The LongPath

April 2022 — Volume 46 Issue 4 A North Alabama DX Club Publication

Contents:

Contributors:
AG4W
K8KI
KR4F
N4NM
NG3K

- .... .

.-.. --- -. --. .--. .-

- ....

.- .--. .-. .. .-..

..--- ----- ..---

..---

...- --- .-.. ..- -- .

....- -....

.. ..- .

....-

From the President

By Bob DePierre, K8KI

The first order of business this month will be the vote on the constitutional/bylaws change we've been discussing for a while. The wording of the change was shown in the March issue of the Long Path. The membership wanted to increase the dues by $5 to accommodate increased activity funding, specifically supporting DXpeditions. If the measure passes, it will become effective immediately.

While it's unfortunate that our search for the DX Banquet has gone on longer than I hoped, it now appears that announcements may be just days away. I had asked Ward Silver/N0AX to be our speaker, but now realize that I had asked him just as he went on a fairly long vacation. He has since returned and says he's interested, but won't be able to commit for another month. I now also have a better idea of what we really require in a venue. I hope to make it to the Elk's Lodge on April 6 to see what they can offer. I'll let you know at the April meeting. There are several venues available where we lower the banquet price, and others where we cannot.

I got a compliment on the quality of our Long Path newsletter a week ago when I got a request from the Northern Indiana DX Club, as they requested to reprint an article from our March edition. As I get heat from various sectors, it is uplifting to hear of those who appreciate what we do here. Their complaint, as I imagined, was that it was very hard to get writers for their articles. I hope that problem doesn't ever come to afflict us.

I received a proposal from the Virginia DXCC Club seeking support for a proposal for ARRL to re-consider rarely on-the-air entities as Deleted. This action would put many DXers on the Honor Roll. There are just a few, such as North Korea, Turkmenistan, and Scarborough Reef that are on the air so rarely that hams will no longer have a reasonable opportunity to work them. I think they have a strong point. If those are Deleted, hams who have worked them keep the contact, but the number required for Honor Roll does indeed go down, in this case by 3 countries. I agree with them in the case of Scarborough Reef, since it is only about 16 square feet in size, and is sometimes totally under water – and it's not even a country. But the others are well populated and are only off the air due to political difficulties. I think it best for ham radio to stay out of politics, with the same consideration for Russia at the moment. If you have comments, please

From the President (continued)

let me know, and I'll reply to them after the meeting.

Fred Kepner/K3FRK will do the presentation "Most Wanted DX Entities - Part 1," which will be part historical and part geographical. You'll like this one.

So, let's have the next NADXC club meeting on Tuesday, April 12, at the Museum of Information Explosion at 1806 University. The Zoom sign-on will be exactly the same as in the past. I'll send members the Zoom invitation on Sunday just before the meeting. Again, remember to pick up your dinner on the way over. I'll get a few of you to help set up the tables and we'll just eat here. I'll open the doors by 5:45. The meeting will start at 6:30, and the program by 6:45.

The Museum of Information Explosion

Why is AG4W Beating Me on 6 Meters?

By John C. Winter, Jr., KR4F

The summer of 2020 was pretty good for sporadic-E propagation on 6 meters. I probably spent more time on 6 meters that summer than ever before. One thing quickly became very obvious. AG4W was frequently working European stations that I couldn't even hear. So, what was going on?

I live in an old Victorian, densely packed, noisy neighborhood. The difference in my receiver noise floor on 6 meters when looking at ambient noise versus looking into the dummy load can be, at times, as much as 20 dB. That can certainly be an awful problem. But, could there be more going on? Steve's antenna, a 4-element quad, has slightly more gain than my 3-el yagi. But, the gain difference does not appear to be enough to explain why I couldn't hear the Europeans he was working. However, Steve's antenna is at 40 feet, while mine is at 62 feet. Could that explain the difference?

Recall that the elevation antenna pattern is significantly dependent on the antenna height above ground. That's because the ground-reflected component adds or subtracts in phase with the direct component.

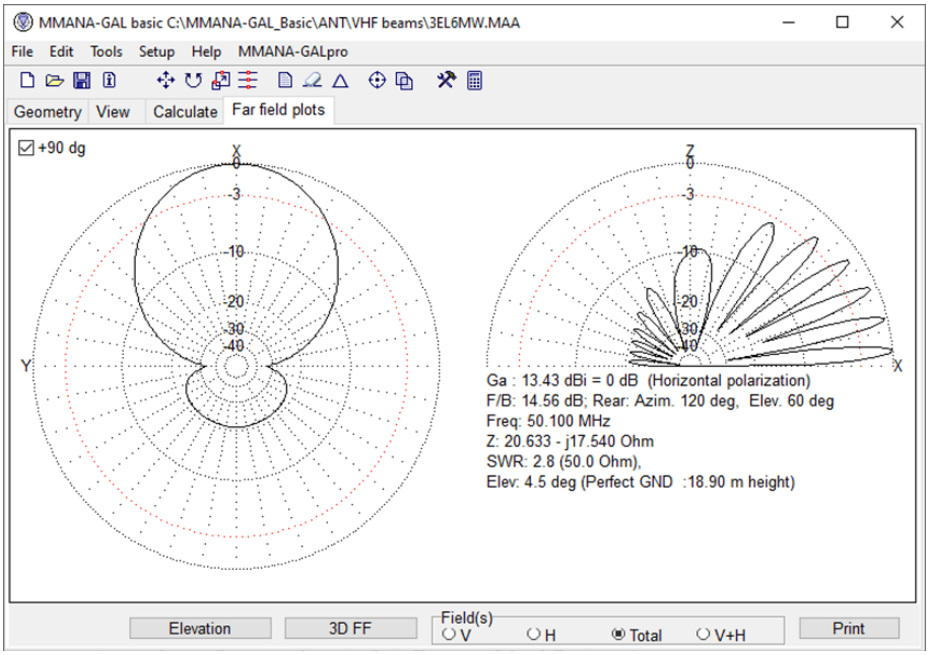


Figure 1 - 3-element 6m yagi elevation pattern for KR4F's antenna, 62 feet above perfect ground

Why is AG4W Beating me on 6 Meters? (continued)

Referring to Figure 1, it's obvious that my antenna is high enough that several very steep nulls have formed in the elevation pattern. Are those nulls significant with respect to my attempts at Europe versus AG4W's performance?

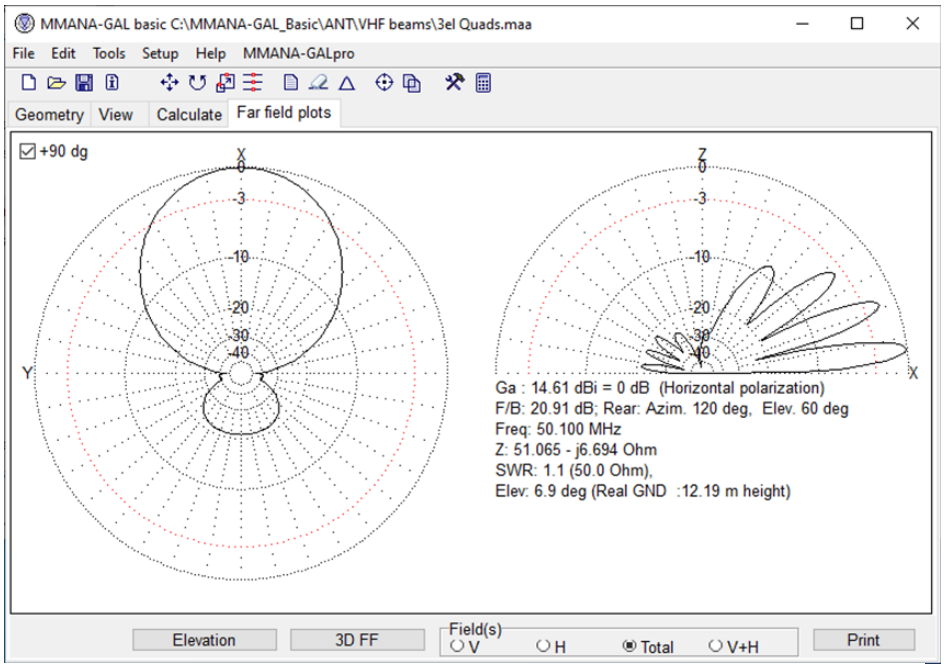


Figure 2 - AG4W's 4-element quad elevation pattern, 40 feet above perfect ground

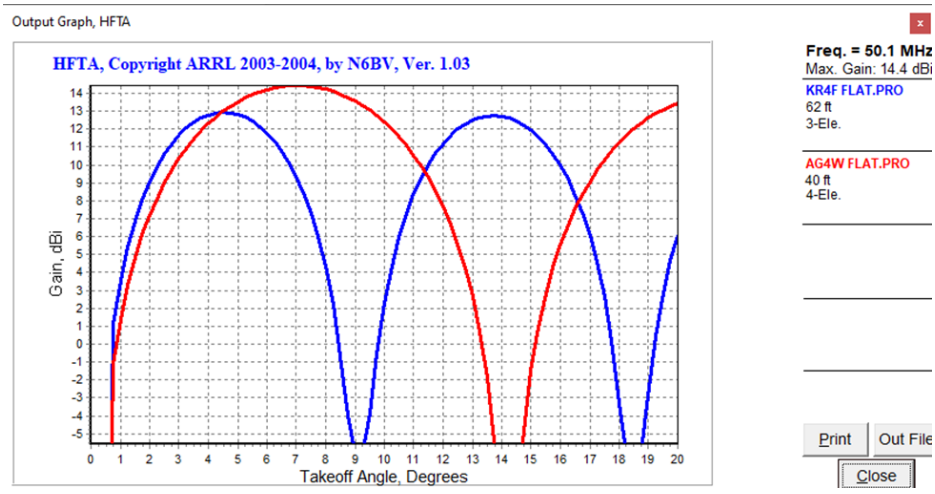


Figure 3 - KR4F and AG4W antenna elevation patterns above a flat Earth

Figure 2 illustrates AG4W's elevation antenna pattern. It has fewer nulls, but is that significant? The answer probably depends on the most likely elevation arrival angles for six meter sporadic E.

In an unpublished paper: " Elevation Angles Required for 6m Sporadic E, Carl Luetzelschwab K9LA, 21 October 2006 [unpublished]", Karl calculates the most likely elevation angles to be below 10 degrees, but goes up to 15 degrees just in case. Unlike when I was doing radar analysis, Karl uses the standard average Earth radius rather than the 4/3 Earth radius model I used to use. That model was to take in to account very low elevation angle refraction in the lower 10 km of atmosphere. For our purposes, however, I doubt that makes much difference. Based on Karl's discussion, I'm perfectly happy to assume that most 6m sporadic E DX propagation will be at an elevation angle less than or equal to 10 degrees.

Figure 3 hones in on the difference between the AG4W and KR4F antenna elevation patterns for elevation angles less than 20 degrees for antennas above perfect flat ground. Wow! AG4W appears to have a significant advantage for about 50% of the angles below 10 degrees! So, the different antenna heights might be having a huge impact.

The immediate problem is that neither of us operates over perfect ground! So, it's time to

Why is AG4W Beating me on 6 Meters? (continued)

start up the HFTA (High Frequency Terrain Assessment) program. It calculates antenna elevation patterns over your actual terrain. I got my copy on a disc in the back of the 20th edition of the ARRL Antenna Book. HFTA requires digital terrain data for your location. The notes explain how to get the data from various government sources. But, the easy alternative is provided by Stu Phillips, K6TU. Go to K6TU.net, and request the terrain data centered on the coordinates of your antenna. He returns the data, in exactly the form HFTA requires, almost immediately. So, I requested terrain data for both AG4W and KR4F.

The AG4W and KR4F stations are only 5.1 miles apart. But, the terrain from the view point of the antennas is significantly different. Let's look at Europe. At 45 degrees azimuth, note in Figure 4 that at two miles from the respective antennas, the AG4W terrain continues to slope down while the KR4F terrain blows up like mad!

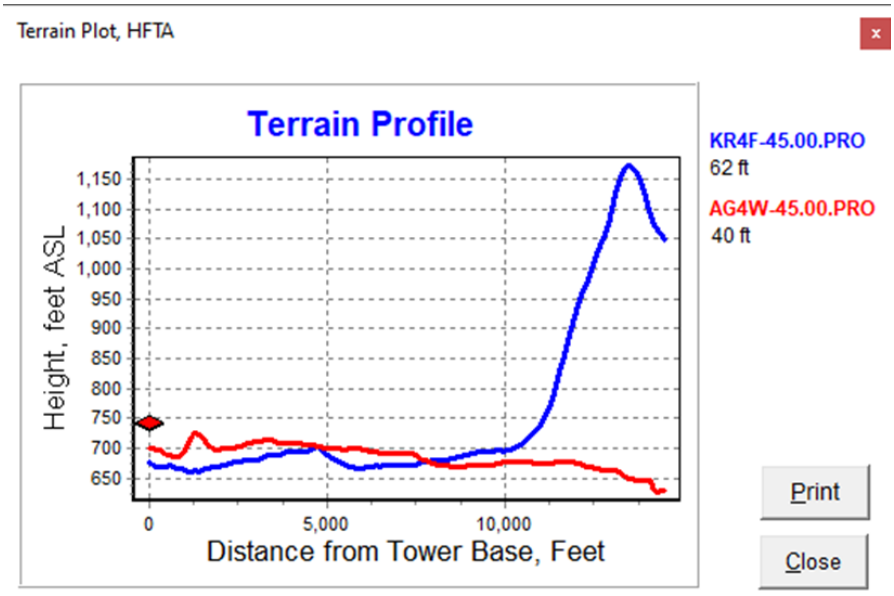


Figure 4 - KR4F and AG4W terrain profiles toward Europe

So what does that mean? Figure 5 shows the gain versus elevation take off angle.

AG4W has a very slight advantage between 0.5 and 1.5 degrees, and that can be important, but the very big deal is from about 6 degrees to 9 degrees. I have a huge null there!

The gap between 6 and 10 degrees in Figure 5 is particularly telling. Depending on elevation angle, Steve might enjoy as much as a 20 dB advantage. Especially when coupled with my, at times, 20 dB noise level disadvantage, that beats the heck out of any small differences in free space antenna gain!

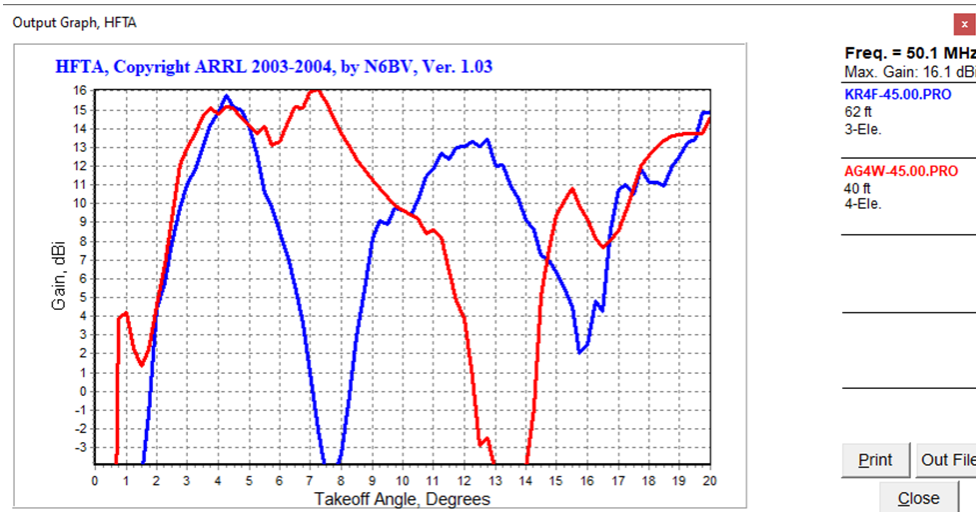


Figure 5 - KR4F and AG4W antenna gain versus elevation angle toward Europe

That may explain the issue in the direction of Europe. But, do similar things happen in other directions? Should I move the 6m yagi down to a lower height? This elicited a parametric analysis

Why is AG4W Beating me on 6 Meters? (continued)

of antenna height versus terrain around the KR4F QTH.

To begin, Figure 6 shows the KR4F QTH with TH-3 pointed at Europe (before I put up the 6m yagi).

Figure 7 shows the terrain around the KR4F QTH. The QTH is at the center of the figure. The terrain is particularly brutal to the East (Monte Sano) and Southeast.

We'll start around the compass rose in 45 degree increments and compare the actual 6m yagi antenna height to speculative heights of 40 feet, 35 feet, and 30 feet.

Figure 8 shows the terrain profile looking due north from KR4F, while Figure 9 shows the gain in that direction for the various antenna heights. The 30 foot height is definitely best in that direction!

Figures 10 and 11 show the plots toward Europe. Again, the 30-foot height seems to be the best.

Looking at Figures 12 and 13, nothing looks particularly good to Africa. None of the antennas are high enough to provide good coverage at the very low elevation angles. It's a bit of a toss-up, but the 40 foot height may be the best compromise. Just for drill, I checked the Africa patterns for antenna heights up to 180 ft. None added any coverage below 3.5 degrees. Monte Sano looms over everything!

As seen in Figure 14, the land rises very rapidly toward South America from KR4F. So, Figure 15 indicates that, up to about 8 degrees, the

Figure 6—Image of KR4F QTH with TH-3 pointed at Europe

Why is AG4W Beating me on 6 Meters? (continued)

highest antenna is best.

As illustrated in Figures 16 and 17, the situation is very similar looking due south. Again, the high antenna seems to be the best in that direction.

Figures 18 and 19 illustrate the situation toward Oceana. The terrain falls off very rapidly in that direction, so the high antenna is definitely too high, although you could argue that the distances involved probably mean elevation arrival angles much less than 10 degrees.

Figures 20 and 21 illustrate the situation due west from KR4F. The terrain falls off very, very rapidly in that direction which means that almost any of the shorter antenna heights might work better.

As illustrated in Figure 22, the terrain falls off extremely rapidly toward Japan. In the case of Japan, Figure 23, the lowest antenna would definitely seem to be the best!

So, what to do? In several directions, the current 62-foot antenna appears to be too high. But, toward Monte Sano, in particular, there appears to be no way to get it high enough. Further, I'm unwilling to go to the expense and bother to mount a lower antenna on a tic ring or rotate the tower.

But, it so happens I had a spare 3-element 6 meter Yagi! Stephen Ford, KJ4DWX, graciously climbed the tower and side-mounted that antenna at an approximate 30-foot height pointed at Europe.

I suspect the probable elevation arrival angles to the Pacific and Asia will tend toward the very low angles. The high antenna is therefore probably acceptable in those directions. I chose Europe as the most likely to give me DX I hadn't worked on six meters.

So, maybe the upcoming six-meter sporadic E season will tell the tale. Will AG4W still hear Europeans I can't hear? Does my local noise make all of this discussion moot?

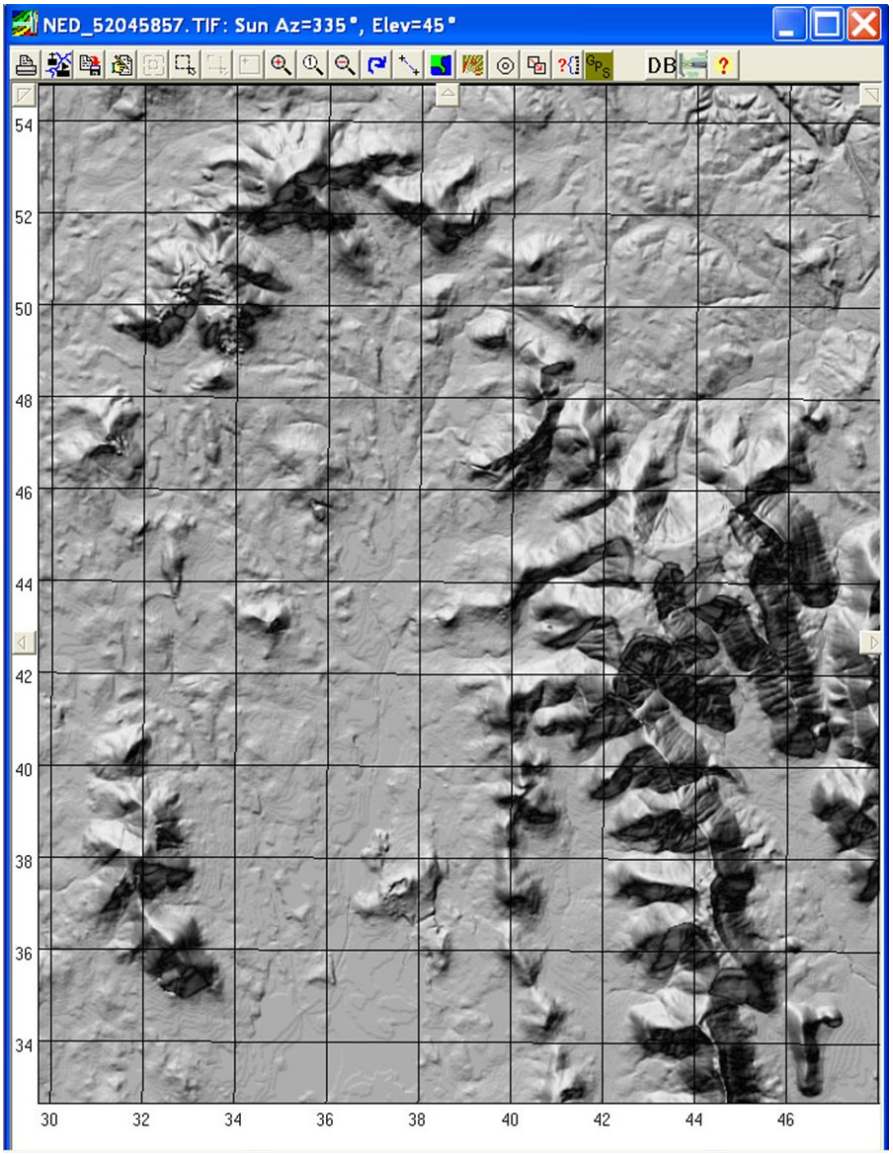


Figure 7 - Terrain around KR4F QTH, QTH at center

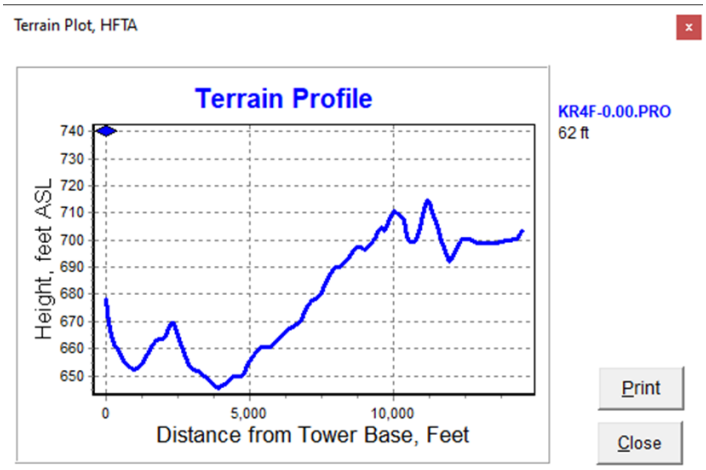


Figure 8 (above) - Terrain profile due north of KR4F

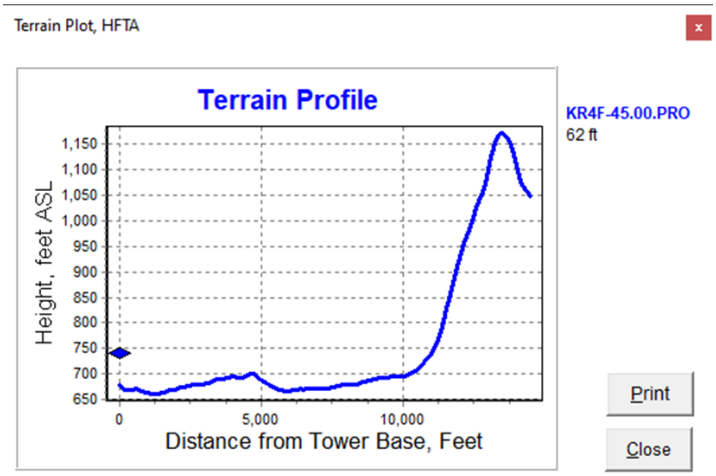


Figure 10 (above) - Terrain profile to Europe from KR4F

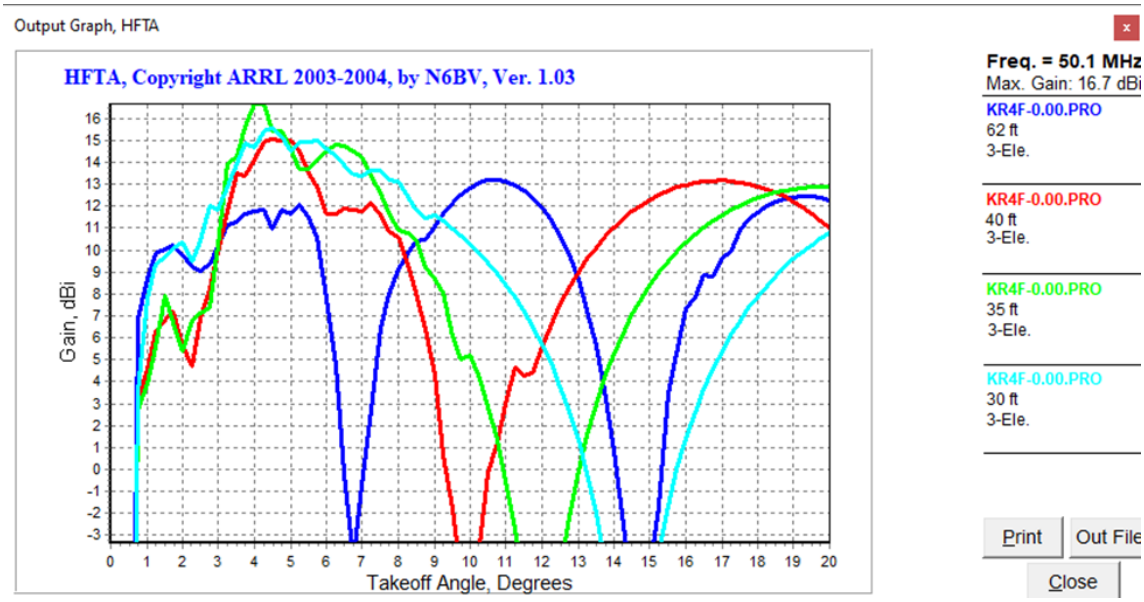


Figure 9 (left) - Antenna gain versus elevation angle for four antenna heights looking due north from KR4F

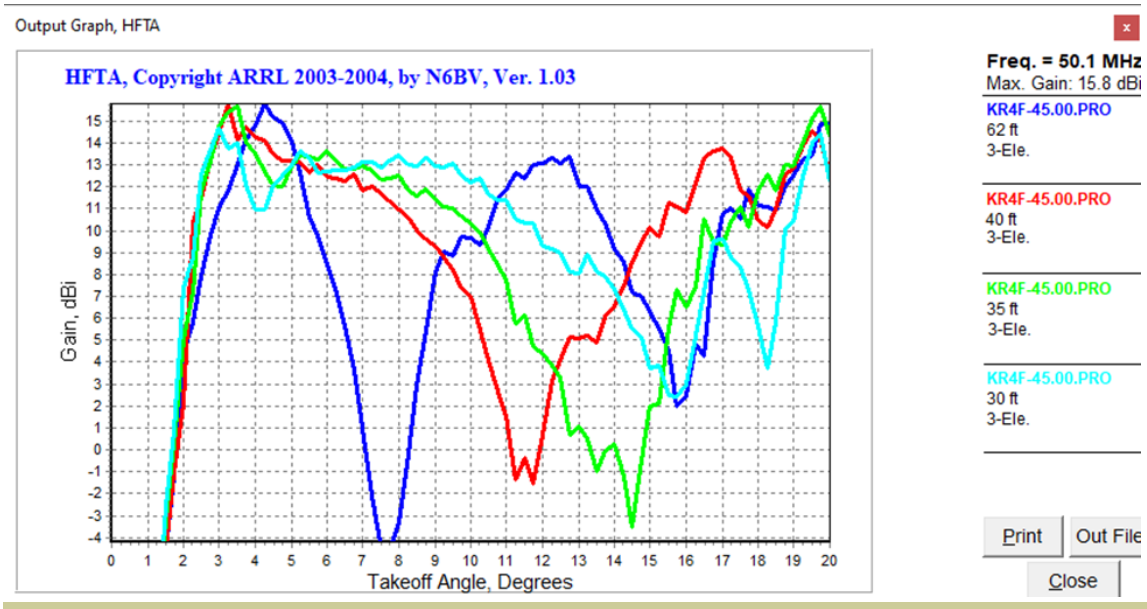


Figure 11 (left) - Antenna gain versus elevation angle for four antenna heights looking to Europe from KR4F

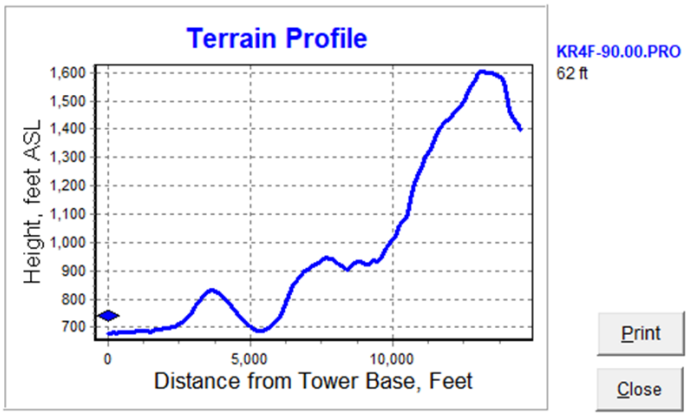


Figure 12 (above) - Terrain profile toward Africa from KR4F

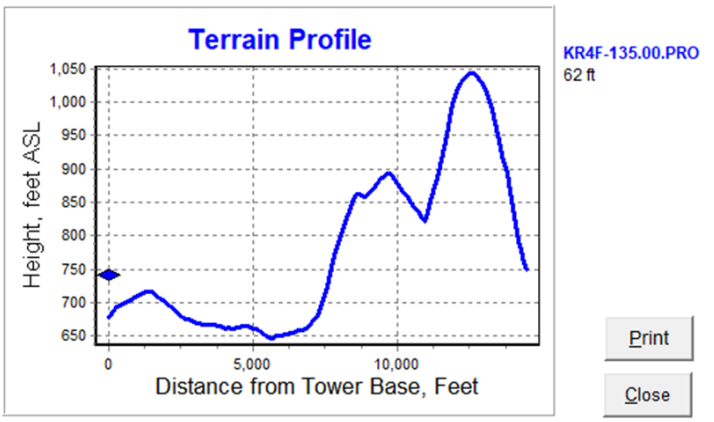


Figure 14 (above) - Terrain profile to South America from KR4F

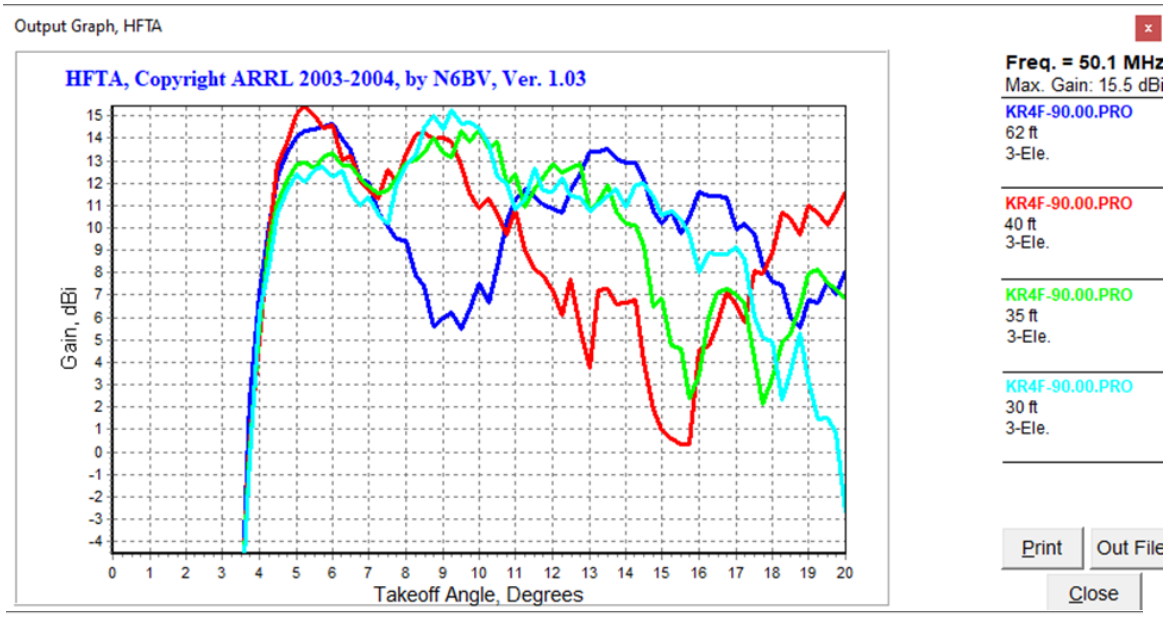


Figure 13 (left) - Antenna gain versus elevation angle for four antenna heights looking toward Africa from KR4F

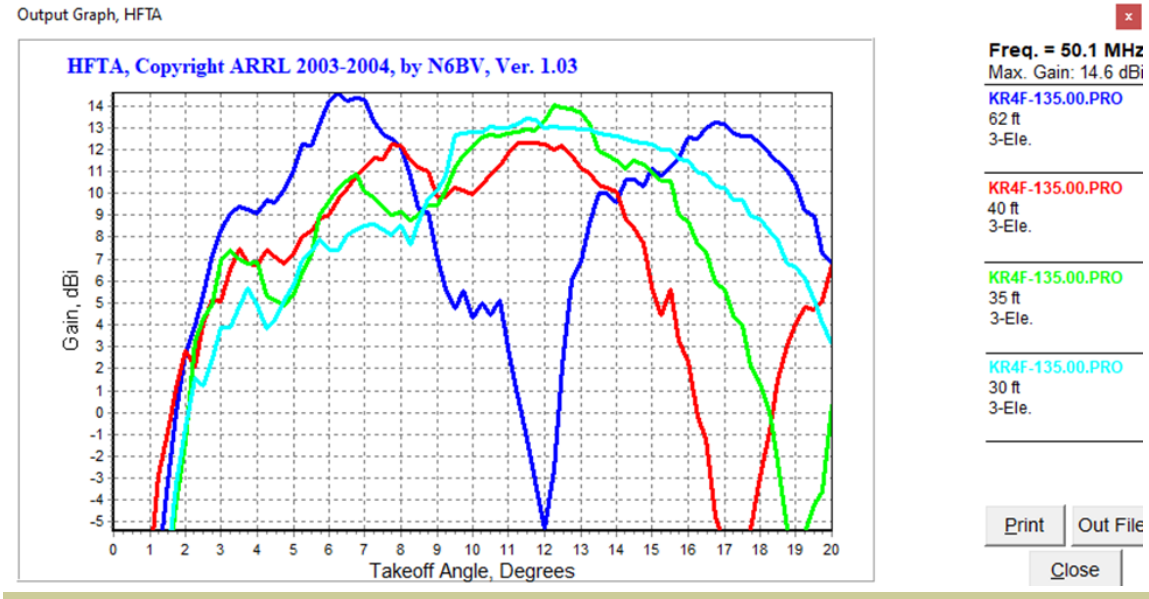


Figure 15 (left) - Antenna gain versus elevation angle for four antenna heights looking toward South America from KR4F

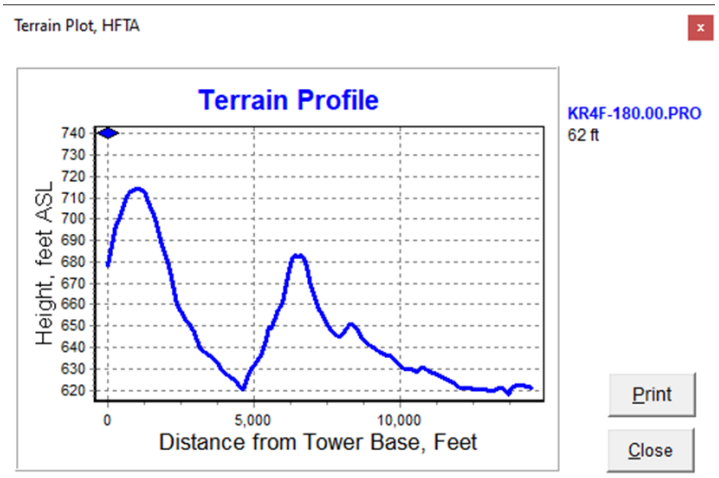


Figure 16 (above) - Terrain profile due south of KR4F

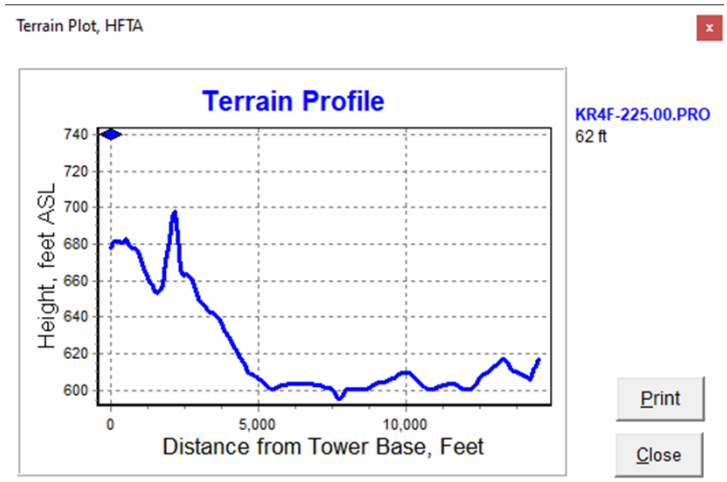


Figure 18 (above) - Terrain profile toward Oceana from KR4F

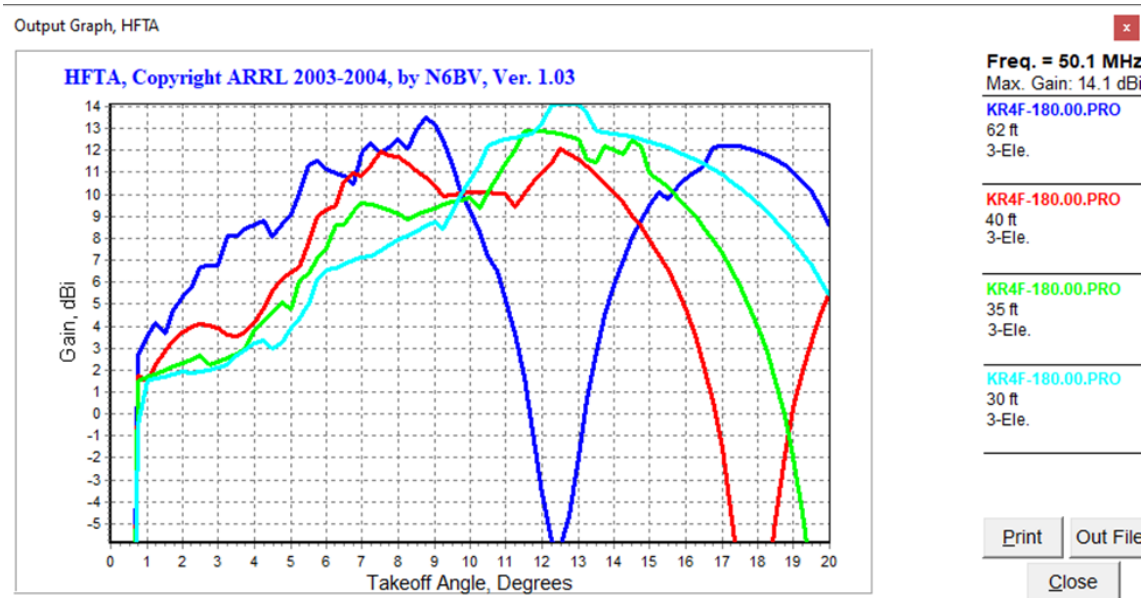


Figure 17 (left) - Antenna gain versus elevation angle for four antenna heights looking due south from KR4F

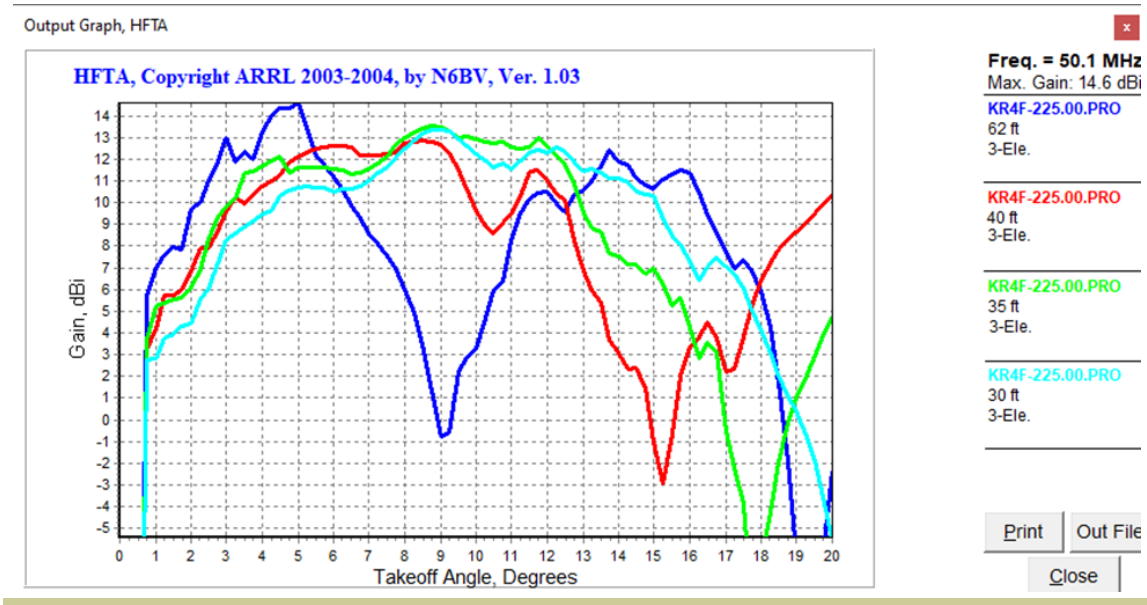


Figure 19 (left) - Antenna gain versus elevation angle for four antenna heights looking toward Oceana from KR4F

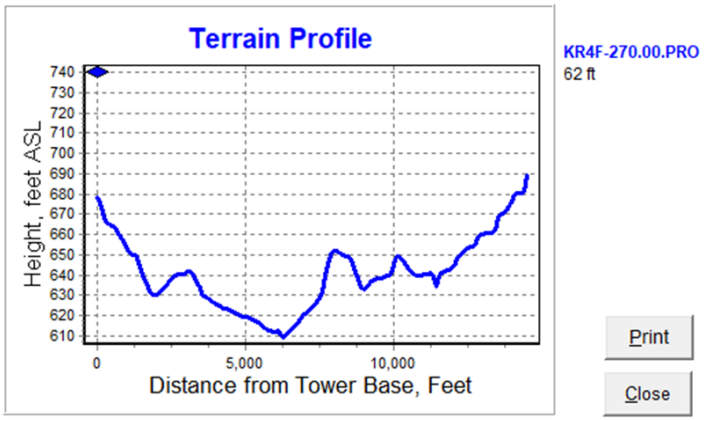


Figure 20 (above) - Terrain profile due west of KR4F

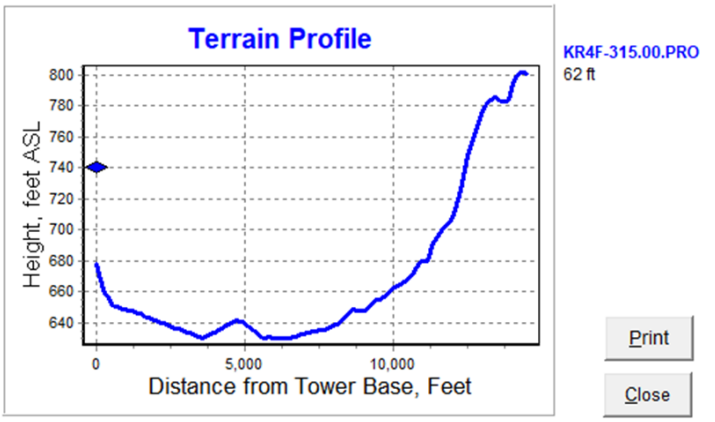


Figure 22 (above) - Terrain profile toward Japan from KR4F

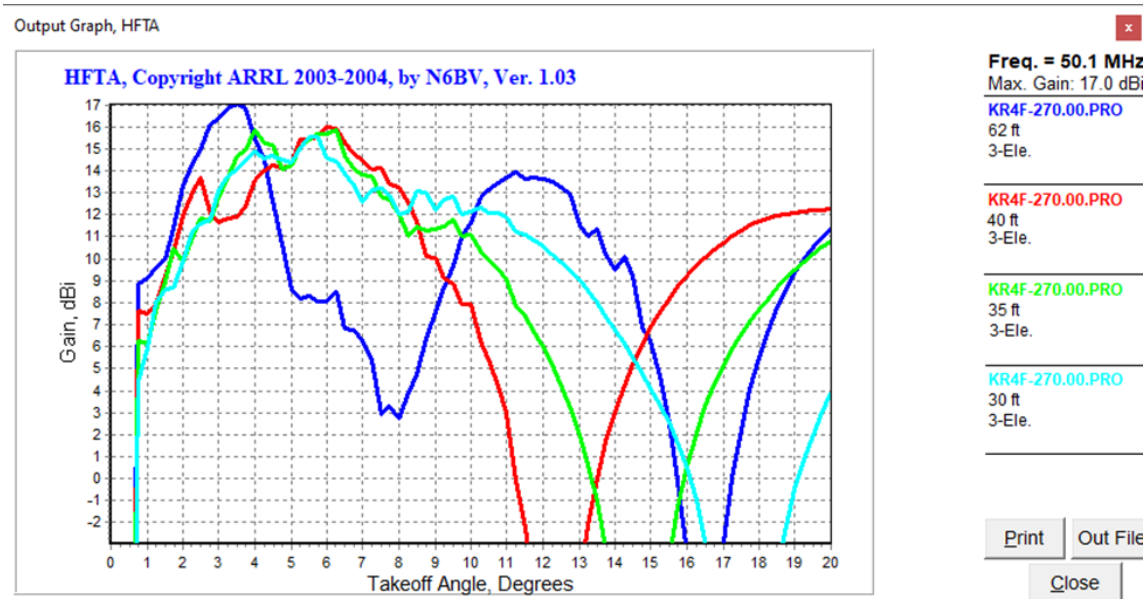


Figure 21 (left) - Antenna gain versus elevation angle for four antenna heights looking due west from KR4F

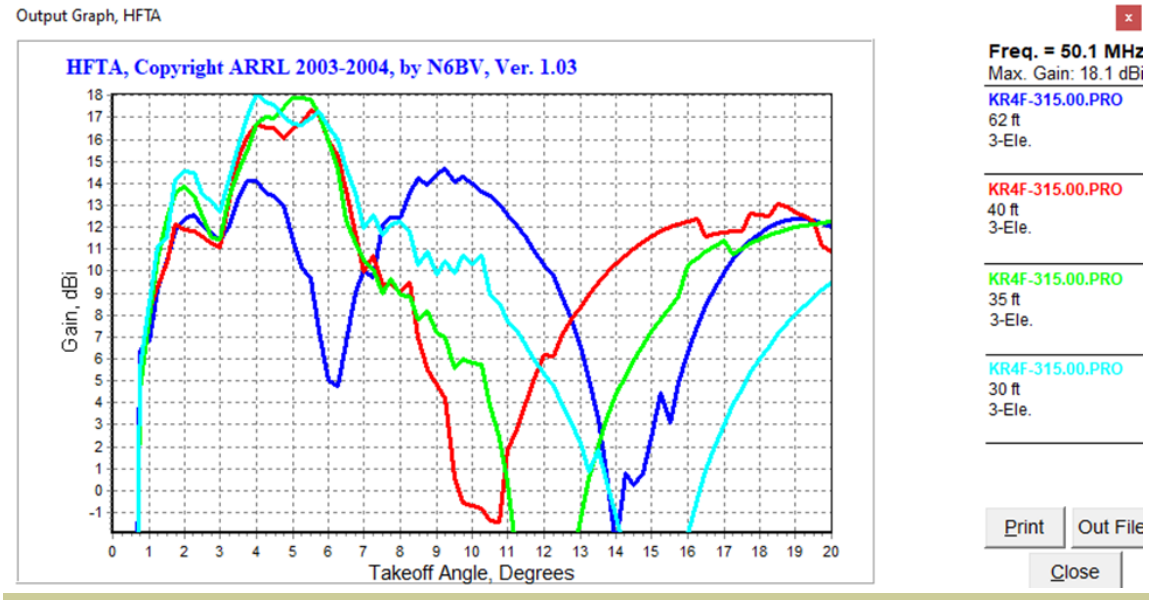


Figure 23 (left) - Antenna gain versus elevation angle for four antenna heights looking toward Japan from KR4F

The SWR on My Coax is 1.5. That's Way Too High!
Part 2

By Bob DePierre, K8KI

There are times when your SWR makes little difference, and times when it makes a big difference. Last month I considered a situation at HF where the SWR was 1.5 on a 100' piece of RG213 coax, and the transmit power was 100 watts. In that case the forward line loss was 9.4 watts and the reflected power incident on your transmitter was 3.6 watts. The reflected power was actually trivial, but the 9.4 watts coax loss might make you think about a different transmission line, not to mention the 0.94 dB added to your receiver's noise figure (hence sensitivity).

Now let's change a couple of the variables: try moonbounce at 146MHz and 1000 watts. Use the same 100' piece of RG213 coax with the SWR still at 1.5.

RG213 is a very common product, often used at 2m, but it becomes lossy at VHF and higher. The loss/100' isn't specified for 146MHz, but you can easily do a linear interpolation to find its loss to be 2.51dB/100' at that frequency. Taking into account the SWR and line loss (equation 20-11 in most ARRL Handbooks), you can calculate the Total Mismatched Line Loss to be 2.63dB (the SWR only adding 0.12dB to the total). But since you're now transmitting at 1000 watts, those line losses add up to 454 watts! So only 546 watts reach the antenna. You are going to feel some temperature rise in that line.

The ARRL Handbook, in Chapter 20, goes through a good discussion of SWR, the reflection coefficient, and the forward and reflected power. But there is a lot those paragraphs don't say, and you need to go through some algebra to isolate variables you need to calculate. You'll need to do that when working with the forward and reflected quantities.

Of that 546 watts reaching the antenna, 506 watts will now get radiated and 40 watts will get reflected. On the return path, the Total Mismatched Line Loss will be the same 2.63dB, which works out to be 18 watts, and just adds to the temperature of the line. 22 watts will hit your amplifier, which is actually trivial.

According to the Handbook, there are two types of RG213. The Belden cable has a max breakdown voltage of 3700*Vrms*, while the CPX213 version has a breakdown of 600*Vrms*. If you are transmitting 1000 watts, then *Vrms* can be calculated as:

$$Vrms = \sqrt{P * R} = 224V$$

The 1.5 SWR adds peaks and valleys to the mix, thus adding 20% to what the coax sees at SWR=1.0, or 268V. I'd double that to be on the side of safety, but it's getting maybe a little close for comfort with CPX213.

There are a few considerations for this case that matter little for the HF case. And none of it has anything to do with protecting your amp from high SWR. Here you'll have physically warm coax, with only 506 of the original 1000 watts actually getting radiated. And the travel path for moonbounce is a half-million miles. You want the most sensitive receiver you can possibly get. The Total Mismatched Line Loss of 2.63dB (receiver sensitivity loss) is a killer for this application. Let me know if you'd like to see the calculations for ½" hardline as used for this application. Hint: You'll radiate 749 watts, suffer 211 watts of line loss, and lose 1.03dB in Noise Figure.

Pick Your Battles

By Steve Werner, AG4W

It is best to decide what your objective is when entering a contest. If you enter to win it is best to understand which category you are most competitive in. As Clint Eastwood once said "A man has got to understand his limitations." Entering in all mode high power with marginal antennas on some bands will not get you a winning entry. It is also important to understand how many hours you can put into the contest. A single band entry on 160, 80, 40, 15 or 10 meters can be competitive with 24 -28 hours of operation.

One of the difficulties we can't fix is our location. The stations in the Northeast have a distinct advantage with propagation to Europe. They also open to Europe an hour before we do. Some of that advantage can be made up with additional seat time. That is one reason I recommend a good chair. Keep in mind that the best contesters will not only put in the seat time, but also maintain high accuracy and intensity. Accuracy is very important which was highlighted to me by our win at D4C in 2019. Our win was due to accuracy and not the most contacts.

I have found that operating at a multi-multi station helps you to improve the intensity of your operating. Most casual contesters do not have the drive and focus and do not maintain it to the end of the contest. The winners keep that drive even after operating over 40 hours in a 48 hour contest. I find this is particularly difficult running on CW. Some operators find that practicing with Morse Runner before the contest gets them prepared for pileups while running. I am in awe of the operators that can run doing dueling CQ's on CW on different bands at the same time. The intensity of this operating technique to me is crazy. I find it is difficult to chase multipliers while running after you get tired. I do this using SO2V not to be confused with SO2R where you use 2 radios.

It is easy to get confused after working long hours, particularly on Saturday night at 3AM when rates drop. It is good to have SWR lockout on your amplifier so if you select the wrong antenna bad things don't happen. It is also good to have a backup antenna and amplifier. I rarely run my amplifier at 1500 watts. I have found over the years the increased reliability at slightly lower power is better than the hassle of swapping or fixing an amplifier in the middle of a contest. This is particularly true with the SB-220.

Before a contest it is useful to review the previous year's efforts and your record years. Writelog has reports that I find useful that show rates and multipliers per hour, what multipliers you worked on each band, and the makeup of contacts by continent by band. You can review these reports for my 2021 CQWW RTTY results and come to some quick conclusions on which bands were most productive. It also showed when I decided to take a break. This year I took more and longer breaks than some other years. I keep a copy of my record year rate and multiplier summary to compare with the current year during the contest.

The same issues apply to chasing DXpeditions. A station with small antennas and low power should not expect to break the pileup of a rare station on the first few days. Always start with your most competitive antennas. Later in their operation they will be looking for the weak stations.

It is also easier for stations to run in a contest on Sunday, often called "Dupe Day". Many times I will put in a part time effort in a contest on

Pick Your Battles (continued)

Sunday because you are fresh meat. You will get spotted and even the large stations will chase you. Sunday is also a great day for QRP operators.

It is also good to review the propagation forecast before the contest. This will give you a better idea of which bands will be most productive and when to expect the band will open and close. During DXpeditions it is good to review Club Log to see when stations have worked into our area on a particular band. As you get more experience you can look for potential long path or skew path openings.

One of the great things about DX contests is that it brings out the rare stations on all bands. It is a great time to increase your DXCC Challenge count. If that is your goal it is best to focus on bands where you need the most new countries and chase the stations that are new ones. Sometimes even a few hours in the contest can yield a handful of new ones if propagation is good.

Entering a contest part time is also good to improve your operating skill. This is particularly true on CW. I found that my CW speed jumped to 25 WPM after entering a number of CW contests. You will also find it is much easier to get DXCC on the low bands on CW. If you like the slower speeds I find that stations tend to send slower on 160 meters.

Last weekend I entered the CQ WPX SSB contest single operator 15 meter only high power. This contest has defaulted to assisted now. I picked 15 meters because I thought I would have better runs into Europe than 40 meters and would have more fun. I have won the US before on 40 meters, but chose to have more fun. With higher sun spot numbers, propagation has also made 15 meters more fun. We had an opening into Japan Saturday night and I had a nice run into Europe on Sunday morning. On Saturday morning during the opening to Europe, I also worked E2A in Thailand. At the beginning of the contest D4Z was 20 over 9 in darkness here and 1AM there.

I was disappointed that CQ magazine made a rule change for the WPX contest to not accept Russian and Belarus station entries and assign zero points to their contacts because of the war. I believe in strong sanctions to Russia, but I don't feel that penalizing less than 50 hams will deter President Putin in his war effort. Ham radio is like the Olympics and should be used to help bring people together and encourage peace. I did work Russia and Belarus during the contest. I guess they didn't hear about the rule change. I am concerned we are headed back to the 60's when all Russian QSL cards went to PO Box 88 Moscow and Russian stations were limited in what they could discuss over the air.

The Bavarian Contest Group also thought it was not an appropriate understanding of the non political nature of ham radio to exclude a group of contesters. Their way of protesting their disagreement was to pull sponsorship of four plaques that included the rookie and youth categories. I again disagreed with their thought process because all they did was hurt the youth and rookies who entered the contest and not CQ magazine who made the rule change. What this all showed me is how difficult it must be to impose sanctions and how hard you need to look at the consequences.

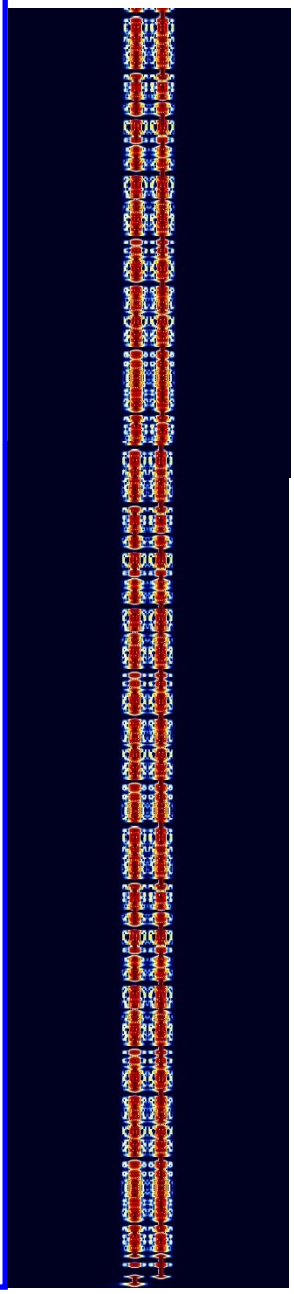
	80M	40M	20M	15M	10M	Total	%
NA	198	360	213	34	4	809	48.3
EU	32	110	353	277	0	772	46.1
AF	1	5	4	5	0	15	0.9
SA	0	7	6	25	12	50	3.0
OC	2	4	3	0	0	9	0.5
AS	0	6	10	3	0	19	1.1

AG4W's 2021 CQWW RTTY QSO's by continent

QSO/Zn+Dx+St by hour and band

Hour	80M	40M	20M	15M	10M	Total	Cumm	OffTime
D1-0000Z	--+--	47/43	6/12	--+--	--+--	53/55	53/55	
D1-0100Z	-	82/28	-	-	-	82/28	135/83	
D1-0200Z	-	83/11	-	-	-	83/11	218/94	
D1-0300Z	-	67/9	-	-	-	67/9	285/103	
D1-0400Z	12/17	39/5	-	-	-	51/22	336/125	
D1-0500Z	40/25	-	-	-	-	40/25	376/150	
D1-0600Z	-	15/1	-	-	-	15/1	391/151	38
D1-0700Z	-	-	-	-	-	0/0	391/151	60
D1-0800Z	--+--	--+--	--+--	--+--	--+--	0/0	391/151	60
D1-0900Z	23/8	8/3	-	-	-	31/11	422/162	13
D1-1000Z	24/7	-	-	-	-	24/7	446/169	
D1-1100Z	14/8	6/2	13/13	-	-	33/23	479/192	
D1-1200Z	-	-	15/7	-	-	15/7	494/199	
D1-1300Z	-	-	1/2	31/27	-	32/29	526/228	
D1-1400Z	-	-	-	81/18	-	81/18	607/246	
D1-1500Z	-	-	-	51/10	-	51/10	658/256	
D1-1600Z	--+--	--+--	12/11	1/0	--+--	13/11	671/267	
D1-1700Z	-	-	11/8	8/1	3/3	22/12	693/279	
D1-1800Z	-	-	17/9	3/4	7/6	27/19	720/298	
D1-1900Z	-	-	67/15	3/1	-	70/16	790/314	
D1-2000Z	-	-	67/14	-	-	67/14	857/328	
D1-2100Z	-	-	69/13	-	-	69/13	926/341	
D1-2200Z	-	-	38/4	11/4	-	49/8	975/349	
D1-2300Z	-	-	61/9	4/1	-	65/10	1040/359	
D2-0000Z	4/2	18/0	10/1	--+--	--+--	32/3	1072/362	
D2-0100Z	21/6	10/1	9/5	-	-	40/12	1112/374	
D2-0200Z	30/2	2/0	-	-	-	32/2	1144/376	
D2-0300Z	11/2	11/0	-	-	-	22/2	1166/378	16
D2-0400Z	-	-	-	-	-	0/0	1166/378	60
D2-0500Z	10/2	-	-	-	-	10/2	1176/380	45
D2-0600Z	9/0	6/2	-	-	-	15/2	1191/382	25
D2-0700Z	-	-	-	-	-	0/0	1191/382	60
D2-0800Z	1/0	9/4	--+--	--+--	--+--	10/4	1201/386	13
D2-0900Z	-	2/0	-	-	-	2/0	1203/386	56
D2-1000Z	-	15/2	-	-	-	15/2	1218/388	37
D2-1100Z	19/1	14/0	4/0	-	-	37/1	1255/389	
D2-1200Z	-	-	17/2	27/2	-	44/4	1299/393	
D2-1300Z	-	-	19/0	10/0	-	29/0	1328/393	
D2-1400Z	-	-	2/0	58/4	-	60/4	1388/397	
D2-1500Z	-	-	18/2	28/8	-	46/10	1434/407	
D2-1600Z	--+--	--+--	23/0	--+--	--+--	23/0	1457/407	
D2-1700Z	-	-	2/1	9/4	-	11/5	1468/412	
D2-1800Z	-	-	42/1	-	-	42/1	1510/413	
D2-1900Z	-	-	30/2	-	-	30/2	1540/415	48
D2-2000Z	-	-	18/0	14/5	6/7	38/12	1578/427	
D2-2100Z	-	14/0	13/0	4/2	-	31/2	1609/429	
D2-2200Z	-	14/0	5/0	1/0	-	20/0	1629/429	
D2-2300Z	15/1	31/2	-	-	-	46/3	1675/432	
Total:	233/81	493/113	589/131	344/91	16/16			

Left: AG4W's 2021 CCWW RTTY QSO's by hour and band.



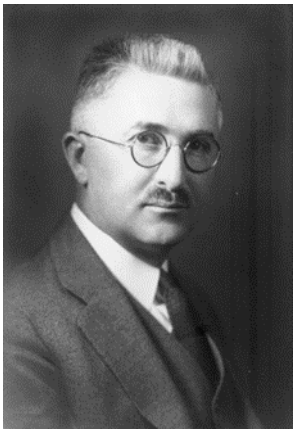
	80M	40M	20M	15M	10M	Total
3D2		1				1
9A	1	3	5	4		13
9G		1	1	1		3
9Y				1		1
A6				1		1
C3			1			1
CE				3	1	4
CM	1	4	3	1		9
CT			3	4		7
CT3	1	2	3	2		8
CX				1	2	3
DL	2	16	58	34		110
E7			2			2
EA	6	9	20	12		47
EA8		2		2		4
EI	2		1	4		7
ER		1	1	2		4
ES			3			3
EU		2	3	3		8
F	2	4	19	12		37
FG					1	1
G		7	17	13		37
GI			1			1
GM	1	1	6	2		10
GU				1		1
GW		2	3	3		8
HA	1		3	6		10
HB			2	4		6
HB0			1			1
HC				1		1
HI	1		2	2		5
HK			1	1		2
HP		1	1			2
I	5	19	50	47		121
IS				1		1
IT9	1	3	5	4		13
J3					1	1
JA		6	8	2		16
JT			1			1
K	174	311	163	18	2	668
KH6		1				1
KL		1	5			6
KP2		2		1		3
KP4	1	2	2	4		9
LA	1		4	4		9
LU		2	2	2	4	10
LX		1	1			2
LY		2	3	2		7
LZ			6	3		9
OA				1		1
OE		2	3	3		8
OH			9	3		12
OK	2	7	15	10		34
OM		2	8	3		13
ON	1	2	9	6		18
OZ			3	2		5
PA	2	6	16	6		30
PY		5	3	15	4	27
S5	3	2	7	5		17
SM		1	3	4		8
SP	2	7	18	18		45
SV			2	4		6
SV9			1			1
TF			1	1		2
TG				1		1
TI		1	1	1		3
UA		1	18	10		29
UA2				1		1
UA9			1			1
UR		5	12	22		39
V3	1		1			2
VE	17	34	30	6		87
VK	1	1	3			5
XE	2	3	4			9
YL			4	2		6
YO		2	3	8		13
YU		3	2	4		9
YV					1	1
Z3			1			1
ZF	1	1	1			3
ZL	1	1				2

Above: AG4W's 2021 CCWW RTTY QSO's by DX entity and band.

Who Was Ralph Hartley?

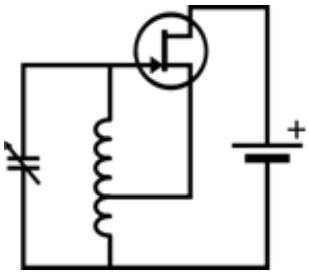
By Bob DePierre, K8KI

Most everyone has heard of the Hartley oscillator. Its patent dates all the way back to 1915. You'll often hear me refer to this period as the time "before they invented sinewaves." There's some truth to this, although we know scientists didn't actually invent sinewaves. But it did take some heroic leaps to bridge the gap between high school trigonometry and inventions that actually generate precise sinewaves. Much of that leap occurred around the time Ralph Hartley came upon the scene.



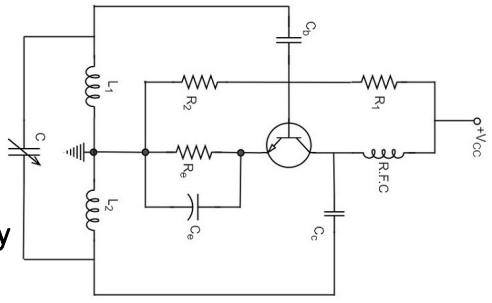
Dr Hartley was born in Nevada in 1888, and finished his education in 1913. The earliest successful circuitry involving feedback that I'm aware of was Howard Armstrong's regenerative receiver, patented in 1913 when he was a senior in college. At this point, engineers were apparently aware of how to use feedback, but not necessarily how to express it mathematically. But that was changing, and quickly. Armstrong had certainly figured out that if you take a sample of an amplifier's output, and reinsert it back at the input, then the signal would grow without bound.

World War I broke out in August, 1914, and certain projects accelerated to the front burner. Hartley found himself in the Research Lab at Western Electric working on a transatlantic telephone project. In that effort, he perfected the very first feedback circuit that would start running once powered up. The output was a natural response to the instantaneous circuit conditions, and not surprisingly, it was sinusoidal. As taught to me many years ago, the "homogeneous solution" (i.e., the solution with no input to the circuit) for this amplifier solves to be a sinusoid. As shown to the right, only two components are required, besides the device and the power supply. A simple, but marvelous invention.



At the time, "spark" was the dominant mode of transmission and reception. Tubes were very limited in performance (mostly in frequency response and gain). The Tuned Radio Frequency (TRF) receiver was patented in 1915, and soon became the dominant architecture, albeit with spark signals. Its inventor, Ernst Alexanderson, was already heavily invested in the spark process. The TRF didn't need any oscillators in order to work, and Armstrong's regenerative hadn't yet become popular. The TRF did, however, become popular immediately, although the best examples I've seen have had serious behavioral issues. TRF receivers stayed in production until the early 1930s. Spark started its death spiral in 1920, upon the introduction of sinewaves in numerous areas.

Oscillators were not used in receivers until the introduction of the superheterodyne in 1919. Hartley's invention didn't make it into the very first examples, but it didn't take long to figure out that the Hartley oscillator was cheaper, easier to design, and much more reliable. We still use them today.



Right: A Hartley oscillator

Club Business and Announcements

Proposed Changes to NADXC Bylaws

A vote will occur at the April 12th meeting regarding whether to amend the bylaws in order to increase the annual dues. The current Constitution and Bylaws can be read here: https://www.nadxc.org/constitution-by-laws/

The proposed modification to the "Dues" section of the Bylaws reads:

"Annual dues for Regular membership in the NADXC shall be $20, or $25 for households where more than one Regular member of the same family resides."

Budget Update - From the President, K8KI

Budget Category	Targets	March Activity	Year to Date	
Year Start	7436			
Dues In	720		885	59 members
Recurring Exp	-668		-350	
Sales	300	300	300	
Discretionary Exp	-1000			
DX Banquet	650			
Bank Delta	2		835	

I'm trying out a new format for the budget report in the Long Path, and would like your feedback on the information it conveys. For years we had just reported the previous month's transactions plus the funds in the account. I preferred to instead portray it as how well we are working to the budget the we adopted earlier in the year. This format shows how well we are doing toward what we had planned. At this time of year, the membership dues are important. As you can see below, we attracted more members than we anticipated! Very soon the DX banquet will become the next important activity. I tend to become distracted from what we are trying to do. I'm hoping this format will become a good tool in conveying how well we are managing our funds.

CQWW SSB Results

CQ magazine has released the CQWW SSB contest results and three NADXC members placed near the top of their classes. Congratulations to Stever Werner/AG4W, Larry Crim/K4AB, and Bruce Smith/AC4G!

- AG4W competed in the Single Operator - High Power - 1.8MHz category and scored 3,774 points. Steve finished 1st in the #4 call area, 2nd in North America, and 10th in the world.
- K4AB competed in the Single Operator High Power - Assisted category and racked up a score of 4,046,868 points. Larry finished 1st in the #4 call area, 8th in North America, and 28th in the world.
- AC4G competed in the Single Operator - Low Power - All Bands category, scoring 536,568 points. Bruce placed 2nd in the #4 call area, 11th in North America, and 28th in the world.

2022 NADXC Officers and Directors

President	Bob De Pierre, K8KI
Vice-President	Steve Molo, KI4KWR
Sec./Treasurer	Chris Reed, AI4U
Directors:	Bruce Smith, AC4G
	Fred Kepner, K3FRK
(Ex-Officio)	Steve Werner, AG4W

How to Join

Come to a club meeting or send in an application by mail (form on www.NADXC.org)

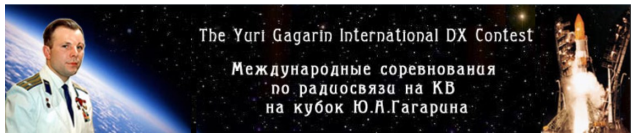
This edition of The LongPath published by: Fred Kepner, K3FRK

Upcoming DX Contests

By Chuck Lewis, N4NM

OK/OM DX Contest, (SSB), (160-10M)

Apr. 9, 1200Z to Apr. 10, 1200Z
Exchange: RS plus serial; OK/OM send RS plus county code (3 letters)
See: Page 74, April QST and
www.okomdx.crk.cz



Yuri Gagarin International DX Contest, (CW), 160-10M

Apr. 9, 2100Z to Apr. 10, 2100Z
Exchange: RST, ITU zone
See Page 74, Apr. QST and gc.qst.ru/en/section/32

FTn DX Contest, (DIG), 80 – 10M

Apr. 9, 1200z to Apr. 10, 1200Z
Exchange: 4-char. grid square
See Page 74, Apr. QST and https://europeanft8club.wordpress.com

Japan Int'l. DX CW Contest (CW), (160-10M)

Apr. 9, 0700Z to Apr. 10, 1300Z
Exchange: RST plus CQ zone; JAs send RST plus prefecture
See page 74, Apr. QST and www.jidx.org

Int. Vintage Contest HF, (CW & SSB), 80-20M

Apr. 10, 10700Z to 1900Z
Exchange: RS(T) & 4-char. Grid square
See page 74, Apr. QST and
www.aririmini.jimdofree.com

YU DX Contest (CW & SSB), 160-10M

Apr. 16, 0700Z to Apr 17, 0659Z (see web site for times)
Exchange: RST plus Serial #; YUs send County or Serial
See page 74, April QST and
www.yudx.yu1srs.org.rs

CQMM Contest, (CW), 80-10 meters

Apr. 16, 0900Z to Apr. 17, 2359Z
Exchange: RST, continent abbrev., category
See Page 74, Apr. QST and
www.cqmmdx.com

ES Open HF Championship, (CW & SSB), 80 & 40M

Apr 16, 0500Z to 0859Z,
Exchange: RS(T) plus Serial #
Note: Dupes OK once per hour (see rules)
See Page 74, April QST and
www.erau.ee/en

Upcoming DX Contests (continued)

SP DX RTTY Contest, (DIG), 80-10M

Apr. 23, 1200Z to Apr. 24, 1200Z
Exchange: RST, plus Serial # or SP province
See Page 74, April QST and
www.pkrvg.org

Helvetia Contest, (CW, SSB, DIG.), 160-10M

Apr. 23, 1300Z to Apr. 24, 1259Z
Exchange: RS(T) plus Serial # or Swiss canton
See Page 74, Apr. QST and
www.uska.ch/contest

UK/EI DX Contest, (CW, SSB, DIG), 80-10M

Apr. 30, 1200z to May 1, 1200Z
Exchange: RST + Serial #, or UK/EI district code + serial #
See page 74, April QST and
www.ukeicc.com/dx-contest-rules.php

Russian WW Multimode Contest, (CW, SSB, DIG), 160-10M

Apr. 30, 2000z to May 1, 1959Z
Exchange: RST + Serial #, or RST + 2 letter Russian area code
See page 74, April QST and
www.rdrclub.ru/russian-ww-multimode-contest/159-rus-ww-multimode-contest

OTHERS:

IG-RY Worldwide RTTY Contest, April 9, 1200Z to April 10, 1800Z

Holyland DX Contest, April 15, 2100Z to Apr. 16, 2100Z

UKEICC 80 Meter Contest, CW, April 30, 1200Z to May1, 1200Z

ARI International DX Contest 1200Z, May 1 to 1159Z, May 2

Dates & times often change or are misprinted in the journals; beware!

DXpeditions in April 2022

Reprinted by permission of Bill Feidt, NG3K

Start Date	End Date	DXCC Entity	Call	QSL via	Info
2022 Apr01	2022 Apr09	Aland Is	OH0EG	LoTW	By DK8RE DM5WF DL8UUF SP1EG; 160-10m; CW SSB + digital; 1kw; dipole, ground planes; QSL via SP1EG
2022 Apr02	2022 Apr23	Nepal	9N7MK		By S57MK fm various Nepalese locations; 40 20 17 15m; FT8 SSB CW; 10w; dipole, mag loop, ground plane
2022 Apr07	2022 Apr14	Galapagos	HC8	LoTW	By HC1MM as HD8MM and NE8Z as HD8MD fm Santa Cruz I; 40-6m; FT4 FT8 SSB CW; QSL via K8LJG or NE8Z
2022 Apr08	2022 Apr20	Burkina Faso	XT2MAX	LoTW	By DK1MAX fm Ouagadougou (IK92fh); HF, focus on high bands; CW FT8 (f/h) FT4, some SSB; 100w; dipoles, verticals; QSL via EA5GL direct
2022 Apr13	2022 Apr19	Azores	CQ84AS	LoTW	By CU8AS fm Flores I (IOTA EU-089); HF; mainly CW; 800w; QSL via HB9CRV
2022 Apr13	2022 Apr19	Martinique	FM	DF8AN (B/d)	By DF8AN as FM/DF8AN; HF; mainly CW + digital; 100w; dipoles
2022 Apr13	2022 Apr27	Maldives	8Q7DX	LoTW	By E77DX fm Fihalhohi I (IOTA AS-013); 80-10m, perhaps 160m; QSL via E73Y or Club Log OQRS
2022 Apr14	2022 Apr25	Norfolk I	VK9NT	M0OXO OQRS	By VK3QB VK3HJ VK6CQ fm IOTA OC-005; 160-6m; CW, some SSB FT8
2022 Apr15	2022 Apr28	Austral Is	TX5N	LoTW	By N7QT N6XG DJ9RR K5GS W1SRD N7BX K0BEE fm Raivavae I (OC-114); 160-10m; CW SSB + digital; QSL via
2022 Apr19	2022 Apr24	Dominca	J79MN	DF8AN (B/d)	By DF8AN; HF; mainly CW + digital; 100w; dipoles; call sign requested
2022 Apr19	2022 Apr26	Svalbard	JW0Z	LoTW	By ON5UR ON4ANN + others; HF CW SSB RTTY FT8 FT4; 5 stations; QSL via M0URX OQRS
2022 Apr20	2022 Apr28	St Kitts & Nevis	V47JA	LoTW	By W5JON fm Calypso Bay; 160-6m, incl 60m; SSB FT8; yagi, verticals; QSL also OK via W5JON direct
2022 Apr22	2022 Apr29	Aland Is	OH0EG	LoTW	By SP1EG SP1QY SQ3PMX; 80-15m; FT4 FT8 RTTY; 100w; ground planes; QSL via SP1EG
2022 Apr24	2022 May01	St Lucia	J6	DF8AN (B/d)	By DF8AN as TBD; HF; mainly CW + digital; 100w; dipoles
2022 Apr28	2022 May26	Botswana	A25VR	VE7VR	By VE7VR; HF
2022 Apr29	2022 May06	Mauritius	3B8	LoTW	By OM5ZW as 3B8/OM5ZW fm Long Beach; 80-10m; CW SSB RTTY FT8; QSL via Club Log OQRS
May					
2022 May01	2022 May02	Martinique	FM	DF8AN (B/d)	By DF8AN as FM/DF8AN; HF; mainly CW + digital; 100w; dipoles
2022 May01	2022 May31	Philippines	DU	LoTW	By W6QT as DU/W6QT fm Subic Bay; 80-6m; SSB FT8; ; QSL via W6QT; operation to continue until 15 Sep
2022 May21	2022 Jun04	Martinique	FM	ON4RU Direct	By ON4RU as FM/OQ3R fm IOTA NA-107; 160-10m; CW; holidaty style operation
2022 May22	2022 Jun07	Gambia	C5C	LoTW	By F5RAV F5NVF M0NPT; 20 15 10m; possilbe sidetrip to Bijol Is (IOTA AF-060) using C5B