THE NUGGET

Mother Lode DX/Contest Club

The Newsletter of the Mother Lode DX/Contest Club

October2024 **Volume 29 Number 10**

Treasurer's Report

MLDXCC Treasurer's Report - August 2024

7/31/2024 Opening Balance $2,509.07

Income $0.00

Expenses $0.00

8/31/2024 Ending Balance $2,509.07

Sue Allred, K6SZQ

NCCC PICNIC AT N6RO

The annual NCCC picnic, at the QTH of N6RO in Oakley, was well attended including several MLDXCC members. These included AF6SA, K6EST, K6TQ, N6JV, N6RK WC6H and WE6Z. Plenty of good food and music. I hadn't been out there in many years. His antenna farm makes you feel very inadequate.

N6JV

DELETED COUNTRIES

Desroches

Desroches was discovered by Chevalier de la Billioere in 1771 He named the island after the governor of Mauritius. Britain named it Wood Island because of its dense tree vegetation. It was run as coconut plantation for over a century.

In 1835 the first settlement was established. In 1909 the island was incorporated into the Seychelles and was split in 1965. Later it was returned to the Seychelles to build a joint US / UK military base the Seychelles.

Eventually the island was developed into a resort that passed hands until Four Seasons picked it up. It will revert back to the orginal owners who plan to remodel and expand it.

Thanks to the Southern California DX Club Newsletter

Tube of the Month

F-124A & F-125A

In 1909, Federal Telegraph Company (FTC) reorganized in Palo Alto, California after acquiring the Poulsen Wireless Company. They were trying to develop very high-power telegraph transmitting systems using the Poulsen Arc technology. The U.S. Navy was a major client for these systems. By the start of WWII, much of the radio equipment used by the Navy was Federal Telegraph. The early operations of Federal Telegraph have been noted as the start of what would become Silicon Valley.

The production of transmitting vacuum tubes started after WWI with an association with Lee de Forest to produce oscillions. In the 1930s, most of the tube types they made were copies of tubes developed by other manufacturers especially Western Electric and RCA. In the 1940s, new designs were developed under a new name Federal Telephone and Radio (FTR). Two of the first were the 40 KW dissipation, water cooled, F-124A and F-125A triodes. The obvious difference between the two tubes was that the F-124A had two grid connections. Internally they had different grids. The F-124A had a mu of 40.5 and the F-125A had a mu of 4.75. The F-124A was designed to be a power amplifier and the F-125A was intended to be a modulator. The second grid connection on the F-124A was used to provide a terminal for the large, wide spaced neutralization capacitor. The dimensions of the tubes were the same with a length of 25.75 inches. Both tubes used the same water jacket that was also made by FTR. The filament for each tube was 27.2 volts at about 200 amps. The current was divided between 6 filament strands. The strands could be configured to operate on DC, single phase AC, 3 phase AC or 6 phase AC. Single phase operation extended tube life and limited the generation of hum. Maximum plate rating for the F-124A is 20,000 volts at 7 amps in class C as an amplifier. The F-125A when operated as a modulator in class B, is rated at a maximum of 15,000 volts at 10 amps on the plate.

The two tubes were intended to be used together in 50 KW AM broadcast stations. I bought the F-124A on the internet while sitting in a bar in La Paz, Baja California, Mexico before an XF1K IOTA operation. It looked so good.

Visit the museum at N6JV.com
Norm N6JV

Measuring Ground Constants

Gary, NA6O

September, 2024

Ground conductivity and dielectric constant (relative permittivity) directly affect the performance of our antennas. When simulating an antenna, getting these values wrong will result in errors in the pattern and feed point impedance. This is especially true for designs that have elements close to the ground, such as radials, or any kind of low antenna. Results may be so far off as to turn you into a non-believer in simulation when you actually build and test your design.

Simulators like EZNEC include default parameters for various types of ground with names like “extremely poor” and “very good.” The corresponding numeric values (also published in the ARRL Antenna Book) are derived from 1939 FCC measurements intended for use in the broadcast band. However, soil parameters vary quite a bit with frequency, thus guaranteeing errors when applied to the HF bands. But you can get better values from a webpage provided by Brian Beezley, K6STI. Brian assembled some charts and tables [Ref 1] that extrapolate those BC band data to the HF bands for much-improved accuracy. It’s better to start with that information.

Then there is another matter: What kind of soil do you actually have? The FCC has a map of ground conductivity for the USA [Ref 2]. Once again it’s for the BC band so the values need correction, and your particular location could be different due to all sorts of alterations to the local soil and of course moisture content. Also the map only shows conductivity but not permittivity. So this is again only a partial solution.

When in Doubt, Measure It

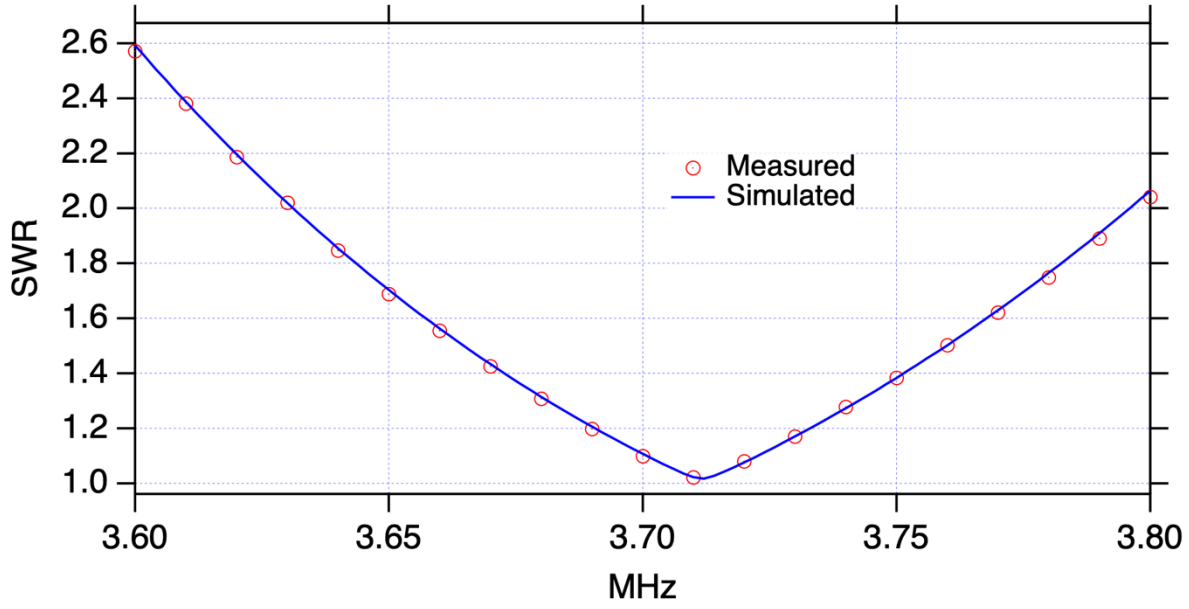
Yes, you can directly measure your local ground constants. There are at least two ways. One is to use a special dielectric probe that is inserted into the ground and connected to an impedance analyzer [Ref 3]. After applying a formula, reliable results are obtained. Of course you need to make the special probe and it only measures data at single points. But it’s an excellent technique.

Another way to do the measurement is with a low dipole [Ref 4]. The beauty of a dipole is that it’s easy to build and easy to simulate accurately. Basically you measure it’s impedance and then in EZNEC you simulate the antenna geometry exactly and then adjust the ground parameters until the results match. The other advantage of this method is that it averages a large volume of soil. All you need is some wire, insulated supports, and enough space to string it up a few feet above the ground. Height is not important—3 to 5 feet is fine—as long as you *know* the height accurately. Also it will make simulation easier if you run it in a straight line. Finally, you will need a good common-mode choke at the feed point to prevent your (short length of) coax and equipment from becoming part of the antenna [Ref 5]. And of course you need a reliable impedance measurement device that displays complex impedance (R+jX). I used my Rig Expert AA-230 but a NanoVNA or many other instruments are fine.

Some Actual Results

My friend Greg, KK6PXT, has been considering purchase of some new property so I went along to do RFI measurements with portable antennas. While I was at it, I put up a full-length 80 m dipole at 4 ft off the ground. It was made from 18 AWG magnet wire and had a good choke at the feed point. When I measured it, resonance was at 3710 kHz and 49.2+j0 ohms. I also saved an SWR scan for later comparison.

The *exact* geometry (including the 3-foot feedline) was simulated in EZNEC using the NEC5 engine and a real/extended accuracy ground. (NEC 2 will be pretty close too; just be sure to use real/high-accuracy ground.) Ground properties were varied by guessing until results perfectly matched simulation; it took me about 15 runs. I was focused on matching the impedance at resonance and finally nailed it. The result was conductivity = .0232 S/m, dielectric constant = 41. In the graph below, SWR data from my antenna analyzer and from the simulation are overplotted. This is a great validation of simulation! If I did not do this measurement, and didn't know better, I'd use the default values for "poor rocky soil", .002/13. That's wayy off, with resonance appearing 6 kHz low and Z = 95+j0.



Now that we know the values on 80 m, we can use the information from Ref. 1 to extrapolate to other bands. It turns out that I could have taken data on other bands while using this same antenna and then run the simulation at those other frequencies, again looking for matching impedances. In that case you do have to watch out for extremely high or low impedances where your analyzer may exhibit large errors.

Conclusion

Don't trust the generic default values for ground constants. At the very least, use the estimates discussed here. Or dig into your junk box and put up a simple dipole, then spend some quality time with EZNEC. You may want to repeat the test in wet and dry conditions as well. At last, you will have accurate ground data for your property and future simulations will be much more accurate.

Additional Comments Regarding Accuracy

I had some discussion with Brian Beezley and he noted that like any metrology endeavors, the absolute accuracy of this measurement depends on more than just the wire geometry. First, the end insulators and even the small loops of wire have to be accounted for. Actually, minimizing them is probably the way to go. A miniscule insulator made from a small-diameter rod of low-loss polymer (e.g., polystyrene, Teflon, polyethylene) or fiberglass would be ideal. Then the loop of wire may also be negligibly small.

The other thing is your connection to the analyzer. Excess capacitance from cables and connectors must be included in the simulation or somehow minimized to a negligible level. Hand or ground capacitance is also a problem. Rudy found that his VNA had to be elevated off the ground with no hand contact, otherwise results would vary. My best solution is to solder the antenna wires directly into an N connector that's plugged into my Rig Expert analyzer. After pressing the start button, I can let go of it and walk away while it does its slow scan. Residual capacitance is very small, and there is essentially no feedline at all.

References

1. Brian Beezley, K6STI, "HF Ground Constants" http://ham-radio.com/k6sti/hfgc.htm

2. FCC, "M3 Map of Effective Ground Conductivity in the United States for AM Broadcast Stations" https://www.fcc.gov/media/radio/m3-ground-conductivity-map

3. Rudy Severns, N6LF, "Measurement of Soil Electrical Parameters at HF" https://rudys.typepad.com/files/qex-nov-dec-2006-soil-parameters-at-hf.pdf

4. Rudy Severns, N6LF, "Determination of Soil Electrical Characteristics Using a Low Dipole." QEX, Nov/Dec 2016. https://rudys.typepad.com/files/qex-nov-dec-2016-soil-characteristics-using-low-dipole.pdf

5. Jim Brown, K9YC, "A New Choke Cookbook for the 160-10m Bands" http://k9yc.com/2018Cookbook.pdf

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Super Fox vs Fox Hound

There has been a series of discussions on the club reflector concerning the comparison of the new Super Fox program and the older Fox Hound version of WSJT-X. This link contains a comparison performed by the WSJT-X developers.

SuperFox_Performance.pdf

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When KH7Y moved to New Mexico, he left me with most of the stuff he had in his scrap aluminum pile. This included several Hustler mobile antenna coils Most of them needed repair. Several of the bottoms of the coils had been in a very wet storage area and needed to be cleaned out with a tap. The coils have a phenolic cylinder to hold the wire which is attached to the top and bottom casting with four steel machine screws. Due to corrosion, I removed all these screws and re-tapped the holes for #6-32 stainless steel screws. New 2.50 inch shrink tubing makes the assembly very water proof. **N6JV**

Club Log Standings 2024

Overall

1	W1SRD	Steve Dyer	242
2	NK7I	Rick Bates	236
3	W6DE	Dave Engle	227

CW

1	K6YK	John Lee	188
2	W1SRD	Steve Dyer	143
3	W6DR	Dave Ritchie	127

Phone

1	W1SRD	Steve Dyer	138
2	K6YK	John Lee	117
3	K6TQ	Dave Sanders	100

Data

1	NK7I	Rick Bates	230
2	W1SRD	Steve Dyer	209
3	W6DE	Dave Engle	207

Awards Checkers ARRL

Rick Samoian, W6SR

(DXCC, WAS, VUCC, 160M)

The NOAA Solar Update

Click the link below to display the latest NOAA solar predictions.

MLDXCC Focus Contests

ARRL SS CW/PH
California QSO Party

http://www.swpc.noaa.gov/products/weekly-highlights-and-27-day-forecas

Upcoming Events

For the latest contest info. click on the following link:

http://www.contestcalendar.com/contestcal.html

Upcoming DX and DXpeditions

Click the link below to display upcoming DXpeditions.

http://www.ng3k.com/Misc/adxo.html

MLDXCC Reflector

The MLDXCC reflector is maintained at groups.io. Visit https://groups.io/g/mldxcc

We also maintain a spotting reflector at https://groups.io/g/MLDXCC-Spots

We are also on Facebook! https://www.facebook.com

Classifieds

Members are requested to review their classified ads each month for accuracy and to resubmit their ads or confirm their desire to keep it running in the next issue.

Need QSL cards, business cards, club banners? Contact Vina K6VNA vina@sign-tek.com

W6SR

I have two items for sale/trade.

1. Recently I acquired a Johnson KW tuner (site unseen) from a friend. My plan was to modify it for the remote radio setup at W1RH. However, after I inspected the unit, it is way too nice to modify. It's (IMHO) collector quality, original in and out. It even has the original, working SWR meter, relay, relay power supply and directional coupler cable. But not the directional coupler. Couplers are more available than the KW tuners since they were used on the 250W tuners also. I hate to see a vintage piece of collector quality gear hacked. Anyone interested in one of these? Price, you tell me, best offer takes it.

My portable Honeywell generator is excess to my needs, and needs a good home.
Used very little, mostly for microwave (10GHz) contesting and to power up tools in the field at the old place.
I always ran it out of gas when stored, and it was EZ start. Runs hours on 1 gal of gas.
What's it worth? You tell me, offer.

Contact me at ricksamoian@outlook.com
de Rick, W6SR

KN6TZK is looking for an amplifier. Any suggestions may contact him on the reflector.

Area Clubs

Northern California Contest Club -
https://www.nccc.cc

Lodi Amateur Radio Club -
http://www.lodiarc.org

Stockton Delta Amateur Radio Club -
http://www.w6sf.org

Pizza Lovers 259 –

https://www.pl259.org

El Dorado Amateur Radio Club -
http://edcarc.net

Sierra Foothills Amateur Radio Club -
http://www.w6ek.org

Redwood Empire DX Association -
http://www.redxa.com

Calaveras Amateur Radio Society
http://calaverasars.org/

Tuolumne County Amateur Radio Electronics Society (TCARES)
https://tcares.net/

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The MLDXCC NEWSLETTER