



Episode 292 – Dale Parfitt – W4OP

Transcript Funded by Mike Tindor AA8IA

Eric 4Z1UG:

QSO Today, episode 292, Dale Parfitt, W4OP.

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My thanks to both ICOM America and QRP Labs for sponsoring the QSO Today podcast, we are planning an amateur radio group tour to Israel in may of 2021, a beautiful time with the year to tour and play radio. If you think that you'd might have an interest in our tour, please click on the banner on this week's show notes page.

Welcome to the QSO Today podcast I'm Eric Guth 4Z1UG, your host. Dale Parfitt W4OP developed a love for frequencies, VHF and above, including moon bounce operation, from an early exposure to a six meter Gonset Communicator or Gooney Bird. His love for electronics grew into a career as an electronics engineer and entrepreneur, founder of Par Electronics, where custom filters and antennas are his special forte, W4OP tells his story in this QSO Today. W4OP, this is Eric for 4Z1UG. Are you there, Dale?

Dale W4OP:

4Z1UG. W4OP. So nice to hook up with you.

Eric 4Z1UG:

It is indeed, Dale. Thanks for joining me on the QSO Today podcast. Can we start at the beginning of your hand radio story? When and how did it start for you?

Dale W4OP:

You know, I would say I was probably about 10, 11 years old, and I was rather intrigued with radio. I recall we had a Zenith floor model wood radio popular in the day, but it had short wave bands on it. And I was just intrigued by all the different short wave stations that were on back then. Many more than what we have today. And one in particular was of course, radio Moscow, and they had that Moscow mail bag and which I'm sure they wrote both sides of those letters in Russia, but they just scared the daylights out of me listening to that. And then I had a cousin considerably older than myself. Bill. Later, WB2NEV. And

Bill was into RC airplanes and he helped me build my first crystal radio. And it was just magical to me.

And from there, I started building an Olson one transistor radio with a dial detector. And then my father bought me a small Olson, portable three or four tube, a little portable radio. And, then I'm listening to the amateurs on the air and we did have an amateur about two blocks over from me. He and his wife were very active. And so I thought about getting licensed and in Elmira, New York, where I grew up, just a bit south of where Janice grew up, your previous podcast. And, but it was adult education. They were offering ham radio and you had to be 18. So I was 12 at the time I believe, but my mother was kind enough to enroll and she was able to take me along and babysit me so to speak.

But at that time she was finishing her nursing degree at Syracuse and never took the exams, but I did take the novice exam and waited very, very patiently for that glassine envelope late 1962, I believe. And I was given the call of WV2, whiskey Victor two, Yankee, Papa, Yankee. And in that day, of course you had to take a higher class license. Your novice was only good for one year. So in about six months, I took my general and got WA2YPY, and was at that time, very active on, on HF CW, a little bit of AM, but CW has always been my first love. So, that's how it all began. And it continues to this day, unabated.

Eric 4Z1UG:

In addition to the help of your mother, did you have any Elmers or mentors that helped you along?

Dale W4OP:

Well I did. I was remiss, yes. At night school, we had two teachers, Joe Spetico, WB2ZBD, who was a CW op, and Bill Hamilton, W2HQY. And Bill was a phone op. So they were perfect. Joe taught the code and Bill taught us the theory. Two wonderful, wonderful Elmers.

Eric 4Z1UG:

Now you have your license. You're 12 and a half 13. So you're actually quite young to be a general class ham, which is cool. How did that play out as a teenager? What was the first rig that you had then after you got your license?

Dale W4OP:

Yes. Before I was licensed, my father took me over to an electronic store in Elmira. Chemung Electronics. Chemung is the name of a river that passes through Elmira. And he bought me a national 188 receiver, general coverage receiver, with hand band spread. And I had been saving up for one of the night kit regen receivers. And my dad said, "We can do better than that." So I already had the receiver. I had done a lot of listening, so I

really knew what the protocol was. And then when I got licensed, before my license came, my father bought me a Heath kit DX20. And then when I got my general, I went up to a DX40. So I had a screen grid AM rig. And after that in Eico, I think it's a 720, the 90 Watts CW rig, and later the plate modulator with the magic eye tube.

And receivers after that, my science teacher sold me very reasonably, an SX96, which is a really nice upgrade to the NC188. And after that, just a lot of rigs I can't even recall at this time. So I was very active during high school, and it was at that time another amateur took me to a ham fest and he had a Gonset, one of the Gooney boxes, in his car on six meters. And as we were headed to this ham fest, six meters opened, and I was absolutely enthralled by all the really strong signals on six. And it was pretty much at that time I was probably about 15 or 16, and I fell in love with VHF and up, and don't do a lot of HF work these days, except to keep in contact with my other friends, mostly Earth Moon Earth, and moon bounce buddies. We use HF for that. But my first love is still VHF and up.

Eric 4Z1UG:

Let's touch on that. When did you start doing moon bounce?

Dale W4OP:

Oh, the year, probably about 1990. I was at that time living in West Palm Beach, Florida working for an antenna company, mostly citizens band, when I first joined them. Avanti Research and Development. So I was very active in the West Palm Beach Amateur Radio Club. And one of the guys got the idea we might want to try moon bounce. And it just so happened that a ham who I was soon to know, Randy K9BCT, was moving from two meter moon bounce to 432. And he made the club an excellent deal on four two meter yagis. And we slowly got those set up in a nature array, and had, I think, a 300 watt amplifier and the antenna array was virtually on the ground so we could manually steer it on the moon with four yagis. The beam width is not that narrow. You can update it every 15 minutes or so and not lose anything.

So that was my first experience. We worked a whole bunch of stations on CW in an ARRL EME contest, but even back then, we're starting to be bothered by household noises, but more particularly computers, computer clocks. And so I talked to Randy K9BCT some more. He said, "Well, I'm going to 1296." And he explained why, and it's just of all the bands we have 1296 is probably optimum for EME. It allows the use of large parabolic dishes. Power is relatively easy to come by even more so now with solid state devices. And low noise amplifiers. We're also reaching into the low noise figures, well below a DB. And so if you look at all the different trade offs of EME, path loss and available power, and 1296 or 23 centimeters is just wonderful.

So I put up a dish and I built a tube amp, a water cooled tube amp, and began to learn an awful lot about feed horns and how to efficiently illuminate dishes. And that was the biggest and best experience I've ever had in ham radio. And in fact, when I had a station big enough, where I could hear my own echoes, I must have done that for half an hour. And my station at that time was off the living room or our family room. And I

remember my wife saying at one point, "How long is this going to go on for?" I said, "I don't know. It's so much fun."

Eric 4Z1UG:

I remember speaking to one of the hams who was an early moon bounce operator, that he would actually record his CW transmission on tape, and then speed it up and play it over the air, in order to get his moon bounce information in before the signal faded. Was there a trick to working moon bounce on CW in the early 90s?

Dale W4OP:

Well, yes, there is Eric. And it more or less depends on frequency. You can certainly do it on six meters and two meters and 432. All moon bouncers face a number of issues. One is of course the moon is not in a circular orbit. It's an elliptical orbit. So it has apogee when it's furthest from the earth and perigee when it's closest. And that differential from memory is over 2DB. So we try to time our operation activity weekends when the moon is at its closest. As you go higher in frequency, you're also hearing more galactic noise. So if the moon happens to be behind a noisy constellation, that will hurt the signal, the noise.

How we also have a problem it's called libration and libration fading is a type of QSD and it's a result of your signal hitting the moon. And sometimes the reflections from all surface of the moon will add up and be louder than what is average. And sometimes it'll cancel out. And so it can take a Morse code dash and break it up, make it sound like two dots. The higher you go in frequency, the worse libration fading is.

So speeding. We mostly run around 13 to 15 words a minute. If we're working big stations, you can speed up to 20 or so, but somewhere around 13 to 15 seems to be optimal on 1296, at least, to deal with liberation fading. And the last problem is that as a signal transits through the omnisphere a linear signal can rotate. So if you set up your antenna to be in the same polarity with say Europe, by the time it gets through this omnisphere, it can rotate. And it is possible to predict that rotation, but it does vary with time and that's called Faraday day rotation.

So if you cannot change the polarity of your station or the other station cannot change his polarity, you can be making a QSO. And all of a sudden you'll be at right angles. And the theoretical penalty for that can be up to 20DB. So that's called Faraday rotation lockout. Now in 1296, many, many years ago, before I got involved, we all adopted circular polarity. And I can't tell you the sense right now, but I think we go circular to the moon and just like a mirror upon reflection, it comes back. So if you go circular clockwise up, it comes anticlockwise or counterclockwise back. So we never have any of this Faraday rotation.

The ways in which we accomplish that circularity have progressed over time. So we have much more efficient feed horns than we used to. So it's just a painless method. And I don't know if other bands, they've tried circular on 10 gigahertz, and there's some problems with that. It doesn't work out nearly as well as it does on 1296. But those are the

problems you have. And stations that are in that libration level where it can take a dash and break it up into a couple of dots. Sometimes it becomes almost like ESP.

And there are a lot of guys doing digital, you mentioned. For me, it's even with before moon bound on VHF, UHF, it's always been the thrill of being able to work stations that I can hear that I'm not supposed to be able to work or here. So maybe I'm an old codger. I don't know, but I have zero interest in the digital modes. I just love copying weak CW and working these very small stations off the moon. In my case, that would be stations maybe with eight foot dishes and 150 or 200 Watts. I can work them very nicely on 1296.

Eric 4Z1UG:

The 3.5 gigahertz band is apparently up for grabs potentially by mobile operators in North America. Have you ever used the 3.5 gigahertz band for moon bounce?

Dale W4OP:

No, I have not. I've listened. I had a dish up for a while on 10 gigahertz before I put my big dish up here, but I've never operated above 1296 as far as transmit, but it's not only 3,500. There's now a GPS system in Europe. I believe it's called Galileo. And one of their spectrum is right in the 1296 band. Now, fortunately, they're running circular polarity of the opposite sense that we are, and I have not heard any interference from them. There is a fellow up in New England, and I believe that perhaps his circularity is not all that good. And he has watched his noise level raise on his noise meter and has nailed it down to being interference from this Galileo system. So I hope it doesn't hurt us on 23 centimeters, but as you mentioned, our hand bands, especially the microwave bands, are really under pressure, I think, now.

Eric 4Z1UG:

Is there any conversation happening in your corner of the amateur radio spectrum, say in moon bounce, and working outside of the atmosphere, about the constellations of communication satellites that are being put into space by the hundreds in order to create this blanket around the world of internet service?

Dale W4OP:

If there is, I'm not aware of it. Is amazing though with all the objects up there, how they avoid hitting one another and causing a cross modulation, inter-modulation. It has to be a very well balanced orchestra, I think in order to keep that from happening, but to date, I haven't seen anything directly interfering with us from outer space, except perhaps this Galileo project.

Eric 4Z1UG:

And now this message from ICOM America. Get outside and be active with ICOM's new IC705 HF to UHF portable trans and its optional multi-function backpack. This is ICOM's

perfect solution for soda and parks on the air. The ICOM IC705 is your perfect QRP companion with its base station features and functionality at the tips of your fingers in a portable package covering HF six meters, two meters, and 70 centimeters.

This compact rig weighs in at one kilogram or 2.2 pounds. This beautiful new rig has RF direct sampling for most of the HF band. And IF sampling for frequencies above 25 megahertz and includes a large 4.3 inch color touch screen with a live band scope and waterfall display. The ICOM IC705 will be the replacement in amazing 21st century base band rig for microwave Dxers, rovers, and contesters, and the operating choice for those under the new S-Hale geosynchronous satellite footprint. Unbelievable.

The radio is five Watts with its internal battery and 10 Watts with an external 13.8 fold power supply. This full featured radio operates on single side-band CM FM as well as full D star functions. Included in this package as a micro USB connector, Bluetooth to support linking to your smartphone or Bluetooth headset, built in WiFi, integrated GPS with antenna and GPS logger, micro SD card slot, and the HM 243 speaker microphone, which is standard equipment. The perfect accessory for the IC705 is the optional backpack, the LC 192, with a special compartment for your IC705 with plenty of room for antennas, cables, and other gear to get you on the air from the mountain top or the local park.

There is a link to this amazing new rig on the QSO Today podcast website for this episode. And when you order your new ICOM IC705 from your favorite hand radio dealer, be sure to tell them that you heard about it here on QSO Today. My thanks to ICOM America for their continued support of the QSO Today podcast. And now back to our QSO Today. What is the current rig that you're using to do this kind of operation?

Dale W4OP:

I've been a big fan of Elecraft even before they brought out the K2 rig many years ago. I remember standing in line at Dayton when they announced that for at Four Days in May with my credit card in hand, and my eyes glazed over. I did not know Eric, but I did know Wayne from the earlier work he'd done with the Northern California QRP group and some of his low power rigs. So I built several K2s in the end. And then when they brought out the K3, I had an ICOM 7700 and I immediately bought the K3 and have never looked back. I think their design philosophy, things that they look at that other manufacturers perhaps don't, and certainly Elecraft was the front, the first one, to revive roofing filters, even though 10 Tech used them, 10 Tech didn't make a big deal out of it. But I've been an Elecraft fan.

And when they brought out the P3 pan adapter, that just makes EME a whole different world to be able to watch these weak signals and tune to them. So it's an Elecraft K3 set up for two meters, and then I use a 1296 to two meter down converter, transverter. And my present, I've gone through a series of amplifiers. Some are on my website.

My current amplifier is a one kilowatt solid state amp made by Kuhne Electronics in Germany. And it's mounted right at the dish. So I don't undergo any feed line loss that I would if the amplifier were mounted in the shack. And my current dish is a 13 and a half foot accurate surface, but I have on order, it should be here on a day, a 15 foot surface. That may not seem like much, but it'll give me about another DB and a half. And that is absolutely huge for EME. So that's the current station.

Eric 4Z1UG:

And do you do any other weak signal modes like meteor scatter or bouncing signals off of airplanes?

Dale W4OP:

Well, I do not. I have. I've worked meteor scatter, especially when I was growing up in Elmira, on six meters and two meters. And I had worked a lot of Aurora. Aurora is a little bit rare here in North Carolina though. I have worked it. But I've got a pretty good system on six. I've got about 800 watts in a long yagi. And most days I can hear the, it's a meteor scatter group, up in Ohio and Kentucky. And I think some of the guys who are in Indiana. And every morning I can work most of those guys on six. So big enough stations, you can really do things that people might think odd or can't be done just under regular conditions with no propagation enhancement on six and two meters. But EME is my first love on VHF right now.

Eric 4Z1UG:

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

Dale W4OP:

Yeah, sure did. Great question. I just, I knew I wanted to be an electronics engineer from a very, very early age. Didn't know exactly how that was going to be accomplished. My family was not wealthy, but perhaps middle class and I was a runner in high school, mostly to just kind of calm down the pressures of studies. I was very interested in grades and the courses I was taking. So I started running and one of the first colleges to make an offer was Army down at West Point and my dad thought that would be great. And I just, I just wasn't cut out for that. So eventually Ohio University offered me a scholarship and I was close to that. And then Syracuse University, just north of where Janice went to school at Cornell, offered me a running scholarship. And that's where I ended up going.

And only when I got there, did I realize how little I knew about mathematics and electronics. In fact, most of the hams that were in my class up there did not do well. I was just stubborn, I think, but received a fabulous education, pretty much free of charge, and stayed on to do my graduate work there, which was a wonderful experience also.

So yeah, ham radio, the people I met, I knew right off, I wanted to be an electronics engineer. And at that time analog was Supreme. And today I tell people I'm an analog

engineer trying to survive in a digital world. And I do some digital things, Arduino and that sort of thing, but I'm not nearly as talented as some of the projects I see in QEX and QRP Quarterly. So I'm, I'm still an analog guy, I guess.

Eric 4Z1UG:

Well, from what I can see is, you're an entrepreneur. You've had a company for many years called Par Electronics. How did you start the business? I'm assuming that you didn't start the business right out of college. You worked for somebody before you actually became an entrepreneur.

Dale W4OP:

Yes. Right? Out of grad school, I was with Sperry Flight Systems out in Phoenix for a very short time, had a wonderful boss, but it never really clicked for me. I was there a very, very short period of time and moved to south Florida where my wife was from, and almost immediately got a job with Avanti Research and Development. As I mentioned early on, they were at that time, doing mostly citizens band antennas, but very novel antennas. And that's what really attracted me to them. They had a number of antenna patents, and I was with Avanti for many years. But at the same time, I always wanted to do something on my own. And the filters had always interested me. And I knew at that time there was a problem with two meter amateur FM he side-band CW, I suppose, but I mostly heard about it from the FM group that the pagers in the 152 band and the 157, 158 band, were causing intermod on two meters.

And if you work out the third order intermod equation, you can see why that's true. And so I designed a filter. It was a notch filter with a very asymmetrical design to it. So it put a deep notch on the 152 pagers and then recovered very quickly on two meters. And those things just started selling extremely fast. And then the FCC contacted me. Turns out the Marine band was also having problems with the pagers. And they had gotten a hold of one of my ham filters. And it did get rid of the pagers, but had a very high SWR or return loss in the Marine band. And that was by design. So I redesigned one for them. And, and that was a huge product for us for many years. And we've done filter work for varied clients as the military, the Australian tank group, and NASA, very novel stuff.

And, I have a software package now owned by Agilent called Genesis, and I have the filter mod for that. And it can get you pretty close to design to many filters without having to do a whole bunch of cut and dry. Recently, we had an inquiry to make a filter for a vehicle to unexploded ordinances in the Middle East. And this company had a much cheaper solution than what was being used, but they had, I think, nine cameras on board and a telemetry channel. And when telemetry came on, which was yielding GPS and all kinds of temperature, all kinds of data, it would black out the cameras.

And so we developed the filter for them. And two days later, that filter was in the Middle East. It didn't get tested for a few days as I recall, because that was right during Ramadan, but they tested it and it worked perfectly. And we built a whole bunch of those filters. So I'd gotten to meet professionally a whole bunch of very, very interesting

scientists and engineers that maybe I wouldn't have met. It's just a varied group of people that may not have met if I'd stayed with Sperry Flight or something along that line. And then we also got into some antennas, some for HF, but mostly VHF and UHF that had some pretty novel characteristics compared to what was already in the marketplace.

Eric 4Z1UG:

So for Par Electronics, would you say it's your filter product line, which is the most important products that you sell now?

Dale W4OP:

It is to me because some of the clients we have are pretty darn demanding and I learn through them. And it's very, very satisfying to come up with successful products. Recently, we make a line of VHF and UHF, horizontal omni antennas, which are unique in that they're better, much better pattern, than the halos and squalos and those type things you see. And in addition, they do not radiate from the mass or from the coax, what we call common mode radiation.

And I was building many, many of these things, hundreds and hundreds for the RFID industry at 433 megahertz. And one client in particular in upstate New York was really putting us to a test to see how many we could build. And we both agreed that at some point when I couldn't meet their demands, I would sell the design to them.

And that occurred about two years ago. They came down and saw what I was doing. And then I met them up in upstate New York a year ago September. And we started doing a design for manufacturer. And that product is now being built by the thousands over in China. And that was an illuminating experience for me too, because not having been in a large company that did that sort of thing, I learned a lot of procedures of how something goes from concept into a working model. And then finally, perhaps the most important, the design for manufacturer where this thing has to be able to be repeatedly manufactured, cost cutting, and that sort of thing. So, the filters definitely dominate.

Eric 4Z1UG:

And working perfectly each time. Right?

Dale W4OP:

That's exactly right. In fact, there was one interesting problem. Once they started manufacturing, this was kind of a rabbit trail. But I got a hairy call from upstate New York. And they said, "These am antennas. We're having a high failure rate in production. They cannot tune them." And that it just seemed odd. So they sent me one that did tune and two that did not tune. And it really threw me for a loop. And they're pretty easy to tune. Requires an Allen head set screw and you move rods in and out. And I just couldn't get anything to repeat. And I finally looked at their rods and I thought it just doesn't look right. And I put an O meter on the rods. There was no continuity.

For some reason, China had decided that anodized aluminum would be better. Passivate the surface. Well, they didn't know, I guess anodizing is an insulation surface. And so there was no electrical contact. So I put one in the lathe and turned that surface off, put two rods in the lathe, two per antenna, and then everything worked perfectly again. So that was kind of a hiccup that I never ever would've imagined could happen.

Eric 4Z1UG:

But you had the expertise to be able to solve the problem. I saw on your website, and I think maybe you've mentioned them, but you have what are called omni-angle antennas on HF. What are omni-angle antennas and how are they different from the antennas that we currently see, or we normally see in amateur installations?

Dale W4OP:

Yes. Well, the omni-angle design is really VHF 50 megahertz enough. We do have an HF version called the Rectangle, which isn't a particularly great omni as the omni angles are, but I wanted to operate mobile. And, all you saw in the marketplace were halos and squalos, which are halfway dipoles bent into a square or a circle. And when you do that, it also lowers the frequency. So it's a little bit shorter than a halfway dipole, but when I modeled halos and squalos, the pattern was not a circle at all. I mean, you'd like an omnidirectional pattern. So when you turn a corner or if you're using them on the tower for net control, you don't want to have areas Northeast, Southwest, whatever, where you have nulls or dips in the pattern.

So I recalled an application note. I think it was RCA that I'd researched many years before. And it was kind of an oddity back then, because before modeling, but it was an antenna that was longer than a halfway, and it was shaped as an isosceles triangle. And it just happens that when you make that isosceles triangle of the right angles and the right length, the current distribution is such you can yield, in theory, a perfect omni, certainly better than the 10th of a DB being an omni. Whereas the halos and squalos were kind of an elliptical pattern about six DB out of omni. So when I saw that, I thought this is really unique, but that the problem was matching it. Whereas, the halos and squalos are easily matched to 50 ohms. The omni angle is not it's. It's about 10 oms resistive and from memory about 90 ohms or a hundred ohms inductive. And that's because it's longer than a half waved dipole, but it takes that length and that shape to make the omni pattern.

So I did work out a high voltage and high current matchbox for it, and also included a balun because just like a dipole, if you don't have a balun in there now, the feed line is part of your antenna. And if you're trying to achieve a nice omni pattern, the last thing you want is radiation from the coax screwing that thing up.

The last feature then is to isolate the antenna from the mass so the mass isn't radiating, and that is a problem that the halos and squalos do face. And that is feed line radiation and mass radiation. And the less than perfect omni pattern. So, as I was talking about earlier, the antenna that is now being built in China that uses our omni angle design, and then we still have the six meter, two meter, 222 megahertz and 70 centimeter

versions that we sell to the amateur community, either single antennas or stacked antennas to achieve more gain.

Eric 4Z1UG:

Now, you say these antennas are mobile antennas. Although they look actually like base station antennas. Are there mounts, or do you also make mounts that you could actually run these antennas down the highway while you're using them?

Dale W4OP:

Well, we do not make mounts. And I would just to put a number on it, say perhaps 10% of our users are mobile users. A lot of rovers, it turns out in fact, and they have these rovers, just incredible. The arrays are able to keep on their vehicles as they're driving. So I don't try to impinge on what they're going to do already for their mounts. And I don't recall anyone ever having one blown off.

The six meter is an isosceles triangle whose base is at 42 inches. And the sides were approximately 46 inches. So it's not a small antenna, but it's less widely than the bug catchers and things you see guys driving around with. Some do use the mobile, well in motion. Others will park as rovers and get everything set up. And they raise the mobile towers or masts up when they're fixed mobile.

But about 90% of our users are guys maybe getting on six or two for the first time. They don't want to get into the money of a yagi and the complexity of a rotor. So they might put up a single on the angle, and then as they get more serious about if they might stack two of them. That gives you almost three DB gain on receive AM transmit, or stack four. I have a friend out west with a stack of eight of them on six meters. And he tells me just, he's doing killer stuff in the contest without having to rotate his long yagi in different directions, looking for stations.

Eric 4Z1UG:

Let me take a quick break here to tell you about my favorite amateur radio audio podcast, the ham radio workbench podcast with George KG6VU, and Jeremy KF7IJZ, where they pursue topics, technology and projects on their ham radio workbenches every two weeks.

George and Jeremy document their projects and make circuit boards available for sale to their listeners. They have interesting guests and go in deep. Even if you're a seasoned ham radio builder, or just getting started, be sure to join George and Jeremy for the ham radio workbench podcast. Use the link on this week's show notes page by clicking on the image. And now back to our Q SO Today.

Now we have some listeners who live full time in mobile homes. Would the rectangle antenna for HF, maybe like for 20 meters, could that antenna be mounted on top of a mobile home and maybe lifted above the top of the mobile home for operation, and then hoisted back down? How far above the ground do those antennas have to be

before they operate well? Do they have to be like a quarter wavelength or half wavelength above the ground?

Dale W4OP:

That's that's a good question. Yes. As with any horizontal antenna, if you're interested in DX, the rule of thumb would be about a half wavelength where you start getting some elevation lobes that are at a low angle. So you can work F2 layer propagation. As you start to bring any horizontally polarized antenna closer to the ground, the elevation angle of the, of the main lobe goes higher and higher until you have what we call, cloud burners or NVIS antennas. So the rule of thumb is a half wave length above ground, but certainly I've worked a lot of DX when hiking where the antenna's a lot lower than that. But that's the rule of thumb is a half wave length above ground.

They're relatively lightweight. The rectangles are eight feet by approximately four feet rectangles, and they weigh maybe two and a half pounds or so. So you can really buy one frame and then by different match boxes for it. So you could have your 20 meter rectangle and take it down and take off the 20 meter match box and put on a 17 or 15 or 12 or 10 meter match box and be on that band.

None of our antennas require tuners. They have a inherently low SWR once you tune it. Now on the 20 meter rectangle, because it's such a small antenna, you would normally tune it optimally for the CW portion or the side-band portion. And if you tune it in between, then it may have a two and a half or three to one VSWR wire at the band edges and you could then use your shack tuner to help lower the SWR. But in general, the omni angles or the rectangles, or when I was manufacturing, the end-feds,, none of those antennas required a tuner.

Eric 4Z1UG:

This rectangular antenna is not a full wave loop. It's like a dipole that's folded into a rectangle?

Dale W4OP:

Yes. Perfect. That's exactly what it is. They're halfway dipoles that are shortened by center loading. And a beta match, which is another inductor inside the match box or raise the feed point up to 50 ohms. So they have, in general, an omni pattern that's not like the omni angles, but they are just really short and dipoles.

Eric 4Z1UG:

Just to shift gears for a second, you obviously, through Par Electronics, demonstrate considerable technical expertise. Do you think the schools and maybe the amateur radio community is producing the kind of technical expertise that you might need in your company and the future to continue to provide the value to your customers that you do now?

Dale W4OP:

Well, it's probably a good question. I think the emphasis today, and rightly so, I suppose, is on digital electronics. RF engineers seem to be few and far between. I do get calls from RF engineers. They're mostly older people and they've sometimes retired and gone back to work for a company because the company did not have any talent in electromagnetics.

So it's kind of hard to say. I think a person could be trained fairly quickly if they are adept with electromagnetics. I know when the first PCs came out that were getting up in clock speed, as the traces on the PC board were now looking like transmission lines, they were not 50 ohm. And you'd send a clock pulse down a PC board trace. And because the match at the far end that trace was not a good impedance match, you'd start to get reflection. So one pulse becomes two or three pulses.

So the computer industry then had to start employing RF engineers to figure out ... again, I think the emphasis is on digital electronics, but if a fellow goes through electronics engineering, I think they've got the math background, particularly calculus, with Fourier series, McLaren series, that sort of thing, that they can catch on to what's going on. And, also today, we have some wonderful simulator tools that can catch you up to speed pretty quickly and catch gross errors that might all otherwise go unnoticed and take a fair amount of R&D to figure out what's wrong here. So computer simulators have played a big part in taking digital guys into the RF field.

Eric 4Z1UG:

Have you had much thought or thinking about how to attract maybe younger people, younger hams, into the hobby?

Dale W4OP:

Well, I am a member of a group over here. You know, we're in the mountains of Western North Carolina, and you can drive a ways sometimes and not even see a house, but we do have a group over in Sylva and I'm a member of that group. And I've done a lot of talks to them on moon bounce, antennas, vintage equipment. All these things are my passion. And we have three or four hams within maybe a 10 mile radius of me. And I do quite a bit of work for them. And they sometimes want to drop something off here and have me work on it or build it or whatever. And I said, "No, you're going to stay here and watch and see how this is done."

So I think, elmering is not lost. I think maybe it was more important when I was a kid growing up. At least I just had so much respect and I was so thankful to have the Elmers I did, but I think elmering and amateur radio is not what it used to be, but it still can be a [inaudible 00:38:52] that's what some of the older hams have to offer.

Eric 4Z1UG:

Okay. So one of the reasons that we may be hearing some sputtering and fluttering on our telephone conversation is I'm actually dialing a landline through Skype. But I think

that probably you say you're in a rural area of North Carolina. What is the service that you have out there? Do you have twisted pair telephone service out there, or are you on some kind of a link?

Dale W4OP:

Yeah, this is all wired road around the lake here. I have not gotten to that yet. I don't know how far the fiber extends, but I'm just on a wired telephone here. And my internet link is a high speed ADSL.

Eric 4Z1UG:

Oh, is that right? Okay. Okay. I notice on your QRZ page that you have a receiver that's called a PR8 and frankly, I don't think I've ever seen a PR8 receiver in the marketplace. What is a PR8 receiver?

Dale W4OP:

Yeah, that's, that's popup radio eight. PR8. And I love restoring old equipment and documenting it before it's lost, but I also like building my own gear and the PR eight was a design by Wes Hayward. And I can't recall the other amateur. I think it was a K5. It appeared in QST. It was called a progressive receiver. And that's where the PR came from. And the design I built was an eight band receiver. So you could start out with just an 80 meter receiver and the PR8, and then you could add converters to it very much like the Drake 2B was. An 80 meter receiver with crystal control converters for the other bands.

And then this goes back a ways when I built that. But I added to that some home brew filters for AM side-band and CW, and I add a notch filter to it, selectable AGCS, a tone control, which is really nice when you're listen to short wave or, or broadcast AM stations. And I really can't think of what else I added in there, but it really became a beautiful receiver, very, very stable. I worked a long time on the VFO on that thing to make it stable. It's just an analog VFO.

Eric 4Z1UG:

Dale W4OP:

Eric 4Z1UG:

Dale, it has a beautiful glass front panel that's painted and stuff. Was that some something of your design? And do you have some kind of a pointer that goes behind the glass that moves up and down the band?

Dale W4OP:

Yeah, that dial, I'm going to say it's an Eddie Stone 890. I'm not sure of that number these days, but Eddie Stone was, and I think still is, a major receiver manufacturer in great Britain. And they sold that dial. It was also used on the Clegg Venus, a six meter side transceiver, and also the Clegg, the Zeus transmitter and the interceptor receiver. And I can't think right off, but I'm sure some other amateur manufacturers here in the states use that dial.

So that's really where I started. I found one of those dials. It has a fly weight on it, and it's a beautiful tuning slide rule dial. And I fooled around and made my own cabinet. And even though I've got a full machine shop, it just wasn't looking good. And then I found a Carcass heath kit SB 313 cabinet. And that was just the perfect size.

So I made a my own front panel for it. And the lettering is done with water slip decals and many, many clear coats of auto clear acrylic. So you put the detail on, you spray a clear coat of the clear enamel on, and then you'll see the edges of the decal. So you carefully wet sand that, spray it again, wet sand, spray it again, until they all disappear. And it's really sharp graphics. Much better than silk screening, I think. And that was the housing for the cabinet and the matching speaker, which is probably on my website, was the matching speaker for the heath kit SB303 receiver, just redone in the colors and grill cloth that I wanted.

And that was about a year long project. It was a learning experience for me. Oh, I added the S meter also. That was another addition to it. And that year I entered that at Four Days in May, which is the QRP group that meets at Dayton every year. They have a home brew contest and I entered that. And gosh, it was just the big time winner. It was wonderful.

Eric 4Z1UG:

Well, I've only been to Dayton once and the Four Days in May was my go-to place for the time that I went. So I highly recommend Four Days in May. The day before the Dayton Hamvention opens for anyone going. What was the most complex home brew project that you've completed on your bench?

Dale W4OP:

It's a 160 through 10 meter, and perhaps six meters. I still hadn't completed the PA that I'm happy with, but that's up there also. And that was also at Four Days in May and the home brew contest, and also won that year. It's a pretty complex receiver. Today you could do it with a lot less stuff, but it's a nine megahertz IF board in it. And it has separate band pass filters for the receiver, low pass filters for the transmitter. It has a hang AGC on it in addition to fast and slow AGC. Of course, a different bandwidth for CW and side-band, a calibrated S meter and bought a 12 watt PA in it.

A very, very fun rig. I spent a lot of time on that and I'm, I'm still not done with it. I don't think I ever will be. I bought more nine megahertz crystals to redesign the filters in that rig. But boy, it looks beautiful and I did add some digital electronics to it so you could

select memories on the VFO and change bands and that sort of thing. There's probably better and more complex receivers out there, but for me, as busy as I am, and not really a digital guy, that was the most difficult project that I've ever, ever tried.

Eric 4Z1UG:

And now this message from QRP Labs, QRP Labs has shipped thousands of QC X QRP trans kits to date. The odds of working another QCX user gets better every day. If you're looking for a satisfying kit experience where you end up with an amazing performing QRP Transceiver for under \$50. Let me say that again. For under \$50. Then you owe it to yourself to go to QRP Labs. We have many home brewers who listen to the QSO Today podcast. For you, QRP labs also has parts, filters, enclosures, and other handy devices to make your home brewing experience even better.

You can use these parts to either enhance your QRP Labs kits or to beef up your own home brew designs. Be sure to browse Hans' entire website, use the link on this week's show notes page, or the one in the sponsored section of the QSO Today website, to get to QRP Labs to buy your QCX or any of the other fine QRP Labs kits or parts. QRP labs is my go-to hand radio kit company. It should be yours too. QRP Labs. And now back to our QSO Today. What's your favorite piece of test equipment on your bench?

Dale W4OP:

Without a doubt that is the Agilent 8713 Vector Network Analyzer. I've got another piece that was given to me by a ham friend from my Avanti days. He repped a line of test equipment, and one of them was a French manufacturer, Adret, A-D-R-E-T. And he sent me one of their synthesized signal generators. And I've just used that so much because it's calibrated and you pick the units, microvolts, or DBM, DB microvolts, whatever, and for aligning receivers and the older rigs I restore, that's just been absolutely fabulous. I use that more in the amateur work.

Of course, the vector network analyzer sees an awful lot of use with filters because it allows me to tune the filter and look at what we call the S21 parameter, the gain of the filter, over frequency spread, and also S11, one or the return loss or SWR simultaneously. And that's important because the filter has two important characteristics, that it's its response is what you want, but it also has to have a good return loss or SWR, so that's more commercial, but so I guess as far as the hand work goes, it's that wonderful Adret signal generator.

Eric 4Z1UG:

What kind of impact has amateur radio had on your family life?

Dale W4OP:

Well, my wife did get licensed. She's not active at all, but renew her license. She did get licensed, I think just to prove she could do it because she had to pass the code exam, also.

She's a very, very, very talented registered nurse. I'd mentioned that when I was taking night school and amateur radio, my mother babysat me, but she was tied up with her own studies at the time and never took the test. And then when I was working for Avanti down in Florida, and this goes back in probably the mid 80s, she called me on the phone one day and said, "Get on 40 CW. Here's my call."

So, gosh, this is probably, what? 20 years, 15, 20 years after I'd become licensed. It had to be 20 years. She had gotten her novice license, WN2UNU. And she too just loved CW. And we had a station at Avanti, a Drake B line, and a Heath kit amplifier, had some big yagis up and some big antennas, and we would work every lunch hour on CW, and then she got her general ticket and we would work on single side-band on 20 meters.

So the fact my mom got license really touched me, and then she went ahead and got her advanced license. So then I had to go get my extra class license just to keep up with her. And that early cousin I told you about, W, Bill Par, he became WB2NEV. And then his son, Billy, who is three years older than me, is still today WB2GJV. And I had another cousin, Vern, and he was WV2VKN. So we've had a lot of hams in the family. And I think my wife, she went to field day with me one year. She's not at all a electronically technical person, but she shares a lot of the things I share. And it's been a joy for us, I think, except for maybe this big, giant parabolic dish antenna down over the hillside. We've had some discussions about it and the fact it's going to get bigger here in about three months, but that's for another time, Eric.

Eric 4Z1UG:

Well, I think if you look at the picture of it on your QRZ page, that antenna pretty much blends into the hillside. Perhaps, maybe the new antenna won't as much, but I think that grid kind of antenna seems to kind of blend in. What do you think the greatest challenge is facing amateur radio now, from your perspective?

Dale W4OP:

You know, looking back on it. I hope that today's amateurs don't forget our past. You know, you hear a lot of new hams on the air today, and they do not know the protocol at all. And some, we've got a group of EME guys that get on 80 meters sometimes at night, and guys will break in. We're down in the extra portion of the band, and they've got a general class ticket. They don't know where the band edges are. So I think if they did a lot more listening, and again, this is from a cranky old guy, but if they did a lot more listening, and developed the lingo instead of the word, balun, B-A-L-U-N, today, balanced unbalanced, I hear a term balun, B-A-L-U-N, which I am told, comes from the CB group, Citizens Band group.

And there's just a lack of desire, it seems, to learn the technical end of it, to build things. And a lot of the emphasis today is I'm talking and that's fine. I would just like to see the history of amateur radio, the older equipment, more appreciated, and for amateurs today to become more technical before that is just lost. And it turns into more of just people getting on the air and talking, but not being able to build their own antennas, not

being able to even design their own equipment. That is not impossible today. You can really build some nice gear yourself, even if you're not designing. You can copy another design. So I worry about the lack of the technical end of amateur radio today.

Eric 4Z1UG:

Do you have any thoughts on how amateur radio clubs might make their new hams more technical? I mean, is there something proactive that amateur radio clubs can do?

Dale W4OP:

Well, I think getting people in to speak on these subjects. It's interesting you should ask that because several weeks ago I was on and I saw a six meter regenerative transceiver, much like the heath kit sixers and twoers and lunch boxes. And I really had a passion to try to preserve some of this information. And so I bought that rig and on the back of it low and behold was the builder's name and email, but I knew the guy that sold it to me bought estate sales. And I looked up and sure enough, this guy was a silent key. And I wanted learn more about this radio. And I did find his club and his club put me onto his two sons who were hams. And they told me the story behind this radio, that it was done as a club project.

And their design pretty much came from an article on QST, which was entitled to Club Saver two meter rig. And this club was just foundering and they decided to do a home built project. They built about 50 of these transceivers. They put a top price on it. Would be \$30 where this is back in 1957, but that really saved their club and I think enhanced the club that built the six meter version of it, redesigned it and built it for six meters. So I think club projects, whether it's building two meter yagis or perhaps some Arduino project, I think building really helps with these clubs.

And if you can have good speakers in. I know there's a club over in the Raleigh, North Carolina, and they have terrific speakers. I am not a public speaker, but I kind of enjoy it more and more. So I've done more clubs in the last probably 10 years than I did when I was in Florida when I just spoke to our club. So I think speakers, and if you can get these people involved, technically have a building night. Everybody is busy. I recognize that, but those are my two thoughts on it. Really, really speakers that can capture your imagination and then get a club building project.

Eric 4Z1UG:

Well, I think we're almost at the point, or maybe we're beyond the point, where it's even possible to bring your speakers in on Skype or something like that. For example, if the club has access to a pretty good internet connection and maybe a couple of projectors so that you can see your speaker and their slides. So therefore your club, even if it's rural, might have the opportunity to bring in some pretty high power speakers.

Dale W4OP:

Well, I couldn't agree more. And I wish I knew the group I spoke to in Atlanta last, let's see, a year ago, September. The club was active, but one of the fellas down there, and I knew him, because he's very much involved in Four Days in May, especially in the early days. His name is Jim and his call, hope I've got it right, it's W4QO.

And so their club has kind of reinvented itself and they put on this series of seminars in the fall. It's free to get in. You can buy raffle tickets on some beautiful equipment they have to raffle, but every year they get in three speakers. And that year, the first speaker was a ham who had done a DXpedition on a very, I'll call it, a delicate island in the Pacific, where they had to haul everything out, bathrooms, everything. They could touch nothing.

And just it was a really neat and a number of QSOs they made from that island. And then I went next and did my talk on EME. And then the last speaker came in via Skype. And I can't remember her. It seems like it's Judy, but anyway, she's very well known, she's a self-taught engineer, has done some major, major projects. And so she was brought in on Skype and every year, this club down there gets bigger and bigger. They take these funds and they award scholarships for students that are interested in engineering and science. And just like that club that was revitalized and reinvented by making those two meter transceivers, this group down there, I wish I had the name of it. I can get it to you, Eric. Gosh, it just gets bigger and bigger. Crowds are huge down there. Costs you nothing to get in. You just buy raffle tickets.

Eric 4Z1UG:

What advice would you give to new returning hams to the hobby?

Dale W4OP:

Well, don't be shocked at all the changes. I have phone calls and emails from amateurs all the time that they got a license early on, but family and their careers took them away from it. Now they're getting back into it. And I meet them because they want to get on six meters or two meters, something like that. And so it's kind of fun to talk to them and hear what equipment they're using back then, and then maybe get my thoughts on what they should be buying today and that sort of thing.

So it's a learning curve, isn't it? Because now we have all these digital modes in addition to side-band and CW and AM. And some of the hams that are getting back into the hobby, they still want to be on AM. And there is a place for them, either with the newer rigs, like the Elecraft rigs or the 7300 ICOM, which sound very, very good on AM. And fortunately, that's one good thing about amateur radio. There's something for everybody in amateur radio and all of them seem to be excited about being back into the hobby. But they did what they had to do with their family and career. And so I think it's fun for them and they seem to be embracing what there is today.

Eric 4Z1UG:

Well, Dale, you've been a wonderful guest. I really appreciate your joining me on the QSO Today podcast. With that. I want to thank you and wish you 73.

Dale W4OP:

73, Eric. I've really enjoyed this too. And thank you for having me as a guest.

Eric 4Z1UG:

That concludes this episode of QSO Today. I hope that you enjoyed this QSO with Dale. 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 and put in W4OP in the search box at the top of the page.

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