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CORRECTIONS

I noticed a series of errors in my article "A Full Bridge Output Amplifier" in the Aug. '05 issue. Some, which I am sure readers have noticed, are quite evident.

1. Page 24, 3rd column. All speaker impedances should be read in ohms and not in watts as erroneously printed (250Ω and 8Ω).
2. Page 30, 3rd column. Should read 8Ω instead of 8W.
3. Page 31, 1st column. Should read pot. P8 instead of P1.
4. Page 31, 1st column and 3rd column. Should read pot. P4 instead of P6.
5. Page 31, 3rd column. Should read 5Ω/.5W instead of 5W/.5W.
6. Page 28, Fig. 4. Remove the link between HV secondary winding and the -350V railing which shortens diode D2.
7. Page 30, parts list. D1-D6 should read 1000V 3A instead of 103A, and R4 should read 2.7kΩ instead of 27kΩ.

I regret the errors and hope they did not cause any problems.

*Monny Nisel
Montreal, Canada*

In my review "Three Software Editing Programs" (August '05), there are two items which require clarification. On page 56, the sentence "The RIAA filter is 'phase neutral' and provides zero phase shift" was not written by me, and was added after I received page proofs. This statement was actually part of the reply from Jeff Klinedinst of Enhanced Audio, and is probably confusing in the context of the rest of that paragraph. However, it confirms my reservations about digital RIAA playback equalization and makes DC Six unsuitable for this purpose, since

it does not provide correct playback phase equalization.

The caption for Fig. 1 on page 57 is incorrect, which is my fault. The green traces are the recording curves and the yellow traces are the playback curves.

*Gary Galo
Potsdam, N.Y.*

SHOWCASE

Photo 1 shows my completed Dick Crawford IM Distortion Analyzer featured in the March 2004 issue of aX. Dick's original device used a separate digital voltmeter to display the distortion. I wanted my instrument to fit in one box, so I searched my "junkbox" for a suitable analog meter and chassis that everything would fit in. My meter has a 100μA DC full scale, so I substituted a 10kΩ resistor for R126 to give it the same sensitivity as the original circuit.

The analyzer is not a project for the faint-hearted. There are many components to be put on the board. Dick must have spent many hours in the layout effort, which is evidenced by the straightforward interconnections between it and the various input/output connections. Kudos to Frank Glabach's supplementary effort to clear up some questions relating to the general construction effort (a great example of the fraternity helping one another). I built and tested the board in "stages": power supply first, generator section next, and analyzer section last.

A legitimate question is "How do I know whether the unit is working correctly?" For example, what if some mis-wiring produced only two tones in the three-tone switch position? This is a tough one as examining the output on a scope, for example, reveals a mix of frequencies—from which you can't de-

PHOTO 1: Homemade distortion analyzer.



termine either frequency or amplitude accurately.

I happened to be “playing with” the PC-based test equipment program “audiometer.be,” and its spectrum analyzer feature clearly displayed test frequencies and amplitudes (and also showed that I had mis-labeled the switch). I checked the gain and response of the analyzer section using a sine-wave oscillator and confirmed that its gain was centered at 800Hz and that the absolute gain corresponded with the 10× steps on the range switch.

For the front panel overlay, I downloaded and used the “frontpanelexpress.com” panel layout program, printing the result on adhesive-backed paper. The program turns out to be very easy to use; I spent perhaps 45 minutes from zero on the learning curve to something I could print and then “mark up” for corrections.

The finished product has less than 1PPM noise and residual and is very easy to use. I am already using it to set the AC balances on certain push-pull amplifiers I’ve built and keep a “log” of results for other amps—will share the results at a later date.

Stellavox1@aol.com

AMP SOURCE

With regard to “A Minimalist Ampli-

fier Design” by Larry Lisle in the March '05 issue of *aX*, I have built this amp using an all-battery power supply and then an all-mains supply. You may find the results interesting. The file *lisle.zip*

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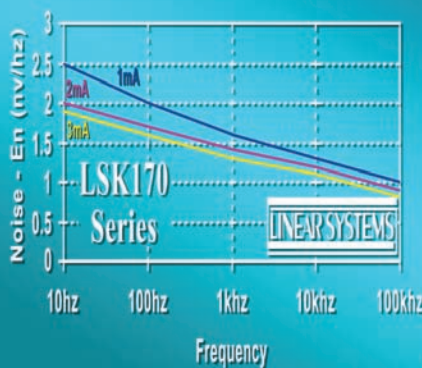
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Ron Tipton
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TUBE SUPPLY

Still going strong developing rather special VT amplifiers, I wanted to make a SE amp with the SV572-3 from Svetlana, which in the meantime stopped production and whose tubes are now NOS. But you don't start the production of an amp if you're not sure about the future availability of spare tubes. Except for Billington, you can't find a website indicating the available quantity of a particular tube.

The question arises how long can we go on making these beautiful amps if tubes are running out of supply? Look at the horror-pricing for original GEC or Siemens tubes. I think the

only way you can prevent this is buying tubes that are still made by China or other countries so that the demand is large enough to keep those guys going.

However, as they all are developing American/Arabian habits, these manufacturing companies will soon have a monopoly and prices will be soaring like those for petrol. For the time being I develop systems in which an op amp is slaved to a tube and consequently will behave like a tube.

This may give cheaper tube-like performance but will not help the tube producers. Most of today's tube gear is for the happy few; the cheaper stuff often looks very nice and is hard to beat in price by US or EEG companies, but technically all these amps still have the model Telefunken 1936 technology, which isn't too bad, after all.

I invite all tube suppliers to report to *audioXpress* about the actual situation, and we may have an idea what we can do to make future tube amps. Nobody will choose to buy a tube amp when he/she can't get replacement

tubes in the future. I always wondered why tube amp manufacturers didn't supply the amps with a set of spare tubes; it would greatly satisfy future customers.

Keep smiling.

AJ van Doorn
Amersfoort, The Netherlands

TEXAS TRIODE

As a subscriber, I believe you are the only one out there dealing with vacuum tube fidelity amps, and I look forward to receiving your publication every month. I would like to see more articles on horn speaker construction. Roggeveen's articles on cement horn speakers (9/02, 8/03, and 4/04) interested me, but did not contain enough construction details.

This summer I designed (took three years) and constructed a single-ended 300B stereo amplifier. The tubes included 2 each Tesla 300Bs, 2 each 6SN7s, 1 each 12AT7 and 5U4. I believe that the power supply is one of the most important areas of an audio amplifier, so I used an 8H choke (Hammond 300mA) connected directly to the cathode of the 5U4, four oil capacitors (600W DC), and another 8H choke (400V DC B+ supply). I added two switches for power on—one switch for the 300Bs filament dual 5V transformer and the other for B+ supply (LED indicators coupled with fiber optics to the front of amp).

For the C minus for the 300Bs I used a Radio Shack 6V (reversed connected) transformer and a solid-state bridge. This is the only area (-C supply) in which I used electrolytics; for the rest of the amplifier I used oil caps and direct-coupled circuits. In the 12AT7 and 6SN7 circuits I used direct-coupled and cathode output to the 300Bs control grids.

For the chassis I used 3/8" thick brass stock mounted on a solid walnut base. I polished the brass stock to reflect the warm glow of the tubes. Some of the parts I cannibalized.

The fiber optics, electrolytics, copper straps (oil cap hold downs), and so on, came from a Hewlett-Packard III laser printer. The copper plate (front of amp) came from a copper roof rain gutter. The porcelain tube sockets

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came from a military surplus radio. The brass stock came from a company in San Antonio. The iron, brass, and walnut make this a heavy (90 lb) amplifier. I call my amp "Texas Triode" Brass.

Performance of my system is outstanding. I can hardly hear any hum when it is in the quiescent state. I use a large speaker system (12" woofer, sub, and tweeters), but I am ready for horn speakers. My next projects include building a line amp, an AM tuner, and an FM tuner.

*Eloy Ashton Heras
Amarillo, Tex.*

P.S. I would like to get in contact with Triode clubs/societies, would you list them in your magazine?

All the audio clubs we know about are listed on our website www.audioXpress.com.—Ed.

MORE ON DIFFRACTION

I thank David Ralph for his article "Diffraction Doesn't Have To Be A Problem" (June '05), which came just in time for me. I am designing a medium-size box for my current project. I have never understood, and could not find any info about, why some boxes have felt rings around the tweeter. When I asked, I never received any better answer than "it makes it sound better."

Your article made it more clear about what they do. However, just like anything else, there remain certain unanswered questions. My main design objective is to have a wide and deep sound stage and image both horizontally and vertically.

Is a tweeter with wide dispersion (a uniform top response of 0° and 60°) an undesirable criterion relating back to my design objective? I always thought it was a positive thing. Is adding a piece of felt—any form or shape—around the driver going to make the sound more beaming, and if so would this make it possible to have a deeper and wider sound stage?

I thank you in advance for your help.

*Vilic Gabrielian
Toronto, Canada*

David Ralph responds:

Mr. Gabrielian's question regarding the effectiveness of the commercial "felt" rings is a good one. I had the same question several years back and purchased a couple of examples to try out. I'll go a bit beyond the question asked, because this is an interest of mine and may be useful to others.

Placing these rings onto a completed system showed that there was an audible, albeit small, difference in sound. I was not impressed. Some quick measurements confirmed that there was a change, but in a case such as this, whether or not the change sounds better is purely subjective.

However, the changes in response that can be easily measured are not subjective. Some time later, I was prompted to investigate more thoroughly when questions were periodically posted at the Madisound and Parts Express discussion boards.

My conclusion is that the rings I tested are minimally effective for diffraction control and may even be detrimental, depending upon one or more variables. The rings that I purchased were purely



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synthetic. They do not show any effectiveness at damping the signal and appear to be largely reflective. They also have round openings and are intended to have this opening concentric with the tweeter dome. That is the least effective shape and relative position, exhibiting distinct dips/peaks in the frequency domain.

I have since seen at least one web source that has changed the material to real wool felt. Not having tested them, I cannot comment on the change in effectiveness, but it must be better than the synthetic variety. I still do not recommend a circular shape which gives a constant distance to the edge. That said, the real wool felt variety could be an improvement, but again, this is subjective. It's a cheap tweak and should be reversible at least.

Mr. Gabrielian desires a wide and deep sound stage (don't we all?). I can't definitively answer whether tweeter dispersion is undesirable or not. It depends upon the goals.

Integrating the tweeter with the other driver(s) has many variables, directivity being just one. Wide dispersion would most often be considered a good thing,

but there are valid arguments that controlled directivity, as opposed to purely wide dispersion, can be preferable. The integration with the rest of the design must take into account the directivity of the other driver(s) and the dispersion characteristics desired.

An exceptionally wide dispersion tweeter will possibly interact more with the baffle and yield a bit more diffraction influence as a consequence. This is not to say that this is undesirable, but it is a factor that you should take into account.

My response about sound stage and beaming is based upon my testing and personal opinion. Let me address the testing first. Adding just "any form or shape" of felt is going to be problematic. There is little question that real wool felt can reduce diffraction. The amount varies, as I've shown previously. I would not characterize the change to be increased beaming, though technically it is to a limited degree, because there is absorption of the wave at extreme angles. The balance is that this reduces the diffraction influence, which is more important in my opinion.

Subjectively, I do think that the sound

stage is improved, not due to the change in directivity, but due to the fact that there is much less time-delayed interaction from diffraction that can be conclusively shown to result, both in the time and frequency domains. To my ears there is improvement in the sound stage—subtle but audible. I would not say that it is wider, but I do think that there is change in apparent depth with more precise placement of images laterally within the sound stage. I attribute this to the reduction of the time-delayed alterations added by diffraction.

My suggestion is to experiment a bit if possible. Because Mr. Gabrielian is in the design stage and not trying to tweak an existing design, he can incorporate diffraction control as part of the design. I believe that the result will be better than it can be without diffraction control.

PHONO PREAMP

I would like to take my turntable (Ariston RD-20) out of "retirement." I have recently purchased two different MM cartridges (Shure V15xMR and Audio-Technica AT95E) to replace my older/broken Shure V15 TypeV-MR. I would

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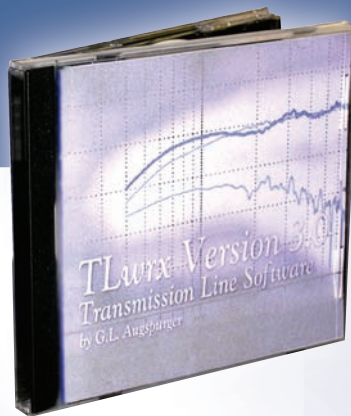
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like to build an inexpensive, good-sounding phono preamp. The music library preamp (March '05) looks like a good project. The addition of a line stage will be an added bonus!

Maybe I've read too much about phono preamps, but is adjustable loading and capacitance really that big of a deal at the level of performance I'm talking about here? Can this preamp be configured for different cartridges?

I do not want the preamp to be the sound-quality limiting factor (I plan on upgrading my table/arm in the future). My record collection is mostly 60s-80s rock, solo piano, small jazz groups, instrumental, and some classical.

I don't know whether I trust all of the designs that litter the Internet. I would like to build something that has some kind of testing and kudos behind the design. Mr. Galo is definitely a name/person I feel I can trust with a good, tested design.

Randy Anderson
rnder@hotmail.com

Gary Galo responds:

Thanks for your interest in the Music Library Preamp. You should always load phono cartridges properly. It's easy to tailor the music library phono preamp for different cartridges. Simply adjust Ct and Rt (Fig. 1 on page 26) to the values recommended by your cartridge manufacturer. When selecting the value of Ct, don't forget to subtract the capacitance of your tonearm cable from the manufacturer's recommended value. The difference is the value needed for Ct.

HORN DIMENSIONS

What is the function of the ports in Bill Fitzmaurice's Wedgehorn (July '05)? What would the effect be of placing tubes behind them—or not having ports at all?

Also, are crossovers not required because you're using piezo tweeters? How did you arrive at the particular dimensions of the Wedgehorn, such as the size of the throat, the horn angle, and the horn length?

Angel Rivera
Wimauma, Fla.

Bill Fitzmaurice responds:

The ports of the Wedgehorn tune the cabinet fb to 100Hz for maximum sensitivity to that frequency. If they were ducted, the fb would be lowered and there would be a loss of midbass response. If the box was sealed, the fb would be raised and a loss of midbass response would again be the result.

Piezo tweeters don't require high-pass filtering, and because the response of the woofer is falling above 3kHz, a low-pass filter isn't necessary for it either.

I use McBean's HornResp freeware program to determine the throat, mouth, and path length dimensions required to achieve the desired frequency response.

ADCOM UPGRADE

I'm very interested in upgrades and mods for my older Adcom 565 preamp, and, particularly, your Dec. '04 article ("GFP-565 Preamp Follow-Up Mod") about the upgrades to this amp. Would it be wiser to just upgrade to the new Adcom 710, 715, or 750 preamps? Will your upgrades surpass the performance of the new preamps? What's the

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total cost for the 565 upgrades?

Stan Ng
Issaquah, Wash.

Gary Galo responds:

Thanks for your interest in the GFP-565 preamp mods. I have not heard the Adcom preamps you mention, so I can't comment on their performance. The 565 preamp modifications I described were developed over a period of many years, and there are numerous options, as you can tell from the articles (not everyone will modify the phono preamp, as an example). Unfortunately, I don't have a price for the complete package, and prices keep changing, so any estimate that I might have published would probably not be accurate today. I suggest deciding which mods you wish to build, and compile an estimate based on the parts lists and the latest prices on the websites of the various vendors.

HELP WANTED

I need help! I'm locked up, but I still love to enjoy good sound as much

as possible. I have learned to make good, quality sounding, 4" drivers. My problem is I must run it off an AM/FM alarm clock radio (like you keep on your nightstand). It's stereo, but only 5W. I have heard an amp made out of only the components from one of these radios, but it exhibits a serious "hum" and a very high distortion rate beyond half volume.

Is it possible to make a good, quality, 2-5W amp using only recycled parts out of an AM/FM alarm clock radio? If so, I'd appreciate all assistance. I'm a beginner and could use help.

Gerald Nickerson #733285
2101 F.M. 359 N.
Iowa Park, TX 76367

In 1961, when all the world was young, a speaker building article called the "Sweet Sixteen" was published in *Popular Electronics* featuring the use of a multiple of 16 5" speakers. It evidently was a popular article; I was in college at the time

working part time for a local electronic parts distributor, and we sold out of 5" speakers because of it. The claim, in a subsequent article, was that the bass was lowered a full octave with each additional speaker. Of course, we know better today and certainly there must have been some phase cancellation with that setup.

Do you know of any papers or articles that may have been produced as a result of that article or any on multiple arrays of that type? I recently came into 40 5" "full range" speakers and want to do some experimental array building to see for myself what prompted the Sweet Sixteen frenzy in 1961.

Always enjoy each issue of aX—keep up the fine work.

Ken Bird
klbird@rcn.com

Readers with information on these topics are encouraged to respond directly to the letter writers at the addresses provided.—Eds.

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