



## Episode 392, Dave Bottom, WI6R

Commissioned by: **Brian Whitaker AG6WR**

Eric, 4Z1UG:

My thanks to Icom America for sponsoring the QSO Today podcast. Welcome to the QSO Today podcast. I'm Eric Guth, amateur call sign, 4Z1UG, where I demonstrate the diversity and relevance of the amateur radio hobby and its impact on society by interviewing ham radio operators, many of whom played vital roles in shaping our technology through the amateur radio hobby. While many people might say, "Ham radio, do people still do that?" This podcast demonstrates through in-depth interviews, just how amazing, diverse and dynamic the amateur radio hobby continues to be.

Eric, 4Z1UG:

Based on the many comments that we received last weekend, the fourth QSO Today Virtual Ham Expo was a success. The presentations were spectacular and are now on the expo platform for playback. We heard nothing but positive comments about the Kumospace lounges and I was happy to discover that the Ham Radio Workbench podcast crew were still holding hours of discussions in their lounge. Thanks to all of you who came and the support for this project. We will be back in September once we have cleared the date.

Eric, 4Z1UG:

Dave Bottom, WI6R, a second generation amateur radio operator, credits his early exposure to radio and spending his teenage years in Palo Alto to a stint in the famous Hewlett-Packard labs and a lifetime electronics career. WI6R is a builder of his own rigs, kit rigs, and restorer of popular vintage rigs. Dave likes DX, QRP, and operating. He is my QSO Today.

Eric, 4Z1UG:

WI6R, this is Eric 4Z1UG. Are you there, Dave?

Dave, WI6R:

I am.

Eric, 4Z1UG:

Dave, thanks for joining me on the QSO Today podcast. Can we start at the beginning of your ham radio story? When and how did it start for you?

Dave, WI6R:

First, thanks for the opportunity to meet with you today. For me, ham radio probably got its initial start when I was quite young. When I was, oh, three years old, I would stand in my dad's ham shack while he operated his station. I have vivid memories of that, primarily, the big glow on the wall behind the radio that would get brighter when he talked on the radio. But that was probably just my first introduction to ham radio. My dad had gotten back on the air. This was, of course, after World War II.

Dave, WI6R:

This was 1951 and we lived north of San Francisco in a little town called San Anselmo, and lived high on a mountaintop top though. That was my first introduction to ham radio, was just being around him and listening to him talk to hams around the world.

Eric, 4Z1UG:

What was your father's name and call sign?

Dave, WI6R:

My dad's name was Austin and his call was W6LEH. That's Whiskey, six, Lima, Echo, Hotel. He'd been on a ham since 1936. He was involved in ham radio since he was aged 16. He actually got his start much earlier than that, at around age 10. Those were tough times, obviously. These were the 1930s. He would not be able to afford to buy magazines so he'd have to read the articles and memorize things, including the schematic, and then go home and write them, and write down his information and draw the schematics out from his memory.

Eric, 4Z1UG:

He had to suspend operation most likely, like all hams did during World War II. What did he do during World War II?

Dave, WI6R:

During World War II, he was ... happened to be drafted into the Army, of course, like many did. At the time he was drafted, he worked for [inaudible 00:03:50] dehydrators, which is a company that actually used microwaves to dry food and make food for the Army. But he entered the Army and, of course, there's hams everywhere in all the forces. He was part of the Air Corps, which later would become the Air Force. But he contacted a well-known ham and high ranking officer in the army about getting a good position that was suitable for

him and he ended up teaching radar during most of that time down in Florida. Of course, at that time, radar was a hush-hush thing. No one was supposed to know what it was.

Eric, 4Z1UG:

When he left the Army, you say that you were up in San Anselmo?

Dave, WI6R:

Yes.

Eric, 4Z1UG:

North of San Francisco. What did he do there?

Dave, WI6R:

I think at the time he was, we were living there, he was actually asked to come up there to be chief engineer for a television station in San Francisco, at that time, it was Westinghouse KPIX. He was invited to come up there and work for a fellow who was in the process of trying to buy KPIX Channel 5. Apparently, that deal fell through, even though he'd been hired and brought up there, so he ended up doing some other work. I honestly don't know exactly what it was he was doing at the time. Just prior to that, he had been in Southern California running a business that he started with another fellow installing TV antennas.

Dave, WI6R:

Of course, these were the boom years for television. This was the late 1940s and early 1950s, and he had, essentially, a contract business installing TV antennas. Every time a department store sold a television set, there would be a task to install an antenna for that TV. This started out with just a couple of guys in a truck to do this, but by the time we moved to Northern California, it was something like 13 or 14 trucks and a couple of guys in each of these vehicles that were running around and installing TV antennas, and some of them by spotlight at night. That was quite an interesting time for television.

Eric, 4Z1UG:

What kind of effect did your father's interest in electronics and television and radar and radio, what kind of effect did that have on you as a youngster? How did you proceed forward?

Dave, WI6R:

I don't think I really had a whole lot of interest in it initially. It was a little bit of curiosity, but I honestly didn't pay a lot of attention to it until 1957, when my mom and dad, my brother, who was also a ham, and myself, were standing in the front yard of our house in Palo Alto watching Sputnik fly overhead. When we watched it pass across the sky at night,

my dad said, "Let's go in and see if we can hear the beacon signal from it." I thought, "What's a beacon signal?" He headed into his shack and fired up his receiver and the Sputnik was putting out a signal somewhere just below the bottom end of the 15-meter band, 20-point something megahertz.

Dave, WI6R:

Sure enough, we could hear the beacon signal from Sputnik and every 90 minutes there would ... we'd hear the signal on the radio. I'd run out front and watch it fly overhead. This was just absolutely fascinating to me, hearing radio signals from space. I then had to learn everything I possibly could about radio. I proceeded to be sitting around the floor of my dad's shack with stacks of CQ and QST magazine, and Popular Electronics and other things like that to learn everything I could possibly learn about electronics and radio.

Eric, 4Z1UG:

How did that go for you?

Dave, WI6R:

Oh, it was great, actually, great fun. I think my dad was glad to see that I was interested in it. He took me off to one of the local electronic stores, which happened to be a store that had not only electronic parts and things, but also all sorts of war surplus gear. That was fascinating to me as well but we ended up coming home with handfuls of parts for me to start building things with. Of course, my first task was building simple crystal sets and then, more and more interesting little projects. At the time, my dad was working at Raytheon.

Dave, WI6R:

Raytheon, like most US electronics companies who were somehow involved in television and other things, but Raytheon was one of the companies that was the first to introduce, basically, the general public that's interested in electronics and radio and other things, the first semiconductors. He brought home a box of CK722 germanium transistors, and those were parts for me to start building projects with, and I did.

Eric, 4Z1UG:

What was your first project that you built with a CK722?

Dave, WI6R:

The first one was just a simple AM radio with an audio amplifier and it got a little more complex, and I built a super regenerative receiver with some. About this time, and mind you, I'm nine years old in 1957, my dad tells me that he built his first radio when he was 10 years old. I said, "Wow, I'm still nine. I have to build ... " Oh, his first one tube radio. I decided I have to build my first one tube radio while I'm still nine, so I proceeded to start

gathering together bits and pieces to do this. Of course, I hit up my dad for some parts and he came up with a 1S4 tube.

Dave, WI6R:

A 1S4 tube had a 1.5 filament, so you could run that from a D cell battery. Then, they typically ran with something like a 45-volt battery, which at that time you could still go down to the local drugstore and buy a 45-volt B battery to run your radio. I gathered together some parts and I got an idea from something in Popular Electronics that I should use a cigar box, so I built this super generative receiver. It was actually based on an article in Popular Mechanics and in those days, Popular Mechanics had lots and lots of things about building radios and electrical devices of all sorts.

Dave, WI6R:

I proceeded to build this one tube super regenerative receiver, and lo and behold, it actually worked, which probably surprised my dad more than me, but I didn't know enough to know how unlikely it was I would get this to work, but it did work. That was a lot of fun.

Eric, 4Z1UG:

Your father was obviously your mentor, your Elmer, and getting you towards amateur radio. When did you get your first license and how did that go?

Dave, WI6R:

I'd been already now building all sorts of electronics and radio things. I built little bug transmitters and things like that. I think we built a tubular microphone that was mounted on an old rifle stock that we could point down the street and listen to conversations and so on. But amateur radio didn't really get to the point where I said, "Okay, I have to get my license." Until the summer right before high school, so this was 1962 and I'm 13 years old. I finally decided that during the summer I would get my license. Honestly, at the time, I didn't want to learn the code.

Dave, WI6R:

I just wanted to build radios, but you got to learn the code, so I did that. We lived on a street, it was, at that time, a dead end street in Sunnyvale. We had, of course, three hams in our household. Well, two at that point, but we had two more on the same block, right across the street was another ham. I wish I could remember his call sign. It was a K6 call sign, Malan Heslop. He agreed to give me my novice test and I passed the test. I received my first license right before high school, probably terrible timing to start in on a hobby right before high school because you know what effects that has on doing homework.

Eric, 4Z1UG:

What was your first amateur radio rank? Did you get a novice license at age 13 or did you go straight to technician or general?

Dave, WI6R:

I got a novice license. The struggle was learning five-word per minute code for me. That was where I started off but by the time my year was coming to an end, I could send and receive 20 words a minute or more. CW has been my favorite mode ever since.

Eric, 4Z1UG:

What was the first rig?

Dave, WI6R:

Oh, so my first transmitter was a Heathkit AT-1, which honestly never worked very well. It had stability problems. It would break into oscillation at some bizarre frequency, not the crystal frequency. I did fix that about 50 years later. But that was replaced by a Globe Chief Deluxe, which was my first transmitter and then the receiver was an ARC-5/BC-453, which is one of the receivers that's right below the broadcast band. My dad had an old 40-meter mobile converter that we tweaked the IF output down to operate below the broadcast band instead of in the broadcast band, as those converters did in those days. That was my receiver all through my novice years.

Eric, 4Z1UG:

Did you work in the Awards, Worked All States or DXCC or anything like that?

Dave, WI6R:

My station was pretty minimal. I only operated on 40 meters. The antenna was entirely inside the garage. It was fed off of a water pipe ground, a quarter wave antenna that passed up from the water pipe where it entered the house in the garage. Then, up through the rafters with a neon bulb at the end and you'd tune it for maximum brilliance. That was my event. Although, I did enter one of the novice contests and I think I finished third or something like that on a single band op on 40 meters. I mostly rag chewed with people, so when we had a QSO, it would be 30, 45 minutes or so.

Eric, 4Z1UG:

Your father also had an operating position in the same house, right?

Dave, WI6R:

Yes. In 1959, he brought home a Collins S-Line that was in the shack in the house. That was not a radio I was allowed to operate. I could listen on it and all that, but I wasn't operating that. Even after I had my general, I wasn't operating that. But when the year was up, I didn't have an opportunity to get to San Francisco to take my test for my general

license. Once again, my neighbor across the street gave me the test for the technician class license and that allowed me to hang onto my call sign. For what it was worth, it was a terrible call sign.

Dave, WI6R:

They issued me, as a novice, the call sign, WB6BDA, which was a mistake. It was supposed to be WN6BDA. The problem with that was that everybody was sending too fast for me because they thought I had a general class license. It was pretty frustrating. I sent the license back to the FCC and said, "Can I have the right call sign?" Which they accommodated me with and sent it back to me.

Eric, 4Z1UG:

So, they did correct it?

Dave, WI6R:

Yes, they did correct it. Yes.

Eric, 4Z1UG:

Took a lot longer than they would now.

Dave, WI6R:

Oh, yeah.

Eric, 4Z1UG:

Everything was by mail and hand processed.

Dave, WI6R:

It was months, yes, but I endured until I got the license back with the call sign corrected.

Eric, 4Z1UG:

Were you in the public school in California and was there an amateur radio club in your high school?

Dave, WI6R:

Oh, yes. Yeah, I was very fortunate. The high school I attended, which was Fremont High School in Sunnyvale, we had a ... that school had just everything you could imagine in terms of equipment and facilities and so on. They just built a brand new Science Building. One of the science teachers was Doc, W6ZRJ. He was probably well-known in the area because he ran the ARRL West Coast CW Code practice sessions, but he was our electronics teacher. We had a couple of years of electronics in high school and we had just absolutely everything imaginable to assist us.

Dave, WI6R:

While my dad worked in the electronics industry and was an engineer most of his life, he taught me all the early stages of electronics. Doc was there to provide us some real guidance and what kind of things we should be learning. We had a really active club. We had lots and lots of hams in that club. Many of those guys, including someone who lives only 10 miles from me now are still active and on the air. Actually, probably some of them like Tom N6BT are very well-known in the industry.

Eric, 4Z1UG:

Now, this message from Icom America. Spring is just around the corner and Icom's new ID-52A handheld is now shipping. The Icom ID-52A is an industry-first handheld that can send photos over the D-STAR network. This radio is perfect for working your favorite VHF and UHF bands inside the ham shack and venturing outside. Did I say that Icom's ID-52A is now shipping? Icom's newest handheld amateur radio is a VHF/UHF dual bander with D-STAR and FM dual mode functions. This radio supports conventional FM communications and D-STAR simplex, repeater, and regional and worldwide calls over the D-STAR Internet gateway.

Eric, 4Z1UG:

The Icom ID-52A is the first handheld amateur radio with a full color 2.3 inch waterfall display that can send photos over D-STAR with connected Android device. Other features include wideband receiver with a guaranteed range of 144 to 148 megahertz and 440 to 450 megahertz. V/V, U/U, V/U with dual DV mode. Integrated GPS or GLONASS receiver, including grid square locations. Micro SD card slot. Micro USB for data transfer, programming, and charging. It's IPX7 waterproof and rugged. To get your Icom ID-52A or any find Icom transceiver, visit your local ham radio dealer.

Eric, 4Z1UG:

Click on the banner in this week's show notes page. When you finally buy that Icom radio, be sure to tell your dealer that you heard about it here on QSO Today. Now, back to our QSO.

Eric, 4Z1UG:

Did ham radio play a part in the choices that you made for your education and career after high school?

Dave, WI6R:

Absolutely. I thought communications was something that was really vitally important and that that's something that I should really pursue as a result. That was really my focus, I wanted to get an engineering degree. Right out of high school, I was able to get a job at Hewlett-Packard because my brother was working there while he was going to school. He

was three years older than me. Hewlett-Packard at that time would offer summer jobs for family members to allow them to earn some money during the summer. I ended up working that summer in their sheet metal department.

Dave, WI6R:

I'm banging holes in 608 signal generator panels. It was an experience. One, having my first job in industry, although I'd worked with my dad in his businesses, this was my first job in their electronics industry, per se. At the end of the summer, I was ... as it was approaching, I said, "I need to keep working. I need to earn some money. I need to buy books. I need to get gas for the car and car insurance and so on." I took some of my ham radio projects into the HR people at HP and told them that I wanted to try and work during the school year.

Dave, WI6R:

They asked if they could keep the little projects I brought in, which were some solid state VHF radio equipment I was working on, if he could keep it for a couple of days. I said, "Sure." Well, the next morning he gives me a call and says, "Come on up." He brought me down to the Frequency & Time Division, R&D lab, and asked me if I'd be interested in working there during school. Of course, obviously, I would. This was like falling into heaven for a ham. Here you have everything imaginable that you could possibly be interested in, is surrounding you, with all sorts of fantastic test equipment and so on, signal generators, spectrum analyzers. It was really a treat.

Eric, 4Z1UG:

Well, except it doesn't end there, does it?

Dave, WI6R:

No, it really doesn't end there. One night, this is probably, well, this is ... I'm in my second year of college. I'm working on a project at night in the lab and ... Okay, so I'm 19 years old. There's nobody else there at night, they're all home with their families. But at age 19, you can stick it out and work on projects. I'm building a solid state two-meter transceiver. Now, mind you, in 1967, we had the very earliest of repeaters, two-meter repeaters, but they were AM. I was building a solid state two-meter transceiver.

Dave, WI6R:

At that time, the difference between input and output frequencies was 1.1 megahertz, I believe, and that meant, hey, we have an IF that's in the broadcast band. Like so many HF mobile stations of the 1950s, here we had an opportunity to build something where a good deal of the receiver efforts handled with the car radio. I built this little transmitter, but I had all sorts of problems because ... I have test equipment, I can see what it looks like and the signals, well, the output, it had plenty of power. That was not the problem.

Dave, WI6R:

It's just that, where it was, it was on the third, fifth, seventh, and ninth harmonics of the output I really wanted. This was because we were using bipolar transistors and when you're trying to get a lot of power, well, they cut off at six-tenths of a volt. You have this flat wave form, and that means you have lots and lots of odd harmonics being generated. I had just read a little announcement from Motorola that they just released a field effect transistor for VHF and I thought, "Wow, field effect transistors, those work like tubes, they don't cut off at six-tenths of a volt."

Dave, WI6R:

Being at HP, I called a local parts distributor and asked them, "Well, do you have any of these new Motorola MPF-102s?" Of course, when you call from HP in those days, you get real attention from the local parts supplier. He says, "Yeah, would you like some samples?" I said, "Yes, that would be great." He says, "Well, okay, come up down at lunch and I'll have some on the counter for you." I went down to the parts distributor. I can't remember, it was probably LMR or somebody like that. Sure enough, on the counter were about 10 MPF-102s.

Dave, WI6R:

I took these back and replaced all the bipolar transistors in my multiplier chain, which was a 36 megahertz Crystal, double to 72, double to 144, and then drive an output stage with a modulator, and re-did the bias and everything for the FETs. Wow, this worked. This was a huge improvement. These odd harmonics were all 20, 25, 30 DB down, so this was hugely successful for my two-meter rig. But then I thought, gee, on the bench right behind me, I have a microwave frequency counter and they take a 10 megahertz oven-controlled crystal oscillator, that's this frequency standard inside the counter.

Dave, WI6R:

They multiply that up several times and they drive, essentially, a Varactor diode that is a multiplier. It generates all these harmonics from this 10 megahertz oscillator. With that, this Varactor sits inside a very, very sharply tuned microwave cavity. With that, it's essentially the LC filter that selects which harmonic you're going to see and that's used to provide the reference signal for measuring frequencies in microwaves ranges. I pulled the multiplier chain board out of that and replaced all of them with the Motorola MPF-102s that I had.

Dave, WI6R:

One of the other neat toys I had was a Polaroid instant camera so I could take before and after shots of what it looked like, the output of this reference signal, before and after. I got even a better result than I did with my two-meter transceiver. Primarily, it was in a nice shielded aluminium cavity box, so every print circuit board was plugged into a slot and then there was a cover that was screwed down over the top of all of them. It was really

nicely shielded, so it worked great. Well, right about the time I had taken the after picture, here comes someone wandering through the lab and who is it? It's Bill Hewlett.

Dave, WI6R:

He comes up and asks, well, what am I working on, so I showed him my two-meter transceiver and I then showed him what I'd done with the microwave frequency counter. Anyway, we talked for a few minutes, he got up and left. I thought, "Wow, how cool to meet one of the founders of HP?" Here's a company that has 4,000 employees. What's the likelihood of you meeting one of the founders? But I didn't give it much more thought. However, about three weeks later, one of the girls in the lab came to me and said, "You have a phone call." My first thought was, well, there's some emergency at home or something.

Dave, WI6R:

I'm just a student here, I don't think they even called them interns then like they do now. But she said, "No, no, it's the vice-president of engineering. He wants you to come to this conference room." She tells me how to find my way through the maze of buildings. There's five buildings, three floors each, on Page Mill Road in Palo Alto. I go to this conference room. Mind you, the VP of engineering, he sits probably 30 feet from me in the lab. I've never spoken a word to him, but as I walk in the door, he raised his hand up and says, "Hi, Dave, come on in."

Dave, WI6R:

There's four other guys sitting at the table with him. Two of them I recognize from the back corner of our lab. They have some sort of SkunkWorks project they're working on. Then, there's two other fellows I don't recognize, but he introduces me around to everybody. Two of them are Charlie Trimble and Jim [inaudible 00:27:22], the two from the back corner of our lab. Charlie Trimble's probably known by most people today as the guy who started the first GPS company, Trimble Navigation. Then, there's these other two fellows, and they're from something called HP Labs.

Dave, WI6R:

I didn't, at the time, even know what HP Laboratories was, but I quickly found out that it was essentially the West Coast equivalent of Bell Laboratories. It is a huge think tank with some very, very smart guys, lots of PhDs. Lots of PhDs working on projects. These two fellows are introduced as software engineers. I just have to keep reminding myself and everyone, this is 1967 and computers are not a household term, but they tell me about the project they're working on and then asked me if I'd be interested in working on it with them.

Dave, WI6R:

While the answer was, of course, I would. The project was actually to develop the first computerated printed circuit board design. The reason for this is that Charlie Trimble and Jim Ellinger were working on a project to build something called a signal analyzer. This was, essentially, one of the first digital signal processing systems. This project had lots and lots of circuit boards in it. The amount of time that it took to lay out manually as they did in those days, printed circuit boards, where you're laying tape down on Mylar and running them in one direction on one side of the board, a different direction on another layer in the board, and then figuring out where all the plated through holes go that connect those traces.

Dave, WI6R:

This was an arduous task. It took, essentially, one-man month or 30-man days to lay out a printed circuit board like we were doing. That was not going to work because they wanted to demonstrate this project at the IEEE show, the following year, in the following April, and this is August of 1968. They want to show it the following year at the IEEE show. Well, my job ended up being to work with these two software engineers on that project. But they said, "First of all, well, come on over. We'll show you HP Laboratories." I was then headed over to their workspace, which happened to be a door right between Bill Hewlett and Dave Packard's office.

Dave, WI6R:

I was quite startled when I saw one of them reach in his pocket, pull a key out to open the door. I thought, "Wow, that's really strange. What's the key for?" I can't roll \$20,000 worth of test equipment out here at night. They just say, "Goodnight, Dave." You go home with your test equipment and work on your project. But as soon as I got inside the door, I realized, wow, okay, there's something else going on in here. They proceeded to take me around HP Laboratories, through several lab areas and introducing me to, I can't even remember how many PhDs I met that day, and all the while they're reminding me that software is the future.

Dave, WI6R:

As we approached the door headed back out after heading through and visiting with fellows on various projects, I see a fellow with a very odd-looking thing. He has a probe with a display on the side of the probe. Mind you, at that time, I don't think a light-emitting diode had ever been seen outside HP Laboratories, where the LED was invented. But this fellow had a four, 7-segment LEDs mounted on the side of the probe and he's measuring the voltage on a pin on a tube socket. Yes, they had equipment with tubes. Instead of looking up at a VTVM sitting on the counter to read the voltage and, of course, when you move and look up to look at your VTVM on the shelf up above, and you inadvertently slip with the probe and [inaudible 00:31:28] pins on the socket and all this.

Dave, WI6R:

Well, here, he's just simply putting the probe on the pin, on the tube socket, and reading the voltage on that pin. My jaw hit the floor. I was just in absolute awe. As we proceeded towards the door, these two software engineers said, "If you can imagine it, we can make it." Those were words to live by at HP in those days.

Eric, 4Z1UG:

Wow. What a story. What happened after that? Did you finish your education and continue there?

Dave, WI6R:

This, again, was 1968. I was attending college. However, one quarter I dropped a class and was going to add a different class. Then, I wasn't able to get into that class. This meant I didn't have enough units for a student deferment.

Eric, 4Z1UG:

During the Vietnam War?

Dave, WI6R:

Yes, during the Vietnam War. This was a big problem. Proceeded to do everything I could to avoid this, to get some deferment, including with the help of HP, to try to prevent me from having to leave school and also leave HP, the whole project I had worked on at HP Laboratories. I was running the Computer Center at Stanford University from midnight till 8:00 in the morning. They basically rented the time on that computer system, which at the time was a Burroughs B5500. That's the computer that did the CAD design work, and mind you, we were able to do as many as three printed circuit boards.

Dave, WI6R:

From schematic to the printed circuit board in my hands in 24 hours, which was quite a remarkable breakthrough. The first demonstration of the HP-5480 Signal Analyzer was to bring a fetal heartbeat up out of the noise. This had to be the beginning of HP's medical instrumentation group, but they were successful in doing it and demonstrating it. We got the project done on time and that was pretty exciting. But after all the effort of trying to avoid getting drafted while I'm in the middle of school, I had to make a tough decision because it doesn't look like I'm getting anywhere with this.

Dave, WI6R:

If I'm going to go into the service, I'm going to do something by choice. I decided that I would go into the Navy's program because they had, at that time, probably the best electronic school anywhere. I entered this program in the Navy and was off, first to boot camp. Then, the school was actually in the same place. They were both in NAS, in Memphis, Tennessee. Actually, it was a adjoining town called Millington, but this is where

the Naval Training Facility was where I went through both boot camp and also this P school, which is how to not get killed working around aircraft.

Dave, WI6R:

Then, their technical school, which was an electronic school. On getting into that program, I learned that it was possible to challenge the courses. This meant that I could take tests and avoid having to actually do the school.

Eric, 4Z1UG:

I want to take a minute to tell you about my favorite podcast, the Ham Radio Workbench podcast with George KJ6VU and now joined by Rod VA3ON, Mike VA3MW, Mark N6MTS, and Vince VE6LK. Every two weeks, George and company offer up a status report on the mini amateur radio projects on their workbenches and explore projects on their guest workbenches. This group is project-active and prolific, covering many technical areas of amateur radio. The next time you want a deep dive into ham radio electronic project building or to learn about technology, tools, test equipment, construction techniques, and the rest, listen to the Ham Radio Workbench podcast available on every podcast player and channel.

Eric, 4Z1UG:

Use the link in this week's shownotes page to get to the Ham Radio Workbench podcast directly. Now, back to my QSO.

Eric, 4Z1UG:

In other words, you were testing out of classes that they would require you to take?

Dave, WI6R:

Exactly. I requested the chance to do that and they said, "Okay, fine." It started off with, essentially, a test that would happen every Friday. This is Tuesday, I think, already. It's no longer Monday, it's Tuesday. They've said I can do it and so they rolled this cart down to a door, opened up the door, and they started piling books, text and materials, study materials on this cart. I can't tell you how many there were. There were 30 or 40 different ones. Friday, I'm taking a test on this material, and that was just the start. But I managed after five weeks of testing to complete the 13-month curriculum, and I did it with a 3.67 GPA.

Dave, WI6R:

That was good enough for a commendation and an early trip home for a few weeks. It was a surprising thing, but here I am. I've been through their school and now what do they do next? Because they weren't really prepared for me, I ended up teaching electronics at NAS Alameda up in the Bay Area, not too far from my home, about a hour's drive. I spent a good deal of my time there just teaching electronics before getting assigned to a

squadron and where I became actually a radio operator on anti-submarine warfare planes.

Eric, 4Z1UG:

What happened after that?

Dave, WI6R:

After I got out of the service, I decided, well, it's time to go find some work again. Well, I knew that at that time that a company was actually required to bring you back as an employee, if you were drafted into the service during the war. My first thing to do was to go back to HP and drop in and see what was going on there. This was a pretty easy thing at that time. Things were not too crazy in the industry. Although, I have some stories about that. I can tell you about spying on, people spying on other companies.

Dave, WI6R:

But I went back in and stopped in and said hi to the folks in the lab where I'd worked and decided that I should at least let them know I'm back and I'd like to come back to work. While some time had passed, I'm burning through money, sitting at home, trying to figure out what I'm going to be doing next. I finally thought, "Well, I should really look and see if there's any other jobs available." I went down to the local employment office in Palo Alto to see what was on their board. Sure enough, here's a job that looks interesting. It's the stuff I've been doing.

Dave, WI6R:

It's a company that also does test equipment like HP. HP wasn't a computer company in those days, that was two guys in the corner of our lab building the first HP computer, but it was a test equipment company, number one. I thought, okay. I went up to the lady at the counter and said I'm interested in applying for this job. She asked, "Well, do you have resumes?" I said, "Yeah, I have one here." "Well, do you have more?" I said, "No, but I can get some." I got back in my car, drove back to HP, walked in the door and made a few copies on the Xerox machine and came back to the ... and dropped off the resumes.

Dave, WI6R:

Well, within a couple of hours, I had an interview scheduled at this company. It's actually quite amazing what it was like in those days compared to what it's like now, where companies may have a thousand people applying for jobs or hardly anyone applying for jobs when they have a thousand openings, but it was very different in those days.

Eric, 4Z1UG:

To put it in context, Dave, the Silicon Valley wasn't yet the Silicon Valley, right? It had its anchor at Stanford, in the middle of the valley there, but what San Jose was a lot of orange trees.

Dave, WI6R:

Yes. That's really true. Yes, absolutely. It wasn't known as Silicon Valley. It was known as the Valley of Heart's Delight. Matter of fact, that's the title of my book is, A Walk Through the Valley of Heart's Delight. It's a book I'm writing about growing up in the Bay Area and working in the industry, because there were just a handful of companies. There was Fairchild Semiconductor. There was Hewlett-Packard and a number of other companies that were in a park called Stanford Industrial Park. That was really because of Terman, Professor Terman at Stanford who, during World War II, had been very, very involved with the government and military and doing research projects.

Dave, WI6R:

He thought that after the war, that there should be an opportunity for students that have been working on projects there to go off and do interesting and fun things and help them develop and start companies, including taking technology developed at Stanford and go start a company with that technology. Yeah, it was a very, very different time. HP was probably the first company that just absolutely exploded, going from a couple of small buildings to building a five-building complex in Palo Alto. Yeah, it was a very, very different time.

Eric, 4Z1UG:

Hewlett-Packard has that romantic history of starting from a garage in Menlo Park in the late '40s.

Dave, WI6R:

Yes, and both, of course, were hams and this is not uncommon and still is not uncommon for companies being started by hams.

Eric, 4Z1UG:

You had this interview that afternoon. What company were you interviewing? Did you get the job there?

Dave, WI6R:

Yes. The company was Wiltron. Wiltron was actually made up of several ex-HP people and as well as some other very, very bright fellows that had been working on building RF and microwave test equipment. I went in and started interviewing for the job, and mind you, I'm still only 20 years old, not quite 21. I'm being interviewed by people who I just assumed they're engineers. I had no idea I was being interviewed by the president and vice-president of the company. Of course, when they saw my resume that I'd worked at Hewlett-Packard and HP Laboratories, they ... while I was being interviewed, somebody called HP and asked for references.

Dave, WI6R:

I would love to know what Bill Hewlett put in my personnel file at HP but whatever it was, it must have been pretty amazing because they wanted to know if I could start that day.

Eric, 4Z1UG:

Cash advance, perhaps. I got to buy gas to come tomorrow.

Dave, WI6R:

They were pretty adamant that they wanted me to start as soon as possible. I said, "Well, how about if I start on Monday?" I think it was Wednesday or something like that and I needed a couple of days to get some things in order. I did agree to accept the job. Thursday morning, I'm actually woken up by the telephone ringing and it's HP. They want me to come in and talk to me about a job opportunity they have for me. I've already accepted a job at Wiltron. I said, "Well, okay, I'll come in anyway." I didn't tell them I'd already taken the job. I went in and the job they offered me, absolutely startling.

Dave, WI6R:

If I think back about it, I go like, "Was I crazy I didn't take that job?" They wanted me to run the manufacturing operation for the 5480 digital signal processor, that was going to be me running the whole operation. Yeah, me? I'm going to be here with this 20-year-old kid with about 30, 40-year-old ladies that are working in manufacturing. This didn't look like something that was going to work for me. Besides that, it wasn't engineering. They were doing manufacturing and, obviously, they wanted somebody that was really familiar with the equipment. I built most of the test fixtures for it.

Dave, WI6R:

While I was doing the PCB CAD work, I also built all the test fixtures, the automated test facilities for this thing. It was so complicated. You had to test everything, boards and chassis wiring and everything before you dare plug things in and turn them on. But it just looked like this would be a ... not exactly my cup of tea. In the end, I turned down that job offer, as insane as that seems today, and took the job at Wiltron. But the experiences you get through your career, they're what pay you back in the end. It was a really good experience working at Wiltron because I not only had an opportunity to get involved with ...

Dave, WI6R:

Well, I started out as a test technician there but I rapidly ended up working in their R&D group as well, and ended up being product manager for more than two-thirds of their product line. It was a really good experience. They got involved in the telecommunications industry, building test equipment for the telecommunications industry. That experience was invaluable. Going out and visiting Western Electric and showing them and demonstrating our product we developed for them, was really priceless. All I can say is that it was really time well-spent working at Wiltron as well.

Eric, 4Z1UG:

Were you able to finish your degree?

Dave, WI6R:

That's one of the things that's really, really difficult. I did go back to school as soon as I got back out of the service, as soon as I could get into classes. Surprisingly, classes, I felt like I was struggling with beforehand were really easy. I got really great grades, I got As and everything I took afterwards. The problem was, it's getting increasingly expensive. I'm no longer living at home. Honestly, learning in school was slow. I'm learning at a rate a hundred times what I would be in school. As a result, it was difficult to go back to school.

Dave, WI6R:

This was one of the really offsetting things about not staying at HP. If I'd stayed at HP, they would've paid me full time and sent me to school. Working at Wiltron, they weren't at all interested in that. They were mostly interested in me working. It became not an easy thing to do and it got progressively more difficult. All I can say is, is that having a degree is critically priceless today for almost anyone. As much as I wanted it then, it was an interruption to learning. There's many things I wanted to learn more about in school, which, things like physics and many, many more math classes and so on.

Dave, WI6R:

But honestly, throughout my career, when I needed to learn some of those other things, well, you learn what you needed to do the project you're working on and you proceeded ahead. I ended up, towards the end of my career, having PhDs working for me. I guess, it really depends on how you make use of your time and what your focus is on.

Eric, 4Z1UG:

Were you penalized at all for not finishing the degree as you're going up the ladder in the industry?

Dave, WI6R:

I don't think so. I think that my work ethic and my attitude towards the job, and really much of my learning about how businesses run at HP, those were invaluable. The reason HP was the company it was is because of the principles that Hewlett and Packard brought to that company. That's something they instilled in everyone in the company, in our labs there. Every little group was like its own little company. That turned out to be quite valuable down the road in anything I did, because you just have a different perspective on doing a job and getting the work done.

Eric, 4Z1UG:

We will return to our guest in just a moment. A new way to show your support of the QSO Today podcast is to buy me a coffee. I consume gallons of coffee to create this weekly podcast. Invite me for coffee by pushing the yellow button, buy me a coffee on the QSO Today show notes page. Now, back to our QSO Today.

Eric, 4Z1UG:

Now, was there a time for amateur radio during this period of time?

Dave, WI6R:

Boy, there was ... this was pretty difficult. When you start working on a career and a family and so on, that becomes difficult. There was probably a seven or eight-year period of time where I wasn't involved, but I was living in apartments, and putting up antennas and things were not really practical. I ended up, I think at one time, selling all of my ham gear that was stacked up in a closet. Actually, to a fellow from Memorex who had just done their IPO, and he became, I guess, quite wealthy after the IPO. He bought all of my ham radio equipment. He just took everything I had stored in the closet. I didn't have anything until the late '70s when I decided to get back on the air again.

Eric, 4Z1UG:

When you got back on the air, what did you do?

Dave, WI6R:

Well, the first thing I did was I went out and bought brand new commercial gear, which was something I'd never had before. I bought a Yaesu FT-101ZD and the external VFO. I think I bought their antenna tuner and some other things. I was back on the air. I put up a simple vertical antenna, a trap vertical, a horrible antenna, but it got me on the air. That was my start of getting back on the air, having some fun chasing DX and running phone patches and so on.

Eric, 4Z1UG:

But you said earlier that CW is your favorite operating mode. How did you pursue that?

Dave, WI6R:

I took every opportunity to chase DX on CW, a few contests. I got interested in that. It was tough to be super serious about it, but I did do that. I got the little computer logging programs and things that would key the transmitter and that sort of stuff. But I was mostly interested in talking to hams in other parts of the world. I thought that was the next most fascinating part of the hobby that I could do, and that was my peak interest. Although, I also got interested in VHF and UHF again. Part of that was because I got involved with the DX packet spotting network, and I ran some of the software and I was working in the computer industry as well.

Dave, WI6R:

I built computers to run those packet radio systems, got on VHF, got on VHF on single side band, which was fun. Again, something I had done back when I was in high school. Yeah, it was really exploring a lot of different facets of ham radio that I hadn't done before.

Eric, 4Z1UG:

Anybody that looks at your QRZ page should be prepared for about 19,000 words, I think.

Dave, WI6R:

Yeah.

Eric, 4Z1UG:

You lay your life bare there on QRZ.

Dave, WI6R:

I think three times he had to increase the size that was allowed for a QRZ page, and it's not because of photos, photos, you can have as many as you want.

Eric, 4Z1UG:

It's very fine print, I must say. You tell some interesting stories. But it appears to me that you've become a very project-oriented ham. From restoration of radios, you're interested in QRP, which one of those do you want to start with first? How about let's start with radio restoration. How did that happen? How did that start for you?

Dave, WI6R:

When I retired, I realized that I had been storing at a significant cost for about 11 or 12 years, all kinds of gear that my dad had kept clear back from my days in high school. My original novice transmitter and receiver and, oh, just all sorts of things. Some of my solid state version of a Collins S-Line I had been building while I was at HP. I just had all this stuff and I thought, "Man, I've got to get that stuff out of storage. I'm not working. I got to stop paying storage fees on all this stuff." I started pulling it out of storage and I thought, "Gee, I wonder if any of this still works."

Dave, WI6R:

I've been running engineering teams. I haven't had a soldering iron in my hand for quite a long time. I proceeded to start restoring my Novice Station and pulling out some of this gear and making projects out of some of that gear and sure enough, I could get this stuff to work. The next thing I know, I'm in the process of ... when I was in the process of searching for parts for some of those radios I was restoring, although I didn't need too many. My dad's supply of brand new electronic parts of all types from 40 years before was

pretty amazing, but I kept running across, "Wow, I always wanted to have one of those when I was young." But, of course, I couldn't afford it.

Dave, WI6R:

I would find some used gear on eBay or at a swap meet or whatever. Pretty soon, I'm collecting radios and restoring them. It's contagious, I have to say, because once you start doing it, you start meeting other people that do it, including on the air. We started a little vintage single sideband round table some 11 years ago, that's still going today. It's quite active. It's all guys that were interested in restoring old gear and have fun operating the old gear.

Eric, 4Z1UG:

How far back, Dave, does vintage have to be to be vintage SSB? Are we talking late '60s? Like you're talking then, the Drakes, the Swan?

Dave, WI6R:

The single sidebands commercial gear really started in the early 1950s with Central Electronics. That was the beginning. That was probably the first piece of commercial single sideband gear on the market. By the end of the 1950s, there were many, many companies building single sideband equipment, the AM single sideband wars as people refer to. I don't think of them as that really, but there were some issues in the beginning where the guys on single sideband were driven to edges of the band by the carriers from the AM guys. I really didn't experience too much of that.

Dave, WI6R:

By the time my dad had brought home a Collins S-Line in 1959, single sideband had already taken over completely. I think there were probably more carriers on the air today than there were by the end of the 1950s. But, yeah, there's quite a little bit of that. The 1950s stuff is really interesting. Some of it is quite complex, some of it's quite simple. Then, as you move into the Collins gear that was produced in the 1950s, which I have most of that gear, it's quite complicated. It's quite good equipment. It works extremely well.

Dave, WI6R:

Then, there's the really, really simple equipment like ... were done by Herb Johnson who started Swan. My first single sideband rig was, in fact, one of those first 11 radios built at his garage in Benson, Arizona. Before he moved to California, to Oceanside, to really grow the company. But his stuff was just, it looked like something you would build as a home brew project, except with the manufacturing capability you couldn't dream of building at home. It was quite a simple gear. It was very effective, but it was also cost effective at a fraction of what some of the more exotic stuff like Collins had.

Dave, WI6R:

That was kind of the interest, is really looking at how these different companies approach designing and building this gear, and it's fascinating. The ingenuity that was used to build some of these radios is really amazing.

Eric, 4Z1UG:

If you were going to recommend for someone who wants to join the vintage SSB round table, a pair of radios that they should have in order to be eligible, what would you recommend?

Dave, WI6R:

Well, basically, we really look at the period of time up until 1980, that was the breaking point between the gear that was designed and built here in the US, the onslaught of gear coming from offshore. Although, there's plenty of vintage single sideband gear built by companies like Yaesu and Kenwood, and then later Icom. But basically any of that gear built before 1980 is possible, from very straightforward transceivers, which are pretty easy to use. I have a Swan 240, which is a tri-band, 80, 40, 20-meter transceiver.

Dave, WI6R:

It's very simple, but it has a lot of the features that didn't exist in his earliest rigs, which were all monobanders, but it's a cute little box, a single box with a power supply. You plug a mic in it, you plug an antenna on the end of it and you're on the air with it. It's pretty straightforward. Putting one of these back on the air usually requires replacing electrolytic capacitors, which over time go bad. Usually, do that in the power supply and any other place in the radio that they exist before you power it up, and then you can have a radio that you can put on the air.

Dave, WI6R:

It's interesting from a standpoint of troubleshooting. If you like doing that sort of thing, you'll need a little bit of test equipment, voltmeter, a signal generator are very, very helpful, but you don't need a lot to get this old gear running.

Eric, 4Z1UG:

The Heathkits like the HW-101, the SB series, if you're looking American, that would be-

Dave, WI6R:

Absolutely.

Eric, 4Z1UG:

... in that place. You could even maybe go further back Apache, the big boxes.

Dave, WI6R:

Oh, yeah. Yeah. Our high school club station was a Heathkit Mohawk and Apache with an SB-10 single sideband adapter. That was actually quite a station. It worked terrific. It was built by students in the amateur radio club and they're quite effective, but they're heavy.

Eric, 4Z1UG:

You can't put it on a card table.

Dave, WI6R:

I own a little scissor jack cart that I can move the heavy one's around, because some of them are pushing a hundred pounds but ... and that's why I suggest the ones that are a little lighter, particularly if you're my age, you appreciate not having to lug the heavy stuff around. But there's lots and lots, and the Heathkit gear, I really like the Heathkit gear. They built some tremendous radios in the SB series. One of the things I think that differentiates all these radios, one from the other, is how good the AGC system is in them.

Dave, WI6R:

The Heathkit ones are probably the only other ones, bar Collins, that has just absolutely superb AGC system, which is so important in single sideband.

Eric, 4Z1UG:

What does your workbench look like?

Dave, WI6R:

It looks like my workbench at HP.

Eric, 4Z1UG:

You have a lot of HP gear on your workbench in addition to it might being busy?

Dave, WI6R:

Yes, I've got two HP spectrum analyzers with tracking generators. I've got a military version of their 8640 signal generator, which is our priceless piece of test equipment because I can measure receiver sensitivities down to minus 140 decibels. There just isn't much made ever even since then, that's quite as good as that, for doing that sort of thing. I've got a Techtronics scope. Sitting on my bench at the moment is a spy radio that was used by the CIA that I'm repairing.

Eric, 4Z1UG:

Are you still working for money?

Dave, WI6R:

I have a consulting business that I started in early 1990s when I was building data centers and I still do that. Most of the work in that consulting business today is defending patents that I have, which I'm finally done with because I don't have any patents that aren't more than 20 years old now. But I did do that. I just finished up with a patent defense case for Dell Computer, who is using one of my patents and that kept me busy. But I also, in the process of getting back on the air for the second time, after a hiatus, after moving, where I didn't have antennas, I got back on the air and I wanted to have a decent headset for my radio.

Dave, WI6R:

Prior to retiring, I'd been racing. The fellow who built the headsets for our team, race team, I paid him a visit and asked if I could pick through his parts and pick out some pieces to build headsets for my radio. I am a CW operator so I wanted a listen-only headset, but I chase DX, so I work them on phone as well, so I built a boom-mic headset. The result of that is, as I'm meeting all the local hams is, I keep being asked to make headsets for them like the one I had. I think I built 16 headsets for local hams.

Dave, WI6R:

My neighbor at the time, John W6XSL, he's unfortunately a silent key now, but he said, "Look, why don't you build these? Where else can you buy a commercial quality headset for ham radio?" I went back and talked to the fellow who was manufacturing the headsets and said, "Can you build me some headsets so I can see if there's really any interest in this?" I never imagined I'd ever be building anything for amateur radio after 43 years in the electronics industry. But he explained, "Look, I can't build small, just a few of these."

Dave, WI6R:

We have all this setup time and this highly automated manufacturing process, but he agreed to do 25 of listen-only headset and 25 of boom-mic headset. I took about half of those to a little ARRL convention in Santa Barbara. I sold 13 of them in four hours. I thought, okay, I guess that's the answer to my question is, yes, there's demand. That was 11 years ago. We've built more than 10,000 amateur radio headsets that are in 130 countries. It's been a fun experience. I wouldn't call it as something that makes money, but it's a heck of a lot of fun.

Dave, WI6R:

We enjoy doing it. As long as we can justify doing it, we'll keep doing it. Virtually, all of the big DXpeditions will only use our headsets. They don't like having to repair stuff when they're halfway around the world on some little island in the Arctic or something. It's been a lot of fun and we try to support those guys as much as we can. Yeah, that's what we've been doing.

Eric, 4Z1UG:

That's Arlan Communications? That's the company?

Dave, WI6R:

Yes, it is.

Eric, 4Z1UG:

You're the headset guy. What's the current QTH. Where are you located now?

Dave, WI6R:

We just built a new home and shop. Well, actually, just outside Kingman, Arizona. We're in the Northwestern corner of Arizona, about 90 miles south of Las Vegas, Nevada.

Eric, 4Z1UG:

Of course, anybody that is from California would ask, why would you move from California to Kingman, Arizona of all places?

Dave, WI6R:

There's space here. In California, space is prime and it's expensive. If you want a place where you can put up antennas, the dirt's about three-quarters of a million dollars, and then you start from there. The impudence to come to Arizona is you've got some space. As my high school buddy, Tom, has seven and a half acres about 10 miles north of me with a absolutely stunning antenna farm on it. That's a lot of the motivation here, but it's also, I got pleasant weather. It's not so different from the northern end of the Central Coast. It's got reasonable weather. It's very different.

Dave, WI6R:

Desert in Arizona is nothing like desert in California. Desert in Arizona is quite unique. 10 miles from our house, we can be at 7,700 feet in the snow as we were last week, having dinner at the lodge. But you can be back down here. We're at 3,500 feet, so that helps. The antennas, you can put up almost anything and it works. I put up a temporary Dipole at 25 feet and worked the world, worked the Cayman Islands on a 160 meters. It's possible to do things here that you probably wouldn't want to spend the money to do somewhere else.

Eric, 4Z1UG:

From your perspective, what do you think the greatest challenge facing amateur radio is now?

Dave, WI6R:

I think relevance is probably one of the biggest challenges because there's so many other things that can distract or attract people, but it still has, I think, some of the same

potential draws if they're handled in the same way. As I mentioned, my interest was spawned by Sputnik. I thought that was amazing. In 1983, I feel like I came full circle because I had just bought a new car and put a little two-meter FM transceiver in it. I read the announcement that Owen Garriott W5LFL on the space shuttle was going to be operating a radio from the space shuttle.

Dave, WI6R:

They had put what date he was going to do that and the approximate time. I said, "Well, I'm driving to work so I guess it's going to have to be from my car." Sure enough, I heard Owen Garriott call CQ on the frequency he was to be on. I called him. He came right back to me. I may not have been the first US ham that talked to him, he may have talked to somebody in Hawaii prior to that, but I was certainly, if not the first, one of the very first amateurs to talk to another amateur in space.

Eric, 4Z1UG:

There was some wonder about that, I guess. What you're saying is, there seems to be a lot of other things that are wonderful in our sphere of influence that probably ham radio doesn't seem to create that same kind of wonder that it used to. Would you say that?

Dave, WI6R:

Actually, I think it does. It's just that there's a lot of noise if you will, of other things that might take away from that. The reason I brought up the example of what to me was coming full circle, from Sputnik to talking to an astronaut in space was that, hey, anything else I do in ham radio is a bonus, but it's the same interest today. At the Yuma Hamfest this past weekend, I had a young lady talk to me about, "Well, my daughter wants to be an astronaut so we decided we're all going to get our ham radio licenses because we think this is something that will allow her to get involved in that, for example, the communications with the space station and so on, that goes on with schools."

Dave, WI6R:

I think it's the same attraction to get kids interested in science and in technology. Those are the key elements. I work very closely with the kids at Cal Poly State University in San Luis Obispo. I can tell you the kids in their amateur radio club, every one of those kids that graduates with an engineering degree has a job before they graduate and their interest in amateur radio, their ability to have context to what they're going to do in school is really priceless. That's something that I can't imagine any other opportunity young people could have to be involved in something like this.

Dave, WI6R:

At a very, very early age and like myself, come out of school prepared to actually do something. I think that's one of the real attractions of amateur radio for young people today, if they realize it.

Eric, 4Z1UG:

I'm often thinking that you represent a wide range of skillset that is not created anymore. Do you think that skillset that you have and that many amateurs have, who've gone the same path that you've gone, do you think that skillset is needed now and in the future?

Dave, WI6R:

Absolutely. I think it's needed maybe more now, simply because it's lacking. Honestly, it was lacking throughout my entire career. For all the jobs that I've had and all the things I've done, the most important jobs I've done, I've been as a product manager, and why I say that is, is you really need to understand customers. If you're going to build something, you need to understand the customer and what they're trying to do. The customer rarely can come to you and tell you what they want.

Dave, WI6R:

They can tell you what you need, what they need from a perspective of what they're trying to do, but they don't know what's possible. If you understand what their needs are and you have the experience of what's possible that they would never have thought of because it's just not something that's commonly out there, then you have the opportunity to do something that's really remarkable and make a big change. That's where real successes in the industry come from. My patents from 20 years ago, I was in my early 50s, but they turned out to be extremely valuable.

Dave, WI6R:

All of that was really based on my entire career of working in electronics and knowing, and understanding people, and understanding what their needs were and how do you solve the problem that they have. I think it's needed just as much today as it ever was. It's just as much in demand as it ever was, even if it's not recognized.

Eric, 4Z1UG:

Does that demand keep you busy? I seem to know a fair number of hams who are in their 70s now, who are still working because their skill sets are just not available in younger people.

Dave, WI6R:

I think that's absolutely the case. That's why I enjoy working with kids at the university level, because I try to encourage them to do these things. In amateur radio, if you work on projects for yourself in amateur radio, you get to do all of those things. You get to scope out what the entire scope of a project is. No matter how simpler complex the project is, you end up learning how to do both electrical and mechanical design and development work. If you do it, really take it on to do it yourself. When you're done, you may say, "Okay,

that was 80% of what I wanted to do, and I'm going to redo it again later, and I'm going to fix those things that we're lacking."

Dave, WI6R:

Because that's exactly what happens in the industry. You develop a product to solve a problem and as soon as you've done that, you realize that, okay, we solved a lot of the problems, but now I know how many more things I can do, and that's the next product. I think this is critically important. Yes, we are an aging group. My brother did a XML download from QRZ to find out what the average age of different licensees hams were. The extra class licensed ham at that time two years ago was 70 years old. Today, he's two years older, he's 72. The problem is that very sharp and I mean very, very sharp peak of ages around that is getting shorter.

Dave, WI6R:

That's a big problem, but the demands are very much there. What we really need more of is we need more people working with young people to encourage them to take up and learn those things that we did. They can become very, very successful in their career and in their life.

Eric, 4Z1UG:

Often people tell me that in their retirement, they seem to be more busy than they were before they retired. Is that your life as well? Are you more busy than you were before you retired?

Dave, WI6R:

My dad, also a ham, W6LEH said, "I don't know how I ever found time to work." I was, of course, I was probably 40 at the time and I didn't quite get that, but I do now. I can work 18 hours a day, seven days a week. It's not a bit of a problem. There's more to do than I can imagine. There's things I want to do. There's things I have to do. Yeah, I do more today of the scoping out what things I actually am going to do and take off the list of things that I'm not going to get to.

Eric, 4Z1UG:

You're more discerning now than you were in the past?

Dave, WI6R:

Well, I just have to be, yeah. There is a lot to do. One of my friends used to say, he said, "If you have something that you need done, give it to somebody who's busy."

Eric, 4Z1UG:

That's absolutely true. Do you have a discipline or do you calendar projects so that you make the time to get them done or do you just have this work ethic that as soon as breakfast is over you're in the lab by 8:00 o'clock, 9:00 o'clock. Right now you're talking to me and we started when it was 6:00 AM, I think, or maybe 7:00 AM your time.

Dave, WI6R:

Yes, 7:00 AM. Yes. Right.

Eric, 4Z1UG:

I'm getting you're an early bird.

Dave, WI6R:

Yes and no. I can also be someone who's up quite late. Matter of fact, sometimes the projects I work on for myself are from 10:00 o'clock at night till midnight or 1:00 in the morning or something, but yeah, it's ... I think if you talk to the typical person who's writing software, it's addictive. I had to stop writing software because I realized I'd be up all night. Of course, your ability to do a good job of writing code at 3:00 AM in the morning is not very good, you need to stop and get some sleep. But yeah, the software engineers show up at 11:00 in the morning and stop working sometime after midnight. Yeah.

Dave, WI6R:

Yes, you have to decide when you're going to do it and what you're going to get done. I have a lot of projects that they're interrupted by, I need this to do that. I then work on another project while I'm waiting for those pieces to arrive. I'll have many projects going at one time, not as many as I used to. I used to be able to handle a lot more, but it's still, yeah, it's still that way. I don't know what I'd do if I didn't have projects to work on. I would be probably terribly bored.

Eric, 4Z1UG:

What excites you the most about what's happening in amateur radio now?

Dave, WI6R:

I think what's happening in amateur radio now is really typified by what's happening in our everyday lives. I look at my own current radio, software defined radio, and it behaves the way it behaves because of Apple Computer producing an iPad. Manuals are no longer required to run a radio. We had this period of time where we went from radios that you could walk in, turn this, the power switch on and start using the radio immediately, to radios that had 20 buttons, which each could do up to three different things. It required a 300-page manual to go figure out how to do something you haven't done for a few months with the radio.

Dave, WI6R:

This became a big problem. This was the radios built from 2000 forward, largely were that category. I had an FT-1000MP, which I was constantly learning it would do things I didn't know it would do. I had owned it for a long time. With a modern radio with a touchscreen, you literally can run the radio without ever opening the manual, except for maybe some really obscure thing, but capabilities to have very, very sophisticated communications equipment that's easy to operate is really an amazing aspect of our latest equipment and its ability, obviously, to perform a bit better than anything we've ever had in the past.

Dave, WI6R:

Since I've worked on DSP stuff in 1967, that doesn't seem like new things to me. But if you look back at just where we've come from and look at some of the technology, it's new technology that's quite old. Our third method of single sideband generation was patented in the 1950s by a former student at Stanford, had earlier been working on a project for Central Electronics to build a better phasing single sideband transmitter. He left Stanford and went to work at Stanford Research Institute, SRI, and there he developed this other method of generating single sideband, which was... it has been adopted by the people in the telecommunication space.

Dave, WI6R:

But it is in fact the method that's used in the software-defined radio to generate single sideband. Here we are in the 2000s, using technology that was actually invented 50 years ago. Even the microwave digital radio system I worked on in the mid-70s was another leverage of Weaver's design for generating single sideband, where we put two T1 carriers on upper and lower sideband of a microwave transmitter. We constantly reinvent, but some of the underlying technology goes way, way back.

Eric, 4Z1UG:

Do you have advice that you would give, Dave, to new or returning hams to the hobby?

Dave, WI6R:

Oh, boy. Well, I suppose if they're coming back to the hobby ...

Eric, 4Z1UG:

After being asleep for 20, 30 years.

Dave, WI6R:

Yeah, probably the biggest thing is you don't need to run out and go buy a brand new expensive radio. I have fun working DX with a 50-year-old radio and they never know on the other end, except that somebody will recognize what it sounds like. I just brought a KWM-1 up that was the first single sideband transceiver and my first station at work was in Anchorage, Alaska. When I told him what I was running, he came back and said, "Yup,

typical, great Collins audio." You don't need an expensive radio. You do want a good antenna, that's maybe the most important thing.

Dave, WI6R:

Then, you need to pick up the magazines and find out what's going on, find out where the local clubs are and get to know the hams in your area. That's where you'll find the opportunities of new things to do, whether it's operating field day, going up and operating on a mountaintop, which I and my brother would like to do a lot more of. Something we did back on field days and when times passed, and there's just a wealth of things. Working satellites, you can do it with a handheld radio and antenna held in your hand.

Dave, WI6R:

My advice is, coming back to it is, you don't need to go spend a lot of money to do this. You do want a good antenna that works and go join the local club and find out what other people are doing. For somebody that's brand new to the hobby, particularly if they're wanting to get licensed, the first thing I tell them to do is go find a 1960s or '70s radio amateurs handbook at a swap meet, learn the first hundred pages of it. Learn the material. Don't memorize answers to questions, actually learn the stuff. Then, the hobby will be fun for you because you'll know what you're [inaudible 01:21:05].

Eric, 4Z1UG:

Well, I think that's great advice, Dave. I want to tell the listeners that you should look up Dave's QRZ page. Look up WI6R on QRZ, and you'll see that Dave and I have just scratched the surface of Dave Bottom WI6R. If you'll do that, then you'll learn more about Dave. Dave, I want to thank you so much for joining me on the QSO Today podcast. It was really a gas. I had a thousand questions that I didn't get to, but that's okay, because at some point people will scratch Dave more and they'll ask you those questions and will learn about them. With that, I want to thank you so much and wish you 73.

Dave, WI6R:

Thanks, Eric. 73s to you, too. Thanks for the invite.

Eric, 4Z1UG:

Please be sure to check out the show notes that include links and information about the topics that we discussed. Go to [www.qsotoday.com](http://www.qsotoday.com) and put in WI6R in the search box at the top of the page.

Eric, 4Z1UG:

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Eric, 4Z1UG:

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