

The LongPath

July 2023 — Volume 47 Issue 7

A North Alabama DX Club Publication



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- K8KI
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From the President

By Bruce Smith, AC4G

I trust every NADXC member was able to participate in Field Day from some location this year. It always helps me to improve my operating skills. I operated from the Lincoln County Amateur Radio Club (LCARC) in Fayetteville, TN for a short while. We had a few people stop by to see what we were doing, and I hope we encouraged them enough to attend one of our club meetings. I know HARC was on the air because they always put the effort to setup a first-class operation. I worked them from my home QTH after I left the LCARA Field Day setup.

Last month during the club meeting, I had indicated that the bands were really active and to go chase some DX. Mid-June, the higher bands decided not to cooperate. Ten meters and twelve meters have not been that productive, even opening late in the day which was not expected. I then focused my attention to six meters to find a few openings to Europe, Alaska, and South America, but they were not too productive for me. It seemed as though propagation was one-sided many days. I read somewhere recently that rare streaks of light above the U.S. are a sign that solar maximum is fast approaching. I have never heard this in the past, so I do not know if there is any

truth to this information. Since I waited many years for 10m to open and be wide open for world-wide communications, I am certainly taking advantage of being active on 10m and encourage you to do so as well.

Recently Chuck Lewis, N4NM reported that he finally made the coveted ARRL DXCC Honor Roll. Congratulations Chuck! The upcoming World Radio Team Championships (WRTC) 2023 which was postponed in 2022 will be occurring this month on 11-12 July. I am told we have a NADXC member as a participant. I encourage you to find out who this member is when the details are released to the public. If you get a chance to operate in this contest in July, I am sure a QSO from you would be appreciated. Teams will be announced later prior to the event.

We have a hamfest quickly approaching in about 6 weeks. I hope you are as excited as I am. The huge event for the NADXC is our DX banquet to be held on 19 August. It is the club's big fund raiser for the year. We have sold about half of our tickets (50%) with ticket sales going well. These funds help the club support DXpeditions. We will accommodate only 100 attendees for the banquet. I encourage our members to purchase their ticket(s) now, be-

From the President (continued)

cause once they are sold out, that's it. I want to thank all of the vendors supporting the banquet through prize donations, especially Gigaparts and Yaesu who donated a Yaesu DX10 HF Transceiver. We also have prizes from donors already being shipped and received by the club. During the hamfest, Steve, AG4W will be working his way through the crowd seeking more banquet prize donations. I believe these prizes will help entice more banquet ticket sales.

The DX Banquet speaker this year will be Ken Claerbout, K4ZW, who was inducted into the CQ Contest Hall of Fame at the Dayton Hamfest. Ken has done a lot to activate DX entities and club stations, as well as operate around the world from exotic places which he will share with us.

We typically have the top brass from the ARRL Headquarters attend our banquet in case you would like to meet them. I already know that tickets have been purchased by distinguished members of the DX community and some members from the ham radio businesses where we purchase our gear and other supporting software and equipment.

The NADXC Banquet will be held at the Signals Museum of Information Explosion (MIE) on University Drive this year. I believe that our banquet venue this year ranks above some of the best venues ever for a DX banquet. This venue falls in line with ham radio operators and the radio electronic enthusiast. There is also a functioning ham radio station that will wet any operator's appetite. I anticipate many will want to attend just to see the museum and be next to some rare antiques.

At the July meeting this month, we will dis-

cuss more about the DX banquet in the business portion of our meeting. The speaker for our program will be Gary Sutcliffe, W9XT. Gary will be discussing "Low band receive antennas". If you are thinking about achieving DXCC on any band from 40m through 160m, this program will be a must for you. Please come out and support Gary as he attends via ZOOM.

Let's all plan to participate in the next club meeting on 11 July at the Signals MIE at 1806 University Drive. The ZOOM sign-in credentials will be the same as last month for those members who cannot make it in person. I will send these log-in credentials in another email prior to this meeting. The doors to the museum open typically at 5:45 P.M. Tables will be setup for those wishing to pick up dinner and eat it at the museum prior to the meeting. The meeting will begin at 6:30 P.M. with the program starting around 7:00 P.M. I look forward to seeing each of you at our July NADXC meeting.

2023 NADXC Officers and Directors

President	Bruce Smith, AC4G
Vice-President	Mick Bell, N8AU
Sec./Treasurer	Barry Barton, WA4HR
Directors:	Fred Kepner, K3FRK Bob De Pierre, K8KI (Ex-Officio)

How to Join

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

Monthly Meetings

Meetings are held at the Museum of Information Explosion at 6:30pm on the 2nd Tuesday of each month. Participants can also join the meeting virtually via [Zoom](https://zoom.us).

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

HARC Field Day, What's Not to Like?

By Norm Schklar, WA4ZXV

- Thursday I went to pick up supplies from club storage. It rained on us.
- Friday morning, I had to be there early, as I had supplies in my car (no one used any of them on Friday).
- My fingers are sore from tightening and loosening hundreds of bolts and nuts.
- My knees are sore from bending down and getting up while assembling towers.
- My back is sore from moving tower sections.
- I was yelled at many times for not doing things just like last year, or tying knots wrong, or trying to do something new.
- I drank too much Gator Aid. Everyone kept talking about heat exhaustion.
- I was assigned station operating duty while everyone else ate lunch. I did get to eat and there was plenty to pick from. Of course, the plates were too small.
- Everything I helped with was at the other end of the field. As soon as I got to one end, I was sent back to the other.
- My wife was out of town so I had doggy duty.
- The top of my feet itched from sunburn (oh that was from taking the grand kids to the beach a week or so ago).
- Sunday it finally cooled off for a spell while raining. After a short spell, it stopped, and it got hot again.
- I thought I was done for the day and was then ordered to help unload the tower up in Harvest.
- I came home, walked the dog, ate, took a shower and thought about how much fun I had at 2023 Field Day.

THANKS to all the folks that planned FD, worked at getting HARC ready for FD, made contacts on the radio, helped with a lot of other duties like hospitality, food, drinks, laying power lines assembling and taking down towers, putting up canopies and taking down canopies, brought food for Saturday afternoon, and all members that supported HARC in many ways even if not participating in FD. It takes a team. Oh, and thanks to all those that told me what I was doing wrong!

432 EME Station Design Progress

By Steve Werner, AG4W

The design of my 432 MHz EME station is in progress. The first step was to model the original KLM design in EZNEC. Regular yagis and most wire antennas are easy to model. The 14-element log periodic KLM antenna was a different story. Log periodic antennas can be modeled in 2 ways. One method is to model the interconnections between the driven elements as wires. This is not recommended by EZNEC. They recommend treat-

ing them as transmission lines. This involved creating a model for 3 transmission lines to connect the 4 driven elements. The 50-ohm source is driven into the front of the 4 driven elements. The antenna is rated to work between 420 to 470 MHz. I am looking for good performance from 432-435 MHz. After numerous changes I have a model with the azimuth radiation pattern shown in Figure 1 and the SWR shown in Figure 2. I believe these

432 EME Station Design Progress (continued)

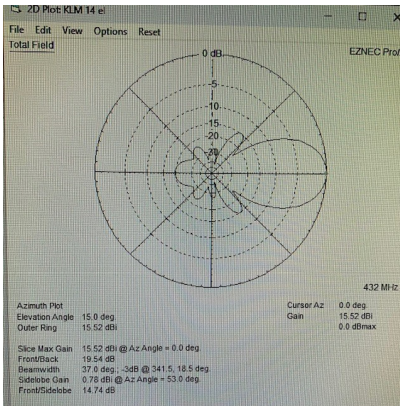


Figure 1: The azimuth radiation pattern of AG4W's KLM 14-element log periodic antenna

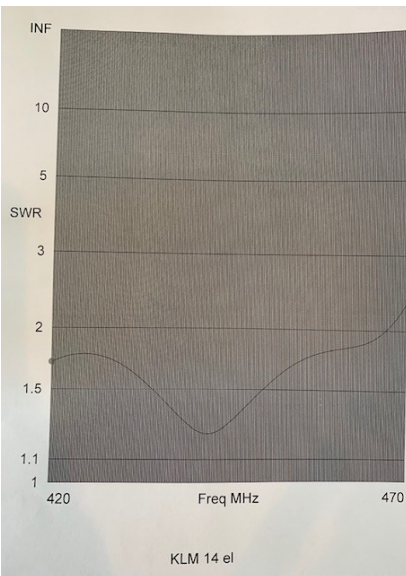


Figure 2: The SWR plot of AG4W's KLM 14-element log periodic antenna

are close to representing the antenna.

With that as a good start on the original KLM design I have begun to model 22-24 element antennas using the basic KLM antenna original design as a baseline. KLM also sold a 27-element antenna that covered 420-450 MHz that I have the manual for. It has also been a help. Back when these antennas were designed there was limited antenna modeling software. Originally antenna modeling software was written in Fortran in the

1970s. I remember writing Fortran programs in the 1970s using 1 IBM card

for each line of the program. The university would give you 2 runs a day on the mainframe. I believe in the quote from George Edward Pelham Box, "Essentially, all models are wrong, but some are useful." I keep that in mind. He also said, "overelaboration and over-parameterization is of-

ten the mark of mediocrity." It will be interesting to test the high-performance antenna I come up with using simulation. One thing I have noticed is that small changes in element length and spacing can have big effects on gain, front to back and side lobe performance. I know Innov antennas use this to their advantage.

This month I also ordered many of the parts I will use for the LDMOS 70 cm amplifier. It appears ordering them and receiving them are not closely related. I expect this project to be more difficult than the 2- or 6-meter amplifier design. I also plan to get the 2 basic 14-element 70cm KLM antennas working together next month. The two of them will give me about 16.5 dBi gain. The final two high performance antennas should be over 19 dBi gain.

This month I spent more time working on the on-line supplementary materials for my article that QST will be publishing in August titled, "A High-Power Dummy Load for DC through VHF". I encourage each of you to vote every month for the articles you like in QST. Go to the ARRL homepage, click on "News and Features", click on "QST" and click on "Cover Plaque Award". Don't be afraid to write the authors of CQ or QST articles. It will help them write a better article next time. Voting on the articles sends a strong message to the editors on the type of articles that are preferred by members. I will make a UHF dummy load using flange mount power resistors soon to help with my amplifier design.

Upcoming NADXC meeting:

Tuesday, July 11th, 2023

5:45 PM Doors Open / 6:30 PM

Meeting

Location: Signals Museum of Information
Explosion, 1806 University Drive NW,
Huntsville, AL 35801 and via [Zoom](#)

The G5RV Antenna

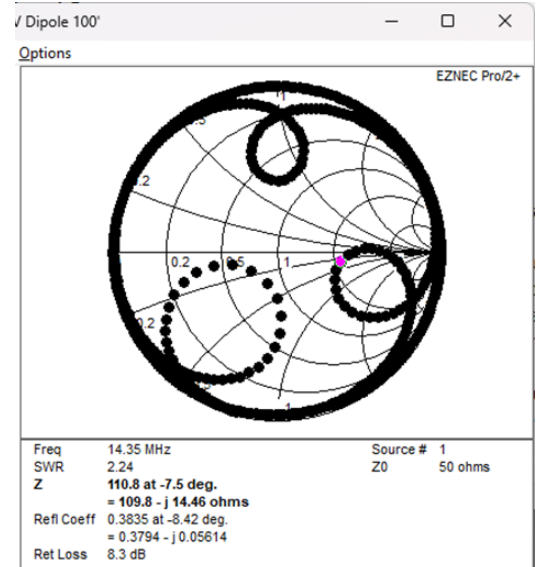
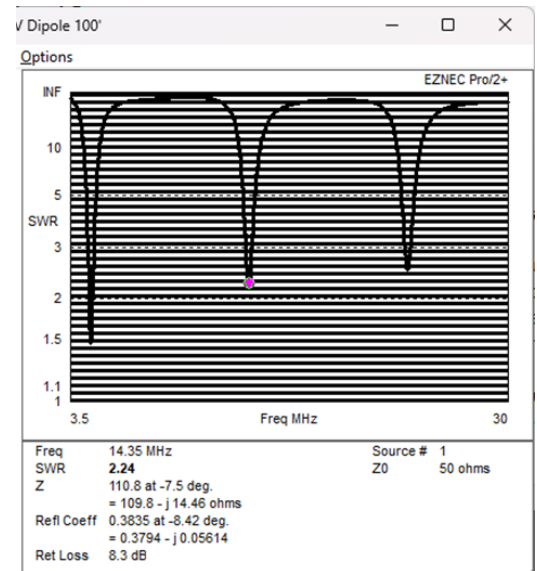
By Bob De Pierre, K8KI

I have heard so many stories about this antenna over the years. None of the stories sounded informed, and I generally didn't want to have anything to do with a G5RV. But there is a way that certainly wipes away all of the misinformation and tells the story as it really is. It's called EZNEC. The pro version of this program is now a free download, so if you want to know the real story about antennas, use it.

The original (and current) design of the G5RV antenna calls for it to be 102 feet long with 34 feet of open wire line then connected to any length of coax. That's what I modeled here – at 100 feet above ground. The 102-foot value, by the way, is the length of a dipole cut for 4.6MHz.

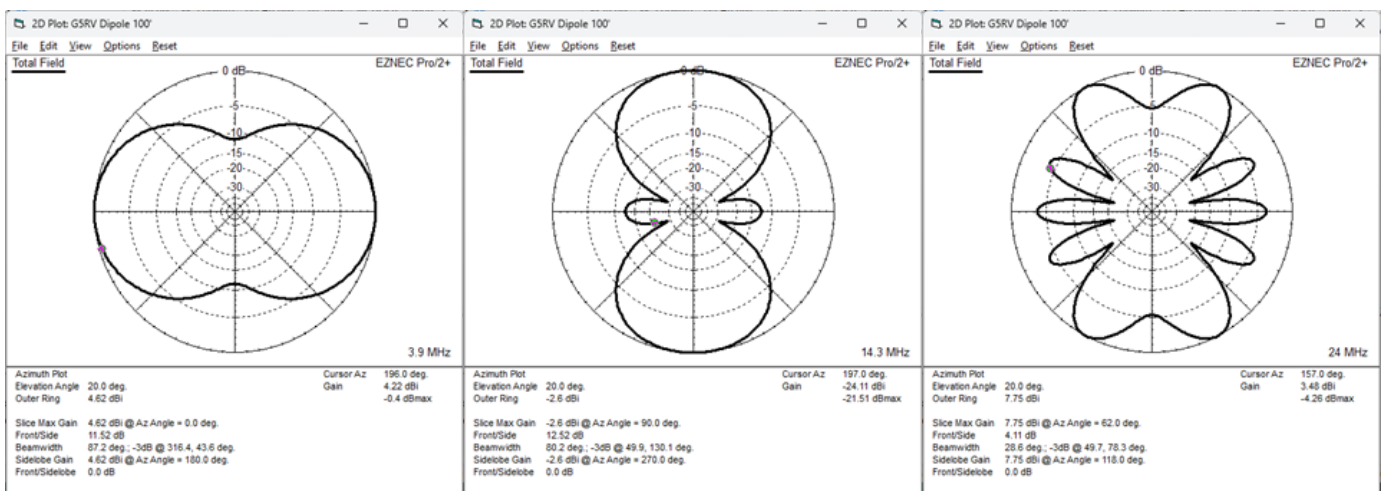
Here's just a dipole with those measurements. Three SWR minima are at 4.6, 14.35, and 23.9MHz (fundamental, plus 3rd and 5th harmonics). Not real good SWR, and not in the ham bands. The Smith Chart S11 sweep is at the right.

Let's look at the same antenna at three frequencies. The azimuth plot depends greatly on the frequency. I didn't realize it would change this greatly. Also, this antenna is laid out in the y-direction (that is, up-down in the radiation plots below). Now note that the primary direction rotates 90 degrees between the first



Right: The SWR plot and Smith Chart S11 sweep for a G5RV antenna

Below: The azimuthal plot varies greatly with frequency



The G5RV Antenna (continued)

and second plots! So, it points east/west near 80m and north/south on 20m and up. OK. Count on this any time you use a multi-band antenna – your pattern is going to rotate. Also note that the max gain goes substantially down in the 20m area, with the highest gain at the highest frequencies.

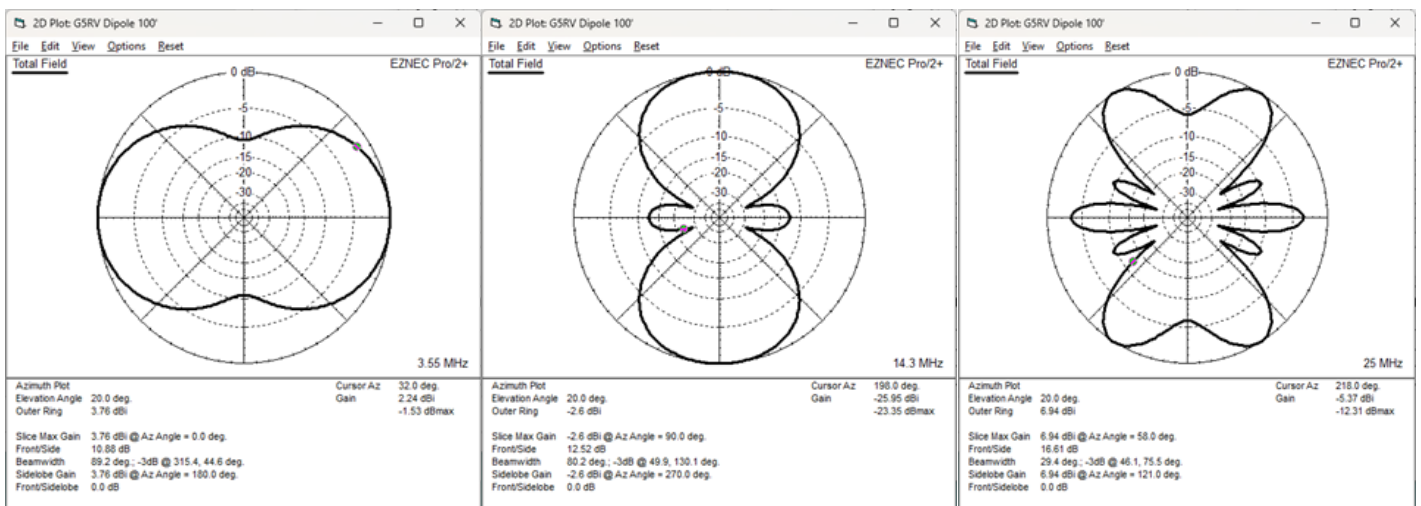
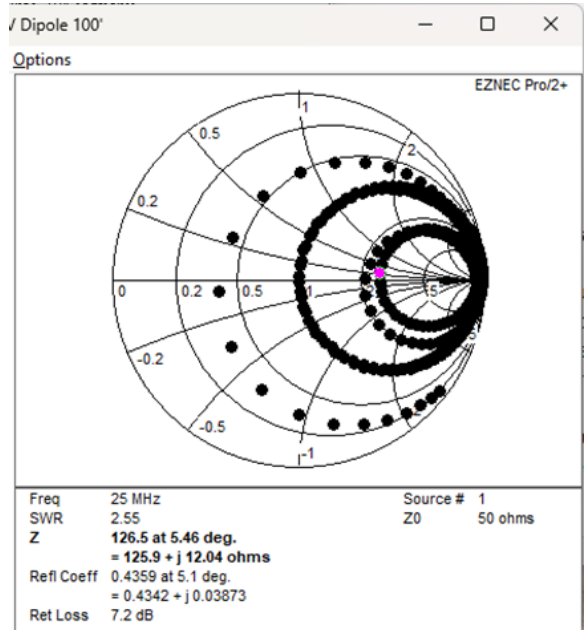
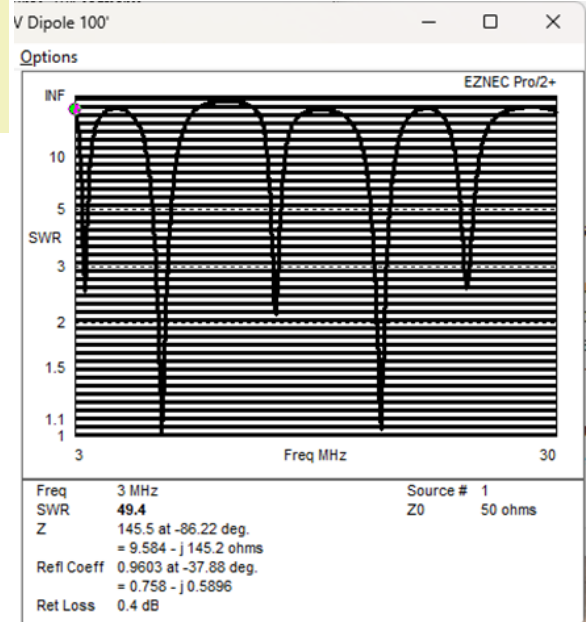
So, let's try again with a 34-foot piece of 450Ω open line instead of direct coax feed. Now, instead of three resonances, we have five, at 3.55, 7.85, 14.3, 20.1, and 25 MHz. Note also that some of the SWR nulls have improved! Also, we have a new resonant band – 80m!

Here are the radiation patterns for the G5RV. They are identical to the dipole patterns.

The deeper I dug with this antenna, the more confused I got. Try this one: Would you expect the antenna to work better where the SWR is low or high? Well, define better. How about Gain (not SWR)? At which frequencies would you expect the max gain? You can read the Slice Max Gain from the azimuth plots. You have to tell EZNEC what the frequency is you want, and it will then produce the plot. So, I

Right: The SWR plot and Smith Chart S11 sweep for a G5RV antenna fed with open wire instead of coax

Below: The azimuthal plot varies greatly with frequency

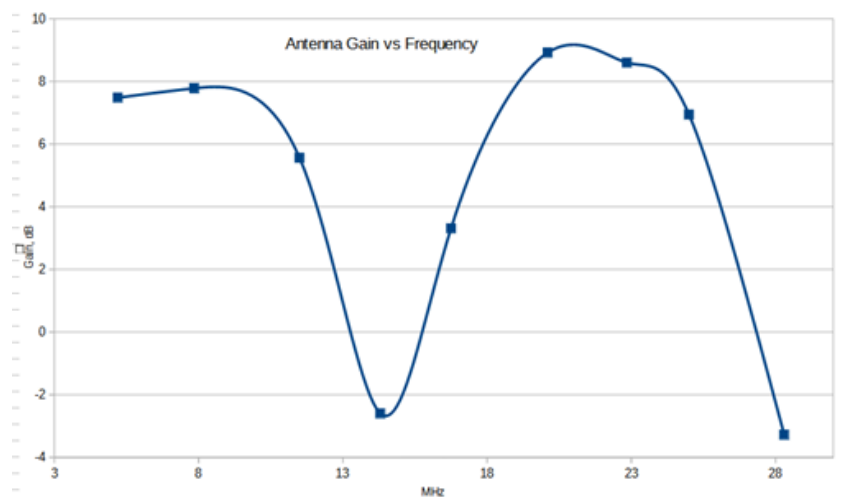
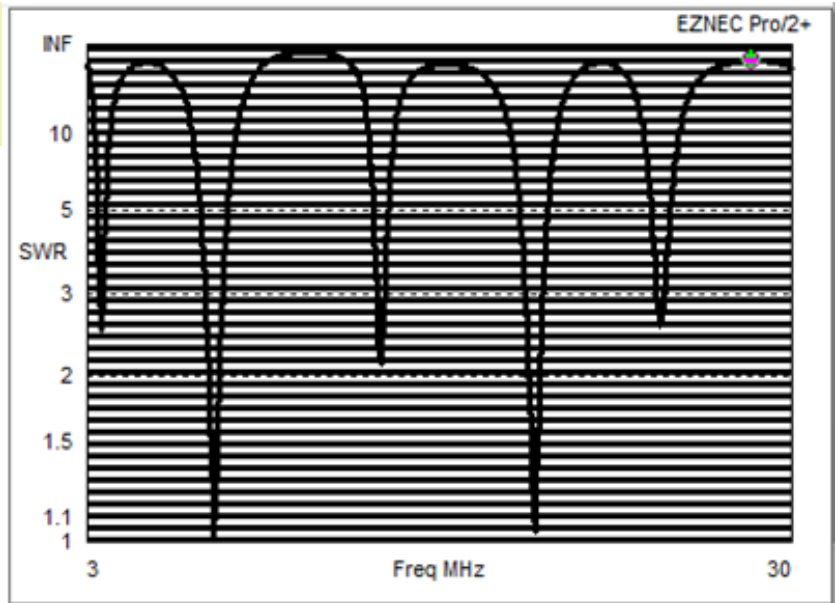


The G5RV Antenna (continued)

looked at the SWR plot, and then recorded the max slice gain at each of the SWR minima and maxima points. My results are to the right.

You can compare the SWR results versus the gain results, also to the right. If this is a 40m antenna, then the gain has minima at the even harmonics (2nd and 4th). At the odd harmonics, and even where the SWR is high, the gain shows to be high! (The gain might be high, but the antenna sure isn't taking much of the applied power when SWR is high). Also note that the impedance, as shown on the Smith Charts above, is normally very high. You'd have a hard time causing SWR-overcurrent damage at high impedance.

I hadn't considered this data to be intuitive. It may even be controversial. But I have every reason to believe this EZNEC data is dead accurate. I hope it prompts feedback!



Top: The SWR plot of the G5RV antenna

Bottom: Antenna Gain vs Frequency of the G5RV antenna

So, what is there to learn from all this:

- 1) Multi-band antennas rotate their radiation pattern after the fundamental frequency.
- 2) The G5RV can manufacture/add about double the number of resonant points versus a dipole.
- 3) With some effort, you can get better SWR than you might get with a plain dipole.
- 4) You would need a tuner, but its job would likely be easier than for a dipole, since the impedances are so high.
- 5) Antenna gain for multi-band antennas drops at the even harmonics but is high at the odd harmonics.

And I have an extra-credit homework problem for our antenna enthusiasts out there. Again, I'll award gold stars for correct answers: Three-element yagis are multi-band antennas just like the G5RV. They point where you want on 20m, but does their radiation pattern rotate 90 degrees, or some other angle, at their 2nd harmonic, i.e., 10m? Do their tuning traps compensate for this?

Long Distance Six Meter Openings Have Begun

by Bruce Smith, AC4G

Most, if not all, six-meter long distant QSOs occur via the Sporadic E-layer. Sporadic E-layer propagation (Es) occurs when E-layer winds, the Earth's magnetic field, and other effects work to compress low-density ionization from a large volume of space into a very thin, localized, high-density layer. These thin layers may be vertical stacks of only tens of meters thick, but can lead to nearly specular reflections with Maximum Usable Frequencies (MUFs) at time higher than 150MHz.

There appear to be different forms of Es behaving differently at differing latitudes. Polar regions experience Auroral Es having a nightly effect independent of season. Equatorial Es has a daytime effect with little seasonal variation. Temperate Zone Es (North America falls into this category) differs from the others quite a bit. QSOs data shows a peak in early summer and a small peak in winter.

We happen to be in early-summer and the six-meter band has come to life. My experience reveals in recent weeks that as early as 0700 CDT thru 1200 CDT here in southern Tennessee, six-meters is open to Europe. There seems to be another smaller peak in the afternoon around 1300 CDT thru 1600 CDT. Recently, Steve (AG4W) worked D2UY at around 1500 CDT, while I was able to hear D2UY, but was unable to make a QSO

with D2UY before the path faded. Very recently, AG4W made a QSO with NL7S in the afternoon local time, even though I saw NL7S in Alaska decoded a few times, I was unable to make the contact, again before the path faded. One almost has to be there at the right place at the right time to make a QSO, because the path does not seem to last too long. If you see a cluster spot, do not hesitate, but jump on the chance to work a new grid square of DXCC country.

In an article by Jim Kennedy (KH6/K6MIO) "Extreme-Range 50-MHz Es: nEs or Chordal?", Mr. Kennedy explains Es and that long distant DX six-meter QSOs are achieved via Es. Mr. Kennedy explains some relevant Es characteristics regarding the difference in F-Layer and Es. He explains that Es occurs at a height of about 100km, while F2 occurs at about 275 km and higher. Further, the Es ionization process is different and more complex than F2. He also states that the morphology of Es clouds is quite different from F2 propagation. Mr. Kennedy also shows ground footprints for successive Es hops based on real experience and QSOs that I will show in Table 1. Relating this data to some of my long distant QSOs on six meters, I will have to agree with the approximation of the distances and number of hops.

Hop	Min (km)	Max (km)
1	1,700	2,200
2	3,400	4,400
3	5,100	6,600
4	6,800	8,800
5	8,500	11,000
6	10,200	13,200

Table 1: Six-meter Es ground footprint for successive hops

Long Distance Six Meter Openings Have Begun (continued)

In the future, I plan to plot time of day versus DX QSO to see the almost predictable time that differing parts of the world can be worked on six-meters based on all of my past QSOs on six-meters. One must be aware that DX can be worked at any time on six meters when the band is open. A few months ago, I worked VK4MA with an opening that lasted about five minutes. Last month, I worked 3D2AG when the opening lasted about 5 minutes at my QTH. Both were FT8 digital

QSOs.

My advice is that the serious six-meter buff will almost continuously monitor six-meters 24/7. During the day when I know thunderstorms are not predicted and I have to be away from the shack, I leave my six-meters operational decoding FT8 signals to see if any DX is being worked and/or when I may have missed an opening to an exotic DX station. This has paid off recently giving me an indication when an opening to Europe might occur. I was successful. You cannot work them, if the band is closed and this occurs more often than not on the magic band. Happy six-meter DXing!

Club Business

June 2023 Meeting Minutes and Financial Report by Barry Barton, WA4HR

- Club President Bruce Smith, AC4G called the meeting to order at 6:30pm
- Minutes from JMay were approved.
- Bruce spoke about the various DX club members worked.
- Treasurer Barry Barton, WA4HR gave the monthly treasury report for June.
- Bruce spoke about keeping the membership roster up to date after fielding a question from a member.
- Steve, AG4W spoke about the various 6-meter band openings that have occurred.
- Bruce gave an update about our DX Banquet. Ken Clearbout, K4ZW would be our speaker and there were not enough tables for the banquet.
- DX Committee will be formed. This committee would be responsible for deciding how the money allocated for DX-peditions would be given out.
- Steve stated that Swains Island will be coming up later this year. He also informed the club that a DX-expedition, not yet announced, will also occur this year.
- Bruce asked the membership to please continue writing articles for the Longpath.
- Next meeting will take place on July 11
- Meeting was adjourned at 7:01pm
- Following the meeting, Rob Suggs, NN4NT gave an excellent presentation on how NASA communicated to the moon and back during the Apollo missions. This was very informative considering this technology was developed over 50 years ago.

The following members attended the meeting:

John Stensby N5DF, Birgit Stensby, Rodney Durrett AK4PR, Rob Suggs NN4NT, Jerry Rossano N4JR, Jim Clifford NK3V, Craig Compton K4XR,

June 2023 Meeting Minutes and Financial Report (continued)

Norm Schklar WA2ZXV, Steve Werner AG4W, Mike Werner KF4BOG, Barry Barton WA4HR, Bruce Smith AC4G, Mick Bell N8AU, Sandy Bell KB0DLS, Bill Grim Grimwood W4WEG, Jarad Cassidy KQ4VT, Mike Rozar N4CNZ, Billy Gold KM4BGF, Jack Hemby W5WQQ, Mark Brown N4BCD, Chuck Lewis N4NM, Kevin Hibbs KG4TEI, Mike Maples K4ADK, Laura Morgan K4CNY, Walt Miller AJ6T, Fred Kepner K3FRK, Chris Reed AI4U, Jim Spikes N4KH, and Tim Huffacre KM4ESU.



2023 NADXC Financial Status		06/30/23	
Budget Category	Targets	Year Totals	June Subtotals
Year Start	8,365.65	8,365.65	7,653.73
Dues In	1,000	1,103.87	66.41
Recurring Exp	-683.00		
repeater elect	-160	-160	-160
web hosting/domain service	-73	-16.88	
repeater maintenance to HARC for Zoom	-100		
use of museum	-50	-300	
Bank checks	-300	-22.5	
Donation of equipment to sell			
Dxpeditons	-1,000	-305.00	
Picnic	-160		
DX Banquet	380.00		
venue	-600	-600.00	
food	-2,350		
speaker	-400		
tickets	3,800	1,049.03	1,049.03
raffle	700		
grand prize	-390	-400.00	
beer/wine	-250		
insurance	-130	-105.00	
EOY Bank Delta	-463		
Year End Bank Balance	7,903	8609.17	8,609.17

2023 North Alabama DX Club Banquet tickets

Saturday, August 19th, 2023

5:30 PM Social / 6:30 PM Dinner / 7:30 PM Program

Location: Signals Museum of Information Explosion

1806 University Drive NW, Huntsville

Keynote speaker: Ken Claerbout, K4ZW

Grand prize: Yaesu DX-10 HF radio

Tickets for sale on the [NADXC website](#)



Upcoming DX Contests

By Chuck Lewis, N4NM

IARU HF World Championships (SSB/CW), 160 - 10M



July 8, 1200Z to July 9, 1200Z

Exchange: RS(T) plus ITU zone; IARU HQ stns send HQ abbrev.

See page 78 July QST and <http://www.arrl.org/iaru-hf-world-championship>

Russian Radio Team Championship (SSB/CW), 40 - 10M



July 15, 0700Z to July 15, 1459Z

Exchange: RS(T) + ITU zone or mbr code

See page 78, July QST and www.srr.ru/championat-rossii-po-radiosvyazi-na-kv-rrtc

RSGB IOTA Contest (CW/SSB), 80 - 10M



July 29, 1200Z, to July 30, 1200Z

Exchange: RS(T), S. N., & IOTA# if island

See page 78 July QST and www.rsgbcc.org/hf



European HF Championship (CW/SSB), 160-10M

August 5, 1200Z to 2359Z

Exchange: RS(T) plus year first licensed

See: https://euhf.s5cc.eu/euhfc_rules/



WAE DX Contest, (CW), 80 - 10M

August 12, 0000Z, to Aug. 13, 2359Z

Exchange: RS(T) plus Serial #

See: <https://www.darc.de/der-club/referate/conteste/wae-dx-contest/en/>

Others:

Trans-Tasman Low-bands Challenge, CW/Ph, 0800Z - 1400Z July15

10-10 Int. Summer Contest, SSB, 0001Z, Aug 5 to 2359Z, Aug 6

SARL HF Phone Contest, 1400Z-1700Z, Aug 6





DXpeditions in July 2023

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2023 Jul02	2023 Jul10	Rotuma	3D2BJ	LoTW	By WA7WJR; HF; CW SSB FT8; QSL via WA7WJR
2023 Jul04	2023 Jul18	American Samoa	KH8RRC	LoTW	By ON3QQ N3QQ W8HC KB2FMH fm Tutuila (IOTA OC-045); 80-6m; CW SSB FT8 FT4; QSL via Club Log OQRS or KB2FMH direct
2023 Jul06	2023 Jul18	DR Congo	9Q1AA	LoTW	By IV3ZXQ I2PJA I2YSB IK2CKR IK2HKT I1FQH I1HJT; 160-6m; CW SSB RTTY FT8 (f/h); 9Q1ZZ on FT8
2023 Jul06	2023 Jul18	Saba & St Eustatius	PJ5	Club Log OQRS	By PE6Q as PJ5/PE6Q and PA4O as PJ5/PA4O fm Sint Eustatius I (IOTA NA-145); 80-6m; CW SSB FT; PJ5C during IARU Contest
2023 Jul07	2023 Jul14	Sint Maarten	PJ7	LoTW	By PE5B as PJ7/PE5B fm IOTA NA-105; SSB RTTY
2023 Jul11	2023 Jul18	Maldives	8Q7HU	CX3AN	By CX3AN fm Dhaalu Atoll' 40-6m; holiday style operation
2023 Jul23	2023 Jul26	Faroe Is	OY	LoTW	By SP7VC as OY/SP7VC and SQ7ORL as OY/SQ7OYL; 20m + VHF
2023 Jul23	2023 Aug04	Guatemala	TG4	LoTW	By KT8X as TG4/KT8X; 40-6m; CW FT8, perhaps SSB
2023 Jul27	2023 Aug17	Iceland	TF	LoTW	By SP7VC as TF/SP7VC and SQ7ORL as TF/SQ7OYL; 20m + VHF



GET PREPARED. GET OUT THERE.

Adventure READY

OFF GRID
Communication Gear
for Your Next
Adventure!

GigaParts
Technology Superstore

(256)535-4442 www.gigaparts.com 1426 B Paramount DR
Huntsville, AL 35806