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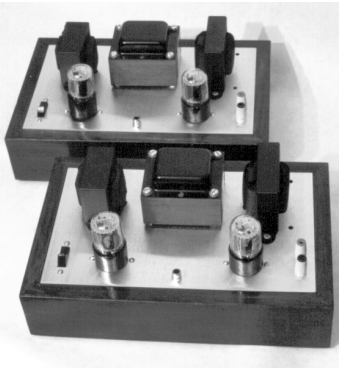
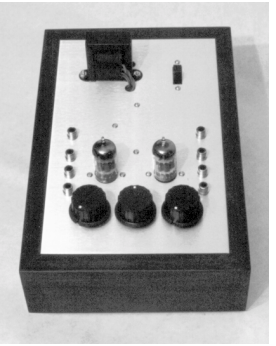


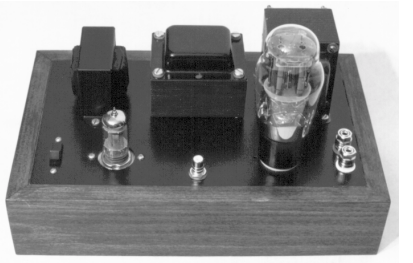
** Kits shown here have been finished to suit the tastes of their builders. Painting and staining is optional.*



Foreplay$_{TM}$ preamp kit

S.E.X. is best when preceded by Foreplay, our new stereo line preamp kit, designed by George Wright. 12AU7 gain stage and direct coupled cathode follower output, dual mono volume controls, three inputs. The perfect match for Afterglow, too. Basic kit, sans base, $99. Shown with optional wood base kit (pictured here assembled and finished*), $15.

Afterglow$_{TM}$ direct coupled SE 2A3 kit



John Tucker brings us this world class design. A 5965 driver with active loading is direct coupled to a 2A3, playing through our exclusive MagneQuest TFA-204 output transformer. Not to be confused with wimpy Loftin-White circuits, this amp has speed, clarity, and midrange that will bring your listening pleasure to a climax. Pair of monoblocks, with base kits, $849. Afterglow retrofits available for S.E.X. kits, call for details. (stock chassis plate is aluminum finish, not black*)

ElectronicTonalities

P.O. Box 2786, Poulsbo, WA 98370 360-697-1936

VALVE

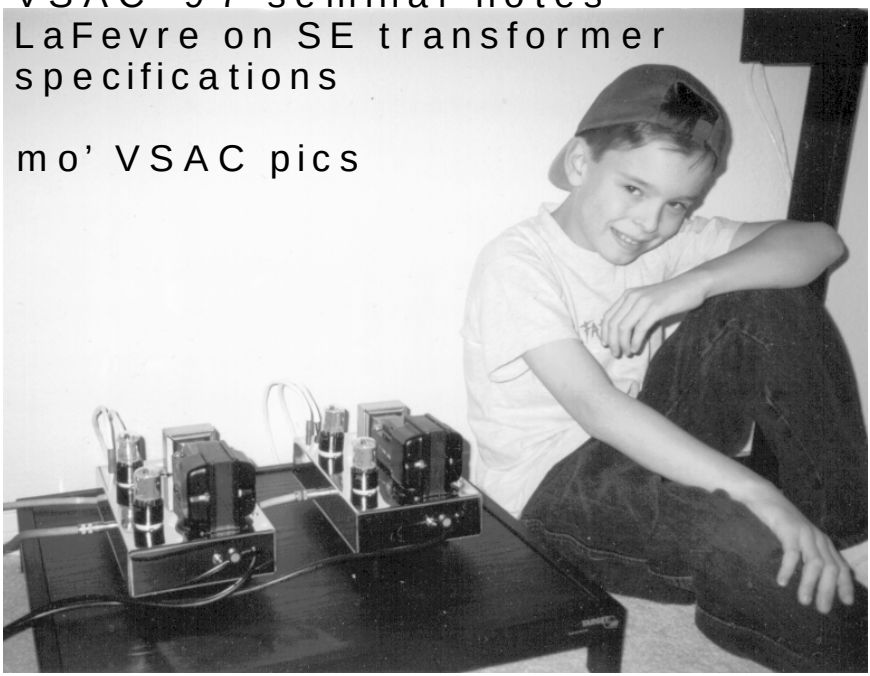
an Edgarhorn builder's story

parallel feed 45 amp

brainiac's S.E.X. changes

VSAC '97 seminar notes - LaFevre on SE transformer specifications

mo' VSAC pics



11 year old Alistair Reay and his S.E.- well, you know, amps.

volume 4, number 10 October 1997

VALVE

the monthly magazine
of eXtreme audio

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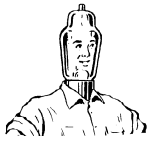


editor's thing

Yo, bottleheads,

Had a rare opportunity to get out and hear the Seattle Symphony a few weeks ago, at one of the local high school gymnasiums. Surprisingly it was a decent venue, one the Symphony has played at annually for several years. I suspect they have built up a foundation of knowledge on how to deal with it's awkward acoustics, as the somewhat unorthodox seating arrangement sounded good.

And so I sat back with eyes closed and tried to analyze what made this real music sound real, compared to my homely audio system.

Certainly the first sense was one of vast dynamic range, although, aside from the tympani and a few major blasts on the tuba, (only Mr. Tucker and Dr. Edgar are even close on the dynamic levels of these instruments) nothing seemed very far beyond the "average loud" levels of my system.

Imaging? Well, this was an orchestra, and we sat toward the rear of the house. Not much of an issue beyond general "basses over here, brass over there" stuff, unless I really concentrated, at which point you could pick out the location of many individual instruments, but I didn't get a sense that this contributed to my impression of realism as much as the established Hi-Fi potentates lead one to believe.

But it was obviously real compared to my system. What was the difference?

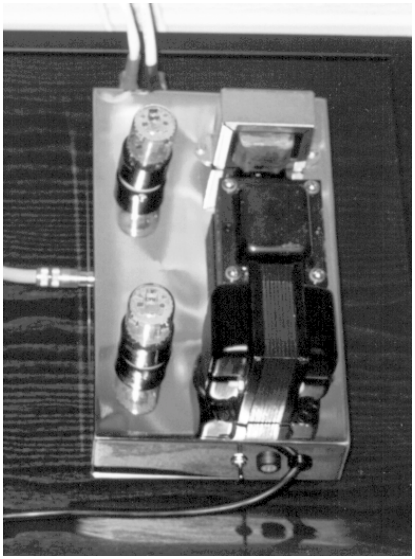
After listening for a while, the most obvious difference was the total lack of any added electronic distortion. This wasn't a big black and white deal, I mean strings sound very real on my system, and I don't really run it always at the verge of clipping like a lot of SE freaks do, Sakuma san among these. Nonetheless, the difference was that subtle underlying electromechanical sound, the kind that is somewhat alleviated by careful damping and shielding of a system's components, and elimination of materials that color the sound.

While this type of discussion leaves the mainstream groaning about tweaks and snake oil, I suggest that more effort be out into eXperimentation along these lines. We have come so far in the past few years, and this may be the ticket to reaching another level of realism.

Doc B.

cover story

Proud papa Ian Reay sent us these photos of his son Alistair's sparkling S.E.X. amps. Here's a closeup:



The rundown on the mods implemented during construction:

- Hammond chassis, chrome plated
- Mitchell copper binding posts
- new outside accessible fuse holders
- 3 wire 20 SWG power cords
- 6K output transformers liberated from a GE amp
- zero negative feedback
- silver wiring
- 4% silver solder
- spikes
- gold RCA jacks

This is for real folks, Ian was adamant that I explain that Alistair really did all the assembly and soldering on these beauties himself. Well done!

november

The November VALVE meeting will be at John Tucker's house. John will demo his version of the 45 SE parallel feed amp featured this month, as well as a new 5965 cathode follower output line stage that uses a similar active load, and I'll bring my VV52 amp. Sunday, November 2nd, 12 noon. 360-805-0179 for directions.

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 bake-off; 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 rectifiers; 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.

Volume 3 - 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; cathode coupled SE 6AS7 amp; how to build the Superwhamodyne; refoaming AR woofers; mesh plate tubes; rebuilding QUADS; QUAD amp filter surgery; single gain stage amps; the Brooklet, and Brookson, choke loaded PP 6080 amps; transformer coupled PP 6DN7 amp; the Iron Maiden;

Building a three-way Edgarhorn: one man's story

by Rene' Boulders

Although I had a pretty good system (MR-71, Citation II, Benz Cartridge, and so on), I knew that there was more and I found a new direction as I subscribed to *Sound Practices*. It was Actually, Herb Reichert's rave report about the Edgar midrange horn (as well as the report about Onken systems) in *SP*, Vol 1, #4, which made me curious, so I wrote Bruce for some more information.

Bruce sent me reports about his Show Horn, the Midrange Horn, and his Monolith, and I must have read his *Speaker Builder* articles about 20 times.

If you want to build good sounding horn systems, first you must know how they work and why they do certain things. Read everything you can get your hand on, you'll be amazed, and about the same time you will understand why most P.A. and other stuff on the market doesn't sound as good.

In winter 93/94, I decided to build midrange horns using Bruce's article from Speaker Builder. The article pretty well describes how to do all this, if you can operate a screwdriver and a hacksaw, there should be no problem.

Using a jig as Bruce suggests, my horns ended up with overall sizes of 10"H x 17"W x 11"D. Bruce sells midrange horns in different sizes, depending on which driver is to be used. Typically the size is around 11" x 14".

I used 3/4" thick plywood instead of MDF, because I already had a few sheets. I'm not sure if there are big sonic differences. The inside of the horn, throat and all edges were sanded round to make sure there are no sharp corners which would create colorations in sound. I used

The original system, with Audax PR 120, Dynaudio D-54 in Edgarhorn style midrange horn, and Altec 414 in Edgar style 100Hz bass horn

ABA

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Finally!

The new, improved S.E.X. kits are available and shipping, with beautiful new universal power transformers, and a newly revised, even more comprehensive 40 page assembly manual.
Afterglow and Foreplay are coming soon also, as soon as Doc B. can get the manuals printed!

Electronic Tonalities/VALVE

Bondo to create a smooth surface, and painted the horn shell satin black. The outside enclosure was also made of 3/4" plywood.

Bruce offers midrange horn shells for a variety of drivers - Dynaudio, JBL, Focal, Altec, WE 755, and Lowther. I picked the Dynaudio d-54 on Bruce's suggestion that it is the best sounding.

I also followed his advice regarding a good tweeter, and purchased the Audax PR120.

Then came the big moment! (I had never heard any of Bruce's horns) I hooked the horn up to my system, and I remember that I sat there for half an hour or so and didn't know what to think.

I had disconnected all other speakers and just listened to the midrange, 500-5000 Hz. The sound out of that horn is so clean, so dynamic, so different than any other stuff you have ever heard, it's unbelievable.

After that I hooked the Audax tweeter up to have a little more top end. I followed the setup suggestions of Herb Reichert in *SP* vol 2 #1 (his Bliss system), and it worked pretty good for me.

So now I had a good midrange horn and a good tweeter, that was easy (because Bruce Edgar had done all the hard work over the past 15 years!).

So, what to use for the low end?

Originally I had planed to use a Petite Onken cabinet, and so I had bought a pair of Altec 414-8Cs. One Sunday afternoon I decided to build a mockup out of cardboard boxes to see how big it would actually be.

I will never forget the expression on my wife's face as she saw this fridge sized box - no way (and this was the *Petite* Onken!). So I wrote Bruce a letter and asked him for help and he sent me construction plans for a 100Hz straight horn based on the 12" Altec 414 (96dB, 35-4000 Hz, 8Ω).

Back to wood work - the outcome was not much different than Bruce's own 100Hz horn, just an inch or so smaller, as Bruce uses a 15" EVM, although the horn shape was different.

Now I was getting somewhere.

One problem I ran into was the difference in sensitivity between the Altecs (96dB) and the D-54 (103dB) so I had to bi-amp. In the meanwhile I had added a SE amplifier to my system, the AES SE-1, with Cetron 300Bs and Vitamin Qs, and so on, and I still had my Citation II, so I hooked all this up, installed volume controls on the Citation, and then the nightmare began - setting driver levels. Those of you with bi and tri-amped systems know what I'm talking about!

For crossovers I used an air core coil, 2.5 mH, 0.36 Ω DCR, and a .47 mfd Solen cap for the midrange, and a 3.3 mfd Solen cap for the tweeter. The whole system was connected with Kimber Cable, 8TC for the low end, 4TC for the midrange and tweeter, KC-1 as Interconnects.

After a few months the whole system had stabilized, after a dramatic break in on all these components, especially the Kimber Kable. And it sounded pretty good. Although no low bass, the sound was so clean, so accurate, and with a slam I had never heard before - I was happy.

Rene's AES SE-1, in his custom built chassis with transformer enclosure. Rene' restores Porsche racecars for a living, and his skills make this a standout SE-1. Amp sports the signature mods.

The problem with the 100Hz horn, as its name implies, is that it only goes down to 100Hz. Beyond 80Hz it completely dies.

So to get some low bass going, we'll have to come up with either a subwoofer (powered) or a giant bass horn (could be mono with a dual voice coil driver).

This is the point where I made a big mistake. I experimented with cheap subwoofers. I tried different systems (all powered) and none made me happy because of the poor sound quality.

They all sounded like boom-cars and none were fast enough. Of course if you try really good ones like the NHT ($!) it would be a different story.
Another thing I realized much later is the fact that all the bi and tri amping creates a host of problems in level matching the different drivers with the different amps. If you play a certain recording at a certain volume level, and set the driver levels a certain way, when you want to play something else a little louder you notice that now one driver is playing louder with respect to the other drivers.
Like I said, a nightmare, I never got it tweaked to the point where I was happy.
Six months ago I discovered a pair of old JBL corner horn/reflex boxes in a local thrift store. I bought them and restored them completely. I installed a pair of 15" JBL D-130 woofers, which are fairly efficient Alnico drivers, and solved the biamp problem.
Meanwhile the AES SE-1 was upgraded to the signature version (highly recommended, way better bass and detail). So now I'm using only one amp and I changed the .36 Ω DCR air core coil to a Sledgehammer steel core inductor (.16 Ω DCR) and the driver levels are nearly perfectly matched.
These boxes look somewhat like a Klipschorn low end with the difference that they radiate the front and the side (as a bass reflex system). Because of corner placement, the walls act like a giant horn mouth. Bass response is good, but it doesn't go lower than 50Hz.
Meanwhile I did some experimentation with crossover capacitors which have quite an effect on the sound. Bruce Edgar recommended 2.5mH, 40 mfd midrange, and 2 mfd tweeter. Herb Reichert reported use of 4 mfd tweeter, 48 mfd midrange, and no crossover on the Altec A7 low end.
Today I use a 2.5mH Sledgehammer steel core inductor a roll off around 512Hz,
I use a .47 mfd Solen for the midrange and a 3.3 mfd Solen for the tweeter (425 Hz and 6060 Hz)
I'm very happy with the Sledgehammer inductor (sold through Madisound). It creates a clean accurate bass and it has very low resistance.
All internal wire for the speakers and amp is Kimber because I believe in homogenous signal transport. So, today I have low bass and no bi amping, but I do miss the slam of the 100Hz horn.
Don't get me wrong, I am very happy with the way my system sounds, but there are still many questions. I was warned that in combining bass reflex systems with pure horns, I would have good sound, but not great sound. Boy, they were right.
So what to do if you want to try this?
First, go for the Edgarhorn System-100, with choices of:
-an 80Hz straight horn, or a 100Hz straight horn, either with EVM-15" speakers
-a midrange horn with driver of you chioce
-a tweeter like Audax, JBL, Gauss
Make your choice of a subwoofer, maybe - Bruce's giant horn subwoofer,
-or an Altec A7 low end with heavy modifications or
-JBL bass bins from pro gear collections
-a Klipsch corner horn with Edgar midrange
The Edgarhorn System 80 is a very good alternative for those on a budget. For those with gold cards, go buy Bruce Edgar's System 50, which is really unbelievable.
If you want to know more about horns, please study Bruce Edgar's articles about the Show Horn and his midrange horn, and you'll get an idea of the problems involved.
Contact Bruce at P.O.Box 1515, Redondo Beach, CA 90278 if you want a good system, he's the horn man!
A few tips at last:
Whatever you do, don't pad down the midrange horn, leave it alone and use a high quality cap. Padding down the midrange horn makes it lifeless and takes out all the excitement.
I've heard that some folks use a Lowther driver on their midrange horn, and they're really happy.
Bruce Edgar offered different tweeters some time a go, the Audax PR-120 peaks at around 5-6 kHz.
The JBL 2405 is still a good choice.
The EVM 15L is a great driver low end horns and it is not too expensive, unlike Altec 515-8G units!
Use thick (3/4"-1") plywood or good quality alternatives for enclosures. I used 5/8" MDF for my 100Hz enclosures and at high volume levels you could almost see it vibrate!
Remember besides all of the problems I'm still talking about a great music reproduction system with little or no competition. It's not easy, it requires a lot of work and thought, but those of you who have a system like the Edgarhorn will agree with me - nothing tops it!

single ended direct coupled active loaded parallel feed 45

45

Design by John Tucker, with contributions by Mike LaFevre, John Camille, and Kim Jenkins.

Here's a truly delightful amp circuit for owners of truly efficient speakers *(the schematic is shown on the next page).*

The protoype of this circuit, built at the first amplifier builder's class after VSAC '97, left all in the room at it's debut rather smitten, particularly John Tucker, who currently uses this circuit as his front line amp on his Exemplars.

The midrange is balanced, smooth, and very real. Bass articulation is phenominal, you would never expect this sound from a puny 45. Top end? How 'bout -1dB at 46kHz, and black as can be?

Downside? Well, it's only 1.6 watts, so you better have some pretty efficient speakers (although Kim Jenkins seems happy with this setup on Whamos).

And it's not a forgiving circuit, if your front end sucks, you'll know it. This amp reveals a great deal of information.

Also, doing it right means it isn't a super cheap project. For best performance you'll want to use nickel core parallel feed output transformers, and proper plate loading chokes. The choice of manufacturers for these items is pretty narrow (said with a big grin).

The name of this amp gives about 90% of the circuit's description. Note the use of an active load on the driver stage. This load is quite similar to the one used in the Afterglow circuit, and in concert with the parallel feed output arrangement, accounts for the amp's superior speed and bass response.

You might try this load, with the proper adjustments as outlined in the note on the next page, as a load for your other projects. Try it on the first stage of the 5963 output stage in George Wright's line amp, or on top of the mu follower in the S.E.X. amp (put it in in place of the 20K resistor).

The 45 is running at a classic operating point, 250V plate-to-filament, with -50V grid bias, yielding a 34 mA current draw.

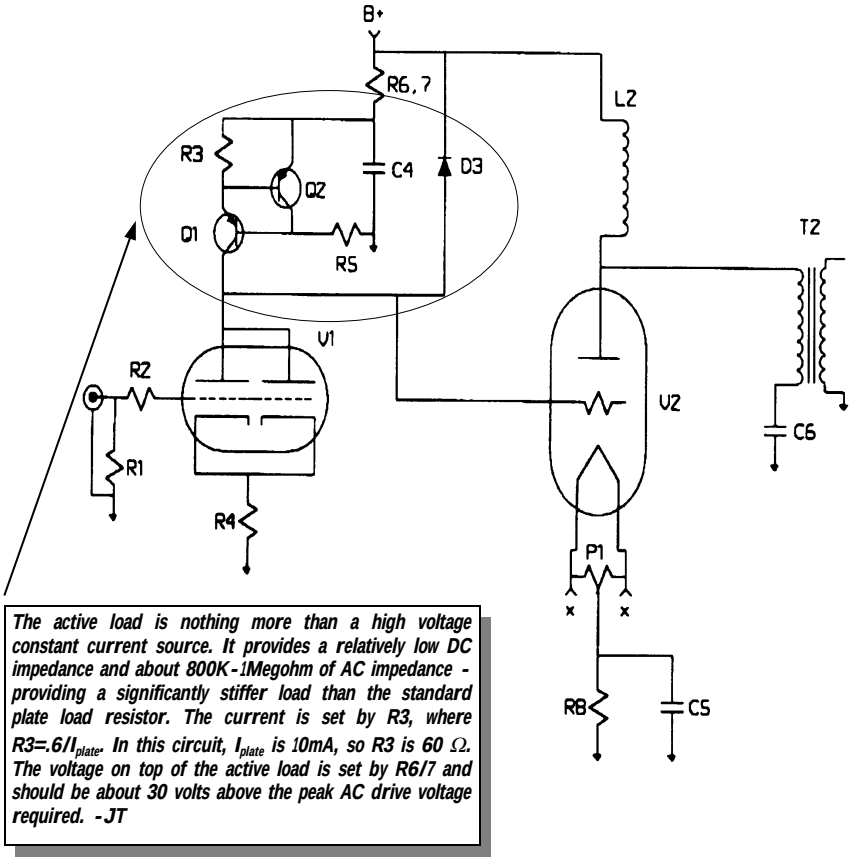
Note that these voltages are translated up by the plate voltage of the direct coupled driver stage, so actual measured voltage on the plate of the 45 is more like 400V above ground.

Man, I get all tingly just writing about this amp.

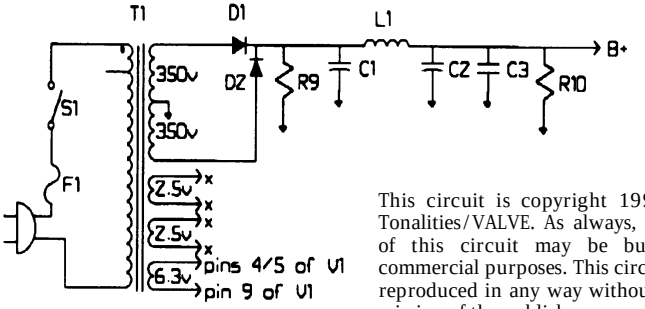
Better get started on my own copy!

Doc B.

Direct coupled parallel feed output SE 45 amplifier amplifier and power supply - one channel



The active load is nothing more than a high voltage constant current source. It provides a relatively low DC impedance and about 800K-1Megohm of AC impedance - providing a significantly stiffer load than the standard plate load resistor. The current is set by R3, where R3=.6/I_{plate}. In this circuit, I_{plate} is 10mA, so R3 is 60 Ω. The voltage on top of the active load is set by R6/7 and should be about 30 volts above the peak AC drive voltage required. -JT



Direct coupled parallel feed output SE 45 amplifier parts list (for two monoblocks)

Designator	Description	Value	Tol.	Pwr. Vlt.	Qty
C1,C2	Electrolytic Capacitor (Radial)	100mfd	10%	450V	4
C3	Metallized Polyester Capacitor	1 mfd	10%	630V	2
C4	Metallized Polyester Capacitor	1 mfd	10%	250V	2
C5	Electrolytic Capacitor (Radial)	220 mfd	10%	200V	2
C6	Poly or Oil	10 mfd	10%	400V	2
D1,D2	Fast Recovery/Soft Start Diode	1N4948		1000PIV	4
D3	Diode	1N4007		1000PIV	2
L1	Filter choke	10H 270 Ω		90 mA	2
L2	Plate Load Choke (Brooklyn BCP 15)	40H 550 Ω		50mA	2
Q1	Transistor, PNP	MJE350			2
Q2	Transistor, PNP	MPS4250			2
P1	Wirewound Potentiometer	50 Ω		5W	2
R1	Metal Film Resistor	249K Ω	1%	1/4W	2
R2	Metal Film Resistor	681 Ω	1%	1/4W	2
R3	Metal Film Resistor	60.4 Ω	1%	1/4W	2
R4	Metal Film Resistor	174 Ω	1%	1/4W	2
R5	Metal Film Resistor	100K Ω	1%	1/4W	2
R6	Metal Oxide Resistor	10K Ω	5%	3W	2
R7	Metal Oxide Resistor	13K Ω	5%	3W	2
R8	Wirewound Resistor	4.4K Ω	5%	10W	2
R9,R10	Carbon Film Resistors (PS bleeders)	270K Ω	2%	1/4W	2
F1	Fast Blow Fuse	1 amp		250V	2
S1	SPST switch			3A 250V	2
T1	700VCT, 50mADC 6.3V, .5A	2.5V, 1.5A	min.		2
T2	300H 5K primary (MagneQuest EXO-	45 or 46)			2
V1	Medium Mu twin triode	5965			2
V2	Low Mu Triode	45			2

Aside from the parafeed iron, most of the parts spec'd are fairly non-critical in terms of manufacture. I changed Smoothplate's spec for the PS bleeders from metal film to carbon film, because I've found they seem to hold up to big startup voltage swings a little better.
Note that the power trans specs are the bare minimum required. Bigger may work better.
Brooklyn BCP-15 plate loading chokes are available for $100 the pair, and Magnequest EXO-45 (5KΩ:8Ω) and EXO-46 (5KΩ:16Ω) parallel feed output transformers are available for $150 the pair with M6 steel laminations, and $250 the pair with Permalloy (nickel) laminations. For a real treat, we also have a couple of pairs of the Permalloy EXO-46s with pure silver secondaries and Teflon coated 'touched by God copper' primaries, for $650 the pair. Call us at 360-697-1936 to order any of these goodies.

Parallel Feeders, Get Busy!

The reaction to the parallel feed amps we've been playing with has been tremendous. Our seminar on the subject at VSAC '97 was 'standing room only'.
We're working as fast as we can to continue to develop circuits for you potential parafeeders. In the meantime, here's some combos that should work very nicely:

- For 45, 71A, 417A/5842, 6CK4, 6DN7
- Brooklyn BCP 15 40H 50mA plate loading choke, $50
- MagneQuest EXO-45 (5K:8ohm) or EXO-46 (5K:16 ohm) parallel feed output transformer, M6 version, $75, Permalloy version, $135 (as used in this month's 45 parallel feed article)
- for operation at 2 watts maximum output

For 2A3, 6A3, 6B4
- MagneQuest EXO-03 30H 60mA plate loading choke, $65
- MagneQuest EXO-04 50H 60mA plate loading choke, $99
- MagneQuest EXO-35 (2.5K:8 ohm) or EXO-36 (2.5K:16 ohm) parallel feed output transformer, M6 version $75, Permalloy version $135
- for operation at 3 watts maximum output

For 300B, VV300B, VV32B, operating at 60 mA maximum
- MagneQuest EXO-04 50H 60mA plate loading choke, $99
- MagneQuest TFA-2004 (3K:4,8,16 ohms) parallel feed output transformer, M15 version $99, special edition Pinstripe M6/Permalloy/brass ends version, $225, Permalloy version $225 ($275 with brass ends)
- For operation at 12 watts maximum output. New 80mA B.A.C. choke is under development!

And don't forget the Brooklyn B7 parallel feed line stage transformer - $65 in M6, $75 with M6/Permalloy mix, $99 all Permalloy version, and matching BCP 14 plate load choke, 100H, 10mA, $45.

Call 360-697-1936 and ask for Doc B. for more info.

brainiac's S.E.X. changes

By Paul Joppa

Driver stage mods

-Take the driver output from the upper cathode (pin B6) instead of the lower plate (pin A5). This provides a much lower source impedance for driving the large Miller capacitance of the relatively high-mu output sections.
Editor's note: This change has been incorporated into the S.E.X. kit. When I read this, I remembered seeing variations in top end response with different tubes when prototyping the kit, and never put the facts together correctly. Thanks Brainiac, you da' man. Here's how easy it is to make the change on existing kits:
Remove the .47 mfd capacitor from pins A1 and A5, and reinstall it on pins B1 and B6 - that's it! -B.

-Increase driver tube voltage and current. They now draw about 2.75 mA at 100V per triode. Short out the 20K plate load resistor and reduce the 24K cathode multiplier resistance to 12K. Now raise the upper cathode bias resistor from 1200 to 1500 ohms, and the lower one from 1000 to 1300 ohms. This will give 3.3 mA at 150V per triode, raising slightly the drive current capability.

-Now modify the bottom driver to fixed voltage bias, using series connected LEDs or diodes, or Zeners, to replace the cathode bias resistor and capacitor, as described previously. The stock circuit want about 2.8 to 3.2 V, the above modification wants about 4.3V.

-Replace the upper driver bias system with a battery and resistor. Try 4200 ohms from lower plate to upper cathode with a 9V battery from lower plate (-) to upper grid(+). Throw out the three resistors and the cap.

Output Stage Mods

-Replace the output transformer. This is probably the biggest single improvement available for the kit. There are a number of suitable transformers available, including the TFA-204 described in the manual. They are not cheap - expect to pay $150 to $600 for a pair - but all of them in the 3-5K ohm, 60mA range are also suitable for 2A3s and 300Bs if you expect to move on to these some day. With a better transformer, you can reduce or eliminate the feedback loop, and you can drive lower impedance speakers better. Some transformers are too big for the kit chassis, so you may have to extend it some way - the chassis is precut to mount the TFA-204.

-Replace the common cathode resistor with individual units of twice the value for each tube. This will reduce the difference in operating points due to tube variation and aging. Be sure to bypass them both.

- If you stay with the stock output transformer, you may do better with less current - it saturates at something above 50 mA. Using a 330 ohm common cathode drops the plate dissipation to 8 watts per plate; more output is available if you remove the 1K extra plate load resistor and use a 390 ohm common cathode resistor.

-If you have modified the power supply (see below) to reduce voltage and increase current capability, and substituted a transformer that can handle the current, then you can increase the output stage current. Either replace the 270 ohm cathode resistor with a 200 ohm unit, or install a 390 ohm unit in each cathode separately as above (be sure to bypass them both)

-You can get line matching transformers for $4-5; they wont handle any DC but you can use the stock output as a choke and couple through a cap to the matching transformer. Something in the 5-10 mfd range is appropriate, but the matching is tricky and depends on the transformer. It's not as good as an interleaved nickel core parallel feed transformer, but you can eliminate the feedback and substantially reduce the transformer losses for more output. And it will drive 8 ohm speakers better (the stock output works better into 16 ohms or even 32 ohms; see speaker mods below).

Power Supply Mods

Get more current, less voltage from the power supply. Either 1) switch to a choke input filter as described in the manual, or move the 1K wirewound resistor to a position between the rectifiers and the first filter capacitor. Either way will get about the same output plate voltage as before, but none of the output audio power will be wasted in the 1K resistor. Both ways will also reduce the power transformer heating, so you can draw more current in the

(Continued on page 16)

(Continued from page 15)

output tubes if you want (see above). To get the benefits of this approach, you need an output transformer that can handle larger current, preferably one rated for at least 65 mA - that's really too much for the TFA-204.

Speaker mods

-The output transformer in the kit performs better at higher impedance levels. If you like the sound of the S.E.X. speakers, get four more and use four per side, wired in series for 32 ohms. Put them in a 24"x48" plywood board, centered 10" from one side, in a vertical row with the top one centered 6-10" below the top edge. Or build a Whamodyne box for them. Or go all out and build a tapered pipe. In any case, you will not only double the speaker efficiency, but will also nearly double the power output available from the amplifier - for a total 5dB increase in acoustic level.

-There's no reason not to eXperiment with tweeters, such as the one used in the Whamodynes (MCM pn 53-325). You may need to pad it down with a series resistor, especially if you are using the 32 ohm version. Wired in series, the speaker sensitivity is about 90dB/2.83V no matter how many are used, so any tweeter of 90 dB or better is suitable.
(Somebody check my math, but I think you could try the 53-325 which is 8 ohms, 96 dB, with three of the Radio Shack 8 ohm non-inductive wirewound resistors in series with the + leg. Then use a 1.2 mfd cap ahead of the resistors, and use a 1.2mH choke ahead of the + leg of the 32 ohm woofer array, for a 4kHz crossover.
Note: while we're on the subject of the 53-325, open it up and put a 1/2" dot of felt on the face of the pole piece, and a 3/8"x3/8"x1/4" piece of acoustic foam on top of that. The drivers were made this way two years ago, but this has been dropped from the current models. It seems to kill a resonance in the 2-3kHz range -B.)
8 ohm tweeters will load the amp, but there's not much power in the music if you use a 10kHz crossover, so using a 2mfd cap on the tweeter and running the woofers full range would be a reasonable choice.

-Want a dipole woofer to go with the S.E.X. speakers? Get a pair of big cheap woofers, 12" or 15", with a resonance of 40Hz or less. You want a Q_t of around .7 to 1.2, which means a small magnet, which means cheap speakers.
(How about MCM pn 55-1245? 12" driver, F_s is 28 Hz, Q_t is .71, 95dB SPL, price $24.95! -B.)
Put them in 24" square boards and stack the S.E.X. speaker boards above them (or use the bottom half of the 24x48" boards mentioned above). Now go find an old integrated amp or receiver to drive this woofer - almost anything will do, if it has tone controls and a volume control. Use a pair of Y-adapters to drive the integrated amp in parallel with the S.E.X. amps. Set the controls for maximum bass boost and treble cut, then adjust the volume to get the right bass balance. If you like it, you can refine the woofer equalizer later, but this is pretty good as is. And you can get some use out of that piece of silicon junk that you replaced with the S.E.X. kit in the first place!

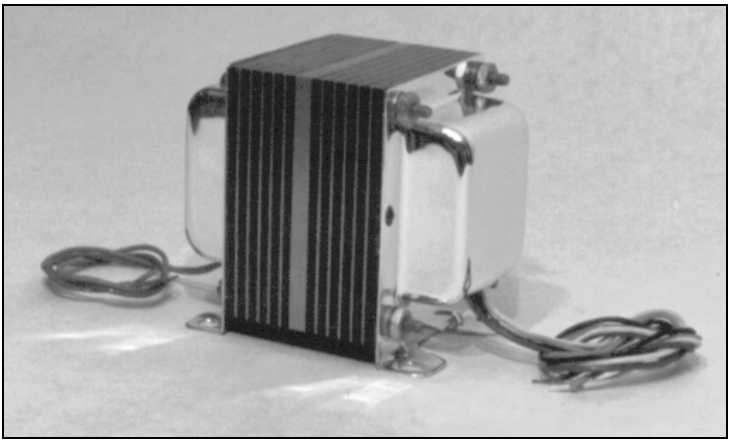
Wilder Changes

-OK, you want to really get the most from your S.E.X. kit? Make them stereo amps! Following Dave Dintenfass' article for a 1 tube 6DN7 amp (Jan '96), move the choke to in front of the power transformer so you can put a second output transformer where the choke was. Ok, you have to punch some new holes and install some more input jacks and binding posts.

-If you have TFA-204 output transformers, why not drive them with a 300B? You can't get a full 12 watts out of the S.E.X. power transformer, but you can get 5-7 watts. Circuits are under development, but driver options include SRPP 6SN7s or 6SL7s, or a pentode like the 6SJ7.

-Prefer push-pull? Some people do. Dave Dintenfass had a nice circuit in October/November '96 VALVE, which you could probably fit on a S.E.X. chassis. It uses two 6DN7s so the tubes and power supply are already there. If you don't like the transformer input/phase splitter, a differential pair with a cathode current source (as in the Brooklet) would also work.

THE PINSTRIPE



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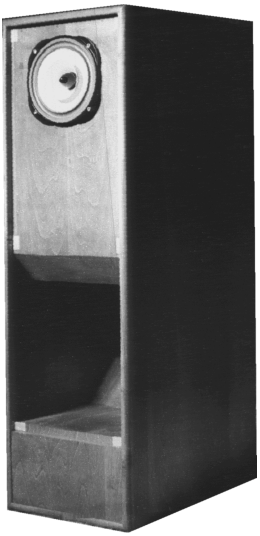
- ◊ the legendary midrange quality of the TFA-204, now with phenomenal bass and treble speed and texture
- ◊ measured frequency response of -1dB at 2 Hz and 26 kHz
- ◊ perfect for SE 2A3, SE 300B, PSE 50s, SE VV300B, SE VV32B, even works with the VV52B!
- ◊ alternating interleaved laminations of M4 steel and nickel - pinstripes!
- ◊ stunning polished solid brass bell ends
- ◊ use with 2A3/300B and the new, larger EXO 04 60 mA 50H plate loading choke - 80 mA choke coming soon (VV32Bs!)
- ◊ perhaps the most beautiful transformer ever made

special price - $225 each.

Hyperpinstripe version, shown above, with nickel "sandwich", $250. All nickel version available on special order, $225 each w/ black oxide bell ends, $275 each with brass bell ends

Lowther

MEDALLION II KIT



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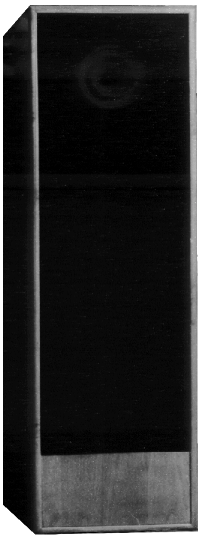

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VSAC seminars - my notes

by Paul Joppa

Saturday, 10:00 a.m. - Mike LaFevre on SE transformer specification and design

There are no standards, and there is a great variety, in how SE output transformers are specified. For example, some give a specification for maximum current which will saturate the transformer, while (often in the fine print) the "typical operating condition" is at half that current. The ideal would be to specify a recommended maximum DC current at which the unit would handle the specified AC power at the lowest specific frequency.

Incidentally, the maximum flux for M6 steel is about 17 kilogauss.

The primary specification that all transformers must have is primary inductance. Unfortunately this is a function of both AC and DC flux, and of frequency. It can be, and is, measured in a variety of ways so that it is difficult to compare specifications. Some transformers are specified for primary inductance at 1 kHz, but this is not very relevant for two reasons. It is an important parameter at low frequencies, not mid frequencies ; and it is sensitive to level in a frequency dependent manner so that measurements at 1 kHz are necessarily done at very low magnetic excitation levels. The preferred, and easy, method is to measure it at 50 or 60 Hz and to specify the voltage level also.

Both of the above observations suggest that there is a need for better consumer education on the subject of transformers, since the usual specs are generally not comparable. Most people will fall back in confusion on frequency response as a specification they can understand. But here too there are a variety of ways it can be measured and specified. For example, Tango generally specifies the -2dB points, Audio Note the -1.5dB points, and MagneQuest the -1dB points. These can differ by an octave easily (not mentioned, but important, is the variety of drive and load resistances used). In any case, Mike generally says that frequency response is the "13th most important spec"; i.e. there are many more important details that we should care about. One of them, for example, is the low frequency power handling capability. In Rueben Lee's book, (an old text, now out of print, but highly recommended) a minimum of 500 to 700 circular mils per ampere is suggested; the MQ FS030 uses 3100. Incidentally, if you are looking at frequency response anyway, be sure to look at the ratio of high to low frequency - it is very easy to get good high frequency response at the expense of the lows and of power handling. See also the Radio Designer's Handbook, chapter 5 section 4 for more on this.

Insulation is also important. The most basic materials are Kraft paper and Mylar. Other candidates are glassine, Kapton, Nomex, and two kinds of Teflon.

MagneQuest uses a capacitor wax for impregnation, rather than the old standard, varnish. The wax is a blend developed for Western Electric, which incidentally may become unavailable when the current small business that makes it retires. The advantages are a low dielectric constant (2.26 vs. 4.6 for varnish) and a very low dielectric absorption (only Teflon is lower). It also provides some mechanical damping, and is even non-toxic!

Some one asked about silver, Mike said that while most people hear a distinct difference with silver wire, not everyone will prefer it. He strongly advised finding a way to listen to the effect of silver vs. copper before spending too much money on it - speaker cables were a specific example of how to get a feel for it.

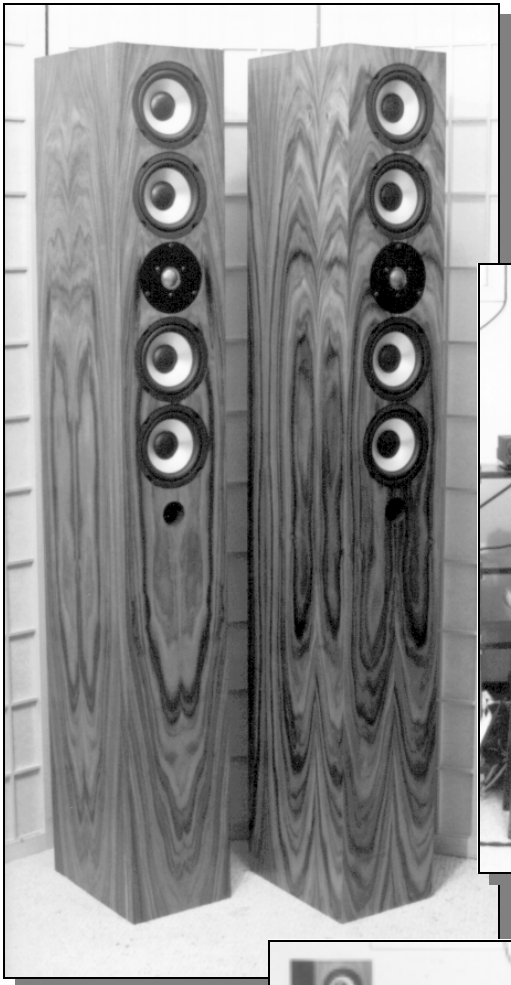
cravings

For Sale: 2A3 monoblocks - MagneQuest power and output transformers, oak chassis, aluminum top and bottom plates, 5965 driver, NOS tubes. $1200 the pair. L.Dean Moore, 419-612-6026.

For sale: Two pairs assembled S.E.X. amps, ceramic sockets, Hammond 10"x 6" chassis - $350/ pair. Chadd Moore, 419-692-6026.

For sale: 1)Wavelength Audio Cardinals, a primo pair with a pair of our FS 030 Ltd. ED. (only 24 of these ever made), mint condition, $3500, half of new. 2)Cary SE 1 amp, factory built, new Chinese 300B's, uniquely upgraded with MQ DS 025 outputs, excellent condition, $700. 3)Audio Research SP12 preamp, great condition, phono and line stage, $600 4)Diatone PM 610's (8 ohm version) in factory cabs, anniversary drivers, great with SE amps of 3 watts or higher, $500 a pair 5) Timbre TT1 balanced DAC and Teac P10 luxury transport, Sonic Frontiers jitterbug. Mike LaFevre, 215-288-4816.

For Sale: MagneQuest FS-030s. John Tucker, 360-805-0179.



"Yo, Doc, how come you weren't answerin' the phone in September?"

"Been a little busy."

(prototypes designed and built in three weeks to test the market for Whammie style speakers at the Hong Kong audio show in late September - Yeah bowee, das' reel rosewood)

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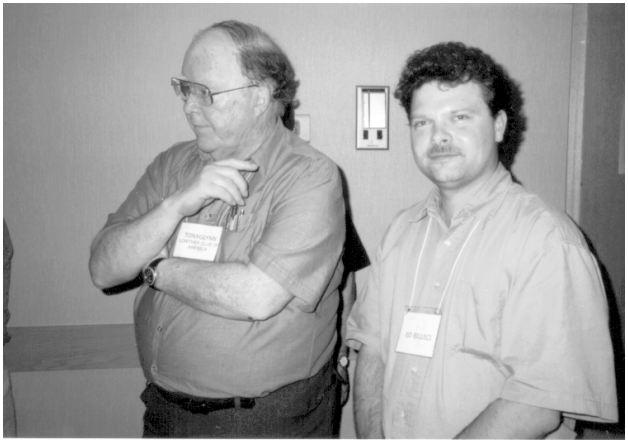
VSAC '97 - the players



Top: Tony Glynn (l) and Ed Billeci (r) shut up and listen in the Welborne/ Lowther Club room

Middle: Jeff Markwart (l) and Buddha Camille (r) give Jack Strayer (c) a hard time in Jack's Audio Technical Products room.

Bottom: Jennifer and Mike Crock pose while Dick Olsher checks the tonal balance in the Greybeard/ Atma-Sphere/Jena Labs room.