The Trials and Tribulations of an American Inventor

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Prologue

My mom once told me that my first words weren't "Mommy", or "Daddy", but instead saying "*Light*" while reaching for a light switch. Maybe that was a foretelling of how early my enthusiasm for the technical and mechanical would be…

My autobiography covers my strained background and many harsh events and incredible twists and turns that helped create the framework of my life. This would result in many decisions, tangents and forks in my life. Besides covering most of my personal hurdles, I have also described many of my inventions and achievements and hope that reading this autobiography will help guide and give purpose and inspiration to the reader.

David Theodore Miga, CET

Note: Web links to all of Dave's technical and construction articles and independent EDS product reviews, evaluations and feature articles are at the end of this bio.

Born unwanted and brought up by an abusive paranoid ex-convict father with a trigger hair temper and a mother with Stockholm syndrome, life wasn't a walk in the park. There was never any money and I spent my early years growing up in the projects in Far Rockaway, Long Island. From an early age, I figured out that I would be on my own to survive as best as I could. My father had a couple of good points: like his dad, he was brought up as a contractor's son and was a second-generation mason. Also, being ex-military, he was disciplined and he knew how to take care of everything he owned, keeping everything looking like new and in its place. As his son, the relationship was more like a drill sergeant bossing around a private. But it did help mold my personality and like him, I was always organized and always cared for everything that I owned.

I had an insatiable curiosity for wanting to know how things worked, why things did this or that and what was that for? This would occasionally get me in trouble. Right after moving into the projects in 1960, we were the first tenants in our building while behind our building, the city was building another row of apartments. There were almost no people in the projects yet and I hadn't made any friends. I used to explore the complex by myself, and one weekend I took my toy rifle that shoots plastic bullets and shot at everything until I was out of plastic bullets. Bored, I wandered near a gigantic hole with yellow warning stickers around it. Wonder what this is for? I looked down the deep hole and saw water at the bottom and a large plank going across. Let's take a closer look. So it looks like a hole with water on the bottom, just closer now that I am standing on the plank, about ten feet below the surface. Well, isn't this boring, guess time to leave and go wandering again. But the sides of the hole were a lot steeper than I realized, and sliding down was a whole lot easier than getting out. I tried and tried for hours, but each time I kept sliding back down, each time almost missing the plank, If I had missed, who knows what horrors were there under the water.

51-24 Beach Channel Drive apt 1F was home for five years.
Note this is a picture taken at my revisiting in 2012.

It was starting to get dark and now I'm not just worried, I am getting downright scared, almost getting into a panic. It was the weekend and no one would be coming back until Monday at least. Finally, I decided to stop panicking and took a deep breath and calmed down to think. It struck me that I needed a stick of something to maybe stick in the sides of the hole like ski poles my uncle used when he went skiing. Then I could pull myself up a little at a time, but no sticks down here, just a plank and water…. Wait! Maybe I can use my toy rifle as a stick. I knew I would probably ruin it getting sand and dirt into the barrel, but it was my only choice. That was the answer, and a few minutes later I was home, getting yelled at for being late for dinner and looking like I had fallen into a hole filled with muddy water (!) I was all of five years old at the time. But since then, I have never forgotten that day or have been scared of anything in my life. Funny how one simple action at a young age can affect you forever…

Things were different than what is considered the norm now. It wasn't unusual for me at the ripe old age of seven years old to take a dime, my weekly allowance until the age of ten, and on a Saturday, get on a bus on Beach Channel Drive and get off under the "El" and window shop for hours. When it got dark, I would take the bus ride back home to the projects and my apartment. Often I would cross the scary four-lane Beach Channel Drive and walk all the way to the boardwalk along the south shore and swim at Far Rockaway Beach. No one bothered me and no one thought this was unusual in those times.

As people started moving into the projects, there were opportunities to rummage through garbage. On trash day there was always something to pick up, bring home and take apart. I nearly electrocuted myself when I plugged in an old lamp I found and tried to take it apart while it was still plugged in. The projects used 130 volt transformers for some reason, not 120 or 110 volts; getting hit with 130 volts across the fingers of my right hand while picking up the Levitton socket stayed in my mind for a long time after that. But it made me very curious on how things were made and I dreamed that some day, I would be making these things myself for other people. The dream of being an inventor was built into my DNA.

My first experience to someone who was a true successful inventor was in 1961, when I was just six years old. My grandparents lived in Laurelton, a nice, and *very* Jewish community in Queens with rows of Dutch-influenced Victorian townhouses constructed as one huge block-long structures built from cinderblock with amazing quality. Lots of brass hardware, stained glass and glass doorknobs, collector quality that nowadays would bring a fortune.

Grandparent's Townhouse in Laurelton; picture taken at my 2012 revisit.

One next-door neighbor, Saul, had a daughter, Joanne, who would become my first "best friend". Playing "doctor" was one of our favorite pastimes, along with swimming in her family's pool, the only one in the neighborhood. Saul was a professional TV service technician and I would watch in amazement as he worked on TVs in his basement.

The other next door neighbor, Mr Weiss, had invented a plastic sealing machine that the military found quite useful during the Second World War, and it had made him quite rich. I remember that every year, he would have a new Cadillac or Lincoln, never keeping a car for more than a year, and always alternating between Ford and Lincoln. So you see I had some mentors who would influence me.

One day, my parents drove us from the projects past Idlewild Airport (now JFK International) to my grandparents' townhouse in Laurelton. Mr Weiss saw me playing outside in the alleyway, and invited me into his basement. There, he showed me a blue and white RCA Victrola record player, all taken apart. He said that he felt that I had the capabilities of fixing it and if I could fix it, I could have it. He pointed to what I know now as a Selenium rectifier, a component with lots of plates joined with a long bolt and nut.

"You see here, one of the selenium plates has shorted and caught fire. I'll bet that someone could probably take off the bolt and nut and remove the shorted plate and put the thing back together and have a working Victrola."
"But if the plate is removed, that would mean that it wasn't necessary in the first place. Why will the thing work with a missing part?"
"Because when things are engineered and designed, a great engineer will always design in more than is necessary and even though there is less of it than what was built, this might simply have been a defective plate, and the rest of the plates will indeed have to share more of the load, but hopefully they will survive. Either way, it won't cost a thing to experiment and see. So, do you want it?"

Does a bear shit in the woods? Everyone knew that I loved to take things apart to see what makes them tick, and then put them back together again, perfectly. But having my own record player? Wow. Now only if I had some records…

In was in 1962 during the summer break from PS105 when my parents took me to take a ride to Woodmere, a small town in eastern Long Island, closer to the Hamptons. No explanation was given except that I would be "tested". There I was given an IQ test at Woodmere Academy, a private school not for military like it sounds, but for business training for the kids of the rich and famous business leaders and CEOs of the country. All the children had to wear business suits and learn to make ties and wear black leather shoes with shoestrings, just like their CEO daddies. I landed up killing the test, reading at a 12th grade level and an IQ way beyond normal and scored a year's free tuition for third grade. It, however, would turn out to be a life-changing thing, both good *and* bad.

Original building of Woodmere Academy, picture taken in 2012.

I was beat up daily by the rich kids, me having the absolute *nerve* of being driven by a *school bus* every day from the projects to Woodmere Academy to mingle with the elites. Every morning after I arrived and was waiting outside with the others to be let in, there were chauffeured limousines coming and going with armed bodyguards with Colt 45 pistols on their belts, guiding their precious cargo to the waiting area. It gives some perspective to even young children on how people can live completely different lives than what you were brought up to think was normal. Especially when most all you've known was the projects and how people lived there.

But there were moments to savor also.

I remember one day when we were to have a "show and tell" describing what our fathers do for a living. Most of the kids were describing their dads as business leaders, politicians, bankers, contractors and so on. At that time, my usually-not-working father was working as a printer for my grandfather's business in Manhattan, so naturally I would do something on him. But right before my presentation, a boy pulls his Red Rider into the classroom with the biggest light bulb I've ever seen. It took up the entire length of the Rider and looked like something from a nightmare movie.

He explained that his dad “worked” for General Electric (I guess a company president works?) and made these bulbs for the Long Island Expressway and when he was done, I felt like burnt toast describing my dad as a printer.

Since there were so many talented and smart children there, I knew that to make any friends at all I had to do or be something different and make myself interesting. I spoke some Polish (from my father’s side) and impressed a few to become my friends by translating some of their best lines into Polish. This allowed me to be invited to one friend’s house in the Hamptons. What a change in my life would be coming…

My parents drove me in their 1963 Volkswagen Bug east to the Hamptons and we arrived to what would be my pictured dream house in my older years. I didn’t know people could live in such splendor and modern technology, have a huge backyard to play in with the ocean and your own private beach. My friend even had his own room with his own furniture and pot lights in the ceiling (!) above his own desk! I think back to my life in the projects with the exposed pipes we would bang on when the tenants above got too noisy shouting at each other. No exposed pipes or wires here in the Hamptons. What a thought!

I also learned woodworking in Woodmere Academy, as they had a full wood shop in the basement. Imagine a bunch of 7 and 8 year olds cutting wood on a huge noisy table saw with no protection from the 12-inch dado blade screaming like a banshee. I was nearly scared to death by the screaming monster and nearly chickened out, but I remembered how I confronted with my fear when I was at the bottom of the hole in the projects. I calmed myself down, and boldly picked up my mahogany plank and made my two dado cuts on my piece of mahogany and lived to tell the tale. Today it would lead to the teacher’s arrest for child endangerment but back then, it was a normal learning experience for Americans. This turned out to be another life-changing experience, as I turned out to be a perfectionist in woodworking, a hobby I have had since that time. Oh yes, I still have the Honduras Mahogany bookstand I built in 1963. It looks as good now as anything I’ve ever made since.

We finally caught a small break when my father scraped up enough money to buy a small delicatessen in Amityville. We lived above the store in a small apartment that you could get to from a separate door outside, but also a hidden door from the deli by the milk cabinet. That deli was where I learned all about hard work, having to stock the shelves and sweep the floor several times a day, sweep the front or shovel snow so the cars could park, before and after school. I eventually became a somewhat buff pre-teen carrying three cases of beer up the basement stairs at a time, amazing the beer delivery drivers. But I also learned a great deal about how money and business worked, as my father had learned from his accountant how to handle finances and keep the books. I also learned all about refrigeration and electrical and plumbing from the various technicians having to deal with our Victorian wiring, plumbing and refrigeration systems for the beer, cold cuts, salad, milk and freezer cabinets. This would be invaluable in my various and varied careers in the future. I also became a good cook, as we made our own hot lunches, meatball heroes, cooked roast beef, made salads and so on. Everyone needed to know how to cook, and I found myself usually chosen to cook the meats and eggs because I had the talent to know how to spice and when to take the food off the stovetop or out of the oven at precisely the correct time.

2012 picture of the old building, still standing after 100+ years. No longer a Delicatessen.

I built a workshop in the basement, near the stairwell where I had an outlet for power. For a few months during 1966 I played mostly with lamps, motors, and 8,000 volt power transformers from old Budweiser and Scheafer beer neon signs. I was quite aware of the danger and obviously never electrocuted myself.

My first electrical inventions were nothing more than electrical control boxes to supply power to various lights, motors and work outlets. I gave each new venture a model number starting with DEL for DETUM Electronic Labs, a name I made up using my initials. The DEL-2 was the first controller.

The DEL-3C was the final version with some improvements.

My mom, seeing me kind of in a rut and not really learning anything in electronics, did some research and discovered a magazine called **Popular Electronics**, and gave me a subscription. At the age of 11 years, mostly everything I read was so far ahead of my abilities… I realized I had a long way to go. But I stuck with it and continued my subscription long until the magazine went out of business in the early 1980's. And of course, I kept and still have every magazine to this day, and as I grew older, I would reread each issue, understanding more and more until I knew 100% of the content of each article and even built most of the projects. I attribute 95% of my knowledge of electronics to this one magazine. Through the years I would subscribe to all the others and at some times in my life I had as many as seven magazines a month come in from radio to analog to audio to digital and computer subscriptions.

I also learned something about the way things work when being involved with the Mafia. One day, two dark-haired gentlemen dressed in *very* expensive suits visited my father in the deli after school. I was there and saw one lift his jacket I bit to show off a nice nickel-plated Colt 45 auto while he was talking to my dad. My dad told

me later on that the men suggested that he change his garbage pickup from Long Island Trash to a new company called Waste Management. He made the change. I never forgot that scene; it remains in my memory to this day (and would repeat itself many years later).
On another day, I was with my friend Chris, in the deli by the hidden door to the apartment. We were talking about school when suddenly, two men crashed through the front door swinging their crowbars on the way to the register breaking things along the way, and proceeded to rob the register. My mother screamed and ran. We had two dogs that heard the commotion and flew from the back room through the door than always remained open a bit using a sixpack of Bud as a doorstop (Bud was cheap and the sixpack usually exploded from the spring-closing door every week or so). That was intentional so we could hear customers come in while we were in the back kitchen. Good thing the dogs could get through. The bad guys only had crowbars for weapons, and when the Shorthaired Pointer and German Sheppard chose their targets, there was blood and guts and shreds of torn clothing flying all over the place. Chris and I bolted through the hidden door. Chris held the door closed with his leg in case the robbers had spotted us, while I flew up the steps to the apartment to call the police. But instead of calling the operator, I tried a new thing I had heard about on TV, dialing 911 instead of O.
What the robbers didn't know was that the front door stuck on this old Victorian building and all our customers knew you had to push the door lever down, pull back, then forward, but the bad guys didn't know this and landed up being nearly eaten by the dogs. They had broken most of the jalousie window panes in the door trying to get out while the dogs ripped them to shreds. They were gone by the time the police showed up, leaving a trail of blood on the front walk. But word got around our little town and we were never bothered again.

In 1970, my parents had made enough money to have a small house built along the Long Island Expressway on Spur Drive South. I moved my lab from the deli basement in Amityville to the new house basement in Islip.

Throughout grade, mid- and high-schools on Long Island, the small towns I lived in (Amityville and Islip) everyone knew each other and I was quite popular with the geeks and intellectuals and often beat up by the popular jocks and put down by the popular girls. It didn't bother me much since I knew they wouldn't amount to as much as I had planned for myself. From as early as I can remember I always wanted to be an inventor and often dreamed about how some day, I would be living on my waterfront ranch, taking my sports car to my factory and directing my employees on assembling my inventions and working with other geeks on new ideas. As a child, I was always the "leader" in whatever day's adventure I had planned for the day for my brood. In High school I started an "electronics experimenter" club and gave tests that had to be passed to join. Anyone failing the tests would get free lessons from me until they qualified. We all had CB radios then, our form of social networking. In high school in Islip, the first (and only) electronics schooling I've ever had, started in quite an unusual twist; when I entered the classroom for the first time, the teacher came up to me and said, "David, I know about you and you don't have to attend the class or take the exams except for the final, all you need to do to fill the curriculum requirements is that you have to attend the labs. And I expect you to teach the class at times as well. Is that OK?" Yea, it was.

I had a ball there. There was a huge amount of government surplus from WW2 and Viet Nam and I was in heaven with switches, indicators and meters from B17 to B52 bombers, transistors, resistors and radio equipment surrounding me. I brought quite a bit home to experiment with in my own lab down in the basement. In class, while the rest of the students were taking tests, the teacher would teach me things I didn't

know about, specifically showing me how to make a pc board using a magic marker and ferric chloride solution. We made a frequency meter from a homemade pc board with surplus parts and a schematic from Popular Electronics magazine, but it didn't work. **I made a second one on my own, this time using modern parts, and it worked! I gave it an official DEL model number of DEL-7A since the DEL-7 was DOA.**

One day, with help from my two best friends John and Rich, we built an FM transmitter on a circuit board using a new invention called an integrated circuit, and fitted it with a free Radio Shack battery (you got one free 9V battery every month!). John, who had a natural ability as an announcer and was an avid collector of rock albums, decided he would be the announcer. Rich was more of a techie and he maintained the transmitter and antenna. John went out to the pizza shop and real estate store on Main Street and sold advertising time, and Rich would rotate the TV antenna towards each store when their commercial would air. In respect to me, John dubbed the radio station WDTM (using my initials) and transmitted for years after, even long after I moved to Florida in the summer of 1972.

Rich manning the WDTM radio station circa 1971.

Rich also became my first "professional" engineering client when he asked me to design a water-sensing and pump motor-

driving system for his parents. The "Pump-Master" became the product, allowing the basement washing machine to empty into the sink and sensing the high and low levels of the water, it would run the pump to move the water to the overhead sewer lines. I'll bet it is still in use today.

Meanwhile, in 1971 my uncle George decided to build a discotheque called "Max's Silver Hammer" in New Hyde Park. He knew I was into designing and building electronics and also enjoyed building Heathkits, and officially hired me to design the audio and visual electronics for the disco. He gave me a huge sum of cash and I purchased some Universal Tiger amp kits from Dan Meyer, built a preamp from a David Hafler PAT-4 design, built a bunch of strobe lights and a powerful color organ of my own design and integrated it all into a huge NASA-sized sloped metal cabinet I named DEL-11. I also bought some speakers from Lafayette Radio Electronics

in Syosset and used my woodworking skills to build some bass reflex speakers of my own design for the dance floor. I gave them model DEL-14. I also had John help me install all the Jensen PA speakers throughout the rest of the building ceiling.
When George went out to buy supplies for the kitchen, John and I decided to sample all the goodies in the bar. Wow, I thought, I've got to build me one of these when I buy my first house! When George got back with supplies he made us the best hamburgers I've ever had. Uncle George was so impressed with my systems he christened the dance room as the "D+1" room in my honor on his Grand Opening brochures.

The bar finally opened for business on Friday, June 11, 1971, and it was a hit. Discos were not yet a thing then and George had made history with many strange and new ideas for the times. Only problem is that Vincent, an English DJ, would constantly blow out the subwoofers and amps playing "Green Eyed Lady" and the new Rolling Stones album. Since I wasn't allowed in the bar during working hours (I was under 18) I had to sneak into the side door and swap out or repair whatever components Vincent blew out that night.

The DJ console controlled all audio, strobe lights and color organ from one location. This was my stereo system until I got to work at Bell's HI & CB in 1974. That gave me the opportunity to buy wholesale..

Uncle George lasted less than a year then went out of business. He had no idea how to run a business. When one of my checks from him for doing repairs bounced, he let me have all the amps, the speakers I built, and the strobes and color organ. All this stuff would eventually come down to Florida with me.

The year was 1972. My 18th birthday would be coming up in August and I couldn't wait to get my driver's license, as the three-mile trek up the big hill to Hills Supermarket, where I was working in the cheese department, was a chore. In June, my parents informed me that my so-called college fund, started on by birthday in 1954, mysteriously only had $200 in it, so as far as the college funds I was promised, oh well. I suppose all the motorcycles, speedboat, new Vista Cruiser, stereo equipment and new house in Islip that my dad bought was more important…
So for the $200 I bought my aunt's old Chevy Nova station wagon, made in 1964 and never seen a garage for maintenance or even an oil change. It barely ran, but it was mine. I replaced the spark plugs and the oil and had my friend Will (whose dad was a mechanic) rebuild the bendix drive on the starter. We got it running well enough for the long trip to Florida. I installed an Amphenol Commander 777 CB radio under the dash and a roof

antenna, so I could talk to all my friends. Every teenager back then had CB radios. It was our form of social networking, pre-cellular, pre-computer, hell, pre-*everything*.

I was allowed to drive the Nova during the day with a learning permit, so I finally drove it for the first time to Hills. When I finished work, I discovered that the car wouldn't start, and investigating, I saw that someone had stolen the battery. Hoods opened from the outside back then. Amazingly, the thief left the Amphenol. So I had someone push start me and drove home on the alternator alone (a trick my dad had taught me).

June, 1972 I invented what may arguably be the first RF remote control system for a car. I installed a simple relay and key switch alarm circuit I cobbled together, then wired the alarm output to the Amphenol, which was wired so that it could transmit when the alarm went off. A "birdie" oscillator made with two transistors sounded like a siren. I wired the PA switch on the Amphenol to also sound its own horn siren speaker outside the car. Then I bought a Lafayette HE-210A walkie-talkie and set it on squelch to pick up the Amphenol transmission if anyone tampered with my car again while I was at work. I could then transmit and yell at them to scram. Ironically, in 1976, a company called "Page Alert" would re-invent my invention and make millions. Story of my life. And this would not be the only time.

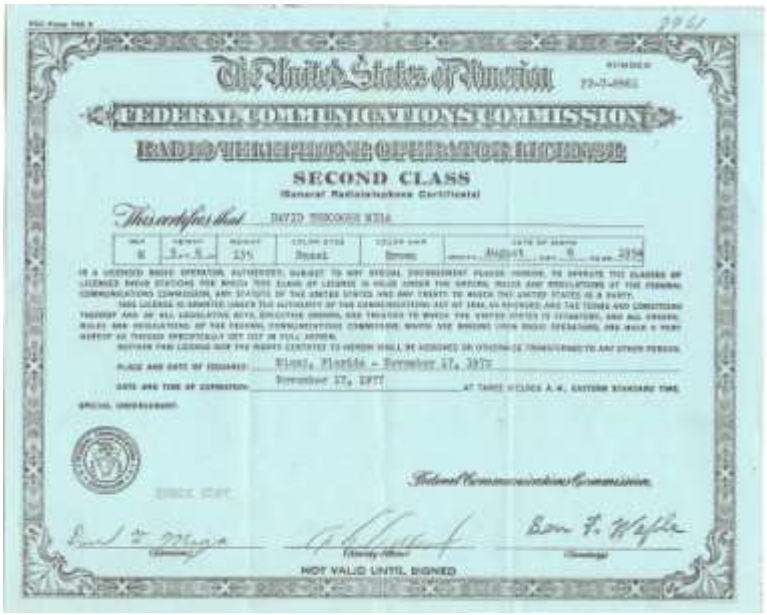
After my 18th birthday it was time to leave the nest and head for Florida, since the only way I would ever be able to attend college was to get out of New York. It was getting brutally expensive to live in New York. All my friends were sad to hear that I would be leaving them, the first one of us to leave our little town. Will hosted the party and invited everyone, even the girls. I got plastered on a cherry kijafa/vodka concoction that Will referred to as "Jungle-Juice" and even though sick as a dog, insisted the next day to go to school. I had a perfect record, never ever missed a day. But just before home room, I proceeded to barf all over a jock's locker and most of the walls, the floor (maybe even the ceiling;-)

After my going-away to Florida party, I prepared the old Nova as best as I could and drove the three days to sunny South Florida. I95 hadn't been built yet. I had only tried to get into one college, Broward Community College, one that I could afford while living with my grandparents in Fort Lauderdale. Being a community college, I could swing doing a couple of part-time jobs while putting myself through school (there were no such things as college loans for white people back then; there was a lot of reverse discrimination in those days including "Affirmative Action", thankfully declared illegal to the US Constitution during the Clinton years. Thank you President Clinton! Everyone should be equal, like Dr. MLK said. Shame it took the politicians 30 years to figure it out… But I digress)

My broad plans were to work full time for the remainder of the year to build up enough money to pay for the first semester, then start BCC in January 1973 and attend for the first two years and get my Associate in Arts degree in Engineering, while working part time after school and saving money to (hopefully) get into Florida Institute of Technology near NASA. After graduation with my MSEE I planned to work for NASA on a new project called the Space Shuttle, or if I couldn't get into NASA I could go to Disney World animatronics since Disney had just opened recently in Orlando and they were looking for new engineers for something called Epcot Center.

So I lived for a short time in my grandparents' 7-apartment seasonal rental, earning my keep by maintaining the pool. I invented the Pool Sentry, a simple water sensor derived from the Pump-Master to let me know when the pool was being used or when the pool was at the correct level while being filled. I found employment at Executone, a company that installed business intercoms. I had a blast as an installer, learning all the trade secrets the industry used to run wires in 100+ year old conduits in the DuPont winter home mansion in Manalapan. This "Gone With The Wind" Tara mansion covered the entire width of the strip of land between the Intracoastal and their private beach on the Atlantic Ocean with an underground "tunnel living room" that actually went *under* A1A! It had two ballrooms and an ocean living room that had stunning views of the two miles of beach. I'll never forget the priceless antiques this French family had, and this was just their winter "shack". More incentive to make it big and get rich some day. But I quit when we started wiring a nursing home in St. Lucy County…it was just way to depressing. (Hope I die before I ever get to that point.)

Next I tried to get a job at Dayton Aircraft Products in Fort Lauderdale, where they made ELTs. (Emergency Locator Transmitters). But the manager didn't care that my experience in electronics was far ahead of what they needed for their "radio shack" where the ELTs are checked and aligned. The manager was Jack Chapdelaine. "Dave, I appreciate your experience, but the FAA requires a radio technician to have an FCC license. You need either a second-class or first-class FCC license to work on avionics. But I'll make you a deal: You can start in our machine department and learn all the tools of the trade, milling, drilling, threading, routing, and welding. Study for, and get your FCC license and I'll raise your salary and put you in the radio shack"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I got the recommended books from the library and bought a few that I wanted to keep, and in November 1972, I took the 6-hour test in Miami and passed, got my second-class "FCC ticket" as it is known by. The manager put me in the radio shack and I learned how to use spectrum analyzers, distortion meters, frequency counters, vector network analyzers and so on. But the tiny increase in salary was frankly, insulting. So after a month I quit.

I built many projects in my spare time. DEL-19 was a miniature dual power supply for experimenting. DEL-20 was a series of three linear RF amplifiers. DEL-23 was a simple semiconductor junction tester. Del-26 was a 4-channel logic probe in a nice plywood box, and DEL-28 was a dual-digital logic probe with pulse generator.

My grandfather on my mother's side was a realtor, and after a break in at his office in Lauderhill he hired me to design and build an alarm system. I bought some lead window tape and magnetic door switches and built a simple system with Radio Shack parts and a siren I had left over from another project.

My parents also moved down to Fort Lauderdale and my mom worked as a medical assistant in Hollywood. She talked about me to her boss and next thing I know, I'm hired as a designer for making an electronic acupuncture machine with variable output stimulus and up to 12 probes. I based the circuit on a simple neon relaxation oscillator, but the doctor loved it and I was paid well, as well as getting free medical treatments and a foot exam showing I had flat feet to show the draft board, since the Vietnam War was still going on and the draft was going strong. The ploy didn't work and I was chosen anyway. The politicians were desperate for soldiers so the fact I was in college, paying my own way, as well as being an only child with flat feet didn't concern them. The draft then was a lottery draft with no getting out of being chosen. But thankfully, as I was planning my move to Canada, President Nixon nixed (!) the draft, and I was able to remain in the USA. So my plans and goals continued. For a while, anyway…

John drove down from Islip to visit me in 1973 and to go to the brand-new Disney World in Orlando. He took this picture of me having a cool break at my work bench in my shack. No air conditioning!

Unhappily, we had a "great recession" in 1974, brought about by the 1973 Arab/Israeli war and subsequent oil/gas shortage and stock market crash of 1974/1975. I lost both my part-time jobs and since my grandparents (mother's side) had sold their seasonal rental apartment complex, I was living in an outdoor shed at my other grandparents' house and finding it impossible to survive without making an income.

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DAVID MIGA, LICENSED RADIO TECHNICIAN

I made these business cards to hand out with both grandparents' phone numbers.

I started my CB radio club as I had when in Islip to make friends and bring in some money. I ran a phone wire from my shack to the main house and tapped into the phone line so I could also make phone calls. To receive phone calls, sometimes late at night, I studied the signals on the phone lines and discovered that the voltages changed right before ringing, so I designed the Auto Phone Sentry, a device that monitored the phone line for various activities and when my grandparents were asleep and I was conducting business, I would switch it on and be able to receive phone calls before the phone rang. I had many curious callers asking me how I picked up before they even heard a ring!

The shack behind my Grandparents house was 10 by 12 feet. Look hard and you'll see a customer's (Heathkit?) Ham Transceiver, a Lafayette HE-20C CB radio with a D-104 mike. The HE-210C walkie-talkie on the bed was used with my wireless car alarm. A sink is in one corner, a toilet in another. A brand-new RCA XL-100 ColorTrack TV sits on one of the speakers I built for Max's Silver Hammer. (I showered in the main house.)

The CB club brought me customers as well as a buddy and a couple of girl friends. My buddy at the time was a couple of years younger, Still in 12th grade. John introduced me to Loretta, who was the spitting image of Sally Fields, one of my Hollywood heartthrobs. Her mom was a divorced engineer and Loretta had two younger sisters. They were having a hard time financially and living in a tiny apartment across the New River. Her little sisters helped me feel like shit when they complained that "I was eating their food" when Loretta made me a couple of eggs one morning. Being poor myself I really felt guilty. So that relationship didn't go so well. Especially since the alternative to her apartment was my tiny shack, not very impressive. We did have some private time there anyhow…

John was a buddy and would do anything he could to help me out. His dad worked in a TV repair shop, and one day John showed up with a brand-new RCA ColorTrack XL100 TV. I was suspicious, because John had the reputation of being a kleptomaniac. His dad was divorced and had remarried a non-speaking knockout Hispanic and John was rebelling in many ways, one of them was stealing everything he could. Another was lying and making up ridiculous stories. We all have our demons, and after trying to get him to act more responsible a few times, I just let it run.

One day he introduced me to my first bottle of rum. Not just any rum, but Appleton *Jamaican* rum. (Did you miss the part before that he was still in high school?). Another time he brought me a Radio Shack LCD watch. I had the idea that everything he brought me was probably stolen. But I really needed the watch and the Appleton rum was sooooo good!

This would end badly. One day, he mentioned that he planned to hide in a J.Byrons department store ceiling in the bathroom and steal a camera from the camera and small electronics booth. I had given up trying to talk him out of his annoying petty five-finger discounts; after all, it's his life and I am not his dad.

So on the Saturday before Easter, that night I had finished my engineering thesis on calculator design and was done with the day's repairs. I was watching Disney's Wonderful World of Color on John's "loaned" RCA XL100. Someone knocked on my shack door…it was late in the evening and I was concerned. When I opened the door, the man introduced himself me as Detective Duffy of the Fort Lauderdale Police Department.
"Do you know a John Smitter?" he asked.
"Yes, he's a friend. Is he OK? Or maybe I should ask what trouble he got himself in this time?"
He didn't answer, but instead asked if he could come in my little shack. Sure, why not. He looked around a bit, then let me know that John had been caught by Police dogs hiding in the J.Byrons ceiling when he set off the ultrasonic alarm system. So I asked, "So why aren't you going to his father? I am just one of his friends."
He didn't answer, but thanked me for my time and left.

That Easter Sunday would change my life forever. My relatives from New Jersey were visiting and my cousin Lia was in my little shack. We were making recordings of her guitar playing and singing on my Lafayette reel-to-reel recorder when there was a knock on the door. When I answered, Detective Duffy came in with two uniformed officers and proceeded to arrest me in front of my cousin.

"On what charge?" I yelled as Detective Duffy searched me, being sure to hit me hard in the crotch as he searched the obviously desperate and dangerous college student criminal for weapons in his crotch.
"Receiving stolen property" he said with a smile you usually see on a man who has just come. You know what I mean…

As it turned out, the TV store hadn't reported a theft or had a record of the serial number on the RCA, and as for the other "presents" John had given me throughout the time we were friends, there was no evidence of any kind of any stolen stuff anywhere in my shack. But the police did give me as hard a time as they could, taking all of my customer's repaired CB and HAM radios out and even my Ruger Mark 2 target pistol and Radio Shack LCD watch. It took a few weeks to get everything back, except the TV and the watch. I didn't push the issue. But Detective Duffy was very upset that he couldn't charge John with an adult crime since he was a minor. So he worked on John psychologically to convince him to accuse me of being the "brains of a teenage criminal ring". John couldn't help himself and made up a story that only an idiot would believe. It even culminated to Duffy putting a wire on John and setting up a meeting between John and myself at a shooting outing in the Everglades. I suppose we were expected to discuss our incredible crime spree over a few rounds into collected beer and soda bottles. John thought the whole thing was funny and even joked that I was going to kill him. Duffy finally

figured out that he was being made a fool of after trying to charge me with receiving stolen property, then breaking and entering, then entering without breaking, all phony charges that were each dropped a day later. Since I had never stolen anything and had never even set foot into J.Byrons at any time in my life there was no way for Duffy to fabricate phony evidence. I was promised that all records of my arrest would be expunged. But that turned out to be a lie also, as 40 years later it was still in the system. A lesson learned that even Police officers are human with the same lack of honor and personal integrity as any other person would have, with the addition of wanting to control other people's lives and carry a gun. Even with false charges and without a felony conviction, in those years just being arrested carried a stigma that prospective employers could use as an excuse not to hire me in the future. Employers were even allowed to give all prospective employees lie detector tests along with their drug tests before hiring them. Thankfully in the years to follow, laws in this country and in Florida would make it a crime for this kind of privacy invasion and intrusion by a business, or even a police officer to randomly be able to investigate an American citizen without just cause. But it didn't help me half a century ago. The records are still there and anyone with a connection to a police department can illegally pry into my background or anyone else's. So keep this in mind.

During this time, the emotional issues of being arrested in front of my cousin, my parents and grandparents getting involved borrowing bail money and making it appear that they thought I was guilty of some major crime really affected me. Being the object of a criminal action caused by my "best" friend was the nail in the coffin. The ongoing recession and gas crisis wasn't helping either. I failed calculus and physics at BCC and had to retake both again the next semester. Loretta decided that she didn't want to be associated with such a dangerous and terrible criminal and left.

It took an incredible amount of will power and networking with my CB clients and working all nights doing repairs and modifications, then go to school all morning, then work part time after school, but I put it all out and finally graduated BCC with my Associate of Arts degree in Engineering in 1975. By then, I had established a reputation for being able to fix anything and CB radio and Ham operators had discovered me. Even the local Fort Lauderdale Police force was using me to fix their CB radios. I was fixing and modifying everybody's equipment in my little shack. I even designed and built linear amplifiers from parts salvaged from old color TV sets, and sold them. One CB customer who was a jet engine mechanic for Eastern Airlines taught me how to fly (single engine IFR) to pay for his linear amplifier, and we enjoyed flying every weekend in a rented Piper Cherokee 140 or Cessna 152. I also designed and built a bunch of electronic LED display digital clocks from Radio Shack parts and would sell them when customers would stop by to pick up their radios.

Another picture of my "shack".
You see the famous RCA TV lower right. An early 1900's refrigerator was dead center in the shack and I used it to show off the digital clocks I had designed and fabricated in Radio Shack cabinets.

My attitude towards people in general had changed after my terrible experience with John and Detective Duffy. I no longer wanted any friends as no one could be trusted. I had already been screwed by my parents (more than once) and now my "best" friend had screwed me. My parents, relatives and girlfriend didn't trust or believe me, so my attitude then was to simply treat everyone as suspicious and have as little interaction as possible with all humans, with the exception of doing business with them. Socializing with, or having relations with other humans was now taboo. No more buddies or girlfriends or parties or gatherings, just the drive to become successful and think only of myself and to get ahead of all this misery and poverty. I deserved better.

During the recession and gas shortage, everyone started selling their big cars and my 1964 Nova was falling apart so I looked for a replacement and lucked into buying a really pristine 1969 Thunderbird with the then brand-new 429 Thunderjet engine. It had electric windows and I used to keep them open a crack during parking lot stay at BCC, but during rainy season that changed. So I invented the Auto Rain Sentry, a device that sensed water by a homemade pc board glued to a side mirror and would roll up all the windows at the first drop. My grandfather insisted that I get it patented, so I graciously accepted his $2000, which got me only partially there, through the pre-patent search, but it was a nice gesture anyway.

But Ford electronics in those years was in a word, dismal. Everything electrical on the car had issues. The first to fail was the voltage regulator, so I designed a simple Germanium-based two-transistor circuit and placed it into the same metal enclosure that the relay-based original was in. That problem solved. Next issue: the Thunderbirds and Mercury Cougars had the sequential rear directionals very much like the current Mustangs do. But the original was based on mechanics and an electric motor running through a gearbox and hitting microswitches. It would run slower and slower. I replaced it from a junkyard 1970 Cougar XR-7, which didn't work any better. Finally, I designed a digital version using a unijunction transistor as the oscillator, with 7400-series TTL digital counter and decoder chips, a diode matrix directing the output to run Germanium power transistors power into the bulbs. I even added a cute beeper inside the car so instead of clicking, turn signals now beeped. That problem solved as well. But the electronic light sequencer design would play many more rolls in the future…

My friend in college, Alfonso, who graduated with me in 1975 with his Associate of Science in Electronics degree, went to work for Motorola in Sunrise, FL. This gave me a nice edge into the future, as he would sneak me into Motorola and show me some interesting things Motorola was working on. I remember one day, we were on the catwalk and he pointed to a group of techs/engineers huddled around someone holding what looked like a computer notebook. Yup, it was Motorola who invented the notebook computer, years before Microsoft and Apple were even in business. (Probably used the ubiquitous 6800 microprocessor that competed against the inferior Intel 8080;-) Another time, he showed me a portable telephone in a suitcase. He said it used the AT&T telephone network using radio frequency networking cells designed by Motorola around the area to be able to communicate without interruption while in motion. His connection with Motorola and my fame in the future would come to yet another fork in the road for me a few years later…

After college, things got better. Having made a reputation in Broward County as a supertech working on CB and HAM radios and TVs, I landed a great job at Bells HiFi & CB/Car Stereo shop in Ft. Lauderdale, where my reputation increased to Palm Beach and Dade counties, and even various parts of the world where people would

send in their CB and Ham equipment for modifications. During my employment, a customer who owned the Pipeline Patio furniture factory in Fort Lauderdale had heard of my engineering skills. He hired me to make the **Intruder II**, a device that installed in a car and would switch the car stereo speakers away from the stereo and to the CB radio when a call came in. His previous engineer couldn't get his circuit working with any regularity. When I finished the project, he showed his appreciation on that Thanksgiving afternoon.

"Hi Dave. I know you fly and I was wondering if you want to go up today in my Bellanca Decathlon."
"Hmmm, you realize that today is Thanksgiving, right? And I just had a huge meal. Isn't your Decathlon an acrobatic plane?"
"Yea. Why, ya scared?"
"Well, it's your plane, so if you don't mind a possible cleanup, I'll give it a go."
"Remember it's a stick, no wimpy yokes like the toys you fly…" (probably smirking;-)
"OK. When do we go up?"
"I'll pick you up in the Ferrari at 4:30."

After several hammerheads, some inverted flying dives and other methods of aerial terrorism, I was feeling a bit poorly but managed to keep it all down. I still have sore areas inside my legs from his manipulation of the stick doing 90 degree twists. But I had a great time! And remembering that the only thing holding me in during the inverted flying was the seat belt, looking up at the ground below, don't ask me why when I drive my car why I pull the seatbelt super tight. Why is it nearly a half-century later I still can't get that image out of my brain every time I buckle in?

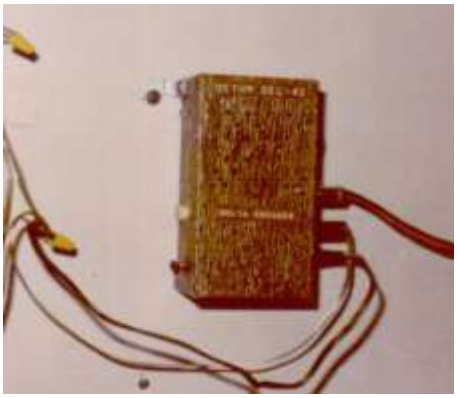
In 1975, I was "stolen" by a competing CB shop in Hollywood, by the owner, Warner, spreading rumors that I was leaving Bells HiFi & CB in Fort Lauderdale. The Fort Lauderdale store manager always hated me because he thought I was after his job so it gave him the excuse to fire me. I was upset but Warner's offer from the Hollywood shop to make a disgusting amount of money as a CB Radio tech gave me no choice. That worked out so well I was able to make enough money to start my first retail business, naturally a CB Radio store of my own. I found a partner and he agreed to help build the store in the new shopping center being built in Lauderdale Lakes by Oriole Builders, while I continued to work in Hollywood and finance the construction. In the fall of 1976, I gave notice to Warner, and opened **The Delta Base CB Store** amid much fanfare from my numerous customers using the CB radio frequencies as one would use social networking nowadays. We incorporated with me as president. The store was a great success, allowing my partner and I to buy things on the whim, and I spent most of my money on electronics, computers of the pre-PC era, HAM radios and extreme high end audiophile equipment.

The first Delta Base store in Shoppes of Oriole Estates in Lauderdale Lakes.

This picture taken in 1977 after we introduced car stereo and made a new sign over the front. Dave's 1969 Thunderbird is parked in front.

But the original dream of being an inventor never disappeared.

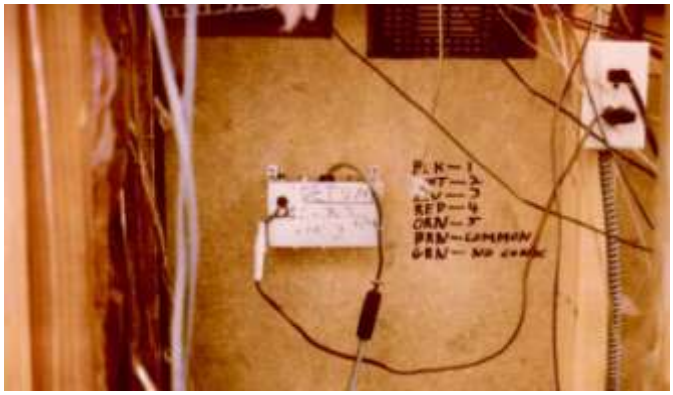
While we were building the Delta Base store I invented a digital programmable doorbell that I set to play the "Delta is ready when you are" Delta Airlines jingle with a light beam across the front door as the trigger.



(Heathkit came out with their own programmable doorbell just a year later). I also invented some basic test equipment to help me with my servicing needs. I even started designing my own audio equipment.

By 1977, we knew the CB radio fad was starting to fade and I knew I had to segway into something different, so I introduced car stereo, alarms, radar detectors and automobile computers into the store. This was also a huge success, as by then I was writing my own radio station commercials and designing ads for the newspapers. This would eventually grow into two more stores, with locations in the Coral Springs Mall and Hollywood. By 1981, when the third store was opened, I was quite well known by then and had given several TV and radio interviews and been written about in various magazines like **Autosound and Communications** magazine.

But the original drive of inventing never disappeared. The original store had been opened in 1976 and by 1978 was doing well, selling automotive electronics. I designed a programmable digital light sequencer for the entrance to the sound room. Like the DEL-33 Thunderbird sequencer I had designed just a couple of years earlier, It used the popular 7400-series digital TTL chips that were popular with experimenters and professionals alike. But this time I was using a new type of high-voltage semiconductor that had been introduced a short time earlier, the triac. I gave it the DEL-33 mkI model number. It replaced the germanium transistors I had used for the Thunderbird and allowed AC voltage to be switched. I was even designing my own alarm systems and a sound room switching and audio-leveling system that would allow any brand head unit to work with another brand equalizer with another brand power amp. No one else in the business had this ability.



The Stereo Sound Room featured my first digital light sequencer using triacs, the DEL-33 Mkl. It powered the *SOUND ROOM* sign and the Delta Triangle inside the room. The Delta triangle also had a motorized 3-D grating. The light show attracted many customers inside.

In was the fall of 1978 when two distinguished dark-haired gentlemen dressed in *very* expensive suits sauntered through the front door. I distinctly remember the scene of my earlier years in my dad's deli flashing in my mind. Yup, it's what you thought. But not Waste Management this time; this time it was Mr. M___o introducing himself as a developer and his buddy Mr. C_____o as his contractor, and they specialized in building shopping centers for an outfit in Colombia that was known as Cartagena Enterprise. They were impressed with my small 900 square front store and wanted us to consider building a second store in their regional mall that would feature the greats of the time, Sears and JC Penny. They didn't have to show their guns this time.
I was as suspicious as you would expect; why would such major players be interested in a tiny mom and pop store as a central location a regional mall? But it didn't cost anything to see if the research came up as legitimate.

It turns out that they were on the level (at least in building the shopping center and agreeing to our terms for the five-year lease) so my partner and I signed up. I ran the old Lauderdale Lakes store and provided the financing to build the Coral Springs store while my partner helped with the construction. Getting a loan from the banks was impossible at the high inflationary rate of the times and the SBA was impossible to get a loan from in those years unless you were considered a "minority". Even trying my Polish Hungarian excuse of being a minority didn't count; all Caucasians were grouped together as being "privileged and not a minority", so as usual it was up to me to provide all the funds. As we were building our amazing store in the center spot (as promised), the store was becoming a dream. An entranceway in the shape of a Delta (like the modified A in the original Delta Base store sign) with super science-fiction details and a tunnel with flashing strobe lights that you walked through into the eight-side sound room with my own custom electronics. At 2000 square feet and a specially built explosion-proof (Coral Springs Building Department, sigh…) two-car garage in the rear allowed sales in the front and custom installation in the rear. We added window tinting because an installer had the skill. Those "firsts" made both local news as well as a blurb in **Autosound and Communications Magazine**.

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The DEL-33 MkIII, a more sophisticated digital light sequencer, ran the *STEREO SOUND ROOM* sign in the Coral Springs store. A tunnel with sloped walls and a neon-lamp strobing ceiling in the tunnel was also wired to the sequencer. The walls of the tunnel had digital switchboxes on both sides to select head units, amps and speakers in the eight-sided sound room

Things started turning south when during our build, suddenly a plant store started construction in the center of the mall where our lease distinctly showed a park bench, small fountain and plants in the center. My partner and I watched in horror as the plant kiosk got taller and taller, eventually hiding our $2000 neon, custom made Delta Base sign above the delta entrance. Complaints to the mall association reps were ignored. Talking to several other store owners, it was obvious that everyone's lease was different, each showing a different design of the mall. Basically we were all conned into believing we each got what we wanted. Mr. M___o's job was to build and fill every mall with bodies for the Colombians and he did what he was paid to do with no regard to fairness. Besides our complaints to the mall association, we also threatened to sue them and leave. But we were too heavily invested so we decided to give it a go and open up the fall of 1979, right after Hurricane David, and not pay any rent until the plant kiosk was removed.

But the drive to invent never disappeared.

We needed several employees to run the Coral Springs store, and we started to have issues of receipts not matching the cash in the register, so to solve the problem, I invented a digital cash register system that involved an employee to have to enter his code on a keyboard, which would open one of four different cash drawers. For some reason, we never lost a penny after that.

I had designed several unique auto alarms in the early 1970s such as the wireless "page-alert" auto alarm (June 1972) and a digital-entry auto alarm (1974) that was installed in the Thunderbird, and I was designing custom alarm systems for customer's special wishes in both stores. When we started doing installations outdoors, I invented a device that would remove power if an employee used a device that became hot with AC. Nowadays it would be called a ground fault interrupter device.

Things started to get ugly at the Coral Springs store. We were getting threats from the association, as well as the Colombians, for not paying rent. I stood my ground, but when someone damaged my precious Thunderbird and we started seeing bullet holes in our garage doors in the installation area, I finally figured out that we weren't just dealing with the Mafia. The Mafia was apparently laundering money through building malls all over the country with drug money, and the Cartagena Enterprise was obviously the Cartagena Drug Cartel. At that time cocaine was coming out of Colombia in huge uncontrollable amounts and the new drug czar, George Bush, was appointed by President Reagan to try to stop the massive inflow of cocaine by the so-called "cocaine cowboys". Eventually, the movie *Scarface* and TV series *Miami Vice* would be based on this nasty cartel.

Even though the second store was open and making huge amounts of money and The Delta Base was now as well-known as any major retail store, maybe this wasn't such a great idea to have given into temptation and getting mixed up with not just the Mafia but the vicious Colombian drug cartel as well. When I discovered an

employee dealing cocaine to the girls at Ziggy's Boutique across the hallway, I decided that I had had enough excitement and that it was time for us to leave.

But the Mafia wanted everybody to stay legal and not attract attention, and knew that the Colombians could be vicious and bring unneeded attention to the situation, so they directed their lawyer, Mr. C_____w to sue us in civil court for not paying rent, even though *they* had clearly violated the lease. I knew that simply moving the store out and relocating would be an issue as these Colombians were known to hold a grudge, so I needed to revise my strategy. So my plan now was to secretly start a new corporation and secretly start looking for a new location, and with a different corporation name, even if we lost the lawsuit, at least the new corporation would be shielded against any judgment from the old one. And I expected that the Mafia would help keep the Colombians in check, rather than risk their exposure to the public. So I hired a lawyer and made it clear that he was my mouthpiece and advisor but wouldn't have anything to do with my strategy. We fought over my strategies for the nine months this all dragged on, but I kept to my guns and told him I didn't care if I was supposed to pay rent during the lawsuit, supposed to provide discovery items, what would they do, sue me? They were already doing that. I would cross those roads when I needed to. Besides I couldn't afford to pay rent if I had to pay him also, which was much more than the rent. I started to gather enough evidence to win. I purchased a brand-new Canon AE-1 with all the lenses and flash modules. I took pictures taken intentionally in black and white and at specific angles showed the extent of the bright red Delta Base sign not being seen from any of the three great halls of the mall.

Of course, Mr. C_____w brought his own pictures, but in *color* and in his views. But the jury had enough information to make an intelligent decision and we won the lawsuit. The jury only took four hours to decide in our favor that we didn't owe any rent until the plant kiosk obstruction was removed. But it had given me enough time to build the Hollywood store. Two days after the lawsuit victory, over a long weekend, all Delta Base employees and two 18-foot trucks moved everything out and into the Hollywood superstore. We did it all over a weekend. Imagine the planning and preparation that was involved!

The Hollywood store was a 3000 square foot supercenter with two sound rooms (the Blue room for sub-$1000 systems and the Red room for extreme over $1000 systems), a separate CB radio/radar detector/car computer section, a service/repair section, an installation section, and individual offices for both my partner and myself. One thing I did do was to hang a copy of our business license in the hallway between our offices. When my partner questioned this, I said, "I've got a feeling this is going to come in handy". The corporation was Florida Auto Sound but the d/b/a was *Delta* Car Stereo. My thought was since I was well-known in South Florida it wouldn't be a stretch to find Colombians discovering the new store since it had the same directors, with me as president.

The new store became the talk of the town in all three counties with big shots coming in from Luskins, Lafayette, Sound Advice, CMC and BrandsMart to look over the competition. We were on all the radio stations and in the papers.

It didn't take long for the Colombians to find us.

We had been open for about six months when one day a big 22-foot truck pulled up behind two police cars. Out of the passenger side of the truck came a super-confident familiar face, the lawyer for the Cartagena Enterprise, Mr C_____w.

The lawyer stayed outside looking in while the cops came in with a legal document, a ruling for the Colombians to take everything from the Delta Base Corporation, since our victory in court was that we didn't have to pay the rent owed. But there was never a ruling on the validity of the contract to let us out of the original five-year lease, so they had won an appeal in our absence to claim the balance of the five-year lease.

When I remained calm and smiled at Mr. C_____w through the front window, I could see his smile turn into a question…why wasn't I terrorized, there being cops and Colombians everywhere and me possibly losing everything? I calmly asked to speak to the officer in charge and directed him into the office hallway. Looking at him directly in his eyes and very close, I told him I would sue him personally if he so much as touched anything in my store, and pointed out the business license hanging up there in the hall. I pointed to the ruling against *The Delta Base of Lauderdale Lakes, Inc*, then pointed to the business license showing *Florida Autosound Corporation*, d/b/a **Delta Car Stereo.** He turned white as a ghost. After a few shaky questions on why the directors were the same, I reminded him that that was a moot point and this was a different corporation and he had no legal reason to be there, and if he didn't remove himself, his deputies, the Colombians and Mr. C_____w, that I would call his boss and there would be hell to pay. The look on Mr. C_____w's face will remain with me forever. Everyone left and I never heard from the Colombians or C_____w ever again.

I think it was around the end of 1980 when I got a call from Motorola. They had kept track of me and my stores, and possibly Alfonso, my buddy from college who worked at Motorola, may have had something to do with it. The caller was one of the big shots at Motorola and he was looking for an autosound store like Delta to work with them on a new business venture. He explained that Motorola had invented a new type of portable telephone that used cell towers using Motorola microprocessors integrated with AT&T's phone network, and since Motorola didn't have a consumer sales division and AT&T didn't want anything to do on a retail basis with something they hadn't invented, his job was to find an independent sales company to sell, install and service their so-called "cellular telephones". It sounded a little too much science fiction to me, but remembering the time that Alfonso had shown me what Motorola was capable of doing, I felt it was worth getting into.

Until he told me how much it would cost me. I nearly had a heart attack. The equipment needed to service and repair these super complex high-frequency devices was in Hewlett Packard/Ferrari territory and totally beyond anything I could swing. Going up the right fork in the road would have been a game changer for me, but I went down the safer left fork instead.

Meanwhile, I was starting to get burnt out. Between having to deal with mobsters, landlords, asshole customers, cops and drug-dealing employees, especially having to train car stereo installers all day long, only to see them leave for more money once I trained them, I was dreaming of quitting and getting back on track. My fingers were always a bloody mess wiring under car dashes and twisting my back to fit under the dash was getting old. This one young man came in one day and wanted to become an installer. I had a policy that the first "test" install would be done with no compensation and under my direction and supervision. If there was any talent at all then

we would hire the applicant. The fact that this young man had zero ability didn't faze him when I told him he didn't get the job. But he insisted, and did day after day of installations with no pay, learning just a bit more each time. After weeks of installations, I finally hired him and he stayed with us until the end.

Subnote: Fast forward 25 years into the future. I was reading a magazine article about the service manager for Circuit City, a major fortune 500 consumer electronics company with thousands of stores all over the USA. They were interviewing the service manager about his fame and long history starting at the bottom as an installer and working his way up the ranks to become the world service manager for the company. I couldn't believe it when he mentioned that he had started at a small car stereo store in Hollywood, and the store owner, Dave Miga, had taught him everything he needed to know about installation and he credited me for allowing him to learn even though he was a klutz. Nice to know I had something to do with his success!

Back to the past now: George Bush, the drug czar (and future president) did his usual best and by late 1981 he had killed off most of the Colombians in charge of the Cartagena drug cartel, and surprisingly, our customer base nearly disappeared overnight, with sales from the Red Room down to zero and even Blue Room sales down, it became clear that most of our customers had probably been young adult drug dealers. Cocaine became hard to find for the first time in years. By the end of the year, my partner and I had been fighting daily as there was no money to pay for anything. CB was a dead issue and our competitors were selling car stereo equipment cheaper than we could buy it wholesale. Finally, after my partner "lost" an entire week's deposit and we were out of cash, I decided that I had had enough. Enough of cocaine dealing and stealing employees, lazy and dishonest partners, governments with their tax hands always out and Hollywood code enforcement assholes always complaining about our flashing signs. I told my partner it was over. We would let the landlord know that we were breaking the lease, but since his original location was originally a brothel and we had cleaned it up and put in new carpets and pulled down all the pink (!) privacy walls of the brothel and fixed the electricals, he was nice enough to bid us adieu with no hard feelings. My partner and I split up the remaining stock and fixtures 50-50 and parted ways. He got the company car, a 1979 Mustang with our best sound system and one of my passive alarm systems, and I received the majority of the retail goods. I spent the next year at the local flea markets and introduced them for the first time to a professional electronics dealer, not just the usual old clothes and tools. I even took credit cards, having the foresight to notify my merchant bank that I was changing my address from the Hollywood store to North Lauderdale. That sneaky action allowed me to keep taking credit cards for another 30 years from my home even though there were strict rules that you couldn't get a merchant account if you work out of your home. *Fooled ya!*

But the drive to invent never disappeared.

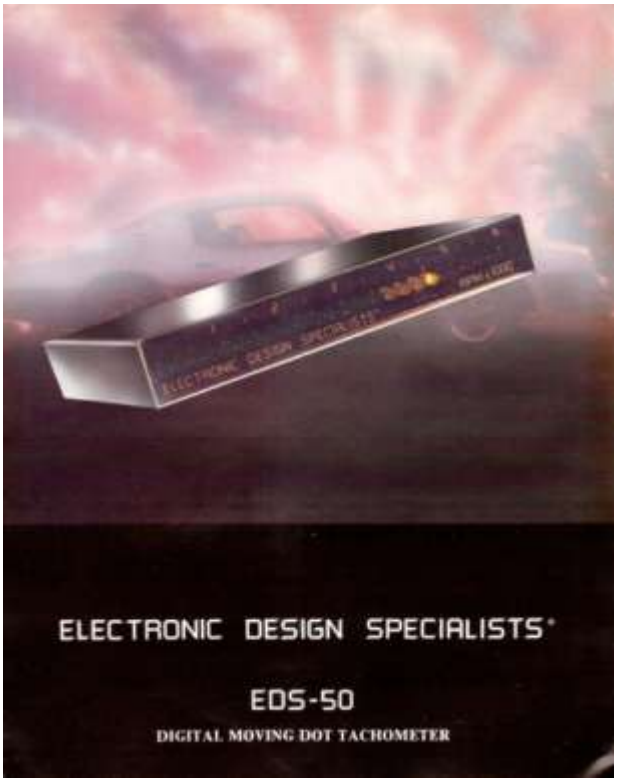
After I sold all my store fixtures and stock at the flea markets and seeing others copying me and also selling electronics, I decided to take a year off and chill down after all the previous excitement. During this time, I started inventing and designing things for myself. Specifically, I wanted to get back to driving my 1969 Thunderbird, now that my use of the Delta Car Stereo company 1979 Mustang show car was taken away as my partner's share of the breakup.

When the lead was removed from gasoline in the early 1980s, I invented arguably the very first *after-market* automobile engine computer to allow my 1969 Thunderbird with its high-compression high-test leaded-gas-only engine to run without destroying itself. Back then, lead was added to aid in increasing octane levels by acting as a heat sink in the combustion chamber and dispersing and slowing the combustion. It also lubricated the exhaust valves preventing burning and seizing of the valves to the head. So there would have to be a two-angle approach. First, I made a small analog computer using an LM339 quad comparator to serve as a throttle position and acceleration sensor and engine speed sensor, driving a water/methanol injection system that allowed the engine to use the water/methanol mix during hard acceleration and gradually switch to straight unleaded 81 octane gas when loafing with minimal load. I used a JC Whitney generic window washer kit for holding and squirting the mixture into the carburetor. That would bring the 81 octane gas up to the 96 octane level the engine was designed to use. Second, I designed and built an ignition system substitute to replace the ancient points/distributor/coil Kettering system then in use. I used the usual 7400 series digital chips to pick up the points (set 20 degrees way advanced) and delay the timing through digital shift registers that varied their delay times in relation to engine temperature, air temperature, and throttle sensor data from the LM339 by varying the frequency of the NE555 oscillator chip that was sent to the shift registers. I mixed Marvel Mystery Oil in the gasoline to replace the lead as a lubricant for the exhaust valves. Yea, I did loads of research first and became an expert on the subject of engine design including aerodynamics and engine air flow and turbulence. (That would eventually help me design the engine honeycomb intake manifold that maintains air speed at the perfect velocity to fill the cylinders with the correct amount of turbulence and volume at any speed from idle to maximum. I don't believe anyone has done that before or since.) The computer took about a year to program to the various seasons and speeds, but it worked perfectly, allowing me to continue using my beloved Thunderbird for another 15 years and 128,000 miles before I sold it in 1995. It also drastically increased the power of the Thunderjet 429 engine and gas mileage increased about 25% as well. It was a Corvette-beater!

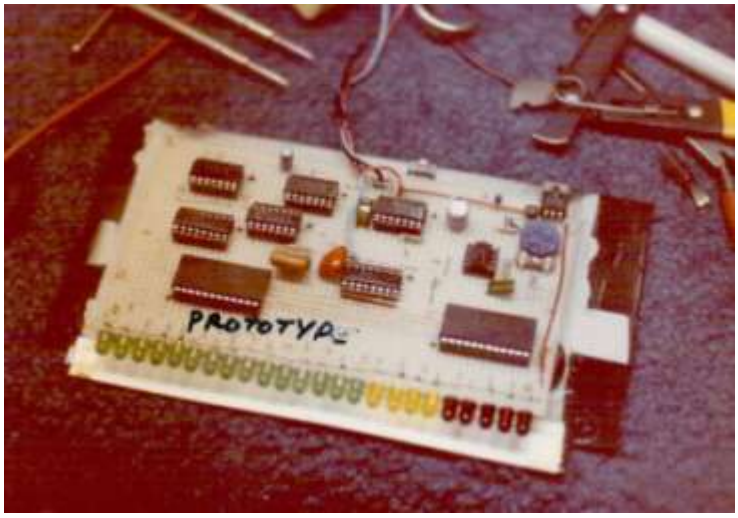
But the original dream of being an inventor never disappeared. In fact it was stronger now than ever before.

By then I was becoming stir-crazy, I suppose it was my first mid-life crisis. I had designed so many things for myself that I dreamed of doing this for a living, as I had since single-digits of age. So at my Uncle Peter's mansion in the hills of beautiful central New Jersey, I took a couple of weeks off to collect my thoughts and start a new company. This one would do designs for clients as well as my own products, and market them in the ways of the days, via technical magazines and direct mail. My uncle was a chemical engineer, but quit and decided to become a self-made businessman. He built a chain of paper good stores called *Paper Tiger*, beginning in New Jersey at the brand-new Paramus Mall and the new Cherry Hill mall in Pennsylvania, with more stores to follow. In his guestroom where I chilled, I found his collection of books of his heroes. Among them were Ray Kroc, the founder of the McDonalds Empire, Dave Thomas, founder of Wendy's, and Ross Perot, founder of Electronic Data Systems, all self-made billionaires. Since Ross Perot was also one of my heroes, I decided that my company would have the same letters in his honor. So I thought about it for a few days and finally I came up with **Electronic Design Specialists**.

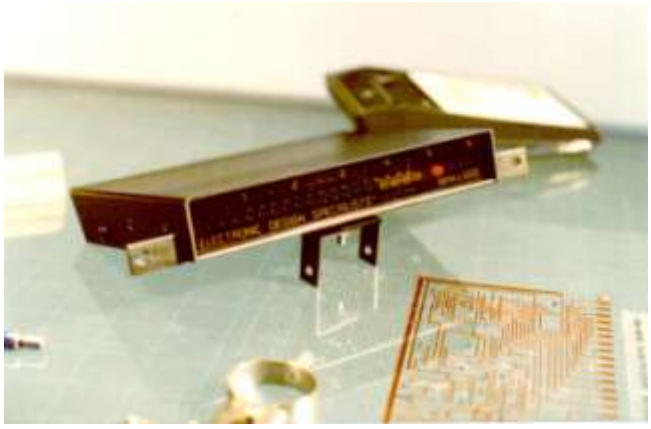
The first effort to come up with a client was a tip from one of the CB store owners I had done numerous repairs for over the years. He claimed that he had a connection with Zimmer Motors, a custom automobile fabricator in Fort Lauderdale. They wanted custom digital dashboard gauges to replace the mechanical ones that Ford was



installing on the Mustangs that they started with. I felt that going to Zimmer with nothing but an idea wouldn't cut it, so I decided to actually make some prototypes at my own cost to impress them with, along with some inventory in case they made an immediate order. Even if they



weren't interested, it would be a learning experience for me, as I would have to design a pc board, have it fabricated locally in Fort Lauderdale, have a custom metal case designed, brackets for the case, a nice silkscreened acrylic front panel and so on. So the first EDS product was the Moving Dot Tachometer. I decided to give every EDS product an official EDS model number, and this one was given EDS-50 because it sounded better than EDS-1. It took many months to design the pc board (using Bishop Graphics on a light table, before the PC) and getting everything fabricated, boards stuffed and so on. By the time I had some working prototypes made and the artwork and brochures done (before color printers, everything was air brushed by hand and photographed by very expensive cameras) my connection to Zimmer was lost and the product was never shown to Zimmer. I used it all as a learning experience and sold off the 100 prototypes to a surplus company for $5 each.



Meanwhile, my mom called and let me know that Lakes Electronics, the largest consumer electronics repair center in Broward County with a dozen technicians, was looking for a tech and the pay was 50% commission, with most techs making $25K a year. (Remember this is 1982, the average salary then was about $15K). So I went in for the interview and was instantly recognized by the owner, Andy, who was aware of my stores as the first Delta Base was just a block away from his location in Lauderdale Lakes. This turned out to be the proverbial fork in the road in my career, as what would happen would define what the new EDS would eventually become known for.

First, Lakes was way behind in their work with customers waiting an average of three weeks before any of the 12 techs would get to their units. On top of that, the IRS had shut down Lake's bank account because Andy had no idea of how to run a business he had inherited from his dad. The books were a mess, and the techs all disgruntled because Andy was making them do free estimates which meant as a commissioned tech they were doing work for free. Yet he was taking taxes and social security from their pay, which was illegal for a commissioned tech with income from more than one source. Plus he was taking in everything from cheap clock radios to women's vibrators. I could see a financial bonanza for myself (so much to fix!) and offered my business experience to get Lakes out of trouble for free if he would give me free reign without question to rebuild Lakes Electronics into a profitable enterprise. Techs would be paid for doing estimates as well as repairs and I would make a list of what we would repair and what we would refuse, with all estimates no longer free. Although he questioned me, with his other choice to let the business suffer and die, he looked the other way and let me do as I wanted.

The change was immediate and drastic. The techs, now being paid, were happy to work on the items we took in, now that high-end audio equipment and VCRs were replacing clock radios and vibrators. I also contracted all the techs that wanted to be contractors so that Lakes would no longer have to bear the expenses of income tax, social security, unemployment tax and insurance. Lakes became incredibly profitable in a few short months. Meanwhile, as an experienced supertech, I was going through the stack of incoming work so fast we were caught up in no time. Money was pouring in.

Here is where things got interesting: one day a Pioneer SX 525 stereo receiver came in with some strange symptoms no one had ever experienced. I realized that since the unit was a decade old, I needed test equipment to check components like capacitors and semiconductors that had aged and probably were out of tolerance. But none of those component testers had been invented yet, with the service technician in mind. Hewlett Packard had test equipment that worked for the large component manufacturers, but a transistor analyzer could cost more than a house and was far too complex for a simple service technician to use. So the techs were trying their best to check components with nothing more than a simple VOM (Volt/Ohmmeter). So as one would probably expect, I started inventing test equipment to reduce my precious time troubleshooting components.

The first was the EDS-52. It started out to be an accurate digital capacitor meter that used TTL digital chips for generating accurate timed tests to charge and display the precise amount of capacitance of a capacitor under test. Thinking out of the box, I also added the features of a frequency counter, a timer accurate from 1 microsecond to 500 seconds that could time the high and low times of a square wave independently, and an accumulation counter. I was seriously into designing digital circuits, after ten years of RF and analog designs. This was so much easier, much less math, and mostly everything worked first time! The EDS-52 was put to lots of use then and deep into the future.

As you guessed, I used the EDS 52 to test the capacitors in the Pioneer and found several out of tolerance. Replacing them made the Pioneer as good as new and all the technicians in Lakes were impressed. Several of them convinced me to make more EDS 52 units, and I proudly made three more. I never thought about making it an official EDS product at that time. Perhaps I should have…

In 1983, Andy decided that being the biggest service shop in Broward County, and offering a one-year warranty on all repairs wasn't enough. He wanted all his technicians to be official CETs, or Certified Electronic Technicians. This isn't a requirement; in fact Florida doesn't even have any requirements or license to be an electronic technician. It is like being just a doctor vs being a board-certified doctor. It suggests experience and professionalism beyond the norm.

So he found the local ISCET division and told all the technicians they had to take the test, and he did as well.
The testing was brutal, even by my standards. It covered every aspect of electronics technology, from mercury tube rectifiers from the 50's to the understanding of current oscilloscope eye-patterns in high frequency digital frequency phase coordination alignments, along with a small amount of high-level algebra. I felt like an idiot after taking the test. But when the test results were handed out, I was the only one who passed, even so by only a couple of points. So I was the only one who got to hang my "shingle" on the wall.

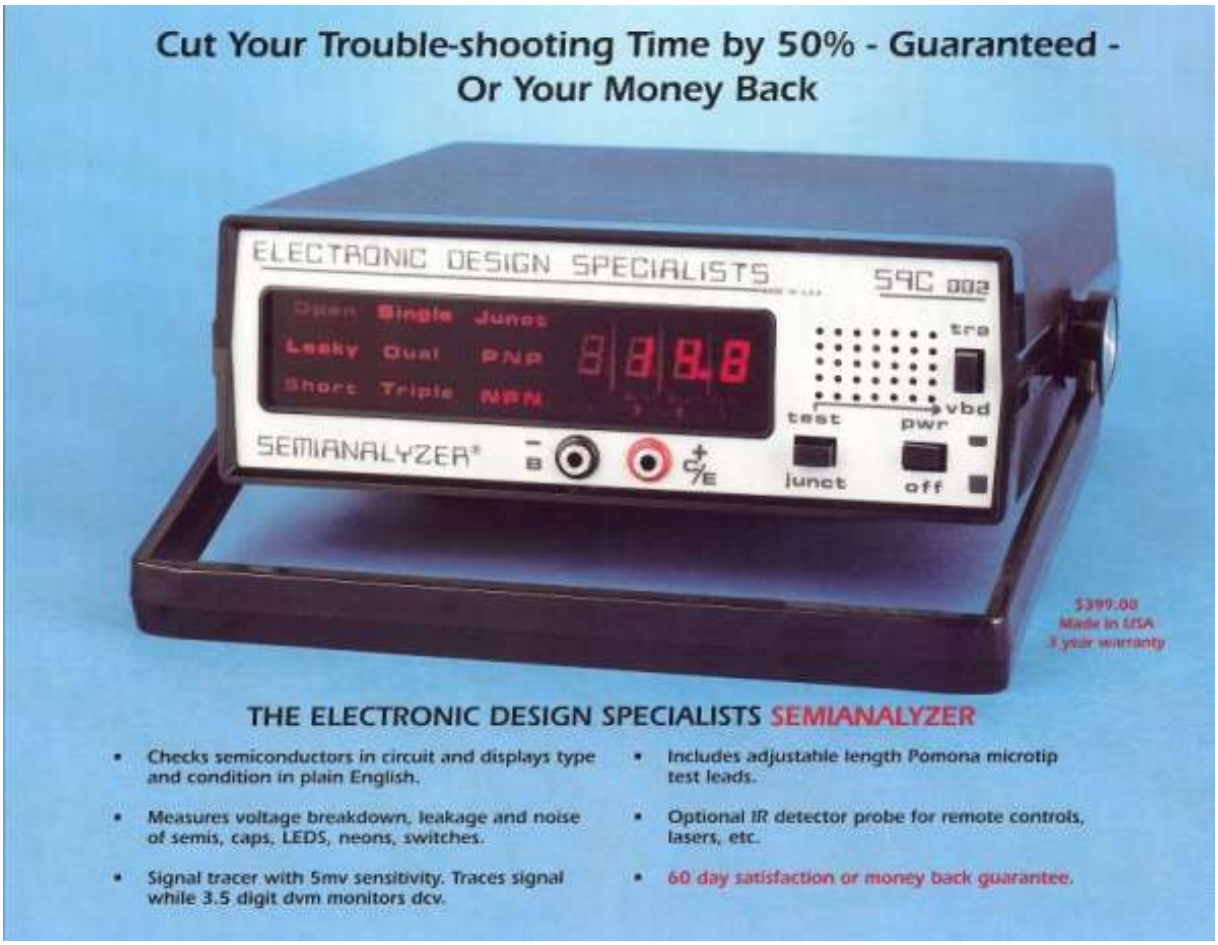
Then my house in North Lauderdale was hit by lightning. I was at Lakes when it happened, where we had a super storm with lightning strikes and thunder loud enough to scare you to death. I realized that something was amiss when I arrived at home. The electric garage door wasn't working, and I walked into a dark X10-controlled house that should have had automated lights on. Going into the garage, I was shocked to find *every* single circuit breaker was switched off, as if someone had done this deliberately. But I lived alone… guess it was the massive EMP you read about, and circuit breakers *are* magnetic devices. Mystery solved.

So I started switching circuit breakers on, one by one, and as I did this I heard sizzles and explosions after almost each breaker was switched on. I came back into the house to be greeted by smoke and screams from the TV, microwave oven and various electronics around the house. Lightning was a major problem in those years before surge strips were invented, and as a CB/Ham tech during the 1970s I had more experience with lightning-damaged equipment than arguably anyone else in the country. I knew that it would be months of troubleshooting to fix everything.

Thus was my next major test equipment invention, the EDS-59 SemiAnalyzer.

The SemiAnalyzer used well-known ideas from semiconductor signature analyzers designed in the past, as well as modern versions like the Huntron Tracker used by huge component manufacturers, but with a twist. Instead of needing an oscilloscope to view the waveforms of semiconductor junctions under an AC load and having to memorize thousands of waveforms, I designed a dual bi-polar comparator circuit using two of my old friends, the LM339 quad comparator (remember the car engine computer?). I output the eight lines into LEDs on the prototype, but in

the EDS-59B the outputs went to the address buss of a 32K eprom memory chip that I programmed (in binary machine code!) to recognize the type of junction waveform using all I had learned from using my own Huntron Tracker I had purchased during the Delta Base days. This made it super inexpensive to manufacture and affordable to the average service technician. **The EDS-59C series 002 *SemiAnalyzer*.**



After making the usual small amount of first-generation SemiAnalyzers for my fellow technicians at Lakes and receiving useful feedback, I finally saw the light, and designed a *production* version using a gorgeous Amerex test equipment enclosure, by now designing the pc board on my new IBM PC using the Smartwork pcb design program and Epson wide-carriage dot-matrix printer, a setup that had cost me more than a used car. I had power transformers custom made to my specs in Hong-Kong, had a plastic waffle-matrix panel mold made for the readout, and I assembled a few units to have some stock. Then came the cost of marketing…wow. You would think that the major cost of manufacturing would be the cost of parts, or the cost of fabrication and assembly, or even the cost of employees. But it all pales when compared to the cost of marketing.

A full-page ad in a major magazine like **Popular Electronics** cost more than a new Cadillac, and that was just for one month! I had plans for a three-month blitz in **Popular Electronics** and **Electronic Servicing & Technology** magazines. But in the end I would have run completely out of money in the first month. So I just went with ES&T magazine for three months and these direct mail brochures to radio/TV repair shops listed in American Business Mailing Lists.

Below is the two-page original ad for the SemiAnalyzer in the April 1987 Electronic Servicing & Technology Magazine. The idea was to introduce a *computer-controlled* semiconductor tester, a new concept.

IN THE FUTURE...

TECHNICIANS WILL HAVE TEST EQUIPMENT YOU MAY DREAM ABOUT TODAY...

A Technician may probe with just two test leads, an amplifier, TV, or cellular telephone, and his test equipment may read out:

"LEAKY SINGLE JUNCTION NPN TRANSISTOR, BREAKING DOWN AT 15.3 VDC"

Imagine, if you will, that even an average technician would be able to locate, IN SECONDS, defective components in a blown amplifier, a lightning-damaged TV, anything with transistors, diodes or capacitors;

EVEN MAJOR DISASTERS WITH MULTIPLE DEFECTIVE COMPONENTS...

WELCOME TO THE FUTURE

INTRODUCING A NEW IDEA IN TEST EQUIPMENT;
SO REVOLUTIONARY IN FACT, IT HAS TWO PATENTS (pending).

ELECTRONIC DESIGN SPECIALISTS, INC.

EDS-59C SEMIANALYZER®

$489

- Reads condition (OPEN LEAKY SHORTED), polarity (NPN PNP), and number of junctions (SINGLE DUAL TRIPLE) of semiconductors.
- Uses only TWO test leads, not three.
- Measures junctions IN CIRCUIT with circuit turned off.
- Audible beep tones for circuit conditions; keep your eyes on your work.
- Displays voltage breakdown (non-destructive) of semiconductors AND CAPACITORS up to 175 Volts DC; finds leaky components FAST!
- LISTEN to junction breakdown with built-in amplifier; FINDS NOISY DIODES, TRANSISTORS AND CAPACITORS.
- Displays Zener diode voltages IN CIRCUIT!
- Made in U.S.A. with TWO YEAR limited warranty on PARTS AND LABOR.

Designed in cooperation with technicians who make their living on commission, the SEMIANALYZER® 59C is designed to make you a faster, less frustrated "Supertech". We're so sure, we are offering this money-back guarantee: Use the 59C on your most difficult "dogs" for 60 days, and if it hasn't earned its keep, ship it back for a full refund.

LIMITED SPECIAL OFFER: Semianalyzers ordered before June 30 will receive a free pair of specially designed Pomona adjustable length, curved tip test probes (a $20.00 value).

VISA or MASTERCARD ORDER TOLL FREE 24 Hours/Day—7 Days/Week: 1-800-544-4150 (Florida 305-726-7416) or send check or money order to:

ELECTRONIC DESIGN SPECIALISTS, INC.
P.O. Box 9609
Coral Springs, FL 33065

Please include $7.50 to cover P&H. Florida residents add 5% sales tax.

Here is where I should have quit Lakes and given my full attention to EDS. I didn't want to give up my Lakes gig because it had brought in the tens of thousands of dollars that gave me the opportunity to start my test equipment manufacturing division in the first place. In those days, cellular telephones weren't in use yet except for some experimental bag units used by Motorola technicians, so I needed a way to be able to take orders using my toll-free phone number that rang at my house while working at Lakes. So I modified a Cobra answering machine that thankfully used 4000 CMOS chips instead of a microprocessor, and I had the schematic since Lakes was an authorized warranty center for Cobra. So I modified it to ask for name, leave time to answer, then address, then time to respond, and so on including credit card numbers. Since there was nothing else like it anywhere, I think it scared most callers as there were lots of starts but few that gave all their data. Net result was only seven orders for the first month. A big lesson was learned: be passionate enough for your dream to succeed, and give up your great job; have faith in your invention and if it fails, then it wasn't as great as you thought or not the right time for it. Then think of something else, but never give up.

My experience building lots of Heathkits led me to believe that I could make a decent living writing about each invention and offering it as a kit, like Dan Meyer had with his Tiger amplifier kits. I used the EDS credit card network I had saved from the Delta Base store merchant account for sales.

I wrote for several magazines, but mostly for Modern Electronics Magazine. I wrote my first construction/kit article on the SemiAnalyzer in the April 1988 Modern Electronics Magazine and sold many kits and got lots of free exposure.

Another interesting thing happened in 1984. Andy at Lakes Electronics liked to put up the usual blinking Christmas lights every Christmas on his Sunrise home, but remembering that I invented a series of digital light controllers for my Delta stores, he had an idea: he wanted his lights to simulate a giant Christmas tree rotating with light strings to simulate branches and the lights organized into recognizable patterns and not the usual random blinking lights. He asked me if I had any of the light sequencers left from the Delta Base stores. Yes, I had the one left from the Hollywood store sign that used to give the Hollywood code enforcer fits.

But Andy wanted even more. He asked, "How about a different and more interesting thing than a simple sequencer. How about something you could program for any type of sequence at any speed and any duration?" After we negotiated terms, and never turning down a challenge, I designed the new system to fit into a Hammond console cabinet and even gave it an official EDS model number, the **EDS-63** *Christmas Computer*. The first use was in 1984 with amazement from his neighbors, and in 1985 he set it up again, but this time he had strings not just for the huge Christmas tree on

the roof but also strings on the mailbox, up the driveway, everywhere! WPTV TV in Miami sent their helicopter and that was the big news story that Christmas. I guess we started something that continues to this day.

I decided to write about it in **Modern Electronics Magazine** in November 1988 and make the parts available in kit form as I had done with SemiAnalyzer. Many kits were sold and EDS made another venture into the world of inventive products. And it now made me an official published technical writer as well. Money came in from both the magazine and the kit customers. Sweet!

A second Christmas computer was built with details showing how it was built inside.

With money coming, in I decided to put the old Thunderbird in the garage as a weekend car and bought myself a very rare limited edition of a very special car. I had waited a year for it and was the second buyer in Florida of a 1984 mid-engine turbocharged and intercooled Mustang SVO. Ford had made the very first computer-controlled engine computer for automotive use using (of course!) a Motorola 16-bit microprocessor, and surprisingly, had installed it on a heavy-duty European 2.3 liter Kent engine used in Escort rally cars. It controlled a state-of-the-art digital port fuel injection system, digital timing, even the turbo wastegate was computer controlled via pulse-width modulation, and it had a two-position switch on the console for normal boost, and super 16 pound psi super boost. The car of my dreams was finally mine in January 1984. I installed a stereo system from left over Delta Base electronics that I saved just for this occasion and built a nice

subwoofer speaker system in the rear hatch. I also installed a water/methanol injection system as I had with the Thunderbird along with a circuit that bypassed the AC compressor during boost, and set the wastegate to 20 pounds. This made lots more horsepower.
Problem was, Ford build quality was awful in those years. The car spent lots of time at the dealer and each time I saw evidence of the mechanics playing the stereo so loud the speakers were being blown, and the water/methanol was suspiciously lower, so they must have been having lots of street fun at my expense. So next, I designed a circuit with a hidden switch that would disable the power amps, turn the boost down and modify the air vane sensor readings to stall the engine if anything more than a parking lot drive was attempted. I had the Helms manual for the car that showed the pinout of the Motorola engine control system and integrated my circuit into the wiring. That solved the abuse issue.

By 1986, I had left Lakes so I could stay home and take orders for the EDS-59C SemiAnalyzer. I needed a decent power supply to be able to test and debug my more complex circuits, but multiple voltage/polarity supplies with adjustable current limiting like the HP 6623A were far too expensive for me. Thus was born the EDS-64, a dual polarity 0-24VDC dual DC supply with current limiting, designed totally with transistor differential circuits and current mirror design. I used spare parts and power transformers I had salvaged from High School surplus and junker units from the Lakes "junk room" (a place that unfixed customer units were stored for parts). I built two digital DVM boards using the Intersil ICL7107 DVM chips for the volts, and added two amp meters from High School surplus for the DC supplies. There was even an isolation transformer for testing AC line-powered units safely that could be set for 220VAC to test European units.

A blinking "HV" indicator lamp taken from a 1964 Thunderbird at a junkyard was mounted in a spare military surplus Dialco bayonet lamp fixture, and indicated the isolated AC outlet was set for 220VAC. This power supply has been in constant use since its construction and has been 100% reliable since I built it. The Thunderbird bulb still works too!

Realizing that marketing the test equipment strategies that no one else had thought of was my edge, I designed the next piece of test equipment I had always needed whenever a shorted part caused a failure and brought an entire power supply buss down. Finding these in the past was a lot of cutting up the pcb board along a shorted power buss and measuring at each cut to see if the short was there or further down. Ultimately, a careless technician could add problems if each cut wasn't repaired before going further. I designed a super sensitive ohmmeter with resolution so fine it could measure the copper foil resistance and subtract that from the short value. But unlike the expensive 7-digit digital ohmmeters like the HP 3455A, I didn't need the complexity of a display. Instead, I made it simple, with

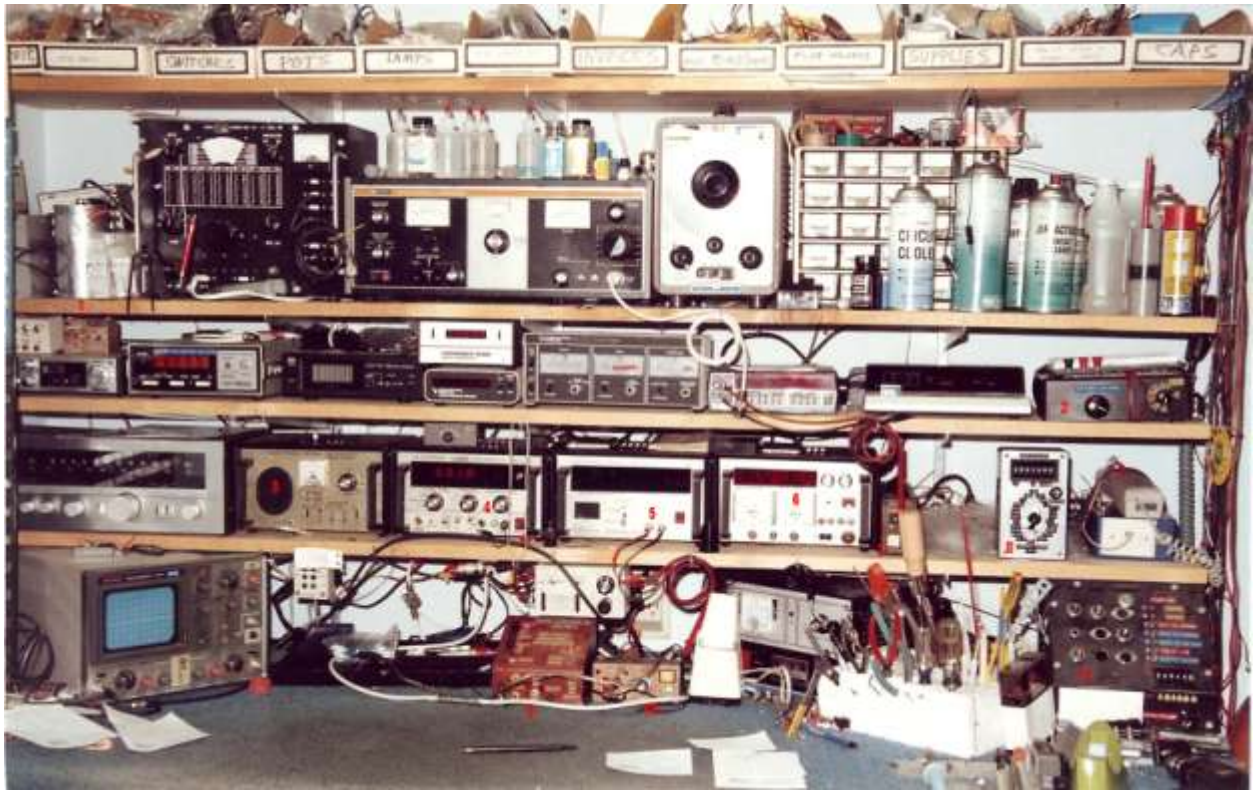
an oscillator that would change tones depending on the resistance. In that way, a technician could simply probe each solder connection along the shorted buss and turn a dial to calibrate the test equipment to the resistance reading at that solder connection. The solder connection with the lowest reading and the highest pitch from the oscillator would be the location of the shorted component. This way the technician didn't need to know the resistance value to 7 digits. One would only have to listen to the oscillator. It was a serious analog design using low noise high gain CMOS operational amps, but the final circuit worked perfectly once I had selected the perfect operational amplifier and set all the passives to the perfect values. I gave it model# EDS-68 and called it the Buss Line Tracer, or BLT for short (no pun intended).

So as I had done with the SemiAnalyzer and the Christmas Computer, I wrote an article in **Modern Electronics Magazine** and made the kit for the EDS-68 Buss Line Tracer available. I also went into production of completed units, making the pc boards at home and installing in Radio Shack metal cabinets.

In 1988, I was getting restless staying at home and partnered up again for a new business venture. Randy, an owner of a small service shop in Oakland Park was also a part-time police officer, so we had some fun at the Shooter's Emporium every weekend. He and I opened a shop near my house in North Lauderdale and named it Southgate Electronics. He would be in charge of fixing microwave ovens and camcorders, and I was in charge of VCRs, telephone equipment and audio equipment. We hired an outside tech to handle TV sets. Since I didn't want to lose sales by not being at home, I finally spent the money to have another phone line put in for the EDS 800 number so I could stay at work at Southgate and handle both types of customers in one place. I built two 80286 computers running DOS4.1 for the business and networked them via a long serial cable and installed PC File to track customers and print out NARDA forms and receipts on the old Epson printer.

In the picture below of the Southgate test bench, you will see many of the custom-made test instruments I designed. Of course I also bought some classics like the Clemens RF Oscillator, the B&K CB radio tester, the famous HP200CD audio oscillator, the Yaesu YC200D Nixie frequency counter, a programmable 11/10 meter VFO for the President CB radio, triple watt/swr meter set, Fluke DMM, an Eprom programmer to program the EDS-59C SemiAnalyzers in production. The test devices I designed and built are numbered 1 through 11.

1: Mini Audio test oscillator
2: Prototype breadboard test fixture
3: Circuit tracer
4: Prototype EDS-52A digital capacitor/frequency/period measurement system
5: Prototype EDS-59B SemiAnalyzer
6: EDS-64 Triple dual-polarity power supply
7: DEL-24 pulse generator (built in 1975)
8: Programmable resistor/capacitor subber
9: DEL-28 Dual Digital logic probe with pulse generator (built in 1975)
10: DEL-23 Semiconductor tester (built in 1972)
11: CB Mike machine (built in 1976 for wiring & testing CB/HAM mikes



Fixing answering machines was big business, and I needed a way to simulate and measure all the telephone signals, so I designed the EDS-69 TeleTester. As usual, I wrote about it in **Modern Electronics Magazine** and sold both assembled and kit versions.

Eventually I made TeleTester a production piece and made three versions depending on the features required. All used the same Amerex case as the SemiAnalyzer to give some uniformity in looks to EDS test equipment. Even BellSouth bought one!

I was designing a lot of audio circuits, having become a dedicated audiophile. So I needed a good audio oscillator that would have sine and square wave outputs for testing power and distortion, a sweep oscillator to test frequency response, and some way to offset the waves on a zero peak for my digital circuit designs, and as usual I decided to design something since professional equipment like the HP 3325A easily ran into five figures. With some inspiration from a Popular Electronics Magazine article featuring a simple circuit using the popular ICL8038 chip, I based the basic circuit on that and simply added my own circuitry to include the extra features I required like sweep function and DC offset.

I gave this audio waveform generator/sweeper the model number EDS-72. Like the EDS-64 power supply, this was a one-off only for my own use and I didn't market it.

There were just too many similar pieces of test equipment out by the major manufacturers to bother competing with. I only marketed specialized test equipment that no one else had ever thought to design. That had been my secret money making strategy and I planned to stick with that strategy as it was working for me.

The electric bill at Southgate was huge, and on top of that, frequent power surges, lightning and power outages were taking out the compressors at both my house and the Southgate store. Since I had a background in refrigeration and even had my registration permit to buy Freon 12 and 22, I knew that I could make a circuit that would replace the simple thermostat-turning-on-everything-at-once system that hadn't changed in 50 years. My plan was to have individual circuits running the air handler and the compressor separately. In this way, the compressor could be turned off instantly on any surge or slump or playing around with the thermostat, and keep it locked out for the three minutes needed for pressure down. The air handler would run during this time allowing the cool air of the evaporator to not be lost in the ducts. The circuit worked so well that besides protecting the compressor, it also reduced the electric bill by about 20% since the thermostat could now be turned warmer by a couple of degrees without the room temperature changing. I thought that this had a good chance of being patented and licensed to all the HVAC companies, but after the experience in trying to patent the Auto Rain Sentry in 1974, and then and the SemiAnalyzer in 1985, I decided against it. The SemiAnalyzer patent attempt cost had run into the tens of thousands of dollars and after two years was still being argued despite nothing else close to my claims. My strategy changed to putting money into marketing instead of a patent lawyer, and in the future I would only do preliminary patent searches just to make sure I had an original claim.

So as I had before, I made the EDS-71 A/C Sentry available as a kit or complete in 1987 and wrote about it in the **Modern Electronics Magazine**, March 1989 issue. Interestingly, this article attracted my next engineering client, the CEO of a large HVAC company in Fort Lauderdale that had an amazing idea: East Coast Mechanical was involved in the construction of a new hotel in the Bahamas, and wanted the office to be able to control all the individual AC units in each room from the office. In this way, the usual practice of every room running their AC unit needlessly, waiting for occupants would be eliminated, saving a huge cost in electricity. Now the manager could turn on the AC unit while the customer was still checking in, and the customer would enter a room already cooling down.

I thought the idea was great, until he informed me that they were already past rough-in, which means the walls were already up and painted, so running wires would be out of the question.

So now I start thinking… I am already an expert on telephone systems, having designed the TeleTester series. Maybe I can reuse the telephone lines for an alternative use? But the phone company owned the wires and would not allow unusual voltages or signals that weren't from their equipment.

So the final design of the TeleController solved everyone's issues. Since no one would be in the room when the AC unit would be turned on by the office manager, the phone could ring forever, right? So, all I had to do was have a circuit (derived from TeleTester) to know when the phone was ringing, and after 8 rings would pick up like an answering machine, and listen for DTMF tones that all touch-tone phones put out. I set the controller up so **2** turned on the AC unit, **8** turned it off, and thinking out of the box, added outlets for lamps that also could

be turned on or off by pressing **1**&**7** or **3** & **9**. Since this was a special project for a paying client, I couldn't write about it or disclose any data to anyone else at the time. But I do believe it was the first time anyone ever used their phones for digital remote control functions. Twenty-five years later we would do something similar via the Internet and a smartphone app.

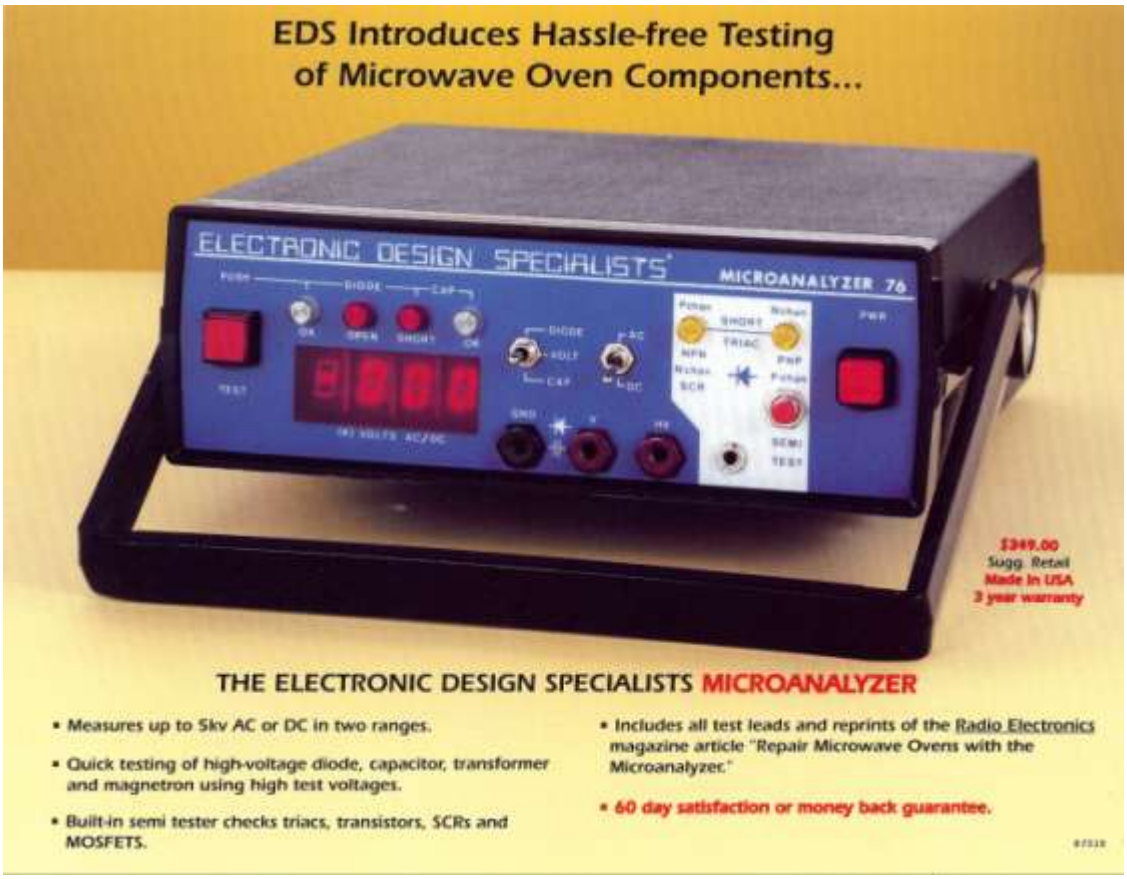
While tending customers at Southgate, a young man came in one day and wanted to know if I was the one writing electronic technical articles in the various electronic magazines. I told him I was. He was only a stock boy at Publix, but being a dedicated audiophile himself, he wanted something special and was ready to pay whatever he needed to. He wanted a preamp and control center that was completely over the top in quality and features and had the special things he wanted. I was impressed and decided I would do the job for $1000. That didn't faze him a bit and he came back in a few days with the cash and a list of features and specifications. I saw what he wanted was close enough to the EDS-61 preamp and control center I had built for myself at a huge cost in 1981.

I could use some designs from that. So the EDS-61A came along built in a sleek black cabinet rack enclosure. I didn't tell him, but I actually built two identical units and sold him the one. I kept the other simply because it had turned out so impressively.

Subnote: fast forward almost 20 years later and living in Boca Raton: I get this email wanting to know if I was the same Dave Miga who built his preamp, and if so, could he send it in for repair? Of course! It turned out that a tantalum capacitor had shorted in the positive 15 volt supply, so I replaced all the tantalums of the same value and returned it to him. Sweet being remembered and found after so long…

In 1990, someone broke into the Southgate store at night using a crowbar to rip the back steel door out of the frame. Although we had an alarm, it didn't go off until the thief was already inside, and he knocked it off the wall with the crowbar anyway. Luckily, we only lost the small change left in the register and one customer camcorder. So I decided to replace the UL approved alarm that did nothing, with one of my own design. Because on occasion employees would sometimes forget to turn the old alarm on when closing shop, my plan was to design a simple system where the store lights would control turning off the alarm when the lights were on and turning on the alarm with lights off at closing. And I put a sonic sensor on the back door with an unreachable speaker and a police siren outside, near the roof level. Now at the first bang on the door at night, the siren would sound for five minutes. We never had any more issues after that.

Randy was in charge of repairing microwave ovens, and often complained that the only way to fix them was to substitute good components one at a time until the oven worked. Wasn't there some way that I could design a test solution that could check all these exotic high-voltage parts in circuit without having to remove and replace every component? So I designed the EDS-76 MicroAnalyzer, and being patriotic (the Gulf War had just started) I designed it with red, white and blue accents into a beautiful Amerex style case, like the SemiAnalyzer and TeleTester.



It could test under high voltage load the power transformer windings, diode, capacitor, triac and so on without taking anything out of circuit. It could also measure up to 5,000 volts, AC or negative DC on a red digital display. Because it had no competition at all, it was an instant success selling more than all the other EDS test solutions combined. I celebrated my windfall by buying a house in Boca Raton and rented out the North Lauderdale house. For many years, I had heard that the rich and famous had homes in country clubs in Boca, and we even had some Boca customers come to Southgate because there weren't any decent service shops there. Boca had been on my radar for years, and now I am going to live among the quality people. Good-By Broward County! Nice knowing ya! Welcome to the elite in Palm Beach County!

Besides advertising in the electronic magazines of the time, I was getting the chance of teaching all about troubleshooting using specialized test equipment. Naturally I tried to plug my own products, but the magazines also took it upon themselves to evaluate EDS products with their staff. All the reviews and feature articles have links at the end of this bio.

My partner, Randy, wanted to buy a C4 Corvette for a long time and he went to a Corvette specialty dealer in Oakland Park. There, among rows and rows of Corvettes from all years was a bright yellow and black 1983 Lotus Turbo Esprit. I recognized it as the "submarine" car featured in the "Spy Who Loved Me" James Bond movie, and the car I had lusted for since the movie. After working on the store owner for a few days, we agreed on a test drive. The car had a lot of miles, the speedometer didn't work, the tires were worn out, most of the electrics didn't work, but this was a Lotus, so not completely unexpected. What was unexpected was a sudden oversteer

on the entrance ramp to I95 at Sunrise Boulevard, where I found myself going backwards down the grass. I managed to keep the car from hitting anything while going backwards towards the drainage pond (this was during the rainy season) pumping the brakes as I had been taught. The car just stopped short from going "submarine" with just the rear wheels in the water. The store owner had peed in his pants. There was no way to get the car out of the mud, so I knew this was going to be embarrassing. I had my brick cellphone with me and called the Southgate store. The store manager answered.
"Southgate Electronics. This is John. Can I help you?"
"John, its Dave. I need your help."
"What happened? Did you drive the Lotus?"
"Yea, but it wasn't so great at being a submarine."
"What do you mean? Are you OK? Did you crash it?"
"No, but…hell, I'll tell you later. Everyone's OK, but I need it towed. Can you send out a truck to the north onramp at Sunrise?"
"Sure, no problem. I'll have Randy watch the store, I want to see what you got yourself into!"

I felt so sorry for the car owner that I bought the Lotus. John presented me with a present for the car: A custom yellow and black front license plate that read "*Yellow Submarine*".

The Yellow Submarine with its doors open, fitting it with what would become the ProCar Owner-Recognizing security system.

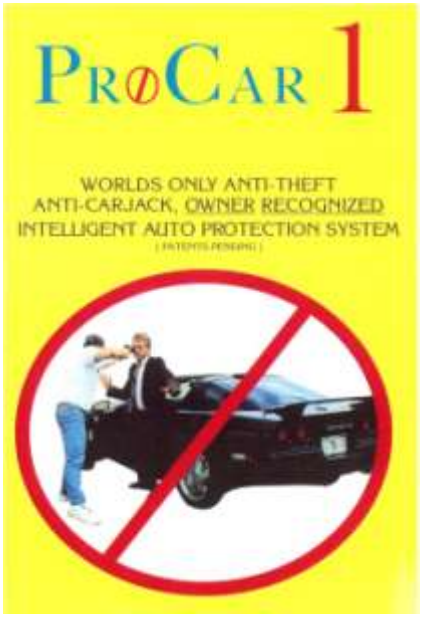
The car was a joy to drive but a terror to maintain. I had to repair the speedometer and all the electrics. I replaced the tires and the worn interior with *Bridge of Weir* leather and installed a Blaupunkt car stereo system and recharged the AC system. I even installed my usual water/methanol injection system since the gas quality was still poor back then.

But the Lotus was a maintenance nightmare. There was always something leaking, breaking or blowing up. It was the perfect test bed for what would become one of my most important inventions, the owner-recognizing auto security system known as ProCar. Because the car used a fiberglass body on a monocoque chassis, electrical grounds were sometimes at different levels at various points on the car. After three ProCar prototypes blew up during testing, I brought out my big-gun Hitachi oscilloscope in the garage and discovered a *negative* 3 volt spike drop when a door was opened, therefore blowing up the NE555 used for triggering. A simple diode fix made the circuit foolproof.

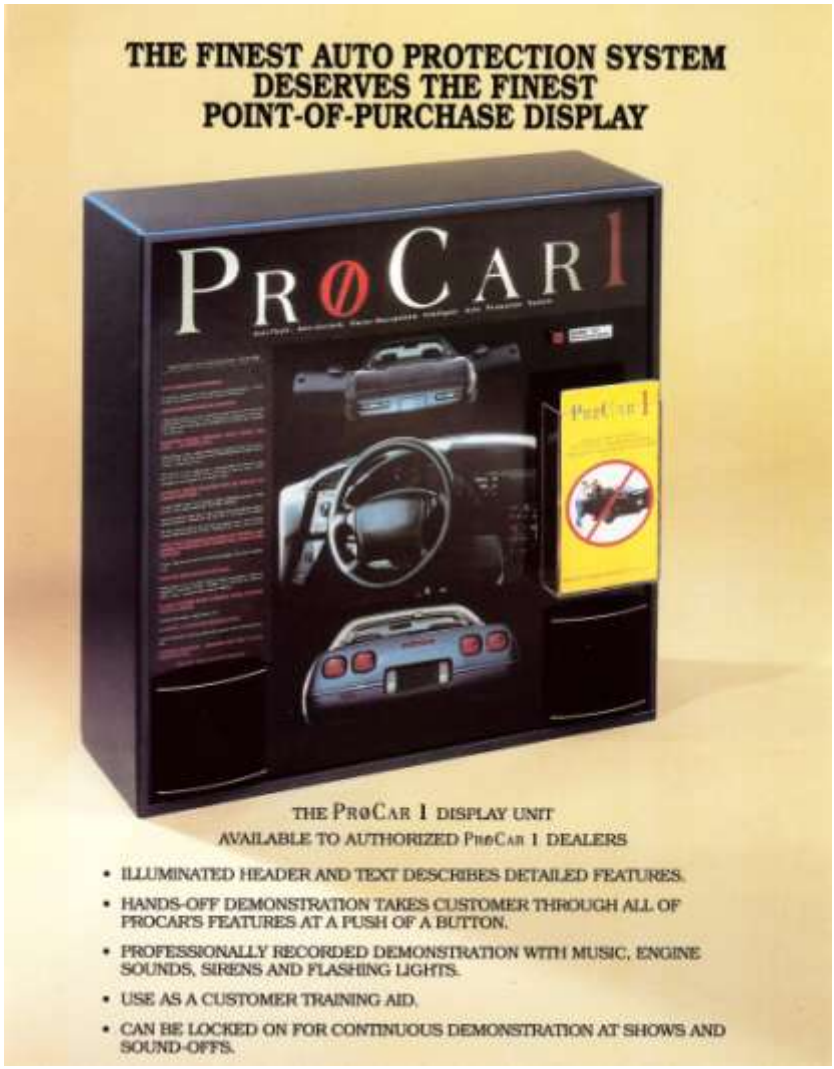
After four years and a cost to repair and maintain that was more than *double* what I paid for the Lotus, it found a new home in San Jose, California with a nice gay couple who were optical engineers. I kept the *Yellow Submarine* license plate where it hangs in my garage. I miss that car more than any other I ever had.

Meanwhile, repairs on TV, audio and video products had been slowing at an even faster pace and people were more inclined to buy a new cheap Chinese product than pay to fix a high-quality Japanese or American-made product. Sales of test equipment to electronic service shops also started slowing down in as the recession was declining and by 1993 people were buying new microwaves instead of fixing the old ones.

I had some spare time and listening to the news about all the new carjackings that were going on with all the horror stories, I decided to design yet another new car alarm. But unlike the simpler systems I had done at the Delta Base stores, I was going all-out and design an operating system using lots of state-of-the-art 4000-series digital CMOS chips and make it one incredibly intelligent, owner-recognizing system that would thwart the carjackers as well as the regular auto thieves. I already had a passive alarm in the Lotus, and planned to start with that and keep adding 4000 series CMOS chips to do all the smart stuff, including a NoGo or Sensormatic resonant wafer put into the car owner's wallet or back pocket for owner ID. The ignition and fuel system electronics would go through some new specialized power transistor recently introduced as *mosfets*, which could intercept the engine electronics. As usual, I built a prototype, but this time considering the impact it could have, went to my patent attorney for advice. He thought the idea of "owner recognizing" and "anti-hijacking" claims were great but the possibility of a carjacker crashing when the engine quit suddenly without warning was going to be a legal problem. I had been working with ISD voice chips, a new product at that time, and decided to add that feature so the driver would verbally be told that the engine would be disabled.



It took a full year, staying up long nights to design and build all the various circuits and design changes until I had the perfect design. It had four levels of security, including a valet level that would allow a valet to drive slowly and only five minutes and would shut down a stereo system, a standard security level that would allow a permitted driver to drive with just the ignition key, and a high-level that would only allow the actual owner to drive the car using two versions of owner recognition. It also had a service feature to allow mechanics to work on the car without interference, yet flash the internal alarm LED as if it were armed. It also had a remote that could stop the car from outside within a quarter-mile.



The system was so advanced that it would lock the car doors while driving, unlock them when the ignition is switched off, and would auto lock and arm the vehicle after all motion has stopped and all the doors and trunk were closed. Because no remote was needed to lock the car, code grabbers had nothing to grab, and upon returning, the code from the remote was encrypted in a way that code grabbers wouldn't work. I thought of everything that 20 years of auto alarm designs had taught me. "Totally spooky" is how it has been described by some who have watched it in action. I tried to sell it to both the big three car companies as well as the local dealers and installers, but everyone was scared at the level of installation difficulty and cost of the system. I made a demonstration unit with a picture of Randy's Corvette with doors that lit when opened and demonstrated all of ProCar's features. The demonstrator used a cassette player with a four-channel tape head and my design of DTMF telemetry decoders to run a production ProCar alarm box and power the lights and siren of the demo box. There were so many features that the show ran for ten minutes. I think it simply overloaded people's brains like too much cgi on a Marvel movie. The thought of a complex installation scared every dealer and car stereo store I showed it to. But I used mine on my Mustang and Lotus, then my Ford Escort wagon for twelve years. And it is still in use on the 1997 M3 to this day.

I did write about it in **Radio Electronics Magazine**. Because of the level of difficulty and several pc boards with components on both side, and two modules, one in the engine compartment and one under the dash, the magazine had to run it for several months, each month was a section on building and testing each step, and finally installation. I sold a few systems and got paid for my writing. As for the dealers it was just too much when they could just sell a $29 alarm that just made noise. And the big three simply told me to go to the dealers. I suppose only those who have felt the terror of being carjacked would have been customers. Although GM and BMW did steal one feature that ProCar featured, that was the RFID idea that the car would recognize the owner by the RF tag. But another feature ProCar had was, if you lost your wallet and the RFID tag or remote, you could still get in and drive; while ProCar is waiting the ten seconds after entry for the driver to ID themselves, it also watched over the various electrical switches in the car. During installation, ProCar was set to watch for a particular function of a particular switch. In Randy's Corvette, he might have to open the passenger window

halfway then close it. On my Dinan M3, I have to wash the windshield for three seconds. Every install was different and coordinated with the customer's requests.

I liked the voice feature using the ISD chips so much, I decided to use it in even more inventions. The Boca house I had moved into needed an alarm system, so I designed a home alarm with eight zones. I programmed the ISD1016 voice chip to actually announce which zone had been activated, so if you were woken up at night and heard the alarm blaring "break in at garage door" between siren blasts, you would know where to turn your attention (and aim your Colt 45 or whatever). I christened the system the "Voice-Alert" alarm system gave it the EDS-83 model number even though I wasn't planning to market it. I had no connections in that market.

Early 1993, I received an interesting phone call from the editor of **Appliance Tech-Talk Magazine**. He mentioned that he had seen the MicroAnalyzer on the internet (!) and "had I ever considered selling to the appliance servicing industry, not just electronic service shops?"

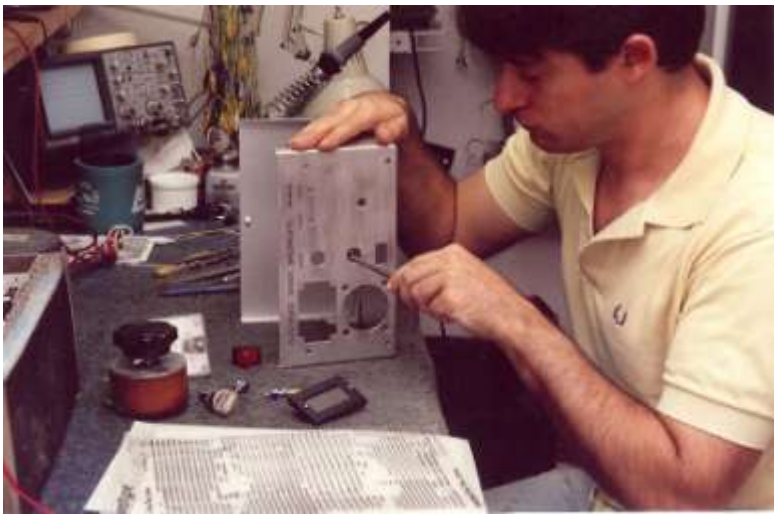
I was taken back a bit, as the internet and World Wide Web were so new to the public, and furthermore, EDS didn't even have a website yet. Windows 3.1 didn't even offer internet access yet. What he had seen was our EDS-76 MicroAnalyzer shown in an **ES&T Magazine** ad and the magazine just happened to have started a new website. So that got me thinking about two things: EDS needed a website and I wanted to try the *appliance* technicians angle as he suggested. So the editor first did a "new product review" article in their January/February issue to evaluate reaction. Reaction was immediate and positive, so we advertised the EDS-76 MicroAnalyzer in his magazine, and as he predicted, we opened up an entirely new market. But this time it was much bigger than the electronic technician market, as professional microwave ovens as well as built-in consumer ovens were still being repaired due to their high cost new. There are countless more appliance technicians than electronic technicians. The financial rewards were so great that I saw no more reason to keep Southgate Electronics open and deal with Randy as a partner. Repairs of audio and video had been declining at a fast pace now that the Chinese were pumping out electronics at a price that was less than our service fees. We couldn't survive trying to pay all our bills and keep employees with the small amount of profit from Southgate, and EDS clearly was paying all the bills. So in 1994 I gave notice that I was leaving, and Randy could either buy me out or better yet, let us sell the place for whatever we could get for it, which was better than nothing. So I put the word out by sending mailers to all the other TV repair shops, and the brother of a Pakistani service tech who already had a shop decided he wanted to have his own shop. So we got enough to pay for all the test equipment we left behind (including the original EDS-52 I had built ten years earlier for Lakes Electronics:-)

So now it was like old times, working out of my house again, still able to take credit cards. I had the EDS phone number ported to the new Boca house and now got to keep all the profit from EDS sales to myself. No more partners to ever have to deal with!

Because I was still fixing A/V electronics I needed a source of variable AC that could be isolated, a requirement for any A/V tech at the time. Having left so much test equipment at Southgate, I needed to replace some of it. One project was the IsoVariac.

The IsoVariac combined some left-over military surplus and parts from Lakes "junk" room to make this 0-140VAC isolated power supply with volt and ammeters.

Here I am making the IsoVariac out of the same Radio Shack test equipment case I used for EDS-52A, EDS-59B, EDS-64 and EDS-72.



I also sold the Mustang SVO Turbo, which by 1995 had become a collector car and had been replaced with the Ford Escort wagon, making service calls easier. A Microsoft executive in Washington fell in love with my highly-maintained SVO and probably paid more to have it lovingly transported to Washington State than he paid for the car. He was so appreciative that I received arguably the first Windows 95 CD in the state.
I had learned to code in html and had designed and built a beautiful EDS-Inc website on my new AMD Windows 95 tower, showing the EDS test equipment products for sale. Also, keeping my back doors open, I had copied the PC File Southgate database from the 80286 in my office and planned to continue to service those who knew me and wouldn't trust their electronics to Southgate's new owner. Of course, that meant that I now had to do the actual service calls myself instead of sending out the TV tech as I had at Southgate. This started a bunch more problems, one of which involved inventing a new product. This time, however, it would get *national* TV coverage.

In order to take EDS orders while I was out doing service calls, I had been call-forwarding the EDS number to my brick cellphone that Randy and I had each purchased through Southgate. These early cellphones were not only expensive to buy, but the monthly service fees were in addition to a cost per minute, and the average cellphone monthly bill could be anywhere from $400 to as much as a grand a month, unless you simply didn't use the thing.

So imagine what happened when some stranger tried sending a fax and misdialed, getting the EDS phone which then transferred to the cellphone. And of course, not getting a response, the fax machine redialed again…and again, over and over for several hours. I was mobile with no way to stop the action especially since I didn't know the fax phone number to try to reach. So I came home to a cellphone bill high enough to need a ladder to pay. Time to solve this problem!

Thus started one of my most ambitious projects, so different and amazing that it received national attention. The plan was to design a multi-line telephone system that could transfer landline calls using just one incoming phone line. The first design used lots of digital chips and worked as a prototype, and I gave it the EDS-81 model

number. I used the feature provided by the phone company known as three-way-calling to start with. The idea was to install my new Selective Teletransfer Unit (aka **STU**) between the normal answering machine most everyone had by then, and the phone line. STU would allow the answering machine to pick up since you would be out and about with your cellphone. The way you word your outgoing message would make a human caller take a specific action. So if you programmed STU to take action, you might set the transfer flag to 8. Now your outgoing message can give several numbers and STU could transfer to your cell when it hears 8, or to your pager if you set that function to 7, or your girl friend's house if STU hears 4 being pressed. Or STU could ignore any number as well. You could even reprogram STU remotely from your cellphone for a different function. To transfer a wanted call to your cellphone, STU flashed the line to get the second dial tone and dialed your cellphone, then flashed again to bring the caller, you, and STU all on line together. Best of all, the answering machine was still recording so you could take customer info and credit card numbers while driving and not bother to write anything down. Simply play the answering machine back when you get home. The biggest benefit is that no one ever needed to know you cellphone number, only STU needed it.

So in the fall of 1994 I made the production version of STU using the very most of my abilities in using the ISD voice chips, DTMF decoding chips, eprom memory programming as I did on SemiAnalyzer, and coded the eprom in machine language. No microcontroller was being used, just a simple NE555 oscillator and counter chips sequencing the parallel address lines of the eprom, which basically simulated an actual microprocessor. I put it into a sleek Simco case and dubbed it EDS-81A. I even sent it off for FCC approval and got my approval number. In the summer of 1995 I was interviewed by WPEC and WFLX in my Boca house and CNBC ran an article of interest on their Steals and Deals TV show featuring the STU unit. https://www.youtube.com/watch?v=cWr9Et41pGw
Despite all the press, surprisingly there were very few real buyers. Even the realtors, who used to have at least four phone numbers to reach them, couldn't see spending the $150 for STU to consolidate their mess into one number. To this day, it remains a mystery to me why STU didn't sell. Time to think of something new…

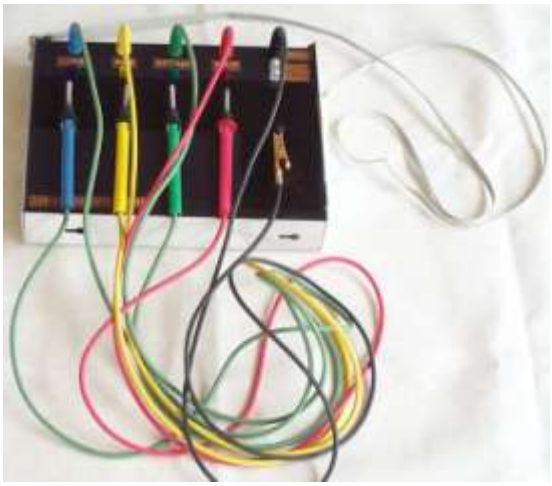
One thing all the publicity did was to make me almost famous. Suddenly I was getting clients who wanted me to design and build their own inventions and projects. I was being recognized by the locals I did service calls for.

My largest client was General Motors, through a specialized engineering firm in North Carolina. GM had bought out a company that was attempting to make ultrasonic distance meters for cars for backing up (long before backup video cameras). The company had given up trying to get the system to work and by the time GM took over, most of the prototypes had issues and most of the data was either lost or bogus. GM had passed the project to TR Technology since the complexity was way past their engineers. Pat at TR Technology saw how complex the system was and decided it was too much for his team as well. Here is where it is great to have people in your network. Most of my fabrication contacts in South Florida have been Indians, and besides being

the smartest race on the planet, they network and include non-Indians in their network as long as the quality of the work is proven. Pat contacted his friends in Broward and my name came up. The project required me to reverse-engineer several complex multi-layer pc boards with only 3 mils of spacing, and make a schematic, and a new pc board design that we would finally have some control over. During the reverse-engineering, I saw and corrected all the mistakes and problems and finally after three months of work, had a working system.

The next client was the manager for Lexus of Coconut Creek. Dave Milman wanted me to design a remote auto start for his Lexis company car as a demo. I used the original Lexis remote, but designed a digital circuit that monitored the door locks for an open or lock signal. Five clicks (START) or four clicks (STOP) allowed this function without having to use a second remote. The EDS-86 used 4000 series cmos digital chips and a relay did the trick.

Another client contacted me. These were the days when everyone was gold-plating the emblems and logos on their cars. “Gold Accents” in Hollywood asked me to design a portable inexpensive system that would automatically set the proper polarity, voltage and current for the type of plating probe, be it nickel, tin, gold or chrome stripper. I gave this portable unit model # EDS-87.



Finally, a client’s project that went through all the prototype steps and actually made it into production!

I eventually gathered the courage to set up a booth at a major trade show since I was still selling test equipment direct. I had been selling EDS products directly since the beginning and had been wooing as many test equipment distributors that I could find addresses and phone numbers for, but unless your name was Fluke or Hewlett Packard, you could never get an audience. None of these major players had probably ever heard of EDS and I was completely ignored. So in 1996 I signed up for a booth plus electricity at the NASD show in St. Louis. This was my first trade show. It seems that the big shots go to these yearly shows and when they see something special in action, it finally gets their interest. On the table were TeleTesters 69A and 69B and SemiAnalyzer 59C. Here I am demonstrating the MicroAnalyzer. I had the ProCar display there also, but as expected, it was totally ignored. Lots of bigwigs were there and took notice of the test equipment line.

Dolby surround sound had started becoming popular around that time and I purchased an American-made (!) Radio Shack 15-1964 ProLogic decoder featuring the well-acclaimed Analog Devices SSM-2126A chip. The sound

quality was audiophile quality but it lacked remote controls. I planned to replace the analog potentiometers with motorized potentiometers sourced from Pioneer through my old contacts with Lakes Electronics. I realized that I would need to get serious using microcontrollers to receive the signals from an old Fisher VCR remote and run the corresponding motors. I added outputs through optoisolators to run my FM tuner and JVC cassette deck as well. I had to use a real microcontroller chip; eproms running from simple oscillators couldn't do calls, jumps or macros. Microchip was looking for new business and they were nice enough to provide me lots of free chips and a PicStart programmer. They hooked me up with a technical advisor through a local distributor. It only took a day to learn how to code in assembler, and I wrote my first program to add remote control capability to my Dolby decoder, cassette deck and FM tuner. Just 99 lines of code and it worked right away, no debugging! I wrote about this as the usual construction article with kits available, but this time in **Audio Electronics Magazine** in their June 1996 issue. Again, links to all my articles are at the end of this bio.

Meanwhile, the Buss Line Tracer had been out for ten years and it was time to replace it with something better, and also easier to use. The BLT had always been a little difficult to use as it was totally analog in design. It was also limited to finding shorted and leaky components only up to 15 ohms. So I used the same analog circuit, but now embedded it into a digital control circuit that could control a military-quality 12-bit digital to analog circuit, which would allow the range of the analog circuit to be expanded by a factor of ten, from zero to 150 ohms, still without losing resolution. It also became easier to use since the digital 4000-series cmos electronics did all the scanning work, as the user no longer had to spin a ten-turn knob to match the value of the defective part. It now was automatically put into digital memory and did the scanning search automatically.

This is the picture of the EDS-82A, which added LED indicators for easier usage and a three-wire test for difficult circuits.

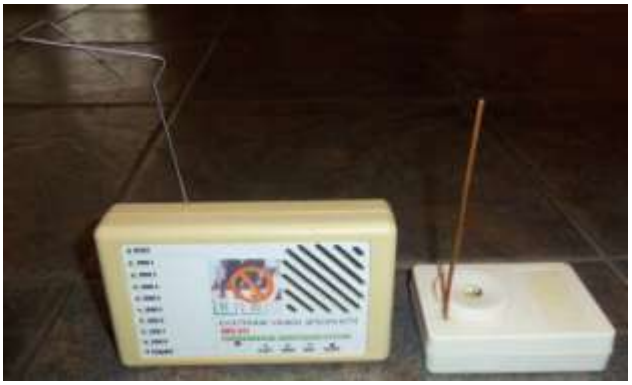
The new name for the BLT was ***LeakSeeker*** and the EDS model number was now EDS-82.

The NESDA trade show in Orlando was my second trade show.

The next client was an established manufacturer that sold devices called "FloodBuster" through stores like Walmart. They were having their units assembled in Coral Springs at one of my Indian contact's assembly plant. Their unit was a simple device you placed next to your water heater for example, and it would whistle if it sensed a leak.

The new project was very ambitious, especially considering the technology of the times. It would be a complex network of wireless Floodbusters that would signal distress to a central unit which would then call you on your cellphone (or landline) and give the zone number of the intrusion. It was close enough to my "Voice-Alert" alarm that I modeled the new project after that one. Since I was using the ISD voicechips for almost everything now, I added the feature that the owner could even make their own recording on the central unit, so in calling out, not only the zone, but the address or any other information could be recorded by the owner and sent out. Because it used audio, an alarm monitoring company was no longer required; it could dial directly to your cellphone or any other number. Of all my inventions, this one when demonstrated in my home to this day gets the most praise.

The Microchip in the master controller receiver required almost 5000 lines of assembler. And since these early microcontrollers didn't have any interrupts yet, everything had to be polled so the system could multitask, even receive communications from two remote units at the same time. It took about four months to code and debug with jumps and paged memory calls everywhere… first generation microcontroller chips were hell to program. But it worked, and it was FCC accepted (part 68) for use on the telephone lines.



I couldn't help but improve the original customer's idea to a network of sensors that didn't only look for floods, but also temperature, motion, door/window break switches, even a panic pendant. I renamed the system the EMS-911 since it was now an Environmental Monitoring System that called out in emergencies. It was the very first smart alarm system, and it didn't even need an alarm monitoring company! It monitored eight channels for any combination of faults and even notified you if a remote needed new batteries. You could turn the "intrusion sensors" off and it would still monitor for fire, flood or temperature change. The intrusion sensors could be activated by any remote or by the pendant and then would notify of motion, or break of any door or window switch. I suppose I should have marketed this as it was soooo far ahead of its time, but I was still rubbing my backside from the failures of ProCar and STU, and this was too close to my client's project, so I just kept my prototype EMS-911 system and still use them today.

In 1997, I heard from another new client. The client, Randy, owned a company he called Rad Source. He had established that blood could be disinfected of viruses and bacteria by irradiating it with X-Rays at a certain distance, without having to heat the blood as other systems did. He also discovered that food could be sterilized of bacteria, viruses and other pathogens using X-Rays, instead of Cobalt-90, as the produce and other food distributors were currently using. This way, they could bypass the Nuclear Regulatory Commission and use a safer, smaller system that could be moved room to room on wheels. My job was to combine the Siemens X-Ray tube, the chiller to cool the tube since it ran continuously, and make a controller for everything with timers and meters. It had to pass FDA requirements, since the high voltages and currents were extremely dangerous. I successfully designed the system for Rad Source, just about the time that McDonalds had a batch of bad beef. I thought that this was the perfect opportunity for Randy to show the system to McDonalds or at least get some public air time or press releases, but last I heard from him is that he had mortgaged his North Carolina ranch to continue his project, then I heard nothing more. I thought this would have been a winner for Randy. Most

inventors like myself are smart but not necessarily in finance or marketing. Even Steve Jobs needed Steve Wozniak to do the inventing while Jobs was the marketer. But at least I did my job, and furthermore, gave me some learning experience on FDA approval and requirements.

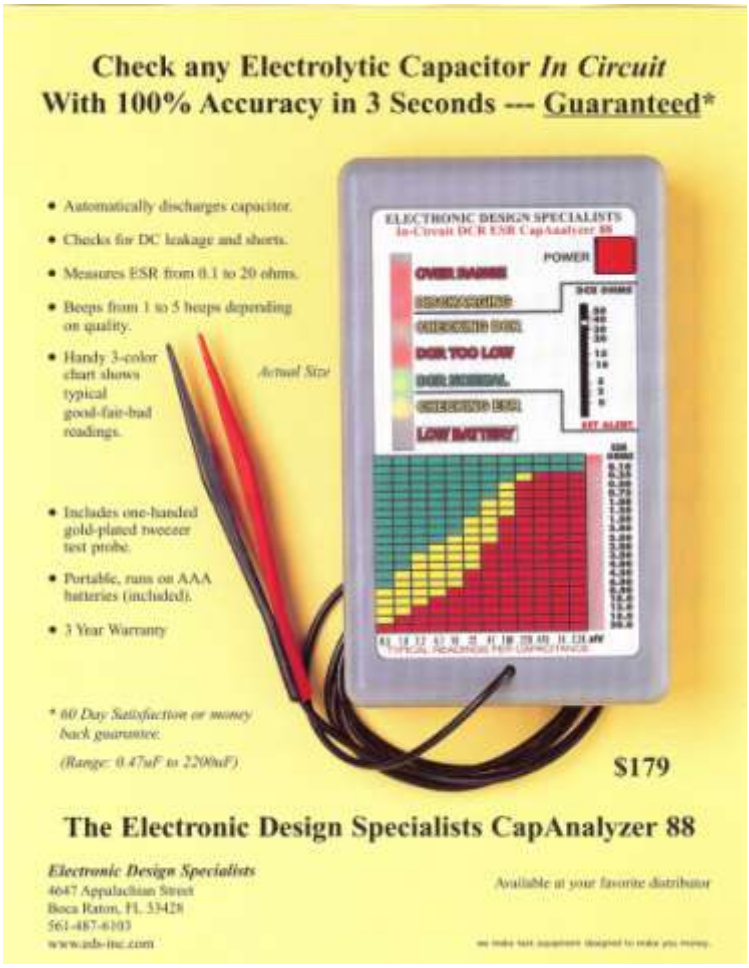
By that time, I had started including in-home computer repair to my struggling in-home VCR/TV business, since I already was an expert on building and repairing computers. This increased business dramatically as I had the ability to think out of the box and always solved the customer's problems. I still was using my EDS-52A for testing capacitors, but they had to be unsoldered to be checked. More and more electronics were showing up with bad capacitors. There were some so-called *in-circuit* capacitor testers, but none of them were very dependable as far as accuracy was involved. One of the technicians at Lakes had been using a simple in-circuit capacitor tester that didn't measure capacity at all; it measured ESR instead which basically indicates the "health" of a capacitor, not its actual value, but his unit would always show a defective, shorted capacitor as "healthy" and could send him on wild goose chases. It also wasn't very accurate, giving false readings and wouldn't check small capacitors at all. Scott and I kept in occasional contact long after I left Lakes, and one day, I was feeling bored as all projects had been completed. I decided that I needed to make an in-circuit capacitor tester that was as close to 100% dependable and accurate as possible. I asked Scott about his unit and he let me borrow it and see the schematic. Instantly I could see both the unique idea of the circuit, but also see the huge mistakes made and why it would never be accurate as it was. But it did give me the start and inspiration to create the next test solution for EDS. After loads of research on capacitors and the finer details on how they work under various conditions, I designed the analog circuit of what would eventually become the best-selling in-circuit capacitor tester in the world.

As it turned out, the Microchip technical advisor, Robert, had his own company and was selling home alarm systems through the shopping channel. He needed a new and updated design, and I got the job of designing a new circuit, pc board, and of course programming a Microchip microcontroller for the alarm. With the successful completion of his alarm project, and with several programming successes now under my wing, it was time to design and program the CapAnalyzer.

The idea was to first discharge the capacitor under test to keep from damaging any electronics from a charged capacitor. Next, to measure the capacitor for DC leakage *before* testing for ESR, to eliminate the problem of ESR-only testers looking at a shorted capacitor and giving it a clean bill of health since the shorted cap's "ESR" measured low. If the capacitor passed that test, only then would the "ESR" of the capacitor be measured. But other components in the circuit could cause erroneous readings to take place. Therefore, a way had to be devised to make the CapAnalyzer ignore all other components like semiconductors, resistors, inductors and so on. The plan was be to probe the capacitor under test with a very low voltage of very high frequency, which would leave semiconductors and inductors out of the picture and tend to localize the test area. Secondly, the environment needed to be as low as possible in resistance, so that any resistors in the circuit would also be ignored. Therefore, with all semiconductors, inductors and resistors being forced out of the measurement test, the only thing left was the capacitor under test. A Microchip microcontroller would dictate the steps and calculate the results into signals that would be displayed on a simple LED bargraph.

Not only was the analog theory sound, after just a weekend of design changes and modifications, I had a working analog circuit that performed far better than I ever expected. Now all I had to do is integrate a microcontroller to coordinate everything, and design a pc board and a nice case and overlay to put it in. I had just spent a small fortune on a CNC router specifically designed to fabricate prototype pc boards and a new program to make the pcb design program to integrate with the new LPKF CNC router. This replaced the original SmArtwork PC board program I had been using since my first IBM computer. It took a couple of months of coding but finally I had my LPKF machine going and made a nice pcb for the first CapAnalyzer circuit. Finally, a Microchip PIC16C54 was programmed to coordinate the functions and send the correct signal to the LED drivers. The resultant analog voltage would be read by conventional and popular LM3914 bar graph LED driver chips. Thus, a simple to use, inexpensive, and most importantly, accurate and dependable in-circuit capacitor tester was finally born.

It sounds corny to say the rest is history, but after the showing at the 1998 NASD convention, the rest is history. Everyone who saw the demonstration was amazed and ordered or bought on the spot. I was testing capacitors with popular testers I had on hand that were showing defective capacitors as good. Then I tested them with CapAnalyzer EDS-88 which showed them as bad. Equivalent new, good capacitors of identical capacity showed good on CapAnalyzer, as expected. It really made one a believer when used. This is how I finally picked up a major distributor, with more distributors to follow. No one wanted to be left out of such an important discovery, especially since we were seeing lots of Asian capacitors fail in so many types of equipment.



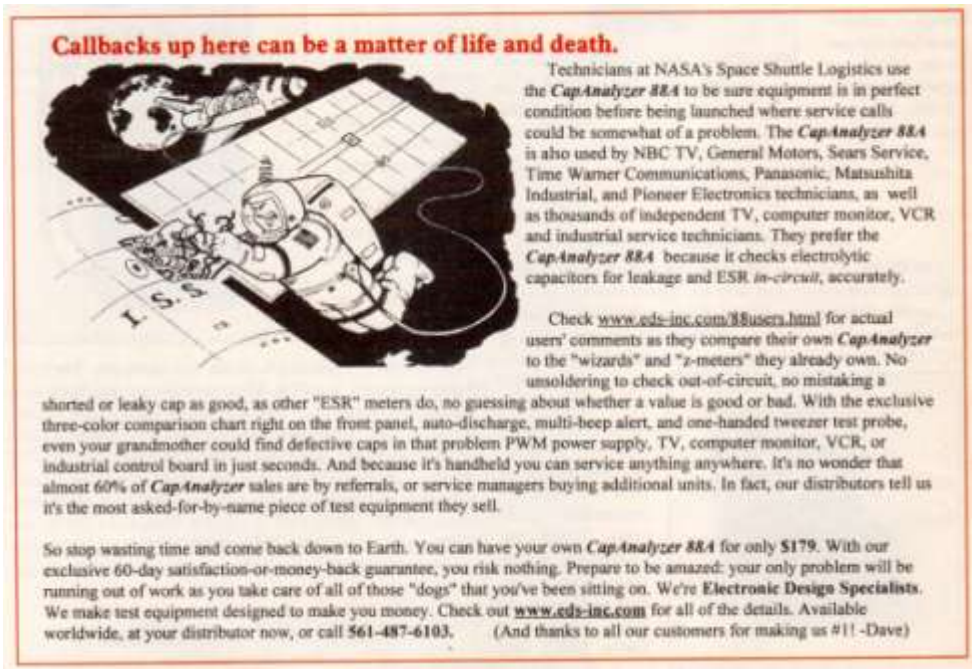
The original EDS-88 CapAnalyzer brochure was used for direct sales and was also handed out at the convention.

By the end of 1998, there was so much money coming in that production had been moved to an assembler in Hialeah as I couldn't build that many in my house. After treating the Boca house to a new porch and a new paver driveway, there was still more to spend, so I bought the car of my dreams, a 1997 Dinan Stage 3 BMW E-36 M3. The car had been featured in several auto magazines and was as close to a supercar as I could get without going to Porsche Turbo or Ferrari. I pulled the ProCar prototype I had used in the Lotus out of storage and installed it on my new toy.

The EDS-88 CapAnalyzer was improved five times in the space of two years, with a total circuit redesign in 2000 that replaced the two power-hungry LM3914 LED driver chips with one Microchip PIC16C710. This new low-power chip had a built-in analog to digital converter and I programmed it to light all 20 LEDs with this 18-pin chip using multiplexing. The design was much easier on batteries and more accurate. The new model number became EDS-88A series II. The circuit was so perfect in fact that there were no more changes and is still being sold deep into the 21st century by licensed manufacturers/distributors. Its success is so well known that many technicians now use the "CapAnalyzer" name to describe every capacitor tester out there, like Xerox is still used to describe a photocopy. Unfortunately, this success also brought several Asian clones to the marketplace. Buyer beware!

I thought of new ways of marketing and decided to add some humor to the magazine ads. One of my best and most talked-about ads was the "Bob Saved the World Today" ad. Technicians related with the ad because of the **MITSU** on the TV suggested Mitsubishi (a well-known offender with bad capacitors) and the "Super-Tech" nomenclature I invented with a troubleshooting article I had written years earlier in ES&T Magazine.

How ironic life can be. Recall that I wanted to work for NASA on the new Space Shuttle project when I graduated; you know how that didn't work out. So imagine my joy when NASA ordered CapAnalyzers for the Space Shuttle Logistics center in Florida. I had to celebrate this with my next ad.



I had added in-home computer servicing to my home service business in 1998 and finally dropped audio and video by 2001. Because I was doing service calls for the rich and wealthy Boca country club residents, my clients were realtors, business owners, CEOs, money managers, lawyers, doctors, singers, musicians and movie stars. I was sworn to secrecy on many service calls since many famous people didn't want me to talk to my friends on who I met and which country club they lived in. Let's just say that I enjoyed Airplane! I love the Pink Panther theme, even met the family of a fellow inventor who made billions

with his medical inventions and owns his own island up North. I found all these people to be friendly and not stuck up as you might expect.

Meeting these self-made millionaires and billionaires brought me much more than just money; now I was gaining knowledge. I learned how to trade in the stock market, how to use other people's money to leverage my purchases, and how to get paid for using credit cards instead of paying their interest. I had used their OPM knowledge in finances to become mortgage-free. Also, their beautiful homes gave me the inspiration to renovate. I had a background in construction from my father's side and was a third-generation mason. I knew electrical, woodworking, plumbing, drywall and framing, even HVAC. I needed a new house to be my canvas. And now I could afford it.

It was time for a bigger house anyway. I needed more room for a workshop and a shipping department. I had a dream: the dream I had back in 1963 when I visited my rich Woodmere Academy friend and saw how rich people lived in the Hamptons. I described the house I was looking for to my realtor and we started the search. It had to have a bonus room (not just another bedroom) for my own theater, it had to be on a lake, and it had to have a huge lot without the loss of privacy I had with the first Boca house that had neighbors on all sides. It took a couple of years to find it, but we did, and I moved into the big west Boca Estate in Loggers Run on Winding Lakes in the spring of 2001. Indeed, the house of my dreams, but even bigger!

The house needed lots of repairs having been built in 1982 with a huge upstairs playroom added in 1988, and everything was original with lots of roof leaks, electrical and plumbing issues, two faulty HVAC units, and there were CAT5 wires hanging through holes in the ceiling in every room. The two-car garage had been partitioned into two bedrooms for the out-of-work IT brothers that were living in the garage and had dropped network wires into every room. It took many years, but eventually over a 17-year time span I repaired everything and converted the upstairs playroom into a THX-Certified theater, built a custom kitchen making all the cabinets myself out of red oak from Lowes and Home Depot, updated all the bathrooms and bedrooms, built a Tuscan-inspired 1200-bottle climate-controlled wine cellar, restored the pool deck with hand-cut flagstone and replaced the pool plaster with 120,000 glass tiles. I even built a custom Sapele front door and grand entranceway with stained glass sidelights and transom. I devoted a portion of the EDS-Inc website to my renovation, woodworking and stained-glass projects at https://eds-inc.com/Dave/index.html .

I'll never forget where I was when I had just finished building the THX-certified Theater in the second floor playroom in 2001 and was working on the foyer. I was on the way to Lowes on September 11 early that morning to pick up some wood when I turned on the car stereo and was startled by what appeared to be some kind of "War of the Worlds" program on what had been my favorite classic rock radio station. It took a few minutes to realize this wasn't just a stupid radio program but that the USA was under a real attack. Besides being stunned like everyone else, it became scary when the stock market was closed for a week, and when it reopened, crashed to lows by early 2002. Everyone, like me, lost a fortune, and in my case, business stopped for about a year. Thankfully, we all pulled ahead as expected as Americans and by the end of 2002, our lives continued on. The market struggled back and business resumed.

I started getting engineering gigs again. The assembly shop in Pompano that I eventually moved CapAnalyzer board stuffing to, started sending me prospects. Small time entrepreneurs and small companies needed engineering assistance to make their own inventions or updated projects into a working prototype.

A company in Miami contracted me to design digital dashboard instruments for yachts. I developed a series of volt, amp and frequency meters that they put into production, and were still making as of 2018. How ironic, as the first EDS product twenty years earlier was supposed to be digital dashboards for cars. The company also contracted me to make a remote control system for the yacht owner to be able to turn on and off various lights and pumps via the telephone system, somewhat like the Tele-Controller system I developed for East Coast Mechanical in 1989. That was completed and shown at a trade show, and they had lots of interest. They RFQ'd me for production numbers, but decided not to go into production. At the next show a year later, a competitor had seen my prototype work and decided to make copies. So it just shows that you can bring a horse to water but you can't make them drink it. That was their loss, but at least I had the satisfaction of being the first one to build a working system, and got paid too.

Another client in 2003 was the laser comb company. This well-known South Florida company was having their laser combs made in the same Pompano plant that was making my CapAnalyzer and LeakSeeker boards, and the owner had seen a unique system in Europe that he wanted to emulate here in the US. It was a machine that looked like a women's hair dryer in a beauty salon, but instead, would have lots of 670 nanoMeter lasers inside the hood that would rotate back and forth to stimulate the scalp.

The prototype pcb was designed using Traxmaker 3.1 and fabricated on the LPKF CNC router.

I made the controller to run the lasers and motors, and added a timer and an ISD voice chip (as usual) with a sweet female voice counting down the time remaining every five minutes between music playing from an Ipod or walkman. It had safety features such as the hood lowering automatically to the correct height for the person, and immediately removing power to the lasers and raising the hood if the head was removed.

The demonstration of the system went perfectly, but after reviewing some patents, the hair comb owner decided not to chance making the machine in quantity.

One nice thing about this business is that I always got paid for a working prototype and data, and it was no skin off my nose if they didn't have the money, brains or willpower to go the distance. Still, it is a great feeling when a client actually does go into production, and to know that their success is proof of my abilities.

My next client specialized in making medical treatment devices, mostly with optics like lasers and UV lamps. Throughout the past two decades he has been a consistent client and we have made some amazing and ground-breaking systems. One I am quite proud of is a class-4 980 nM 12 watt laser treatment system we received FDA

acceptance on. Another is a blood sterilizer system using a multi-spectrum light system of UV lamps and high-power LED strips in a heat-controlled environment.

Blood sterilizer next to its daddy.

The quad hurricanes of 2004 and 2005 caused quite a lot of problems, and in particular, Hurricane Wilma created a month-long power, gas, telephone and cellular blackout and left me stranded in the house with no way for customers or distributors to reach me to place orders. Business suffered for years afterward as many people thought I had gone out of business. But I had a generator and was able to get gas from areas in east Boca with power, so I survived. I did change the way orders came in, especially from distributors. I dumped the fax machine and forced all distributors to use emails for their purchase orders, and all invoices were sent via email as well. In this way, I would be able to conduct business from a hotel room anywhere in the world and a laptop computer.

By this time the EDS-Inc website had been on line for ten years and was bringing in lots of engineering business. One client, Clay, came to me with a really far-out project he named “Commercial-Break”. He wanted a system that he could sell to sports bars that would bypass the network commercials and play local commercials in their place. We needed a way of making a system that would know when a network commercial was starting, some method of inserting a conventional NTSC video commercial, and a way to return to the football game without creating a riot if we screwed up. This turned out to be a far more complex project I thought it would have been. I discovered a circuit using a Panasonic sync-separator chip normally used in a commercial-bypassing VCR. I used a Microchip controller to switch inputs from the cable box to our video source, and programmed the microcontroller to look for times when video levels and audio levels from the Panasonic chip went to zero for a few milliseconds, indicating a commercial. Some more programming was added to return to the network source if we missed the end of the commercial to keep the rednecks from starting a riot if they didn’t get to see the touchdown. The video source would eventually be a cheap DVD player with its buttons interfaced with my Commercial-Break controller.

The controller indicated when audio and video both showed pauses via the A and V LEDs, and then processed the video and audio switching as determined by the microcontroller and as shown by the R LED.

Sales for Commercial Break were far apart and few and Clay wasn’t much of a salesman, spending most of his time drinking in bars and flirting with the bar maids. Finally, he decided to get serious, especially when cheap DVD players became available as our commercial source and reduced system complexity. So he hired an employee at one of the bars, a bar maid who had worked at lots of bars where the rich and famous would gather. She had lots of contacts with the owners of car dealerships, local businesspeople, politicians and other

bar owners as well. She was also very aggressive and took her job seriously. Sherry also had a head on her shoulders, as well as being pretty and had a nice figure to boot. I had been busy running multiple businesses and had never found the time or found anyone up to my standards for a relationship, but I fell head over heels for her. She was smart and independent and I tried to impress her with my business experience and talents to such a degree I mostly made a fool of myself. That she was ten years younger than me probably had something to do with her not taking me seriously. We went on a few excursions, not quite dates, and got to know each other more like friends than anything more. She understood my frustration; she was also looking for that special someone too.

One morning she came over to the Boca estate and sat in her usual bar stool in the kitchen. She opened her laptop and asked me to take a look. Instead of going over whatever sales and installations of Commercial Break we would do that day, she had the Yahoo Singles website open. While she knew I was looking over her shoulder, she showed me her personal information and the type of person she was looking for.

“No, no, not this one, you’ve got to be kidding, ouch, this one’s got issues, hmm, maybe this one?” she mumbled loud enough for me to hear while she spent most of her time clicking delete on all the emails from the guys that turned her off. Which was about fifty out of fifty-one.
“Dave, I wanted to show you something you didn’t think of. I know you aren’t a bar person and I’ve found this Internet dating a great way to meet people. Just be careful, everyone lies and the pictures are usually bogus. Just wanted to show you, maybe you should consider it.”

I *did* consider it. It had been a long time since I had any kind of relationship. I was really disappointed that Sherry wasn’t interested in me, but I took her advice and put my own personality out there with current photographs and total honesty about my life and what I was looking for. Apparently I was almost the only one who was being honest, as I responded to, and was responded to by lots of strange and desperate people. I also started accounts in several other singles website; some were awful like Match, which only had Russian women looking for a way into the states (despite my settings that said 50 miles only). Some sites were great with emails that worked and settings that were honored, like American Singles.

I landed up becoming *quite* experienced. So many fish in the sea! I met a lot of women, a few that I dated more than once. Some were terrible dates and some were great. Some even made it to third base. Some were just weird and one in particular was the type that you never forget. (Anna Bella from Miami, I’ll never forget you).

After a few months, I met and dated one woman who, amazingly, was as honest with her photos and personals as I was. I was very impressed. We would talk about our adventures with the opposite sex for hours. Eventually, we became much more than best friends and became a couple. Our relationship was strange for the times: Joy and I both had big houses, were both very independent, both intellectuals and both working professionals in our fields. We loved our big homes and didn’t want to lose either one. So each night we would alternate from her place to my place, and continued to do this until 2018!

It did confuse some people at times. One time we were returning from the Caribbean with booze. Joy knew about my wine cellar and my particular fondness for Jamaican rum. So we had bought a few bottles to bring

back, but there was a limit to how much you could bring back tax free per household. So Joy had half of my purchase and I had the other half. Going through customs, it was impossible for the agent to understand that we lived together as a couple but lived in our two different houses at alternate nights. He didn't know how to process the "household" limitation, so in distress he just threw up his hands and let us go through tax-free with all of our bottles.

My HVAC experience turned up a client in 2006 and I was contracted by Green People to design a system of wireless thermostats that communicated with a master thermostat via radio control. Each room in a typical house had a vent that was motorized and communicated with the thermostat in that room. The idea was a multi-room, multi-zone system using only one HVAC system and no dampers, making a retrofit easy for any home. Everything was going perfectly, until the 2008/2009 "Great Recession" saw all the backers run for cover. The product and company both died. Since then, it has been copied by others.

One of the principals of Green People was Stu, who had connections with many of the large HVAC companies like Trane, and for years, he would dream up some type of accessory or efficiency-increasing system, patent the product and then have me make prototypes to show these companies. There were emergency backup generator-and-heat projects to keep pipes from freezing during a blackout for the northern customers, effluent pump systems for clogged pipes for the southern customers, efficiency improvement systems for solar power, and so on. I used Microchip microcontrollers for all his projects. One became an offshoot from Trane; Plexaire became the branch that made, sold and installed the water overflow effluent pump systems.

One of my Indian contacts, RFInnovations, had been sending me business for years; Basant owned an assembly plant in Coral Springs. One project came to mind because of its complexity and forced me to go deep into learning something new. Boca Raton is a town of gated communities, and he wanted a design for a remote gate control company. My job was to design a system where every homeowner had a remote that was encoded to them. The gate receiver could be programmed to open the gate and show the owner's house number, or programmed to show a "refused" signal and not open the gate if they moved or lost the remote. It integrated with Basant's RF receiver and usually opened a DC Solutions motorized gate. I experimented with encoders and decoders and finally decided not to use any of them. Instead, I developed my own NRZ Modified Manchester adjustable-rate serial coding system that allowed me to use inexpensive microcontrollers with built-in oscillators that weren't crystal-controlled. That also eliminated the need for specialized encoder/decoder chips like the Holtek chips I had used on the EMS-911 project. I have been using my proprietary serial coding protocol in all of my remote-control projects since then.

2011 brought on a unique client, Intellivoice. Justin Bieber was singing "Baby" ad nauseam at the time, and the client had the idea of selling T-shirts with miniature water-proof credit-card sized music players that would mount to the T-shirt. Besides selling the shirts to Justin's young fans, there were sound bites for religious, racial, movie scenes, nursery rimes and so on. My job was to make the thinnest, smallest programmable music player that was waterproof and could be mounted with a Velcro strip to a T-shirt. By now, my favorite ISD voice chip company had been bought and sold several times, now calling itself Nuvoton. I used their chip and programmer and made a bunch of surface-mount prototypes (stuffed by my assembler in Pompano) and presented them to

the client. I still have a couple in my collection, but never heard from the client again. He probably ran out of money, especially when he saw how much it would cost for all those Ascap licensing fees!

Another project came in from RFInnovations. Captured Discipline had one of the most unusual products I've ever seen. Tom was buying cheap digital safes from Amazon and replacing the control board for the digital combination, with a custom board that converted it into a *time* safe. The idea was to put your cigarettes or liquor bottle in it and set it for longer and longer times to break bad habits. His supplier couldn't get his circuit to the client dependably and getting in contact with the supplier was impossible. The client had customers and was in a bind to get product shipped ASAP.

I designed a pcb to fit perfectly where the original was mounted, sourced compatible connectors so it would be a simple un-plug old, plug in new board, and programmed the usual Microchip controller to allow times from 1 minute to three years (!) in one minute bits. Because the cheap safe didn't have a readout and only five buttons, programming was intense. I had to devise a way for five buttons to emulate ten, and an audible and visual way for the board to communicate with the user via the two-color LED and piezo beeper mounted on the unit. I had programmed features in so that at any time, the user could press one button and the circuit would beep the number of times and flash the LED to indicate exactly in days, minutes and hours when he could have another smoke, along with the battery condition. Everything came out in an elegant, easy-to-use system that even checked the battery before locking the safe. Tom sold many units.

In 2012, I was having so many problems trying to source parts for the EDS-82B LeakSeeker that I decided to discontinue the product. But I hadn't anticipated how much hate mail I would get from disappointed customers. So I decided to come out with EDS-89, a modern version of the LeakSeeker that would be smaller and portable, and finally use a Microchip microcontroller so that it would be even easier to use than the EDS-82B.

I used a 16-bit precision digital to analog converter to double the range from the EDS-82B. Now it could locate leaky components from zero to 300 ohms! This was what everyone wanted and sales were intense right away, with most customers in Europe and even further. I even had customers from Japan, Poland, the Middle East and Africa. But the mad rush was short-lived; by 2014, sales of both CapAnalyzer and the new LeakSeeker had been reduced to such small amounts per month that I couldn't see having to make another batch of 400 units, or even only 100 units, since I would be sitting on stock for a long time. So I announced that EDS was closing the test equipment manufacturing division, but parts and even kits would be available. This would allow me to at least reduce the large amount of components taking up room in my store room.

The next major project was so complex I originally turned it down several years earlier. It was just way too complex and probably why no one else had made anything like it. The computer service at home business had died after Microsoft bombed out with Windows 8 and everyone went out and bought Apple I-Pads instead. The test-equipment manufacturing had ended in 2014 and I was getting bored and worried.

Preston was more than a client. He was the boyfriend of Joy's daughter, Kara. So since he was "family" I finally gave in and decided to challenge myself again. We made the deal that I would do all the engineering and make the working prototype, if he paid for production and marketing. We would share the profits 50-50.

Preston was in the cellular phone business, working for a major company with thousands of locations, and he was flying around the country training people to fix cellphones. His major gripe was getting quality replacement batteries for rebuilding phones and some way of testing them. I had turned him down originally because of the millions of types of batteries with all types of connectors and different specifications. Not only would I have to design a foolproof battery charging/analyzing system that was safe and 100% accurate on tests, but I had to devise a mechanical way to be able to connect to any type of battery, no matter how the connectors are done on the battery. This would not only challenge my electronics and coding abilities, but also my mechanical ones.

I worked on the project for nearly half a year. I figured out a way to make a platform for the battery that would measure temperature and have connectors on a 2-axis elevator with gold spring-loaded pogos to be able to contact any type of battery. It even had an adjustable battery lockdown. I decided to add to his original idea and make Intelli-Cell work with *any* type of battery, not just Lithium Ion. When I got done with the three months of 8-hour days doing the coding and debugging, I had written almost ten thousand lines of assembly code, including double-precision 16-bit unsigned math subroutines for the PIC16F74 microcontroller. Everything was state-of-the-art surface mounted components. It was demonstrated in September 2015 to Preston and his partners. The videos are on u-tube with links on the eds-inc site https://eds-inc.com/ICU112.html .

Everyone loved the unit and its unique features, especially the mechanical elevator and moving contact system that allowed any battery to be hooked up, and the external adapter cable for the custom Apple I-Phone adapter and cables for larger, remote batteries and optional battery holders.

So the project was put into phase two, which would be a small pre-production run of only ten units, dubbed ICU112, which stood for Intell-Cell Unit, 1 battery 12V maximum. (Other models for up to two batteries up to 24 volts would therefore be called ICU224, and so on). In anticipation of making the next batch of ten pre-production units, I ordered ten blank pc boards from my Chinese fabricator, and built one unit by hand, making notes establishing procedures that would be used in mass production. I placed all of the parts on the pc board

by hand and soldered in my home-made reflow oven made from parts from two toaster ovens and a PID temperature controller.

Preston decided to go ahead with a pre-production batch of the remaining nine boards. These units he would distribute to some of his stores for technicians to evaluate. I had my usual Pompano assembly company run off the nine state-of-the-art surface-mount stuffed boards.

Preston and his partners joined me in my garage to build out the nine pre-production ICU112 units. I am rear right with Preston looking on.

After the New Year started in 2016, with the nine black ICU112 demo units made, Preston (assumedly) sent them out to his choice of nine distributors and cellular repair stores. From here the facts become somewhat murky... Preston apparently lost his job with the company he was with, probably because his employer didn't appreciate Preston doing the Intelli-Cell project on his own, and the company possibly saw it as a conflict of interests...either way, Preston lost his contacts. Things got worse for him; he lost his long-time girlfriend Kara, and started using drugs. His partners apparently also lost contact with him as they weren't around to help him possibly get to rehab. Preston's spiral downward sadly ended on July 20, 2016, when he was murdered by four people who lured him into the Withlacoochee State Forest with promises of drugs and sex, where he was beaten to death so savagely that he was unrecognizable. His killers were eventually found and convicted of first-degree murder.
https://www.tampabay.com/news/publicsafety/two-sentenced-to-life-after-luring-man-through-dating-app-to-his-death-in-hernando-woods-20190523/
Where those nine black anodized pre-production units were ever sent to, and who has them now is, and probably will remain a mystery forever... Shame, because I have firmware updates ready for them!

In 2015 a partially disabled client from Peru came to me. Meyer had Polio as a child, a disease stopped in the USA but still around there, and he had invented a tiny electric tricycle made of aluminum that could be folded up and placed under an airline seat, or carried easily as it was super-light. It held 500 pounds and would fit between the narrow doors on a cruise ship and could be stored flat under the bed. But he needed a Lithium battery and charging system that would be safe and a controller to be able to vary the style of use. I devised a

controller that featured a three-position selector switch for normal, sport and energy-saver. The charger and battery balancer circuits would control the power and make safe the Lithium Ion batteries. When I built the grand entranceway of my big Boca estate I intentionally made the cut flagstone front area slope of the house so Meyer could ride his “AtomTrike” right into the house. The work I started for the Lithium-ion battery monitoring system (BMS) turned out to be a great starting point, as now I use the same basic configuration for all of my Li-Ion projects. It has made me that much more of an expert in the field.

Next I was treated to working with a doctor who was working with disabled people. Thus my robotics and bionics learning began. I had to update the workshop to be able to cut and bend aluminum into braces to fit over knees, arms, jaws, ankles and so on. I developed systems using resistive touch sensors and potentiometers to be able to sense the position of a joint and the pressure of a disabled person trying to move a limb. This work was quite different and very satisfying, as I was directly helping disabled people.

Meanwhile, Joy and I had been playing ping-pong with our houses, taking turns on who’s house we would stay in that night. Joy had retired from a long medical career and she no longer had any family locally, so she was free to relocate. We decided that after twelve years of house ping-pong and the change in the quality of the people in Boca, that it was time to get out and buy a place together somewhere nicer.

The work I had started for Meyer was my introduction to the care and feeding of Lithium batteries, both the polymer and ion variety. That was when I developed my first balancer, charger and safety circuits. In 2017 I was starting to work with more projects using Lithium-ion batteries, and I also needed a way to test under load power sources like Chinese wall-warts, which seem to have an issue going bad after a short time. I am sure many people have thrown away perfectly good electronics that were only malfunctioning because their AC adapters were actually at fault. The capacitors dry out. It had become such an issue for me that I knew I needed something that could give me accurate readings of power supplies and batteries under load. Here, I was lucky to have some spare old Intelli-Cell boards from the original prototype. Intelli-Cell already had a battery load system used to calculate the amp/hours and quality of a battery. So I decided to hack up a prototype Intelli-Cell board and rewrite the software for this specialized function. The Adjustable Dynamic Load Test System used a state of the art super power silicon carbide wide gap mosfet that could handle an 800 amp load of 500 watts and 500 volts. It used the Intelli-Cell circuitry for the control and LCD display, and added an op-amp circuit board to allow the Si-C mosfet to be biased at start and stop voltages that match the Si-C mosfet to the Intelli-Cell circuitry. Adding a 25 amp full-wave bridge on the input allowed AC loads to be tested as well, so the secondary of a power transformer could be loaded down while the LCD displayed dynamically the voltage, current, and calculated the wattage and dynamic resistance of the source. I used the very last of my ancient Radio Shack cases to match the EDS-52A, EDS-59B, EDS-64, EDS-72 and the IsoVariac.

Joy and I decided that maybe it was time to move out of Florida altogether. We were both tired of the hurricanes and the increasingly number of rude people. Since I had several memberships in wine clubs and we flew to California every year to sample the wines in Napa and Sonoma counties, and Joy's son Greg was a lawyer in San Francisco, Joy and I discussed moving to Santa Rosa. We made several trips there, saw at least a hundred houses and marveled at how expensive everything was there. But selling both of our houses might be enough for a nice house in the hills. Our search started in the spring and went to the fall making several flights back and forth.

We finally decided on a nice 1980's house in the Fountaingrove area, on a hill with a three-car garage and a nice yard overlooking the valley. That weekend we flew back to Boca to discuss the house and how to finance it and how much work it would need to make it ours. Late that Sunday night at around one AM, we agreed to buy it and make our offer that Monday morning.

We awoke early in the morning to the news that Santa Rosa had caught fire that Sunday night at around ten PM and was having the worst fire in its history. All of the Fountaingrove area was on fire. Within a few hours almost all the houses we had looked at had burned to the ground.

Joy and I aren't necessarily very religious, but both of us took it as a sign. The timing between our decision to buy and when the fires started was nearly simultaneous, within minutes!

So I reminded Joy that we visited Florida's west coast every year, as we liked the mild and warm beaches in comparison to the cold and turbulent Atlantic Ocean on the East coast. I had business acquaintances in the Tampa area that did my optics for ALD lasers. Tampa was nicer than Boca with huge oak trees everywhere and less traffic lights, and the people were nicer, older and lower key. Perhaps Craig could suggest an area?

Indeed he could. We needed a big house, preferably with a four-car garage to house our three cars and a workshop for me. Also needed was a room for the theater and a place to build a wine cellar, two guestrooms for Joy's kids, a bedroom for my lab, and hopefully even a lake for me. Craig said the only place that fit all of our wants was the Keystone area of Odessa. We looked for several months, until we found a nice 6000 square foot three-story French Chateau on three acres with a mahogany elevator and a five-car garage. The house was beautiful; it had a long driveway past a security gate with a telephone and looked everything like the mansion in the movie *Scarface.* But the house had very few internal pictures and was being offered by a bank, so we assumed someone couldn't afford the payments and stuck the bank with the foreclosure. After looking over the place, and not finding anything visible that needed any major work, just minor things like burnt bulbs, bad faders and non-working HVAC units, we made an offer and the bank accepted.

What happened next would test all I had learned from my construction background and legal lessons I had learned from my experience as a businessman. Because the house was built in 2007, I knew that the quality of the construction materials were questionable. The builder had a solid and well-known reputation, but he was still at the mercy of his subcontractors. Was the plumbing copper or just cheap pex? Was the drywall domestic, or Chinese drywall that had contaminated so many Boca and New Orleans houses after the quad hurricanes of 2004 and 2005? Only an inspection would answer that. I had planned on doing the inspection myself, but Joy

and I were in San Francisco at the time for our Hawaiian cruise when the bank approved us, and only gave us seven days to inspect and sign. So I called a building inspector our real estate agent had recommended. I specifically told him to check the plumbing and drywall to be sure the house had copper plumbing and didn't have Chinese drywall. Both easily checked, especially the drywall. All anyone needed to do was look at any copper in the house. Any switchplate could be simply unscrewed and a quick look at the copper wiring would be all that was needed. Was it copper, or corroded with sulfur dioxide and sulfuric acid fumes? It would be black as soot.

Long story short, the "inspector", Dave Marvel, wasn't even licensed and never showed up to inspect the house. Instead, he had hired a licensed inspector and never bothered mentioned anything about my concerns. There were also inspectors allegedly hired to check for termites and to check the elevator and pool system. He made a standard report copied from the obviously incompetent licensed inspector that didn't mention either of the things that I personally asked him to check. Only the elevator inspection was legitimate. The pool inspection and termite inspections were paid for but also never done. When I talked to him the night before our departure to Hawaii, I specifically asked him about the plumbing and the drywall. He pretended that *he* had been there and said everything looked normal.
"But Dave, I asked you specifically what *type* of plumbing the house had and what the wires behind the switchplate looked like. Was it copper wire or was it covered in black sulfur?"
He answered, "I couldn't tell about the plumbing, and the wires looked OK".
So although I couldn't get him to answer the two questions, at least he seemed to be on the level about "things looking OK". Joy and I spent two weeks on our cruise and came back mid-December 2017 to close.

The house was vacant and had a faint garbage smell that we had noticed originally and decided that there was some garbage somewhere that we didn't see. After we did our walk through and closed with the bank on Friday, we planned to stay that weekend and take inventory of what the house needed and get everything on Saturday from Home Depot. I knew that there were a lot of dead pot lamps, faders didn't work and electric outlets on the second floor that had a missing neutral. And four of the five HVAC systems weren't working. Neither was the built-in microwave oven in the kitchen. We had noticed this on our walkthrough and these were mentioned on the inspectors report as well, and our offer was made with these repairs in mind. Nothing else was mentioned or any major problems declared, as required by Florida law.

Saturday we bought over $1000 of potlamp bulbs, a dozen faders, gardening stuff for Joy to get started on and pool chemicals. I figured on starting with the bulbs first so we could work into the night and sleep in the media room.

What happened next was like a slow-motion sweaty bad dream that you try desperately to wake up from but can't.

I removed the first switchplate to replace the fader…..and I felt my whole life flash in front of my eyes. Joy and I had bought the house cash. Banks don't give mortgages to retirees. In essence, we were house-poor. And now I was looking at soot black wiring indicating sulfur dioxide and sulfuric acid was in the air. Panicking, I removed plate after plate in every room downstairs, only to find the same sooty wiring. Then I realized why four of the

five HVAC units weren't working; taking a cover off of one of the downstairs unit, all the copper coils were sooty black and perforated with micro holes. The sulfuric acid had destroyed the copper and all the refrigerant had leaked out. The entire house had been built with defective and dangerous Chinese drywall! The garbage small was the sulfuric acid from the decaying drywall. I'll never forget that small for as long as I live.

How to tell Joy? I had convinced her to come to Tampa and buy this house, assuring her that all of my concerns would be taken care of by the inspector. Now we were screwed out of all of our money, were now going to be broke. The bank had sold the house "as-is" and none of the realtors had disclosed anything major wrong with the house, as required by Florida law.

I waited about an hour staring at the last outlet, gathering up the courage to tell Joy we had lost everything. Joy was in tears for hours and I felt like I had let her down. I could deal with issues, I had made and lost fortunes in the past and could treat this as a learning experience. But I couldn't deal with all this misery involving Joy.

After a few hours of crying, Joy calmed down and tried to keep herself busy bringing out the weeds she had pulled. It was a long driveway so I helped her. Halfway down the long driveway we saw our neighbor in his yard. I decided to introduce us as his new neighbors and maybe get more info on the house or its previous owner.

"Hi neighbor! My name is Dave and this is Joy. How are you doing?"
First words out of his mouth. Didn't even give us his name yet.
"Did you buy that Chinese drywall house?"

Joy started crying again, and I was floored. Did everyone in Keystone know about this house but us?
So he explained that the previous owner had the house custom made and was a very wealthy dentist and had moved into another mansion just a block away. He had tried for years to get out of his mortgage after an air conditioner technician had given him the bad news that his units were being destroyed by the Chinese drywall. Now the clues were starting to make sense. The owner hadn't defaulted on the house financially or he wouldn't have been able to buy another mansion down the street with a bad credit report from the bank. There had to be a conspiracy between the owner and the bank, and collusion between the bank, the realtor and the owner to sell the house without disclosing. So now I put my efforts into paralegal research to gather evidence for discovery and to surprise the bank with what I found. I would destroy them in court just as I had with the Colombians!

Joy and I did days of research on our laptops and she located the original Dentist while I located attorneys suing the Chinese drywall companies. I had a plan that had worked when I sued a stock trader twenty years earlier that had lost some of my money. My mentor was a district attorney for California that had taught me many secrets. One secret is to threaten to sue an innocent employee in the company that screwed you and suggest that if they answered questions that any lawsuit against them would be dropped. Problem was, every attorney I contacted told me that they wouldn't take the case.
"Mr. Miga, you signed a contract with a major bank that the house was sold as-is. I've never been able to win such a case. Sorry I can't help you".

This was the reaction from every attorney I called. But I wasn't deterred. I had won every case against every landlord, every stock broker, and every homeowner association that had tried to screw me. And I had won every time using my own strategies and the knowledge gained by research. Watching ***Law and Order*** on TV every week helped too.

The trick I had used in the past to threaten to sue an employee in the conspiracy worked like a charm.
"Hello. This is Dave with the attorney's office. I am making a pre-litigation courtesy call to talk to Doctor _ before we start litigation. I hope that with his cooperation we can leave him out of the lawsuit."
That worked. Dr _ was with a patient but this was *way* more important. He hated the bank for not letting him out of the mortgage and putting his family's health in jeopardy. He would help me in any way he could. So I started my tape recorder after getting his permission and recorded his statement which blasted the bank and confirmed that they knew that the house was contaminated and uninhabitable. I thanked him. My next call was to the bank's realtor. I used the same strategy.
"I'll leave you out of this multi-million-dollar lawsuit if you give me the full name and personal phone number of the person in the bank who told you to sell this tear-down of a house without disclosing, as required by Florida law."

He sang like a canary in heat. By the time he was finished, I had the name, phone numbers, number of children and the kind of car the executive vice president of the bank had. I called her on the phone that afternoon. I caught her in her car going home. She realized that she had been found out and started getting hysterical. I let her know that besides losing her high-paying job, that she would be prosecuted for conspiracy to defraud senior citizens, a Federal offense. She was clearly in panic mode and was shrieking on the phone that the house was sold as-is and I would never get a penny. I was quite upset after that unexpected response and all my next calls were to the Florida State Attorney's office and several newspapers and the local TV stations. I almost feel sorry for all the commotion I caused for her and the bank when it wasn't even twelve hours later when the phone rang.

"Hello?"
"Hello, this is the attorney's office for ___ bank. Are you David Miga?"
"Yes. Can I help you?"
"Yes. There seems to have been a major misunderstanding on the sale of the house on Roberts road. Do you have a minute?"
"Sure. What do you have in mind?"
"Well, it appears that the house was not supposed to have been sold, and we would like to offer you all your money back, plus any expenses you had. Is that OK?"
"Yes. But I did have to hire a lawyer, so you will need to pay their expenses as well. Is that OK?"
"Yes, of course, we want to do right in this situation. Send me a list of your expenses"

Well, Joy and I had spent hours doing research, and we had the Home Depot bill as well, so I sent the bank's attorney a bill for $16,000 for the hours spent by Joy and myself, charging at conventional paralegal hourly rates. Plus all the Home Depot stuff. And gas and transportation costs. And I did have to hire a Miami lawyer to

negotiate the agreement, which was another $8000 above the $16,000 that Joy and I were to receive on top of our settlement. We received our money and continued the house search.

Never deterred, and really loving the Keystone area, Joy and I were determined to find the perfect house. Just a couple of miles southeast from the “China Syndrome” house we found a wonderful 5000 square foot ranch on three acres with a picture book pond. Joy fell in love immediately. I wasn’t convinced and needed more information.

The house was only 20 years old, built by the same builder as Chinatown but before the quad hurricanes. I looked over the quality of the construction: it had copper plumbing, domestic drywall, an electrical system featuring 400 amp service and 12 gauge copper wiring to every fixture. It seemed too good to be true at the price.

Then came the required disclosure….

The realtor did her job. The house was being sold for less than it cost to build 20 years earlier because the owner suspected that it might be on a sinkhole! No one would buy the house and she was desperate to sell since she was divorced and all the kids gone to college. 5000 square feet was too big for one person and the house needed some tlc. I had noticed that the roof had some leaks. Doing more research, I discovered that she had seen cracks form in the tiles and spread apart areas of the engineered wood planks. She had convinced the insurance company to pay for and install 60 pilings around the entire perimeter. The engineering report suggested that the construction of the house, built up high on a bed of fill to avoid Tampa’s floods, was the cause of the cracks in the tiles. But because there was no way to absolutely say if there was or wasn’t a sinkhole the insurance company played it legally safe and paid for the unnecessary pilings.

Did I mention that I had a construction background? I brought my 12-foot level I used to build the islands in the kitchens I built for Joy and myself. I measured every area of the house; it was even more level than my Boca estate, which did have foundation issues that I spotted when I inspected it in 2000. I had incorporated that into my bid then and had helical pilings installed after hurricane Francis in 2005. Seeing nothing wrong with this house, I decided to talk to the engineer who had reported to the insurance company. After talking to him engineer to engineer and letting him know this was just for my edfication since I was to buy the house, he leveled with me.

“Dave, there is nothing wrong with that house, other than the way it was constructed. The owner wanted it high in the air to keep it dry when Tampa floods, and the sand and fill they chose allowed for some compaction. On top of that, it is a single 5000 square foot slab with no relief joints so you know what that means.”
I did. A slab is a somewhat self-leveling combination of sand, cement and water. Key word here is water. As the slab dries, which actually takes several years, it forms cracks. That’s why big stores like Home Depot have reliefs every ten feet or so in their concrete floors. But homebuilders take shortcuts leaving cracks to be dealt with by the floor installers, who in this case didn’t install the floors correctly. Instead of installing a motion barrier like a ditra membrane, they had glued the wood, and thinset the tile directly to the cement! Ignorant!

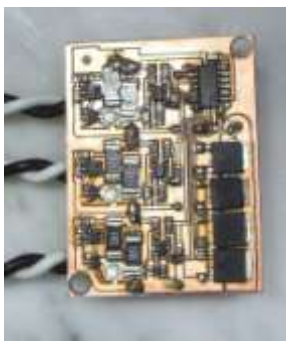
So we got our dream home, cracks and all. The house needed a new roof which I had done, and I installed my lab and workshop and Joy and I moved in the spring of 2018. Our old houses sold shortly after. Welcome to lovely Keystone!

By 2018, my only client was ALD, the medical client I've had for two decades. I designed a state-of-the-art digital replacement for the original FDA-approved class-4 laser treatment system I had designed back in 2007. It was so efficient, using a thermo-electric Peltier cooling module and digital power supply, that it only weighed a pound and maintained the laser diode temperature within a degree at 16 watts optical power. All FDA protocols were employed and ready for approval.

In 2020, during the pandemic, I designed and built a portable laser treatment unit using four Samsung high-discharge 80186 Lithium Ion cells in a small case that can be worn on a belt. It featured interchangeable 12-watt 808 nM or 980 nM laser diode F-mount wands and had a treatment time of several hours. It could be charged from any 5V cellphone charger or quickly from the 2.1mm jack and optional high power adapter.

Now that all the components that I use in my designs are mostly made in Asia, It can make building a product challenging. Chinese electronic components are either impossibly inexpensive and work, or impossibly inexpensive and *don't* work. Quality control and integrity are always suspicious. When I tried to use a popular 3S Li-Ion balancer/protector board, I discovered that it used the correct chips, but the wrong values of resistors. Worse, the balancer was on the wrong side of the protector so after only one battery was charged, the protector turned off the connection to the entire battery pack so the balancer was out of circuit. Ignorant!

So I desoldered the balancer and protector chips and mosfets from the Chinese board and designed a replacement circuit that balances the 3S batteries, indicates each one as charged by a super bright CREE green LED, and monitors all three and protects the pack for shorts or discharges of any single battery, via three comparators and a gate. It is smaller than the original



and can handle twice the current with 50% less voltage drop from the battery pack than the original. All while using the same semiconductors! It's all about design. Think it through and test, test, test! I hope our young American engineers are better than theirs.
Us old-timers won't be around forever, you know.

Another product I designed for ALD is a portable high-output portable photonic treatment unit that can power LED pads or handheld treatment devices designed to stimulate blood flow, repair collagen and skin damage, disinfect and other functions depending on the protocol and treatment device plugged into the USB port. It runs on four Lithium-polymer batteries and puts out 30 watts of adjustable power. It uses my own design balancer/protector system.

Here the portable MultiLumen uses a flexpad of high-power 670nM LEDs to stimulate blood flow.

I hacked one board from production and turned it into a portable 30 watt adjustable power supply. Output starts at 5V through the USB port to charge your phone, or through the 2.1mm DC jack where voltages can be set from 3.3 to 12.0 volts. It includes a cheap digital DVM. It is great for testing or running portable devices in the field or during power blackouts. It also charges from the same 2.1mm jack from an ordinary 19V notebook charger.

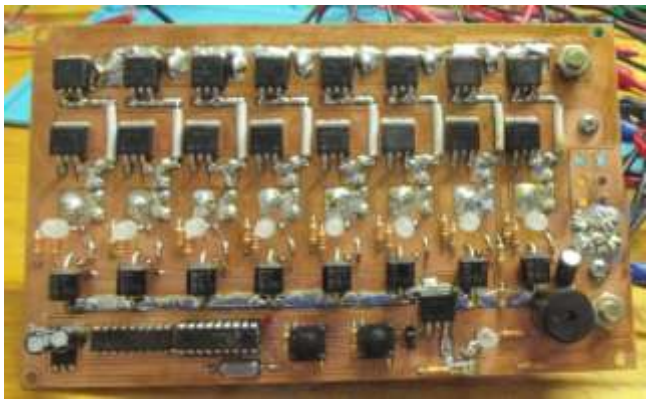
Lots of portable power packs from China seem to have copied my idea of charging your cellphone this way. But *none* of them are adjustable in voltages.

To develop the charging and battery-balance circuits for all the various portable projects I've had to do recently, I had to develop a new piece of test equipment. This circuit simulates a lithium-ion battery pack, providing a source and load by varying its impedance and allows both positive and negative flow. It can be set to simulate any number of batteries of any voltage or current. It is shown on the picture of my bench, lower shelf right side.

A hobby of mine is going to auctions. Sometimes I get a new power tool for my woodworking, sometimes decorations for the house. But sometimes it is for computer equipment and even test equipment. Recently I acquired and repaired a bunch of HP test equipment from the 1970s and 1980s. One that gets lots of use is my most recent acquisition, my prized HP6623A, which has three independent four-quadrant power supplies; perfect for simulating three Li-Ion cells in a balancer circuit!

Here is a picture of my current test bench with some of my own test equipment and my HP acquisitions.

Now in 2021, at the time of this writing, I am still inventing. A battery farm controller using a Microchip PIC16F716 maintains up to 8 AGM/SLA batteries, used in my numerous UPS units around the house. It keeps them charged and individually tests each one under ten-amp load once a day. A DVM and warning piezo alerts me to weak batteries. All batteries are isolated from each other, but outputs are channeled through Schottky diodes so the power of all eight can be used to run and inverter during power outages. After all, I live in Florida…



CONCLUSION

I have passed the baton of making CapAnalyzers and LeakSeekers and selling kits to a small manufacturer in California, so the dream remains alive for those who still repair electronics and want my two most famous and unique test solutions for their own. I have promised an endowment to the electronic engineering college close to my new hometown, University of South Florida in Tampa. So the next electronic engineer wannabes will have more of a head start than I was ever given. No discrimination or talk about color or race as was the norm for the dark times when I had to do everything for myself with no help from anyone, let alone the US Government which only wanted me to die in Viet Nam. As long as you are born in the USA and have your citizenship, you are welcome. But don't waste my money if you don't have the talent, dream or determination; you will be responsible for paying back *every* dollar if you don't make it to graduation. No one ever got rich being *only* an electronic engineer, it has always been for the intellectual gratification of creating the technology that everyone needs and uses and can't do without. We engineers are rarely ever given public credit for our achievements. Some of us who made it big did so by creating our own companies and becoming leaders in our fields and teaching others. I believe it is long due that American citizens stop depending on having to be spoon-fed like little babies expecting freebies while depending on every country around them for electronics and technology, computers, clothing, even food…when does it end? I believe we need to be as self-sufficient as other countries, and stop spending all our taxes on invading other countries and instead put those trillions into improving the standard of life in the USA so that US citizens have the same advantages and access to education and health care that almost every other country has. I am doing my part in the electronic engineering section and I invite everyone else in their fields to do the same. Perhaps, long after I am gone, America will again be able to stand alone and without crutches from so many other countries.

Oh, and Go Bulls!

David Theodore Miga, CET
Founder and President
Electronic Design Specialists, Inc.

Links to all of Dave's construction and technical articles and product reviews, evaluations & features:

Radio Electronics Magazine construction article: Build the EDS-76 MicroAnalyzer
https://worldradiohistory.com/Archive-Radio-Electronics/90s/1991/Radio-Electronics-1991-09.pdf
page 47

Appliance Tech-Talk Magazine article: Understanding Microwave Ovens using the MicroAnalyzer 76
https://eds-inc.com/ATT%20Understanding%20Microwave%20Ovens.pdf

ES&T Magazine article: Servicing Microwaves Ovens featuring the EDS-76 MicroAnalyzer
https://eds-inc.com/ES&T%20servicing%20microwaves%20EDS-76.pdf
Radio Electronics Magazine ProCar part 1

https://worldradiohistory.com/Archive-Radio-Electronics/90s/1995/EN-1995-02.pdf
page 35
Radio Electronics Magazine ProCar part 2
https://worldradiohistory.com/Archive-Radio-Electronics/90s/1995/EN-1995-03.pdf
page 85
Radio Electronics Magazine ProCar part 3
https://worldradiohistory.com/Archive-Radio-Electronics/90s/1995/EN-1995-05.pdf
page 71
Radio Electronics Magazine ProCar part 4
https://worldradiohistory.com/Archive-Radio-Electronics/90s/1995/EN-1995-06.pdf
page 87

Modern Electronics Magazine construction article: EDS-59 SemiAnalyzer part 1
https://worldradiohistory.com/Archive-Modern-Electronics/Modern-Electronics-1988-04.pdf
page 34
Modern Electronics Magazine construction article: EDS-59 SemiAnalyzer part 2
https://worldradiohistory.com/Archive-Modern-Electronics/Modern-Electronics-1988-05.pdf
page 54
ES&T Magazine Evaluation of the EDS-59C SemiAnalyzer
https://eds-inc.com/ES&T%20eval%20EDS-59C.pdf

ES&T Magazine Evaluation of the CapAnalyzer 88A and LeakSeeker 82A
https://eds-inc.com/ES&T%20eval%2088a,82a.pdf

Slot Tech Magazine: Feature article: Locating Shorts with the EDS-82A LeakSeeker
https://eds-inc.com/Slot%20Tech-Locating%20shorts.pdf

Slot Tech Magazine: Feature article: Meet the LeakSeeker EDS-89
https://eds-inc.com/Slot%20Tech-EDS-89%20feature.pdf

Radio Electronics Magazine construction article: build the EDS-69 TeleTester
https://worldradiohistory.com/Archive-Modern-Electronics/Modern-Electronics-1988-10.pdf
page 48

Slot Tech Magazine: Feature article: Electrolytic Capacitors and ESR featuring the CapAnalyzer 88A series II
https://eds-inc.com/Slot-Tech%20Capacitor%20Feature%20article1.pdf page 1
https://eds-inc.com/Slot-Tech%20Capacitor%20Feature%20article2.pdf page 2

Audio Electronics Magazine Construction article: Add Remote Control for Old Timers
https://eds-inc.com/Audio%20Electronics%20Remote.pdf

Radio Electronics Magazine Construction article: EDS-63 Christmas Computer Light Controller part 1

https://worldradiohistory.com/Archive-Modern-Electronics/Modern-Electronics-1988-11.pdf
page 50
Radio Electronics Magazine Construction article: EDS-63 Christmas Computer Light Controller part 2
https://worldradiohistory.com/Archive-Modern-Electronics/Modern-Electronics-1988-12.pdf
page 50

Troubleshooting Audio Equipment Supertech Style
https://eds-inc.com/ES&T%20Article.pdf

Modern Electronics Magazine construction article: Air Conditioner Brownout Protector EDS-71 A/C Sentry
https://worldradiohistory.com/Archive-Modern-Electronics/Modern-Electronics-1989-03.pdf
page 57