The SPARC NEWSLETTER
October 2026

A publication of the Southern PA Amateur Radio Club
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110 Years of Radio Builds
(part two)
by W3IHM

Last month's article was about radio build and manufacturing techniques and dynamics. I ended with the 1960's decade, because, well, it was looooooong. SO now, after a month of rest and relaxation, to let the brain think some more, I will pick up where I left off.

Also, if you want a more confused, technically hampered video presentation, check out the talk I gave at the September SPARC meeting. That is the whole shebang in one confused, lumped, gibberishy schpiel.

Also, generally, I heard from Ralph, K3KMT, that all these newsletters were somehow super-secret, and secure behind some top secret K3IR club paywall or whatever.

Uh, as they say down-under, yeah-nah. Anyone can access these newsletters who wants to.

I publish them to the K3IR website as soon as I deliver them to the K3IR members, but there is a slosh time on the web server. Sometimes the articles appear late, or sometimes disappear, only to later reappear, but that's technical. Hey, the web hosting is real cheap, so it's maybe a bit spotty, but there is no paywall to any newsletter.

Pish-tosh. If you want to read any or all, but can't gain access, just wait and try back later. So these things are free-free-free. I wish there never be any pay for my writings. It's for you, for funzies, silly.

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the license, and indicate if any changes were made, and no restrictions can be applied. That's it, like everything else on the web. This stuff is just for entertainment, and inspiration. It's like shareware. Are we done here? Moving on.

1970's

Now, this is my personal "coming of age" electronic decade, when I personally cut my electronic teeth. At the turn of the decade, when I was in grade school, there was a small herd of us acne-pocked, antisocial, dysfunctional CB'ers, and SWLs with some smattering of electronic knowledge. Like AI, we usually had just enough knowledge to sound smart, but actually drew schematics also like AI, full of shorts, and pointless wiring. Since we didn't know whither or no, we could then convince each other that we knew something about radio magic, but not really. We needed education.

So by the turn of the decade in 1970, I had acquired a tube Lafayette HE-20c CB and license (KSL6739) I also got a roughened up old HRO-7 receiver with a home brew power supply, both from my older teenage neighbor, who got shipped off to Vietnam. In his stead, his dad worked out a deal with me that if I cut his lawn all summer, I could have both. By the time Paul came back, he didn't care a whit about the radios, and dad wanted them out of his garage, including the swell "LOW-COST" CB antenna. So I acquired both of them. SO after a summer of mowing, I had CB radio and SWL shortwave. I tuned all sorts of things in. I was "da-man!"







A bunch of us neighborhood kids also had various CB 100 mW license free walkie-talkies. We could talk to each other, but often had to add long wires, or TV antennas to do it. We learned that longer wires are better. Anyway, there was also a lot of interference from the DX and sunspot openings, plus everyone wanted a CB back then, so the band was full of all kinds of signals. We kids fiddled around, trying to make our radios work better.









One thing we found was that if the walkie-talkie was a "superheterodyne" radio, like the

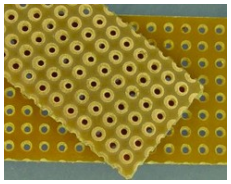
TRC-25A, and not a “regenerative” receive, like the cheaper “SPACE PATROL”, it had separate RX and TX crystals inside. You could then put the RX and TX crystals in backwards. (Why do that?) Then, after a careful alignment, we could make our 100 mW walkies work somewhere else. I don’t think we even realized that they were out of band, but they worked without interference, so we figured it was a new SECRET frequency that regular CB radios could not hear. Woo! Cool. I could tune them in on my HRO-7, though, and found it had to be somewhere below the CB band. The young boy’s wheels started to turn.

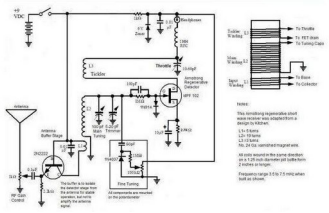
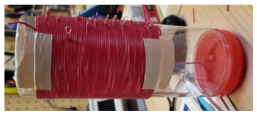
Eventually, I figured out that doing this little crystal swap would shift the channel frequency down by 455 kHz. And since my trusty TRC-25A came with channel 11 (27.085 MHz), it would then put them on 26.630 MHz, below the CB band. Woo! Illegal bootlegger free-band 100 mW talkies! We even had a special SECRET Sunday night net that would meet on our secret frequency, to see who’s radio would go the farthest. We all made up bogus call letters, like WBXLK2, or whatever. Trick-or-treat was also radio equipped to obtain the best boodle. But we also feared the FCC knocking on our doors, so we all agreed to “play dumb” if that ever happened. “Gee! Did I put the crystals in backwards!?”

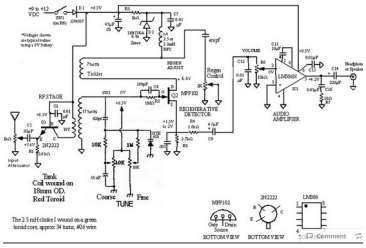
I don’t think it really made any difference as far as interference and range, but we thought it certainly did, and that was good enough. But for me, after awhile, I wanted to know WHY. By 1973, I had gotten hold of an ARRL handbook from my janitor ham Elmer, who had been seeding ham literature in the small school library. In that book, I had read about “regenerative” and “superheterodyne” RX. I also read about local oscillators, IF and AF stages, and even a bit on transmitters. I wanted to learn this stuff. It was neat! I had plenty mucho-mucho questions.

By this time, after a few failed tube radio builds and several crystal sets, I had actually built a shortwave radio from a Charlie Kitchin article in an RCA manual (...or was it ARRL Hdbk?). I also had won first prize, 7th grade, in the school science fair with this build. This was a super-regenerative shortwave receiver that used an IC as audio amp, an FET as regenerative detector, with a pill bottle for the coil. I don’t think I ever added the RF amp stage. It worked fine without it. But it was all solid state IC FET impressive space-age electronics.

I got most parts at Radio Shack, and built it into an old blow-mold bedside AM clock radio cabinet. I just copied the schematic diagram out of the book, wound the coils on a pill bottle, soldered parts I scrounged up on a piece of perf-board, and by golly, it worked! WOW! I can do this radio thing, I thought. So now I had confidence I could figure this SECRET radio stuff out. Solid state! IC! Woo!



So, with that under my belt, I confidentially dug into how the secret CB free-bander 100 mW walkie-talkie magic happened. I could deduce that plugging in the 26.630 MHz crystal into the transmit socket would just put the transmitter on 26.630, after a peaking for maximum power out on a field strength meter. That was simple. But how the receiver worked was different. How did this work?

Well, I wasn't sure, but I had my ideas. I figured the "wrong" RX LO crystal worked as "low side" injection (27.085-0.455= 26.630 MHz) instead of "high side" injection (26.630+0.455=27.085 MHz). The receiver would then hear 455 kHz below where the crystal local oscillator was running, instead of 455 kHz above. We also had to align the front end, but hey, we were all "magic golden screwdriver" whiz kids, peaking and tweaking our little coils until they cracked, jammed, and then fell apart, so this was no problem.

When we tweaked up the radio front end, the RX was now more likely to hear on the "image" frequency. I could also tune my HE-20c CB down to below the CB band and hear 26.630 MHz, so I know that must be it. I eventually got up the courage to talk with my Ham Radio janitor Elmer, risking being turned into the FCC. He agreed that this was happening, along with not turning me in. He also said: "You should really get your Ham license, kid."

He was right. But I have just jumped down another rabbit hole. Oops. Sorry. Back on topic.

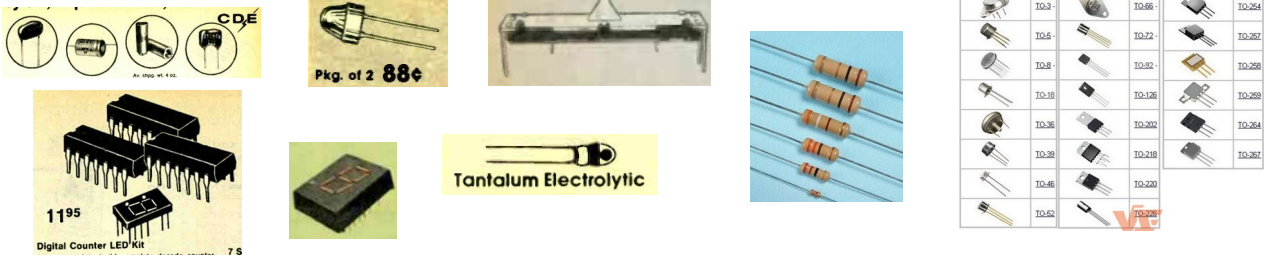
What I went down this rabbit hole for, was to hopefully illustrate that with a little determination, a know-nothing kid, with an interest in electronics, could feed their curiosity, and delve right into consumer electronics in the raw, by disemboweling and eviscerating his new, expensive, TRC-25A. One did not even have to be schooled to do it. One could just pull apart their doohickey, and for better or worse, start to "modify" it. And

when that failed, they could then pursue it further, and maybe even learn how the thing actually worked, so they could maybe even fix it, before daddy found out they broke it.

So think about it. Go back 100 years to the 1870s. A small shop with a lathe, a drill press, maybe some stamping machining, and some casting capabilities, could come up with a new thing like a “horseless carriage”. Someone who had expertise in bicycle repair could, with some self-taught machining and mechanical engineering, come up with propellers, small gas engines, wings, and eventually a flying machine.

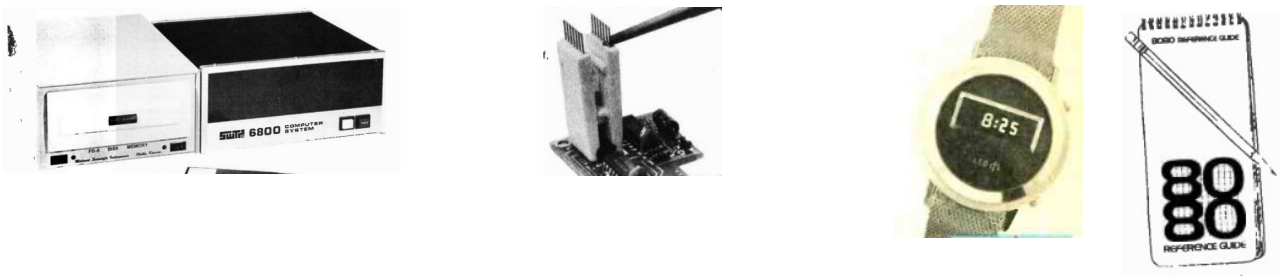
By the 1970s, another explosion of technical advancement was ripening, in the same way.

Anyone could start building their own electronics in their garage. There was human-routed circuit board artwork, single sided phenolic and glass-epoxy (FR4) circuit boards, and fish tanks with heaters for etching your own garage circuit boards. There was a huge inventory of new components with all kinds of unexploited functions flooding the market. Carbon resistors were replaced with much more precise, stable metal film resistors. Incandescent bulbs were replaced with LEDs. No longer a domain of math professors, digital electronics was now not just boolean gates, but also available as a complete central processing unit on a single chip.



Furthermore, anyone could come up with a new circuit design for doing just about whatever, build the boards and solder the parts in them, and then sell them all from someone’s garage. If you look back, many new product genres got their inception in the electronic industry by small companies doing exactly that.

Take personal computers. A plethora of new integrated circuits were coming out, along with a set of early microprocessors to augment the already growing families of digital logic ICs. It was initially a few hobbyists and ham operators who dabbled in this, but soon whole “computer clubs” sprang up. And eventually, out of these clubs, came the fathers of the personal computer industry.







Combinations of newly available digital and analog electronics, made building phase locked loops (PLL) possible in one's garage laboratory. Then a PLL could be used on a VHF radio, instead of drifty analog VFOs. Also digital test gear and frequency displays could replace mechanical dials and meter pointers, making test gear more cool-looking.







There was also still vacuum tubes available of all sorts, to handle where solid state devices could not. So when costs, high voltages, or power handling was an issue, hybrid designs containing vacuum tubes, incandescent lamps, transistors, mechanical switches, digital logic, PLLs, and micro-controllers appeared briefly during this decade.

This is the "hybrid" ham rig decade, with rigs such as the Kenwood TS-530s and Yaesu FT-102 being manufactured. I personally find these radios the most interesting (in a nutzy-crazy way) because they span the entire electronic industry progression from the incandescent lamp, up to the integrated circuit, all in one box.





By the latter part of the decade, there were LED, LCD, VFD, and CRT displays. There were metal film resistors augmenting carbon and wire wound. There were all sorts of stable poly film capacitor types, along with tantalum, to augment mica, paper, and electrolytic types. Cheap foreign and international markets dominated the component market, with ICs and transistors made in Taiwan, Japan, Europe, and USA. Stuff was coming from everywhere, and used to do everything.

With parts-a-plenty came restrictions, though. Among all the new components, there were some specialized function ICs produced for VCR, TV, radio, and other products. Some of these components were released without information about what the insides actually did. They were mystery “black box” chips found inside of consumer electronics. This forced repair of any device using these chips to a single source, the manufacturer. A manufacturer could then choose at any time to “NLA” (no longer available) the replacement component, making the device using it not repairable. These were the first “NLA-not repairable” planned obsolescence products.

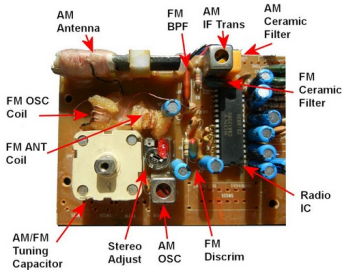
Also, with international competition, price reduction made some things no longer worth fixing. Once costing hundreds of dollars, the pocket AM transistor radio sunk to less than five 1970 dollars. Although still quite fixable, by now, it was definitely not worth repairing.

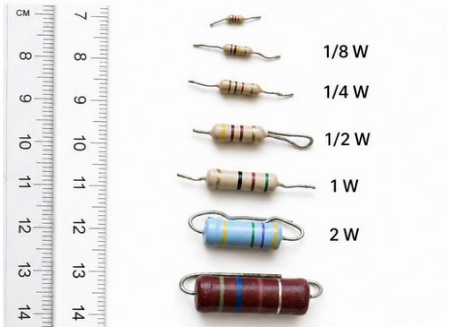


Throw it away, or give it to the kid down the street.

1980’s

By now, for many reasons, things started to get small. The wired components were still used, but they shrank. The vacuum tube had vanished, all but the CRT. No longer needing to handle several hundred volts, resistors went from half-watt to a sixteenth. Also, lower voltage allowed for capacitors to shrink. Some ceramic wired disc capacitors rated at only 12 volts or less began to appear. Single custom ICs could be used to do everything, with one chip radios becoming common. Repair was often just to replace the chip.

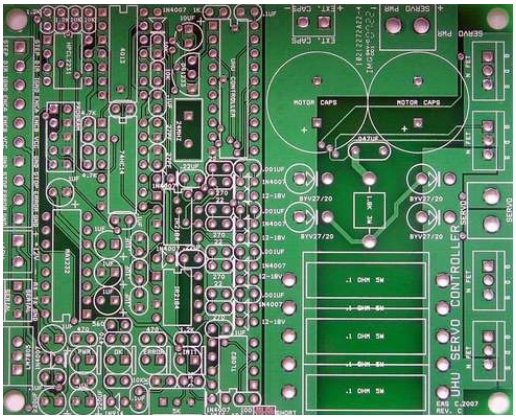




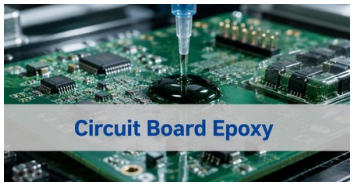
The brown phenolic circuit board also disappeared from all but the cheapest products. These were replaced with two-sided fiberglass epoxy resin (FR-4) boards with special plated through holes, called vias. While FR-4 is a superior board in many respects, the vias made through-hole components more difficult to replace.

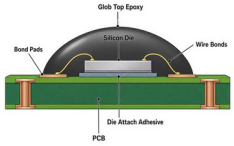
Also, the computer revolution made human circuit board routing no longer necessary. An algorithm could rout wires and place components to minimize the trace lengths, reduce waste copper, and make boards cheaper and better performing. But these fancy boards could not be churned out in someone's garage. They required a board foundry, and a computer design file. It became a sign of a "professional" build, and a status symbol, too.

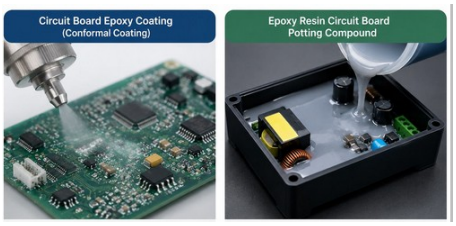
These boards were still repairable, though. A technician could access through hole components, trace the wires around the board, and troubleshoot a bad component, or find a board flaw or defect. Products built on these kind of circuit boards were still fixable.



With international competition, in some cases, the usual flow of open information and technical development in the hobby circles choked. A tinkerer's idea became a guarded corporate secret for the latest highly competitive, razor-thin margin product. The "epoxy fill" and "chip-on-board" also became a repair nightmare. Service became impossible in these cases, much less, figuring out what the epoxy blob actually did.



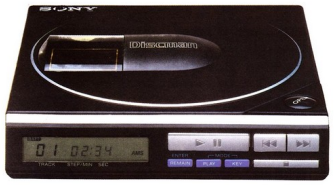




Being cheaper, these techniques also proliferated in low cost electronics. Consumer products used custom chips, sole sourced to the manufacturer, or chip-on-board techniques. That made the products cheaper, protected corporate information, and gave the customer more features than ever before, but this was at a price. The repair-ability and open information that flowed among hobbyists started to dry up. A young kid may open up their speak-and-spell, but they are greeted only with a double sided circuit board, a speaker, a keypad, a display, and a black blob of mystery epoxy. There is nothing to mess with. Nothing shows how it works. Bummer.







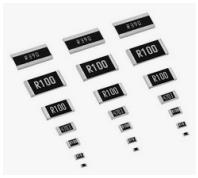
By market and consumer forces, throw-away electronics were here to stay. Also, as kind of an omen, the cheap, fixable, AM transistor radio, once present at stores since the 1950s, simply disappeared from the shelves. FM stereo radio was king now. AM was an “add-on”.



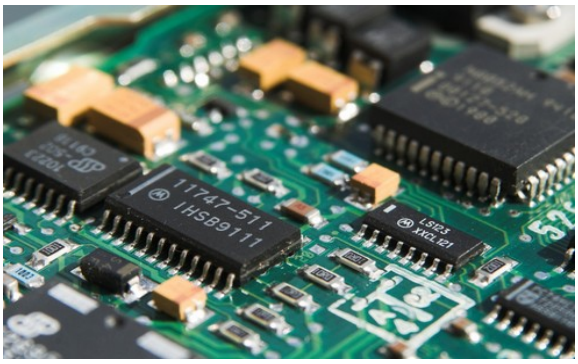
Although expensive, a new device, the micro-controller, appeared in products. It combined a CPU, RAM, ROM, access ports, and a method of programming and loading code, all into a single integrated circuit. These devices would come to proliferate every consumer product, eventually. This single chip computer could be loaded with commands at the manufacturer and then installed in a product. A single chip could then control timing, actuation, sensors, and perform extensive calculations all within a single device. Software could also implement state-logic, and make “decisions” based on statistics and fuzzy-logic principles. This was an extremely powerful development.

1990’s

Someone decided that through-hole wires were a waste of board space. They were quite right. Wires, once used to attach components to binding posts or terminal strips back in the 1930’s, were no longer necessary. The time had come to do away with them altogether. Enter the surface mount device. A whole new type of construction was now being done. Resistors got the wireless shrink treatment.



So did everything else!





The boards themselves also changed to four layers, with power and ground usually occupying the inaccessible middle layers. Even these boards could be troubleshot at the component layer, as long as ample information from the manufacturer was available, and no traces ran in the inaccessible layers. Compared to their leaded component packages, surface mount devices were way smaller.



Although difficult, fixing surface mount equipment was still possible. A technician may even be able to “crush” the offending component, and then solder a new part on to the pads, if the board was not destroyed in the process. Special soldering and de-soldering tools were also made, such as “hot-tweeze” soldering tweezers for removal of two-terminal passives. Special heat gun brass hood nozzles were also useful with various shapes to focus the hot air, for removing large pin-out chips from the board.

A pattern started to emerge through all this. When board costs decrease, labor costs increase. Any kind of repair becomes marginally economic. Why fix it if replacement costs are cheaper? Electronics became cheaper, so repair became increasingly unfeasible.

By now, circuits were modeled in computers, simulated in computers, boards were then routed in computers, and then a file was sent to a board foundry. For an additional fee, parts could also be placed, and then soldered, using a manufacturer’s special thermal profile.

Custom driver ICs, mated with LCD displays, became a single component. Although LCD displays with EL/LED backlighting were common, the CRT vacuum tube was still used for large displays with high resolution. Also the magnetron tube was, and still is, hard to beat

for economics and power level. So microwave ovens still used a vacuum tube.

Micro-controllers could implement extensive features at low cost. Early digital signal processing was done using powerful micro-controllers, some of which were proprietary to the manufacturer. Algorithms such as speech recognition and digital signal processing (DSP) could be done, all within a micro-controller, on a single board.

The ability of placing a micro-controller's device code in "firmware" also became common. In this case, the operating machine code for a particular product is stored in volatile ram, with a battery or other backup. It allows for a product to be "field-programmable", often changing the entire product configuration. This firmware could change buttons, display, and hardware functions of a particular item.

This became useful for products such as cellular phones, and two-way radio systems, where frequencies, digital access codes, and speech processing as well as button features are all controllable in device firmware. A phone manufacturer could make a single phone hardware device "platform", and multiple carriers could configure it for their particular cellular phone system.

Of course, now it becomes possible to damage or delete this firmware, thus "bricking" a radio or cellular phone. The manufacturer can also control the ROM image distribution, rendering a device useless if they decide to discontinue an older product's support. So, even though you own the hardware, the manufacturer maintains some control over their device, even after it has sold to a customer or service provider. So the "ownership" of an electronic device becomes somewhat fluid. Sure, you own the radio or phone hardware, but it is useless without the software.

Much like personal computers, and their operating systems, a company such as Motorola, would sell you a radio or phone, but retain the rights over the radio's firmware, as a trade secret. Modifying or changing the firmware in any way requires the company's proprietary software. Thus, the physical item becomes useless without the firmware to operate it. Without the firmware, it will no longer accomplish the functions it did upon purchase.

You may retain the hardware, as you wish, but the firmware and software is only leased to you for a time. Planned obsolescence becomes rigorous, enforced by the manufacturer. Any attempt to circumvent this control is viewed as property infringement. The hardware has become secondary to the software that runs it. Great.





2000’s

The new millennium had brought about further changes in electronic device technology. One of the innovations that spelled an end to component level diagnosis by a technician is the multiple pin “bump” mount package.

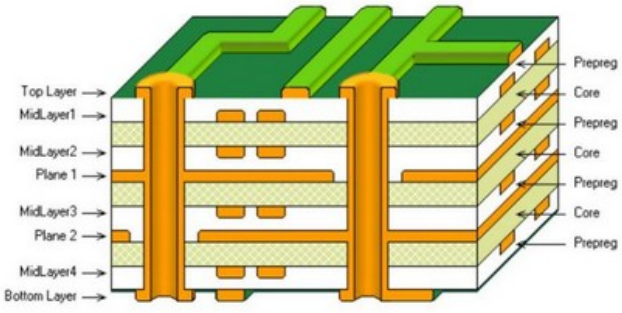
A bump mount is a surface mount package that no longer has connections on the sides only, but the entire bottom of the package is covered with solder pads. To connect the device to the circuit board, a solder-flux paste is first masked onto the board. Then, a component placement mask is used to align the parts.

All the devices to be installed, rest upon the circuit board, and a specific heat profile is then used to solder the whole board, with all individual “bumps” making simultaneous contact. The part would “float” into position merely by solder surface tension. With careful heat profiles, the solder pads would all align.



There is no way to troubleshoot these boards, as most all of the circuit interconnects are buried underneath bump mounted parts, or hidden in between circuit board layers.

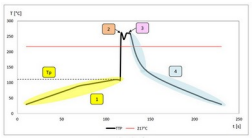
Another change that brought component level diagnostics to an end was the multiple layer circuit board. Traces were now encapsulated inside the circuit board, with no way to measure currents or voltages of most of the circuit nodes. The few traces on board surfaces were usually not enough to gain any insight into what was or was not working. The board itself, containing all the circuit interconnects, became a “black box” component.

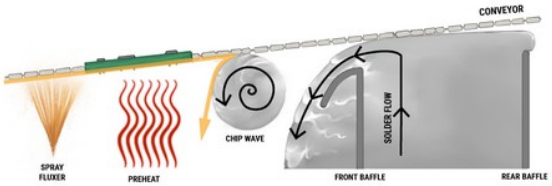


These construction changes resulted in incredible circuit complexity and densities. A device, once requiring multiple racks of double-sided circuit cards, of through-hole components, could now be held in the palm of your hand.



But this kind of construction sacrificed serviceability. To remove a single component became impossible. Remember that a board had to undergo a thermal heat profile, to solder all the connections at once. During manufacture, any defect in any one of the solder pads would render the board and all components scrap. Circuit construction now required clean rooms. So removing a single component became all but impossible.





These factors, plus decreased costs, made single component diagnosis and replacement on some products a thing of the past.

Another sacrifice was ruggedness. Due to any moisture, a board with this level of circuit density would be easily damaged or destroyed by corrosion penetration and electrolysis. This is especially true with bump mounted components. Moisture can easily get trapped under them. The circuit board needed to be kept bone dry.

The noticed lack of board sealing that was otherwise available became an easy route to damaging electronics. Board connects also became weak spots in all designs. So the device was really designed to not last very long, even if carefully cared for. Even so, software support could still end, rendering the device useless at a scheduled time, anyway. Here’s an Ipod touch, first generation, now, mostly useless.



Another innovation of the 2000’s was to manage thermal heat by board construction. What once was dealt with by external heat sinks or large packages, now became a function of board design. Copper vias and pads leading to large inner board expanses of copper were designed into multilayer circuit boards to manage device thermal heat. A failed inner board thermal pathway would lead to unexplainable device overheating.

This is especially hard to diagnose, because the device mounting and package were all considered in thermal management. But again, this technique led to smaller devices with more compact size.



With increased processor capabilities, DSP replaced analog filters. Device alignment became a software function, with a RF board being “tuned” by firmware at manufacture. The benefit was that once a device was aligned, no further alignment would ever be necessary. There were no analog filters that could drift or age to require periodic re-alignment. There were also no parts that could or would ever be replaced.

But if the firmware became corrupted somehow, then the circuit board was toast.

2010’s

This decade increased device shrinkage to new insane smallness. Package devices became almost invisible, with sub-millimeter devices used.

PASSIVE RECTANGULAR

SMD PACKAGE TYPE	DIMENSIONS MM	DIMENSIONS INCHES
01005	0.4 x 0.2	0.016 x 0.008
0201	0.6 x 0.3	0.02 x 0.01
0402	1.0 x 0.5	0.04 x 0.02
0603	1.5 x 0.8	0.06 x 0.03
0805	2.0 x 1.3	0.08 x 0.05
1008	2.5 x 2.0	0.10 x 0.08
1206	3.0 x 1.5	0.12 x 0.06
1210	3.2 x 2.5	0.125 x 0.10
1806	4.5 x 1.6	0.18 x 0.06
1812	4.6 x 3.0	0.18 x 0.125
2010	5.0 x 2.5	0.20 x 0.10
2512	6.3 x 3.2	0.25 x 0.125

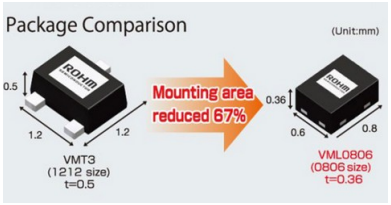
SOD (SMALL OUTLINE DIODE)

SOD PACKAGE TYPE	DIMENSIONS MM
SOD-723	1.4 x 0.6 x 0.59
SOD-523	1.25 x 0.85 x 0.65
SOD-323	1.7 x 1.25 x 0.95
SOD-128	5 x 2.7 x 1.1
SOD-123	3.68 x 1.17 x 1.6
SOD-80C	3.5 x 1.5

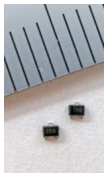
With increasing copper costs, PCB trace widths were also reduced to hairlike widths. Any extended package contacts were also removed to further increase circuit density. Components would practically touch each other, all routed and simulated by computer models.



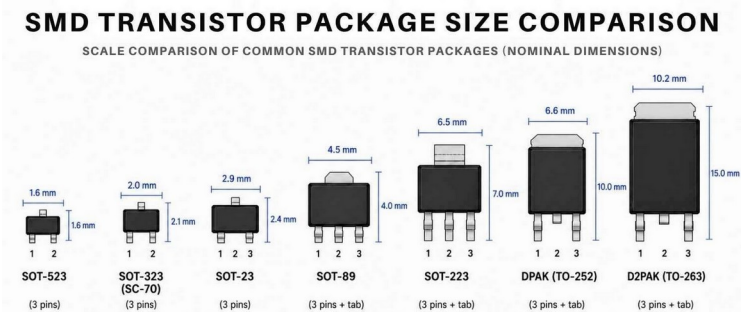




Active devices became hard to even see. Shown here is the smallest transistor package now used, the SOT-723. These devices are sub-millimeter. Yes, that is a millimeter ruler.



I ordered some of these devices, placed them on the bench to get a picture, but sneezed. Gone! I have a SOT-723 LED on a piece of copper board. I really can not see it unless I light it up.



By this time any manufacturer's service data was nonexistent. Firmware was obscure and secret also. There were hidden functions and test modes often incorporated into the firmware, but none of this is available to the equipment owner. So the manufacturer controls everything. The customer is shut out.

Remember that these circuits are incredibly delicate. Moisture intrusion, corrosion, sweat damage, ESD, even opening up the board and exposing it to air can ruin the circuits and destroy traces. "Not repairable" also means that it goes from brand-new, just bought it, big expensive, to absolutely worthless, because you touched the microphone connector, and ESD somehow fried something inside. The value of your new radio can plummet very rapidly. Sheesh. Warranty? Read it. Many do not cover much now, either.

2020's (NOW!)

So we took a couple months to walk down a hundred and ten years of electronic circuit

development. We consumers, including governments, military, corporations, stock holders, and investment holders, have led us to this place in our electronic circuit industry. It was not a “conspiracy”, so take off your tin foil hat. Things just went where the markets led them, and here we are.

People wanted more bang for the buck. Stockholders wanted higher profits. Military wanted stuff the enemy could not copy. Corporations wanted things that would break easy, wear out fast, be field configurable, and are hard for the competition to copy. So, I guess it ultimately means that now you have to buy a new radio, for less, but more frequently.

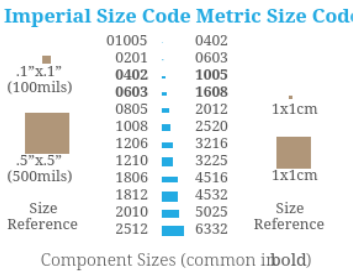
International trade and competition drove costs ever lower and lower. Countries that previously could not enjoy a higher standard of living, built labor intensive electronics industries, and ended up better off for it. So they also became competitors in the world markets.

Also, like it or not, setting up electronics industries, like a chip foundry, is expensive and environmentally very messy. Some countries invested heavily in encouraging these industries, while looking the other way environmentally. Other countries didn’t, regulating and taxing them away. So, now, everyone mostly buys chips from whoever was the winner in this international semiconductor foundry olympics.

For whatever thousands of reasons, we all did what we do, and now we are here. This is ok. In fact, it’s great. Imagine if you tried to build a cellphone with tubes. Yeah-nah. But we lost something along the way. Maybe you can see what, now.







Strangely, though, one thing that came in early, that seemed to have stuck around since, has been soldering electrical connections. I am actually surprised about this, but maybe I speak too soon. There are now companies working on conductive glues, so who knows.

Still, I really have to say “why not” with the glues. It’s not like I can use my trusty 1970’s Weller soldering station to fix a modern Yaesu FTDX-101MP, anyway. About all I can do is to make sure there is power to the board, and all the controls are hooked up. Ok, maybe I can also change the firmware battery, but even that, may brick the rig. Better send it back to Yaesu. My 1970’s tools are more like this 1850’s soldering iron, quaint, but not useful.



Also, as I desired in the beginning, I hope a reader now knows why repair is generally NLA. It's like when you send your Yaesu FTDX-101MP back to Yaesu, and it costs $800. Yes, they don't fix it, because really, they can't. They just swap boards until it works again. A new board costs them $600, plus S/H, plus someone to swap it, plus profit, so it costs you $800. That's where we are. Don't get mad. We all got our money out initially, backwards in time, over the past 110 years. We made things not fixable, small and feature loaded, but cheap, remember? Now it's time to pay the $800 and swap the board.

What can Joe Hamster do? What can you do? Well, make sure it's the board that is bad. Learn how to change a fuse, to check a connector, and also work a volt meter, to make sure voltage is getting to that $800 board. If all that seems ok, then look the board over for burned stuff, connections that are bad, or corroded. Get out the microscope.

If all that does no good, then it's time to pay the piper, or give the radio to someone as a gift. Your spiffy radio you just bought last year for $3000, but with a dead board, really is not worth anything, now. Sorry. Like I said before, un-fixable means the depreciation curve is incredibly sharp.

Maybe you can sell some of the extra pieces like the mic, maybe a front panel, or whatever? Or worse, you can deceptively pawn it off on some unsuspecting sucker somewhere as "Used, untested". But I believe that we all will have to give an account in the end, and I don't want to fry in hell, just for a stupid junk radio. I also value my sleep, presently. And if you think you can fix the board, have at it. But maybe now, you will understand that you will also need to break out the microscope.

So what are some benefits of all this? Here is a list of a few things we have gained in the past 110 years:

Consumer electronics disposable designs – rapid improvement cycle

Board level diagnostics - less technician expertise

Automated process from diagram to finished circuit board

Virtual design, board layout, testing automation – Defense sector

International competition drives high functionality for very low cost

OK, what have we lost along the way? Here's another list. This time, it is of things we have lost:

Manufacturer service data "trade secret" - Hardware wall

Firmware not publicly released – Software wall

Algorithm guides the design loop – Personal expertise lost

International industrial espionage prevalent – Open design discouragement

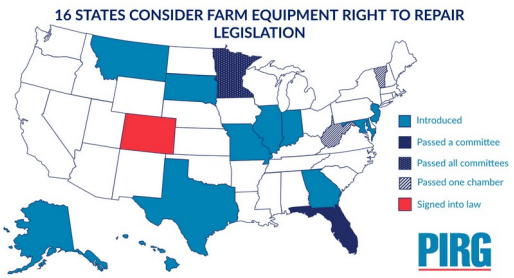
E-waste – Rapid cycle forces "improvements", and ultimate complexity

Gone are the little "glowing bulbs" in the back of radios and TVs, that were in everything when I was a kid. Gone are the "cities" of discrete components piled inside a transistor radio. So I wonder what is going to tickle the imagination of our future hamsters when they peek inside their new internet sky-link super walkie-talkie doohickey? I don't know.

Don't get me wrong. People are starting to notice this "loss of control" about electronics in things we "own". There has been some push back. Among everything else, cars are also now becoming like many other consumer electronics, with a "subscription" to your car's software, and enough data collection about how you drive to keep insurance actuarial tables jumping for joy. (Most new cars track your body weight, among everything else, so maybe they will send you your GLP-1 automatically!)

No, I suppose you can still drive your Tesla even if you don't pay the monthly fee, but companies want income streams, not single point sales. So the pressure is there for them to deliver. Like Windows, you may have to update software and spend more money, while also charging the EV or gassing up the tank. Like, have you also tried out the car OBD2 "open" bus lately? Funny how I have to pay my dealer $300 to tell me what $10 module died in my car.

There is a "right to repair" legislative movement, although I don't know if it will go into ham gear. Right now, legislation seems to target only farm tractors. Don't get me wrong, and I am all about this, but I also want my 401k to keep going up. Choices have consequences, right?



My farmer grandpa always said:

“If you can’t fix it, you don’t own it, it owns you.” – Ed Joos

He was born in 1899, and fixed everything with an anvil and a smokewrench. Well, things have changed, but I suppose he was right. Sure, but somewhere, a small child will take apart their radio or whatever, just to see how it works. That wonder will light the imagination as it always has, and a curiosity will ignite the next radio nerd. That nerd will just have to go about it differently than I did.

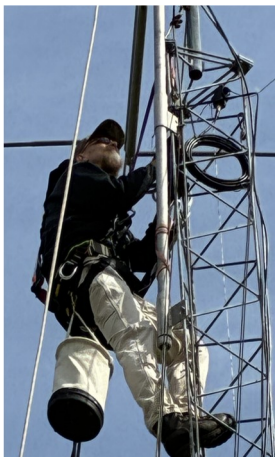
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Tower Work
by
Harry, N3FMO

Did you notice anything different at the club site? Yes, it’s time to get the antennas buttoned down before the snow flies. This includes the club antennas. Shown in the pictures below are Harry Bauder, N3FMO, John Hewitt, KA3RDZ, Nick Seiver. KD3BVS, but not Bill Slabonik, KZ3I. I guess he took the pictures. Anyway, these guys all risked life and limb to improve the antenna situation at your club site.







Ok, ok…. Maybe not ALL. Ok… OK! ...maybe just one or two, because I think Bill and Nick did the climbing. The other guys ate donuts, or maybe they supervised, or did ground prep work? Well, anyway, maybe it was better this way. Fat old men need to know their limits, me included.

But, it was a nice sunny day, so kudos to Nick and Bill for shinneying up the pole, and Harry and John for doing whatever they did. I don’t know why Harry is wearing a kiddie

bike helmet, either. Maybe he is afraid of getting hit by a defunct Starlink? Anyway, thank all these guys, if you happen to hear them on the air. They are who keeps the club going. Remember, it is a volunteer club. It is only as good as the volunteers that are members.

-...-

Stylish Club Kit

by
Harry, N3FMO

Did you enviously see someone with a custom SPARC shirt, sweater or hoodie? Well, envy no more. You, too, can possess your own SPARC clothes. There is an on-line store that has just been launched.

The direct link for the store is: https://etownsportinggoods.chipply.com/SPARCk3ir/

If it does not work, contact the host store.

Contact: Mitch Gibson
Elizabethtown Sporting Goods
7173676633
info@etownsportinggoods.com

Meeting Night

The SPARC monthly general membership meeting is the fourth Tuesday of the month at 7:00 PM. The meeting is being held at the Clubhouse until it gets cold. Bring your snacks and hike out your trash.

License Test Sessions

Testing is conducted at the SPARC site on the first Tuesday of every month. Fee to take the exam. It is $14.00 payable on the K3IR website or in person, cash or check only.

You can pre-register to take the technician test, or upgrade, at Hamstudy.org. There is also a link on the K3IR web site. If you do not already have one, go to fcc.gov and register for a FRN (Federal Registration Number).

Looking For Volunteers

Retired? Need to get out of the house so the XYL doesn't kill you? Go to the club! SPARC currently has 131 "active" members on the roster. We have a lot to offer to our members. At this time we have a dedicated group of hardworking volunteers who keep the site running. Some say this is typical with most organizations. I don't think SPARC should be "typical" We need more real active members. Jobs range from the highly technical to the mundane but ALL are important. Please look at the list below and see if there is a place for you. Then ask Harry, N3FMO, or someone else about it.

IT Team – Computer stuff

Just hang out at YOUR club sometime!

Fix the projector so it works with Sam's silly Linux computer.

Give a Talk, will ya? Some of you have had interesting lives!

Write an article about something, too.

Tower climbers and ground help – put up the 6 meter yagi

Eat donuts, drink coffee, and talk on the radio: a.k.a. be an NCS

Operating building maintenance and cleaning

Build up the solar array gizmo to cut our power bill (it's expensive)

Buy/acquire apples from the orchard, and make cider for us to drink.

Operating building equipment maintenance and improvement

Porta Potty cleaning (not Pumping!) – donate a solar light for inside night use, too.

Adopt a Highway crew – pickup trash on Breneman road.

Elmers and Elm'ettes – help a new ham GOTA

Hamfest help, planning, equipment lists, tables, sales haggling, etc.

Go to a Meeting and vote!

Build some useful gadget and donate it to the club.

Antennas! ...always more, bigger, higher.

Someone to take the trash home and pitch it when it's full.

Someone else to either eat or toss the old stuff in the fridge.

Someone else to bring in new stuff to eat at meetings.