

FREQUENTLY ASKED QUESTIONS

NOTE: The answers here may well pertain to the time period in which the questions were actually asked/answered (many years ago in some cases). Some things may have changed - particularly any mention of prices at the time, which we have not kept updated.

Q: Where should I start?

A: Well, we would love for you to purchase the whole Electronotes package. This really is a great saving of over half the cost of the individual items. Still it's a fair amount of money (\$373) but many of you have paid more than that for just a semester of text books. If you had to get just one thing, it would probably be the ***Builder's Guide and Preferred Circuits Collection***. This you could peruse to see what we suggest about an actual construction effort and you could look at the circuits to see if they look like something you could handle (could you actually build from the information we provide?). The ***Musical Engineer's Handbook*** offers a lot more in the way of theory. If you are looking more toward digital music synthesis, perhaps a volume or two of the most recent ***Electronotes*** would be most useful (also – available free online!). Note that we are quite liberal about allowing you to "upgrade" to the whole package - using your original purchases as a credit.

Q: Isn't that \$373 pretty expensive?

A: It's \$373 which is a lot to some folks and pocket change to others. Here is what it is from our business point of view. We have roughly 7300 pages in the everything package, and printing is currently 3.5 cents/page (inventory replacement costs). We also have about \$39 built into the price to cover shipping. That puts us at \$294! That leaves \$79 for our time, for our inventory holding expenses, for misc. expenses, and for any profits. So the question is rather - how do we do it so cheaply?

The answer is: because some of the items in the everything package were printed at a much lower cost - years ago. That's the only thing that is keeping the price so low. Eventually we will run out of more and more items, and the price will have to go up, or we will drop more items (like some already on line). This is one reason we have put all the new material on line for free, and have also posted some items of less interest instead of reprinting them. Also, the buyer can always start out smaller, and build up a credit toward the full package if that works best.

Q : Why don't you have the whole thing on line?

A : Well, that would be quite an order even if we wanted to do it. There really is a stack of papers a foot high, double sided. From the buyer's point of view, do you intend to print out hard copies? I guess not. Unless you have free internet time and free laser printing (which means someone else is paying!) and a lot of time to waste, you are far better off ordering from us. And, we need to get something back for the years of work that went into it.

As for scanning and posting items, this would be a tremendous amount of time and expense. When I post an issue from paper originals, these often need considerable repair (rubber cement and adhesive stickers dried out and floating about) and it frequency takes me several hours just for say, 20 pages. (Other items are virtually ready to scan.) On average, a tedious and exhausting prospect. Could they be run through a high speed scanner, two sided, without jamming (old warped copies), without error or annoying degradation? I don't know.

Why not just go ahead with the scanning and sell digital copies? Sounds good. If it is so easy, and such a viable business prospect, why doesn't someone take on the job under contract. We offered:

<http://electronotes.netfirms.com/en200.html>

Two people since 2001 replied – neither (not even customers) with a lick of business sense. HINT: THE MARKET IS TINY.

Q: Do you accept PAYPAL?

A: Yes. The account is at berniehutchins@yahoo.com - our usual email contact. We are not currently adding any surcharge for using paypal. Feel free to use it. One request however. In addition to any order through paypal, please send a separate email telling us what you are ordering. (There is however no need to send any filled out order form.) This permits us to make sure your order makes sense to both buyer and seller.

And - please include your complete mailing address - this sometimes comes through from PayPal in a garbled form, and we want to cut/paste address labels directly from the email so we minimize errors. Sending the address twice is kind of like program downloads that make you enter a password twice.

Q: Is analog synthesis dead? Is digital better?

A: Of course one must not generalize. Analog synthesis, as we knew it from the commercial efforts of Moog, Arp, and from many other companies, and more specifically as we at Electronotes promoted it as a practical home-hobbyist activity, is gone. What is it that's gone? Well, when we began, we were just finding things out, and very soon, an individual could build a better synthesizer, and at less expense, than one could buy.

But many people were also doing this for the fun of making sounds and making music, not just for the fun of building circuits. At one point I saw, in a department store, a synthesizer for \$149 that I knew was a much easier and cheaper route to having fun with sounds and music. So you can do analog synthesis if it is the building you enjoy as much as the sounds and the music, or if you feel an analog sound is inherently superior, and if you can get along without the very large support base of fellow builders.

While there seems to be some activity in hobby-level analog synthesizers (on the Internet), it is but a remote relative to the intense support (contributors for new circuits, sources for parts, help debugging, new applications, etc.) that was available. Today, often times, people do not even read the text of the old ***Electronotes*** issues before jumping on the Internet to ask for help, and then they get wrong answers from people who have not read the issues either, but who feel obliged to appear helpful. I myself am always glad to try to answer questions when an individual sends me a carefully prepared question with enough details that I can make a useful guess about what is going on.

Is digital better? Of course the answer is: sometimes, sometimes not. But you are reading this on a computer. Likely you know how to program - in C or in BASIC or something. You understand how you sequence instructions to make the machine do something for you. In Cornell DSP labs, we prepared about a 40-page handout on DSP assembly language, and ask the students to read it before coming to lab. Did they read it? Of course not! Did they get their lab exercises completed? Yes they did. About 20 minutes of instruction and a couple of examples, and they were off and running. The handout becomes a reference. Is this good result a consequence of Cornell students being exceptionally bright! Well, some of them are, and some of them aren't, but they all, and you too, know the basic ideas of programming. That's all you need to start. It's easier than getting started in analog.

I myself am not one to automatically embrace something simply because it is new and shiny. Indeed I drive a 1984 Ranger pickup. I do look at new trucks - I just don't need a new truck. [UPDATE: I got a new Ranger in 2001, and still use it to take your orders to the Post Office in 2015.] Some people however do long for and insist on the superiority of the good old days. Most of you have encountered (some of you may be) an almost

militant analog purist. The point I hope I am making is that these people, in also already knowing how to program, are well advised to look to digital methods, especially when it comes to experimentation, where complicated structures can be created and altered easily with no additional hardware investment.

Q: Can I put up Electronotes material on my site?

A: We have, at times, gotten a bad rap for supposedly not allowing people to post our material. In actual fact, we never denied material to anyone who asked and would agree to a few simple conditions which were, in essence:

1. The material had to acknowledge the source as Electronotes and to list all the contributors accurately.
2. The pages had to lead back to us for those interested in purchasing more.
3. We had to see, review, and correct any material to be put up, and possibly, to comment on or update it.

Almost universally, people initially did not ask. What was most annoying were postings that seemed to deliberately (or by omission) suggest that the poster was the original source, which brought us no business, as well as constituting theft of intellectual property. And at times they said that we were no longer in business! - people who had requested and received our ordering information in fact!. One posting, which I still see from time to time says that Electronotes was a "source of errors" and that few of the circuits we published were tested, and that we never acknowledged that! Where this came from, I can't imagine. All our circuits, save one, I believe, were tested, and there are no known errors which have not been reported.

There were very few errors anyway, because the editor (me) knew circuitry. I say this as a matter of fact - not to brag. As a sometimes academic, I know the joys of dealing with draftsmen and editors who do not understand the technical content they are handling. Some redrawings (unauthorized) of our circuits have perpetual errors. They look better than our hand drawings - but they are wrong and won't work. Happily, many of these offenders have gone on to "other pursuits" or perhaps the Internet has just become a place where more courtesy and integrity is expected.

Incidentally, some people were apparently wondering if the use of our circuits in Hal Chamberlin's book and Barry Klein's book were authorized. Certainly, both of them asked, and permission was gladly given. Both Barry and Hal have received a fair amount of credit for the work they have done for us all. For the record, they deserve more.

Q: Do you still have your analog synthesizer set up?

A: No. It had been out of use for a number of years even before our move of a dozen years ago. A major portion of it was housed in a large enclosed "relay rack" that my wife calls "the telephone booth," and the panels were all taken out and stored somewhere. Long time readers will recall that I had a rather "informal" construction practice:

<http://electronotes.netfirms.com/AN14-AN18.PDF>

where components were all soldered to the top of the board, and the boards were more or less secured by soldering to convenient panel controls, jacks, etc. I still do favor and would recommend today that same mode of construction. It is described in the ***Builder's Guide and Preferred Circuits Collection***. I could produce a circuit board in just two hours or so, and have it behind panel in a couple more hours. It didn't look too bad either, although it did look "unprofessional." Yet we have pointed out that here is no reason a circuit board produced at home need look like one made in a factory. Likely it does not even make sense to try for a factory appearance - and certainly there was no electrical reason to do so. But what I had were definitely prototypes. When I do find them some day, perhaps I will be able to figure out what they were.

We made so much! It was great fun, but I never did get much of a chance, ever, to just play.

Q: What sort of digital things make sense? How do we do digital synthesis?

A: Most often there is no direct translation between analog and digital. But some basic things are identical - most notably the parametric nature of music synthesis. In analog synthesis, the parameters are knob settings and control voltages which represent pitch, loudness, durations, etc., pretty much analogous to a musical score.

We set what are relatively slowly varying parameters that control audio frequency results. In a digital approach, what we think about is producing a sequence of samples. Typically, the sampling rate is twice the bandwidth. A CD for example has a rate of 44,100 samples/second. With digital synthesis, in contrast to analog synthesis, we really do have the ability to produce truly arbitrary sounds. This is the freedom we get by (simply!?) assigning a value to each and every sample. But we don't use this freedom. In fact, if we did, we would all be listening to white noise tunes! Instead we establish a relationship between samples in a sequence. We write programs that organize samples. In a simple case, we might require them to be samples of a sinewave. What have we done? We parameterized the synthesis. Relatively few numbers (parameters) control thousands of samples (seconds of synthesized sound).

When we try to translate from analog synthesis to digital synthesis, there are no real rules. In fact, it is difficult to do normal subtractive synthesis with a digital approach. This is mainly because subtractive synthesis requires filtering, and while we can make fixed-specification digital filters just fine, making a frequency variable digital filter is usually difficult. Nominally we would just change the “time constant” and in a digital filter. This means changing the sampling rate – something we usually can’t do without upsetting a sampling rate in a final, musical end product.

Additive synthesis is probably easier digitally. This is just a matter of generating samples (in a higher level language) and playing back as a sound file. FM synthesis works pretty much equally well with a digital or an analog approach, although neither is easy if we are trying for an exact sound. Other methods like the marvelous Karplus-Strong plucked string synthesis are powerful, fairly simple, and uniquely digital.

Obviously, when it comes to experimentation where a particular structure is to be repeated a large number of times (such as the design of animators) a digital approach has immense advantages. Duplications are a matter of cutting and pasting portions of code (seconds of work), not of producing and soldering more and more boards.

Many DSP cards with associated software are available, or can be accessed by a sound card in a computer, if not for production of music, at least for experimentation with synthesis methods. A couple of hundred dollars will get you going quite nicely on your own computer.

Q: Why do you have both Newsletters and Application Notes?

A: This is addressed a bit in our general information. Perhaps it is most interesting to say how the Application Notes came about. We had been producing Newsletters for about four years when, for a number of reasons, we decided to set up shop in a storefront just off the Cornell University campus (the Collegetown area if you know it). We had a Xerox machine installed for our printing, and since we were selling parts by mail order as well, we offered a more general line of parts over the counter (just trying to pay the rent actually!). So many people came in asking the same type of questions, one day I just got out the typewriter and typed up a few answers (power supplies at first). We sort of gave these away in the store or charged a dime. Soon it became a habit, and we added them to our mail-order offerings. It has always been the case that we thought of the Application Notes as electronics, and the Newsletter as electronic music.

Q: How many people work for Electronotes?

A: Gosh! I guess the answer is 0.834 persons. This is the figure used by the great sage Don Lancaster in his *The Incredible Secret Money Machine* (Sams 1978). He meant you should employ yourself - 83.4% of the time. We are a family business in terms of our extra income activities. We also do sewing (alterations). I once put on a button back when I was in the Army. So my wife does all the sewing and lets me do all the newsletter business.

I think many engineering students (or liberal arts!) get no exposure to business. We found this out when we had a business phone and a free Yellow Page listing as a result (listing under "publishers"). So many graduating liberal arts Cornell students had come to love Ithaca so much they wanted to stay here, and looked for publishers in town. Very few publishers actually. We got a good number of calls to learn if we were hiring. How heartbreaking to have to tell the English major caller that this was a part-time business for one person. How depressing to have to explain that this means there were no possible jobs. We dropped the free YP listing. I'm fairly certain no one in Ithaca looked to the local YP for publishers of electronic music technology!

Were engineers any better? Well I was on good terms with the IEEE students who ran the coffee/doughnut table in our building. One of the leaders came to me excited about this snack business: "Bernie, do you know how much money we are making?" I had to remind him that he wasn't paying any rent, utilities, labor, or taxes, and had no competition.

Q: What are the "Supplements" all about?

A: Hmmmm. Well, they are not supplements to anything in particular - not to the *MEH* or *EBG&PCC* as some might misunderstand by the placement on the order form. Much of the function of the original supplements was taken over by the application notes. The ones we still include are either still thought to be valuable or in good supply (or both).

I plan to keep only three S-014, S-015, S-017 in paper. I am way overstocked in these and am offering them free with any order. Two of them are really useful:

S-014 B. Hutchins, "New Approaches to Analog Musical Synthesis" 93rd Acoust Soc Amer meeting, June 7, 1977

S-015 B. Hutchins, "Transform Methods in Musical Engineering" July 1977

At the same time, some of the rest of the supplements will be posted. This has already been done for S-016, for example. There is at least one that was never published, I believe, which I will post.

Q: Do you have any parts left?

A: Yes - lots of parts! Not much really good stuff, although I do find occasional "pockets" of gold. Since we were for a while in the parts business, let me tell you something about that experience (in case you are thinking of it).

You can buy a part in 100 quantity for say \$X and expect to sell it for \$Y. You expect a profit of $\$Y - \$X - \text{expenses}$. In the mean time, you have $\$100X$ invested. To get your profit, you need to sell all 100 parts. But, before you sold them all, you had to reorder, investing another $\$100X$! It gets worse - you decide to add to your line, and invest in 100 of a different part. You don't catch up until you go out of the business.

Some of you who ordered the everything packages some years back received a "bonus" item: white breadboards of student projects never even broken down. These were rescued from a garbage can at Cornell (almost literally). I prefer this "business model". Throw "junk" into a box that is already going to be shipped. Any suggestions?

Q: Can I get on your "Friends" link page?

A: Absolutely. Just ask and supply the best URL. This is badly in need of updating, and never was done properly. If not your own link, feel free to make suggestions.