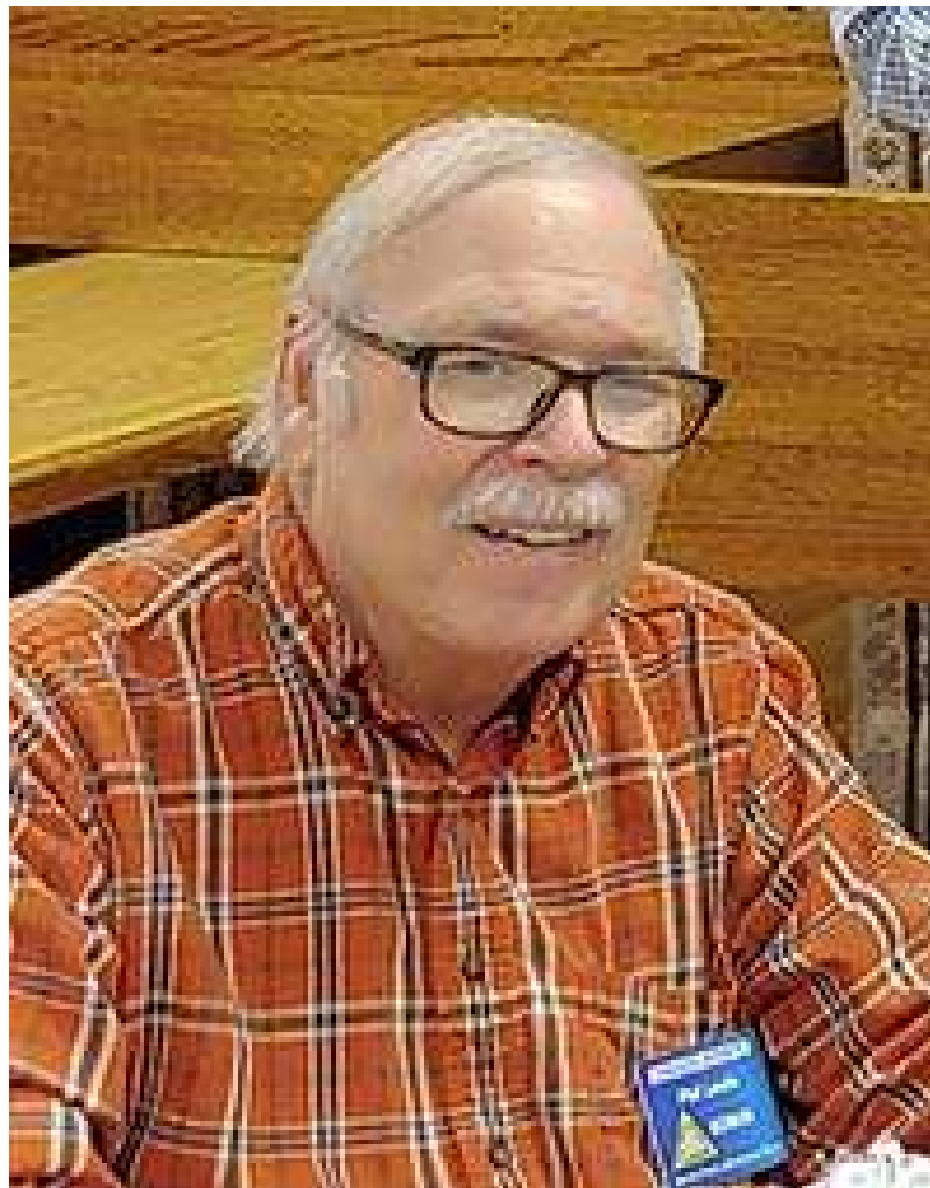


Building Your First HF Station  
Welcome to Ham Radio University 2026!

# Ham Radio University



**2026**  
Our 27th Year!



Dedicated to the Memory of  
**Phil Lewis, N2MUN**  
Founder of Ham Radio University

- Your ham license allows you to do much more than just operate a radio.
- You can build, operate, and maintain your own equipment (on ham bands).
- No other radio service allows you to do this.
- Building an HF Station is a System Engineering Project.

UNITED STATES OF AMERICA  
FEDERAL COMMUNICATIONS COMMISSION  
AMATEUR RADIO LICENSE  
KC2KY

HEFT, NEIL M  
CENTEREACH, NY 11720

FCC Registration Number (FRN): 0009742453

Special Conditions / Endorsements

NONE

Grant Date	Effective Date	Print Date	Expiration Date
10-03-2017	10-03-2017	10-03-2017	12-18-2027

File Number	Class of License	Category
0007944403	Amateur Extra	PRIMARY

THIS LICENSE IS NOT TRANSFERABLE

\_\_\_\_\_  
(Licensee's Signature)

FCC 660 - August 2021

Cut Along This

**Let's Get Started!**

# GETTING STARTED

What Interests You?

Operating Modes: CW, SSB, Digital

Dxing? Contesting? Informal Rag Chewing? Experimentation?

Time invested in hobby

Money available : 1/2 antenna system, 1/4 radio, 1/4 extras

Shack Location: Remote Station Option

Antenna Location: Town Restrictions / XYL

Feed Line/Coax cables : Remote Antenna Switch

What Radio should I Buy : Elmers / Mentors  
Club  
Reviews on [eHam.net](http://eHam.net)

Computer/Radio Software needed

Extras needed : Test Equipment, Headset, Keyer, Power Supply

# Starting Point

## Shack Location

Away from house traffic

Easy access to feed line entrance

2 sets of 4 110VAC outlets

One 220VAC outlet (for amplifier)



# Antennas

## BEAM

Advantages : Directional, Gain

Disadvantages: Cost, Support Structure Needed

## VERTICAL

Advantages: Small Footprint, Height Not Critical

Disadvantages: Omni-Directional, Noisy

## DIPOLE/WIRES

Advantages: Low Cost, Easy to setup

Disadvantages: Space Required, Support Structure Needed

# Radios

NEW -- Kenwood, Icom, Yaesu, Cost \$800-1800

Yaesu FT-891

ICOM IC-718



Kenwood TS-480



Kenwood TS-590



Yaesu FT-DX 10



ICOM IC-7300 / IC-7300MK2



# Radios

USED -- Many available at Hamfests -- Cost \$500-1200



Yaesu FT1000D



ICOM IC756PRO-iii



Kenwood TS-850



# Manual Antenna Tuners

- MFJ -949E --300 Watts



- MFJ-962D - 1,500 Watts



# Automatic Antenna Tuners

Auto tuners "one touch" antenna/transmitter VSWR matching.

Automatic tuners do have a down side -

You press button and all seems OK...

But - They offer no information about the health of your antenna and feed line

Noting the position of the XL and XC on the manual tuner, if I see a large change the positions then may be time to check the antenna feed line, remote switch, grounding, etc.



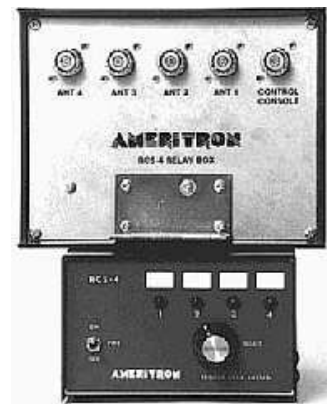
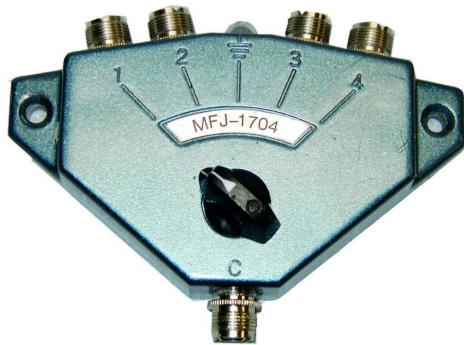
## Feed Lines

- RG213/U ---> 1.0 DB LOSS PER 100FT
- LMR400 ---> 0.80 DB LOSS PER 100FT
- RG8X or MINI8 ---> 1.4 DB LOSS PER 100FT

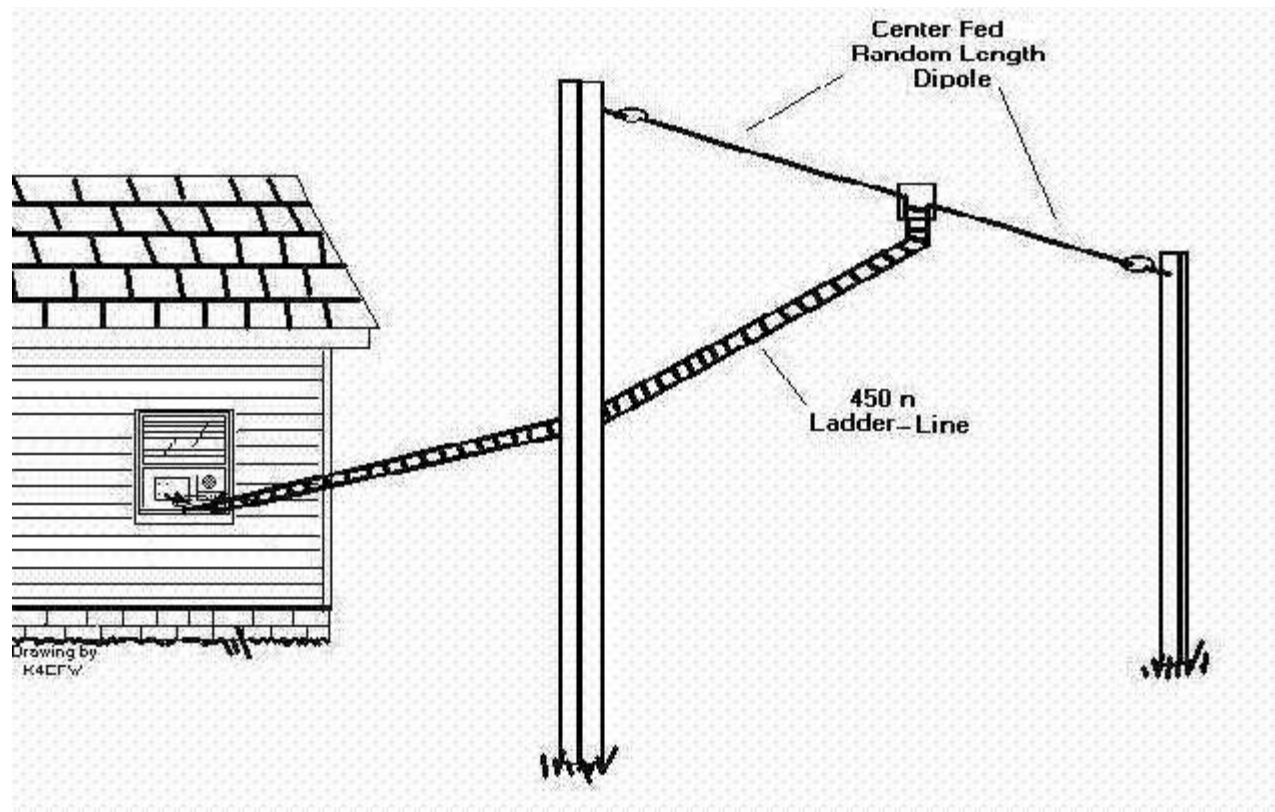


1 dB loss = 20% loss of power from your transceiver output to the antenna

# Antenna Switches

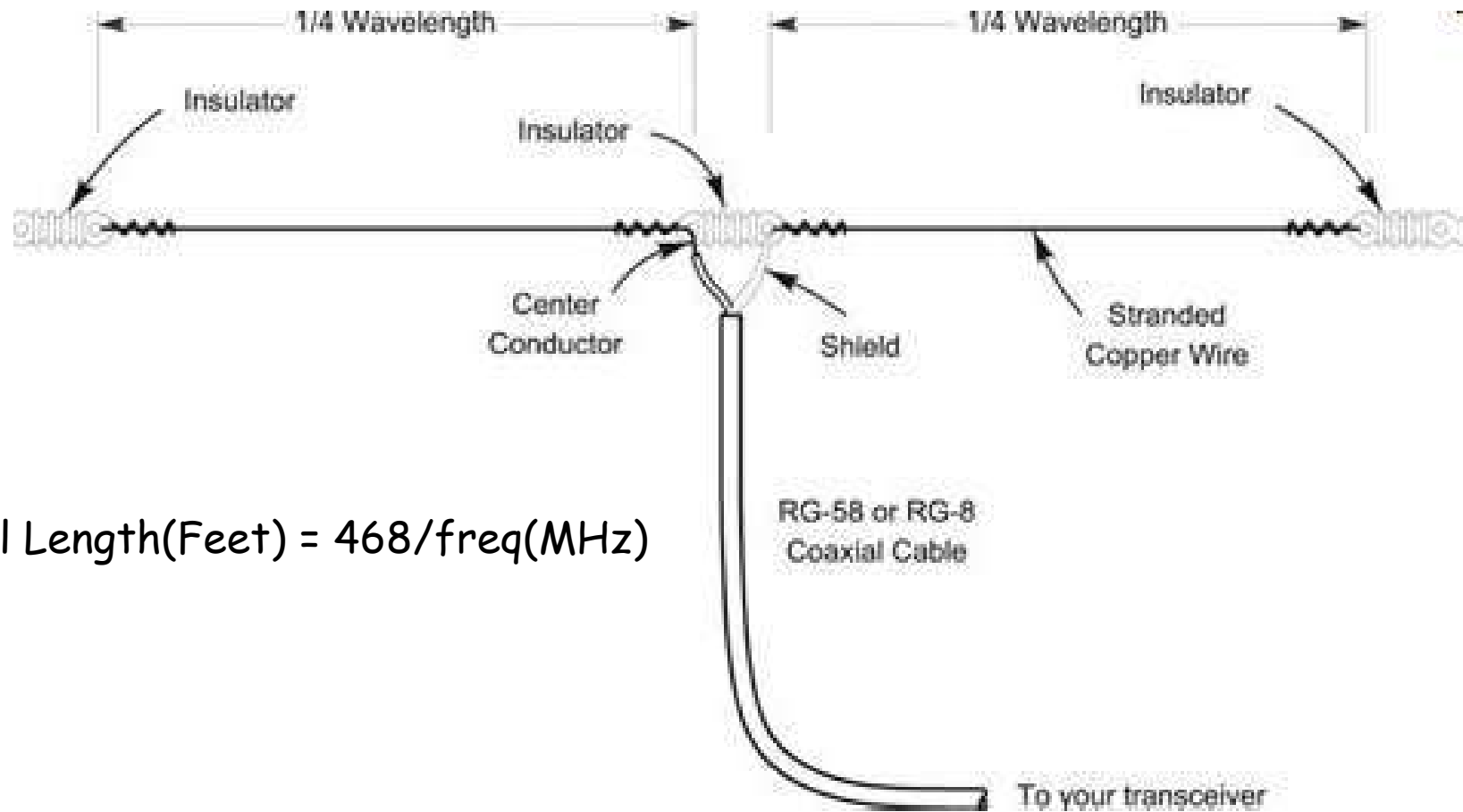


# Basic antenna for the beginner



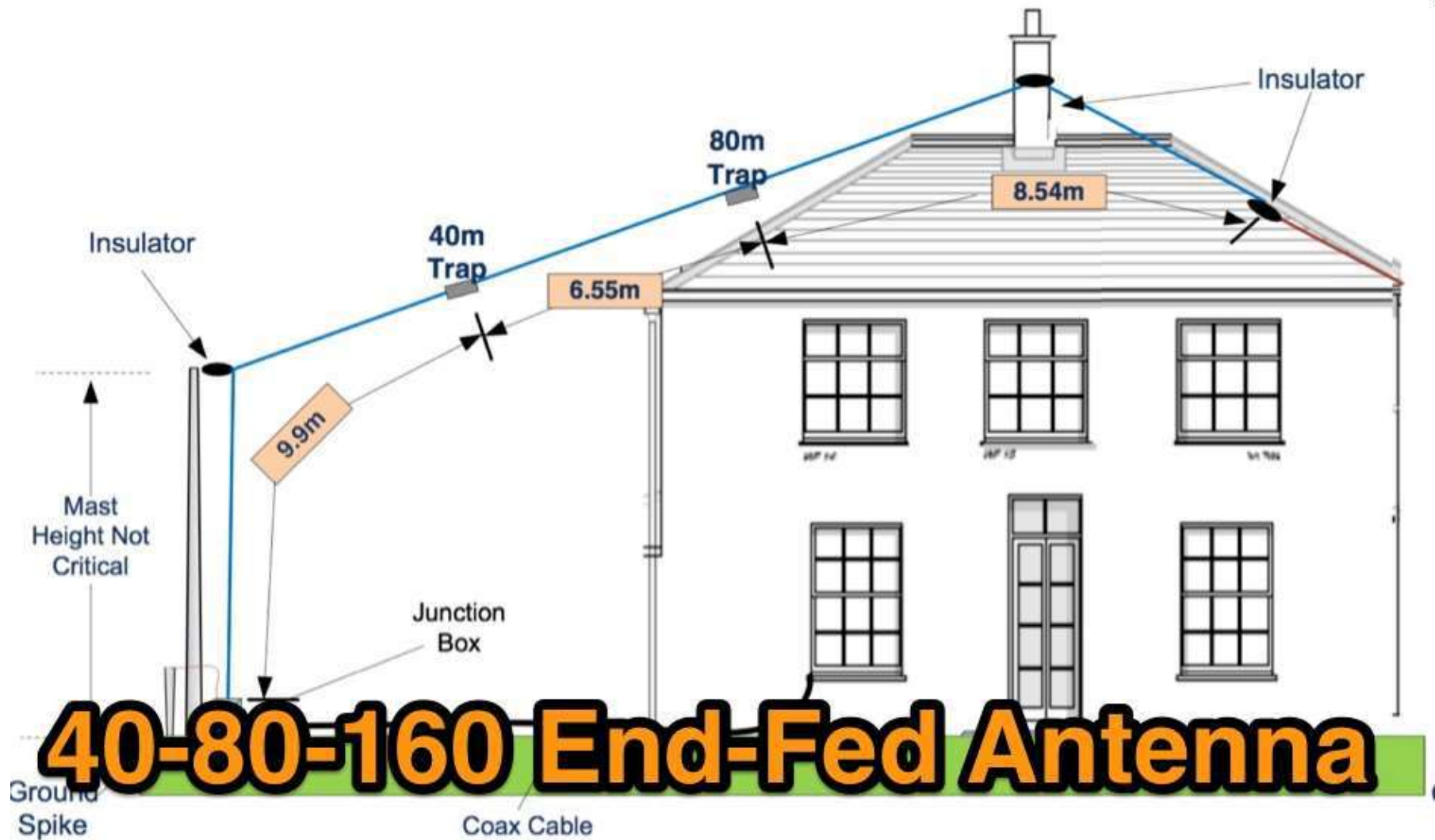


# Dipole Measurements



$$\text{Total Length(Feet)} = 468/\text{freq(MHz)}$$

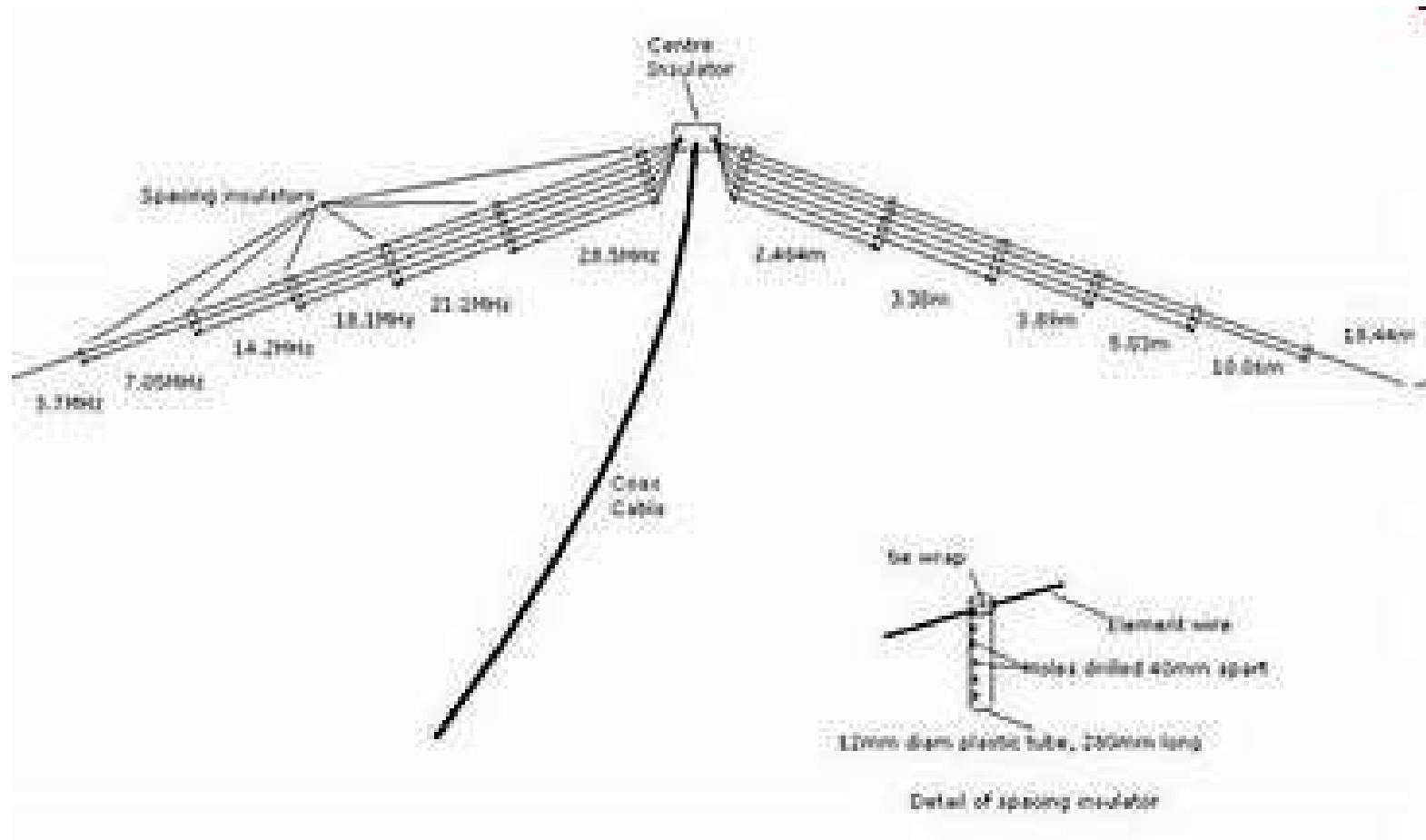
# End-Fed Triband (40/80/160) Antenna



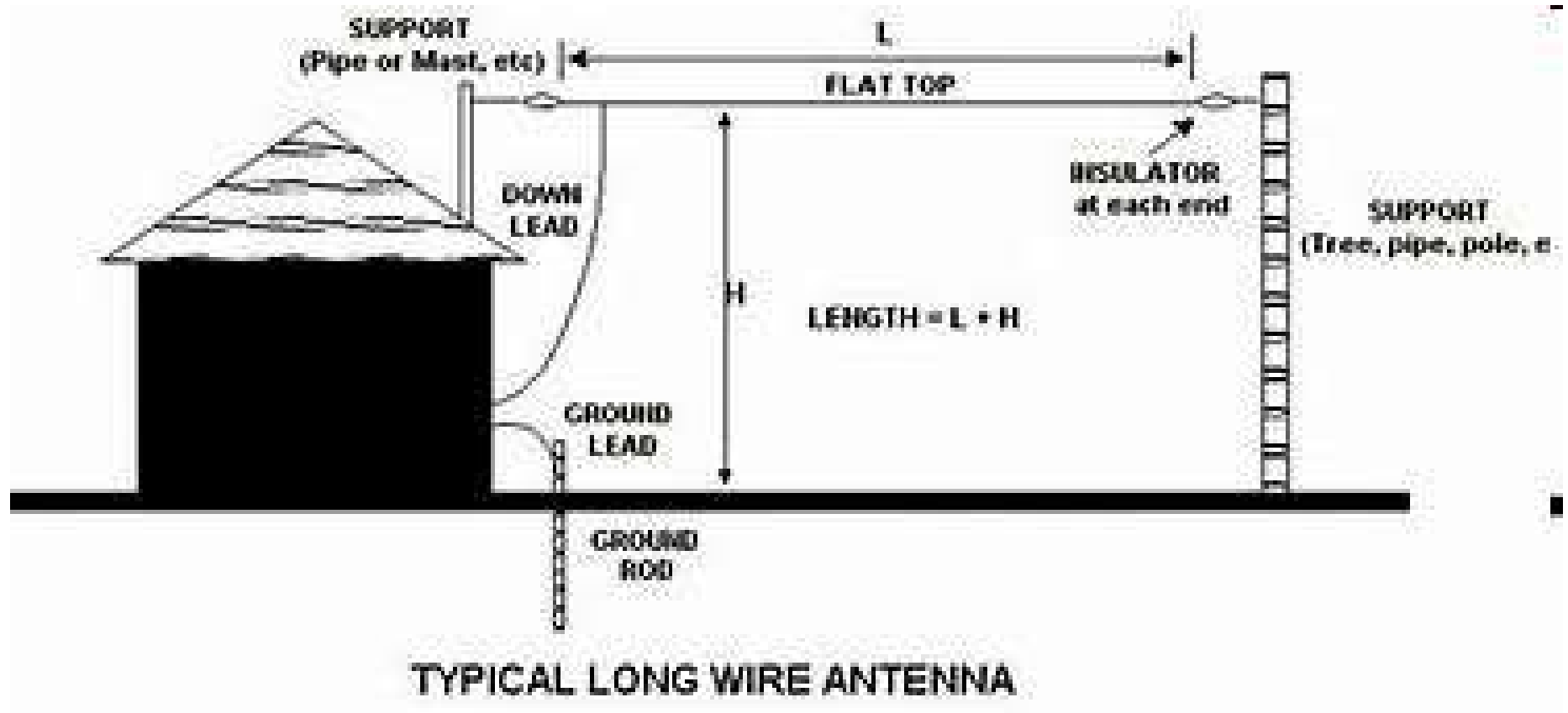
Details on construction of the traps can be found here:

<https://rsars.files.wordpress.com/2013/01/160-80-40-m-end-fed-antenna-g0csk-iss-1-31.pdf>

# Multi-Band Fan Dipole



# Long Wire



# Portable Verticals are Gaining Popularity

New rig just arrived? Get on the air **today**.



Wolf River SOTA Special

**Compact Storage**  
**Easy Setup and  
Teardown**  
**(Set up in about 5  
minutes)**

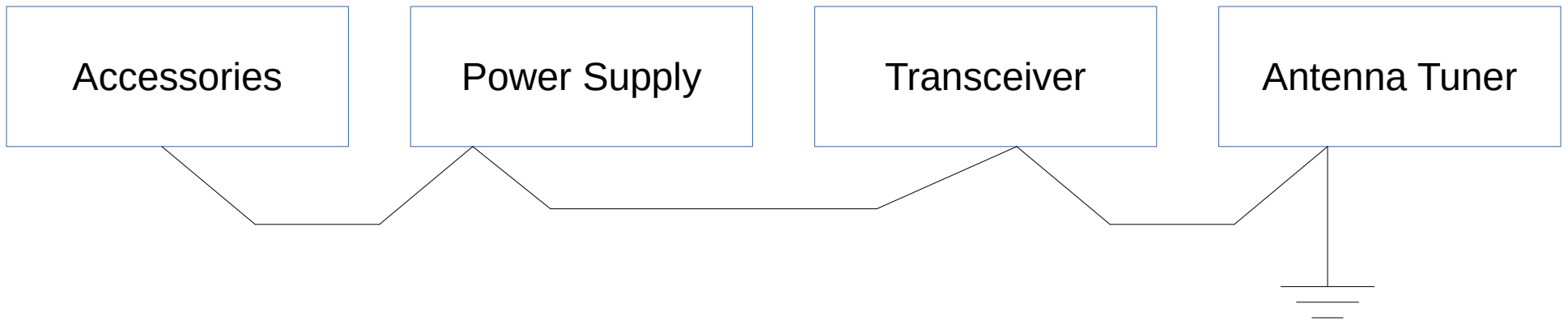


GOOZEEZOO Portable Vertical Kit

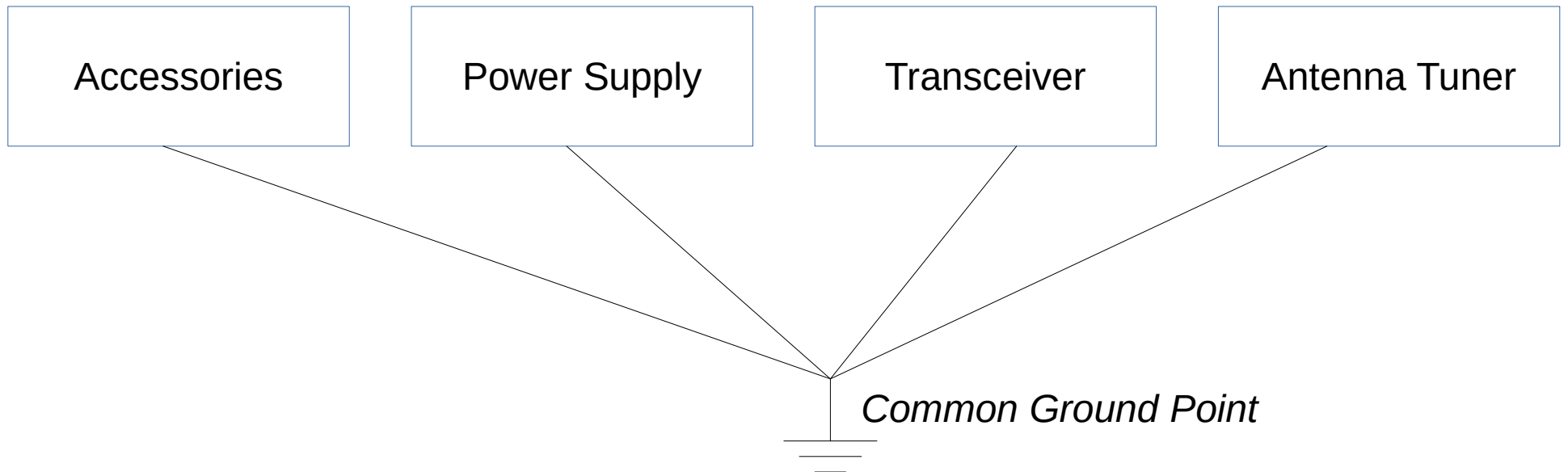


# Station Grounding

**WRONG**



**RIGHT**



# Towers and Rotators for Beam Antennas

## TOWERS:

- TRIPOD ROOF
- US TOWER
- UNIVERSAL



## ROTATORS:

- YAESU
- HY-GAIN



# Test Equipment



MFJ 259C



RigExpert



Dummy Load



Multi-Meter



DX Engineering Ultra-Grip Crimping Kit

# Rig Sound Card Interfaces





## Other Extras



Headset w/ Boom Mic

## Digital Voice Keyer



## Power Supplies



Linear power supply



Switching Power Supply



Keyer Paddle



Straight Key



Logging Software



# Helpful Tricks

After setting up your station...

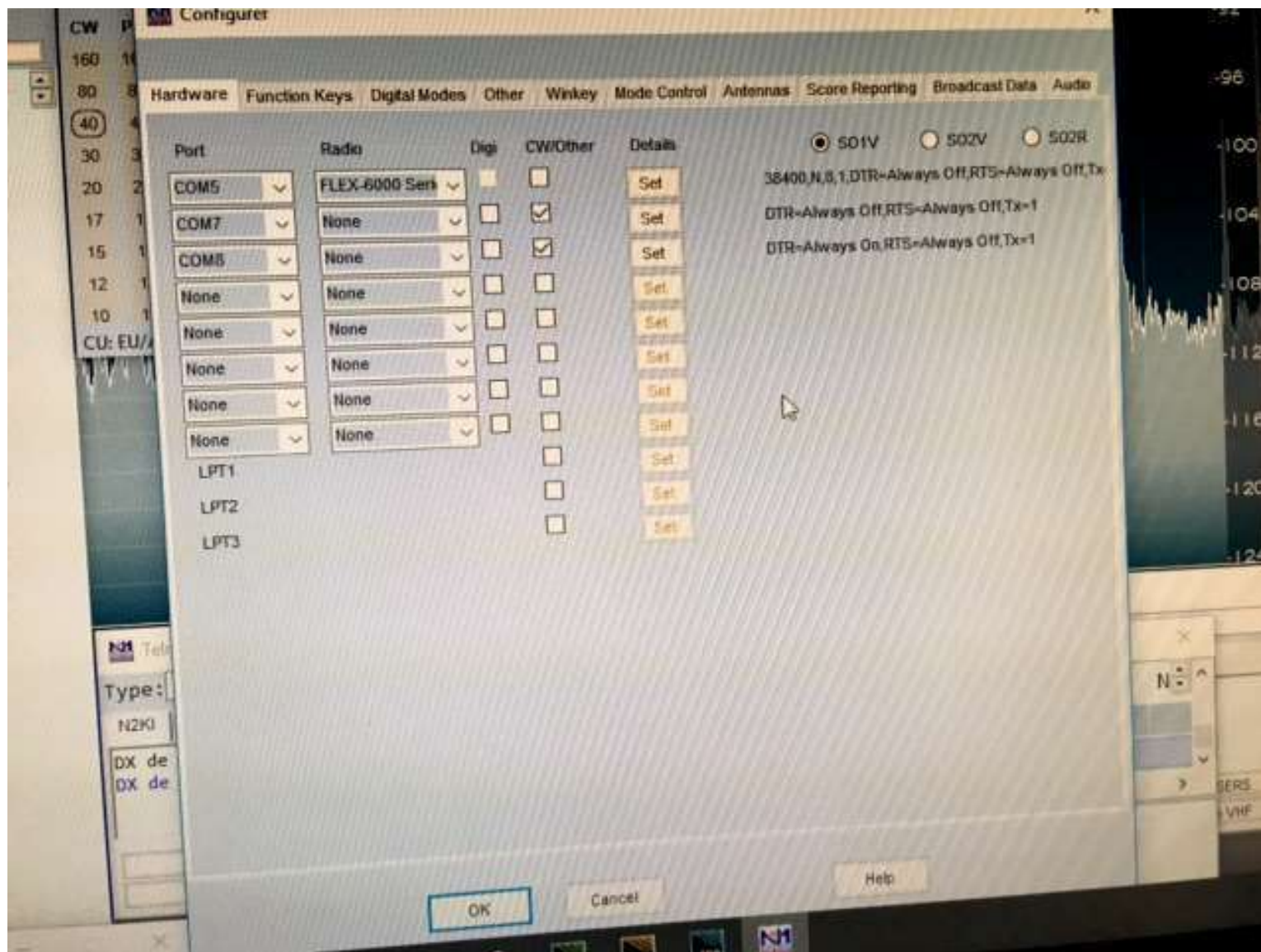
Take Pictures

Draw schematics /Block Diagrams

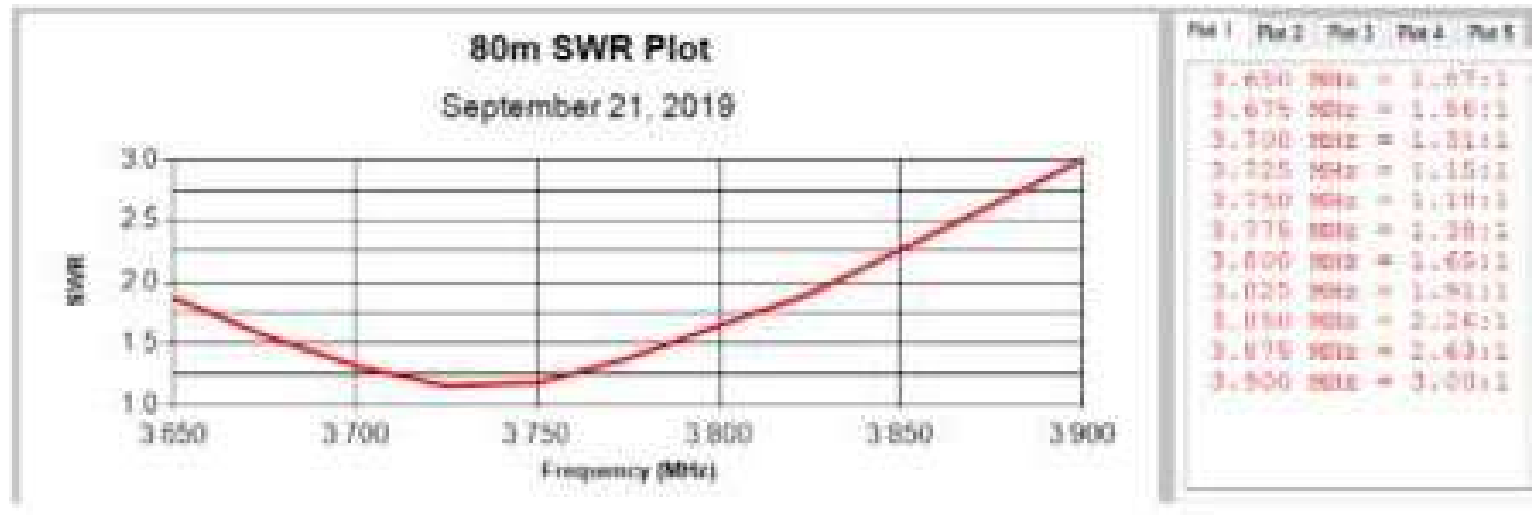
Download Manuals



## Take Screen Shots of Software Settings (N1MM Example Shown)



Document Antenna SWR Data on Each Band for Each Antenna  
 With and Without Tuner  
 Re-check periodically (Spring and Fall)



Replaced RG8 with LMR400 + RG213



# **Continuous On-The-Air Performance Assessment**

Ask For Detailed Signal Reports -- Not just "59"

- Actual Signal Strength
- Audio Quality
- Compare With Previous Contacts

## **Think About Possible Improvements**

- Better Antenna System  
Bigger, Higher
- Higher Quality Coax Cables

# Improve Receiver Performance by Reducing or Eliminating In-Shack Noise Sources

Fluorescent lighting - Replace with LED's

Identify and replace noisy "wall wart" power cubes

Check Light Dimmer Switches

Use power strips with EMI filtering

Shielded Cables

Here is an excellent presentation By Rick, KC2FD, on RFI in the shack:

[http://www.rcarc.org/presentations/RFI hamshack 20180829 obd a.pdf](http://www.rcarc.org/presentations/RFI%20hamshack%2020180829%20obd%20a.pdf)



# External Noise Floor -- Determined by Location

20-Meter Noise at QTH of N2MUN vs. W2JV

## N2MUN

- South Shore - Elevation 8 ft
- Flex 6400M Xcvr
- Antenna - C3SS
- Ambient Noise Floor: S-5 to S-6

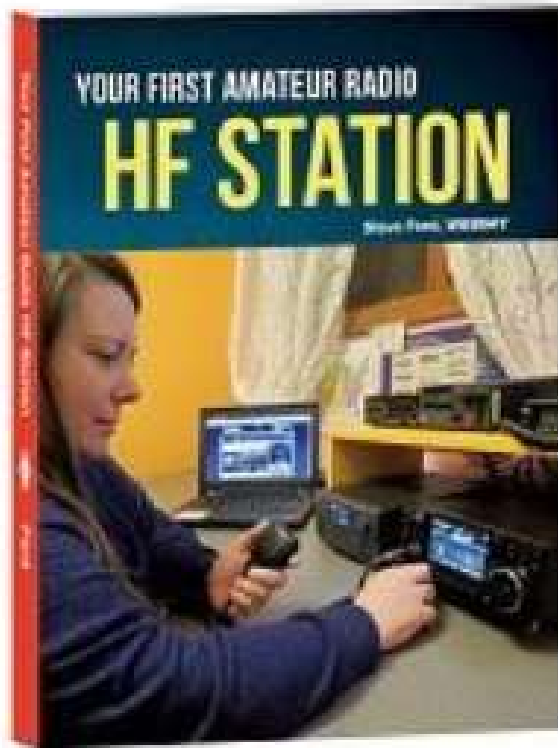
## W2JV

- North Shore - Elevation 150
- Flex 6400M Xcvr
- Antenna - Navassa-5
- Ambient Noise Floor: S-3

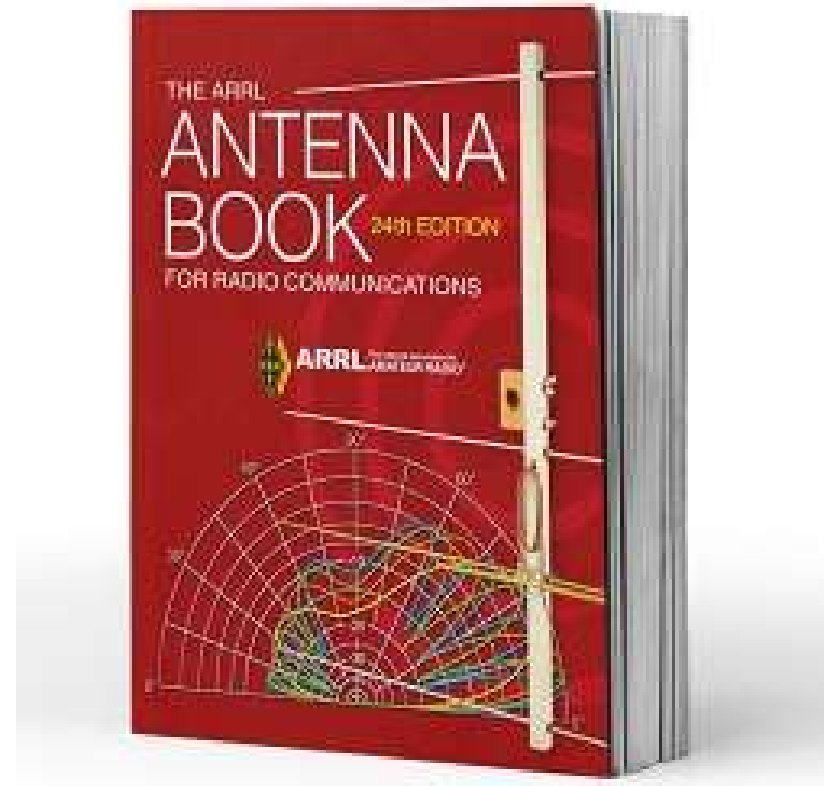
# HF During Low Propagation Cycle

- 40 And 80 Meters
- Consider separate TX and RX antennas
  - Vertical For Transmit
  - Receive-only Magnetic Loop
    - Reduces Noise Floor three S units
    - Directional
    - Easy to Rotate
- Digital Modes
- CW
- ARRL Book "LOW BAND Dxing" BY ON4UN

## Additional Reading Suggestions



ISBN: 978-1-62595-007-9



ISBN: 978-1-62585-111-3

Thanks for Listening, 73, and See You On the Air!

Neil, KC2KY  
kc2ky@arrl.net

These Slides are Available at <http://www.rcarc.org/Presentations.htm>