VALVE

the magazine of astounding sound

hardcore action - Buddhafied Afterglow

Deep Throat - a Lowther front horn

C⁴Sing the Decware Zen

da basics - V=IR, it s not just a good idea, it's the law!

mo' Heavy Metal

volume 6 **number 3** **1999**

B-Glow

single ended 300B amp kit

another masterpiece from Electronic Tonalities

active loaded 5965 driver

MagneQuest TFA-204 air gapped output transformer

8 watts

$900 the pair, you just supply the 300 Bs

VALVE

the magazine of astounding sound

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editor's thing

Yo, bottleheads-

Discussion came up at the last meeting that while the new surge in local VALVE membership has been bringing in lots of folks who are eager to learn the basics of design, there seems to be a general swing towards requests for "cookbook" circuits in VALVE by the worldwide membership. (definition: if you read VALVE, you're a VALVE member, we are quite democratic) How can I put this diplomatically- Ain't gonna happen, no way, no how.

For those of you who have recently discovered the pleasures of tube audio, and are finding a desire to construct your own gear, maybe partly for economy's sake (Amen, bro!), maybe partly for the satisfaction of telling others "I made it myself!", we aren't going to let you off that easy.

See, VALVE was formed by a bunch of guys who didn't just roll tubes, or hook up a new piece of used gear every week. The guys who started VALVE learned early on to dig up the forgotten nuggets of information in arcane texts, apply that knowledge in their own experiments, and share that knowledge - not just the end result, but the *method* behind the madness as well. In fact the most hardcore DIY guys I know are usually more proud of their tube electronics book collection than they are of their projects!

What we intend to present in VALVE is not just a canned circuit full of exact Digi-Key numbers and a preprinted circuit board, but rather a general design and just enough information to make you work a bit to get the project finished.

This may seem a bit overwhelming the first time you work through a project published here, and that's part of the reason we ve started "da' basics" column, to help you through the math and other basic knowledge you will use again and again in designing tube gear. You'll usually find the math to help you through the tough spots, and once you finish a project or two, our hope is really that you'll go off on your own, devise some devilishly clever new circuit, and share it with the readership (complete with color photos, of course).

Which brings me to another important point-

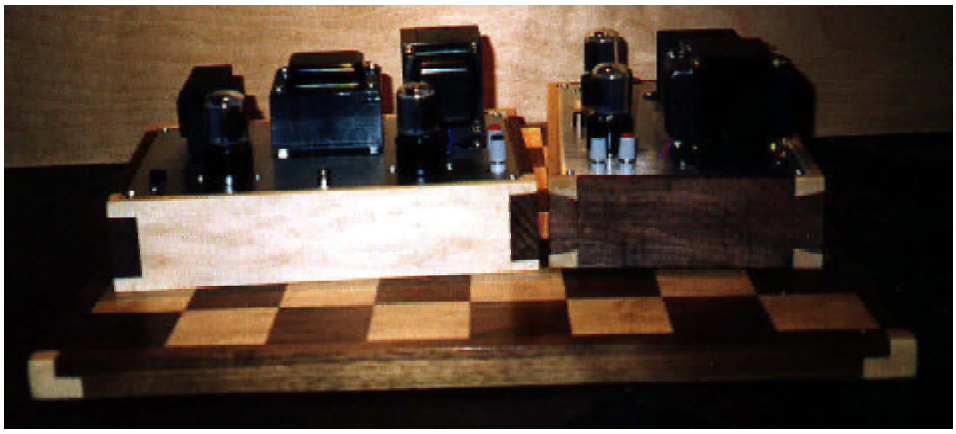
We need article submissions like yesterday. We need not only your new circuit designs, but also your photos of finished ET kits and other projects, stories of your experiences learning the craft of tube audio, and your pieces on the theory of various aspects of design. You needn't be intimidated by the fanatical attention to detail of Buddha or the way math rolls off the pen of Brainiac. Some of our most popular articles are those like the original old S.E.X. speaker piece, where we slapped a couple of drivers on a cardboard box! And in fact I can't think of two guys to whom the sharing of knowledge is more important. Believe me, they will appreciate your contributions more than anyone, no matter what your skill level at the time of writing.

So fire up the iron and the pen,
but- don't let the blue smoke out,

Doc B.

on the cover

Mike Connly sent us these photos of his S.E.X. amps. Mike not only built the amp kits and made the custom walnut and maple bases for the amps, he also made the chessboard upon which they rest. Mike was the first bottlehead to build a Blues Master, and rumor has it he will be putting the completed amp in a new chassis soon. Another cover girl, maybe?



NEW EXOTICA FROM FIRST IMPRESSION MUSIC

FIM CD019 Favorite Chinese Instrumentals

The Jin Ying Soloists

1 Like Wave Again The Sand (Pipa solo with ensemble) 4:36 2 Singing the Night among Fishing Boats (Jung solo) 4:15 3 Night (Percussion ensemble) 5:54 4 Love Song Of The Grassland (Tung-hsiao with ensemble) 2:34 5 Ducks Quacking (Percussion ensemble) 4:00 6 Love At The Fair (Er-hu solo with ensemble) 5:04 7 The Fishing Song (Ba-woo solo with ensemble) 4:53 8 Happy Reunion (Xylophone solo with ensemble) 2:55 9 Chinese Martial Art (Emsemble) 1:43 10 The Flowing Stream (Er-hu solo with Yang chin) 8:25 11 Spenpadei Folksong (Yang-chin solo with ensemble) 4:32 12 Autumn Moon (Er-hu solo with ensemble) 7:06 13 Moonlight Over The Spring River (ensemble) 9:22 14 Variation On Yang City Tune (Ku-jung solo) 5:36

FIM CD020 A Vocal Tribute to Ben Webster

Jacintha, Vocal

Teddy Edwards, tenor sax; Kei Akagi, piano; Darek Oles, bass; Larance Marable, drums

1 Georgia On My Mind (Gorrell-Carmichael/BMI) 5:19 2 The Look Of Love (Baccharach-David/ASCAP) 4:08 3 Danny Boy (Traditional) 7:26 4 Somewhere Over The Rainbow (Harburg-Allen/ASCAP) 9:43 5 Startdust (Parish-Carmichael/ASCAP) 6:40 6 In The Wee Small Hours Of Morning (Hillard-Mann/ASCAP) 4:15 7 Tenderly (Lawrence-Gross/ASCAP) 5:25 8 Our Love Is Here To Stay (George & Ira Gershwin/ASCAP) 3:19 9 How Long Has This Been Going On? (George & Ira Gershwin/ASCAP) 5:28 10 Pennies From Heaven (Burke-Johnston/ASCAP) 3:12

First Impression Music

#189 16149 Redmond Way
Redmond, WA 98052

http://www.fimpression.com

Tel: 425-868-5326
Fax: 425-836-9061

Buddhafied Afterglow

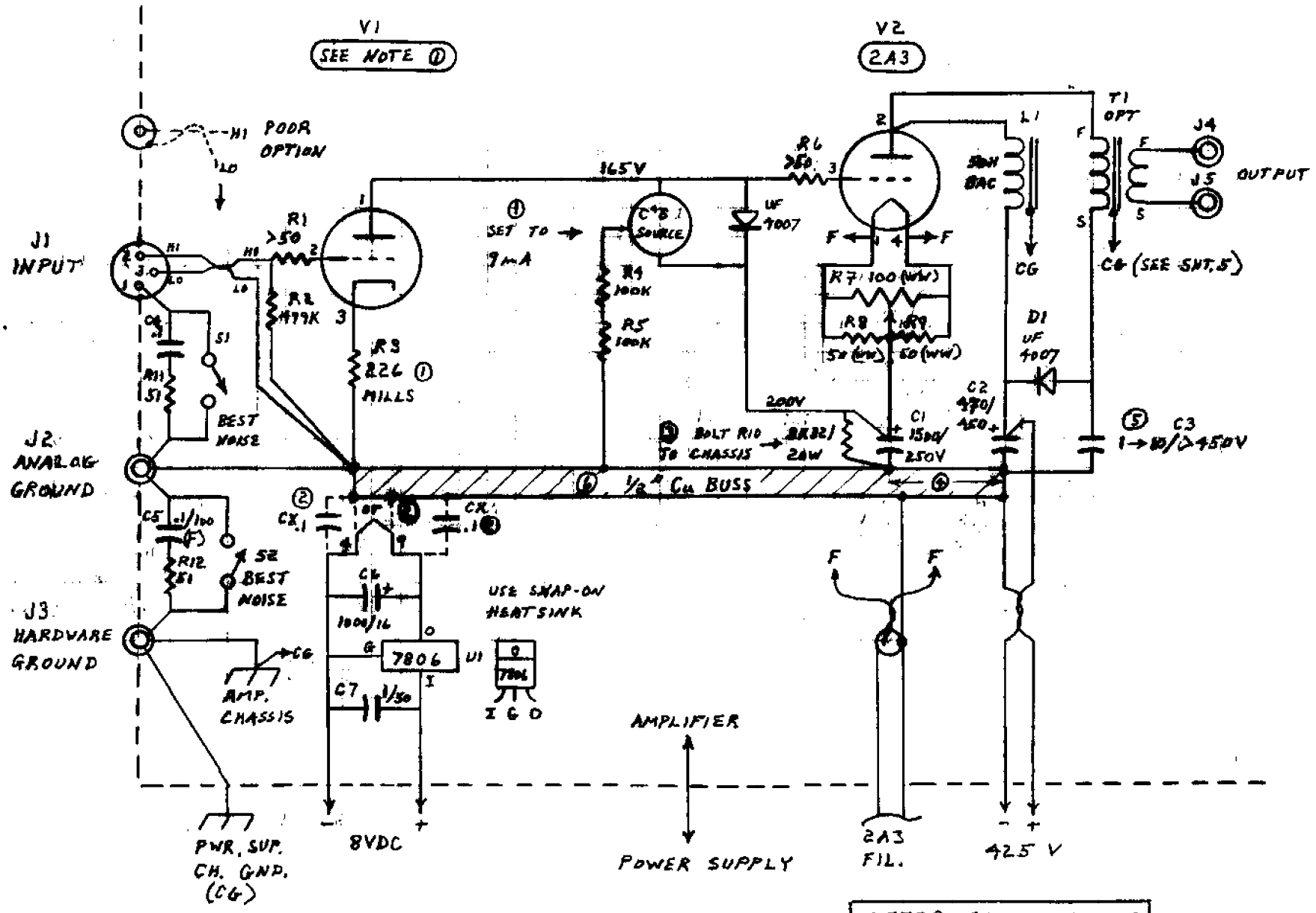
Hi Dan,
Talked to Ken Dangerfield and he has been busy on the Internet. He told some group about the beefed up design I gave him for a two chassis layout for the Afterglow. (we had this info posted on the old website -B.)
He has been getting numerous questions about the power supply, switching, noise suppression and CMCs. He came up with the idea of putting the mod on your internet site, so I cleaned up the drawings so you might scan them into the gadget. Evidently you are assembling a compendium of A-glow mods - pretty neat.
Included a short theory-of-op s to save you from a bunch of questions. Hope you do not find all of this too presumptuous.

Regards,

John C.

Can you believe this guy? Too presumptuous? Zowie, this article has some incredible gems in it! Study these pages hard, learn from Buddha, and be a better builder for it!

Doc B.



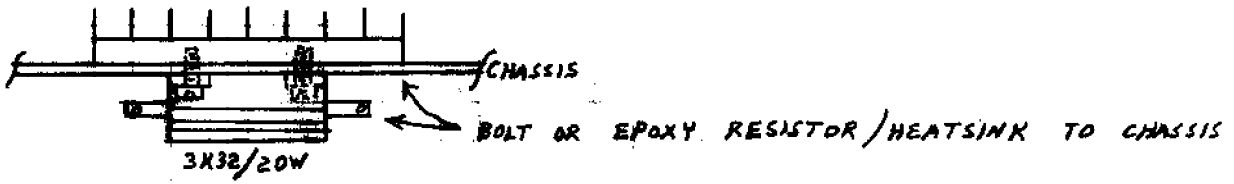
AFTER-GLOW MOD 1

AFTER-GLOW MOD I NOTES:

① PIN-OUT & CIRCUIT VALUES SHOWN FOR ½ 5965. THE OTHER AMP. SHOULD BE WIRED USING THE OPPOSITE HALF OF THE TUBE. THUS, TUBES CAN BE ROTATED FOR LONGER LIFE. HIGH G_m/MEDIUM μ TUBES SUCH AS THE 6BN4, 12AV7, 5670/2C51 MAYBE SUBSTITUTED BY ADJUSTING R_K & THE C^4S CURRENT TO OBTAIN THE PROPER BIAS, THUS PLATE CURRENT FLOW, FOR THE 2A3. SEE PARTS SHT.

② TEST VARIOUS COMBINATIONS OF FIL. BYPASS' OR A DIRECT CONNECTIONS TO GROUND FOR BEST HUM & NOISE. INSTALLATION SPECIFIC.

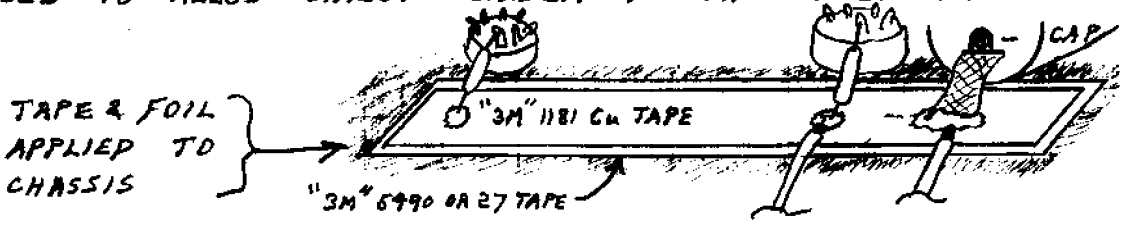
③ THE METAL CASE OF THE SPECIFIED RESISTOR MUST BE ADEQUATELY HEAT-SINKED IN ORDER TO DISSIPATE 12 W. IF CHASSIS IS LESS THAN .063 ALUMINUM, FIT ADEQUATE HEAT-SINK TO CHASSIS TOP SIDE.



④ MOUNT BYPASS CAPS. WITH NEGATIVE LEADS SOLDERED TO BUSS WITHIN 1" OF EACH OTHER.

⑤ EXPERIMENT WITH VARIOUS VALUES OF OPT BYPASS CAP's. EACH AMP./SPKR. COMBINATION WILL HAVE A GENERAL SWEET SPOT AT THE LOW FREQUENCY EXTREME. AS THE CAPACITY IS VARIED,

⑥ A FAST, LO-NOISE GROUND BUSS MAYBE FABRICATED Ⓦ COPPER SHIELDING TAPE LAID OVER PTFE FILM. 3M GLASS CLOTH TAPE MAY BE SUBSTITUTED FOR THE HIGH COST PTFE TAPE. HI-TEMP TAPES MUST BE USED TO ALLOW DIRECT SOLDER TO THE TAPE. DO NOT USE ACETATE, VINYL OR OTHER LO-TEMP FILMS.



TAPE FROM NEWARK 1-800-463-9275

HOBBY OR FLASHING COPPER MOUNTED Ⓦ NYLON HDWR. MAY ALSO BE UTILIZED.

AFTER-GLOW MOD 1 PARTS:

MOST PARTS AVAIL. FROM:

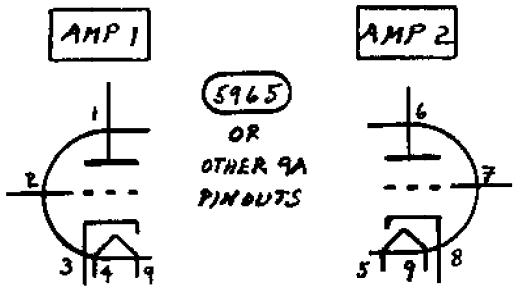
TANNER ELECTRONICS	972-242-8702
ALSO	
DIGI-KEY	800-344-4539
MOUSER	800-346-6873

C1 1500 mF/250V ELEC. PAN. TSHB (DIGI. P10134)
C2 470 mF/450V ELEC. PAN. TSHB (DIGI. P10170)
C3 1 TO 10 mF/>450 VDC FAVORITE DIELECTRIC
C4, C5 & CX 0.1/100V FILM
C6, 1000 mF/16V ELEC.
C7, 1 mF/50V FILM
J1, XLR PANEL RECEPTACLE OR ISOLATED BNC/RCA
J2 → J5, 5 WAY BINDING POSTS
R1, R6, 50Ω OR GREATER GRID STOP—YOUR TWEAK—
R2, 499K / 0.25W FILM
R3, 226Ω QUIET WIRE WOUND (MILLS)
R4, R5 100K 1% METAL FILM / BULK FOIL
R7, 100Ω ONE TURN TRIMMER, WIRE WOUND (MOUSER 510-V80-100) NOTE: TREAT Ⓜ PRO-GOLD
R8, R9 50Ω/1W WIRE WOUND (DIGI. 43F50 / OHMITE) TANNER MAY HAVE EQUIVALENT.
R10 3X32Ω/20W DALE RH STYLE CHASSIS MOUNT (WW)
R11, R12 51Ω/0.25W FILM
C*S, CURRENT SOURCE KIT (ELECTRONIC TONALITIES)

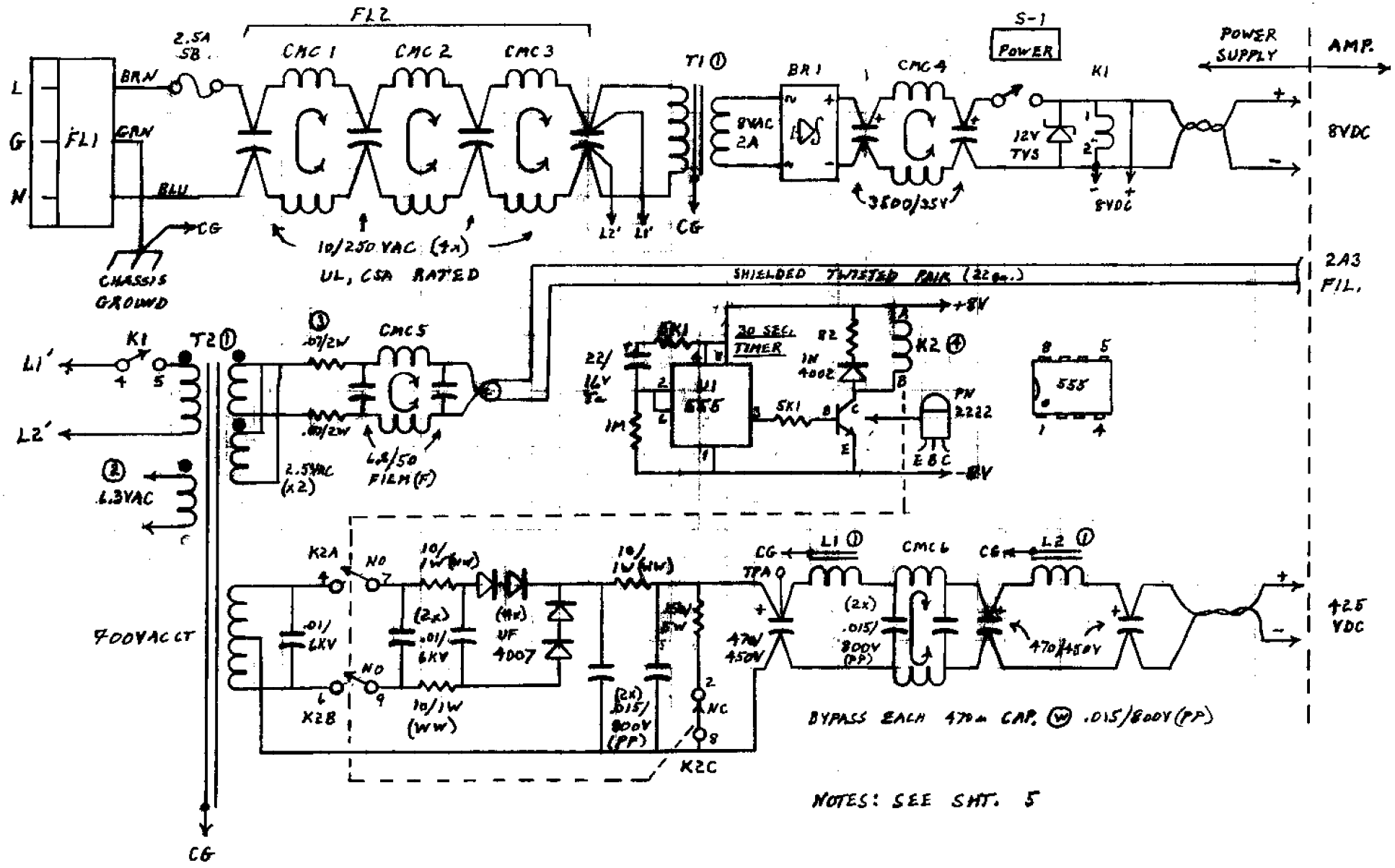
MISC.

L1, 5H / 60mA MAGNAQUEST BIG-ASS-CHOKE (BAC)
T1, >2500Ω TO 8Ω OPT, MAGNAQUEST PINSTRIP OR NICKEL
U1, 7806 V-REG. TO-220 Ⓜ SNAP-ON HEATSINK
S1, S2, SPST TOGGLE
DIODES, UF4007 (TANNER ELEC)
PLUS: TUBES, SOCKETS, HDWR, WIRE, 3M TAPES, ETC.

COMMENT (CONT)



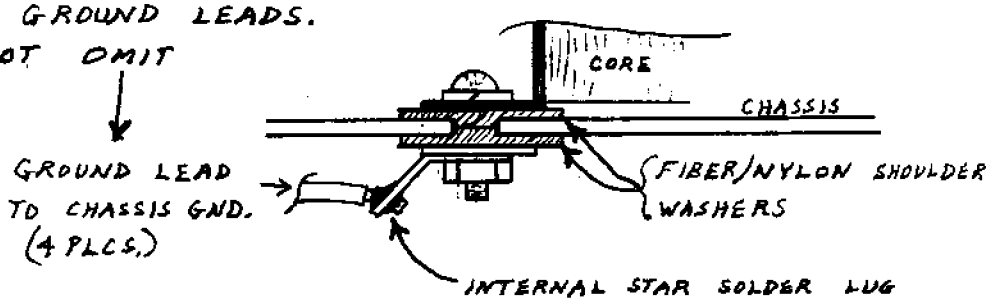
TYPICAL DUAL-TRIODE WIRING FOR EXTENDED LIFE. SWITCH TUBES BETWEEN AMPS. AT THE END OF LIFE TO USE THE UNUSED PORTION. GROUND UNUSED CATHODE, GRID & PLATE PINS.



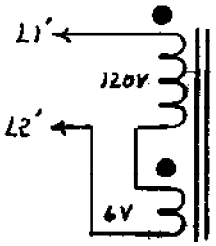
MINIMALIST POWER SUPPLY

POWER SUPPLY NOTES:

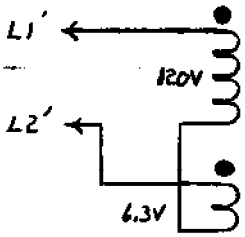
① ALL IRON SHOULD BE MOUNTED ON SHOULDER WASHERS SUCH THAT NO CONNECTION EXISTS Ⓦ CHASSIS. RUN SEPERATE LEADS FROM EACH XFRMR./ CHOKE FRAME TO SINGLE POINT CHASSIS GROUND. DO NOT DAISY CHAIN GROUND LEADS.
WARNING: DO NOT OMIT



② THE 6.3VAC WINDING IS USED AS A BUCK-BOOST WINDING TO TAILOR B+ OUTPUT TO THE LOCAL LINE VOLTAGE. B+ MUST STAY BELOW 450 VDC AT TPA (TEST POINT A). PROPER HOOK-UP MUST BE DETERMINED DURING DE-BUG. USE NORMAL CONNECTION (AS DRAWN) IF B+ IS BETWEEN 400 & 430 V. USE THE BUCK CONFIGURATION IF B+ IS NEAR OR OVER 450 VDC. USE THE BOOST (REVERSE 6.3 VAC WINDING LEADS) IF B+ IS BELOW 400 VDC.

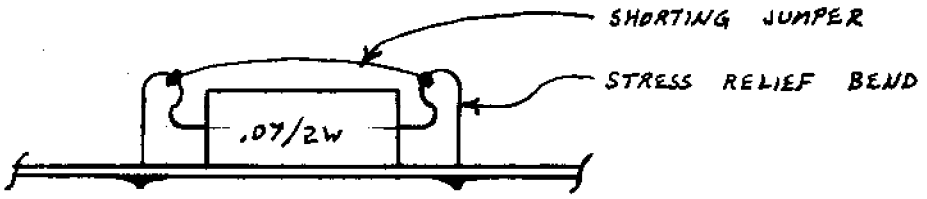


BUCK CONFIGURATION



BOOST CONF.

③ MOUNT 0.07Ω/2W (WW) RESISTORS Ⓦ EXPANSION STRESS RELIEF LEAD CONFIGURATION. SHORT RESISTORS AS NECESSARY TO ACHIEVE 2.25 → 2.5 VAC @ 2A3 SOCKET. THIS PROCEDURE MUST BE ACCOMPLISHED AFTER STEP ② ABOVE. ADD 0.07Ω RESISTORS AS NECESSARY IF FILAMENT VOLTAGE IS OVER 2.5 VAC. DO NOT OVER-VOLT FILS.



④ USE ONLY THE SPECIFIED RELAY TO SWITCH THE HV SUPPLY. PAY PARTICULAR ATTENTION TO CONTACT NUMBERS EMBOSSED ON RELAY INSULATOR BLOCK. SUBSTITUTE RELAYS MUST HAVE ADEQUATE INSULATION & LEAKAGE PATHS FOR VOLTAGE INVOLVED. HI-POT SUBS. @ 1000 VAC. FOR 1 MIN., CONTACTS TO CONTACTS & TO FRAME.

MINIMALIST POWER SUPPLY PARTS LIST:

FROM: TANNER ELEC. 972-242-8702

FL1 SPRAQUE IEC FILTER 4A Ⓦ WIRE LEADS
F1 2.5A 3AG SLO-BLO & HOLDER
(4 ea.) 10mF/250 VAC ACROSS LINE CAP.
CMC1 → CMC5 PANASONIC 4700 mH/4A COMMON MODE CHOKE
T1 .8V/2A SURPLUS XFRMR
BR1 SCHOTTKY DIODE BRIDGE (4 ea) 3A/40V DIODES ∴ SR306
(2 ea) 3300/35V ELEC. CAPS
12V/5W TVS TRANSIENT VOLT. SUP.
K1 SPDT 10A CONTACT/12V COIL [SCHRACK (ORANGE)]
S1 SPST 10A TOGGLE SW.
T2 ORIGINAL A-GLOW PWR. XFRMR.
(2 ea) .07Ω/2W (WW) RES
(2 ea) 6.8/50V FILM CAP.
22 mF/16V DIPPED TANTALUM CAP.
(2 ea) 5K1/.25W CARBON FILM (CF)
1M/.25W (CF)
555 TIMER IC Ⓦ 8 PIN DIP SCKT.
82Ω/.25W (CF)
≥ 1N4002 DIODE
MPS OR PN 2222 NPN XSTR.
K2 3PDT/10A – 9V RELAY [DELTROL (BLUE)]
(3 ea) .01/1KV CAP
(3 ea) 10/1W (WW) RESISTOR
(8 ea) .015/800V CAP
150 → 200Ω/5W (WW) RES.
(3 ea) 470/450V ELEC. CAP.
L1, L2 5H/150 mA/105Ω DCR CHOKE (ANTIQUE) SUB Ⓦ CHOKES HAVING <100Ω DCR
(4 ea) UF4007 ULTRA-FAST DIODES
CMC 6' 104 mH/200 mA CMC (DIGI PLK1064)

SEVERAL ANNOTATED PARTS FROM:
ANTIQUE 602-820-5411
DIGI-KEY 800-344-4539
MOUSER " 800-346-6873

AFTER-GLOW COMMENTS

THIS "A-GLOW" MODIFICATION WAS DESIGNED TO FIT A CONSTRAINED PHYSICAL LAYOUT USING READILY AVAILABLE PARTS & TO A CERTAIN EXTENT WAS LIMITED BY COST.

THE BASIC, TWO-STAGE, DIRECT-COUPLED AMPLIFIER HAS ONLY BEEN TWEAKED TO LOWER HUM/NOISE & TO SPEED IT UP SLIGHTLY.

CONVERTING BOTH CATHODE BIAS NETWORKS TO ALL WIRE WOUND WILL HELP THE NOISE LEVEL. DO NOT WORRY ABOUT INDUCTANCE - HERE IT HELPS. THE U80 STYLE POT USED AT R7 LOOKS A BIT KLUDGY BUT THEY HOLD A SETTING FOR YEARS & DO NOT MIND DC.

THE DUAL GROUND SYSTEM WAS ADDED TO MAKE THE SYSTEM COMPATABLE WITH ULTRA-LOW-NOISE PRE-AMPS, ETC.

A DC FILAMENT SUPPLY WAS ADDED FOR HUM REDUCTION.

C1 & C2 ARE INORDINATELY LARGE COMPARED TO OTHER DESIGNS. THE 1500 uF @ C1 PUTS MOST OF THE SIGNAL DEVELOPED BY V2 ACROSS THE OPT. C1's 1.8 Ω REACTANCE AT 60 Hz. ALSO HELPS IN THE HUM NULL DEPARTMENT. C2 KEEPS MOST OF THE AC SIGNAL DEVELOPED ACROSS L1 ON-CHASSIS & OUT OF THE POWER SUPPLY. A SHUNT REGULATOR WITH A .01 Ω IMPEDENCE IS NOTICEABLY BETTER WHEN THE POWER SUPPLY CAPABILITY EXISTS.

THE UF4007 DIODE AT D1 DRAINS THE OPT BYPASS CAP UPON SHUT-DOWN. THIS ACTION KEEPS MOST OF THIS DC CURRENT FROM MAGNETIZING THE NICKEL CORE OF T1. A COMPLETE CURE ENVOLVES PLACING A SET OF RELAY CONTACTS ACROSS THE PRIMARY THAT ARE ACTUATED DURING START-STOP OPERATIONS.

AFTER-GLOW POWER SUPPLY COMMENTS

A FAIR AMOUNT OF NOISE & HUM FILTERING WERE ADDED AS SPACE PERMITTED. THE SPEC'D LINE FILTER FL1 (FROM JANNER) STARTS BECOMING EFFECTIVE @ 50 kHz VS 10 MHz FOR OTHERS USUALLY SPEC'D. THE DISCRETE FILTER FL2 STARTS ROLLING OFF @ SEVERAL HUNDRED Hz. THIS COMBINATION REDUCES LINE NOISE OVER MUCH OF THE SPECTRUM. FL2 ALSO FORMS A LINEAR TRANSFORMER THAT REDUCES THE NORMAL AC LINE IMPEDENCE OF 100 → 150 Ω DOWN TO APPROX. 65 Ω. THUS, A LITTLE BEEF IS ADDED TO THE LOW-END ALONG WITH A SIGNIFICANT DROP IN BACK GROUND NOISE.

COMMON MODE CHOKES ARE ALSO USED IN THE SIGNAL PATH OF EACH POWER SUPPLY IN ORDER TO REDUCE THIS MOST COMMON FORM OF RFI INTRUSION.

SCHOTTKY DIODES AT BR1 STOP THE HUGE AMOUNTS OF REVERSE-RECOVERY NOISE GENERATED BY pn DIODES USUALLY SPECIFIED FOR FILAMENT SUPPLIES.

THE HV RECTIFIERS SPEC'D (UF4007) HAVE A REVERSE RECOVERY CHARACTERISTIC THAT IS MUCH EASIER TO FILTER THAN EVEN HEX-FRED DEVICES. WITH THE RC FILTERING PROVIDED BY THE 10Ω/.01 COMBINATIONS, RECOVERY SPIKES ARE USUALLY BELOW 10 mV IN AMPLITUDE VS 10's OF VOLTS FOR MOST pn's & HEX-FREDS. CMC 6 SLOWS THE REVERSE RECOVERY dV/dt RATE SO THAT SUBSEQUENT FILTERS ARE MORE EFFECTIVE.

THE $5 TIMER CIRCUIT ALLOWING DELAYED B+ APPLICATION SAVES THE TUBES & PREVENTS HV SOARING. THE UNUSUAL USE OF A SPARE SET OF NC RELAY CONTACTS ALLOW CROW-BARRING THE B+ UPON SHUT DOWN. THIS ACTION REDUCES STRIPPING AS EACH CATHODE COOLS & REDUCES SHOCK HAZARD. THE FULLY DISCHARGED CAP'S ALSO CAUSE B+ TO RISE AT A PREDICTABLE RATE THROUGH OUT THE ENTIRE CIRCUIT AT TURN ON. THE 555 IS ALSO CONFIGURED TO OPEN K2 FOR 30 SEC. EACH TIME THERE IS A POWER INTERRUPTION PREVENTING SHORT-CYCLE SURGES FROM LIGHTNING, ETC.

ALL IRON IS MOUNTED ON INSULATING WASHERS TO REMOVE CIRCULATING CURRENTS FROM THE CHASSIS.

FOR B+

ONLY TWO LC FILTER SECTIONS USED, DUE TO SPACE LIMITATIONS & AVAILABLE B+. ONE OR TWO MORE SECTIONS ARE NEEDED FOR BETTER LOW NOISE OPERATION.

the Deep Throat Horn

a front horn for Lowther drivers

by Bent Audio

John Chapman of Bent Audio sent us these wild horns a few months back, and Doc just finally got around to setting them up. The tractrix expansion contour horns are molded from ABS and have a theoretical cut off frequency of 140Hz.

The horn mouth is about 34" in diameter, and the horn is 18" deep, hence the name Deep Throat. The throat opening is 7-1/2", just right for fitting snugly against the frame of a Lowther driver.

The driver mounts to a piece of PVC pipe which comes cut to just the right length to make a nice mounting flange, as seen in the picture to the right. John suggests attaching the flange with 5 minute epoxy putty, which worked nicely. The putty is rolled into a snake of a length approximately equal to the throat circumference and then pressed in the tapered gap between the outside of the horn throat and the PVC flange.

Once the epoxy dried holes were drilled for 3/16" hanger bolts and the drivers were slipped on and secured with brass nuts and washers.

The backs of the drivers were left open for the first audition, and fiberfill was piled over the backs to damp the rear wave. A quick and dirty frequency sweep by ear indicated that the horns went down pretty smoothly to 200hz, where they begin to roll off.

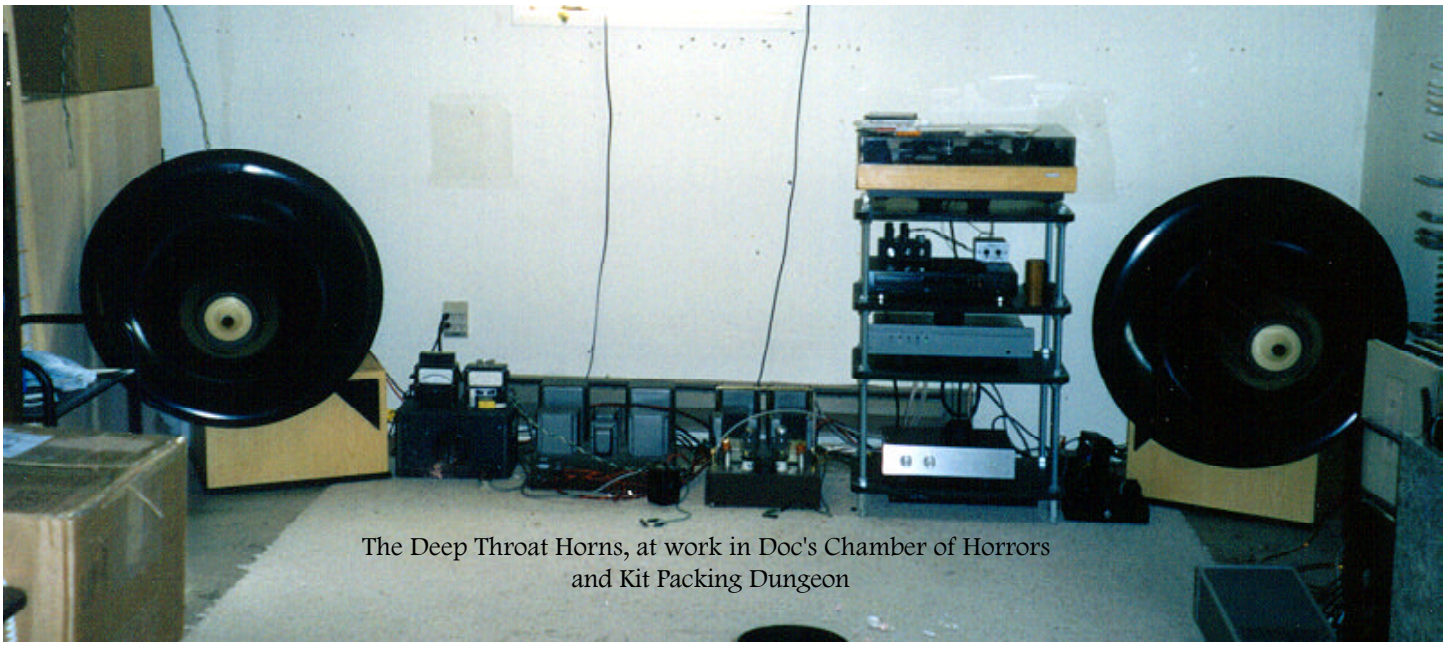
Anyone who has listened to Lowthers knows they have a 'presence peak' which is generally centered around 2-2.5kHz.

I have measured my PM2As as having more of a plateau from 2 kHz clear up to 10 kHz, so I was curious to see if these horns would fill in the midrange and upper bass.

Yup! The peak is still there a bit, but the front loading does wonders for the balance without losing any of the speed and life that the Lowthers are known for. The dynamics are stunning, I have a drum solo that will blow your mind on these guys. I estimate overall sensitivity at something around 101dB@1W@1M.

I have been using a Whamo subwoofer temporarily, but we'll develop a woof that's a better match both in terms of bandwidth and sensitivity in the future. These babies may not be plug'n'play', but they are really worth trying if you're a hardcore Lowther tweak. The Deep Throat Horns are $520 the pair, plus shipping. Contact John Chapman at Bent Audio, lchapman@home.com or 604-533-6684 for more info.

A similar horn called the Oris 150 has been developed by Bert Doppenberg. More info about it can be had at http://home.wxs.nl/~lowther/final.htm



The Deep Throat Horns, at work in Doc's Chamber of Horrors and Kit Packing Dungeon

Out with the Old

We are closing out the KR Enterprise VV Valves to make room for the new generation of KR tubes. All sale tubes below have the KR 1 year warranty from date of purchase. Visit our website for KR pictures, specs and curves. **http://www.welbornelabs.com/krhome.htm**
Please Note: These VV Valves all have 2A filament current requirements. Please check your equipment specification before ordering and make sure they will operate in your amps.

No returns on these sale items.

VV300B...the following are all electrically the same tube, just different glass shapes and color. The cylinder tubes are just that...they have a cylindrical shape with a flat top.

VV300B	regular transparent glass	$200 per pair
VV300BL	regular blue glass	$200 per pair
VV302BL	regular blue glass	$200 per pair
VV302BC	blue cylinder	$200 per pair

VV32B...these VV32Bs are all electrically the same tube except for glass color and shape.

VV32B	regular transparent glass	all sold
VV32BL	regular blue glass	$250 per pair
VV32BC	blue cylinder	all sold

VV52B...these VV52Bs are all electrically the same tube except for glass color.

VV52B	regular transparent glass	all sold
VV52BL	blue glass	all sold

Hurry, quantities are limited.

All sales are final.

Buy 2 pair... take a 5% discount.

Buy 3 pair... take a 10% discount.

In with the New

New From KR Enterprise. All tubes feature a 2 year warranty.

KR10 Dual Triode Pre-amp and Driver Tube.

A 6SN7 on Steroids? $395.00/pair

KR2A3 Single-Plate Vacuum Tube

A great new single plate 2A3. 2.5V/2.0A filaments. 2-6 watts of glorious sound. $395.00/pair

KR PX25 Vacuum Tube

A replica from the past. 4.0V/2.0A filaments. 8 watts. $435.00/pair

KR300B Vacuum Tube

An awesome 300B replacement. 7 to 14 watts, 5.0V/1.2A filaments. $435.00/pair

KR300BXLS Vacuum Tube

8 to 20 watts of power and dynamics. 5.0V/1.2A filaments. $575.00 per pair

New KR2A3

Welborne Labs
ph: 303.470.6585 fax: 303.791.5783
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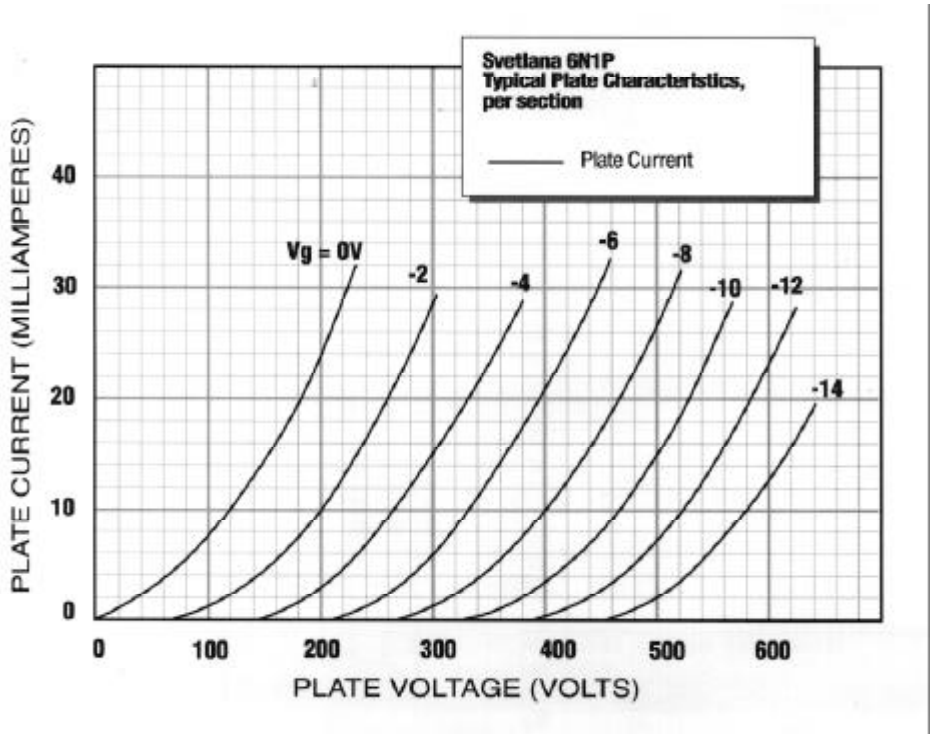
you asked for it

C4Sing the Decware Zen



By Doc B.

We've hade several calls from folks who ve been using the Decware SE84B Zen amp, a single ended SV83 amp manufactured by Steve Deckert (www.decware.com). A few of the callers have listened to the Zen amp and have asked us for a way to make the Zen sound a bit more dynamic.

I point out here that the folks who have called *liked* the Zen amp, this article is not intended in any way to be a flame job of the stock amp. This mod is offered strictly in the spirit of experimentalism that makes VALVE what it is.

The choice of tubes is cool - The driver is Svetlana's 6N1P, sister to the 6922, but with a bigger cathode and vastly reduced microphony. In fact we like the tube so well we are using it in a new prototype parafeed line stage here at Rancho Tonalities. The SV83 output tube is a sister to the 6BQ5, which any triode guy will tell you is the best sounding pentode made.

The circuit is as simple as possible, the only adjustment being a choice of cathode resistance on the straightforward voltage amp driver stage. The output stage is operated in triode mode with a 1K resistor tying the screen to the plate.

The simplicity of the circuit makes the C4S installation easy. The 6N1P is set up to run at a plate voltage of 156VDC with a cathode bias of 4.3VDC and a cathode resistance of 2.7K, *or* a plate voltage of about 104VDC, cathode bias of 2.3VDC and a cathode resistance of 964 ohms.

The first operating point gives us a plate current of 1.6 mA, and the second operating point gives us a plate current of 2.4mA.

Version 1

Looking at the curves published by Svetlana for this tube, these are really kind of low operating points. I'll do a conversion sticking with a low 2.4mA current first, and using the curves I'll shoot for an op point of about 110VDC on the plate and 2VDC of cathode bias.

The SV83 grid is biased only 10V or so, so the voltage swing requirements for the 6N1P are minimal.

To hit our numbers means replacing the 2.7K and 1.5K resistors with a single 833 ohm (820 is a common value that would be close enough) 1/4W resistor on each cathode.

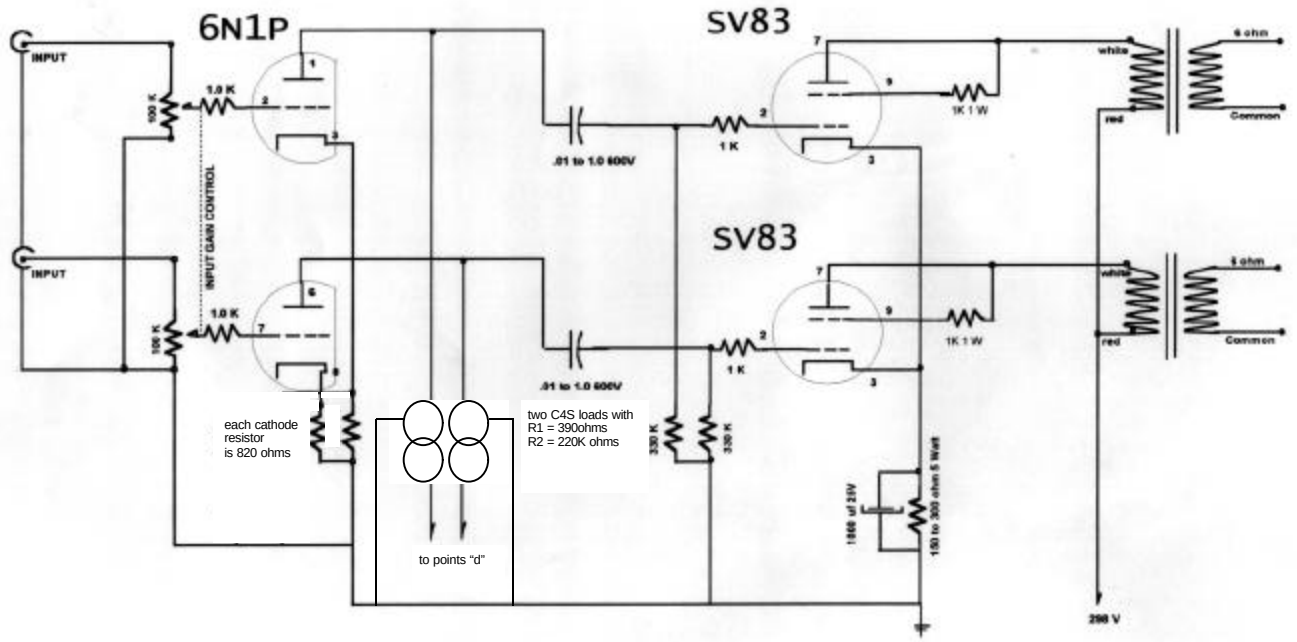
Our C4S's R1, the current set resistor, will need to be .95V 0.0024A, or 396 ohms 1/4W (390 is close enough).

To set the bias resistors we will need to go back upstream in the circuit and figure out what our voltage should be at the top of the C4S loads and how to make it so.

At point b in the power supply schemo we know we have a pretty stable 260 VDC or just a few volts less available.

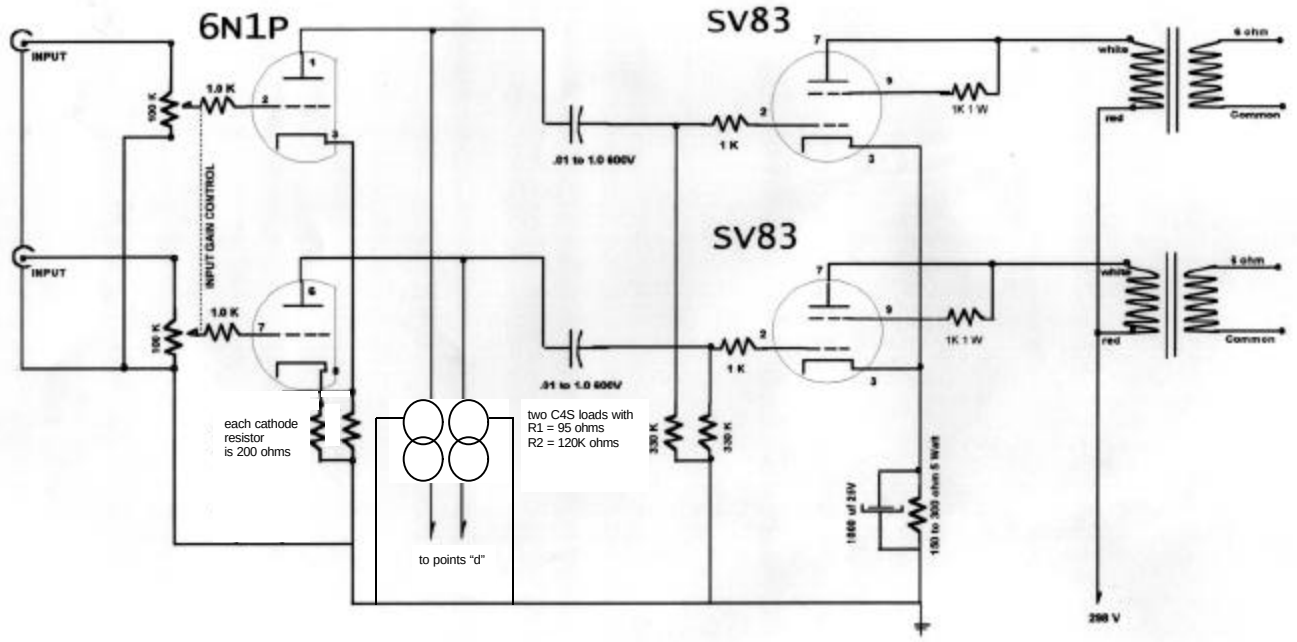
We will have a total draw of 6.8mA from our new circuit, 4.8 mA total thru the two plates and 2 mA total thru the bias diodes of the two C4Ss.

The 15K and 10K resistor in parallel between points b and c equal a 6K resistor. The drop across this puppy at 6.8 mA would be 22.8V, so let's say we would have around 256 - 22.8= 233VDC available at point c. The actual value may vary a bit but this is close enough for jazz.



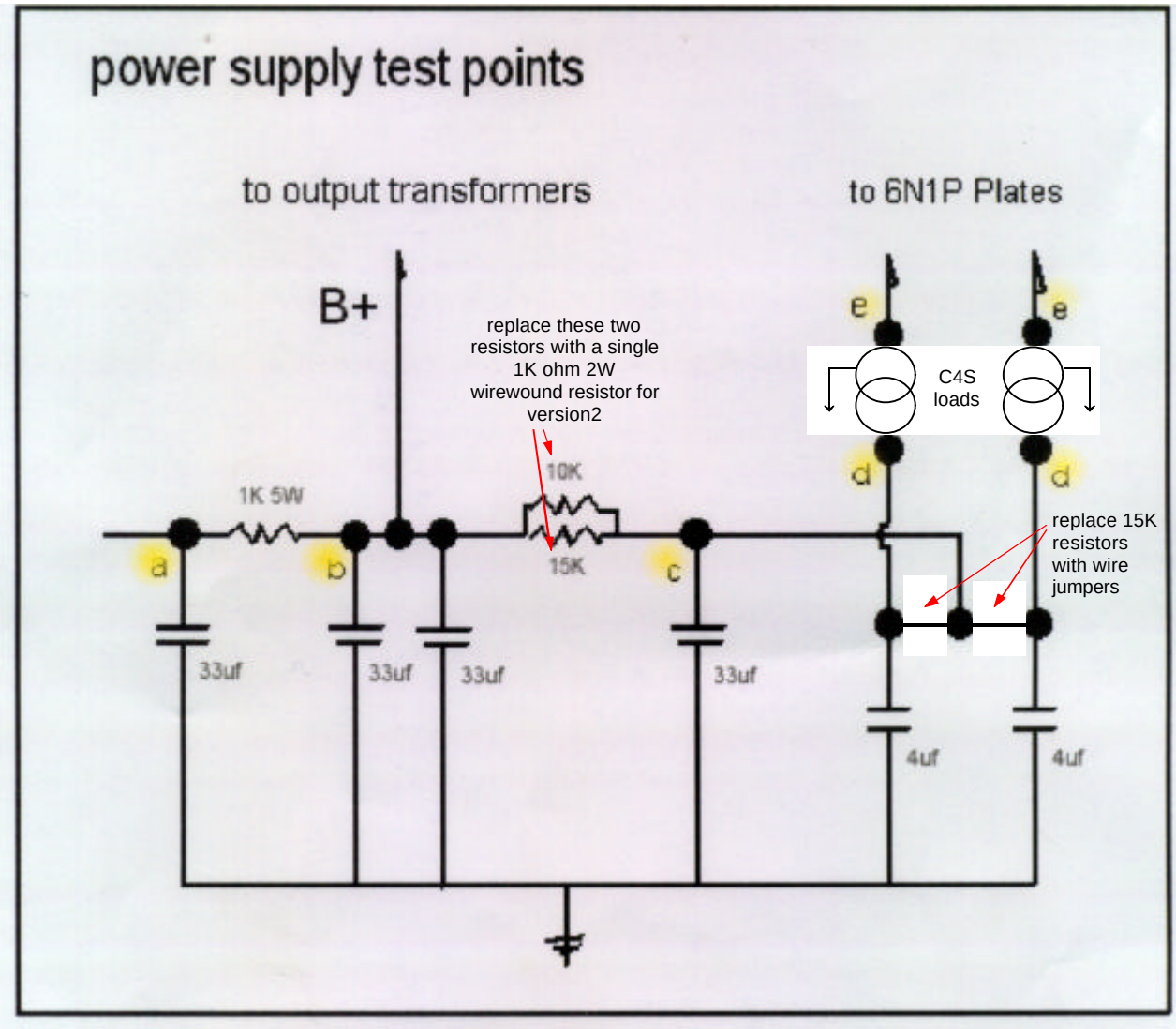
SE84B Zen Amp with C4S active loads

version 1



SE84B Zen Amp with C4S active loads

version 2



Now we calculate our bias resistors R2 on our C4Ss as 233V/.001mA = 233K ohms. A 220K 1/2watt resistor will do. Substitute wire jumpers for the 15K resistors between points c and d. The C4S loads replace the 47K plate loading resistors between points d and e, obviously...

Version 2

For a higher current version that will have the 6N1P running at a point we like in other circuits we use, let's shoot for 10 mA at 200V as an operating point for our 6N1P. The SV83s draw a maximum of 66 mA total, so the total draw of two SV83s and the two halves of the 6N1P running with C4Ss will be 66 + 20 + 4 = 90 mA, well within the maximum 150 mA current rating of the Hammond 372-FX power trans.

R1, the current set resistor on the C4S board, will need to be .95V/.01A = 5 ohms.

The cathode bias on the 6N1P halves will need to be 2V, so we need a cathode resistor on each triode of 2V/.01 mA = 200 ohms.

Let's bump the LED's current draw up to 2 mA. We already figured our current draw by the 6N1P halves and C4Ss to be 24 mA. The voltage drop across that 10K and 15K resistor from point b to point c would now be 144V, way too much!

No sweat, let's just change the 10K and 15K resistors in our previously modified power supply (modified by the jumpers replacing the 15K resistors at points c and d) to a single 1K 2W WW resistor. This would give us 24V of drop, and our voltage at the top of the C4S loads should be about 260-24=23 V. This is just enough plate to source compliance for our C4S load to work, and remember, we only need about 10V of drive for the grid of the SV83.

We can now compute the value for R2. With 236V available at the top of the load and a 2mA current through the LEDs we need a 236V/.002A = 118K resistor rated for 1 watt. 120K is plenty close.

What else can you do?

Parafeed it, Baybee

Disconnect the secondaries of the existing output transformers, and cap couple a suitable PA matching type transformer, ala ParaS.E.X., to the plates of the SV83. Try a 2-3mfd coupling cap.
The plate resistance of the SV83 may be a bit high with respect to the inductance of the Zen output-trannie-now-plate choke, so you may not get much sub 30 Hz bass, but there's only one way to find out, and it would be a cheap experiment..... *B.*

da' basics

Ohm's law -
the most important formula you'll need

If you can remember this one, you can figure about 80% of the math out in a given circuit design. Ready?

$$V=IR$$

where V= Voltage
I= Current
R= Resistance

How about some applications, you say? OK, here s one:

You need to calculate the value of a cathode resistor for a 2A3 self biased at 43 Volts and drawing 60 mA of current.

We use our junior high algebra and rearrange Ohm's law to read

$$V/I=R$$

Substituting 43 Volts for V and .060A (that s the same as 60 mA, get it?) for I we get

43V/.06A=R
which equals about 717 ohms.

Now a nice feature of Ohm's Law is that we can relate power to it with the following formula

$$P=VI$$

where P = power and the other variables keep the same definitons.

With this information we can calculate what kind of power rating our 2A3 cathode resistor needs. We know V = 43 Volts and I = .06A, so we can find P by substituting

P= 43V x .06A
which equals 2.58 Watts.

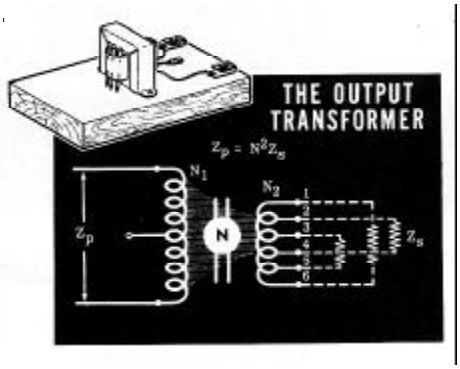
By the way a good rule of thumb is that you want the power rating of a resistor to be at least twice (the conservative say four times) the power radiated by the resistor. In this case you would want to use a 5 watt resistor at the very least, and a 10 watt resistor would be safer.

There may be cases where you are working on a design and don't have one or the other of V or I through a given component, but you know the value of the resistor. You can still calculate the power rating.

Since we know that V=IR, and hence I=V/R and we can substitute for I in our power formula:

$P=VI=VxV/R=V^2/R$
or $P=IRxI=I^2R$
Cool, huh.

Brainiac's



Heavy Metal

...an occasional review of some nifty chunk of iron (usually cheap!)

by Paul Joppa

Today's Topic:

the De Young Mfg. S.E.X. kit "universal" power transformer

This is the transformer supplied with the S.E.X. kit for international orders. It differs from the U.S. version in having more primary windings so it can be wired for several power line voltages, it is rated for 50 or 60 Hz operation, and it has less B+ current capability than the Magnequest unit offered for the domestic market. It weighs about 3.5 pounds on my kitchen scale, and the lamination stack is 3 x 2.5 x 1.5 . The laminations are moderate, about 0.01 , and they are interleaved one by one. It is mounted horizontally with an upper metal end bell, and takes mounting holes 2 x 2.5 . All the wires come out on the bottom.

The primary can be wired for 100, 120, or 240 volts and measures 7.1 ohms DC wired for 120 volts. There are four secondaries. The ratings and my measurements are as follows:

Rated voltage	Rated current
2 x 2.5v	2 x 1.25A
6.3vCT	2A
350-0-350v	60mADC

Open circuit voltage	DC resistance
2.90 + 2.90v	0.12 + 0.12 ohms
6.67v	0.17 ohms
366-0-366v	404 ohms CT

Estimated voltage at rated current
2.66 + 2.66v
6.13 v
343-0-343 v*

* the high voltage winding was estimated on the basis of 60mA RMS through the whole secondary, which is a reasonable approximation for capacitor-input circuits but is not exact. Leakage inductance was not evaluated but may reduce the B+ output voltage slightly.

Equivalent source resistance in the B+ is about 267 ohms, or about 4% of the likely load resistance. With a capacitor-input filter and using silicon diodes, a maximum of 445 volts could be generated at 60mA. Remember however to allow for the drop in the DC resistance of any filter choke used, plus the loss in the rectifier tube if used. With a choke-input filter an output of 305 volts at 90mA could probably be obtained without excess heating, again minus the losses in chokes and rectifiers.

Unusual in smaller power transformers, the regulation is pretty good. You can probably draw more B+ current if the filament windings are not fully utilized, but no more than half the extra volt-amp capability can be used this way without excess heating.

jc morrison smashes record for the worlds largest S.E.X. speaker...

This is a photo of one of a pair of speakers constructed by jc morrison and demoed at nyNoise, a very cool show put on in Hoboken, NJ by jc and pal Blackie Pagano, which we attended on March 13. The speaker is a 9' tall open baffle with 18 of the drivers that Doc worked with MCM Electronics on a couple years back (PN 55-1870). The tweeter is a Raven (sounded very nice!). There was also a TAD based subwoofer with this system. The overall sensitivity was quoted as 100dB, and it sounded like it.

You long time bottleheads will note a basic resemblance to the open baffle S.E.X. speaker born from the unstable minds of Doc and Brainiac at the first VALVE Xmas party after several bottles of Champagne. If you want to take a project like this on, we might recommend that you try what is often called the "original S.E.X." drivers instead (PN 55-1290), With their high Q they are quite a bit more open baffle friendly, going lower on an open baffle (about 110 Hz vs. 200Hz for the drivers shown here) and a bit more efficient to boot. See our new Whamo webpages for lots more info.

Thanks to jc and Blackie for great hospitality and a fun show. We hope to twist their arms and get them to come to the next VSAC. Hey jc, will those things ship?

now that looks dangerous

All you gotta do to get bottleheads to look at the camera is say "beer".

Here's Smoothplate, John Hoffman, Brad Brooks (he's the one guy who s working), Tom Vetromile, Richard Riley and Brainiac in his disguise, hard at work on the new VALVE listening room. Those joists that Tucker's almost hitting his head on will come out, and if you look close you will see the new ones he put in at 9-1/2 feet. The room will finish out to about 19' x 11'.

We're planning on installing two layers of 1/2" sheetrock, and there's four hospital grade sockets on the front wall and one side wall, in case we audition speakers that like long walls, like Ariels.

Oh yeah, there'll be a small wine bar in the back corner too. Brainiac smiled very wide when I announced this...

Doc,

This is Joe from Australia. Thanks for the Foreplay Kit with the upgrades. I have received the package in December last year. Unfortunately, I was away in Malaysia for a couple months. So, I was able to finish the kit just a few weeks ago. Anyway, I have managed to build another deluxe version of the kit using better parts like the Hovland musicap, Holco, Kiwame resistors. I have used VSE Allen Wright's voltage regulator together with the power supply of the Foreplay to provide the B+. Heater is also DC regulated as well. I have put the whole package in a Hammond Aluminium box with the valves sticking out proudly (see pic).

I have managed to have a power transformer custom wound for operating in 240V country. I went to Octave Electronics (www.members.xoom.com/octave/) in Malaysia and they did it for me at a reasonable price (works out to be about US$27 / VA). So if someone from 240V territory needs the service, I would recommend them.

Anyway, thanks again.

Regards,
Joe Ling

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