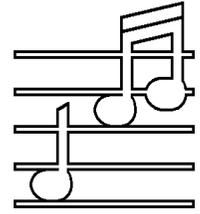


AUDIO BASICS



A MONTHLY NEWSLETTER OF AUDIO INFORMATION

VOLUME ELEVEN NUMBER TWELVE DECEMBER, 1992

Which Component to Upgrade? (continued)

Last month we covered the recommended upgrades for our older solid state preamps and smaller power amplifiers. Now we will continue with some of our higher power products.

Mos-Fet 400 Amplifiers (thru Series D) including all AVA Mos-Fet and Transcendence power amplifiers built in Dyna St-400, St-410, St-416 chassis.

We started this whole process with the Dyna St-400 way back in 1975. Because we had built so many of the stock ones (in the old days we sold custom wired Dynakits for the price of the unassembled kits and did more Dyna business than anyone else in the region) (learned how to wire fast and good too) we saw performance differences when Dynaco changed parts suppliers and noted that some versions were much more apt to fail than others. This got our attention! We investigated the circuit and found some sources of power output transistors had much less reverse leakage than others, that some "matched pair" transistors were not matched at all, that polarized electrolytic capacitors were being used in the bootstrap circuit where high power would apply reverse voltage across them, turning off the slave outputs and loading the main pair excessively. We found resistors under-rated in power handling (they would actually cook themselves right off the driver boards during normal operation) and found flow solder work that was simply pathetic. We decided we could do better and designed the Double 400. It had twice as much out-

put current capacity and significantly revised and reworked drive cards eliminating all the problems we could identify at the time. It sounded better, it was much more rugged and long term durable, and it got us thinking about doing even better amplifier designs yet.

With bi-polar power transistors there are lots of use problems. Because of a phenomenon called thermal runaway, it is difficult to make a reliable high powered amplifier. The output devices conduct harder as they get hotter which makes them conduct harder which makes them hotter, and so on until they melt. When they are installed in pairs, the hotter one tries to "hog" all the current instead of sharing, tending to defeat the purpose of installing more outputs in parallel to handle bigger loads. One has to design thermal sensing circuits that shut down the bias currents to the outputs as they get hotter to keep them alive. Unfortunately these circuits add nothing to the music and can only be built externally to the devices, thus giving only an approximate (and late) reaction to the actual thermal conditions at the semi-conductor die. The big bi-polar power devices are slow, fragile, and need all kinds of protection circuits to keep them working. Trying to keep a Dyna 400 working better than new with more bi-polar

power transistors was an expensive and labor intensive task. There had to be a better way!

There was a better way – namely the advent of the Hitachi power V-Mos-Fet transistor. This guy resolves many problems because of one special inherent characteristic – a negative temperature coefficient. The hotter you get it the less it wants to conduct. It is self biasing (after an initial setup and adjust to the amplifier) and no external bias tracking circuits are needed. When used in parallel, it shares current instead of hogging because the cooler devices will take the most current. Also the device is voltage controlled, not current controlled, so the need for a high current small power amplifier like predriver stage was eliminated. Design was simplified. Except ...

The device was so fast that most designers couldn't handle it. Layouts that worked with old slow bipolar circuits went into full bore oscillations when mos-fet outputs were used. Many mos-fet amplifiers (but not ours), to this day use slow-down capacitors tied to the gates of the outputs to slow down the circuits in an after the fact attempt to keep the amplifier stable. The bandwidth of the devices is essentially thrown away. The power mos-fet also has lots more stray interelectrode capacitance than most bipolar devices do. Although only a voltage is needed to turn it on or off, that voltage must be from a low source impedance with good drive current to force the pole point of the gate capacitance formed filter to far above audio. It also must have the steam to charge and discharge this stray capacitance quickly without current limiting. The runaway thermal problem was solved, but a new can of worms was opened that most designers have never resolved (which is why most audio amplifiers are still built with old, slow, and creaky bi-polar power transistors).

A final problem was that the early Hitachi mos-fets had a maximum power rating of 100 watts and a maximum voltage rating of 160 volts. We could not just substitute them in a Dyna 400 chassis because four of these per channel was only marginally adequate for the 200 watt power rating and the 150 volt rail to rail supply rating. We had to drill the heat sink for 16 power mos-fets and provide a very complex drive and decoupling circuit to support all those devices. It worked a lot better than the original Dyna bi-polar circuits, was rugged, was cool running, and sounded great, but it was too expensive. The original Transcendence 400 was more of an artistic and engineering success than a commercial one.

When Hitachi came out with the “big die” versions of the audio power mos-fet our life was simplified. Each of these was essentially 1.25 of the standard devices, at a voltage rating up to 200 volts, in the same size package. Now we only needed eight in a St-400 or St-410 and could use the high voltage transformer taps in the St-150 with four devices and get 120 watts per channel there too. Our drive circuits and labor time were simplified, our costs went down, and we offered you our famous high performance and cost effective Mos-Fet series amplifiers in Dyna St-400, St-410, St-416, and St-150 chassis for as long as the metal was available. St-150 metal still is available.

Because our mos-fet output circuits have worked so well and so reliably since day one, it has allowed us to concentrate on improving the small signal drive circuits as time went on, rather than in having to reinvent the wheel time and again. The Mos-Fet amplifiers got cleaner, quieter, wider band, and more transparent over the years. The current product, the Delta Series is very musical and cost effective indeed.

But we now have developed a revolutionary (rather than evolutionary) drive circuit for

our amplifier. The Ω mega II active feedback amplifier simply sets new standards of transparency and definition with NO solid state edge or roughness at all. It is quieter and more rugged still and has absolutely awesome bass definition too.

Because it is a new *drive circuit*, not a new output circuit, it is cost effective to retrofit it into many of our old Mos-Fet series amplifiers. Their output circuits, with certain necessary enhancements to adapt them to the new active feedback small signal circuits (such as 100 ohm gate resistors!) were so well done and durable that it is rational to salvage and upgrade them.

So any of our Mos-Fet Series power amplifiers in Dyna St-400, St-410, and St-416 chassis can be (and should be) upgraded with Ω mega II electronics. Transcendence Series One and Transcendence Series Two amplifiers are retrofittable too. Although these circuits (so favorably reviewed in *Audio*) are much more sophisticated than the Mos-Fet series, they are not in the revolutionary conceptual new class of the Ω mega II. You will enjoy a big difference in musicality.

Mos-Fet and Transcendence Amplifiers in Hafler Chassis (DH-500, DH-220, DH-200, XL-280, XL-600).

Our audio circuit boards were designed to interface with both the Dyna and the Hafler chassis. Because the mechanical layout of all the Hafler amplifiers we support is essentially the same (although they look different on the outside – a DH-500 is essentially an XL-280 turned inside out) it is cost effective for us to continue to support these chassis with new circuits even though they are out of production at Hafler. The stability and durability of our Mos-Fet circuits was determined by their design, not the exact mechanical layout. Although a different output decoupling network layout was necessary with the Hafler chassis designs, the

same audio boards we designed for the Dyna layouts are used. Only the mounting holes are different.

Keeping this in mind in designing the final layout of the new Ω mega II drive circuit cards, we were able to make these new circuits available as a retrofit in any of the Hafler chassis too.

We need to change the gate resistors and of course the Ω mega II audio boards will be all new, but we can salvage our old output circuits and power supply and save you money. You get a new Ω mega II power amplifier at a lower than new cost by recycling your old AVA amplifier.

There are certain advantages in installing the Ω mega II circuits in a Hafler 500 or Hafler 600 chassis, namely great gobs of power and effortless low impedance drive capability. The 500 heat sink supports twelve power mos-fets (six per channel) while the 600 supports sixteen power mos-fets (eight per channel). Both of these chassis have a ± 90 volt power supply and make well over 300 watts per channel real! One client tells us that an Ω mega II 600 is the first amplifier to really make his Infinity Servo-Static speakers sound real and make him happy with his investment. They are the answer too for Apogee speakers and other extremely difficult loads. It isn't practical to design a new amp now for these extreme power and current conditions. The cost of power supply parts and the space necessary for 16 mos-fets without forced fan cooling would make the amplifiers too expensive (and unnecessary) for most people. The efficient new Ω mega II 440 chassis was a better and more cost effective solution for almost all of you needing a better new amplifier. But if you really need the enhanced current drive and power we can provide you in the 600 or 500 Hafler chassis, then upgrading a Mos-Fet 500 or Mos-Fet 600 is a very good idea.

The cost to upgrade any of our old Mos-Fet series amplifiers to our new active feedback 300 volt per microsecond slew rate Ω mega II series is shown on the last page. Remember, until February 1, 1993, for *Audio Basics* subscribers only, we will throw in that new black AVA faceplate and power switch at no extra cost in St-150, St-400, and St-410 chassis if you do not have it already. Sorry, meters are not supported. You will have to choose between your original faceplate if you have meters or our new black faceplate without meters. Read all about the Ω mega II 240 in *Sensible Sound* and get your old Mos-Fet amp back to us soon for the upgrade. It will make more difference than anything else.

Whoops, out of room again. We will tell you more next month.

Wrong Phone Number Warning!

Last month we told you about Himelblau, Byfield & Co. of Illinois and their acoustical damping and insulation products. Unfortunately, I made a typo in giving you their telephone number!

The correct address and number is:

Himelblau, Byfield & Co.
1530 N. Mannheim Road
Stone Park, IL 60165
phone: (708) 343-3384

(not 3385 as shown last month). One of my clients told me they have a local order desk so if you live in the Chicago area you are welcome to drop by and pick up their products in person. He also informed me that the VMC/Korfund Elastomer Cup Mounts are probably too stiff to be useful for vibration damping of normal high fidelity products (unless you are running Krell amplifiers). Try and call again, and this time you won't get a church. Sorry about that!

Used Equipment

We have a good selection of great used equipment this month because so many of you are taking advantage of our special 20% off sale on selected new AVA products. Remember to call us promptly when you see something you would like because the factory checked used equipment vanishes instantly. *They are really good (and no risk) buys because our satisfaction guarantee applies to the used equipment advertised here too.*

Super Pas Three Preamplifier. This is one fine all vacuum tube preamplifier (a Fet-Valve trade-up). I installed our circuits originally into a good used chassis so the wiring is nice (the customer did the power transformer relocation a few years back and his work is good too). It has our black AVA faceplate and new Alco knob set, our most current vacuum tube circuit upgrades, our selector switch, and our ground plane jack set with high quality Switchcraft (not gold plated) jacks. It has a fresh set of our select 12AX7A tubes and is every bit as nice sounding as brand new. The faceplate is perfect, the black cover has a few minor dings. We need to get \$325 for this unit, including a one year parts and labor warranty.

Delta 120 Power Amplifier. Here we can offer you an outstandingly clean black and chrome current version of our lowest priced high performance amplifier in a Dyna St-120 chassis. It makes a solid 60 watts per channel quietly and reliably. It was owned by the president of an auto dealership who even had his shop buff the chrome! We tested this amp (it is about 4 years old) and upgraded the grounding to current status for low noise operation. If you are looking for a really nice AVA amplifier at the lowest possible price look no further. This one is just \$275 with our one year parts and labor warranty.

Mos-Fet 150C Power Amplifier. A Ω mega II 260 trade-up, this is in the baby Hafler DH-120 chassis – the attractive black low profile package with heat-fins on each end. It is a few years old (built by us in 1986) but it is in excellent condition mechanically and electrically. Our 75 watts per channel Mos-Fet 150C circuits still work fine and test fine and we will provide a 6 months parts and labor warranty. The price is just \$225. Or for a special treat, we will install our new Ω mega II 150 circuits in this unit for you for just \$375 extra and provide a new two year warranty too.

Fet Three Preamp in a very nice Hafler DH-100 chassis (the matching companion to the Mos-Fet 150C amp described above). This was Hafler's best little chassis, and the attractive black package handles phono, tuner, CD, and one tape deck. It has our precision volume and balance controls, our ground plane jack set, and is in very good condition. The tone controls are permanently wired out of circuit. We built this one from scratch in 1986 and upgraded it in 1987. It and the amp above are being brokered for the original owner. The price is just \$165.00 with a 90 day warranty. As an ultimate upgrade, we can install the newest Ω mega II preamp circuits in this chassis for just \$130 extra.

Fet-Valve 300i Hybrid Power Amplifier. It is not here yet but it is coming in soon, a two year old trade-up towards a new Fet-Valve 300hc. This is our big chassis version of this circuit in the 8 power mos-fet 410 shell (our best at the time). It is powerful, uniquely musical, and is the first of these we have ever had for sale used. The price is \$700 (half of new) and we will provide a six month parts and labor warranty. You will love it, experience Fet-Valve sound now for the lowest price ever.

Fet-Valve Full Function Preamp (new return). This brand new full function Fet-Valve preamplifier (built in new Pat-5 metal with tone controls, speaker switcher, EPL loop, 24 gold jacks, ceramic selector switch, our black faceplate, and our great hybrid Fet-Valve circuits) came back under our satisfaction guarantee because it sounded “too neutral and clean.” The potential client wanted “tube sound” and all we gave him was the music without the colorations he was hoping for. This unit is not in our catalog any more because we are running out of new Pat-5 metal, but we still can build a few more. Our 20% off special was supposed to be only on our new easier to build in-house designed chassis. But because we have this new unit sitting here, we will extend the offer to it too. It is yours for 20% off the normal price of \$1195 (you pay \$956 and get the best deal we have ever offered on this model).

It is Time to Renew *Audio Basics!*

If the four digit number on your mailing label is 9212 or 9301 it is time for you to renew your *Audio Basics* subscription. The price remains \$16/year US, \$20/year Canada, or \$24/year foreign. It is not too late to renew and take advantage of the special subscriber 20% discount explained last month. You have until February 1, 1993 to have your order letters postmarked. Thank you for your continuing support.

Frank and Darlene Van Alstine.

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Component Retrofit and Upgrade Prices December 1, 1992

Chassis	From	To	Price	Notes
Dyna Pat-4	Ωmega	Ωmega II	100.00	
Dyna Pat-4	Any other AVA Circuits	Ωmega II	245.00	
Dyna Pat-5	Ωmega	Ωmega II	100.00	
Dyna Pat-5	Any other AVA Circuits	Ωmega II	245.00	
Dyna Pat-5	Any AVA circuits	Fet-Valve	895.00	
Dyna Pas-5	Any AVA circuits	black AVA faceplate	75.00	
Dyna Pas-5	Any AVA circuits	AVA gold jack set	90.00	
Dyna Pas-3	Super Pas, Super Pas Two	Super Pas Three	345.00	
Dyna Pas-3	Super Pas Three	Add Ωmega II Buffers	245.00	output and phono
Dyna Pas-3	Super Pas Three	Add Ωmega II Buffers	145.00	output only
Dyna Pas-3	Super Pas Three	black AVA faceplate	75.00	
Dyna Pas-3	Super Pas Three	Ceramic selector switch	75.00	
Dyna Pas-3	Super Pas Three	AVA gold jack set	90.00	
Hafler (any amp chassis)	Ωmega	Ωmega II	200.00	
Hafler (any amp chassis)	Any other AVA Circuits	Ωmega II	695.00	
Dyna St-400, 410, 416	Ωmega	Ωmega II	200.00	
Dyna St-400, 410, 416	Any other AVA Circuits	Ωmega II	695.00	AVA black faceplate +\$80
Dyna St-150	Ωmega	Ωmega II	200.00	
Dyna St-150	Any other AVA Circuits	Ωmega II	595.00	AVA black faceplate + \$50
Dyna St-120	Ωmega	Ωmega II	200.00	
Dyna St-120	Any other AVA Circuits	Ωmega II	445.00	(includes new transformer)
Dyna St-120 regrounding	Any Mos-Fet Series	Δelta	245.00	with low noise
CD Players (610 or 502)	Δelta or Ωmega	Ωmega II	100.00	See Note Below
FM Tuners (130 or 330)	Any AVA Circuits	Ωmega II	100.00	

Notes:

All prices are plus return shipping cost. Call us for prices.

Call us at **612 890-3517** to confirm the status and cost and packing instructions to upgrade your equipment before shipping to us.

Our prices assume that you are sending an AVA wired and working unit not subsequently modified by others.

If you do not see your old AVA equipment on this list, call us to find out if there is an upgrade available for it.

Upgrade prices assume **no complications**. If your unit needs additional work to complete the conversion (upgraded supply or controls for example) the price will be higher.

Upgrades are not available as user installed kits.

CD Players will likely require a new transport assembly if they are not packed perfectly for travel. The current cost of a replacement transport is \$150.00 installed. This is in addition to the upgrade cost. Call us before shipping to make sure your unit is worth upgrading and that you understand how to pack it complete with travel screws.