Building Your First HF Station

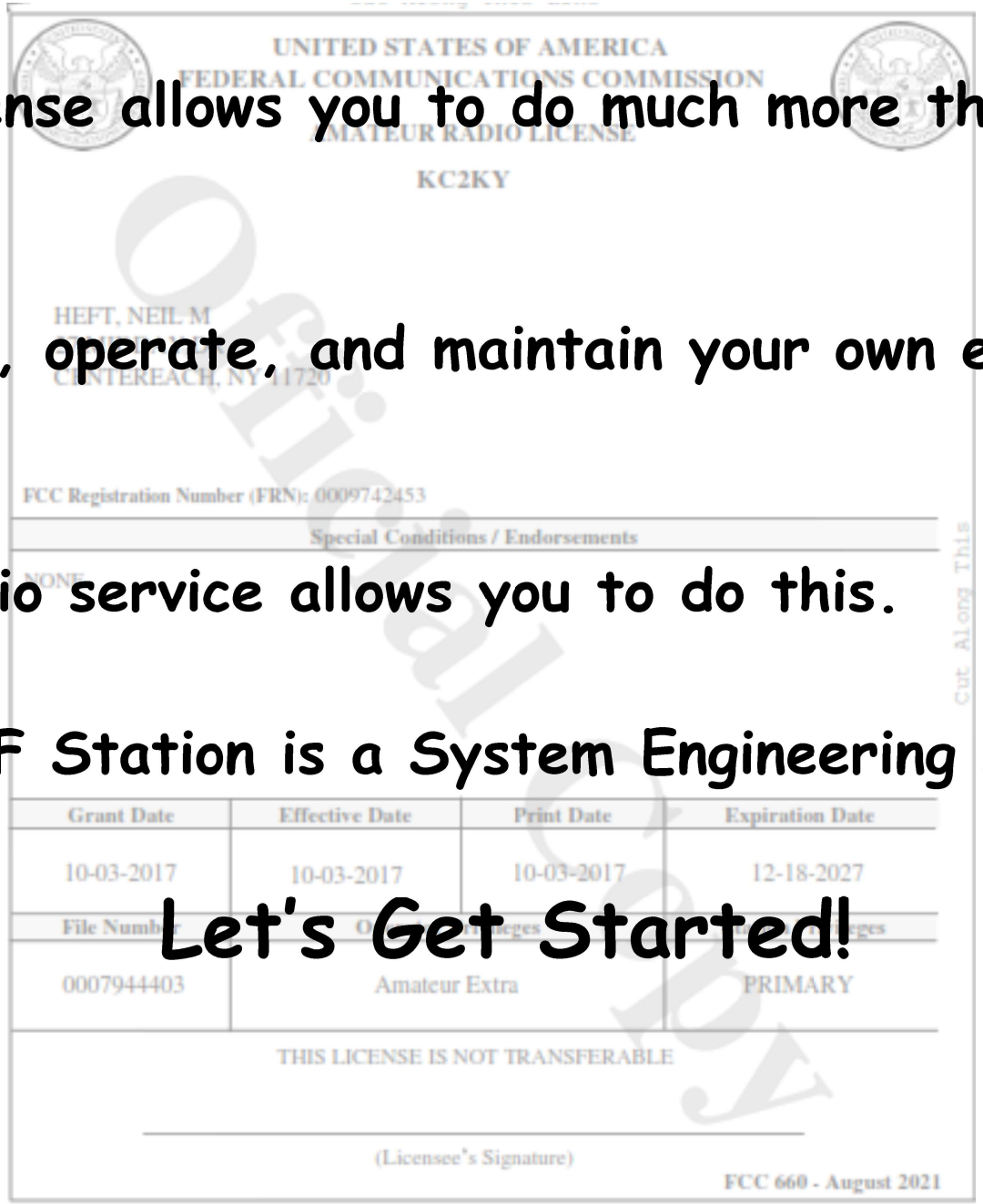
Welcome to Ham Radio University 2024!

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 | Operator Class | Group Code
0007944403 | Amateur Extra | PRIMARY
THIS LICENSE IS NOT TRANSFERABLE
(Licensee's Signature)
FCC 660 - August 2021
Official Copy
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

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

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…

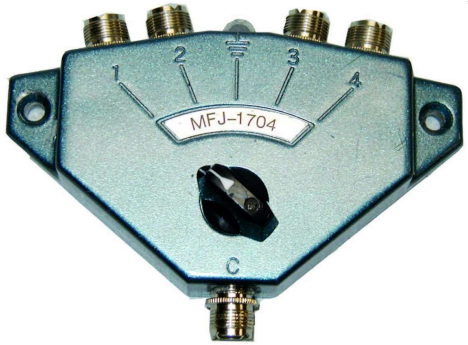
But – They offer no information about the health of your antenna and feed line

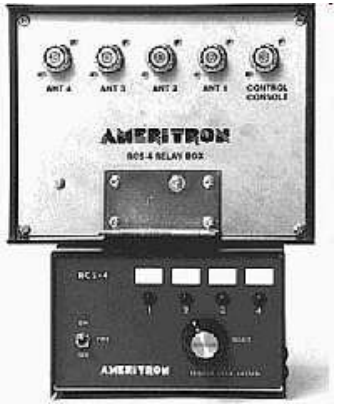
Noting the position of the XL and XC on the manual tuner, if I see a large change the positions then may be time to check the antenna feed line, remote switch, grounding, etc.

Feed Lines

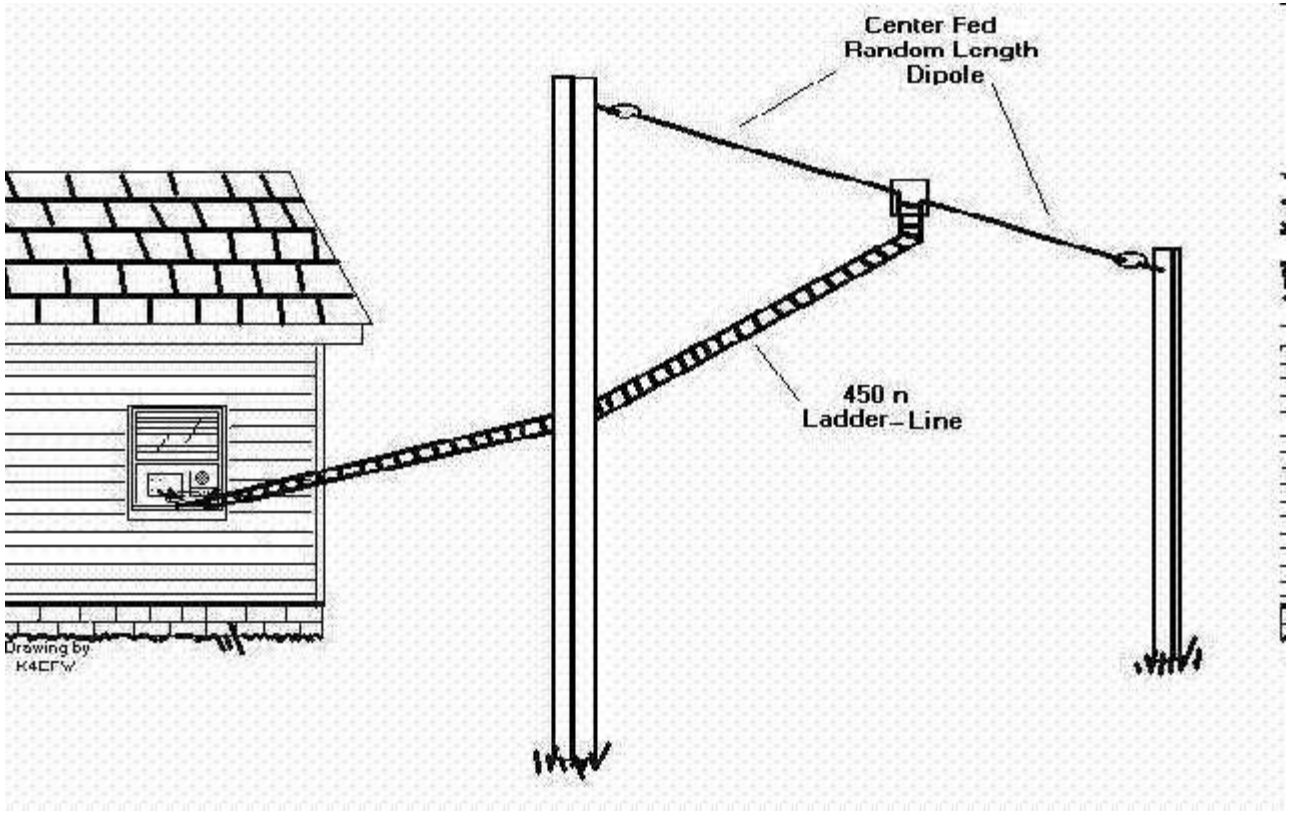
- RG213/U ---> 1.0 DB LOSS PER 100FT
- LMR400 ---> 0.80 DB LOSS PER 100FT
- RG8X or MINI8 ---> 1.4 DB LOSS PER 100FT

Antenna Switches

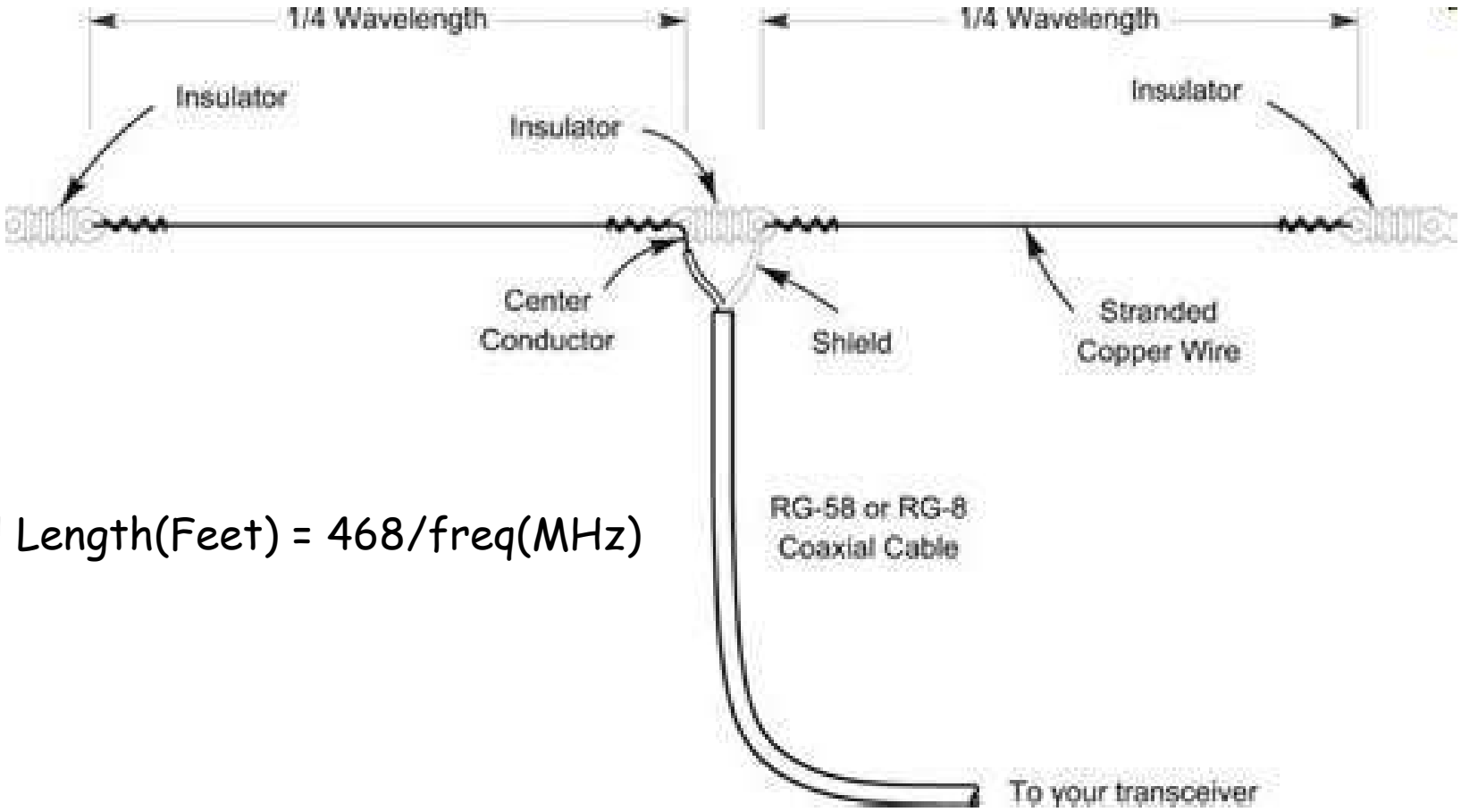




Basic antenna for the beginner

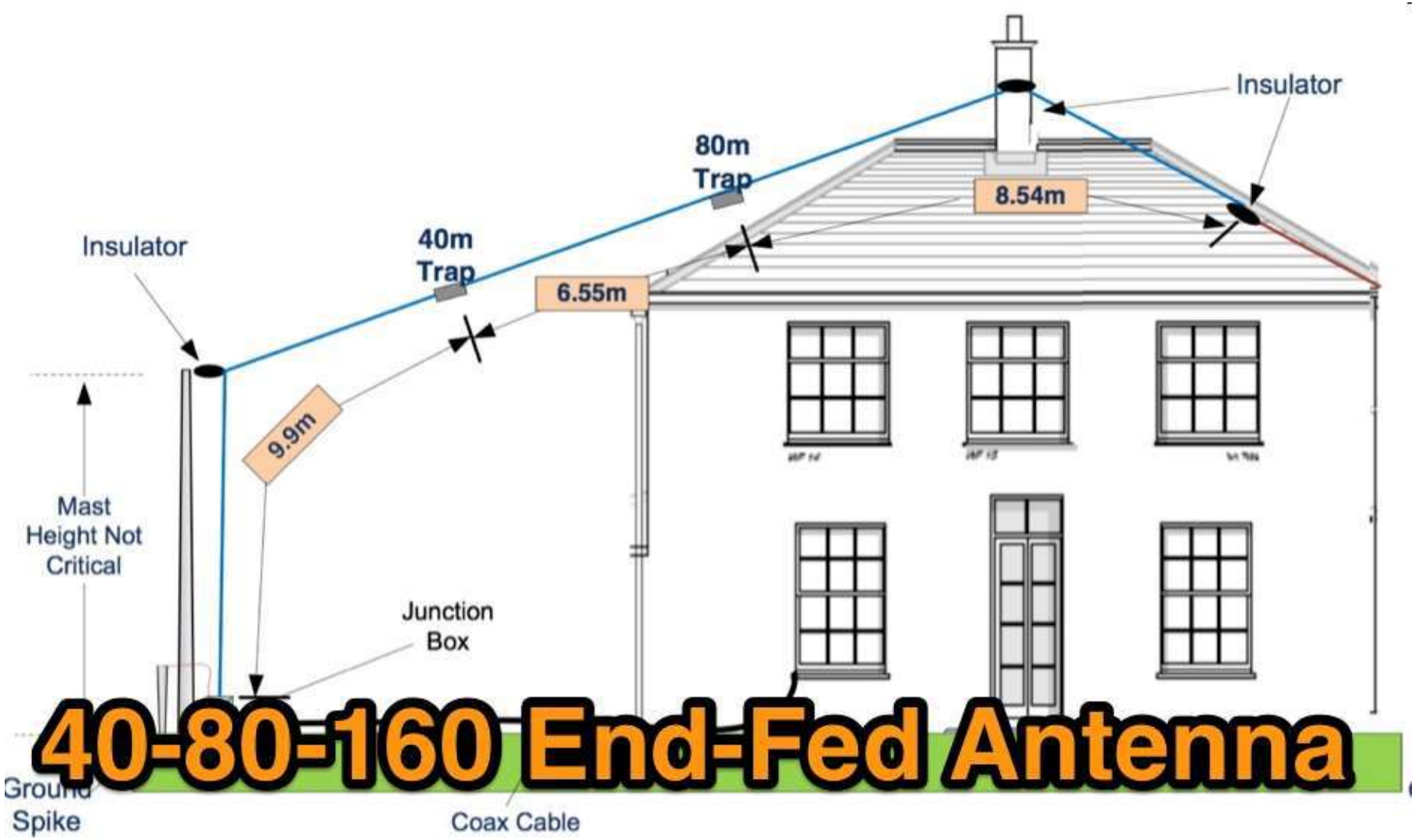


Dipole Measurements



Total Length(Feet) = 468/freq(MHz)

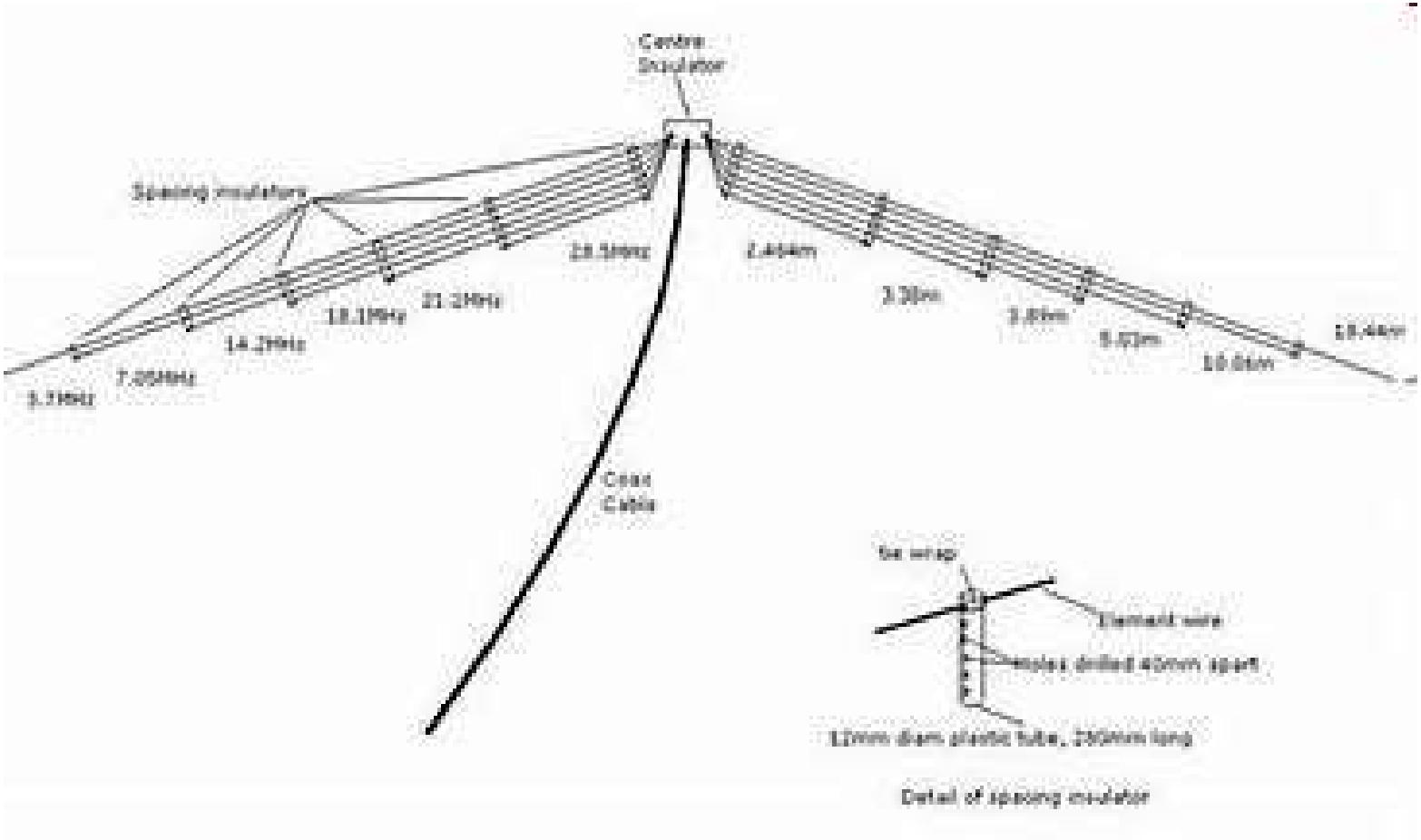
End-Fed Triband (40/80/160) Antenna



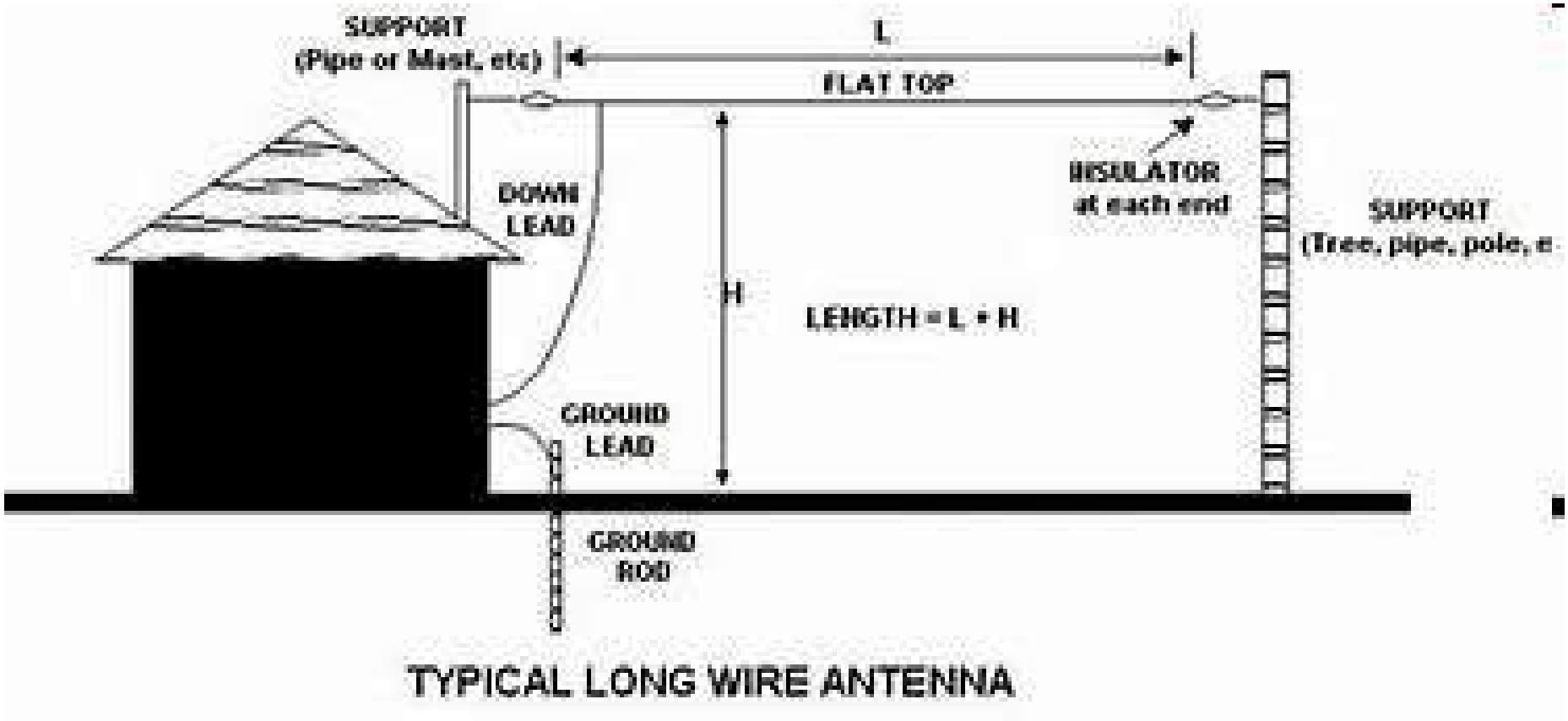
Details on construction of the traps can be found here:

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

Multi-Band Fan Dipole



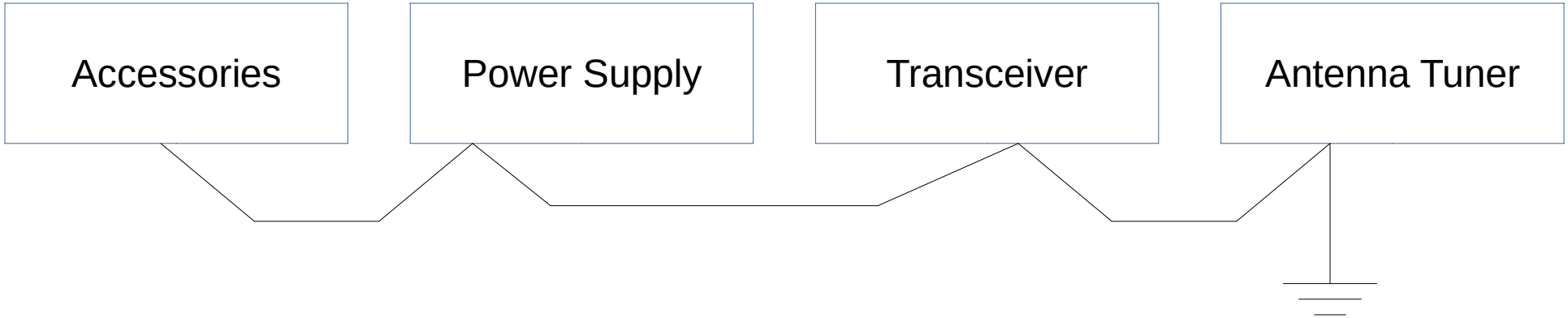
Long Wire



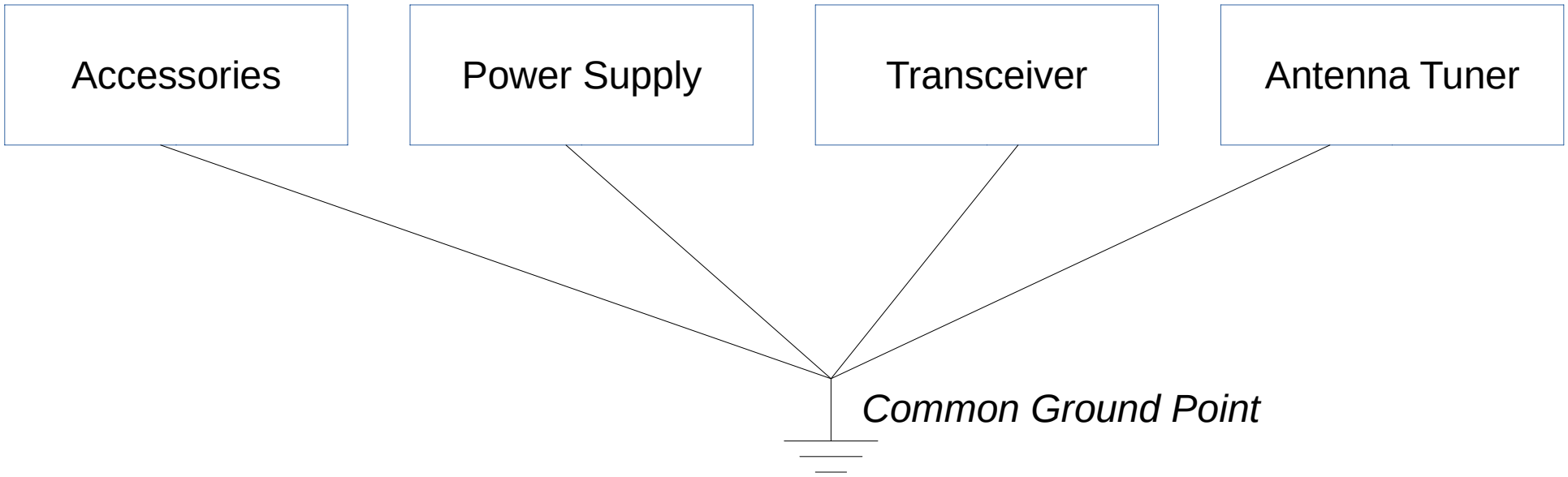
TYPICAL LONG WIRE ANTENNA

Station Grounding

WRONG



RIGHT



Towers and Rotators for Beam Antennas

TOWERS:

- ROHN
- 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

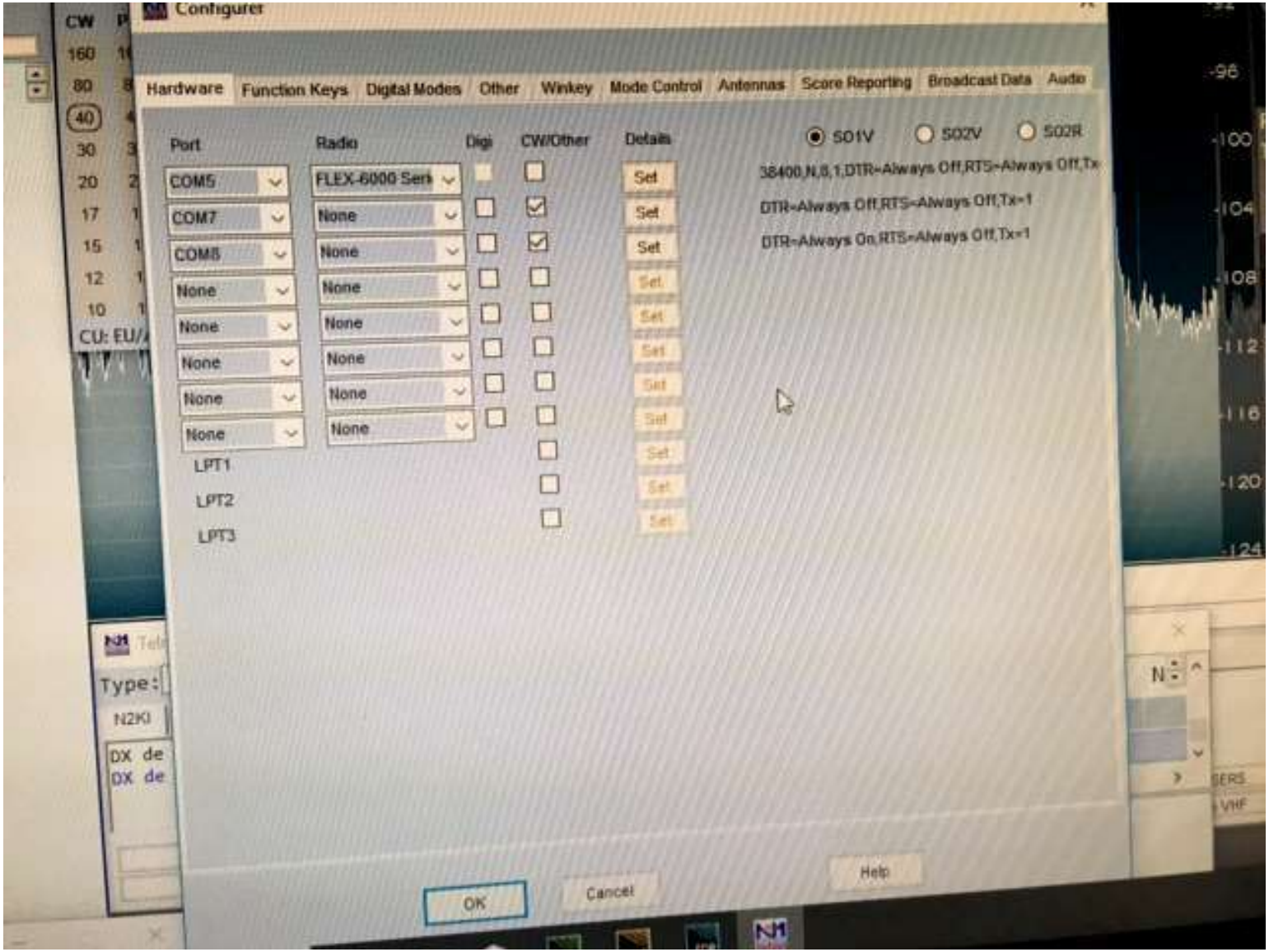
After setting up your station…

Take Pictures

Draw schematics /Block Diagrams

Download Manuals

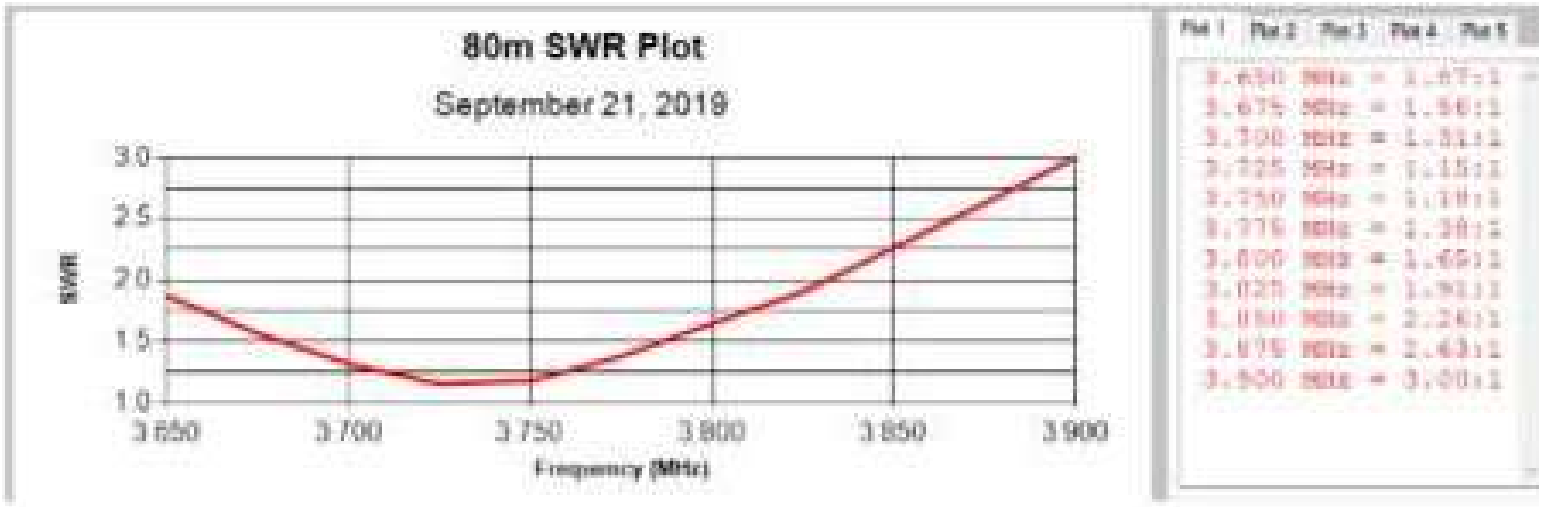
Take Screen Shots of Software Settings (N1MM Example Shown)



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

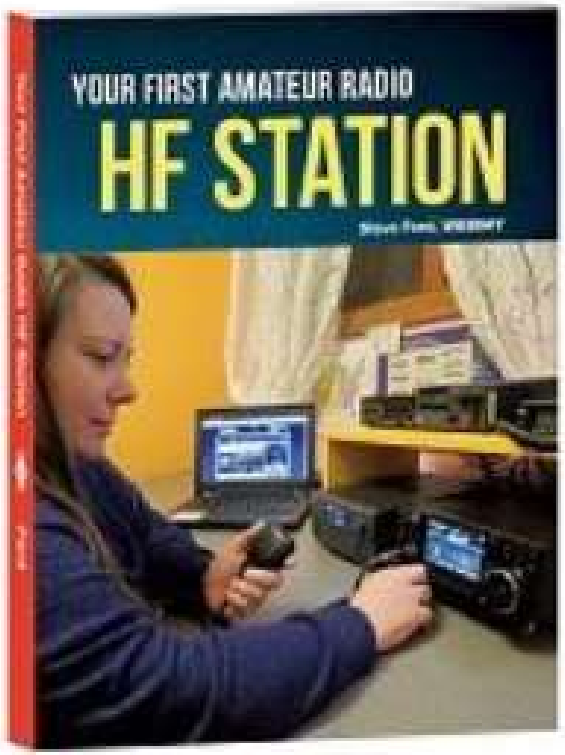
- Consider separate TX and RX antennas
  - Vertical For Transmit
  - Receive-only Magnetic Loop
    - Reduces Noise Floor three S units
    - Directional
    - Easy to Rotate

- Digital Modes

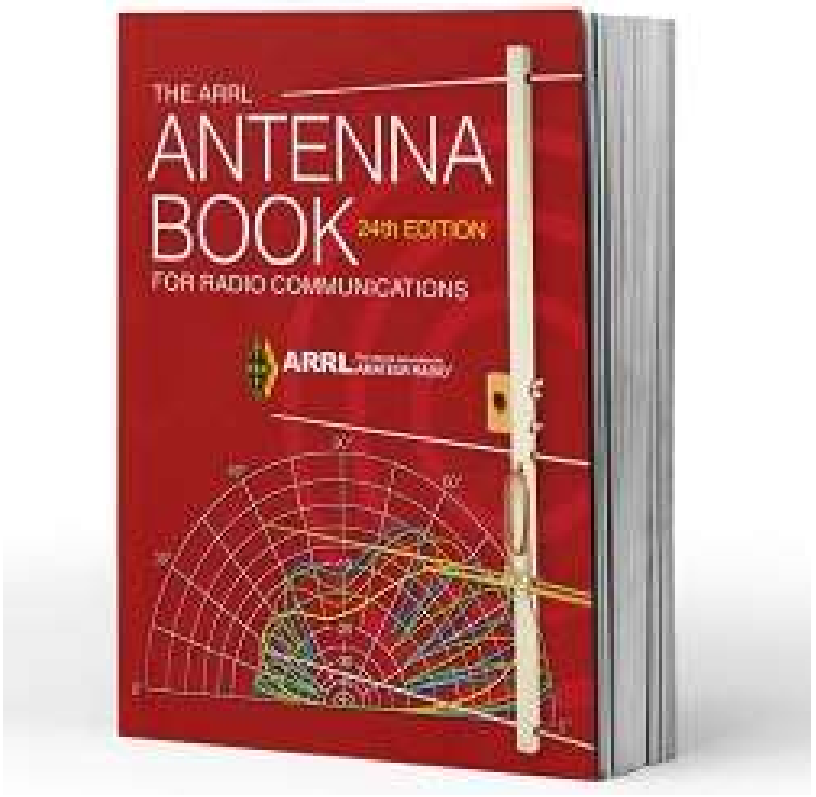
- CW

- 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!

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