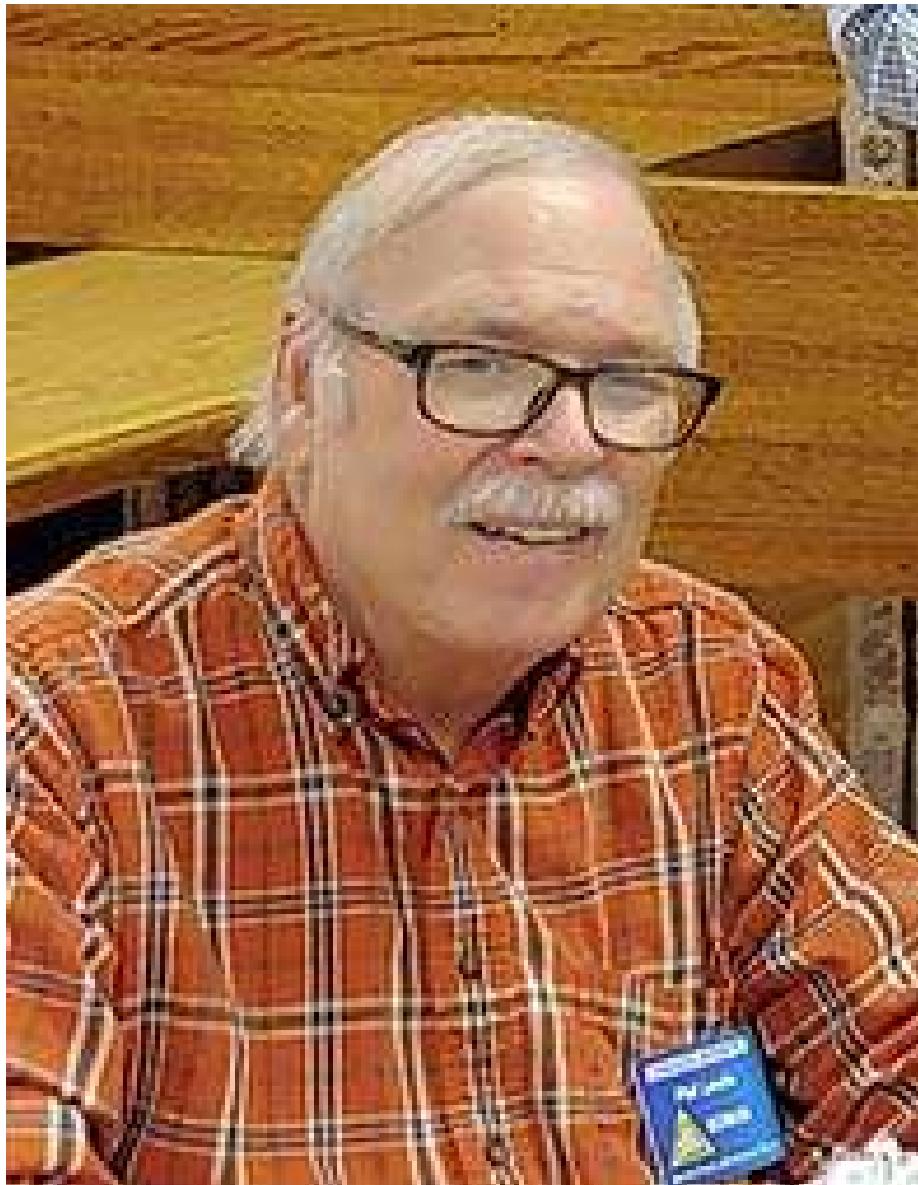


Building Your First HF Station
Welcome to Ham Radio University 2026!

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
100-100-1000
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	0007944403	0007944403	0007944403
	Amateur Extra		PRIMARY
THIS LICENSE IS NOT TRANSFERABLE			
(Licensee's Signature)			

Cut Along This

Let's Get Started!

FCC 660 - August 2021

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

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



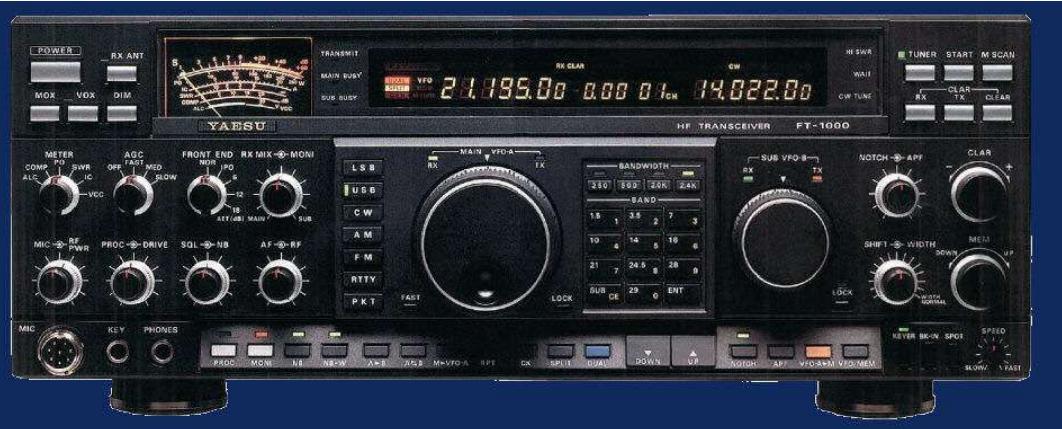
Yaesu FT-DX 10



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.



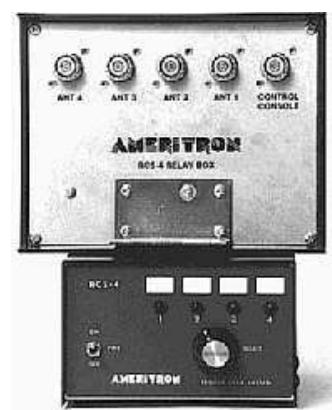
Feed Lines

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

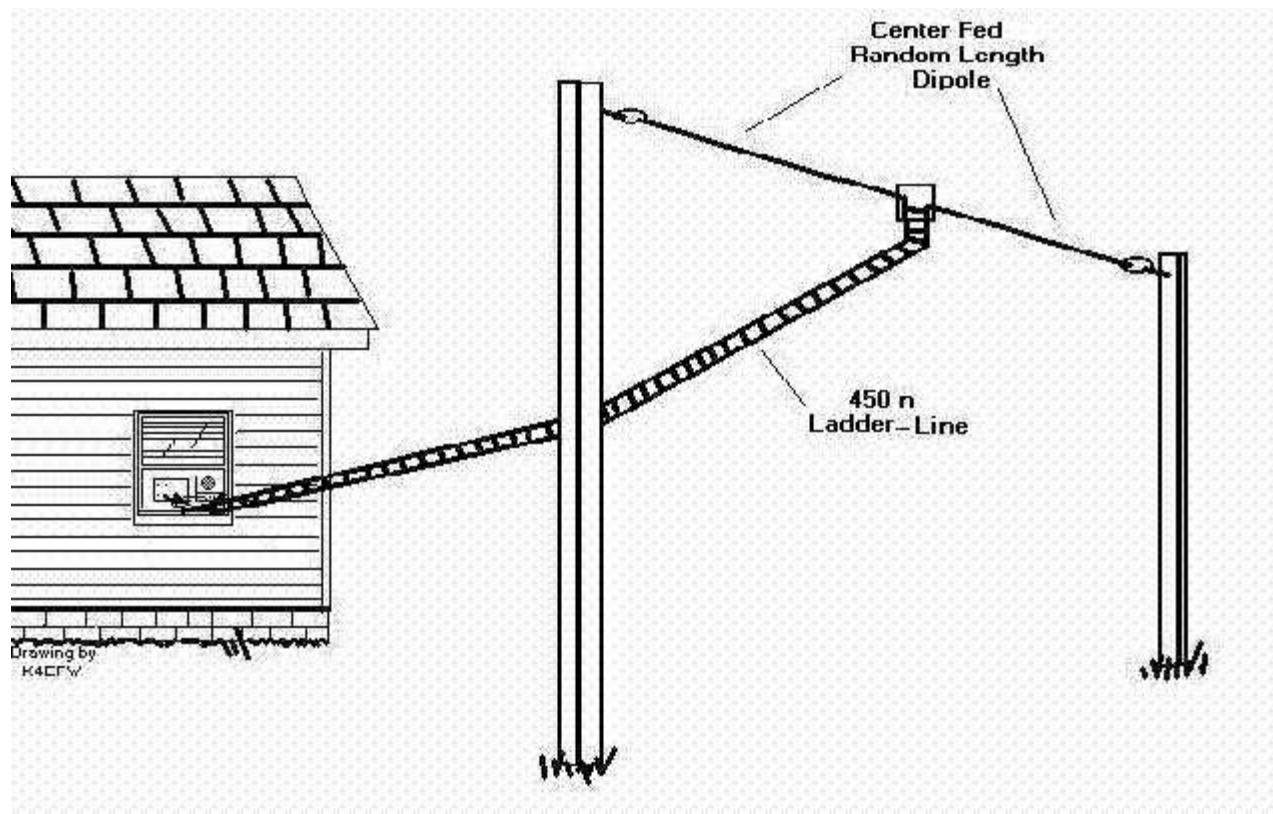


1 dB loss = 20% loss of power from your transceiver output to the antenna

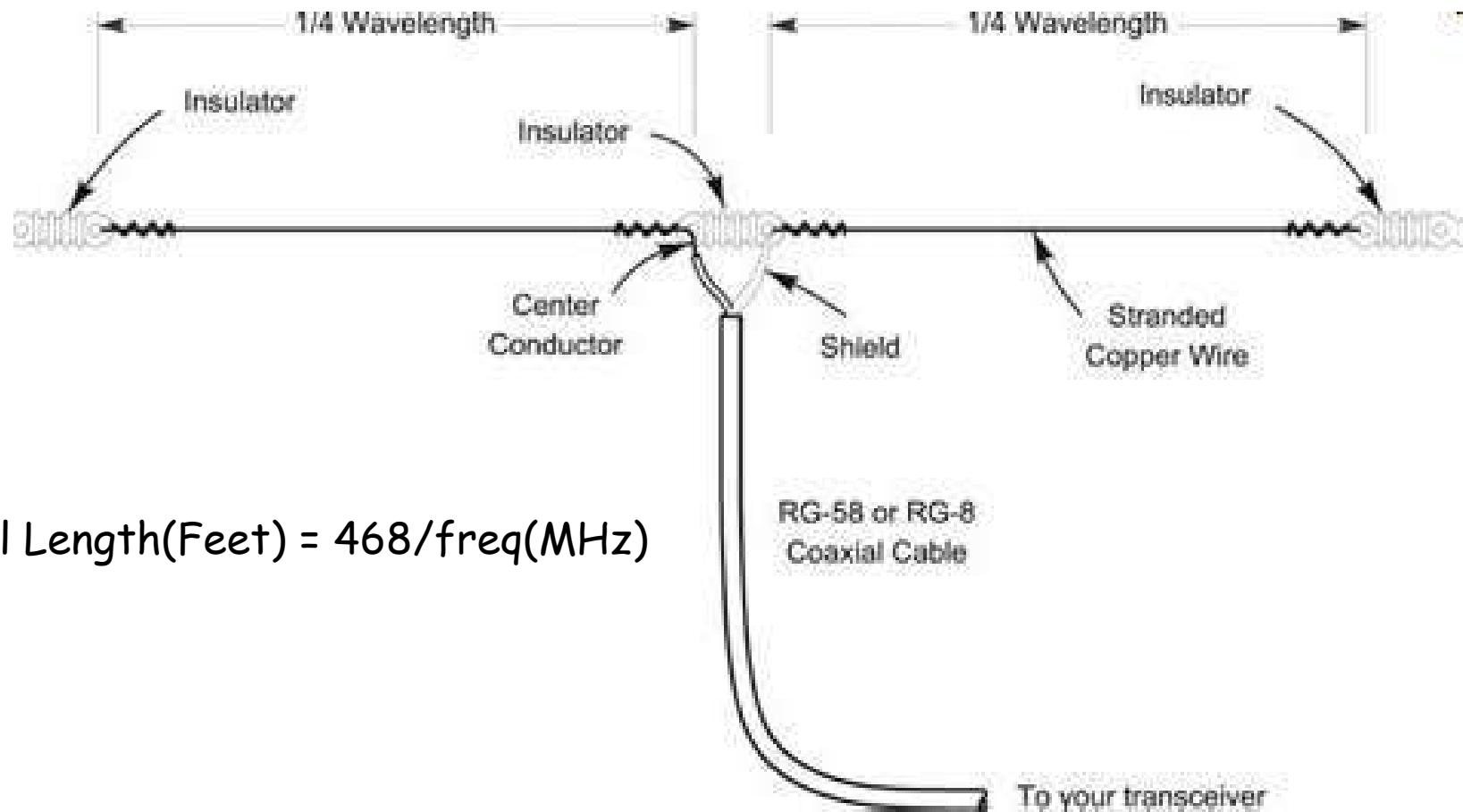
Antenna Switches



Basic antenna for the beginner

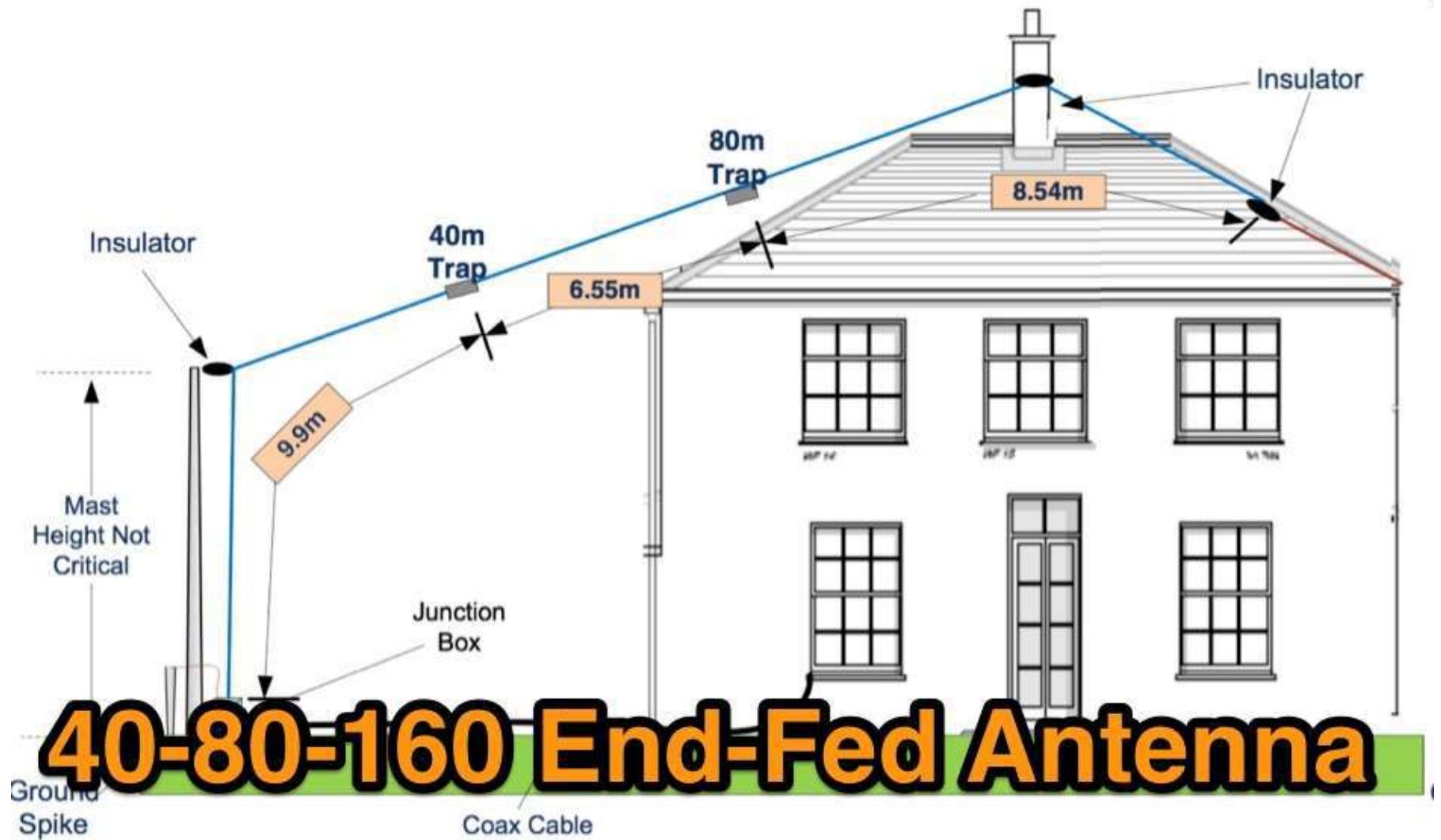


Dipole Measurements



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

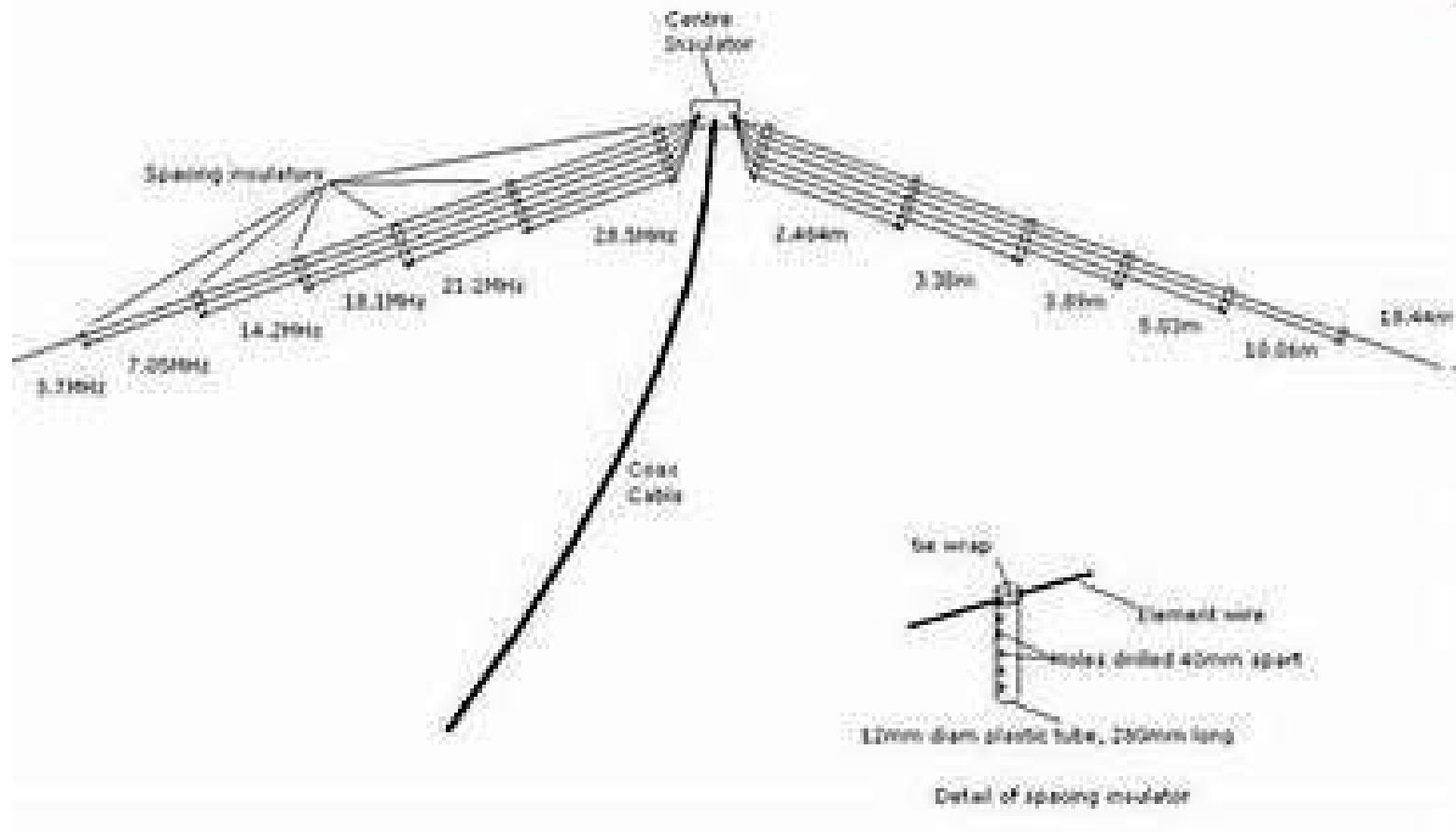
End-Fed Triband (40/80/160) Antenna



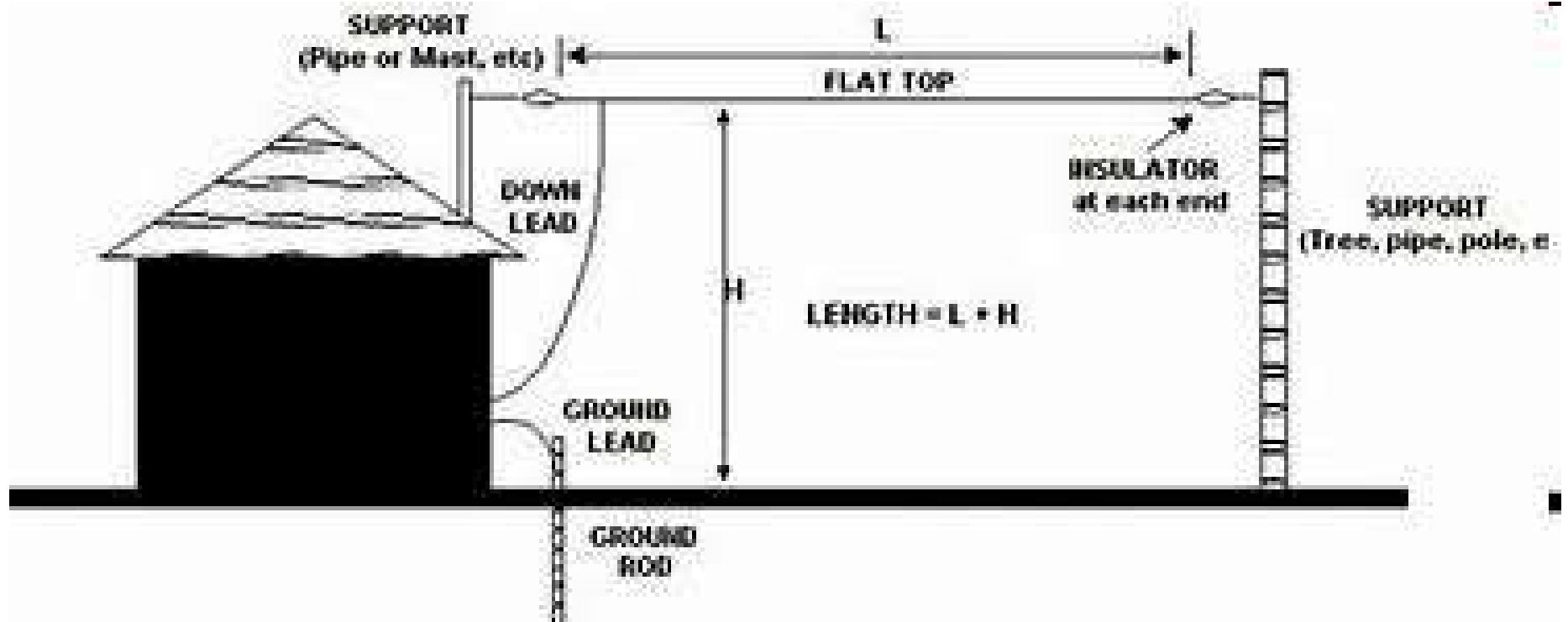
Details on construction of the traps can be found here:

<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



TYPICAL LONG WIRE ANTENNA

Portable Verticals are Gaining Popularity

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



Compact Storage

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

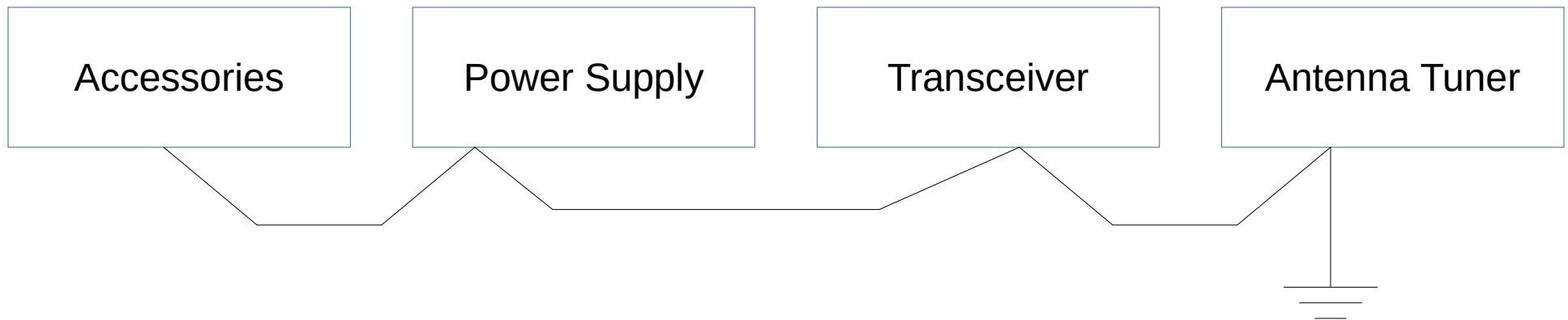


GOOZEEZOO Portable Vertical Kit

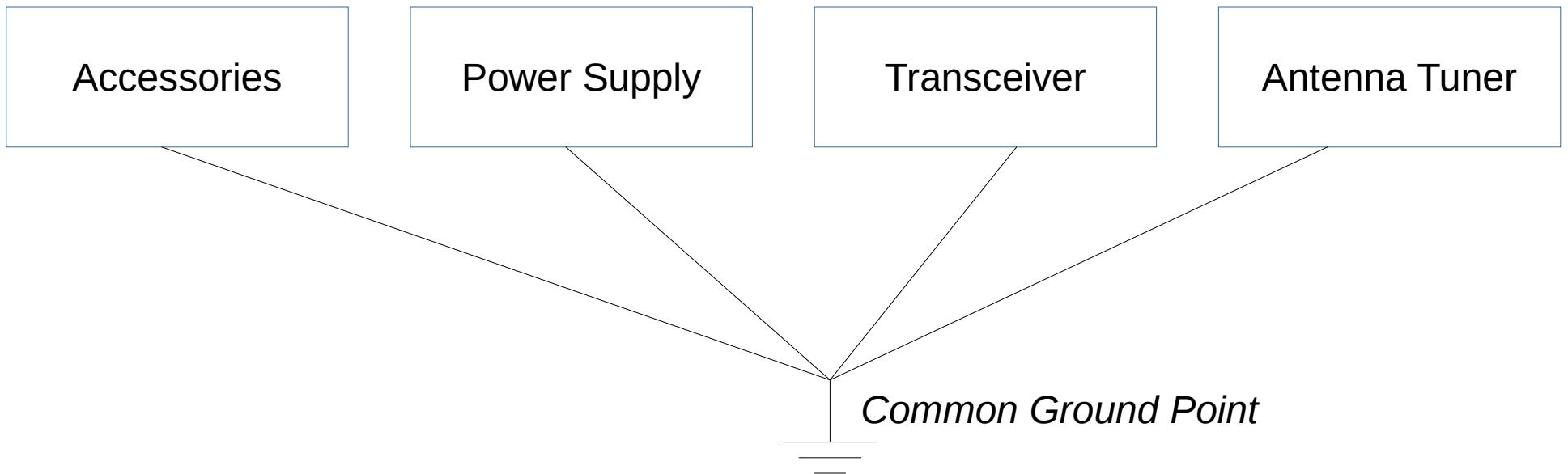
Wolf River SOTA Special

Station Grounding

WRONG



RIGHT



Towers and Rotators for Beam Antennas

TOWERS:

- TRIPOD ROOF
- US TOWER
- UNIVERSAL



ROTATORS:

- YAESU
- HY-GAIN



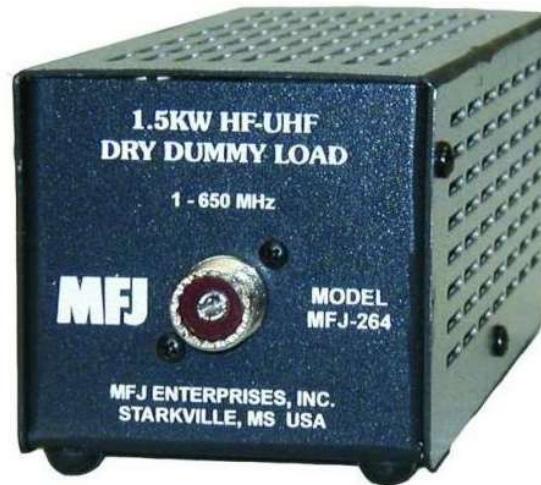
Test Equipment



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...

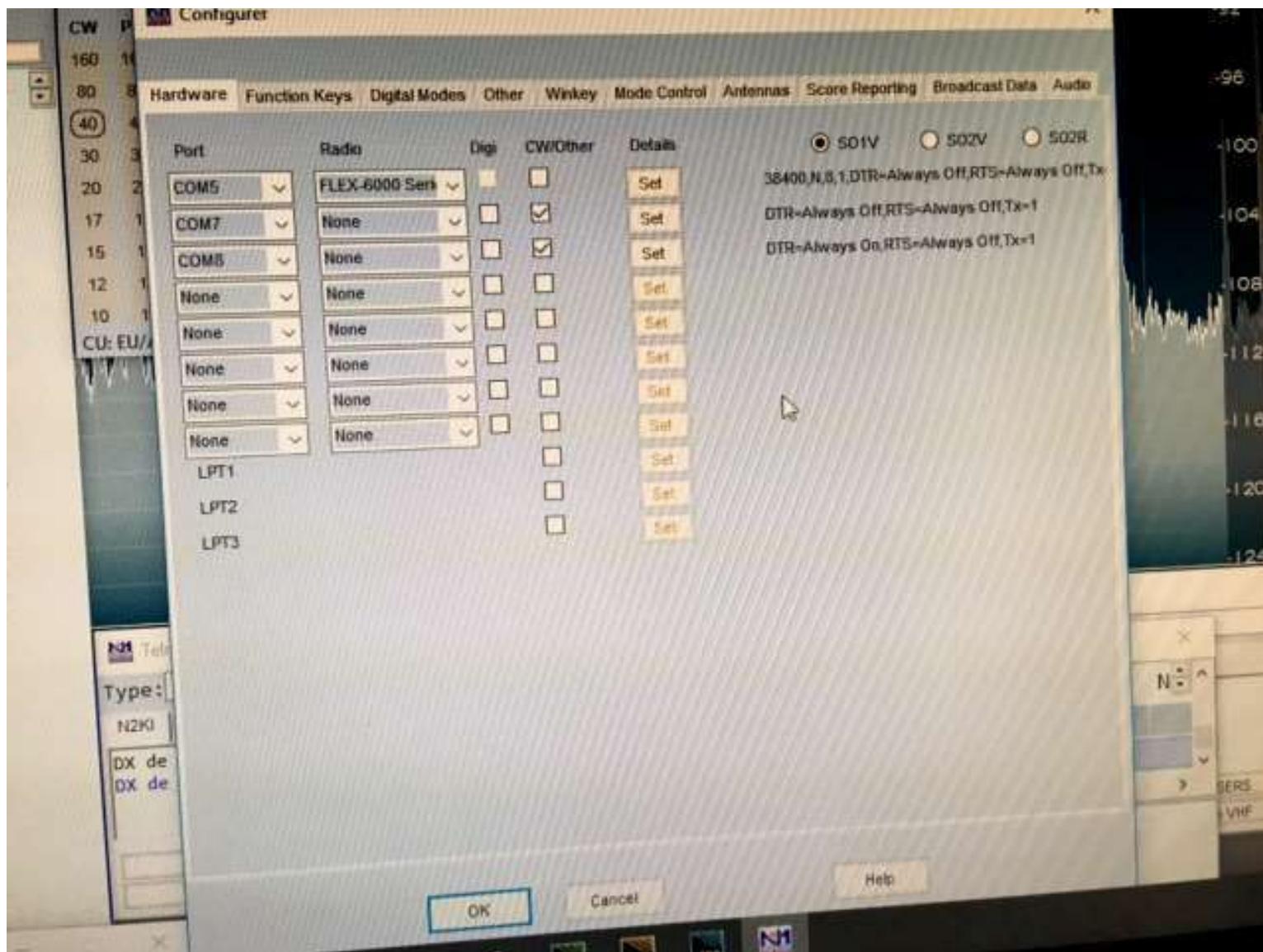
Take Pictures

Draw schematics /Block Diagrams

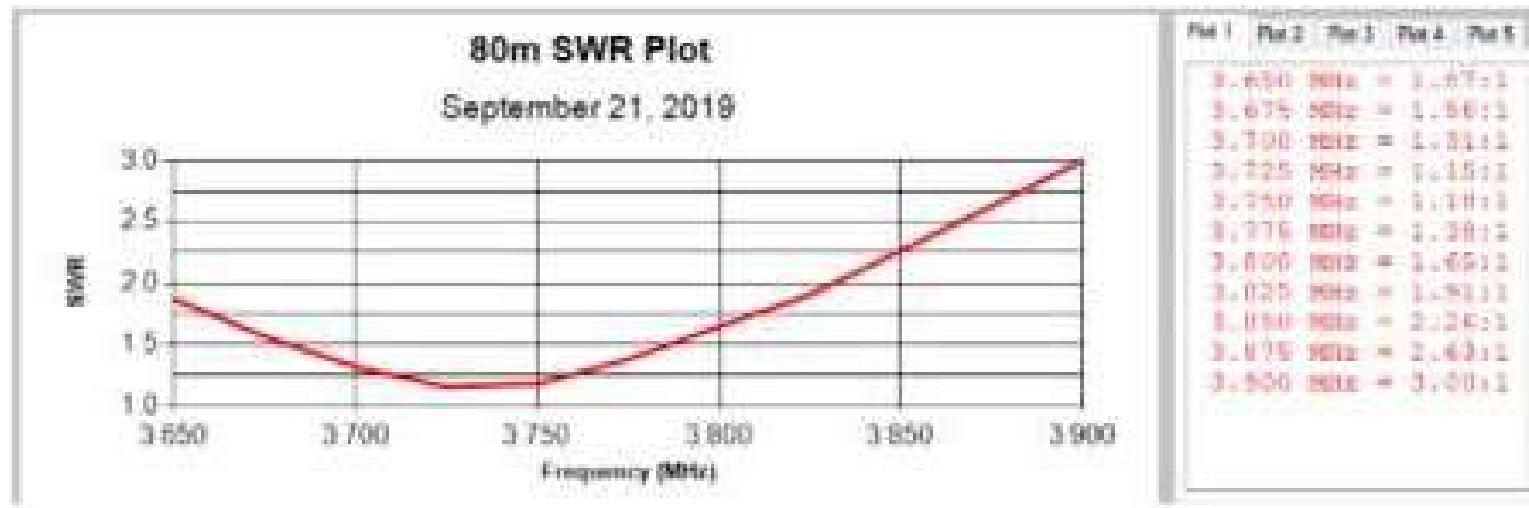
Download Manuals



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>

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

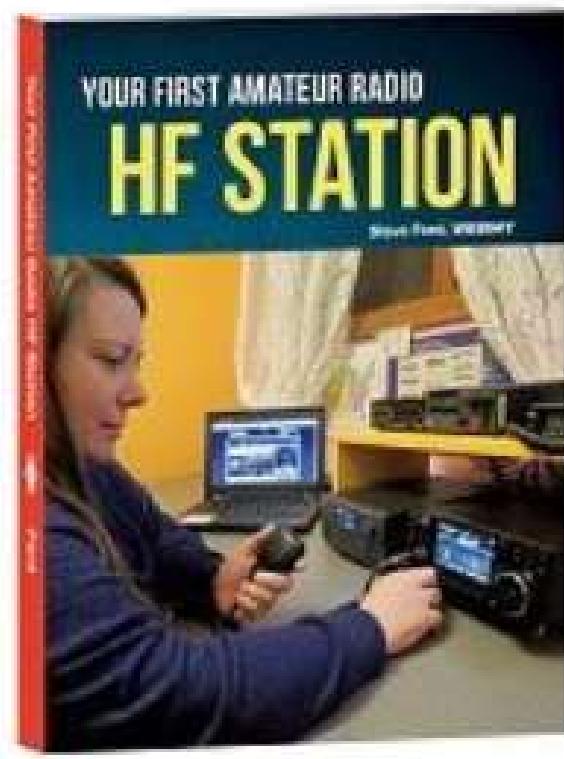
W2JV

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

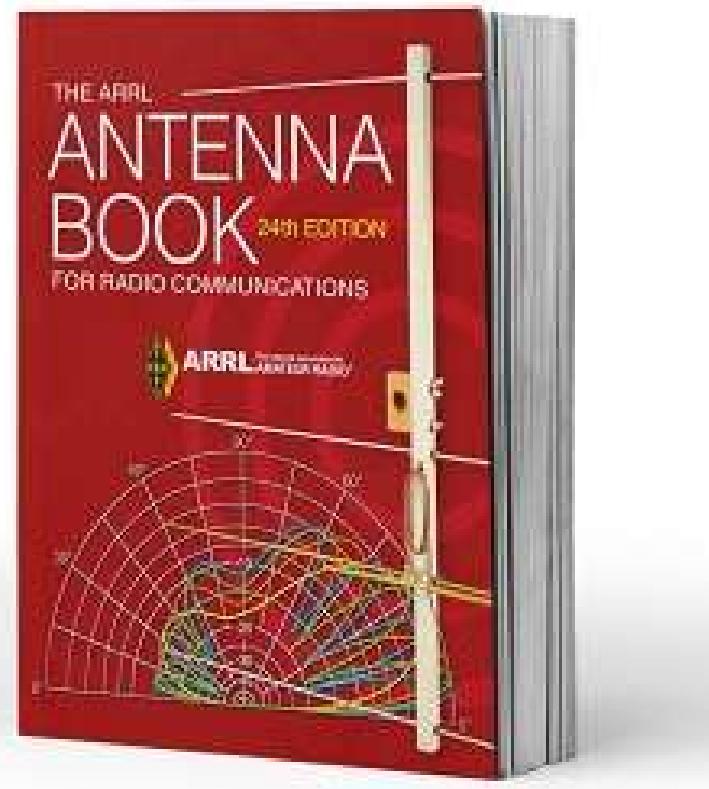
HF During Low Propagation Cycle

- 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>