The Spiral Fracture Antenna
Part One: A Beginner's Reference
By: Jeff Wandling, NT7R

Before I begin. . .

I have been writing this article for three months now. This article is about my best effort to begin operating on HF bands for the first time. It was an exciting time for me. And it was dangerous, as we will discover.

I have to apologize in advance for the excessive enthusiasm. The initial excitement has evolved into modest "Hey, cool man." from the original "Hey everyone! Look at me! I'm on the RADIO!"

The QSL cards are flowing steadily now. It's all good.

This is part one of a saga. This is the saga about getting on the air, how to "get off the fence" and how going to the hospital with a freak accident started by a swarm of bees finally put me on the HF bands.

Oh, a Grand Saga this is! There's nothing more ham-like than to tell the story of how they became a Amateur Radio Operator in their own words. There is nothing like that First Whiff of burnt Rosin on the dipole center feed connector. "Mmmm."

We all have the same story, except each of us make our stories unique. . . and so gosh darn special.

How do these stories begin? How do they all begin?

It's Monday morning and it's raining. Usually that would be enough to make me gloomy, but not me. Oh no. Not today, because I am a ham![1] My weekend stuffed with family obligations; shopping, house cleaning, and kid-raising. Yet, in between chores I found time to:

1. Read the latest QST.
2. Stay up late Sunday night and work HF low bands.

Pacific Coast Hardware

I wanted to get on the air for a very long time and for a long time was unable to stick to the goal. Work, life, school, all got in the way. It wasn't until I had an accident with bees when everything changed.

Let's rewind the tape a bit and start at the beginning.

My grandfather Herschel Wandling[1], (W7BRS, W7CCZ) (SK) was an employee of Seattle Radio Supply until December 31, 1940, when he was directed by orders to report to duty for the US Navy. He was a radio engineer and he was assigned to work as a radioman on the USS NEVADA. His work was in building direction-finding radios and antennas. He started out with radio when he was a teenager and was a member of the Franklin HS Amateur Radio Club. His ship was ordered to Pearl Harbor. Eventually, he was stationed in Hawaii months before December 7th, 1941. He worked with codes for the Navy and established a radio station for gathering information during the war.

After the war, he was the owner of two stores on 1st Avenue downtown Seattle. They were Pacific Coast Hardware (1st and University) and Pacific Coast Electronics (next door).

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1 As of this writing it was assumed from family sources that these were his call signs. It has turned out to be false. The author is still not sure what his callsign was. The records have been lost. If any reader of this article has a callbook from the 1930s to 1941, please contact the author. The author would like to solve this mystery.

His skill at operating was advanced. The short story I heard was at 60 years old, he sat and wrote clear copy from 25 wpm CW he received on his headset. I remember on Christmas holidays at his house he would from memory write out the schematic for a super heterodyne receiver from memory. Back then, I didn't understand the significance.

On weekends, as a kid, I would go downtown to the store and explore row after row of shelves holding a billion vacuum tubes, walk past cases full of test equipment, components, wire, tools, manuals, etc. . . . If I only knew then what I wish I knew now. I became hooked into electronics and computer systems by exposure to digital electronic projects when I was 11. Not to spoil the story, but it wasn't until many years later that the goal of being a ham came to fruition. This would have certainly delighted my grandfather.

Uncle Ham

In 1999 while visiting my wife's uncle in southern California, I found out he was an Advanced class amateur operator. His name is Art Rutledge and his call is WA6SLI. He has a nice house in Glendale, California and above his garage is a second den converted into a ham shack. He invited me up a floor to his shack and I sat in a leather chair while he warmed up his Kenwood TS- 830 and Henry 2K and began to work HF. I never got to see my grandfather operate, so this was the next best thing for me.

I watched and listened as he worked a couple stations casually. I loved the way he dug in and rallied to find a contact on the band. The rig's meter lights and the amplifier's lights provided most of the ambient light that evening in the shack. I was just in awe. His rig was complimented with a Viking Transmatch, Heathkit monitor scope, Henry 2K with matched 3- 500Z tubes. He even recently had his amplifier checked out by Henry Radio and it's doing quite well.

Zapped again by the bug, I decided that the time was right to become an amateur operator. After returning home, I went to amazon.com, ordered Gordon West's Technician Class book and the ARRL Handbook and began to study.

I studied for a few weeks, but the goal was pushed off to the side, again. A few years later, while working for Elektrobit, I talk to a colleague there, also an amateur operator, named Ken Koster, N7IPB[2] who showed me some recent QST magazines. He gave me a ICOM band-map. "Why don't you get your ticket?" he asked. My thoughts drifted.

I thought to myself about my Uncle's shack, the electronic store my Grandfather used to own, and the other side projects involving radio that I started but never finished. The power-supply I started, the really ancient oscilloscope I found at Western Nut and Bolt on First Avenue South, rummaging through "United Products" scrap bins for neat electronic widgets to take apart, peeking and poking on the VIC-20. (poke 36878,8 made the display white on black.)

"Huh, what Ken?"

"Your ticket, go get your ticket." Ken walked off to get another cup of coffee.

I kept thinking about getting the license. A year later I left the company to pursue other jobs. It bothered me that I didn't get my ticket while I worked with Ken. It bugged me that I didn't follow through with the goal that Ken encouraged me to achieve.

In year 2004, I ordered an updated Tech book since the question pool had been updated since I last

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2 Ken manages the WETNET site. He is well known for his operating on digital modes as well as using portable/mobile equipment.

ordered it and I crammed for my test. I wanted to get my code element also; I wanted Tech-Plus! My grandfather was a natural over 20wpm and I thought having code even at 5wpm would be a good start to being a decent CW operator. From what I was told about his CW, he was simply a phenomenal CW operator. I'll never know.

In 2006, I found the Mike & Key ARC mostly by accident when I was looking for information about my late Grandfather. I just wanted to know if anyone remembered him given that he was involved in radio extensively in the 30s through 70s.

There didn't seem to be much luck in that search, I didn't learn anything new about my grandfather, but by being exposed to a group of friendly hams, I did receive encouragement to press on for the license.

I searched the net for help with learning CW. It was as if every amateur operator had decided to write their own software for the "best way to learn the code."

Ward Cunningham, K9OX, the creator of Wiki, is an amateur operator too. He wrote a nice program called the Morse trainer.[2] The feature about this program is simple: You learn the next letter after you've proved you mastered the previous letters.

As far as learning code for practicing QSO via CW, the best I've seen so far is G4FON[4]. The Koch method, which is the real technique used with his software is why it's so effective. Whether or not you use this package, it won't matter. But, the Koch method is very effective. See also AA9PW.com for another appraisal of the Koch method. About G4FON, it has an effective GUI for setting the parameters of the lesson. I won't go into it's finer details, except that the framework of the UI makes it tailored for learning to copy this fictional QSO

2W1UHG DE CY4QAS
ALL FB BILLY UR SIG RST 439
WID SOME QSB HR QTH MONTREAL
NAME IS NORMAN RIG IS TS950 WID
100W INTO 3 BAND YAGI PSE QSL
VIA BURO OK? AR 2W1UHG
DE CY4QAS KN

With the software I can preset custom QSO to practice like this[3]

CQ TEST DE VP2E VP2E
NT7R
K7R 59 VI
DE NT7R NT7R 59 WWA
NT7R TU DE VP2E QRZ

Either way, the application will let you work your own samples or randomly generated ones.

The simulated CW tone is clear and natural. However with the GUI settings you can add QRM for making it sound more realistic. The GUI shows you the copy delayed a few words behind so you have time to copy without a hint. I let it run and I listen, I copy the code on paper and then check my work.

Eventually I was confident I could pass the Code test for Tech-Plus. I had the CW enough for 5wpm. So on one of my first couple visits to Mike & Key ARC, I took the test and passed, barely. I got Tech-Plus ticket in 2006.

3 Sample provided by Scott Robinson, AG7T

Got Radio?

I was a Tech-Plus license without a radio. I looked for answer on what kind of radio to start with. The ham magazines didn't help, everything started to look the same. I decided to just take the next test (General) until I figured out what I was going to do.

General was more specific data, and frequencies to memorize. I passed General in 2007 just before the no-code-ever requirement was in effect. Over the break in December 2006, I studied for my Extra exam and worked on the tougher problems. I practiced the questions from Gordon West's book, and took the practice tests on QRZ.com. After I passed Extra, I thought I'd be OK.

This is where I got a lot of flack from my Dad.

"Hey, what do you mean Extra? You don't even have a radio? I thought you had to have some time on the air before they hand out Extra tickets". He was wrong, but he was right. Pathetic! I had no radio, no antenna, no idea how to actually operate. I just book-learned theory and now very rusty Morse code skills.

Five steps to Get off the Fence

"Getting off the fence" would be a common theme when talking to my new Mike & Key ARC friends.

The Mike & Key ARC provided a venue for me to learn more about amateur radio and also provided something that is very valuable to me: An opportunity to learn from those who know more than book-smarts. They helped advise me on radio and antenna selection, and coached me on other things ham related.

From what I've learned so far, here was my approach to operating amateur radio from the position of high-interest level, but low-capabilities.

1. Go to the local Amateur Radio Club, make contact and start asking questions. You will meet people who are willing to help you.
2. Buy a radio. You know how to use a credit-card? You are qualified to buy a radio. Warning: There are really two groups of radios. The ones you cannot afford, and the ones you can. Forget the radios you cannot afford, for obvious reasons. I don't know yet what I could do better with an expensive radio. You know the brands: Kenwood, Yaesu, ICOM, etc. . .They all have pluses and minuses. You may be tempted to buy from ebay.com or a flea market. If you know what you're looking for, go ahead and act on that preference. It may be a good deal!If you wait for the angels to sing and a beam of light to shine down from Heaven on the rig you are supposed to buy, then you will not get on the air.
3. Build a wire dipole if you have room, or buy a vertical if you don't.

The Dipole

You have the room for a dipole. You don't need that much room for a dipole. Think about it. The dipole overall length is half lambda which for 20m band is about 33ft. 33ft for a 20m dipole. Can you string wire 33ft in a mostly straight, bent, curved, or tilted configuration? Remember the study guide for your license?

$$\text{Length(ft)} = 492 / \text{f(Mhz)}$$

This is the total length of the dipole. Each segment is half this value. I bet you can make a dipole work if you get creative – it doesn't need to be straight.

If you're going to build a dipole, this is good. Go get the wire. the PVC pipe or Plexiglass to make insulators.

The Seattle Public Library has copies of the ARRL Handbook and in there are pictures of how to make a dipole. Or if you surf the web, visit ARRL. I was impressed at how many public and free resources there were for finding details on dipole antenna construction. ARRL has a database of articles. Visit their search engine and enter in: antenna projects. You'll be amazed at what's there. Get some sturdy line to hang the wire and get the two segments of the dipole connected by a feedpoint raised up as high as you can. Be safe. Remember, you've been bitten by the bug, so you can re-work your home-brew antenna any way you wish later.

The Vertical

If you don't have the room for a dipole then just get a vertical for now. They're a lot of companies that make verticals. I picked a GAP Titan-DX. There are many other varieties. QST magazine has ads with companies that sell them. Talk to hams, read reviews, use your gut instinct but, get the order on the delivery truck. You need an antenna. Remember: Catalog bought verticals (or wire dipoles) are ready to go out of the box. . . (some assembly may be required - that's the fun part)

4. Think about the parts you need between the Transceiver and Antenna. Tuner, coax (RG213/U or RG8X), SWR meter, Antenna Analyzer, wire for dipole (#12-16 AWG copper stranded wire), insulators (PCV pipe works good if you need something now), SO-239 connectors, PL-259 connectors (get the good stuff: Amphenol).

5. Realize there are always trade-offs. If you want to be an amateur operator, you need to get on the air. Getting on the air requires stuff. If you're blocked because you don't have the stuff, then get the stuff. The trade-off between buying an antenna vs. building one is something you decide. The trade-off between a small portable rig versus a more expensive home base station is up to you. I selected a portable rig that can also serve as a decent home station. I selected a home made di-pole antenna because I didn't have any other options at the time. What helped the most too was making contact with a ham from Mike & Key ARC. I talked to fellow Mike & Key ARC member John Marthens, NU6A and he came out to my property to walk over the acreage. I needed some advice on how to raise up the antenna among the thick trees on my property. I told him I wanted to put up a wire antenna. He just gave me a smile because he knew it would be a great place to put a wire antenna. We chatted and he left me with some good advice. The message was clear. Get the radio, get on the air. So, what did I do? Of course, I waited because I was afraid of getting the wrong radio.

Off the Fence and in the Hospital

There's no better way to get off the fence than get rushed to the hospital because of a severely broken fibula (that smaller non-weight bearing bone between your knee and ankle).

I had a cast on my leg, I got bored. I grew tired of staring at my trees not seeing a wire strung between them for a dipole. Enough! So I went on-line and opened up my notes on radios I had been considering and then placed the order. I called HRO. Ham Radio Outlet HamRadio.com, 1-800-854-6046. I ordered a Yaesu FT-897D. I liked that model for it's size and capabilities. I ordered coax, a tuner, a power-supply, more coax, a headset. All the stuff came in a few days and I moved the shipping containers to my shack.

My leg surgery was scheduled right after the equipment arrived. It would be a few days more before I was ready. I had to recover and deal with the pain medication.

The stuff sat there for three days in the boxes. I actually had a good excuse because I was recovering from bone surgery on my leg. I was looking forward to setting it up.

"What's that Noise Outside?"

One night, after the kid was in bed, the house quiet, and the pain killer's worn off, I went out to the shack. It was midnight.

My property is just shy of 7 acres and if you remember the Star Wars movie "Return of the Jedi", and the planet Endor (Trees, Ewoks, etc. . .), that could be filmed at my place. It is dense with trees.

Now, how was I going to get a wire up into these trees? I thought about that as I stood in front of the equipment boxes on my bench in the shack. I scanned the shack: I need an antenna! Oh look, I got some PVC. And some cord that's strong.. I found some cable clamps, a pocket knife, wire-cutter, flashlight.

Shall I open the boxes now? Not yet, I need to get the antenna up. It's 1 a.m. now, and I was out in the dark on crutches trying to toss some bolts tied to the cord over high branches of the cedar trees near the shack. This was not easy to do. It probably wasn't even smart to try on crutches and a freshly broken leg in a cast.

About 14 tosses later, I got the cord over the branch. The clamps were heavy enough so they came down gently on the end of the line. I secured the ends and find another tree. I tossed another dozen times until I finally got the right branch and secure that end.

Back in the shop I measured and cut wire for a 40m dipole. Using coax, I still have an unbalanced feed-line. I should have had ladder line. Note to self: Order ladder line, 450 ohm.

Anyway, I got this crazy dipole up, and it's 2:30 a.m. I strung the coax back to the shack under the door and to the bench where the boxes sat. I opened the boxes solemnly and put my rig and it's parts carefully on the wood bench.

I connected the antenna to the tuner, tuner to the transceiver, transceiver to the power supply. I looked for the rest of the rig – headphones, mic. I setup a lamp and a UTC clock.

The rig came with a 3' world map with the DXCC prefixes. I proudly pinned this up on the wall behind the rig. I thought "This is my world and I'm going to work it one entity at a time!"

Upon checking all my connections, I power-up'd carefully. Everything seemed fine and I tuned down to 20m. . . "WOW. . . this stuff actually works. Dipole's work!" (See pre-introduction part about containing my excitement. I left the original words in here to let really new hams reading this know, yes it is **damn** exciting to be on the air).

I was on the air. . .Now what. . . Let's see. Tuned that dipole a bit to get a better SWR. I'm ready to warm the clouds.

I was too timid and so I just listened. I found a net that was working late at night. I joined the net by accident and had my first HF QSO with Harry, KH6FKG, on 40m.

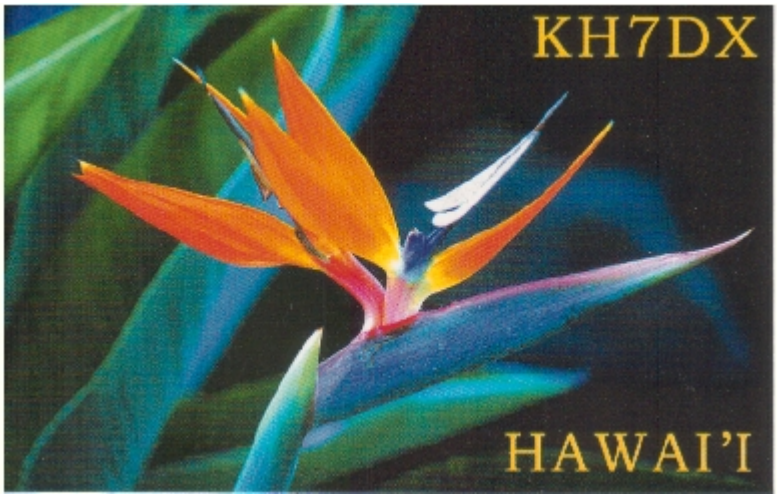
I was able to get Hawai'i in the log book for my first QSO. A DXCC entity. 1 down and about 300 to go.

After that I went back to 20m because I wanted to try it and I heard some traffic when initially powered the rig.

They were still there. I heard hams on 20m trying to work a 9K station. I broke politely during their lull very carefully. I joined the conversation with the operator in Arlington, WA and learn that he and

another ham in Region-6 are QSO'ing with a ham in Kuwait (9K). They let me have a try and I tried very well, but I could not get my signal to reach him. My dipole wasn't aimed exactly where it should be and I could barely hear him. What a shame. But at least I had some contacts that first night.

By 3:30 a.m. I have logged two stations, one in Hawaii and one in Arlington, WA. I'm exhausted, but I'm on the air. I'm not a Complete DX'er but I'm on the air[1]. Some of the first QSL cards I received those first few weeks of operating are below.



And one afternoon, I just turned on the radio and had a good QSO with a Japanese operator who also just turned on his radio at nearly the same instant. His first CQ his morning was my first JA.

Building my Station

My station is still sparse and not quite setup, but every few days now I'm in the shack working 80m or 40m. I have tried 20m but it's not easy these days since we're still at the bottom of the cycle. Hearing local stations in Washington work Kuwait on 20m makes me think I could be working them, but not yet.. Not enough gain on my antenna, and not the right direction on the dipole.

One of the more interesting aspects of operating for me is the analysis and design of antennas. I'm by no means very good at designing antennas, however I enjoy the antenna design area because it gets involved with fundamentals of HF propagation.

Another person that I am thankful for is Scott Robinson, AG7T. He's a member of Mike & Key ARC also and has a lot of sage qualities. He is the one who has along with John, NU6A, been key for me to think more creatively about how to put up an antenna – any antenna to work stations. To help with debugging my antennas, I use a MFJ antenna analyzer. I use an antenna analyzer so I can figure out how to tune the wire for a particular frequency to be at optimum power output. Building and refining antennas is sure to be an ongoing activity for my whole operating experience, I have no doubt.

Odds and ends to make the shack more useful: I got a extra digital clock set for UTC to make log entries based on UTC. I got couple desk lamps, ferrite cores for RFI from the computer. I also am starting to collect books on operating HF.

One of the books I've been reading for operating on the low bands[3] (160m, 80m and 40m) says consistently that a good antenna is vital to working stations effectively. This makes sense. Investing time and money into a Transceiver without investing thought into the antenna is a poor formula for

enjoying the ham radio hobby.

Consider the trade-offs:

A store-bought antenna will get you working on multiple bands effectively The engineering has been plugged into the product. A home-brew wire dipole or a store-bought dipole will get you working in short order for fewer dollars, but you'll have more variables to adjust. A vertical although a bit noisier because it's vertically polarized (and picks up more man-made interference). But, the vertical will give you omni directional radiation pattern.

73 on Your Final

Next part, I will write about the excitement of working 80m as a new operator and tell about what it's like to operate without a broken leg even! Until next time,. . . 73!

http://nt7r.com/saga

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