

The Way Things Were

I have recently been doing some interviews on personal computer history, so I thought it might be a good idea to work up some sort of a personal backgrounder. For the record. Perhaps reviewing just who I am and where I came from. Sort of an unauthorized autobiography.

My general goals consistently have been to take some emerging tech development and either show others how it works or make it do something useful in the way of a fresh product or new opportunity. Hopefully a lot cheaper and simpler than before. And, wherever possible, leading with a high personal valued added. All the while favoring Fuller's *Synergetics*, Schumacher's *Small is Beautiful*, and of course, always seeking out *Elegant Simplicity*.

Somewhere along the way, I've been called one the of the fathers of the personal computer and the patron saint of the Walter Mitties of the world. By *John Dvorak*, the *Boston Computer Museum*, and others.

Life sorta started out as...

An Amplifier With Nothing to Amplify

Because of an exceptionally supportive grandfather, I did fast become a grade school science junky of Pittsburgh's wonderful *Buhl Planetarium*. Even getting to be a radio "school science expert" who didn't make the finals because I never heard of "anatomy".

I skipped over the fifth grade, which quickly became way more of a curse than a blessing. Since I always seemed to have my own agenda, I was more a high B student. Always somewhat shy of head of class. Years of forced piano and violin lessons (I suffered the unspeakably horrible disability of having a convent in my back yard) were wasted on me as I remain utterly unmusical to this day.

But knowing where the notes were supposed to be and the underlying theory did end up helping bunches later on with some of my electronic music projects.

Later on, we moved a few miles north into the Wexford and Ingomar area. Somewhere around seventh grade, I had discovered some long ignored and unused *National Schools* WWII electronics veteran scam kits scunging away in the attic. In one of these was a 35Z5 vacuum tube which I used to miraculously fix our ailing radio.

Naturally, in the process, I trashed the adjacent 50L6. Which seemed to lead to a lifetime recurring theme of my snatching defeat from the jaws of victory. And of leading the way but missing out on the longer term rewards.

These days, it is called "you can spot the pioneers by all the arrows in their back" syndrome.

I started buying *Radio & Television News* for a quarter at the newsstand and read just about anything I could find on electronics in the school libraries. About that time, the absolutely incredible new *Popular Electronics* magazine appeared. Which had outstanding construction projects that many school students could easily handle. There were two fictional characters named Carl and Jerry in each issue.

Written by a paraplegic, which is a story unto itself.

In many ways, I *was* Carl, albeit a far shorter and more wiseassed clone. I quickly built up a primitive electronics lab, frequenting the counter of long gone *Cameradio*, the superb *Burstein Applebee* bargain catalog, and the *Newark* and *Allied Radio* suppliers.

Being an underage and undersized me-first loudmouth, ninth grade was a total horror for me. I seemed to spend most of my time getting thrown into trash bins or belittled by gym teachers. But I did manage to enter a proximity relay and touch switch into the Pittsburgh Science fair. It worked, sort of, but was not a winner.

I never did really figure out what girls were all about. (please email any hints to don@tinaja.com) And I guess I still have shyness problems to this day. Which sort of made me into the prototype archetypical computer nerd.

I actually formed a virtual company I called *West Penn Sound*. By sending RCA \$2.50 for a ream box of tv service letterheads. I did manage to revive and occasionally rent several PA systems and later turned into the world's most clueless school disk jockey. Paying far too much attention to gear and way too little to entertaining the people, to playing what they want, or to the event itself.

I was in the first graduating class of *North Allegheny* High School. Which was into a lily white fifties suburbia head trip. We did have an exceptional science program. Some of the astonishing student projects included then new gas chromatography, induction heaters, dc amplifiers, and resistive inks. We also were sort of a control group for early Dr. White televised physics lectures from *WQED*.

In those days, ham radio was a technology leader, doing such things as bouncing radar off the moon, pioneering practical SSB, creating parametric and distributed amps, or helping with the *International Geophysical Year*.

It was also a great place for answers and parts. I became licensed as K3BYG and joined both school and "grownup" ham radio clubs. There were also informal techie meetings in the projection booth of the Mars Theater.

Several of my personal projects of this era did include superregenerative VHF "acorn tube" receivers, tube based

pilot light string color organs, the obligatory Tesla coil in the form of a *Van De Graff* generator using a dogfood pan dome, test equipment, a Theremin, mobile sound systems, walkie talkies, twinkle light neon dance decorations, and various WWII comm gear restorations.

Jobs, Sort of

My first real summer job was in a radio and tv repair shop in a long gone warehouse near where Three Rivers Stadium is today. This was primarily an in-house warranty repair service for Pittsburgh's snottiest department store. But we did make house calls. I was mostly a gofer and replaced the techs on their vacations.

We also installed and serviced organs, and I became super impressed by those folks at *Allen Organ*. Who had combined impeccable Pennsylvania Dutch craftsmanship with an uncompromising seeking out of tech excellence.

I really, really wanted to be like them.

Further summer "intern" work was at *Pannier*, where I helped design billet markers, display exhibits, magnetic amplifiers, and electrohydraulics. I was actually granted a patent on an ultrasonic position detecting system. Which gave me my first clue that, for most individuals, things are very, very wrong with the US patent system.

More on my *Case Against Patents* web page.

"We'll Gather by the Twilight's Glow In Front of Old Pardee"

Lafayette College had one of the finest undergraduate Electrical Engineering programs in the country, and I did manage to pick up a BSEE with minor honors in 1961.

Partially working my way through as a waiter.

I made Dean's List the first of several times by way of a computer roundoff error. I was mostly a technonerd but did manage some minor radio station work and a stint as a dorm social chairman. Naturally, I flaunted my pocket protector and most proudly wore my K&E log log duplex decitrig dangling on its belt carrier.

I studied under the legendary Finley Smith. Who literally bit through his pipe stem when, after awarding me the *Outstanding IRE Student*, found out I wasn't.

One of the most important things I learned was that the best way to create a thick lab report was to use thick paper. And that a little bit of fun effort attractively arranging text and graphics can give you an incredible edge.

Somewhere along my junior year, there was this paper contest with a then princely \$25 prize. Several days before the deadline, I asked how many entries there were.

After some hemming and hawing, Finley said zero.

Figuring these to be fair to middlin' odds, I entered. And, not totally surprisingly, I won. This also was to become a recurring theme with my seeking out obscure *Con Tests* and finding that you'll often have a big advantage at an auction if you can arrange to be the only bidder.

The contest paper was a demo of an outdated digital counting device called a *Dekatron*. I used the money to buy a *Television Engineering Handbook* that I still refer to this day. Some of my other projects were on an FM commercial killer, one of the very first solid state Nixie tube drivers, a color organ based on power transistors, and a tunnel diode oscillator. But the real biggie was winning the homecoming contest (unheard of for a social dorm rather than a frat

house) by using a giant 15 cell alphanumeric display that spelled out *CRUSH LEHIGH*. Which referred to a minor remedial school of no consequence in a ghetto to the west.

"In all the world no other scene, so fair, so dear to me."

Back to Work

After graduation, I returned to the Western Pennsylvania area and began graduate work at what then was *Carnegie Tech*. I remember an outstanding problem solving class and microwave analysis work involving diode switching. Also building a high gain VHF parametric amplifier out of a plain old 1N914 silicon diode.

My first full time engineering job was at Irwin's *Femco*, a small firm involved in trainphones, trolleyphones, and similar industrial carrier current comm. I cloned a *Heathkit* style assembly manual that cut their production time on a tone receiver by over two thirds. Other work involved cable testers, printed circuit layouts, and mine safety.

My interests in FM commercial killers and psychedelic lighting didn't seem to fit their product mix all that well, so I also continued developing electronic projects on my own. *Texas Instruments* had just come out with the first relatively low cost SCR's, so I personally bought three of them at \$6.35 each. I then combined them with some LC audio detector/filters and a trio of unijunction triggers to form one of the first solid state color organs.

I queried *Electronics World* if they wanted such a construction project, and they snapped back their offer of \$150 for my first professionally published story.

Which appeared in April of 1963. Even forgetting about the incredible ego trip, there was something utterly magic about getting paid lots of money to do what I thoroughly enjoyed doing anyhow. And thus began a long career of writing technical stories and papers.

Largely for the popular and newsstand titles.

I milked those SCR's and triacs for all they were worth, creating over a dozen constantly improving color organs and similar psychedelic lighting systems. Whose names included *Colorgan*, *Musette*, *Psychodelia I*, and the incredibly badly renamed *Hi Fi a Go Go*. Along with a lot of dimmers, power controls, and photo timers. One of the latter being in log stops rather than seconds.

At the same time, I also started doing tech tutorials. A few early examples included semiconductor sweeps for large screen TV, archaeomagnetism and paleomagnetism, chirp radar, thermoluminescence, and quite a few more mundane topics. The stories, which are approaching 1700 published to date, were spread over a few dozen magz.

With *Popular Electronics*, *Electronics World*, and *Radio Electronics*, being the early biggies. And later on including such titles as *Byte*, *Kilobaud*, *PC Techniques*, and *Circuit Cellar*,

Aerospace Daze

My forced college ROTC experiences led me to believe there was serious doubt whether the US military would be able to survive my involvement with them. The easiest way to beat the draft at that time was to become an aerospace engineer. Which I did. By joining long defunct Goodyear Aerospace a few miles west of Phoenix, Arizona.

Work was highly classified, but I think I'm allowed to say it involved measuring the lumps in the atmosphere

which set the ultimate resolution limits of long range side looking radar. While doing foliage penetration tests, film data annotation via minicomputer, intelligent spectrum identification, adaptive interference rejection, and the first all-electronic *Fourier* "chirp" correlators.

I went on writing tutorials and construction projects, sometimes appearing three times in a single issue. I did the first "linear" hobby integrated circuit project by making a utility amplifier out of a MECL digital logic gate.

I continued with my graduate studies at [Arizona State University](#), picking up my MSEE in 1966. I started but never completed a second master's degree in anthropology.

My E.E. thesis was on the first integrated circuit metal locator. Built by biasing RTL logic gates into their linear amplification region. Thus making great diffamps. Real linear IC's were yet to show up at reasonable prices. The beast was called the IC-67 and ended up on the January cover of [Popular Electronics](#).

Getting Goodyear to pay ASU to let me write a hobby construction project was an interesting scam. One from which I developed the concepts of [reversing cash flow](#) and [letting others pay you for your fun](#).

Southwest Technical Products

I strongly feel that the most unsung hero of the personal computer revolution was the late [Perry Ferrell](#) of Popular Electronics. Who ground out the zillions of superb quality construction projects that anybody could build and learn from. Thus creating [the](#) environment from which personal computing was to evolve.

About the time Perry was putting the finishing touches on my IC-67 story, Dan Meyer of [Southwest Technical Products](#) called, offering to sell my circuit boards.

I was never actually an owner or employee of SWTPC. Typically, I generated artwork and prototypes and was paid on a flat percent-of-sales royalty basis. I guess around a quarter of their sales were often my products.

Some of my more popular designs included a [Psyncrone](#) pseudorandom tone generator, the color organs, several generations of digital logic microlabs, and various pitch references, dot and bar color tv service generators, logic demos, bounceless pushbuttons, my WWVB receivers, NBS superclocks, music modules, electronic dice, and such.

But the big cash cow was the DCU on the February, 1968 [Popular Electronics](#) cover. Getting something to count to ten and display it was a really big deal at the time. My goal was a ten dollar [Decimal Counting Unit](#). I made several of these that involved either meters or bouncing incandescent light displays combined with low cost RTL logic. The DCU's quickly led to the first low cost hobby frequency counters and digital voltmeters. Plus PH Meters, pressure gauges, and ballistic chronometers.

This led to a long series of improved counter and meter projects. Using Nixies, LED's, and a few others.

We were way ahead of the crowd on low cost keyboards. The usual [Apple I](#) photo you see has my keyboard in it.

The TV Typewriter

One of the Goodyear projects was to build up a million dollar, twelve megapixel display system. That a hotshot pilot would supposedly thoughtfully scrutinize while in the middle of a dogfight. I asked myself the obvious question

"Can I trim costs a tad on this by cutting a corner here and there and drop the price to \$99?"

The only cheaply available semiconductor memory chips at the time were long shift registers, so I took six of these nickel-a-bit beasts and arranged them into a simple frame grabber that was capable of showing 512 upper case ASCII characters. [Signetics](#) had recently come out with a 2513 character generator, so I hung this and a few TTL chips on the output, and added a rf modulator. The rest is history.

My TV Typewriter first appeared in the September 1973 issue of [Radio Electronics](#). It instantly became the most popular hobby construction project of all time. And was felt by some to be the opening shot fired in the personal computer revolution. Despite the powers that be studiously ignoring it or vehemently denying it had any commercial potential whatsoever.

I followed up with a [TV Typewriter Cookbook](#). And a series of improved models, ranging from the [TVT-2](#) up through the [TVT 6-5/8](#). The larger units quickly upgraded to fewer CMOS chips and newly available static RAM. The smaller ones were cards that attached to low priced logic trainers and were driven by CPU cycle stealing. My [Cheap Video Cookbook](#) and a [Son of Cheap Video](#) followed.

I'm often asked what my involvement with MITS was. There was an Albuquerque conference or two with Ed Roberts and Les Solomon over linking the Altair and the TVT, but we seemed to be on different pages and nothing much further ever came of it.

The Cookbooks

The urge to publish can be insatiable, so I also did lots of internal Goodyear apnote stuff we called AEEM's. Much of this was on RTL digital logic. Seems there was this [Navy Preferred Circuits Handbook](#) we were using that every techie called "the cookbook". So, I stole the concept, and sent Sams my [RTL Cookbook](#). Thus starting a trend where everybody and his brother started naming all of their new titles "cookbooks" after mine started selling so well.

This was followed by the [TTL Cookbook](#) and the later [CMOS Cookbook](#). TTL went way up over a million copies, appearing worldwide in half a dozen different languages. To date, CMOS remains just under a million seller.

Shortly after the TV Typewriter, I did, of all things, a [TV Typewriter Cookbook](#). Later to get followed up by the [Cheap Video Cookbook](#) and [Son of Cheap Video](#).

Just about then, the very first computer stores started appearing. These consisted of a nearly empty storefront with a [Cromemco Dazzler](#) in the window and several poorly printed brochures on the counter. In the middle of the floor were four skids full of books. Two skids were Adam Osborne introductory computer titles. Plus one skid of [TTL Cookbooks](#) and a second of [TVT Cookbooks](#).

To leave the store, a customer had to physically climb over the skids, and their wallet usually fell out onto the floor in the process. Those were heady times.

Other titles of mine from that era included the [Active Filter Cookbook](#), which was the best seller ever for this topic. Plus [Micro Cookbook I & II](#), The [Apple Assembly Cookbook](#), the ISMM, [Enhancing your Apple II \(I & II\)](#) and the [AppleWriter Cookbook](#).

A partial booklist is found on my [Book Access](#) page. I hope to e-publish them all someday.

The Incredible Secret Money Machine

After eleven years, I bailed out of Goodyear, moving to Parker. Bee running a museum and me doing my thing full time. Sort of. Where I wrote my *Incredible Secret Money Machine*. Which *Whole Earth Review* and scads of loyal fans felt was by far the best small business book anytime ever. Looking back, much of the stuff was right on, but there were a few rough edges. I'm supposedly doing an all new rewrite and have an *ISMM* page on my website.

I got involved in the *Kansas City Standard* for cassette data recording. Based on UART-like tones. But cassettes became obsolete before the system was widely used. I was also involved in the old MacDonald farm interface, which was later to become an EIE I/O.

Byte Magazine started up around then, and I appeared in nearly all of the early issues. Mostly chapter reprints, but several projects. One of which was one of the very first plug-in memory cards. I switched to *Kilobaud* magazine after Byte went through an editorial cataclysm.

This was when the 6502 arrived. The world's first RISC microprocessor, although this is still vehemently denied to this day. I used everything from *OSI* to *KIM-1* to *Apple*, did a lot of machine and assembly language programming, and wrote a bunch of 6502 related books and columns.

I even made it my license plate.

I particularly liked the *KIM-1* and even did a \$6 video system for it. Others wrote chess programs and adventures in its 1K memory space!

Seems to me there were some *Computer Faire* papers and booths and stuff around then as well. Working with John Simonton of *PAIA Electronics*. Some involving video displays and others audio.

Parker was pretty much a technical wasteland. I wanted to get a lot closer to my readers, so we moved to Thatcher. I started teaching microcomputers, other electronics, and desktop publishing at *Eastern Arizona College* under Ward Belliston. I guess I had a pretty good rep as an adult education teacher, using a double strategy of "no place to hide" and my "always asking answerable questions". Plus continual hands-on game and role playing combined with visiting outside experts.

Twelve years later, EAC stupidly cancelled their entire electronics program because the football team needed the money. Seems the subsidy of \$37 per homegame spectator was not nearly enough.

I ended up buying the entire electronics inventory at an auction and sold it as surplus junk for far more than I ever got paid teaching. There's an important message in here somewhere, but I'm not exactly sure what it is.

Something about popping seed corn.

The Columns

Several multi-part *Parts Profiles* and *Electronic Music Fundamentals* stories seemed to do fairly well in PE, so I started exploring monthly columns. To date, over 500 have been published, and many appear in ezine format on my *Guru's Lair* website.

Hardware Hacker was the first major series, initially appearing in *Modern Electronics* for several years. It was then moved over the Larry Steckler's *Radio Electronics*. These columns would typically try to explore half a dozen technical concepts. Some beginning, some advanced, some

proven, some off the wall. Something for everyone.

I wrote a lot of my own *PostScript* routines that gave me exceptional control of layouts and tight integration of text and figures. Many of the figures actually did what they claimed to, generating real curves directly from underlying math formulas.

An obsessive result of my custom PostScript layout is the secret hyphenation algorithm you see here.

I also found out that the 68030 or whatever hidden in a PostScript laser printer made a jim dandy "mother's little helper" for the 6502 in an Apple IIe. And that the potential of PostScript as a general purpose computing language is grossly underappreciated.

Hacking used to mean "pursuit of technical excellence" or doing anything that left the experts shaking their heads in stunned disbelief. The term got thoroughly trashed by the media, and I started getting phone calls from wannabe felons and having men in black sitting on my doorstep.

So, I changed the column name to *Tech Musings* in April of 1995. I switched to an *ezine-only* format around May of 2000. With its overwhelming advantages of total control, full color, easy revisions, tight feedback, and the ability to do instant resource linking.

I did two series of longer term columns for *Computer Shopper*. One was called *Ask the Guru* and was largely on Apple II and IIe programming. The second was initially called *Laserwriter Secrets*, later renamed as *PostScript Secrets*. At the time I was both a seeder product tester for *Apple* (IIGS & LaserWriter) and a beta tester for *Adobe*.

I started a *Blatant Opportunist* column for *Midnight Engineering* magazine. Mostly about useful help for small scale startups and emerging technical opportunities. This was one of the first columns of mine to go ezine only and (as you are now viewing) continues to this day.

I also did a series of 92 *Resource Bin* columns for *Nuts & Volts* magazine. The focus of the columns was "where to get stuff". The "column" continues to this day, privatized as part of our custom *InfoPack* cash-and-carry service.

Except for the earliest columns which are being slowly added, most everything can be found in ezine format on my *Guru's Lair* website.

Back to the Future

The web had my name written all over it. Coming along just as most magazine author payments were becoming abysmal (dropping an unconscionable 10:1 in terms of real dollars since I began), editing was becoming ludicrous (the last known competent editor was locked in a closet at Sams in 1978 and has not been seen since; the breed is presumed long extinct.) and any interest in high volume electronic hardware kits was clearly waning.

So, I created my *Guru's Lair* website which presently is receiving over 2000 *page views* per day. Yes, it's profitable (forgoing, of course, such frivolities as food, clothing, and shelter). *Funded* largely by *Banner Ads*, royalty residuals, *eBay Sales*, associate fees, *Surplus Bargains*, consultant referrals, seminars, and my *infoPack* consulting.

I'm also doing original research into energy efficiency. Especially using some super heavy math I've gotten into to do *Magic Sinewaves*. While exploring *Book-on-Demand* publishing, *PIC* micros, *Flutterwumpers*, my *Hydrogen Energy* resources and ongoing *Pseudoscience* bashing.

Other Stuff

Let's see. I literally married the girl next door. But since our daughter only recently got her MBA, it's way too early to tell how things are going to work out.

Don't want to rush things.

Back around when I was six or so, the "bad boy" of the neighborhood torched the garage across the street. I ran over three blocks to turn in the alarm to the wrong fire department and then suffered a year's nightmares over the incident. Which led to my becoming a volunteer fireman, first for Parker and later Thatcher. I served around ten years as a training officer and one as a captain.

I also spent a few summers working forest service fire towers. On which the [Active Filter Cookbook](#) math was worked out. As was my new [Tearing Method](#) of program analysis, and many of the unique [Cheap video](#) projects. I also did enough wildland firefighting to know which end of a [Pulaski](#) gets sharpened.

I've long had an interest in caving and joined the CAG grotto and ARA regional of the [National Speleological Society](#) around 1968. I have done more than my share of ridgewalking and mapping, and explored virgin cave both in [Lilburn](#) and in "my own" [Dum Ditty](#) cave.

I've been officers in local groups and have put on several spelunking seminars, been a grotto editor for three years publishing the [Cave Crawler's Gazette](#) And, in a minor role, I helped develop Arizona's [Kartchner Caverns](#).

What I really like about caving is that you can literally go where nobody has gone before.

Over the years, I have been very heavily into travel and adventure. Participating in archaeological field schools, fuzzy elephant hunts, the [Na Pali](#) cliffs (which makes the redwall in the Grand Canyon look like a sidewalk curb), or exploring our incredible [Mt. Graham Aerial Tramway](#).

It is a rare Sunday that this desert rat is not tromping off somewhere. By cave ridgewalking, bicycle touring, visiting ghost towns, tracking down remote hot springs, or simply wandering down a forest trail with Bowseretta.

Or, above all, [Tinaja Questing](#).

Sources close to an associate of the barber of a usually reliable spokesperson claim I've got this sometime associate by the name of [Marcia Swampfelder](#) who occasionally ghost writes an April column for me.

Her combination Apple II reset protector and miniature guillotine was superb. As were her many mass teleportation products. Those with a cloning gain of four were favored by importers of specialty herbs and spices to set their own currency exchange rates. But one end user complained because he had the gain and polarity settings wrong when he tried modeming his now shorter and newly lefthanded girlfriend to Petaluma.

Marcia also used a hex inverter to uncast an evil spell.

Marcia's best product by far was the [Gentry Systems](#) 110 volt ac solar panel that used [Barfoot Layering](#). It seems the key ingredient was a chemical that got extracted from the sex pheromone of the pine sawfly. Used some thirteen orders of magnitude above normal.

Don't let it bug you.

I want to emphatically and categorically deny the ugly rumor that all of Marcia's products and researchers are named after Arizona fire lookout towers. Sadly, Marcia is in semi-retirement owing to clueless potential litigants.

Closing Thoughts

So what if you have nothing to amplify? If you want to build an amplifier -- **DO IT!**

Many years ago, I was at a rock concert. The opening act was a single flute player standing solo in front of the closed stage curtains. His job was to warm up the audience for the high priced talent that was to follow. He was good.

But as he went along, the musical vibes got stranger and stranger, then totally bizarre. He was playing **chords** on his flute. Combined with utterly unbelievable riffs. Much of the audience got impatient and bored at what seemed like a bunch of gawd-awful squawks.

Then I happened to notice a friend beside me who had both been in and taught concert band. He was literally on the edge of his seat. He turned to me and slowly said "**you ... can't ... do ... that ... with ... a ... flute**".

Of the thousands and thousands of people in the theater audience, at most only five realized they were witnessing a once-in-a-lifetime performance of the absolute mastery of a difficult and demanding instrument.

Always play for those five.

*Microcomputer pioneer and guru Don Lancaster is the author of 35 books and countless articles. Don maintains a US technical helpline you will find at (928) 428-4073, besides offering his own **books**, reprints and **consulting services**.*

Don also offers surplus bargains found on [eBay](#) and on his [Bargain Pages](#) .

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