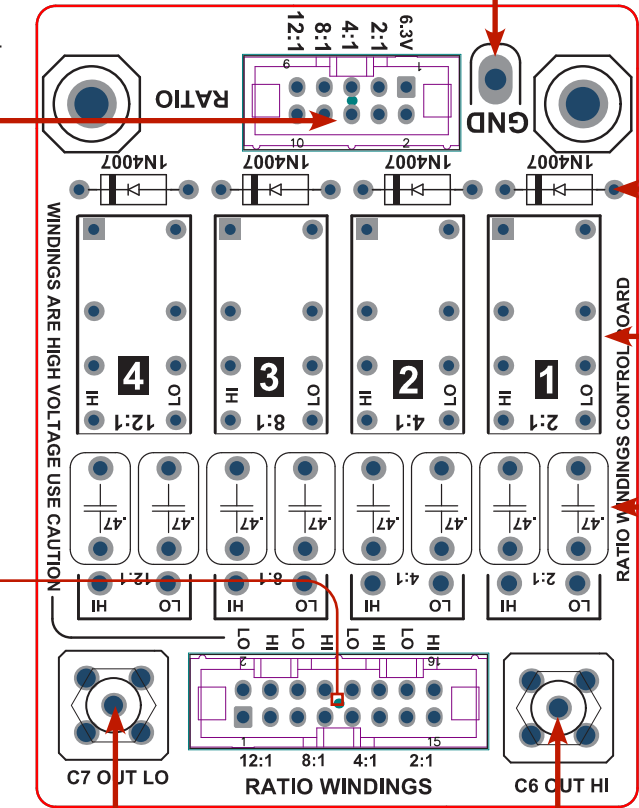
16 pin round idc cable

Insulation Displacement Connector

main board (1 channel)



ground this pad to chassis (or can be grounded to chassis via metal stand-offs if mounted to case)



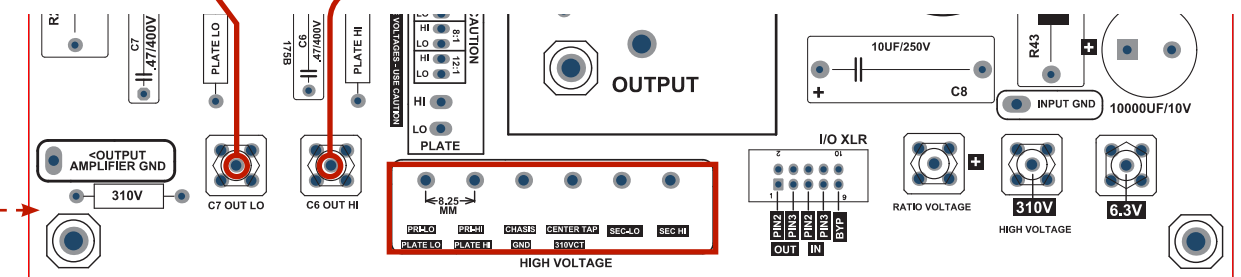
anti pop diodes (fly back diodes)

omron 6v relays

dc blocking .47 capacitors rated @ 400v or greater - ceramic is fine - film is best , space is limited

note : do not go buy 30\$ sma cables for RF frequencies - amazon has sma cables for 2 to 6\$ as with ebay (best lengths are 6" 12" and perhaps a 20" for longer connections if required) you can also make them to exact size if you are more advanced using the sma connectors and the proper coax cable from amazon

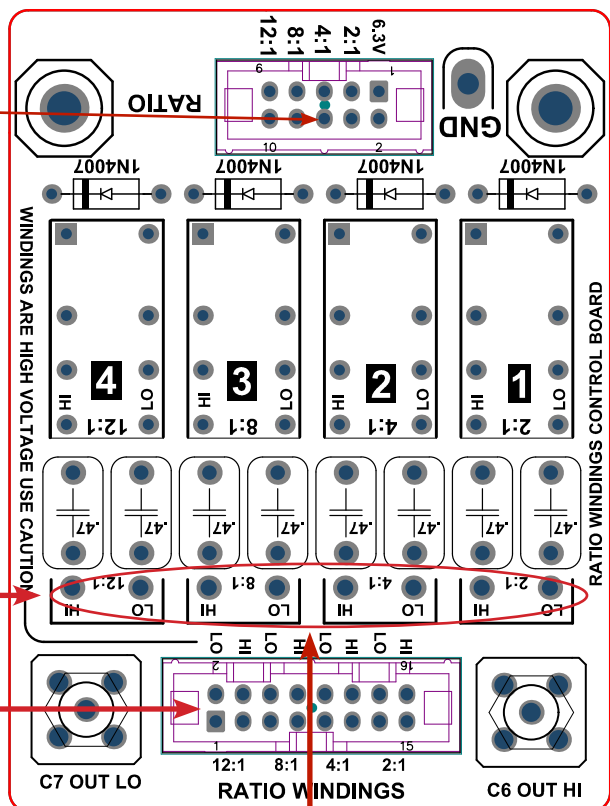
sma cable connections



output transformer secondary and primary b+ ct connections (high voltage use caution)

RELAY TRIGGER CONNECTOR

option 1



SOLDER DIRECTO BOARD HERE

OR

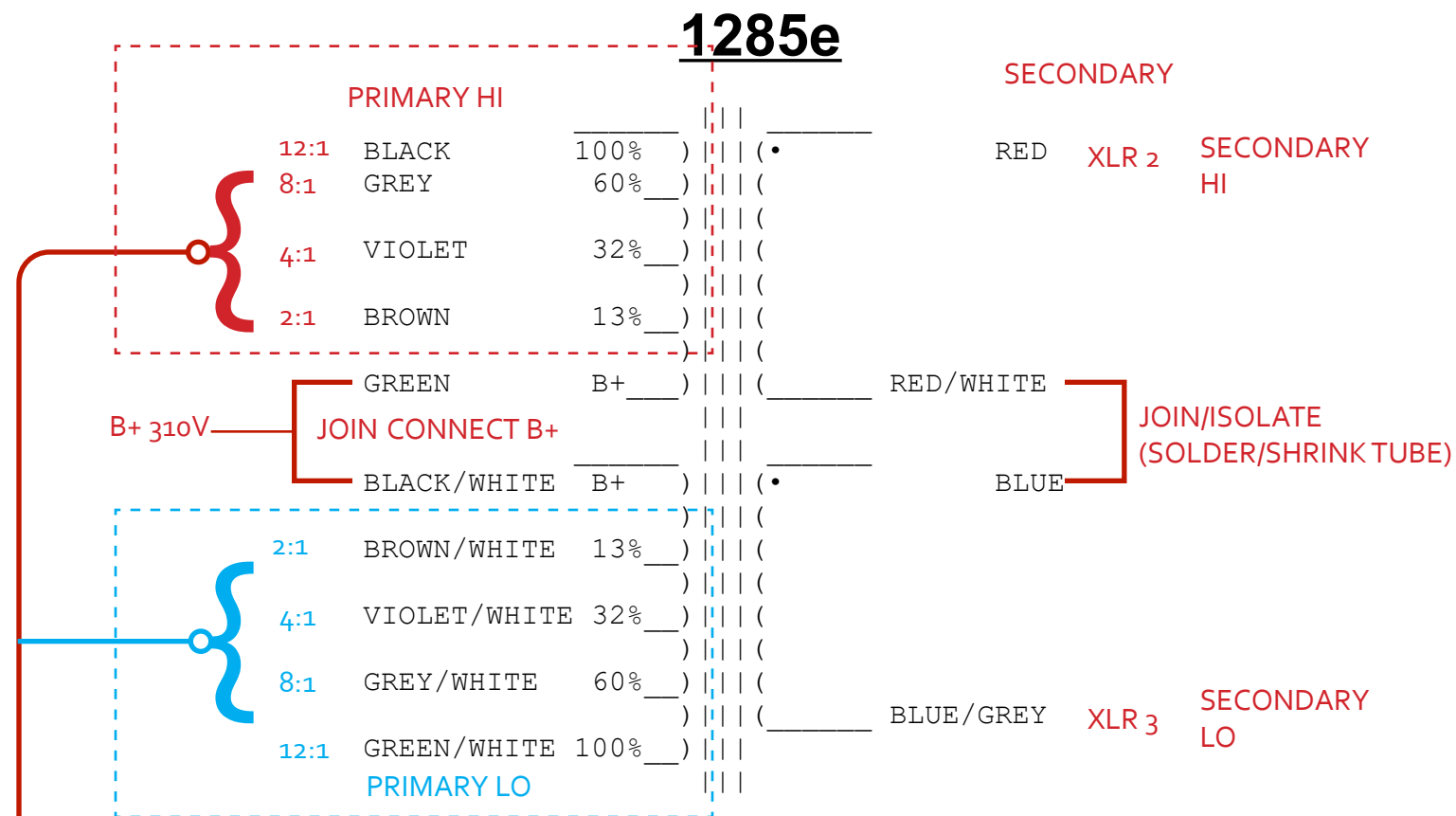
CONNECT TO BOARD USING 8 POS 2.54MM TERMINAL BLOCK

note :

once the unit is energized. there are no bleeder resistors on the .47 capacitors , so they will zap you if you touch the leads - even when the unit is off - use caution. a small shock , but enough to remind you to not do that again.

also :

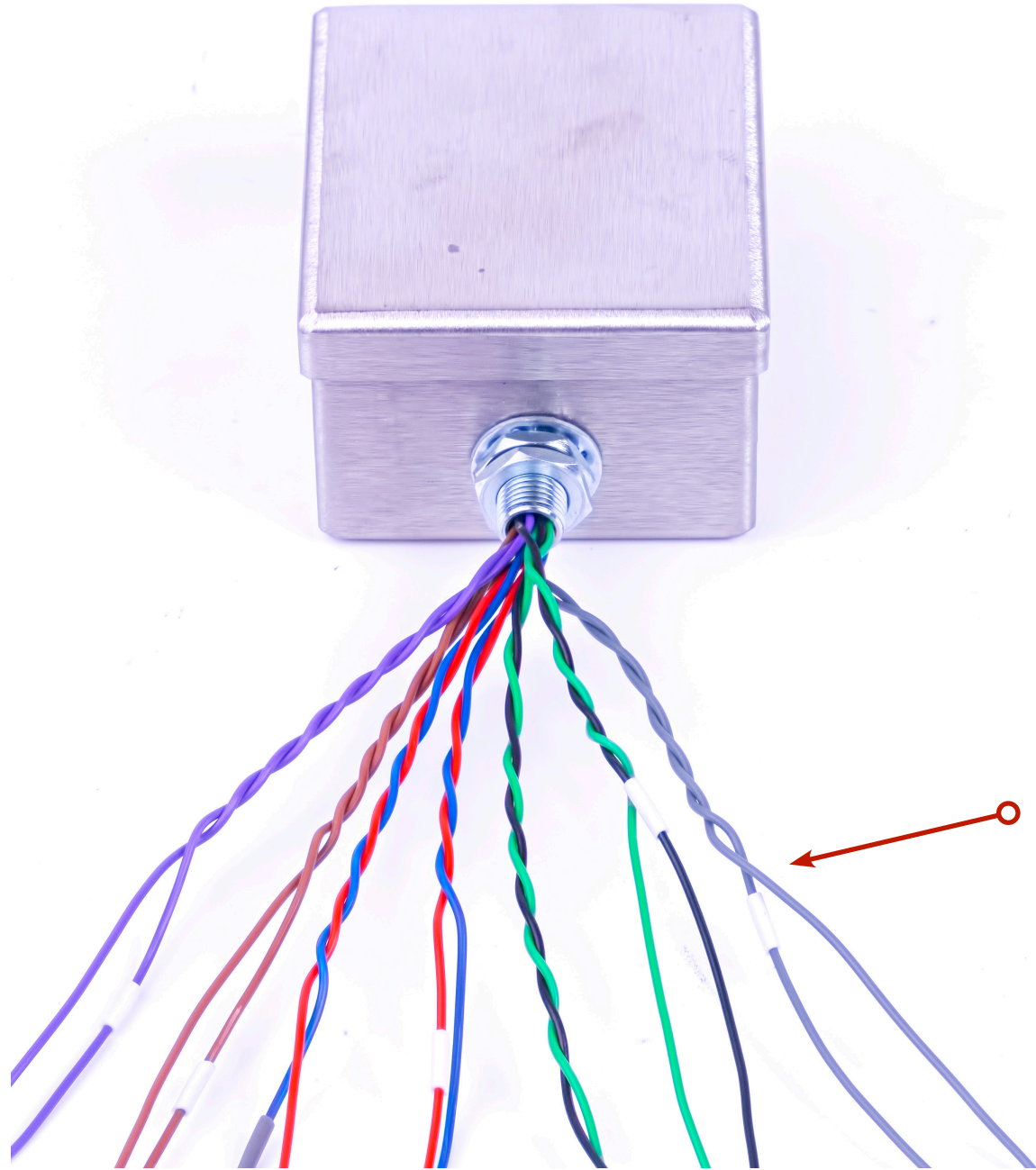
the ratio winding of the output transformer are all high voltage (285VDC) use caution when the transformer is energized. this shock will possibly end you - think rattle snakebite feeling - yeah ,it feels like that. **RULE #1 DO NOT LEARN OHMS LAW BY THE TOUCH METHOD !**



1285 UA-176 Push-Pull triode to balanced line 9CT:1 with attenuator.

15k/185 ohm output transformer for driving a balanced ohm line from push-pull 6SN7, ECC83 etc. 50% bandwidth and dynamic range, Max output level at 50 Hz +28 dBu (19 volts). Includes primary taps for resistance ref secondary 14 ohms. Colour coded leads. Size A. In Mumetal can with threaded gromme

sowter 1285e output transformer



group the windings of the transformer in twisted pairs. this will keep what you are working with together

for the ratio :

- black and green/white - 12:1
- grey and grey/white - 8:1
- violet and violet/white - 4:1
- brown and brown/white - 2:1

the b+ that will be connected to 310VDC+ (i.e ct (center tap)) is green and black/white

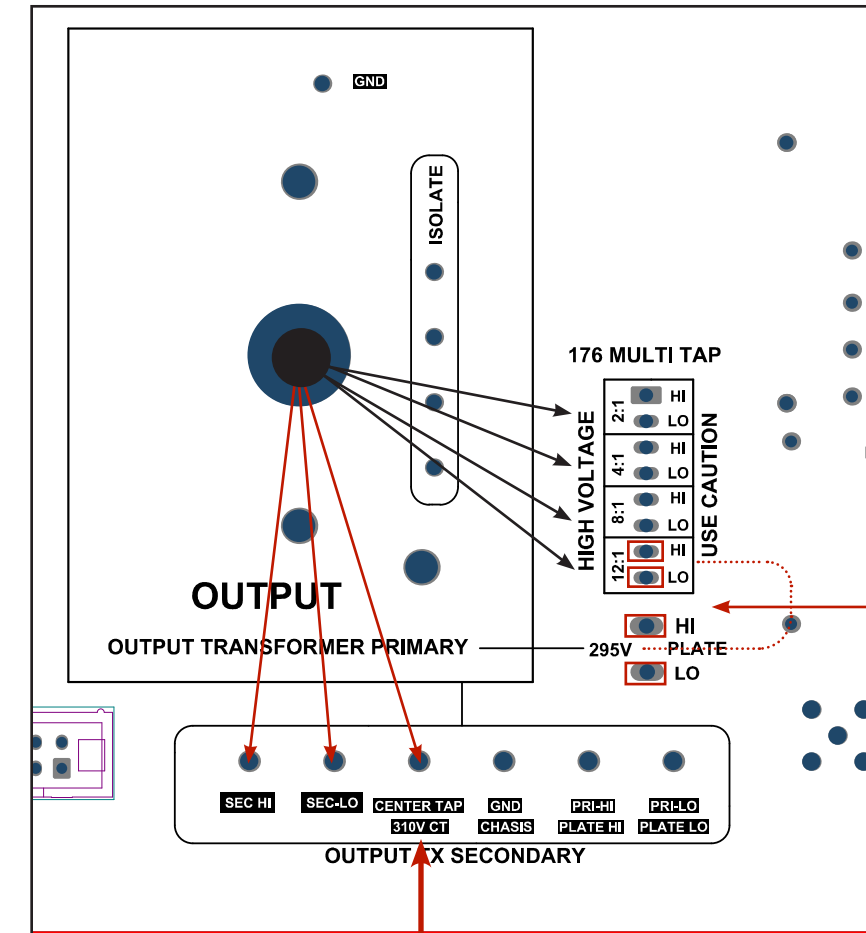
secondary connections are

- red = secondary hi (xlr2)
- blue/grey = secondary low (xlr3)

red/white and blue are joined (soldered together) shrink tubed and isolated.

if you are cutting the wires shorter - make sure you move the white tube so you don't cut it off (it slides along the wire) otherwise you are guessing which winding is which without the white tube indicator. LEAVE 1 INCH OF SLACK MINIMUM this will prevent you from cutting too short.

connection locations for the output transformer wires

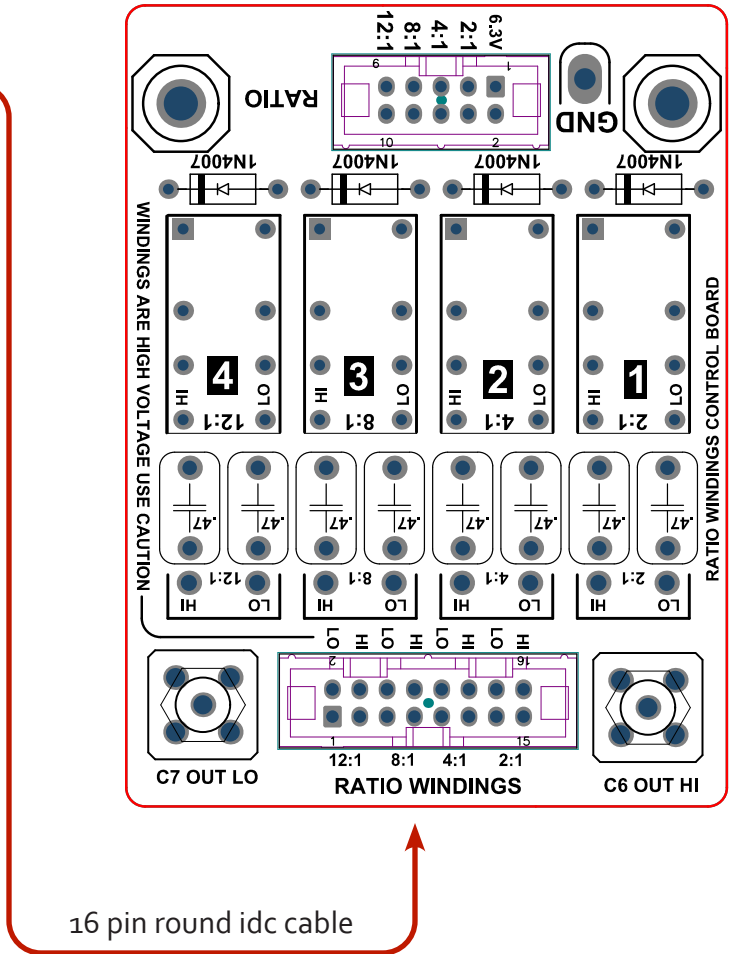
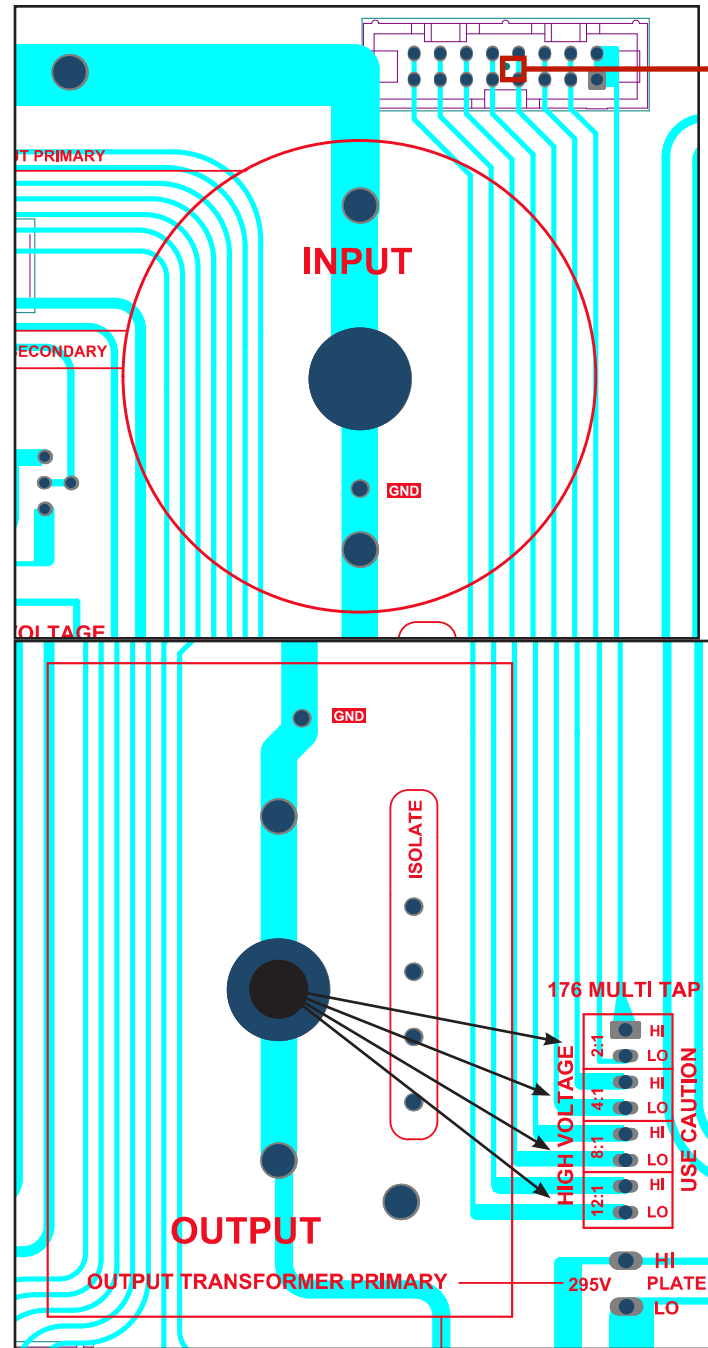


important!

since the pcb is designed to be the 175 b or the 176 you must connect 12:1 hi to plate hi and 12:1 lo to plate low manually with a small wire best to do this on the bottom of the pcb so it doesn't look like a bodge from above.

output transformer ct goes here . green and black/white , join and place here (310VDC)

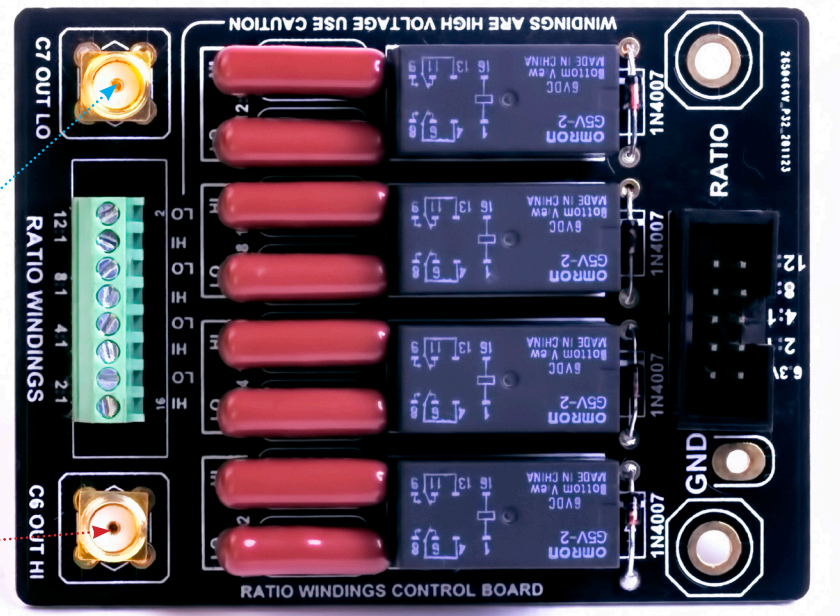
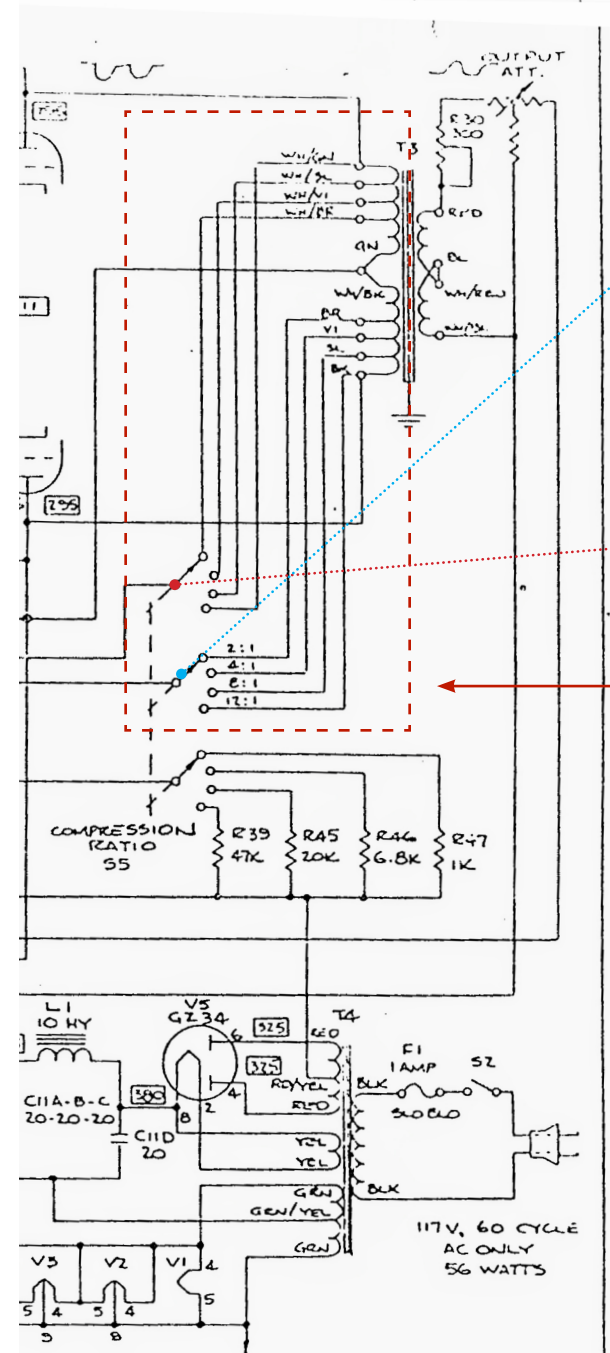
main board bottom silk



16 pin round idc cable

option 2 (winding switch)

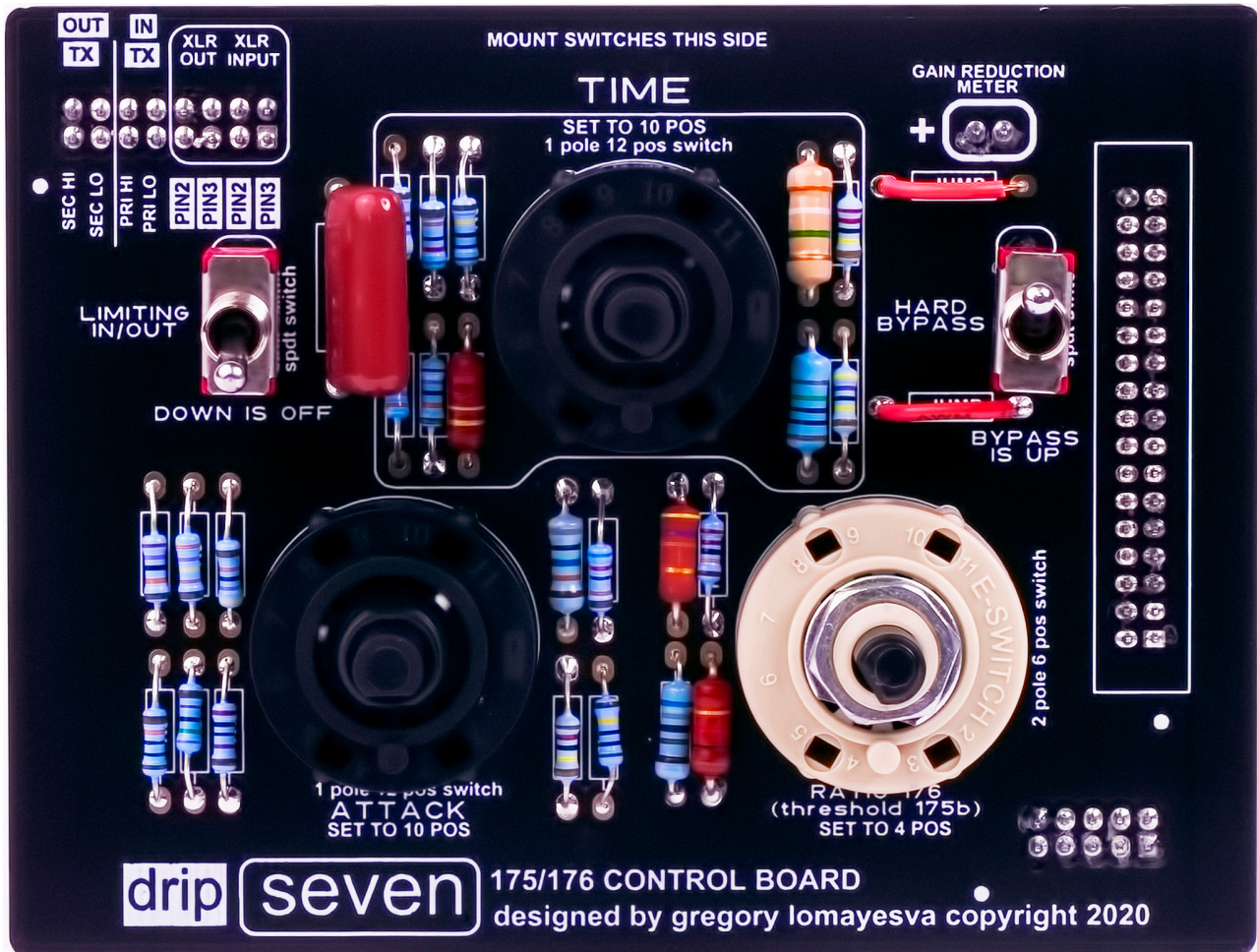
option 2 : wire output transformer to main board transfer taps , this allows you to mount the ratio switcher board in a good location in the case and then use a round 16 pin idc cable to make the connection between the main board and the ratio switch board.



this - achieves this



front panel control board switch side



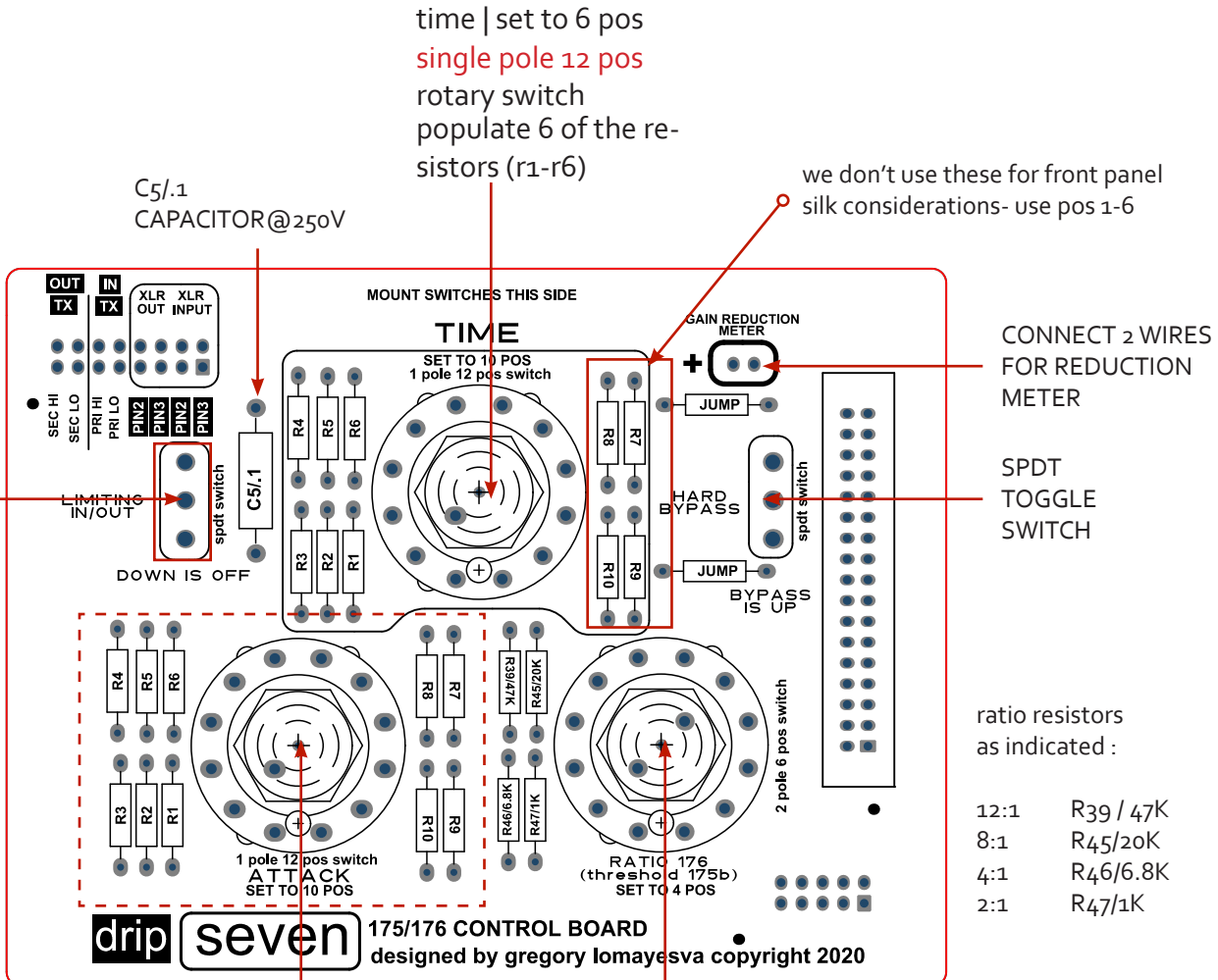
time constant resistors
(may select to taste)
a lower value is faster

- 1: 220k 1/2W
- 2: 470k 1/2W
- 3: 680k 1/2W
- 4: 1 meg 1/2W
- 5: 2.2 meg 1/2W
- 6: 4.7 meg 1/2W

DO NOT PLACE IDC
SOCKETS ON THE
SWITCH SIDE OF
THE PCB

attack resistors
lower is faster
(may select to taste)

- 1: JUMP (ZERO ATTACK)
- 2: 1K
- 3: 2.2K
- 4: 4.7K
- 5: 6.8K
- 6: 10K
- 7: 15K
- 8: 18K
- 9: 22K
- 10: 24K



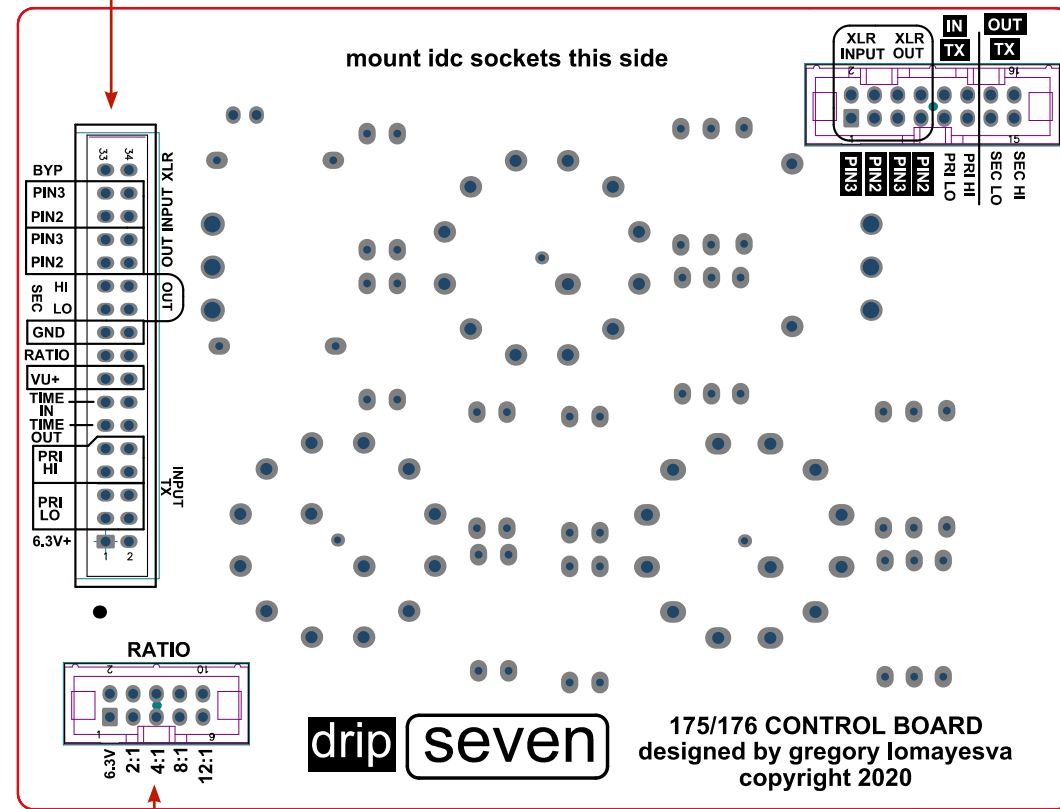
attack set to 10 pos
single pole 12 pos
rotary switch
populate 10 of the
resistors

ratio set to 4 pos
double pole 6 pos
rotary switch

front panel control board idc socket side

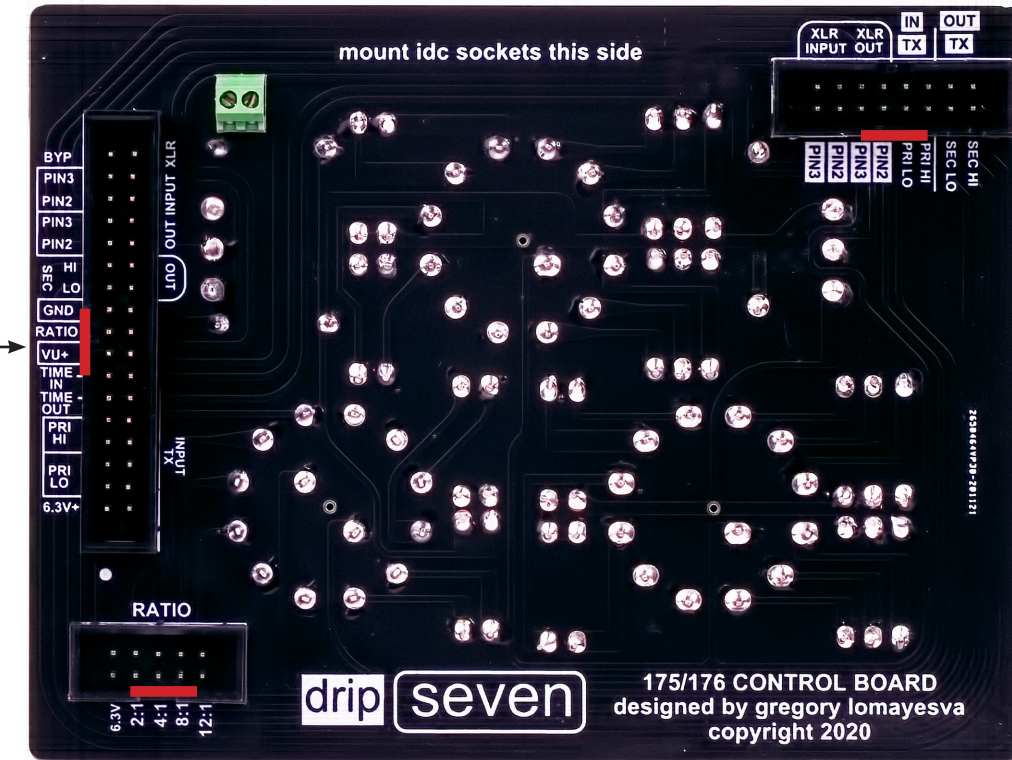
to main board
34 pin idc socket

to attenuator board
16 pin idc socket



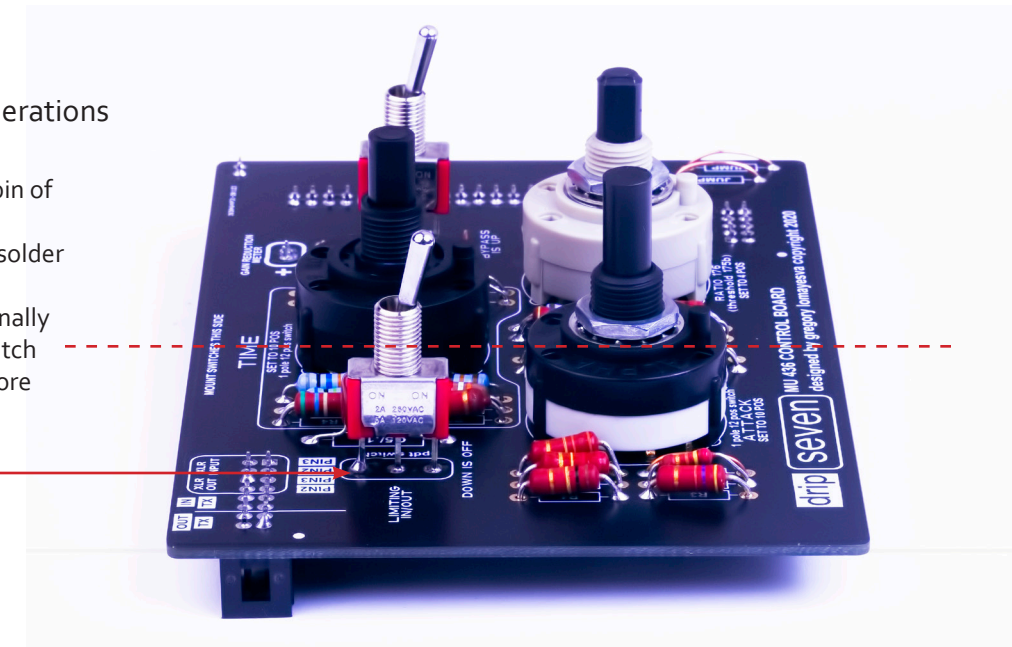
10 pin idc socket
to ratio switch board

notch this side →



toggle switch considerations

elevate to match rotary switch height - solder 1 pin of toggle and adjust to maximum height - then solder the rest of the pins once straight and level . optionally use wire wrap toggle switch with extra long leads (more expensive)

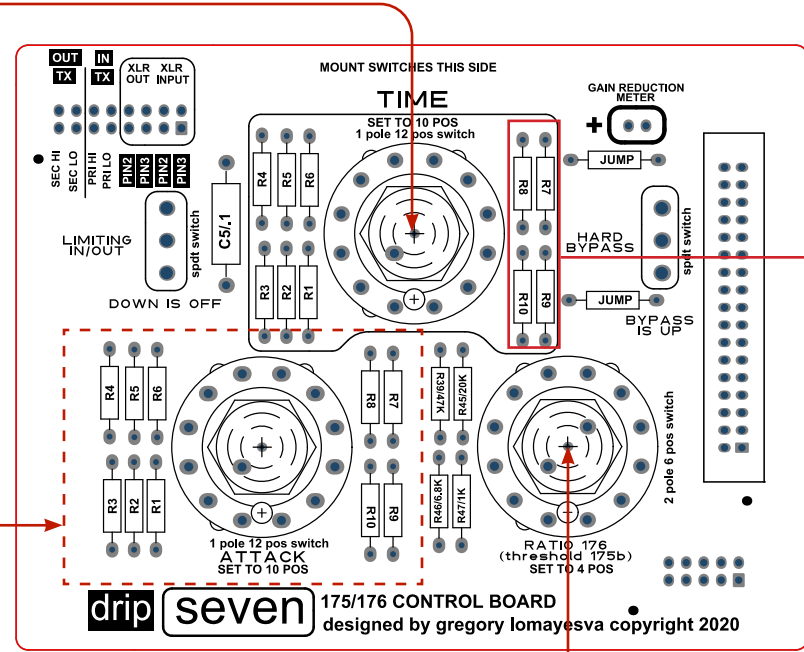


release resistors

#	quantity	description
1	1 pcs	
2	1 pcs	
3	1 pcs	
4	1 pcs	
5	1 pcs	
6	1 pcs	

attack resistors

#	quantity	description
1	1 pcs	
2	1 pcs	
3	1 pcs	
4	1 pcs	
5	1 pcs	
6	1 pcs	
7	1 pcs	
8	1 pcs	
9	1 pcs	
10	1 pcs	



do not populate pos 7-10

attack resistors
lower is faster
(may select to taste)

1:	JUMP (ZERO ATTACK)
2:	1K
3:	2.2K
4:	4.7K
5:	6.8K
6:	10K
7:	15K
8:	18K
9:	22K
10:	24K

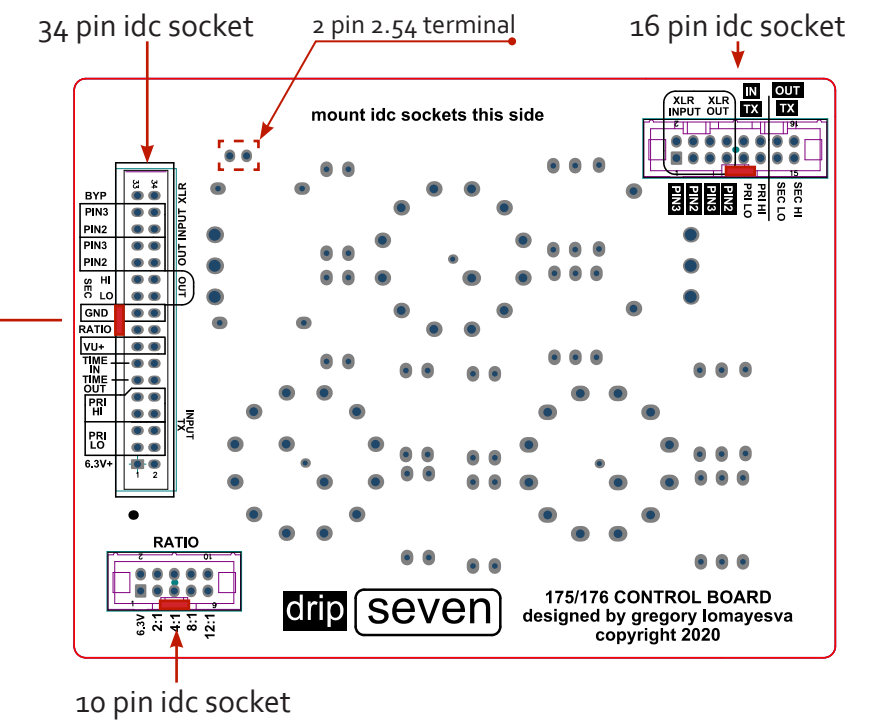
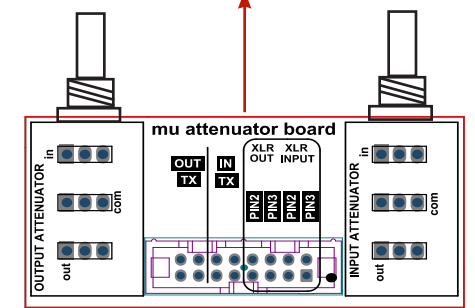
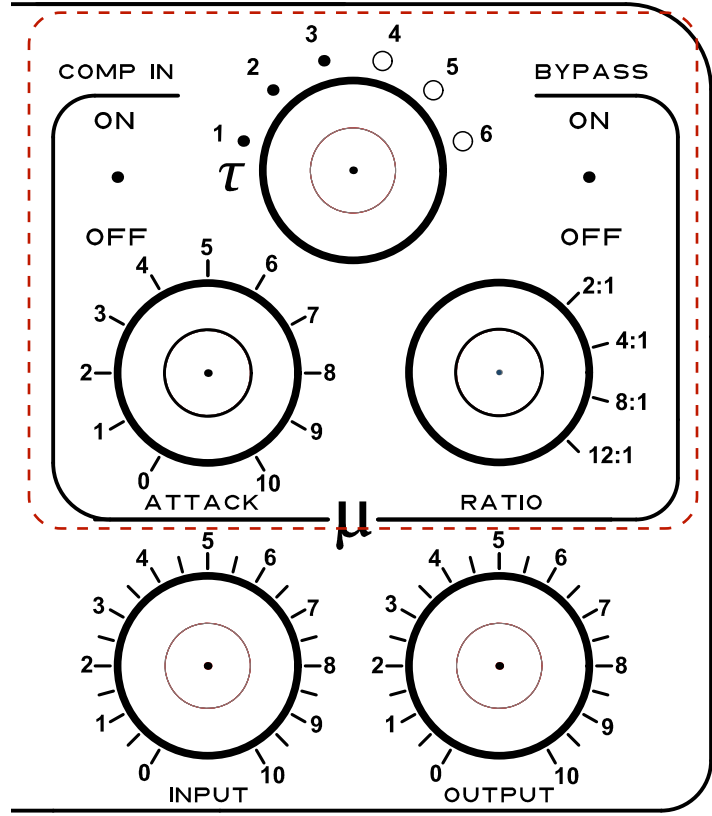
ratio resistors
as indicated :

12:1	R39 / 47K
8:1	R45/20K
4:1	R46/6.8K
2:1	R47/1K

time constant resistors
(may select to taste)
a lower value is faster

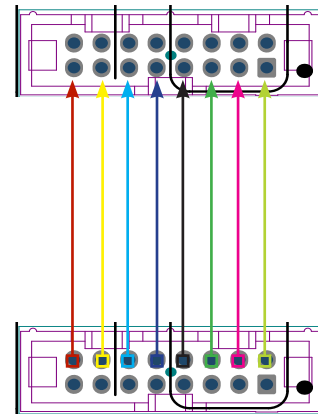
1:	220k 1/2W
2:	470k 1/2W
3:	680k 1/2W
4:	1 meg 1/2W
5:	2.2 meg 1/2W
6:	4.7 meg 1/2W

front panel silkscreen



10 pin idc socket

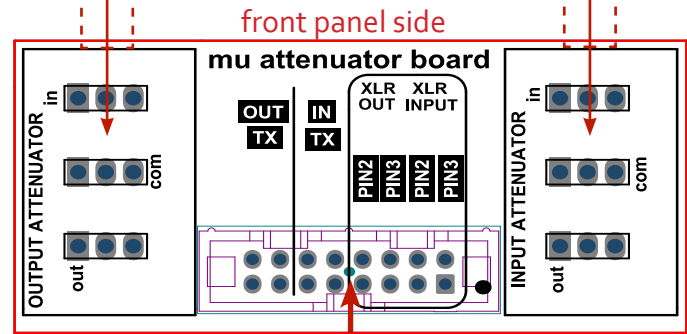
front panel in/out attenuator board



if using discreet wires and terminal block

600 ohm T-attenuator

600 ohm T-attenuator

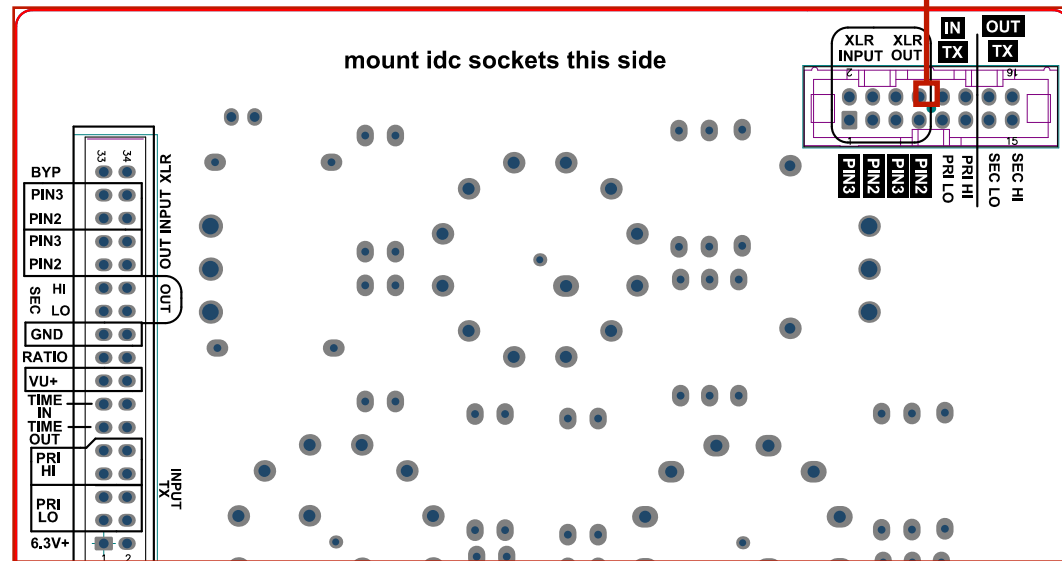


attenuator board

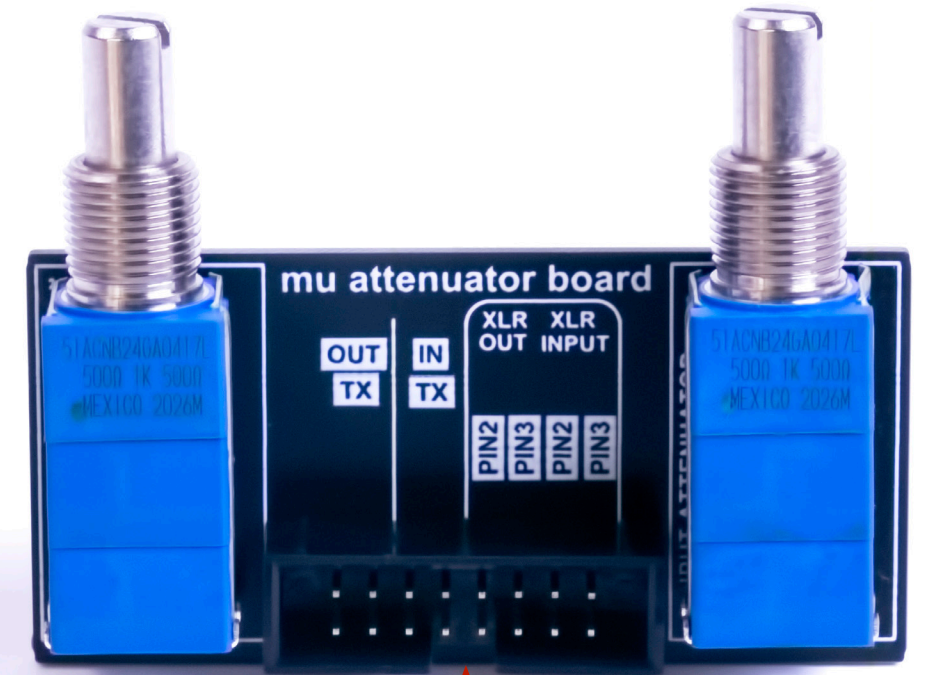
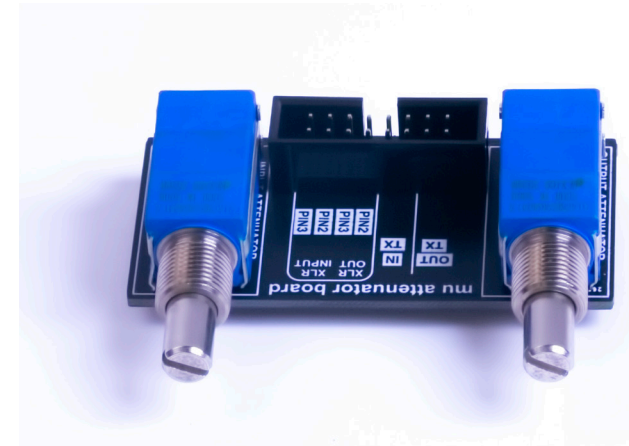
16 pos ribbon cable or 8 discreet wires

control board

16 pos idc socket or 8 pos 2.54 terminal block for discreet wires

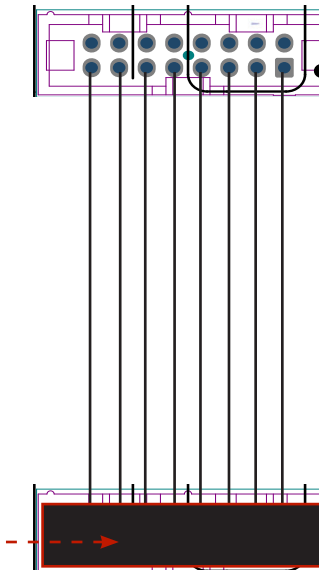


mount idc sockets this side



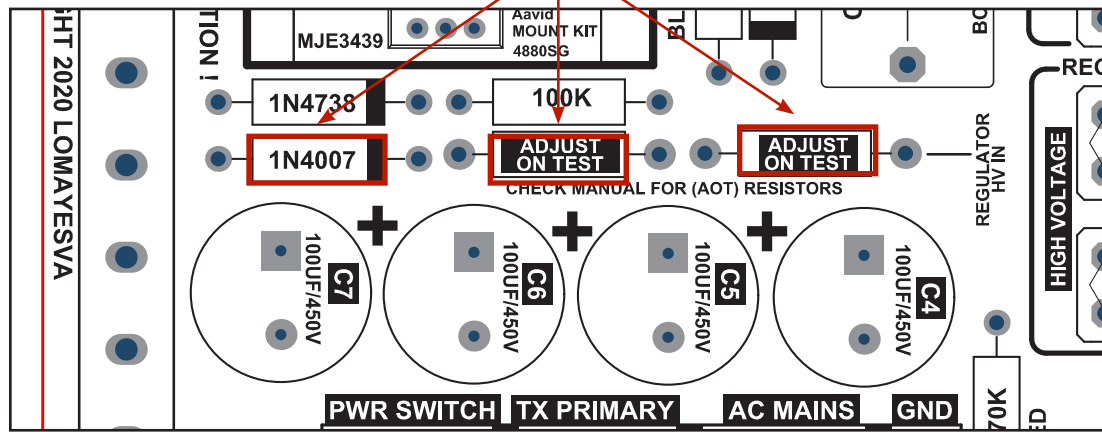
keyway

IDC CONNECTOR
SFH210-PPPC-D08-ID-BK
Digi-Key Part Number
S9288-ND
Manufacturer
Sullins Connector Solutions
Manufacturer Product Number
SFH210-PPPC-D08-ID-BK
Supplier
Sullins Connector Solutions
Description
CONN HEADER 16POS IDC
28AWG GOLD
Manufacturer Standard Lead
Time
5 Weeks
Detailed Description
16 Position Rectangular Header
Connector IDC Gold 28 AWG

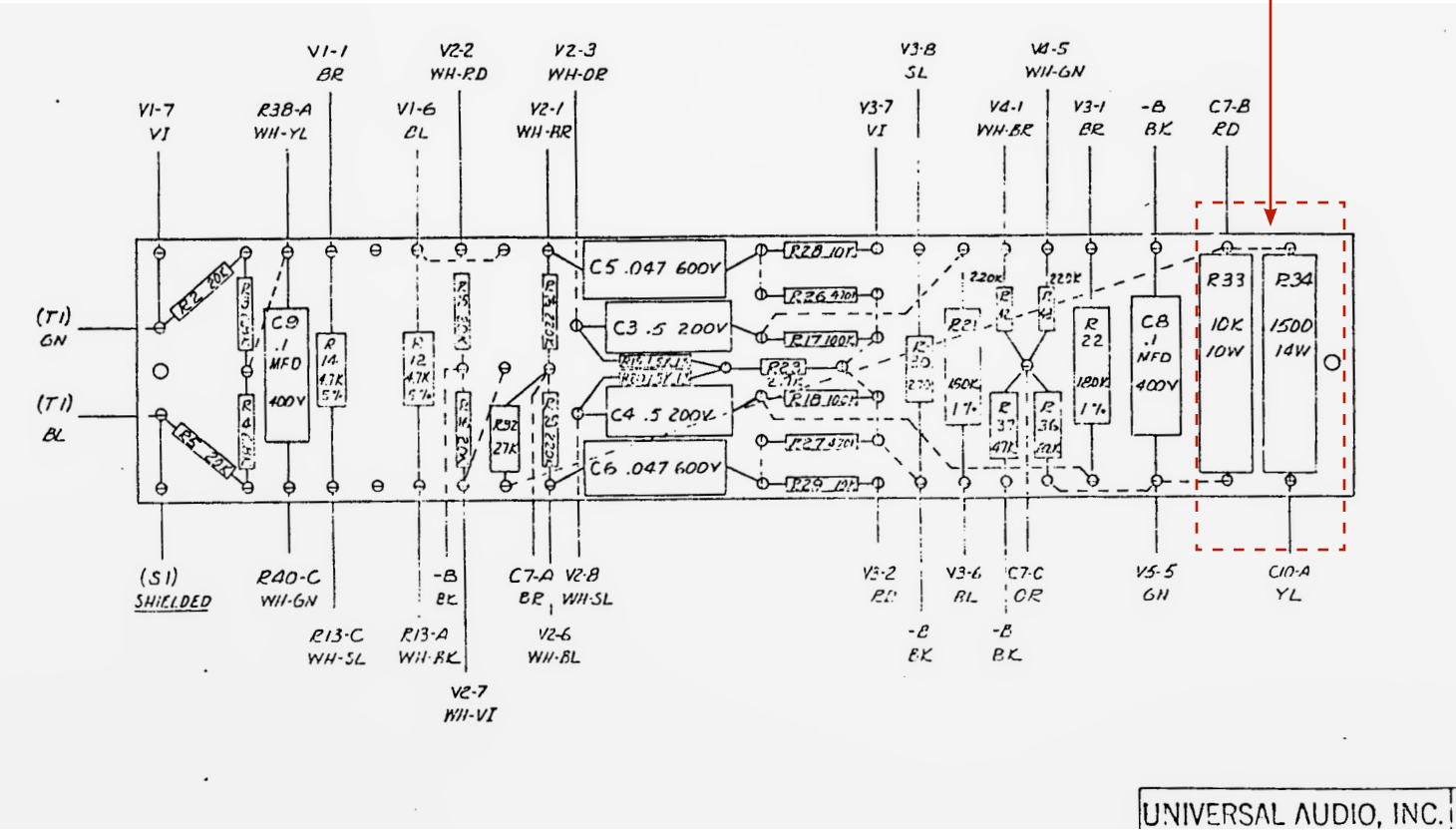


SOCKET
SBH11-PBPC-D08-ST-BK
Digi-Key Part Number
S9171-ND
Manufacturer
Sullins Connector Solutions
Manufacturer Product Number
SBH11-PBPC-D08-ST-BK
Supplier
Sullins Connector Solutions
Description
CONN HEADER VERT 16POS 2.54MM
Manufacturer Standard Lead Time
5 Weeks
Detailed Description
Connector Header Through Hole 16 position
0.100" (2.54mm)

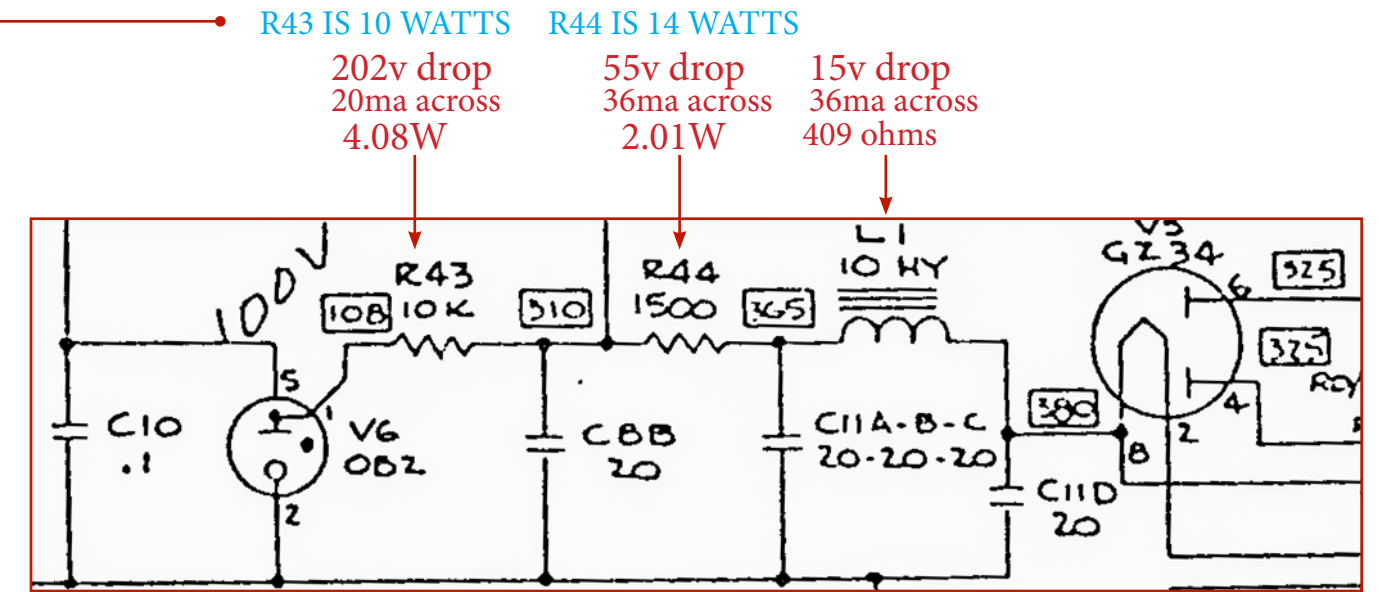
we will use these to create R34, place 3 resistors here @ 250 ohms 5w (TWO CHANNELS)



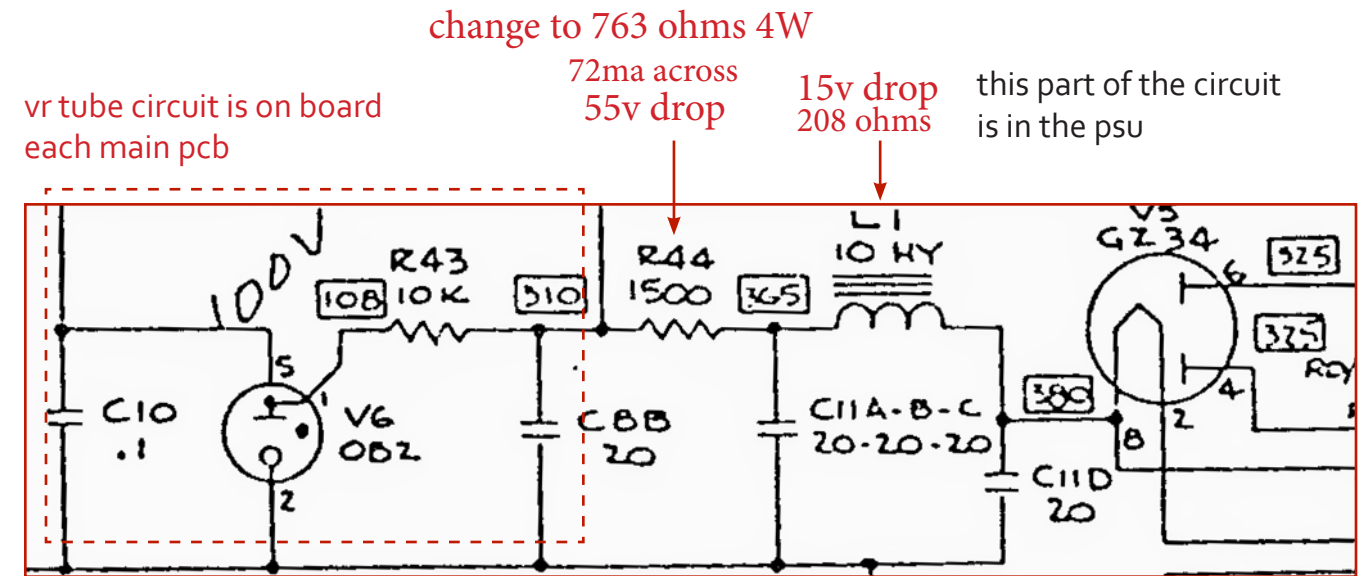
this page is under review to physically test and measure the current draw



CURRENT CALCULATIONS FROM SCHEMATIC (OHMS LAW) single channel

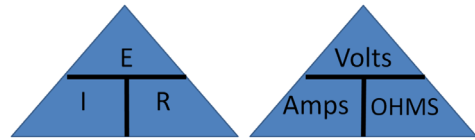
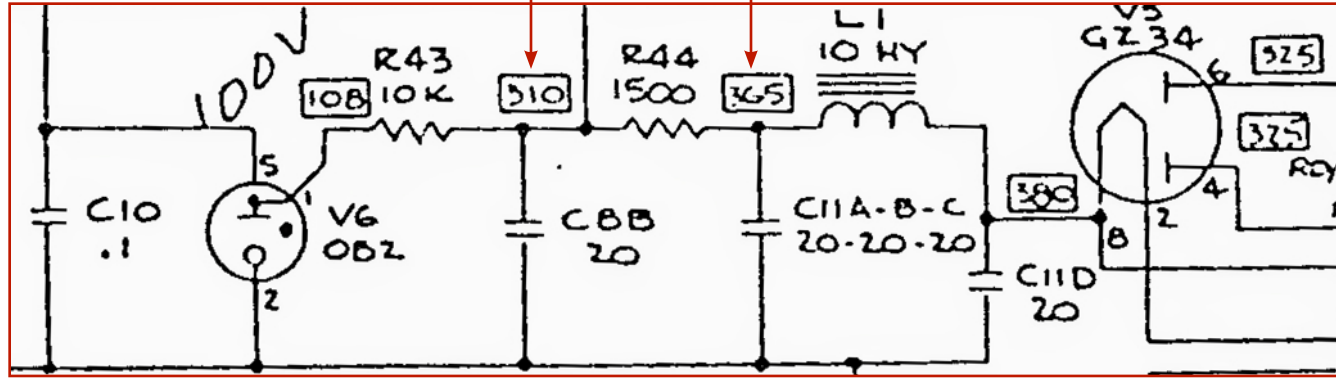


CURRENT CALCULATIONS FROM SCHEMATIC (OHMS LAW) dual channel





$$365V - 310V = 55V$$



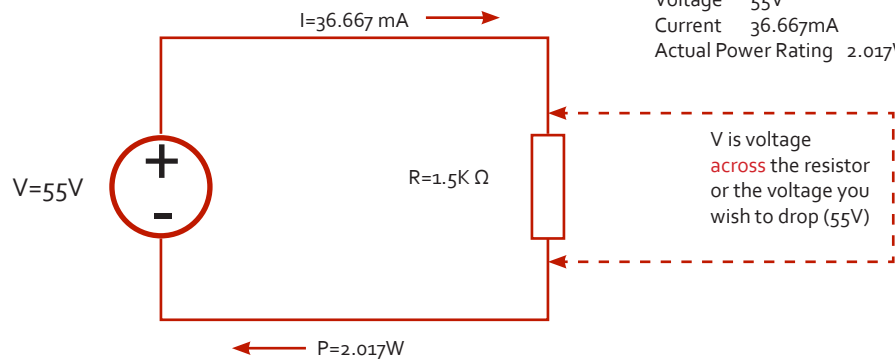
Volts ÷ Amps = Ohms
 Volts ÷ Ohms = Amps
 Ohms X Amps = Volts

$V = I \times R$ (OHMS LAW)

V = VOLTAGE
 I = CURRENT
 R = RESISTANCE

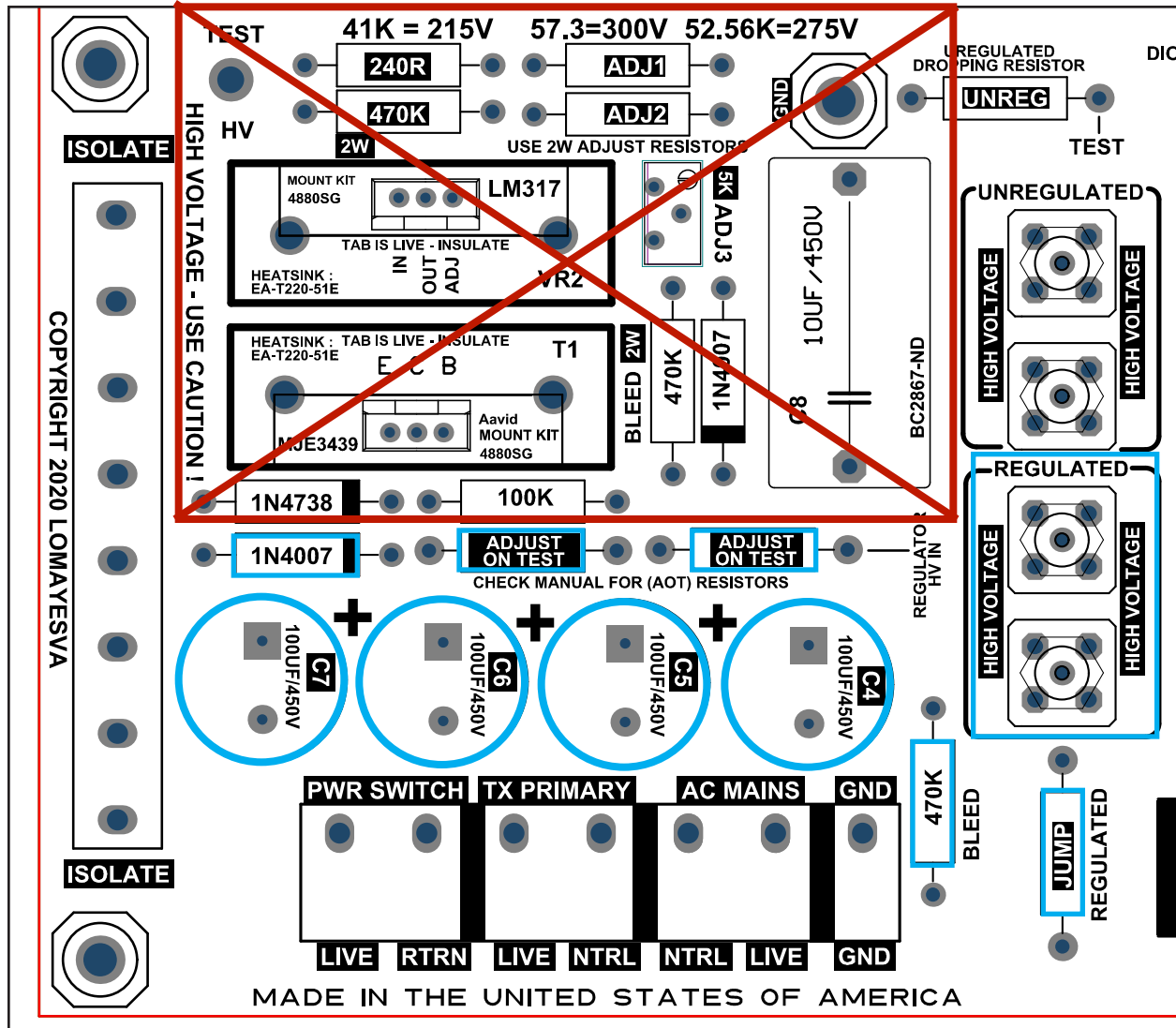
P = POWER
 power equation : $P = I \times V$
 Resistance 1.5kΩ
 Voltage 55V
 Current 36.667mA
 Actual Power Rating 2.017W

$\frac{V}{I R}$	$\frac{V}{I R}$
"virus"	V = IR
$\frac{V}{I R}$	$\frac{V}{I R}$
$I = \frac{V}{R}$	$R = \frac{V}{I}$



this page is under review to physically test and measure the current draw

BYPASSING THE SOLIDSTATE REGULATOR CIRCUIT AND KEEPING THE PSU OLD SCHOOL.



AC03000005000JAC00
 Digi-Key Part Number
 PPC3W500CT-ND - Cut Tape (CT)
 PPC3W500TB-ND - Tape & Box (TB)
 Manufacturer
 Vishay Beyschlag/Draloric/BC Components
 Manufacturer Product Number
 AC03000005000JAC00

Supplier
 Vishay Beyschlag/Draloric/BC Components

Description
 RES 500 OHM 3W 5% AXIAL

Detailed Description
 500 Ohms ±5% 3W Through Hole Resistor Axial Flame Retardant Coating, Pulse Withstanding, Safety Wirewound

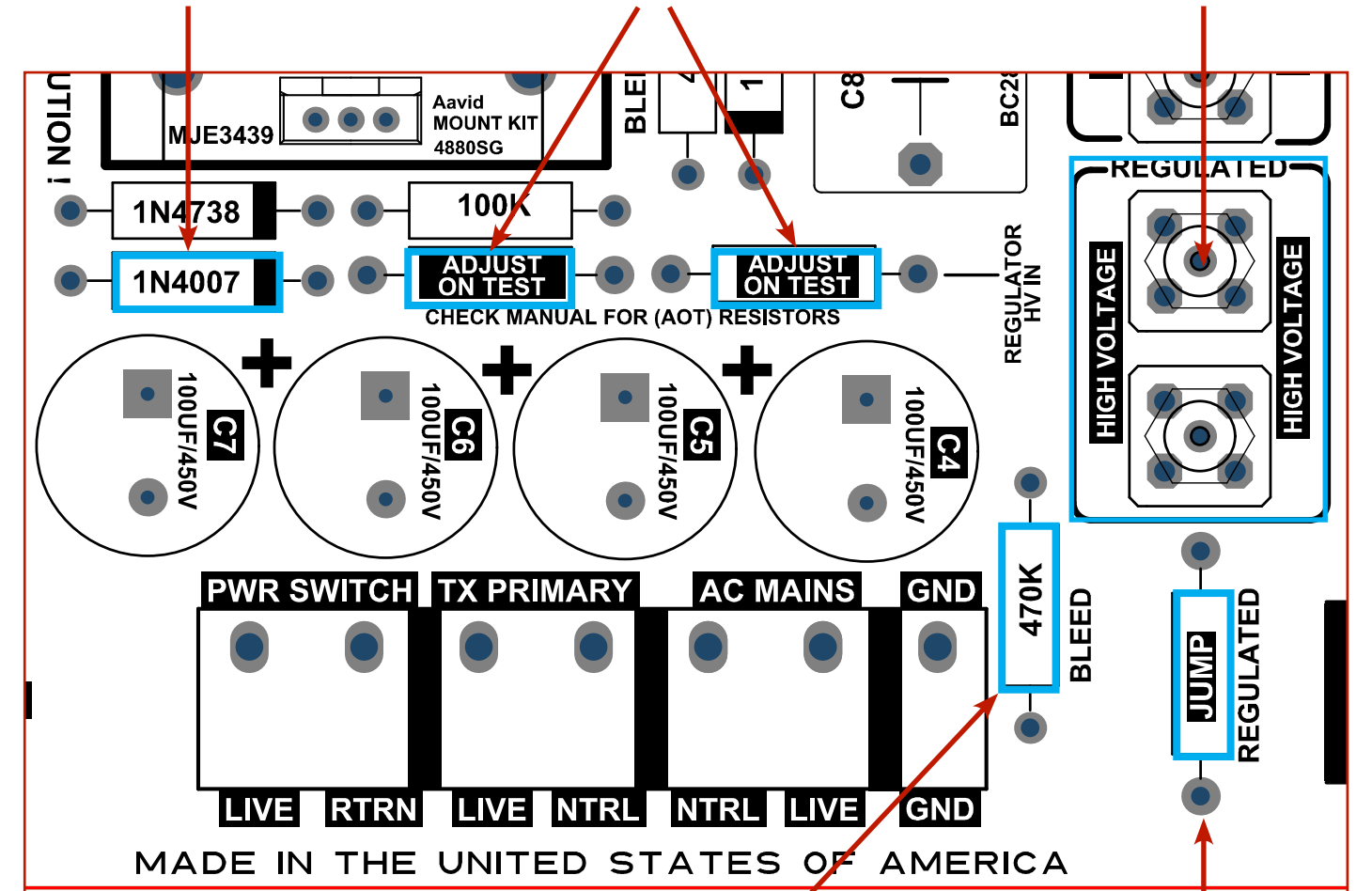
DO NOT POPULATE RED BOX - POPULATE CAPS AND BLUE BOX'S

for dual channel

replace with 250R resistor 5w resistor

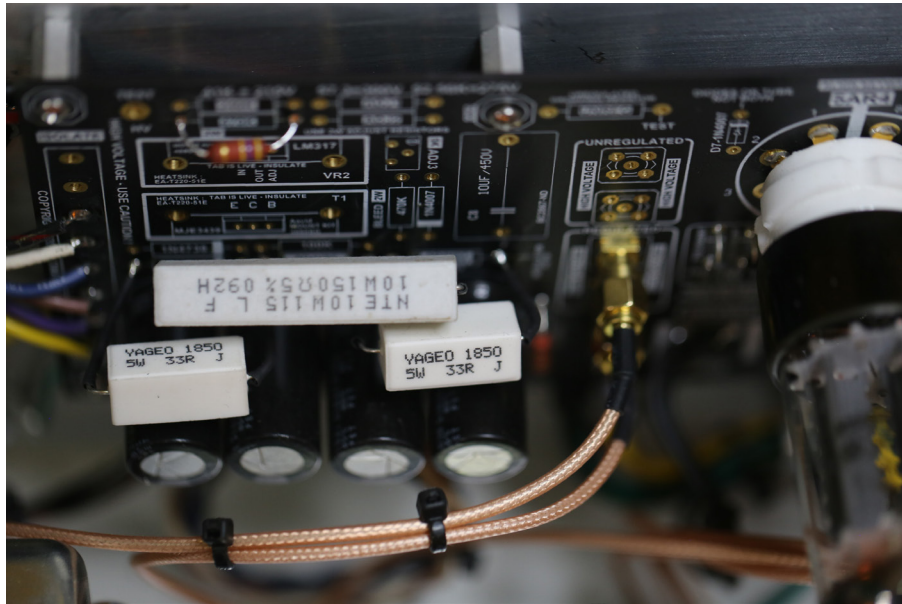
250 ohms 5w

power unit from here B+



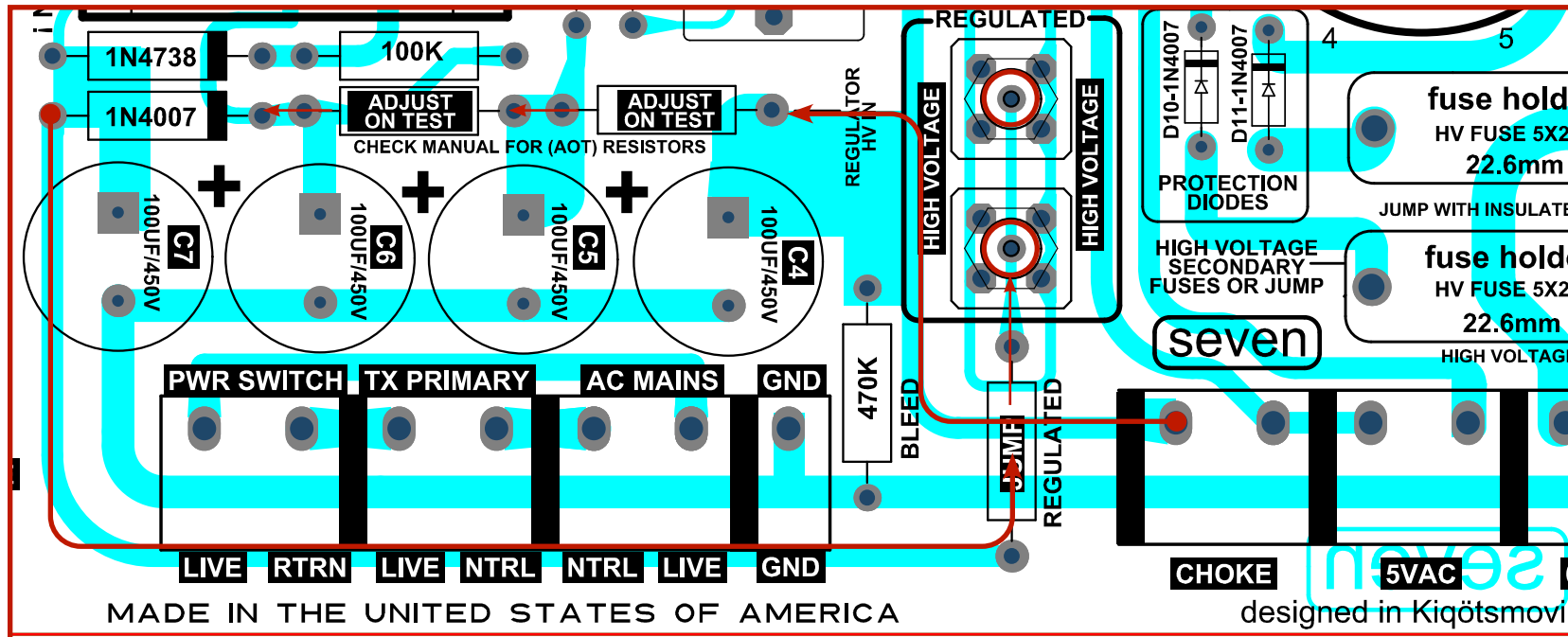
add this bleeder 470K 2W

jump or add resistor to fine tune B+



example using heat shrink leads to avoid shorting (large resistor is a 10w that was on hand)

flow

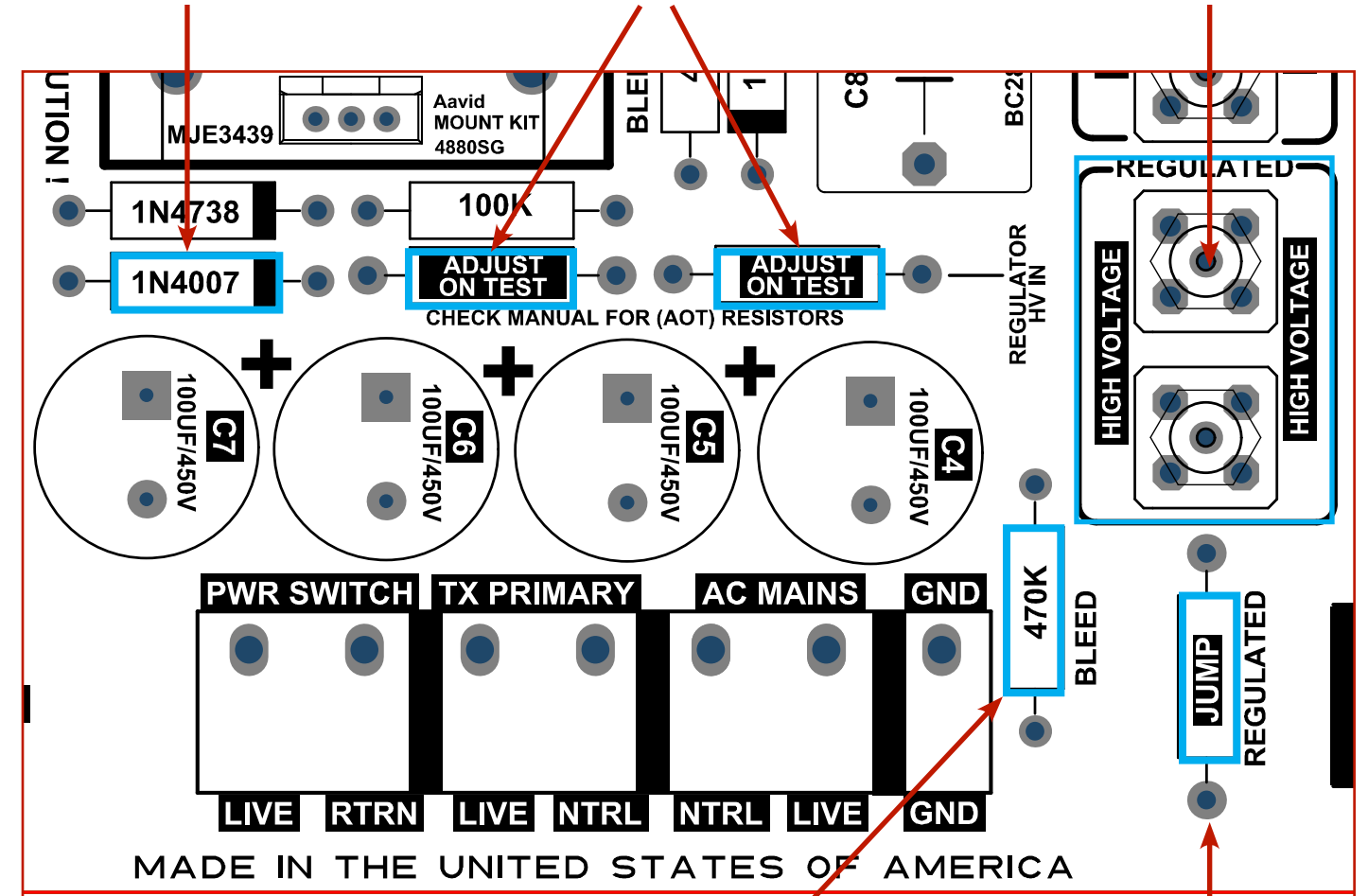


for single channel

place 500R resistor 3w here

500 ohms 3w

power unit from here



add this bleeder 470K 2W

jump this

signal transformer wiring



Hammond Mfg. Co. Ltd., Electronics Division
www.hamfmfg.com

850A Series Audio Broadcast Quality Transformers

850NA

Features:

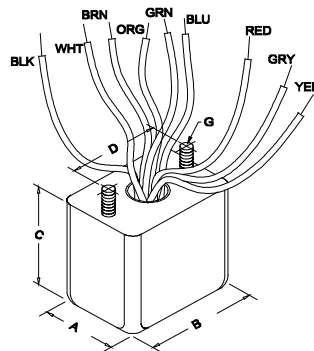
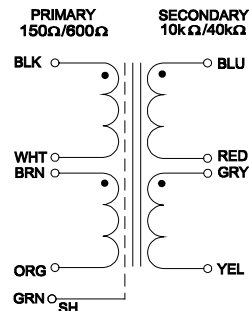
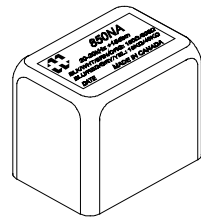
- Deep-drawn steel case with tin plated finish, with two convenient 6-32 mounting studs with mounting hardware.
- Sealed case and epoxy-potted transformer for stable characteristics and long life.
- Wide frequency response $\pm 0.5\text{dB}$ max. from 20Hz to 20KHz.
- Maximum power level +15 dBm. with specified characteristics, or higher levels with reduced low frequency performance.
- Distortion is $<1\%$ @ 20 Hz under full power.
- Electrostatic shield between primary & secondary connected to the green lead.
- Humbucking construction
- Balanced split windings on primary & secondary for circuit versatility. Primary may be used as a secondary and vice versa for impedance matching.
- Includes mounting hardware. Shipping weight 0.4 lb. (0.18 kg).
- Lead length: minimum 4"

ELECTRICAL SPECIFICATIONS

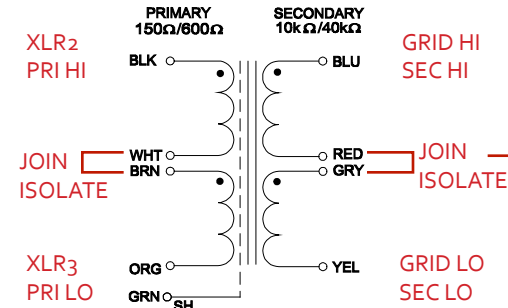
Characteristics	Typical
PRI Impedance	150 / 600 Ohms
SEC Impedance	10K / 40K Ohms
Output Power	+15dBm (31.623mW)
DCR BLK – WHT = BRN – ORG	16.9 Ohms $\pm 20\%$
DCR BLU – RED = GRY – YEL	1258 Ohms $\pm 20\%$
Dielectric Strength	250V RMS
PRI Inductance Impedance 1V @ 1KHz OC	
BLK&BRN joined – WHT&ORG joined	226mH 5.58K Ohms
BLK – ORG (WHT&BRN joined)	776mH 19.82K Ohms
PRI Leakage Inductance 1V @ 1KHz SC	
BLK&BRN joined – WHT&ORG joined	270uH
BLK – ORG (WHT&BRN joined)	1.08mH

DIMENSIONAL DETAILS:

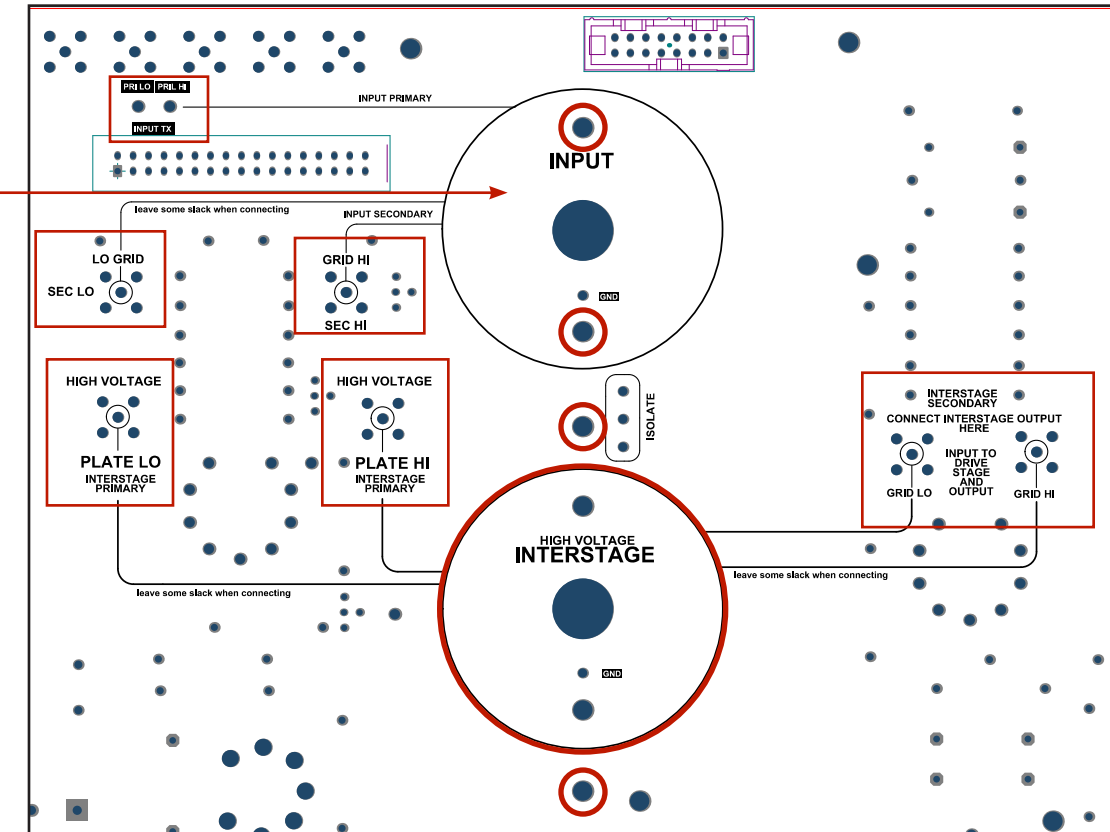
DIMENSIONS:	
A	1.20" ± 0.063
B	1.70" ± 0.063
C	1.65" MAX.
D	1.32" ± 0.063
G	6-32 mounting studs



INPUT TRANSFORMER 850NA



the input of the 175/176 is the UTC O-1 transformer
it is 500 OHM : 50K OHM impedance
this is a 1:10 ratio
many transformers will do the job in this application . here we have selected the hammond 850a series
the NA is a 1:8 and will be fine.
the foot print has been added to the board - the mounting holes should be widened to 6-32 with a drill bit.





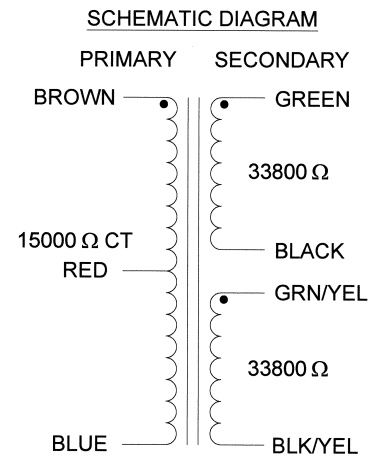
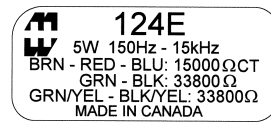
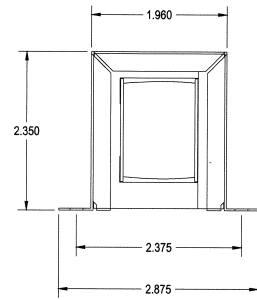
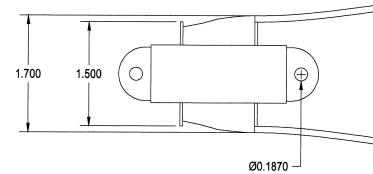
Hammond Mfg. Co. Ltd., Electronics Division
www.hammondmfg.com

124E
TUBE DRIVER - INTERSTAGE TRANSFORMER

This transformer operates in the 150 Hz to 15 KHz range.
Designed for general purpose or replacement use in single ended
or phase inverter tube driver circuits
Open style, 2 point mount with minimum 5" long leads
Core material Grain Oriented Silicone Steel laminations

ELECTRICAL SPECIFICATIONS

Characteristic	Typical
Input Impedance	15,000 Ω
Output Impedance	33,800 Ω (Parallel) 135,000 ΩCT (Series)
Output Power	5.0 Watts
DCR	
Primary	
BLU - RED	373 Ω
RED - BRN	355 Ω
Secondary	
GRN - BLK	1630 Ω
BLK - GRN	2250 Ω
Inductance @ 1.0 kHz, 1.0 V OC	
Primary	15.9 H
Secondary GRN-BLK	32.0 H
GRN/YEL-BLK/YEL	32.0 H
Leakage Inductance	0.18 H
Impedance @ 1.0 kHz, 1.0 V OC	
Primary	100 KΩ
Secondary GRN-BLK	200 KΩ
GRN/YEL-BLK/YEL	200 KΩ
Frequency Response	±1db from 150Hz to 15Hz
Turns ratio	1:2.97 1:5.94
Dielectric Strength	500 Vrms



INTERSTAGE TRANSFORMER

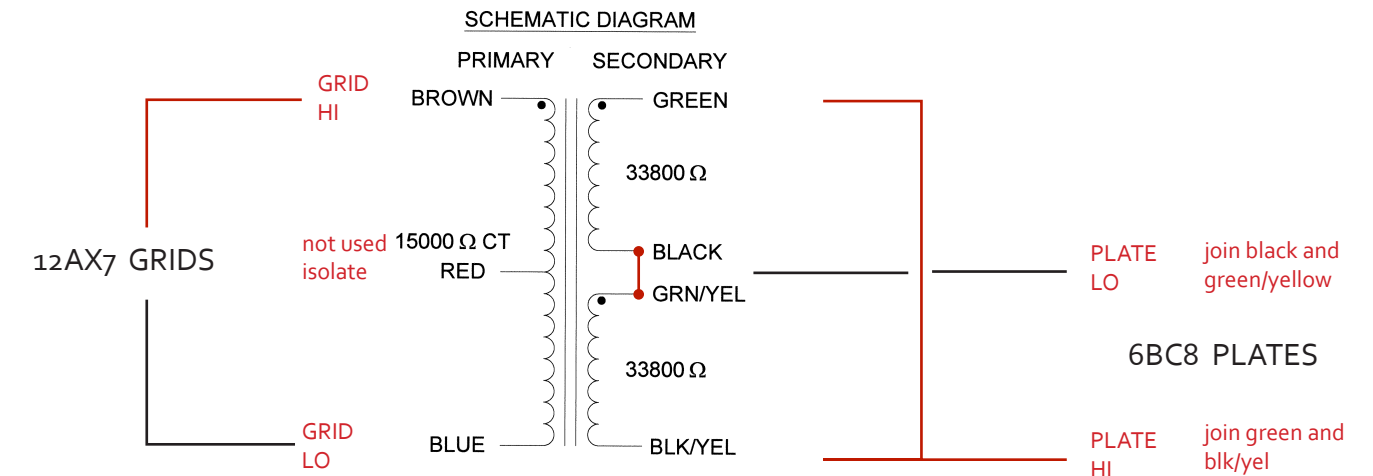
Ideally sower transformers are the best choice for this design .

hammond has a selection of trans-
formers available @ digikey and
mouser .

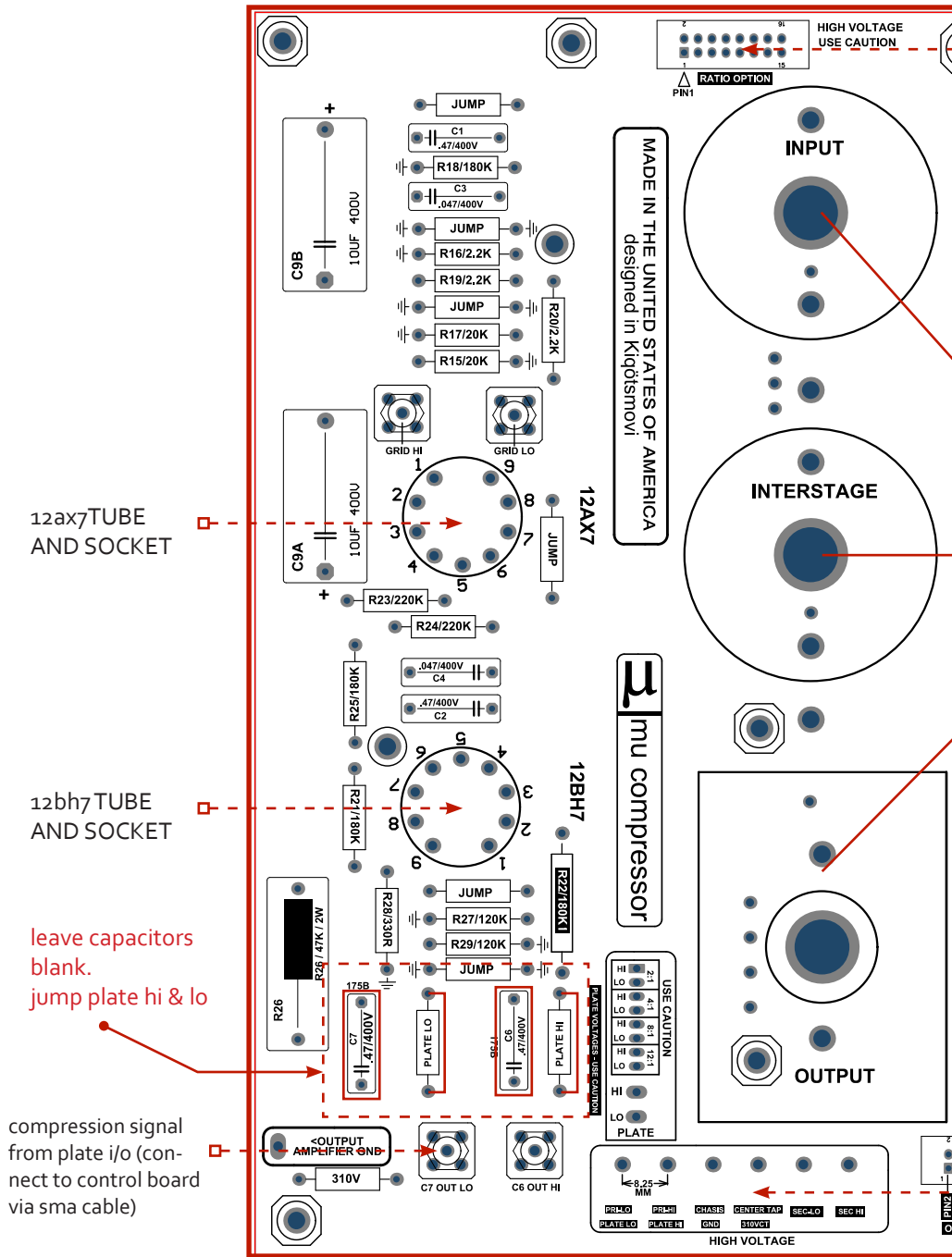
with this transformer , it would be
best to wire on the top side of the
pcb - connect as indicated.

LOW IMPEDANCE

HIGH IMPEDANCE

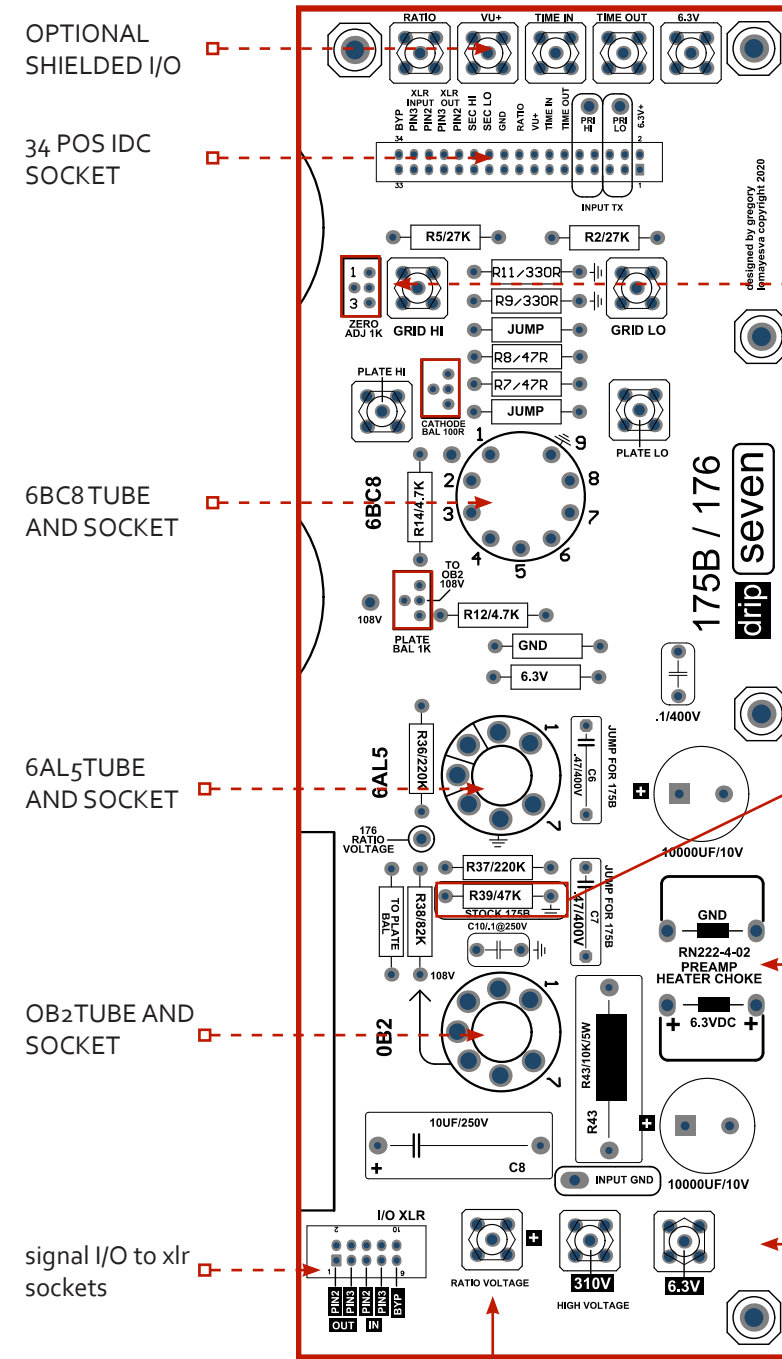


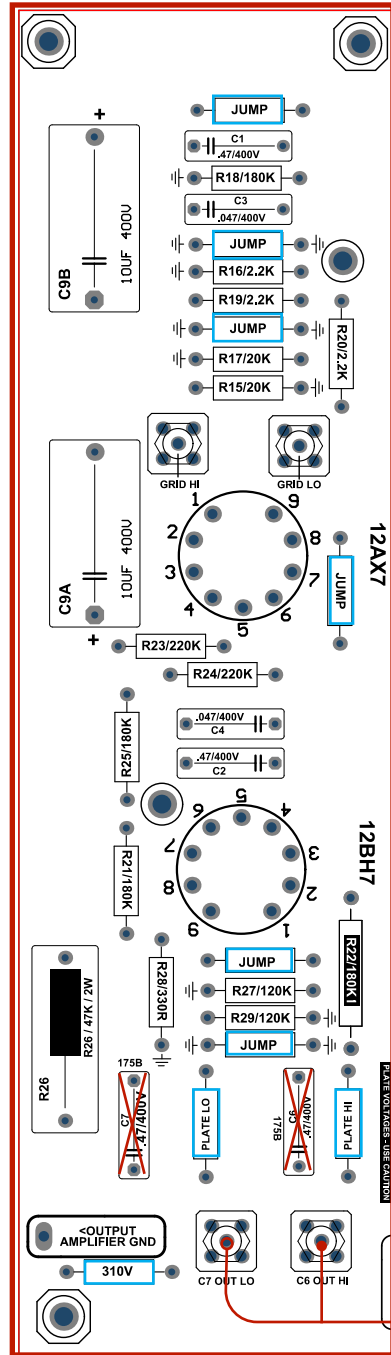
124E



main board overview

transformer mounting foot prints the board is optimally designed for the sowter transformer 3/8 mounting post design, mounting for hammond 850a signal transformers has been added - the output transformer should be push-pull (gapped)





output amplifier

2pcs sma sockets

2 pcs 9 pin tube socket pc mount (gold plated fender type)

resistors:

- r18/r25/r21/r22 180k
- r16/r19/r20 2.2k
- r17/r15 20k
- r23/r24 220k
- r27/r29 120k
- r28 330r
- r26 47k 5W axial

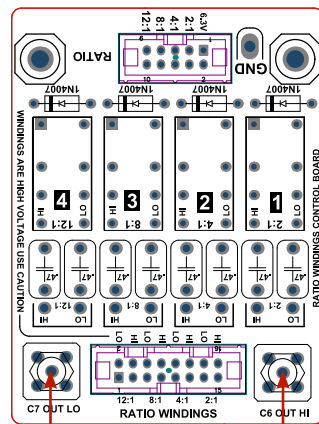
9pcs jumpers zero ohm resistor or jumper (3m violet) .7"

jumpers (highlighted in blue) if not using 3m violet jumpers - use insulated wire or 0 ohm resistors

capacitors :

- c9b/c9a wima 10uf film radial 27.5mm lead space 400v rated
- c1/c2 2pcs .47 @ 400v panasonic film radial
- c3/c4 2pcs .047 @ 400v panasonic film radial

ratio board



1 pcs 10 pos idc socket (ribbon cable)

or 1 pcs 5 pos 2.54 mm terminal block

4 1n4007 diodes (1000v) or 4 100v diodes

4 pcs omron relays 6v

4 pcs millmax dip sockets

8 pcs .47 @ 400v panasonic radial film capacitors

(smallest size possible or use 500v .47 ceramic)

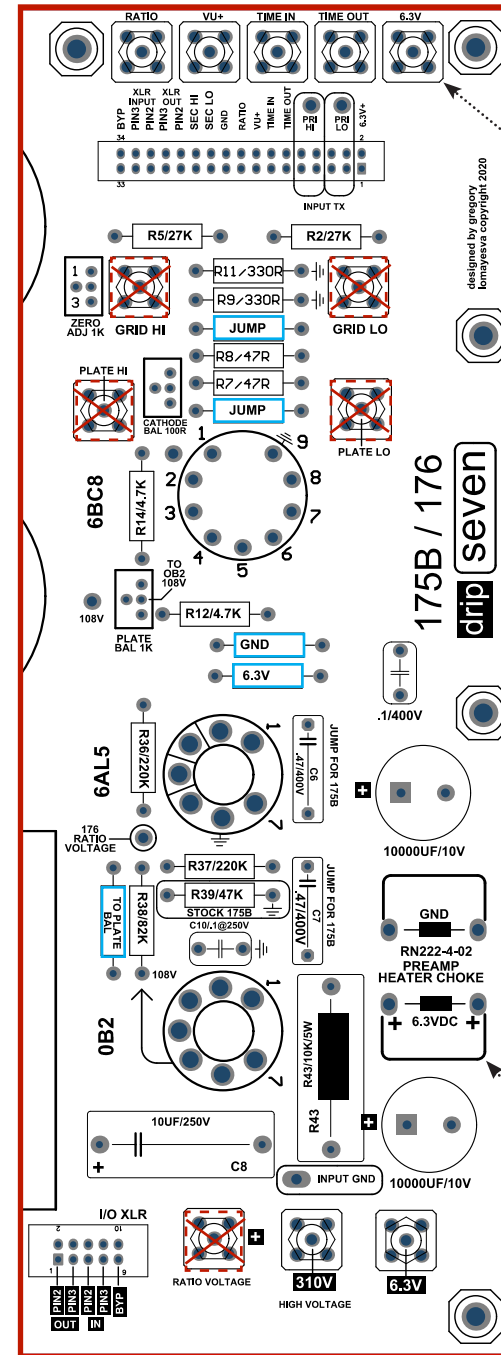
1 pcs 8 pos 2.54mm terminal block or solder ratio

winding direct to board.

optional mount to board :

1 pcs 16 pos female board to board socket 2.54

2 sma cables 12-20 inches



input preamplifier

sma sockets on top of board are optional if using idc socket

8 pcs sma sockets (DO NOT POPULATE GRID HI/LO , PLATE HI/LO)

1 pcs 34 pos idc (ribbon cable) socket

1 pcs 9 pin tube socket pc mount (gold plated fender type)

2 pcs 7 pin tube sockets (pc mount)

1 pcs 10 pin 2.54 idc socket (ribbon cable)

2 pcs trimmer 1k

1 pcs trimmer 100r (100 ohm)

resistors:

- r5/r2 : 2 pcs 27k
- r11/r9 : 2 pcs 330R (ohm)
- r8/r7 : 2 pcs 47R (ohm)
- r14/r12 : 2pcs 4.7k
- r36/r37 : 2pcs 220k
- r38 : 1 pcs 82k
- r39 : 1 pcs 47k (if doing 175b version)
- r43 : 1 pcs 10k 10w (axial)

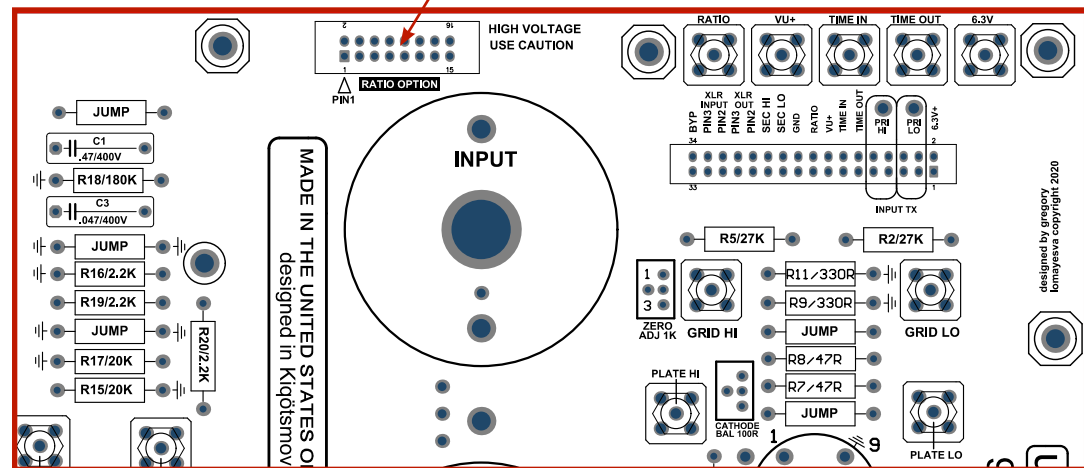
jumpers (highlighted in blue) 5 pcs .7" (violet) jumpers if not using 3m violet jumpers - use insulated wire or 0 ohm resistors

capacitors :

- .1/400v panasonic radial
- .1/250v panasonic radial
- 2 pcs .47/400v wima 15mm capacitor
- 2 pcs 10,000UF 16mm 7.5mm lead space capacitors
- 1 pcs 10uf wima (27.5mm lead space) @ 250vdc

1pcs inductor RN222

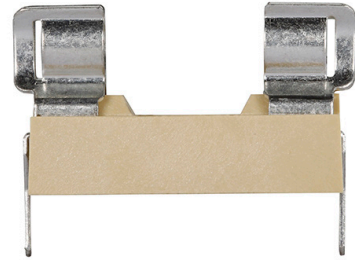
SBH11-PBPC-D08-ST-BK
 Digi-Key Part Number
 S9171-ND
 Manufacturer
 Sullins Connector Solutions
 Manufacturer Product Number
 SBH11-PBPC-D08-ST-BK
 Supplier
 Sullins Connector Solutions
 Description
 CONN HEADER VERT 16POS 2.54MM
 Manufacturer Standard Lead Time
 5 Weeks
 Detailed Description
 Connector Header Through Hole 16 position
 0.100" (2.54mm)



drip psu board rev 1.2 fuses and holders

high voltage secondary winding fuses and holders

BK/HTC-15M
Digi-Key Part Number
283-2923-ND
Manufacturer
Eaton - Electronics Division
Manufacturer Product Number
BK/HTC-15M
Supplier
Eaton - Electronics Division
Description
FUSE BLOCK CART 250V
6.3A PCB
Manufacturer Standard Lead Time
5 Weeks

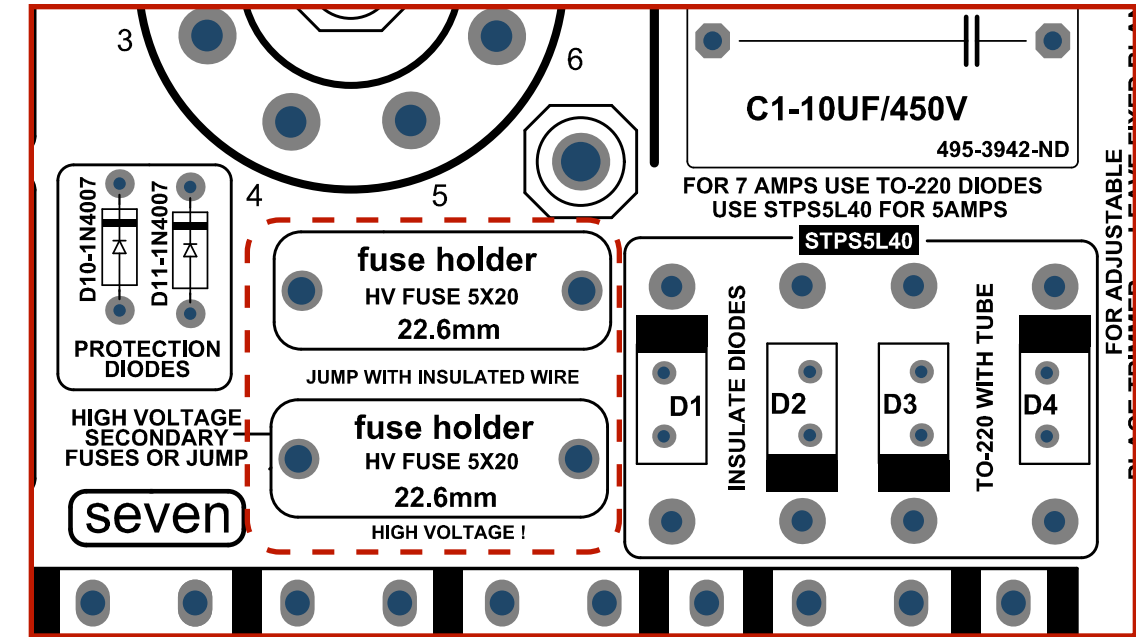


BK/HTC-150M
Digi-Key Part Number
283-2922-ND
Manufacturer
Eaton - Electronics Division
Manufacturer Product Number
BK/HTC-150M
Supplier
Eaton - Electronics Division
Description
ACCY COVER SNAP-ON
FOR HTC-15M

0477001.MXP
Digi-Key Part Number
F2986-ND
Manufacturer
Littelfuse Inc.
Manufacturer Product Number
0477001.MXP
Supplier
Littelfuse Inc.
Description
FUSE CERM 1A 500VAC 400VDC 5X20
Manufacturer Standard Lead Time
12 Weeks
Detailed Description
1A 500V AC 400V DC Fuse Cartridge, Ceramic Holder 5mm x 20mm



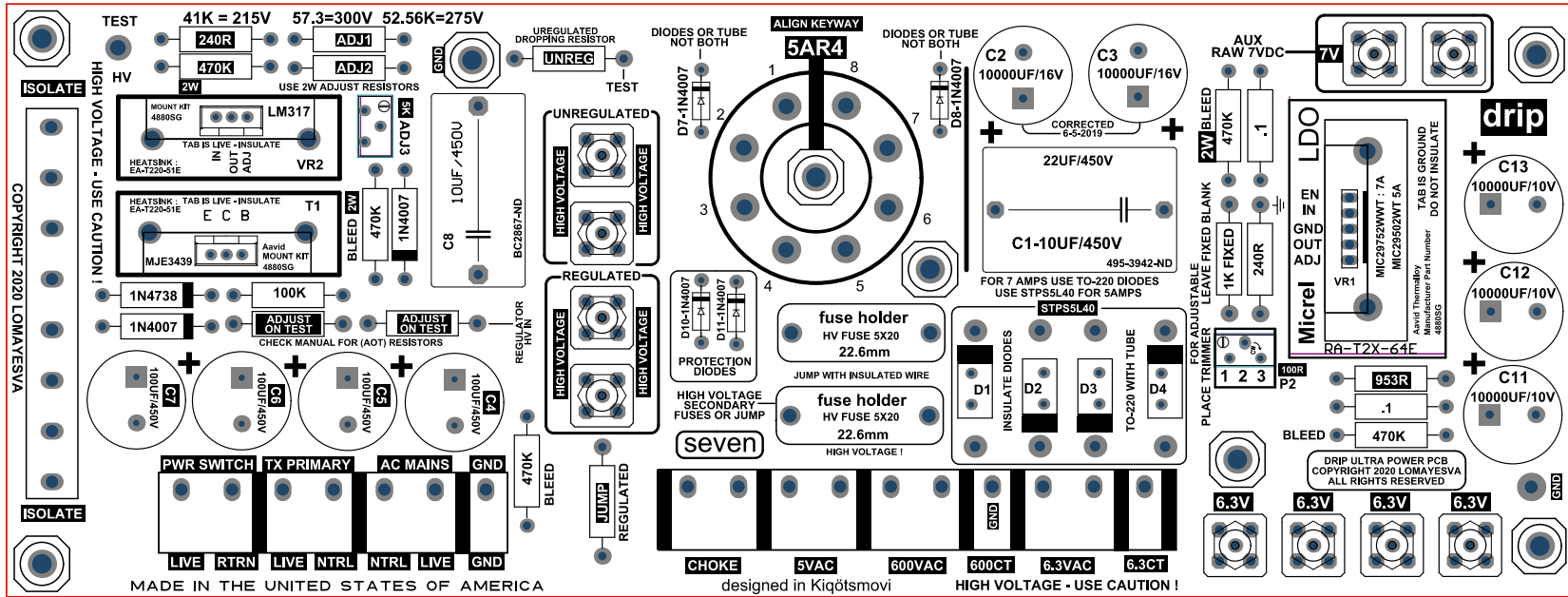
fuse rating for iec socket is 2A slow blo



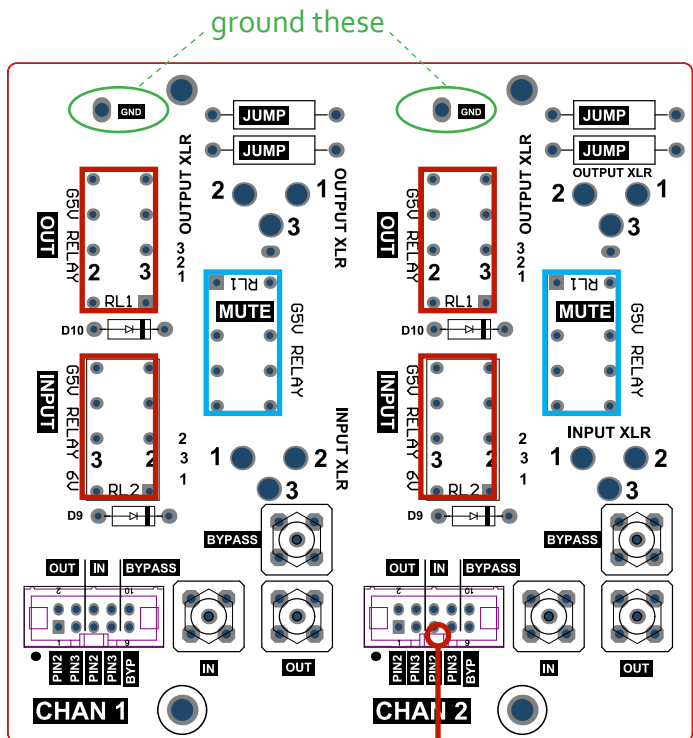
the drip psu rev 1.2 remains the same as the rev1 version only that the xlr board has been placed on a separate board to allow for different positioning and serviceability of the psu main board.

additionally 2 fuses footprints have been added for the use of 5x20 high voltage fuses. these fuses are placed on each load of the power transformers high voltage winding . this will protect the power transformer from damage if the rectifier tube decides to fail shorted.

Optionally the fuses may be replaced with thermistors , a trend being done in guitar amplifiers. thermistors will slow the inrush current when the unit is first powered up . essentially a resistor that has a high value when cold ,then when they heat up the resistances falls to a negligible value . a note on these is they get hot. it is recommended to elevate these off the board a little bit to allow for heat dissipation.



xlr i/o board



bypass relays :
 6v omron dpdt

out and in relays hard
 bypass the xlr input and
 output

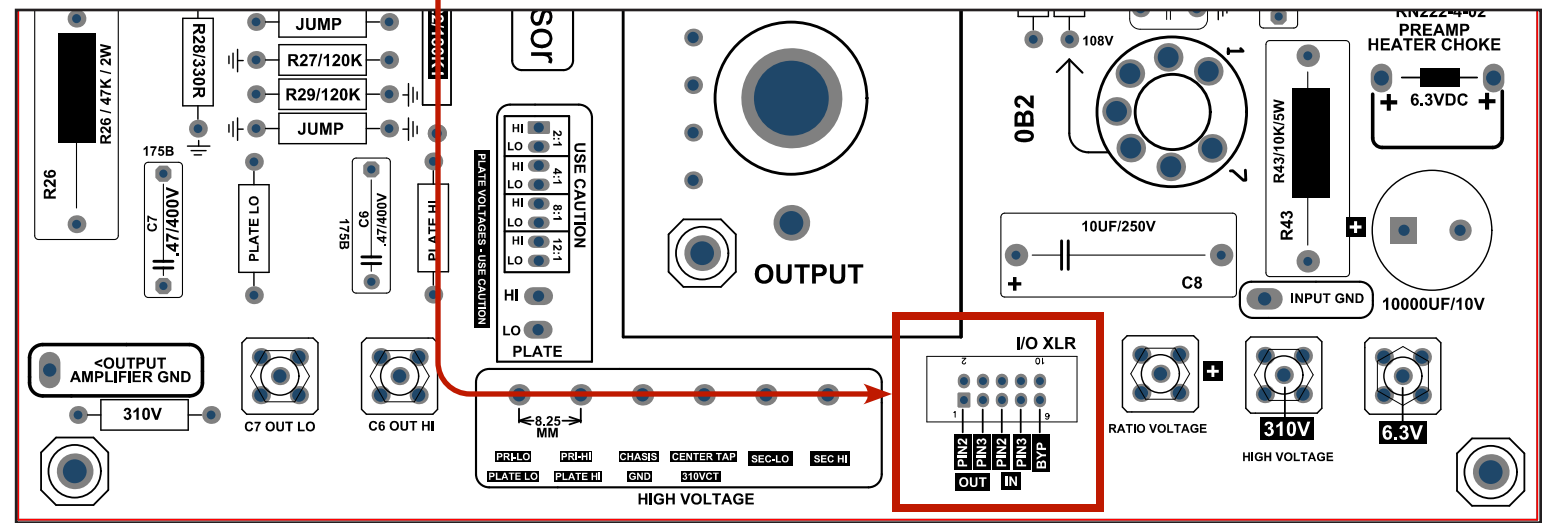
the mute relay grounds
 the output xlr pins 2/3 -
 this relay is optional

the 2 jumpers above the
 output xlr sockets can be
 replaced with resistors
 this way when muted the
 output pin 2/3 are loaded
 to ground while in mute .

audio i/o sma sockets
 and idc socket.

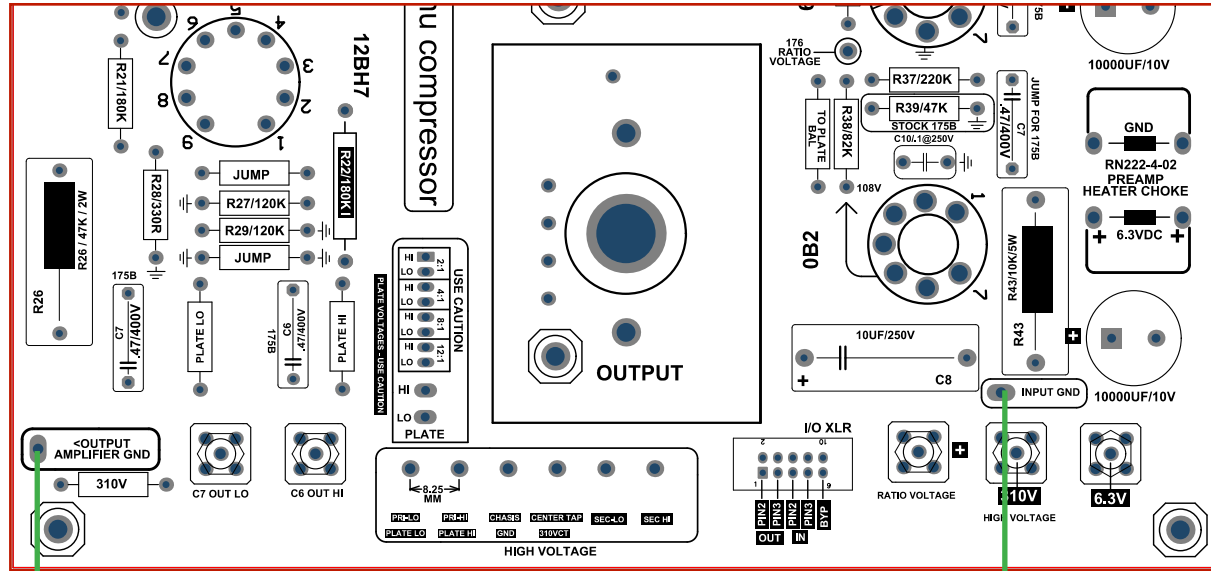
for this application of the
 176 you will use the idc
 socket and connect it to
 the corresponding chan-
 nels main board audio i/o
 socket.

important : make sure the ribbon
 cable matches
 and aligns to both sides - i.e by-
 pass aligns to bypass
 use the ribbon cables red strip
 to achieve this.



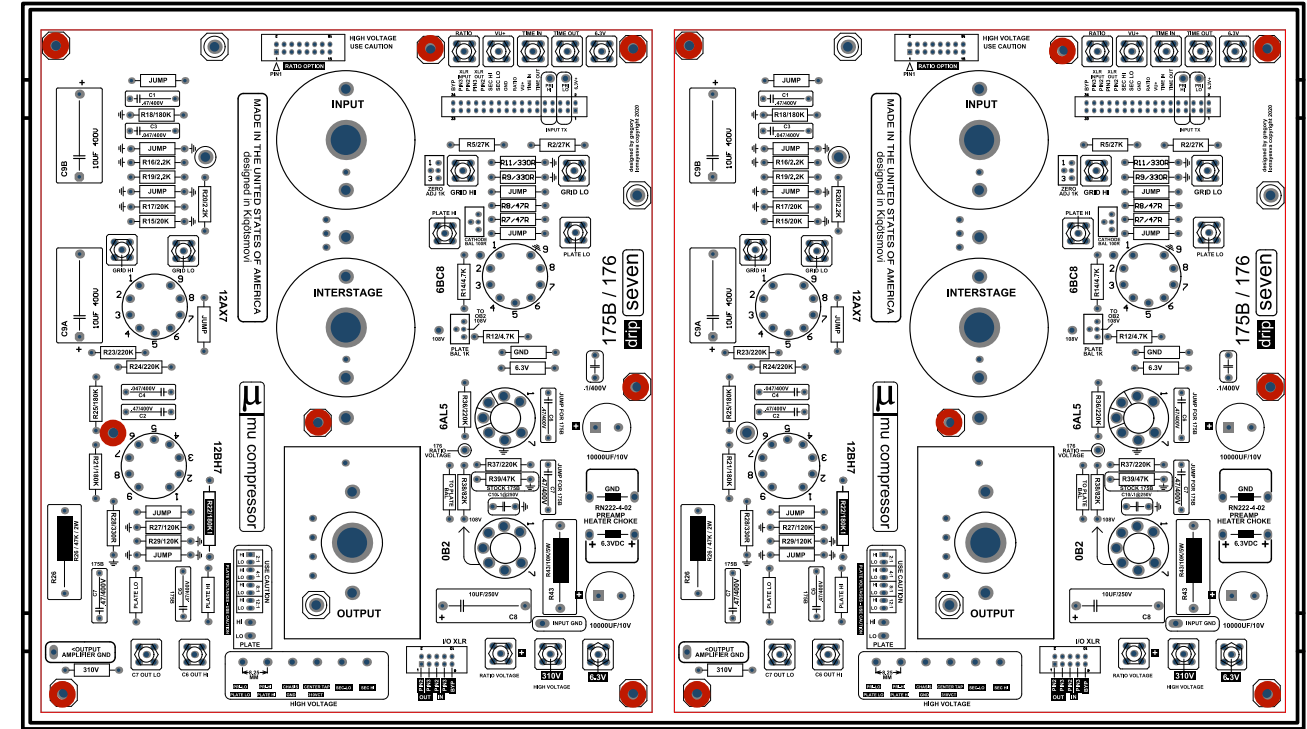
main board close up

main board grounding points



Digi-Key Part Number
0190730019-12-G9-ND
Manufacturer
Molex
Manufacturer Product Number
0190730019-12-G9
Supplier
Molex
Description
12" JUMPER 3075 GR001 GREEN
Detailed Description
Green 18 AWG Jumper Lead
Ring Terminal to Cable Tin 12.0"
(304.8mm)

pre crimped grounding wire with ring terminal bolt to ground near xlr socket/use 6-32 bolts and lock nuts



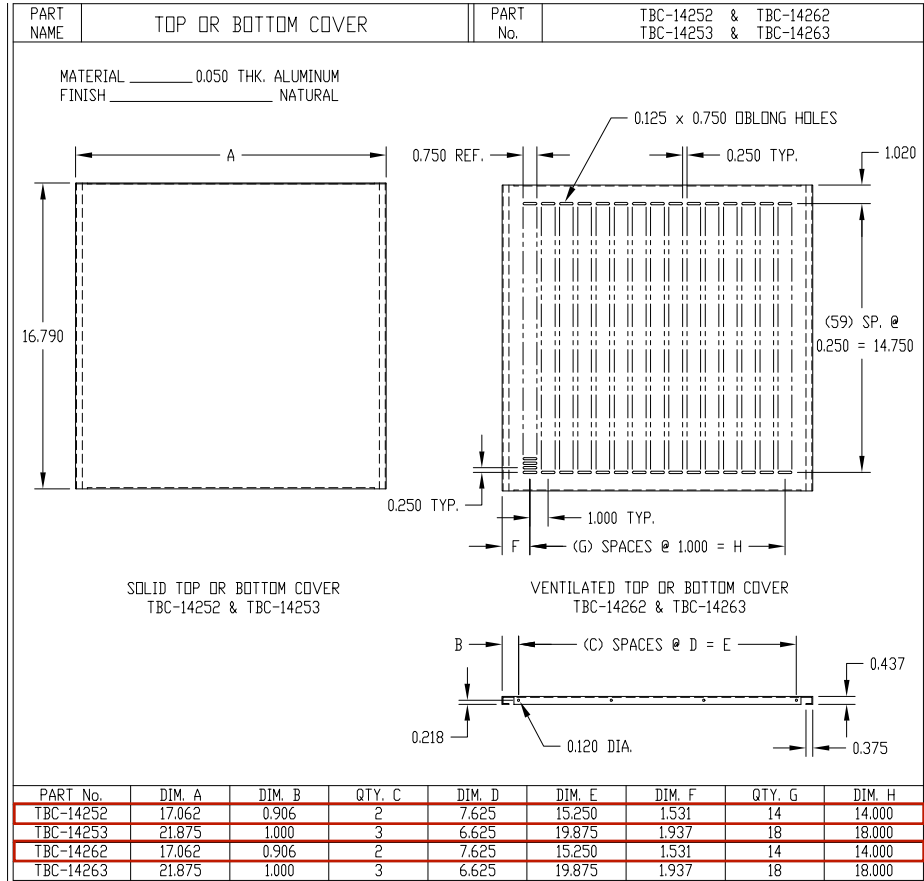
PART NAME	INTERNAL CHASSIS	PART No.	C-14242 TO C-14245	REV. DATE	8-30-10
MATERIAL _____ 0.090 THK. ALUMINUM FINISH _____ NATURAL					
PART No.	DIMENSION A	DIMENSION B			
C-14242	4.281	3.500			
C-14243	6.031	5.250			
C-14244	7.781	7.000			
C-14245	9.531	8.750			

mounting specifications :
C-14245

internal bracket to hold pcb

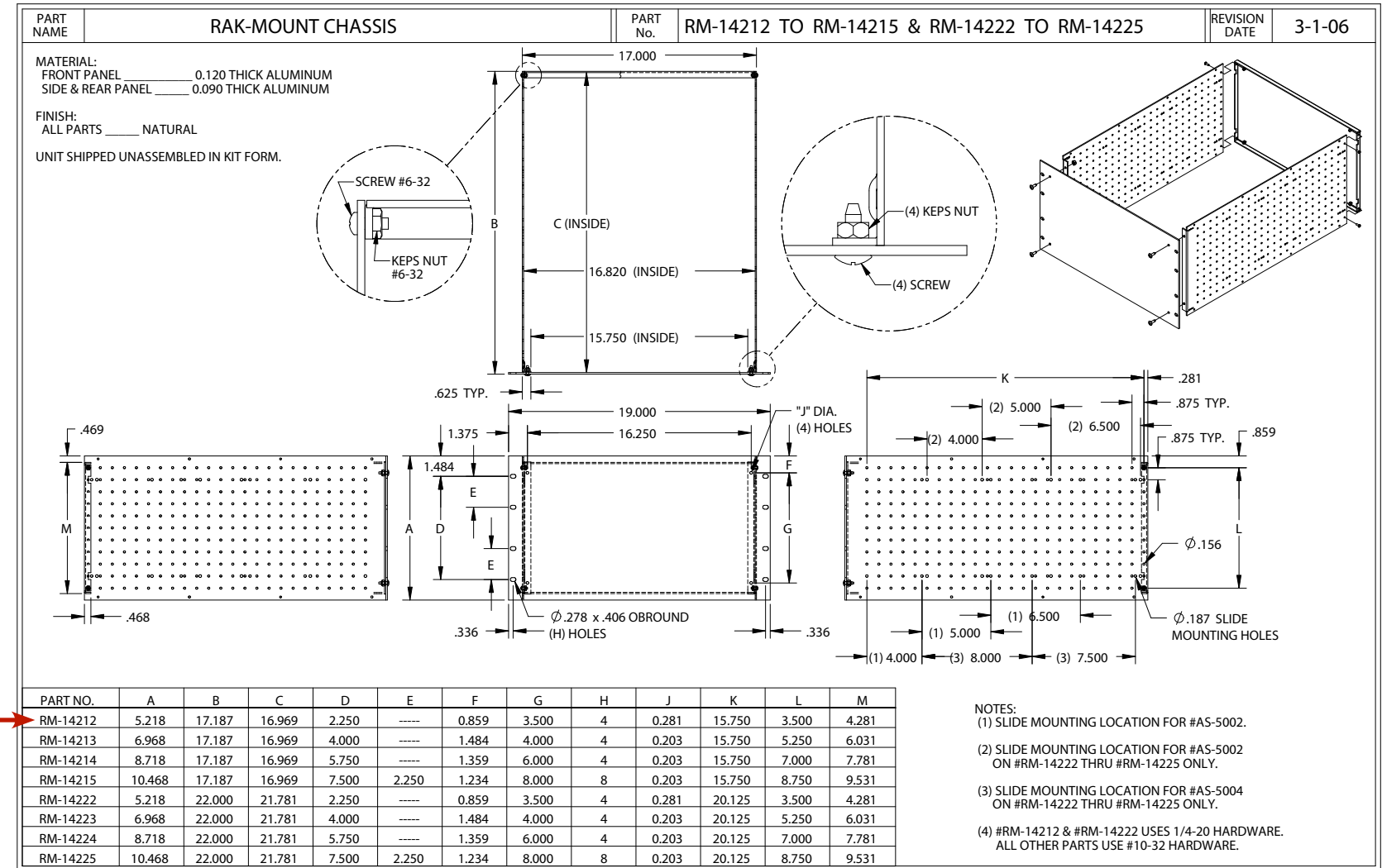
TBC-14262 (ventilated)
 Digi-Key Part Number
 377-1311-ND
 Manufacturer
 Bud Industries
 Manufacturer Product Number
 TBC-14262
 Supplier
 Bud Industries
 Description
 COVER FOR RAK-MNT CHASSIS VENTED
 Manufacturer Standard Lead Time
 6 Weeks
 Detailed Description
 Metal, Aluminum Cover 17.062" L x 16.790" W x 0.437" H
 (433.37mm x 426.47mm x 11.10mm) Natural

TBC-14252 (solid)
 Digi-Key Part Number
 377-1310-ND
 Manufacturer
 Bud Industries
 Manufacturer Product Number
 TBC-14252
 Supplier
 Bud Industries
 Description
 COVER FOR RAK-MNT CHASSIS SOLID
 Manufacturer Standard Lead Time
 6 Weeks
 Detailed Description
 Metal, Aluminum Cover 17.062" L x 16.790" W x 0.437" H
 (433.37mm x 426.47mm x 11.10mm) Natural

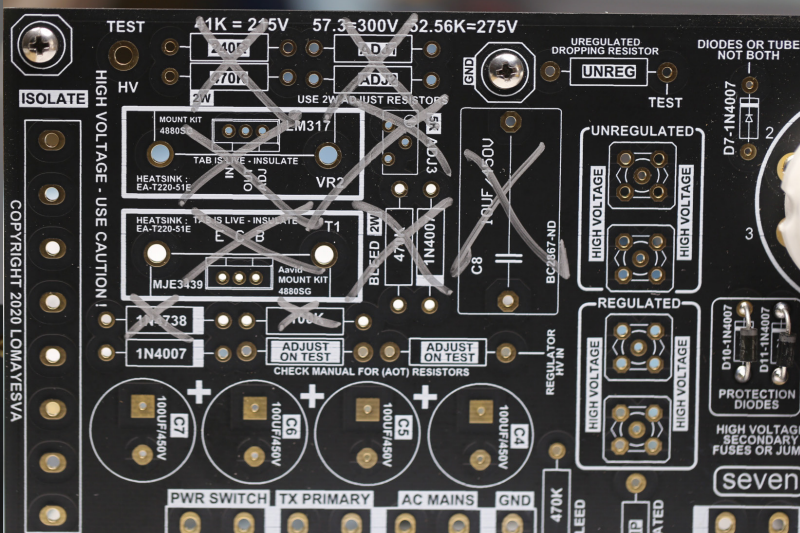
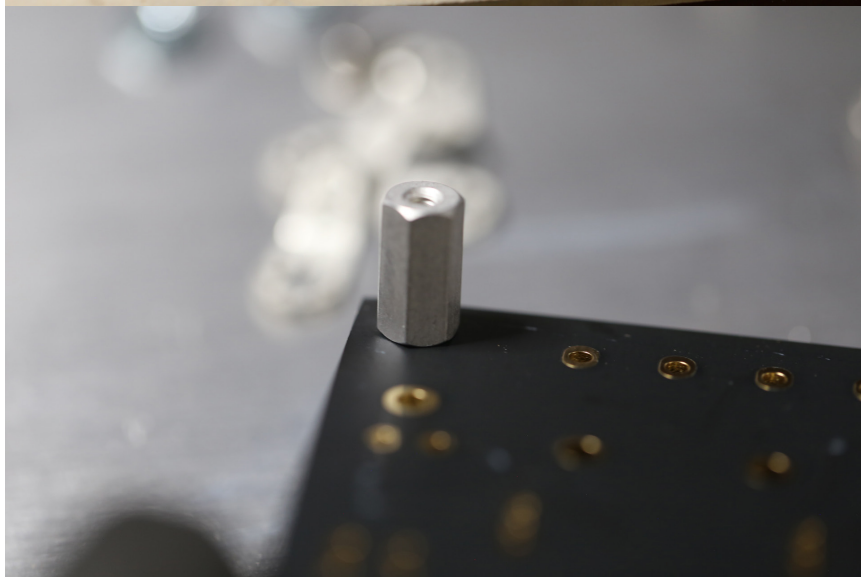
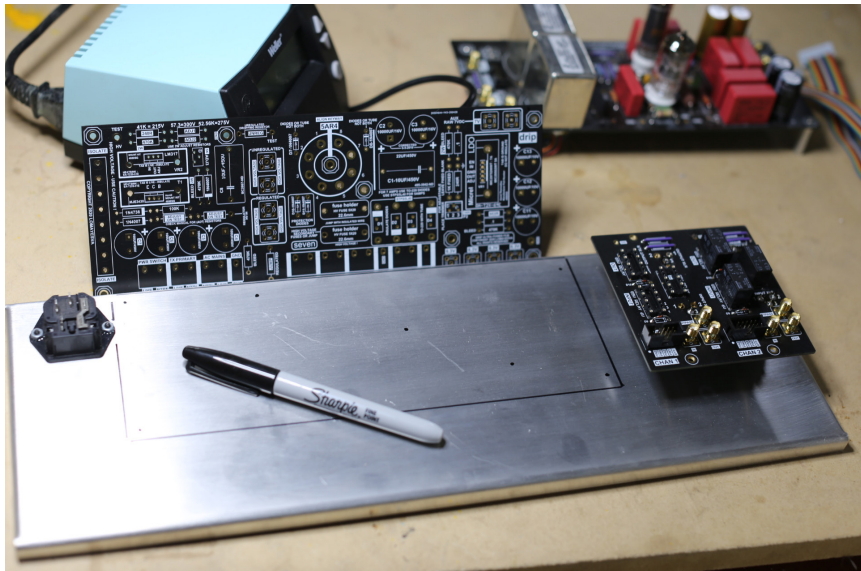


enclosure lids
 Bud Industries
 one ventilated for top and 1
 solid for bottom

enclosure specifications :
 RM-14212 Digi-Key Part
 Number



To learn more about aluminum enclosures visit <http://www.budind.com/>



confirm we are aiming for 215V for the ADJ resistors in the PSU?

PSU board: two more AOT (adjust on test resistors) for HV Regulated Supply: 1k/2W were used in the previous version. Should I use those?

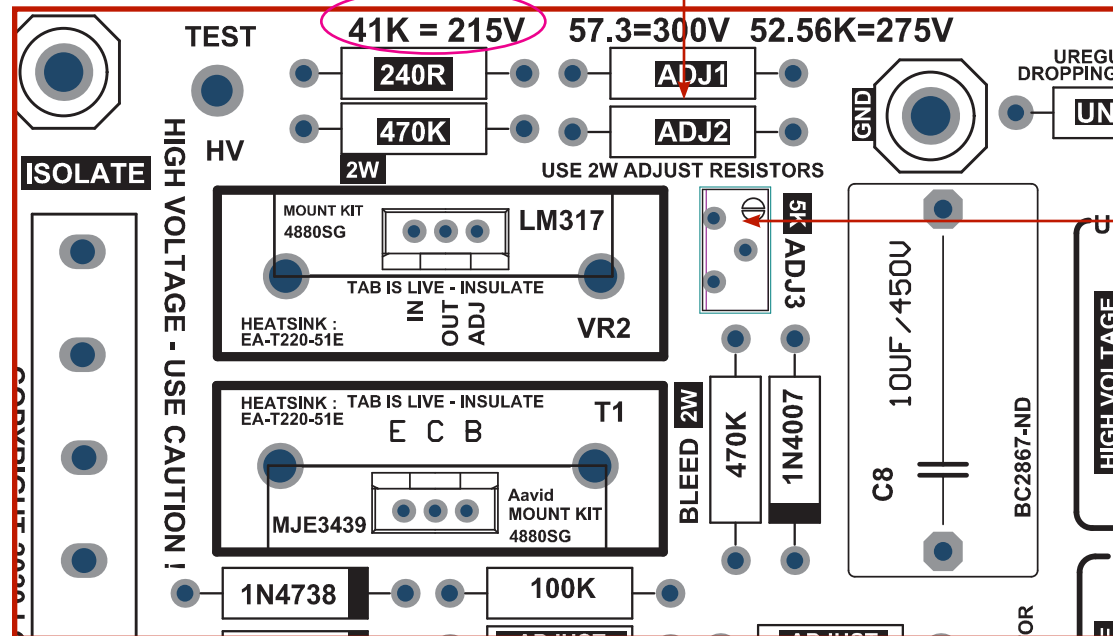
What are the values for the two HV Secondary fuses? What about the IEC socket fuse?

Do you recommend using a choke (10H 400V) in the PSU or not? If so, what mA rating?

I purchased the Varicom PCBs on your site several weeks ago, never received them, and never heard anything else about it. Is there a build doc/BOM for it? When can I expect it?

What size chassis should I get for the stereo build with varicom? Are you going to manufacture a few front panels for Dave and I to buy, or will it just be templates?

use 2 pcs 20K resistors rated @ 3 watts for adj1 and adj2

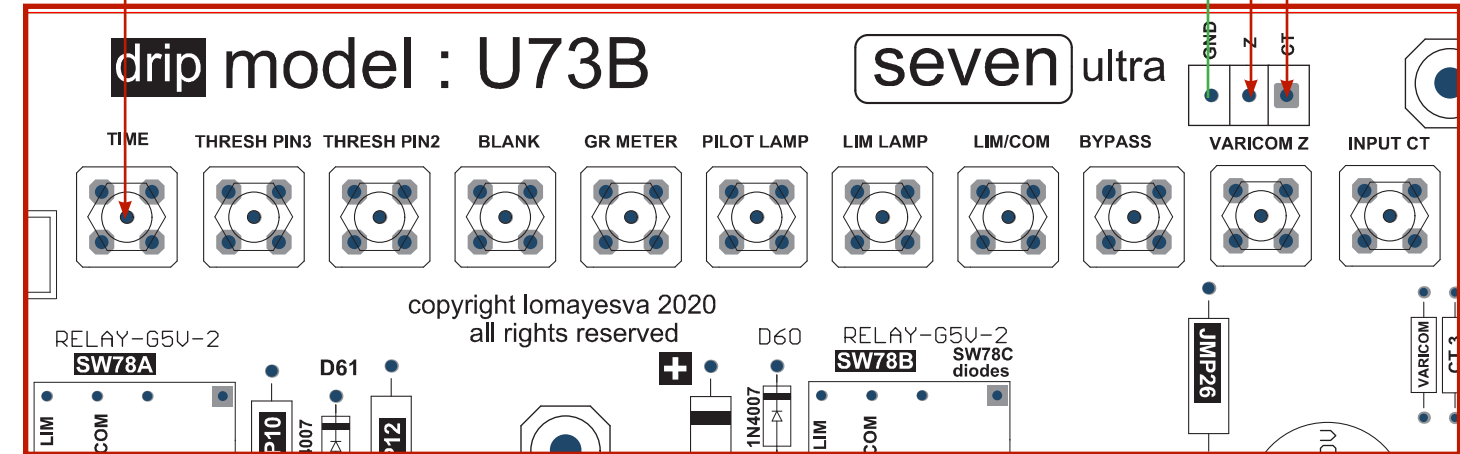
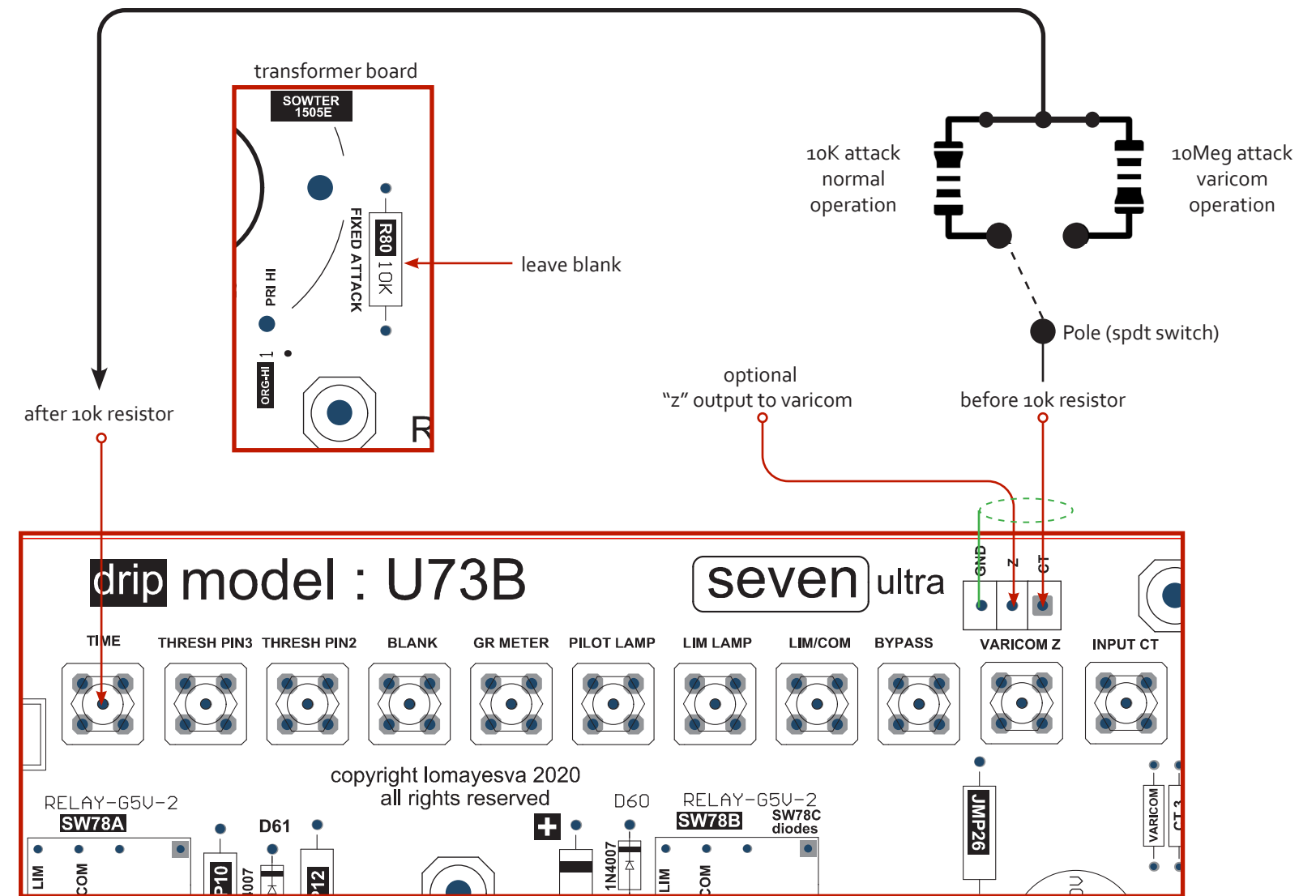


Digi-Key Part Number
RSB-20KRTR-ND - Tape & Reel (TR)
RSB-20KRCT-ND - Cut Tape (CT)
Manufacturer
Vishay Dale
Manufacturer Product Number
RS02B20K00FE70
Supplier
Vishay Dale
Description
RES 20K OHM 3W 1% WW AXIAL

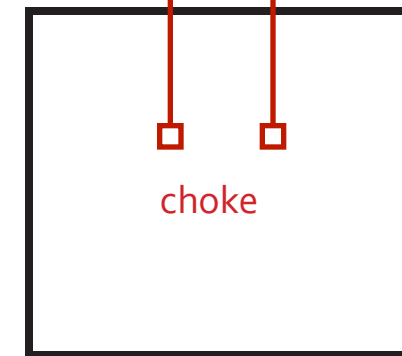
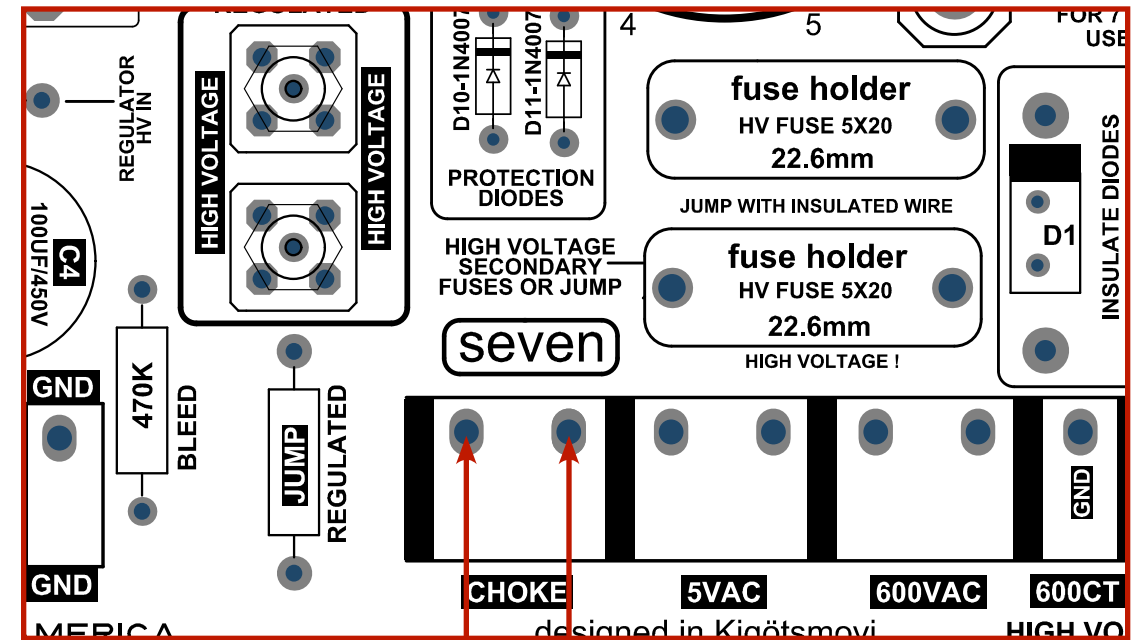
use 2k to 5k trimmer to adjust to nominal 215V

U73 VARICOM NOTES

drip | for use with drip u73b rev 1.2
attack resistor switching (r38) for varicom operation



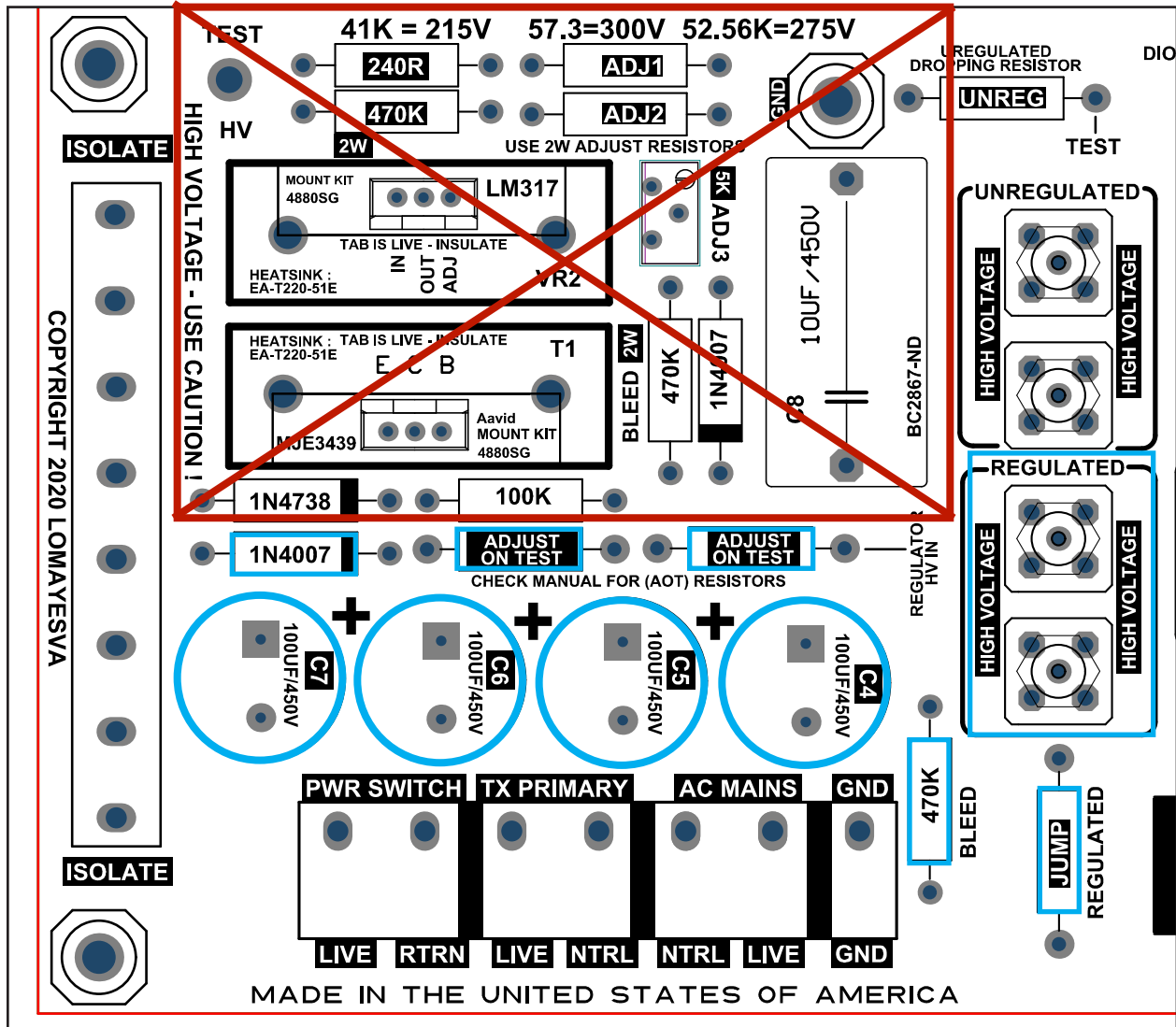
copyright lomayesva 2020
all rights reserved



optional or jump choke pads
with wire (choke is best)

STA LEVEL PSU NOTES

BYPASSING THE SOLIDSTATE REGULATOR CIRCUIT AND KEEPING THE PSU OLD SCHOOL.



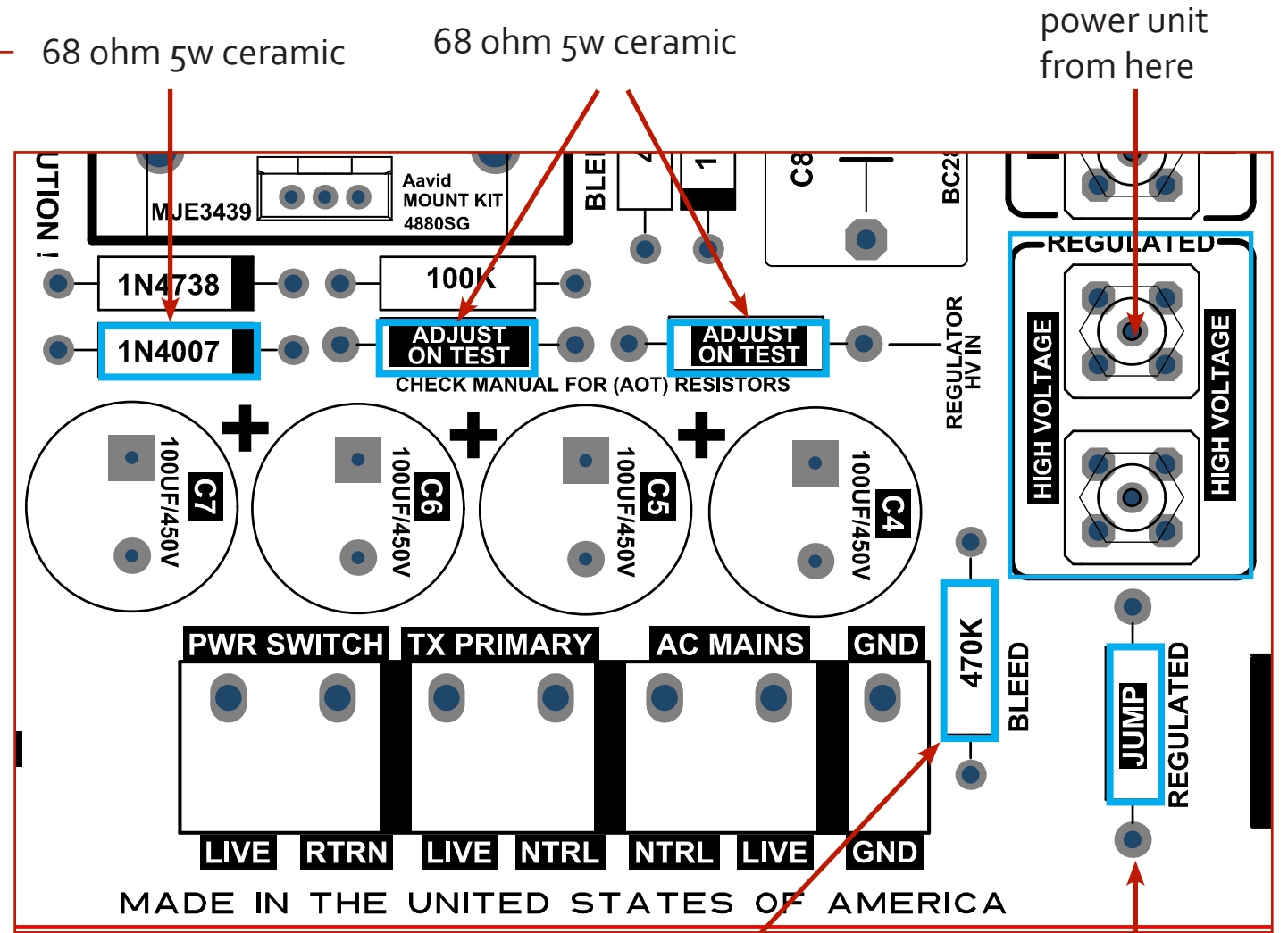
AC05AT0006809JAC00
 Digi-Key Part Number
 749-1870-1-ND - Cut Tape (CT)
 749-1870-3-ND - Tape & Box (TB)
 Manufacturer
 Vishay Beyschlag/Draloric/BC Components
 Manufacturer Product Number
 AC05AT0006809JAC00
 Supplier
 Vishay Beyschlag/Draloric/BC Components
 Description
 RES 68 OHM 5% 5W AXIAL
 Manufacturer Standard Lead Time
 15 Weeks
 Detailed Description
 68 Ohms ±5% 5W Through Hole Resistor Axial
 Automotive AEC-Q200 Wirewound

AC05AT0003309JAC00
 Digi-Key Part Number
 749-1856-1-ND - Cut Tape (CT)
 749-1856-3-ND - Tape & Box (TB)
 Manufacturer
 Vishay Beyschlag/Draloric/BC Components
 Manufacturer Product Number
 AC05AT0003309JAC00
 Supplier
 Vishay Beyschlag/Draloric/BC Components
 Description
 RES 33 OHM 5% 5W AXIAL
 Manufacturer Standard Lead Time
 15 Weeks
 Detailed Description
 33 Ohms ±5% 5W Through Hole Resistor
 Axial Automotive AEC-Q200 Wirewound

DO NOT POPULATE RED BOX - POPULATE CAPS AND BLUE BOX'S

for dual channel sta level

SHRINK TUBE LEADS TO AVOID SHORTS -
 ELEVATE TO ALLOW AIR FLOW UNDER
 RESISTORS



68 ohm 5w ceramic

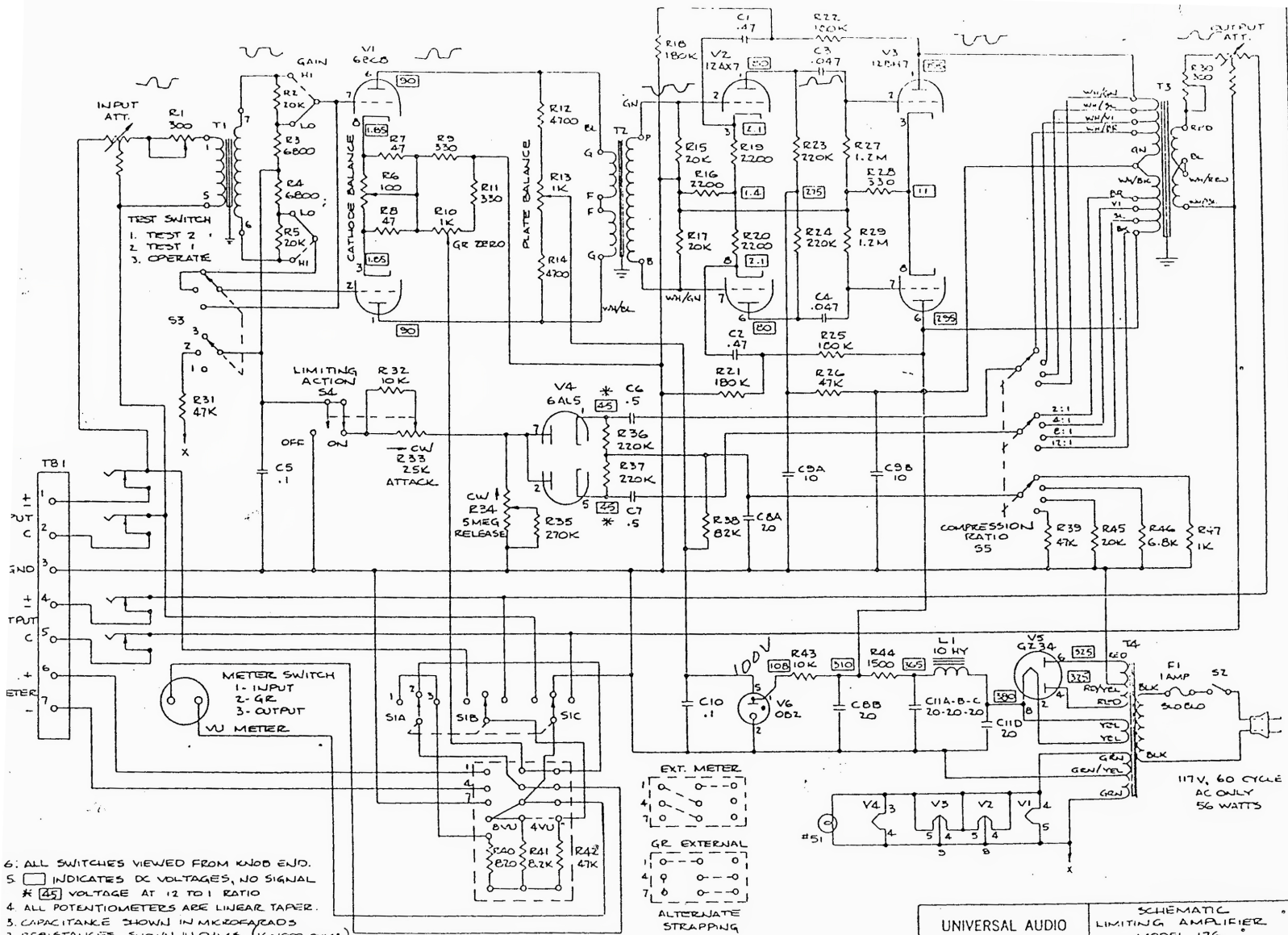
68 ohm 5w ceramic

power unit
 from here

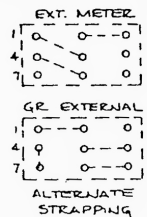
add this bleeder
 470K 2W

jump or add 33 ohm
 5w here if voltage is to
 high (fine tune to 300v)

MADE IN THE UNITED STATES OF AMERICA



- 6. ALL SWITCHES VIEWED FROM KNOB END.
- 5. INDICATES DC VOLTAGES, NO SIGNAL
- * 45 VOLTAGE AT 12 TO 1 RATIO
- 4. ALL POTENTIOMETERS ARE LINEAR TAPER.
- 3. CAPACITANCE SHOWN IN MICROFARADS
- 2. RESISTANCES SHOWN IN OHMS (K=1000 OHMS)
- 1. ALL RESISTORS ARE 1/2W AND 5%



UNIVERSAL AUDIO
INCORPORATED
6000 SUNSET BOULEVARD
HOLLYWOOD 28, CALIF.

SCHEMATIC
LIMITING AMPLIFIER
MODEL 176

DESIGNED	GENE MILLER
DESIGNED	
APP'D.	

C-10476