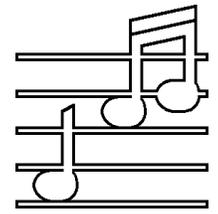


# AUDIO BASICS



The Complete 1986 Back Issue Set.

## VOLUME FIVE NUMBER ONE JANUARY, 1986

Here we go again with another new year of *Audio Basics*. Thank you very much for your continuing support. We have more renewals, and have lost less readers this year than any other. We now have all of you in our computer and hopefully, will be able to make address changes and renewal date changes quicker than before. No, we won't sell your name for the Bill the Cat Christmas catalogue or for any other purpose. We will be able to cost effectively remind you if you "forget" to renew, however, and to inform you if we have new products you might want to know about. Anyway, let's get started with a new year.

One of my readers wrote me pretty disappointed about the T-60 power supply project. He "read" the article to mean that I recommend the T-60 over any other turntable and thought I was abandoning the T-30.

He misread the article by reading between lines that were not there. I wrote the T-60 upgrade project because the T-60 is a good turntable, and there are a lot of them out there in service that can be easily helped. Our new T-30 package is still a better unit, is available new, and is lower priced. But, the external power supply helps the T-60 a whole bunch, and part of our purpose is to help improve what you may already own. That is the simple, and straightforward reason for the project.

Many of you have asked me about improving FM reception. I may have found an outstanding answer for many of you – the PARSEC 7403-II amplified indoor FM antenna. This little (16" high black "obelisk") unit has a list price of \$75.00 and is available from Parsec, 130 West 42nd Street, New York, NY 10036-7901, 212 302-4880, and is probably available at an audio store near you (we are not stocking them, yet).

It plugs into AC power and to your tuner, via a 300 ohm matching transformer (supplied) or direct 75 ohm F connector. I purchased a sample because my daughter has terrible FM reception in her dorm room at Carleton College, about 50 miles south of Minneapolis (and nearly 100 miles south of the main Twin Cities antenna complex). In a dorm room, there is no way to install an outdoor antenna, and with a "rabbit ears" she could only receive the two

local college stations cleanly, with noisy reception from a few of the stronger Minneapolis stations.

I tried the antenna in my own reference system first, where I use a simple test clip for most local stations and an attic mounted antenna when trying for distant stations. Because of the orientation of my attic antenna, I get severe multipath distortion from one local station and, with the clip lead, get noise on that station.

With the PARSEC, I was able to have my cake and eat it – no noise or multipath on my "problem" station, and clean reception from as many stations as my attic antenna. Also, because the gain on the Parsec is adjustable, I was able to "turn it down" to prevent overload from a 50,000 watt rock station a mile away from me and get less signal (and better reception) from that station than with a test clip.

At Carleton College, the improvement was night and day. Vanessa now gets 17 stations with no noise at all, including all the important Minneapolis stations, plus several from southern Minnesota and Wisconsin I don't receive here 50 miles north. The unit can be used as an omnidirectional antenna if pointed up, or as a directional antenna if pointed towards the station.

There is another indoor antenna that appears to be a clone of the Parsec, one called the TERK. According to reviews I have read, its performance is similar to the Parsec, and both may have a common origin (I don't know the "politics" of the situation). If one of my readers can fill me in, I would appreciate it. I have not "hands on" evaluated the Terk antenna. I do know that the Parsec works very well for us, and may be a real problem solver for you.

One of my readers, Joel Witherell, writes me to ask if I know if I.A.R. (*International Audio Review* – aka Wonder Caps, et al.) is still in business. It seems that he sent I.A.R. \$53.00 for a two year subscription in April, 1985, and has received only one issue and nothing else in the past nine months. Again, can we get any help out there? Thank you.

I would like to share a few more readers' letters with you.

Mike McGill writes, "*Just had to take time to write and tell you how much I am enjoying the Super Pas Two and Mos Fet 120C purchased*

*last month. I am using the pair with a Magnavox FD2040SL CD Player and a pair of Rogers LS3/5A's. I think even you might be surprised at how loud the Rogers will play in my 13' x 22' room using the 120C. I don't understand how this can be a forty watt amp. The Super Pas Two does just what you said it would for my CDs. The DGs, Philips, London, etc. sound so much better that I can listen much longer without getting fatigued. The Telarcs even sound smoother, by the way, I buy every Telarc CD I can get my hands on."*

Dr. Peter Johngren says, "*Thanks for your fast service, upgrading my preamp to a Transcendence PAT-5 Series Two and my amp to a Mos Fet 150C. The improvement is striking and very much appreciated. I wanted to let you know that you have finally done it; you have finally managed to retire my equalizer! I used to jack up the 16K and then roll off the treble on the preamp in order to end up with less noise - that is no longer necessary with the Series Two. What interests me more, however, is that I used to reduce the 4K sliders a lot, in order to reduce a harshness, more noticeable with CD. In fact, I thought I would eventually have to retire my beloved Sony CDP-101. With the Series Two/150C combination, however, the harshness is gone on all well recorded CDs (all Telarc, ProArte, London, and most Philips) and greatly reduced on others. Any remaining harshness can pretty much be smoothed out with the Treble control. How do you explain this? Also, I no longer need to jack up the 30 and 60 sliders to get that nice solid, tight bass - it's there if it's on the record. The net result, of not having to use the equalizer, is a more open, spacious, solid, gorgeous sound without that slightly "pinched" quality that the equalizer seemed to introduce. Needless to say, I am very pleased. It was well worth the \$450 for the upgrades. Thanks again."*

The following letter from Jim Willis is a bit longer, but since he reinforces what I have been trying to tell you, and since I want you to do some of the system improvements I have been writing about, rather than just reading about them (reading about simple system improvements won't make your system get better by itself) I am reprinting his entire letter as follows:

*"Dear Frank: The purpose of this letter is to renew my subscription to Audio Basics, so*

enclosed is a check for \$16.00. This has been the year where I have (finally) followed some of your advice, and boy, has it ever paid off!!! Here are a few of the Audio Basics tips I have followed, and what I perceive the results to have been:

1. Installed a 10,000 ohm load parallel to my Longhorn Grado (instead of using a 30,000 ohm circuit prewired for a Grace F9E or std. 47,000 ohm). Also re-set-up turntable/ tonearm/cartridge. Result: slightly improved bass, better imaging.
2. Installed TL071 op-amps on the phono boards of my Super-Fet. (Note: Phono boards only, as I didn't want to mess up the hard-wired ICs.) Result: slight improvement in "listenability," i.e., a little more musical.
3. Damped my turntable (FONS CQ-30/ Grace 707) with four pounds of "Plast-i-clay." Result: much improved bass, removal of a lot of the mud that I didn't even realize was present. This was a big improvement, and I'm planning on adding several more pounds to the areas near the turntable.

The biggest improvement, however, was getting my Hafler DH-220 rebuilt into a MOS FET 200C. I am impressed. I had been listening to the Hafler as well as a BGW 250B. The Hafler has more pleasing highs, and the BGW a more solid bass. However, both of these amps are mediocre (at best!) when compared to the MOS-FET 200C. The bass is astounding. It seems as if an additional 1/2 octave has been added on the bottom. (This through a pair of Magnapan Tympani I(U)s that I thought wouldn't play deep bass - wrong.)

The power of the unit (Mos Fet 200C) is also remarkable. On a whim, at one time I had the Magnapans bi-amped with 2 BGWs(mono) on the bass, and the DH-220 on the tweeters. While this set-up sounded pretty average, it would at least generate a lot of power (360 watts per channel on paper). However, power on paper was no match for the Mos Fet 200C, which is capable of driving the Magnapans to frightening levels! I don't see how someone could possibly use more power with conventional speakers.

The Mos-Fet 200C is also a very listenable amp. The mid and high frequencies are clean and very musical. However, I do have two complaints:

1. On many recordings (more than I suspected) it has become possible to listen to some pretty bad studio recording, mixing, and engineering. I had missed this because of the "haze" provided by the previous amplifiers.

2. It is now possible to hear the Magnapans make music by shaking sheets of Mylar plastic. (I guess "mylar breakup" is Magnapan's equivalent of "cone breakup" or "horn sound," etc.)

Obviously, these complaints are not about the Mos-Fet 200C. It is just that my amplifier is no longer the weak link in my system. The problem now is in the software and in the speaker system. My 1986 hi-fi resolutions are:

1. Save money to upgrade to a Super Fet Two.
2. Buy a (Philips) CD player.
3. In the event of a windfall, buy some B&W DM3000s.

Thanks again for the audio advice as well as the super new power amplifier."

Thank you, Mr. Willis, for your kind and useful comments. I hope they help motivate more of my readers to actually try some of my advice.

My biggest frustration in writing *Audio Basics* is lack of response from many of my readers, and indications that you are reading it, but not reading it. I get too many requests to write about topics I have already covered in detail. (Back issue sets are available at \$15.00/year.) I get many requests for troubleshooting help, but was told not to write any more about system troubleshooting in *Audio Basics* because the subject is "too boring." About a third of the subscriptions drop into a black hole, with no renewal and no feedback.

Letters like those above are what keep me going. Without them, I would quit.

Enclosed with this issue is our complete new 1986 product catalog. I would like to call your attention to a few items:

1. The first go-around on a new faceplate for the Super Pas Two was a failure. We gave the sheet metal house "too good" data. Murphy struck! We prepared two mylar film sheets, the bottom with the engineering data and dimensions, the top with the actual artwork, each a registering film. When the artwork went to be photographed to make the etching mask for the faceplate, nobody noticed that there were two overlapping films, the bottom one being the engineering data. They photographed the whole mess (both films) and, the engineering dimensions were printed on the finished faceplate. The workmanship is lovely, the result is - do it over. So, new Super Pas Two faceplates are still about a month off. They will cost \$40.00 (with new silver knobs) and must be installed here as we must do a LED swap, and unglue a few old push-on type balance

knobs without damaging the new balance controls. When faceplates are ready, we will, shortly thereafter, be able to offer complete brand new Super Pas Two units, as then we will be able to use new hardware from S.C.C. (they are out of original PAS faceplates).

2. I am really pleased with the improvements in definition and musicality I have recently made in our Super Tuner Two (can be done with the original Super Tuner also). Those of you using our tuner circuit know it is already the most musical sounding there is. About 20 new capacitors, some timing changes, and a careful re-alignment makes it much more transparent yet. Remember to pull your flywheel before shipping your tuner for a retrofit.
3. The new Transcendence 400 and 200 audio boards have been completed and produced and we are in production now. I have already been called by one respected reviewer (I sent him a "surprise" sample T-200 Series Two) who told me that he had expected a better amplifier, but not "that much" better! He said in comparing it with another amplifier he had then in house (noted for having excellent definition) that the "other amplifier" now sounded muddy! The new Transcendence Series Two amplifiers are simply better than you can anticipate! They are dead silent, have essentially no measurable distortion, and are super transparent. We have "violated" lots of design rules. They are very high feedback units (try 200 - 300 dB of feedback for starters) in a single overall loop. However, they have no transient distortion or phase distortion, and the feedback loop cannot overload. Otala said it could not be done. He is wrong. The units are absolutely stable too and will drive any rational loudspeaker load. Output current is limited by the speaker and power supply fuses within the limits of the power supply capacitors and power ratings of the mos-fets. Thus, you cannot expect to directly drive loads of less than two ohms at high power, as the current required will blow the fuses. If we don't use fuses, then many people would destroy their speakers under "party" conditions.

Here is the math of the situation. If our amplifier can swing in excess of 40 volts RMS into 8 ohms, then its power output is  $V^2/R = 200$  watts. This requires 5 amperes of output current. No problem, and our big amps do this easily. However, with a one ohm load, the math starts to get to you. Assuming the same 40 volt swing (which our big amps can still do if not fused), the power into the load goes up to  $40^2/1 = 1600$  watts (enough to fry any loudspeaker) and

the current goes up to 40 amperes (80 amperes for two stereo channels). Sorry, you simply cannot pull that kind of "juice" from a single residential AC outlet, let alone dump it into any speaker system and have it survive. Those claiming high power into one ohm loads, and those producing "wonderful" one ohm impedance loudspeakers, are simply "blowing smoke." And if you try it (with any brand of amplifier that does not have rational output and power supply fuses) you will be "blowing smoke" too, as your system goes up in flames. Believe the math, its real, the audio soothsayers are not.

The price of the Transcendence 200 to Transcendence 200 Series Two retrofit (all new audio circuits) is \$400.00. The price of the Transcendence 400 to Transcendence 400 Series Two retrofit (all new audio circuits and many layout and engineering detail improvements on most older units) is \$800.00. We can also install the Transcendence Series Two circuits in old Transcendence 300 amplifiers with excellent results but it takes a lot of rewiring of the output circuits, as well as new audio circuits and thus costs the same as re-doing the T-400, \$800.00. In each case, the Series Two circuits are well worth the expense.

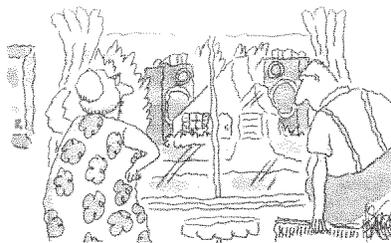
4. We have made a running production change in the mechanical specifications of the Transcendence and Super Fet PAT-5 Series Two models. The change, applicable to new units supplied by us only, is a new selector switch that occupies much less chassis space. There are two reasons for this change.
  - a. Most of you are using only one phonograph now, and are looking for even more sets of line level inputs to accommodate Stereo TV and VCRs, etc. The new switch changes the function of Phono 2 to an additional line level input.
  - b. We will have another new product coming (hopefully by this summer) – a dead silent and zero distortion, overload proof moving coil head amplifier. The new short selector switch leaves room in the PAT-5 chassis to accommodate the new head amp circuits internally. It will be available as a separate package too.

I might as well tell you about a few more of our upcoming plans too.

1. Assuming that we get past the "learning curve" on the Super Pas Two faceplate, we will offer a new faceplate for the PAT-5 chassis too. That brings up a question – what do you want, silver with black

lettering, or black with silver lettering? Send me your "vote" before we get started.

2. We are also seriously thinking about a "Bridge" – a little box that will allow you to run any common ground power amplifier (including all of ours) as a double power mono amplifier without any of the nasty side effects (excess transient distortion and poor definition) of previous mono bridged designs. We can do it, do you want it? It will cost about \$250.00. Let me know.
3. Are any of you interested in a Transcendence Series Two Integrated Amplifier (complete Transcendence Series Two preamplifier circuits and a low



Well I'll be, Nate! Get a load of the speakers Frank Van Alstine bought!

powered version (about 30 watts/ch) distortionless Transcendence Series Two power amp circuits all packed into a Dynaco SCA-50 chassis? I built one for my son for Christmas and got phenomenal sonic performance and outrageous dynamics for the power rating (it drives the B&W 808s just fine on digital material). It would cost about \$1000. If there is enough interest, I will tool the new amplifier cards (my son got the hand etched prototypes).

4. Finally, we can do a new Transcendence 150 Series Two built into a Hafler DH-120 chassis. It will be as clean as the bigger Transcendence Series Two amplifiers and make about 70 watts per channel at zero distortion. It would cost about \$800.00. Does this excite any of you? Let me know.
- No orders for these items yet please! They are not in production, just working "breadboards" that we can produce if there is demand. Your feedback now will help us to decide whether or not to go ahead with them.
5. Now, what do you want us to do next? Got any good ideas for a practical new product for us? We are open for suggestions. Call me with your ideas.

How could *Stereo Review* have known about my new B&W 808 loudspeakers when they sent me a renewal request containing the computer generated cartoon above? It fits the situation, except I was able to get them inside (I

installed extra wide downstairs doors when building the house 20 years ago – good planning). After living with the 808s for a month now, I want to tell you a bit about their "sound," why they are important to us as a research tool, and why they will be important to you in the future as they lead the way to improved audio products and a much closer approach to reality. A couple of years ago, my brother-in-law (a non-audiophile) gave my best equipment a close listen and asked me, "On a scale of 0 to 10, how close do you think you are coming to live?" It was a serious question, and I gave a serious answer, "A seven." Last weekend, Paul and his wife spent an evening with us listening to the B&W 808s driven by the big Transcendence Series Two equipment. He asked the same question again. This time, the answer was, "A nine." We were playing a Neil Diamond CD at the time, at a sound pressure level duplicating live concert conditions. Paul had just been to a live Neil Diamond concert. His response was that I was underestimating the situation, as he could listen to Neil here without hurting his ears, but not at the live concert. We, and B&W, are making progress.

The greatest virtue of the 808s is not their stupendous dynamic range, nor is it their awesome range, bass response, and sheer brute force LOUD capability clean. Their greatest virtue is their resolving power. They are simply much more transparent windows to the live performance than anything else in existence. The additional 20 dB of dynamic range built into the 808s is best used to reach 20 dB further into the reality of the music. Of course they are neutral, of course their tonal balance is perfect, that was expected. The excitement, the wonder, the awe of their performance comes from the purity and detail of these masterpieces – their resolving power. I heard the 808s last fall at B&W (on prototype B&W electronics) and was immediately struck by their astonishing transient performance. Signals that would simply destroy other loudspeakers are played faithfully, and startlingly, on the 808s. The demonstration at B&W was impressive enough to cause me to decide to order out a set. However, I did not hear the best virtues of the 808 at the factory – the definition there was simply ordinary. Imaging was ordinary too. In my studio, with Transcendence equipment (even with Super-Fet and Mos-Fet equipment) that all changes. Now the musical purity and realism of the speakers shine, and unlike Bert Whyte thought in his *Audio* review, the 808 images in a realistically superior way too – a much better three dimensional sound stage than with any other system I have heard, including 801s. One problem, the 808s are so good that they are going to be the worst displayed loudspeakers in history. They will tell you everything that is wrong with the rest of your system. One B&W dealer tried to sell a set to a client of mine, giving a demo so terrible (with McIntosh equip-

ment) that the dealer explained that the 808s "boom too much" and that the client would have to buy a McIntosh equalizer too, just to use them. The dealer was so stupid that he didn't know the boom was in his electronics, not the speakers. To be continued.

*Frank Van Alstine*

## VOLUME FIVE NUMBER TWO FEBRUARY, 1986

We have got so many new ideas, improved products, and so much work to do around here these days that I really don't know where to begin this month. I guess I will start by telling you about a few new products and improvements to some old familiar ones.

B&W has just made two really nice improvements to their "low end" loudspeaker line that makes them better than ever, with no increase in prices!

1. DM110, 220, and 330 models are now coming with built-in 2 ampere quick blow speaker fuses. The fuse holders are located in the input terminal tray on the back of the system. Although troubles with these models are rare, the extra safety margin provided by the fuses should make them more blow up proof than ever. We are stocking a good supply of the special small British sized fuses.
2. These same models have a new "open" molded plastic inner grill frame (instead of a wood panel cutout for the speaker openings). This new grill support eliminates the diffraction effects of a standard grill frame and the speakers all simply sound more open and spacious (and they were all very good before). They look sharper too.

The DM110 model (\$300/pair two way bookshelf) is now the equal of the DM100 in the middle and top, with better bass extension, and dynamics. So that while I previously rated the DM100 as being better overall than the larger DM110, now I would rate the DM110 as being worth the small extra cost over the DM100. B&W just keeps getting better and better, and more cost effective. If your drive electronics are really good, there simply is not any competition to them.

How many of you would be interested in making your standard line (DM100 through DM330) B&W loudspeakers work a lot better yet? Are you willing to "get inside" your speakers and rework the crossovers according to my directions? If so, there are major improvements you can achieve yourself to the definition and musical character of these models.

I became aware of the possibilities when a client returned a set of DM100s to me to fix. There had been a "party" and the DM100s were fed the full continuous power of a 140 watt/channel MOS-FET 200C until they gave up and died. Talk about a wipe out! Not only were both woofers frozen solid, but upon further investigation, I found that all the crossover capacitors were simply "blown up" too. They had been overdriven so hard that the crossover parts had got so hot that they even partially melted the input terminal trays. This was a real repair challenge!

Fortunately, it is rather easy to take B&W loudspeakers completely apart, and after disconnecting the crossover output leads from the speakers, the whole tray can be "popped out" for convenient work on the test bench.

An interesting thought came to me while examining the "remains" on the bench. For economy reasons, B&W uses non-polar audio electrolytic capacitors in the crossovers of the standard line (not in the DM1200s and up). By pure luck, the values they use were, in the case of the DM100s, the same as I had in stock for our new Series Two electronics.

What would happen, I thought, if, when repairing these DM100s, I used our new high quality film capacitors for the repair instead of original non-polars?

Note that we did not change to film capacitors throughout our new product line for any mystical or magical reason. Film capacitors do not, in and of themselves, sound better! However, a very careful examination on our super-mini computer did show us how one major electrical difference between an electrolytic capacitor and a film capacitor could cause "side effects" that would affect the sound of the system. Simply, an electrolytic capacitor, depending on value, has an internal resonant peak in the range of 30,000 to 50,000 Hz. A well made film capacitor "peaks" at a much higher frequency – typically between 200,000 and 500,000 Hz.

We have already shown that audio circuits are not perfect critters, they generate their own internal resonances under transient conditions (as do woofers and tweeters). Simply, by moving the resonant frequency of the needed capacitors much further away from the audio range, there is less interaction and IM "beating" between the circuit and the passive parts. Distortion under transient conditions is lower, Qs go down, and musical character is improved. Anyway –

I repaired the DM100s by using carefully matched film capacitors (paired channel to

channel)(three capacitors per speaker required, a 10  $\mu$ F, an 8  $\mu$ F, and a 7  $\mu$ F, all at 100 volts). I replaced the fried woofers (the original tweeters survived) and compared these rebuilt DM100s to my stock demo pair, first on white noise (interchannel noise from an FM tuner with the muting off). The result on white noise was interesting, and telling. The "new" DM100s were noticeably smoother. On music, the results were the same. The rebuilt DM100s were smoother, higher resolving, and best of all, showed a distinct improvement in musical character. This is a useful improvement.

I will, as soon as time permits, go through each of the loudspeakers in the DM100 through DM330 series and make these changes, taking careful notes so that I can write up a detailed do-it-yourself project for *Audio Basics*. I will also order out the appropriate parts for the other models so I can offer you a parts kit (consisting of the properly matched capacitors for your unit) for a reasonable price – probably about \$25.00 per stereo pair. Are you interested? If so, let me know. Don't order parts yet, I simply have been too busy building, testing, and shipping our Series Two electronics to get into this project in detail at this time.

One reason we have been very busy is that we have finished another new product – THE TRANSCENDENCE TUNER. This one does it all folks: digital readout, signal seeking, five non-volatile station presets, effective variable muting, a volume control, headphone jack, mono-stereo switching, and sonic quality simply unbelievable for a tuner.

The sonics are so outstanding we had to build our own FM broadcast station to find out just how good it is. We did this by designing pre-emphasis circuits around Transcendence line cards, feeding the output of a Compact Disc player into these circuits, then into a Transcendence Series Two preamplifier for gain adjustment, and then into the external inputs of our Sound Technology FM alignment generator (which is actually a little very high quality self contained stereo FM station). We then fed the output of the Sound Technology into a 300 ohm antenna (instead of directly into equipment on the bench) and "broadcast" the signal across the lab into the new Transcendence Tuner prototype connected into my reference system.

The reference system, by the way, now consists of B&W 808s, two Transcendence 400 Series Two amplifiers (bridged mono with a prototype Transcendence Bridge – 800 watts real per channel into 8 ohms!!) and a Transcendence Series Two preamp (along with a Magnavox CD player and our H-K T-30 phono system).

I connected an identical Magnavox CD player directly to the system (through the tape inputs

so I could easily A-B the Tuner with the CD player by simply pushing in or out the tape monitor button). I used two copies of the same CDs, with one playing in the Magnavox driving the broadcast station to the Transcendence Tuner, and the second playing directly into the system. After setting the levels into the Sound Technology for optimum broadcast without over modulation and adjusting the volume control on the tuner to match levels exactly with the directly connected CD, we sat down to make a few musical comparisons.

The major difference is that there is no major difference! In essence, our new Transcendence Tuner will play back with equal dynamic range, fidelity, musical character, resolution, and imaging as the same CD source directly into the system. And since our reference system is far better in every aspect than any other home audio system, I have got to tell you the Transcendence Tuner is pretty awesome.

Yes, if you strain, you can hear on a direct A-B a very slight dulling of the extreme highs, and a very slight loss of "authority" on the deepest powerful bass notes (keeping in mind that the 808s will play bass notes clearly that other speakers don't reproduce at all). However, if you come into the sound lab without knowing which is playing, you simply cannot tell, in the absence of a direct A-B, whether it is "live or is broadcast." On any lesser system, with a really high fidelity FM broadcast, the Transcendence Tuner will give away nothing to any other source you may use.

The Transcendence Tuner is built into a Hafler DH-330 tuner chassis. We have salvaged Hafler's digital and logic circuitry for outstanding tuning stability and "creature comforts." We re-engineered the IF section (you can now tune it a full division "off station" and still get clean reception), we optimized the operation of the Hitachi IF-Detector and Mplx integrated circuits, and interfaced brand new Transcendence Series Two audio sections (two complete new PC cards to replace one little original dual op-amp). We also installed a new power supply board that does two worthwhile things. First of all it supplies an independent + & - 15 volt shunt regulated and wide band supply for our new audio section (free of any logic and switching trash). Second, it substantially stabilizes and improves the original raw power supply to the rest of the circuits, providing much better regulation for all of the original tuning and signal seeking functions. We also installed new high quality Switchcraft input jacks. The only original function that had to be discarded was the Hafler dynamic noise reduction board. This circuit just cuts separation when things get noisy (a function the tuner does anyway with automatic stereo-mono switching) so it is no great loss, since our circuits are quiet and sensitive in any event. Coupled with a Parsec or Terk antenna, you

should have fine reception (and amazing fidelity) in any rational location.

The price is \$695.00 for a complete new unit, or \$495.00 if you supply the Hafler DH-330 assembled, and in good working order. Availability? Right now! Allow 30 days for delivery, we are running really busy.

How does it sound compared to our famous (and recently improved) Super Tuner Two? Like the difference between the Super-Fet Series Two preamp and the Transcendence Series Two preamp. Although the Super Tuner Two is widely known for the best sonic quality out there, the Transcendence is much more transparent and dynamic, and as mentioned above, is fully equipped with "creature comforts" (sorry we don't have the micro-wave oven or coffee maker circuits working quite right yet). Best of all, the Transcendence Tuner is available directly from us new (we are out of FM-5 chassis and can only rebuild Super Tuner Twos from units you supply). The Transcendence Tuner is simply a product no other esoteric manufacturer can design! No matter what brand of audio electronics you like, you have no other choice when it comes to FM reception, you need our tuner.

Hot flash! I discovered I overlooked another set of "SPARS" codes you should be looking for when examining Compact Discs to find out how they were recorded. In addition to the [DDD] and [AAD] codes explained to you last year, there is another code - [EED]. This stands for, of course, Eight Track to Eight Track to Digital. Look for the great new CD, *Slim Whitman's Greatest Hits* on this format in the near future (not available in any store, call us now at 1-800- etc. and have your credit card handy). Just kidding, folks (I hope).

I investigated another audio cassette recorder recently, the new Harman Kardon 192, and unfortunately, found it to be just another awful Japanese "air pack" made in the same cassette deck plant (apparently) as all the other crummy cassette decks are.

It appears that all cassette decks are made in the same place to the same formula. Stuff a fancy faceplate on a big tin box, stuff an el-cheapo PC card full of trash in one corner, stuff a plastic \$5.00 tape transport in the other corner, tie the whole works together with a wad of ribbon connectors and cable ties, and write a \$100 full color advertising sheet telling everybody how "wonderful and unique" it is. Sorry, the method and marketing is simply one big lie! This "brand new" Harman Kardon model has an identical plastic transport as my daughter's two year old Onkyo, yetch! The frequency response chart was drawn by that same elderly Japanese lady with a ruler and pen too (she is very good at it).

Essentially, H-K has attempted to "extend" the frequency response of the unit beyond what it is capable of doing. It may "measure" flat to high frequencies, but it sounds terrible with a "ringy" and non-musical top, boomy bass (what there is of it - not much) and a sucked in mid-range. Not to pick on Harman Kardon too much, this is the way all "extended range" cassette decks I have heard in recent years sound to me.

In contrast, the Sharp RT160S, (available at discount stores for under \$50.00) is simply a much smaller tin box (less air in the "air pack") with a similar plastic transport and trash PC card, but with much better sonic quality because they didn't try and make the unit do what it cannot. It is a limited range machine, and what it plays, it plays well. Sure the highs are dulled and the bass is rolled off, but, the midrange is musical and the balance is good. The RT160 has one major mechanical improvement over the previous RT100 and RT110 models, a more reliable slip clutch (a real spring rather than a sliding rubber cogwheel) that will probably last much longer.

My observations on cassette decks have not changed. There is simply no point in spending over \$50.00 on one, and the Sharp units are consistently good sounding and good value. If you want a "hi-end" tape recording format, get a Sony Hi-Fi Beta video recorder which will wipe out any cassette deck at any price. Audio cassette is simply a stupid format.

In general, the Japanese get away with selling this trash because the consumer does not understand what "quality" really is! The marketers have conditioned the public into thinking that high quality is nothing more than a good external fit and finish and pleasing shape, together with a large helping of "features." This sells millions of nicely finished "air packs." They are selling you the "package," the box it comes in, not the product! They have got the consumer thinking that a White Castle in a stainless steel case (excuse me - a plastic case finished to look like stainless steel) is better "quality" than a porterhouse steak in a paper sack.

Take the cover off the package folks, look inside, then tell me if the mass marketers are supplying quality, or are simply selling fancy wrapping paper.

The SUPER PAS TWO faceplate is finally ready! The metal shop got it perfect the second time around. The price is \$40.00 installed, including return shipping in the continental USA for any Super Pas Two preamp we have previously built. The unit must be returned to us for the installation. The reason, because this faceplate specifically identifies unit as a Super Pas Two, it cannot go on any original Super Pas or stock Pas preamp as that could lead to

problems if the unit traded hands later in the used market. It is for the Super Pas Two only.

I was planning to continue with a description of the "sonic quality" of my reference system at this time, now that the \$7500/pair B&W 808s and bridged Transcendence 400 Series Two amplifier are in use, but ran into a problem – the vocabulary used to subjectively describe the sound of an audio system is inadequate, confusing, and not clearly defined or understood. In addition, the terms are nebulous, many times describing overlapping characteristics rather than specific qualities (describing effects rather than causes). Lets see if we can help the matter out a bit by describing a set of terms we shall use from now on in subjective reporting, how these terms relate to other less precise "golden ear" vocabularies, and even hopefully, resolve some of the contradictions between what some people like, but others do not.

In listening to "the sound of music" in an audio system, we are listening to the characteristics of:

**Range, Balance, Dynamic Range, Transient Character, Musical Character, Harmonic Balance, Definition, Imaging Character, and Vowel Tone Colorations.**

Each of these characteristics, I observe, can exist for better or worse, nearly independently of each other in a given audio system. The emphasis the listener puts on each characteristic, will determine whether he likes the system or not. Another listener with a different set of priorities may reach an opposite conclusion about the system. Designers of esoteric equipment themselves have differing value judgments as to which characteristics are most important, execute different aspects more, or less, successfully, and in general appeal to different little groups of audiophiles. It is not uncommon for a designer to get one characteristic right and like that characteristic so much that he misses completely the fact the equipment is below par in other important aspects, put the equipment on the market, and then wonders why nobody else likes it.

Lets try to define the characteristics and then look at how they interrelate.

**Range** is the easiest to talk about. This is simply how great a frequency response the unit plays reasonably uniformly. A telephone is a narrow range device, a B&W 808 is a wide range device. Note that the Range is not the measured or "spec sheet" characteristic, but the real world perceived characteristic. There are many components with wide range specifications that don't play bass (or highs) at all. In general, consumer grade receivers and "store brand" speakers have wide range specifications, but real world narrow range (and lousy) performance. From an engineering sense, be-

cause it is more important at how the range is achieved than what the limits of the range actually are, it is quite possible to have a narrow range device (carefully executed) sound wider range than a specified wider range unit poorly executed. Great perceived wide range is very expensive to execute properly. Great "spec sheet" wide range is not. In general, pushing the boundaries of the envelope – designing to drive the circuits and their parts to their limits to get wider range yields poor results. For rational undistorted performance, the device or circuit must always be operated way inside its design limits. Wider range should be the last characteristic you worry about in trying to improve your audio system.

**Balance** is the large signal characteristic telling you if the system is "weighted" towards one end of the Range or the other (or both). Ideally (and reasonably easy and inexpensive to achieve) the Balance should be neutral. This characteristic is most easily observed in loudspeakers. Many small speakers are so lacking in bass and mid-bass range that they have a "thin" balance. Many "rock" speakers have booming bass and piercing highs with a Balance most politely called a mid-range suck out. A "heavy" balance obviously is a system with too much bass in relation to the rest of the range.

**Harmonic Balance** is the small signal characteristic that if very poorly done, will yield **Vowel Tone Colorations**. The harmonic balance describes the unit's ability to play all of the overtones of a musical instrument in their proper relationship. It is the subjective description of a combination of the unit's frequency response smoothness and its freedom from spurious resonances and oscillations (both mechanical and electrical). In a unit with poor Harmonic Balance, the overtone "signature" of a given instrument will be reproduced unevenly, translating the sound of the instrument into "something else." Flutes change into potato whistles, violins turn to plastic, drums to cardboard boxes, for example. Good Harmonic Balance is very difficult to achieve, but not necessarily expensive to achieve. It requires that the designer looks beyond simple IHF measurements. Loudspeaker designers must build non-resonant cabinets. Electronics designers must keep track of de-stabilizing oscillation mechanisms and design them out. Frequency response extending schemes such as feed-forward compensation and under-damped bass "boosters" cannot be used. These tricks increase resonances and degrade the Harmonic Balance.

**Vowel Tone Colorations** are the result of very poor Harmonic Balance characteristics. These colorations are constant and obvious sonic aspects of the system most easily described as the sound of speaking a "vowel tone." Try

saying "Aaaaaah," "Eeeee," or "Uuuuh." If your system is always playing one, or more, of these vowel sounds along with the music, it indicates there are internal resonances so severe they are dominating the character of the system. Most likely, your loudspeakers are the culprit. Strangely enough, I have heard highly regarded loudspeakers, raved about in the underground press for excellent resolution and imaging, that have terrible vowel Tone Colorations. The Spica TC-50 comes to mind as a system with an obvious "Aaaaaah" sounding coloration. These colorations are high on my personal "pet peeve" list – I cannot tolerate them at all.

**Imaging Character** is the ability of the system to recreate the dimension and space of the original performance. It has two aspects. The first is the ability of the system to define each performer and instrument as a solid, three dimensional object in space. The second aspect is to integrate all of the performers into a larger stage duplicating the surroundings of the performance. I never judge the accuracy of the second aspect unless I was at the recording session or have a photograph showing the orientation of the performers and the recording microphones in relation to them, and to the hall. If one does not know what the question was, one has no way of knowing if the system's overall imaging on a given performance is the "right answer." Some people think the imaging can only be "right" if the performance is placed in front of the speakers. I suggest this would be true only if in the original recording session, the microphones were placed behind the performers. Since imaging is the "where is it" aspect of hearing, as contrasted to the "what is it" aspect, identical channel characteristics with respect to both frequency and phase response are the most important concern. If you want excellent imaging, buy tightly matched loudspeakers and audio electronics with carefully matched channels and smooth, critically damped roll off characteristics.

To be continued next month, and then an integration of these characteristics to more usefully describe the sound of audio components.

*Frank Van Alstine*

**VOLUME FIVE NUMBER THREE  
MARCH, 1986**

Oh boy are we busy! Everybody seems to really like our new product line and orders are coming in at a rate of about double (at least) as in the past. One client told me, "Frank, you really have invented a better mouse trap!" Needless to say, we are doing everything we can to keep up, working nights, training more technicians, and going slightly dingy too, but our lead time to fill your order has gone out to a solid 30 days at this time. We don't want to

resort to "assembly line" methods. We still assign each piece to a trained technician to complete as an entity. Dave and I still do all of the final inspection, testing, and burn in on each unit. Our methods take time. Please be patient with us and give us the time to produce a custom built quality piece for you. There is not much in the way of anything in the world you can buy any more that exhibits individual craftsmanship in its production. We don't want to be like the rest of the world. We still think there is a place for quality craftsmanship and individual attention to your needs at a rational price. Every phone call to us asking, "Is it done yet?" simply adds to the time it takes to finish everybody's equipment. Help us to complete all orders as quickly as possible with no let-down in workmanship or testing. Don't call us about your order unless you really need help. We don't lose orders. We will notify you if there is a problem, and no, we cannot have it ready two weeks early, not without breaking promises to somebody else. We cannot be in the "instant gratification" business and maintain the level of individual craftsmanship that helps make our products such a unique value. Give us the time to do it right.

Meanwhile, Dave, Aado, and I have finished the engineering of another new product, the TRANSCENDENCE 100 AMPLIFIER. This is our new Series Two Transcendence super circuits installed in the Hafler DH-120 amplifier chassis. This little amplifier (70 watts/channel at less than 0.1% THD open loop) sounds just like our big Transcendence Series Two amplifiers, with the same advantages of nearly zero noise and simply awesome dynamics and transparency. Its 70 watts per channel is a ridiculous understatement of its real world dynamics into a loudspeaker - it will simply drive a conventional 200 watt per channel amplifier into the ground.

The object of the Transcendence 100 amplifier is to provide you with Transcendence musical quality at a more affordable price if the rest of your system is of high enough resolution and your loudspeakers are efficient enough so that absolute refinement in the amplifier is more important than outright power and current drive. The price of the Transcendence 100 amplifier, \$795.00 outright or \$595.00 to install in your DH-120 chassis, competes with our best selling amplifier, our 140 watt per channel MOS-FET 200C. Which amplifier is for you?

Essentially, if you own loudspeakers that simply require brute power to "turn on," such as Dahlquists, Magnaplanars, Acoustats, big Infinities, Ohms, Apogeos, and the like, or if you want to get the utmost in sheer sound pressure levels from speakers such as B&W 801s and 808s at a reasonable price, the MOS-FET 200C is your choice. It is, after all simply cleaner than other amplifiers in this price range and has

great gobs of reliable, durable, and time tested real power.

If, however, your speakers are a bit more efficient (or are limited as to how much power they can handle) and overkill power is not as important as the utmost in refinement and resolution, then choose our new Transcendence 100 amplifier.

I have some good news for owners of Dynaco PAT-4 preamps and Dynaco SCA-50 integrated amplifiers. In our rebuild process of these units (to our Super Fet Series Two preamp and Mos Fet Control Amp respectively) we have been able to provide some very useful additional switching functions at no increase in price.

For the PAT-4 rebuild, if, and only if, you pay for the optional (\$40.00) new selector switch, we will at no additional charge provide your unit with two sets of tape inputs, two sets of tape outputs, tape to tape monitoring capability, and an additional set of line level inputs too.

We can do this by using the Loudness switch (previously unused and disconnected in our Super Fet circuit) as a Tape 1 - Tape 2 switch. We then wire the obsolete Tape Head jacks as a second (and independent) set of tape inputs. The Tape Amp inputs are the first set of tape input jacks.

The To Tape output jacks become the first set of Tape outputs, and we then wire the Output - 1 jacks as the second set of Tape Output jacks. The Output - 2 jacks become your main audio output jacks to drive your amplifier.

In addition, the Special inputs become available as another set of line level inputs for a source such as Stereo TV while the Spare inputs are for your CD player.

Now the Super Fet PAT-4 can accommodate two tape recorders - either audio or VCR, a turntable, a CD player, a Stereo TV, and a FM Tuner and can tape from any source to either tape deck and monitor what you are taping. We really are trying to build you better (and more useful) products.

For the SCA-50 rebuild, at no additional charge, we are making a simple modification to the selector switch and our wiring to provide similar functions.

The unused Loudness push-button is rewired as a Tape 1 - Tape 2 switch and the Tape 2 position on the selector switch is ungrounded to provide full tape to tape monitoring functions "left out" by Dynaco.

Now the SCA-50 based Mos Fet Control Amplifier can provide tape to tape dubbing

and monitoring functions too, at no increase in price.

Sorry folks, we do not plan on offering these functions as a retrofit all by themselves. To access the switching wiring to make the necessary (and rather complex) wiring changes, the preamplifier PC cards must first be removed.

While this presents us with no additional work when starting with a stock unit, or when retrofitting the new Series Two circuits (in either case you are already paying for the changeover to Series Two circuits and the removal of the PC cards as necessary), the labor time (at \$38.00 per hour) to do the tape monitor switch rewiring independently of our normal rebuild process will make the cost of the functions simply too high to be worth the effort. I cannot contemplate this as a "do-it-yourself" project either, inasmuch as we don't feel very comfortable about telling you to remove the PC cards from our products!

Thus, we feel it is only economically feasible to provide you with these new functions as a part of a complete rebuild or when the Series Two circuit upgrade is done.

Note that you must order the optional new selector switch if you want these functions provided for a PAT-4 chassis. The original selector switch simply cannot accommodate these more complex switching functions. You may order the optional switch, and have the tape to tape monitoring functions provided by adding the cost of the switch to the price of the Series Two upgrade, but only at the time the upgrade is done. Note that tape to tape monitoring and dubbing functions are standard equipment on all PAT-5 chassis and Hafler 101 chassis equipment.

We have done something completely new about another audio problem child, the "Bridged Mono" amplifier. Lets talk about the problems and advantages of this mode of operation for a bit, and then see if our solution may be of value to you.

Bridging an amplifier is a method of tying the two separate channels together to make the unit, in effect, into a much higher powered mono amplifier. Obviously then, you would need two stereo amplifiers, each "bridged mono," to provide two high powered channels for your stereo system.

Because of the little known laws of Electronics, combining the channels of an amplifier by bridging provides more power than you would expect.

Let us, for example, assume that we are starting with an honest 50 watt per channel into eight ohms stereo amplifier. This amplifier will have the capability to swing about 28 + and - volts (peak) into 8 ohms. Note that RMS power = RMS voltage

squared divided by the load resistance (nominal 8 ohms). Note also that one converts peak voltage to RMS voltage by multiplying the peak voltage reading by 0.707.

Now, while you might assume that when you add together the two channels of a 50 watt amplifier, that you would end up with a 100 watt (50 watt plus 50 watt) mono amplifier, this assumption is not correct because the “squared” factor was overlooked.

Essentially, when you bridge an amplifier, you are not adding together the separate power ratings of the two channels. What you are really doing is adding together the peak voltage swing capabilities of the two channels (with some reservations to be discussed later herein).

Thus, in theory, when properly “bridged” our 50 watt per channel amplifier mentioned above, will (if it had a nearly perfect power supply) now swing 28 volts plus 28 volts, or over 56 volts peak into 8 ohms. Now, lets convert this peak voltage swing into RMS power:

$57 \times 0.707 = 40$  RMS volts. 40 squared = 1600. 1600 divided by 8 ohms = (surprise!) 200 watts! – not 100 watts. Thus, when you bridge an amplifier, you in theory quadruple the power! This is because you are dealing with a voltage squared function, not a simple addition function.

This little “squared function” allows an audio designer to slip some really sneaky (but sometimes really useful) “spec ratings” into his design.

Lets look at the “good things” about using this little known law of physics first:

In a bridged amplifier, each “half” is still only operating at the original design voltage. Our 50 watt per channel stereo amplifier still is working within 30 peak volts per channel, not the nearly 60 peak volts of its combined output.

The cost of high voltage parts is much higher (all other things being equal) than the cost of parts designed to operate within lower voltage ratings. Actually, when one starts looking for output transistors, power supply capacitors, and fast small signal devices with ratings of more than 100 volts (remember, for our 200 watt amplifier we must allow for a + and - 60 volt peak swing, together with an adequate safety margin for abuse conditions – 150 volt devices required) one will find that the supply of available parts is limited, very expensive, and possibly not made at all!

Since high voltage parts and power supplies can easily be more than twice as expensive, twice as bulky, and twice as difficult to design and produce with, it often can be less expensive to produce an amplifier with four small audio channels, internally bridged to make two high powered audio channels than it is to produce two higher powered, higher voltage channels.

It is relatively easy to provide a simple “bridge” switch on an average audio amplifier so that you can later economically upgrade your system to much higher power simply by buying an additional matching amplifier and bridging both of them.

In some applications, such as in an automobile where one is faced with either a maximum 12 volt supply or an expensive switching power supply circuit to step up the battery voltage, “bridging” may be the only easy way to upgrade the 6 watts maximum power available from a 12 volt DC supply to in excess of 20 watts.

Finally, in theory, bridging can reduce some forms of distortion. For example, since in the bridged mode, the phase of one channel is inverted in relation to the other, any “common mode” noise can be canceled because the noise (primarily hum) signals will now be out of phase with each other and sum to zero.

That’s the good news folks, now for the bad news – all things are not equal when you bridge an amplifier – several bad things happen:

The total current demanded from the amplifier’s power supply is doubled in the bridge mode. In general, any given stereo power amplifier has a power supply designed to make its rated power (hopefully) in stereo. A power supply with twice the current capacity would make the stereo amplifier much bulkier, heavier, and more expensive, and serve no useful purpose in the stereo mode. Thus, it is highly unlikely that the power supply in any ordinary amplifier will be adequate for actually supplying the doubled current demands of four times the rated power.

More likely, the bridged unit will “run out of power supply” somewhere between 2.5 and 3.5 times its rated stereo power (depending upon the amount of overkill capacity designed into the original power supply).

Referring back to the “sneaky spec ratings” approach mentioned on page 3, it is possible for a designer to ignore the “real world” power supply demands, and simply calculate that his bridged mono amp will give four times its rated stereo power, and provide you with a “spec sheet” only power

rating that falls apart under the demands of real world current.

Another “red flag” warning! Note that the currents through each internal channel of your bridged mono amplifier double too! While having overkill capacity in the power supply is unlikely, having a current reserve margin in excess of a factor of two in each audio output channel is almost unheard of! In most cases trying to make your amplifier drive at twice its output current design will simply fry fuses or activate protect circuits (if you are lucky) or cook output circuits and drive boards (if you are not).

Certainly you would be pushing your luck, and the limits of your amplifier, to use a conventional bridged amplifier into a low impedance loudspeaker. If, for example, your loudspeakers have a four ohm rating, they require double the normal current from your amplifier already. Since bridging doubles the current demands again, four times the current is sure to cause trouble.

Thus, looking back at that “inexpensive” design using four small channels bridged to make a high powered stereo amplifier, the real answer is, not necessarily a good idea after all. The designer still must make four “small channels” with twice the current capability as normal, and still must include a power supply with twice the current capacity too. This will increase the price substantially – probably right up to the cost of two high powered, high current channels in the first place. Be very careful in evaluating this kind of bridged design – if its power rating seems to be too good to be true for the money, it probably is.

One further disadvantage of the “four small channels bridged to make two high powered channels design” – there is no “common ground” available, thus making it difficult (likely impossible) to use the amplifier with stereo headphones or a speaker switching network.

Now, another ugly electronic problem comes to light. In a bridged amplifier, the signal from one channel is inverted and then added to the signal to the other channel. Some kind of a circuit is necessary to invert the phase of the signal in one channel. That circuit cannot be perfect (no electronic circuit is). Thus, in a conventional “bridge” the top half of the signal waveform is not the same as the bottom half of the signal – not a very clever idea!

There are several ways of inverting the phase of one channel. The least expensive is to diddle around inside the feedback loop of one channel – it is simple to provide a switch that changes the feedback (and internal operation) of one channel of an amplifier from non-inverting to inverting.

Thus, all you have to do is throw a switch to convert your amp to "bridged mono," hook the speakers up from hot to hot, and voila – more power.

Not such a good idea! You now have two different circuit configurations per channel. The internal bandwidth, phase response, and internal distortions are markedly different between the inverting and non-inverting halves of the amplifier. The top half and bottom halves of the music signal no longer are the same. In general, stability margins are reduced too.

The usual result – an amplifier that goes louder, but with less convincing reality, and usually with scrunched dynamics and bass. Useful for "boombox music" but not for much else.

The other normal approach to a phase inverter is an additional circuit ahead of the power amplifier itself (either an additional card inside the chassis, or a separate phase inverter "black box" in line between the preamp and the power amplifiers).

In this scheme, the output from the preamp is tapped and fed into a unity-gain phase inverter circuit. The direct output of the preamp goes to one internal channel, the inverted signal to the other channel, the speakers are connected hot to hot, and the result is high powered bridged operation. The internal feedback of the amplifier is not changed, so this eliminates the "difference between the halves" problem, yes?

No! You simply move the problem to the phase inverter circuit. The unity gain phase inverter circuit itself changes the characteristics of the signal. In most cases, the unity gain feedback generated adds gobs of transient distortion, and the amplifier drive capability direct from the preamp compared to the phase inverter are different. You still have two different signal halves and the music does not come together!

So then, is Bridged Mono operation a lost cause? Not necessarily! We have done something new that absolutely cures the second set of problems (two unequal signal halves and added transient distortion) and then, bridged mono amplifiers, rationally used, may be useful to make your audio system sound better.

The cure is the Transcendence Bridge – four separate Transcendence preamplifier audio cards with special inverting mode feedback circuits together with a Transcendence Pre-amp power supply. There are left and right channel inputs, and four audio outputs – left channel non-inverting, left channel inverting, right channel non-inverting, and right channel

inverting. The price – expensive – \$500.00 installed in your chassis box (minimum size we need is 8" x 10" x 3" high) (remember - we do not make sheet metal and this is essentially a custom product).

We resolve the "halves matching" problem in a unique way. The signal from the preamp (any preamp) goes first to an inverting set of Transcendence circuits. These circuits first buffer and isolate the preamp from the amplifier and provide the preamp with an easy load to drive. The signal is filtered and limited to audio frequencies thus making life easy for the power amplifiers downstream. The direct output of this first set of inverting Transcendence cards is the inverted outputs. After the first set of Transcendence circuits, the signal is also fed to a second pair of inverting Transcendence circuits and inverted again. Thus the output of these second cards are non-inverting (having been inverted twice). These second circuits are very wide band in their internal operation. All of the frequency limiting is done in the first set of cards. Note also that the output sections of all four cards use our hybrid LH0002CN line drivers, which will drive any power amplifier (and long interconnect cables) without stress. Of course, our Transcendence circuits are immune from the transient overload effects of normal unity gain inverting circuits so no additional distortion is introduced. Phase - gain characteristics of the inverting and non-inverting outputs are identical over a far wider bandwidth than required for audio.

The result, finally, a method of operating an amplifier in a bridged mono configuration in which the top and bottom halves of the signal are identical! You simply have not heard this done before! The sonic improvements, of course, are as striking as going from a toy amplifier to one of ours. With any of our power amplifiers, the Transcendence Bridge will provide you with essentially triple the normal rated power into 8 ohms and safe operation into four ohms. It will also provide amazing imaging as the two amplifier channels are completely isolated (they are separate amplifiers!).

For some applications, the Transcendence Bridge is essential. For example, the B&W 808 speakers can actually handle 600 real watts per channel, and bridged T-400 amplifiers give us a real 600 watts per channel into 8 ohms. The results, a further reach into the absolute reality of live music, as the dynamic and transient limitations of more "mundane" equipment vanishes. In fact, I can now reproduce live "stage" performances better at home than at the concert! My "PA System" is simply much better than their PA system. Obviously, the Transcendence Bridge can give you more absolute power than it is possible to build into a stereo amplifier at a rational price.

Another logical use is with a set of our much smaller amplifiers. The overall cost of a second amplifier plus the T-Bridge may be less than the cost of a new high powered amplifier. Of course, sometimes it is just plain "fun" to have great gobs of power on tap – kind of stuffs you back in the seat when you hit the gas pedal. Note that the T-Bridge cannot be used with an already bridged amplifier, in a common ground wiring or switching system, or with the speaker switcher in the PAT-5 chassis. It should not be used with marginal amplifiers as more current and heat is generated. But boy is it fun to use! We will continue with the sounds of quality next month now that you know what I am doing to get the sound.

*Frank Van Alstine*

## VOLUME FIVE NUMBER FOUR APRIL, 1986

Well, we are slowly digging ourselves out from under the winter avalanche of orders for our new products and have our lead time back to 3 - 4 weeks again instead of 4+ weeks. *Audio Basics* has been suffering a bit, simply not enough time to do a really good job so far this year. It is another Sunday project again this month. We do have a bunch of interesting things to talk about, so stay with us.

I need your help! We are preparing a new "professional" catalogue with type set pages, and a gorgeous cover photo showing the T-200 and an array of our PC cards on a translucent black background. The package will make a much better first impression on prospective new clients. My catalogue preparation advisors tell me that it would be useful for me to include a bunch of short quotes from some of my clients telling readers "how wonderful we are." I have received many really nice letters from you in the past (and good feedback about our products really helps our morale) but I am not supposed to reprint these comments without your prior permission. Let me know if I can use your written comments in the catalog.

We have made a running major improvement in the MOS-FET 120C amplifier (as of April 25, 1986) with no increase in price (until my accountant tells me the bad news of how much more money we are putting into it). How about fifty percent more power and lots more "punch"? We did it with a new power supply. In the past, we have used a regulated power supply in the 120C simply because the raw supply operated at +90 volts and there were no small sized, high capacitance, 100 volt rated power supply capacitors available. An adequate unregulated 90 volt supply simply would not fit in the chassis. Thus we used a small raw supply, and regulated down to +70 volts for the main supply to stay within the chassis limits.

We now are receiving a new 100 volt rated PC card mounted power supply capacitor that makes an unregulated 90 volt supply practical in the Dyna 120 chassis. We designed a new power supply card for this application, which is now in production. The new power supply board replaces the entire regulated supply (original chassis mount capacitors, original power supply card, regulator transistor and heat sink – the whole works). Our audio circuits work just fine on 90 volts instead of 70 volts (some decoupling capacitors had to be changed to a higher voltage rating) and the result is substantially higher power (60+ watts per channel instead of 40 watts).

Sorry, we are not planning to offer a retrofit for the power supply as the cost would be too high for value received (about \$150.00). We would have to make changes on each audio card, the output ground planes, the output decoupling card, and redo the entire power supply and rewire the whole thing. The labor time would be extensive for the power and performance gain. The original 120C is a great amplifier. But when we can improve the value you get in one of our products in a real way, we like to be able to do it, especially if we do not have to charge you extra for the enhancements.

We had an interesting comparison session with a Bedini 25 - 25 amplifier recently. This is one of the little expensive "cult" amplifier that is supposed to be "just wonderful." On our test bench it was not very wonderful. It didn't like capacitive loads at all. A one microfarad capacitor across our 8 ohm load bank caused the amplifier to generate gobs of ringing in both the channel the capacitive load was driving and in the other channel too. This indicates two serious problems. The first problem, we suspect, is an inadequate common power supply causing lots of crosstalk from the channel disturbed by the capacitive load into the other channel. The second problem likely is feedback loop failure causing the oscillations to reflect back to the input, thus appearing in the input to the other channel through our signal generator. Neither characteristic is something that makes an amplifier "just wonderful."

We took a look inside the Bedini and found that it was chock full of 2N3055 bipolar output transistors (the same 75¢ each devices we throw away each time we rebuild an old original Dyna St-120). The cases of the 2N3055 transistors in the Bedini were colored red (by what appeared to be a wide felt marker). Why, I do not know. The power supply was pretty anemic – less than what we use in our low cost integrated amplifier. Someone had been messing with the unit though – the undersides of the audio boards were cluttered up with wonder caps dangling in mid-air and the outputs were wired up with something resembling welding cable. (Lot of good that will do – 2N3055 transistors will fry before they will heat up a 24

gauge wire – this "mod" is kind of like putting a culvert after the output of a soda straw.)

The Bedini did not sound too bad. It was pleasant and smooth with good definition and no obvious colorations. Bass and transient character were pretty stifled, though. Drum transients turned to cardboard and my woofers played mud. Recovery time from obvious overloads was too slow. It did not like digital dynamics at all. If your taste is analog chamber music on little speakers that don't play bass, at modest listening levels, the Bedini probably will work as well as many other good amplifiers (certainly it is a large cut more musical than the Adcom we discussed a couple of months ago). But if you want to hear all the music (including transients and dynamics) full range on real loudspeakers, you had better look for an amplifier that makes a lot more power into real world loads.

The internal "modifications" we saw in the Bedini are typical of many amateur "golden-ear" engineering jobs. We have noted a few contradictions regarding golden-ear recommendations:

1. The "experts" claim you gotta have a vacuum tube power amplifier to get good dynamics and really musical sound. These same experts demand that you use speaker wires heavier than the top support cables of the Golden Gate Bridge to transfer all that "good vacuum tube sound" downstream to your speakers.
2. Did you ever contemplate what conductor and how heavy its gauge is inside your vacuum tube amplifier? Yep, you got it – your signal is not going through welding cables, not through Monster Cable, not even through pure gnarled copper crystals. It is going through a vacuum! Do you want to know how good a conductor a vacuum is? Well, it isn't! You have to heat those electrons red hot and stuff several hundred volts behind them to get them to move at all! Interesting. One consolation – at least the vacuum inside your power vacuum tubes is oxygen free.

Our suggestions: A. Use vacuum speaker wire. Have your local friendly neon advertising lamp builder blow you a set of pure everything free tubes to connect from your vacuum tube amp outputs to your speaker inputs. If vacuum works so nice in a vacuum tube, just think what it will do for your speaker wires. B. Rewire the insides of all your power vacuum tubes with Monster Cable or similar. Look at how tiny all those wires are inside those tubes. You should carefully fix them.

I recently told you that B&W had started supplying the models DM110, 220, and 330 with back panel protection fuses. They have now started shipping the DM100 models with fuses

too (no increase in prices). These improvements have caused us one minor problem. The new fuseholders interface with the crossovers and have changed the layouts of the crossovers in these models. Thus, the instructions we were preparing for crossover improvements to these models now need to be rewritten to include both the old and the new crossover layout configurations for each model. This will set us back a couple of months before we have the chance to tear down a set of each kind of speakers and write them all up. Note that the larger B&W models all have electronic protection circuits (no fuses required) and have all film crossover capacitors standard. The models DM1200 and DM1400 have been discontinued and will be replaced with new models this summer. They were the oldest (and poorest performing from a dollar value basis) of any of the B&W models. I will be going to the big C.E.S. show in Chicago in early June and will give you a complete write up of what is new and interesting in the June issue of *Audio Basics*.

I have a new "toy" to play with that is really pretty super – the Sony PCM 501 ES digital processor. This is a stereo analog to digital and digital to analog converter that allows digital recording and playback onto any quality video recorder. It can be switched from 16 bit to 14 bit operation (to match other external devices) and can make direct digital copies from one digital tape to another. It can also record to two VCRs at the same time. It has a useful peak sample and hold stereo display with 60 dB of dynamic range in the display. Finally, it makes outstanding tape recordings.

Hook up into an audio system is pretty simple. You have a set of audio inputs and a set of audio outputs that connects to your preamp just like any tape recorder. In addition, you connect two more cables – to the video input and video output of your video tape recorder (either Beta or VHS). The PCM 501 ES converts the analog output signal from your audio system to a digital signal that is sent on to your VCR for recording as "numbers." In the playback process, the "numbers" from the VCR are converted back to an analog signal (similar to reading and converting the information on a digital audio disc) and the analog signal is sent to your audio system for playback.

Since the information sent to, stored on, and read back from the tape are digital bits (pulses either on or off) all tape noise, transport noise, flutter, wow, and distortion are simply ignored by the processor as they are not "bits." Thus the system records with essentially zero distortion and with no noise or speed variations. Dynamic range and separation are about 90 dB and frequency response is ruler flat under real use conditions. It will record the full dynamic range of the best CDs with no overload or compression. It is obviously superior to the

Sony "Hi-Fi" FM video recording system which, although very good, does exhibit "breathing" on translations from very quiet to very dynamic passages. The Sony digital processor is simply noiseless under all conditions.

Musically, I simply cannot easily tell any difference at all between the direct playback of the digital disc and the recorded copy playing back through the processor on my VCR. It seems not to make tape copies – it makes clones! I like it.

The unit cost me about \$650.00. I am using it with an el-cheapo (\$289.00) Sony 5L2300 Beta VCR. Thus, the total cost of my recording system is \$939.00 – a whole bunch less than a high end audio cassette recorder or a bottom end open reel recorder and a whole bunch better than the very best studio analog tape recorders. There are a few "catches." Sony doesn't seem to want to make any of these units and they are very hard to locate. I got mine from Q Audio of Boston after a wait of about four months and I think the prices are higher now due to revaluation of the Yen.

There are a couple of more reservations regarding the use of the PCM 501 ES unit. First, you must be very careful in setting record levels to never exceed the zero dB indications. Unlike an analogue tape recorder, which always has much higher distortion and noise but overloads somewhat gracefully, a digital processor goes instantly to 100% distortion when 0 dB is exceeded because it runs out of bits – crunch! It is not really a problem because with the much extended dynamic range and signal to noise of the PCM unit, you simply start out at much lower record levels to insure that you never overload. You will have to change your recording techniques though if you are used to "pushing" an analogue tape recorder to get a better signal to noise ratio. You cannot do that with a digital machine.

Second, you have to have something worthwhile to record! There is not much point recording CDs that you already own – its easier to simply play them. I will be recording many of my best demo records so that I don't wear them out but what I really need is a bunch of "loaner" CDs to record.

If any of you out there have any unique CD material that you think that I, and *Audio Basics* readers should know about, simply send me your CD for my evaluation and return. I will pay the shipping cost both ways and review the CD herein if it is really good material. I will give you a two week turnaround on the loaner material. Call me first to insure that I do not already have it. All of the recording companies I have written to regarding *Audio Basics* have ignored and never responded to my letters (except Telarc). I have already purchased over 100 CDs, but I cannot afford all the good

material out there and I have got to hear it to give you a reliable review.

It has come to my attention that I am getting the newsletter out so late this month that many of the topics I had picked for April are no longer appropriate, such as:

How to make your vacuum tube products sound better by soldering in all the pins to the vacuum tubes directly to the circuit boards (eliminates all those nasty sounding contacts).

Then, how to carefully check vacuum tubes for microphonics with a ball-peen hammer.

Testing woofers and tweeters for possible defects with a broom handle.

How to "shock" your possibly dead electronics back to life by sparking a dead short across the outputs while turning them on and off with the volume control all the way up.

How to lubricate and adjust the heads on your cassette recorder using only a vise-grip pliers and two cups of 3-in-1 oil.

The proper techniques of gob soldering. Practice first with a lit candle dripping wax onto connections from a distance of one foot. Then repeat with molten solder. For best results, use Kester Gutter Solder.

How to make bad equipment sound better using the "super magic brick" (consisting of two cubic feet of lead). You place the super magic brick on top of the equipment, it squashes the equipment flat, and the ensuing silence sounds nice.

How to pack equipment for shipment with non-surprising results. First use a press-to-fit box. Then loosen or remove all hardware. Put in box upside down (if shipping two units, pack them together faceplate to faceplate too). Do not use return address or name, and ship from your company (General Motors or similar is best so it will be really easy to identify). The non-surprising result is, of course, damaged or lost equipment. Its really fun!

Now, back to something a bit more serious, a continuation of our discussion (from February) of audio system "sounds." We previously discussed Range, Balance, Harmonic balance, Vowel tone colorations, and Imaging character and you should probably re-read the last two pages of the February issue at this time before proceeding herein.

**Dynamic Range** is the ability of the system to play the entire level of the musical content in the same loudness ratios as what was recorded. Dynamic range is a large signal character as opposed to Transient Character which describes the ability of the equipment to play the "at-

tacks" of individual notes within the whole score with convincing reality. Equipment with excellent dynamic range must be quiet enough so that the quietest passages are not obscured by noise, and must have the stability and drive to play the loudest passages without clipping (gross distorting) or compressing the music. The equipment must separate out the quiet parts that are playing at the same time part of the music is powerful. Some equipment responds to large scale crescendos by putting out an impressive "whomp" of sound. Impressive, that is, until you realize the music doesn't go "whomp." This equipment is simply translating large scale input transients into underdamped output oscillations. It is "fake" dynamic range because all the music is lost when the big "whomps" come along. Good dynamic range requires stable components and adequate amplifier power for the speakers in use in your environment at the playback levels you like.

**Transient Character** is a bit tougher and is one of the really important "essences" of playback that if executed really well, leads to a convincing sense of reality in our audio reproduction. It is the capability to play all of the instantaneous power and clarity of the "attack transients" of individual notes. Good transient character will tell you what kind of a guitar is being played, and with what kinds of strings and pick. Poor transient clarity makes a system sound like a wet matchbook cover is being used as a pick, and that the system is always "stubbing its toes" as it stumbles along. It is the bow first "biting" the string, the drum head hitting the skin (before the drum body responds), the air flow being released by the pipe organ control valves, and the sound starting in the singer's throat before the mouth and throat structure shapes it. Outstanding transient character seems to require outrageous amounts of clean amplifier power. With a kilowatt of power per B&W 808, drum sticks tapped on cymbals and picked strings become stunningly "you are there" real – the stage and performance have been moved "right here." With less power, the transient character is still nice to listen to, but not as convincingly real. This need for awesome amounts of energy seems to be independent of playback level. When you have got it, low level playback still seems real, just further away. Transient character seems to be the characteristic most ignored in most reviews. "Detail," imaging character, definition, and low colorations get all the words, possibly because they are much easier to get right, probably because the reviewers have never heard a playback system that does approach reality in transient character.

**Definition** is the ability of the equipment to play back all of the music. This characteristic is measurable, and is inversely related to the amount of transient distortion the equipment generates. If any internal stage of any part of

the audio chain is driven to its maximum rate of change, then, while that component is saturated, all musical information occurring at the same time, at any frequency, is erased. Poor definition relates simply to how much of the music information riding on the sides of wave forms is being clipped off and erased. It's pretty easy to get perfect definition in audio electronics – simply never let any internal stage go into saturation or cutoff on any input signal of any frequency short of output clipping (when you get 100% distortion anyway). It is too bad hardly anybody (except us) does it. If you have perfect definition, the definition of "detail" becomes redundant, because "detail" as usually heard, is not music at all, but excess transient noise bursts caused by saturation of circuits. Most people are impressed short term with lots of "detail" which I define as a zingy bright high end. When you get the circuit working properly, the "detail" goes away, but now you can understand all the words.

**Musical Character** is the aspect of performance that determines how perfectly the data is played back after you have got everything else down pat. You can pass all the music, with excellent dynamic range, transient character, imaging, harmonic balance, range, and with low colorations and still not present a convincing representation of reality. It simply is a subjective evaluation of how badly you have diddled up the music. It might be compared to having all the best possible ingredients for a great banquet, but the chef had better prepare them perfectly too. Good ingredients not perfectly mixed and cooked yields a ho-hum (or worse) dinner. Interestingly enough, you can also have excellent musical character even if some of the "ingredients" are missing or are "stale." For example, a small speaker, in a small room, with most of the bass range missing can still have excellent and satisfying musical character on most music.

Excellent Musical character is the absence of "sawtooth waves" riding on strings and voices. It is the absence of the "scrunch effect" on massed strings. It is the system that not only plays the notes, but plays the time and space between notes. It is the system that has no "background" for the music but the environment of the recording session itself (and that environment should be obvious). Great musical character requires very low harmonic and IM distortion and absolutely zero transient distortion at the same time. It requires a complete absence of spurious resonances in any part of the electronic circuits.

Some aspects of Musical Character actually do respond favorably to "better sounding parts," if the characteristics of the parts that are impeding musical character can be defined and improved upon. For example, electrolytic capacitors have internal resonant frequencies that are probably too close to the top end of the

audible audio range. These resonances are likely disturbed by musical transients, causing interactions and further oscillations within the music itself. In general, film capacitors resonate at much higher frequencies, further from the audio range. In case of doubt, an audio circuit probably is better off if electrolytics are not used therein. Caution is required in replacing capacitors. Many film capacitors have other characteristics worse than electrolytics, such as microphonic and inductive resonances. Trading off one form of interaction for another is not progress. One must use parts that are real improvements, not blind steps off another cliff.

Some aspects of Musical Character are frustratingly difficult to analyze from an electrical engineering sense. How does one tell, for example, what is going on between the halves of a "matched pair" transistor. How much damage are the stray electrons bouncing around inside a tube doing? There are no models to work with. A perfect circuit cannot be done, because nobody knows where all the problems are.

Many people honestly believe that "improved" speaker wires and interconnect cables yield much better musical character in their system. I wish I could agree with them as it would be an easy way out for us, and I would like nothing more than to be able to recommend the "right" speaker wire and interconnect cable for our equipment for best musical character. Sorry, I simply cannot hear it (nor can others, including golden-ears I have tested when they did not know what kind of wires were in the system).

Certainly the various inductive, capacitive, and resistive loads represented by different kinds of wires can change the sound (especially if the equipment is load sensitive) but change and better are two different things. I hear no improvements in musical character when the speaker wires and interconnect cables are changed.

Now think about how the aspects described interact to produce the sound of your audio system. See if you can use these terms to better define a system subjectively. We will talk more about this.

*Frank Van Alstine*

## VOLUME FIVE NUMBER FIVE MAY, 1986

Thanks for all the kind letters of endorsement from so many of you. My request of last month for quotes for our new (in the preparation process) catalog achieved a very pleasant response from you. I still have room for a few more, so if you want to tell others about our work, get your opinions in to me soon.

*The Sensible Sound* has very fair reviews of several of our products in their Spring, 1986 issue (number 29). Their address is 403 Darwin Drive, Snyder, New York 14226 and a subscription (four quarterly issues) is \$18.00 per year. It is worth the price for the industry news in the "Ramblings" and "Bits & Pieces" sections alone. They even have a telephone number now, (716) 839-4590 you can call to trade information. They do not want "what should I buy?" or "what are you going to review next issue?" kind of calls.

They did answer one question in this issue, namely, "Why do you review Van Alstine's equipment?" Their answer – because he is willing to submit equipment for review.

There is one other question that was not asked, that deserves an answer too:

Why don't reviews of Van Alstine's equipment ever appear in *Stereophile* or *The Absolute Sound*?

An original Super Pas was sent to *Stereophile* nearly three years ago. Although it made their recommended components list, it was never reviewed. A Super Pas Two was sent to them late last summer. It too made their recommended list (higher placed) with a note that it was "shockingly good" and that a full review was coming. It has not come. We wrote to them in November, 1985 offering a Mos-Fet 200C for review. The letter has never been answered.

We sent *The Absolute Sound* a Super Pas in 1980. Two years later it was returned without a mention in the magazine. We sent John Cooledge (their Atlanta based writer) a Transcendence preamplifier and a Super Tuner Two in 1982. They vanished into a black hole. No review, no acknowledgement, no nothing!

Instead of asking *The Sensible Sound* why they review our equipment, why don't you ask *Stereophile* and *The Absolute Sound* why they do not? I would sure like to know the answer too.

We have sent *Audio* magazine a Transcendence 200 Series Two amplifier for review this spring too. Although we had advertised in *Audio* for years, they left us off their audio dealer list and their audio manufacturer list in their last equipment dictionary issue. Their editor seemed a bit sheepish about this when I pointed out the contradiction (they happily took our advertising money but ignored us editorially) and did promise us a review to make up for the oversight. We were told that the T-200 review should show up some time next winter. Look for it – our hope springs eternal.

My request last month for interesting Compact Discs for review has met with only one response so far, but with a nice selection of

material from Mr. Bob Allen of Nevada. He sent me seven CDs and one Mod Squad Compact Disc Damper. Lets evaluate the Disc Damper first.

This gadget is a piece of PC card fiberglass (black) cut the same size as a CD and packed in a CD "jewel box" case. It comes with several adhesive backed fiber washers that are supposed to be glued to each of your CDs to help center the Disc Damper on them.

You are supposed to load this fiberglass board on top of your CD when you play it, and it is supposed to suppress edge flutter, eliminate light leakage, reduce digital readout errors, decrease power supply load, and reduce distortion caused by focus servo hunting. Interesting claims for a chunk of fiberglass.

We tried it. We noted the following:

The CD player was much slower in coming up to play speed. The CD player also developed a small "vibration" kind of like an out of balance tire on your car.

The sound really changed – it was obviously worse – kind of dry and hard sounding. It made my system sound much like a very expensive bright and zippy moving coil cartridge was being used. Yetch!

I am highly suspect of the Disc Damper. The platter motor and servos in your CD player are engineered for the mass of a CD only, not for a load more than twice as massive. It appears to me that the extra mass of the Disc Damper causes tracking errors rather than eliminating them. The disc drive servos simply cannot manage the extra mass. In addition, the Disc Damper was not perfectly balanced and its "out of round" loads increased vibrations and tracking errors.

Certainly disturbing the data flow from the CD will change the sound of your system as more errors are introduced. Certainly this is not a way to make your system sound better. We do not recommend the Mod Squad Disc Damper.

I have been doing a bit of engineering on my own Magnavox CD players with good results so far. I started the project to trace down an intermittent noisy channel which turned out to be a defective .0015  $\mu\text{F}$  capacitor in a pre-emphasis circuit. While I had the unit torn apart (its an original FD1000) I also replaced the original Signetics 5532 op amps with sockets and T.I. TL072 fet op-amps. Although the Signetics devices are supposed to be quiet, the residual noise was cut in half with the T.I. devices. I also replaced the polarized electrolytic output capacitors with the same 3.3  $\mu\text{F}$  Panasonic film capacitors we use in our Super-Fet Two preamplifiers. The sonic improvements were obvious, a smoothing of musical

character and a more liquid and natural sounding high end (and it was good, stock). I then reworked my second unit, a FD2020, with the same results.

This can be a pretty easy do-it-yourself project for those of you with a Magnavox CD player and some technical skills. You will need to order the service manual for your machine from North American Philips, Technical Publications Department, Box 555, Jefferson City, TN 37760 (they are \$15.00 I think) so that you will know how to get into it safely. You will also need to acquire two 8-pin dual in-line sockets, two TL072 op amps, and two 3.3  $\mu\text{F}$  film capacitors. (We are not stocking these parts yet.) I also have ordered for each of my machines, two Panasonic 3300  $\mu\text{F}$  at 25 volt capacitors to upgrade the power supply a bit. These will directly replace the stock 1500  $\mu\text{F}$  power supply capacitors. These simple changes will give you pleasantly purer CD sound. Have at it!

We are working on a much more sophisticated Magnavox CD player project right now – a complete new Transcendence audio output and filter section to replace all of the original output circuits in any Magnavox machine. We are running the computer analysis of the filter circuits right now to be able to set the circuit parameters exactly right. The stock filters are a compromise and don't match each other exactly under all conditions.

This will be an external package in its own independent chassis with a Transcendence power supply and line - filter circuits. We will come right out of the A to D converters in the

Magnavox, bypassing all the downstream circuits. With an isolated power supply for the audio circuits, filters of exactly the right values, and the extraordinary clean current drive of the Transcendence circuits for the filters and interconnect loads, we anticipate a new standard in CD performance at a rational price. We will tell you how well it works (and how much it is going to cost) next month.

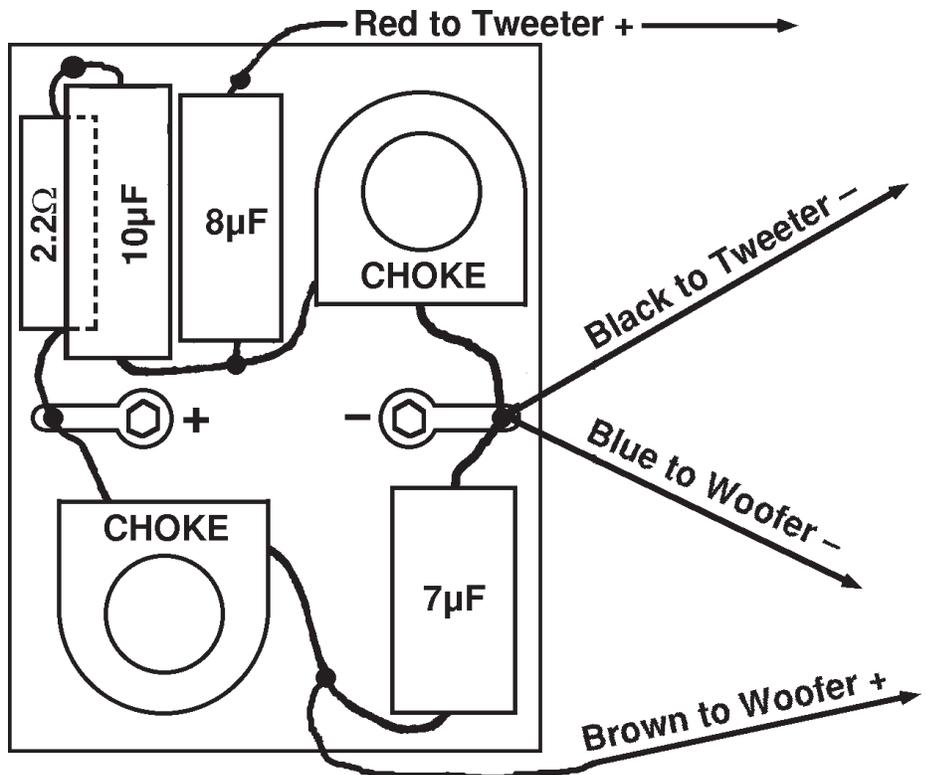
Anyway, back to Mr. Allen's CDs:

The Nylons, *One Size Fits All*, (Open Air Records Div. of Windham Hill OD-0301 DIDX 187). Excellent vocal recording of deep and dark male voices reminding me of the Ink Spots of years ago. The numbers are mostly 1950's and 1960's stuff very well done. Excellent vocal blending and tonal quality.

The Manhattan Transfer, *Vocalese*, (Atlantic 7 81266-2). More modern vocal jazz, again well recorded and natural sounding. I like the CD better than Manhattan Transfer "Original Master" vinyl recording I have.

Dire Straits, *Brothers in Arms*, (Warner Bros. 9 25264-2). A good example of bad studio recording techniques. This modern boring rock album is miked too close, with the high frequencies first lifted and then chopped. It tells you that an all digital production can be poorly executed too. Not my idea of good music, neither in the recording process or in the talent or tunes.

Philip Glass, *Glassworks*, (CBS MK 37265). A digitally produced modern instrumental recording centering around a keyboard and synthesizer. I like the recording fidelity and the



variety of the music – kind of a cross between *Fresh Aire* and George Winston.

Michael Hedges, *Aerial Boundaries*, (Windom Hill WD-1032). Excellent and accomplished acoustical guitar performances of modern themes. Like many Windom Hill recordings, this floats along free and easy (and that is not bad at all!).

Mark Isham, *Vapor Drawings*, (Windom Hill WD-1027). More modern keyboard with some instrumental accompaniment. A good bass line. Not as interesting as *Glassworks*. Although Windom Hill has excellent fidelity, don't play too many of their releases one after another if you plan on staying awake.

James Newton, *Echo Canyon*, (Celestial Harmonies CEL 012). Flute and crickets and more flute and crickets. The crickets are more interesting than the flute. Yawn!

*Growing Up in Hollywood Town*, (Sheffield Lab "Direct from the Masters" CD-13). This is a compressed and limited version of a great Direct Disc record. The CD sounds like it was made from a cassette deck. It is obviously a ploy to jump on the CD bandwagon in spite of having nothing much useful to offer the CD customer. Try again Sheffield, with a digital recorder. If you can do it direct to disc, you can do it on a Sony PCM 501 ES too. A disappointment.

Thank you, Mr. Allen.

One of my readers, Stuart Krivis, of Ohio, has sent me the best "Wonder Cap" I have seen yet. He made it himself out of aluminum foil and the plastic film from a Wonder Bread wrapper. Actually, it is a Wonder Bread Cap! It has a custom capacitance value – you can change the value by squeezing on it. Mr. Krivis tells me it is a "bypass cap" because much to his disappointment, so far, everyone has passed it by. Anyway, one loaf of Wonder Bread and one roll of Reynolds Wrap is probably all you need to Wonderize your whole system. Helpful hint – eat the bread first, peanut butter and jelly do not help the sound of the capacitors too much.

On a more serious note, Mr. Krivis informs me that a simplification of my loudspeaker stand building article of several years ago in *Audio Basics* can be made. He suggests, if you do not have access to a router, that a water closet fitting can be fitted to the top and bottom of the base and then the pipe will slip over, and can be glued to these fittings. Check with your plumber.

O.K., how about a do-it-yourself project now? The crossover upgrade for the B&W DM100 loudspeakers. These instructions are for the non-fused versions only (all production before Spring, 1986).

You will need the following parts:

- 2 7.0  $\mu$ F 100 volt film capacitors
- 2 8.0  $\mu$ F 100 volt film capacitors
- 2 10.0  $\mu$ F 100 volt film capacitors

Digi-Key, Box 677, Thief River Falls, MN 56701 (1-800-344-4539) has suitable Panasonic E-Series capacitors available. Part Number E1685 (6.8  $\mu$ F 100V), Part Number E1825 (8.2  $\mu$ F 100V), and Part Number E1106 (10  $\mu$ F 100V). These values are well within the tolerance required. The prices, in single lot, are 2.35, 2.86, and 3.23 each respectively. There is a 75¢ service charge on orders this small, plus shipping.

You will also need the following tools and supplies:

A Phillips screwdriver, a soldering pencil and rosin core solder, a wire cutters, a hot glue gun and glue, and a flat bladed screwdriver.

Cautions! Although this project does not require exceptional skill, it is rather easy to damage your speakers with a slipping screwdriver or excess force. B&W will not provide warranty repairs for drivers with holes poked in them. You must also be able to make good solder connections. If in doubt, enjoy the speakers as they are.

You may use other brands of film capacitors as you choose. The capacitance values should be within 10% of specified (matched pairs are best) and the voltage rating must be no lower than 100 volts. In general, choose capacitors that are non-polar, small, non-microphonic, and non-inductive.

Lets get started.

1. Lay the DM100 on its back on a clean workbench and remove the grill. Remove the four Phillips screws securing the woofer. Gently lift up the woofer and unclip the two leads noting the orientation of the wires (brown goes near the red dot). Write down the location of the red dot as it is possible, but not likely, that it may fall off while you are handling the woofer. Set the woofer aside (cone up).
2. Note that there are eight screws on the face of the tweeter. **Do not touch the four inner screws!** These hold the magnet on and if you loosen them you will destroy the tweeter. Remove the four outer screws only and lift up the tweeter. Note that the red wire goes to the red lug. Unclip the wires and set the tweeter aside (dome up).
3. Note how the dacron fiber is packed in the box. Remove the fiber and set it aside.
4. Note the orientation of the crossover in the cabinet (red wire at the top). Turn the box on its side. Carefully push the crossover-speaker terminal plate out the back of the

box. It is a stiff press fit. Set the speaker cabinet aside.

5. Compare your crossover with the drawing. It should match the drawing exactly, although some of your parts may be mounted "values down" so that you cannot read the values printed on them.
6. Begin with the 7  $\mu$ F capacitor. Unsolder one end from the ground solder lug and the other end from the brown wire and choke wire. Pry the capacitor loose with the flat blade screwdriver. Hot melt glue the new 7  $\mu$ F film capacitor in place. Solder one lead to the ground solder lug and the other lead to the junction of the brown wire and the choke.
7. Unsolder the leads from the 10  $\mu$ F and 8  $\mu$ F capacitors. Use the screwdriver to remove the 10  $\mu$ F cap from the top of the 2.2  $\Omega$  resistor and to remove the 8  $\mu$ F cap from the terminal plate. Hot glue the new 8  $\mu$ F cap onto the plate and then hot glue the new 10  $\mu$ F cap onto the resistor and the 8  $\mu$ F cap. Make sure the resistor is secured to the plate too.

Solder the lead on the outside end of the 10  $\mu$ F cap to the adjacent resistor lead. Solder the outside lead of the 8  $\mu$ F cap to the red wire. Connect the leads from the inside ends of the 8 and 10  $\mu$ F caps together and solder them to the choke lead next to the 8  $\mu$ F capacitor.

This finishes the wiring work. Your crossover connections should be exactly as shown in the sketch.

8. Press the crossover plate back into the speaker box with the red wire up. You may use four dots of hot melt glue to secure the assembly in the box (from the inside) but do not overdo it as you may want to remove the crossover again.
9. Gather the speaker wires to one side and replace the dacron fiber back in the enclosure. If there was a gasket on the tweeter, fit it back in place.
10. Reinstall the tweeter with the red wire to the red lug, the black wire to the black lug, and the clips pushed firmly on. Tighten the four mounting screws firmly but not too tight.
11. Connect the brown wire to the red dot (+) lead of the woofer and the blue wire to the (-) lug. Align the woofer on the enclosure and secure it with the four large screws – not too tight! Replace the grill and you are half way done.
12. Now connect both speakers to your system (the stock one and the rebuilt one). Compare them carefully. If there are gross differences between the two you may have

made a mistake. If you are simply getting a smoother frequency response and better definition from the modified speaker, you are ready to go back and begin on the other speaker system.

The finished pair should be obviously superior in musical quality and be well worth your time in doing this project. Thank you Gregg McArthur, my Chicago area rep, for preparing the basic instructions for this project. We will move on to other models in the near future.

Stop the press! A very interesting product just came in the door while I was writing this. Audioquest, 629 Camino de los Mares, #306, San Clemente, CA 92672 (714) 240-0604 has sent me a couple of sets of their **Sorbothane Tube Dampers** and their **Sorbothane Isolation Feet**. I just took a 15 minute break and can report to you that these accessories work as advertised!

The Tube Dampers are very clever. You simply slip one over each signal tube in your vacuum tube preamplifier (they are not for power output or rectifier tubes) and they "remove" a layer of extraneous "haze" that you didn't even know was there. We did a quick A - B with a new Super Pas Two and really like the results. The sorbothane ring around the tubes damps out mechanical vibrations generated by the tubes themselves and makes the preamp run quieter and clearer. These little guys will cost you \$12.00 for a set of four (all you need for a Super Pas Two) and we would have to say, based upon our first listen, is that we highly recommend that you get them. We are going to stock them, but for now you can order them directly from Audioquest. [1990 Note: The most recent batch of Tube Dampers we used tended to melt on the tubes in the preamp - not a pretty sight. I don't know if they have changed the mix or if our current 12AX7A tubes run a bit hotter, but we are not using the dampers any more.]

Audioquest's Sorbothane Isolation Feet may work wonders for you too. They are about the size of hockey pucks and, like a meat ball, won't bounce! A set under the Super Pas Two helped it some more (not as dramatically as the Tube Dampers though) and I already have another set under this word processor which gives the keyboard a nicer feel and makes the printer much quieter. In my system, with my turntable mounted on 1000 pounds of concrete and sand, they made no change there, but they may help isolate many of your components (CD Players, Turntables, Power Amplifiers, and even your TV set). They are a bit more expensive, \$10.00 each, and I doubt if I will stock them for now. But they probably have many more useful applications.

Audioquest also makes the sorbothane material in 6" x 6" x 1/10" self sticking sheets. You

can cut and place this material in a variety of places where it is desirable to absorb and damp out unwanted mechanical energy, both in audio systems and in other every day applications. The sheets cost \$15.00 each. Order these directly from Audioquest and let me know what useful applications you find for the material and I will report your findings here. Got to go now, next month the C.E.S. show report.

*Frank Van Alstine*

## VOLUME FIVE NUMBER SIX JUNE, 1986

Due to business and other commitments, I will be out more often than in during the next month. Dave and Aado will be here running the business with the same care and capability I put into it. Remember, Aado designs most of the equipment and Dave is my manager who insures that each order is properly filled, and that each unit is properly built and tested. They know as much as I do about the equipment, maybe even more. Thus, when you call us during the next few weeks, **don't ask for me only and waste your time and ours**. Let Dave or Aado help you; they can help you as well as I can. We operate as a team, not as a "one personality" organization. Take advantage of our capabilities. I must have the time to visit factories, evaluate new products, and deal with suppliers. I cannot be here to answer the phone all the time. If you only are willing to talk to (or place an order with) me, then you keep our team from serving you best, and interfere with our abilities to serve you best in the future. Thank you!

I had an interesting customer complaint last month. The fellow listened to, and purchased, a Super Fet preamp and Mos-Fet 150C amp from us. A week later he called to lament about hard, glassy, grainy, and two dimensional sound with the equipment in his home system. Inasmuch as this is a very unusual response to our equipment, I dug deeper with him to find out what else was being used with our equipment.

I found out that since he had really been impressed with the CD performance of our demo system, he had gone right out to a high end salon and purchased a CD player. And, since we got such musical performance with a \$149.00 Magnavox CD player, just think how much better his system would sound if he purchased a really good (and expensive) CD player. Besides, the salesman at the salon told him that the Magnavox units were not any good. Thus, he was the proud owner of a new \$600 Yamaha CD player.

I asked him to bring it out for evaluation in our reference system. He did. With the Yamaha, I too had the same hard, glassy, grainy, and two dimensional sound he had described. The

Yamaha CD player was simply **awful!** We took it apart and found it was built even cheaper than the lowest priced Magnavox units, with nowhere near the engineering excellence of the Magnavox. We patched the Magnavox back in and all was well again musically. There are differences between CD player brands. In a nutshell, nearly all Japanese units I have heard **sound like Japanese mid-fi receivers!** This should not come as a surprise to you; after all, their audio stages are right out of their receivers.

I have now had "hands on" experience with the newest (lightweight) Magnavox 2041 and 1041 units. I have good news - they perform just as nicely as the older massive Magnavox units. Although they are nearly all plastic, there have been many very clever engineering improvements. The disc drive mechanism is probably better shock isolated than the older units. The much simpler looking PC card is actually much more sophisticated. It is a shielded card with hundreds of chip devices mounted directly to the foil paths on the under side of the board. North American Philips has actually put all the necessary circuits on one simple board in less space, and at less cost, than in their old two board shielded cage installation. The price for these units is \$200 or less. I highly recommend them.

Aado, Gregg McArthur, and I spent the first weekend in June at the giant Consumer Electronics Show in Chicago. This is the annual home electronics trade show at which nearly every supplier of home entertainment products displays their wares to possible buyers. We get to see and hear nearly everything there is all at once - it's kind of overwhelming!

McCormick Place, the giant three level exposition hall (you could play about ten football games at the same time inside) on Chicago's Lake Shore was stuffed with every car radio, satellite receiver, TV set, VCR, and boom box ever made. The nearby McCormick Inn had all its meeting halls and three floors of hotel rooms full of mainstream audio equipment displays. Downtown, there were two hotels full of "esoteric" audio products, and another football field sized exposition annex held acres of porno film purveyors and home computer remnants. There were many other "private showings" of equipment scattered throughout other Chicago downtown and airport area hotels. No single human could possibly see it all in the four days the show ran. We concentrated on those products of interest to you.

I guess my first general overall observation regarding audio equipment is that there is an ever widening chasm between the mainstream "mid-fi" equipment and the esoteric "hi-fi" equipment, in performance, price, and availability, that in general serves the lover of music very poorly!

The “marketing” of mass produced audio equipment is rapidly being dominated by the “Super Stores” who care not what anything sounds like but are only in business to “move” boxcars full of merchandise at supposedly discount prices.

These Super Stores are driving the independent home entertainment stores out of business.

Thus the suppliers to the smaller stores, the NADs, the ADCOMS, the CARVERS, the INFINITIES, the B&OS, (and similar) are seeing their retail base being seriously eroded out from under them.

This forces these producers of rational equipment into a box from which there are no really good choices for you, the person who appreciates music more than blinking lights and fads.

The good quality audio supplier can go ahead and sell to the discount super stores, but there is a catch. Since there are no trained audio salesmen or rational listening facilities in these “electronics barns,” the potential customer will have no expert guidance to help him separate the quality from the plastic. In general, the buying choice will be based upon price and features. Good equipment simply does not sell to the uninformed buyer if his choice is “flashier” equipment with more features at a lower price! Thus, the producer will be forced to build “Super Store type” equipment – cheap circuits, lots of buttons and lights, and worse sound. You lose!

The caring supplier’s other choice is to continue to supply good quality equipment to independents, watch them go out of business due to overwhelming pricing and advertising pressure from the Super Stores, and then go out of business themselves because of a lack of markets. You lose again!

It will be interesting to observe the next few years and see if the best of the quality suppliers and their dealers can effectively deal with this threat. Meanwhile, our position as a direct mail supplier of high quality equipment to informed and caring music lovers does not seem to be too bad a place to be.

Anyway, lets talk about some of our main suppliers first.

**Hafler** showed nothing new, except samples of their \$400 car amplifier (to be available “this fall”). All of the products we build into Hafler chassis, and stock Hafler components themselves, will continue as you know them. When we get the car amplifier, we will install it (along with B&W MASS speakers) in my Audi Quattro and report on the performance,

both before and after we engineer Transcendence audio circuits for the car amplifier.

**Harman-Kardon**, unfortunately, is discontinuing nearly all of its turntable models, including the T-30. They have about a three month’s supply of inventory left, but after that, they will be all gone, unless they can find a new supplier to make them. Their previous turntable supplier (who built the units under contract to H-K) is getting out of the turntable business completely – the CD strikes again! We have inventory and can supply you with our T-30 special units for now, but not long term. If you want to get that one last quality record playback system before there is simply nothing left to play your records with, act soon!

**Grado**, as usual, was not at the show. They spend not a penny on advertising or promotion, and simply build better cartridges for the money as there are no advertising costs built into the price of their products. The **Longhorn Grado** will continue to be available.

We looked very carefully at the new top of the line **Dual** turntable. It has some promise, including a 78 rpm speed for you antique record collectors. I have asked the Dual factory representative to get me a sample. I hope that many of the engineering improvements we made to the T-30 will also work on the Dual. If so, we will let you know. It will be more expensive.

**B & W Loudspeakers** had an outstanding display of three **brand new loudspeakers** at a private showing at the University Club in downtown Chicago. The new loudspeakers are the **MATRIX 1**, the **MATRIX 2**, and the **MATRIX 3**.

These three new speakers share the following rather revolutionary new technology:

Their cabinets are **filled** with a complex series of interlocking cross bracing panels looking much like an egg crate. These panels lock into, and are bonded to, the top, bottom, front, rear, and sides of the cabinet. The spaces in the **matrix** of internal bracing are then completely filled with bars of acoustical foam. The **highly successful results** of this construction innovation is to provide a loudspeaker cabinet that is **absolutely inert**. Actually, the cabinets are stiffer than if made of concrete, and are much more inert than the very expensive Celestion Aerolam metal cabinets (which “ring” at high frequencies). Acoustic output from the cabinet structure is simply eliminated.

The drivers used in the Matrix speakers are all new too. The cast frame becomes the whole face of the speaker, rather than being bolted to the box. All the channels in the frames are **filled with damping**

**compound!** They have put into production the very same damping techniques I showed them when I visited their factory in 1981 and which I have been telling you about for years! The Matrix series are really a partially Van Alstine designed system!

Cone materials are new. Although B&W’s Kevlar cones are optimum, the production yield is low and thus the cost is very high. B&W needed an equivalent performing material that could give you a better **price - performance ratio** than Kevlar.

They have produced a nearly ideal cone material, a homopolymer polypropylene with much better internal damping and stiffness than the more usual copolymer polypropylene used by other speaker manufacturers. Because the homopolymer material is unsuitable for packaging materials (the most widespread application for copolymer polypropylene) it is rarely available. Thus, B&W had to contract directly with a plastics manufacturer in England to produce the new cone material for them.

The new polyamide dome tweeters are ferrofluid filled, have all mounting plate cavities filled with polyurethane elastomer, and are built into castings that are an integral part of the cabinet face. The step function linearity of these new tweeters have been improved from 6 volts to 14 volts, substantially improving dynamic range of the systems.

The crossovers, although complex (and containing electronic protection circuits), are simplified from some previous models because the out of band roll-off characteristics of the Matrix drivers more closely approach an ideal 12 dB per octave. They are built with all film capacitors (except for the large DC blocking capacitors to the woofers).

Even the stands are improved. There are massive marble base stands available for the Matrix 1 and Matrix 2 with filled and damped steel vertical supports. These are strongly recommended for optimum performance of the speakers.

The **Matrix 1** is 9" wide, 16" high, and 12 5/8" deep. It is a two way system weighing 22 pounds with a 150 mm woofer. Its sensitivity is 85 dB and its maximum clean output is about 106 dB. It is a 4.5  $\Omega$  system recommended for 50 to 120 watt amplifiers (at 4  $\Omega$  – any of our smaller amplifiers). Its **list price is \$499 each plus \$199/pair for the stands**.

The **Matrix 2** is 10 1/4" wide, 23 1/2" high, and 12 1/2" deep. It is a two way system weighing 35.2 pounds with a 200 mm woofer and a more massive magnet structure. Its sensitivity is 87

dB and its maximum clean output is about 110 dB. It too is a 4.5  $\Omega$  system and is recommended for amplifiers between 50 and 150 watts. **Its list price is \$699 each plus \$229/pair for stands.**

The **Matrix 3** is 10 1/4" wide, 35 3/4" high, and 16" deep. It is a three way floor standing system with two (more massive yet) 200 mm woofers. Its sensitivity is 90 dB with maximum clean output of nearly 120 dB! It is a 4.5  $\Omega$  system for amplifiers of 50 to 200 watts (any of ours). **Its list price is \$999 each** (stands not required).

Obviously, after we have completed an "in house" evaluation of these products (samples are now on order) we will set our own **lower prices**. Call us for details.

Now for the obvious question, "How do they sound?" In a word, superb!

Given the constraints of a strange room and different electronics and source material than I am used to (B&W's own big mos-fet amplifiers and PCM video taped program material) the quality of these new systems was obvious.

My initial impression is that the Matrix 1 will outperform the DM2000 in all respects (range, dynamics, and clarity) for a lot less money and in a lot less space. I suspect the Matrix 2 will do the same thing to the DM3000. Finally, the Matrix 3 obsoletes the 802 and probably will give the 801F Special a lot of trouble too. The only expensive previous generation model that still emerges as a clear winner is the awesome 808. Note that 2000, 3000, 802, and 801 speakers still remain available.

The clarity, dynamic range, transient character, and overall range of these speakers is very surprising! All in the large demo room nearly fell off their chairs upon first hearing the Matrix 1 put out dynamic deep and clean bass we normally expect from cabinets five times as large. It seems as if the Matrix cabinet structure **greatly extends clean bass response** as more "flexible" conventional cabinet designs simply "eat up" bass energy and turn it into cabinet vibrations and heat. Imaging and staging was lifelike. It seems as if having all the sound coming from the drivers, and none from the cabinets, puts all the music where it is supposed to be, without extraneous output from the cabinets and surfaces near the cabinets. When you hear the music, all the music, and only the music, imaging improvements come automatically without need for electronic gimmicks.

Obviously, my initial impressions are subject to conformation with more realistic

tests in my own studio, but, I did get one further comparison.

B&W had set up, in an adjoining room, their **Active 1** self powered systems, a \$3400/pair three way systems similar in size to the Matrix 2. I stuck my head in the door to this demo room and gave a quick listen. After the Matrix demonstration, the Active 1 room sounded like I was **walking into a mud factory!** Enough said.

Only one piece of slightly bad news at B&W. Due to the recent decline in the value of the U.S. dollar in relation to the Pound, there has been **small price increases** (effective immediately) on the 100 series loudspeakers. We will now be selling the DM100s for \$240/pair, the DM110s for \$350/pair, the DM220s for \$520/pair, and the DM330s for \$675/pair (still under a new higher list price). 100 series stands are now \$60/pair. The recently improved 100 series speakers (all are now fuse protected and have more "open" grill assemblies) remain great values.

Needless to say, the B&W Matrix series was easily the best example of advanced engineering at the entire C.E.S. and was really the only one in which advanced engineering actually resulted in major improvements in sonic reality.

Of course, B&W was not alone in offering good sound, but the examples were, to my ears, few and far between. In almost all "high end" rooms, I could have walked in with a Mos-Fet Control Amplifier and a set of B&W DM110s and simply **wiped out** many thousands of dollars of overpriced and bizarre equipment. But let's talk about the nice things I heard first.

**Bob Carver** showed prototypes of a simply amazing loudspeaker, called, of course, the Carver Amazing Loudspeaker. It looks something like the **dreadful** Apogee Scintilla, but sounds markedly "live" and dynamic as compared to the compressed and bland Apogees. The Carver speaker looks like a "planar" speaker, but is not. It uses several square woofers and something that looks like a ribbon tweeter, but isn't (according to the Carver rep I talked to). Details are not yet available. They are supposed to sell for about \$1500/pair and to be easy to drive. I suggest you keep checking with your nearest Carver dealer and give these a listen.

**DCM** had a nice display of the **Time Frame** loudspeakers. These too are thin (7" deep) and look like planars, but actually are closed transmission line systems. They sounded musical enough to recommend to you that you listen to them for yourselves. Their display of the smaller models sounded much better than the room dedicated to the largest Time Frame.

**Audio Research** easily had the best (most musically convincing) display at the "high end" hotels, but only with their most expensive SP-11 hybrid Fet-Tube preamp (\$5000!) and their most recent version of the D250 vacuum tube amplifiers (\$6500!) driving Infinity loudspeakers. It should sound good, for the system price, you could afford to buy the orchestra! Their "cheap stuff" (\$2000 or so each) driving Dahlquist DQ-20s, sounded grainy and flat - like ho-hum solid state equipment.

**Quad** displayed their electrostatic speakers along with all Quad electronics and produced familiar Quad (civilized and musical) sound. They haven't changed anything and probably won't for many years. Next door, **KEF** had a most uncivilized display, bright and brash sounding. It appears as if they are trying to appeal to the upper end of the Super Store shopper.

**Bob Fulton** was back, with a display of new loudspeakers featuring "Oval Windows." "They are **not tuned ports!**", says Bob. Sure. They also have "Acoustical Yokes." In spite of the literature (a yoke), they sounded sweet and natural, as most of Fulton's products have over the years. He really gets a lot out of O.E.M. drivers and certainly is more of a musical artist than a musical engineer and is fun to listen to.

**Richard Shahinian** displayed his **Obelisk** loudspeakers very effectively and got musical sound in hotel room conditions that were beyond the capabilities of most other companies to deal with. Again, Shahinian Acoustics products are worth evaluating.

Outside of audio, **Sony** displayed very high resolution digital TV sets and **pushed 8 mm VCRs**. It is obvious that they are **giving up on Beta**. Their 8 mm cameras had excellent resolution, better than **Kodak's 8mm system** under similar show conditions.

**Sharp** showed a **3-D VHD (video disc) System**. It works just fine, with electronically controlled liquid crystal shutter glasses you need to wear while watching your TV set. Now, all that is needed is some 3-D movies more modern than The House of Wax!

**Kloss** displayed the highest resolution **big screen projection TV** I have yet seen. If you want a projection TV, Kloss is the way to go.

The **Satellite Receiver** business is dying! (Down 90% since scrambling.) There is a big **scam** going around you need to be warned about. Some unknown outfits are selling "boot-leg" de-scramblers guaranteed to pick up HBO for high (\$700) prices. They work! The catch is that they are simply M/A-COM decoders (available for \$395 anywhere) **repackaged!** The fly by night outfit simply prepays HBO for six months of service before sending you their "black box." When the subscription expires, so

does your de-scrambling ability! There is a **real universal de-scrambler available**, called the **Black Box Solution**, but it handles **video only**. Audio signals are digitally encrypted and will be much more difficult to de-code. The Black Box Solution is **illegal** unless you pay the broadcaster for viewing rights.

Getting back to audio, most of the rest of the esoteric equipment simply is not worth talking about. It is vastly overpriced and in general totally lacking in convincing dynamic character and musical intensity. Good tonal balance and resolution alone is not worth thousands of dollars per product.

One great new product was not at the show, because we just finished it today – **THE TRANSCENDENCE CD PLAYER!** It is \$795.00 complete. It has **profoundly better bass, dynamic range, musical intensity, and resolution** than any other CD player (or any other source) you have heard. Call us about it and allow 6-8 weeks for delivery. It's got five of our new circuit boards inside a Magnavox 2041 chassis. You won't believe it 'till you hear it. Out of space for now – next issue will be in **early August**.

*Frank Van Alstine*

## VOLUME FIVE NUMBER SEVEN JULY, 1986

We are late this month because I just got back from a trip to Europe with the family. We picked up a new VW Quantum Syncro (four wheel drive) and meandered around the continent for a month visiting Holland, Belgium, France, West Germany, Italy, England, and a few other places. I could write this whole issue about driving in Europe (takes about 100 times the concentration as in the U.S.A.) and what interesting things we saw and did, but I won't. This is supposed to be an audio newsletter, not a travel guide.

I will mention that it is nice that the U.S. news agencies scared all the panicky tourists away from Europe with vastly over exaggerated reports on terrorism. It made it easy for us to find hotels and visit uncrowded areas everywhere. At a reader's request, I would like to talk a little about **Audio Test Clinics** this month. These are those great occasions when some manufacturer sets up his test equipment at a pet dealer and has you bring in your amplifier to measure (and always, to show you how bad it is compared to the manufacturer's brand).

I have three observations regarding these clinics:

1. They make lots of unusual business for repair shops such as, "My amplifier has a spec. of .01% THD and at the clinic it measured .02% THD so it has twice as much distortion as normal so you better

fix it!" Sorry, dear panicked customer, the precision of testing at a typical clinic is far worse than the precision of your amplifier – like trying to read 6 place accuracy on a broken slide rule. These "numbers" are meaningless unless done in accordance with repeatable standards – such as having the test equipment isolated from the equipment being tested and using a regulated 120 volt bench power supply, for starters, which I have never seen done.

2. It is really easy to "null" the test equipment so that the distortion in the manufacturer's equipment is canceled, but at the same time the reading is much higher than normal for any other brand of equipment. After all, who is running the test?
3. The best "trick" though is to test for some special characteristic that only the manufacturer's equipment has (even though that special characteristic is valueless).

For example, McIntosh is now running clinics that claim to show that their amplifiers do not distort when grossly overdriven, and that other brands do badly distort, thus claiming that only McIntosh is "digital ready." Of course, any amplifier will exhibit distortion when driven beyond clipping. You can, however, keep the output distortion looking low by simply clipping the input signal first. You will still get the same amount of distortion (a clipped signal is clipped) but if you measure only the output, you won't measure this distortion (but you will hear it still!). Sorry, McIntosh, moving your distortion to a different place does not remove it, nor does it make your equipment "digital ready," it only makes it "advertising clinic ready!"

Your audio system can only be as good as your source material.

Those many pages of agonizing prose in *The Absolute Sound* and *Stereophile* purporting to exactly describe all the marvelous nuances and delights of the supposedly true to life megabuck equipment rest on one assumption – that the playback source material being used to evaluate the equipment is high fidelity. **It isn't!** All the experts are doing is evaluating how their bung source material is interacting with their bung equipment. They are endorsing equipment that has no chance at all of reproducing the dynamics and intensity of live.

Instead of listening to equipment, let's go to a live concert and spend a bit of time listening there to the differences between live and "high fidelity" audio playback. Let's see if we can verbalize the obvious differences we hear.

Live is **smooth!** There are **no rough edges**. Sure, there are "rough and raspy" sounding

instruments, but the sound still is smooth – there is no unnatural harshness – only the pleasing combination of harmonics produced by that instrument. The raucous sound of some reed and antique instruments is pleasing, not fatiguing like the residual harshness of audio playback systems.

Live is **powerful!** The softly drawn bow of a violin in the hands of an artist simply fills the hall in a way no audio playback system can. I had the fortunate experience a couple of weeks ago to attend an organ and violin concert in a great 12th century stone cathedral in Germany. There were only two musicians – violinist Erno Sebestyen from Munich and Organist Hans Joachim Erhard from Aschaffenburg. The program featured works of Handel, Bach, Holler, Mendelssohn, and Vivaldi. To be honest, I had expected the violin to be overwhelmed by the newly built (1967) great pipe organ. I was a big dummy! It was not – the violin played with equal power. That tiny instrument carried and filled the cathedral with some of the most lush string sound I have ever heard, matching perfectly the acoustical output of the huge organ. The concert was magnificent! To a certain extent, it sounded like a human being, the violinist, had been captured and made a live part of the great organ – it sounded like the organ was alive. It was a unique experience (there are not too many 12th century cathedrals in the U.S.A.).

Live is **clear!** It is the clearness of the violin bow starting to play a note, the organ stop opening and the air beginning to flow just before the tone of the pipe is audible. It is the clearness of the singer starting to form the shape of the note before it is really sung. It is all the little clues we hear live that simply are not there in recorded playback. Sure the very best playback system kind of gives us hints of these clues, but it is not the same as live.

Live music has an **intensity of dynamics**, even in low level passages, that is utterly lacking in audio playback systems. Listen carefully to the attack of a lightly tapped cymbal, the transients in a bowed string bass, the quickness of a plucked guitar. It becomes obvious that even the finest audio system is simply loping off and scrunching most of the dynamic attacks of live, even at low listening levels.

Live music has **duration!** Each note "hangs" for a while in the air. It is not cut off as soon as it is played. Listen again to the tapped cymbal. Listen to how long it plays, and to what a complex set of harmonics it plays, slowly fading out. Until very recently, I had never heard an audio playback system handle the duration of live correctly.

I think you have to agree with me that there still remain big differences between live and audio system playback quality.

**Where are the most serious remaining problems?** There are lots of possibilities. Perhaps it is the interconnect cables and speaker wires? Gosh, maybe they do have to be made of Unobtainium and only under a full moon. If this is the line of research you want to invest in, you had better find another source for advice. This reminds me of an interesting experiment I proposed to a magic wire producer at the C.E.S. Show.

These people were selling speaker wires the size of fire hoses at solid gold prices. I investigated to find out what could possibly be so valuable about a chunk of wire. I was informed that the wire was “tri-axial” in its construction – that it has three different kinds and sizes of conductors in it woven in a most wonderful pattern. There were many very fine small wires for the highs, somewhat fewer and coarser strands for the mid-range, and really heavy stuff for the bass.

I asked the obvious question, “Well then, what kind of a three way electronic crossover do you use after the amplifier to get each of the three sonic ranges into the “right” part of the wire, and again after the speaker wire (before the loudspeaker) to get all the sound back together again at the speaker terminals?” You see, I was really worried about this problem. After all, I can surely assume that without an electronic crossover ahead of the speaker wire, that there was a dire chance of accidentally getting highs into the bass frequency wires or getting mid-range into the bass wires, etc., and really ruining the sound. And, I am sure that if you got those big nasty bass signals into that itty-bitty high frequency strands in the cable that you probably would permanently damage the wires and they would no longer be good for anything more useful than connecting the output of atomic power plants to transmission line grids. I need not have worried! I was assured by the manufacturer that an electronic crossover for speaker wires was unnecessary. It seems like the sounds are really smart! The highs know just where to go – to the high frequency strands only. Likewise, with his wires, the mids and bass are magically and mysteriously directed only to their appropriate sized conductors. No interaction was possible.

I restated the question, “You claim then that your high frequency strands will not pass bass signals, only highs?” I was assured that this was correct.

I then posed another question, “Would you then assume that signals below 100 Hz are bass and would not go through your high frequency strands? I was assured that was true. I then proposed an experiment to confirm all this good data:

1. Take a section of the magic wire in question and strip out two lengths of the high

frequency strands only and remove the insulation from the ends.

2. Put one length in each hand of the manufacturer (after wetting hands with salt water to assure good conductivity).
3. Plug other ends into a 110 volt 60 Hz power outlet and see what happens!

Obviously, since the wire was claimed to not conduct low frequencies, and since 60 cycles is a low frequency, the manufacturer would not be harmed and this would be a dramatic proof of his claims.

To my utter astonishment (ha - ha) the cable manufacturer **did not leap** to perform my experiment! Actually, he got red in the face, turned about, and stalked off! He was not happy with my idea at all! I wonder why not? Could it possibly be that his “high frequency” strands will conduct lows (thus electrocuting him) in spite of his claims? Could it be that his claims are false? Could it be that the highs, lows, and mid-range are getting all mixed up in his expensive cables? Could it be that the entire concept of hyper-priced “tri-axial” speaker wires is actually only hyper-bull? What do you think? **Caution! Don’t try this experiment yourself!**

O.K. then, if you are still with me, you probably agree that our worst remaining audio system problems are not the speaker wires or cables. **What about your electronic audio equipment?** You can read many advertiser supported high fidelity magazines and find out that all audio equipment is essentially perfect and cannot be improved upon. You can read the underground magazines and find out that unless the equipment costs in excess of \$20,000.00 that it is not even fit for use by your Great Aunt, unless it is at her summer cottage and she is not there hardly ever. (Class C.) You can get really confused and not know what to believe or who to rely on.

In general, we would advise you that the audio electronics in your system is not perfect. The lower priced receivers are not much better than clock radios, and even much of the expensive equipment is not capable of reproducing every nuance of “live.” However, there is a price to pay for perfection, and you may not choose to pay that price.

To be rational, we would suggest that you have available, with careful selecting, audio electronics, within your budget constraints and your desires, that at the very least, is not the worst case problem in the reproduction chain, and thus, is likely good enough.

**Is it the loudspeakers then**, that is our worst problem? They used to be, but not any more if you select carefully. Certainly even fine loudspeaker designs have their own individual limitations and distortions (otherwise they would

all sound identical) and your final choice is still subject to your own subjective “likes” and dislikes – a kind of “pick your poison” problem. But, there are really fine loudspeakers available at modest prices that are more capable of realistic music reproduction than what is demanded of them – they are higher fidelity than the signal that drives them. And, fortunately, the limitations and colorations of good loudspeakers seem to exist independently of the music – it is easy to tune these problems out and enjoy the music anyway. No, competent modern loudspeakers are not the worst case problem.

The worst case problem in your system can easily be **your listening room**. Ideally, your audio system should be located in an anechoic chamber – a room completely free of reflections and sound of its own. Not many people understand this concept, they assume that room reflections are desirable, and also point out that when a person is in an anechoic chamber and speaks, that his voice sounds strange, muffled, and dead. This is true, your voice does sound strange in an anechoic chamber because you are always used to speaking in a reflective environment, but:

With an audio system, our source environment is not the anechoic chamber, but the environment of the space the recording was made in. We want to hear the acoustics of the original environment, not the acoustics of our listening room, which was not part of the original environment and thus is wrong. Obviously, if you record yourself talking in a reflective room, and then play the recording back in an anechoic chamber, you will hear yourself speaking in the recorded room, and the sound will be natural.

Thus, your obvious goal in making your listening room sound better is to **make it not sound at all!** We want to hear only the sound captured in the recording, not modified by the acoustics of our listening room. With a little care it is pretty easy to make our listening room “dead” and relatively non-reflective. Then it is definitely not our worse case problem.

Next, we better consider **our source material** – our FM reception, tapes, records, and our compact discs. Is our playback quality primarily limited by the quality of our source material?

**FM reception** is actually a “second hand” source. It is obviously dependent upon the quality of the source the broadcasting station is using and upon the engineering excellence of their transmission and your FM tuner. FM is an

original source only for live broadcasts. Fortunately, I can assure you that if the live broadcast is carefully engineered, if the station broadcasts for maximum fidelity and dynamic range (instead of for maximum car radio coverage), and if your FM tuner is of outstanding quality, then FM broadcast is not your worst case limitation, it can be good enough to "put you there."

**Analog tapes** that we can actually purchase, especially cassettes, definitely are a worst case limitation. Consider that the original master recording was done on a multi-thousand dollar studio machine built like a tank, using one-half inch tape running at fifteen inches per second. I have heard the playback of many real original masters made by master recording engineers such as Russ Borud and Bob Fulton. Let me tell you that their originals are no problem at all. Unfortunately, you cannot buy the originals (in fact, you can only play them back a few times before they start to obviously deteriorate in quality). You can only buy "dubs." In general you have only cassettes available. They are one-eighth inch wide and run at one and seven-eighths inches per second. A little math tells you that the amount of data you can store on cassette per unit of time is **32 times less** than what you can store on open reel. If it takes a professional open reel machine to make high fidelity recordings, what do you think you get when you cut the information by a factor of 32? You get low fidelity mud, of course. Cassettes are a worse case limitation. Luckily, we don't have to use cassette as our sole source (unless we are a mid-fi audio store salesman).

We can turn to those tried and true (tired and warped?) **records**. I don't know where the sonic limitations of the best records are, but there certainly are real barriers (mass) that limits our ability to get the information back off the record – namely the mass of the playback stylus and the mechanical limitations and resonances of the entire turntable - tonearm system. Records are a worst case limitation to audio fidelity. Sure, each year there comes along several more exotic, finicky, outrageously expensive, and obscure record playback systems alleged to eek a bit more resolution from your records (assuming you have not already worn them out on last year's equipment). The trouble is you have got to push a stylus around with soft plastic and there are real world limitations as to how fast and how hard the record can push the stylus before the stylus starts eating the record and losing lots of information. Obviously now, no stylus - arm - table is going to track the real dynamics of live music unless a zero mass retrieval system is perfected. Even then, we still have the mass and energy limitations of the record cutting machine – what we really need is a zero mass laser record mastering and playback system. Wait a minute! We have that right now!

It is called the **Compact Disc!** We know we can store music digitally encoded on a Compact Disc with really flat frequency response beyond the range of human hearing, with dynamic range in excess of the capabilities of a real world listening room, and with vanishingly low distortion, channel interaction, and mechanical limitations. Any competent engineer knows we can reach 30 dB beyond the capability of a vinyl record **in every respect!** The Compact Disc, itself, is not a worst case limitation. In fact, it is easily our **best method of storing music**.

**Why then do so many "golden ears" hate the sound of CD playback?** It is because they have been listening to a worst case limitation – the playback quality of all of the CD players they have ever been exposed to. The "experts" are making a great error – they are blaming the CD technology itself for flaws that only exist in all of the totally inadequate CD players they have heard. They are throwing the baby out with the bathwater.

**What is the real problem?** It is that all "off the shelf" CD players are executed to essentially the same low quality standards. Sure, the mechanical and computer sections work just fine and really are capable of the sonic promises of the format. But when it comes to taking the digital data stream, transferring it back to an analog signal, filtering out the residual switching data, and driving real world loads downstream (such as your preamp), the CD designers have completely "dropped the ball." They have designed in tired old "Japanese receiver" **60 dB dynamic range analog stages that absolutely strangle** the music coming out of the CD player. Your CD player may have a 90 dB dynamic range "specification" **but only on simple sine waves**. On real music, your CD player is "stealing" and scrunching off 30 to 40 dB of dynamics and resolution from every disc you play! Cheap IC output stages simply cannot supply the dynamic current to drive the necessary internal filters fast enough without going into hard internal slewing and current limiting. In addition, you simply cannot use high Q filters with high frequency resonant peaks in an audio application. Furthermore, **you cannot "fix things"** by tacking on additional circuits after the original CD audio-filter circuits as is done in several very expensive British CD players. The damage has already been done!

**What must be done** is to replace all of the audio and filter circuits with complete new audio and filter circuits that have the following characteristics. The audio circuits must be 100 dB dynamic range truly high fidelity designs, not "mid-fi" afterthoughts. The audio circuits must be able to drive the required filters without limiting under dynamic music conditions. The filters must be **critically damped** ( $Q=0.5$ )

with no ringing at all. The audio circuits must have an independent power supply, free of digital switching trash. When you experience CD playback that is finally "right," you will immediately know that a great step toward "you are there live" has been made. You will realize that **previously the source playback had been your worst case problem!**

There is a CD player available right now that meets the above described criteria – the **Transcendence CD Player**. It costs \$795.00 outright or \$595.00 to install our five new circuit boards in selected Philips (Magnavox) units. **Call us for application details before shipping!** When you hear it, you are going to throw all your records away because it will make them sound like Edison cylinders! It puts you "in the record booth" with studio recordings, and "in the hall" with good live acoustic performances. Sure, you will hear all the engineering flaws in poorly executed material, but as a "visitor to the session" not as a captive of a hi-fi system. It is a new experience. It is probably our best new product, and works great even when the rest of your system isn't outstanding. And although it greatly extends the range of your system (much more powerful and clean bass and clear highs) with outrageous transients and dynamics, it seems to make your amplifier sound more powerful. It doesn't stress your system; it unleashes your system.

Your audio system can be no better than your source material, and your ability to play back that source material. We now recommend that you start with the Transcendence CD Player first, no matter what the rest of your system is. With stunningly better source playback, you will think you installed an all new system.

We have got one other new product to announce now, the **Transcendence 110 Preamplifier**. We have installed five new Transcendence circuit boards in the Hafler DH-110 preamp: a new shunt regulated power supply, two new Transcendence phono preamplifiers, and two new Transcendence line preamplifiers. We interface with and salvage all of Hafler's switching and control functions. It sounds, of course, just like our other Transcendence Series Two preamps, but is prettier and has complete full functions. The price is \$895.00 outright, or \$545.00 to install our new circuits in your stock Hafler DH-110. It is available right now!

*Frank Van Alstine*

## VOLUME FIVE NUMBER EIGHT AUGUST, 1986

One reader wrote to me last week regarding the July, 1986 issue of *Audio Basics* wondering why I did not say more about treatment of your listening room.

The reason; I did not want to repeat myself. I have already discussed the basics of room "taming" in the **July, 1983 issue** (Volume Two, Number Seven). Yearly back issue sets of *Audio Basics* are still available at \$15.00 per year delivered in the continental U.S.A.

I have talked to many of my clients and readers over the years about their listening rooms on an individual basis. These conversations point out a common problem – people simply **do not want to do what is necessary** to make their rooms sound better. They like their glass, tile, chrome, and hardwood surroundings. While that can be just fine as a human environment, **it is not fine as an audio system environment.** In a bright, reflective listening room, the "sound" of the room will always dominate over the sound of the system and high quality playback equipment just won't do you much good at all. If you want good sound, you must create a good sounding room first – actually a room that does not "sound" at all.

I have got a bunch of products that I have listened to in house recently that **will not** help you get good sound.

I will start with **Reference Recordings.** I have mentioned in the past that I was **underwhelmed** with vinyl records made by Reference Recordings because I thought the special tape recorder used sounded like a Sony 350 with worn heads. Now I have had a chance to listen to a new RR Compact Disc, RR-12CD "DAFOS." I find I was wrong about the tape recorder used. Keith Johnson's "unique focus gap analogue recorder" doesn't sound like a Sony 350 with worn heads, it sounds like a cassette recorder with worn and magnetized heads. There is no dynamic range, the bass is pure rubber, and the hiss level on a CD reminds me of my \$49.00 Sharp RT-100 cassette recorder using Radio Shack tape and with Dolby off. **You have to have more than just good harmonic balance and definition** to qualify for realistic audio reproduction in my book. You have to get the dynamics right too! I have yet to hear a Reference Recording that qualifies as "high fidelity."

Another tape recording format that just does not make it, I am sorry to report, is the current generation of **Kodak 8 mm PCM video** tape decks. I have discussed the technical details of this system previously in *Audio Basics*, but last week was my first chance for a hands on evaluation. I did not evaluate the system for video performance, just to see how well it could be used as a digital audio tape recorder.

As I previously mentioned 8 mm PCM video uses an eight bit digital record and playback system, with built in compression and expansion circuits, giving, **in theory**, a 80 dB dynamic range audio recording capability with flat to 15,000 Hz frequency response. If executed properly, this should be good enough to

give much better audio results than any analog cassette deck.

In practice, Kodak's version of 8 mm PCM video **is useless for high fidelity audio** reproduction. They have made a big mistake. There are no record level meters or audio level controls on their deck. Instead, you get an **automatic record level control** built in!

An automatic level control is what you get on little \$20.00 hand held cassette recorders. It is a circuit that drastically compresses loud passages to not overload the tape, and drastically expands quiet passages to make them louder to cover up tape hiss. It is fine and dandy doing causal voice recording on a toy portable cassette recorder for "talking letter" purposes, especially when used by somebody who does not understand how to record.

For high fidelity purposes, the automatic level control circuits **are fatal!** All of the dynamic range of the music is killed. It turns a CD into table radio music, with all contrasts between loud and soft removed, and with all big dynamic transients removed. Thus the Kodak 8 mm PCM system **cannot record high fidelity music at all!**

It is not possible to tell how well the 8 mm digital record and playback circuits are working. You simply cannot "hear past" the automatic level control, which is ahead of the digital circuits. For your information, **Sony** does make one model of their 8 mm PCM deck that does have record level controls and a metering system. Automatic level control circuits are not used. **It may have a chance** of working for high fidelity audio recording purposes. I have not had the opportunity to evaluate the Sony system. I will report further herein when I do.

I should remind you that the Sony PCM 501 ES digital audio processor works just great for high fidelity recordings. When used with a good video tape recorder (need not be a hi-fi stereo model or high video resolution model) you can record **clones** of CDs! I now have over 140 Compact Discs digitally recorded on PCM video tapes. This extension to my music collection has paid for the Sony processor many times over.

I am still happy with the Sony Beta Hi-Fi process for high fidelity audio recording. Compared to the original CD playback, it very slightly dulls the top and very slightly compresses the most dynamic bass passages, and you can sometimes hear the "swish - swish" sound of the internal noise reduction circuits working when high frequency attacks come out of a silent background. But, the 80 dB dynamic range of this format does give acceptable musical results. In contrast, an audio cassette deck simply cannot record a CD, the dynamic contrasts are "out of range."

Yes, I know that the last issue of *Stereophile* stated that Hi-Fi Beta was not as good as a good cassette recorder. But they are all screwed up! Case in point – my "adventure" at the June, 1986 C.E.S. show at the **Krell** display. There they were, two mono amplifiers (costing \$10,000) as big as, and weighing as much as, steamer trunks full of lead scraps. They were driving **Apogee** ribbon planar loudspeakers. Unfortunately, the system **sounded** like it was being driven by two steamer trunks full of lead (with a Sony Walkman somewhere inside connected to the loudspeakers). The system had the dynamic range of a clock radio. I asked politely if the Krell amplifiers were in use elsewhere at the show as I wanted to hear them on full range dynamic loudspeakers. I also mentioned that the "cello" music sounded awfully pinched and compressed (my sister, a music teacher, plays the cello). I was immediately "jumped on" and told, by the group there that it was not a cello playing, but a string bass! You sure could have fooled me! In fact, the system did – it was so terrible that I really couldn't tell the difference between a cello and a bass (the system had no bass!).

Since the esoteric experts there seemed to be happy with their table radio dynamics and range, I left for more promising exhibits. Of course the new editor of *Stereophile* has gleefully used this incident to malign me in his first issue, writing it up with somewhat different emphasis and choice of adjectives (I seem to be nasty, vicious, and deaf). **Anyway**, the point is that if your "ideal" is a pale, compressed version of live, then an audio cassette recorder will do just fine (as it does for *Stereophile*). But, if you demand that an audio system deliver the dynamic contrasts and attacks of live, then an audio cassette recorder doesn't hack it at all.

One other "curious" thing about the last issue of *Stereophile*. This was their C.E.S. show report issue and the show was written up independently by several different reviewers. Although all kinds of obscure products were noted, an interesting, and well promoted new product "did not exist" as far as *Stereophile* was concerned. **B&W and the new Matrix** designs were not mentioned at all!

Sure, the show is big and nobody can possibly evaluate everything there carefully, it is not humanly possible. Thus, I can understand that a writer might miss B&W by accident, but all their writers "missing" B&W?

This omission reminds me of a statement made to James Bond by Goldfinger after Bond had been captured for "snooping." Goldfinger said, "once is chance, twice is happenstance, but three times, Mr. Bond, is enemy action!"

I am getting a better feeling of why so many esoteric writers and manufacturers do not like Compact Disc as a musical source. Several

clients have brought in pieces of esoteric equipment recently for us to evaluate and it is becoming obvious to me that the dynamic potential of CD is getting a lot of highly regarded equipment into real trouble.

A recent **Belles** preamplifier scrunched the dynamic range and lifelike transient capability of our CD player back down to that of a vinyl record, but with a reduction of definition and "space" to even worse than on the record. At least the line section was pretty smooth and neutral. The phono section of the Belles was not even that good, sounding "detailed" (hard solid state edge on everything). The problems were not terribly obvious, just enough to change listening to music to listening to a hi-fi system.

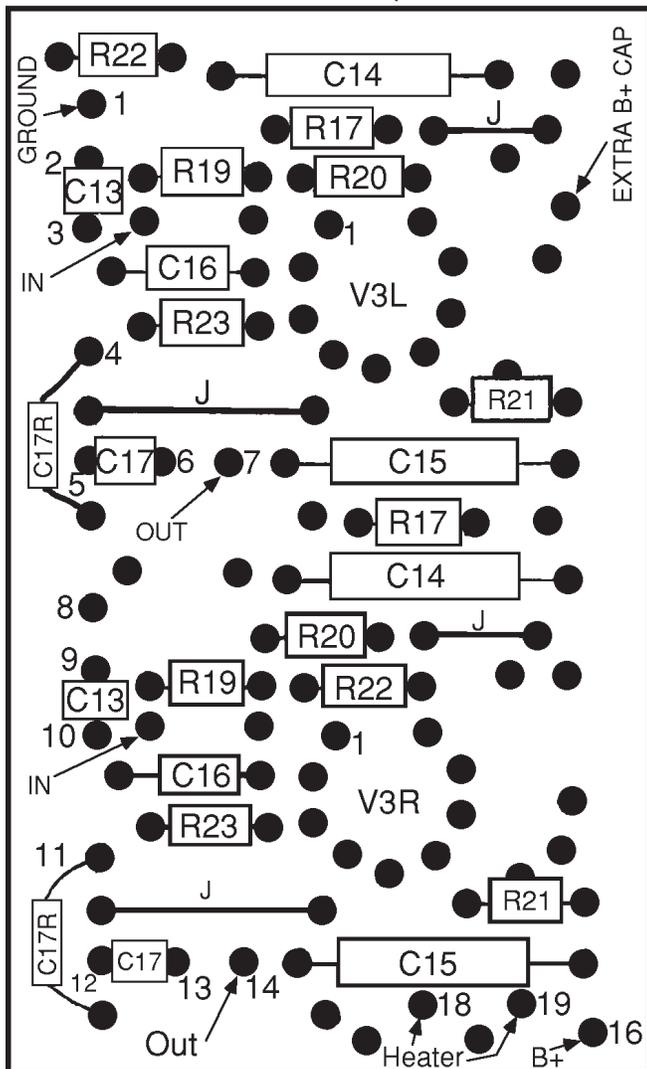
A Conrad-Johnson PV-4 preamplifier sounded very much like an original Super-Pas preamplifier, with perhaps, a little more coloration (not unpleasant). It did not have the stability and freedom from on or off transients that the Super-Pas does, and it costs a whole bunch more. Needless to say, it did not keep up with an **improved Super Pas** (plans for same later in this newsletter!) or a Super Pas Two, and it

did not "like" a CD player at all. It might have liked a very expensive new **Nakamachi** CD player we recently evaluated. This was probably the smoothest and highest resolution **stock** CD player we have heard. Unfortunately, the Nakamachi **compressed** dynamics and transients substantially, and lost the solid bass foundation. It might be a good match for audiophile having better bank accounts than ears. If you have invested megabucks into smooth, but profoundly underdynamic equipment like Krell and Apogee, and pay no attention to "live" (if you get to occasional concerts at all) then a CD player like the Nakamachi might suit you just fine – you will never know what you are missing.

Gee, this issue is starting to sound pretty negative. Lets talk a bit about a new product that I find to be very (but not completely) positive. I finally, at long last, have received my first shipment of **B&W Matrix 1** loudspeakers. They are great loudspeakers performing even better than my impressions of them at the C.E.S. show. They do have some use limitations we need to tell you about first:

1. They have a four ohm impedance rating and are only 85 dB efficient. Thus, they simply cannot be used on a marginal amplifier or with most receivers. Their power demands will likely be more than most low powered amps or receivers can handle safely. If you push them hard on an amp or receiver with marginal current or heat sink capabilities, you will risk overheating and damaging your amplifier.
2. You will really need a big amplifier (our Mos-Fet 200C or better) to drive two pairs in parallel – as this is a 2 ohm load demanding overkill heat sink design and gobs of power at the same time.
3. The special purpose marble base stands for the Matrix 1 are not yet available. Evidently they had a lot of breakage problems in early production and the perfected stands have not yet arrived in the U.S.A. Thus, you will have to put up with a less than ideal location for the speakers until the stands come in. These speakers really do like to be kept away from surfaces (walls, floor, and other components) to

Line Card PC-5 Component Side



avoid putting back into the sound field the resonances and colorations that have been removed from the Matrix cabinet themselves.

Enough of negatives, now you need to know what the Matrix 1 loudspeakers do correctly – essentially, just about everything.

The Matrix 1 is a small loudspeaker (16" high x 9" wide x 12 5/8" deep) weighing 22 pounds. It uses a 150 mm homopolymer polypropylene woofer-midrange and a 25 mm polyamide dome tweeter. Its sensitivity is 85 dB and its impedance is 4.5 Ω (resistive). It has a very flat frequency response (+ and - 2 dB from 80 Hz to 25 kHz) with unusually linear dispersion characteristics (its response is constant even 300 off axis). Our selling price is \$900/pair (Matrix 1 stands are \$180/pair extra).

For those of you familiar with the B&W line, I can point out that the Matrix 1 is simply a better loudspeaker in all respects than all previous models up to and including the DM2000s, which we sold for \$1200/pair!

The first impression is that the Matrix 1 has extraordinary resolution. It resolves small signal detail (from top to bottom) like an 8" x 10" portrait camera resolves landscape detail (as used in *Arizona Highways*). **Not "detail" bright and hard**, but detail soft and clear – simply "more of the music" laid out for you to perceive.

Second, the Matrix 1 provides extraordinary musical space. It does not play what is not there. Thus, it "plays" the **time and space** between notes and performers better. You get a better sense of the music "floating" in your listening room with no audio system there at all. Essentially, it images better.

Third, it plays **much wider range** than you would ever suspect a box this size could do. It sounds like a big loudspeaker. The depth, definition, reach, and solidity of the bass response is striking. It reaches down further than a DM3000, but with less "power." It also plays with excellent dynamic authority, not "shutting down" when played loudly or compressing dynamic transients. The DM3000 will play louder and with greater dynamics yet, but not with the absolute clarity of the Matrix 1 (here we reach a trade-off in performance). Note that the Matrix 1 does have electronic protect circuits that turn off the tweeters under overstress conditions – which clues you in to quit doing bad things to your system.

Thus the Matrix 1 is a really useful product. It will give you "big and expensive" loudspeaker performance at a lower price than possible before, without demanding the space of a big loudspeaker. **It does demand a high quality amplifier!** Any of our Mos-Fet or Transcendence amplifiers will work just fine (higher

power will give you greater dynamic transient capability) for a single pair of Matrix 1s. If you want to run two pairs at the same time, the minimum amplifier recommended is the Mos-Fet 200C or Transcendence 200 as the extra current and heat sink capability is necessary for the sustained 2 ohm load at high power.

One further thought. The higher resolution capability of the Matrix 1 allows you to hear bad program engineering "better" than ever. Poorly produced source material will sound just terrible with the Matrix. It is for quality programming only!

Now, for something completely different – an **upgraded do-it-yourself circuit** for our **original Super-Pas preamplifier only!** The following circuit improvements will give your original Super-Pas nearly the dynamics and resolution of the Super-Pas Two (within the limitations of the power supply and board layout). The necessary parts are going into the complete original Super-Pas do-it-yourself kit right now, at no increase in price (still \$125.00). The new parts required for upgrading the audio circuits of the Super-Pas described herein are available from us for \$35.00. Note that there have been several upgrades to the Super-Pas in the past, including the photo-flash power supply parts and the LED pilot light improvement. Those parts are still available separately as previously described. Very old Super-Pas units (1979 thru 1981 production) may need other circuit changes. If your board layout does not match the diagrams included in this issue, call us for advice.

Note also that the following improvements **apply to an existing Super-Pas unit only**. If you are starting with a stock PAS preamp, you will need our complete Super-Pas kit and plans set **instead of** the following instructions.

Note also that you must have the electrical assembly skill to remove parts from the circuit boards and to solder in new ones without damaging the foil paths or shorting anything out. This upgrade **will not fix a defective unit** and mistakes can ruin a unit now working properly. We cannot guarantee your workmanship.

1. Remove your Super-Pas from your system, remove the top and bottom covers, and **discharge the power supply capacitors** by shorting the eyelets marked **B+** on the sketches (on PC-5 and PC-6 cards) to chassis ground through the **100 ohm 2 watt** resistor supplied. Touch one lead to the chassis and the other lead to the B+ eyelets for several seconds (**hold the resistor by its body**). **Always repeat this procedure any time you work on the unit.** The photoflash power supply capacitors "hold" an awesome charge even after the unit has been turned off and unplugged for a long time. It is unsafe to

work on the boards with the power supply caps charged.

2. Locate the two 10 ohm resistors on the back panel between the audio output jack ground lugs and the next ground lugs over (Brown-Black-Black). Remove these two resistors and replace them with jumper wires taking care that the jumper wires cannot short to the "hot" side of the jacks. This change will substantially reduce "crosstalk" between unused sources.
3. Now you will be replacing 16 capacitors on the two audio boards and 2 capacitors on the blend switch (or on the balance control on some units) as follows. Refer to the board layout sketch and note that there are **two of each "C Number" to be replaced**.
  - A. Locate your PC-6 board (under the selector switch) and the attached sketch thereof. Locate and remove the two **C7** capacitors and replace them with two **0.33 μF 50 or 100 volt film capacitors** (334).
  - B. Locate and remove the two **C8** capacitors and replace them with two **0.1 μF 250 or 400 volt film capacitors** (104).
  - C. Locate and remove the two **C11** capacitors and replace them with two **2.2 μF 250 or 400 volt film capacitors** (225).
  - D. Locate the two 10 pF **C12** disc or mica capacitors on the blend control or on the balance control. Remove them and replace them with two **100 pF mica capacitors**.
  - E. Now refer to the sketch of the PC-5 line board and the board itself. Locate and remove the two **C13** capacitors and replace them with two **0.33 μF 50 or 100 volt film capacitors** (334).
  - F. Locate and remove the two **C14** capacitors and replace them with two **0.047 μF 250 or 400 volt film capacitors** (473).
  - G. Locate and remove the two **C15** capacitors and replace them with two **2.2 μF 250 or 400 volt film capacitors** (225).
  - H. Locate and remove the two **C16** capacitors and replace them with two **10 pF mica capacitors**.
  - I. Locate and remove the two **C17** capacitors and replace them with two **3.3 μF 250 or 400 volt film capacitors** (335). You will get a better "fit" on the new parts by locating them between **Eyelet 11 and the hole just**

beyond Eyelet 12, and between Eyelet 4 and the hole just beyond Eyelet 5 respectively, instead of in their original physical locations. Note the new C17R locations on the sketch to be used instead of the original C17 locations.

This completes the project. All test voltages will remain the same as before. You should notice a big improvement in dynamics, range, bass extension, and resolution.

*Frank Van Alstine*

## VOLUME FIVE NUMBER NINE SEPTEMBER, 1986

It has been a very busy month for me, especially with paperwork. I have been buried in the stuff putting the final touches on our new catalog.

We are changing our name to **Audio by Van Alstine**. We are doing this to end the confusion caused because everybody knows about Van Alstine made audio products but nobody knows what "Jensen" has to do with this. Actually, **Paul Jensen** was my partner for years starting in the early 1960's until 1973. Now, I get far too many calls from people wanting repairs or discount prices on Jensen car speakers and Jensen car radios. Some even get upset with us when we give them the bad news that we do not do warranty work on Jensen car radios. Changing our name to **Audio by Van Alstine** will end this problem, I hope.

You know that we keep telling you **to call us before returning equipment for service** so we can help you find out if the problem is "real" or not. We also ask that you tell about **everything** in your system if you have a problem to help us diagnose what the cause is. This month, we had two rather strange service problems that we could have solved easier if we would have had **all the data** first:

We updated a client's Transcendence 200 amp and Transcendence preamp to our Series Two circuits. When the client reinstalled them, he **really did not like the sound**. He even went to the considerable effort of hand carrying them back here (two 100+ mile round trips) for us to check out again. Of course, both units tested and performed perfectly here. The client really was not very happy with us. But with the data he gave us, we could find no good reason for his negative evaluation of the upgraded equipment. A few weeks later we learned the real reason why the system sounded bad. The client had installed a Pioneer electronic crossover in the system at the same time as he reinstalled our equipment. He didn't tell us that! Of course an audio system will perform to the quality

standards of **the worst piece of equipment in the system** (like the weak link in a chain). When the client removed the Pioneer unit, the sonic quality immediately improved. If we had been given all the data we would have saved that client (and ourselves) a lot of time and trouble. We need **all the data to serve you best!**

Another client called us to complain that his amplifier was intermittently going "beep" every 30 seconds or so. He claimed that the problem had been isolated to our amplifier. Although we could see no possible cause for this problem, we did authorize the client to return the unit to us for testing. He had it all packed up to ship to us when he **realized that the system was still going "beep"** even with the amplifier out of the system! It turned out that the "beep" was coming from a **nearby smoke detector with a low battery** (the intermittent "beep" is the signal the smoke detector makes to tell you it is time to replace its battery).

It is so easy to jump to conclusions instead of carefully evaluating the situation when your audio system doesn't seem to work right. We know it is very frustrating when you don't seem to get the sound you paid for. However, when things seem to go wrong, don't get mad, instead, get analytical! You will get a better fix.

Next is a little **technical formula** to tell you **how much power a given fuse size will pass**. This will allow you to install the **smallest possible quick blow** speaker fuses in your system to provide maximum protection to your speakers and amplifier. The formula is:

**POWER = CURRENT SQUARED TIMES RESISTANCE.  $P = I^2 \times R$**

**Power** is the continuous average power the fuse will pass. **Current** is the rating of the fuse in **Amperes**. **Resistance**, in this case, is the rating of your speakers, in **Ohms** (usually either 8 ohms or 4 ohms). Thus, a 2 amp fuse will pass 32 watts into an 8 ohm loudspeaker ( $2^2 \times 8 = 32$ ) while a 4 amp fuse will pass 128 watts. **Note that the power goes up exponentially with fuse size, not linearly**. Thus using twice as big a fuse does not pass twice the power, but **four times the power**. If you are not aware of this, it is easy to install **far too big a fuse** and fail to protect your system.

In our reference system, we can use 2 amp quick blow fuses on the T-500 driving the B&W 808s to outrageous dynamics without ever blowing fuses. This is because even when transients are at very high levels, the average power is much less than the 32 watt capability of the fuse. You don't need sustained high power for realistic musical reproduction, you need sustained high quality and stability.

Good news for those of you looking for a **Sony PCM 501 ES digital audio processor. Q AUDIO**, 95 Vassar Street, Cambridge, MA 02139 (phone 617 547-2727) has them available. This is a company I have dealt with for years, owned by Bob Heenan. They are reliable and keep their promises. I now have over **500 hours** of Compact Discs transferred to digital video tape with the Sony unit, and am getting record and playback quality that is **nearly a clone** of the original CDs. I highly recommend this unit as the best possible method of tape recording for you. Its cost, along with any good video deck (need not be a "Hi-Fi" deck as the Sony PCM unit uses the **video** section, **not the audio section**) simply wipes out any consumer audio cassette or open reel tape recorder and at a lower total price than the so called high end cassette recorders.

Did you know that it is **very easy to set the record levels on the Sony PCM unit** when recording from a Compact Disc so that it will be impossible to overload the PCM tape? You need to know two things.

The maximum "0dB" level on a CD **cannot be exceeded** because once all 16 bits are turned on, that is an absolute maximum output level.

You can purchase test CDs (Denon #33C39-7441 & Denon #38C39-7147) that have "0 dB" levels on them.

Thus, you can pre-set the record level using the test CD and be assured that no music CD you subsequently record with that CD Player can have an output in excess of the previously set 0 dB level from the test disc.

**There is one "catch."** The Sony digital processor does use about 10 dB of high frequency "pre-emphasis" and "de-emphasis" in recording and playback. Thus, if you use a 1 kHz test tone for setting levels, there is a rare chance that a very high level, very high frequency tone could still overload. To be **really safe**, preset the record level using the 0 dB white noise or 3 kHz tones. Of course if you switch CD Players you will have to re-calibrate, as the output levels from different CD players can vary.

I have previously "panned" Compact Discs from two different companies, **Sheffield Labs, and Reference Recordings**. My negative comments apply only to their **analog masters**. I have recently heard several **digital masters** from both companies, and the sonic and engineering quality is **excellent and recommended!**

If you have been a steady reader of *Audio Basics*, you will know that it is very rare for an "off the shelf" piece of audio electronics to arrive here that we think very much of. Well folks, an audio amplifier has arrived here that is **simply great!** It is the new **Hafler MA-1 Mobile Amplifier**.

This is a 100 watts per channel (into 4 ohms) – about 70 watts per channel into 8 ohms – car amplifier. It is very, very good. It is so good that many users will not realize just how musical it is because the rest of their automobile system will not be its equal. I am listening to my second sample of the MA-1 right now as I write this (the first was already delivered to a client preparing a rally car for a cross Canada and Alaska 4000 mile endurance rally – we will know soon how the MA-1 stands up under that use condition)!

I am not using the Hafler MA-1 in my car, yet! For now, it is hooked up in my home reference system driving my B&W 808 loudspeakers with a Transcendence CD player as a source. It drives the 808s better than any other “outside” amplifier we have tried them with. Yes, it is cleaner than Hafler’s stock home amplifiers (and they are all quite good and are good values).

It has just outstanding bass dynamics and drive (no boom, no mud, and it never gives up). The midrange is clear, with spacious imaging and excellent transient detail with no obvious colorations at all. The highs are very extended, very pure, and very free from nasty edges. It sounds amazingly solid, and handles big dynamic transients just fine – it sounds much more powerful than its rating.

It is not as high a definition as our amplifiers, but without a side by side comparison, the differences are not severe. Certainly it is a more honest amplifier than anything else I can think of, price not considered. Lets put it this way, its level of performance is great enough (especially considering its price) that I don’t have a high priority for tearing it apart and rebuilding it with our circuits. Its already good enough (especially when you consider that the car electronics ahead of it and speakers after it probably are now the “weak links” in any event).

The Hafler MA-1 is a **discrete power mos-fet design** with a switching power supply to efficiently “step-up” the car voltage enough to make some real power. Of course the current draw from your battery at full power is large (in excess of 15 ampere) so don’t plan on “all day sound at a beach party” from it with your engine off – you will end up with a dead battery! It is a flat little package (about 12" long x 8" wide x 3" high) and the entire case is an extruded finned heatsink. (It doesn’t get excessively warm driving the 808s or the 4 ohm Matrix 1s.) One end has gold plated RCA input jacks and level controls. The other end has an output terminal block, battery connections, a LED indicator lamp, speaker and power supply fuses, and a connection for remote turn-on and turn-off from your radio head. It will **not be available as a kit**. There simply is not

enough for a kit builder to do to give any cost savings.

The Hafler MA-1 Mobile Amplifier has a list price of \$400.00. It is available right now! It makes other car radios look and sound like, well, car radios. Mine will be going into the Quattro very soon to drive the B&W MASS LM60s. I can hardly wait!

I have now had the opportunity to evaluate the entire new B&W Matrix line, the Matrix 1 (our price \$900/pr), the Matrix 2, and the Matrix 3.

As discussed last month, the Matrix 1 is a real winner – a clear, dynamic, big sounding speaker that transcends its size and price. It outplays the older B&W models up to and including the DM2000 and has higher resolution than the DM3000 too (although not as big and dynamic sounding).

The Matrix 2, essentially sounds just like the Matrix 1, perhaps a tiny bit more efficient and capable of playing a little bit bigger and louder. However, it costs a lot more than the Matrix 1 and I cannot justify its increased price versus its small (if any) increase in performance. I don’t plan on stocking the Matrix 2 because the Matrix 1 works so well for less money.

The Matrix 3 is a completely different kind of loudspeaker sonically. It is a much more “British” sounding piece, reminding me of Pro-Ac, JSE, and KEF sound. It has excellent definition, detail, and imaging, but is much more “restrained” than loudspeakers I really like. To me, it is too “polite” – it doesn’t go “crash-bang-boom” when I think it should. Many will violently disagree with me about the Matrix 3, especially those that favor electrostatics and moving coil cartridges – they will probably really like the Matrix 3s best of all. I don’t.

I don’t plan on stocking the Matrix 3 loudspeakers because they simply do not “fit in” with the overall sonic character of an audio system that I want to present. My demos are for sale at a very large discount (call for details). I need the floor space for products I do favor. Of course the demo Matrix 3 units are in brand new condition, with all paperwork and accessories, and in their original cartons and will carry a new warranty.

One additional new B&W product does work exactly the way I like – the heavy marble base stands for the Matrix 1 loudspeakers. They are a “bitch” to assemble (you will need a **big** Phillips screwdriver) but once installed, they make the Matrix 1s sound even clearer and more solid than ever. They are worth our \$180/pair price. They are coming in very slowly (we

have received only one pair so far and those have been delivered) so wait patiently for them.

I just got in a big shipment of an older (but very good) model B&W loudspeaker stand, the STAV-22 (made for the discontinued DM22 loudspeakers). These stands have a round, brown fabric covered base, a tubular pedestal (about 14" high) with a metal speaker base-plate. They are sturdy and easy to use, and can be sand or lead shot filled for additional stability. They work very well with DM100s, DM110s, DM220s, Matrix 1s, and Matrix 2s (and other brands of speakers too). We got a special deal on them we will pass along to you – \$35.00/pair delivered in the continental U.S.A. or, **better yet, free, with the purchase of DM110, DM220, or Matrix 1 speakers** (while our supply lasts).

Now I would like to tell you about a nasty little problem affecting the compatibility between certain CD Players and certain CD discs themselves, a problem that can cause some CDs to not load properly in some CD players. First of all, take a **very close look at the bottom (play) side** of several of your Compact Discs – especially in the area between the hole and where the data starts – the area where the disc rests upon the hub inside the player. Notice that **many discs are not flat and smooth in this area!** They have ridges, grooves, and recessed areas. The radius of these ridges and recesses vary from sample to sample. If the radius of a ridge, groove, or recess randomly happens to be about the same as the radius of the hub in your particular CD player, then it is very possible for that CD to sit “crooked” on the hub, wobble when spun, and require more laser focus servo-adjust than the machine can provide.

In this case, the CD will not load, or if it loads, it will cause many play errors – especially on the later (outside) tracks where the “wobble” error is much larger.

Randomly, that same disc may load just fine, or, with a few discs, never load properly at all in your particular machine. That same CD may work just fine in another CD player because that CD player has a slightly different size hub.

Philips, for example, has made minor changes in their hub size in production several times to overcome this problem – but each time they have been “defeated” by yet another CD pressing plant making yet another random change in the size of the grooves or recesses in the CDs they make. It seems as if the CD player manufacturers and the CD manufacturers are not communicating well!

In any event, if a certain CD doesn’t work well in your CD player, do not assume that the CD or the CD player are defective. The chances are they are simply incompatible. Another load

problem is caused by CDs that have too large a center hole. This can cause an “out of round” load condition with a lateral “wobble” again outside the capability that the laser servo-drive can follow. North American Philips engineers tell me they are seeing more “out of spec” CD center holes as more pressing plants come on line and as production increases.

Another problem that can cause unreliable CD loading and performance is **simple to cause, but hard for the consumer to fix**. It is **dirt** – especially dirt specks on the play side of the CD. If there is a bit of foreign matter on the bottom of your CD, and if it is transferred to, and sticks to, the hub of your machine when that CD is loaded, then every CD sitting on the hub in your machine will sit “crooked” and be hard to load and play until the debris is removed. The cure is to clean the hub. To do this, you must have access to the top of the hub, which, in front loading machines, is “buried.” Owners of old top-loads have it made – they can inspect and routinely clean the hub easily. With front load machines you must remove the cover and the hub clamping mechanism – typically a job for a repair shop. The market place has demanded front loading machines and I don’t think there are any top loaders being made any more. The moral **you must always inspect the bottom side of your CDs before loading them and clean off any dirt specks before they get transferred to the hub inside your machine**. A little care here will really help keep your machine playing reliably.

We are seeing more advertisements for “special CD discs” to be stuffed into your machine along with the CD you are playing. These blank discs are claimed to improve the performance by “shutting off light leaks,” “stabilizing and damping” the player, and so on. **Do not believe these claims and do not use those after market blank discs (or stack two CDs in the player) at all.**

Your CD transport is designed for the **thickness, mass, and inertial loads** of a single CD only! Doubling the thickness the mechanism has to handle may deform internal clamps and their tension springs. It may cause excess motor bearing wear. It will **screw up the motor servo-drive** which was not designed to handle twice the inertial loads of normal – causing excess read errors. The extra mass and thickness can cause your machine to jam completely, and you also risk scratching your CDs.

These excess strains and loadings certainly may **change the sound** of your CD playback. They certainly **won’t make the playback sound better**. If you really believe that screwing up the system gives you better results, then do I have a great deal for you – a handful of sand to dump into the oil filler of your car

engine – guaranteed to change the performance of your engine!

The Carver Company has a big advertising push going right now claiming that they have an amplifier that Bob Carver has made sound identical to some esoteric and expensive mono vacuum tube amplifiers (Conrad-Johnson so the rumor goes), and that the engineering was done in a hotel room while Bob Carver was proving his claim that he could duplicate the sound of these vacuum tube amplifiers to the editors of *Stereophile*, on the fly, while visiting them. These claims, and the reprint from *Stereophile* verifying them, appear to be very impressive. I have several observations:

1. Bob Carver is a **very good engineer and is a very good salesman**. His level of technical competence is so much higher than that of most audio writers that his visit to them must be like the early explorers showing flashlights to the natives of Boreno.
2. Carver’s job was **not to come up with a better amplifier**, but a much easier task – simply to match the sonic effects of the distortions of another imperfect amplifier.
3. A lot of different shades of gray look exactly the same when you are in the dark. Carver did not have to get an exact match, only a match better than the distortions in the rest of the system. Obviously, any distortions in the source material, in the record player or CD player, in the preamplifier, and in the loudspeakers that were greater than the difference in distortions and colorations in the two amplifiers under test would mask out the differences between the amplifiers. An extreme example – if you wanted to use a kiddy phonograph as a source, you could get an exact sonic match between any number of amplifiers used after it without trying at all. This is the reason that we always tell you to “start at the source and work downstream” when improving your audio system. We know, but most “underground” writers seem not to know, that a properly designed CD player makes vinyl records functionally obsolete. I suspect Mr. Carver would have a much tougher time getting an exact subjective match with our CD player as the source. We would shine some light on those shades of gray.

4. Getting a “null” match between the input and the output of an amplifier (or between two different amplifiers sharing a common input signal) **does not mean that all distortions or differences have been eliminated**. At least one common and severe source of distortion has been overlooked and is not taken care of by the

apparent “null” – namely dynamic input impedance distortion.

As we have discussed herein in the past, one distortion that happens when the feedback loop of an amplifier fails is that the input impedance of the amplifier goes to flanders – going to some low or high value and loading down the source. We have shown that when many amplifiers try to drive a capacitive load, for example, the ringing that occurs at the outputs reflects all the way back to the inputs, causing ringing to occur in the driving signal too! In other words, the **internal distortion causes the input signal to distort too!** Now, even if you can null any differences between the input and the output, or null the differences between two amplifiers sharing that input, **you have not nulled the input distortion!** You can get the two amps to sound the same, but **only while they are sharing the same predistorted signal**. In general the sonic effects are a combination of the worst case subjective distortions of both amplifiers. However, the placebo effect continues to operate. Once the evaluators are convinced that no differences can be heard, differences won’t be heard.

5. Finally, none of the above observations deny the possibility that Bob Carver did not get an exact match between the sounds of the amplifiers after all. He may have really done it. However, I am not so sure that I want an amplifier that sounds just like an expensive tube amplifier. I would prefer an amplifier that has no sound at all, that just reproduces exactly the source musical material.

*Frank Van Alstine*

## VOLUME FIVE NUMBER TEN OCTOBER, 1986

Hello again dear readers! We are getting into something new this month. Among the neat things in the UNIX system is a text editor that makes it much quicker and easier for me to write this, and a dandy and very fast spelling program that should remove many of my spelling blunders. However, we still need to add a laser jet printer to the system to get really high quality printing – you will have to put up with the system’s thermal printer until we can afford to add the laser jet printer. Then, we will be able to do typeset quality on everything.

It has come to my attention that we need to update the Harman-Kardon T-60 power supply project in the December, 1985 issue, because some of the power supply boards in the T-60 do not have numbered pins and thus our instructions referring to numbered pins are difficult to follow.

So, refer to the December, 1985 issue of Audio Basics, and make the following changes if, and only if, you are rebuilding a T-60 that does not have numbered pins on the power supply board:

Page 5, instruction referring to Pins 6 and 9: Unsolder the secondary power transformer leads (both blue) from the power supply board.

Page 5, instruction referring to Pins 7 and 8: Unsolder and remove the two white wires at the power supply board (the small black switch is located on the main casting near the tone arm) and leave the switch in place. It, and the two white wires, will be re-used.

Page 5, instruction referring to Pin 14: Install an insulated wire from the AC pin with the shield side of the new shielded cable to the pin in the gray block closest to the side of the chassis. A black wire to the main control board is already connected here.

Page 6, instruction referring to Pin 10: Connect one white switch wire to the AC pin with the shielded cable center conductor. Connect the other white switch wire to the fourth pin from the edge of the chassis in the gray block. Another white wire to the main control board is already connected here.

Note: When you have completed the power supply board work on a T-60 with a board having unnumbered pins, there will be no wires connected to the second gray block having five pins.

All other December, 1985 instructions apply as written then. H-K changed the power supply board layout and we did not know it. If in doubt, call us before starting work. It is better to not do the project than to do it wrong.

Now, I would like to talk a bit about "TIP-TOES" – those "spikes" that many recommend that you attach to the bottom of your equipment to firmly locate the equipment on the shelf or floor which are supposed to improve the sound quality. Well, maybe!

Essentially these "spikes" firmly couple the equipment to the shelf or floor it is sitting on. This may, or may not, help the sonic quality of the system depending upon the equipment being coupled, and depending upon the character of the shelf or floor. You need to know what is really going on to understand if the Tip-Toes have changed the sound for better, or for worse (and for worse will happen in many instances).

Things to understand first:

Most electronic equipment is microphonic to some extent. This means that vibrations fed into the equipment will "rattle" the internal parts, and produce an output that was not at the audio inputs. Worst case examples include vacuum tubes and large film capacitors. Obviously too, turntables

and CD players can mistrack if exposed to severe external vibrations. Solid state equipment is microphonic too, especially if poorly laid out, but to a much lesser degree.

Most electronic equipment is supplied with soft rubber feet of some type that to a greater or lesser degree, isolates the equipment from the vibrations around it.

The equipment is setting on "something," and that something may, or may not, in and of itself, be solid and resistant to external vibrations, or be more like a "peach crate" and be very sensitive to external vibrations.

So let's look at the situation now a little more carefully, as it now becomes obvious that you may have several different iterations of equipment, original isolating feet, and support structure. Your equipment may be very subject to vibrations, or very resistant to vibrations. Its original feet may isolate it from vibrations very well, or very poorly. And the shelf or support the equipment is sitting on may be very resistant to vibrations, or may be very subject to vibrations. In your own system, each possibility is likely to be somewhere between the extremes, and the designer of the equipment, and the supplier of "spiked feet" did not know what your particular combination was.

In an ideal situation, we would want equipment absolutely immune from vibrations, built with infinite mass buried in concrete and lead so that no external vibrations (even from an earthquake) would reach it at all. This is not very practical to attempt (although my sand filled concrete turntable base comes pretty close – you can kick the base while the turntable is playing without anything bad happening).

If we change the feet on the equipment to "spikes" what we are really doing is removing the original isolation from the shelf, and instead coupling the equipment hard into the shelf.

If the original feet did a good job of isolating the equipment from vibrations, and the shelf or support itself is "shaky" and is picking up lots of vibrations, then, the hard coupling will introduce more vibrations (from the shelf) into the equipment, and the sonic results will be worse than with the original rubber feet.

If the shelf or support is rock solid (like my sand filled concrete turntable base) then hard coupling with spiked feet will probably give positive results (or make no difference at all). If the original equipment was absolutely immune from external vibrations internally, then, who cares what it is sitting on or how it is coupled.

Obviously, combinations "in between" with slightly "shaky" shelves or supports, and slightly microphonic equipment will give random results. Usually, switching to spiked feet will change the sound, but the change will most likely be simply a change, not a better, as you are substituting vibrations coupled into the equipment from the support for vibrations introduced directly into the equipment.

Note that "magic bricks" change the sound of equipment too, but not by performing any mystical changes to magnetic fields. They simply add mass to the system, making the equipment more isolated from external vibrations, and compress the feet (because of the added mass) coupling the equipment harder into the shelf, which may, or may not, cause the equipment to pick up more, or less vibrations from the shelf.

In general, highly microphonic vacuum tube equipment will exhibit major differences in sonic quality (for better or worse) when spiked feet or magic bricks are used. Well designed solid state equipment will exhibit little or no change at all.

Our recommendations: Try and locate your equipment where it is subject to as little external vibrations as possible (out of "direct line of fire" from the loudspeakers, for example). Make your support structure as massive, solid, and vibration resistant as practically possible. Then, go ahead and play with "Tip-Toes" if you want (they are not very expensive) to see if hard coupling the equipment into vibration free supports gives you sonic results you like better. Also try the other extreme – "sorbothane" isolation feet (available from Audioquest). These will help isolate the equipment from the shelf and tend to damp out vibrations induced into the equipment. Depending upon your system conditions, they may be more useful than tying the equipment hard into the shelf with Tip-Toes.

Using Tip-Toes on loudspeakers presents other constraints.

If the loudspeaker is setting on soft carpet and is wobbling around, then spiked feet cutting through to the firmer flooring beneath may be quite useful, depending on the structure of the floor.

Essentially, Newton told us long ago that for every action, there is an opposite and equal reaction. Thus, the energy dumped into your loudspeaker voice coils that move the cone (or panel in planar speakers) in one direction, tries to move the entire speaker system in the opposite direction. In other words, if the speaker system is not massive and firmly "tied down" then a lot of music energy is wasted and lost trying to shake the speaker system around.

Thus, Tip-Toes may be very useful if they firmly tie the loudspeaker system to a very solid and inert floor structure instead of letting it wobble around on the carpet.

However, if the floor is not really stiff (a wood upper floor or over crawl space, for example) then bad things may happen. You may end up firmly affixing the loudspeaker to a giant sounding board – the “flexible” floor itself. Then, you may end up introducing a nice fat “boom” to your sound. Spiked feet on loudspeakers may, or may not, be of value, again, depending upon your room conditions.

We suggest you try this alternative if you have low mass loudspeakers located on carpet – set a very heavy weight on top of the loudspeaker (a concrete patio block is fine for a starting experiment). You may want to insert the block into a vinyl “slip cover” to prevent scratching things. This will increase the reaction mass (and give you obviously clearer and more dynamic sound) without hard coupling the speaker system into the floor and adding “sounding board boom.”

Now, I would like to tell you about another interesting and valuable audio product we recently evaluated, the Sony EV-S700U 8mm video recorder. Not only is this a very good and functional high resolution video recorder, but it is also a very high quality digital stereo audio recorder with some very interesting capabilities.

Unlike the Kodak 8mm video deck we were underwhelmed with when reported on herein, the Sony top of the line 8mm video deck does have record level controls and meters. Thus, the dynamic range destroying automatic record level circuits can be bypassed. You can set the record levels yourself and make truly high fidelity audio recordings.

A subjective sonic evaluation tells us the Sony 8 bit 30 kHz sampling rate system is certainly not as good as our separate Sony PCM501ES 16 bit 50 kHz system. But, it is a hell of a lot better than any analog audio cassette recorder I have ever heard, at any price, and you can get twelve hours of stereo audio on one little 8mm cassette! I would judge its sonic quality to be equal to Beta Hi-Fi or perhaps a bit better. It is certainly good enough to record vinyl records with no obvious loss, but it does show some “grain” and “compression” (especially some bass compression) that is obvious, but not severe, as compared to the direct playback from the Transcendence CD player or from PCM501ES digital tapes. Sony is planning an automobile deck using this format, and that will allow you to make better tape recordings for your car than ever before, and with the possibility of twenty four hours of music on one tape (in the slow speed) it will make your

car source material really easy to carry around, and will make a car CD player redundant.

Since the market price of this unit is lower than that of “high end” audio cassette players (about \$850.00 right now) and since it is a fine video recorder too, it is a really useful “tool” to enhance the usefulness of your audio system. Remember, you can use it with the Sony PCM501 ES 16 bit digital audio processor too, for higher resolution stereo audio, just like any other video tape recorder (with a two hour per tape time limitation). If you are shopping for a video recorder, or for a high quality audio recorder, we strongly urge you to consider the Sony 8mm EV-S700U deck.

I want to inform you of one more option you now have in ordering a preamplifier from us, or when having your preamplifier rebuilt – a “delete phono circuits” option. Now that CD is simply “winning” in sonic quality compared to phonograph records (it is no contest), there is no good reason to force you to pay for a phono preamplifier circuit you may never use. Thus, we now offer a delete phono circuit option on our preamplifiers. This reduces the price on Transcendence preamplifiers by \$100.00, or reduces the price on Super Fet and Super Pas preamplifiers by \$50.00. The old phono inputs will be wired up as additional line level inputs. Next month, a very worthwhile “budget” Dyna PAT-4 do-it-yourself rebuild project is coming.

*Frank Van Alstine*

## VOLUME FIVE NUMBER ELEVEN NOVEMBER, 1986

We have, as promised, a major construction project for you this month – a significant upgrade to the performance of the Dynaco PAT-4 solid state preamplifier. There are several other things to call to your attention before starting the project.

First of all, it is time to start thinking about renewing your *Audio Basics* subscription again. Look at the date code on your mailing label. It tells you the date of the last issue you have paid for. Please help us by getting your renewal in early so we don’t get buried in paperwork just in time for Christmas. The renewal price for 1987 will remain at \$16.00 for the year (\$20.00 for foreign air mail subscriptions). We already have all kinds of interesting topics ready to go for the 1987 issues. You won’t want to miss them. Thanks for your kind support. Note that many have used *Audio Basics* as a useful and low priced Christmas present for a friend. My wife even includes a Christmas Card for the recipient of your gift at no extra charge.

Note also that we need your feedback. Please write or call us regarding topics you would like to have covered in detail in *Audio Basics*. Skim

your back issues first, however, to make sure we have not already covered what you are interested in. Again, I would be happy to evaluate any Compact Discs you think everybody should know about, and I certainly want to be informed about interesting audio equipment. We cannot write about it if we don’t know about it. Your advice and help are welcomed.

A good friend of mine, Barney Feingold, 8 Bittersweet Road, Fairport, New York 14450, wrote a very interesting booklet a few years ago called, *HOW TO BEAT THE HI FI RIP-OFF*. It is very interesting reading and is especially useful for those just starting out in audio. It is just as valuable now as when written in the early 1980’s. Barney still has a few copies available at \$5.00 each. I suggest that you write to him and order a copy before they are all gone.

I need to call to your attention a MAGNAVOX CD PLAYER model that we CANNOT USE in building the Transcendence CD Player – the more expensive CDB650 model. This is the first generation of the 16 bit times four oversampling machine, with additional “sizzle” added called Favorite Track Programming. It has several problems.

1. The additional memory, logic circuits, and power supply circuit, for the favorite track programming circuits “gobble up” the chassis space we need for our Transcendence circuit board set (five new boards). Thus, there is no place to add our circuits.
2. The transport and load program in the CDB650 are from earlier generation machines, and are not as sophisticated nor as reliable as that in the newer CDB460 (although we expect new production CDB650 machines to be improved as Philips runs out of older transports and board sets).
3. The additional output filtering in the CDB650 is simply more of the same – two more stages of the same tired old Op-Amp filters that we already know don’t work well. Adding two more bad filter stages simply makes the linearity (and the sonic results) worse. As we have mentioned before, the filters, and their drivers, must be replaced, not added onto, as everybody else is doing. Circuits added after the damage has been done do not buy you better sound at all, only different sound.

We are now standardizing on the most current and sophisticated Philips design, the 16 bit times four oversampling CDB460 model for building the Transcendence CD Player. It handles a wider variety of “out of spec” CDs well, and has a digital output port (that could not be done with the previous 14 bit models). Of course we can continue to install our cir-

cuits in the 2041 model, if you already own one, with excellent results. But we get a better "yield" with the CDB460 and so have standardized on it for new production, and that is the machine you should buy if you are looking just for a stock CD player. It is probably the best stock machine on the open market and is priced at under \$200.00 in discount catalogs.

**Now we have an easy and interesting construction project for you – a major upgrade of the Dyna PAT-4 preamplifier.** Although this is not our Super-Fet circuit set (the project is an upgrade of the existing circuits) it will give you a very impressive improvement in dynamics, definition, clarity, and refinement and make your tired old PAT-4 at least as nice as anything new you can find in the \$300 - \$500 price range (except for the even better Super-Fet and Transcendence all new internal circuits).

This project will not repair a defective preamplifier (unless only your existing power supply capacitor is defective). It is not a cure for broken hardware. You must start with a PAT-4 that is in working order. Note that Stereo Cost Cutters, Box 551, Dublin, Ohio 43017, has many original Dyna replacement parts (we do not). Write them for their Dyna parts catalog if you need to replace controls, jacks, switches, etc., before starting this project.

As always, we cannot guarantee your workmanship. The results you get are totally dependent upon your ability to follow directions and to do neat and reliable solder work. If in doubt – don't do it!

Before starting the project, we advise you to check the following inside your preamp (with it unplugged from the AC power line of course):

Check the .02 microfarad 1000 volt capacitor on the power switch and replace it if it shows signs of overheating or burning.

Check the U Brackets holding the main PC Cards. They should be attached to the component sides of the PC cards, not the foil sides. If

the brackets are improperly installed, they can short out the circuits.

Check the condition of the four AC outlets on the back panel. It is not unusual to find broken ones, which can cause electrical hazards. Replace any broken AC outlets and make sure the AC wiring is safe.

Clean all controls, switches, and jacks with a high quality contact cleaner such as Cramolin Red. Spray into each control and then operate the control several times to clean the oxidation away. Note that we can supply you with Cramolin Red spray cans for \$18.00 each (including shipping in the continental U.S.A.) but allow 4-6 weeks for delivery depending on our stock.

Firmly tighten all hardware in the PAT-4, including the nuts and bolts holding the jack sets on, to insure good ground contacts and reliable future operation.

O.K. then, you have got a cleaned, tightened, and basically working PAT-4 preamp. Now let's make it a lot better.

**PARTS REQUIRED:**

2 3300 MICROFARAD 80 VOLT ELECTROLYTIC CAPACITORS

1 6800 MICROFARAD 25 VOLT ELECTROLYTIC CAPACITOR

4 220 MICROFARAD 16 VOLT TANTALUM CAPACITORS

2 10 MICROFARAD 16 VOLT TANTALUM CAPACITORS

6 10 MICROFARAD 100 VOLT FILM CAPACITORS

2 1 MICROFARAD 50 VOLT FILM CAPACITORS

1 3300 OHM 1/4 WATT 5% TOLERANCE RESISTOR

**1 THUMBSCREW PHONO GROUND HARDWARE SET**

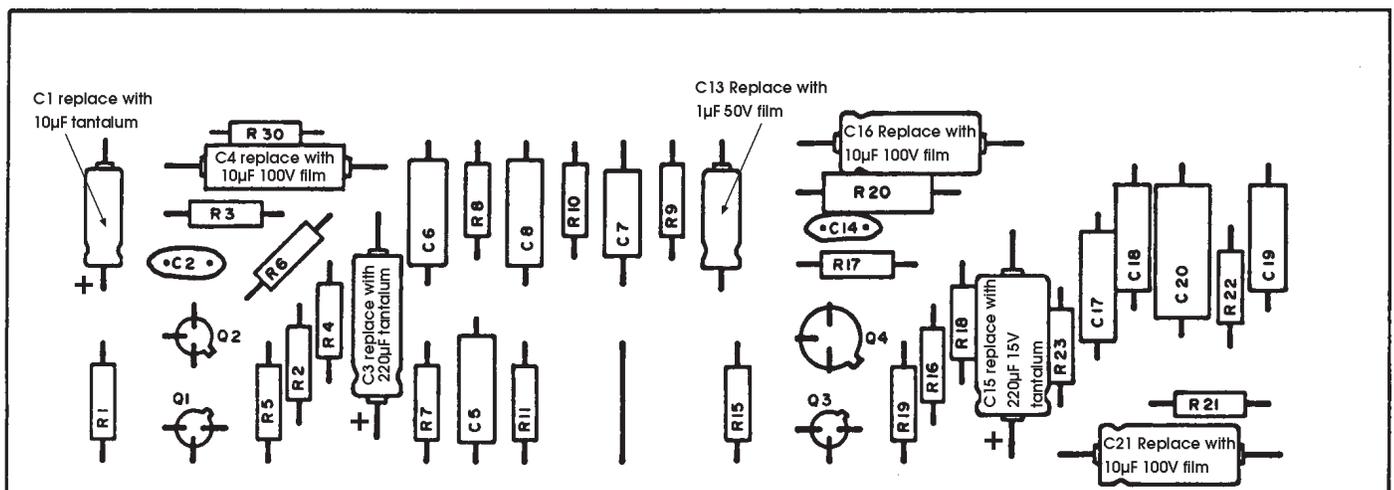
Note that we can supply you these parts as a complete set for \$60.00 including shipping in the continental U.S.A. (tantalum and large film capacitors are expensive!)

We are going to break this project into four parts, each of which can be completed, in order, and evaluated before proceeding. We urge you to do the work in the order suggested, and to try out and test the preamp at the completion of each section. This will greatly help you "troubleshoot" problems as you will know they can only be with the section you just completed. If you do it all at once, then you will have a hard time locating problems.

**STAGE ONE (OPTIONAL, BUT VERY STRONGLY RECOMMENDED) TONE CONTROL DEFEAT.**

The tone control circuits in the PAT-4 do not work very well. The action of the control pots creates an excessive boost and cut with only a small rotation of the controls. Flat response is nearly impossible to achieve unless you have access to a square wave generator and dual trace oscilloscope. You must set the control knobs on the shafts so that when they point straight up, they are really flat and out of circuit, not "almost flat." If the tone controls are turned on even a little bit, the channel balance and frequency response will be "all over the place" and good imaging and balance will be impossible to achieve. Almost always, a PAT-4 will sound, and perform, better, with the tone controls permanently out of circuit, and this is really easy to do.

Note also that the later stages of this project are much easier to do if the tone control circuits are defeated, because many wires will be eliminated that get in your way doing the circuit board upgrades. Note also that the later stages of this project will improve the bass and treble linearity so much that you won't miss the tone controls – they are a "crutch" for "broken circuits."



1. Locate, unsolder, and remove the twelve wires from Eyelets 13, 14, 15, 16, 17, and 18 of each audio board running to the dual bass and dual treble controls.
2. Solder jumper wires across the top of each circuit board shorting together Eyelets 13, 14, and 15 (one wire per board).
3. That is all there is to this stage, except to listen to the preamp to make sure it still works. You now probably have flat response for the first time ever, and should notice a much better balance to the sound.

**STAGE TWO, JUMPING OUT FOUR EXISTING CAPACITORS.**

There are four 1 microfarad electrolytic capacitors in the signal path that must be eliminated (replaced with jumper wires) for best

sonic results. Two are easy to reach, two are very difficult to reach.

1. Locate the two 1 microfarad capacitors (grey or black little "firecracker" shaped parts) on the back panel of the PAT-4. They are located between a 2 lug terminal strip and the Tape Out jacks. Remove each and replace with a jumper wire. These were the easy ones, now for the hard ones!
2. Locate the two identical 1 microfarad capacitors on the front panel of the preamp. They run between the front panel Input Jack and the Tape Monitor switch (buried below the vol-bal controls in front of the PC cards). Remove each of these and replace with wires in the same locations (lots of luck).

NOTE: Some of you might want to remove the PC cards completely to access the parts men-

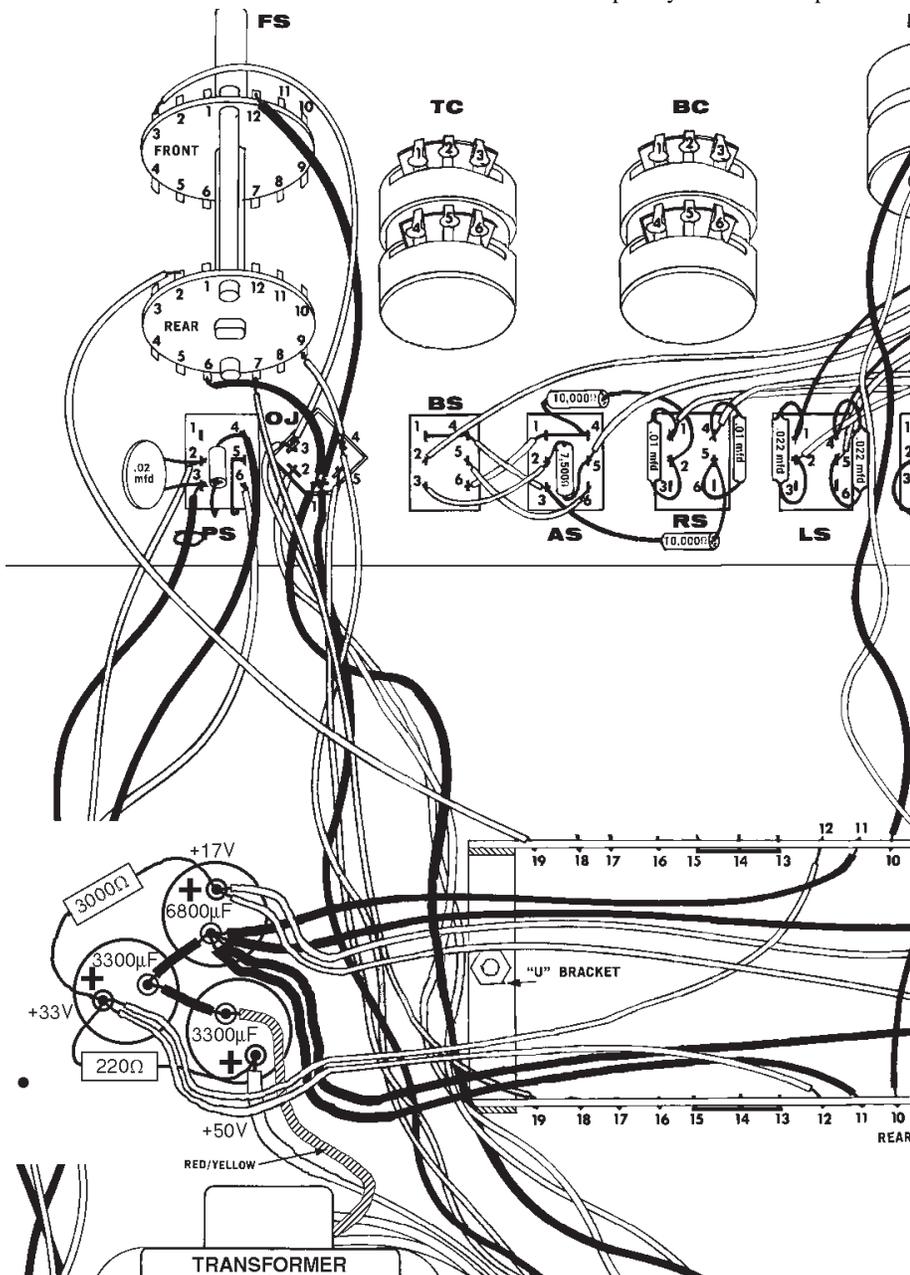
tioned above. If you do, first make a very good sketch of where the wiring goes back in, and, first do the next section, the power supply upgrade. If you are going to remove the cards, then wait until we describe the PC card work itself to do that, and then you can access the two front panel 1 microfarad capacitors at the same time without having to remove and reinstall the cards twice.

Now is the time to try the preamp again, before starting on the "meat" of the project.

**STAGE THREE, INSTALLING AN UP-GRADED POWER SUPPLY.**

A significant "weak link" in the PAT-4 is the power supply capacitor – the "silver can" located in front of the power transformer. First of all, it is probably so old that it is now defective – causing excess hum and "soggy" performance. Second, even when this capacitor is working, it is inadequate. There is substantial audio signal carried on the power supply feeds, generating unwanted feedback loops and crosstalk, and there is not enough energy available for good dynamics and bass performance. So, we shall replace the power supply capacitor with three separate capacitors that will make the power supply many times stronger than new and give you obviously cleaner and solid sound. You will need the two 3300 microfarad 80 volt capacitors and the 6800 microfarad 25 volt capacitor, and the new 300 ohm resistor to execute this stage.

1. Cut the wires to all lugs of the original power supply capacitor very close to the lugs (the wires will all be re-used). Save the 220 ohm 3 watt resistor for later re-use, with as long a leads as possible. Remove the capacitor (and its bracket) from the chassis.
2. Refer to our sketch of the Power Supply Upgrade. Using a bit of double-backed foam tape, fasten the three new capacitors together in a triangular arrangement as shown, with the ground (-) leads pointing towards each other (inward).
3. Solder a wire connecting the ground (-) leads of all three capacitors.
4. Connect the 220 ohm 3 watt resistor (salvaged from before) from the plus (+) lead of one 3300 microfarad 80 volt capacitor to the plus (+) lead of the other 3300 microfarad capacitor. Solder.
5. Connect the new 3300 ohm 1/4 watt resistor from the plus lead of one 3300 microfarad capacitor to the plus lead of the 6800 microfarad capacitor as shown in our sketch. Solder.
6. Make a "trial fit" of this array in the PAT-4 chassis in the same area where the original capacitor was located. You will be



installing this array with double backed foam tape and you will need more than one thickness of tape in some areas to make up for the “bump” inside the chassis where one previous mounting screw was located.

7. When you have got a good fit, firmly affix the three capacitor array in the chassis as shown in our sketch. If you have a very dirty chassis, you may want to “degrease” it first with lighter fluid or similar so that the tape will stick firmly.
8. Now wire in the new power supply array as shown in the sketch.

Note that the four black wires from the PC cards go to ground.

Note that the Red/Yellow transformer lead goes to ground.

Note that the Red wire from the diode bridge goes to “+ 50 Volts.”

Note that the Red wires from each Eyelet 12 go to “+ 35 Volts.”

Note that the Red wires from each Eyelet 4 go to “+ 17 Volts.”

9. It is possible that your 1/10 ampere slow blow fuse may fail at turn-on due to the extra current required to first charge the bigger new capacitors. You may replace this fuse with a 1/4 ampere rated slow blow fuse. If this blows, you definitely have a wiring error.
10. You can now try the preamplifier again. If you have a voltmeter, you should measure about +50 volts, +35 volts, and +17 volts at the power supply capacitors, keeping in mind that the voltages will come up slowly. It may take several minutes for the 6800 microfarad capacitor to fully charge the first time the preamp is used. Avoid “shorting out” these capacitors. You will make very large sparks and bangs!

When you play the preamp, you should notice much clearer and more dynamic sound, with better power. You will also notice that the preamp turns on slower and turns off slower than before, with less stress. You should also notice a substantial reduction in “hum,” especially on phono. If not, you have made a wiring error.

#### STAGE FOUR, UPGRADING THE TWO AUDIO CIRCUIT BOARDS.

Finally, we will complete this project by replacing fourteen capacitors on the audio circuit boards. Replacing these capacitors will resolve several problems at the same time:

1. All parts to be replaced are old electrolytic polarized capacitors, now likely to be defective. They are apt to be leaky, allowing DC to appear on the controls and

switches, causing switching pops and control noise. They are apt to be running out of high frequency response, causing scrunched musical response. They are apt to have drifted in value, throwing off pole points and causing the two channels to mistrack. The DC leakage and value drift also screws up the biasing of the semi-conductors and causes the circuits to increase in distortion.

2. Even if they were new and working properly, these electrolytic capacitors are still not suitable for their circuit applications. Their internal self resonant frequency is in the 30,000 Hz range, close enough to audio frequencies to cause internal ringing and distortion to occur on transients. They will be replaced with capacitors with engineering characteristics much more suitable for the applications needed.

Refer to the sketch of the circuit board (both boards are identical).

We will be replacing C1, C3, C4, C13, C15, C16, and C21 on each circuit board. It is possible to replace the parts without removing the PC boards from the chassis, if you are careful. It is easier to do if you remove the boards. If you remove the boards, you must first make a wiring diagram sketch so that you can get all connections back to the boards done properly. If you do decide to remove the boards, now is the time to replace the two 1 microfarad capacitors at the front panel input jack with jumper wires.

It is necessary to heat each solder connection and gently lift the lead without lifting or tearing the circuit foil paths (which will be re-used). You can open the holes for new component leads with a round wood toothpick pushed through the hole from the foil side while heating the pad with your solder pencil. We will start with the hardest parts to reach first so you can decide whether or not to remove the boards from the chassis right away.

1. Remove C21 (50 microfarad 25 volt electrolytic) from each circuit board and replace each with a 10 microfarad 100 volt film capacitor (106). The film capacitors are not polarized and it does not matter which way they go in the circuit.
2. Remove C15 (250 microfarad 6 volt electrolytic) from each circuit board and replace each with a 220 microfarad tantalum capacitor. Note that these new tantalum capacitors are polarized and that the (+) lead, the end with “silver blob” must point down towards the bottom of the PC card. We cannot use a film capacitor in this application because there simply are not any made of this needed high

capacitance value that would fit in the chassis.

3. Remove C16 (50 microfarad 25 volt electrolytic) from each circuit board and replace each with a 10 microfarad 100 volt film capacitor.
4. Remove C13 (5 microfarad 15 volt electrolytic) from each circuit board and replace each with a 1 microfarad 50 volt film capacitor (105).
5. Remove C3 (100 microfarad 6 volt electrolytic) from each circuit board and replace each with a 220 microfarad tantalum capacitor. Again the (+) end of the new tantalum capacitor must point down towards the bottom of the circuit board.
6. Remove C4 (50 microfarad 25 volt electrolytic) from each circuit board and replace each with a 10 microfarad 100 volt film capacitor.
7. Remove C1 (5 microfarad 15 volt electrolytic) from each circuit board and replace each with a 10 microfarad tantalum capacitor. Note that these new tantalum capacitors are polarized – the long lead is the + lead, and that the (+) lead must point down towards the bottom of the PC card. Although it looks like this might be a good application for a smaller value film capacitor, it cannot be done because these phono input capacitors are part of the phono feedback loop and making the capacitor value smaller screws up the loop operation and actually creates a large bass boom and unstable low frequency operation.

Congratulations, you have finished the PC card work. Now resolder every connection in the preamplifier. In particular, pay attention to the wires connected to the PC cards. In many poorly built kits, the leads are soldered to the rivets at the eyelets only, without flowing the solder to the actual foil paths. This causes intermittent operation. Make sure all wires are smoothly flow soldered solidly to the foil traces.

The final step is to install the Thumbscrew Ground terminal. Remove the original gold sheet metal ground screw. Drill out the hole so that a #6 32 screw will clear from pointing out from the inside of the chassis. Firmly tighten a #6 32 kep nut from the outside. Screw on a #6 32 thumb nut onto the protruding screw and you now have a much more convenient to use phono ground.

You now own a first class preamplifier with much smoother, clearer, and more musical performance than before. Enjoy it.

*Frank Van Alstine*

## VOLUME FIVE NUMBER TWELVE DECEMBER, 1986

Here we are at the end of five years of *Audio Basics* and still going strong. I never would have thought that there was so much to write about when I started this back in late 1981. I would have thought that the major and underground publications would have improved since then, becoming more objective, having a clearer methodology towards finding the "truth" about audio, and making my writing redundant. Instead, we now find the underground magazines emulating the major audio publications, accepting manufacturer's advertising, and thus becoming exactly the opposite of what they claimed was their only real reason for existence – an alternative from advertiser supported (and for all practical purposes, written) equipment reviews and audio data. We are finding the major magazines drifting in the opposite direction – towards subjective reviews with sonic virtues unsupported by any observable, verifiable, and repeatable engineering data. Nobody seems to want to learn, to gain knowledge, data, and to correlate facts and improve the state of the engineering of audio. Everybody seems only to want to speculate, to have opinions, and to have feelings, wants, and wishes about audio.

Unfortunately, the wishes and wants, the feelings and opinions, and the desires and needs don't get the job done. One gets better results by doing a better job. One gets closer to reality by more carefully observing and correlating the data, and by being willing to learn more about the subject, even when the learning process is difficult and the "facts" don't turn out to be what you really wanted them to be.

So – we will keep going with *Audio Basics* for a few more years – until the bigger publications show signs of giving you that real data you deserve to know, and for as long as you support me with your kind comments and renewals. Thanks for your kind interest in us. We would really appreciate having you with us for another year. However, if you are going to "go away," please let us know why. We cannot do "what you want" if you never tell us what you want.

A thought regarding last month's Pat-4 upgrade project – we are running out of the tantalum capacitors and when we are out we will not be able to supply the parts kit. The demand for this kit is running much heavier than we expected and our remaining stock of 220 and 10 microfarad tantalum capacitors is running low. These are very expensive parts that we do not plan on restocking as we don't use them any place in our own internal production. We can only do 15 - 20 more kits and will need to supply good recycled tantalums to fill out those. Order soon to avoid disappointment.

Note that we did get two letters complaining that we wrote the PAT-4 project, wondering why we wasted their time and *Audio Basic's* space. We also got about 30 parts kit orders, and calls from more of you doing the project on your own. We cannot please everybody all the time, but the PAT-4 rebuild sure seems to have pleased a lot more people than it has upset.

We have received several calls and letters from people confused about our comments regarding the Magnavox CDB650 CD player, especially from people who have noticed the excellent *Stereo Review* evaluation of the CDB650 and from those who have used the CDB650 themselves with outstanding results.

To clarify – yes, the CDB650 is a fine CD player and the 16 bit times four oversampling technology it uses is superior in every respect to the older 14 bit times four technology, and to the oriental 16 bit brick wall analog filter machines and the only slightly better 16 bit times two machines. Yes indeed, compared to what else they have seen, the Magnavox CDB650 probably is the best CD player *Stereo Review* has seen, so far!

HOWEVER, THE CDB650 IS THE "FIRST GENERATION" OF Magnavox 16 bit times four oversampling CD players. THE CDB460 IS A NEWER "SECOND GENERATION" MACHINE AND IS BETTER YET:

THE CDB460 HAS A BETTER LOAD PROGRAM THAT HANDLES MORE "OUT OF SPEC" DISCS FASTER.

THE CDB460 HAS A NEWER, IMPROVED TRANSPORT DESIGN WITH USEFUL STRUCTURAL REINFORCEMENT.

THE CDB460 HAS MANY DETAIL IMPROVEMENTS TO THE LOGIC BOARD.

THE CDB460 HAS ROOM FOR OUR ADDITIONAL FIVE PC CARD TRANSCENDENCE CIRCUIT SET. THE CDB650 DOES NOT HAVE ROOM FOR OUR CIRCUITS.

THE CDB460 IS MUCH LESS EXPENSIVE. If you cannot find a stock CDB460 in your area, and you might not because it is a brand new model, we will sell you a stock CDB460 that has gone through and passed our incoming inspection for \$250.00 including shipping to you in the continental USA.

I KEEP HEARING FROM PEOPLE WHO SAY THEY HAVE PURCHASED A CDB650 BASED UPON OUR RECOMMENDATIONS AND NOW WANT US TO REBUILD IT. WE HAVE NEVER AND DO NOT NOW RECOMMEND THE CDB650. WE

RECOMMEND AND USE THE CDB460. Please re-read our comments in the 11-86 and 12-86 issues.

And, for those of you who write to wonder "how can your Transcendence circuits in the CDB460 possible sound any better at all than a stock Magnavox CDB650?" rest assured that our circuits can, and do sound better. Perhaps some of you that already have a Transcendence CD player should write me a note we can publish herein in the next month or so to convince those that doubt we are telling the truth.

We did get some interesting feedback from one of my Chicago field rep's customers. After auditioning the Transcendence CD Player, he did purchase one from Gregg McArthur. However, he had reservations, and told Gregg, "Although this is the best CD player I have heard, when I get it home my best LPs are still going to outplay my best CDs." A few days later Gregg heard from the client again, letting Gregg know that the Transcendence CD Player was working a bit better than expected. Gregg was informed that with the T CD Player, not only did the client's best CDs outperform his best LPs, but that even his worst CDs outperformed his best records, and that all the CD problems he previously thought he had, had vanished!

Here are a few "last minute Christmas choices" somebody on your Christmas list might enjoy. The following is a listing of some Compact Discs I like a lot and find myself playing again and again.

*Nutcracker*, Compete Ballet Score, Telarc CD80137 (two CD set). If you don't have this complete and lovely *Nutcracker* to play at this holiday season, you are really missing something lovely!

*William Tell and Other Favorite Overtures*, Telarc CD80116. Fun to "show off" your system with, even to those who don't like "classical music" ("Hi-ho, Silver!").

*B&W Presents the Academy of Ancient Music*, Christopher Hogwood, BW001. An assortment of classical works played on authentic instruments and recorded very, very well. Available at most B&W loudspeaker dealers. We have it for \$15.00 including shipping in the USA (allow 30 days for delivery).

Pachelbel: *Kanon*, and Tchaikovsky, *Serenade for Strings*, Telarc CD80080. Simply beautiful string sound, the way it should always be but rarely is.

Brahms: *Ein Deutches Requiem*, Telarc CD80092. Robert Shaw directing the Atlanta Symphony and Choir. Soft and spacious voices blending so well with the orchestra.

Berlioz: *Symphonie Fantastique*, Telarc CD80076. The last two movements separate the real audio playback systems from the pretenders.

*Cats*: Complete Original Broadway Cast, Geffen 2031-2 (2 CD set). Although not as good as our front row center seats at the real play last summer in London, it actually is easier to understand the words on the CD than it was there live! This CD captures the energy and vitality of the live performance, but makes one wish for a high fidelity stereo video version too.

Warren Bernhardt *Trio '83*, DMP CD441. State of the art recording of cymbals – or – you simply cannot do this on a vinyl record at all! Fine jazz trio performance throughout.

Billy Barber, *Lighthouse*, DMP CD455. Again, things done here you cannot do on records – jazz piano with some very unusual accompaniment.

Linda Ronstadt, *For Sentimental Reasons*, Asylum 960474-2. The last CD Linda did with Nelson Riddle before he died, and probably the best.

*Digital Dixieland*, Verve VCD107. A very inexpensive CD label with lots of fine Dixieland jazz, performed and recorded just fine.

*West of Oz*, Amanda McBroom, Sheffield CD-15. Just really fine vocal and instrumental work, very carefully recorded.

Tom Browne, *Browne Sugar*, GRP D9517. Although the front says “digital recording” and the program notes say “analog recording” it is a fine recording capturing the power, taste, and dynamics of the brass instruments.”

*GRP Digital Sampler #2*. GRP D9529. This will give you a really good “sample” of the capabilities of GRP. In this case, if you like the sample cut, you really will like the CD it came from (I have nearly all of them).

*Denon Audio Technical CD*, Denon 38C39-7147. You really ought to own this CD. It has 99 tracks of technical data that can turn your CD player into a very competent audio signal generator. It has white noise, sine waves, frequency sweeps, amplitude sweeps, phase sweeps, 20 Hz tones (actually 21.5 Hz), transients, square waves, impulse signals, IM tests, just about everything you ever wanted, and more. It makes it easy to set up, balance, adjust, and with a little too much enthusiasm, destroy your system. If you cannot find it, call Denon and bug them for it. You need it.

Lets think about a couple of excellent sources for low cost (how about free!) Compact Discs:

The first source should be obvious to you – your local public library. Many libraries are carrying Compact Discs now, available

for check out just like books and phonograph records. The Compact Discs have one very large advantage over loaner phonograph records – they have not been destroyed by being played on a kiddie record player and most likely, they have not been passed around at a beach side pizza party. Because Compact Disc is a “new” development, and not yet available to the boombox crowd (hardly) the users of CDs are more likely to be people at the leading edge of technology, and more likely to take care of borrowed goods. In addition, its harder to damage a CD by playing it on a bad system. Note that distilled water (available at your local drug store) and Q-Tips make a good CD cleaner – gently brushed from in to out with a radial motion. I don't trust any CD cleaning device or chemical cleaner yet.

If you live in the Boston area, you can record CDs onto your VCR that are being broadcast on UHF TV by a local public television station. The catch is that you are going to need a digital audio processor (Sony PCM501ES or similar) to play back the CDs you have recorded. The CDs are being converted to video data by the station before transmission. What you record with your VCR is identical to having the CD, CD Player, and Digital Audio Processor at home. All broadcast distortions “drop out” as the noise, bandwidth, distortion, and dynamic range limitations of broadcast sound simply are not part of the digital data. You actually get all of the CD capability with no significant distortions added. Note that you should RECORD AND SAVE THE BROADCASTS NOW ON YOUR VCR even if you don't own a Digital Audio Processor yet. Check with your local public television station and see if they are planning this broadcast service too. It would be a good reason to support them.

Now for some GOOD NEWS FOR DYNA St-400, St-410, AND St-416 OWNERS! We have finally perfected a “budget priced” power mos-fet circuit set for your amplifiers – the brand new MOS-FET 400C AMPLIFIER! Although our Transcendence 400 amplifier has long been known for its very high quality, it has unfortunately been known for its relatively high price too – \$1500.00 to install in your St-400 or St-416 chassis and not available at all in the St-410 chassis. The high price being caused by the need to furnish and install 16 new power mos-fets, and the complete heatsink and faceplate machine work necessary to do this project properly. Well, now we have something much less expensive, and just as great sounding (within its current limits), the Mos-Fet 400C for just \$650.00 installed in your 400, 416, or

410 including return shipping to you in the continental USA and our limited two year parts and labor warranty.

Several things have happened to make the Mos-Fet 400C possible.

The first good thing that has happened is the new “large die” Hitachi power mos-fet device set, the 2SK176 and 2SJ56. These output mos-fets have 1.25 times the die area of the standard 2SK135 and 2SJ50 devices, and for all practical purposes, 8 of the new devices equal 10 of the standard devices. Thus, we can have safe 200 watt per channel operation with just eight of these heavy duty mos-fets (as long as we limit operation to normal 8 ohm and 4 ohm loudspeakers – not for 1 ohm and 2 ohm ribbon speakers). This means we do not have to machine the heat sink for 16 power mos-fet outputs, and the output wiring labor time is also cut in half (and, we can use the 410 heatsink assembly that was not usable at all for a 16 mos-fet output circuit). An additional virtue of the new mos-fets is their lower bias current requirements. They need only 75 milliampere per device, instead of 100 milliampere as in the standard mos-fets. In the 400 chassis, the total current is now 8 x 75 milliamps = .6 ampere instead of 16 x 100 milliamps = 1.6 ampere. This substantially reduces the ripple on the power supply (requires a less expensive power supply) and reduces the heat output of the amplifier (no fan required).

Second, we can directly use the new Mos-Fet 500C driver cards developed for the even more powerful Hafler 500 chassis with no duplication of engineering efforts. Except for a slight rebiasing for 75 volt instead of 90 volt operation, everything done for the higher power, higher voltage DH-500 application works just fine, and provides even better safety margins, in the St-400, 416, 410 chassis.

Third, we rethought our power supply requirements for this application, and have concentrated on additional very stiff decoupled supply sections for the driver boards. This is giving us excellent stability, drive, and low noise without significant cost and without causing excess stress on the power switch. The original power switch handles the load without breakdown, eliminating the need for expensive electronic switching operation.

Finally, we have limited our efforts to the all new circuits only (no cosmetic improvements). The Mos-Fet 400C retains the original faceplate and controls (only the power switch and pilot lamp are functional). If your unit has power meters or power leds, they will be salvaged and will function if they were received by us in working order. We do not have the facilities or parts to repair those functions if they are defective.

Thus, the Mos-Fet 400C is a complete new amplifier inside your Dyna chassis. You get a new power mos-fet output circuit, new ground plane output networks inside the heatsink, new audio circuit cards of our design, and a new audio power supply (independent sections for each channel). All original circuit boards, transistors, and wiring are thrown away. Obviously, there will be no additional charge for repairs, no matter how badly your amp is blown up. Note however that you must supply a complete unit with a good power transformer with basic mechanical integrity. The way it looks now is what you are going to have to look at. The way it sounds now, who cares, you will get back one of the very best sounding amplifiers in existence.

Regarding the sound of the Mos-Fet 400C, it is just a little bit different than our other products, a touch more "romantic." If what you really want is a \$6000 tube amplifier, you probably will decide that our \$650 mos-fet amplifier circuits are better yet! It is the high powered solid state amplifier for folks who simply don't like high powered solid state amplifiers. Its got gobs of guts and control, but it is sweet and spacious sounding too. Many will feel that this is our most cost effective product and it is available right now.

Of course the more expensive Transcendence 400 continues in production, especially for those of you who need continuous 2 ohm drive capability at very high power. But, for those with rational loudspeakers who want music with power and authority at a real world price, the Mos-Fet 400C is just for you.

I would like to talk a little now about another amplifier, a new SUPERPHON POWER AMPLIFIER, that did not work well at all for us.

A client brought this unit in to compare with our Mos-Fet Series C amplifiers and we gave it a good listen and a bench check too.

We listened to it first, and it sounded pretty good. It was smooth, clear, and without major colorations or annoyances. It did not have much "ommph" for its power and size (its 100 watt per channel did not come close to a Mos-Fet 120C's 60 watts per channel) but it did seem to work better than a similarly priced Adcom GF555. I felt it might be a product we should recommend, until we got it to the test bench!

The Superphon looked to be a simple, but well built bi-polar amplifier that easily made its power rating and looked pretty stable, until we got beyond simple resistive load testing and started observing how it behaved with a capacitive load. Normally we start our capacitive load testing with a really small capacitor, a .01 microfarad 100 volt film capacitor in parallel with our bench 200 watt non-inductive load

resistors. This is a capacitive load that any old crummy circuit should drive with no trouble at all, perhaps with a hint of leading edge overshoot if the amp circuit was old fashioned. The Superphon didn't generate a slight leading edge rise on a .01 microfarad load in parallel with 8 ohms, it WENT INTO FULL BORE OSCILLATION! And, not only did the channel with this tiny capacitive load oscillate, but the other channel, connected only to a resistive load, went into total oscillation too. The oscillations existed even if the input signal was simple sine waves for only a couple of watts output at 1 kHz.

This is the worst capacitive load drive we have yet seen on a "modern" amplifier. It shows that the Superphon will sound very different depending upon the loudspeakers (and speaker cables) used, and suggests that the amplifier may have future problems if its stability margins decrease with age at all. A close examination of the circuit showed that the designers thought they could get away without the use of output inductors. They cannot! An output inductor simply decouples an amplifier from the worst effects of external capacitive loads, and are absolutely necessary with bi-polar output stages to avoid the oscillations we see with the Superphon. Needless to say, the client, after hearing the difference and seeing the difference on the scope, purchased a Mos-Fet 120C instead of the Superphon. And, needless to say, we cannot recommend the Superphon for you even though it is pretty nice sounding on some loudspeakers (including many B&W models) because it may turn into a complete oscillator on other speakers and destroy itself and your system.

Enough for now. Have a happy Christmas and New Year, and look for us again each month next year.

*Frank Van Alstine*