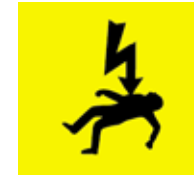
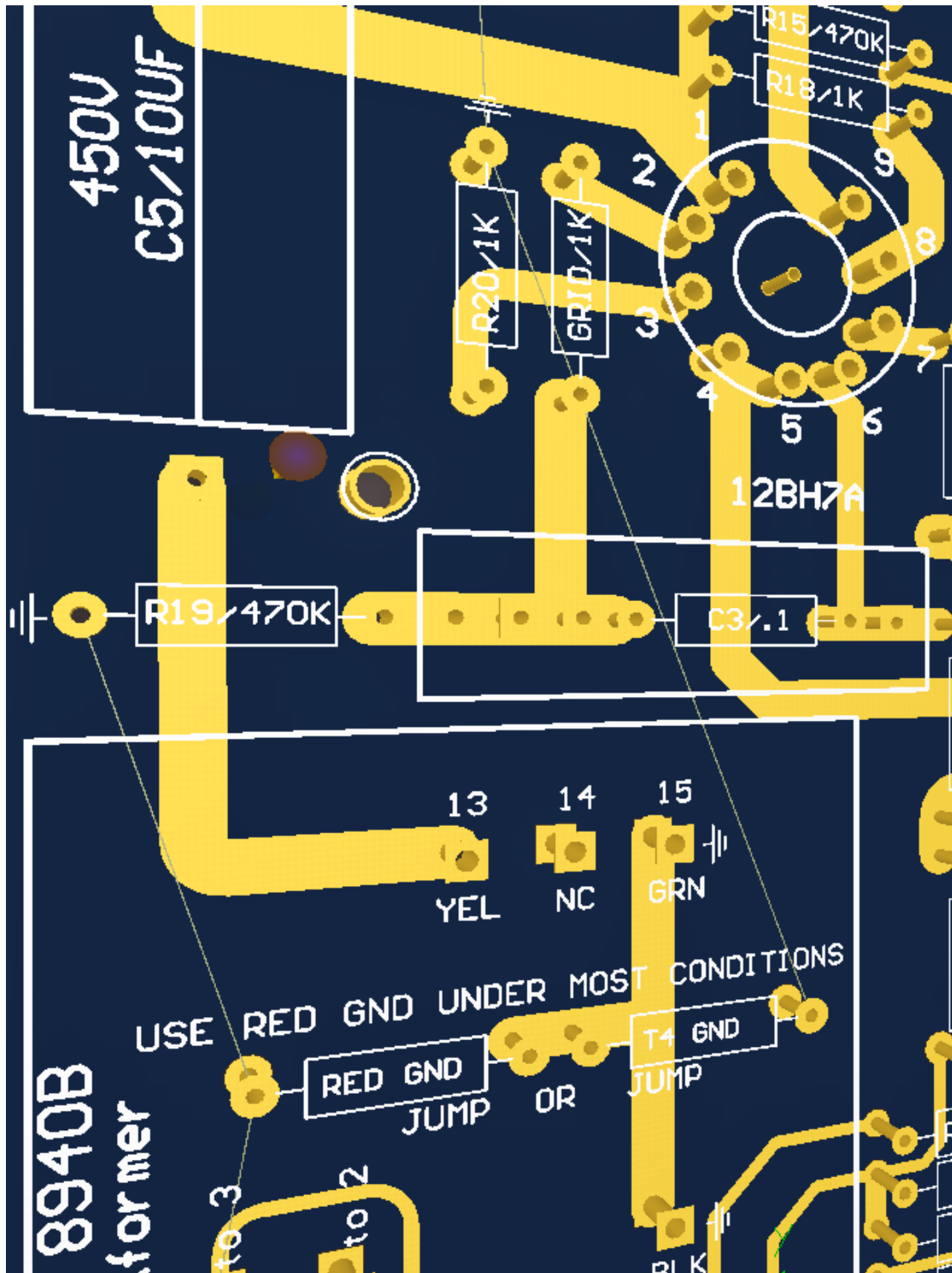




# DRIP OPTO VER 3 OPTICAL COMPRESSOR

INSTRUCTION AND BUILD MANUAL REVISION 1.0  
ATOM VERSION



## ATTENTION | DISCLAIMER

THIS PROJECT IS PRESENTED AS ARTWORK, AND IS SOLELY INTENDED AS SUCH.

ALTHOUGH THIS BOARD CAN BE ASSEMBLED AND BUILT INTO A FUNCTIONING OPTICAL COMPRESSOR, DUE TO THE HIGH VOLTAGES AND POSSIBILITIES OF HUMAN ERROR, DRIP ELECTRONICS | GREGORY LOMAYESVA HEREBY ASSUMES NO LIABILITY FOR INJURY/DAMAGE/LOSS WHICH MIGHT UNINTENTIONALLY OCCUR.

THIS MANUAL IS INTENDED FOR INFORMATION PURPOSES ONLY. PROCEED AT YOUR OWN RISK.

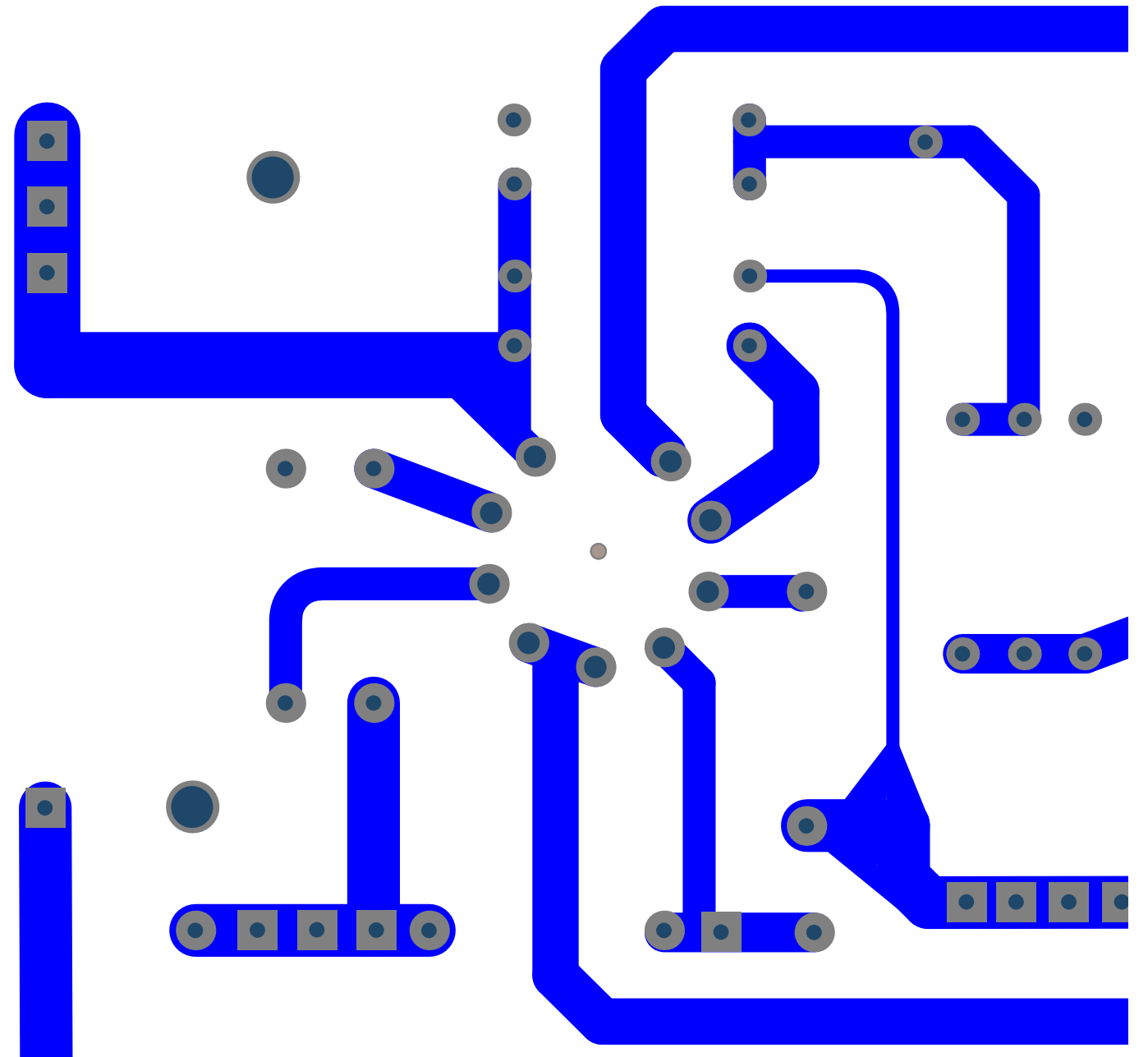


# WARNINGS | CAUTION

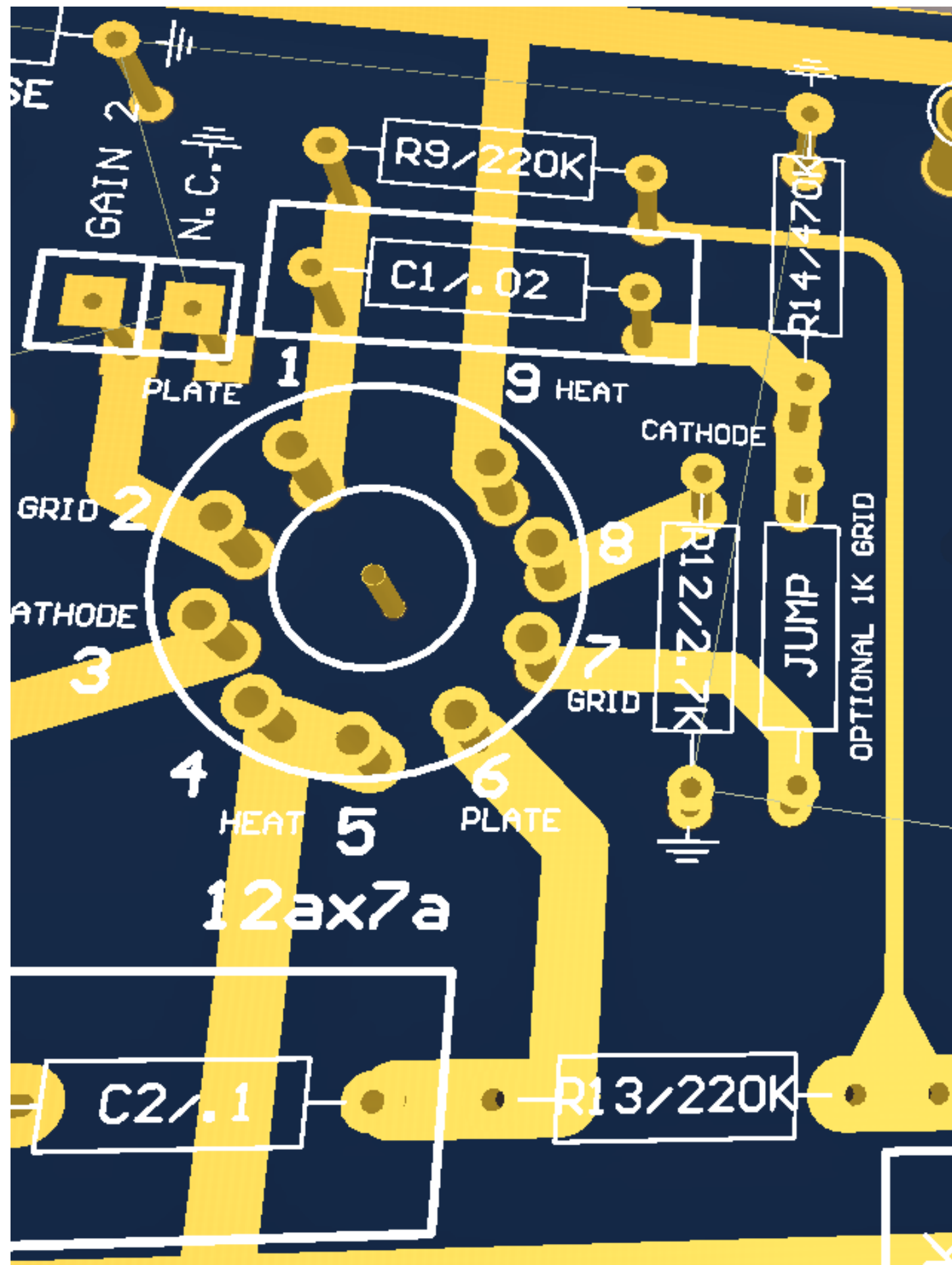


IT IS IMPORTANT TO COVER A FEW SAFETY TIPS AND CAUTIONS BEFORE YOU BEGIN.

1. THIS PROJECT HAS HIGH VOLTAGES, AT SOME PLACES ON A LIVE BOARD VOLTAGES CAN BE UPWARDS OF +300V @ 380 MA. IT IS NOT A TERRIBLE AMOUNT OF CURRENT/VOLTAGE , AND I HAVE BEEN SHOCKED MANY TIMES FOR FOOLISH MISTAKES SUCH AS FORGETTING THE UNIT WAS POWERED ON WHILE SERVICING IT ETC. IT'S ENOUGH VOLTAGE TO REMIND YOU TO NEVER MAKE THAT MISTAKE AGAIN. FOR SOMEONE WITH A HEART CONDITION THIS VOLTAGE CAN BE LETHAL.
2. ONCE THE UNIT HAS BEEN POWERED UP , THE FILTERING ELECTROLYTIC CAPACITORS (C7A-C7D) WILL REMAIN WITH CHARGE IN THEM FOR A PERIOD AFTER THE POWER HAS BEEN SWITCHED OFF. I FOUND THAT A SHOCK ALSO IS STILL POSSIBLE FOR A FEW MOMENTS. (IT SEEMS THE NE-2 NEON LIGHT HELPS DISSIPATE CHARGE AFTER POWER OFF.)
3. NEVER 'LIFT' OR REMOVE THE SAFETY GROUND (CHASSIS GROUND FROM AC CORD). THE BOARD WITH PROPER WIRING AND GROUND LAYOUT WILL HAVE MINIMAL NOISE AND HUM , SOLVING A HUM PROBLEM BY LIFTING THE SAFETY GROUND IS WRONG, OFTEN ILLEGAL AND DANGEROUS TO YOU AND OTHERS.
4. WORK OFF OF AN AC PLUG THAT IS GROUNDED TO EARTH.
5. IF THE FUSE POPS ON THE PCB OR A CIRCUIT BREAKER , THERE IS SOMETHING WRONG , STOP ,RE CHECK ALL CONNECTIONS AND REVIEW YOUR WORK. THE FUSE WILL ONLY POP IF THERE IS A SHORT OR A MISWIRED CONNECTION.
6. DO NOT RUSH THROUGH THE PROJECT WITH OUT REVIEWING YOUR WORK SEVERAL TIMES . BEWARE OF SOLDER BRIDGES . SLOPPY WORK OR IMPATIENCE IS DANGEROUS TO YOU AND OTHERS.
7. BE NEAT IN YOUR CONNECTIONS AND WIRE RUNS, DON'T USE MORE WIRE THEN IS NEEDED FOR EACH CONNECTION. IF YOU CAN'T BE 'NEAT' , DON'T BOTHER WITH THIS PROJECT. 'NEATNESS PROMOTES ACCURACY'
8. IF THE ELECTROLYTIC CAPACITORS ARE MOUNTED IN REVERSE , THEY CAN EXPLODE VIOLENTLY . REMEMBER THIS. CHECK EACH ELECTROLYTIC !.
9. IF YOU DO NOT UNDERSTAND SOMETHING FULLY THAT IS NOT COVERED IN THIS MANUAL OR ARE UNSURE ABOUT SOMETHING. STOP. AND ASK A QUESTION EITHER IN THE FORUM OR THROUGH EMAIL. YOU WILL BE HELPED.
10. THIS UNIT IS INTENDED AS A MONO UNIT , AND WAS NOT DESIGNED FOR ANYTHING BUT THE 'RATED' POWER TRANSFORMER.
11. THE USE OF A 'VENTED' CASE IS NECESSARY.



DESIGNED BY GREGORY LOMAYESVA | COPYRIGHT 2008



## FEATURES

1. THE PCB HAS BEEN DESIGNED AROUND THE CIRCUIT AND NOT THE COMPONENTS. CREATING THE SHORTEST PATHS TO EACH IMPORTANT CONNECTION
2. PCB USES 3 OZ COPPER
3. A NEW GROUND PLANE HAS BEEN ADDED USING THE HEAVIEST GAUGE OF COPPER POSSIBLE .  
(GROUND SCHEME STILL FOLLOWS THE ORIGINAL DESIGN SEPARATING THE REDUCTION/AUDIO/INPUT TRANSFORMER CIRCUITS.)  
(ALSO AIDS IN SHIELDING THE AUDIO CIRCUIT BELOW IT)
4. THE USE OF SPRAGUE ATOMS OR EQUIVALENT FILTERING ELECTROLYTIC CAPACITORS.
5. USE OF PCB MOUNT 1 MEG POTENTIOMETERS FOR STEREO ADJ/LIM RESPONSE AND OPTIONALLY ZERO ADJUST, THUS ELIMINATING ADDITIONAL WIRE RUNS.
6. PCB IS .93" THICK
7. PCB IS SILVER PLATED.
8. TUBE HEATERS HAVE DC REFERENCE CIRCUIT BUILT INTO BOARD  
(FURTHER PROTECTING AC HUM FROM ENTERING THE AUDIO CIRCUIT)
9. A GRID RESISTOR HAS BEEN ADDED FOR THE 12AX7 IN THE AMP SECTION.
10. AN EXTRA 1K RESISTOR HAS BEEN ADDED TO THE PI FILTER IN THE POWER SUPPLY.
11. THE DIODE FOOTPRINTS ARE NOW MADE FOR FRED/HEX DIODES (TO-220)
12. QUENCH ARC SNUBBER HAS BEEN ADDED ON BOARD FOR THE POWER SWITCH  
(TO CONTROL POPPING NOISE ON POWER DOWN)
13. 68 PF CAP HAS BEEN ADDED IN PARALLEL TO R11 TO HELP PREVENT OCCILATIONS.
14. 2ND PAD CONNECTED TO GROUND HAS BEEN ADDED FOR CONNECTING GAIN 2 AND REDUCTION 2 (GIVING OPTION TO OMIT 'Y' CABLE WHEN CONNECTING POTENTIOMETERS)
15. 'X-CAP' HAS BEEN ADDED TO THE PRIMARY OF THE TRANSFORMER  
(HF NOISE FILTER )
16. RESISTOR FOOTPRINTS ARE LARGE ENOUGH FOR CARBON COMP.
17. CAPACITORS FOOT PRINTS IN THE AMP SECTION ARE MADE FOR POLY-PRO CAPS
18. OPTION TO SELECT GROUND CIRCUIT FOR THE OUTPUT TRANSFORMER  
(INTO AUDIO GND OR REDUCTION GND)
19. MOST TRANCES ARE 2MM WIDE ON 3 OZ COPPER  
(ALMOST 20 TIMES THE NEEDED COPPER)
20. ENTIRELY NEW DESIGN OF CIRCUIT BALANCING A COMPACT DESIGN BUT ENSURING SEPARATION BETWEEN TRACES.
21. PCB MOUNT SOWTER TRANSFORMERS
22. OPTIONAL GROUNDING THROUGH STANDOFFS
23. HEATER TRACES MOVED TO BOTTOM OF BOARD
24. ENTIRE CIRCUIT ON ONE SIDE OF BOARD (NO OVERLAPPED TRACES)
25. GRID RESISTORS FOR 12BH7A
26. INSULATED 5.08 SCREW CONNECTORS CAN BE USED FOR ALL CONNECTIONS
27. CIRCUIT IS 'TRUE' TO THE ORIGINAL 1960'S DESIGN
28. HEATER TRACES ON BOARD (NO HEATER WIRING)

## DESIGN NOTES | HISTORY | THEORY:

THANK YOU FOR YOUR INTEREST IN THE NEW DRIP OPTO VER3. THE VER3 IS A WHOLE NEW DESIGN AND LAYOUT BASED ON THE CLASSIC 'LA' COMPRESSOR/LIMITER CIRCUIT.

THIS DESIGN IS TRUE TO THE SCHEMATIC OF THE 1960S COMPRESSOR BUT MANY NEW FEATURES HAVE BEEN ADDED TO THE DESIGN , INCLUDING A DC REFERENCED HEATER CIRCUIT , AND THE USE OF SPRAGUE ATOM OR CDE TC SERIES FILTERING CAPACITORS.

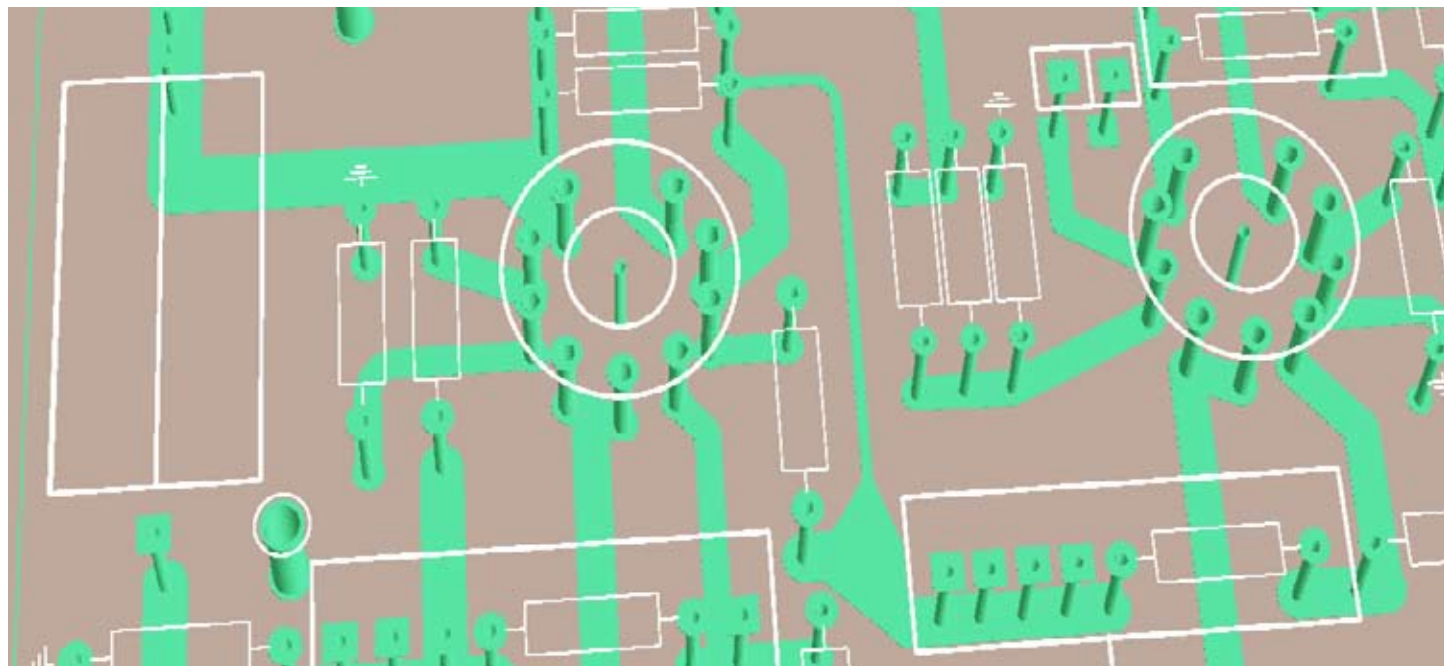
THE PCB IS COMPATIBLE WITH MOST EQUIVALENT AUDIO TRANSFORMERS , BUT THE USE OF SOWTER TRANSFORMERS IS RECOMMENDED FOR A SEAMLESS BUILD.

A LOT OF TIME, TESTING AND PROTOTYPING HAS GONE INTO THIS BOARD ASSURING YOU THE HIGHEST IN QUALITY AND PERFORMANCE.

UNDER MANY CIRCUMSTANCES, THE PCB CAN STAND SIDE BY SIDE WITH MOST COMMERCIAL AND VINTAGE UNITS AND GIVE EQUAL RESULTS.

THE OPTO3 PCB USES AC POWERED HEATER FILAMENTS , BUT MUCH EFFORT HAS GONE INTO ROUTING THE HEATER TRACES AWAY FROM CRITICAL COMPONENTS.

IN MANY TESTS THE AC HEATER CIRCUIT ON THE OPTO3 ARE AS QUIET AS DC RECTIFIED CIRCUITS.



AS ALSO IN SOME CAMPS OF THOUGHT AC HEATED TUBES 'SOUND BETTER' AND IS SPECULATED TO PROLONGS TUBE LIFE.

A DC HEATED BOARD WILL BE AVAILABLE IN THE NEAR FUTURE.

BUT BY KEEPING THE DESIGN AC , READILY AVAILABLE POWER TRANSFORMERS CAN BE USED , ELIMINATING THE NEED FOR CUSTOM JOBS.

THE DESIGN ALLOWS THE USE OF A 6.3V 2AMP DC POWER SUPPLY. IF WANTED SIMPLY ROUTE THE 6.3 DC INTO THE PCB HEATER PADS.

IN HEAVY EXPERIMENTATION WITH FULLY REGULATED HIGH VOLTAGE POWER SUPPLIES AND DC REGULATED HEATERS , THIS DESIGN AND EARLY PROTOTYPES KEPT SHINING THOUGH WITH ALMOST EQUIVALENT SPECS.

THE HV POWER SUPPLY REMAINS A FULL WAVE DUAL DIODE TYPE AS FOUND ON THE ORIGINAL UNIT , BUT THE ADDITION OF FRED DIODES AND USE OF CDE TC SERIES OR ATOM CAPACITORS IS A VERY EFFECTIVE UPGRADE.

ALTHOUGH THIS DESIGN DOES NOT REPLACE THE VER2 OPTO PCB IT DOES EXPLORE MANY NEW CONCEPTS AND IDEAS IN TUBE CIRCUITY DESIGN.

THE DESIGN LAYOUT WAS MADE BY HAND OVER THE COURSE OF A YEAR.

THE GOALS WERE TO REVOLVE THE CIRCUIT AROUND THE SHORTEST CONNECTIONS POSSIBLE , OFTEN DESIGNERS RELY ON COMPONENT PLACEMENT FIRST , CIRCUIT SECOND , WITH THE ADVENT OF MORE ADVANCED PCB DESIGN PROGRAMS AND AUTO ROUTING CAPABILITIES , IT SEEMS THAT DESIGNERS ARE MORE INTERESTED IN SIMPLY CONNECTING A CIRCUIT THEN TAKING THE TIME TO BALANCE THE FORM AND FUNCTIONALITY OF IT .

THERE IS NO 'RATS NEST ' IN THIS DESIGN , IT IS ELEGANT AS IT IS FUNCTIONAL.

I CHOSE THE DESIGN BASED ON A FLOWER TYPE INTERCONNECTION TO THE VACUUM TUBES INSURING A GREATER SEPARATION TO PROTECT AGAINST INTERFERENCE FROM ADJACENT TRACKS.

GREAT CARE HAS BEEN TAKEN IN THE DESIGN OF BOTH THE AMPLIFIER SECTION AND THE REDUCTION CIRCUIT.

THE USE OF A GROUND PLANE HAS ALSO HELPED IN CREATING A MORE COMPACT DESIGN , YET CONTINUING TO MAINTAIN THE ORIGINAL GROUNDING CONCEPT OF THE ORIGINAL UNIT : SEPARATION OF THE AUDIO, REDUCTION, HIGH VOLTAGE AND INPUT TRANSFORMER GROUND.



YOUR OPTO'S FOUNDATION BEGAN AS AN ARTISTIC APPROACH IN SYMMETRICAL DESIGN. BY NOT COMPACTING THE CIRCUIT AND ALLOWING FOR GREAT AMOUNTS OF SPACE IN BETWEEN TRACES , CROSS TALK IS KEPT TO A MINIMUM.

"NEATNESS PROMOTES ACCURACY."

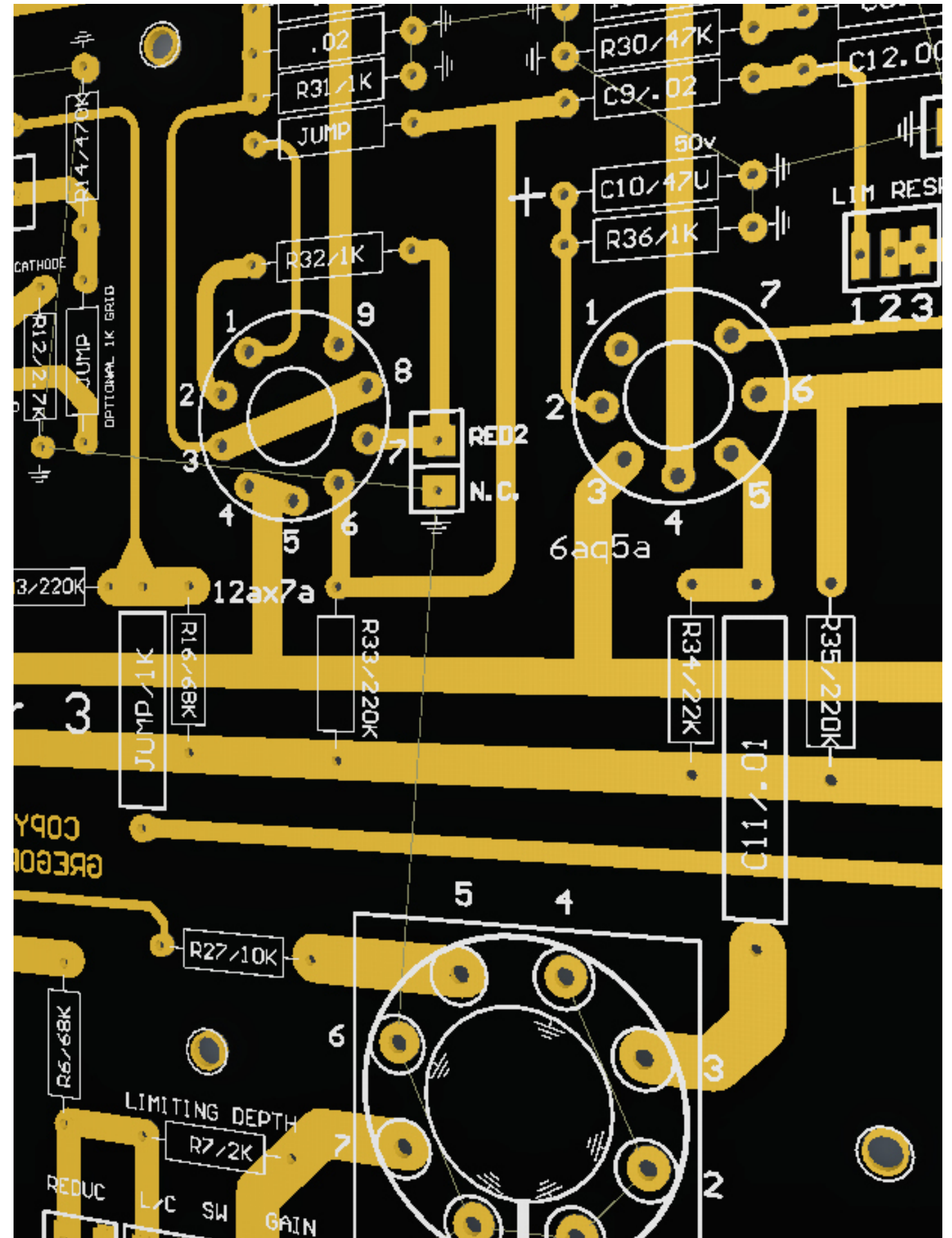
IT WAS MY GOAL TO CREATE A PCB THAT IS COMPLIANT TO ELECTRICAL STANDARDS AND OF A QUALITY RIVALING MOST COMMERCIAL PRODUCTS.

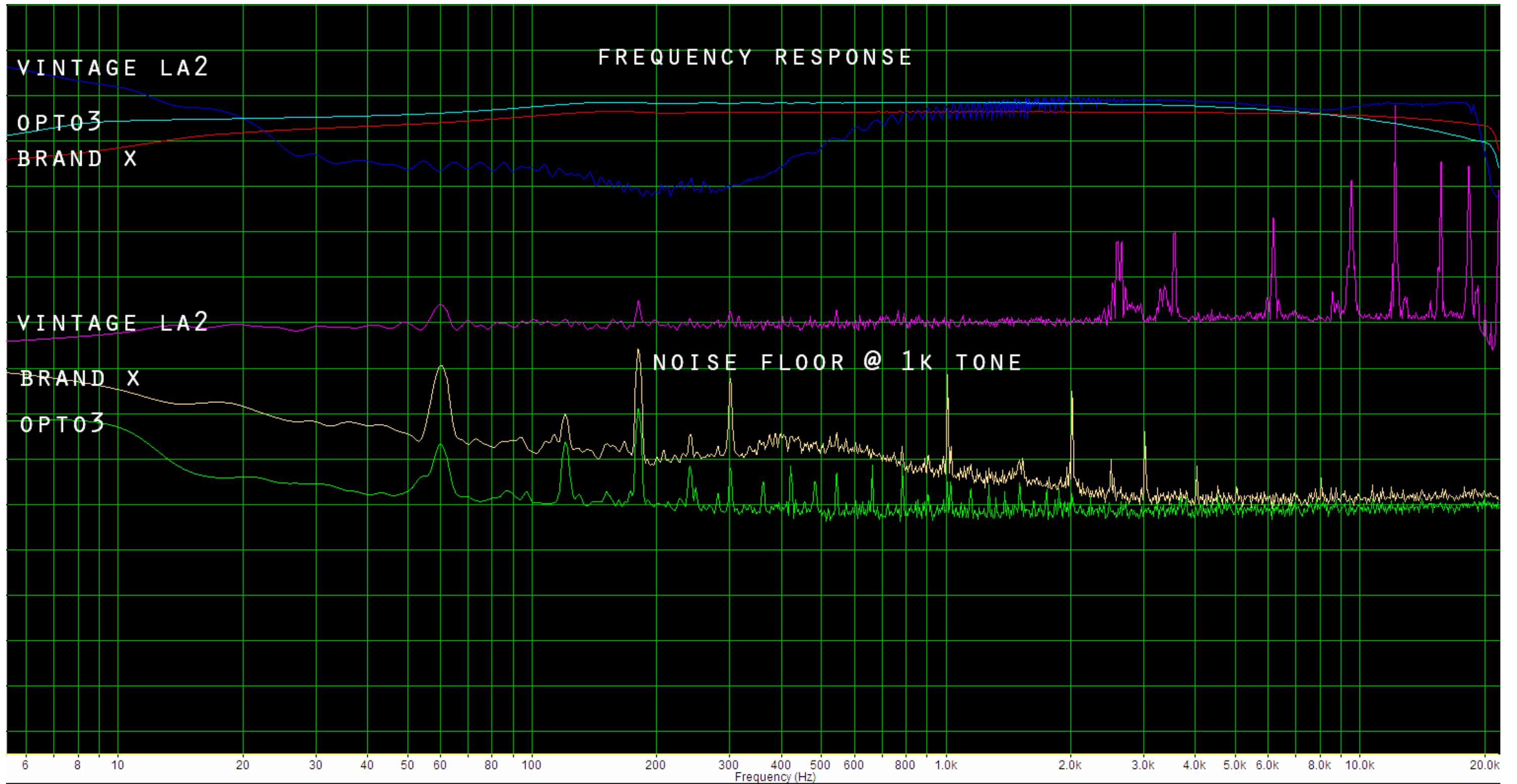
COMPARED TO OTHER MANUFACTURERS OF LA-STYLE COMPRESSORS , YOU WILL BE ABLE TO USE THE HIGHEST QUALITY COMPONENTS AND STILL COME IN UNDER HALF THE PRICE OF MOST RETAIL UNITS .

THROUGHOUT MOST OF THE PCB YOU WILL FIND UP TO 5MM WIDE TRACES ON IMPORTANT CONNECTIONS LIKE THE OPTICAL CELL AND THE C5 CAPACITOR SECTION BY USING 3OZ COPPER ,IT EQUATES TO A 15 MM WIDE TRACE AS COMPARED TO COMMERCIAL PCB'S MEAGER USAGE OF 1 OZ COPPER AND .5MM WIDE TRACES.

PLEASE ENJOY THIS LATEST RELEASE FROM DRIP ELECTRONICS.

G.





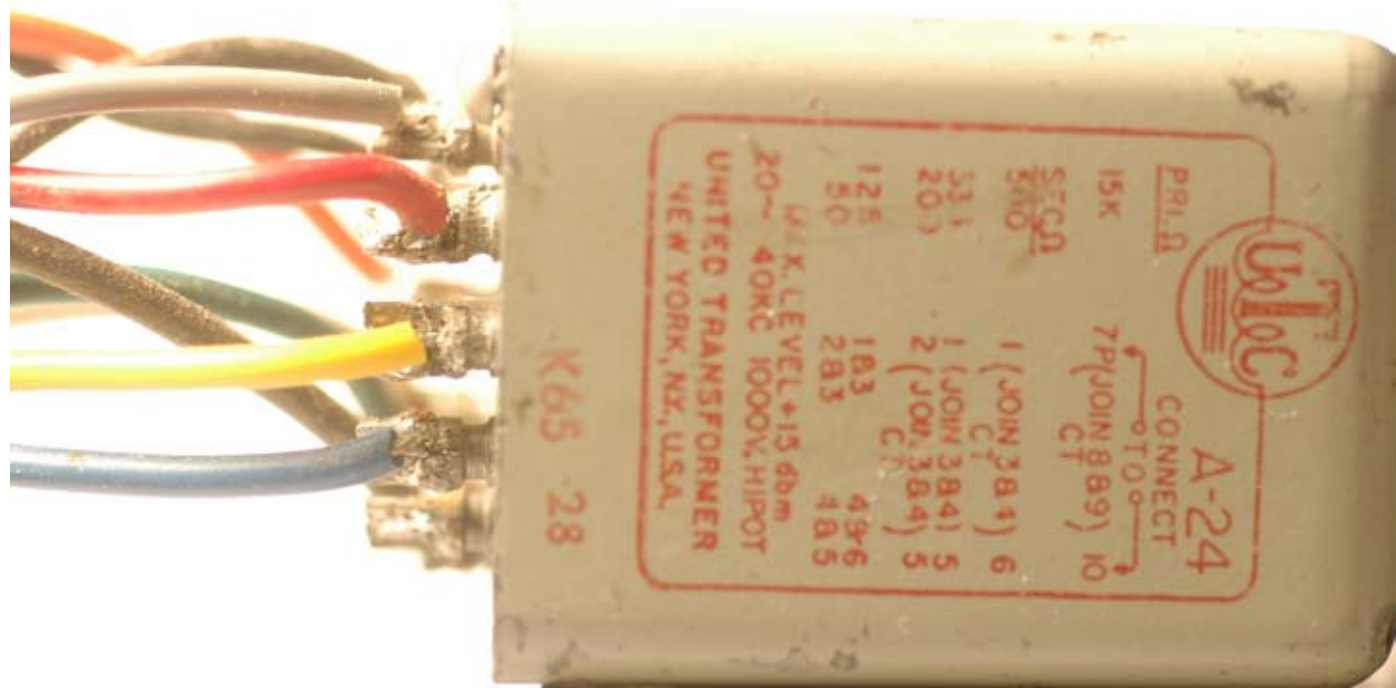
HERE IS A CHART SHOWING SIDE BY SIDE COMPARISON OF A PROPERLY WIRED OPTO3 PCB AND OTHER LA STYLE COMPRESSORS.

(HOW EVER THIS WAS NOT DONE IN A LABORATORY AND SHOULD ONLY BE USED AS AN EXAMPLE OF THE PERFORMANCE POSSIBLE WITH THIS PCB.)

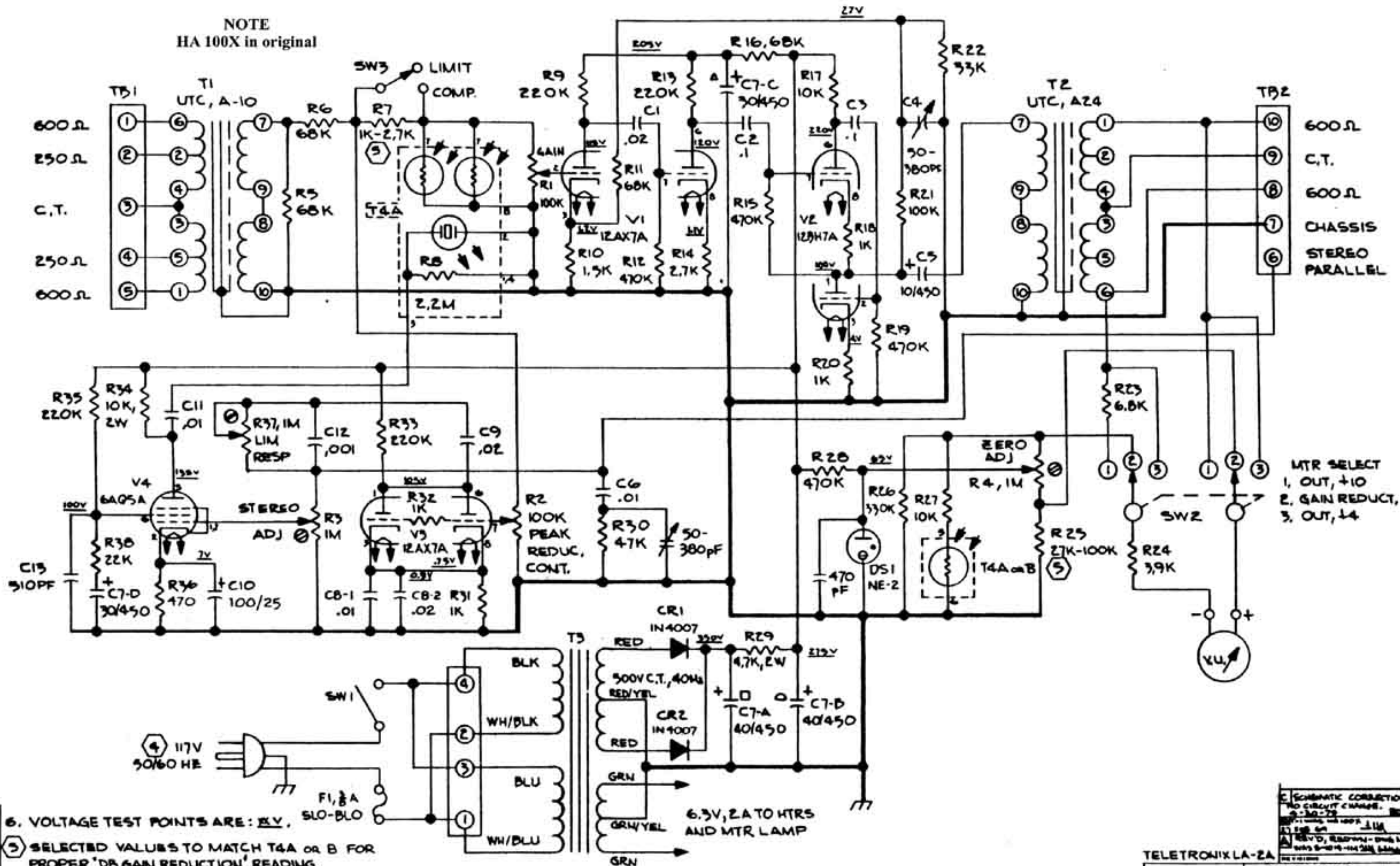
IN THE FREQUENCY RESPONSE , THE OPTO 3 (LIGHT BLUE) SEEMS TO HOLD IT'S GROUND IN COMPARISON WITH A BRAND-X POINT TO POINT UNIT. (THE VINTAGE LA2 SEEMS TO BE USING THE JUMPER NETWORK FOUND ON OLD UNITS , DIPPING OUT FROM 30HZ TO 600HZ )

AS FAR AS NOISE FLOOR , THE OPTO3 IN GREEN SEEMS TO DO VERY WELL.





NOTE  
HA 100X in original

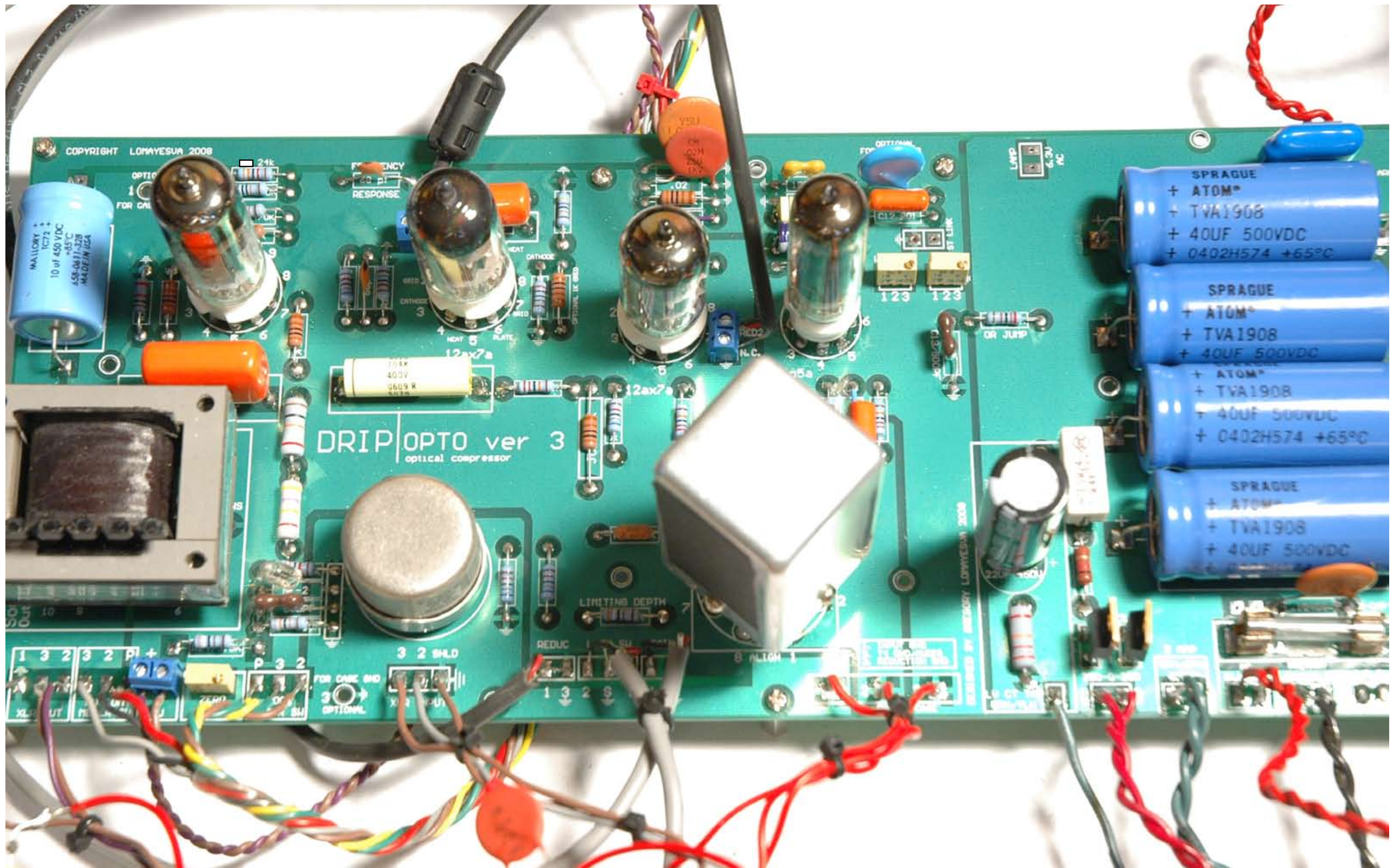


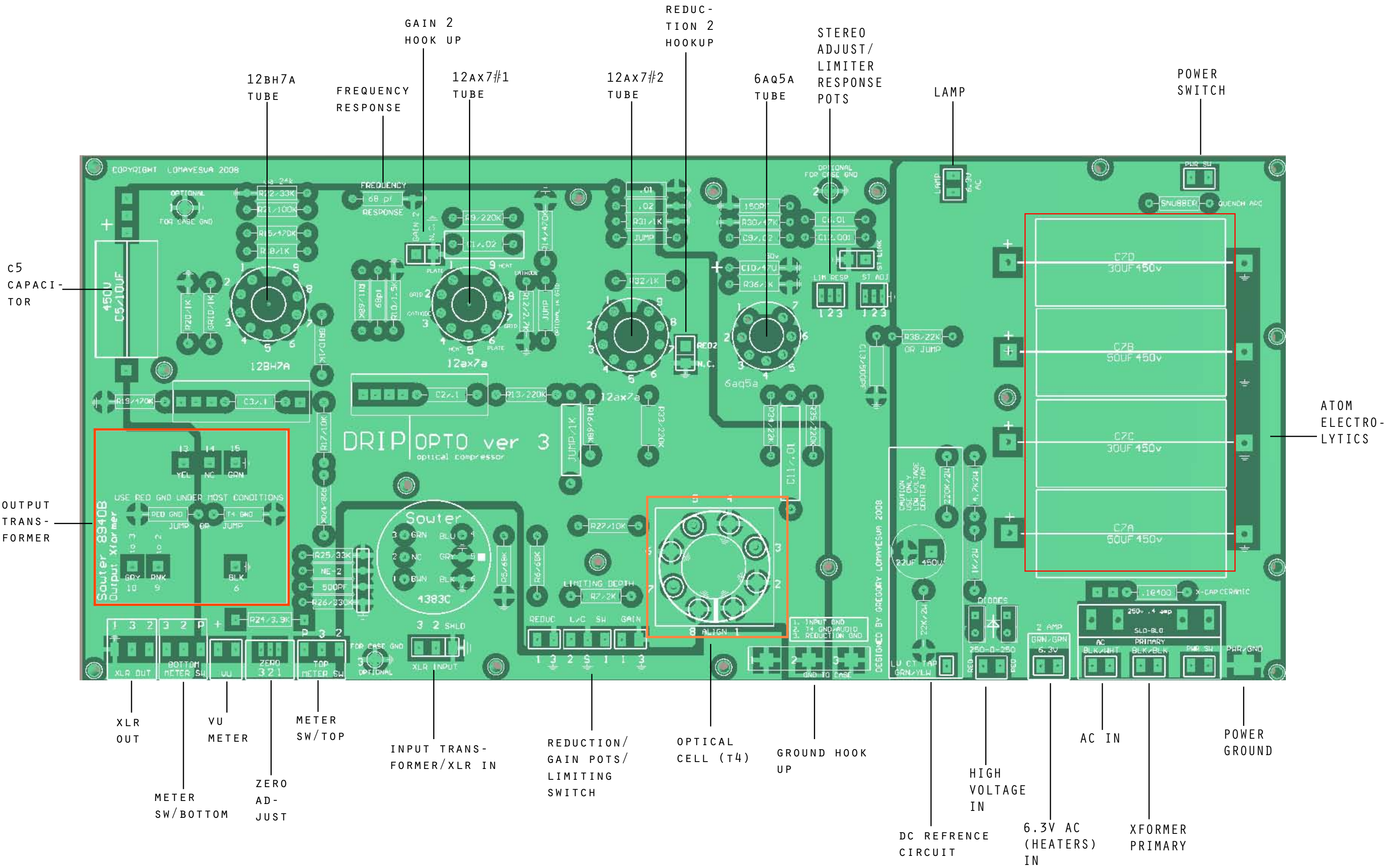
- 6. VOLTAGE TEST POINTS ARE:  $\frac{1}{2}V$ , S10-B10
- 5. SELECTED VALUES TO MATCH T4A OR B FOR PROPER 'DB GAIN REDUCION' READING.
- 4. FOR 220 V CONNECTION, SEE MANUAL.
- 3. PATENT N<sup>o</sup> 3258707 ON PORTIONS OF THIS EQUIPMENT.
- 2. CAPACITORS IN  $\mu$ F.
- 1. RESISTORS IN OHMS,  $\frac{1}{2}$  W, 5%.

NOTES, UNLESS SPECIFIED:

SCHEMATIC CORRECTIONS  
NO CIRCUIT CHANGE.  
C-10953  
REV'D, 8/20/68 - 10/11/68  
REV'D, 8/20/68 - 10/11/68

TELETRONIX LA-2A		SCHEMATIC, LEVELING AMPLIFIER	
UNITED RECORDING ELECTRONICS INDUSTRIES		C-10953 C	
REP. 311A	DATE 6AUG 68	REV. 3	
DEPARTMENT	CHECKED	APPROVED	
LOS ANGELES CALIFORNIA			





C5 CAPACITOR

OUTPUT TRANSFORMER

ATOM ELECTROLYTICS

GAIN 2 HOOK UP

REDUC-TION 2 HOOKUP

STEREO ADJUST/LIMITER RESPONSE POTS

POWER SWITCH

12BH7A TUBE

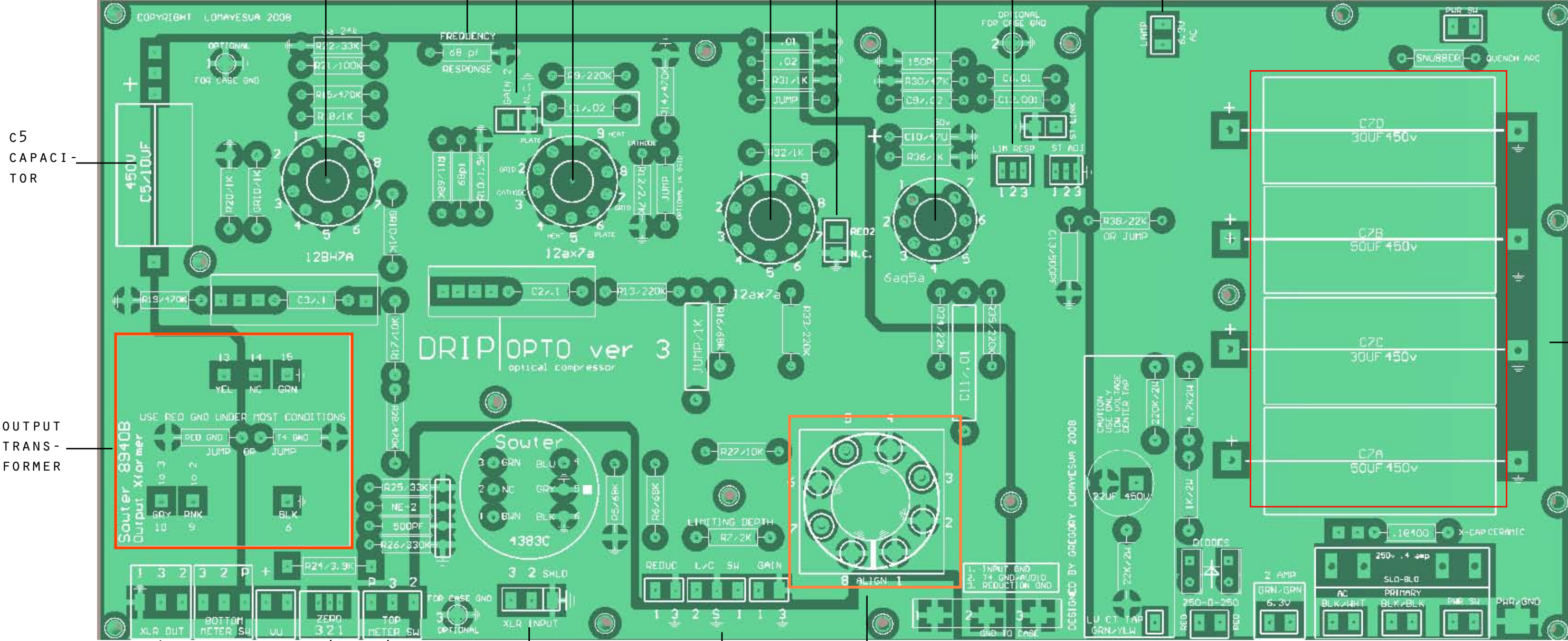
FREQUENCY RESPONSE

12AX7#1 TUBE

12AX7#2 TUBE

6AQ5A TUBE

LAMP



XLR OUT

VU METER

METER SW/TOP

INPUT TRANSFORMER/XLR IN

REDUCTION/GAIN POTS/LIMITING SWITCH

OPTICAL CELL (T4)

GROUND HOOK UP

HIGH VOLTAGE IN

AC IN

POWER GROUND

METER SW/BOTTOM

ZERO ADJUST

DC REFERENCE CIRCUIT

6.3V AC (HEATERS) IN

XFORMER PRIMARY

DRIP OPTO ver 3 optical compressor

Souter 8940B Output Transformer

DESIGNED BY GREGORY LOMAYESUA 2008

# INFO | HOW TO START

TO START IS SIMPLE , USING THE BUILD ORDER ON THE FACING PAGE , YOU WILL BEGIN BY PLACING ALL THE COMPONENTS ON THE PCB, AND SOLDER THEM INTO PLACE .

2 NOTES ON SOLDERING : ALWAYS CLEAN YOUR TIP OF EXCESS SOLDER AFTER EACH USE , ALWAYS CHECK FOR SOLDER BRIDGES AFTER EACH COMPONENT IS SOLDERED.

WHAT'S GREAT ABOUT THE PCB IS IF ALL THE PARTS ARE PLACED CORRECTLY , YOU WILL GET IDENTICAL RESULTS OVER AND OVER.

ONLY THE TRANSFORMER WILL CAUSE ANY VARIANCE IN B+ VOLTAGE(MAIN POWER). BUT THIS CAN BE ADJUSTED BY RAISING OR LOWERING THE VALUE OF R29. THE IDEAL B+ VOLTAGE IS BETWEEN 250VDC AND 275VDC , SOME PEOPLE PREFER 250V AND SOME PREFER 275V , BACK IN THE 60'S PLUS OR MINUS UP TO 20% WAS OKAY , BUT WITH THE ADVENT OF 1% RESISTORS YOU CAN ACHIEVE MORE PRECISE VOLTAGES OVER AND OVER.

THE PCB ALLOWS THE USE OF 5.08 MM SPACED INSULATED HEADERS FOR YOUR CONVENIENCE IN ATTACHING WIRE TO BOARD , BUT I RECOMMEND SOLDERING DIRECTLY TO THE PCB FOR THE POWER SECTION AND ALSO THE GAIN AND REDUCTION POTENTIOMETERS .

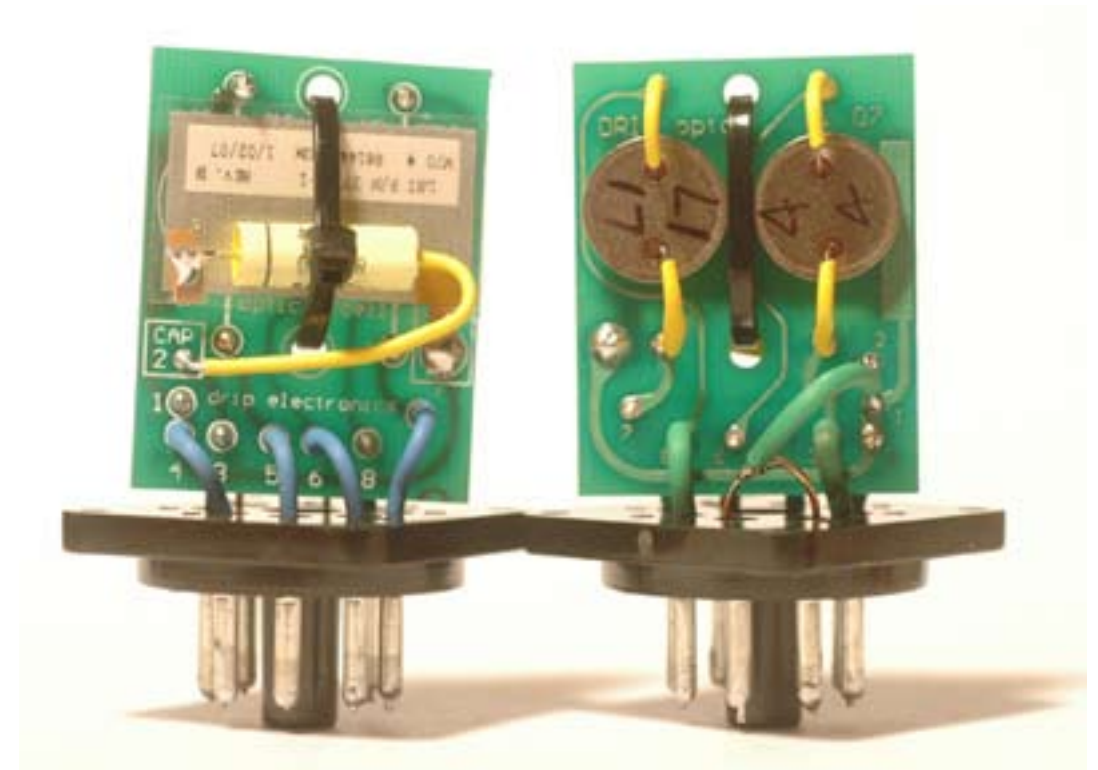
BE SURE TO TAKE GREAT CARE IN DOUBLE CHECKING THE VALUES OF THE COMPONENTS YOU PLACE , IN MOST INSTANCES, THE VALUE ON THE PCB LEGEND WILL BE COVERED BY THE COMPONENT ONCE PLACED ON THE PCB .

IF ONE COMPONENT IS MISPLACED OR THE WRONG VALUE IS SOLDERED , THE ENTIRE CIRCUIT CAN FAIL , DAMAGING MANY OTHER COMPONENTS LIKE THE TUBES AND THE VALUABLE OPTICAL CELL .

AFTER POPULATING THE BOARD WITH ALL THE COMPONENTS AND TRANSFORMERS , YOU WILL PLACE THE BOARD IN IT'S CASE AND BEGIN ATTACHING ALL THE WIRES TO THE PCB ,

TAKE GREAT CARE AND TIME IN ATTACHING EACH WIRE TO THE PCB . MAKE SURE EACH WIRE IS NOT TOO SHORT , BUT ALSO NOT TOO LONG , LEAVE A LITTLE SLACK IN EACH WIRE SO IT CAN BE EITHER SECURED TO THE CASE OR LIKE IN THE POWER SECTION HAVE ENOUGH ROOM TO ALLOW FOR SEPARATION.

IF YOU FOLLOW THE INSTRUCTIONS IN THE MANUAL , YOUR FIRST POWER UP SHOULD BE SUCCESSFUL , BUT ALWAYS CLOSE THE LID ON THE CASE WHEN YOU DO THIS , FOR IF YOU MADE A CATASTROPHIC ERROR LIKE SOLDERING AN ELECTROLYTIC BACK WARDS , IT WONT EXPLODE IN YOUR FACE.



# INFO | BUILD ORDER

- 1.) INSTALL RESISTORS AND JUMPERS
- 2.) INSTALL CAPACITORS
- 3.) INSTALL TUBE SOCKETS / OCTAL SOCKETS
- 4.) INSTALL TRANSFORMERS IF USING PCB MOUNT.
- 5.) INSTALL \_ FUSE CLIPS AND FUSE
- 6.) CONNECT GROUND LEADS AND SOLDER TAGS
- 7.) CONNECT POTS
- 8.) CONNECT SWITCHES
- 9.) CONNECT XLR'S
- 10.) CONNECT AC SECTION
- 11.) CONNECT VU METER
- 12.) POWER UP / POWER DOWN
- 13.) INSTALL TUBES
- 14.) PASS AUDIO TEST
- 15.) TROUBLESHOOT
- 16.) INSTALL T4
- 17.) BEGIN SQUISHING AUDIO



## TOOLS :

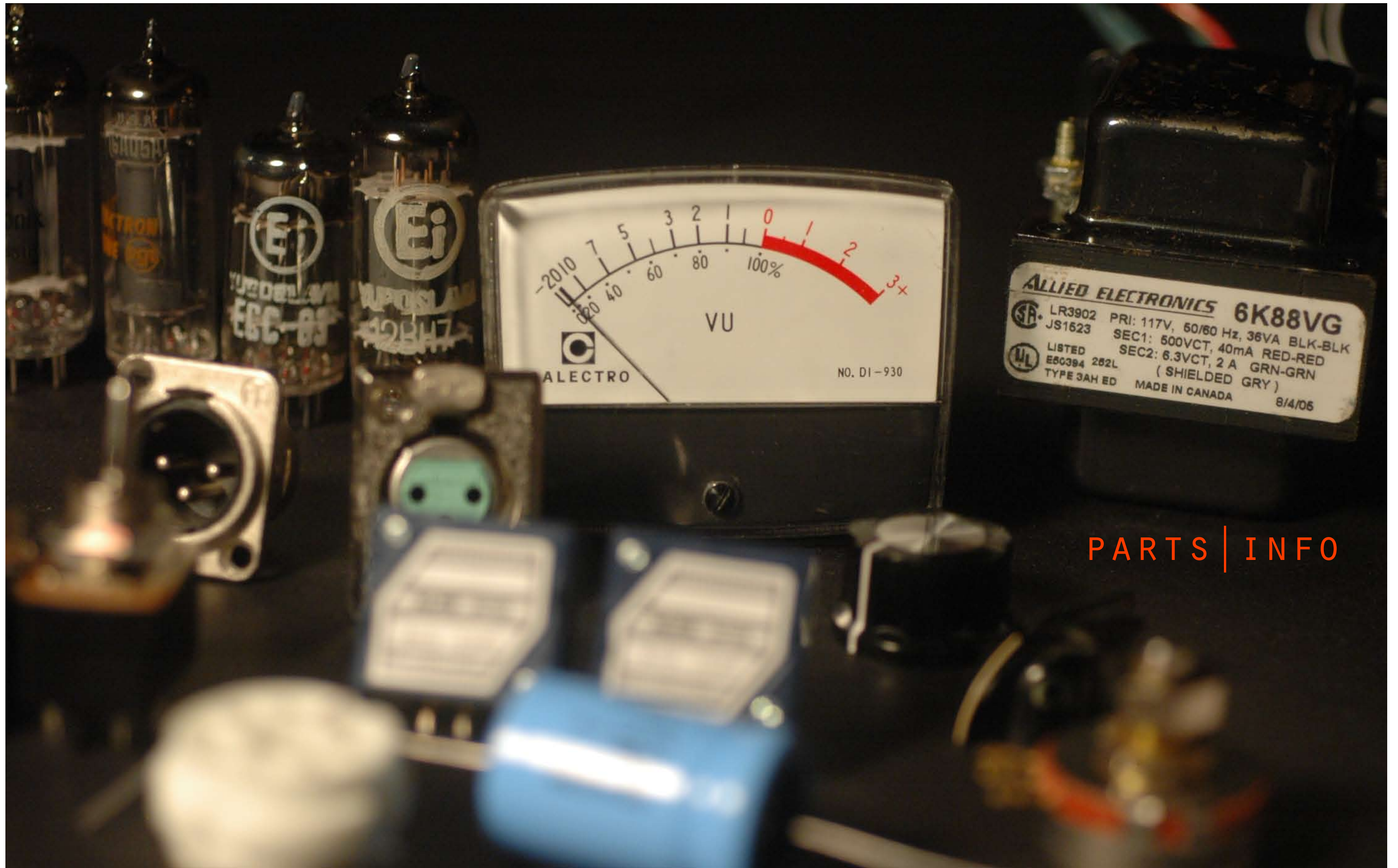
TO START THE PROJECT YOU WILL NEED SOME BASIC TOOLS .  
DEPENDING IF YOU HAVE PURCHASED A PRE-DRILLED ENCLOSURE .  
OR IF YOU ARE FABRICATING YOUR OWN CASE .

FOR BASIC ASSEMBLY YOU WILL ONLY NEED A FEW TOOLS .  
SOLDER/WIRE SNIPS/NEEDLE NOSE PLIERS/WIRE STRIPPERS/SCREW DRIVER AND  
SOLDER

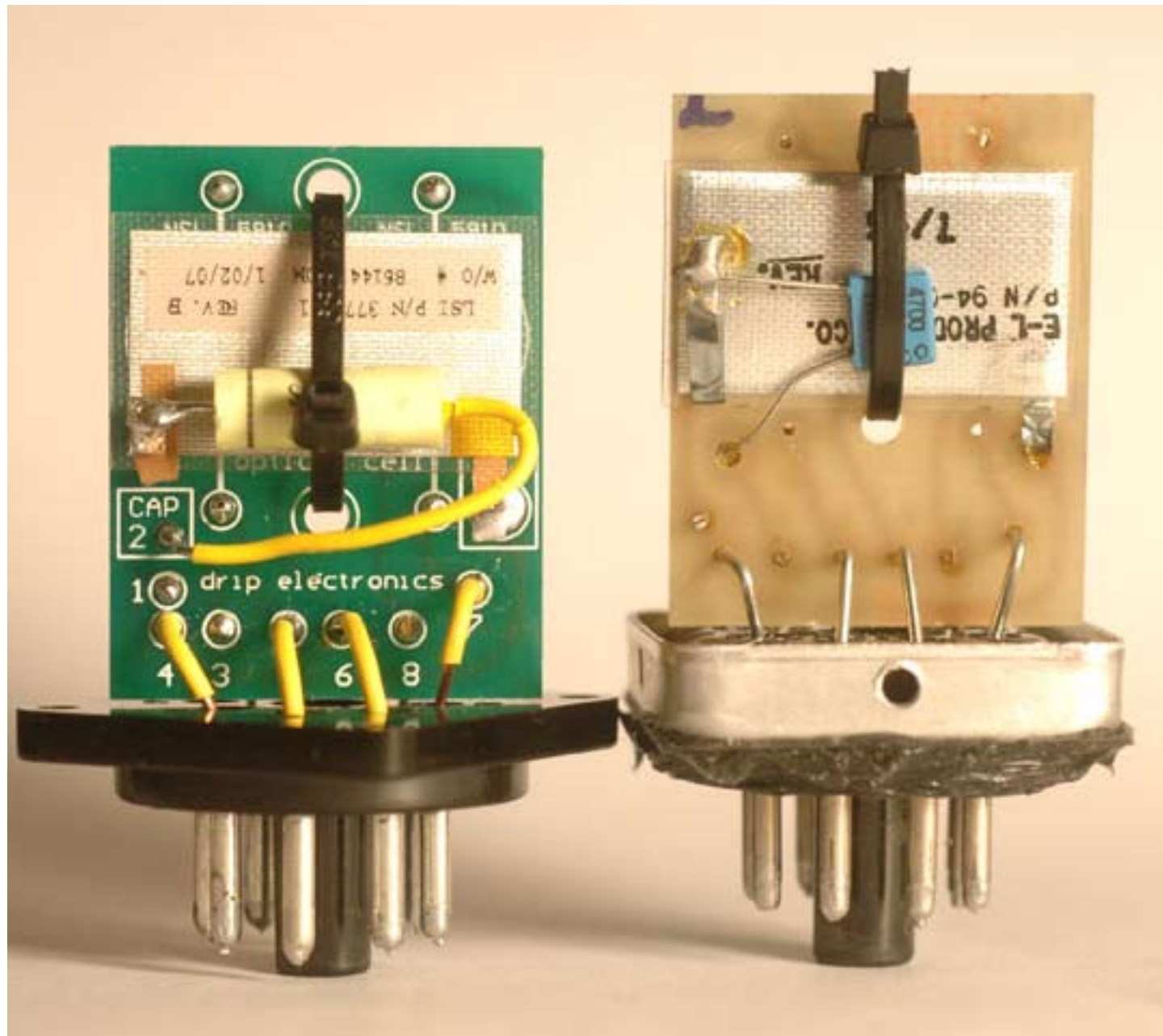
ONE OF THE MOST IMPORTANT TOOLS WILL BE YOUR SOLDERING IRON .

THE RADIO SHACK 40 WATT SOLDERING IRON IS A GREAT BUY AND WORKS WELL .

HOWEVER YOU WILL NEVER REGRET PURCHASING A 200\$ DIGITAL WELLER MODEL  
AS SHOWN ABOVE .



PARTS | INFO



DRIP OPTICAL CELL

UREI NOS CELL

## PARTS | OPTICAL CELL

THE COMPRESSOR SECTION OF THE OPTO REVOLVES AROUND THE OPTICAL CELL USING CADMIUM SULFIDE PHOTO CELLS IN TANDEM WITH A ELECTRO LUMINESCENT PANEL, THIS IS WHAT GIVES THE RELEASE TIME OF THE COMPRESSOR IT'S SMOOTH CHARACTERISTICS.

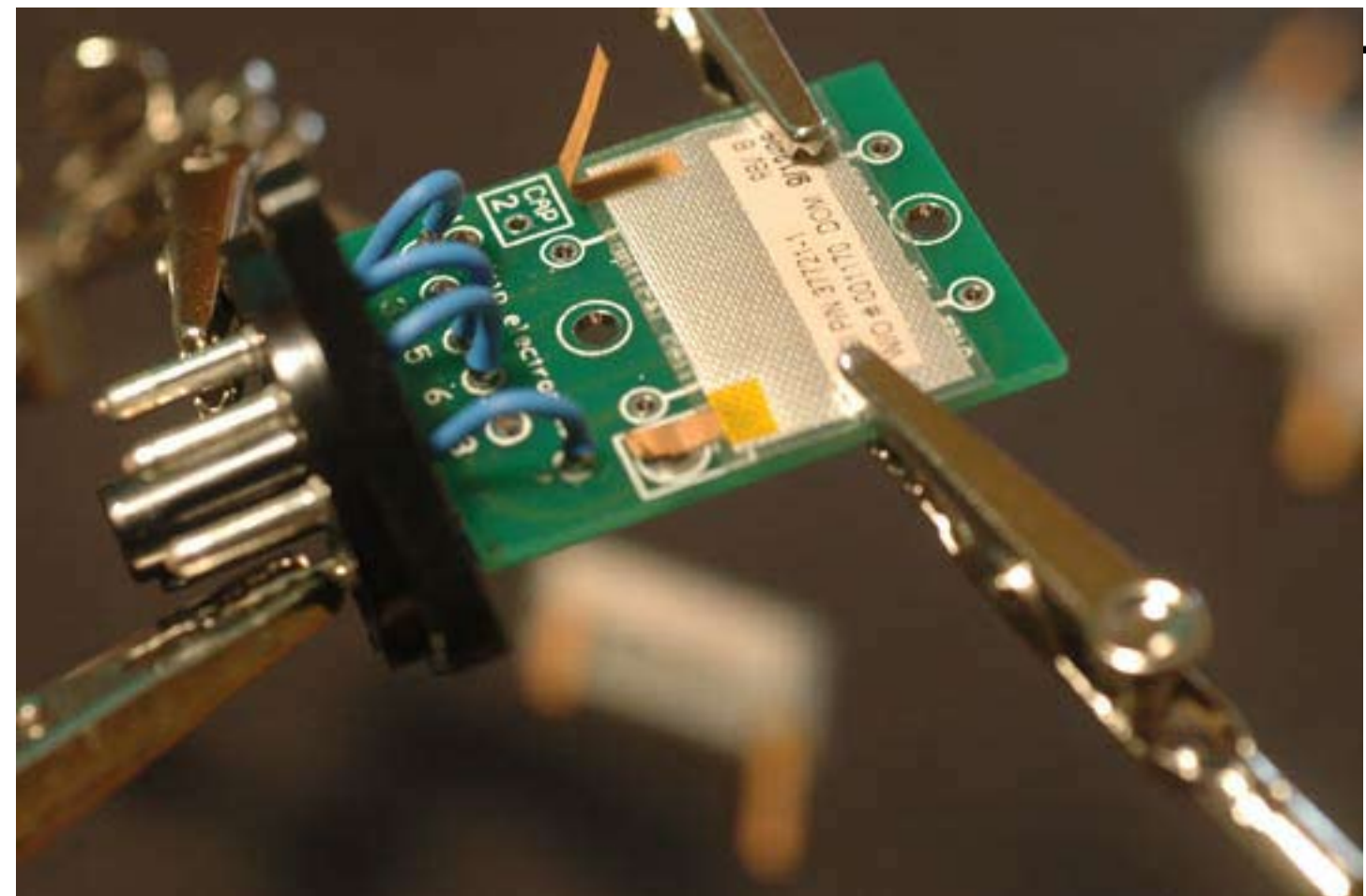
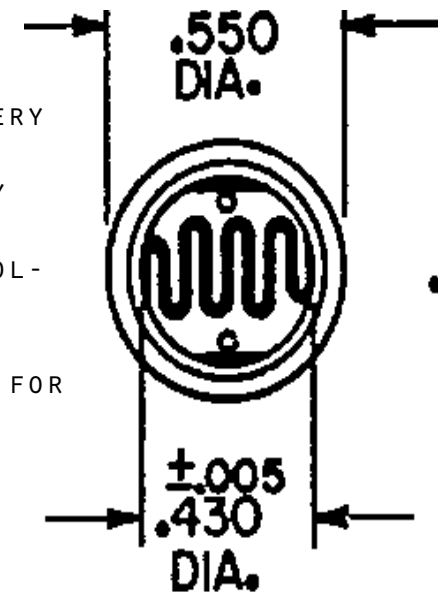
FOR COMPRESSION YOU NEED TO PURCHASE A T4 OPTICAL CELL.

NOS T4BS ARE VERY GOOD , DESPITE MANY OF THEM WERE MADE OVER 20 YEARS AGO .

UNIVERSAL AUDIO SELLS REPLACEMENT T4'S , AND THEY WORK GREAT.

DRIP ELECTRONICS MAKES LIMITED RUNS OF OPTO CELLS EVERY 8 WEEKS . EACH DRIP OPTICAL CELL IS CRAFTED BY HAND USING HEAVY GAUGE PURE COPPER AND A 30Z COPPER DOUBLE SIDED PCB WITH SOLDER MASK.

EACH CELL IS COMPUTER ANALYSED , TESTED THEN MATCHED FOR OPTIMAL PERFORMANCE.







## PARTS | RESISTORS | INFO


THE ORIGINAL RESISTORS IN A VINTAGE UNIT ARE CARBON COMPOSITION ALLEN BRADLEY 1/2 WATT +/- 10-20%. CARBON COMP RESISTORS ARE BELIEVED TO HAVE A 'WARMER' SOUND THEN METAL FILM RESISTORS. YET OFTEN AT A PRICE OF MORE NOISE AND LESS RELIABILITY. THERE ARE ALTERNATIVES TO CONSIDER IN YOUR SELECTION, A COMPANY CALLED OHMITE HAS A NEW CARBON COMP RESISTOR BRAND CALLED 'LITTLE DEMON'.

AS FOR METAL FILM RESISTORS , SOME BRANDS ARE STATE OF THE ART WITH TOLERANCES DOWN TO '0.01%'. METAL RESISTORS ARE QUIET, ACCURATE AND RELIABLE. THE SOUND OF METAL FILM RESISTORS CAN BE MORE PREFERRED THEN CARBON , THE CAPACITORS AND TRANSFORMERS CAN MAKE UP FOR ANY SHORT FALLS OF THAT 'METAL SOUND'.

AVOID METAL OXIDE RESISTORS FOR ANYTHING BUT THE POWER DISTRIBUTION RESISTORS , (THE RESISTORS THAT 'FEED' OFF OF THE MAIN POWER RAIL).

R29(2WATT)/R33/R35/R34(2WATT)/R16/R28/R17

OFTEN I USE 1-2 WATT RESISTORS FOR THESE SECTIONS.



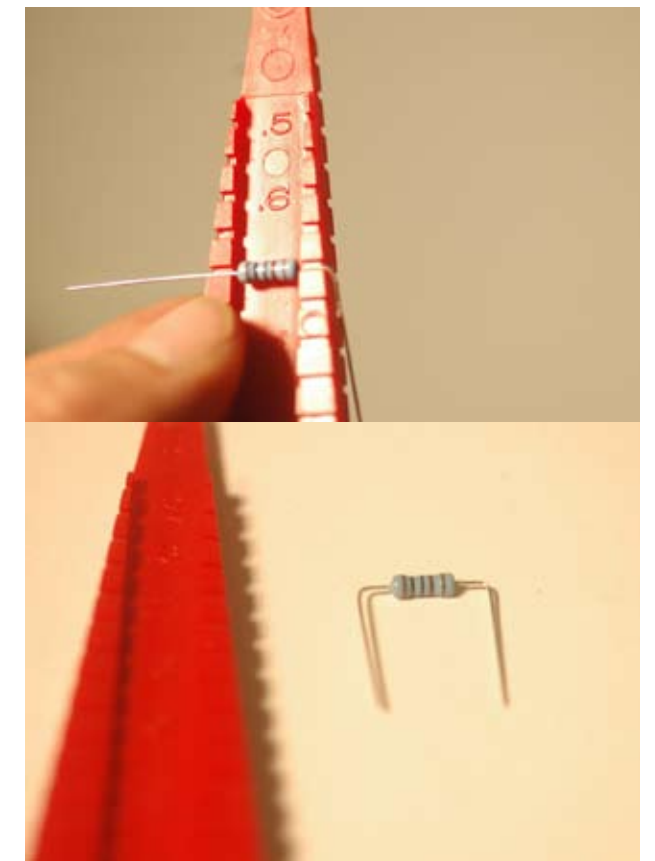
NOTE :DO NOT USE 1/4 WATT RESISTORS!  
HOWEVER TEMPTING THIS MIGHT BE .  
THE VOLTAGE IN SOME PLACES ON THE  
CIRCUIT NEAR OR OVERLAP THE OPERATING  
RANGE OF THEM.

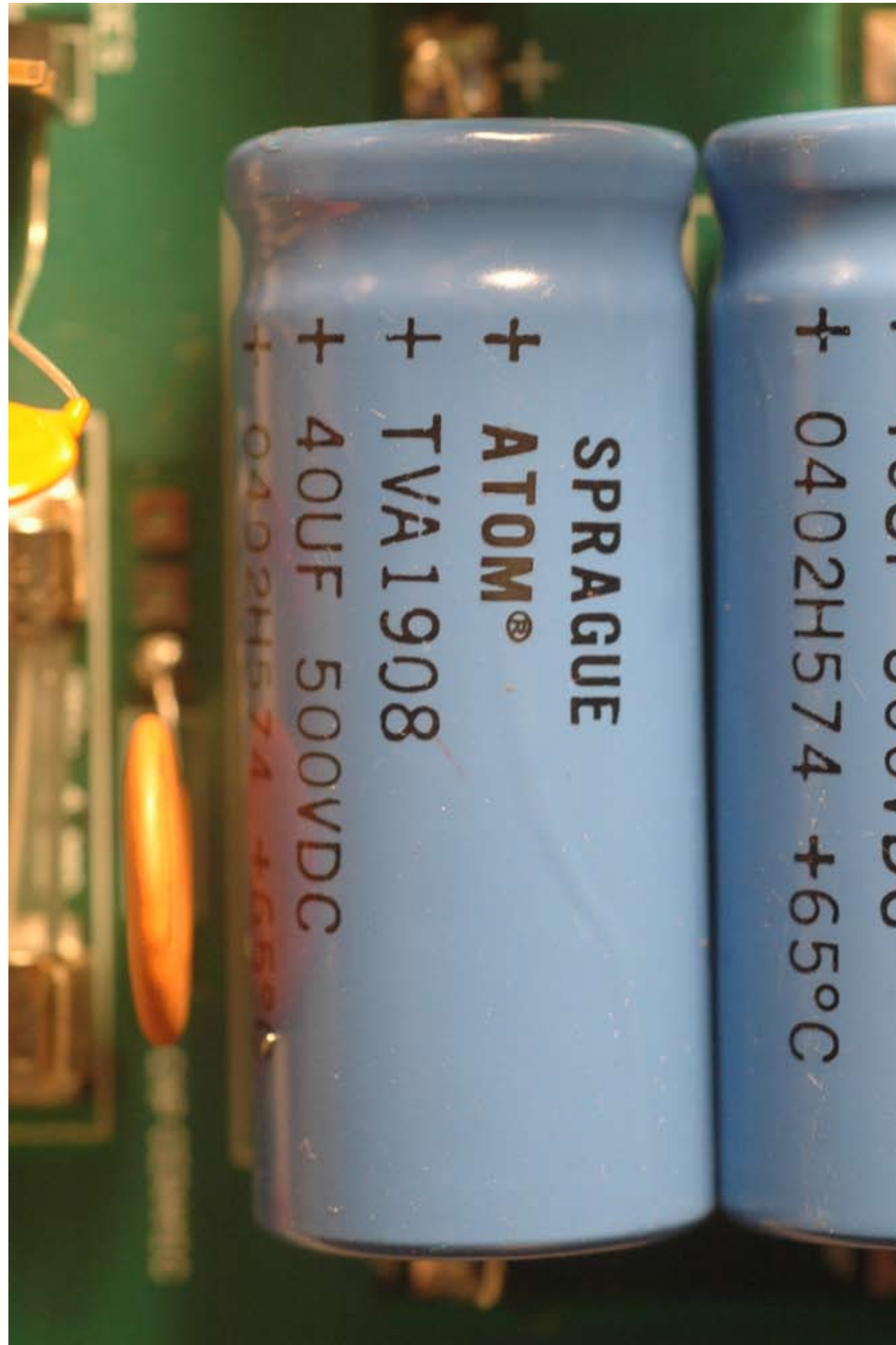
MOST ALL THE RESISTORS THAT YOU USE WILL BE 1/2 WATT EXCEPT FOR  
R29 4.7K AND R34 22K THESE WILL BE 2 WATT RESISTORS (METAL OXIDE).

IN DIFFERENT CAMPS OF THOUGHT , SOME SAY HIGHER WATTAGE RESISTORS  
HAVE LESS NOISE , FEEL FREE TO EXPERIMENT WITH THIS.

INSTALLING THE RESISTORS IS EASY ,  
I RECOMMEND A RESISTOR BENDING  
TOOL, THIS WILL SPEED UP THE PROCESS  
AND KEEP THE RESISTORS LOOKING NEAT AND  
STRAIGHT.  
MOST OF THE RESISTOR BENDS WILL ALL BE  
THE SAME SIZE.

RESISTOR BENDING TOOL  
'SPEEDY BEND LEAD FORMER'  
MOUSER#5166-901





— POSITIVE +

## PARTS | CAPACITORS | INFO

FOR THE PROJECT YOU WILL USE TWO TYPES OF CAPACITORS ,  
ELECTROLYTIC WHICH ARE ONE WAY COMPONENTS THAT MUST  
BE ALIGNED IN THE PROPER DIRECTION ,  
AND NON POLAR TYPE CAPS THAT CAN BE PLACED IN ANY DIRECTION  
PLEASE TAKE NOTE OF THE ELECTROLYTIC , AND USE CAUTION.

# ELECTROLYTIC CAPACITORS :

NOTE :ELECTROLYTIC CAPS MUST BE ALIGNED PROPERLY.  
THERE IS A 'POSITIVE' AND A 'NEGATIVE' LEAD.  
ON THE PCB , THE POSITIVE SIDE IS MARKED  
WITH A PLUS '+' SYMBOL.  
ELECTROLYTIC CAPS CAN EXPLODE IF PLACED  
IN REVERSE.



THE PCB USES 6 ELECTROLYTIC CAPACITORS :  
C5 : 10UF @450V (AXIAL MOUNT)  
C7A : 47UF @450V (AXIAL MOUNT)  
C7B : 47UF @450V (AXIAL MOUNT)  
C7C : 22UF@450V (MINIMUM)(AXIAL MOUNT)  
C7D : 22UF@450V (MINIMUM)(AXIAL MOUNT)  
C10 : 47UF@25V (AXIAL MOUNT)  
DC REF : 22UF@450V (RADIAL MOUNT)

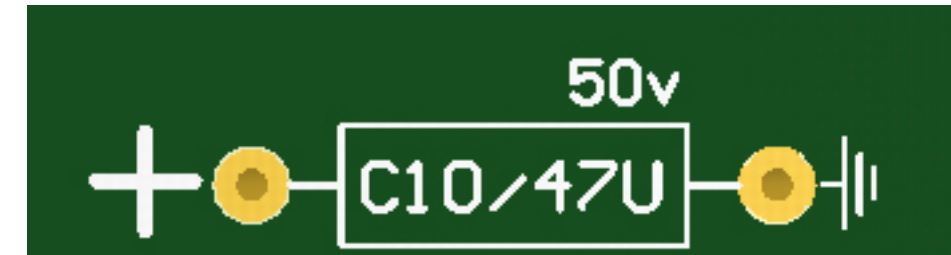
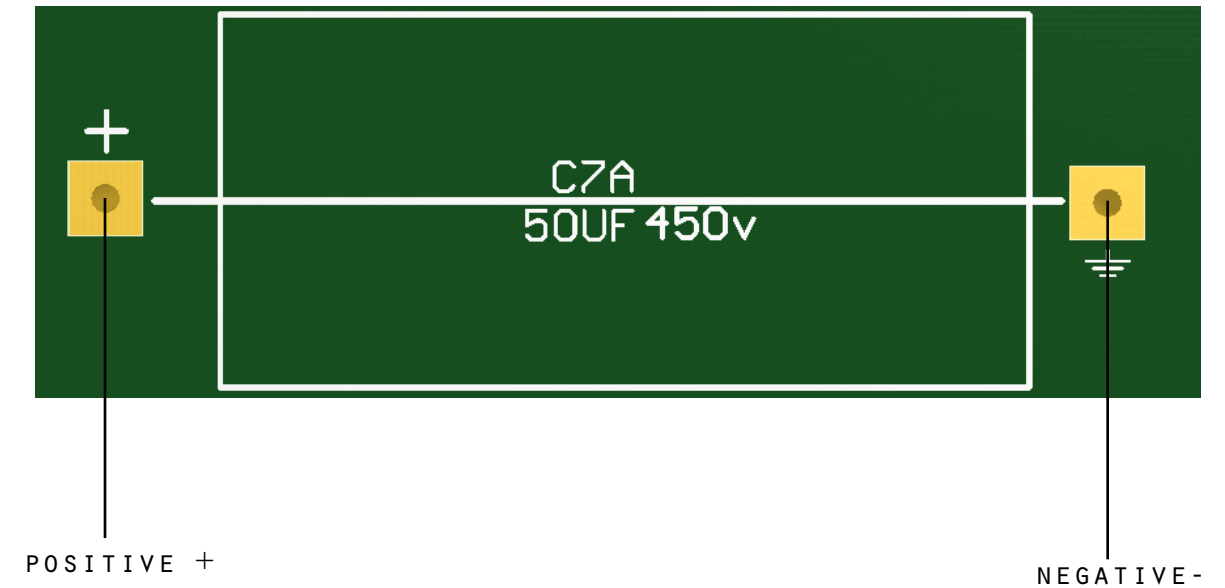
ONE OF THE GREATEST ADVANTAGES OF THE PCB IS THE ABILITY  
TO USE SPRAGUE ATOM CAPACITORS , THEY ARE REGARDED FOR  
THEIR TONE AND RELIABILITY .

HOW EVER CDE MAKES AN EQUIVALENT CAPACITOR THE 'TC' SERIES.  
A LOT MORE EXPENSIVE THEN THE ATOMS , BUT THEY ARE MODERN  
AND VERY GOOD PERFORMERS.

IVE HAD GREAT LUCK USING 4 40UF@450V CAPACITORS FOR  
C7 A,B,C,D ,

THERE ARE SOME ADVANTAGES TO USING UP TO 100 UF CAPS  
FOR C7A AND B THESE TWO CAPS ARE PART OF THE PI FILTER  
OF THE POWER SECTION .

C7D AND C ARE USUALLY 22UF , BUT I WOULD STICK TO 40 UF  
CAPS HERE.

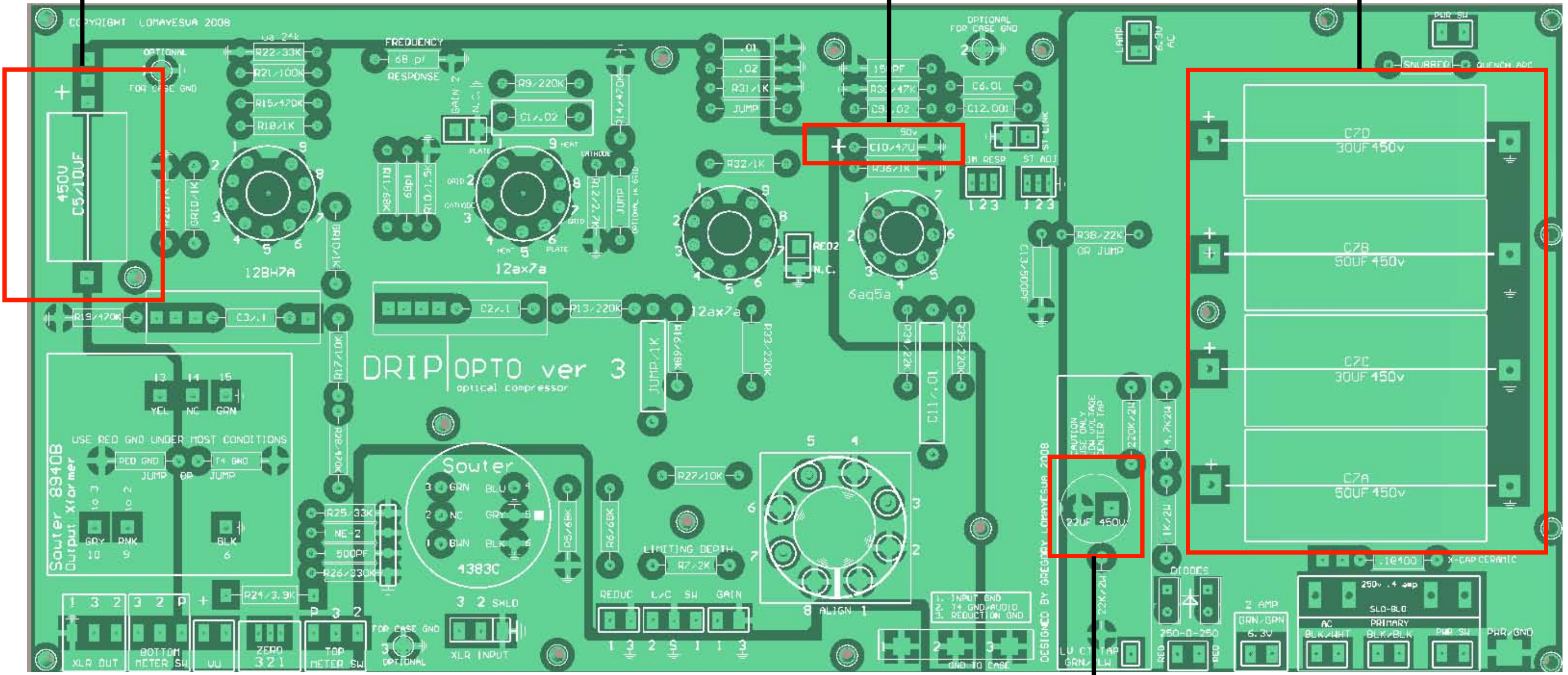


EACH ELECTROLYTIC FOOTPRINT IS CLEARLY MARKED WITH A  
POSITIVE SYMBOL AND A GROUND SYMBOL , IT IS ESSENTIAL TO  
PLACE THE CAP IN CORRELATION TO THESE .  
FAILURE TO DO SO CAN CAUSE THE CAP TO EXPLODE

C5  
10UF @ 450V

C10  
47-100UF  
@50V

ATOMS



22UF@450V

### ELECTROLYTIC CAPACITORS | LEGEND

# C5 : CAPACITOR



THE C5 CAPACITOR (10 UF@450V) PLAYS AN IMPORTANT PART IN THE SIGNAL PATH. IT IS THE LAST STOP BEFORE THE AUDIO HITS THE OUTPUT TRANSFORMER.

POSITIVE +  
SIDE

THE ORIGINAL CAPACITOR IS AN ELECTROLYTIC 10UF@450V CAPACITOR .

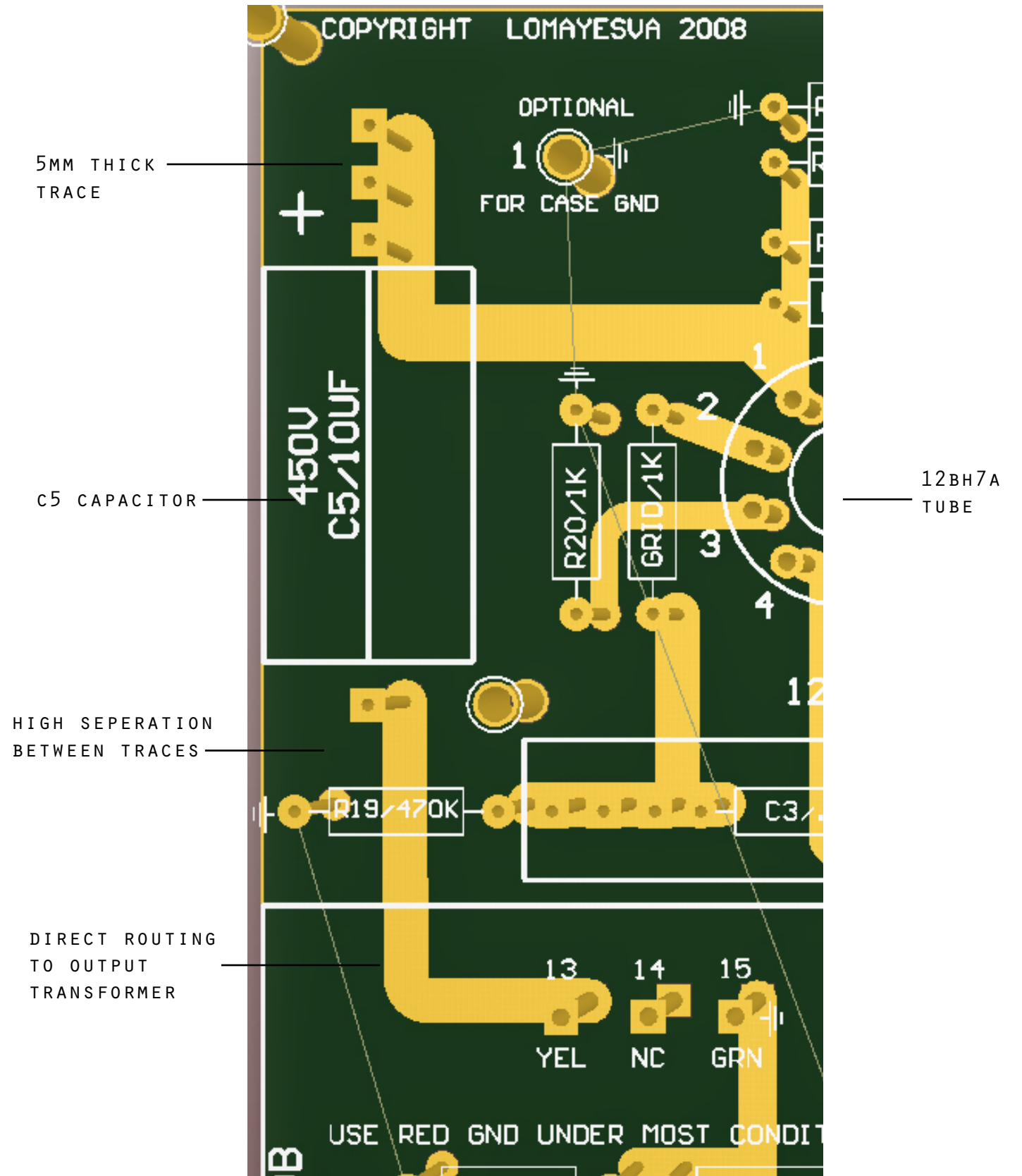
NON POLARIZED CAPS CAN BE USED HERE ALLOWING YOU TO USE SOME OF THE HIGH-END TYPE CAPS LIKE MUNDORF OR SOLEN IN THE 500V RANGE.

INTERESTING ENOUGH , THIS CAP CAN HAVE A SUBTLE EFFECT ON THE AUDIO. HOWEVER SMALL , IT IS ENOUGH TO BE HEARD.

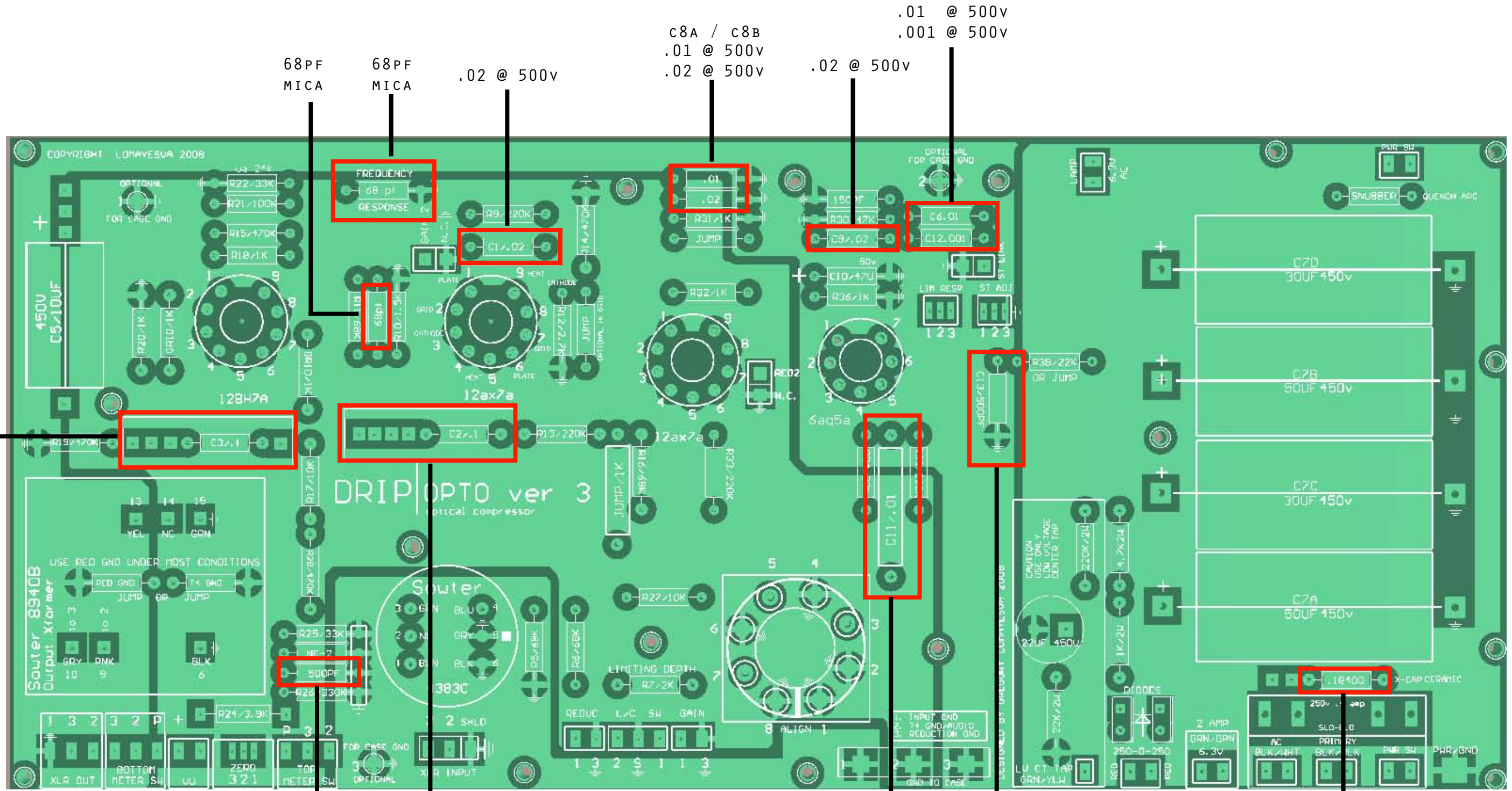
FOR THE MOST PART I WOULD RECOMMEND THE CDE MALLORY TC72 CAP AS PICTURED ABOVE. IT HAS A SLIGHTLY DARK FEEL TO IT AND IS VERY SMOOTH SOUNDING.

MOST OF THESE CAPS ARE RELATIVELY INEXPENSIVE , SO I WOULD ENCOURAGE YOU TO EXPERIMENT WITH DIFFERENT BRANDS.

(FOR C5 YOU CAN USE CAPACITORS WITH A HIGHER VOLTAGE RATING THEN THE 450V MINIMUM)



.1 @ 400  
AXIAL



68PF  
MICA

68PF  
MICA

.02 @ 500v

c8A / c8B  
.01 @ 500v  
.02 @ 500v

.01 @ 500v  
.001 @ 500v

.02 @ 500v

FREQUENCY  
RESPONSE  
68 pF

C1 & C2

C8A  
C8B

C9 & C10

C6, C7  
C12, C13

C3 & C4

C2 & C1

C11

C13

500PF  
MICA

.1 @ 400  
AXIAL

C13 500PF  
@500V MICA

OPTIONAL XCAP  
.1@400V CERAMIC

NON ELECTROLYTIC CAPACITORS | LEGEND

c11 .01@500v  
AXIAL

# NON ELECTROLYTIC CAPACITORS

---

CHOOSING CAPACITORS FOR YOUR PROJECT CAN BE DAUNTING ,  
THERE ARE SO MANY CHOICES AVAILABLE .  
MOST RADIAL AND AXIAL LEADED CAPS WILL FIT.

ON THE ORIGINAL UNIT ALL .01 AND .02 CAPACITORS ARE CERAMIC .  
(Z5U RATED , MOST SEEM IN THE 1-2 KILOVOLT RANGE , ALTHOUGH CAPS  
RATED FOR 500V WILL DO FINE IN ALL INSTANCES)  
THERE IS NOTHING SPECIAL ABOUT CERAMICS , THEY ARE LOW GRADE  
STANDARD DUTY CAPACITORS,  
HOWEVER THEIR QUALITY THEY MIGHT BE ESSENTIAL TO THE ORIGINAL  
SOUND.

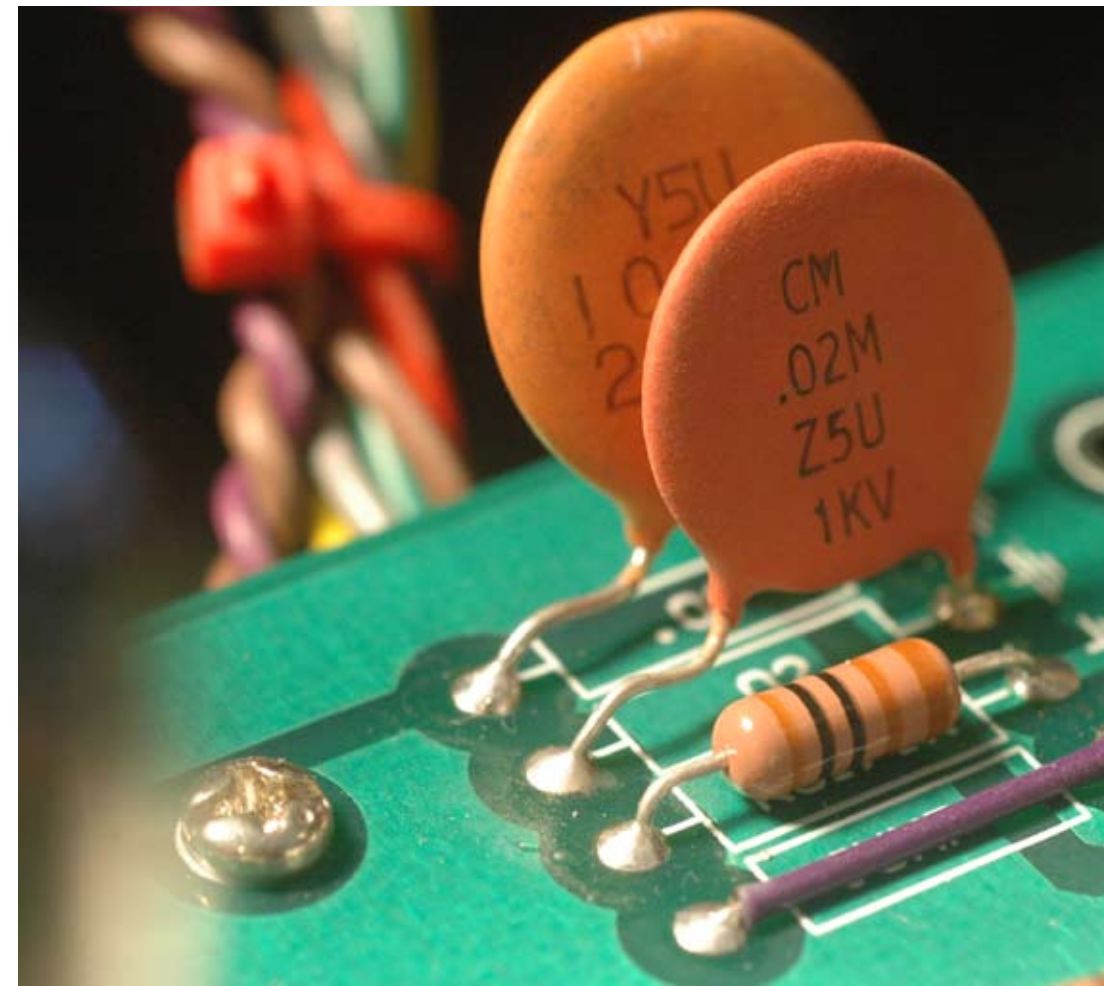
THE .1 CAPS ARE POLYESTER RATED FOR 400V  
(THIS IS A GREAT PLACE FOR AUDIOPHILE OR VINTAGE CAPS)

THE .001 CAP IS USUALLY MICA (300-500V IS FINE).

**NOTE :THERE IS NO POLARITY WITH THESE CAPS , SO THEY CAN BE  
SOLDERED IN ANY DIRECTION , ONLY WITH THE ELECTROLYTICS IS  
THERE A NEED FOR PROPER POLARITY ALIGNMENT.**

THE USE OF VINTAGE CAPACITORS CAN REALLY HAVE A COOL EFFECT ON THE  
TONE OF THE PROJECT , BUT YOU WILL NEED TO CHECK THEM FOR CONSISTENCY,  
MANY VINTAGE PARTS INCLUDING NEW OLD STOCK CAN BE DEFECTIVE OR  
SIMPLY DEAD.

---



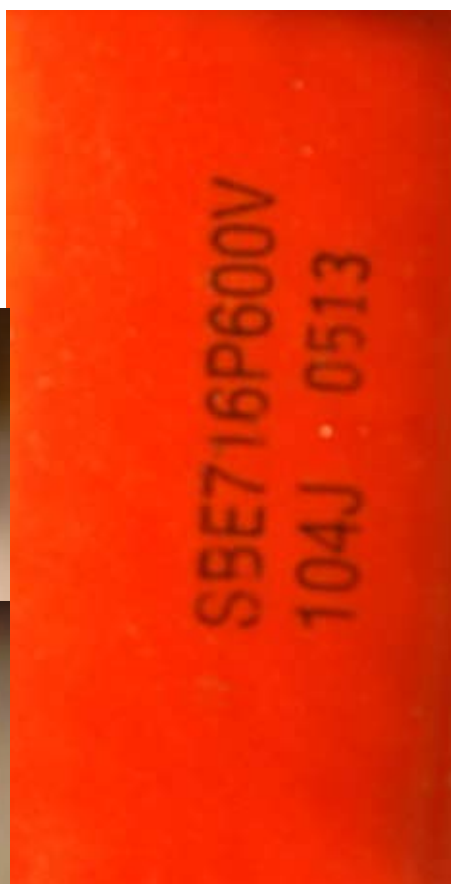
SOME OF THE COMPONENT FOOTPRINTS ON THE  
VERSION 3 BOARD HAVE BEEN ENLARGED TO  
ACCOMMODATE LARGER MODERN AND VINTAGE CAPS.

I TEND TO USE CERAMIC CAPS  
FOR THE 6AQ5A AND THE 12AX7#2 SECTION.

SAVING THE MORE EXPENSIVE CAPS FOR  
THE GAIN AMPLIFIER SECTION .  
(12BH7A/12AX7#1)

ONE APPROACH IS TO BUILD THE PCB  
USING QUALITY AND RELIABLE MODERN  
PARTS , THEN AFTER ALL TROUBLESHOOTING  
HAS BEEN COMPLETED AND THE UNIT  
IS WORKING WELL ,  
REPLACE THE MODERN CAPS WITH  
VARIOUS VINTAGE STYLES.  
THIS APPROACH MIGHT SAVE TIME  
AND HEADACHES DUE TO FAULTY PARTS.



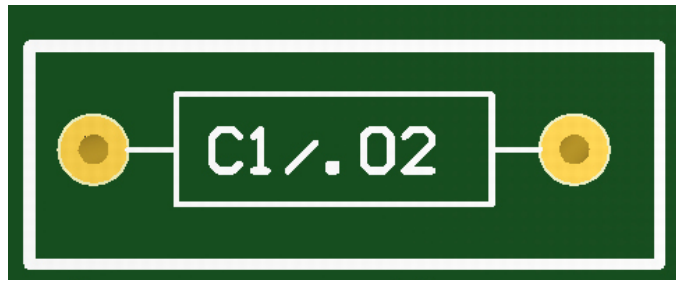


MANY PEOPLE USE THE 'ORANGE DROP' VARIETY OF CAPS, EITHER THE 716 OR THE 715 SERIES. THEY ARE RELIABLE POLYPROPYLENE CAPACITORS OFTEN USED IN GUITAR AMPS, AND THE 'SOUND' OF THEM IS LIKED. THEY WILL NEED TO BE THE 600V RANGE.

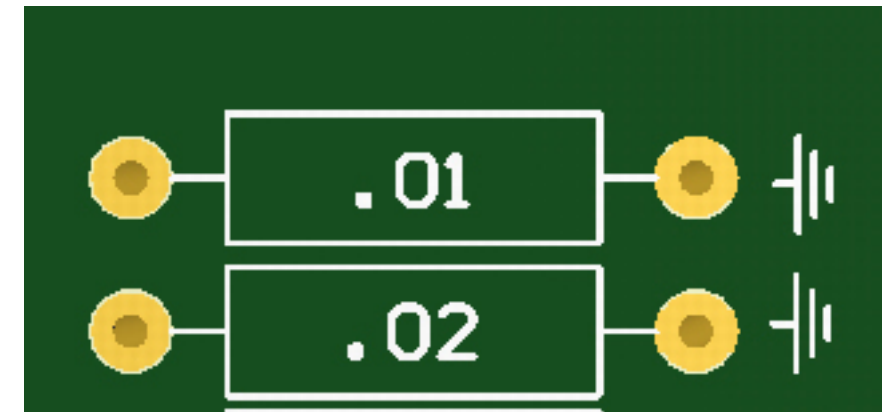
THE CODES TO IDENTIFY THEM ARE :

102J : .001 CAP  
103J : .01 CAP  
104J : .1 CAP  
223J : .022 CAP (.022 REPLACES THE .02)

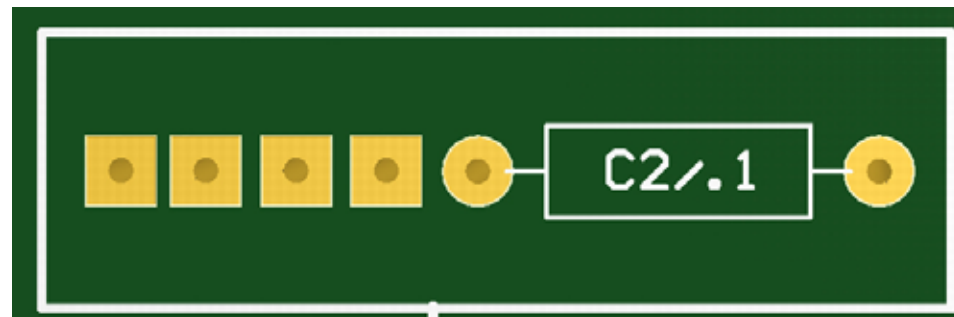
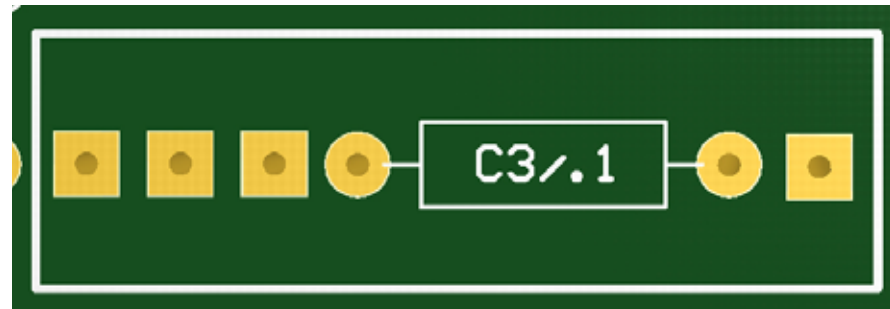




THIS CAP IS IN THE AMPLIFIER SECTION OF THE PCB  
 LOCATED ABOVE THE 12AX7.  
 THE ORIGINAL UNIT USES A CERAMIC 2KILOVOLT Z5U  
 THERE IS A LARGE ENOUGH FOOTPRINT TO USE ORANGDROPS HERE.

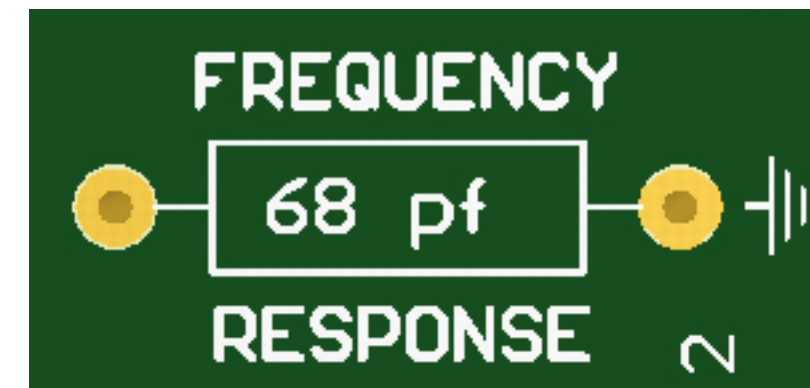


THESE TWO CAPS ARE C8A AND C8B THE ORIGINAL UNIT USES  
 A .03 CAP SO THESE TWO VALUES IN PARALLEL CREATE A .03 .  
 THEY ARE UN MARKED , BUT ARE LOCATED ABOVE THE 2ND 12AX7.  
 USE 1-2 KILOVOLT CERAMIC HERE.  
 IT IS POSSIBLE TO USE ORANG DROPS , BUT SPACE IS LIMITED



FOR BOTH C2 AND C1 YOU WILL USE .1 CAPACITORS ,  
 THE FOOT PRINT ALLOWS FOR A MUCH LARGER CAP HERE.  
 WITH OPTIONS IN SPACING PADS FOR A BETTER FIT .  
 THE USE OF HIGH END BOUTIQUE CAPACITORS IS ENCOURAGED.

THE ORIGINAL UNITS USE A 400V .1 POLYESTER TYPE CAP.  
 THE TONE OF THE COMPRESSOR IS EFFECTED BY THESE CAPS .  
 SO IT IS A GOOD AREA TO PLAY WITH DIFFERENT STYLES  
 AND BRANDS.



FOR THE FREQUENCY RESPONSE CAP US A MICA CAP .  
 68 PF IS THE NORM HERE , GIVING A NICE LINER RESPONSE  
 THE USE OF ARCO 465 VARIABLE CAPS CAN BE USED HERE.  
 REFER TO 'VARIABLE CAPACITORS' SECTION BELOW



FOR C9 YOU SHOULD ALSO USE A 2 KILOVOLT CERAMIC .02 CAPACITOR , ORANG DROPS OR EQUIVALENT MY BE USED HERE IF SPACE IS AVAILABLE



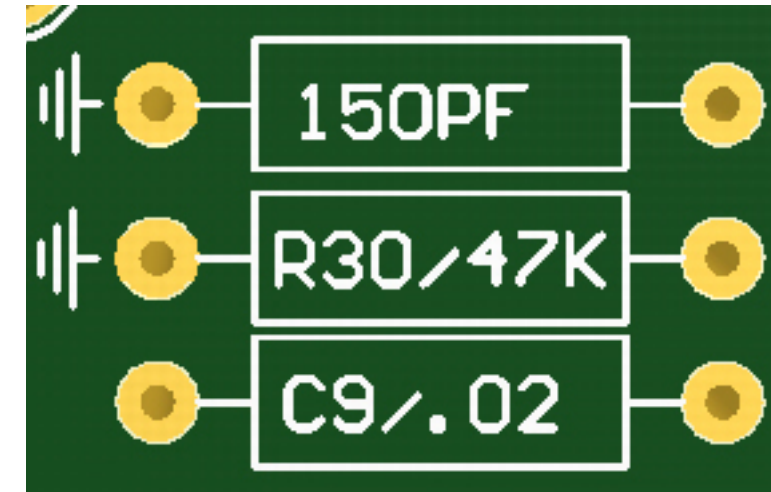
THIS CAP IS LOCATED NEXT TO THE NE-2 LIGHT USE A MICA CAP HERE.



C11 IS A .01 CAPACITOR , THIS CAP CONNECTS THE T4B TO THE REDUCTION CIRCUIT. I WOULD RECOMMEND A NICE AXIAL LEADED CAP SUCH A SOZA OR SOMETHING HIGH QUALITY.

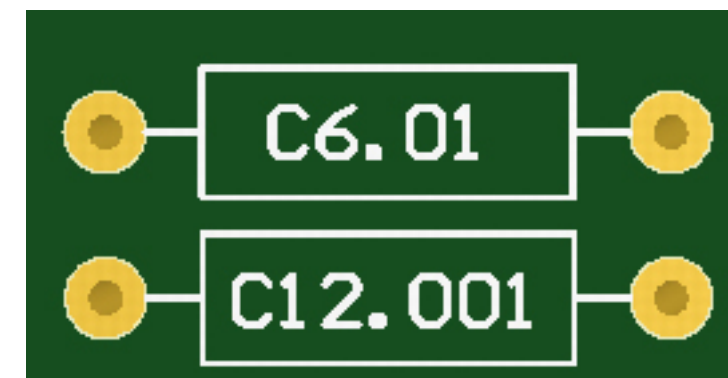


THIS CAP IS IN PARALLEL WITH R11 , USE A MICA CAP HERE



LOCATED ABOVE THE 6AQ5A TUBE , YOU WILL FIND THESE FOOT PRINTS THE 150 PF CAP IS C14 ON THE SCHEMATIC , A VARIABLE CAP WAS NORMALLY IMPLEMENTED HERE , BUT A SIMPLE 150PF MICA CAP WORKS BEST.

C9 CAP SHOULD ALSO BE A CERAMIC .02 1-2KILIVOLT RANGE.



C6 CAN BE A CERAMIC 2KILOVOLT Z5U  
C12 IS NORMALLY A MICA CAP , BUT A SMALL ORANGDROP WORKS WELL

## VARIABLE CAPACITORS :

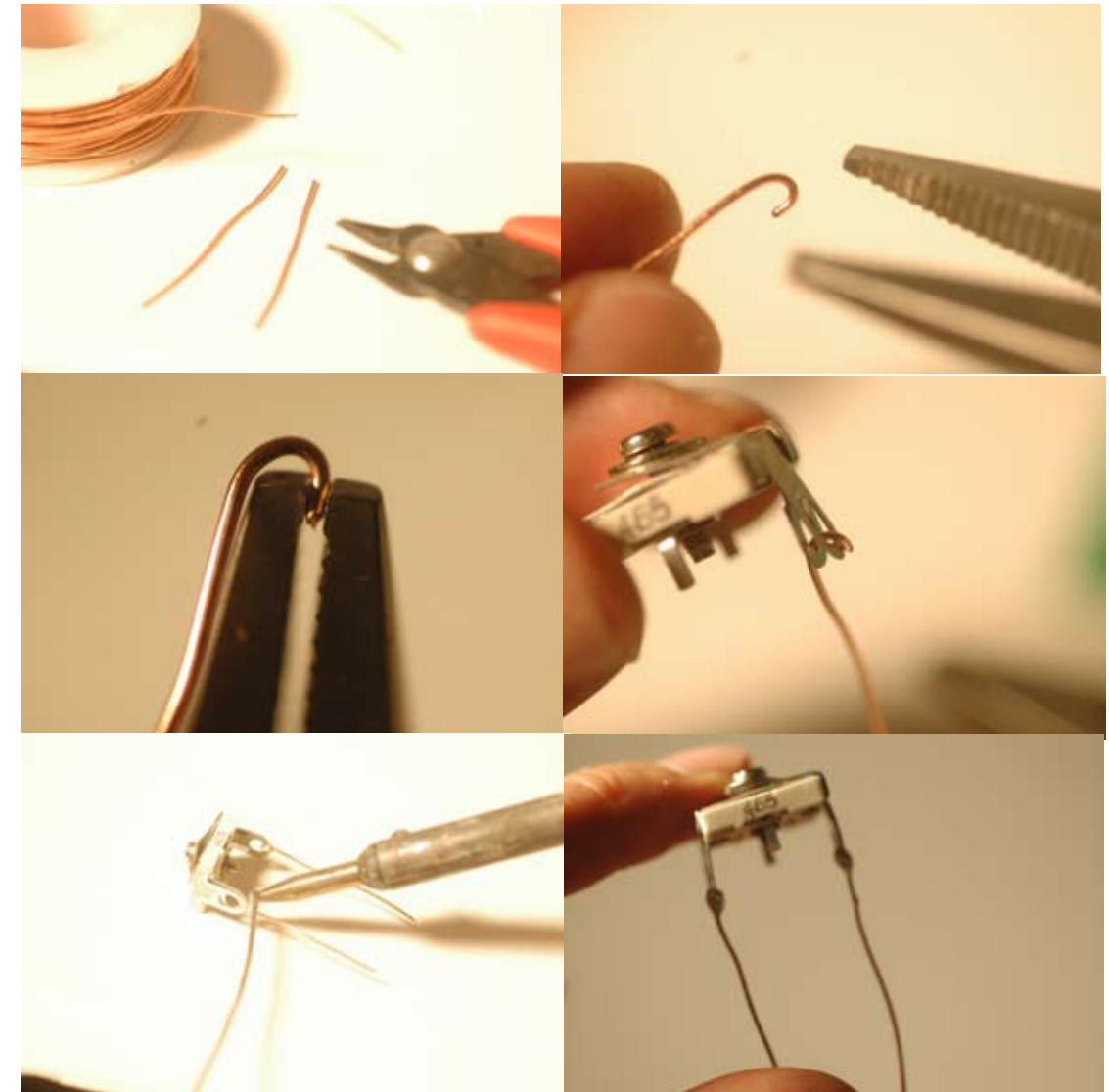


THE ORIGINAL CAPS FOR C4 AND C14 ARE THE ARCO 465 VARIABLE MICA TRIMMING CAPACITORS RATED AT 175 VOLTS AND ARE ADJUSTABLE FROM 75PF TO 380 PF.

YOU CAN USE A FIXED VALUE CAP IN PLACE OF USING THE ARCO'S.  
68 PF CERAMIC FOR C4 (RATED FOR 300V)  
150 PF CERAMIC FOR C14 (RATED FOR 300V)  
(USING FIXED VALUES CAN HELP FOR THE TUNING OF STEREO LINKED UNITS)

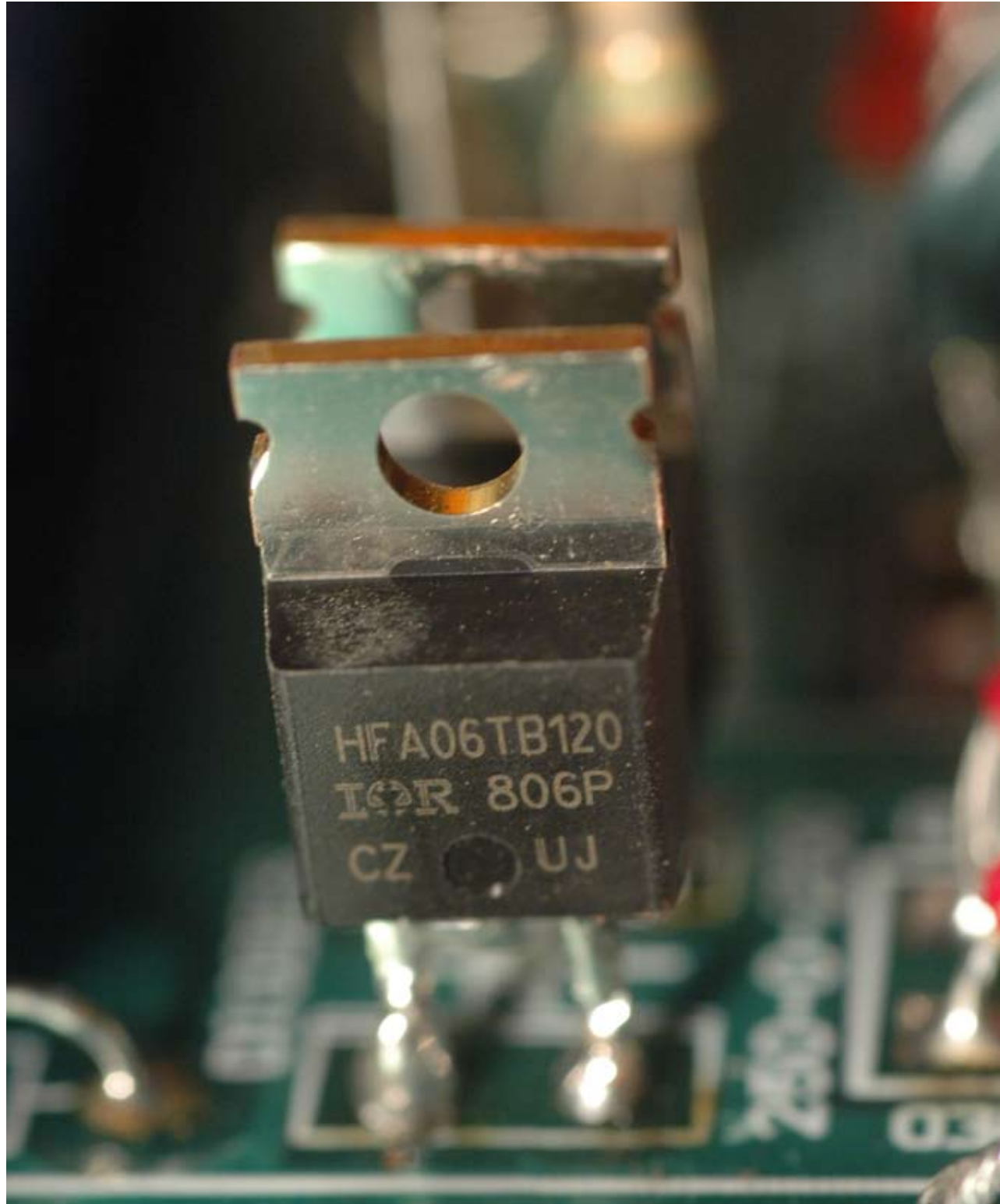
C4 IS USED TO ADJUST THE FREQUENCY RESPONSE OF THE COMPRESSOR.  
A HIGHER CAPACITANCE MAKES FOR A BRIGHTER RESPONSE.  
THE ORIGINAL UNITS ALL SEEM TO LAND AROUND 68-120-150 PF.  
IT IS BEST TO USE A DIGITAL MULTI METER TO MEASURE AND SET THE CAPACITANCE BEFORE ADDING LEADS AND SOLDERING IT TO THE PCB.  
USING A SMALL SCREWDRIVER DIAL IN THE WANTED CAPACITANCE WHILE OBSERVING THE MULTIMETER, THE TIGHTER THE SCREW, THE MORE CAPACITANCE.

(IN MOST CASES JUST USE AN ARCO FOR C4  
AND USE A FIXED CAP FOR C14)

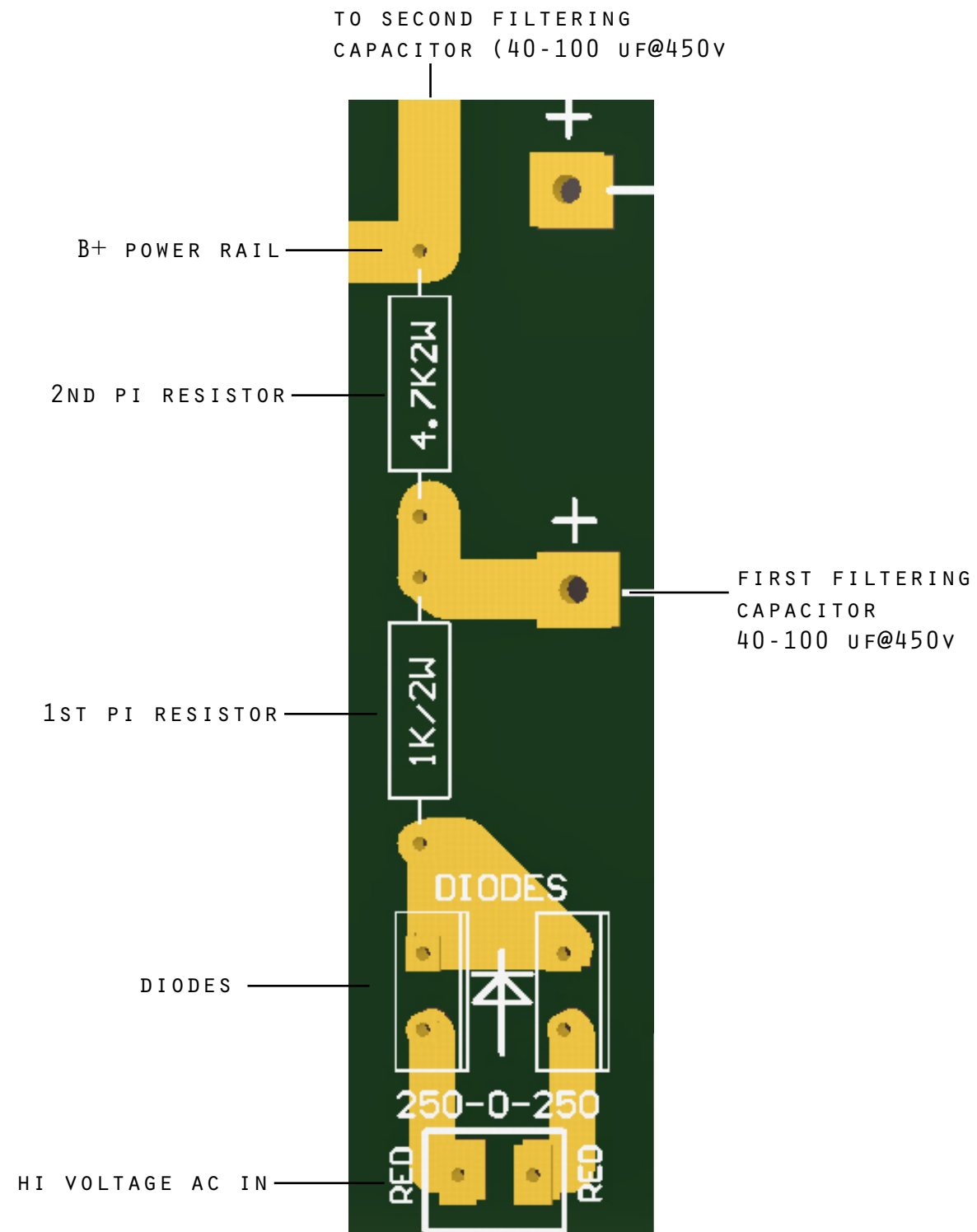


ONCE THE CAP HAS BEEN ADJUSTED FOR VALUE, YOU WILL NEED TO ADD LEADS TO IT FOR MOUNTING ONTO THE PCB.  
USING 24-20 GAUGE WIRE SIMPLY CUT TWO PIECES TO A 1" LENGTH AND SOLDER TO EACH LEG OF THE ARCO.





PARTS | DIODE | INFO



THE POWER SECTION IS THE FOUNDATION ON WHICH THE ENTIRE CIRCUIT STANDS, THE SIMPLICITY OF THIS CIRCUIT SHOULD NOT BE UNDER ESTIMATED, USING 4MM TRACES AND 30Z COPPER THIS COMPACT DESIGN IS VERY EFFECTIVE IN PERFORMANCE AND OPERATION. IT IS THIS AREA WHERE YOU SHOULD USE THE HIGHEST QUALITY PARTS AVAILABLE . I WOULD RECOMMEND CADDOCK: MS223 RESISTORS AND CREE SILICON CARBIDE DIODES OR HEX FREDS.

## DIODES

THE ORIGINAL CIRCUIT USED STANDARD ISSUE 10 CENT 1N4007 DIODES WHICH CAN STILL BE USED FOR THE PCB.

THE DIODES SHOULD BE RATED FOR 1AMP @ 1000V MINIMUM.

THE TRANSFORMER HV PUTS OUT ABOUT 500V BUT THE STARTUP SURGE COULD BE MORE , 600V DIODES COULD BE A LITTLE TOO CLOSE TO THE EDGE OF THEIR OPERATING SPECIFICATIONS STICK TO THE 1000V TYPE.

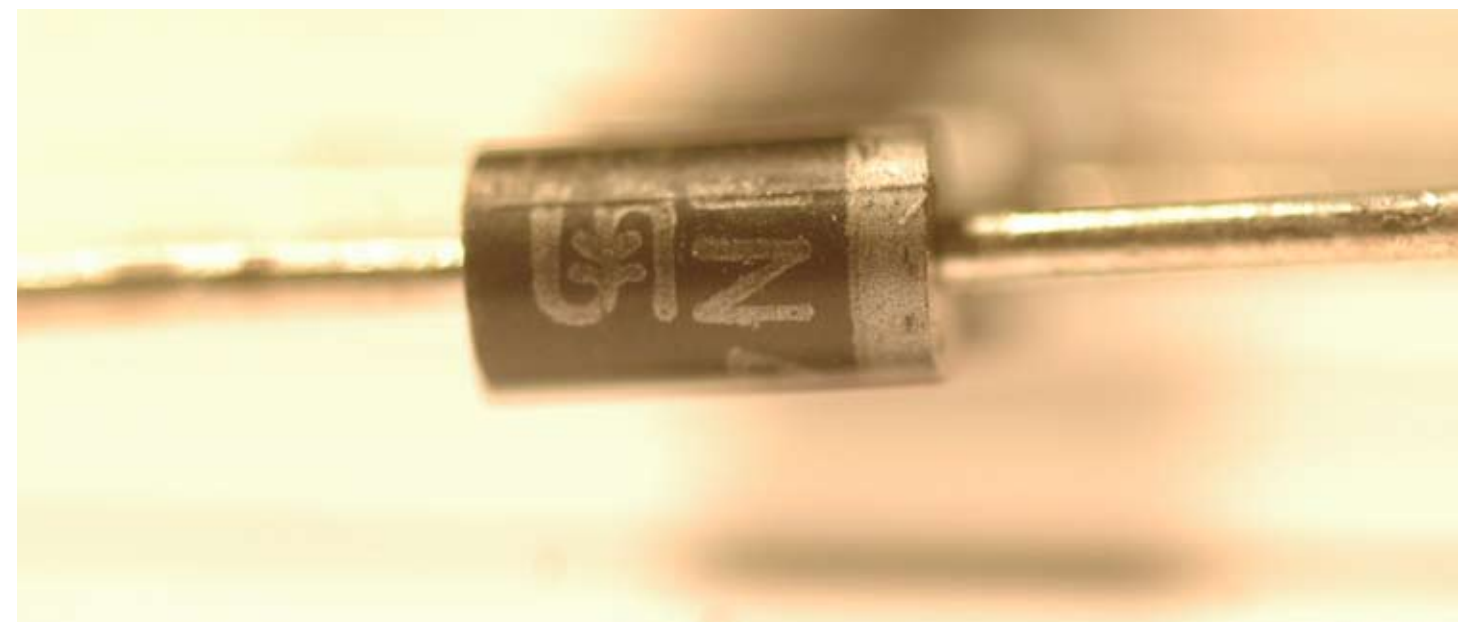
THE BOARD IS DESIGNED FOR FRED OR HEX FRED (ULTRA FAST SOFT RECOVERY ) (TO220 CASE) DIODES ON AVERAGE THESE COST UPTO 10\$ APIECE , BUT ARE WELL WORTH THE PRICE.

THE RECOVERY TIME ON SOME BRANDS IS ALMOST NEGLIGIBLE , AND THE SWITCHING NOISE FOUND IN 1N4007'S IS VERY LOW.

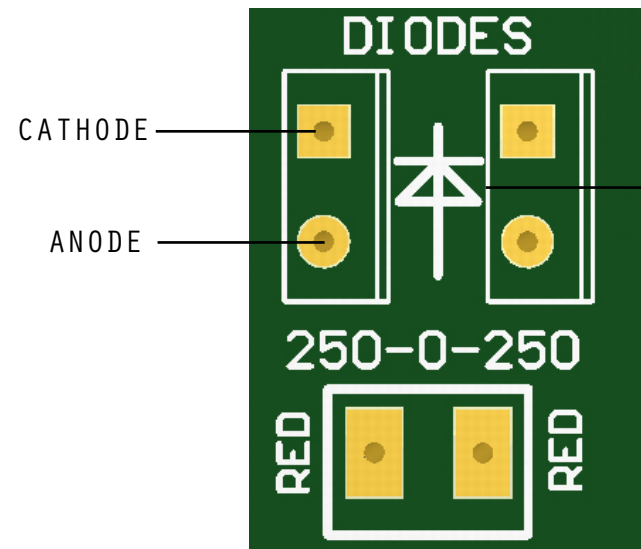
AS ONE PERSON SAID :

“THE EFFECT IS, THAT YOU GET ALL THE PUNCH, SMOOTH AND EQUALLY BRILLIANT TOP END, BETTER RESPONSIVENESS THAT YOU WOULD GET WITH FULLY TUBE-FEATURED RECTIFIER “

THE CATHODE ON A 1N4007 IS DESIGNATED BY A WHITE BAND ON THE DIODE BODY, THIS LINE SHOULD BE ON THE CATHODE SIDE OF THE PCB FOOTPRINT.

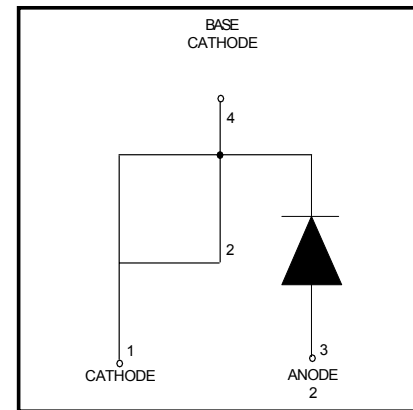


NOTE : THE DIODES ARE ONE WAY DEVICES , THEY MUST BE PLACED IN THE PROPER DIRECTION OR DAMAGE TO OTHER COMPONENTS MAY OCCUR.  
 DIODES ARE VERY SENSITIVE TO ELECTROSTATIC CHARGES.



TAKE NOTICE OF THE ARROW SYMBOL IN BETWEEN THE DIODE FOOT-PRINTS.  
 USE THIS TO MATCH UP TO THE SCHEMATIC OF YOUR CHOSEN SEMI-CONDUCTORS.

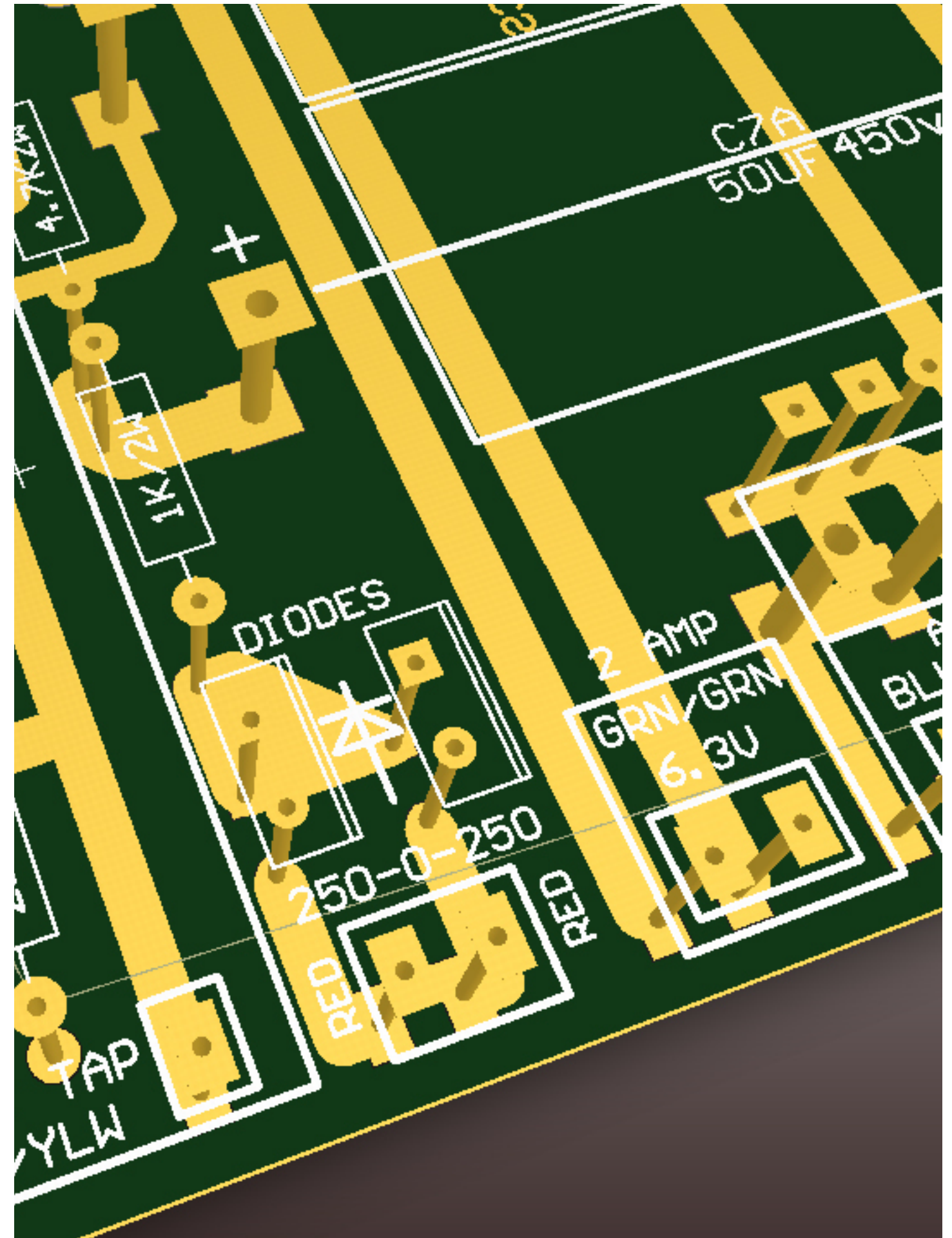
THE CATHODE IS THE SQUARE PAD THE IS THE CIRCULAR PAD.

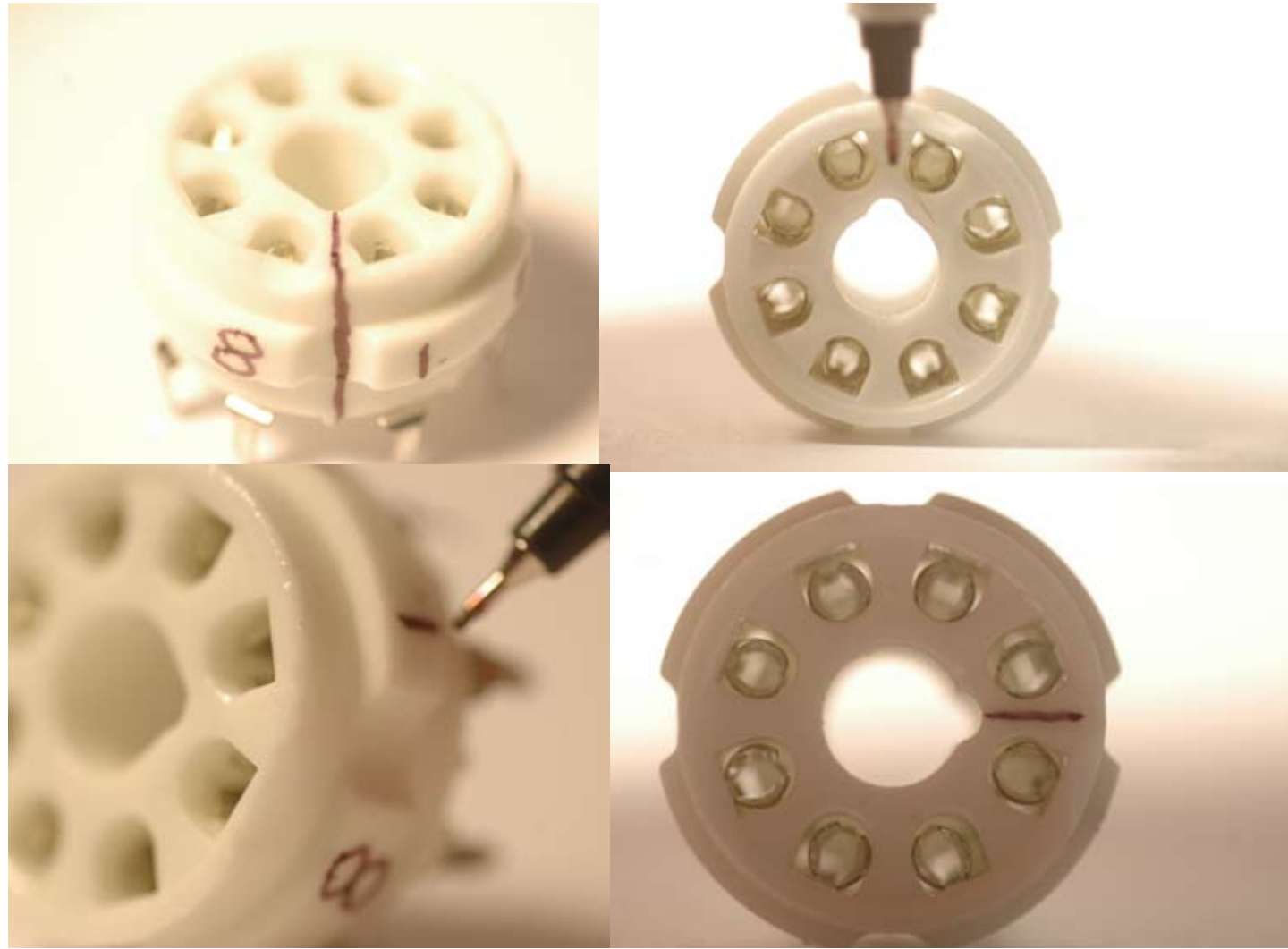


HERE IS THE SCHEMATIC FOR A HEXFRED DIODE (1200V 6AMP) HFA06TB120

NOTE : WHEN POWERED ,SOME OF THE HIGHEST VOLTAGES AND AMPS OCCUR AT THIS AREA ON THE .

IT IS IMPORTANT TO REMEMBER THAT THE METAL PLATE ON TOP OF THE FRED IS ALSO THE CATHODE , AND HIGH VOLTAGE TRAVELS THROUGH IT , AVOID THIS AREA ONCE THE UNIT IS ACTIVE, ALSO A SHORT TIME AFTER THE UNIT IS TURNED OFF.





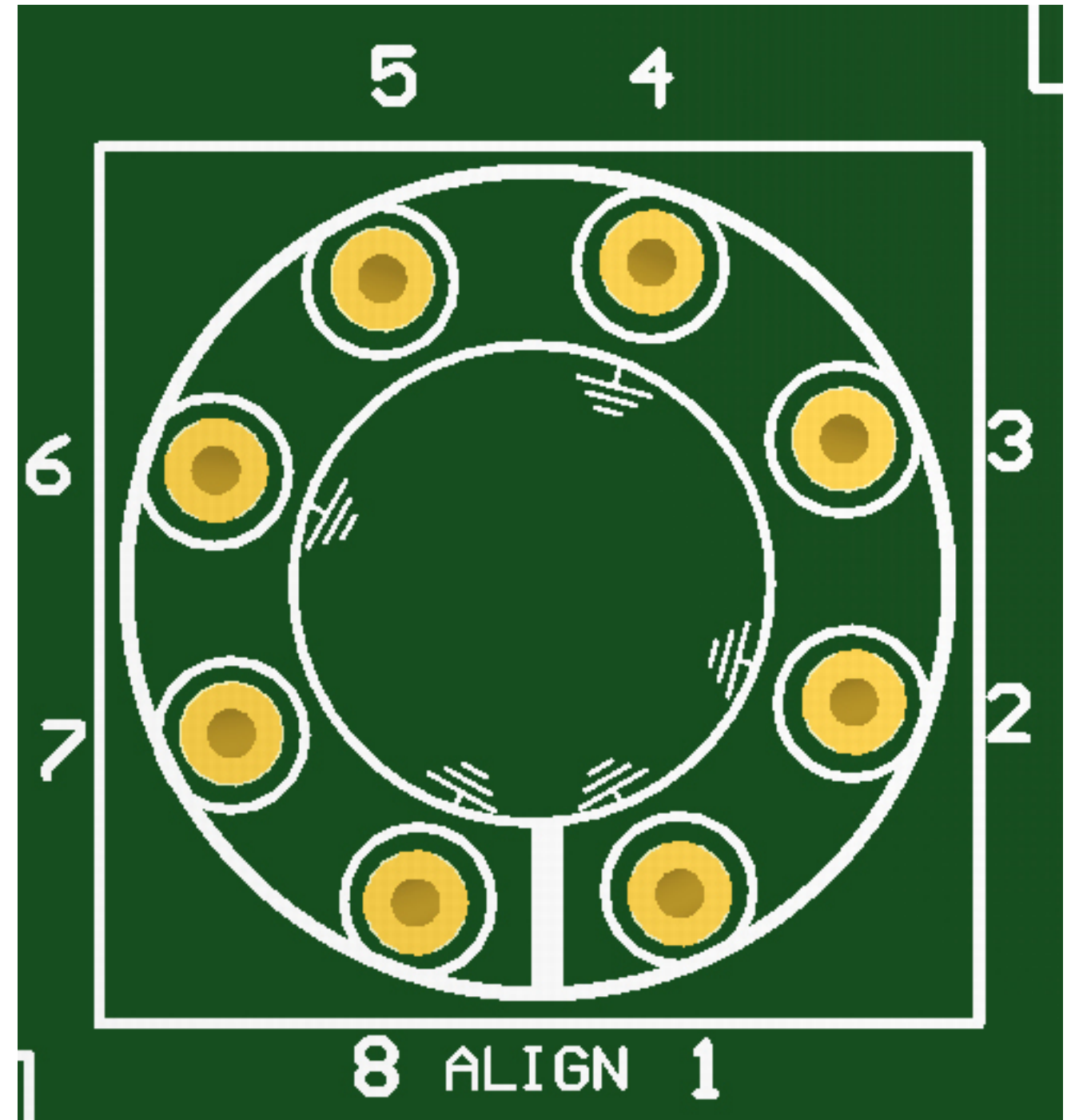
## PARTS | OCTAL SOCKET | INFO

FOR ATTACHING THE OPTICAL CELL TO THE PCB , YOU WILL USE A 8 PIN PCB MOUNT OCTAL SOCKET. CERAMIC WORKS BEST FOR THIS.

IT IS IMPORTANT TO NOTE THAT IT IS ESSENTIAL TO ALIGN THIS PROPERLY.

IN THE ABOVE PHOTO YOU WILL SEE HOW THE SOCKET IS NUMBERED. TAKE NOTICE OF THE INNER CIRCLE AND SMALL INDENT . THE NUMBER 8 PIN IS TO THE LEFT OF THE DENT AND THE NUMBER 1 PIN IS TO THE RIGHT. THESE NUMBERS WILL CORRESPOND TO THE FOOTPRINT ON THE PCB.

**NOTE :** YOU CAN SEVERELY DAMAGE THE EXPENSIVE OPTICAL CELL IF YOU MISALIGN THE OCTAL SOCKET. TAKE YOUR TIME AND DOUBLE CHECK PLACEMENT BEFORE SOLDERING.



ONCE YOU HAVE MARKED YOUR OCTAL SOCKET , ALIGN THE SOCKET WITH THE FOOT PRINT ON THE PCB . TAKING CARE TO MATCH UP THE LINE BETWEEN PINS 1 AND 8.

SIMPLY PLACE AND SOLDER .



# PARTS | VU.

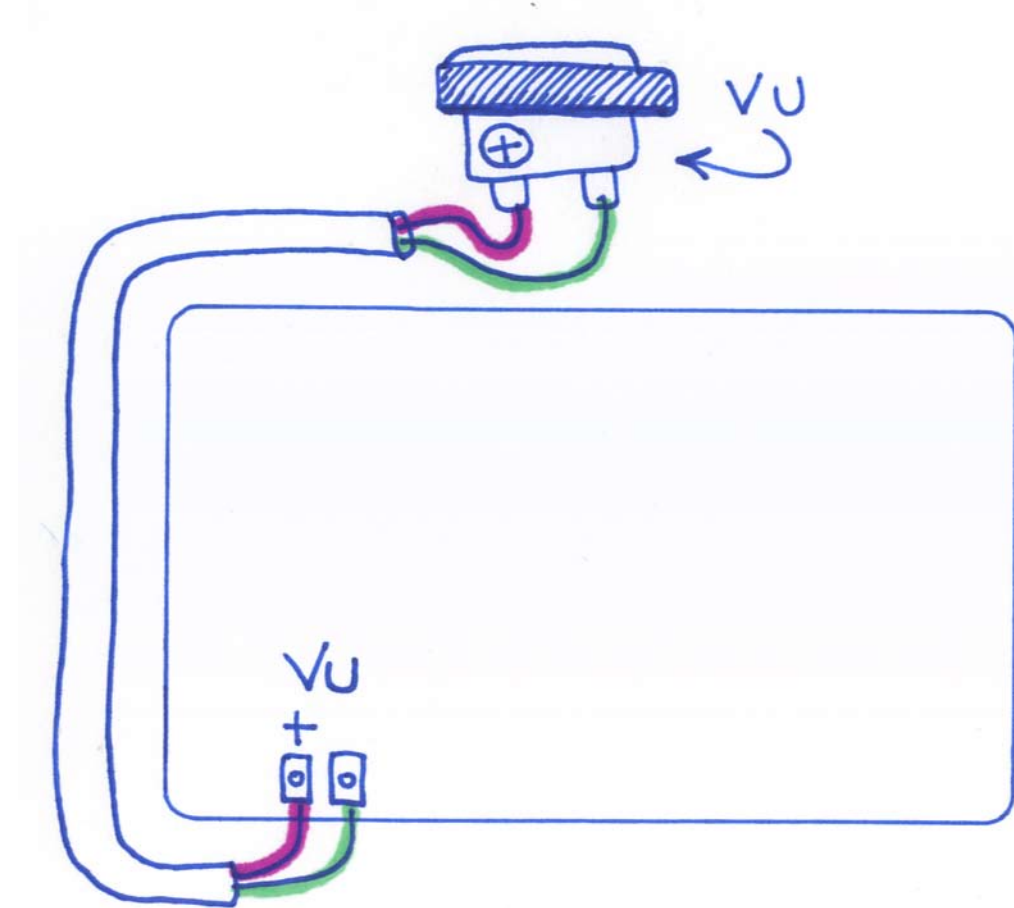
IT IS OFTEN ASKED 'WHO WOULD USE ANYTHING OTHER THEN THEIR EARS WHEN USING THE COMPRESSOR TO CONTROL THE GAIN AND REDUCTION?'

IT IS POSSIBLE TO USE AN OFF THE SHELF ECONOMY MODEL VU METER, BUT THE COMPRESSOR IS HYPER FINICKY ABOUT THE VU METERS IT LIKES.

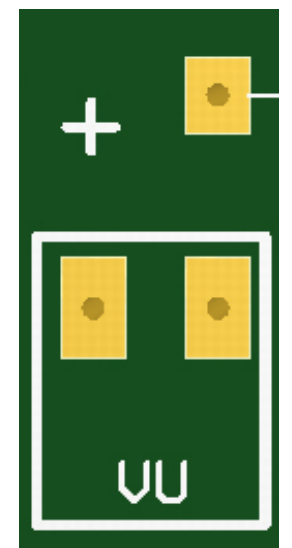
A BRAND CALLED SIFAM MAKES MODERN VINTAGE LOOKING METERS WITH TRUE VU STANDARDS.

WHEN IT COMES TO METERS , SIFAM IS THE WAY TO GO HANDS DOWN.

YOU CAN ALSO USE VINTAGE METERS AVAILABLE ON MOST AUCTION WEB SITES.



NOTE :  
WITH SOME STYLES AND BRANDS OTHER THEN SIFAM , YOU MIGHT HAVE TO BUILD A RECTIFIER CIRCUIT FOR YOUR METER TO WORK PROPERLY. YOU WILL KNOW THIS BECAUSE YOUR METER WILL WORK IN REVERSE.

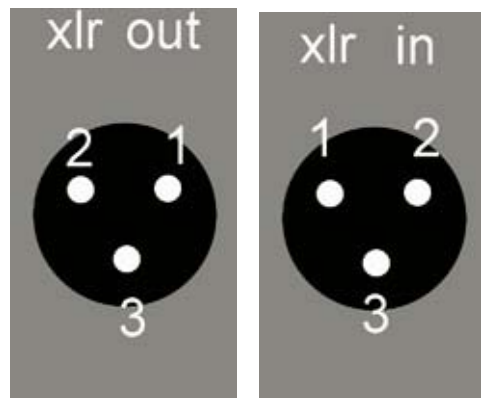


# XLR CONNECTORS



YOU WILL USE 2 CHASSIS MOUNT XLR SOCKETS. ONE FEMALE WHICH YOU WILL USE FOR INPUT AND ONE MALE WHICH YOU WILL USE FOR OUTPUT. (IN THE PHOTO , MALE IS ON THE LEFT)

THERE ARE MANY DEGREES OF QUALITY THAT YOU CAN GET FOR THESE , TRY TO BUY THE BEST YOU CAN AFFORD . THE AUDIO CIRCUIT OF THE UNIT BEGINS AND ENDS HERE. (SWITCHCRAFT AND NEUTRIK ARE SOME GOOD BRANDS TO CONSIDER)



ILLUSTRATED HERE ARE THE PINOUTS FOR THE XLR SOCKETS IF VIEWED FROM THE REAR (SOLDER SIDE)

NORMALLY YOU CAN WIRE YOUR XLRs AS SHOWN BELOW , BUT I FIND THAT USING THE GROUND LIFT SET UP FOR BOTH IN/OUT XLRs PIN 1 (AS ILLUSTRATED ON THE NEXT PAGE) WORKS BEST.

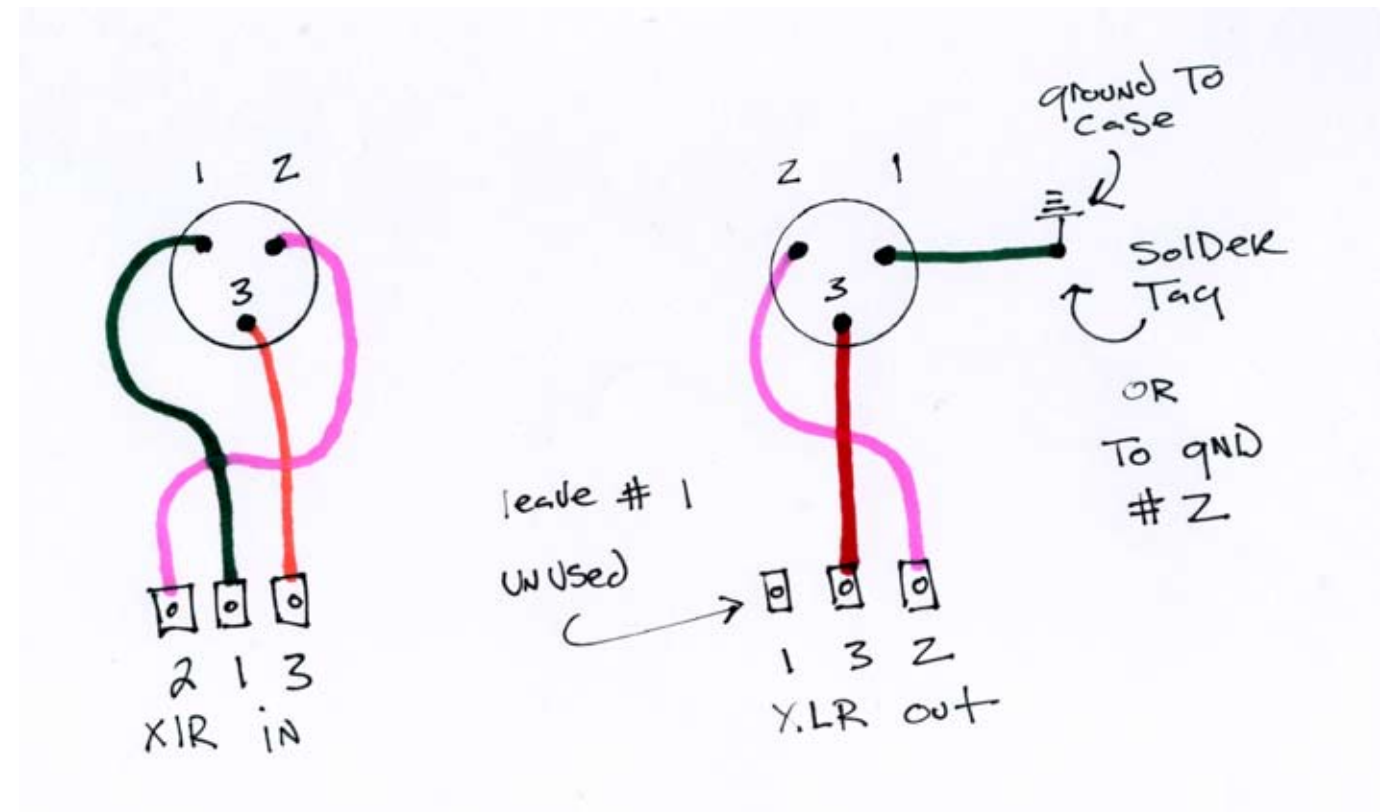
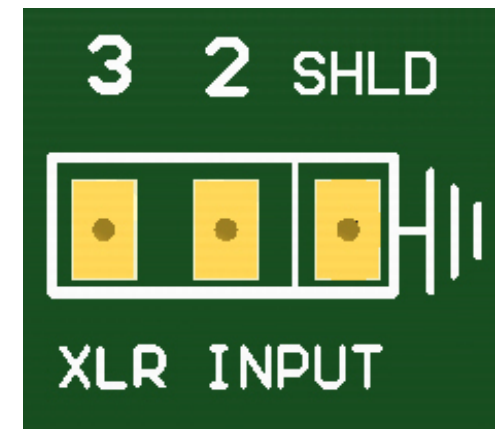
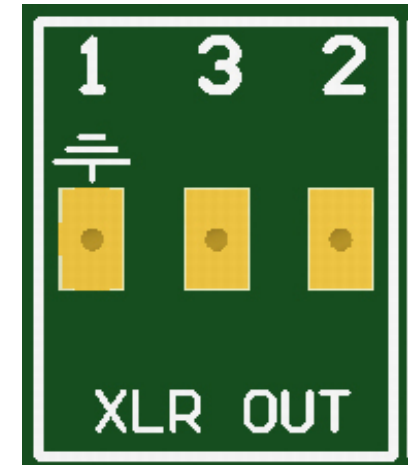
THE XLR OUT PAD #1 ON THE PCB IS NOW LINKED TO THE REDUCTION GROUND .

TRADITIONALLY THE XLR OUT SOCKET'S PIN 1 IS GROUNDED TO THE REDUCTION GND CIRCUIT ON THE PCB, BUT I HAVE HAD GREAT RESULTS BY USING A SOLDER TAG DIRECTLY NEXT TO THE XLR OUT SOCKET FOR THIS.

TRADITIONALLY THE INPUT XLR SOCKETS PIN 1 IS GROUNDED TO A SOLDER TAG NEXT TO THE INPUT XLR SOCKET.

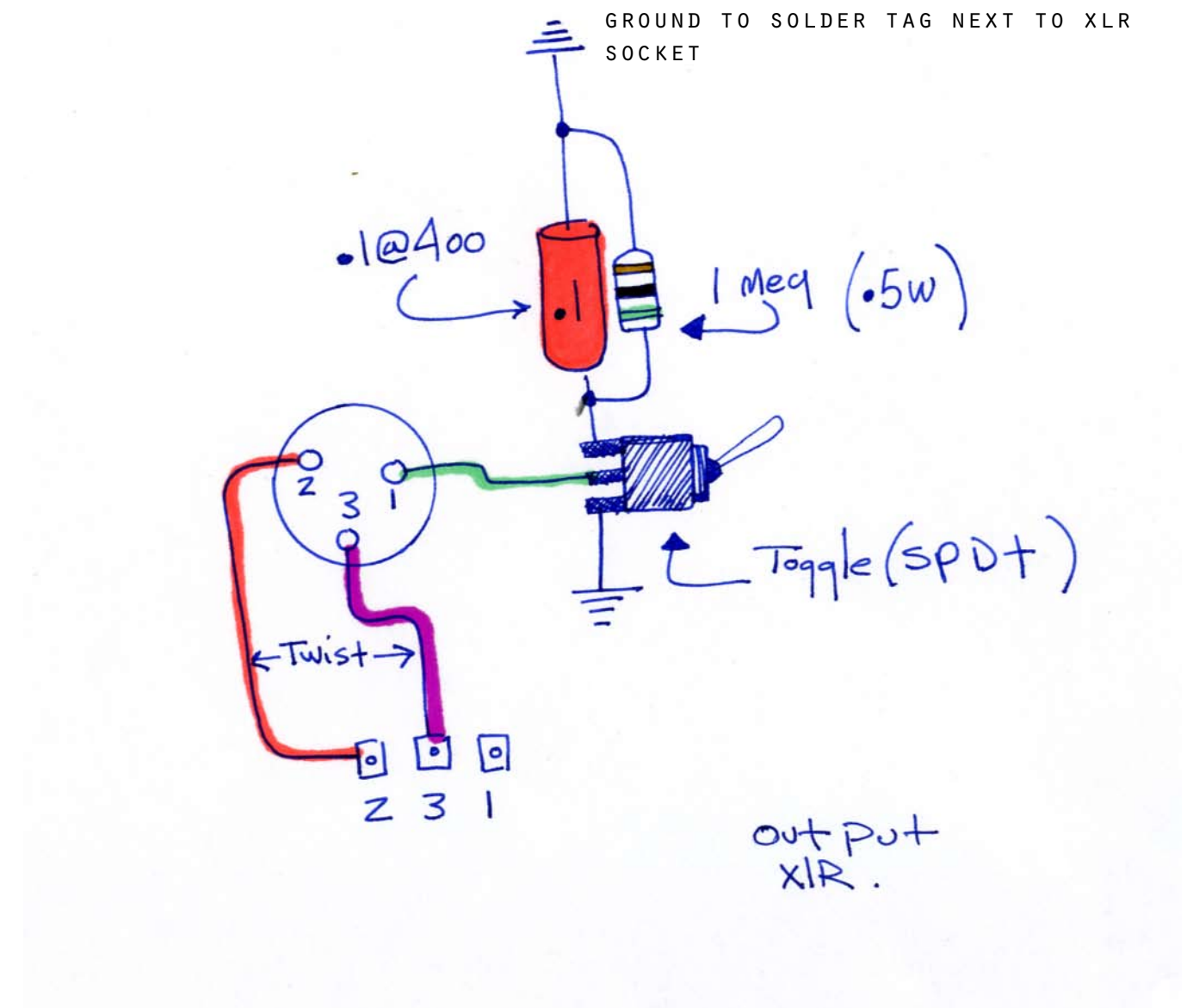
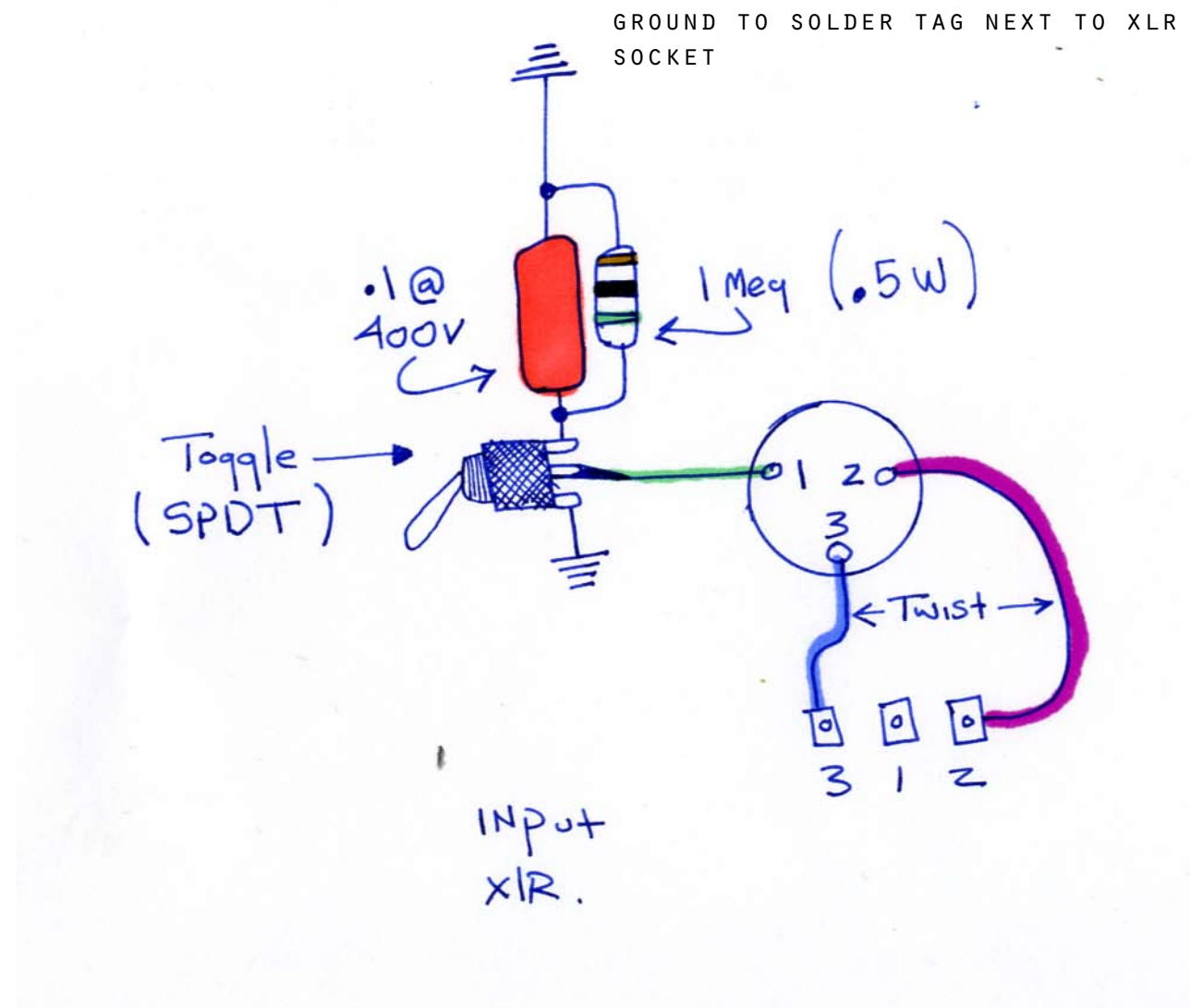
YOU CAN USE SHIELDED WIRE FOR THESE CONNECTIONS , ALTHOUGH IT IS NOT NECESSARY. TWISTING IS FINE

ON THE INPUT/OUTPUT XLR PADS THERE IS A GROUND SYMBOL FOR THE SHIELD IF YOU CHOOSE TO USE SHIELDED WIRE.



# TROUBLESHOOTING | MODS

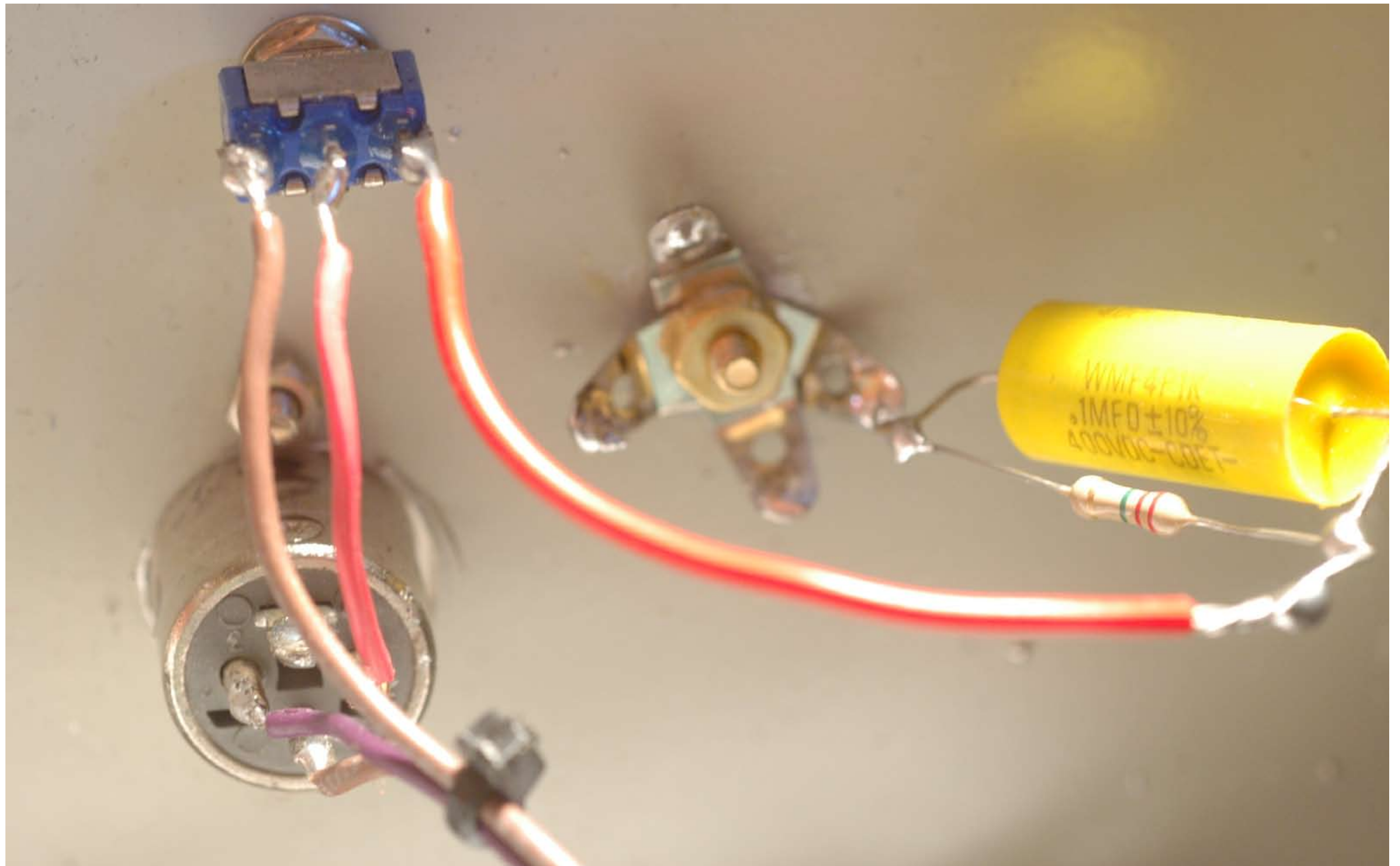
## GROUND LIFT

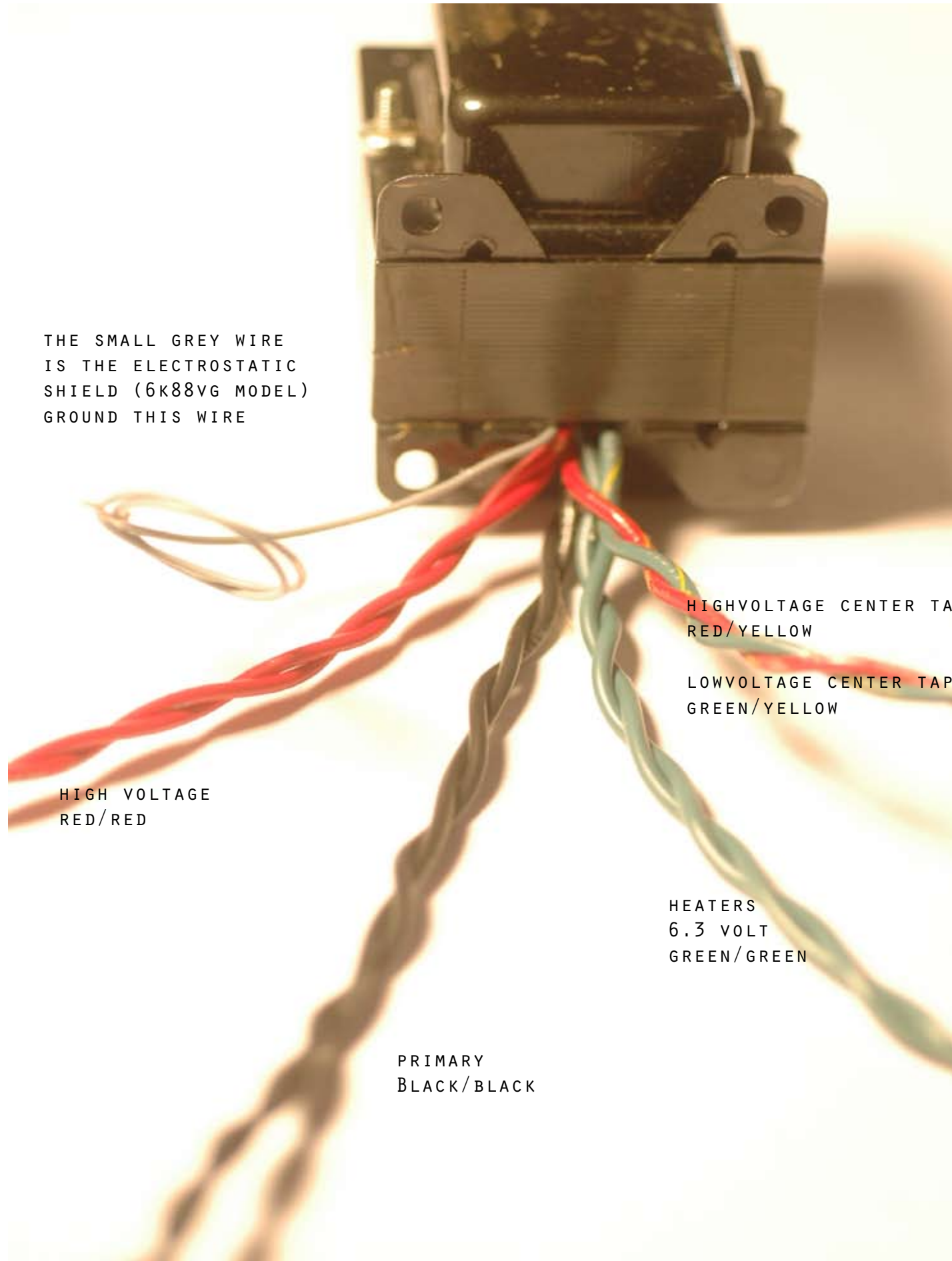


IN SOME SITUATIONS WHEN INTERFACING YOUR UNIT WITH OTHER EQUIPMENT A GROUND LIFT IS HELPFUL IN ELIMINATING MANY DIFFERENT TYPES OF UNWANTED NOISE OR HUM OFTEN ASSOCIATED WITH GROUND LOOPS AND INTERFERENCE.

THE TWO CIRCUITS HERE ILLUSTRATE HOW TO CREATE A GROUND LIFT SWITCH FOR THE BACK OF YOUR UNIT .

NOTE :  
IT IS RECOMMENDED TO INSTALL THIS FROM THE GET GO , THUS ELIMINATING NEEDLESS TROUBLESHOOTING DUE TO INTERFACING CONFLICTS . OR THE NOTORIOUS PIN 1 PROBLEMS .





THE SMALL GREY WIRE  
IS THE ELECTROSTATIC  
SHIELD (6K88VG MODEL)  
GROUND THIS WIRE

HIGHVOLTAGE CENTER TAP  
RED/YELLOW

LOWVOLTAGE CENTER TAP  
GREEN/YELLOW

HIGH VOLTAGE  
RED/RED

HEATERS  
6.3 VOLT  
GREEN/GREEN

PRIMARY  
BLACK/BLACK

## PARTS | POWER TRANSFORMER | INFO



## POWER TRANSFORMER :



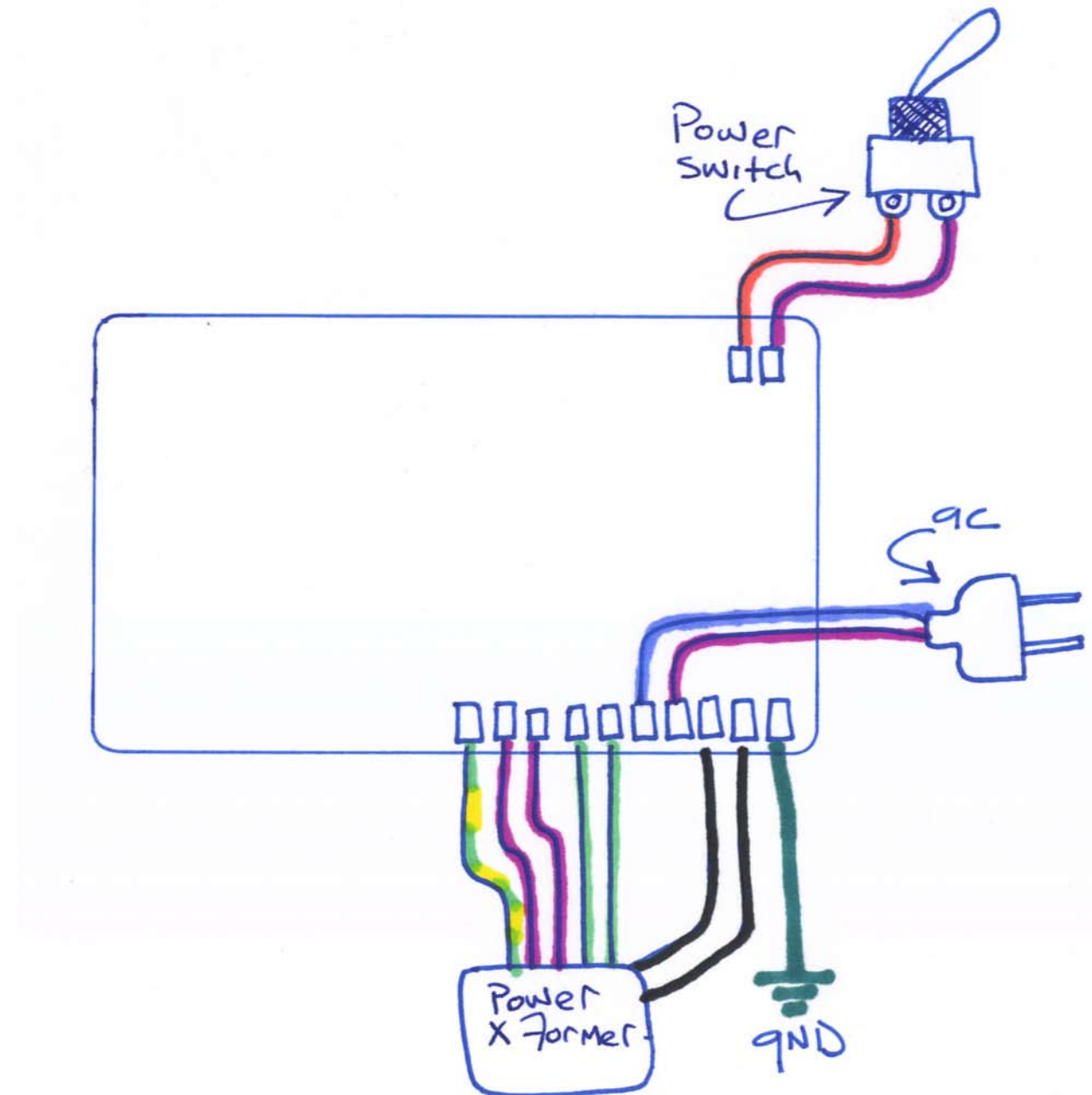
THE TRADITIONAL POWER TRANSFORMER FOR THE CIRCUIT REQUIRES A TRANSFORMER OF 250-0-250 VOLTS CENTER TAPPED @ 40 MILLIAMPERES AND A SECONDARY OF 6.3 VOLTS CENTER TAPPED @ 2 AMPS.

THE PRIMARY CAN BE THE USA 110V OR THE EUROPEAN 240V

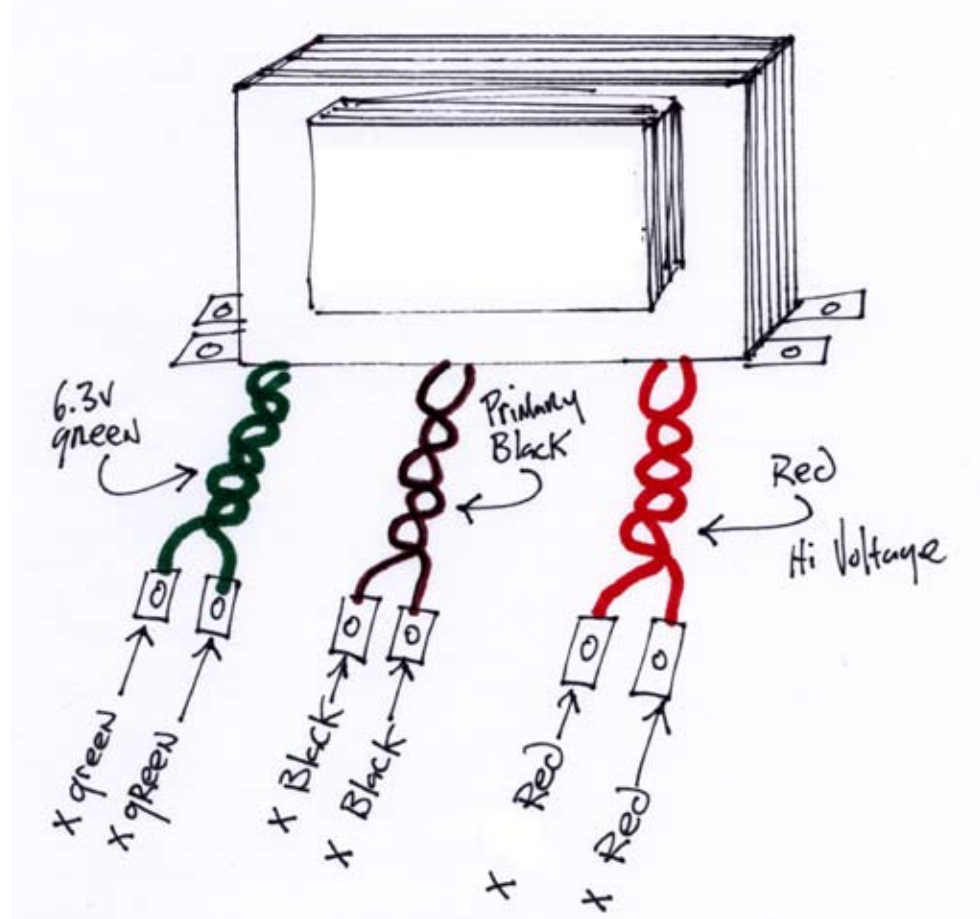
THE ALLIED ELECTRONICS 6K88VG TRANSFORMER WORKS VERY WELL FOR USA BUILDS , IT IS CENTER-TAPPED AND HAS MINIMAL NOISE AND HUM.

PLEASE USE A TRANSFORMER WITH A CENTER TAP IN ORDER TO TAKE ADVANTAGE OF THE DC REFERENCE CIRCUIT ON THE PCB

SOWTER MAKES A MORE EXPENSIVE POWER TRANSFORMER FOR BOTH USA AND EUROPEAN VOLTAGES. I'M SURE THIS IS A FANTASTIC TRANSFORMER BUILT TO THE HIGHEST STANDARDS.



# TRANSFORMER CONNECTIONS :



NOW YOU WILL BEGIN TO HOOK UP THE VARIOUS TRANSFORMER LEADS TO THEIR CORRESPONDING PAD ON THE PCB.

IT IS OFTEN A CUSTOM THAT BUILDERS TWIST THE PAIRS OF WIRE AS ILLUSTRATED IN AN ATTEMPT TO HELP REDUCE NOISE OR HUM ASSOCIATED WITH OVERLAPPING WIRES OF DIFFERENT VOLTAGES.

THIS IS VERY IMPORTANT THAT YOU DO THIS . TWIST THE PAIRS SO TIGHT , THAT THEY ALMOST CONTACT.

AS IN THE DIAGRAM , IT IS CLEARLY MARKED ON THE PCB WHERE EACH OF THESE WIRES GO , I.E 'X-BLACK' MEANS 'TRANSFORMER-BLACK'

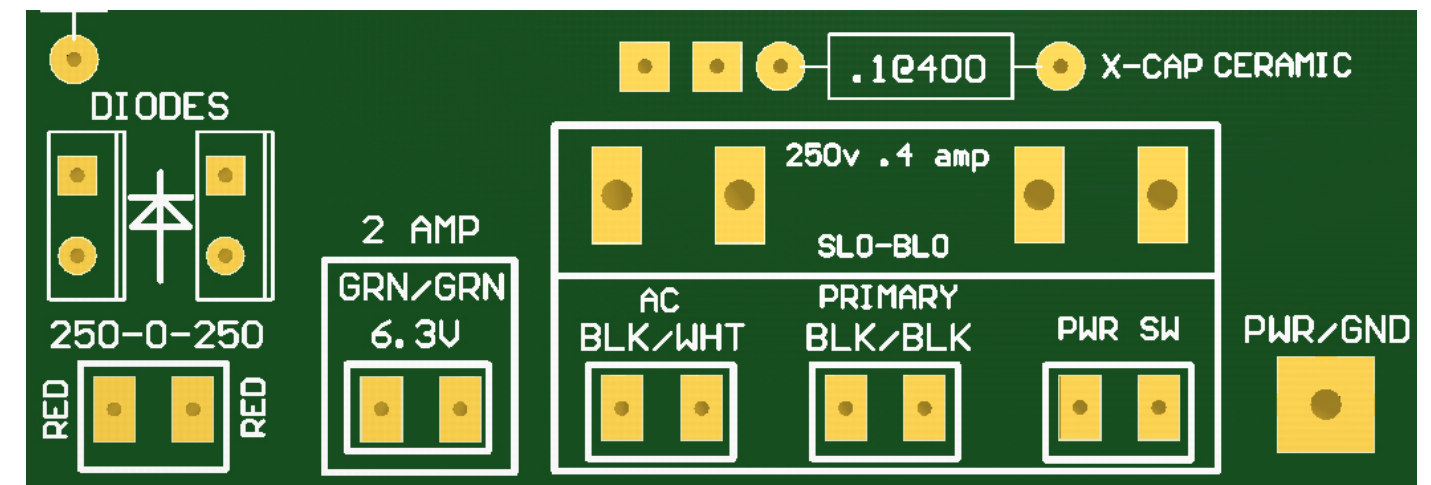
THERE IS NO POLARITY ISSUE HERE , SO EITHER LEAD OF CORRESPONDING COLOR CAN BE PLACED ON THE PAD NAMED FOR IT.

**NOTE :**  
PLEASE PAY ATTENTION TO THE INSTRUCTIONS IN THIS AREA.  
INCORRECT WIRING OF THIS SECTION CAN HIGHLY DAMAGE  
THE COMPONENTS ON THE PCB, AS WITH POSSIBLE  
ELECTROCUTION AND INJURY TO YOU.



TAKE NOTE OF THE ARROW . REFERENCE THE FRED MFG'S SCHEMATIC FOR PROPER PLACEMENT OF 'FREDS'

'XCAP' AC MAINS RF FILTERING CAP. CERAMIC WORKS BEST TO CONSERVE SPACE.



HIGH VOLTAGE CONNECTION

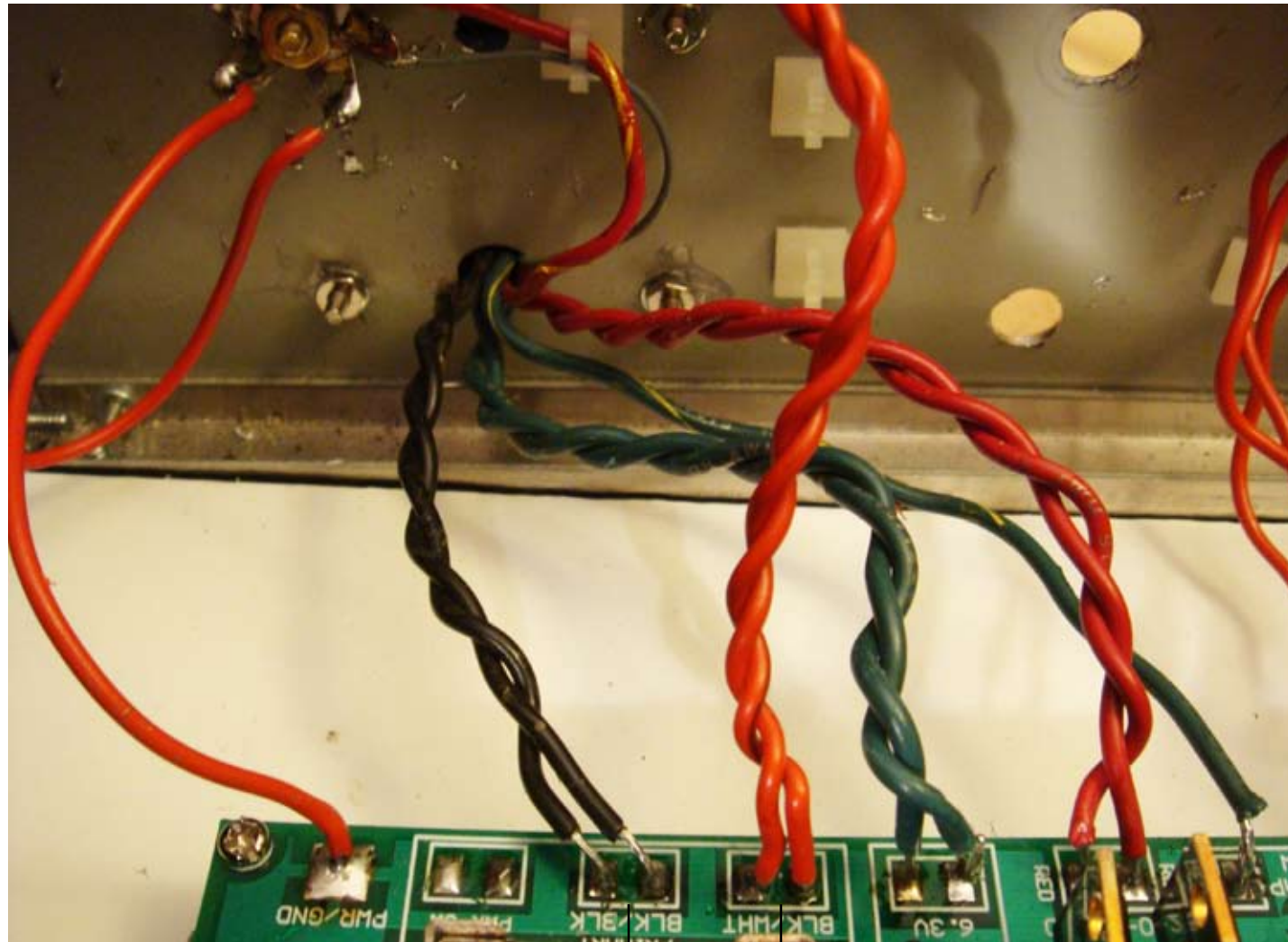
LOW VOLTAGE 6.3 V @2 AMPS MINIMUM

FUSED AC ENTERS THE TRANSFORMER FROM HERE.

OPTIONAL POWER SWITCH LOCATION.

IT IS IMPORTANT TO TAKE NOTE THAT ON THE AC CONNECTION 'BLK' IS THE FUSED SIDE ,

POWER GROUND CONNECT TO STAR GND (USE THICK WIRE)



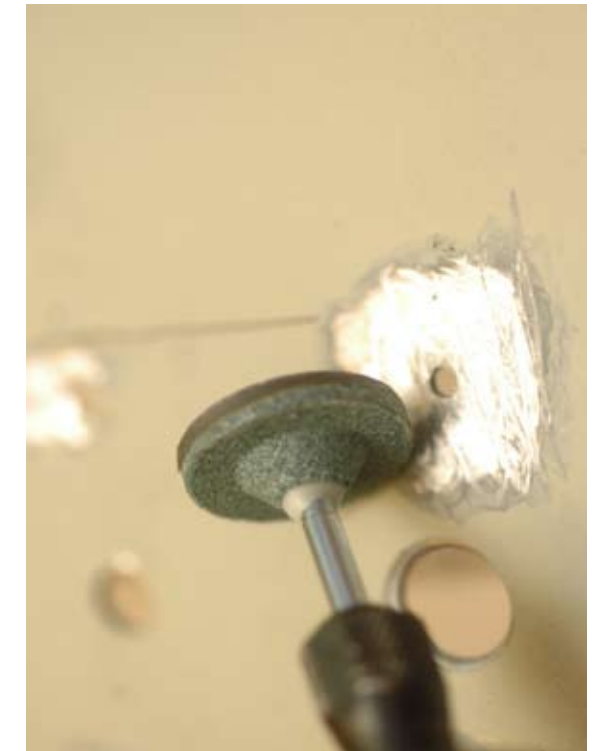
INCORRECT WAY  
OF ATTACHING  
WIRE TO BOARD

CORRECT WAY  
OF ATTACHING  
WIRE TO BOARD

HERE IN THIS PICTURE IT SHOWS HOW TO WIRE THE POWER TRANSFORMER SECTION OF THE PCB .  
NOTICE HOW THE WIRES ARE ALL SEPARATED INTO PAIRS AND THAT THERE IS SPACE BETWEEN THEM .  
TAKE CARE IN THIS AREA LAYOUT NOT TO CUT THE TRANSFORMER WIRES TOO SHORT , BUT ALSO DO NOT LEAVE THEM TOO LONG AS TO FLOP AROUND . SEPARATION IS VERY IMPORTANT ,  
NOISE AND HUM CAN BE INTRODUCED IN THIS AREA IF THE WIRES ARE SQUISHED TOGETHER .  
WHEN CONNECTING THE WIRES TO THE BOARD , STRIP ONLY A MINIMAL AMOUNT OF THE WIRE TO AVOID SHORT CIRCUITS .

## TROUBLESHOOTING

### TRANSFORMER MOUNTING

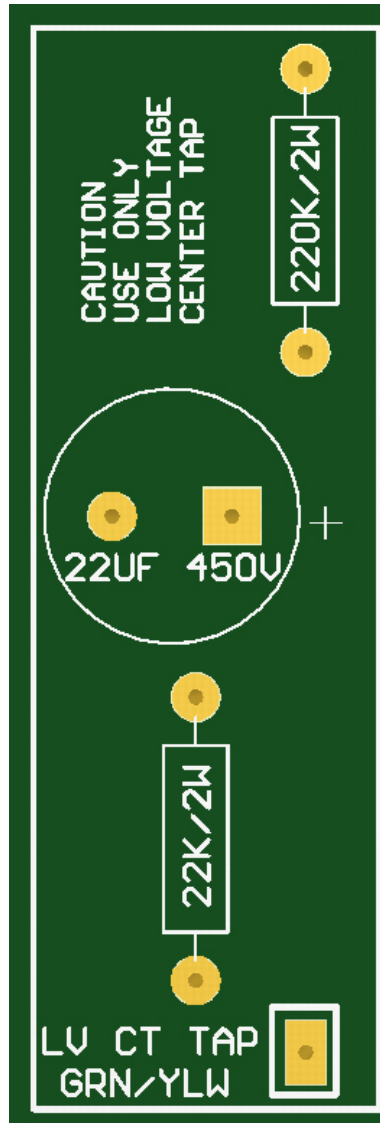


IT IS ABSOLUTELY IMPORTANT THAT YOU GRIND OFF THE PAINT WHEN ATTACHING THE TRANSFORMER AS ILLUSTRATED ABOVE .

WHEN ATTACHING THE TRANSFORMER THE BOLTS MUST BE EXTREMELY TIGHT . ENSURING CONTACT TO THE CASE .

FAILURE TO DO SO CAN RESULT IN UNWANTED NOISE AND HUM .





## DC REFERENCE CIRCUIT:

LV CT TAP : LOW VOLTAGE CENTER TAP (6.3V)

I PREFER TO USE THIS LAST ONCE THE UNIT IS ASSEMBLED AND RUNNING .

BUT I FIND THIS CIRCUIT IN CONJUNCTION WITH GROUND LIFTING CIRCUITS ENSURES THE MOST QUIET INTERFACING WITH OTHER GEAR .

USE 2 WATT RESISTORS IN THIS AREA.  
CAPACITOR SHOULD BE IN THE 450V RANGE

22UF IS A 'START' I OFTEN USE 100UF TO ENSURE A VERY SMOOTH DC REFERENCE TO THE HEATERS THUS PREVENTING 50HZ HUM IN THE TUBE HEATERS.

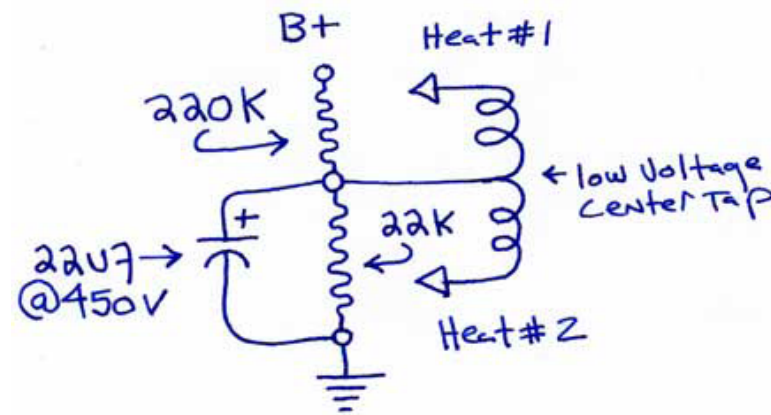
PLEASE USE CAUTION IN THIS AREA AND REFERENCE YOUR TRANSFORMER SCHEMATIC IF USING ANYTHING BUT THE ALLIED 6K88VG (USA).

ON THIS TRANSFORMER , THE 6.3V CENTER TAP WILL BE GREEN/YELLOW

OTHER TRANSFORMERS WILL USE DIFFERENT COLOR WIRES SO DOUBLE CHECK.

IT IS IMPORTANT TO CONNECT THE LOW VOLTAGE CENTER TAP WIRE ONLY.

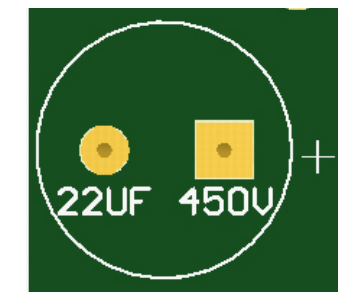
ATTACH GREEN/YELLOW LOW VOLTAGE CENTER TAP TRANSFORMER WIRE



YOU WILL USE ONE RADIAL LEADED ELECTROLYTIC IN THE DC REFERENCE SECTION OF THE BOARD ,

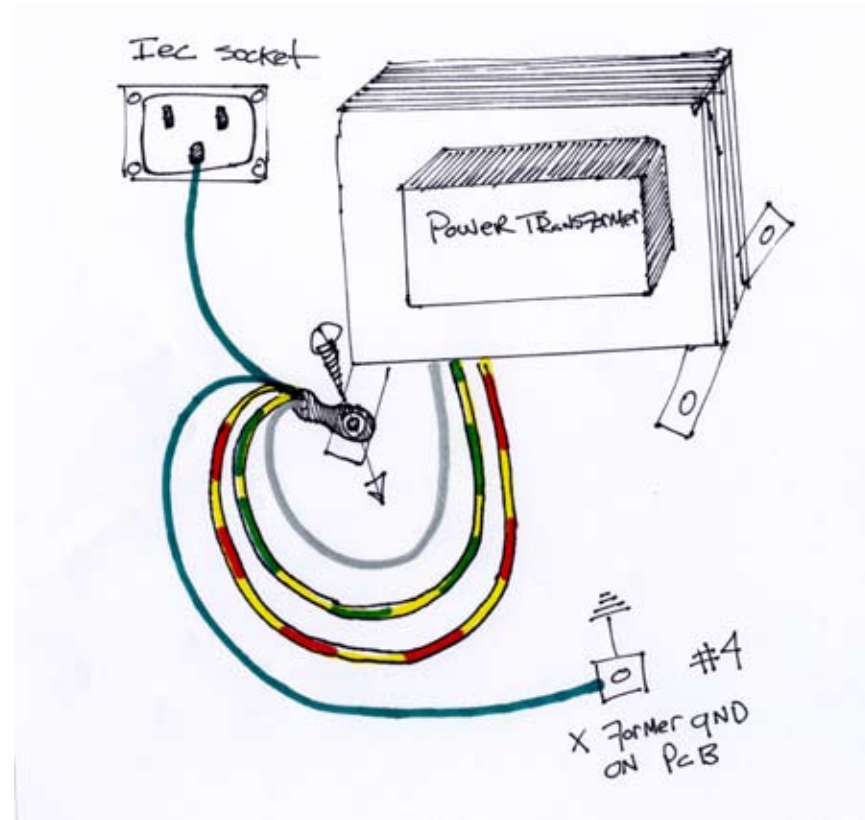


NOTE : THE ELECTROLYTIC CAP HAS AN ARROW AND 'MINUS' SYMBOL TO DENOTE THAT THE LEAD ON THAT SIDE OF THE RADIAL CAP IS NEGATIVE. TAKE NOTE OF THE PLUS SYMBOL ON THE CAP FOOTPRINT



POSITIVE SYMBOL

## STAR GROUND LAYOUT :



TO CREATE THE TRANSFORMER STAR GROUND ,  
FIRST IT IS A GOOD IDEA TO USE A DREMEL AND CLEAN ONE OF THE TRANSFORMERS  
'LEGS' SO YOU CAN MAKE A SOLID CONTACT WITH THE CASE AND THIS GROUND  
POINT.

NEXT YOU WILL BOLT THE TRANSFORMER TO THE CASE AND ATTACH A SOLDER TAG  
OR TWO TO THIS BOLT ON THE INSIDE OF THE CASE.

THIS IS THE BEGINNING OF THE STAR GROUND.

NOW YOU WILL SOLDER THE GREY WIRE (TRANSFORMER SHIELD) COMING OUT OF THE  
TRANSFORMER BASE TO ONE OF THESE SOLDER TAGS.

NEXT YOU WILL SOLDER THE GREEN/YELLOW (6.3V FILAMENT CENTER TAP)  
(BUT YOU WILL OMIT THIS STEP IF USING THE PCBs ON BOARD DC REFERENCE CIR-  
CUIT)

AND THE RED YELLOW (HIGH VOLTAGE CENTER TAP) TO THIS GROUND ALSO.

AS IN THE ILLUSTRATION YOU WILL ALSO USE A PIECE OF 22-20 GAUGE WIRE  
TO CONNECT GROUND PAD #4 (MARKED AS 'XFORMER GND') ON THE PCB TO THE STAR  
GROUND ALSO.

AND LAST YOU WILL USE A PIECE OF 22-20 GAUGE WIRE TO CONNECT  
THE GROUND FROM THE IEC SOCKET TO THIS POINT.



## TROUBLESHOOTING NOTE :

### TRANSFORMER WIRING



I CANNOT STRESS THE IMPORTANCE OF TWISTING THE TRANSFORMER WIRES IN PAIRS SO TIGHT THAT THEY ALMOST CONTORT.

BY NOT DOING SO CAN CAUSE MASSIVE AMOUNTS OF NOISE/HUM.

KEEPING THESE RUNS OF WIRE SHORT TO THEIR DESIGNATED LOCATION IS BEST.

## IEC POWER SOCKET (TYPE C14 CHASSIS INLET)

FOR YOUR POWER CORD , YOU WILL USE THE IEC STYLE INLET , SINCE THE FUSE IS MOUNTED ON THE PCB , YOU WILL NOT NEED THE FUSED VERSION .



### NOTE :

DO NOT USE POWER CORDS DIRECTLY WIRED TO THE PCB! THIS PRACTICE IS DANGEROUS AND UNDER NO CIRCUMSTANCES SHOULD YOU DO THIS.

## WIRING :

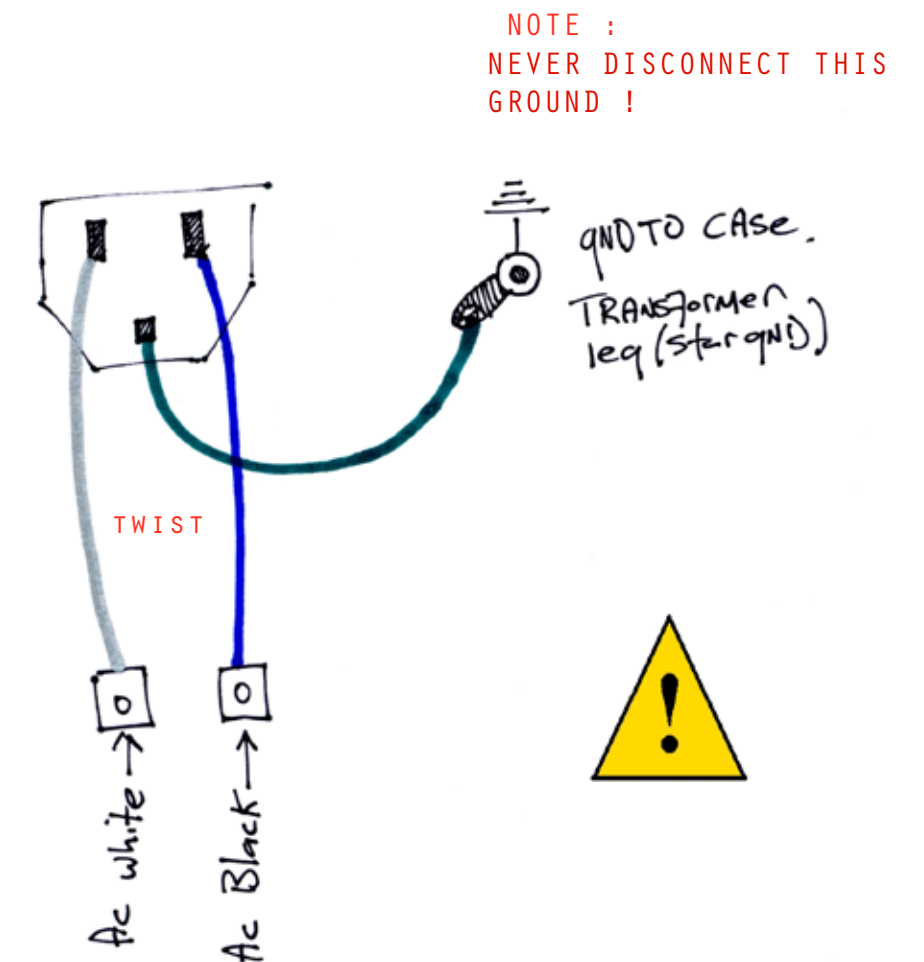
IF LOOKING AT THE IEC SOCKET FROM THE BACK AS SHOWN IN THE ILLUSTRATION , YOU WILL ALWAYS CONNECT THE PCB PAD MARKED 'AC BLACK' TO THE PIN ON THE RIGHT. THIS IS VERY IMPORTANT.

THE BOTTOM PIN IS CONNECTED TO THE STAR GROUND AT THE TRANSFORMER LEG.

THIS GROUND IS KNOWN AS THE 'SAFETY GROUND'

NEVER 'LIFT' OR DISCONNECT THIS GROUND UNDER ANY CIRCUMSTANCES.

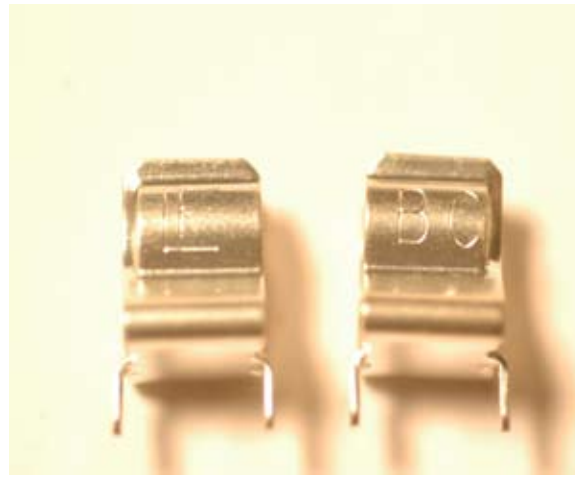
YOU MUST TWIST THE TWO AC WIRES VERY TIGHT.



# PARTS | FUSE | INFO

THE FUSE IS A 250V 400MA(.4 AMP) SLO BLO MOUSER NO# 576-0313.400HXP

THE CLIPS USED TO ATTACH THE FUSE TO THE PCB  
ARE LITTEL FUSE : 3AG PC CLIP  
MOUSER NUMBER 576-01220083H  
ONCE INSTALLED FUSE SHOULD SNAP RIGHT IN.

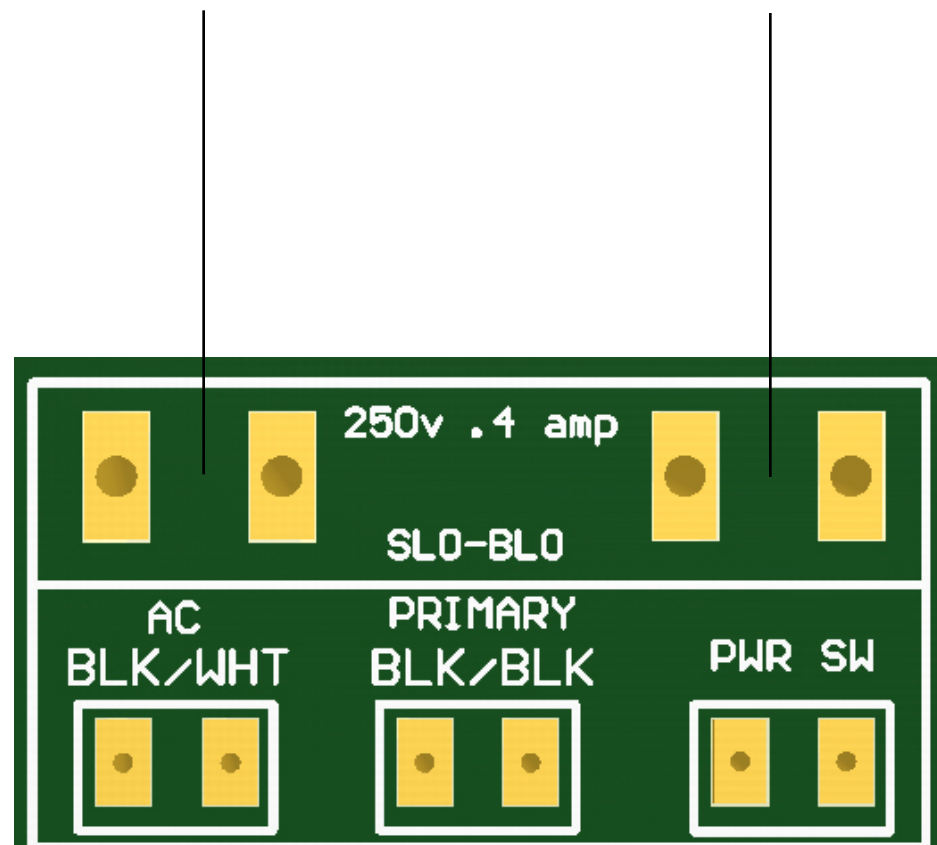


**NOTE :**  
TAKE NOTICE OF THE DIRECTION  
THAT YOU MOUNT THESE CLIPS .  
FOR THEY HAVE A NOTCH ON EACH SIDE  
IF PLACED WRONG THE FUSE WILL  
NOT FIT.



SOLDER FUSE CLIP HERE

SOLDER FUSE CLIP HERE



IF USING AN IEC SOCKET WITH BUILT IN FUSE HOLDER,  
IT'S NOT A BAD IDEA TO STILL USE THIS FUSE AS ADDED  
INSURANCE FOR SAFE OPERATION.

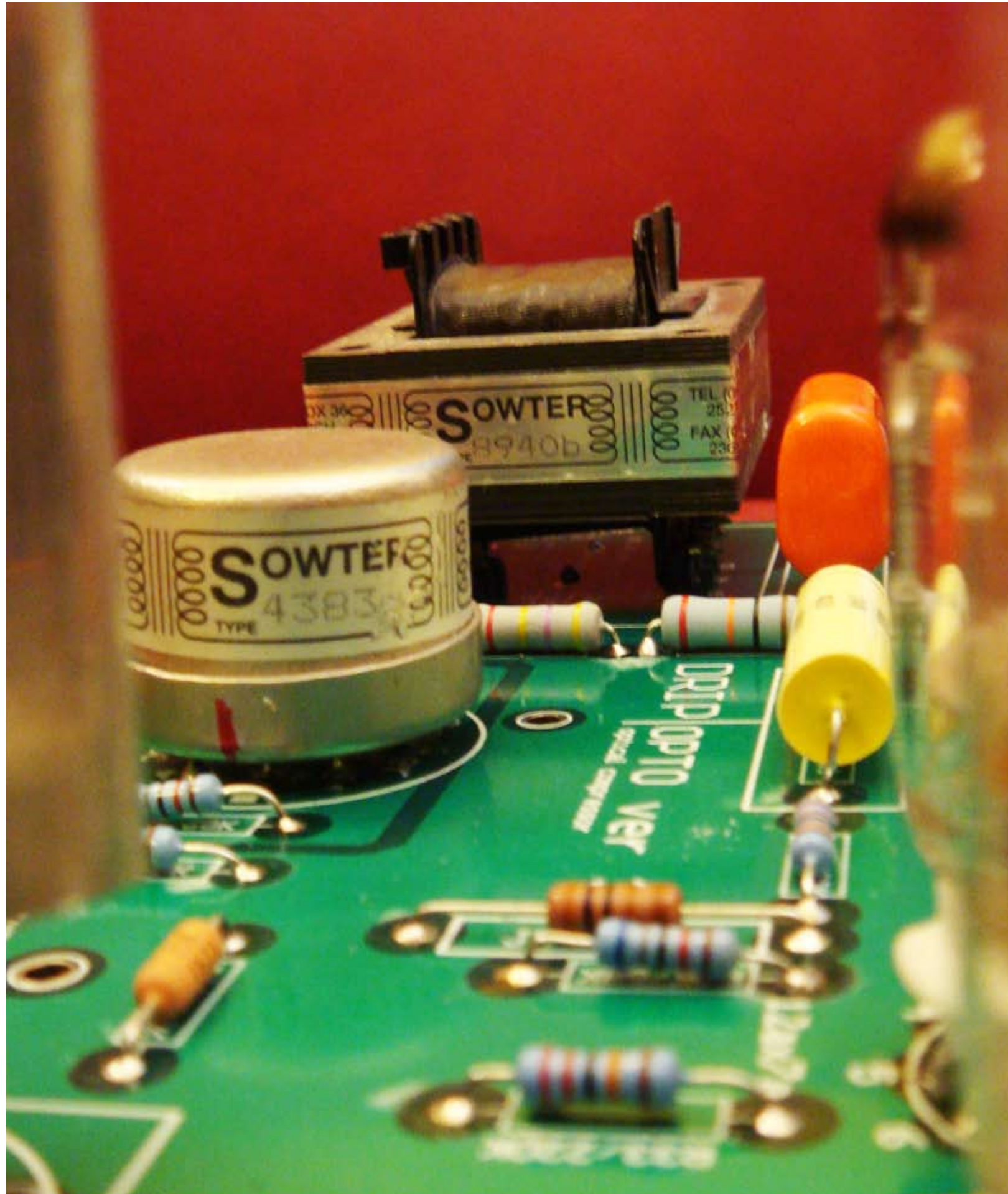


**NOTE :**

UNDER NO CIRCUMSTANCES SHOULD YOU OPERATE THIS PROJECT WITHOUT  
A FUSE IN PLACE. (BY BYPASSING OR JUMPING THIS CONNECTION)

IF YOUR UNIT KEEPS POPPING FUSES 'SOMETHING IS WRONG'.

SIMPLY CHECK ALL YOUR POWER CONNECTIONS , AND COMPONENT  
PLACEMENTS .



## AUDIO TRANSFORMERS :

TRANSFORMER  
SPECS :

INPUT PRIMARY IMPEDANCE :600 OHM  
SECONDARY IMPEDANCE :50K SPLIT  
FREQUENCY RESPONSE :20-20KHZ  
MAX. MW : 30  
MAX DBM : +15

OUTPUT PRIMARY IMPEDANCE : 15K OHM  
SPLIT  
SECONDARY IMPEDANCE: 600 OHM  
FREQUENCY RESPONSE : 20-40 KHZ  
MAX DBM : +15  
MAX MW : 30

(SPLIT WINDING IS NOT REQUIRED)

THE PCB WAS DESIGNED TO USE PCB MOUNT SOWTER INPUT AND OUTPUT TRANSFORMERS.

THE BOARD IS ALSO MARKED FOR THE USE OF LEADED TYPE SOWTERS.

FOR PCB MOUNT USE :

INPUT PART # : 4383 C

OUTPUT PART# : 8940 B

THESE TRANSFORMERS ARE STATE OF THE ART AND AT THE SAME TIME HAVE A VERY CLOSE SOUND TO THE VINTAGE UTC TRANSFORMERS. THEIR SHIELDING IS OUTSTANDING AND HAS ALLOWED FOR A MORE COMPACT LAYOUT.

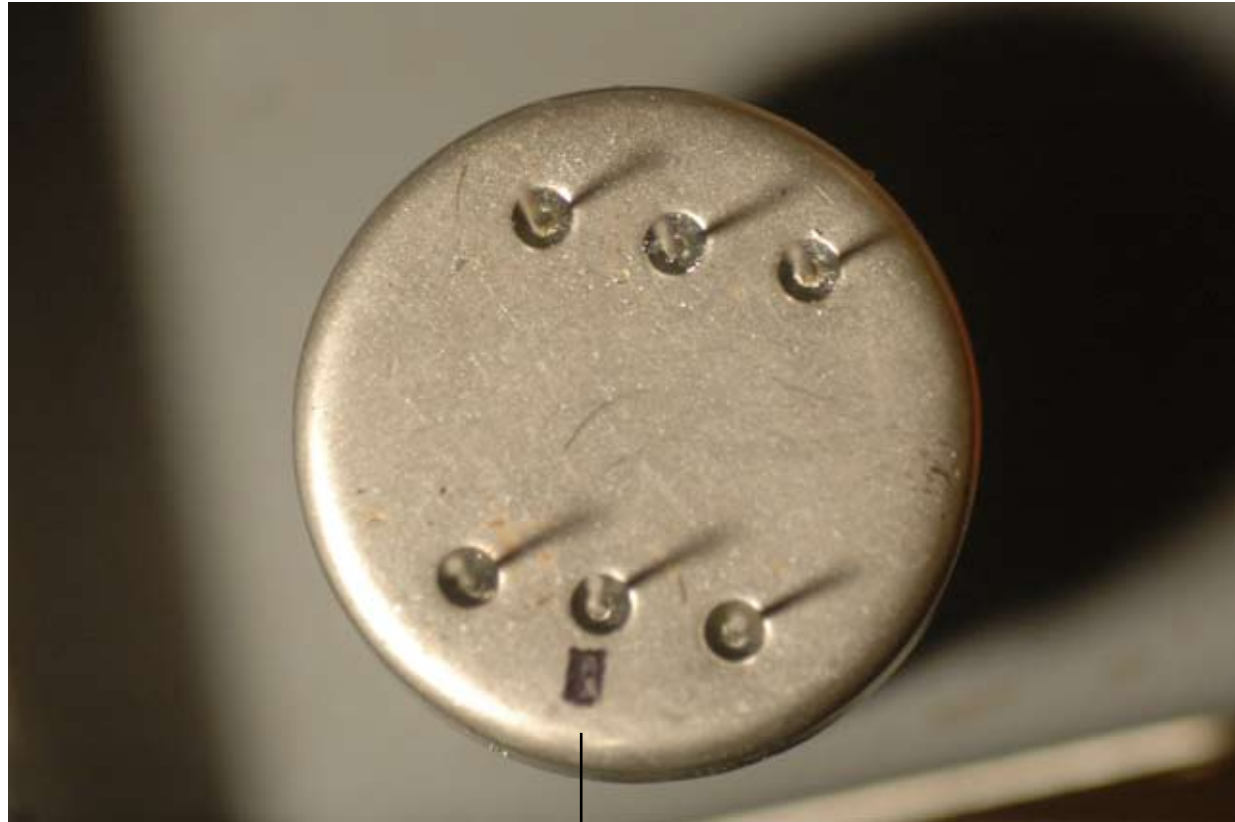
BY HAVING THE TRANSFORMERS PCB MOUNT A HIGHER LEVEL OF CONSISTENCY AND RELIABILITY CAN BE ACHIEVED. (MANY COMPLICATIONS IN BUILDING THE VER1 PCB HAPPENED IN THIS AREA.)

IN COMPARISON TO THE UTC TRANSFORMERS , THE SOWTERS SOUND EVER SO SIMILAR , THE UTC'S HAVE A SUBTLE DARKER FEEL TO THEM .

MOST ALL TRANSFORMERS WILL WORK WITH THIS BOARD INCLUDING THE UTC HA-100X OR A-10 INPUT TRANSFORMERS AND THE A-24 OUTPUT TRANSFORMER.

YOU CAN USE LEADED TRANSFORMERS AS WELL , ADDING AN EXTRA LEVEL OF SHIELDING BY MOUNTING OUT SIDE THE CASE.

# AUDIO TRANSFORMER : SOWTER 4383C INPUT TRANSFORM-

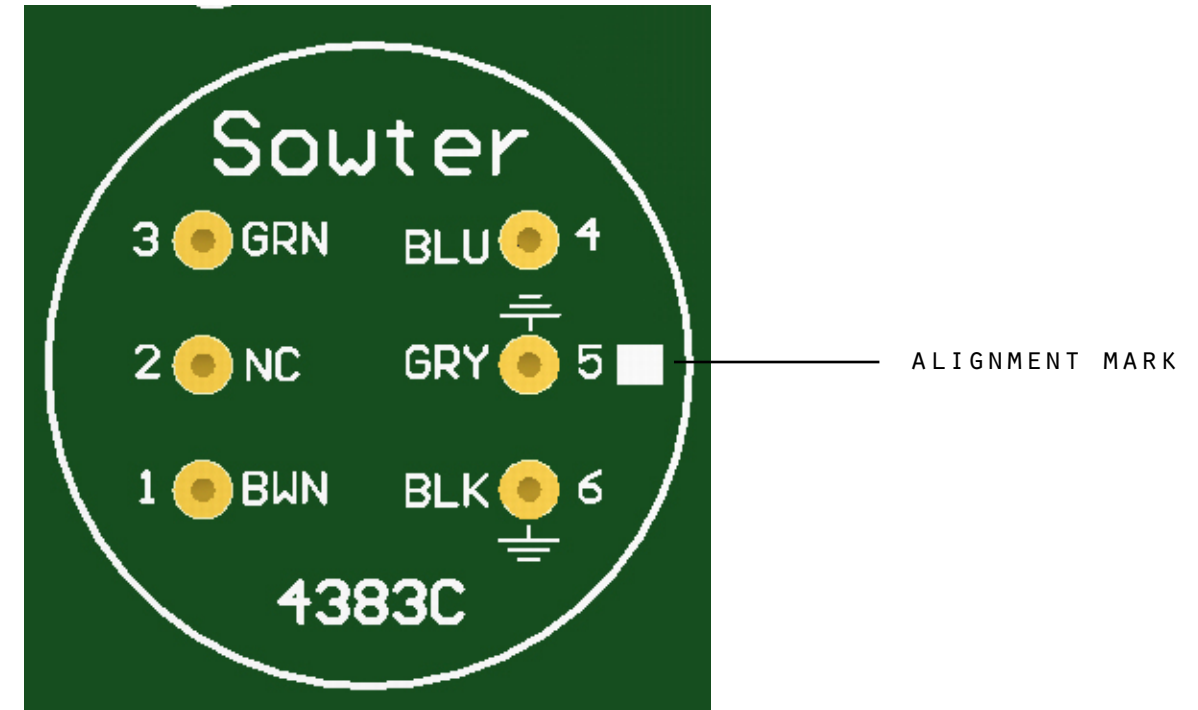


ALIGNMENT MARK

WHEN INSTALLING THE INPUT TRANSFORMER , YOU WILL NEED TO TAKE NOTE OF A SMALL MARK THAT THE COMPANY HAS PLACED NEAR ONE OF THE MIDDLE PINS , IT IS IMPORTANT TO ALIGN THIS SIDE WITH THE CORRESPONDING MARK ON THE FOOTPRINT OF THE PCB 'ALIGN'.

## NOTE :

THIS IS A PARTICULARLY PROBLEMATIC AREA , COUNTLESS PEOPLE HAVE PUT THIS IN BACKWARDS AND SPENT WEEKS TROUBLESHOOTING AND REWIRING THEIR UNIT , ONLY TO FIND THE PROBLEM WAS LOCATED HERE.  
A GOOD IDEA IS TO MARK THE TOP SIDE OF THE CAN ALSO SO YOU CAN BE ASSURED IT IS IN THE RIGHT POSITION IF YOU NEED TO TROUBLE SHOOT YOUR UNIT.



IT IS IMPORTANT TO ELEVATE THE INPUT TRANSFORMER AT LEAST A 1/16 OR 1/8 OF AN INCH OFF THE BOARD , THIS WILL PREVENT THE PADS ON THE PCB FROM SHORTING OUT ON THE CASE OF THE X-FORMER.

WHEN SOLDERING , BE CAREFUL AS NOT TO APPLY TOO MUCH SOLDER BECAUSE IT CAN TRAVEL THROUGH THE PAD AND PUDDLE UP AT THE BASE OF THE PIN ON THE OTHER SIDE AND POSSIBLY SHORT THE PIN TO THE TRANSFORMER CASE.



## NOTE :

FOLLOW THESE GUIDELINES CAREFULLY . SHORTING THE INPUT TRANSFORMER PINS CAN CAUSE DAMAGE TO THE TRANSFORMER . NOT TO MENTION YOUR UNIT WILL NOT PASS AUDIO.

# AUDIO TRANSFORMER : SOWTER 8940B OUTPUT TRANSFORMER

BEFORE YOU INSTALL THE OUTPUT TRANSFORMER , YOU MUST JUMPER ONE OF THE GROUND SELECTORS .

UNDER MOST CIRCUMSTANCES JUMPER THE 'RED GND' THIS GROUNDS THE TRANSFORMER TO THE REDUCTION GROUND CIRCUIT LIKE ON THE ORIGINAL POINT TO POINT UNIT.

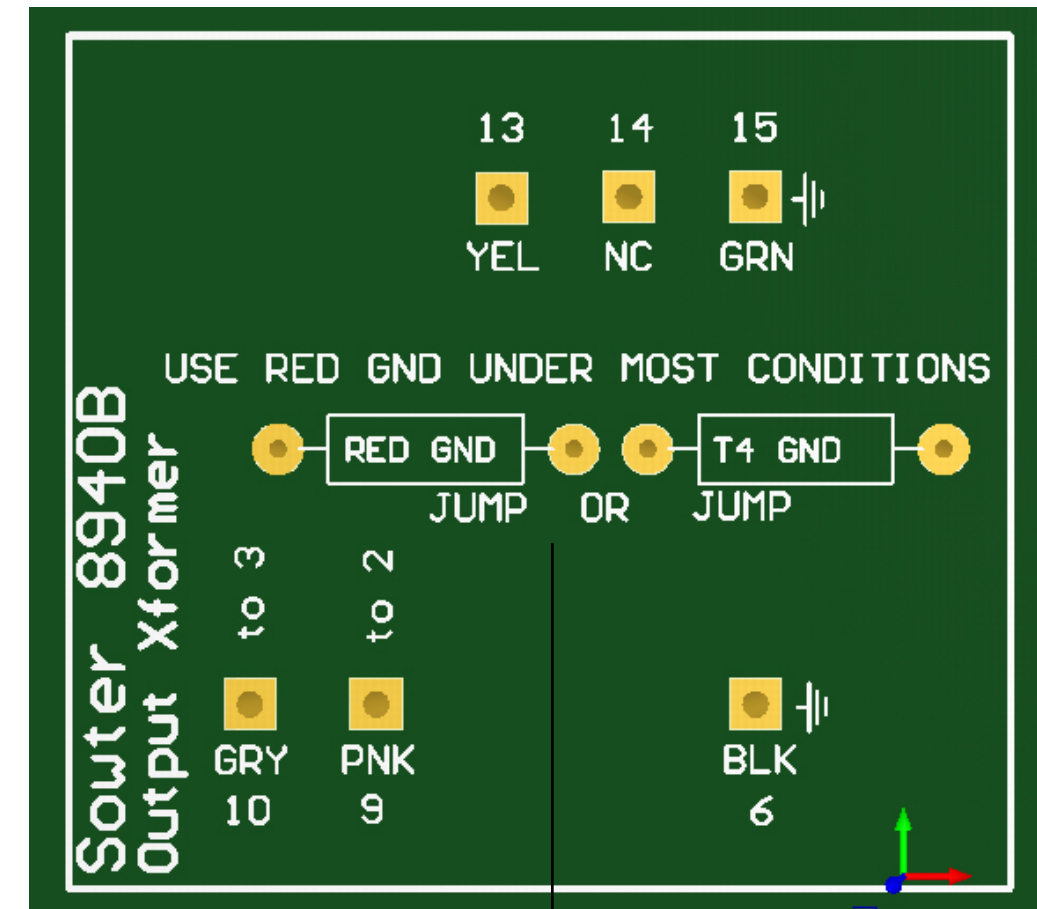
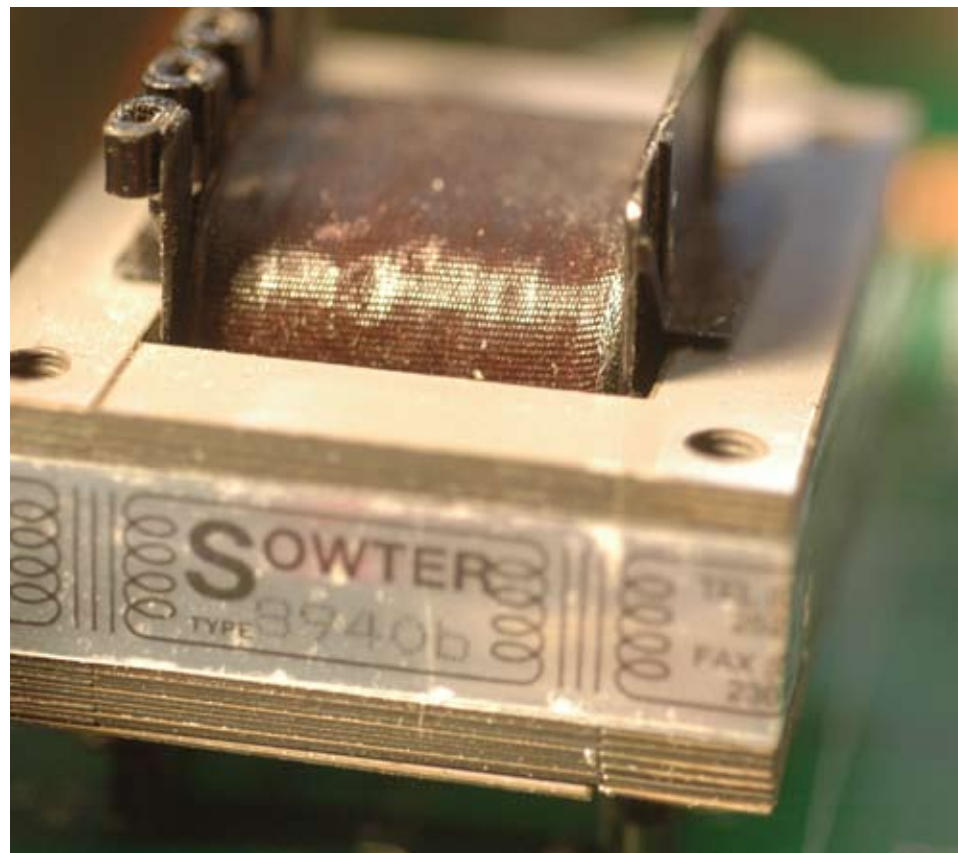
I TEND TO INSTALL THE JUMPER FROM THE BOTTOM SIDE OF THE BOARD INCASE I NEED TO SWITCH THE GROUND TO THE T4 GROUND CIRCUIT.

ONE IDEA IS TO INSTALL A SPDT TOGGLE SWITCH AND ALLOW YOUR SELF TO SWITCH BETWEEN THE TWO , OR DIRECTLY GROUND THE OUTPUT TRANSFORMER TO THE CASE .

IVE HAD GREAT LUCK WITH JUST USING THE RED GND .

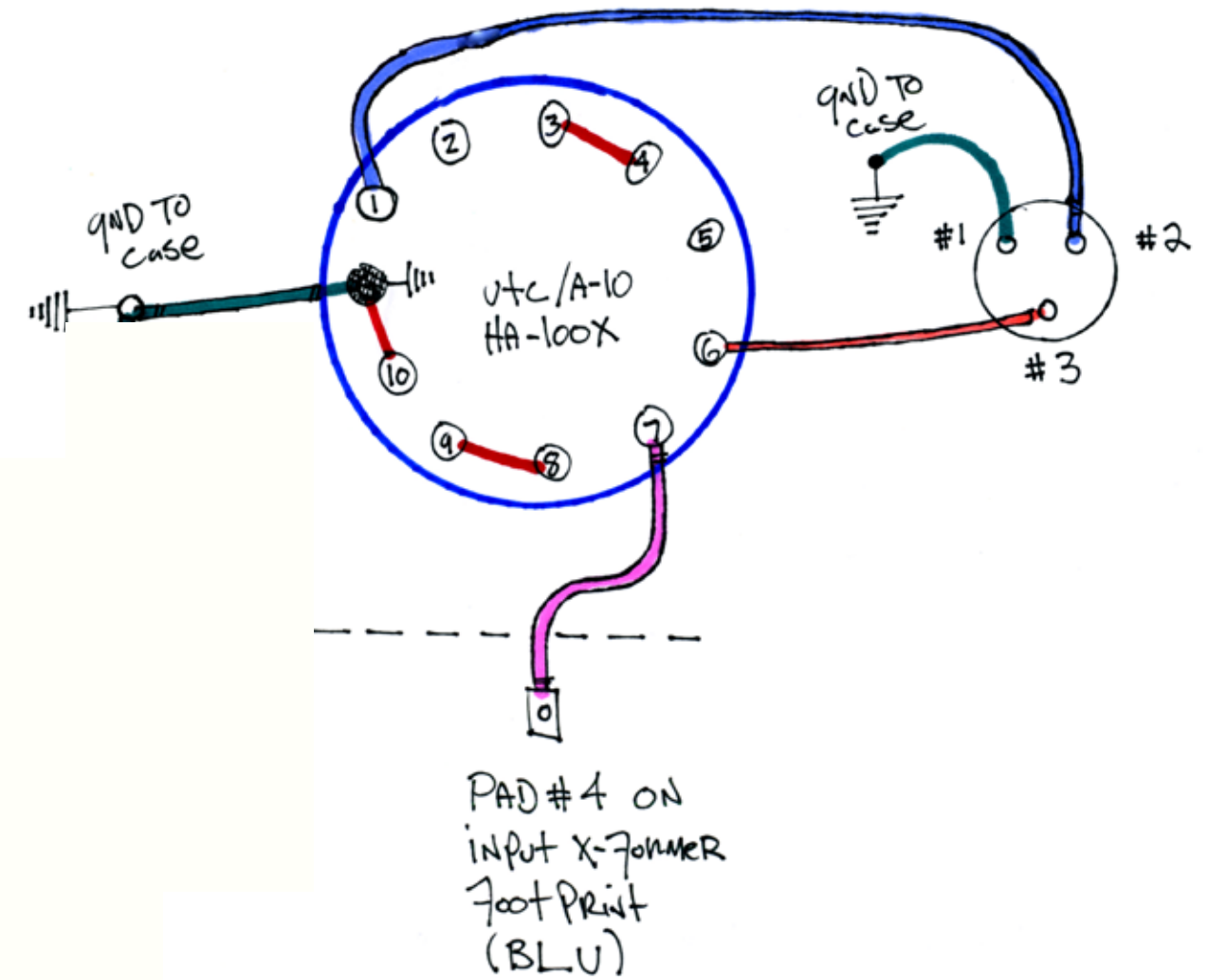
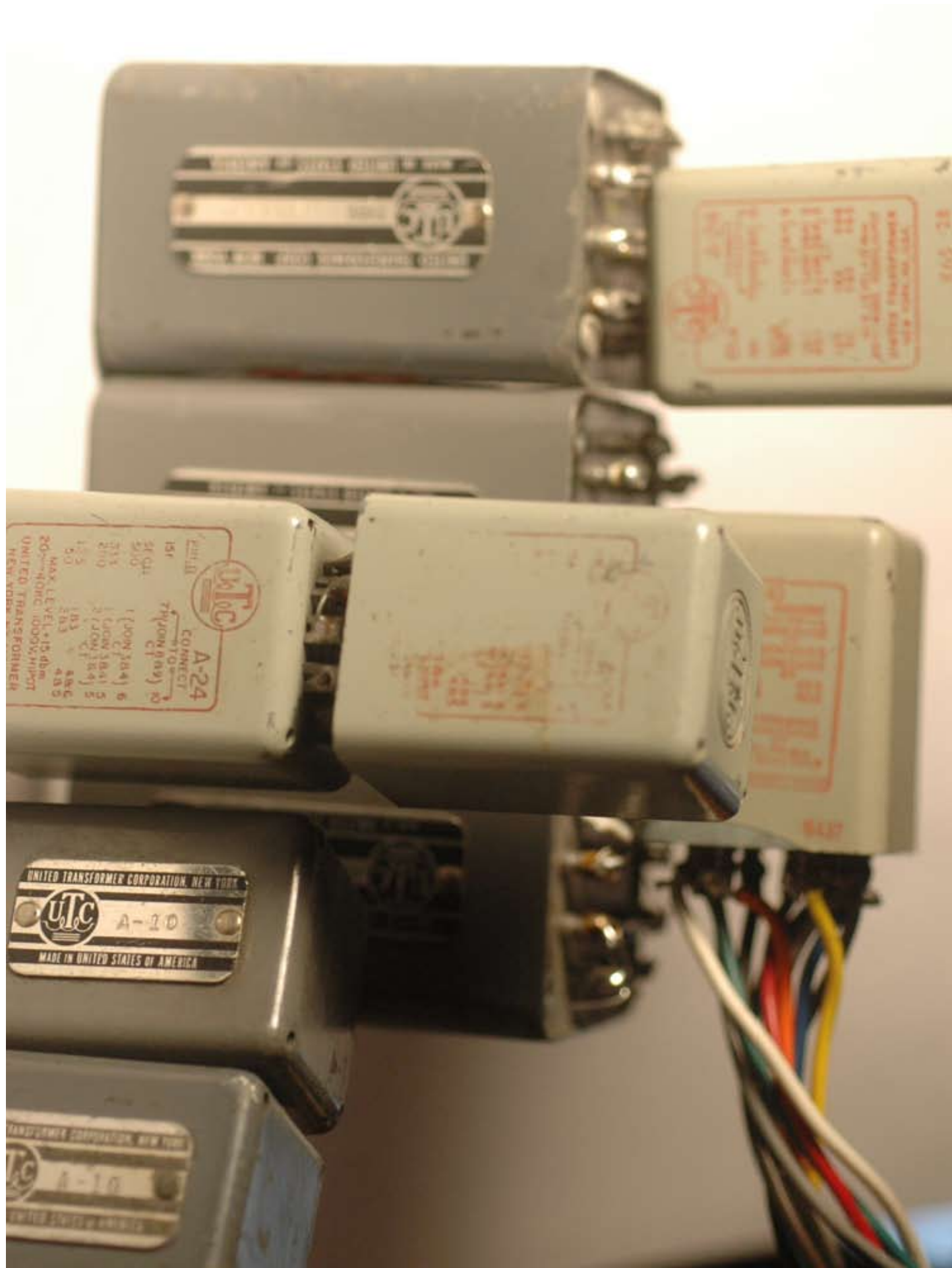
BUT THE OPTIONS ARE GOOD TO HAVE IN TROUBLE SHOOTING CIRCUMSTANCES.

IF USING LEADED SOWTER TRANSFORMERS , JUST MATCH THE WIRES TO THE CORRESPONDING COLOR MARKED ON THE PCB FOOTPRINT FOR BOTH.



GROUND SELECTOR  
JUMPER ONE OR THE  
OTHER ONLY.

THE OUTPUT TRANSFORMER PINOUT MAKES IT SO IT CAN ONLY BE INSTALLED IN THE CORRECT POSITION .SIMPLY PLACE AND SOLDER AFTER YOU HAVE SELECTED THE PROPER GROUND JUMPER.



## UTC A-10 OR HA-100X HOOK UP

ONCE YOU HAVE MOUNTED THE TRANSFORMER TO THE CASE ,  
USE THE ABOVE DIAGRAM TO HOOK THE TRANSFORMER TO THE PCB.

YOU WILL NOT USE THE XLR PADS ON THE PCB , AND INSTEAD JUST  
DIRECTLY WIRE THE INPUT XLR SOCKET TO THE TRANSFORMER.  
I HAVE HAD GOOD LUCK WITH USING THE HAX GROUND AS A GOOD  
PLACE TO GROUND PIN #3 ON THE XLR SOCKET.  
TRADITIONALLY THE INPUT XLR IS GROUNDED SEPARATELY TO THE  
CASE.

IT IS IMPORTANT TO ALSO SOLDER THE BRIDGES BETWEEN  
THE TRANSFORMER PINS AS SHOWN IN RED.

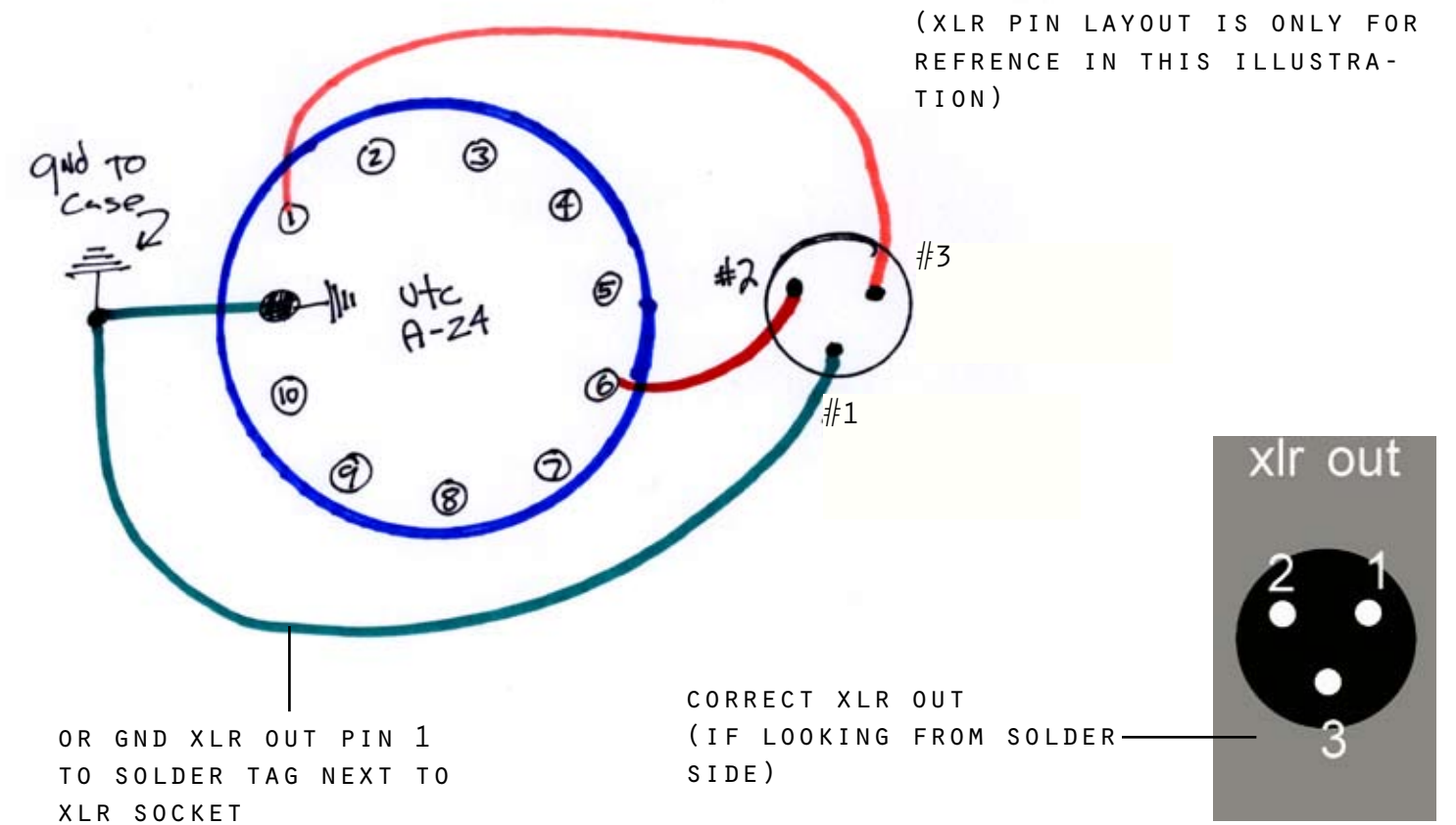
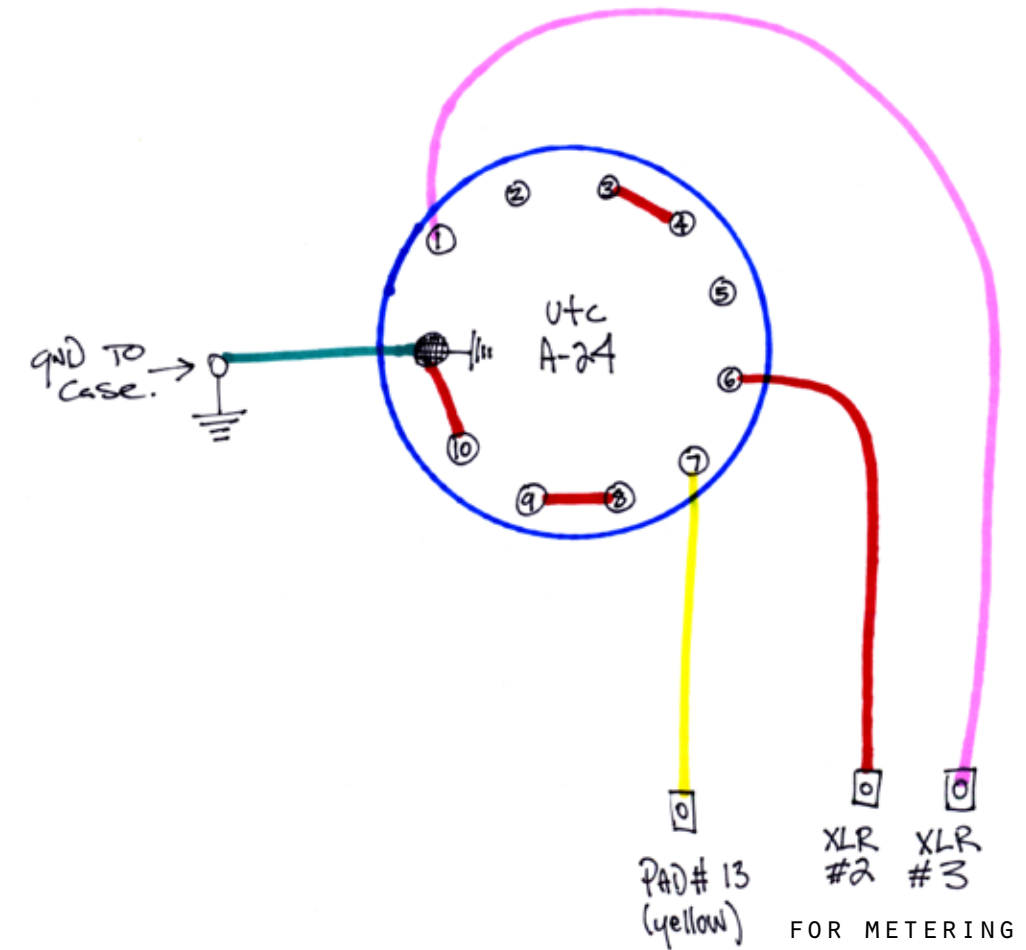


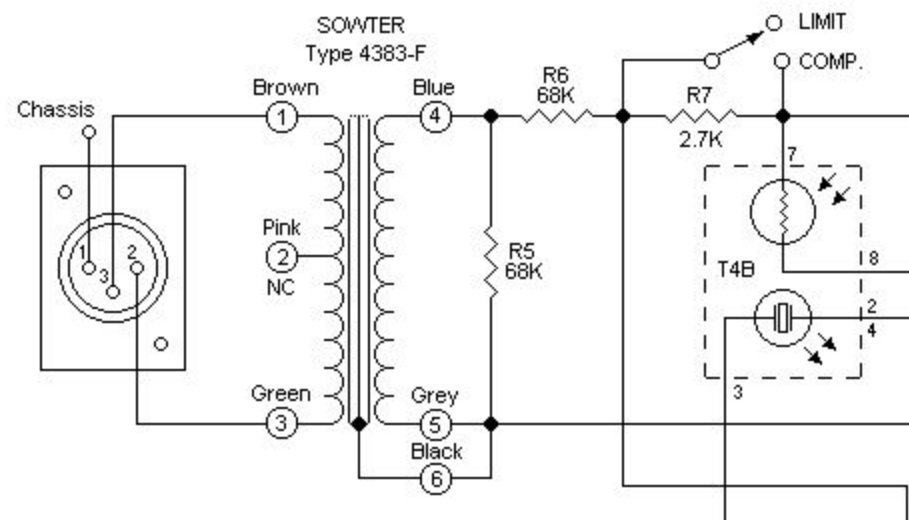
## UTC A-24

THE A-24 INPUT TRANSFORMER INSTALLATION IS SHOWN IN THE ILLUSTRATIONS . IT IS IMPORTANT TO SOLDER BRIDGES AS SHOWN IN RED ON THE TOP ILLUSTRATION.

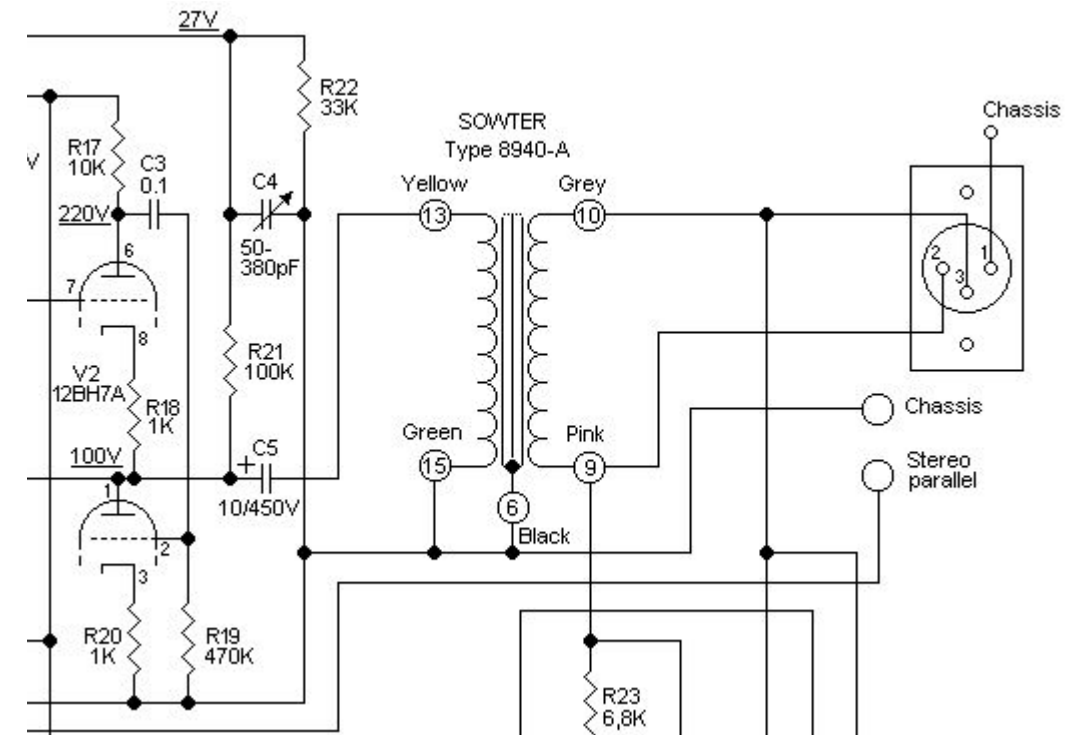
PAD# 13 IS LOCATED ON THE PCB FOOTPRINT FOR THE OUTPUT TRANSFORMER.

YOU WILL ALSO CONNECT THE XLR SOCKET DIRECTLY TO THE TRANSFORMER USING THE BOTTOM DIAGRAM. THE CONNECTIONS TO THE XLR OUTPUT PADS ARE ONLY FOR THE METERING SECTION.

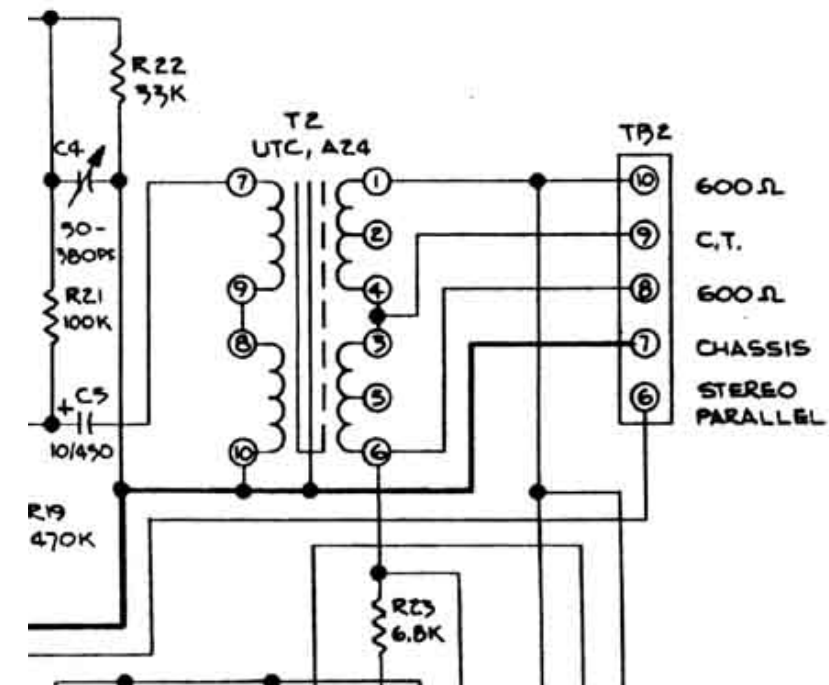
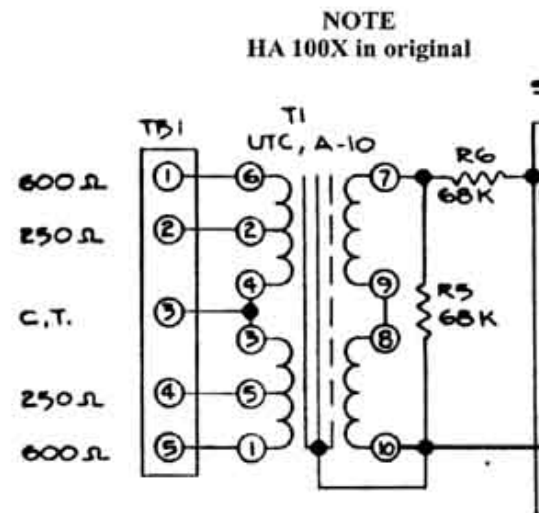




INPUT TRANSFORMER SCHEMATIC



OUTPUT TRANSFORMER SCHEMATIC

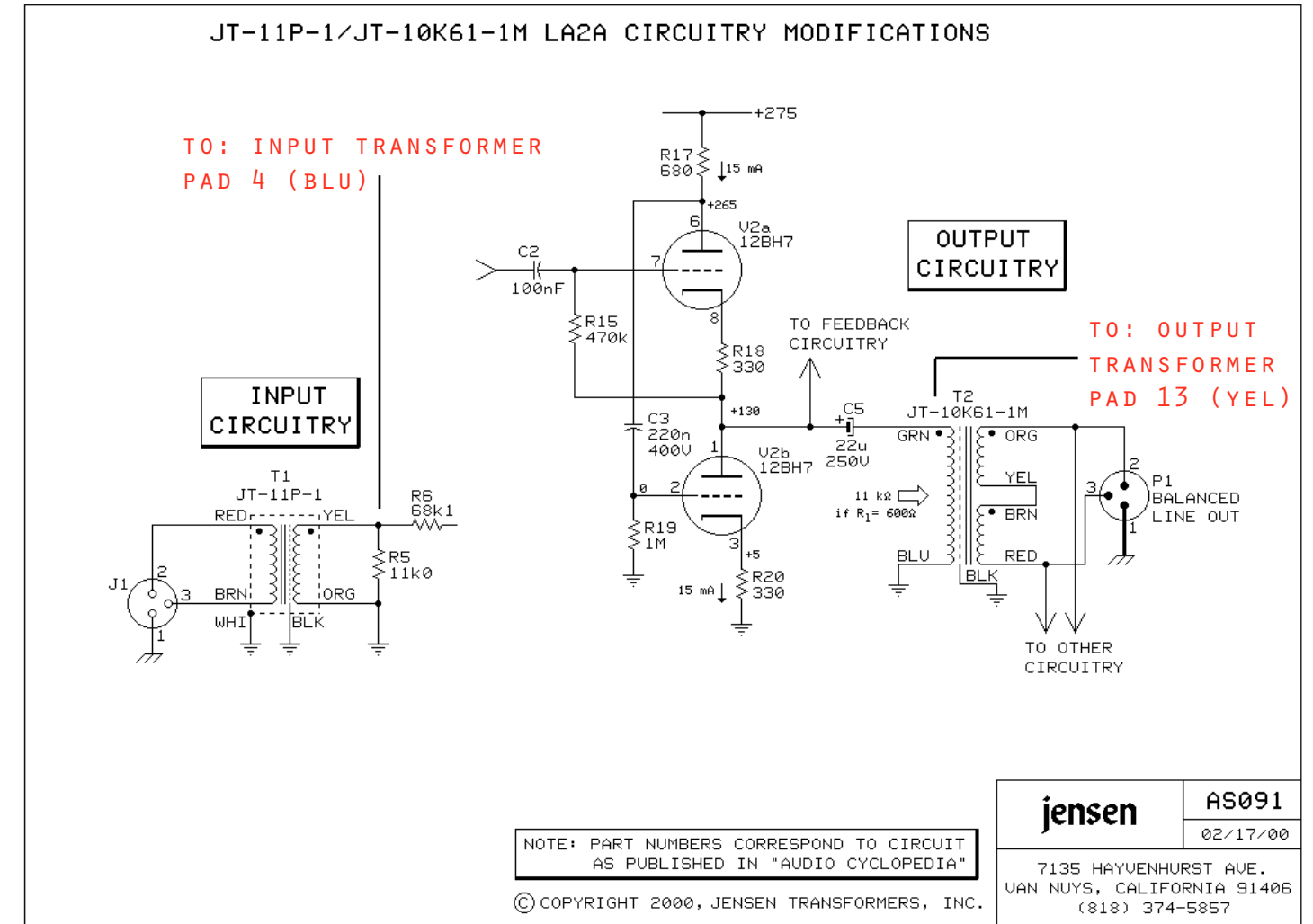


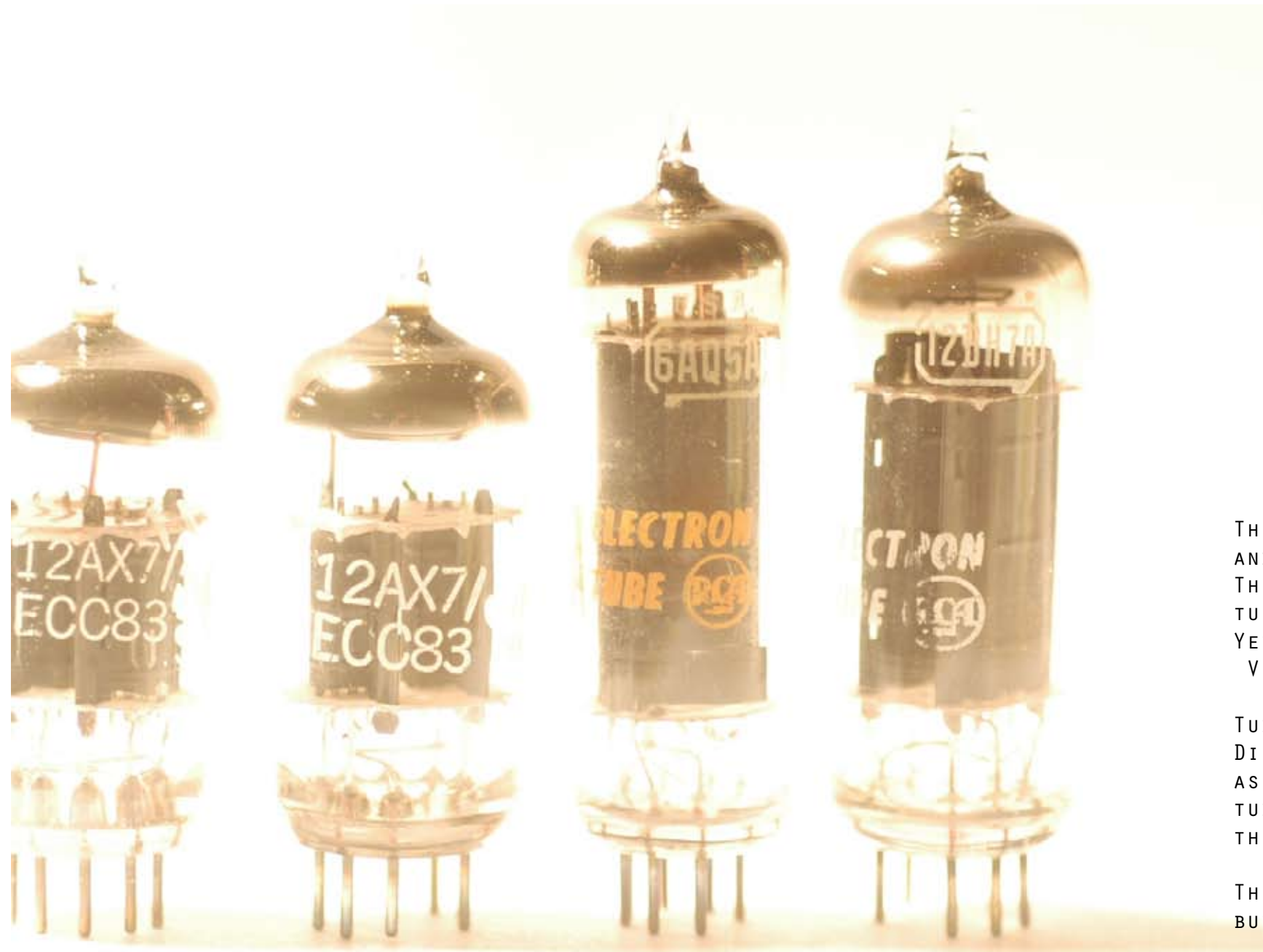
NOTE :

TAKEN FROM THE SOWTER WEB SITE / CREDIT TO THEIR RESPECTIVE OWNER

FOR JENSEN TRANSFORMERS  
USE PART NUMBERS :

JT-10K61-1M AND JT-11P-1





THE COMPRESSOR USES 4 VACUUM TUBES :

- 2 ) 12AX7A HIGH-MU TWIN TRIODE
- 1 ) 12BH7A MEDIUM-MU TWIN TRIODE
- 1 ) 6AQ5A BEAM POWER PENTODE



THERE ARE MANY BRANDS OF TUBES TO CHOOSE FROM , NEW OLD STOCK (NOS) AND ALSO NEWLY MANUFACTURED BRANDS. THE COMPRESSOR WORKS WELL WITH JUST STANDARD ISSUE TUBES OF NO FANCY NATURE.

YET AS WITH SO MANY THINGS YOU CAN EXPLORE THE HIGHLY PRIZED VINTAGE TUBES LIKE TELEFUNKEN, RCA, AND AMPEREX.

TUBES DO HAVE A 'SOUND' TO THEM AND YOU CAN EXPERIMENT WITH DIFFERENT TUBES IN THE GAIN SECTION (12AX7#1 AND 12BH7A) AS WITH THE CAPACITORS YOU CAN ALSO RESERVE THE MORE EXPENSIVE TUBES FOR THIS AREA , AND USE THE MORE AFFORDABLE TUBES FOR THE REDUCTION CIRCUIT (6AQ5A AND 12AX7#2)

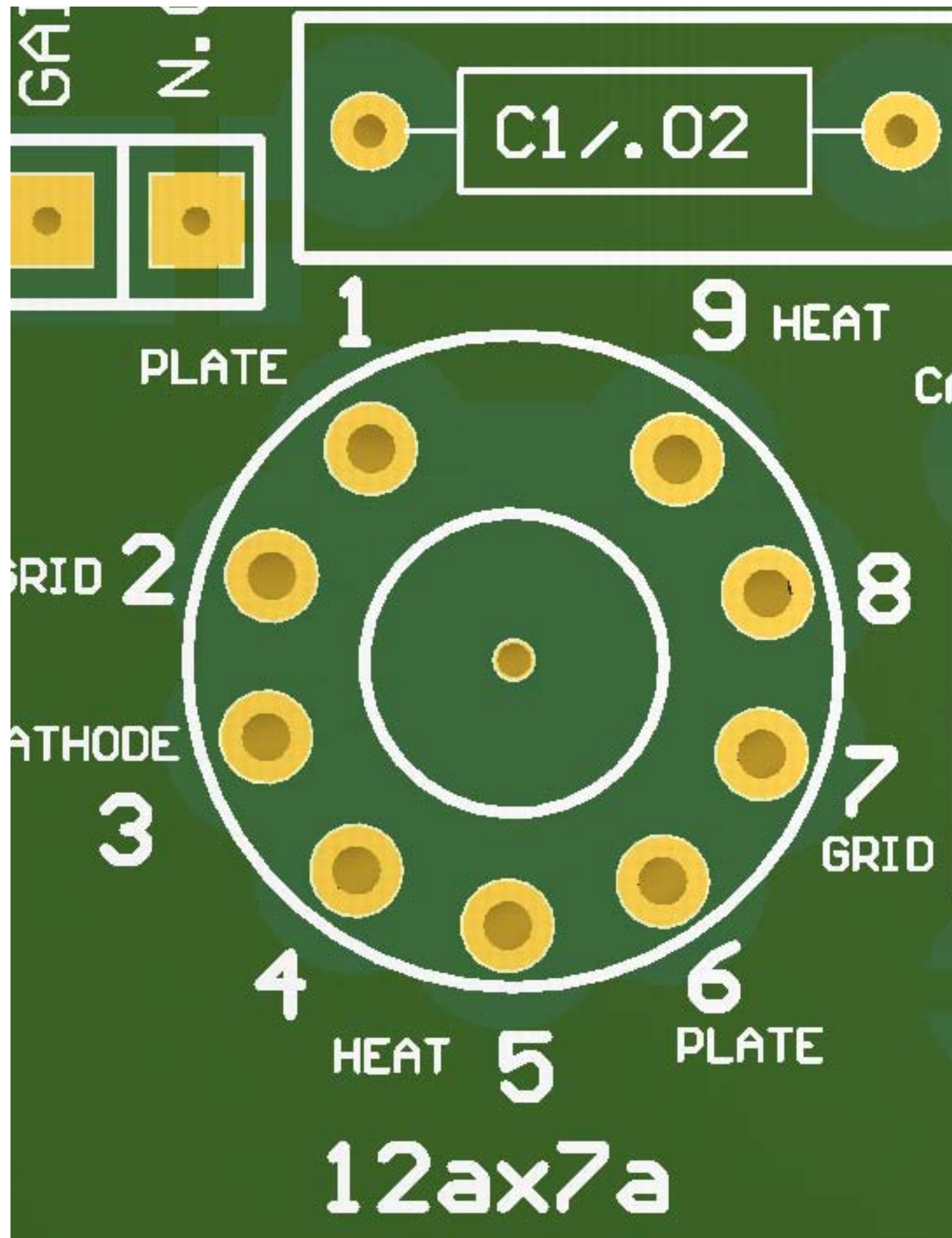
THE 6AQ5A IS THE ONLY TUBE THAT IS NOT CURRENTLY MANUFACTURED, BUT THERE SEEMS TO BE NO SHORTAGE ON THE SUPPLY OF THEM.

WHEN YOU PURCHASE YOUR TUBES IT IS IMPORTANT TO HAVE THEM TESTED. (I'VE DISMANTLED A UNIT TO PIECES TRYING TO FIND THE SOURCE OF HUM AND OSCILLATIONS , ONLY TO FIND THAT IT WAS A BAD TUBE)

TUBES THAT ARE IN THE AMP SECTION (12BH7A/12AX7) ARE VERY IMPORTANT . BUY THE BEST YOU CAN AFFORD .

TUNG-SOL IS A GREAT BRAND AND THE MICROPHINICS ARE USUALLY VERY LOW

(MICROPHONIC : MEANS THE TUBE PICKS UP NOISE FROM INSIDE THE CASE)



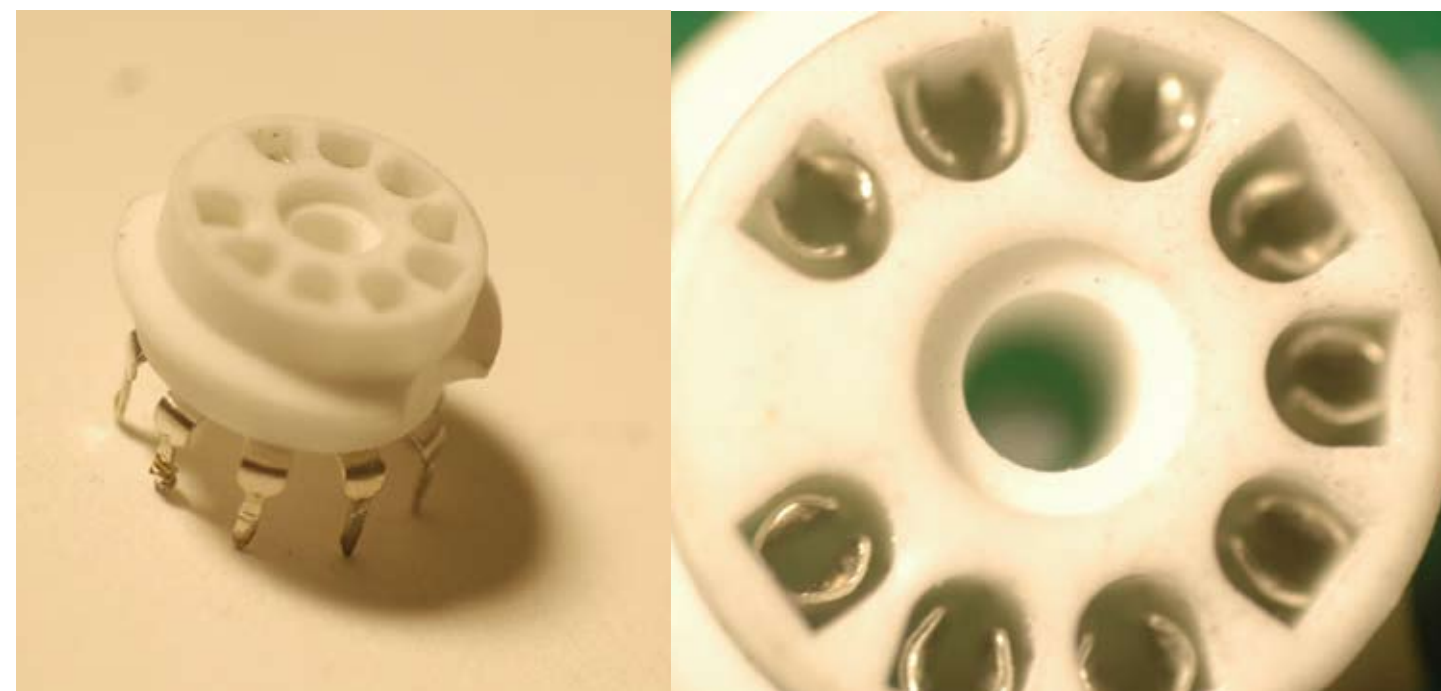
## PARTS | TUBE SOCKET | INFO

THE TUBE SOCKETS ARE A VERY IMPORTANT PART OF THE PROJECT, TRY TO USE HI QUALITY CERAMIC PCB MOUNT SOCKETS. MOULDED PLASTIC WILL WORK, BUT OFTEN HAVE POOR CONTACT WITH THE TUBES. SOMETIMES COMPRESSING THE METAL CONTACT IN THE SOCKET ITSELF WILL HELP INSURE A GOOD CONNECTION.

YOU WILL NEED THREE 9 PIN SOCKETS (12AX7 SIZE)

AND ONE 7 PIN MINIATURE SOCKET (6AQ5A SIZE)

PLACE TUBE SOCKETS IN THEIR FOOTPRINTS ON THE PCB, SOLDER INTO PLACE



## GRID RESISTORS :

NEAR THE 12BH7A TUBE SOCKET  
YOU WILL FIND 2 RESISTOR  
FOOTPRINTS MARKED 'GRID'

ON POINT TO POINT UNITS  
PEOPLE OFTEN ENCOUNTER  
OSCILLATIONS WHEN USING SOWTER  
TRANSFORMERS.

IT IS NOW ESSENTIAL THAT THESE  
SPOTS ON THE 12BH7A TUBE ARE USED  
BY A 1K RESISTOR

THE OPTIONAL GRID NEXT TO THE 12AX7  
WAS ONLY ADDED AS A PRECAUTION.



NOTE : YOU WILL HAVE TO EITHER JUMP  
OR PLACE A 1K GRID HERE,  
THE UNIT WILL NOT PASS AUDIO WITH OUT



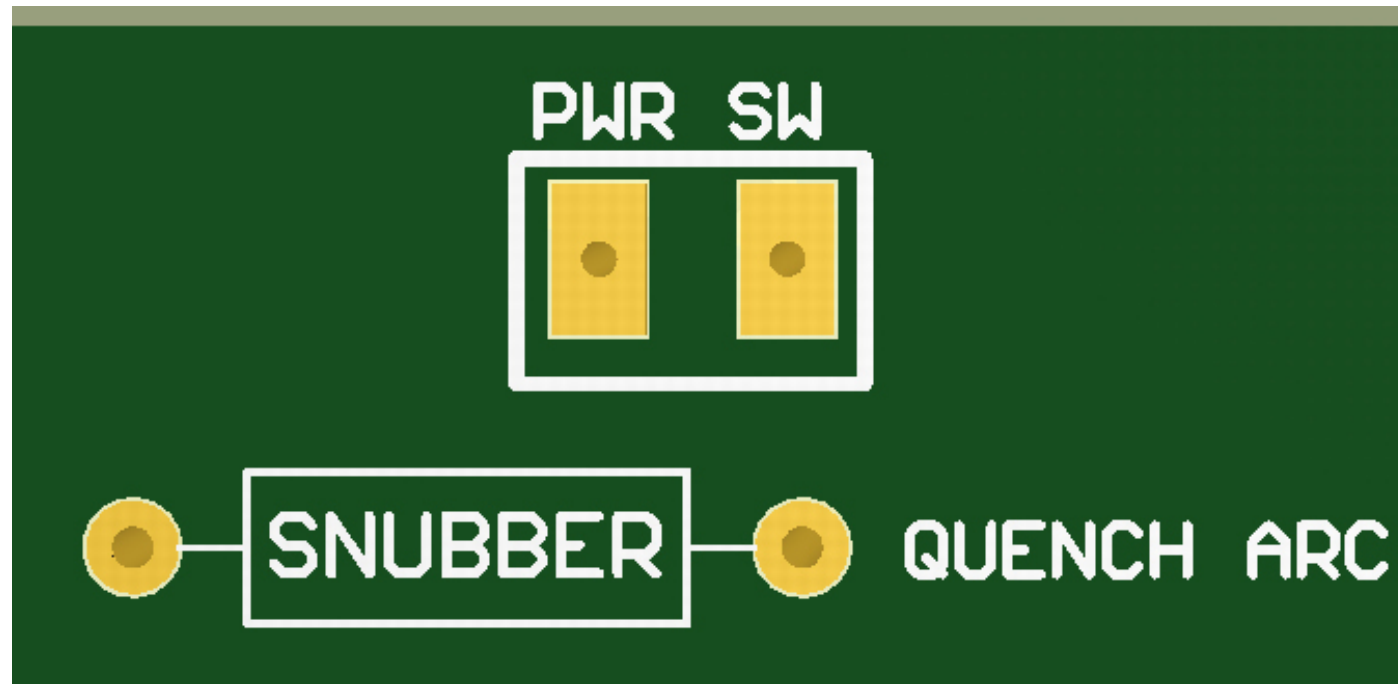
## JUMPS :

THERE ARE A FEW JUMPS ON THE BOARD , WITH THESE YOU WILL SIMPLY  
BEND A PIECE OF 24 GA WIRE LIKE A RESISTOR AND SOLDER THEM  
INTO POSITION.

A STANDARD 0.7" JUMPER WILL WORK ALSO.

ELEVATE THE JUMPS AS SHOWN ABOVE  
IF YOU ARE USING BARE WIRE , YOU CAN SHORT OUT THE PCB BY  
PLACING IT DIRECTLY ON TOP OF THE GROUND PLANE COPPER.

## POWER SWITCH (SPST) 6AMP RATED :



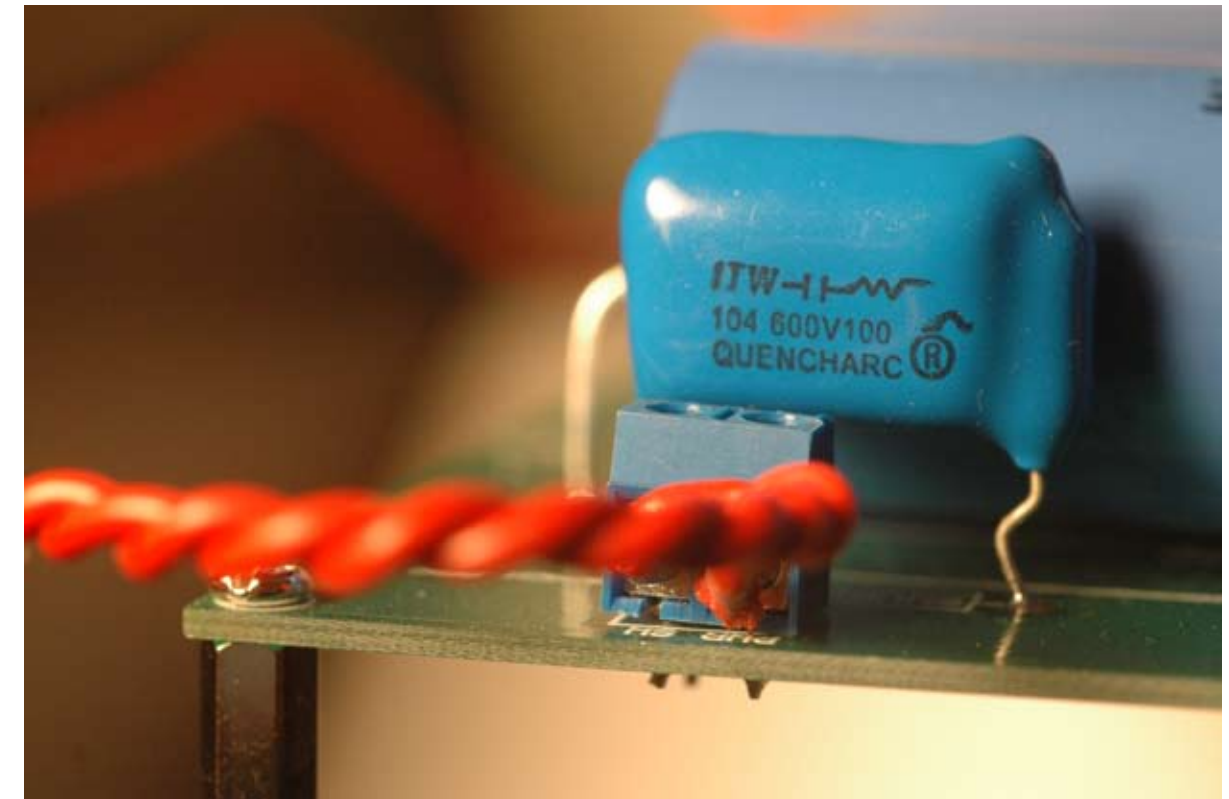
THE POWER SWITCH NOW HAS A PLACE FOR A SNUBBER NETWORK ON THE PCB.

CDE PART NUMBER : 104M06QC100 (.1 CAP IN SERIES WITH A 100R 1/2 WATT RESISTOR)

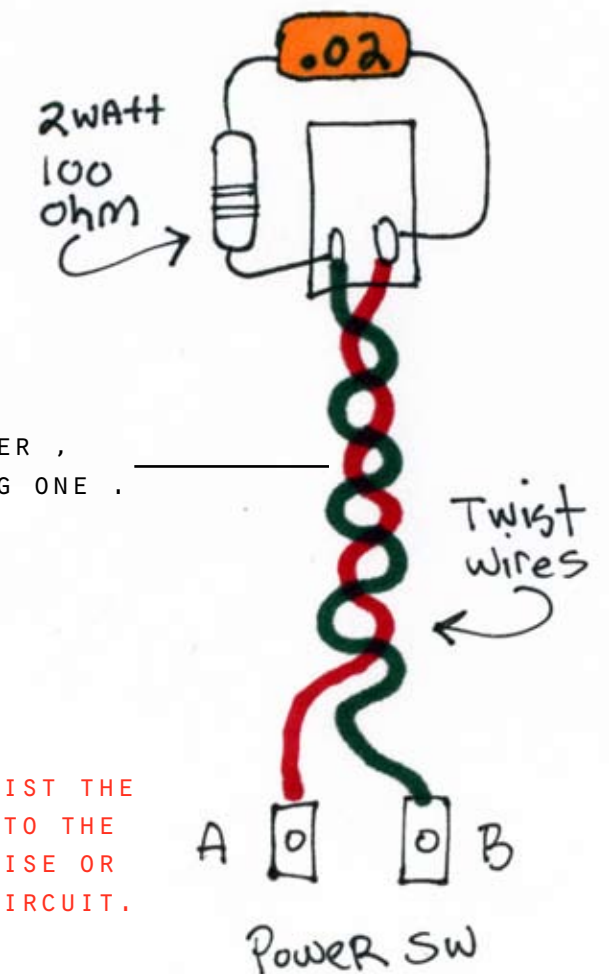
SIMPLY INSTALL THE SNUBBER AND SOLDER , THIS WILL HELP ELIMINATE ANY POPPING TRANSIENTS AT SHUT DOWN OF THE COMPRESSOR.

ON POWER CONNECTIONS IT MIGHT BE BETTER TO AVOID USING 5.08 SCREW HEADERS AND SIMPLY SOLDERING THE WIRES DIRECTLY TO THE PCB , SINCE SOME TIMES THE SCREWS CAN BECOME LOOSE AND ALLOW THE WIRE TO SLIP OUT.

BUT THE CHOICE IS YOURS.



IF YOU CHOOSE NOT TO USE THE CDE SNUBBER , HERE IS AN ALTERNATE METHOD OF CREATING ONE .

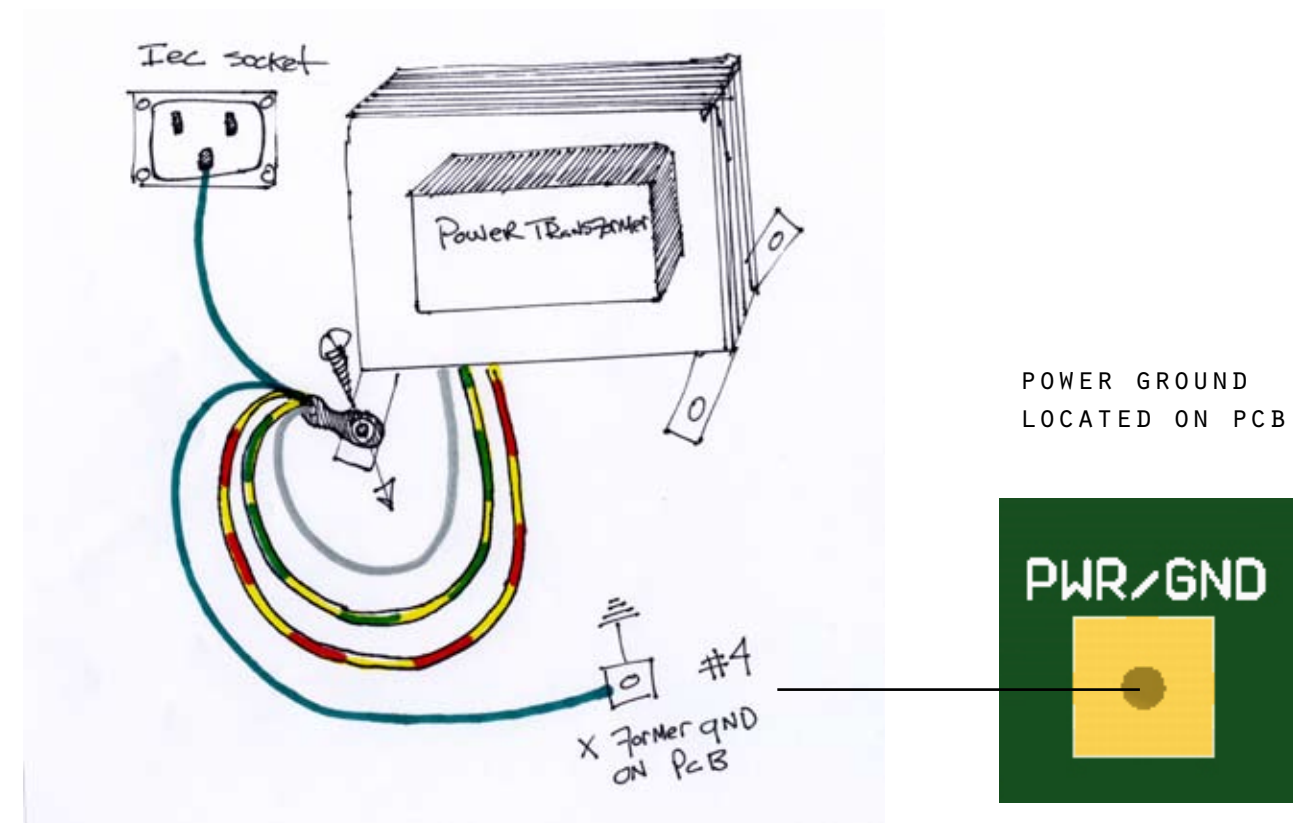


NOTE : IT IS ABSOLUTLY ESSENTIAL TO TWIST THE WIRES TOGETHER FROM THE POWER SWITCH TO THE TWO PADS LABELED 'PWR SW' OTHERWISE NOISE OR HUM MAY BE INTRODUCED INTO THE AUDIO CIRCUIT.

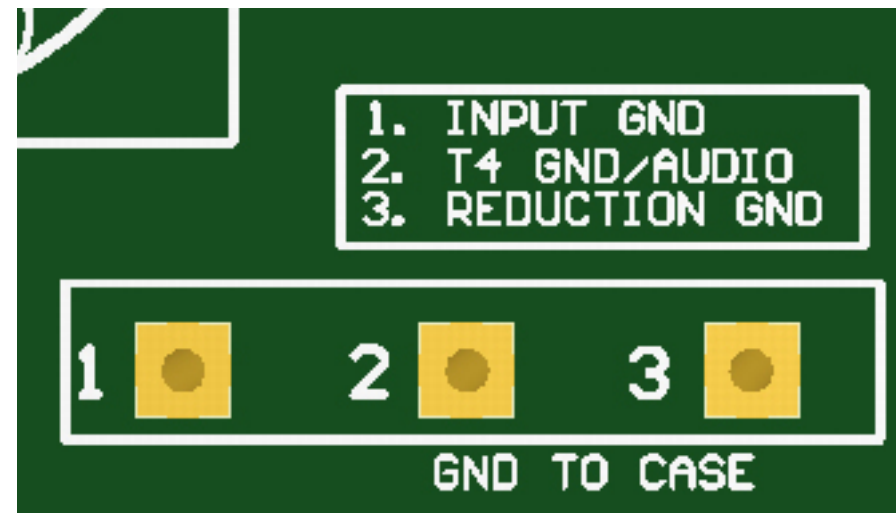
# PARTS | GROUND | INFO



ON THE PCB THERE ARE 4 GROUNDS YOU WILL NEED TO GROUND TO THE CASE.  
THE GROUND MARKED PWR/GND IS THE GROUND FOR THE FILTER CAPS AND OTHER  
POWER CIRCUITRY.  
THIS GROUND WILL GO TO THE STAR GROUND AT THE POWER TRANSFORMERS BASE.





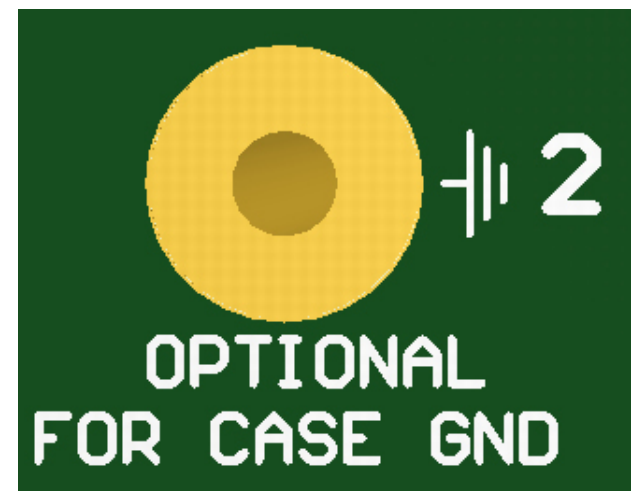


IT IS OFTEN BETTER TO GROUND 1,2,3 AT A DIFFERENT LOCATION THEN THE POWER TRANSFORMER STAR GROUND.

IN SOME OPINIONS IT IS BETTER TO GROUND ALL AUDIO GROUNDS TO A SOLDER TAG LOCATED NEXT TO THE XLR INPUT SOCKET OR ONE OF THE BOLTS THAT ATTACHES THE XLR INPUT SOCKET TO THE CASE.

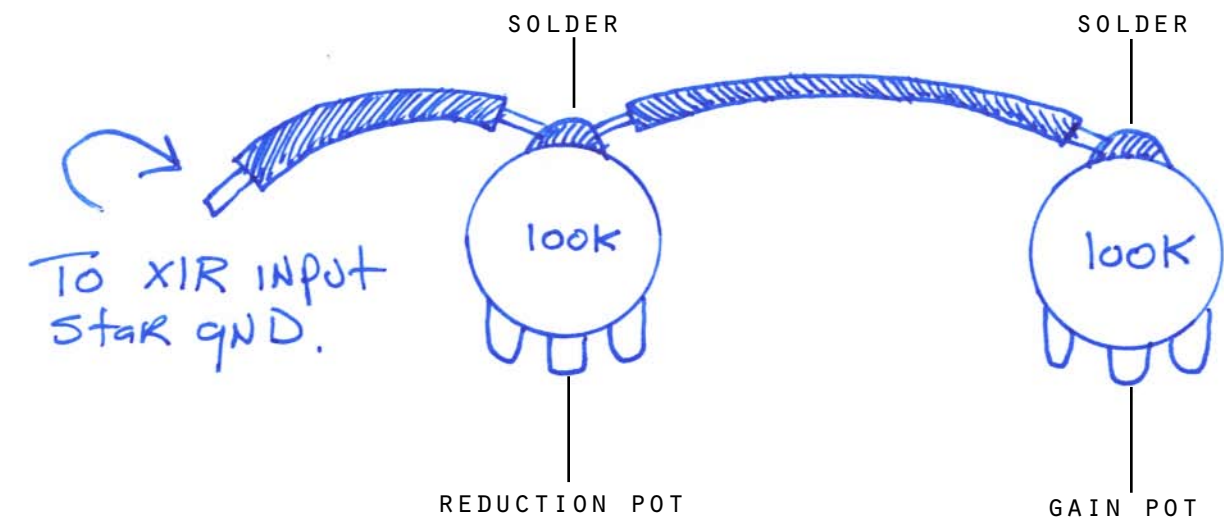
NOTE :MUCH NOISE AND HUM CAN BE INTRODUCED INTO THE CIRCUIT BY THE LOCATION OF THESE GROUNDS , DEPENDING ON YOUR CASE , YOU MIGHT HAVE TO EXPERIMENT WITH DIFFERENT LOCATIONS FOR GROUNDS 1,2,3.

ALSO IT IS POSSIBLE TO GROUND 1,2 AND 3 BY USING THE OPTIONAL PADS 'OPTIONAL FOR CASE GND' THIS ALLOWS YOU TO GROUND THE BOARD USING METAL STAND OFFS BOLTED TO THE CASE. YOU WILL NOT USE BOTH GROUNDING LOCATIONS .



### potentiometer ground mod

HERE IS A TRICK THAT SOME GUITAR AMPS USE. SIMPLY SOLDER A WIRE TO THE CASE OF BOTH THE GAIN AND THE REDUCTION POTENTIOMETERS THEN CONNECT THE WIRE TO THE AUDIO STAR GROUND LOCATED AT THE BASE OF THE XLR IN SOCKET. SOME POTS DON'T TAKE TOO WELL TO SOLDER SO TRY A TEST SPOT.



NOTE :IN SOME CASES IT CAN CAUSE NOISE SO TRY WITHOUT FIRST , SHOULD BE USED AS A FINISHING TOUCH TO YOUR UNIT.

IN MOST CASES THE METAL CONTACT FROM A WELL GROUNDED CASE IS ENOUGH.

# PARTS | MISC | INFO

## SOLDER TAGS :

THIS PROJECT WILL REQUIRE THE USE OF SOLDER TAGS FOR VERY IMPORTANT CONNECTIONS LIKE THE INDIVIDUAL GROUNDS AND THE TRANSFORMER STAR GROUND.

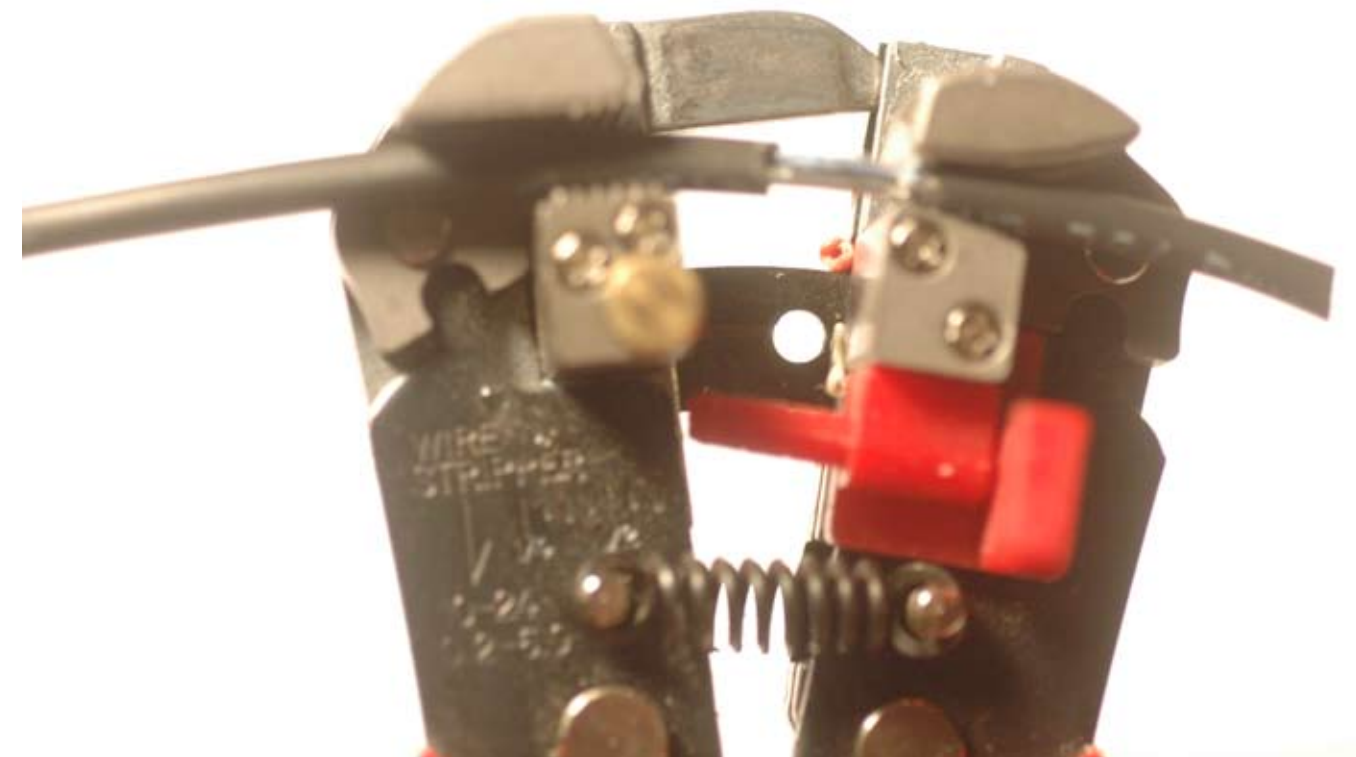
PLEASE USE THESE OR SOMETHING COMPARABLE.

THESE CONNECTIONS ARE SOME OF THE MOST IMPORTANT OF THE PROJECT .

PRE-BENT SOLDER TAGS WITH AN ADDED LOCK WASHER TEETH ARE BEST, THEY HELP INSURE A SOLID CONTACT.



NOTE : IF YOUR CASE IS PAINTED , YOU WILL HAVE TO DREMEL OR SAND AWAY A SMALL AREA TO ATTACH THE SOLDER TAGS, CLEAN SOLID CONTACT TO METAL IS IMPORTANT.



# PARTS | POTENTIOMETERS | INFO

NOTE : IT IS OK TO USE LINEAR TAPER POTS FOR THE GAIN AND REDUCTION CONTROL , THEY WILL BE MUCH QUICKER IN THEIR RESPONSE MEANING THE GAIN AND REDUCTION WILL BE A BIT SENSITIVE OR TOUCHY. (1/4 WATT POTS SEEM TO WORK HERE ALSO INSTEAD OF 2 WATT RATED)

THE ORIGINAL COMPRESSOR USED MIL SPEC 2 WATT CARBON POTS(ALLEN BRADLEY). FOR THIS PROJECT YOU WILL USE 2) 100K OHM AUDIO TAPER (LOGARITHMIC) POTS , 1 FOR GAIN AND THE OTHER FOR GAIN REDUCTION.

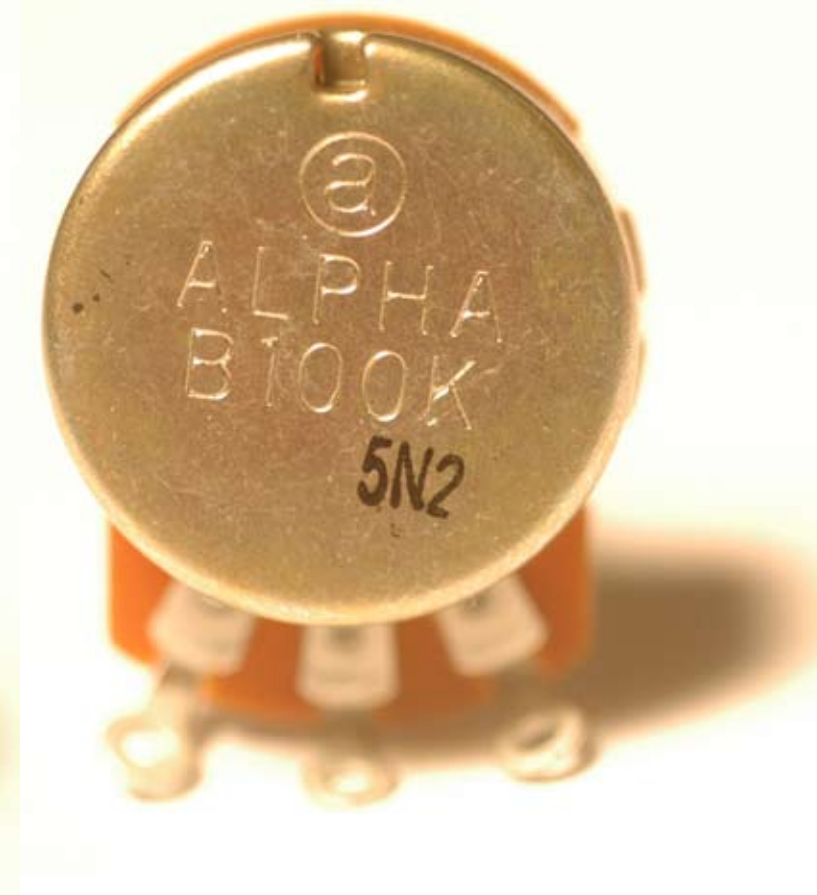
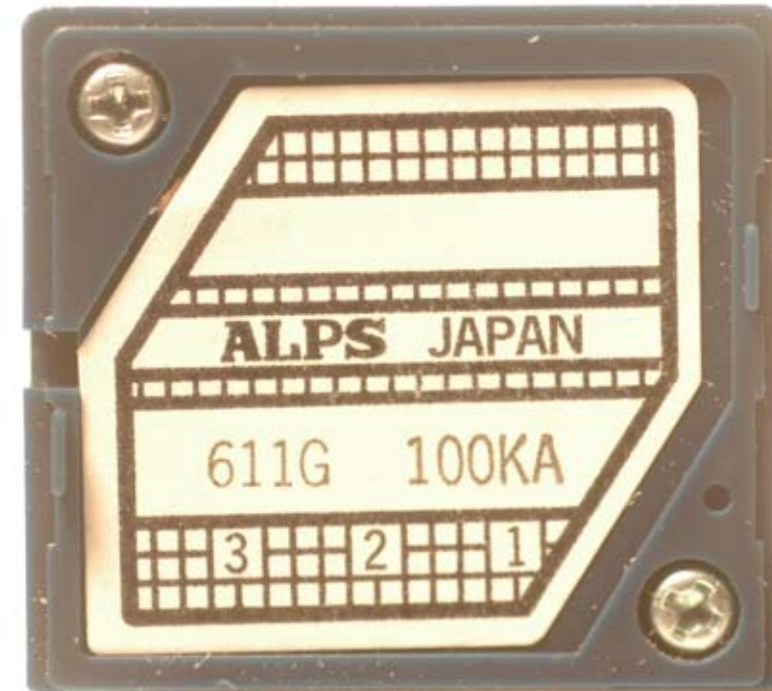
IF YOU CHOOSE NOT TO USE THE TRIMMER (SPECTROL) POTS THEN YOU WILL ALSO USE 3) 1 MEG OHM LINEAR TAPER POTS FOR THE FOLLOWING :  
STEREO ADJUST/ LIMITER RESPONSE / ZERO ADJUST

THERE ARE MANY BRANDS OF POTS FROM THE MODERN CONDUCTIVE PLASTIC, WIRE WOUND , AND THE CARBON VARIETY.

THE 100K POTS ARE A VERY IMPORTANT PART OF THE SIGNAL PATH. FOR THEY PASS AUDIO TO THE AMPLIFIER SECTION AND TO THE GAIN REDUCTION CIRCUIT. IT WOULD BE BETTER TO SPEND MONEY ON GOOD 100K POTS AND USE CHEAPER CHOICES ON THE 1 MEG OHM POTS.

THE PEC CARBON ARE OF VERY GOOD QUALITY AND ARE USED ON THE MODERN COMPRESSOR.

ALPHAS MAY SEEM VERY CHEAP , BUT ARE TRIED AND TRUE . LOTS OF PEOPLE PREFER THE TONE AND FEEL OF THESE UNDERDOGS. CONDUCTIVE PLASTIC LIKE THE ALPS 'BLUE VELVET' CAN BE A VAST IMPROVEMENT TO YOUR UNIT, AUDIOPHILES STAND BY THESE POTS FOR THEIR SILKY SOUND AND PERFECT GLIDE.



# PARTS | POTENTIOMETERS | HOOKUP

## STEREO ADJUST / LIMITER RESPONSE

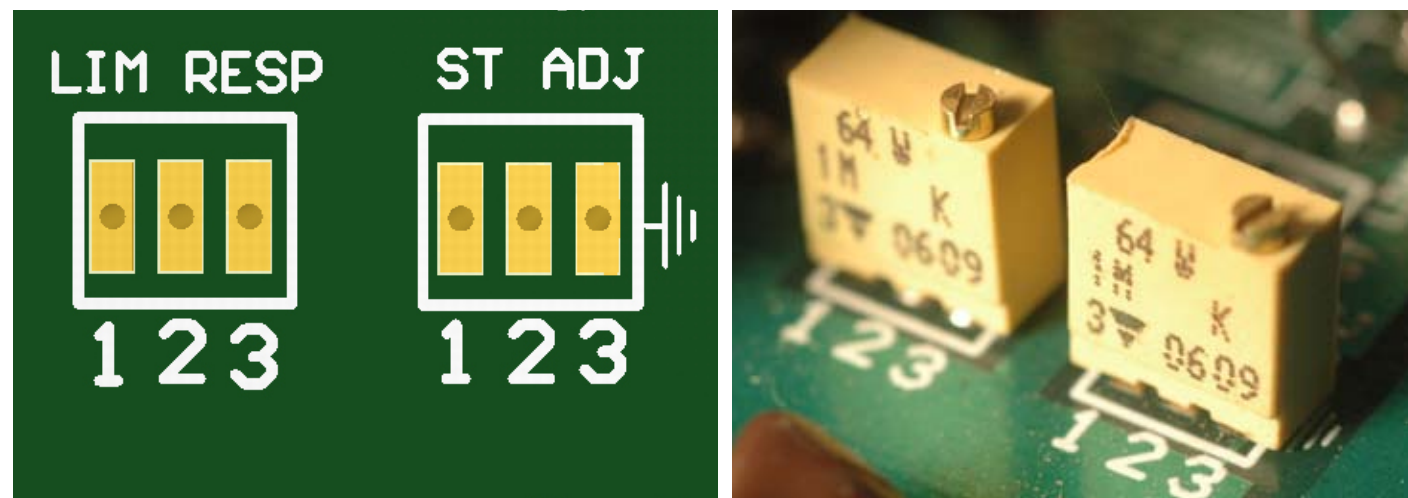
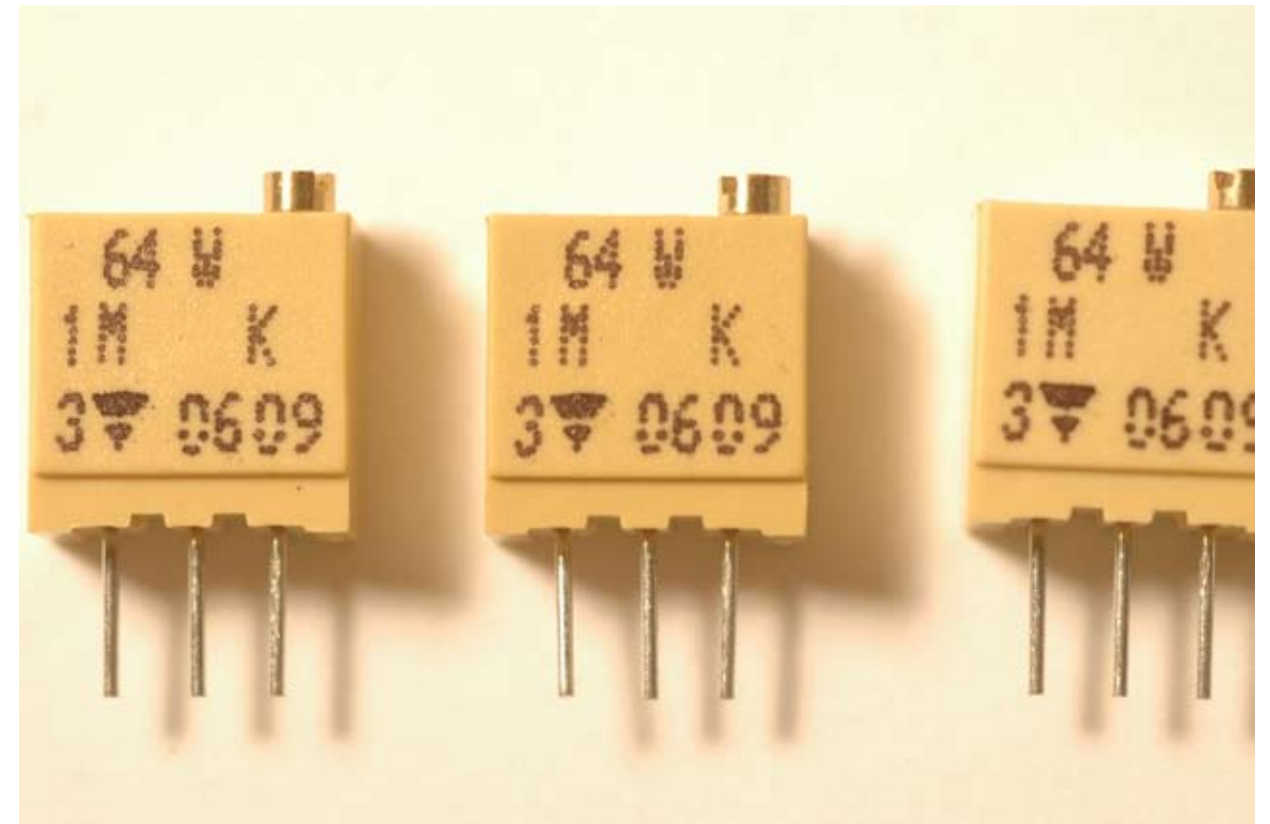
LOCATED NEAR THE 6AQ5A TUBE SOCKET , YOU WILL FIND TWO SETS OF PADS FOR HOOKING UP THE POTS FOR LIMITER RESPONSE AND THE STEREO ADJUST.

FOR THESE TWO POSITIONS YOU WILL USE 3/8 IN VISHAY TRIMMER POT.  
MFG#: M64W105KB40

SINCE THESE POTS ARE RARELY USED I WANTED TO AVOID THE HASSLE HAVING YET ANOTHER RUN OF WIRES THROUGHOUT THE CASE .

INSTALLATION IS EASY , PLACE THE COMPONENTS WITH THE LETTERING FACING THE T4B SIDE OF THE BOARD AND SOLDER.

(BE CAREFUL OF APPLYING TOO MUCH SOLDER AS IT MAY FLOW THROUGH THE HOLES AND CREATE A SOLDER BRIDGE UNDERNEATH THE COMPONENT.



TO SET THE STEREO ADJUST AND THE LIMITER RESPONSE POTS :

TAKE A SMALL SCREW FLAT HEAD SCREW DRIVER AND ROTATE THE SCREW 15 TIMES TO THE RIGHT , DO THIS FOR EACH POT.

THESE POTS DON'T HAVE A STOP THAT YOU CAN FEEL AND MOST MODELS ARE 15 TURN , SO THIS USUALLY WORKS FINE.

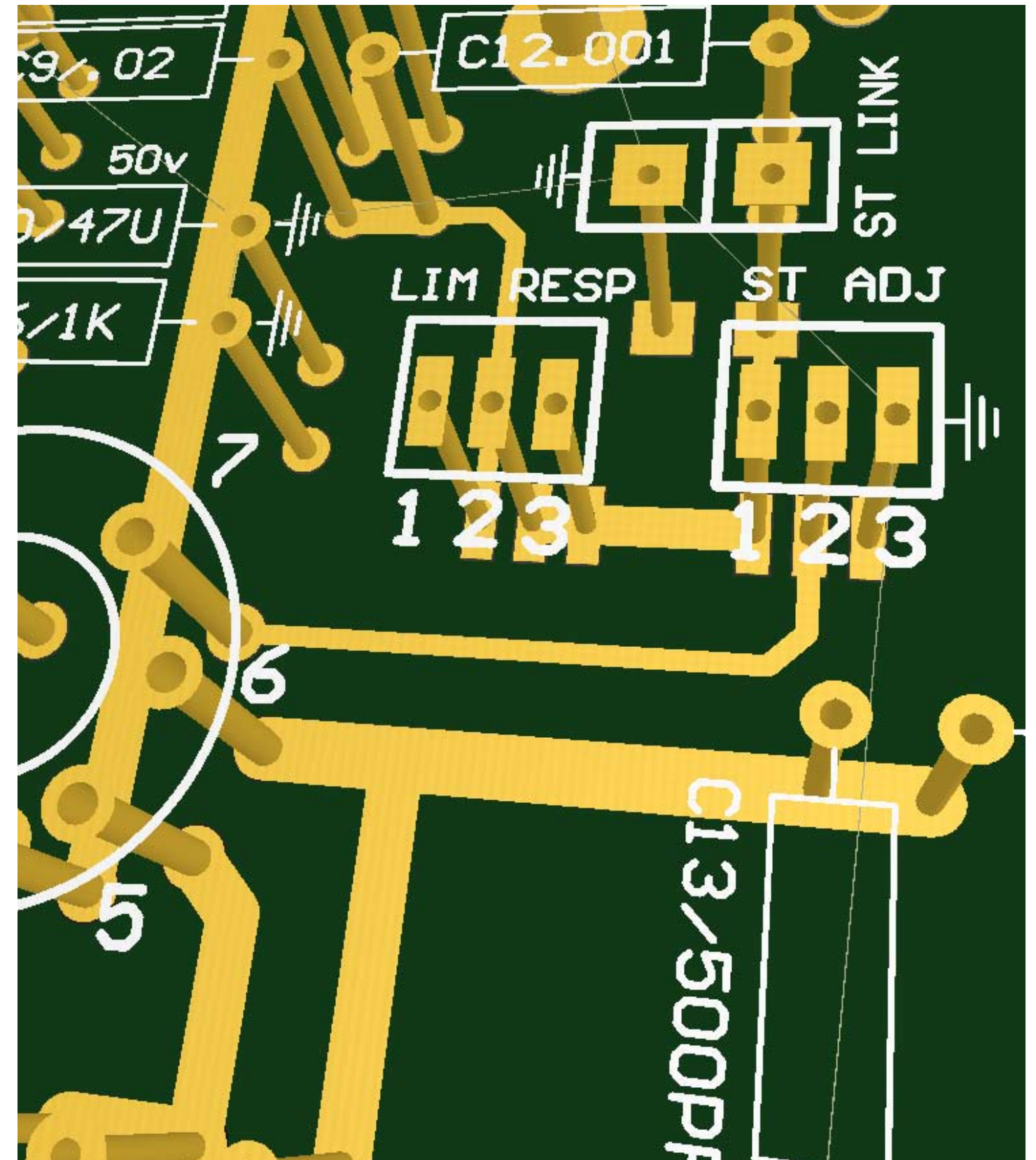
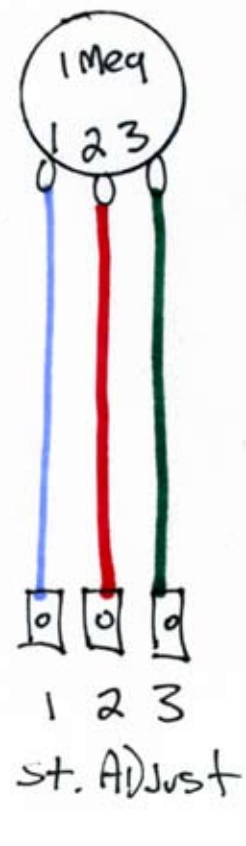
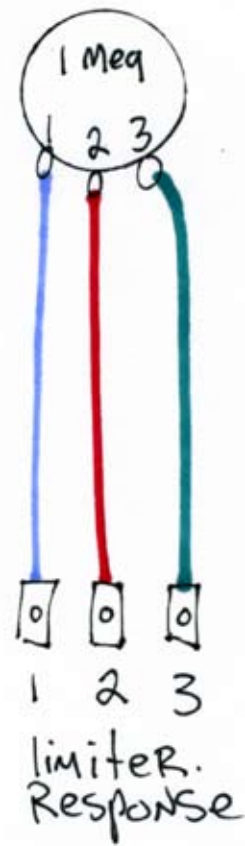
IF YOUR UNIT DOES NOT COMPRESS OR YOU HAVE CHOSEN A DIFFERENT BRAND, SIMPLY TURN BOTH POTS 15 TIMES COUNTER CLOCKWISE.

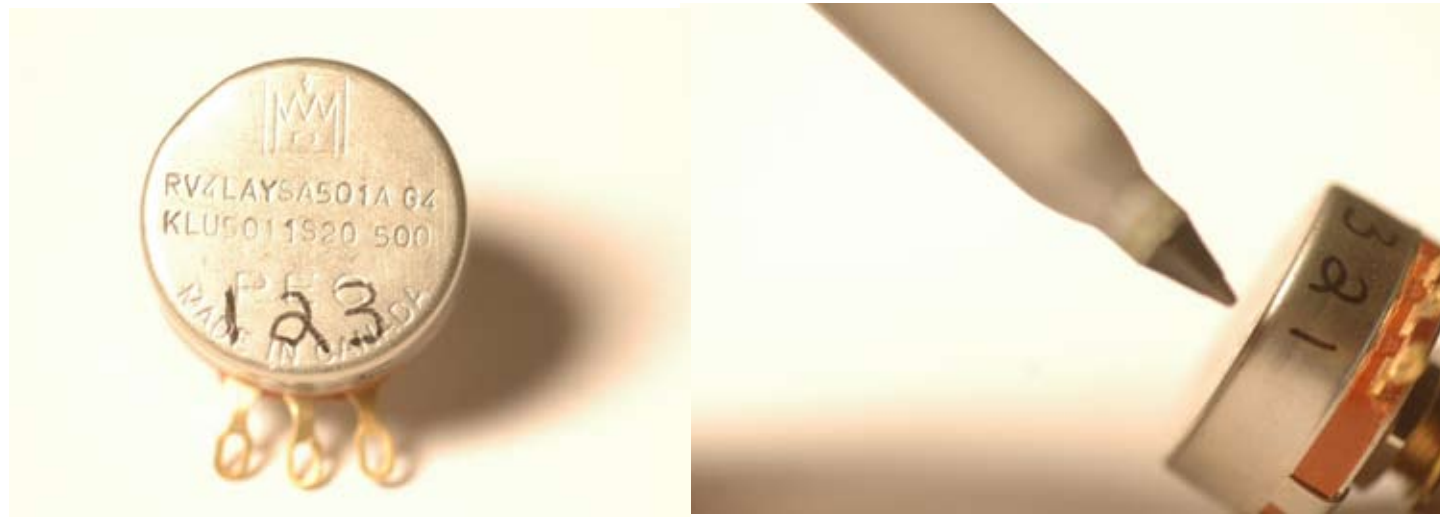
IF YOU HAVE CHOSEN 25 TURN TRIMMERS , ROTATE 25 TIMES.

IF YOU CHOOSE TO USE STANDARD POTS  
HERE IS HOW TO CONNECT THEM .  
PAD 3 ON STEREO ADJ. IS A GROUND  
IF YOU USE SHIELDED WIRE (NOT-  
NECESSARY )

CONNECTION OF THESE POTS IS  
PRETTY STRAIGHT FORWARD.

YOU WILL HOOK THEM  
UP AS ILLUSTRATED HERE.





## GAIN POTENTIOMETER (100k)

### HOOK UP

FOR MOST POTS , ANY EASY METHOD IS TO USE A MARKER AND LABEL THEM AS PICTURED ABOVE.

LOOKING AT THE BACK OF THE POT , USUALLY THE PIN ON THE LEFT WILL BE PIN '1' THE MIDDLE PIN OF THE POT WILL ALWAYS BE PIN 2 ALSO KNOWN AS 'THE WIPER' , PIN 3 WILL BE ON THE RIGHT. (EXCEPT ON ALPS BLUE VELVET PIN 1 IS GND)

**NOTE :** IF YOUR GAIN CONTROL OR REDUCTION WORKS IN REVERSE, YOU WILL NEED TO REVERSE THE PIN 1 AND PIN 3 PIN2 WILL ALWAYS REMAIN THE SAME .

SOME OF THE CONNECTIONS WILL REQUIRE THE USE OF SHIELDED WIRE.

A FOIL TYPE SHIELD WITH A SHIELD WIRE IS PREFERRED , IT IS NEATER THEN A BRAIDED COPPER SHIELD AND EASIER TO WORK WITH. ALTHOUGH IT IS LESS EFFECTIVE THEN THE BRAIDED COPPER .

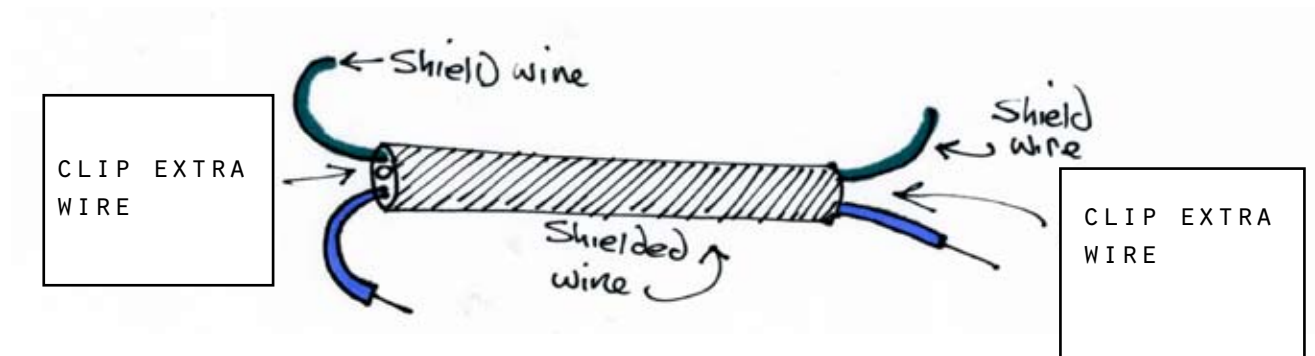
A BRAIDED SHIELD TENDS TO BE TOO MESSY AT BEST.

ON THE ORIGINAL UNIT IT IS ONLY USED TO CONNECT THE GAIN POTENTIOMETER , REDUCTION POTENTIOMETER, AND THE LIMIT COMPRESS SWITCH.

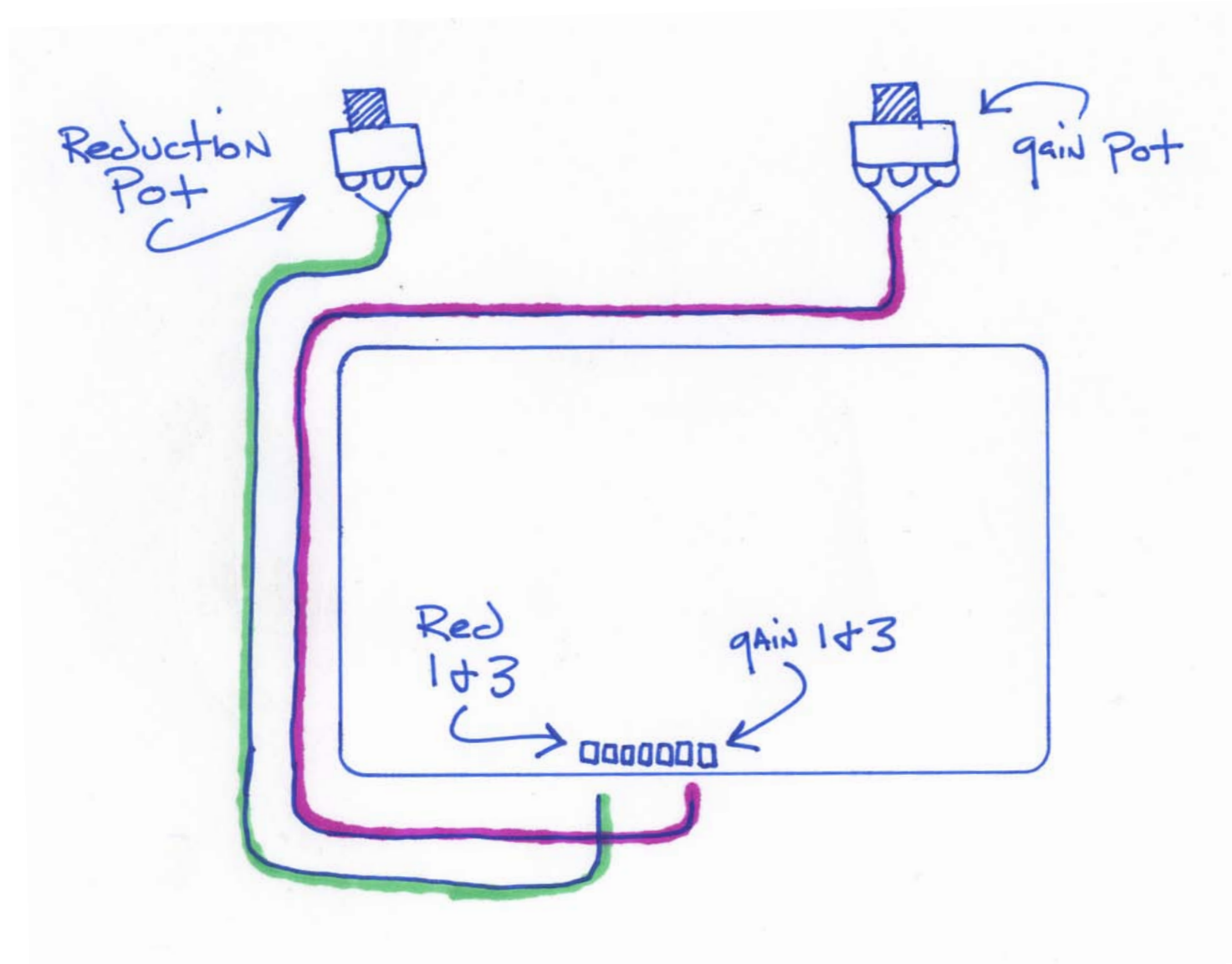
THE GAIN AND REDUCTION POTS WILL USE A 2 CONDUCTOR PLUS SHIELD TYPE WIRE.

**NOTE :**  
FOR THIS PROJECT I RECOMMEND USING AT LEAST 22 GAUGE WIRE FOR MOST CONNECTIONS

FOR THE GAIN AND REDUCTION POTS YOU WILL NEED A PAIR OF SHIELDED WIRES CUT IN THE CONFIGURATION AS SHOWN IN THE ILLUSTRATION, CLIPPING THE UNUSED WIRES.

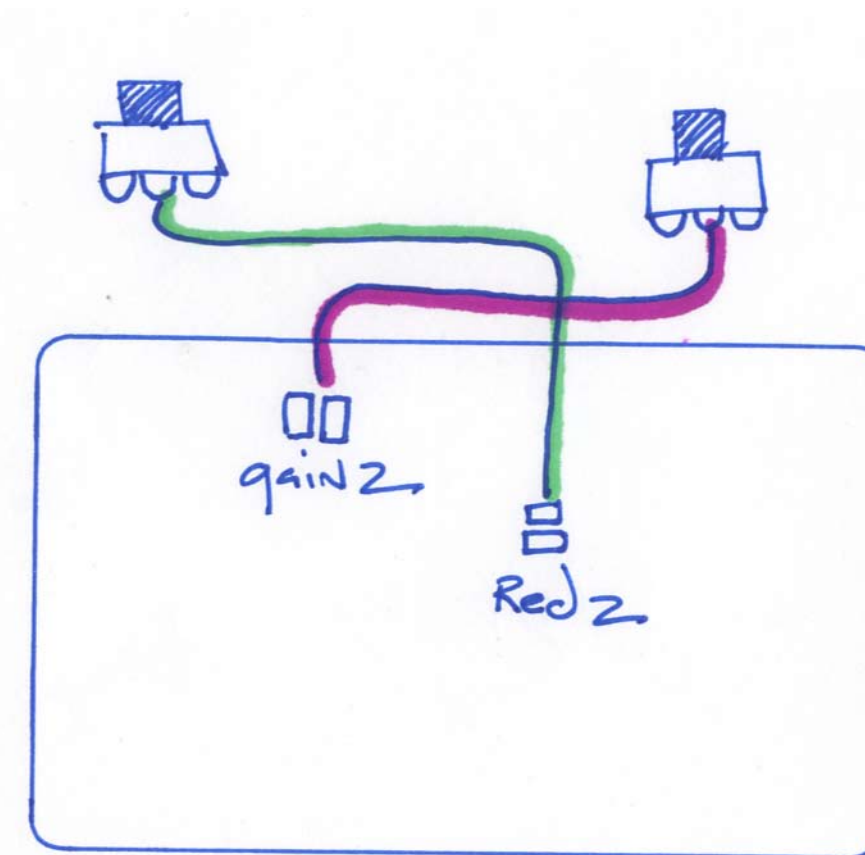


BASICALLY YOU ARE CREATING 4 SETS OF WIRES AS ILLUSTRATED ABOVE . A 1 CONDUCTOR(INSULATED) PIECE OF WIRE WITH SHIELD (AND SHIELD WIRE)

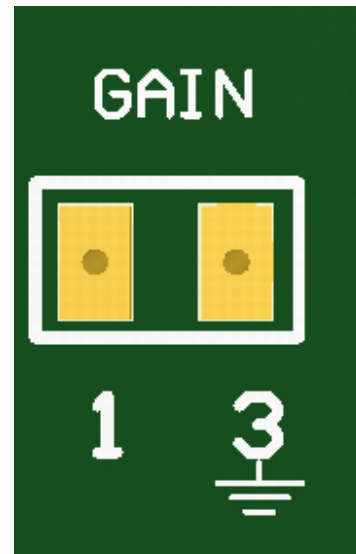


HERE IS AN EXAMPLE OF THE ROUTING PATH YOU WILL MAKE FOR YOUR GAIN PINS 1 AND 3 AND REDUCTION PINS 1 AND 3 WIRE RUNS , SINCE THE WIRE IS SHIELDED , YOUR SIGNAL IS PROTECTED , SO MAKE SURE TO USE ENOUGH WIRE TO MAKE THE RUN WITHOUT TOO MUCH STRAIN ON EITHER SIDE OF THE CONNECTION.

NOTE :  
IT WOULD BE PREFERRED TO RUN THESE CONNECTIONS ON THE BOTTOM CORNER OF THE CASE , THIS WILL HELP SHIELD THE WIRE FURTHER.



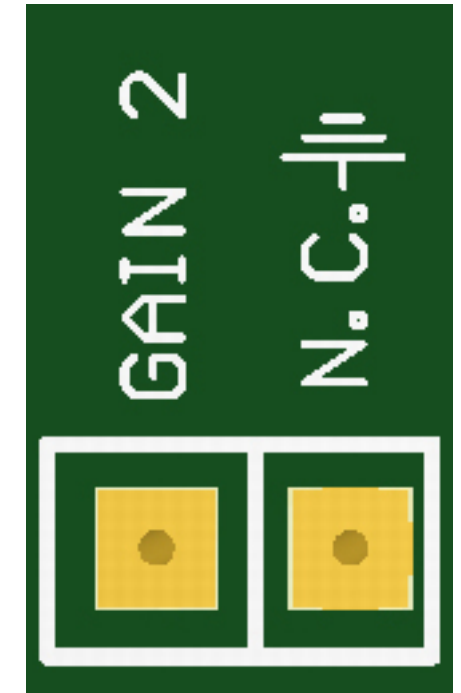
IN THE ABOVE ILLUSTRATION , IT IS SHOWN HOW THE WIRE RUNS FOR BOTH PIN 2'S OF THE REDUCTION AND GAIN SHOULD BE LAID OUT.



ON THE VER 3 PCB THE GAIN 2 PAD NOW HAS AN EXTRA PAD MARKED N.C. THIS PAD IS NOW TIED INTO THE AUDIO GROUND ,

AND CAN BE USED TO CONNECT THE SHIELD WIRE. (ADDING EXTRA SUPPORT FOR THIS CONNECTION)

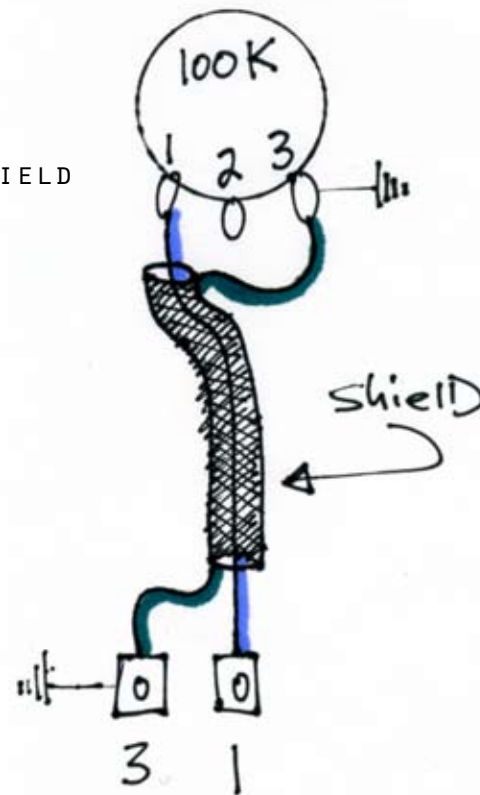
IVE HAD GREAT SUCCESS WITH CONNECTING THE SHIELD WIRE TO THIS ALONG WITH CONNECTING THE OTHER SIDE TO PIN 3 AS ILLUSTRATED BELOW.



#### STEP #1

HERE IS AN ILLUSTRATION OF HOW THE GAIN POT IS HOOKED UP .

- 1.)SOLDER THE SHIELD WIRE TO PIN 3 ON THE POT .
- 2.)NOW CONNECT THE OTHER END OF THE SHIELD WIRE TO THE PCB 'GAIN' PAD #3 (WHICH IS A GROUND)
- 3.)SOLDER THE NEXT LEAD TO POT PIN#1 .
- 4.)SOLDER THE OTHER END TO PCB 'GAIN' PAD#1



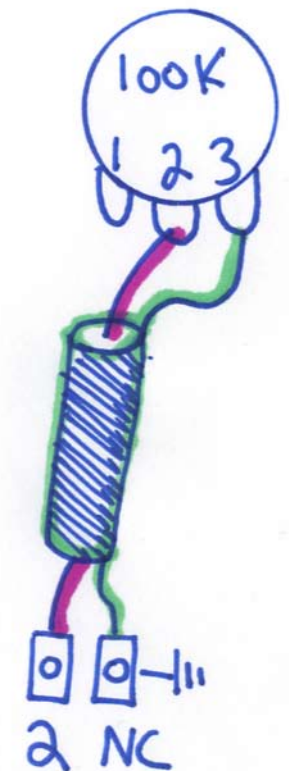
#### STEP #2

USING A PIECE OF SHIELDED CABLE STRIP BOTH ENDS OF THE CABLE AS IN STEP 1 CLIP THE EXTRA CONDUCTOR ON BOTH SIDES.

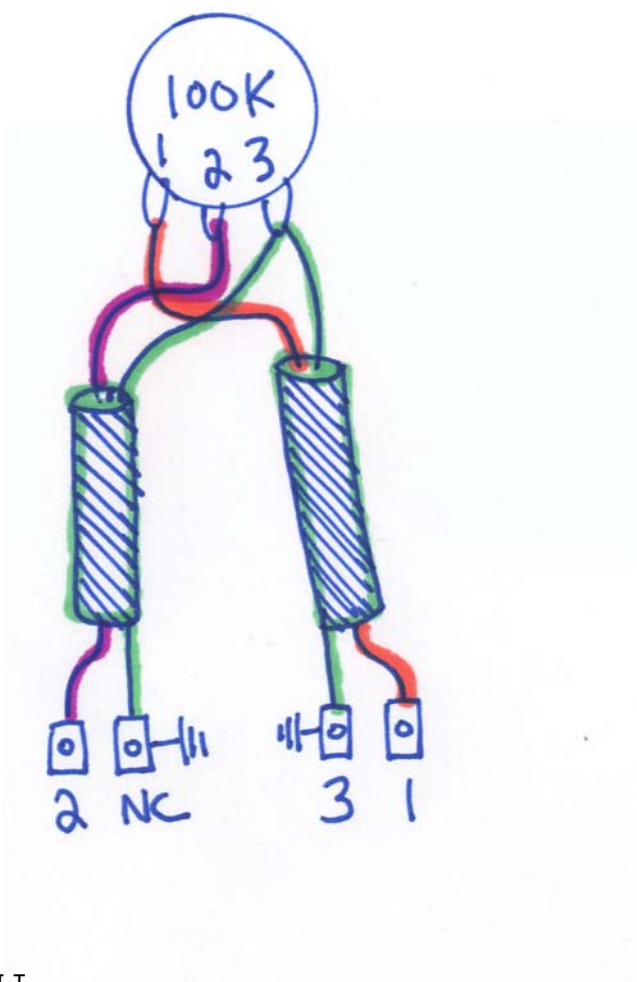
YOU WILL ONLY NEED 1 INSULATED CONDUCTOR AND THE SHIELD WIRE.

ATTACH THE SHIELD WIRE TO N.C. ON THE PCB , THEN ATTACH THE OTHER END OF THE SHIELD TO PIN 3 ON THE POT.

ATTACH THE INSULATED WIRE TO GAIN 2 ON THE PCB , AND THE OTHER SIDE TO PIN 2 (MIDDLE) ON THE POT.

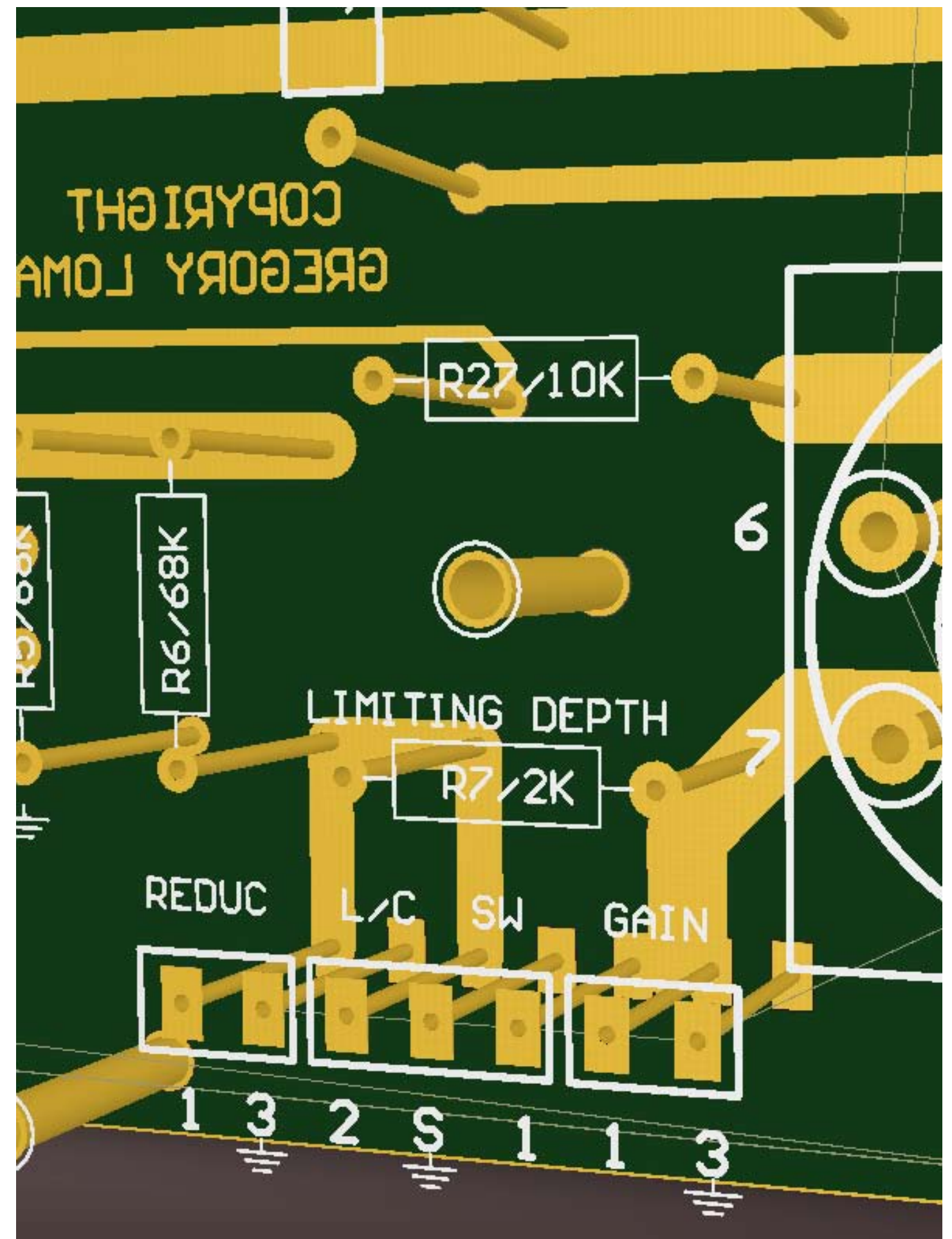


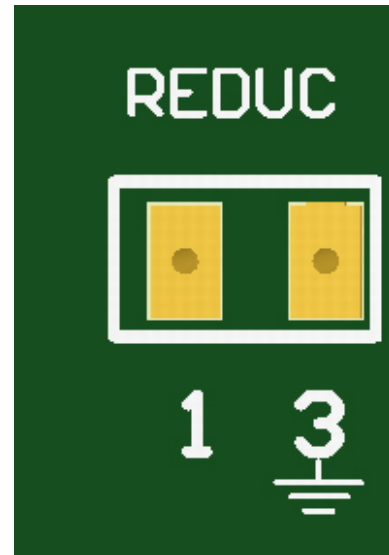




STEP #3

COMPLETED CIRCUIT

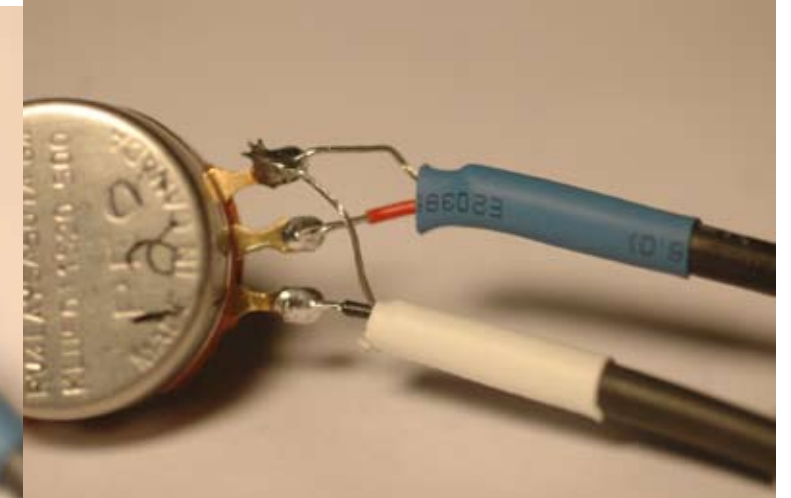
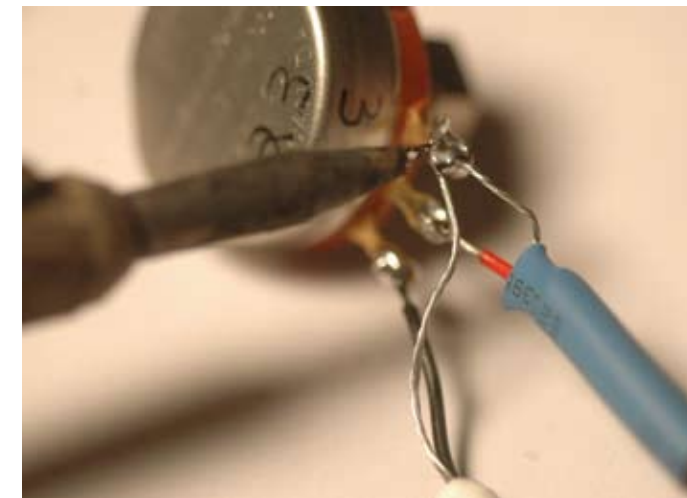
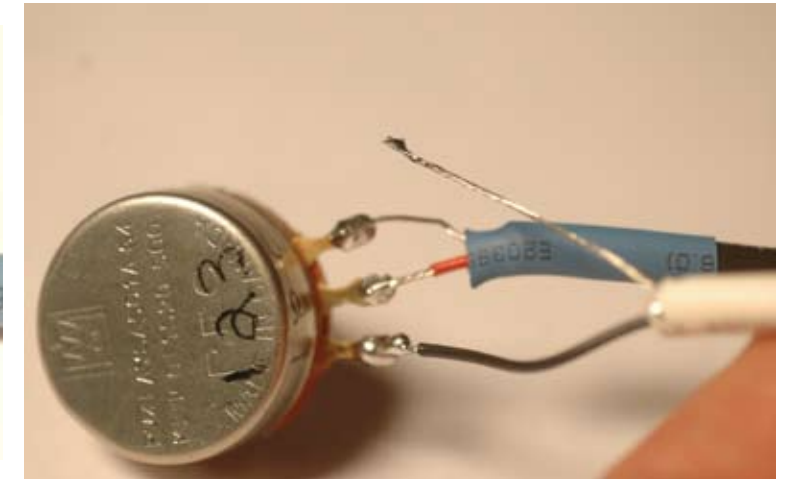
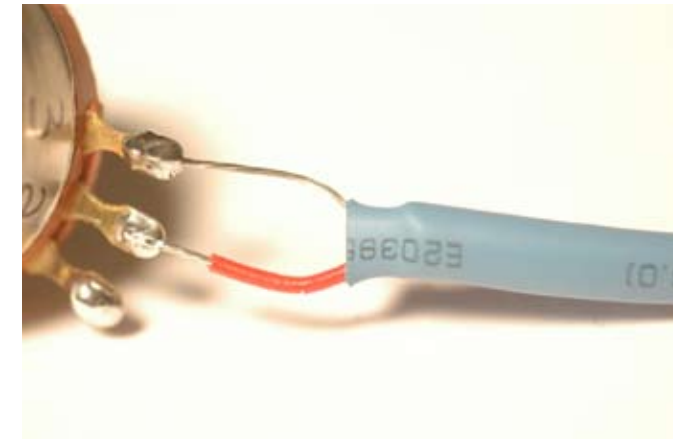
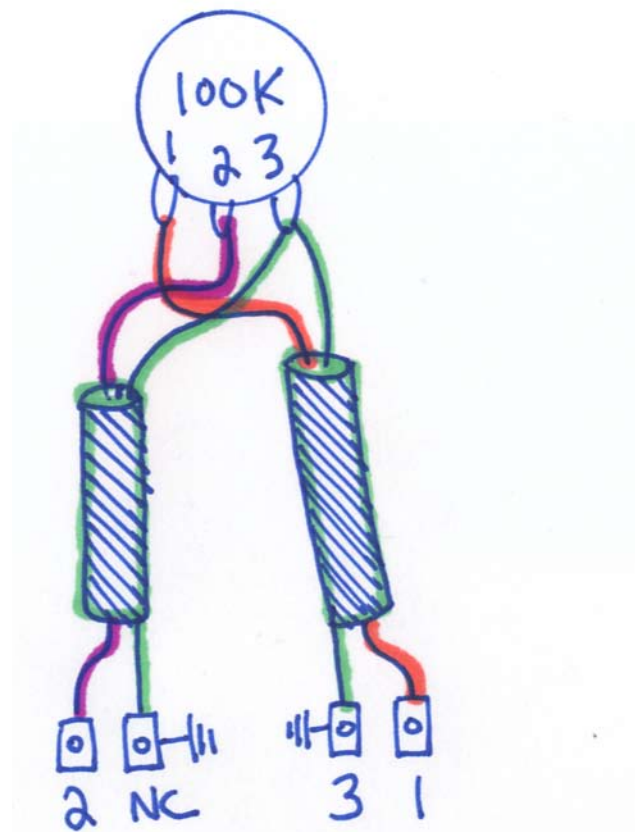




## REDUCTION POTENTIOMETER

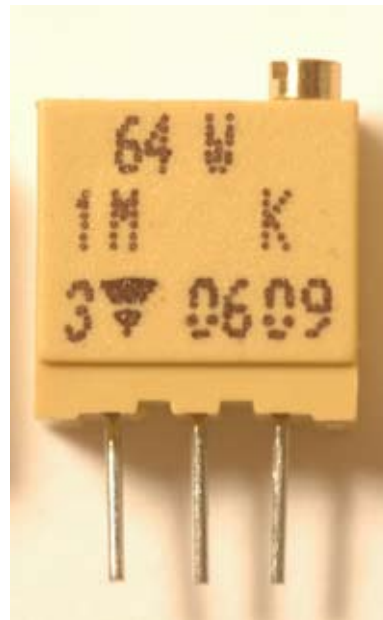
WIRING THE REDUCTION POT IS IDENTICAL TO HOW THE GAIN POT IS WIRED.

SIMPLY REPEAT THE GAIN POT PREPARATION AND STEPS, USING THE PCB PADS ABOVE.



NOTE :  
BE CAREFUL NOT TO LEAVE TOO MUCH EXPOSED WIRE WHEN SOLDERING TO THE POTS.  
ACCIDENTAL SHORTS CAN HAPPEN OVER TIME , USE SHRINK TUBING IF NECESSARY.

## ZERO ADJUST POTENTIOMETER



THIS POT ADJUSTS THE POSITION OF THE NEEDLE ON THE VU METER WHEN THE METER IS SET TO MONITOR THE REDUCTION. THE OPTO3 BOARD ALLOWS FOR THE USE OF A 3/8 1 MEG TRIMMER FOR THE ZERO ADJUST.

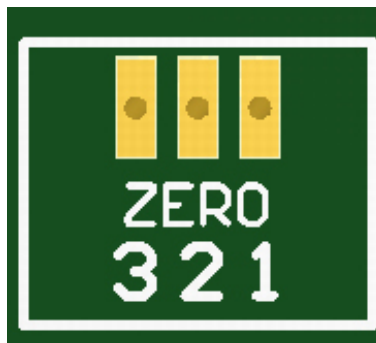
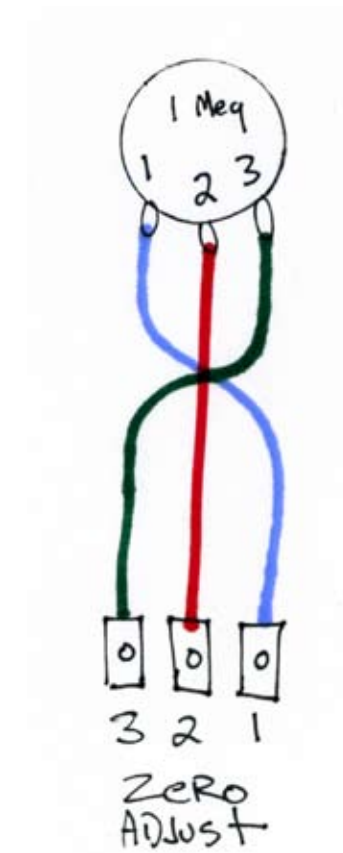
BE CAREFUL NOT TO USE TOO MUCH SOLDER WHEN ATTACHING TO THE PCB , BECAUSE IT CAN FLOW THROUGH AND CREATE A SOLDER BRIDGE UNDERNEATH THE COMPONENT.

TO SET :

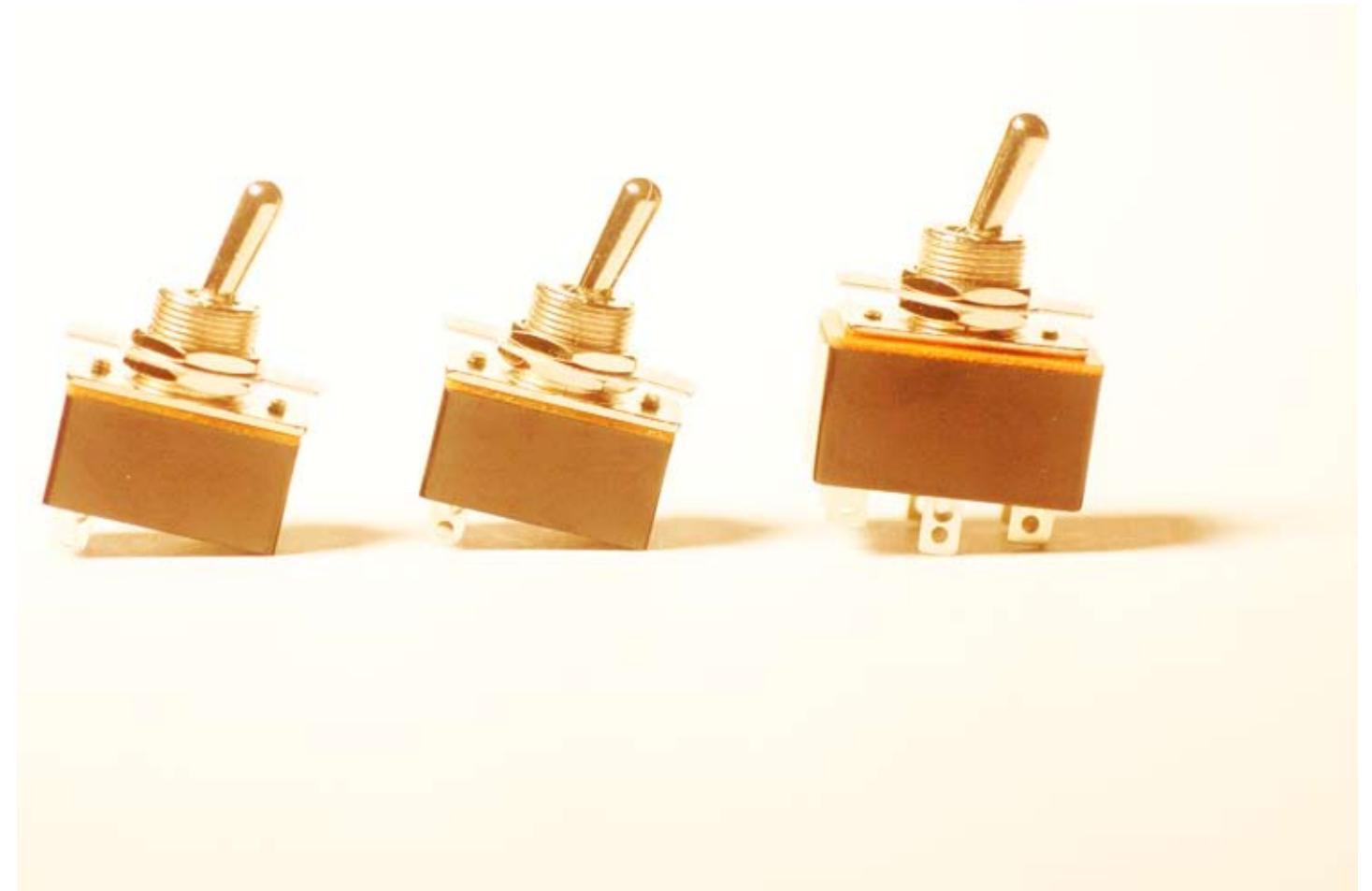
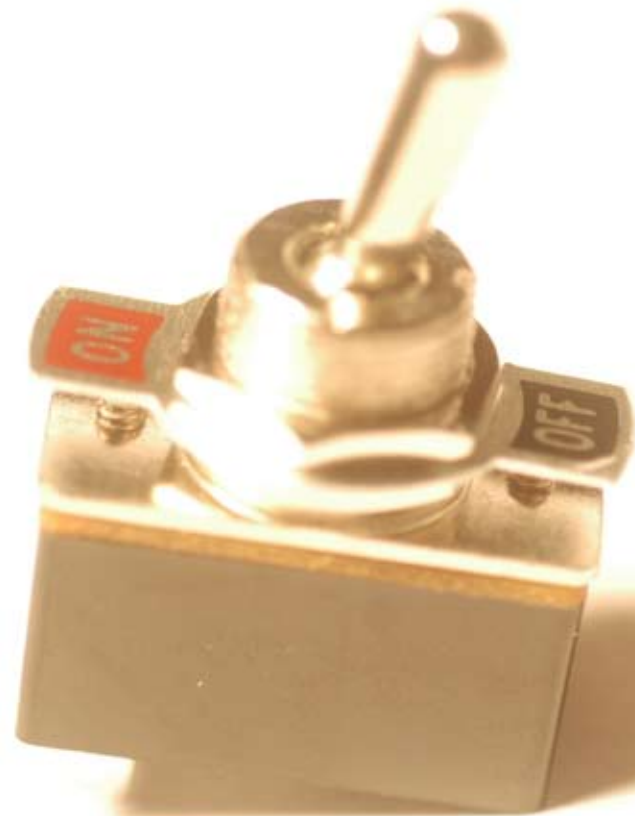
LET THE UNIT WARM UP FOR 10 MINUTES  
SET THE METER SELECT SWITCH TO REDUCTION

THEN , USING A PLASTIC HANDLED EYEGLASS SCREWDRIVER ROTATE THE SCREW ATOP OF THE TRIMMER AND ROTATE UNTIL THE UNIT READS 0DB.

IF YOU WANT TO CONNECT A POT  
HERE IS THE WIRING DIAGRAM.  
SINCE THE PADS ARE CLOSE TO  
ACCOMMODATE THE TRIMMER,  
BE CAREFUL NOT TO CREATE SOLDER  
BRIDGES.



# PARTS | SWITCHES | INFO



YOU WILL USE 3 TOGGLE SWITCHES FOR THE BUILD :

- 2 ) SPST (SINGLE POLE SINGLE THROW) SWITCHES  
ONE FOR THE POWER SWITCH AND ONE FOR THE  
LIMIT/COMPRESS SELECTION SWITCH.
- 1 ) DPDT (DOUBLE POLE DOUBLE THROW) SWITCH  
FOR THE METER SELECTION SWITCH.

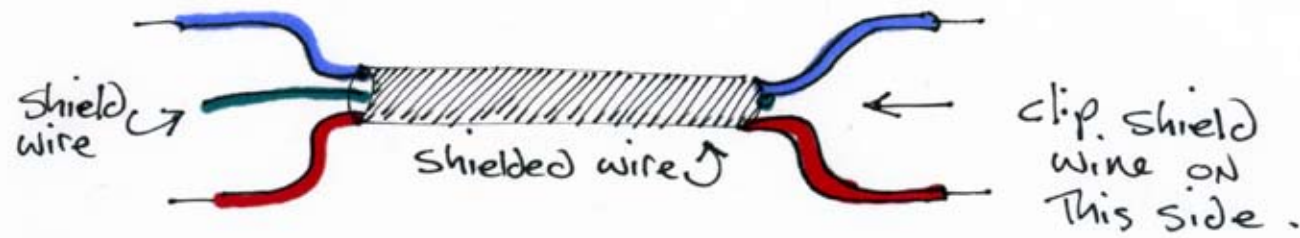
FOR THE POWER SWITCH USE AT LEAST A 6 AMP RATED  
SWITCH.

FOR THE OTHER SWITCHES VERY LOW VOLTS/CURRENT GO  
THROUGH THEM SO A STANDARD DUTY TOGGLE IS FINE.

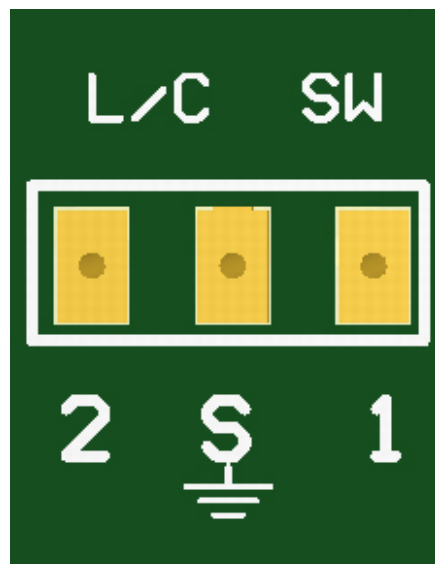
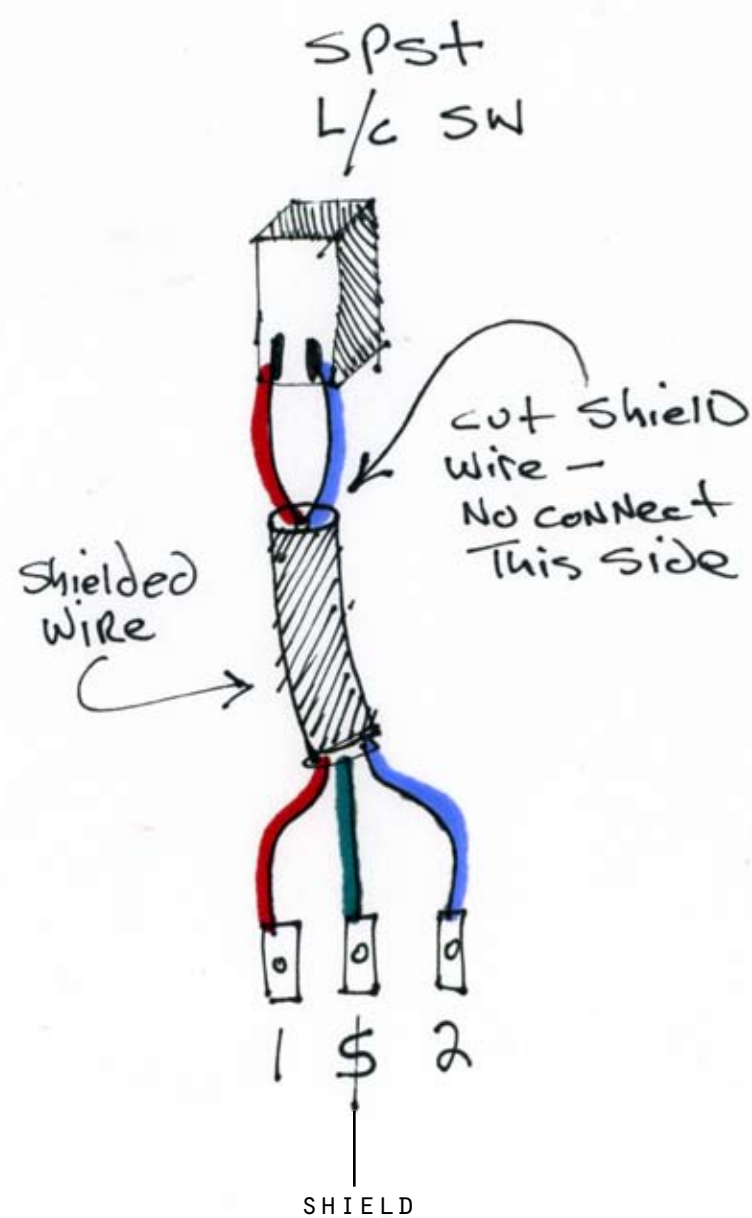
(RADIO SHACK HAS A NICE BAG THAT HAS THE ABOVE SWITCH-  
ES , PERFECT FOR THIS BUILD)

NOTE : THE DPDT SWITCH MUST BE THE ON/ON TYPE  
WITH ONLY TWO TOGGLE POSITIONS.  
SWITCHES WITH A MIDDLE TOGGLE POSITION  
ON-OFF-ON SEEM NOT TO WORK.

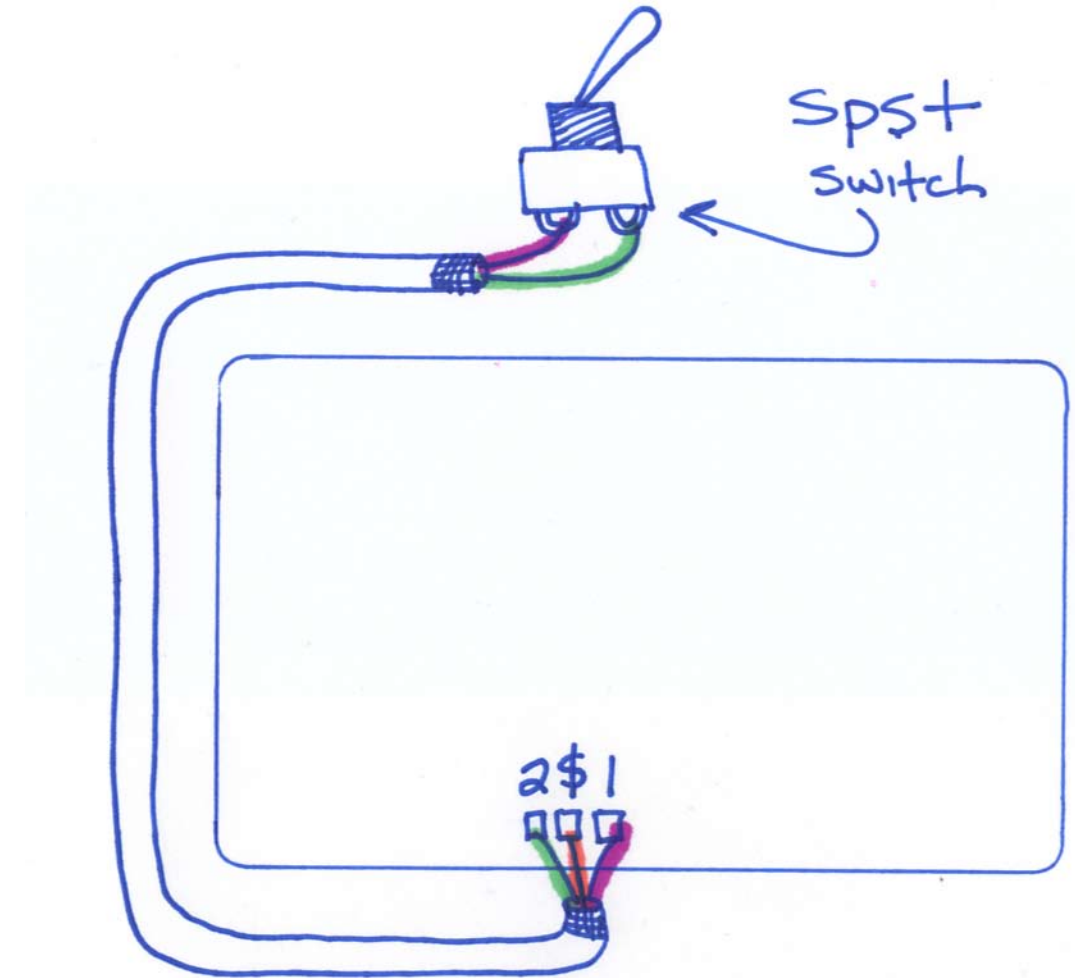
LIMIT/COMPRESSION SWITCH (SPST) :



YOU WILL NEED TO CUT ONE PIECE OF SHIELDED 2 CONDUCTOR WIRE AS SHOWN IN THE ILLUSTRATION. CONNECT TO PADS ON PCB MARKED SPST L/C SW. USE THE BELOW ILLUSTRATION AS AN EXAMPLE.



ROUTING :

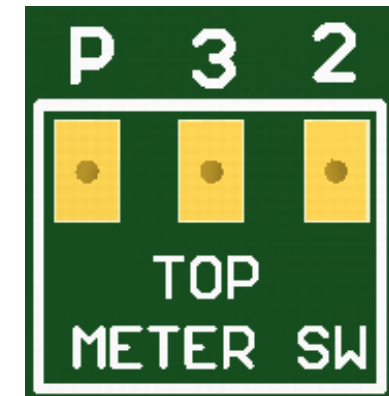
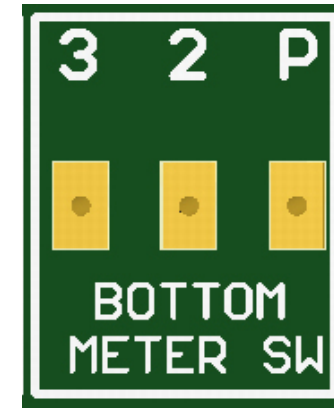
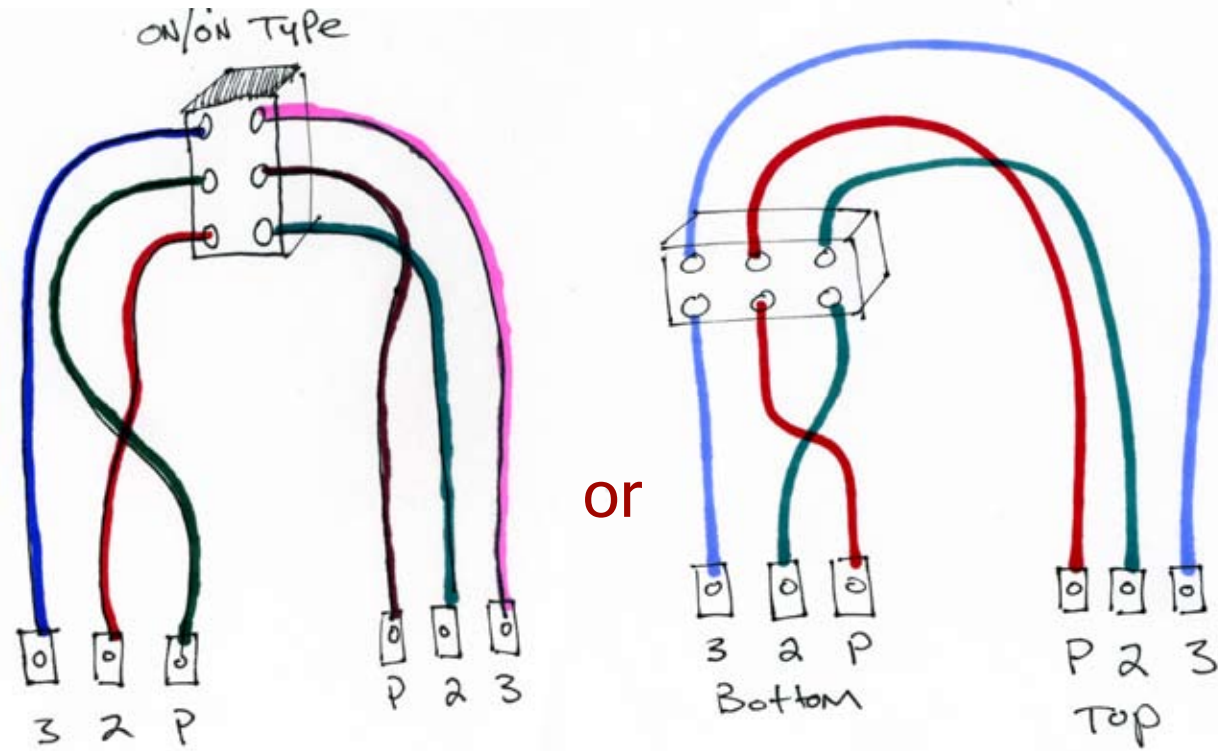


NOTE :  
FOR ROUTING YOUR WIRE RUN , USE THE SAME PATH IN THE BOTTOM CORNER OF CASE AS THE GAIN AND REDUCTION PIN 1 AND 3 WIRE RUNS .

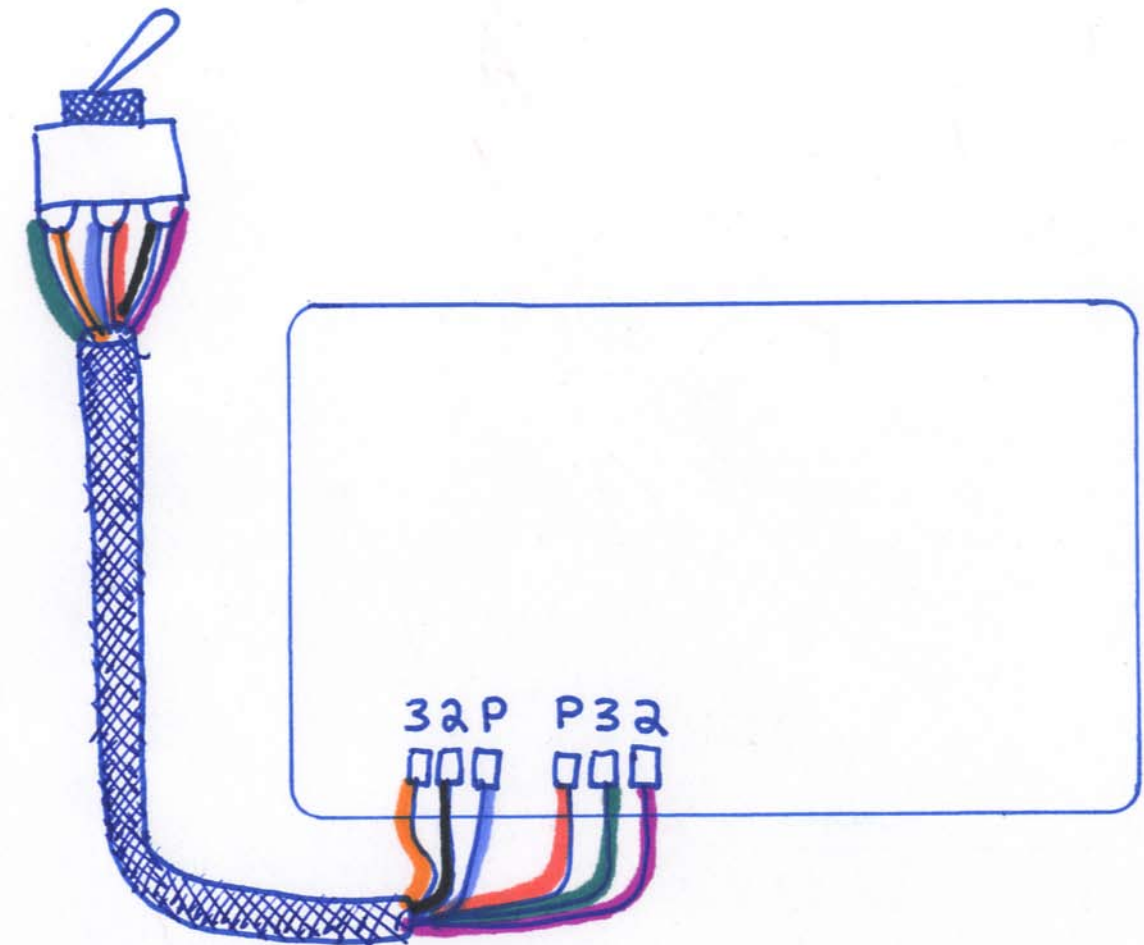
# PARTS | SWITCHES | HOOKUP

## METER SELECTION SWITCH (DPDT ON/OFF)

THIS SWITCH IS USED TO CHANGE THE VU METER FROM MONITORING THE OUTPUT OF AUDIO TO THE MONITORING OF REDUCTION



THIS CONNECTION IS ACTUALLY VERY EASY .  
THE TWO SECTIONS MARKED 'METER SW' ARE ALSO LABELLED 'TOP' AND 'BOTTOM'  
THESE WERE ADDED JUST TO CLARIFY ONE SIDE OF THE SWITCH FROM THE OTHER.  
YOU COULD JUST AS WELL SAY 'RIGHT' OR 'LEFT' AS IN THIS ILLUSTRATION.  
YOU WILL NOTICE HOW BOTH THE PADS MARKED 'P' GO TO THE CENTER OF THE SWITCH , THAT IS BECAUSE 'P' STAND FOR 'POLE'  
AND WILL ALWAYS GO TO THE CENTER PINS.  
IT DOESN'T MATER WHAT SIDES THE  
NUMBERED PADS CONNECT TO , AS LONG AS THEY ARE PAIRED WITH  
THEIR CORRESPONDING NUMBER ON THE SAME SIDE OF THE SWITCH.



## KNOBS

DEPENDING ON THE TYPE OF POTENTIOMETERS  
YOU USE , YOU WILL NEED TO PURCHASE  
5 KNOBS FOR :

- 1: GAIN
- 2: REDUCTION
- 3: STEREO ADJUST (OPTIONAL)
- 4: LIMITER RESPONSE (OPTIONAL)
- 5: METER ZERO ADJUST (OPTIONAL)

YOU CAN SELECT THESE ON BASIS OF YOUR PERSONAL  
AESTHETIC, MOLDED PLASTIC WORKS GREAT HERE.

NOTE :

KNOBS OFTEN HAVE SHAFT SIZE  
REQUIREMENTS , SO BE SURE TO  
CHECK THIS TO MATCH YOUR POTS.

---

## WIRE

PLEASE USE AT LEAST 22 GAUGE WIRE FOR THE  
VARIOUS CONNECTIONS USED IN THIS PROJECT.  
(24 GAUGE WOULD BE THE MINIMUM ALLOWED)

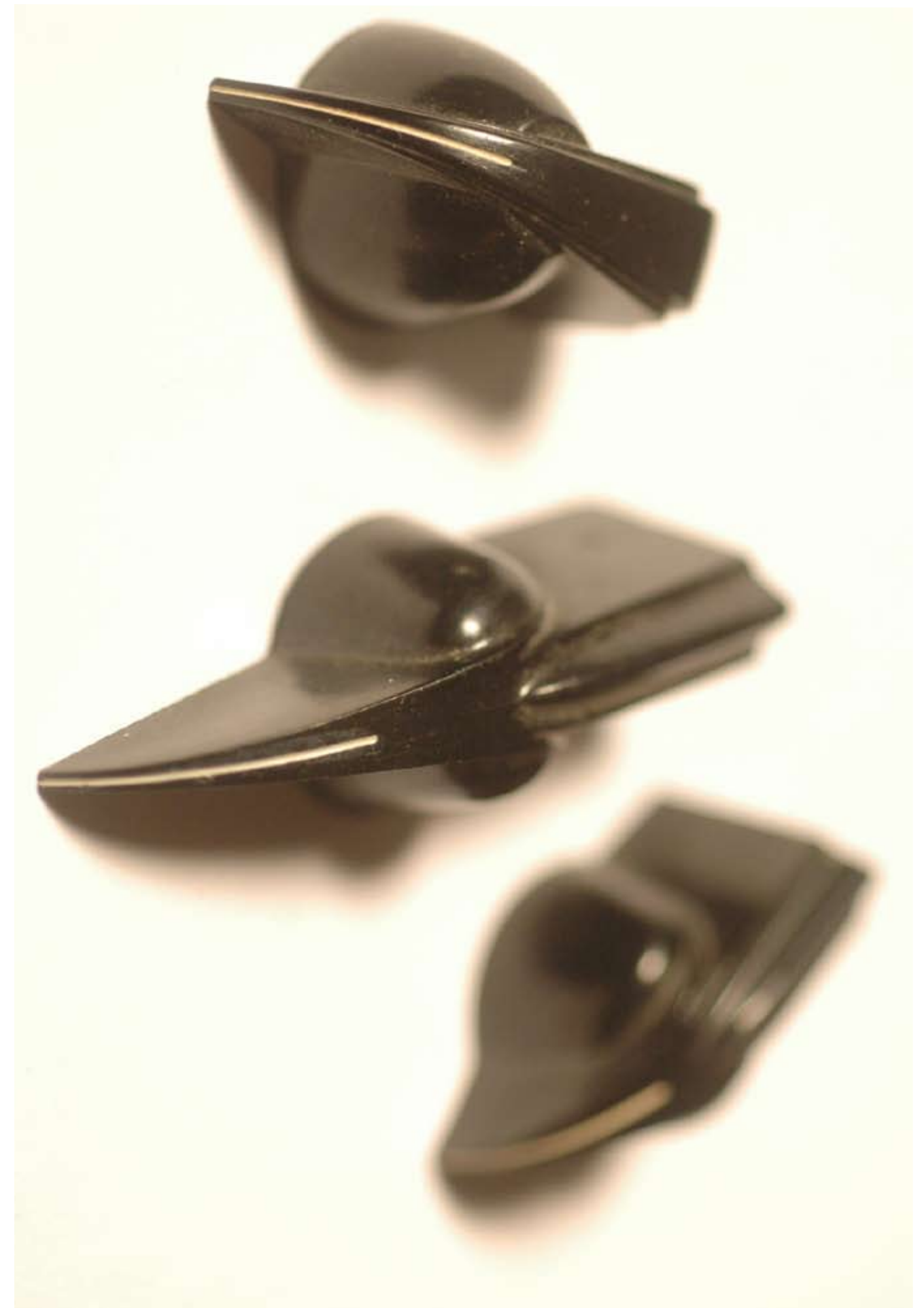
---

## STANDOFFS

8 STANDOFFS ARE NEEDED TO ELEVATE THE  
PCB ABOVE THE CASE FLOOR.

A MINIMUM OF 1/4 INCH IS REQUIRED.

(20MM STANDOFFS WITH #40 SCREWS  
SEEM TO WORK VERY WELL HERE)



# PARTS | CHASIS | INFO

THERE ARE MANY DIFFERENT STYLES OF CASES THAT YOU CAN CHOOSE FOR YOUR PROJECT, FROM STEEL TO ALUMINIUM, BOTH SEEM TO WORK WELL. ALUMINIUM WILL BE EASIER TO DRILL AND CUT FOR THINGS LIKE THE IEC SOCKET.

**NOTE :** IT IS VERY IMPORTANT THAT THE CASE IS VENTED TO ALLOW THE HEAT FROM THE TUBES TO DISSIPATE. ALL OF THE PARTS THAT WILL BE INSIDE THE CASE CAN HANDLE A GOOD AMOUNT OF HEAT BUT VENTING IS NECESSARY AS A SAFETY PRECAUTION AND A STEP TO PRESERVE THE LIFE SPAN OF THE INTERNAL COMPONENTS.

THE REQUIRED SIZE FOR THE PCB BUILD IS A CASE AT LEAST 5" HIGH BY 17" WIDE AND 10" DEEP. THE PCB'S DIMENSIONS ARE 15.75"x6" , BUT YOU WILL NEED A LITTLE ROOM INSIDE THE CASE FOR THE CONNECTIONS TO SWITCHES AND THE SOLDER TAGS THAT WILL RECEIVE THE GROUND CONNECTIONS.

A SOLID CONSTRUCTED CASE WITH A LID IS PREFERRED OVER THE CASES THAT COME IN 6 PIECES (TOP,BOTTOM,SIDE,SIDE,REAR AND FRONT.) IT SEEMS THAT THESE CASES HAVE A HARDER TIME WITH MAINTAINING A SOLID GROUND CONNECTION ESPECIALLY IF THEY ARE PAINTED.

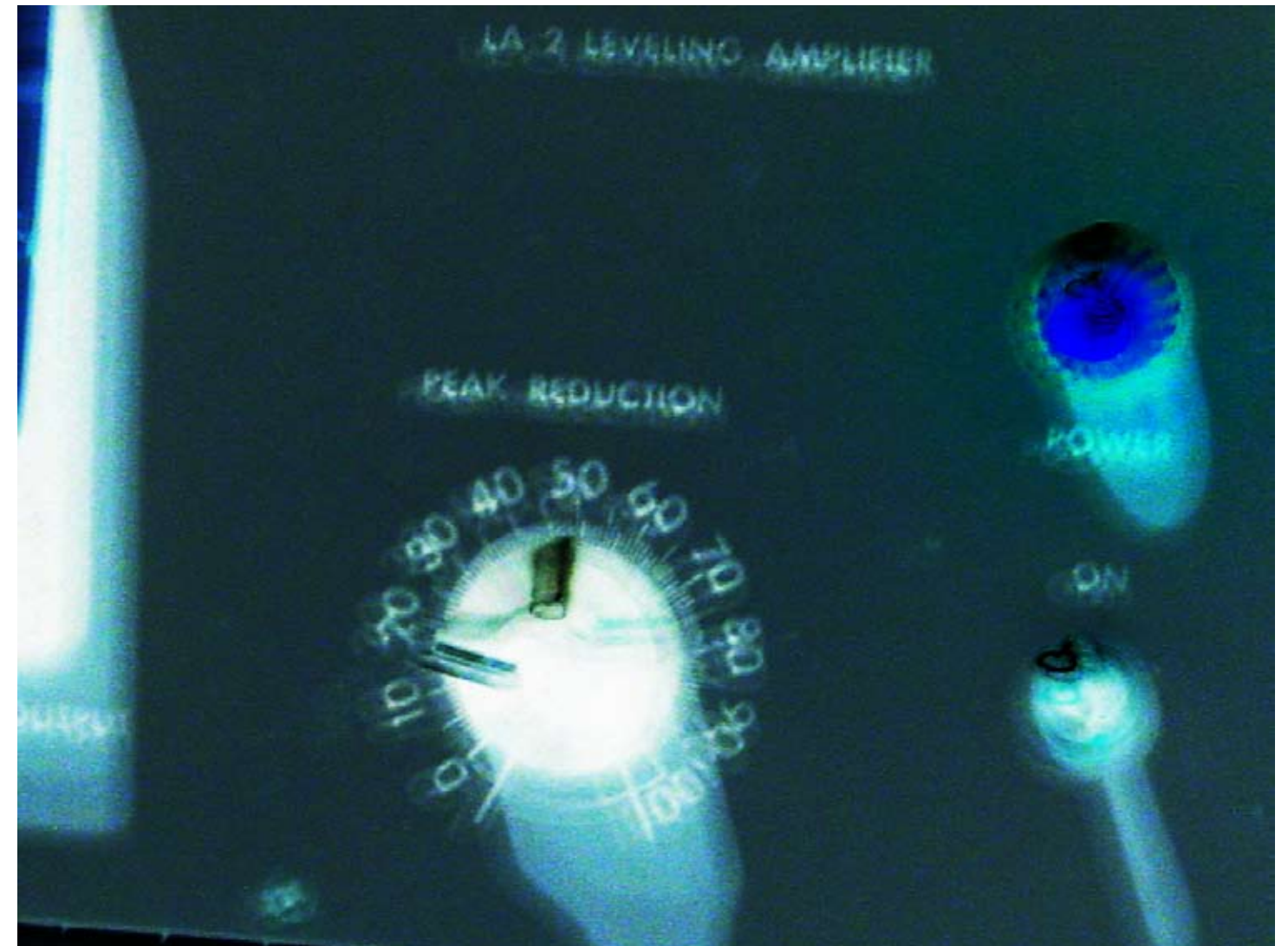
IF YOU DO CHOOSE A 6 PIECE CASE , ONE OPTION IS TO ADD ONE WIRE FROM THE TRANSFORMER STAR GROUND TO THE BOTTOM OF THE CASE TO ENSURE SOLID GROUNDING.

BAD GROUNDING CAN CAUSE NOISE AND HUM.

IF YOU ARE USING A MULTI SIDED CASE , A GOOD SOLUTION IS TO

MAKE ALL GROUND POINTS TO THE BOTTOM OF THE CASE.

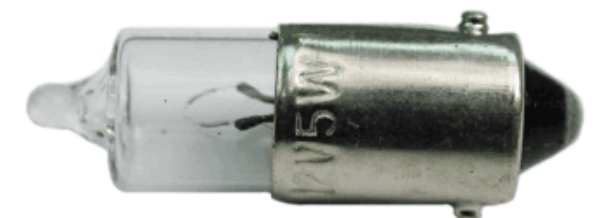
THIS WILL MAKE IT SO THE GROUND CONNECTIONS DO NOT HAVE TO TRAVEL THROUGH THE BOLTS CAUSING GROUND LOOPS AND OTHER PROBLEMS.



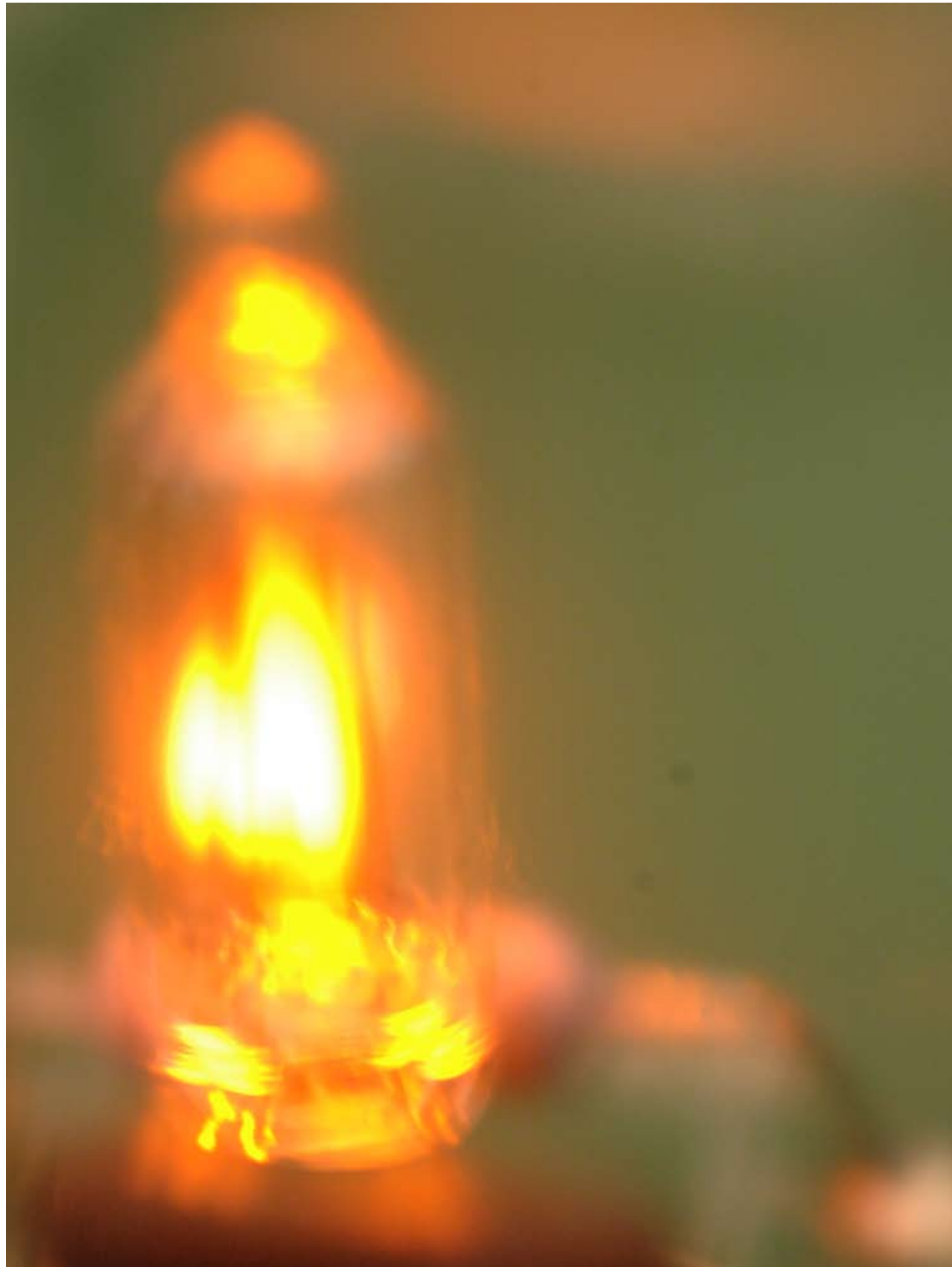
## LAMP/POWER INDICATOR LIGHT

YOU WILL USE A 6V AC LAMP .  
YOU CAN ALSO GET A LAMP/HOLDER ASSEMBLY THAT COMES AS ONE PIECE.

YOU WILL CONNECT THIS TO THE PADS NEXT  
THE HEATER CONNECTIONS MARKED 'LAMP'







## PARTS | NE-2.



THE NE-2 NEON IS USED TO REGULATE VOLTAGE IN THE METERING SECTION.  
THERE IS NO POLARITY FOR IT , SO HOOK IT UP IN ANY POSITION.

THE ZERO ADJUST POT WILL EFFECT THE BRIGHTNESS OF THIS LIGHT AS IT ADJUSTS THE VU METER IN GAIN REDUCTION MODE.  
IN SOME POSITIONS IT WILL TURN IT OFF COMPLETELY.

NOTE : ANOTHER HELPFUL JOB THIS BULB DOES IS TO REMIND YOU THE UNIT IS POWERED AND ON.  
IT HAS SAVED ME COUNTLESS TIMES FROM ACCIDENTAL SHOCK.  
IT SEEMS THAT THE NE-2 ALSO BLEEDS OFF SOME OF THE STORED CHARGE IN THE FILTERING CAPS ONCE THE UNIT HAS BEEN TURNED OFF.  
BUT I WOULD BE CAREFUL AROUND THE C7 CAPS REGARDLESS.



## PARTS | BILL OF MATERIALS

THIS IS A STANDARD LIST OF MATERIALS AND SUPPLIES.  
YOU CAN USE THIS LIST TO REFERENCE ITEMS TO BETTER SUIT YOUR  
BUDGET AND YOUR PREFERRED BRANDS OF COMPONENTS.

SOME OF THE PARTS WERE ARBITRARILY  
SELECTED , THERE ARE OTHER BRANDS YOU MAY PREFER.

ON CERTAIN THINGS LIKE THE CASE , METER AND TUBES  
YOU WILL HAVE TO CHOOSE TO FIT YOUR OWN NEEDS AND PRICE POINTS.

WITH SOME ITEMS THERE ARE MULTIPLE INVENTORY NUMBERS OR  
DISTRIBUTORS , THIS IS TO PROVIDE YOU WITH MORE OPTIONS IN YOUR  
SELECTION ,

# PARTS | BILL OF MATERIALS

## CAPACITORS

- 1 **10UF@V450V** ELECTROLYTIC (CDE MALLORY TC72)  
ALLIED STK#: 852-9089 (CDE MALLORY TC72)  
ALLIED STK#: 507-0192 (ATOM TVA 1705 450V)
- 2 **.1 @ 400v** (NORMALLY POLYESTER , POLYPROP WORKS GREAT) A GOOD PLACE FOR HI GRADE CAPS) 400V MIN.  
MOUSER# 75-715P400V0.1 (ORANGE DROP)
- 3 **.01 @ 450v** (1 KILOVOLT CERAMIC Z5U) OR USE POLYPRO CAP  
MOUSER# 75-715P600V0.01 (ORANGE DROP)
- 4 **.02 @ 450v** (1 KILOVOLT CERAMIC Z5U) OR USE POLYPRO CAP  
MOUSER# 75-715P600V0.022 (ORANGE DROP)/MOUSER# 562R5GAS20 CERAMIC
- 1 **.001 @ 450v** MICA CAPS WORK WELL HERE OR USE POLYPRO  
MOUSER# 75-715P600V0.001 (ORANGE DROP)
- 2 **500PF @ 450v** MICA OR CERAMIC  
MOUSER#5982-15-500V500 (MICA)
- 3 **.1 @ 1KILOVOLT** CERAMIC (500 V MINIMUM) (FOR OPTIONAL X CAP/GROUND LIFTS)
- 4 **40UF @ 450v** ATOM ELECTROLYTIC (FOR POWER SECTION)  
MOUSER#75-TVA1908-E3 (500V VERSION) (450V MINIMUM)  
(IT IS RECOMMENDED TO USE ALL 40 UF FOR THE ATOM SECTION)  
FOR CDE(MALLORY) USE TC78 40UF@450V (ALLIED ELECTRONICS)
- 1 **22UF @ 450v** ELECTROLYTIC (FOR DC REFERENCE POWER SEC)  
MOUSER#140-XRL450V22-RC
- 2 **150PF @ 500v** MICA (USE FOR C4) OR USE ARCO 465  
MOUSER#5982-15-500V150 (MICA)  
SURPLUS SALES OF NEWBRASKA #(CTM) 465
- 1 **47UF @ 25V** ELECTROLYTIC  
MOUSER#75-516D476M025-E3
- 1 **68PF @ 500v** MICA OR CERAMIC  
MOUSER#598-CD4ED680J03F (MICA)

- 2 **HEXFRED** RECTIFIER (DIODE)  
MOUSER#844-HFA06TB120PBF

- 1 **.4 AMP SLO BLOW FUSE** (STANDARD SIZE)  
MOUSER PART#576-0313.400HXP

- 2 **FUSE CLIPS** FOR MOUNTING FUSE TO PCB  
MOUSER : P/N 01220083H | DESC : 3AG PC CLIP  
(LITTEL FUSE , FUSE CLIPS)

- 1 **IEC POWER PLUG** IEC C14  
MOUSER#161-R30148

- 1 **NE-2** (NEON LIGHT)  
MOUSER#36NE002

- 1 **VU METER** SIFAM  
METERDISTRIBUTOR.COM OR SIFAM.COM

## TUBE SOCKETS :

- 3 **NINE PIN** (12AX7 SIZE) CERAMIC PCB MOUNT TUBE SOCKETS  
TRIODEELECTRONICS PART#: #9PINPCRGOLD  
TUBEDEPOT.COM PART#: SK-9PINPCG
- 1 **SEVEN PIN** (6AQ5A SIZE) CERAMIC PCB MOUNT TUBE SOCKET  
TRIODEELECTRONICS PART#: 7PINPCCR  
TUBEDEPOT.COM PART#: SK-7PINPC
- 1 **EIGHT PIN** (RELAY SIZE) 'OCTAL' CERAMIC PCB MOUNT SOCKET. (FOR T4B)  
TRIODEELECTRONICS PART#: OCTAL-PCCERGOLD  
TUBEDEPOT.COM PART#: SK-8PINPCG

## TUBES : (THESE ARE BASIC TUBES OR CHOOSE HIGHER QUALITY)

- 2 **12AX7A** (ECC83)  
TRIODEELECTRONICS PART#: 12AX7TESLA  
TUBEDEPOT.COM PART#: JJ-ECC83
- 1 **12BH7A**  
TRIODEELECTRONICS PART#: 12BH7EH  
TUBEDEPOT.COM PART#: EH-12BH7
- 1 **6AQ5A**  
TRIODEELECTRONICS PART#: 6AQ5EL90  
TUBEDEPOT.COM PART#: NOS-6AQ5A

RESISTORS :

1 MALLORY (CDE) .1/220R @600V 'QUENCHARC' SNUBBER NETWORK  
PT#504M02QA220 . (WILL USE ONE FOR POWER SWITCH 'POP' CONTROL (AKA RC  
NETWORK SNUBBER)

---

HALF WATT RESISTORS

2 1 MEG OHM 1/2 WATT (FOR GROUND LIFT) ALLIED STOCK#: 296-4686

XICON 1% 1/2 WATT METAL FILM RESISTORS

8 1k MOUSER# 273-1K-RC  
1 1.5k MOUSER# 273-1.5K-RC  
1 2.7k MOUSER# 273-2.7K-RC  
2 3.9k MOUSER# 273-3.9K-RC (ONE EXTRA FOR DEEPER LIMIT DEPTH)  
1 6.8k MOUSER# 273-6.8K-RC  
2 10k MOUSER# 273-10K-RC  
1 22k MOUSER# 273-22K-RC  
2 33k MOUSER# 273-33K-RC  
1 47k MOUSER# 273-47K-RC  
4 68k MOUSER# 273-68K-RC  
1 100k MOUSER# 273-100K-RC  
4 220k MOUSER# 273-220K-RC  
1 330k MOUSER# 273-330K-RC  
4 470k MOUSER# 273-470K-RC

---

2 WATT RESISTORS (USE METAL OXIDE POWER RESISTORS)

1 4.7k MOUSER#282-4.7K-RC  
1 22k MOUSER#282-22K-RC  
1 220k MOUSER#282-220K-RC  
1 1k MOUSER#282-1.0K-RC

---

POTS :

2 100k AUDIO TAPER (FOR GAIN CONTROL AND REDUCTION)  
PEC 2 WATT CARBON :DIGI-KEY PART NUMBER KA1041S28-ND  
3 1MEG LIN TAPER (FOR ST ADJ, LIMITER RESPONSE AND ZERO ADJ.)  
PEC 2 WATT CARBON :DIGI-KEY PART NUMBER RV4L105C-ND  
OR  
3 1MEG TRIMMERS (RECCOMENDED) (FOR ST ADJ, LIMITER RESPONSE AND ZERO ADJ.)  
MOUSER# 594-64W105

---

5 KNOBS CHOOSE TO YOUR AESTHETIC AND TO MATCH YOUR POT SHAFT.  
ALLIEDELEC.COM OR MOUSER.COM OR RADIOSHACK.COM

---

SWITCHES :

2 SPST TOGGLE SWITCHES MOUSER # 691-110-73  
1 DPDT TOGGLE ON/ON SWITCH TBA

2 SPDT TOGGLE FOR GROUND LIFT

RADIOSHACK.COM

3-PACK TOGGLE SWITCH KIT

MODEL: 275-322 | CATALOG #: 275-322

INCLUDES ONE DPDT AND TWO SPST TOGGLE SWITCHES. RATED 3 AMPS AT 125VAC

---

XLR SOCKETS

1 XLR IN SOCKET (CHASSIS MOUNT) MOUSER :MOUSER# 568-NC3FP-1  
1 XLR OUT SOCKET (CHASSIS MOUNT)MOUSER :MOUSER# 568-NC3MP

---

WIRE :

APROX 2 FEET OF FOIL SHIELDED 2 CONDUCTOR (PLUS GROUND) WIRE 22GA  
APROX 3 FEET OF 24-22 GAUGE HOOK UP WIRE FOR THE ASSORTED CONNECTIONS.

---

1 ASSORTED PACK OF SHRINK TUBING (WILL USE SOME 1/16 FOR THE LONGER RESIS-  
TOR LEADS) ,ALSO KEEPS THE SHIELDED WIRE ENDS LOOKING GOOD AND NOT RATTY.

---

1 RESISTOR BENDING TOOL 'SPEEDY BEND LEAD FORMER'  
MOUSER#5166-901

#### AUDIO TRANSFORMERS

1 SOWTER 4383c ('c' IS FOR PCB PINS)(INPUT) REQUEST PCB MOUNT VER  
(LEADED TRANSFORMERS WILL WORK TOO)  
[HTTP://WWW.SOWTER.CO.UK/](http://www.sowter.co.uk/) OR [HTTP://WWW.PRODIGY-PRO.COM](http://www.prodigy-pro.com)

---

1 SOWTER 8940b ('B' IS FOR PCB PINS)(OUTPUT) REQUEST PCB MOUNT VER  
(LEADED TRANSFORMERS WILL WORK TOO)  
[HTTP://WWW.SOWTER.CO.UK/](http://www.sowter.co.uk/) OR [HTTP://WWW.PRODIGY-PRO.COM](http://www.prodigy-pro.com)

---

#### POWER TRANSFORMER :

USA BUILD :  
ALLIED TRANSFORMER 6K88VG (250-0250 40MA CT / 6.3V 2A CT ) (RECOMMENDED)  
ALLIED PART #: 227-0113  
SOWTER PART #: 0295 (FOR TELETRONIX )

EUROPEAN BUILD :  
SOWTER PART #: 0208 (FOR TELETRONIX )

---

#### T4B OPTICAL CELL :

JBL :(818) 894 8850 UREI PARTS DEPT  
THEY CARRY THE ORIGINAL UREI MODEL FOR APROX 250\$  
EBAY : OFTEN HAS THE ORIGINALS PURCHASED FROM THE JBL TENT SALE  
PRICE USUALLY IS AT 165-200\$  
UNIVERSAL AUDIO : [UAUDIO.COM](http://uaudio.com) (SUPPORT)  
ADL :[ANTHONYADL@AOL.COM](mailto:ANTHONYADL@AOL.COM) (845 255-4695)

DRIP ELECTRONICS WILL BE FULLY MANUFACTURING THE T4BS EVERY 8 WEEKS.

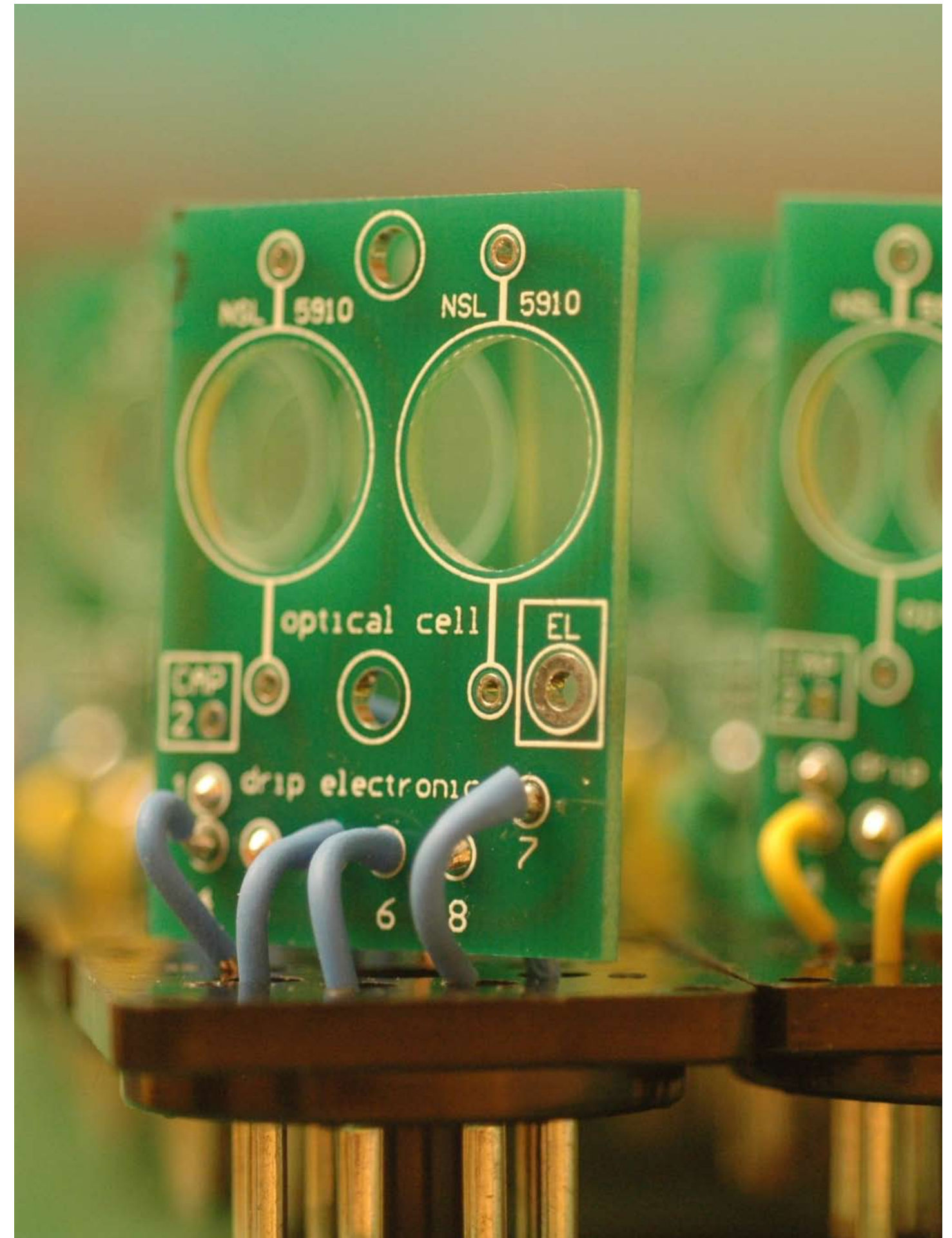
STUDIO ELECTRONICS ALSO HAS ORIGINAL UREI T4BS

---

#### ENCLOSURE :

THE PCB IS 15.75"x6" WIDE , YOU WILL NEED A CASE AT LEAST 5" HIGH TO FIT THE TUBES  
A VENTED CASE IS REQUIRED (CAN ALSO DRILL SOME LARGE HOLES ON THE TOP IF YOUR CASE IS NOT VENTED)

ALUMINUM OR STEEL WORKS WELL , DO NOT USE PLASTIC



ASSORTED :

6 1/4-1/2" STAND OFFS WITH SCREWS.

RADIO SHACK # 276-195 20.6 MM (13/16")

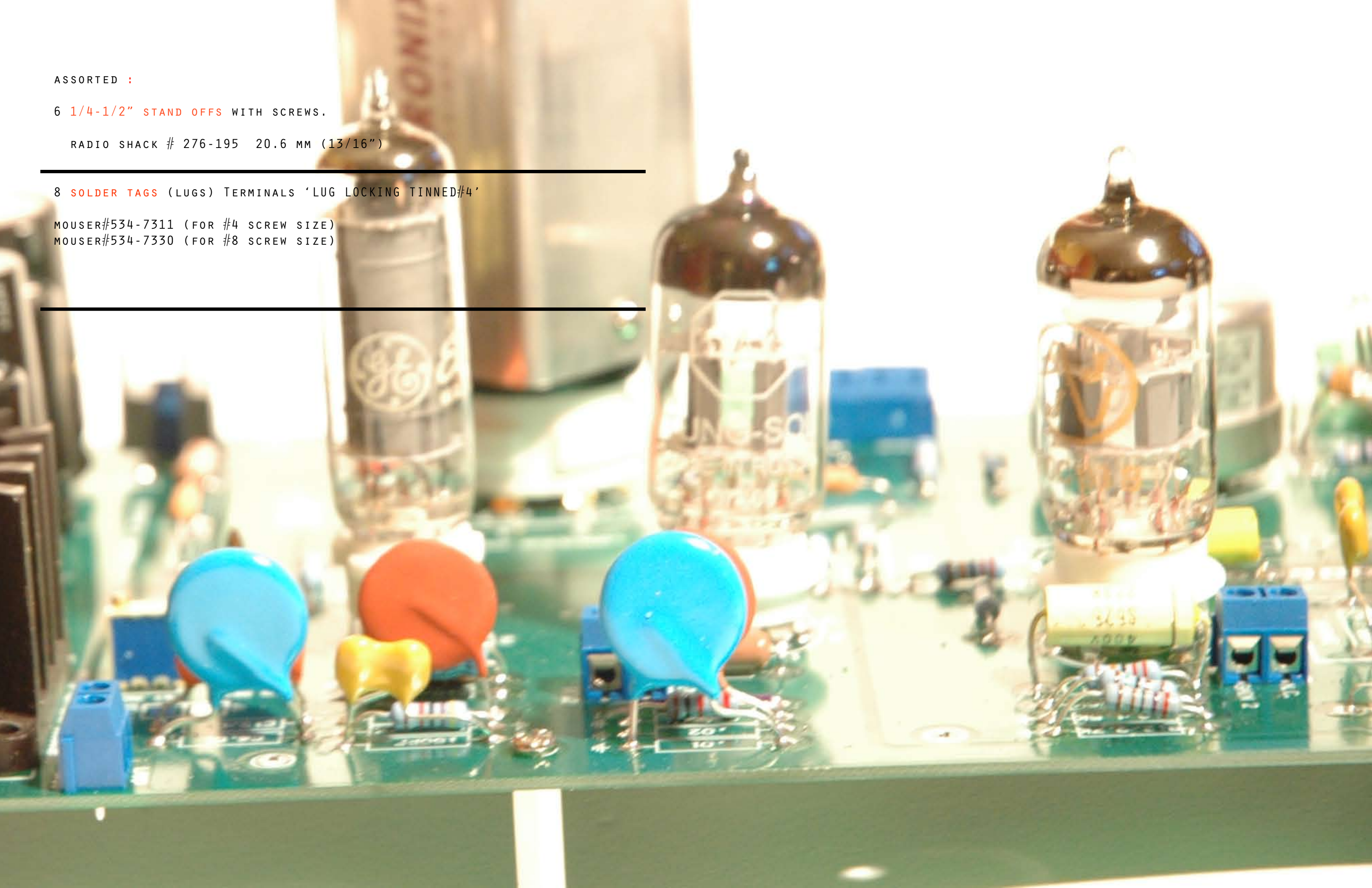
---

8 SOLDER TAGS (LUGS) TERMINALS 'LUG LOCKING TINNED#4'

MOUSER#534-7311 (FOR #4 SCREW SIZE)

MOUSER#534-7330 (FOR #8 SCREW SIZE)

---



# PARTS | CROSS REFERENCE

GRID/1K  
 GRID/1K  
 R5/68K  
 R6/68K  
 R7/2K  
 R9/220K  
 R10/1.5K  
 R11/68K  
 R12/2.7K  
 R13/220K  
 R14/470K  
 R15/470K  
 R16/68K  
 R17/10K  
 R18/1K  
 R19/470K  
 R20/1K  
 R21/100K  
 R22/33K  
 R24/3.9K  
 R25/33K  
 R26/330K  
 R27/10K  
 R28/470K  
 R30/47K  
 R31/1K  
 R32/1K  
 R33/220K  
 R34/22K 2W  
 R35/220K  
 R36/1K  
 R38/22K  
 1K/2W (PI FILTER)  
 R29 4.7K2W (PI FILTER)  
 22K/2W (DC REF)  
 220K/2W (DC REF)

C7D 40UF@450V  
 C7C 40UF@450V  
 C7B 40UF@450V  
 C7A 40UF@450V

22UF@ 450V (DC REF)

C1 .02@500V  
 C2 .1@400V  
 C3 .1@400V  
 C4 68PF@500 (UNLABELED)  
 C5 10UF@450V  
 C6 .01@500  
 C8A .01@500V (UNLABELED)  
 C8B .02@500V (UNLABELED)  
 C9 .02@500V  
 C10 47UF@50V  
 C13 500PF@500V  
 C14 250PF@500V (UNLABELED)

68PF@500V (R11 PARRALELL)  
 .1 @500V CERAMIC (XCAP)

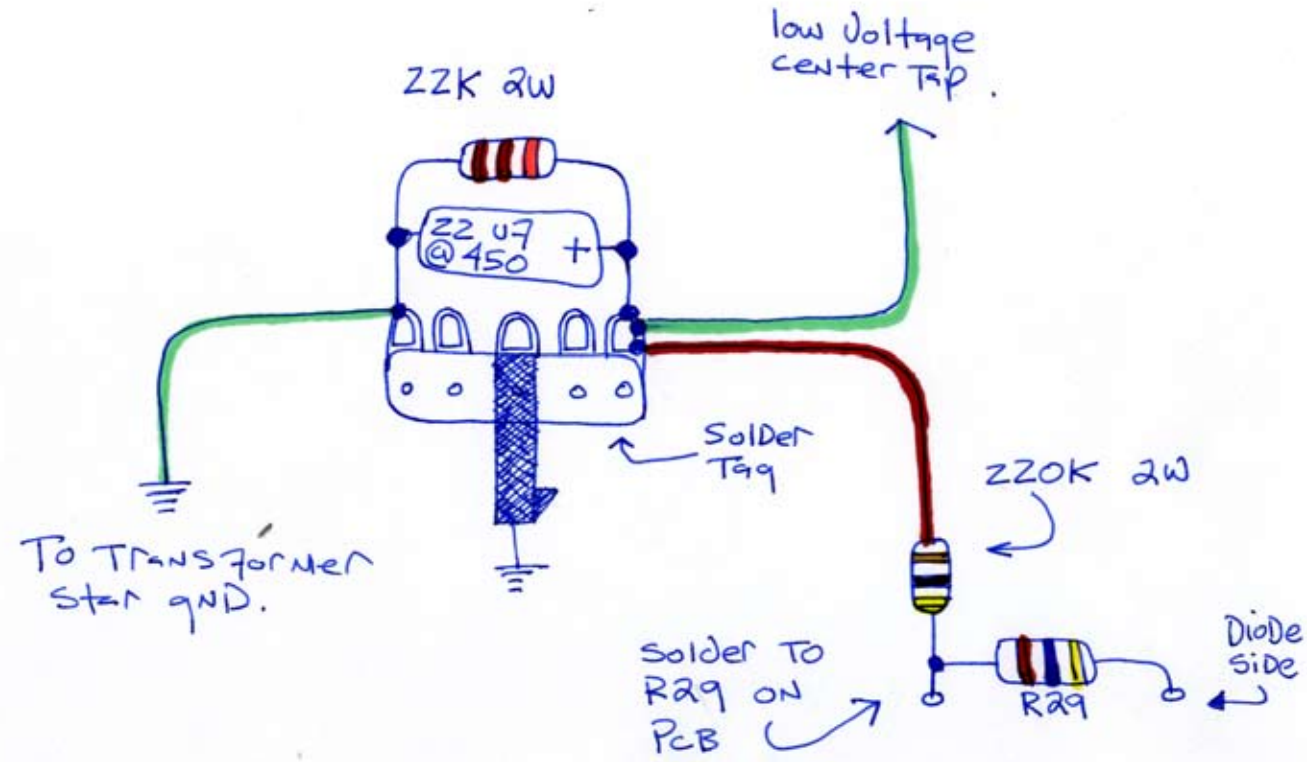
-----

COMMENT	.01, .1@400, .02
	68 PF, 68PF
	150PF, 500PF, C1/.02
	C2/.1, C3/.1, C6.01, C9/.02
	C10/47U, C12.001, C13/500PF
	NE-2, COMMENT

CAPPR7.5-16x35	1	22UF 450V
COMMENT		T0-220_A
	2	DIODES

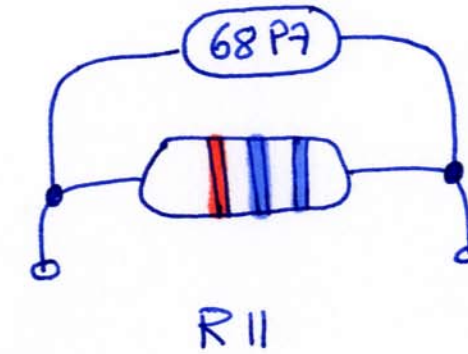
# troubleshooting | mods

## dc refrence circuit

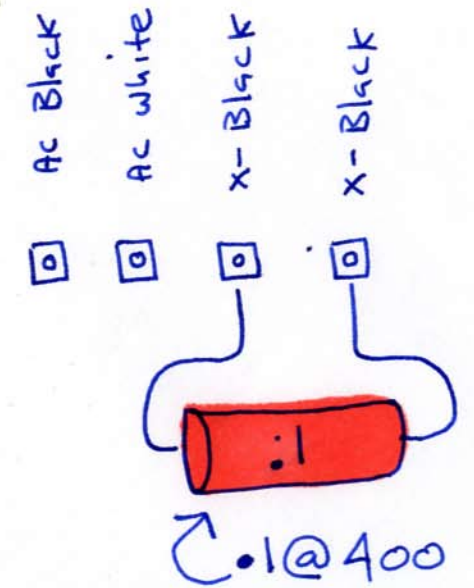


# troubleshooting | mods

## oscillation filter



## primary RF filter 'x-cap'



ALTHOUGH THIS CIRCUIT IS IMPLEMENTED IN THE VER3 PCB I THOUGHT I WOULD IMPORTANT FOR VER 2 BUILDERS TO SEE THIS EXAMPLE .

IT WORKS VERY WELL IN MANY CIRCUMSTANCES , AND HAVE ACHIEVED EQUAL RESULTS WHEN COMPARED TO A DC HEATER SET UP.

NOTE : FOR VER2 PCB ONLY

ONCE AGAIN THES TWO ILLUSTRATIONS ARE FOR THE VER 2 PCB , AND ARE ALREADY IMPLIMENTED INTO THE VER3 PCB.

HOW EVER SUBTLE, THESE TWO CIRCUITS ADITIONS CAN HELP IN THE TAMING OF UNWANTED NOISE .

NOTE : FOR VER2 PCB ONLY



UPCOMING DRIP RELEASES :

# OPTO72

THE OPTO 72 IS A COMBINATION OF THE CLASSIC TELEFUNKEN V72  
CIRCUIT COMBINED WITH THE REDUCTION SECTION OF THE LA2 COMPRESSOR.

THE PCB USES THE LA2 SERIES TYPE TRANSFORMERS AND EF-86 TUBES  
GIVING DEEP TONE OF THE V72 AND SMOOTHNESS OF LA- STYLE COMPRESSION.

THE OPERATING RANGE OF THE PCB IS MORE GEARED TOWARDS THE  
GAIN RANGE OF THE LA2 SERIES COMPRESSORS.  
THE USE OF V72 SPEC TRANSFORMERS IS POSSIBLE , GIVING THE SAME OUTPUT  
AS THE TRADITIONAL V72.

THE VERSIONS WILL BE RELEASED IN A DC HEATER VERSION AND A AC HEATER  
VERSION.

ALL TRANSFORMERS AND ADDITIONAL CHOKE ARE BY SOWTER TRANSFORMER CO.



# OPTO3 DC

THE OPTO3 DC HAS THE SAME FEATURES AS THE ATOM VERSION 3 OPTO EXCEPT USES DC FOR ITS TUBE HEATER.

USING AN ONBOARD UNIVERSAL FILAMENT TRANSFORMER ,ELIMINATING THE NEED FOR A CUSTOM TRANSFORMER JOB.





DRIPELECTRONICS@HOTMAIL.COM

COPYRIGHT 2008 GREGORY LOMAYESVA