

CAP SOLUTION

I wish to share with you my experience in replacing my tweeters and making a crossover for them. These are for my BES (Bertagni Electroacoustic Systems) D-280 speakers, which I bought from Monterey Stereo (Calif.) in 1980. They radiate sound in a 360° pattern—a large, wide, and deep sound, which is a quality I desire in a speaker. I did not entirely like the highest frequencies they produced through the use of cheap piezos.

I purchased a pair of neo 8-PDR planar transducers by Bohlender-Graebener for \$62.68 each from Parts Express. They have very good horizontal coverage and project sound both front and rear with effortless ease and naturalness. They blend well.

On making the crossover I experimented with several values before settling on a 9.1 μ F 250V metallized cap by AEON. I put in a 0.50mH copper foil air-core inductor to filter the lower frequencies, under about 18kHz. The frequencies blend well with no noticeable spikes. The BES speakers have an upper midrange, which goes very high, so I needed to consider that when I listened to many cap values for the crossover. I have only my ears for the test equipment, so I need to trust them.

After a few days of listening, I thought I needed more extension on top. I put in a .10 μ F 600V polystyrene film and foil MIT multicap and two 10nF 600V signature film and foil versions by Infini. (All caps and inductor from Michael Percy Audio.) I got extension in spades.

This is where the fun is, or begins. After more nights of listening, I realized that not all was perfect with the crossover. I'm hearing a smear of the high frequencies. It's like many parts of the highs are overlaying—multiples of the same frequencies are being overlapped, one upon another.

I then remembered a white paper by

Infini on bypassing: When bypassing do not exceed 1/100 of the value of the main capacitor! This is to avoid spectral overlap. The 10nF cap exceeds the 9.1 μ F by 10%.

I replaced the 10nF with a 15nF 600V MIT multicap together with the two 10nF bypasses and was well within the safety zone (no spectral overlap, only good extension, and the sound is very coherent). I feel much better now. I may put in a couple more 10nF caps for even more extension. I'm sure there is a limit on how many you can use, even while staying within Infini's safety zone. For fun, I want to test the outer limits of this, though, before I settle down.

I recall a similar problem when I bypassed a cap in my preamp's power supply. In a few days I wondered what was going on with the sound. By changing to a lower value cap in accordance with Infini's recommendation, all was well. It was easy to hear.

William R. Harren
Ridgefield, Wash.

AUDIO DIVERSITY

Your publication continues to improve in its service to the audio enthusiast. In an increasingly digital world, *audioXpress* retains the necessary dedication to the analog foundation of recorded and reproduced sound. Despite a few complaints to the contrary, I believe that your consolidation of the three former, independent magazines is the only option in maintaining an economically viable product. I look forward to each issue and the diversity it brings to this hobby. In the October issue, I found Mr. Still's approach to "bass enhancement" ("High-Quality Tube Type Control Unit," p. 26) of particular interest.

Jim Wood, Pres./Chf. Engr.
INOVONICS, INC.

SIGNAL WIZARD

I've enjoyed reading "Room Correction" by Rune Aleksandersen in the Aug.–Nov. issues of *audioXpress*. Can you provide me with the name of a supplier for the Signal Wizard 2?

Don Anstedt
sparks33@mc.net

Rune Aleksandersen responds:

There is a new and improved version of the Signal Wizard DSP card now available. I received this e-mail from Brian Jones in San Diego, Calif.:

I met Patrick (designer of the program) on the Internet after purchasing Signal Wizard 1.6, which I wanted to use for arbitrary equalization and linear phase crossovers for loudspeakers—a hobby. As you mentioned in your article, Signal Wizard 1.6 has some limitations for this type of work—no flash, independent filtering, and so on. Now all that has changed.

I have been testing Signal Wizard 2 for Patrick, putting it through a whole battery of tests, and the audio quality and the filtering/EQ capabilities are really very exciting. Patrick has also added the delay feature that allows the crossover designer to completely compensate for the acoustic offset between drivers. I tried this on a simple KEF UniQ bookshelf speaker two weeks ago, using 96dB/OCT FIR filters. Signal Wizard can handle each two-way loudspeaker.

In an effort to see the benefits of Signal Wizard reach the marketplace, I am arranging the manufacture, testing, and supply of the complete package. Shortly, we should have a way for customers to easily purchase and receive the product directly from here. Production of the boards started at the end of October, and the first kit (PSU, cables, S/W) will be available toward the end of November.

Brian Jones
San Diego, Calif.

This is information from Patrick Gaydecki, the designer of the Signal Wizard:

Signal Wizard 2 has many more features than Signal

Wizard 1.6, including flash memory for storage and automatic execution of filters from power-up, true dual-channel operation, FIR and IIR filters, adaptive filters, channel mixing, delay functions, and a real-time digital oscilloscope and spectrum-analyzer feature. It is also some six times more powerful.

If you wish to order a system, please send a check made payable to "The University of Manchester" to the address below. Checks will only be processed once systems have been dispatched. The cost of the Signal Wizard 2 system is £250 + VAT (362 euros or \$448).

For a full description of Signal Wizard 2's capabilities, please visit the website: <http://www2.umist.ac.uk/dias/pag/signalwizard.htm>

Patrick Gaydecki, BSc, PhD, FIEE, MInstP, MInstNDT, CPhys, Ceng Sensing, Imaging and Signal Processing Group, School of Electrical and Electronic Engineering
University of Manchester
PO Box 88
Manchester M60 1QD
United Kingdom

DVD JITTER

During the sound and video experimentation with my Sony DVP-300 DVD player, it was sometimes necessary to operate the player in the Factory Diagnostics mode¹. This easy-to-use resource allows you to look up stored error codes, clear them after repairs are made², and request the diagnostics program to optimize all electromechanical adjustments to minimize measured jitter³.

The diagnostic menus and their attendant results are displayed on the TV monitor hooked up to the player. The service literature, in sometimes strained English, describes how to operate the diagnostic resources by using the remote control from a comfortable couch.

The reduction of measured jitter is always accompanied by noticeably sharper images, better color rendering, and more accurate audio. The process is specialized for CDs, single-layer, or double-layer DVDs. Unfortunately, the written instructions fail to clarify a crucial step in the jitter optimization process, so I offer text to overcome that lack and to inform readers possibly interested in optimizing their own players.

Automated Jitter Reduction

After you identify the kind of disk just mounted, the diagnostic program runs

through a sequence of adjustments to fine-tune the disk-reading process by varying the gain and offset voltages of each servo-driven device used to read the disk. One such device tilts the disk to achieve the best possible angle between the reading laser beam and the disk surface, and also uses measured jitter as the payoff variable. When the optimization program is finished, all settings are stored as binary numbers in EEPROM until another adjustment is performed. Literally, better it could not get.

First Adjustment Cycle

Upon completing the first optimization pass, real-time measured jitter is displayed while the disk continues to spin, and the user is prompted to press the "stop" button or let the program continue. Here the service literature omits a critical piece of text. HIT THE STOP BUTTON to store the OPTIMIZED adjustments in EEPROM. You are now finished.

Final Adjustment Cycle

If you let the program continue, the tilt

servo will be put into the center of its range, then held there to allow you to adjust a screw inside the machine to minimize the jitter displayed on the monitor. The only time this adjustment is needed is when a new read-head has been installed (for example, during manufacture), and is otherwise unnecessary.

It is imperative that you hit "stop" after the first jitter optimization cycle. This avoids the fact that when the second cycle is done, it leaves the tilt adjustment in the center of its stroke, perhaps far from the optimum position, causing very crude adjustment numbers to be stored in the EEPROM when the diagnostics end. Soft images and mid-fi audio are sure to result.

Peak Tuning Forever

When loading a CD or DVD, I now observe the practice of running the jitter optimization sequence before I play each disk. That way I'm assured that every disk starts out from the best adjustment, which consumes perhaps 30 seconds.

The displayed jitter remaining after

• POLYSTYRENE CAPACITORS ARE BACK •
PERMANENT SOURCE, EXCLUSIVE, FULL LINE

MULTICAP & AUDIOCAP
the very finest

from FINCH & MARSH

JEAN SMITH, AGENT • TEL & FAX: 415-924-6090
FINCH & MARSH • WWW.CAPACITORS.COM

Polystyrene has the lowest dielectric absorption, holding & releasing the music-signal energy more completely than any other capacitor film in audio & video - including oil & Teflon. Polystyrene capacitors hold their capacitance and excellent performance for years. Reliable Capacitors has developed a proprietary source for this film, and after six months of performance testing, FINCH & MARSH once more offers Rel's full line of polystyrene caps to the audio & video communities.

optimization is a telling indicator of the manufacturing quality that particular disk has received. Not only do disks vary widely, their sonic and graphic performance is correlated with their jitter. It's nice to know the player has done everything possible to make the best of it. I'm beginning to like this player, it really tries hard to please.

Darcy E. Staggs
destaggs@exo.com

REFERENCES

1. The Sony service literature contains assembly illustrations, operation details, schematics, parts layouts and specifications, diagnostics, and pin descriptions of all major integrated circuits. Sony also sells spare parts (I replaced a ribbon cable) from a central distribution center in Kansas City, Mo. (1-800-488-7669).
2. Causes of repairs have been broken foil traces, short circuits (blown fuses), cold solder joints, incorrect component values, failed ribbon cable conductors, contaminated reading optics, and a disk jammed in the drawer.
3. Jitter can be described as the statistical variation in the time between ticks of a digital clock inherent in the state changes in a stream of digital data. Depending on its magnitude, both audio and video details become smeared.

BOOK REVIEW

I'm finally getting around to writing and saying thank you for reviewing my book (*Sound Recording Advice*) in your Sept. 2004 issue! That was an excellent review by Richard Honeycutt. Wish I could have had him do a once-over before I sent the manuscript to the printer. That was my first book effort, and I started from square zero in self-publishing and authoring with no real background in either.

As for the audio cables that only "pass signals in one direction only," they really do pass signals in both directions. The manufacturer of the cables puts

PHOTO 1: 6550 TUBE-BASED AMP.



the arrows on the cable jacket to alert the user that the shielding is more effective when the source signal flows to the destination in the direction of the arrows. Is this going to make a huge audible difference for your average Joe? I suspect not.

John Volanski
soundadvice@johnvolanski.com

Richard Honeycutt responds:

I am grateful for Mr. Volanski's kind words regarding my review of his book. I still suspect reptile lubricant when manufacturers indicate preferred "source" and "destination" ends of cables. The only case in which cable orientation in relation to source and destination should matter is for a line-level balanced cable, in which the shield is sometimes disconnected at the source end, but should be connected to the chassis at the input to the destination device.

I wish Mr. Volanski much success in his current and future publishing efforts.

WORKING WITH TUBES

As a long-time subscriber to *Glass Audio* and *audioXpress*, I thought it was time to share with you a recent project I completed. *Photo 1* shows my 6550-based amplifier, which is based on Joseph Norwood Still's original design, but uses 6SN7s in the preamp/phase inverter sections. I corresponded with Mr. Still

AUDIO TRANSFORMERS

AMERICA'S PREMIER COIL WINDER

Engineering • Rewinding • Prototypes

McINTOSH - MARANTZ - HARMAN-KARDON
WESTERN ELECTRIC - TRIAD - ACROSOUND
FISHER - CHICAGO - STANCOR - DYNACO
LANGEVIN - PEERLESS - FENDER - MARSHALL
ELECTROSTATIC SPEAKER TRANSFORMERS

Williamson Amplifier Transformer Specialist
WE DESIGN AND BUILD TRANSFORMERS
FOR ANY POWER AMPLIFIER TUBE

PHONE: [414] 774-6625 FAX: [414] 774-4425

AUDIO TRANSFORMERS

185 NORTH 85th STREET

WAUWATOSA, WI 53226-4601

E-mail: AUTRAN@AOL.com

NO CATALOG

CUSTOM WORK

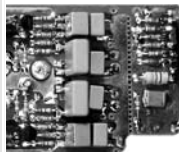
VACUUM STATE



The Winner of Bill Gaw's
Enjoy the Music.com
Best Of 2003 Award
and Best Of 2004 Award ...
Our dpa300B differential
monoblock poweramps!



RTP3C differential preamp
(MC phono & line):
*'Sounds like a Nightingale
that's fallen in love!'*



Our Upgrade modules for
SACD players have won
POSITIVE FEEDBACK ONLINE
2004 Brutus Awards
Best SACD Mods



Pure four nines
silverfoil & silverwire
interconnects and silverfoil
speaker cables.
*'I am really shocked by
their performance!'*

All products available finished or as KITS!

Showroom at: Vacuum State GmbH
Büsingerstr. 5 8203 Schaffhausen
Switzerland Ph + 41 52 620 35 81

www.vacuumstate.com



A Winding Path
There is no music on a record!
Just a winding path of vertical
and lateral amplitude waves.

The time signature comes from
the spinning turntable platter.

Modern disc cutters can achieve
Wow and Flutter of 0.01%.
Shouldn't your turntable
do as well?

**The
Audiophile Standard**

KAB
Preserving The Sounds
Of A Lifetime
www.kabusa.com

on the revised design.

I have also constructed Mr. Still's 6L6-based amp and Rick Spencer's 6V6 amp. Both designs work exceptionally well.

Now for a bit of constructive criticism. I enjoyed Graham Dicker's series for beginning amp builders ("Tube Audio Construction Tips, Parts 1-4," April-July '04 aX), but had to chuckle on some points. After buying and selling numerous tube caddies via eBay and locally, I should warn beginners that they contain mostly useless and disappointing tubes of little or no value to serious tube amp builders. Encouraging beginners to pursue these as a source of useful tubes is leading them in the wrong direction.

The second point relative to that series deals with metal working for an amplifier chassis. Whatever happened to good old chassis punches? They are available on Mouser or eBay. I could not imagine tackling a project such as my 6550 amp armed with a hole saw!

Carl Hartman
carl_hartman@hotmail.com

Graham Dicker responds:

As Mr. Hartman points out, the content of tube caddies will not help the seasoned serious amplifier builder find output valves such as 2A3s, WE300Bs, 6L6s, KT88s, KT66s, EL34s, and other much used audio tubes.

As a long-time tube experimenter, and in the tradition of ham radio operators worldwide, I never underestimate the value of a good junk box, especially one with lots of tubes. For example, if you need half of a 12AX7, the EC91 is a good alternative; commonly found TV tubes such as the 6GW8 and the 6BM8 make a nice 10W per channel push-pull amplifier; and even the 6GV8 vertical deflection tube can serve as a nice audio amplifier. The 6M5, 6CW5, and EL86 vertical output tubes are close replacements for the 6BQ5.

There are literally hundreds of usable TV-type replacement tubes that you can use for audio. My favorites, the 6CM5 and 6DQ6A, make great audio output tubes, even though they were designed for horizontal TV use. Have a look at the following website for some interesting applications:

<http://www.alphalink.com.au/~cambie/EL36.htm>

Mr. Hartman also provides some good sources for

chassis punches. I have a set of these, but I have not used them in over three years on aluminum and bakelite chassis; instead, I use a standard spade type woodworking bit and a little cutting oil. It takes less time to cut a hole, the edge of the hole is as good as a punched one, and a set of six titanium tipped spade bits will only cost around \$3, as opposed to \$25, per punch size for Qmax ones.

JFET AVAILABILITY

In the Dec. 2004 issue of aX, Norman Thagard declares that the 2SK389 is no longer available ("Single-Ended to Differential Mode Made Easy," p. 13). As I have mentioned before, MCM (who, BTW, has an ad on page 57 of this issue) lists many "Japanese" transistors. I called them a couple of days ago and spoke to Barbara. It was like Ripley describing the eggs in "Aliens": "There are hundreds of them," she said.

John Nickerson
johnnickerson@verizon.net

Norman Thagard responds:

Although it has been quite a while since I wrote the comment to which Mr. Nickerson refers, I believe that it was based on an even earlier e-mail inquiry from a reader who asked whether there was a suitable substitute for the 2SK389 and 2SJ109, both of which were used in my phono preamp design published in Jan. and Feb. 2001 and were no longer available. I did nothing to corroborate the writer's assertion and simply mentioned it in my recent article.

This morning I searched Toshiba's website without finding either transistor. I believe Sanyo second-sourced these dual JFETs, but a similar search of their website also gave zero matches. A web search for the 2SK389 and 2SJ109 did reveal that some are still available from distributors, which is good because perhaps additional readers will build my phono preamp.

Shop carefully because some vendors were not located in the United States and were asking as much as \$4 for the 389 and \$10 for the 109. I also found some prices as low as \$0.72 and \$1.80, respectively, but only six of the former and three of the latter were in stock at those prices.

I am unmotivated to search further to see whether these devices are still under manufacture, but it looks doubtful to me. My advice is to buy now rather than later.

CIRCUIT BASICS

In "Line Stage Odyssey Continues" by David Davenport (Nov. '04 aX), I

cannot find any info about real anode voltage B+ (Fig. 9, p. 59). And what is a turns ratio and the inductance of T1 and T2 transformers in this circuit? Also, what is the voltage gain (in/out) of Fig. 9, and what are frequency response limits?

Nick
nick2bike@mail.ru

David Davenport responds:

In an amplifier you can set either the plate voltage or plate current but not both. As the name implies, a constant current source (CCS) sets the current in the circuit and allows the plate voltage to adjust itself to maintain that current. The current is set at about 8mA, and for that current the plate voltage typically is about 165V. The B+ input to the CCS is about 200V, but this voltage is not critical as long as it is high enough to keep the CCS in regulation.

The ratio chosen for T1 is 2:1, and the ratio chosen for T2 is 4:1. These determine the input and output impedances, gain, and frequency response of the circuit. Many—if not most—preamplifiers have too much gain, with the user needing to operate the volume control at 7 or 8 o'clock. I have set the gain of the circuit to 6.5dB, which provides reasonable

adjustment of the volume control for most amplifiers. The frequency response with this gain is 6Hz to 40kHz.

TANG BAND REMAKE

The article "Remaking Tang Band's W3-881S" in the December issue (p. 54) was thoroughly interesting. I was left with two questions after reading it. How did Dr. McKenzie come up with the improvement measures, and how is it that the manufacturer wouldn't have done things like this to start with?

Mark Rumreich
mark.rumreich@thomson.net

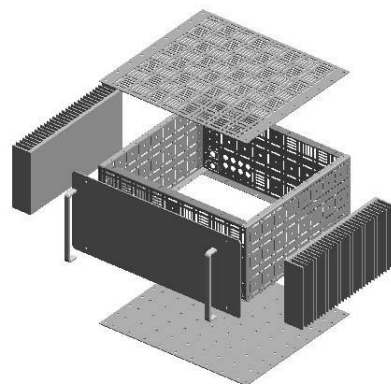
Mark McKenzie responds:

I developed the driver modifications by applying my knowledge of loudspeaker cone design and a proprietary process for mapping cone and diaphragm vibration modes under dynamic conditions. As to your second question, it is not really my place to pronounce on the decisions of commercial manufacturers. This is a case of "your guess is as good as mine." Looking at the range of possibilities, however, the word contractions "won't" or "can't" seem to cover most possibilities.

XM

New ezChassis™ Building Audio gear just got easier

Pre-punched template chassis



- Punched holes for inputs, valves, power supply, speaker terminals
- With 30+ labels (inputs/outputs)
- Strong construction. 17" Front
- Black painted chassis & screws
- Hundreds of ways to assemble
- Also heatsinks, handles & plugs
- Internet, Post or Fax order

www.designbuildlisten.com

audioXpress Back Issues on CD-ROM

AVAILABLE TO audioXpress SUBSCRIBERS
AT A SPECIAL PRICE!

- audioXpress 2001 \$9.95 Subscribers (\$29.95 Others)
- audioXpress 2002 \$14.95 Subscribers (\$34.95 Others)
- audioXpress 2003 \$14.95 Subscribers (\$34.95 Others)
- audioXpress 2004 \$14.95 Subscribers (\$34.95 Others)

NEW

Add \$4.00 shipping per CD in US. Other countries call for shipping quote.

Each CD contains all of the issues of that year along with a special table of contents which links to the individual articles, departments, reviews, etc.

Adobe Acrobat Reader is also included on each disc.

**Call 1-888-924-9465 or order on-line
at www.audioXpress.com!**

audioXpress • PO Box 876, Peterborough NH 03458-0876 • USA
Toll-free: 888-924-9465 • Phone: 603-924-9464 • Fax: 603-924-9467
E-mail: custserv@audioXpress.com • www.audioXpress.com

