

# **NVIS for MRCA Field Exercises**

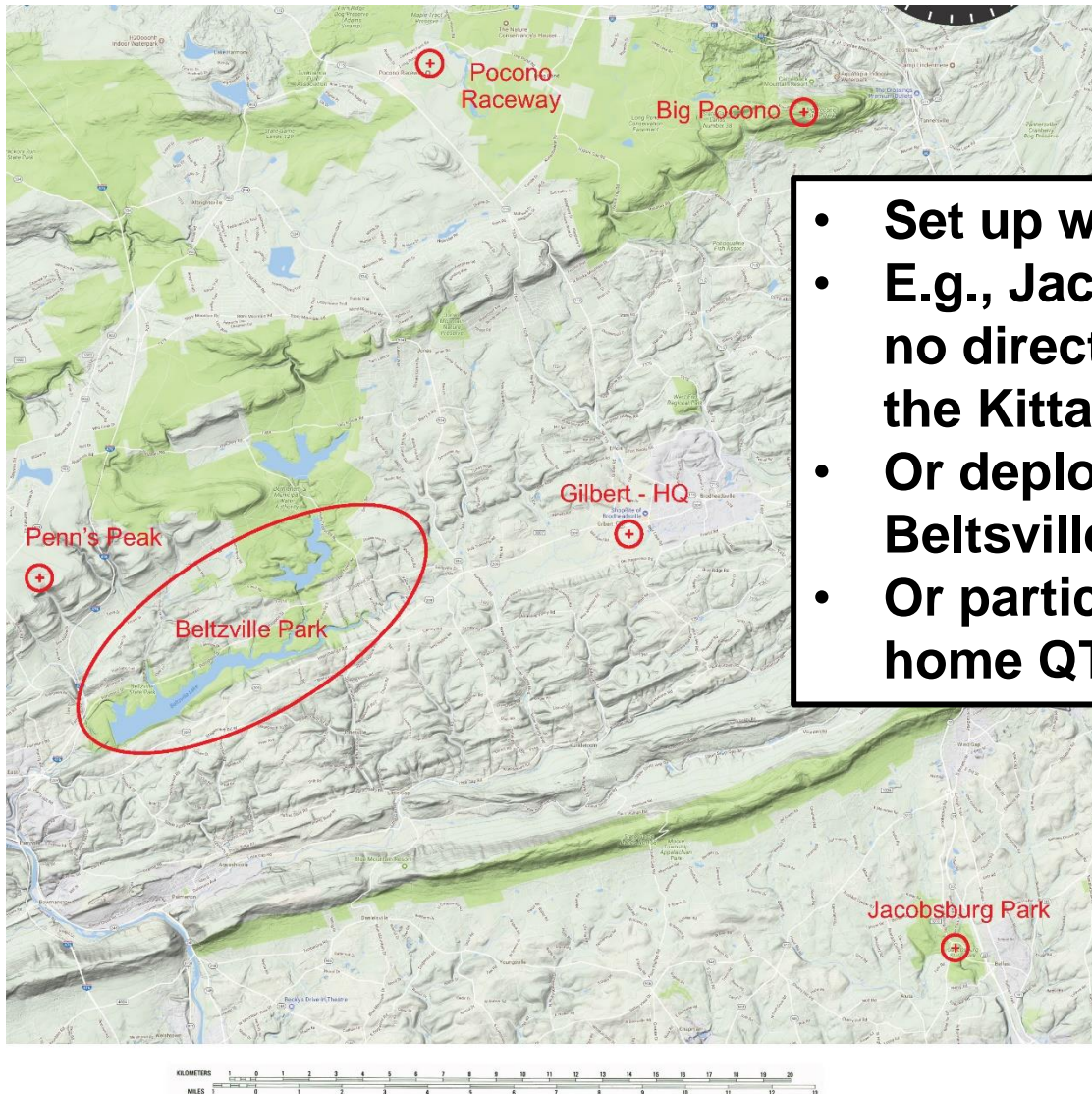
**AI Klase**  
**12 Sep 2023**

# I want to complain!



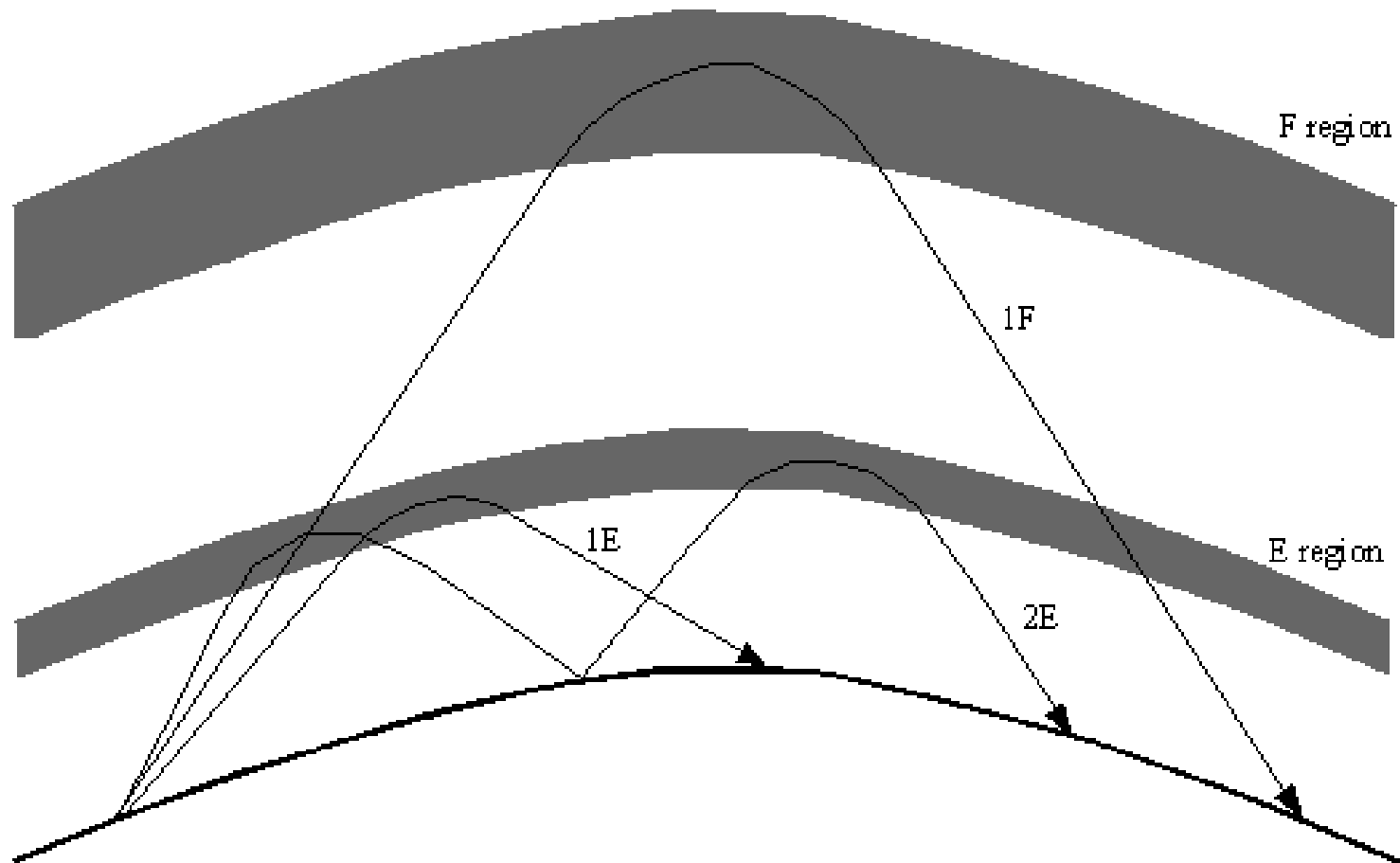
- Over the years, I've watch people bring a really nice HF packset to an MRCA HF field exercise, and put up the whip, and operate.
- That's just fine for the first five miles (Direct Wave.)
- But, nobody hears them at a distance. (Sky Wave)
- The reason these radio were built was their ability to be used for long-range comms out to a couple hundred miles.
- Consider the traditions we are upholding when doing these operations.
- Think Long-Range-Reconnaissance Patrol.

# Here a Challenge.



- Set up way from Beltsville.
- E.g., Jacobsberg, there's no direct-wave path across the Kittatiny Ridge.
- Or deploy an  $\frac{1}{2}$ -wave at Beltsville
- Or participate from your home QTH or remote site.

# Short-wave Propagation

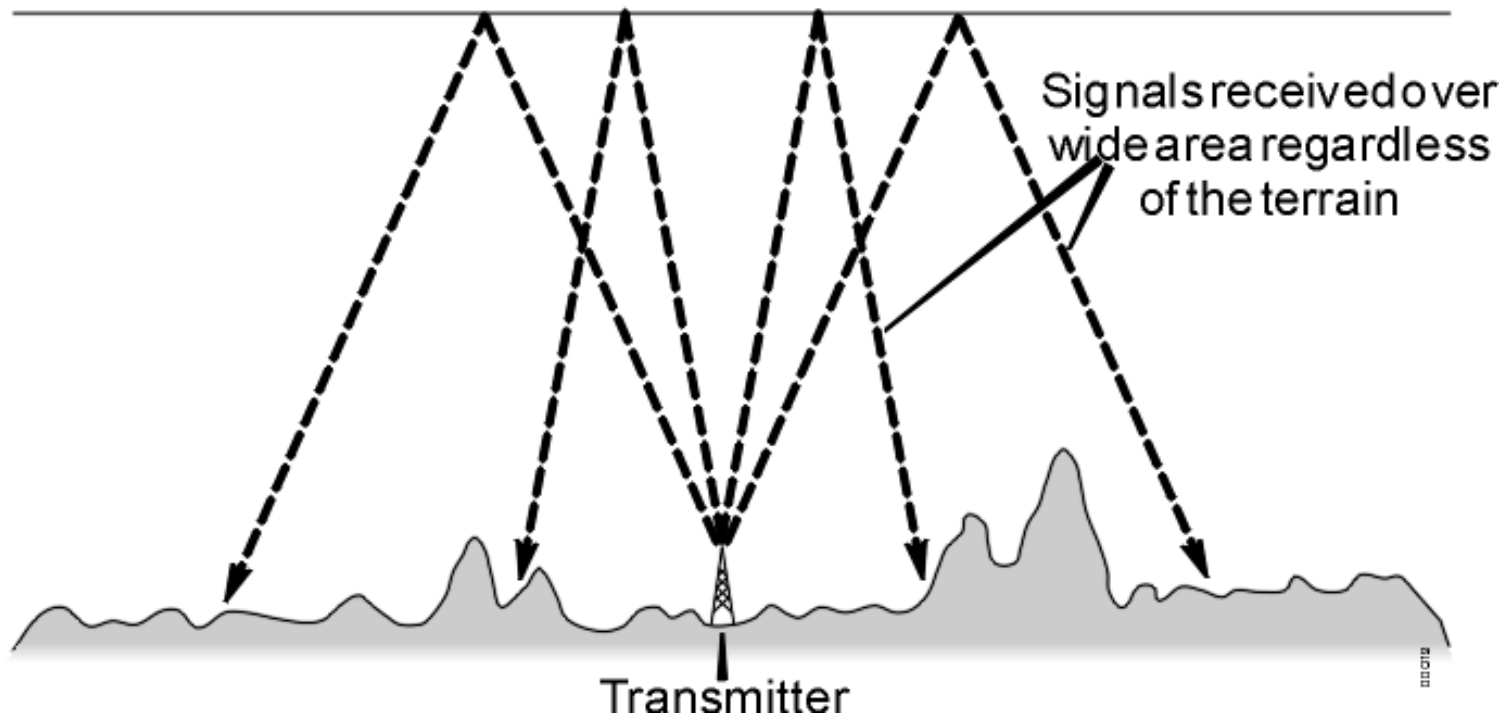


I think we all have some understanding of short-wave propagation.

# NVIS

## Near-Vertical-Incident Sky-wave

Ionised region



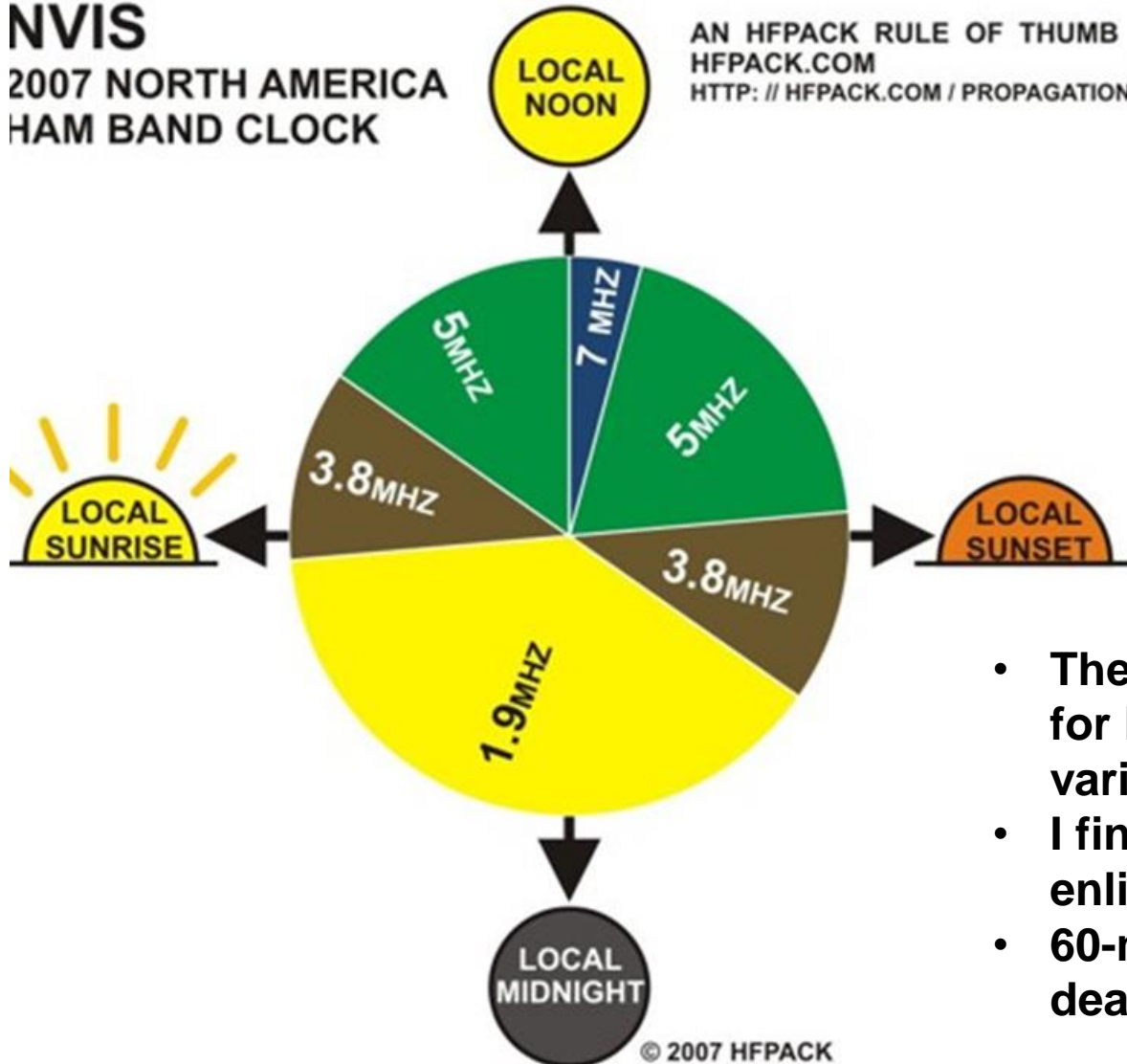
- This takes advantage of a characteristic of the ionosphere known as  $F_0F_2$ , the highest frequency that will allow a vertical reflection from the  $F_2$  layer.
- High-angle signals above  $F_0F_2$  go right through.
- Signals a lot lower than  $F_0F_2$ , say 80-meters in daytime, are reflected, but suffer badly from D-layer absorption.

# NVIS Clock

## NVIS

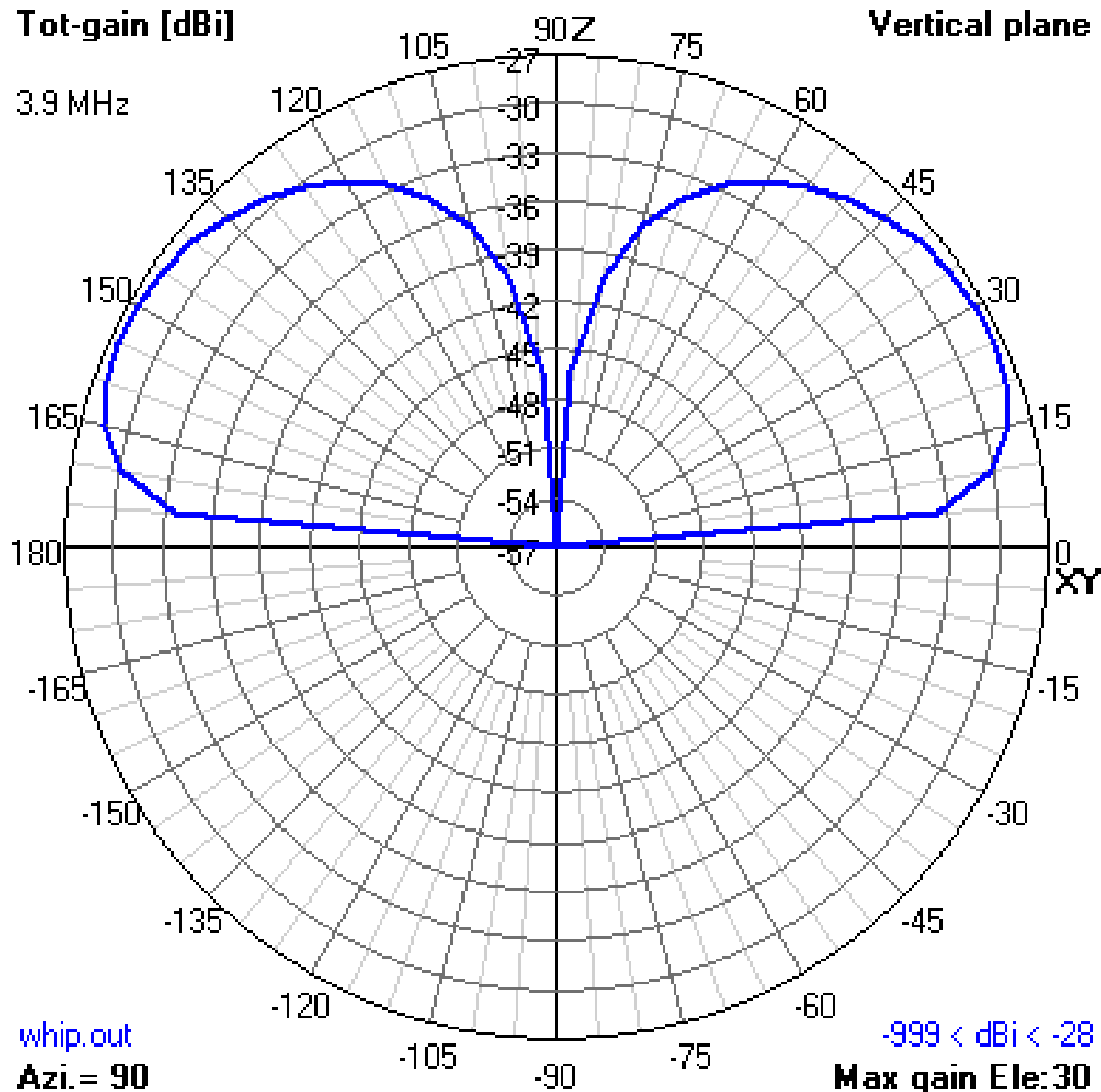
2007 NORTH AMERICA  
HAM BAND CLOCK

AN HFPACK RULE OF THUMB  
HFPACK.COM  
[HTTP: // HFPACK.COM / PROPAGATION](http://hfpack.com/propagation)

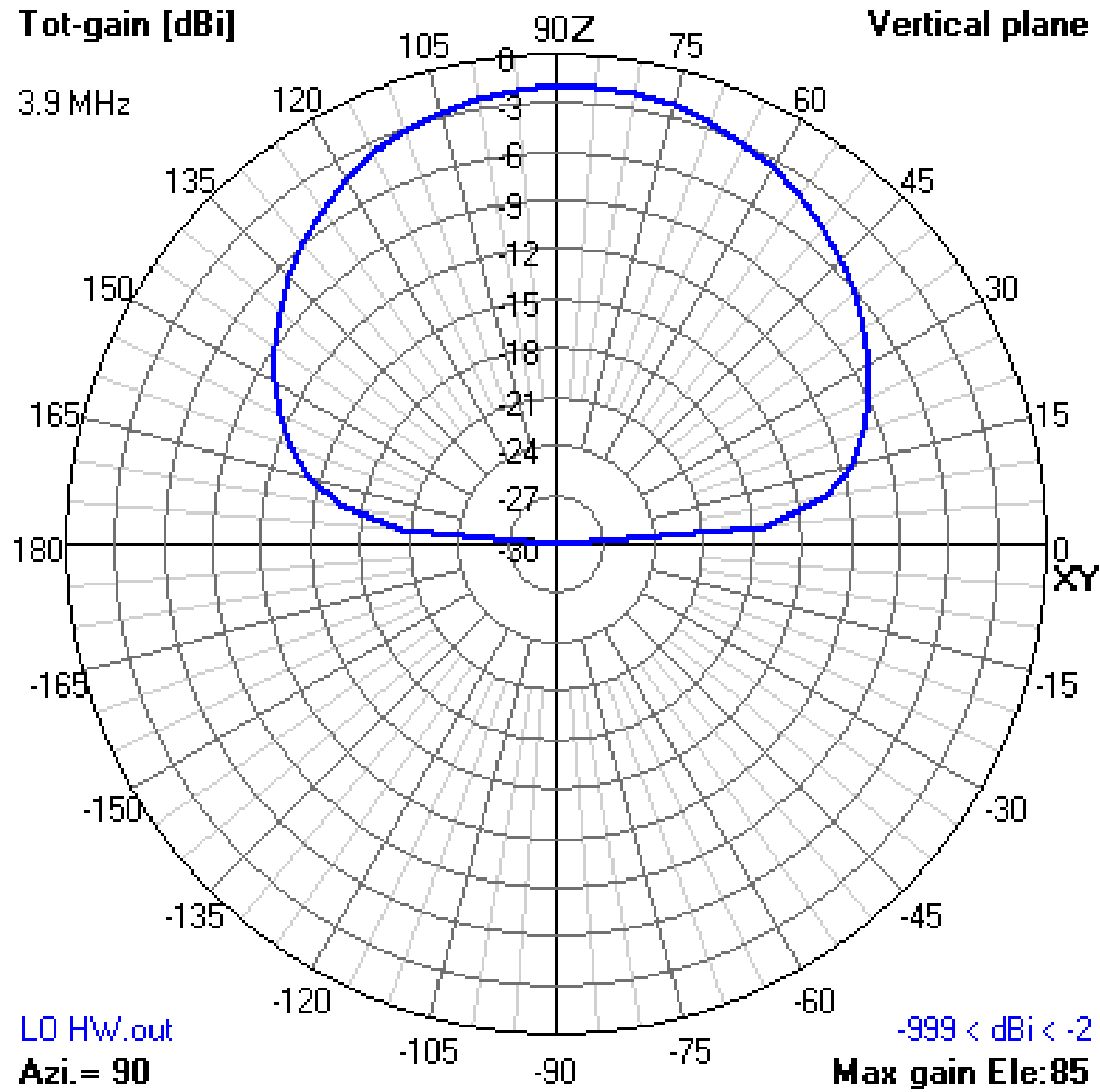


- The optimum frequency for NVIS propagation varies with time-of-day.
- I find this diagram very enlightening.
- 60-meter is a really good deal for our purposes.

# So, What's Wrong with My 10-foot Whip?



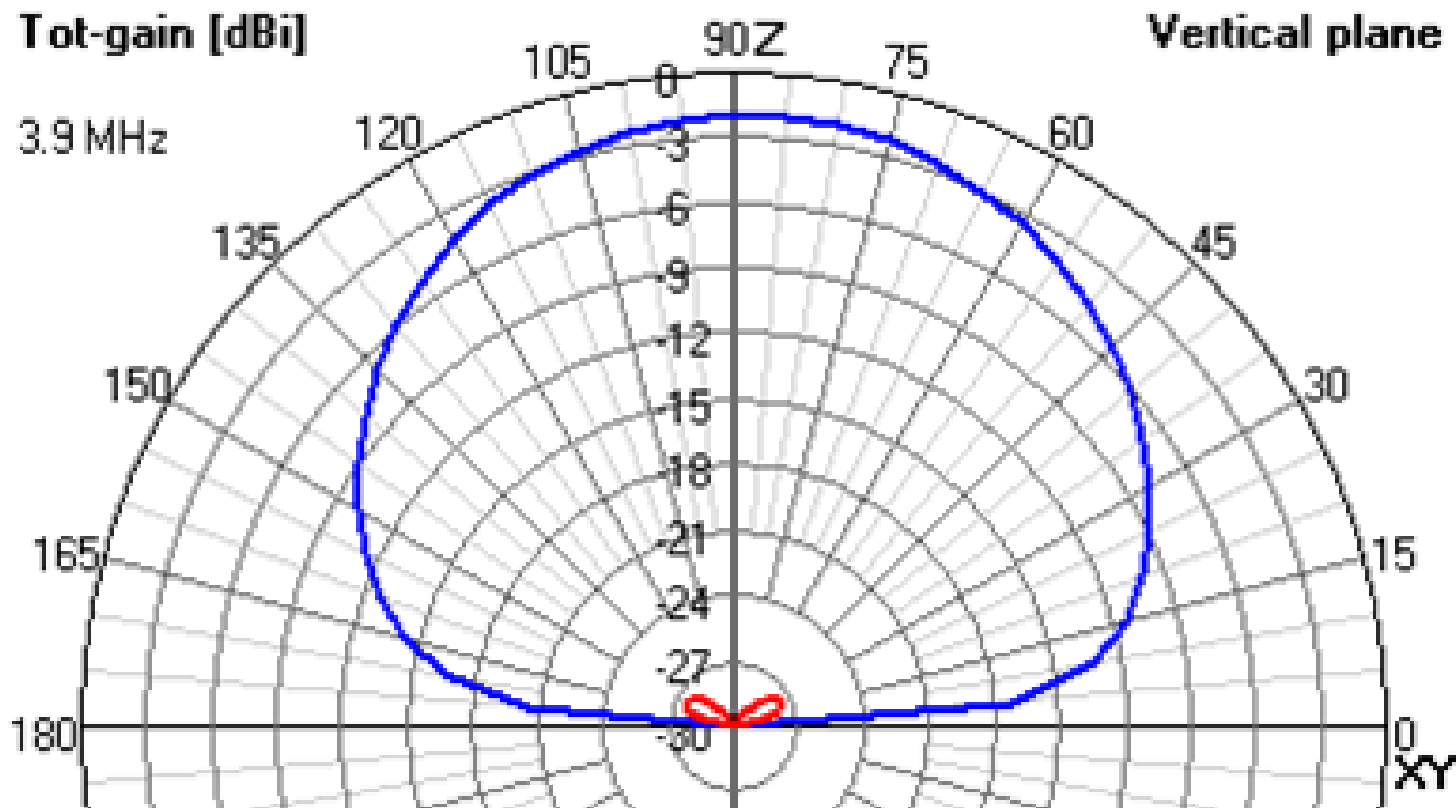
# Low Half-Wave Wire





# Comparison

- Your signal is shown in red. Low half-wave in blue.
- Vertical antenna has almost no vertical radiation.
- At 4MHz, a 10-ft whip is about 3 S-units below a half-wave, even at low angles.



# So, what do I do?



## **Moose and Squirrel NCS**

- \* PRC-2000**
- \* 20 watts PEP**
- \* End-Fed Half-Wave**

## **Inverted-V at 15 Feet**

- \* 20-foot Counterpoise**
- \* Home-brew tuner improved signal considerably.**

**More details of this long-time-ago operation here:**

**<http://ar88.net/mrca/Old%20Pages/Net/11-11-2010.html>**

# My Favorite Portable Antenna



**End-Fed Half-Wave Antenna  
for 75, 60, and 40 Meters**

- **120 feet of Commo (Field-Phone) Wire for 3.9 MHz.**
- **Open Links for Higher Frequencies**
- **40 Meters 65 Feet**
- **60 Meters 86.5 Feet**
- **Insulator and Parachute Cord at Far End.**
- **10-foot counterpoise is all the ground you need.**

# Getting the Wire Into the Sky



## The Halyard

- About 50 feet long
- Be careful with the knot on the sinker. I had a normally trustworthy bowline work loose in the polyester line.
- Carabiner clips around the middle of the antenna.



# Inspire by AN/GRC-9

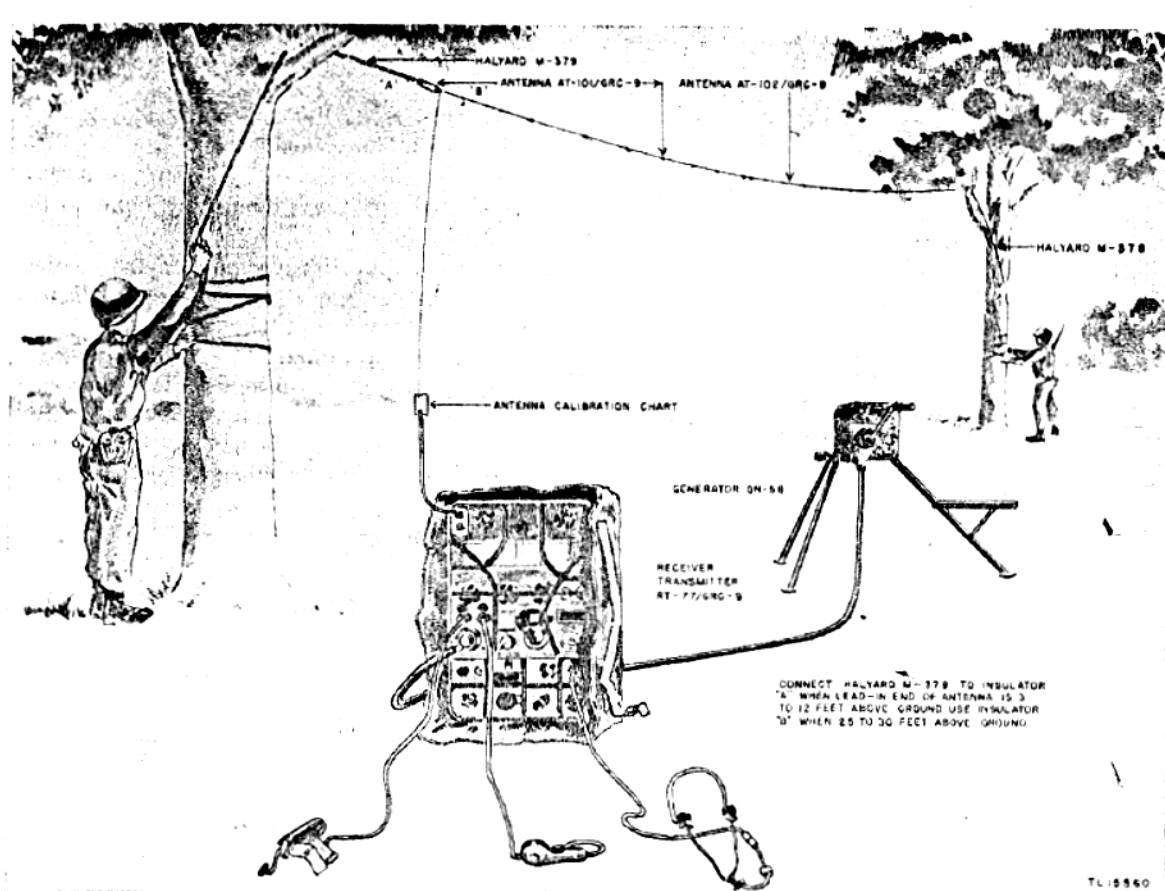


Figure 32. Installation of long-wire antennas AT-101/GRC-9 and AT-102/GRC-9.

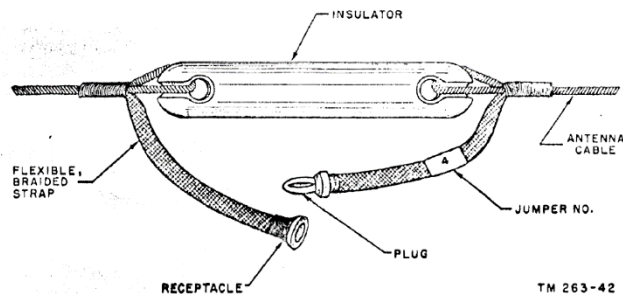


Figure 33. Typical antenna jumper.

- The GRC-9 wire antenna was provided with jumpers to adjust it to  $\frac{1}{2}$  wavelength.
- Make sure your tuner is happy in this mode.
- My PRC-104 works FB.
- My PRC-2000 needed an external tuner.

# Data from U.S. Army – 1960's

## Take a good look at this!

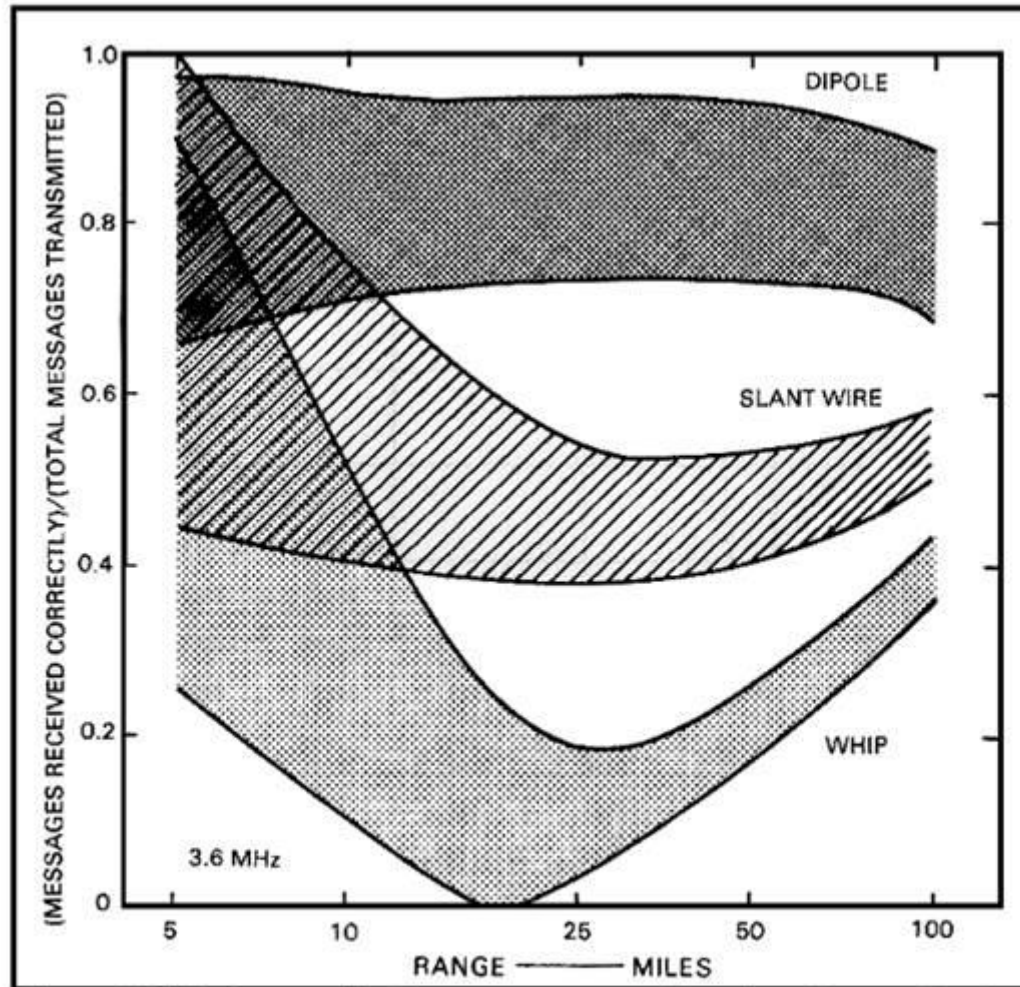
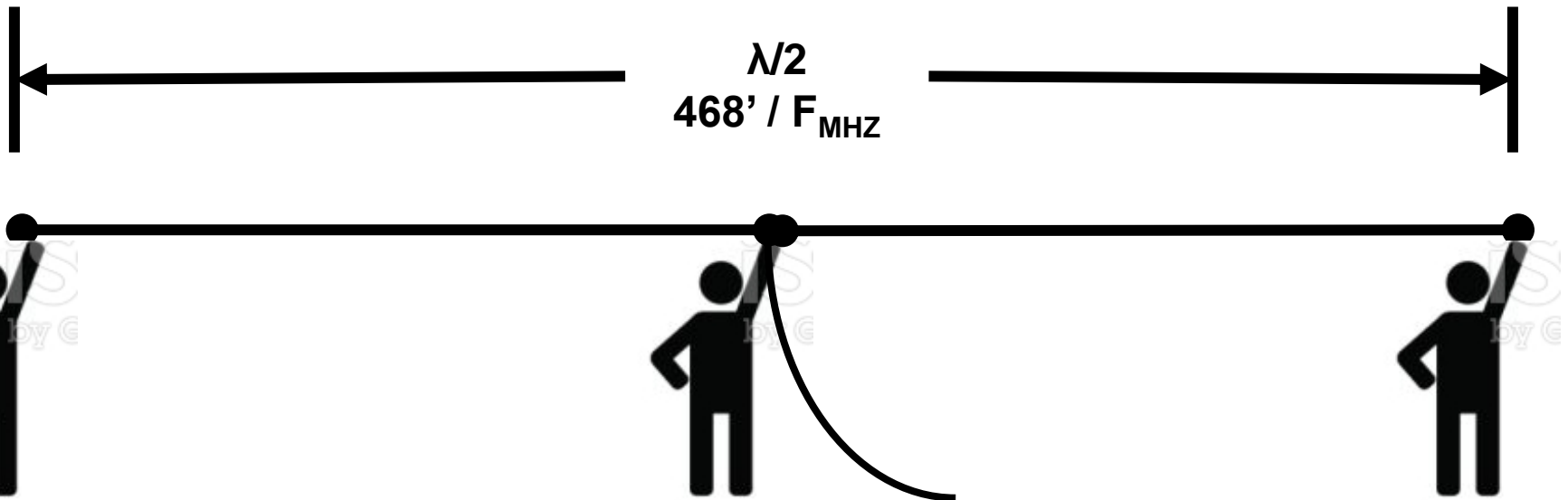


Figure M-15. Communications success as a function of range for the AN/PRC-74 in mountainous and varied terrain—including jungle in Thailand.

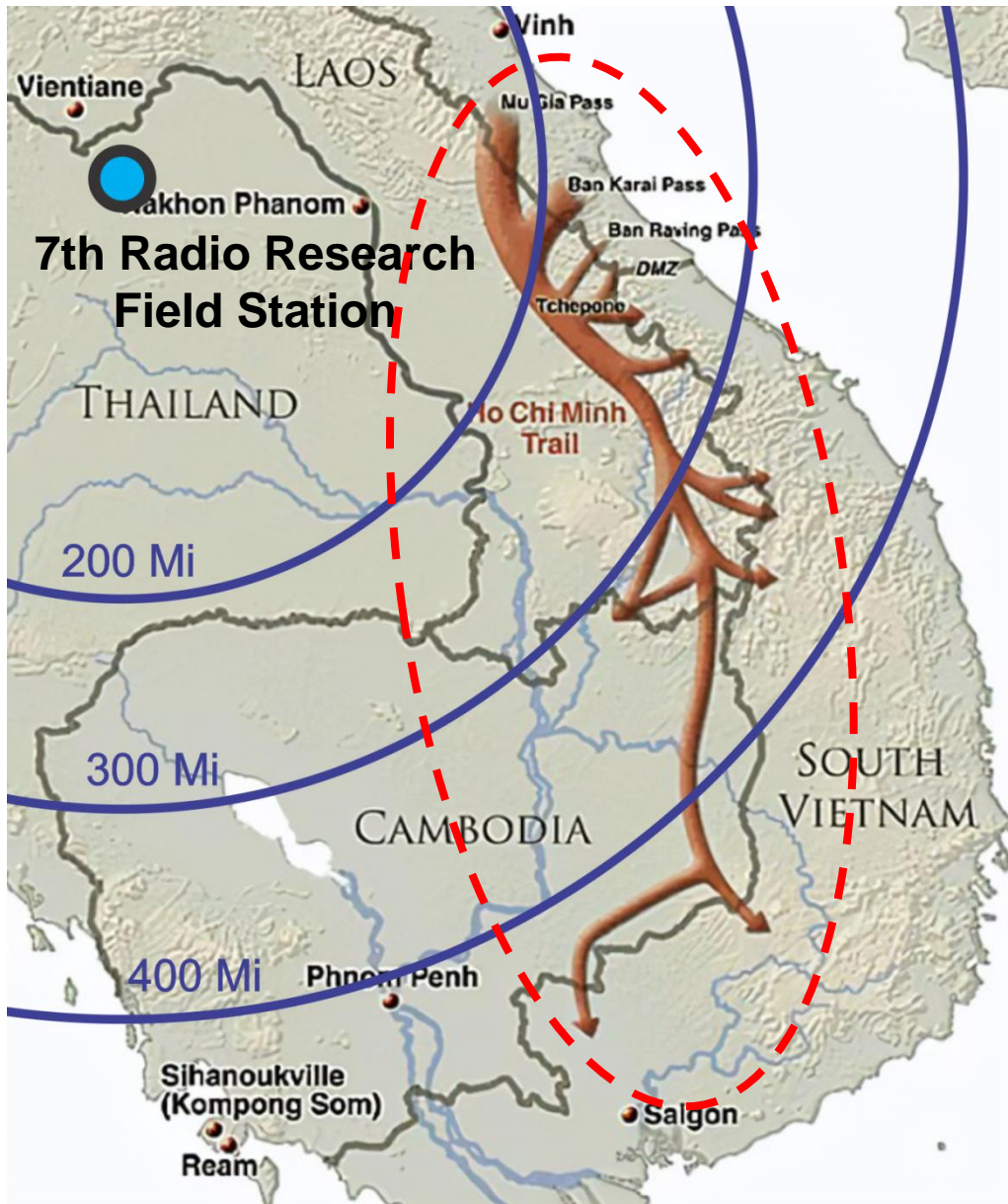
# Dipole

- Of course, a dipole, cut for the frequency will work as well.
- It doesn't have to be high.
- Years ago, at Gilbert, Joe Munson, WA4VAG, showed us how it was done by the 93<sup>rd</sup> Psyop in Southeast Asia. (PRC-74B and a GRA-71 burst keyer.)



# NVIS

## Playing for Keeps in Southeast Asia



The way I understand it, Joe sent reports back to Thailand while they were conducting mischief along the Ho Chi Minh trail in Laos.



# AN/PRC-74

Hughes 1964

N3FRQ Collection

- 2-12 (18) MHz
- 15 watts- CW, USB
- Synthesized, 1KHz steps

