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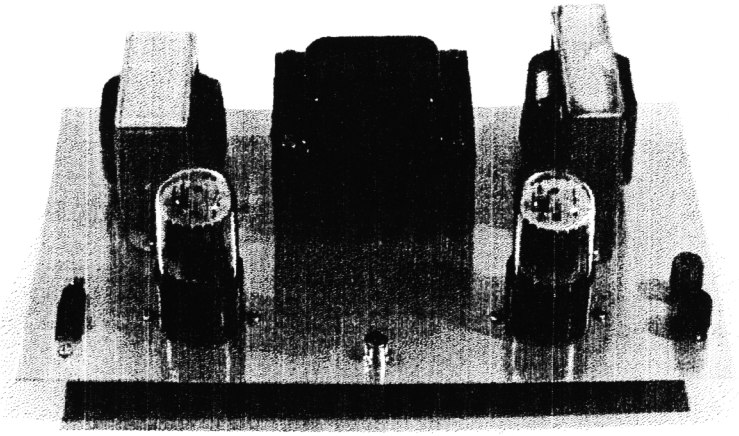
Cheap S.E.X.*



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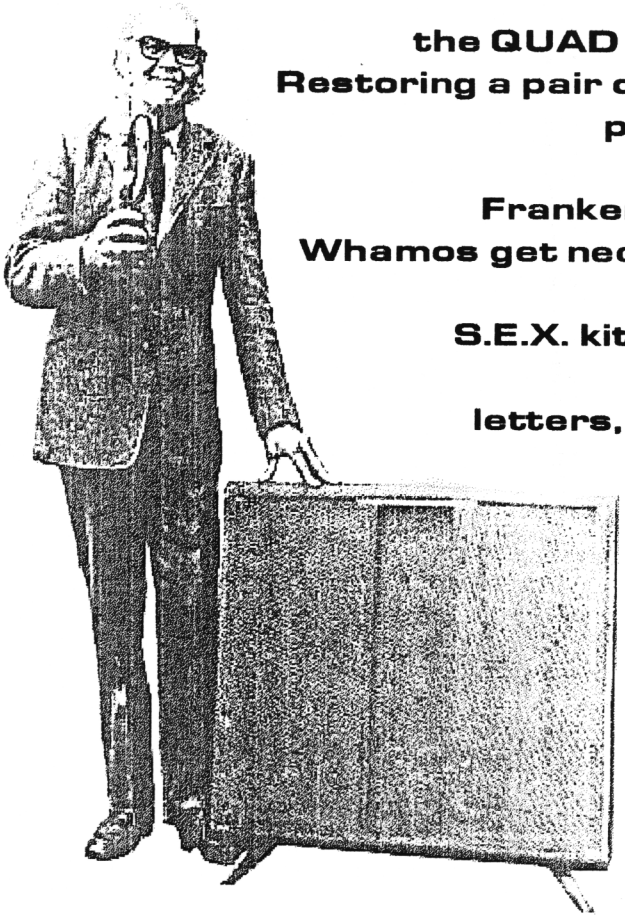
*** S**ingle **E**nded e**X**perimentation

VALVE

VINTAGE AUDIO LISTENERS AND VALVE ENTHUSIASTS

in this issue:



the QUAD squad -
Restoring a pair of ESL's
part one

Frankendyne!-
Whamos get neck bolts

S.E.X. kit comes

letters, letters

volume 3, number 6 June 1996

VALVE

is the newsletter of
Vintage Audio Listeners and
Valve Enthusiasts

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contributing editor's thing

By Doug

Following Dan's "editors thing" in the last two issues of VALVE (thanks for stepping out Dan), and some great dialogue at our last few meetings, I have a few thoughts to share.

I find it difficult to justify discussions of "my equipment is better than yours". Excellent examples of this rhetoric can be found in *Sound Practices* Issue 9. We are fortunate to belong to VALVE where this kind of pettiness is not tolerated. I believe our values are to support each others efforts towards building their dream vintage audio system, even if it means experimenting with innovative circuits and concepts which are not embraced by those who claim to be the audio "experts"! Bottleheads, we're "out there", where we should be!

I'm no electrical engineer or designer, but I do enjoy rebuilding audio gear, especially tube stuff and loudspeakers. And, I'm certainly not a dumpster diver, nor am I a silversmith (dare I explain that one?), but I truly appreciate the design and music from vintage audio equipment. After restoring my share of old equipment, I can attest to the reward of "doing it myself" that Dan speaks of. For me it's understanding what makes my gear work, and knowing that I can depend on it to reproduce some really great tunes!

Still, it's the music I enjoy most. We all need to hold on to that value. So, for just a few moments, stop dreaming about those silver-wound transformers, set the new bypass caps aside, and don't mess with that crossover any more. Instead, forget about what someone says it should be, sit down in your easy chair, and listen to what it is: the MUSIC!

Doug

letters from fred

Reminiscence by Fred Suffield, P.E.

the full service bar or why Sperry and RAND merged

In the early 50's time period there was a research scientist at the RAND corporation in Santa Monica who liked to play jazz piano, but did not have one. He would go up to Malibu some evenings, and at a small bar there he had found an unused piano which the owner did not mind if he came in and played. He did not drink, so it was real cheap entertainment for the owner.

One evening as the scientist was just fooling around on the piano, in came a group of engineers from Sperry in NY who had apparently had an unsuccessful missle shot at Point Mugu, and as all do, after a few drinks started to discuss the problems, and what had happened.

The scientist/piano player could not help overhearing the discussion, and after a while took quite an interest in it. After about half an hour he reached over the Sperry table, sketched an equation on a sheet of paper they were using, and said, " There is your stability problem". And then he went back to the piano.

The Sperry engineers looked startled, and quickly left, carrying the paper with them.

To this day they are probably telling people in New York about the amazing piano players they have in California!

did you just tune in? here's what's happened so far...

Back Issues

Volume 1 - 1994 issues - $20

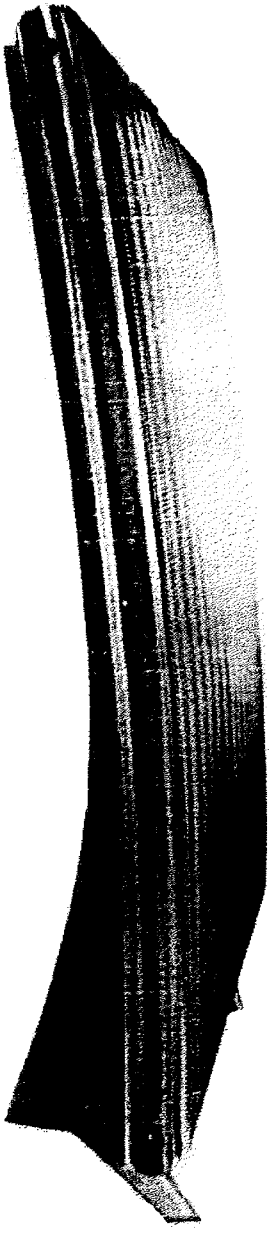
a Williamson amp; Dyna Stereo 70 mod bakeoff; converting the Stereo 70 to 6GH8's; a QUAD system; triode input Dyna MkIII; MkIII vertical tasting; smoothing impedance curves; Altec A7; Ampexes Nagras and ribbon mikes; Triophoni, a 6CK4 amp; audio at the 1939 World's Fair; books for collectors and builders; V.T. vs. R.M.A. cross reference; FM tuner tube substitutions; Big Mac attack - the MI200; 6L6 shootout; a vintage "audessey"; more FM tuner mods; vintage radio mods; Heathkit rectfiers; PAS heater mod.

Volume 2 - 1995 issues - $20

Rectifier shootout, tube vs. solid; FM 1000 recap and meters; single ended 10 amp; triode output W-4; Optimus 990 - speaker for SE?; star grounds; tuner shootout; Living Stereo, vinyl or CD?; World Audio SE integrated; firin' up - smoke checking; Brook 12A schematic; 6C33 vs. 3C33; Heathkit power transformers; 6B4's + Magnequest = SEcstasy; W5 mods; triode operating points; Dyna restorations; Marantz 7,8 and Scott LK150 impressions; hackable vintage gear; Quasimodo - PP 805 amp; restoring a Scott 340 in 75 minutes; a dream system for 78's; cartridges and styli for 78's; Restoring a Lowther, Part 1&2; easy tube CD output hack; 6ER5 phono preamp; 304TL & 450TH SE operating points; hypothetical DC ESL amps.

What we hope to have in 1996 ($25):

Single Watt, Single Tube, Single Ended, an amp for Lowthers; the Vintage Speaker Shootout of 1996, QUAD vs. Lowther, vs. A7; the Voigt Loudspeaker, the Single Ended eXperimenter's kit, amps and speaks for $275; cathode coupled SE 6AS7 amp; how to build the Superwhamodyne; improved CD tube output; refoaming AR woofers; mesh plate tubes; rebuilding QUADS; and a whole lot more!



Quad ESL Restoration (Part 1)

by Doug Grove

How do I start? There's Lowther diaphragm replacements, then there's woofer foam surrounds, and dome tweeter microsurgery? Electrostatic panels - whoa! 6,000 volts is serious stuff!

After the great Altec-Lowther-Quad shootout in February, I had to find out more about the famous "plastic sound". A good friend of mine let me listen to his ESL's for quite some time. He also pointed me in the direction of an acquaintance of his who was willing to part with a decent working pair, needing some cosmetic treatment, but otherwise in good shape.

Before making the plunge I surfed the Net to see if anyone out there knew about Quads. The answer was yes! SDS Labs home page and links: http://www.clarkson.edu/~stokessd/quad.html (or do a web search using "quad esl"). Sheldon Stokes knows Quads inside out. With info from SDS Labs and a few other sources I went to work.

Copper grilles, black side rails, legs in a bag? What's a guy to do? Okay, the grilles needed cleaning, and a few dents removed. But the side rails and legs? I reglued and doweled the legs to their mounting plates. I stripped the teak legs and rails, and refinished them in mahogany- stained tung oil. Looking good! But what about the sound? They imaged well, were reasonably efficient, but sounded a little "thin" and unbalanced. Solution: Power supply rebuild! But first, I needed to know how they work.

Electrostatic loudspeakers function by using a high voltage potential in a flexible flat diaphragm which is held in place between two stationary conductive surfaces (stators) which alternately

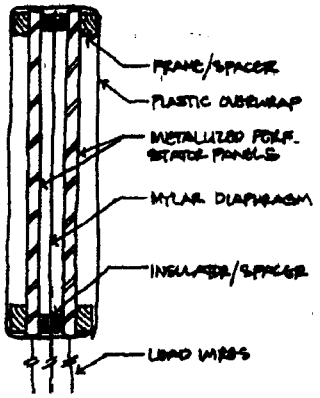


FIGURE 1
TYPICAL ESL CONSTRUCTION

charge and discharge both front and rear, causing the diaphragm to resonate according to the charge in the stators (refer to Figure 1 for typical construction detail). A high voltage power supply energizes the diaphragm with a constant bias voltage, while stator plates are energized at higher fluctuating voltages by a step-up transformer powered by the audio amplifier, not unlike a CT tube output transformer running in reverse (refer to Figure 2 for a generic electrical schematic).

The Quad ESL system contains three major components (refer to Figure 3): Electrostatic loudspeaker panels, high voltage power supply, and audio transformer circuit.

There are 3 loudspeaker panels: Two bass panels flank the treble panel. The bass panels cover frequencies from around 45Hz up to 600Hz. The treble panel is divided into 3 vertical strips: All three strips start at 600Hz with the two outside "mid- range" sections rolled off at 2,000- 3,000Hz, and the center "tweeter" strip reproducing frequencies to beyond 15,000Hz. The panels are constructed of thick plastic sheets riveted together. Diaphragms are mylar, while stators (front and rear panels) are conductive paint coated plastic. Each unit is framed by wood strips and encased in a thin clear plastic overwrap. Treble units also have 4 felt washers and screws placed through the overwrap and panel to control panel dispersion and tension.

The power supply affects speaker performance in that sufficient voltage must be provided to charge the speaker diaphragms to their full potential. Specified voltages for Quads are 6.0 kV for bass panels and 1.5 kV for treble panels. Because of the very high voltages generated, the front and rear grilles are system- grounded. Extreme caution must be exercised when messing around with these loudspeakers! Power must be disconnected for 2 hours for the panels to sufficiently discharge!

Mains power is stepped up to 610 volts via transformer, while DC high voltage is generated by a rectifier block consisting of a progressive voltage doubling circuit using 16 diodes and 8 capacitors. 1.5 kV is tapped early on in the circuit while 6.0 kV requires the full complement of rectifiers. Current potential is very small, as evidenced by the step-up transformer only being rated at 0.5 mA. The rectifier block is cast in beeswax in a bakilite or phenolic box, attached to the transformer frame with

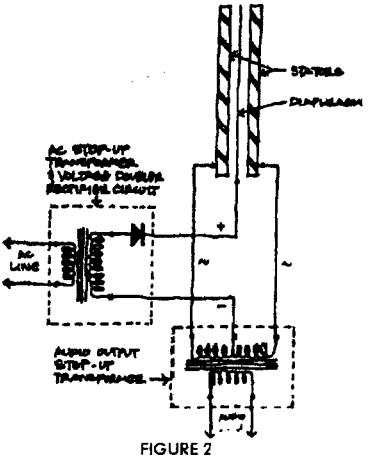


FIGURE 2
TYPICAL ESL CIRCUIT

nylon screws. Chassis mains connection is a European standard round plug and socket. A neon pilot light is fitted to confirm that the system is energized. A note of interest: Contrary to what I had previously heard, Quads will play quite well after only a few minutes of being plugged into the wall! They achieve full potential after an hour or so of being plugged in. And, they will play for quite a while even after mains disconnection. The audio transformer unit is pretty beefy, not really subject to much wear. A step-up transformer, limiting resistors and capacitors are cast in beeswax in a steel case. It needs attention only when removing the treble panel leads or installing a factory protection circuit. The amplifier leads must be disconnected before servicing the audio transformer as it steps amplifier output up to peaks of many thousand volts at a lethal current! This precaution is most important as current potential from the audio transformer far exceeds the diaphragm bias voltage!

So, back to power supply rebuilding. As this pair of Quads is over 25 years old, it is highly probable that if they were plugged in even for half that time, output from the rectifier block diodes has deteriorated, affecting overall sensitivity and most of all, bass output. Here's how to replace the diodes:

Disconnect the ESL from all sources. Remove the 20+ screws securing the rear protective grille. Remove the ground wire screw. Remove the grille. Now is a good opportunity to reglue any burlap damping material peeling away from the grille. Use contact cement or silicone sealer. This damping material really helps control internal speaker resonance and attenuate rear sound output, so try to keep it in place.

Very important: Place a solder shield between the EHT unit and the bass diaphragm rear cover. Even a small solder splatter will pierce the plastic overwrap. If this happens, a small piece of clear packaging tape can be used as a patch without affecting speaker performance. A major sized hole or long rip will mean replacing the entire over-

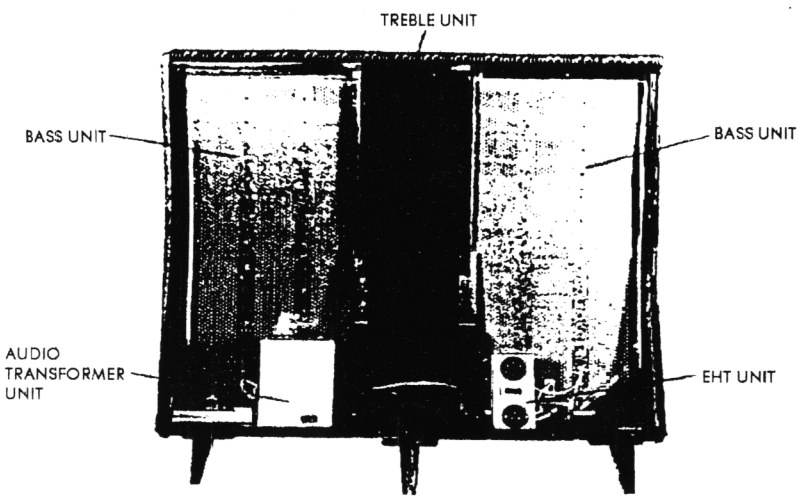


FIGURE 3
QUAD ESL REAR VIEW

wrap. The rectifier block is located high at the rear of the EHT unit (when viewed from the speaker back) with 4 wire terminals visible (these connections are diagrammed in Figure 4). There are also two resistors visible to the right side. With the solder shield in place, remove wires from the 4 pins on the rectifier block. Unscrew the two nylon screws (also remove the wire tie band if used) and lift the unit out.

Place the rectifier blocks on their sides in an old pie pan in a 350 deg. oven for

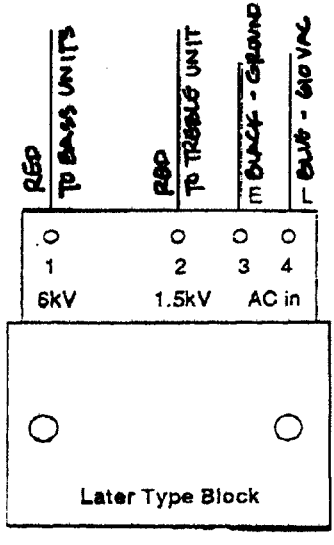


FIGURE 4
EHT UNIT CONNECTIONS

about 20 min. or until the wax has melted from the circuit boards. Remove the circuit boards and boxes. Keep the wax warm at 200 deg. Set the boxes up for recasting and be sure to plug the screw holes with the original nylon screws, otherwise guess what happens when you pour the hot wax back in! Draw a diagram of diode locations and their polarity. Also refer to the ESL circuit diagram in Figure 5. Carefully bend the capacitors out of the way, unsolder and remove the 16 diodes (the caps are usually okay)

. Replace the diodes with 1A, 1000V type 1N4007 (or higher voltage if available). After soldering, test all diodes in place and double check polarity. Bring the wax back up to 350 deg. Set the circuit boards in the boxes and pour the wax in. Let cool for a few hours. Refit the block to the EHT frame and reconnect the lead wires per Figure 4.

Plug 'em in! There may be a some faint crackling at first as the circuit powers up and stabilizes. After an hour or so, connect to the amplifier and slowly bring the volume up. When I did this I was amazed at the improved overall sensitivity and deeper bass. The ESL's seemed to "bloom".

This is a very effective fix for older Quads. It's also inexpensive, as I purchased 1N4007 diodes for less than 3 cents each - did the pair for less than a dollar! If you do nothing else, this update will help balance sound output and improve speaker sensitivity.

More tips on improvements in part 2 next month.

Acknowledgements and resources:

Sheldon Stokes, SDS Labs
http://www.clarkson.edu/-stokessd/quad.html
601 Swan Street
Potdam, NY 13676
(315) 265-6502
QUAD refurbishing and expert advice

Quad Pro Audio
33 McWhirt Loop #108
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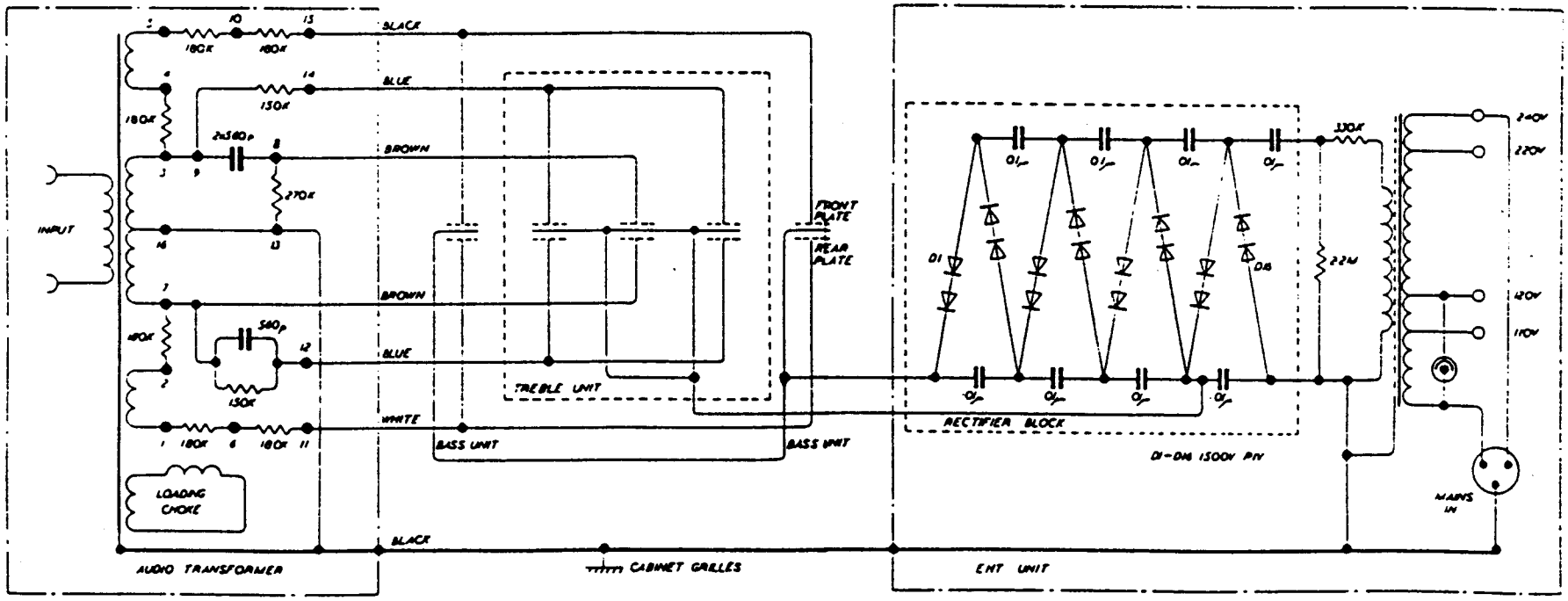


FIGURE 5
QUAD ESL ELECTRICAL SCHEMATIC

letters

all meshed up

CeCo L10 -- sure, that makes sense that it would have had a mesh plate. CeCo dropped the letter designations by about 1929, so yours must have been made in 1928, when they would do anything to cool the structure and reduce grid emission. CeCo tubes however are quite rare, even here where they were made, and I never saw a CeCo 10. Your note gave me an idea, though, to look for Cardon (Sparton) tubes of that era, and sure enough, their equivalent of the 50, the 585, has a mesh plate. Unfortunately of the three I have, only one is any good. As for 56s with mesh plates, that's possible since they were improved 27s, and introduced in 1932. Eveready and Raytheon parted company in 1933, so any Eveready tubes date before that. I only found one Spartion with a mesh plate, and it looks worn out.

A friend tells me that the WE 416A, as used in the Nems-Clarke VHF receiver, screws into a cavity and fails almost instantly if the cooling fan quits.

I mentioned having trouble taking curves of a 6AU5; the screen comes out on pin 8 and I forgot to put a ferrite bead there, since that's normally a cathode connection for any sensible tube. It behaved much better after that, but was not very linear below its rated plate dissipation, so we can write that one off as an audio triode.

Alan Douglas

Congratulations on your will power Alan. You are the first person to mention the Nems-Clarke reciever in print without using the word 'legendary', or mentioning that the CIA used it. See, even I can't do that.

completely baffled

Dan -

Here's a more detailed note on the frequency response of the S.E.X.y speakers. The reference that got me onto this is Harry F. Olson's *Acoustical Engineering*; I have a reprint of the 1957 edition.

Olson points out that there is a severe dip (15 dB!) in the response on-axis if the driver in centered in the board. The dip frequency in practice is about 1.6 c /D, c being the speed of sound (about 1130ft/second) and D the board width. *(this would be 904 Hz for a 2ft square baffle - dan)* This dip is caused by sound being radiated from all the board edges with the same time delay from the driver. It can be eliminated by mounting the drivers off-center.

My best guess would be placing the center of the drivers 5/11 of the board width from one side, and 4/11 down from the top. This makes the driver to

edge distances in the ratio of 4:5:6:7 so that none of them is a multiple of another, and the drivers are not too far from the center, so the bass is retained. This is similar to Olson's sketches.

There is another analysis I've seen somewhere, which suggests a circular baffle with the driver only 1/8 diameter from the edge. It might be worth playing with, if you find a pre-cut round plywood table top cheap. I,ve seen a few other really exotic shapes, such as one that looks like a treble clef, and another that looks like a giant sunflower. I'll dig up the references if anyone really wants to build them.

Looking again at Olson's data, the bass rolls off at 6dB per octave below a frequency of 0.6 c/D, which is about 340 Hz for the S.E.X. speakers. This doesn't quite fit the theory, but that's what his data shows, and he has a lot of data! Also, probably due to diffraction effects, the level is flat to the corner frequency rather than 3dB down as you might expect.

For the S.E.X. speakers, the drivers have a Q_T of about 1.4 at 115 Hz, giving a 3 dB boost just where it is needed, an octave and a half below the baffle cutoff. The boost will be 1-2 dB more with typical no-feedback SE triode amps due to their low damoping factor. So the whole system is fairly flat to about 115 Hz. Most of those high cost, low efficiency mini-monitors cut out about this frequency anyhow.

Paul Joppa

Shoot, does anybody know how to move holes in a board? Your 5/11,4/11 setup would put the acoustic center of the vertically arrayed drivers 8-3/4" down from the top and 11" in from one side for a 2X2 baffle. I should think one would want to make a pair of these baffles as mirror images - Dr. Bottlehead

Frankendyne

Recently spent the afternoon at Tim Lollar's. Tim has been working very hard on a biamped system using Altec drivers run by an AES SE-1, with a solid amp for the bass.

I knock on these big boxes his drivers are mounted in, and they're pretty dead. Tim tells me the joints are dadoed and the panels are braced very simply inside. Very effective, with quick, tight bass.

We talk about bracing the inside of the Whamos with and he says, "Maybe you should play with threaded rods as braces, so you can tune the enclosure like Michael Green does."

I'd been having the same thoughts, so I came home and laid plans.

Went to Eagle the next day and bought the following:

two 1/2"x13, 3" Allen head cap screws

two 1/2"x13, 2-1/2" " " " "

two 1/2" coupling nuts (for joining lengths of 1/2" threaded rod)

four 1/2" ID flanged bronze bushings.

(about $25 total)

I then took a big screwdriver and tapped the sides of the towers all over with the handle, listening for the lowest note (think, thank, THUNK). I marked the spot where the note was lowest and measured it. About 6 inches in from the back edge and 19 inches up from the bottom edge. After verifying that the other side rang in the same pattern, I marked it in the same position.

Took a nice new 3/4" boring bit and let 'er rip through that pretty little piece of ash. eXtreme!

The bushings fit perfectly into the holes. Now I had to come up with a way to join the two cap screws inside the box without taking the front baffle off (yes, I'm lazy).

Put the screws through the bushings, grabbed the coupler in one hand, rolled up my sleeve, and plunged my hand, up to my armpit, into the vent hole. Managed to thread the coupler onto the screws quite easily.

Getting my arm back out wasn't so easy...

Once I calmed down I slowly and painfully pulled it out, managing to embed several ounces of fiberglass in the raw skin of my forearm on the way.

Next, a pair of Allen wrenches tightened the box up to a slight concavity.

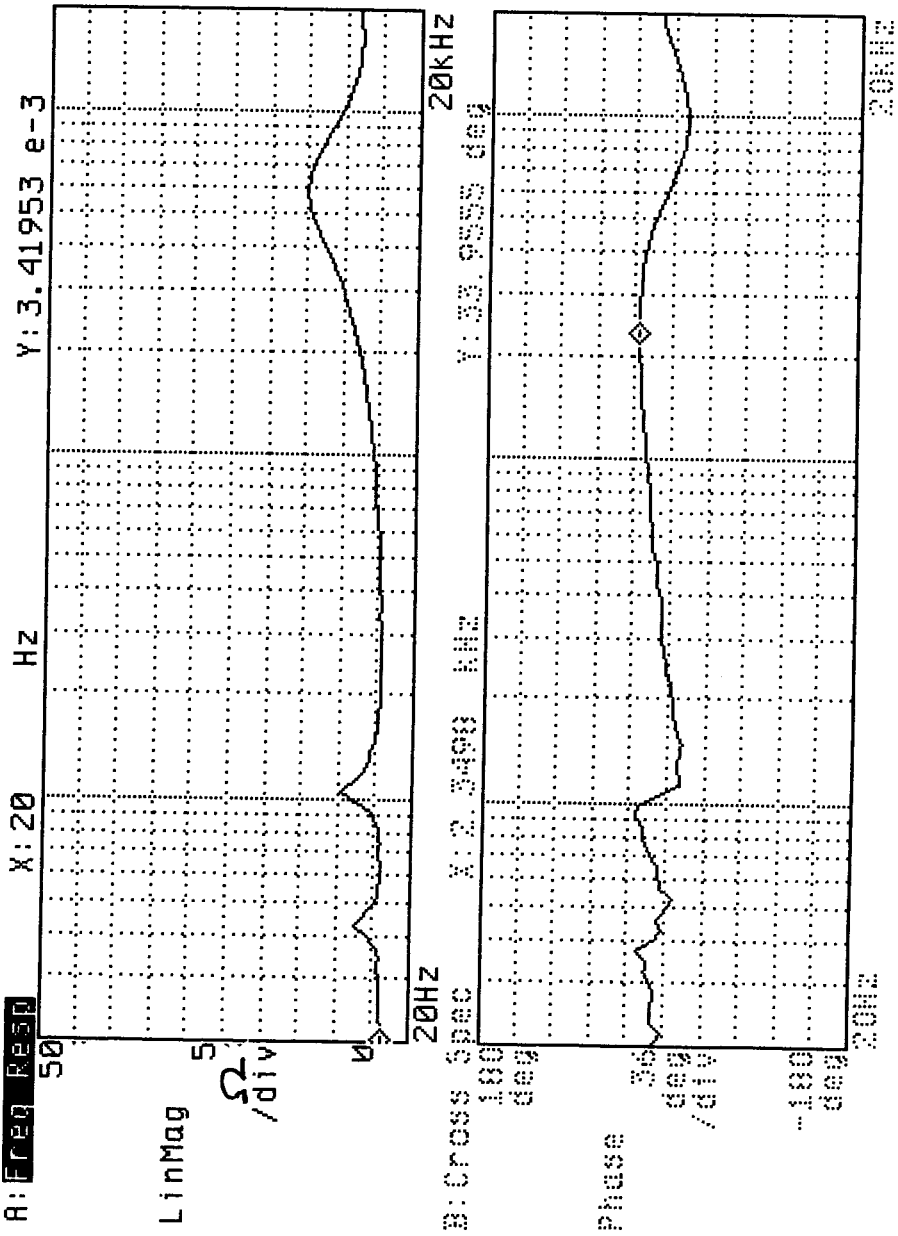
The upper bass I've been searching for finally came through! Tighter, way better definition and coherence. And you could make it go tighter or go 'big tone' by tightening or loosening the screws. Cool.

Of course this treatment needed to be tried next on the sub boxes. I used a 1/2"-13 x 12" threaded rod with nuts, 1-1/4" steel washers and 3/8" ID, 1-1/2" neoprene washers for an airtight fit, mounting it through a hole bored in the center baffle next to the driver, with nuts and washers on each side of the baffle .

This 3/4" hole measures 8-1/4" back from the front outside edge of the cabinet (that's 7-7/16" back from the veneered front panel inside), and 6" up from the bottom edge of either the side panels or center baffle, *measured with the bottom removed.* 4" cap screws and bronze bushings were put into 3/4" holes in the cabinet sides and were coupled to each end of the rod. (about $30 total) Boring the hole through the center baffle was tricky, because of the length of the boring bit. I went through at an angle from each side, and the neoprene washers just covered the hole.

While the box was open I stuffed the back chamber with 8 oz. of fiberfill to smooth the bottom of the sub's response. The bottom was screwed back on with 1-1/4" x 6 particle board screws about every 4", and the cap screws were tightened.

The holographic midrange image now extends to the bass. A required mod!



Here's the impedance and phase angle plots for the Superwhamodyne! Note the smooth load at the low frequency end, thanks to the parallel mid/woofer arrangement of the crossoverless design. The hump at 5.6 kHz is caused by the gap I created in the crossover, which contributes to the Whamo's smooth vocal reproduction and great image depth. NEXT MONTH: Lowther PM7A curves!

thanks nick!

Was listening to Nick Morrison on KPLU the other day. He played a version of Stardust by what sounded like Lionel Hampton's All Stars, but it wasn't the butt kicking 1947session that was my Dad's favorite recording. Sure enough, after the song he explained that a guy on Vashon had sent him a tape of a session that he listened to on his car tape deck on the way home a couple of nights before. It 'knocked him out', but he couldn't find a copy at the station, he had been given no info with it, and hence he had played a 1965 recording as a substitute.

As soon as I got home I packed up one of my two copies of the 1947 session and sent it to Nick that afternoon (with some info on us Vintage Audio Listeners, natch), figuring to hear it a couple of days later.

The next morning about 10:30 the phone rings....

"Hi Dan, this is Nick."

Way cool.

Nick explained that not only had he already played the record, he gave VALVE and Dr. Bottlehead a big plug, and even got a call from a listener asking for our phone number.

Man, I wish I had been listening!

He also told me he checked and the recording is on CD. It's STARDUST, Lionel Hampton and his All Stars, recorded in Pasadena, 1947. Don't have the label in front of me, or I'd give you a number.

Hamp, Barney Kessel, Slam Stewart, Charlie Shavers, et al in a truly classic session. Maybe one of the all time greatest jazz recordings. Will try to find the CD by the meeting, but if not, I have my Dad's very worn copy to play.

Thanks again Nick!

may

Well Dan learned a good lesson this last meeting.

I figured there was enough Heathkit stuff floating around in the collections of VALVE members to keep us busy listening for three or four meetings, so I thought I was a very smart fellow when I asked folks to bring their Heath gear to a meeting. Thanks to the two of you who responded...

In spite of the dismal representation, we did manage to hear a pair of EA-1s, and a nice comparison between a relatively stock W5 and W4. W5 wins, hands down. Smoother, better highs, more detail, better bass too. Chalk it up to a superior Peerless OPT.

We also got to hear one of those Optimus CD-3400's Raydeau Shaque sold a couple of years ago. Surprisingly good!

Thanks for bringing it, Don.

In the future I will make no more general calls for equipment for a meeting. We have members who call me and volunteer to present their equipment, and these meetings always seem to be the most interesting. We cannot have too much equipment at a meeting, so if you have something new and interesting, call me, and I'll talk you into showing it off.

Remember, my *obligation* is to give us all a venue for sharing our ideas. Your *priveledge* is to bring those ideas to fruition, and SHARE them!

june

We'll listen to George Wright's latest frame grid phono preamp, which he now produces on a custom basis, (for Capitol Records, among others). I'll have a Precision Fidelity C7 (for sale!), a VTL maximal preamp, and a C-J PV3 for comparision. Does anybody have a PV-10, PV-12, or Audible Illusions Modulus III to bring? Call me if you do.

cravings

For Sale:

Pair Dyna MkIII's. One is missing the filter can, the other is triode input modded, painted (sounds great!). I appreciate that my mod is worth little to anyone else, no matter how good it sounds, and that paint is a big no-no, so I'll sell the pair for the worth of the transformers, $300, less tubes, plus shipping.

Precision Fidelity C7 preamp. Cascode phono stage, passive line stage, in great shape. $150 plus shipping.

Triophoni - My PP 6CK4 monoblock amps are for sale. Beautiful finish, with cages, beautiful sound, 15 wpc. $600, with spare tubes, plus shipping.

Pair Newcomb P60 amps. PPP 6L6GC's, 60 wpc monoblocks. All triode (6J5) input. Brown. Missing covers. Look ugly, sound good. $150 plus shipping.

I WILL PAY $3.00 EACH FOR GOOD 6DN7 TUBES!

Dan, 360-697-1936.

For Sale:

2 Dynaco MkIV's - all new Wonder Caps, Gold Lion EL34's & RCA 7199's

Excellent

Bob Malecki, 206-842-5556.

For Sale:

Audionote P2-SE signiature amplifier. (Signiature edition has Audionote silver wire, Black Gate caps, etc.) With NOS Tung-Sol tubes. 17 watts, single ended clarity, typical Audionote drive and attack. The P-2 keeps the instruments and musical lines clear in massive works such as full orchestra and chorus. Asking $2200. Selling only because I got a Jeff Medwin designed 6A3.

Ken Yates, 913-962-9301 or

Nkyates@aol.com.

For Sale:

NOS TUBES:

(2) Sylvania(Tung-Sol) 6550, $75.00 ea.
(8) Tung-Sol 5881, $30.00 ea.
(5) National Union VT-45, $40.00 ea.
(4) RCA 5881, $30.00 ea.
(3) 6B4G, $25.00 ea.
(2) RCA 2A3 (double plate), $50.00 ea.
(2) Sylvania (Mullard) 5AR4, $40.00 ea.
(7) Tung-Sol 6SN7 GTB, $10.00 ea.
(19) 12BH7 (RCA,GE,SYL), $10.00 ea.
(2) GE 5U4GB, $10.00 ea.
(1) Tung-Sol 5R4, $10.00
(4) GE 7199, $20.00 ea.
(6) RCA 6AN8, $3.00 ea.
(4) GE 6BH6, $3.00 ea.
(2) Sylvania 6DJ8 (gold pin), $15.00 ea.
(10) RCA 6BQ7A, $2.00 ea.
(4) RCA 6AH6, $2.00 ea.
(3) Sylvania 7591A, $30.00 ea.

All prices are PLUS SHIPPING

Send me your tube want list.

Steve Harrell
1179 Boylston St. #30
Boston, MA 02215
voice 617-247-0672
fax 617-730-8449

Classified ads are free to subscribers. Ads must be submitted in writing, and will be run pending space availability

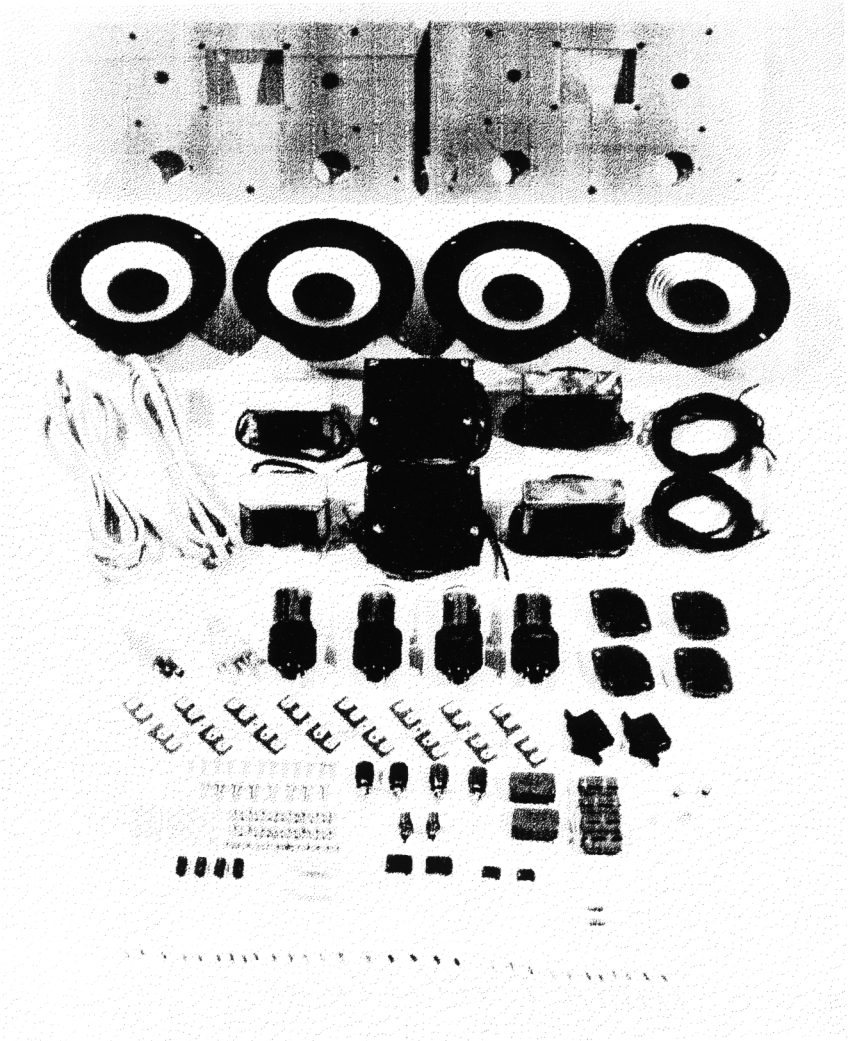
VALVE now takes commercial ads. Available sizes and per issue price:

3-3/8"x 2-1/8" vert.(quart. page)	*$6*
7" x 2-1/8" vert.(half page)	*$12*
3-3/8"x4-1/2" hor.(half page)	*$12*
7"X 4-1/2" (full page)	*$24*

PLEASE NOTE:

Any submittals of hardcopy will be scanned to PCX format for insertion in VALVE, with the usual degradation in quality. Call us if you need an ad layout, for an additional fee.

Here's all the cool stuff you get in the kit:



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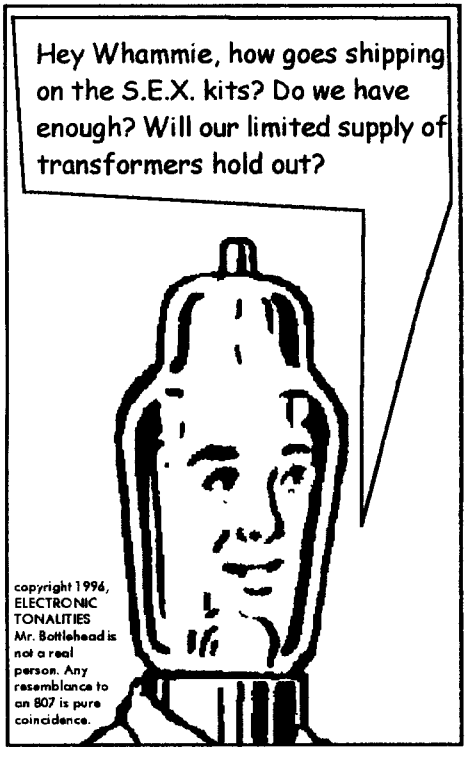

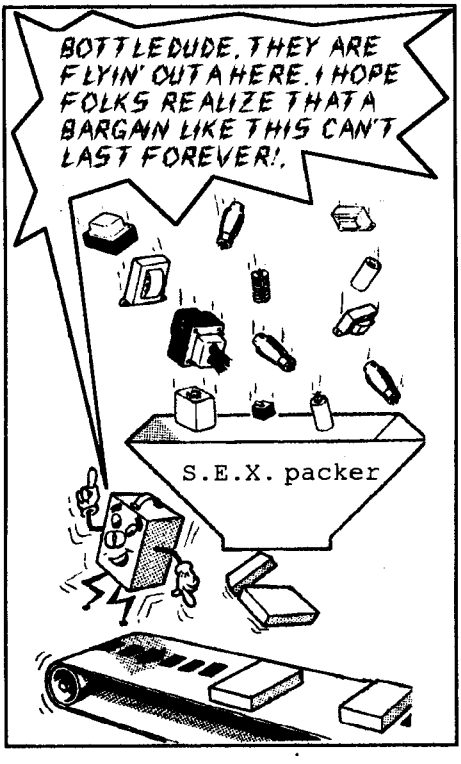

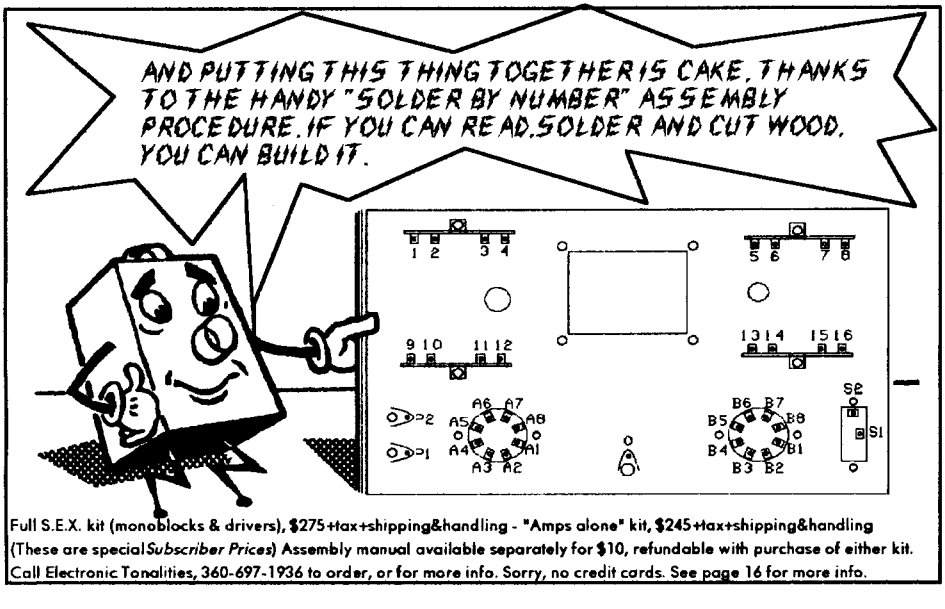

Full S.E.X. kit (monoblocks & drivers), $275+tax+shipping&handling - "Amps alone" kit, $245+tax+shipping&handling (These are special *Subscriber Prices*) Assembly manual available separately for $10, refundable with purchase of either kit. Call Electronic Tonalities, 360-697-1936 to order, or for more info. Sorry, no credit cards. See page 16 for more info.