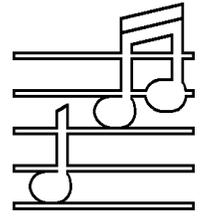


AUDIO BASICS



A MONTHLY NEWSLETTER OF AUDIO INFORMATION
VOLUME TEN NUMBER NINE SEPTEMBER, 1991

The Great Tonearm Giveaway!

OK, this should get your attention. In cleaning and reorganizing our parts storerooms this summer we discovered a long lost but brand new SAEC tonearm. This arm essentially is a precision machined clone of the famous SME arm but with ruby jeweled knife edge bearings and superb workmanship throughout. It is complete with the original packing, ceramic headshell, instruction manual, mounting templates, setup guides, and original hardware (but with no warranty at all). I had it set up some time ago on a Linn Sondek turntable and it worked great, but I sold the Linn separately and never used the arm again. It will fit on any full sized turntable designed to accommodate a separate tonearm. It sold for more than \$500 years ago and would probably be a \$1500 unit now given the value of today's dollar.

But, for some deserving current *Audio Basics* subscriber, its free!

All you have to do is write me a letter explaining why you should be the new owner of this arm. I will read all the letters received before I write the next issue of *Audio Basics* and send the tonearm, free of charge, to the writer who submits (in my opinion) the most convincing letter. The winner's name and the letter (assuming it is short enough) will be published in next month's *Audio Basics*. Start writing!

Bi-Wiring Revisited.

In April, 1988, I wrote an essay in *Audio Basics* explaining the function and possible minimal advantages of bi-wiring speakers.

In recent times I am finding that bi-wiring is coming to be used for a more crass commercial reason – it is being used to allow the salesman of overpriced speaker wire to sell you twice as much overpriced speaker wire. That certainly is an advantage of bi-wiring - if you are the one doing the selling.

However, the advantage to the buyer simply does not exist (except as another expensive sugar pill). Lets take a look at the very simple electrical engineering math of the situation and find out what really is happening.

First, some reasonable standards of comparison need to be established. We will base our calculations on an eight ohm loud-speaker system. If the system impedance is four ohms then the speaker wire's effect is twice as bad, but with any reasonable wire, the attenuation is still not within the range of human perception.

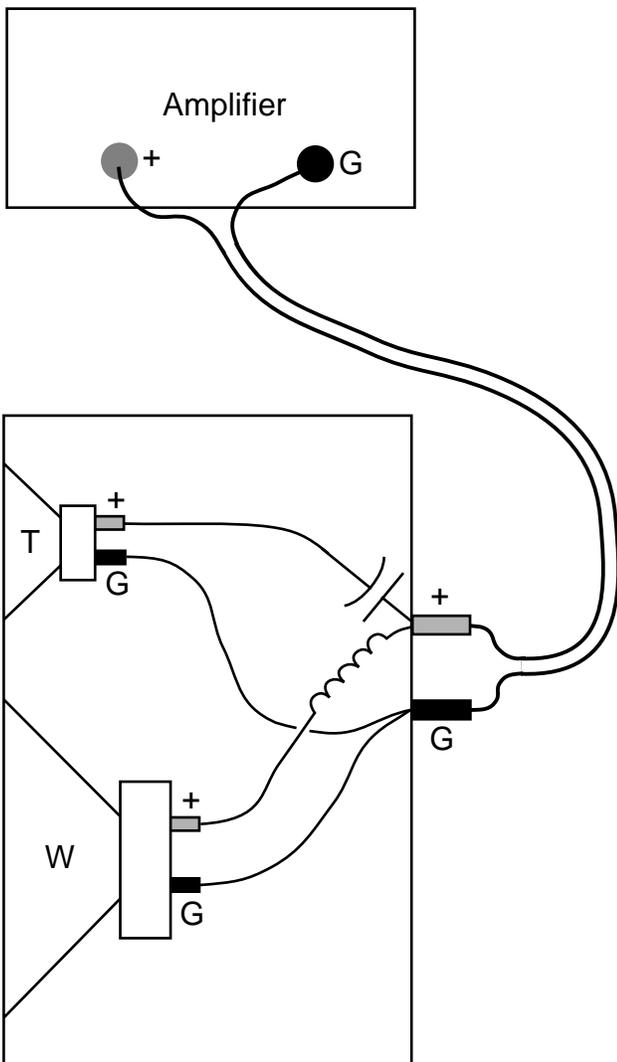
You need some data. 24 gauge speaker wire has a resistance of 26 ohms per 1000 feet. 16 gauge speaker wire has a resistance of 4 ohms per 1000 feet. 13 gauge wire has a resistance of 2 ohms per 1000 feet, and 10 gauge wire has a resistance of 1 ohm per 1000 feet. 24 gauge is that tiny string-thin grey stuff you can break with a hard tug of your hands. 10 gauge is starting to approach welding cable - bigger than car

jumper cables. 16 gauge is adequate for space heaters, electric grills, and outdoor power tools. It is probably adequate for loudspeakers too. Let's find out.

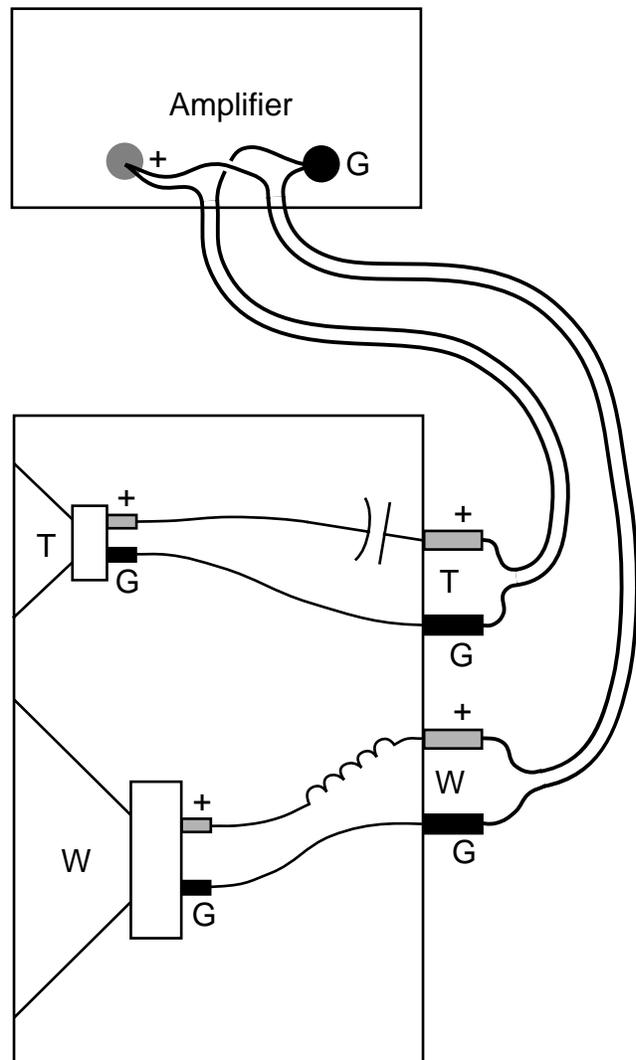
But first, here is some more data. A sound level difference of 3 dB (about 2 steps on one of our precision volume controls) on a test tone under controlled conditions is the difference that most people can easily distinguish. A sound level difference of 1 dB (about half a step in the lower range on one of our precision controls) is considered the lowest difference that can typically be distinguished under controlled conditions.

How much difference can bi-wiring make compared to what is possible to hear?

Look at the drawing below. This shows one channel of the connections between the power amplifier and the loudspeaker. It also shows a simplified version of the speaker's internal crossover (a capacitor in series with the tweeter to keep low frequencies out of the tweeter and an inductor in series with the woofer to keep high frequencies out of the woofer). In the real world, crossovers are usually more complex. But our simplified diagram is all you need to understand what is going on in a general case.



Conventional Wiring
(One Channel Shown)



Bi-Wiring
(One Channel Shown)

When you bi-wire (run a separate identical set of wires to the tweeter crossover and another to the woofer crossover) *all you have done is reduce the resistance of your speaker wire to half of what it was.* The crossover works exactly the same as before. The woofer hot is still tied to the tweeter hot. The woofer ground is still tied to the tweeter ground. The connections are simply occurring at the other end of the speaker wire. When you bi-wire, you are not bypassing internal crossover parts. Those parts are still necessary to keep highs out of the woofer, to keep lows out of the tweeter, to set the relative gains of the woofer and tweeter and to set the slope of the woofer and tweeter crossovers. Bi-wiring does nothing to change the way the crossover parts or drivers work. It does nothing to change the way the power amplifier works (unless the power amplifier is sensitive to capacitive loads and the speaker wire is a high capacitance braided design – then the extra capacitance of the second set of speaker wires may cause the amplifier to oscillate, distort, overheat, and even damage itself and quit – of course that would make many systems sound better).

All you are doing when you bi-wire is lowering the resistance of your speaker wires.

If your original wires were super heavy duty welding gauge size 10 gauge cables and you needed a twenty foot run to a speaker, then the total resistance of the cable (40 feet to the speaker and back) would be .04 ohm. The sound pressure loss (compared with attaching the amplifier directly to the speaker) would be .043 dB (big deal). The loss if you bi-wired with two sets of these cables would be .021 dB (slightly smaller big deal). The difference in levels, all other things set the same, would be all of .022 dB. You are never going to hear it. Or to keep this within some rational value of comparison, changing the ambient temperature of the room in which your audio system is operating (from 70 degrees to 71 degrees for example) will probably cause more temperature related drift in gain set resistors throughout your system and make a bigger (but still inaudible) difference in the acoustic gain.

How about if you start with a simple 16 gauge speaker wire? The total resistance for a 20 foot run would be .16 ohm and the acoustic loss .172 dB. Gosh, turn the volume up 1/5th of a click stop to make up for it, but as we are still way inside the envelope of differences that it is possible to hear, who cares? But to feel better you could buy twice as much 16 gauge wire (it costs about 20¢ per foot) and then bi-wired the resistance would drop to .08 ohms and the loss to .086 dB. The difference between single wired or bi-wired would be .086 dB - or why bother?

We can find one case where you might hear the difference. If you are still using that old thread like 24 gauge speaker wire with a resistance of 1.04 ohms for the 20 foot run, you would get a 1.06 dB loss as compared to a speaker wire of zero resistance. That means you would have to turn the volume up 1/2 click stop to equal things out (not a very expensive thing to do), or you could blow \$10.00 and switch to 16 gauge wire.

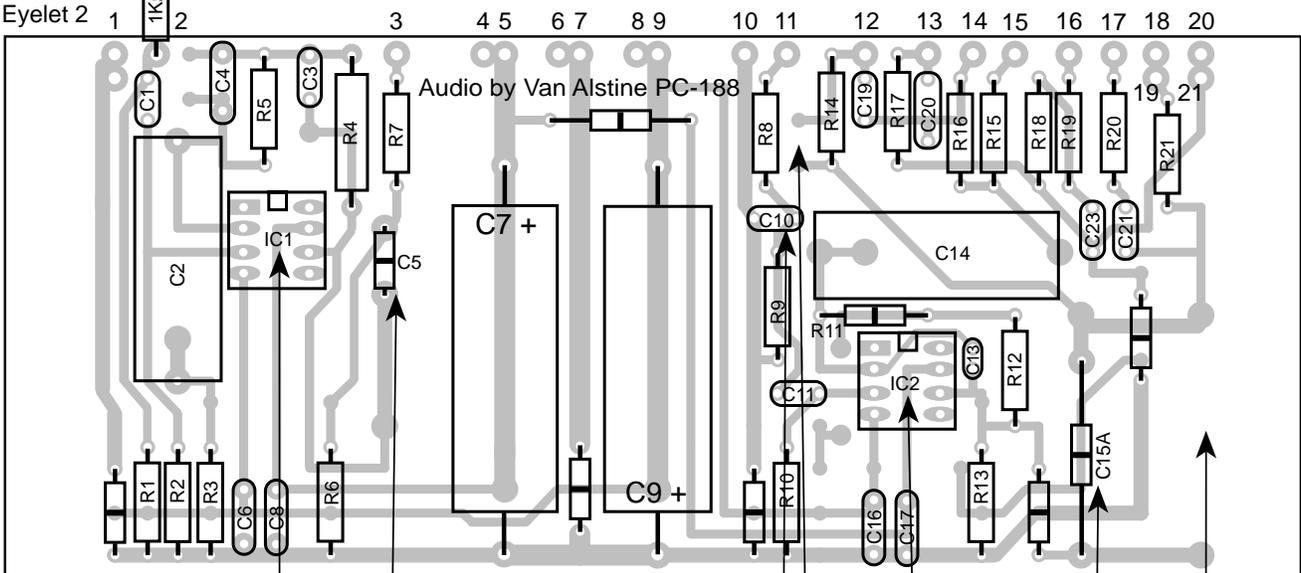
Should you worry about bi-wiring in any of these cases? Not hardly. Should you buy new speakers because your old ones don't have dual speaker terminals for bi-wiring? No. When do you have to worry about needing very heavy gauge speaker wire? Only if you have very long speaker wire runs (over 50 feet), if you have very low impedance loudspeakers (a 2 ohm speaker makes the speaker wire look 1/4th its normal size), or if you have an inadequate power amplifier (one with a high output impedance or one with an output impedance that is abnormally frequency dependent). Of course if your power amplifier is inadequate (and if changing the speaker wires changes its sound it probably is) then a replacement amplifier might be a more rational choice than more expensive speaker wires. Finally, many high priced audio cables are not really very heavy gauge at all - they simply have excessively fat outer insulation to impress the uninitiated. If you do really need welding cable sized speaker wires, shop for them at a welding supply shop.

Fet Kit to Ω mega Upgrade Instructions and Parts Kit

We have had many requests from our Fet Kit owners for an easy upgrade to the newest Ω mega preamp specifications so here it is. For \$40.00 including shipping in the USA we will send you the four new Ω mega ICs, four zero ohm jumpers, two 47pF capacitors, two 1K Ω 1/2 watt resistors, and for Pat-4 chassis owners, two 300 ohm 2 watt resistors to replace the 750 ohm 1 watt resistors on your power supply board. For Pat-5 owners, call us regarding the status of your power supply board before ordering so we make sure to supply the right power supply resistors. Follow the instructions on this page to make a big improvement in your preamp.

Add 1K Ω resistor in series with Eyelet 2

Fet Kit Audio Circuit Board Updated to Ω mega



IC1: Change to Ω mega special fast IC

C5: change to Zero Ohm Jumper

C10: Change to 47 pF

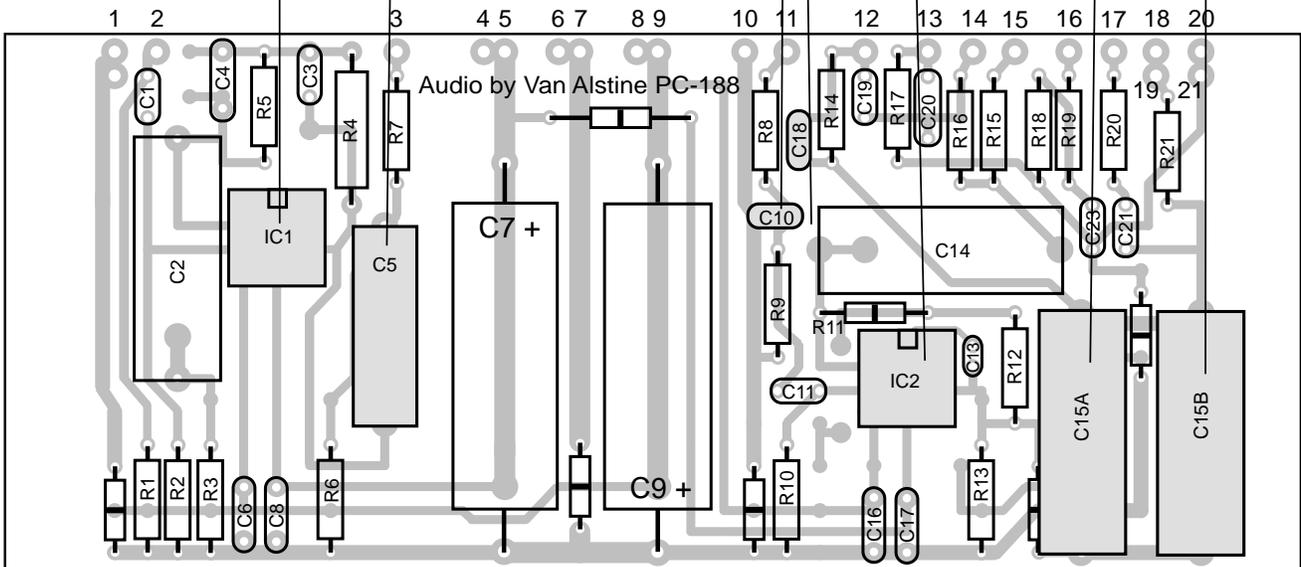
IC2: Change to Ω mega special fast IC

C15A: change to Zero Ohm Jumper

C18: Eliminate

C15B: Eliminate

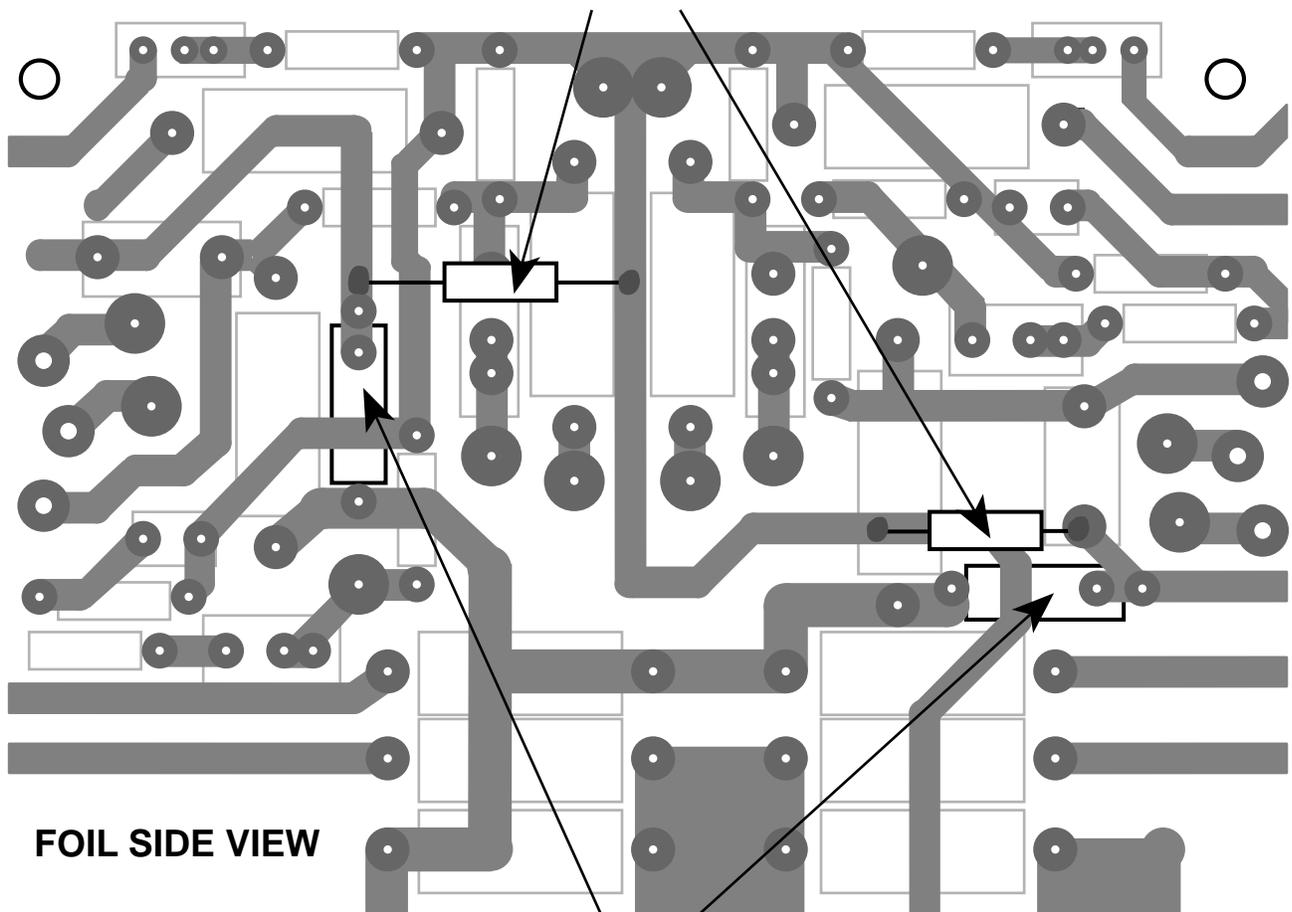
Fet Kit Audio Circuit Board



Super 70 i 6GH8A Tube Rebiasing Correction!

Whoops - last month when we printed the changes necessary to re-bias the screen grid of the 6GH8A tube for improved performance a little mistake got past our proof readers – we printed the view of the circuit card from the wrong side. Here is the corrected foil side view, showing the new 750K Ω resistors on the component side and the new 270K Ω resistors on the foil side. Some people have called us to explain they are waiting until they can get “real good” resistors before making the upgrade. Don't wait. The sonic improvements, even if you use 10% tolerance carbon composition resistors, are very impressive. The circuit design is what counts, not good sounding parts.

Add 270K Ω 1/2W (RN60) on Foil Side



FOIL SIDE VIEW

Change from 1.5M Ω to 750K Ω 1/2W (RN60) on Component Side

Caution Regarding Interconnects

We feel it is time to suggest that you use caution interfacing clamping or locking type interconnect cables with our power amplifiers.

Whether we use gold plated panel mount jacks tightened as firmly as we can without breaking them or the standard insulator

strip mounted jacks, we seem to be seeing a growing number of clients with channel dropout problems when they use expensive clamping type interconnect cables. The users seem to be able to loosen the panel mount jacks from their internal hardware and to deform the contact with the inner conductor on the insulator strip type jacks.

We *never* have an input jack failure here in testing or use and neither do our clients using standard cables. We also have good results with Kimber Kable interconnects. There are very expensive, but their fittings make solid and drop-out immune contacts with the amplifier jacks without breaking or deforming things. Also the ends are slender enough to fit into tight places (such as on Dyna St-400 inputs).

We don't want to condemn any brand because we cannot oversee exactly what our clients are doing with them to give themselves problems. But all other things being equal we would prefer not to have to make unnecessary non-warranty repairs. A cable that clamps too tightly (especially if you twist it) can damage inputs. Please be careful.

A Plug in Stereo Review!

To our surprise, we received an unsolicited good word in *Stereo Review* this month (in the October, 1991 issue) from no less than Julian Hirsch. In his Technical Talk column on page 28 he said that one company's engineers have "consulted with the well-known designer Frank Van Alstine, who has created many Dynaco modifications that have succeeded in making already fine products even better."

He then goes on to tell how we suggested circuit improvements to the company in question to improve the performance of the resurrected \$1000 Dynaco St-70 MK II.

Unfortunately, the kind words do not take into consideration the fact that the company never consulted with us at all. They simply "borrowed" our concepts for setting the bandpass limits at the input within the capabilities of the output transformers and then setting the bandwidth of the inter-stage capacitors and power supply wider yet. (We have been telling you about that since 1982). As we explained to you a cou-

ple issues back, the power transformer is our design too.

But, the idea to eliminate the phase-correction network in the St-70 MK II is definitely NOT our idea. That scheme is destabilizing and will tend to make the top end hard sounding.

We think you will be happier with our Super 70i which is less expensive and is better sounding. We have three units available now. One is very clean, one is fair, and one has a chassis that is a bit rough. A complete unit (new circuits – used St-70 chassis) is \$595.00 complete with our power transformer plus shipping.

One of these days it would be nice if companies that use our original designs would pay us for them. The endorsements don't buy the groceries.

Used Equipment

Fet-Valve 300i Amplifier. This unit is a 30 day trade-up to a Fet-Valve 500 and carries a new two year warranty. Because it has a minor scuff in the sheet metal at the bottom rear corner of the chassis (you can't see it from the front) the price is \$1185 plus shipping (instead of \$1395) with our new satisfaction guarantee too. Here is a real chance to get more for your money.

Transcendence Pat-5 Preamplifier. This all discrete solid state preamp was our best original preamp design one generation back built into a very clean full function Pat-5 chassis with original jacks and faceplate in really nice condition. It is just \$325 plus shipping and carries a 6 month parts and labor warranty.

Delta 240 Power Amplifier with Meters! This is a special unit – our great new Delta 240 power amp circuits in an extraordinary clean Dyna St-150 chassis complete with working lighted power meters and perfect walnut side panels. There is a one year warranty on our circuits too. Its a trade up on a big amplifier and is yours for just \$425.00 plus shipping.

Special Deal – buy the Transcendence Pat-5 and the Delta 240 together and get both for \$695.00 (plus shipping).

Frank and Darlene Van Alstine