Practical Considerations

SFTARC

2016 Technician/General License Class

27 Feb 16

Summary

- VHF/UHF/HF Transceivers
- Power Supplies and accessories
- Antennas, Connectors, Coax & Rotors
- Safety, Grid Squares, Logbook, QSL cards
- Making DC power connection in cars
- Radio stores and on-line opportunities
- Area Hamfests
- Radio and antenna brands
- Vanity call signs

Mobile VHF/UHF Transceivers

- Generally the best choice for a 1st radio
- 12 VDC - You will need a power supply for indoor operation (13.8V output is typical)
- Mono-band VHF or UHF (FM)
- Dual band (FM; 2m/70cm most common)
- VFO function -- direct tune the frequency
- Built in channel memories
- Synthesized vs. very old crystal-controlled
- Older synthesized radios may have few if any memory channels

Mobile VHF/UHF Transceivers

- Needs a Transmit CTCSS tone (PL tone, sub-audible tone to open squelch of repeater)
- Wideband receive
- Removable front panel for easy mounting
- Output power L, M, H; 5, 10, 35 – 70 W
- Microphones have Touch Tone Pads
- UHF antenna connector (SO-239)

Handie Talkies

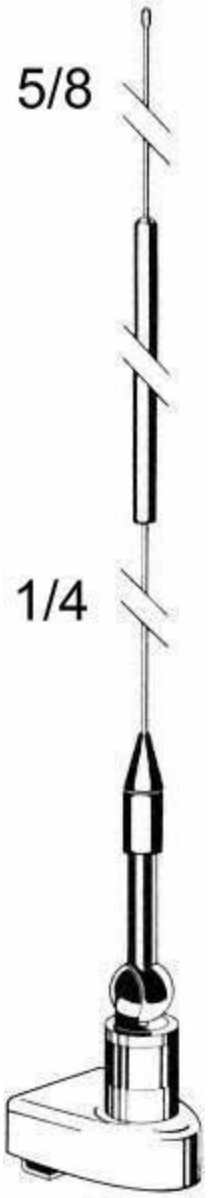
- Like mobile radios, HTs are available in mono-band, dual-band or multi-band types
- HTs will generally be limited to about 5W transmit power
- The receivers may be more prone to strong-signal overload problems
- Rubber ducky antennas perform OK but..
- For mobile applications, an external antenna is strongly suggested

Mobile VHF/UHF Antennas

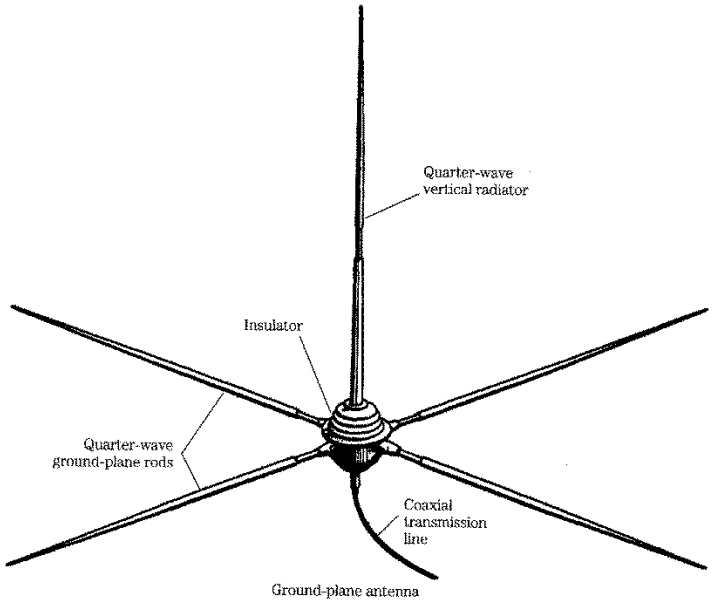
- Mono band, dual band, triband
- ¼ wave, 5/8 wavelength mono band
- Base Type: all-in-one, NMO, SO239, 3/8-24 thread
- Mounts: Magnetic, through–hole, trunk/hatch lip, L-bracket
- 8 -15 ft of coax, Connector: UHF, BNC, SMA

NMO Mounts for VHF/UHF

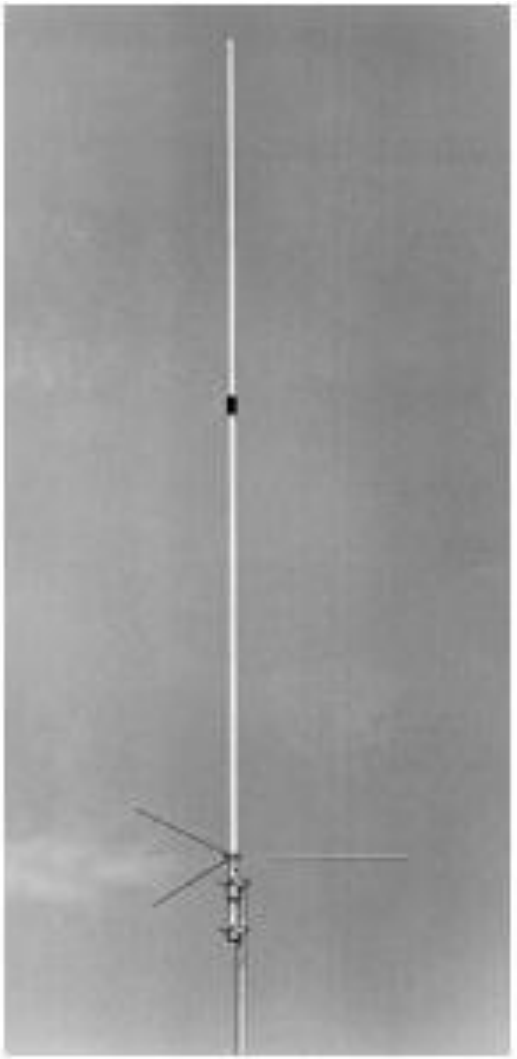
Mobile Antenna Options



Base Station VHF/UHF Antenna

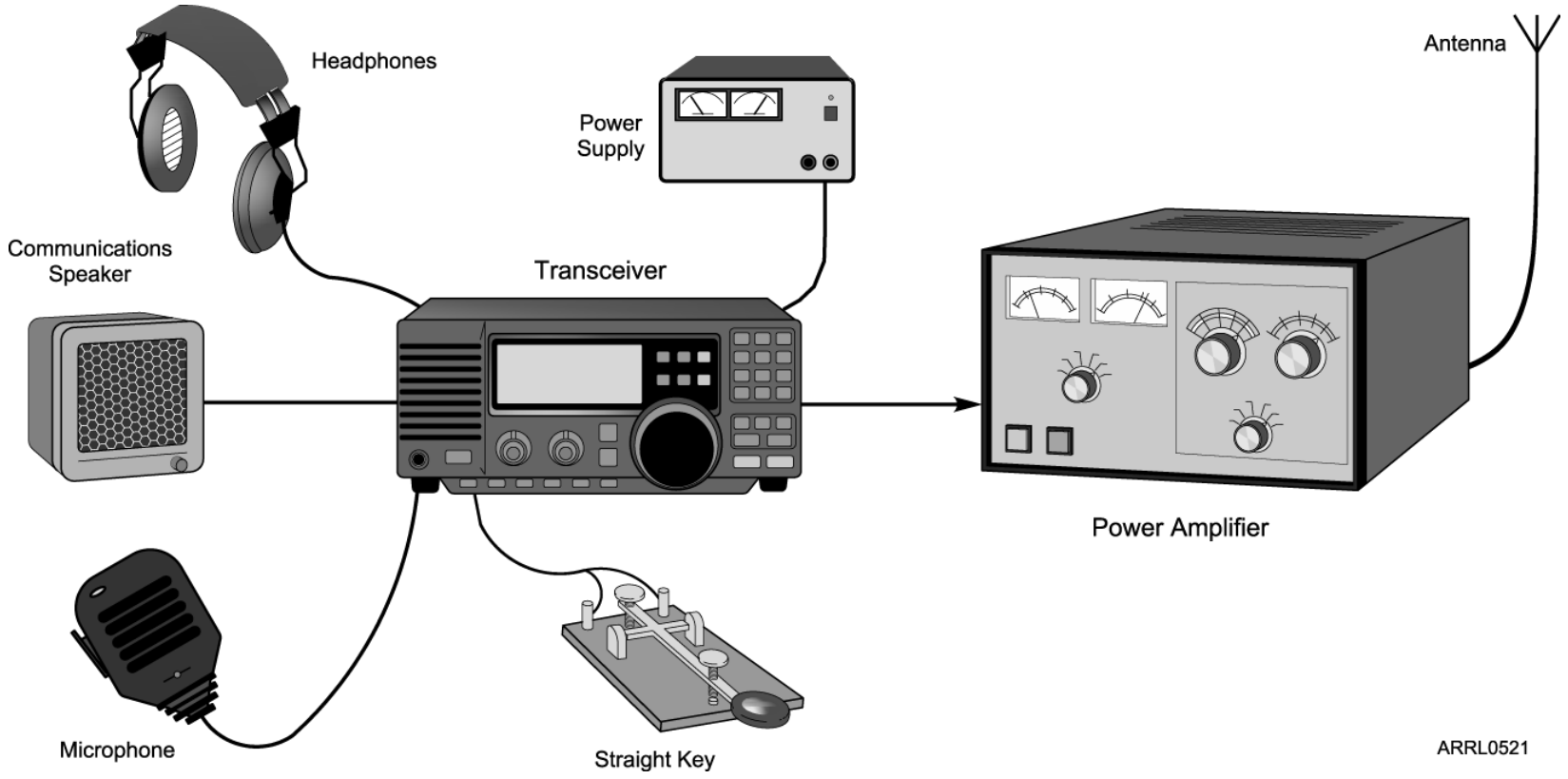


A Simple Ground-plane Antenna can be effective



Single-band, dual-band and tri-band models are available

The Complete HF Station



HF Transceivers

Typical HF Transceivers

- Often covers 160, 80, 40, 30, 20, 17, 15, 12 &10 meter bands. (WARC Bands;
  - World Administrative Radio Conference – 1979)
- 60 m Band; 5 Channels; 5330–5403 kHz
  - Established 2002; Modified 2011

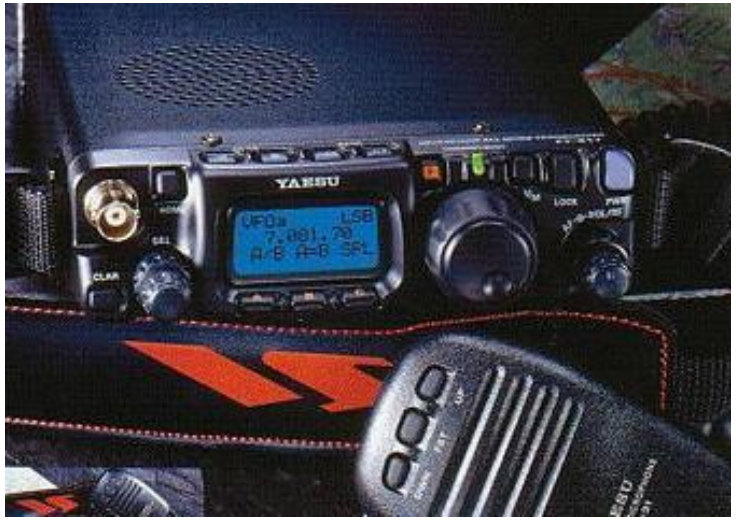
- Some HF units cover 6m, 2m and 70 cm bands
- SSB, CW modes; maybe FM, Digital, Packet and AM also

Typical HF Transceivers

- 100 W (high end units can be ~200 W) on transmit power
- Newer "*rigs*" have "general coverage" receivers
- Older rigs may be ham-band-only receive
- Many HF radio operate from 12 VDC power, others operate from 115 VAC

QRP radios are also an option

- QRP = Low power (typically 1W - 5W)
- You will work harder to make “contacts”
- Voice QRP radios can be almost as expensive as a 100 W radio



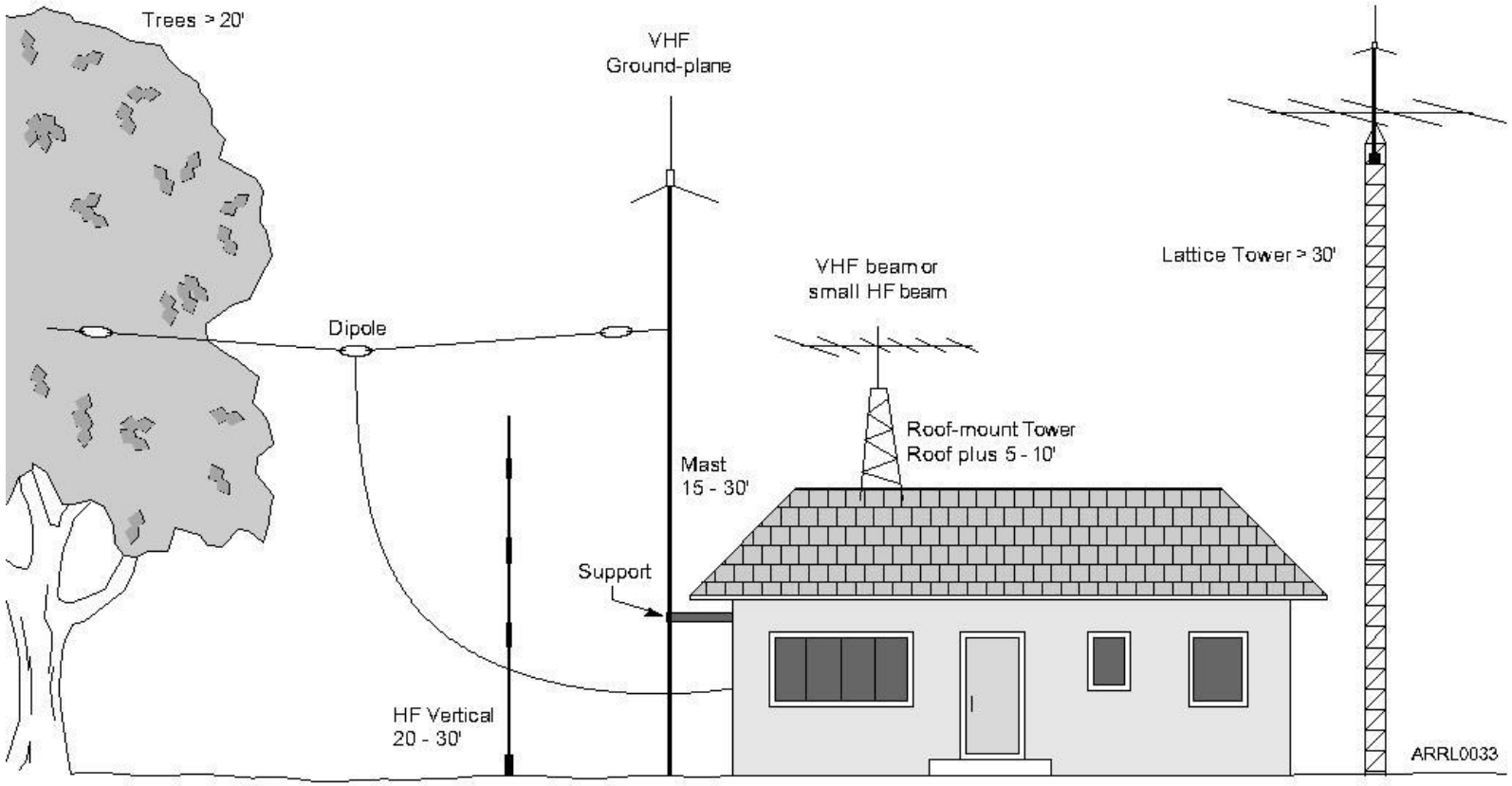
Power Supplies

- 12 VDC (really 13.8 VDC typical)
- Current rating:
  - Handheld: 2 – 3 Amps
  - VHF/UHF Mobile: 10 – 12 Amps
  - HF radio or high power VHF/UHF mobile: 20+ Amps
- Linear (heavy) or Switching

Other Accessories

- External speaker
- Headphones
- Hand mic vs. desk mic
  - A handheld mic is normally suppled with the radio
- SWR meter (may be built into the radio)
- Dummy load
- Linear amplifier – very optional
- Code key or keyer and paddles

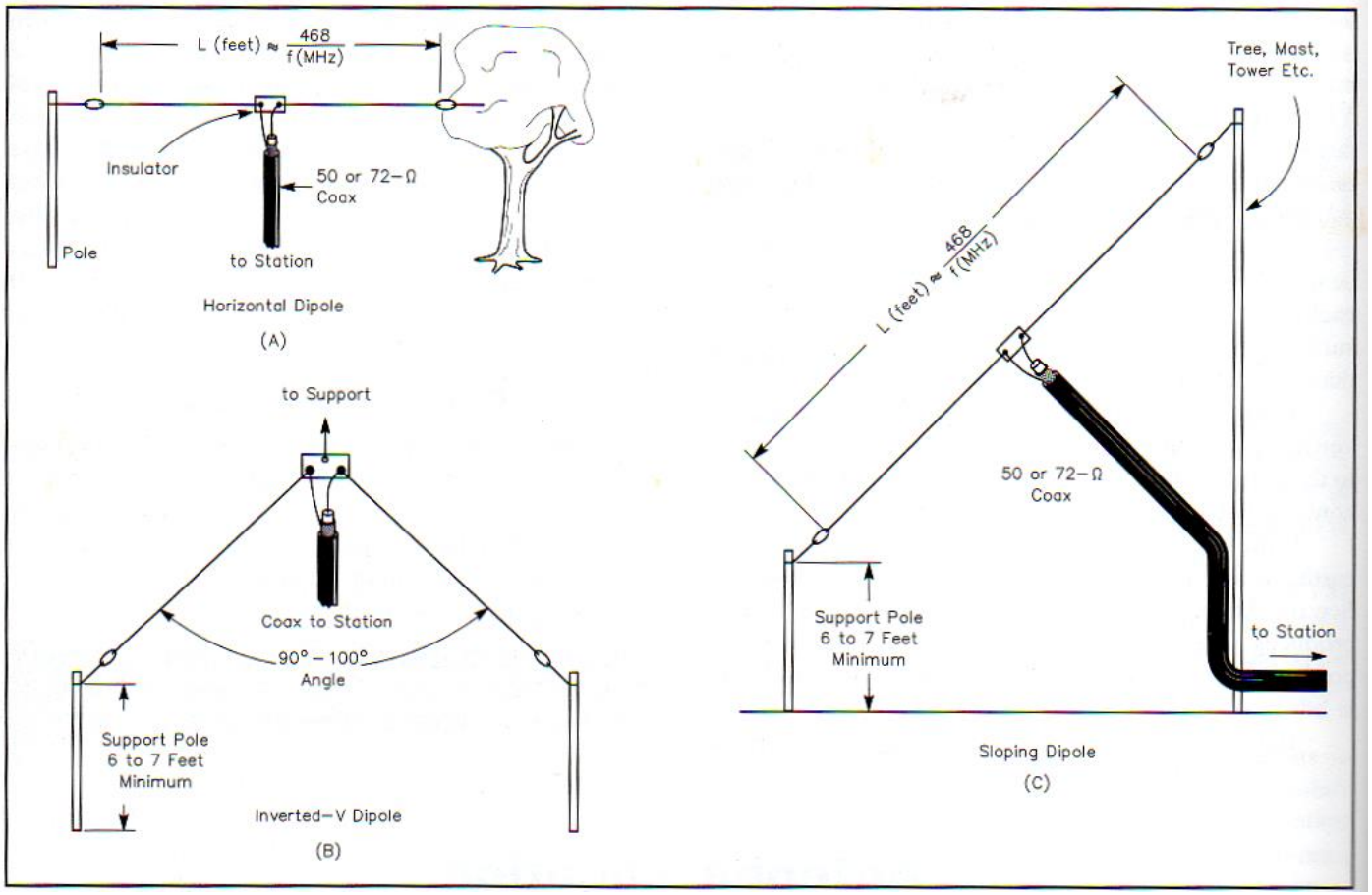
Base Station Antennas



Simple HF Antennas

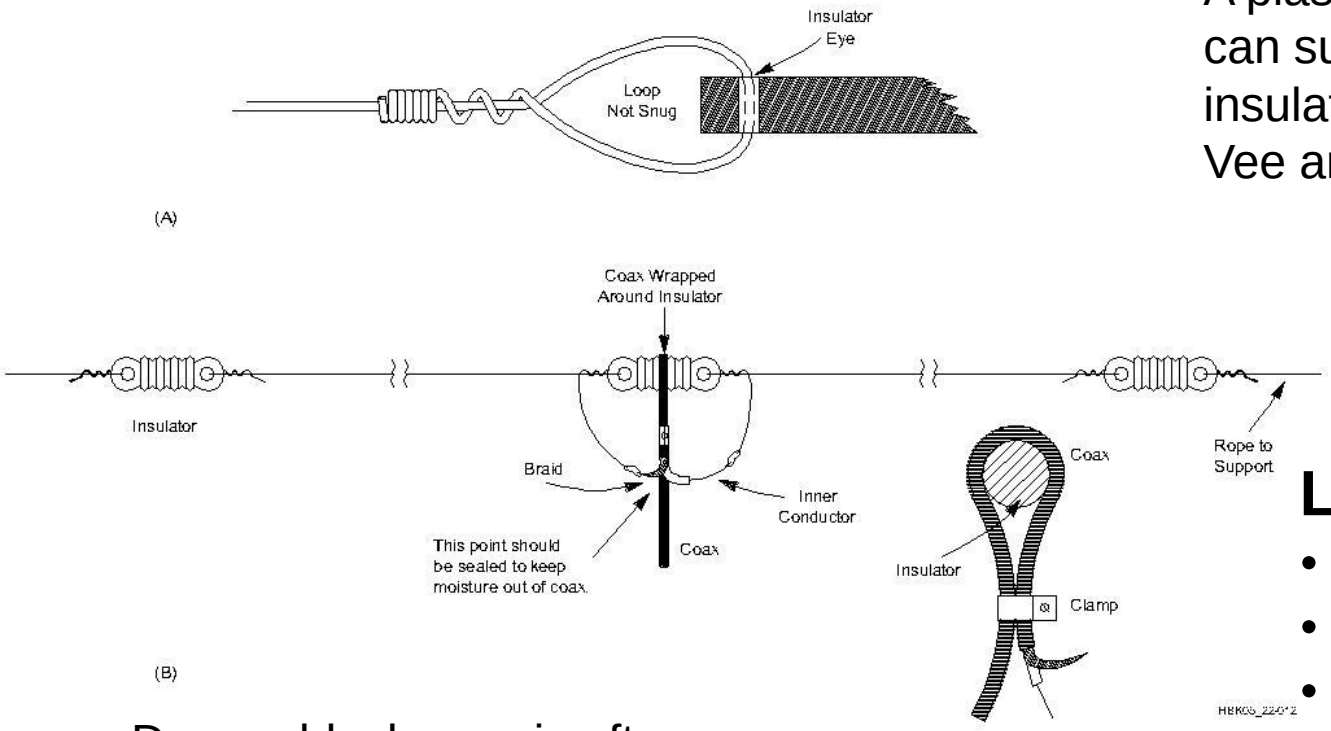
- Dipoles
  - Single band
  - Trapped or fan multiband
  - Multiband with tuner
  - Multiband Off-Center-Fed Dipole (Windom)
- Vertical
  - Trapped multiband
  - Multiband with tuner at the base
- Random Wire with a tuner

Dipole Variations



- **The efficiency of a simple dipole is hard to beat.**
- **Most simple dipoles work only one band**, however a 40m dipole will tend to also work on 15m.

A single-band dipole is simple to build and low cost



A plastic center insulator can support the center insulator for an inverted Vee antenna

L = 468/f MHz

- 80m = ~135 ft
- 40m = 66 ft
- 20m = 33 ft
- 10m = 16.5 ft

Dacron black rope is often used for the supports, better sunlight resistance

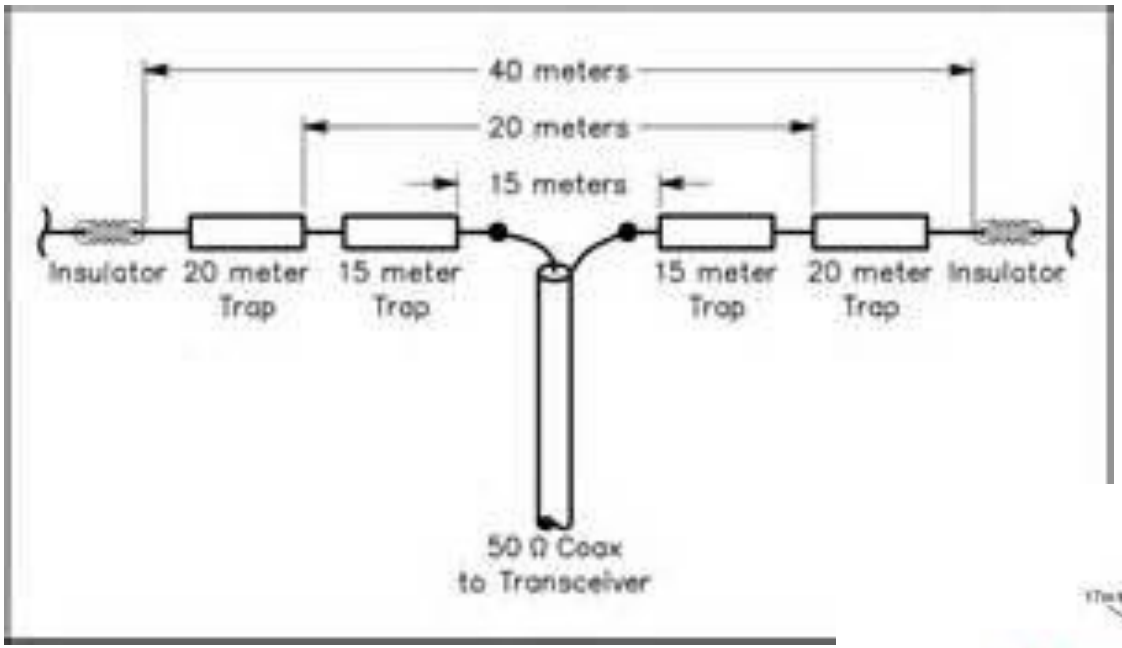
Dipole Length

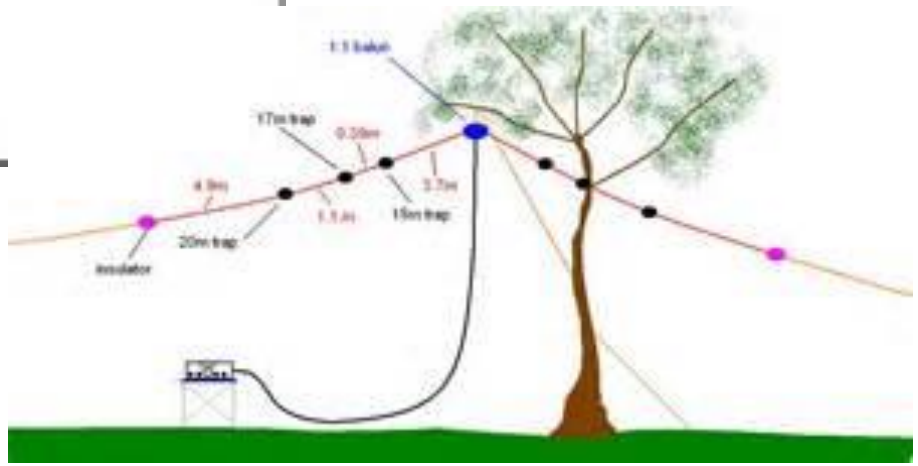
- Typical lengths for common ham bands

Wavelength	*Frequency*	*Length*
80 meters	3.725 MHz	125.6 feet
40 meters	7.125 MHz	66 feet
15 meters	21.125 MHz	22 feet
10 meters	28.150 MHz	16.6 feet
10 meters	28.475 MHz	16.4 feet
2 meters	146.0 MHz	3.25 feet
1.25 meters	223 MHz	2.1 feet = 25 inches

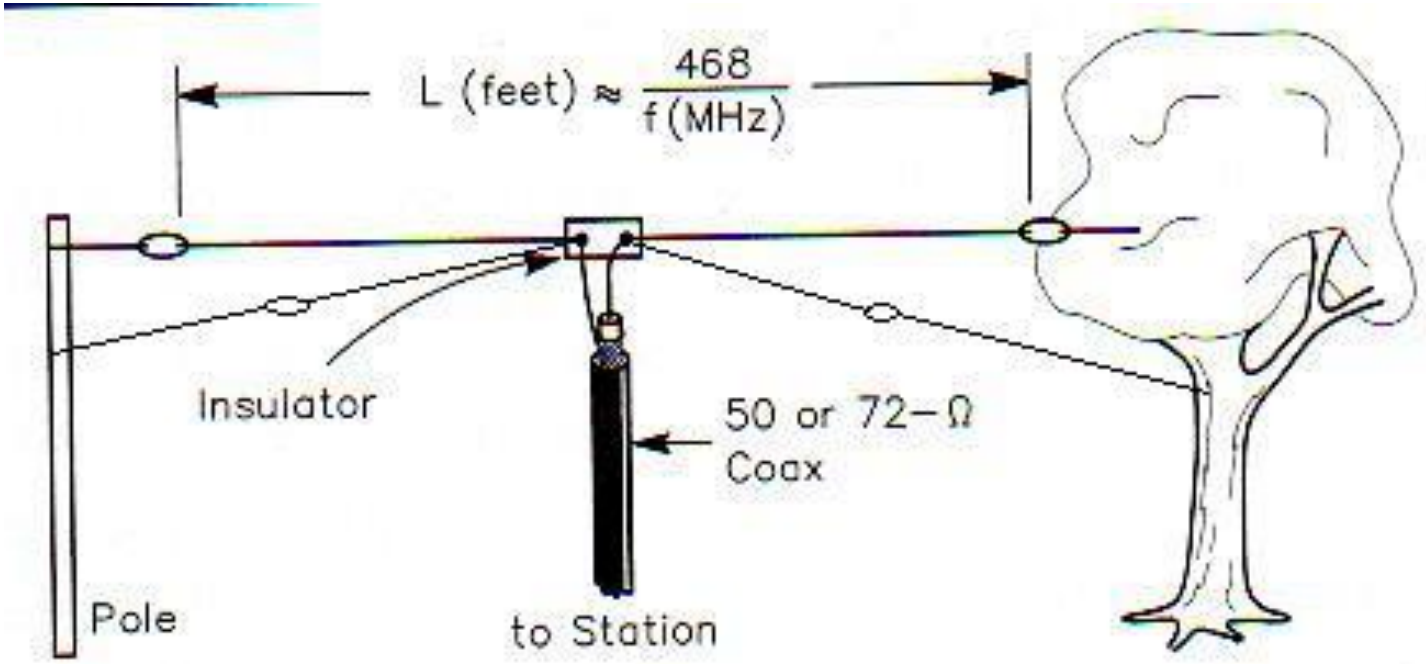
We shorten the antenna to raise the frequency

Trap Dipole – Multiband





Fan Dipole – Multiband
Add wires to dipole design



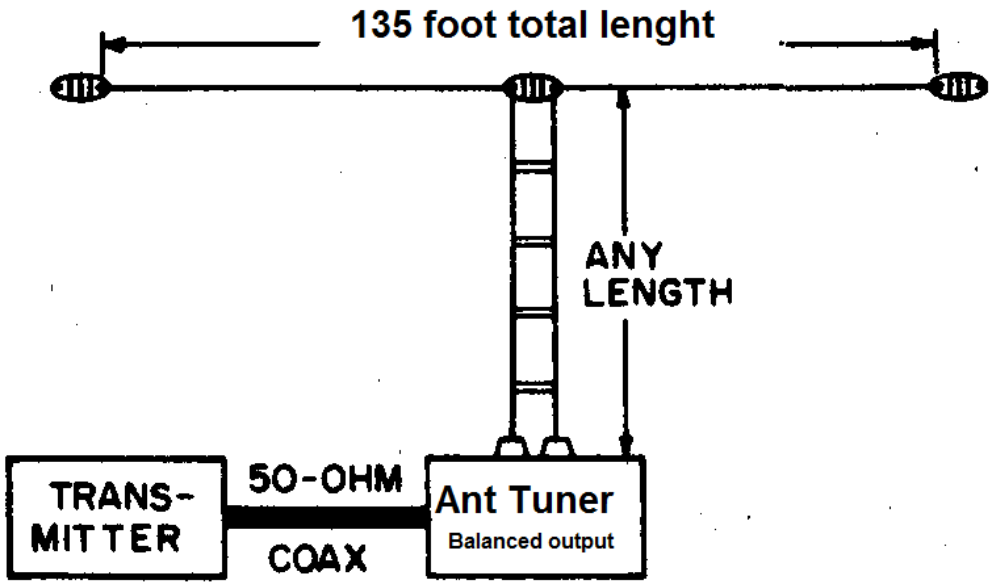
Horizontal Dipole

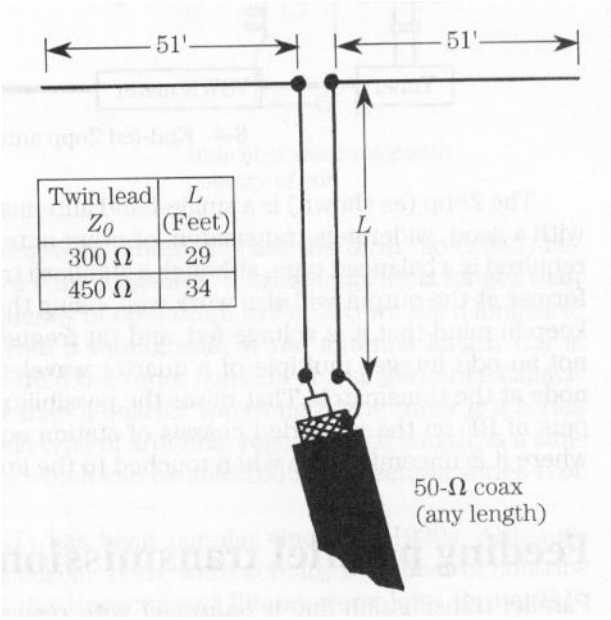
(A)

Hint: A 40m dipole will likely work on 15m also. Interaction happens between dipoles – spacing.

All-band Antennas that Require Antenna Tuners

80 – 10 m coverage



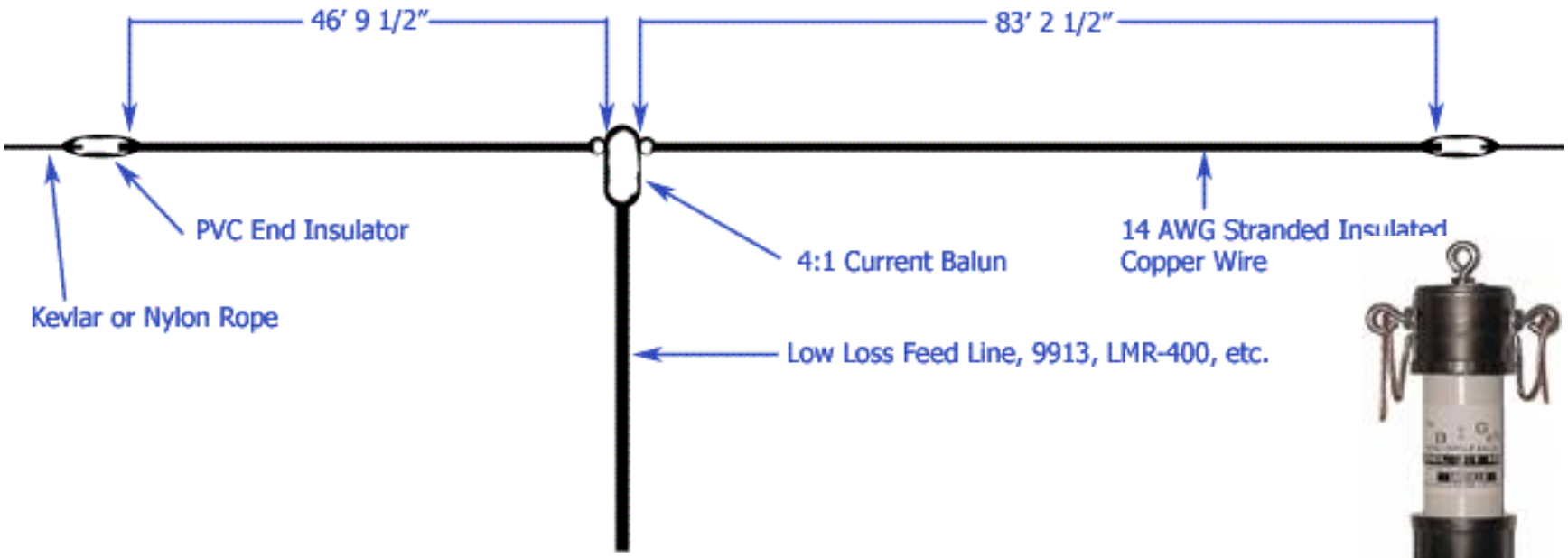


Twin lead Z_0	L (Feet)
300 Ω	29
450 Ω	34

–A center-fed antenna system for multiband use.

80m Dipole fed with ladder line (Zepp) **G5RV (1:1 balun @ coax)**

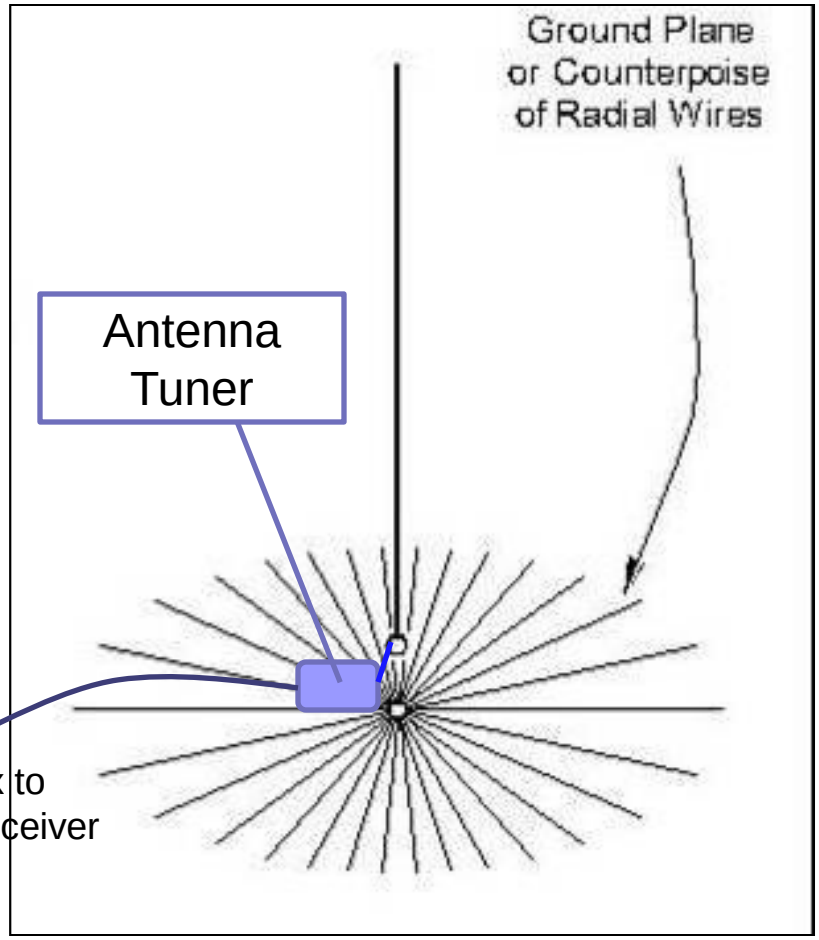
Off-Center-Fed Dipole (Windom)



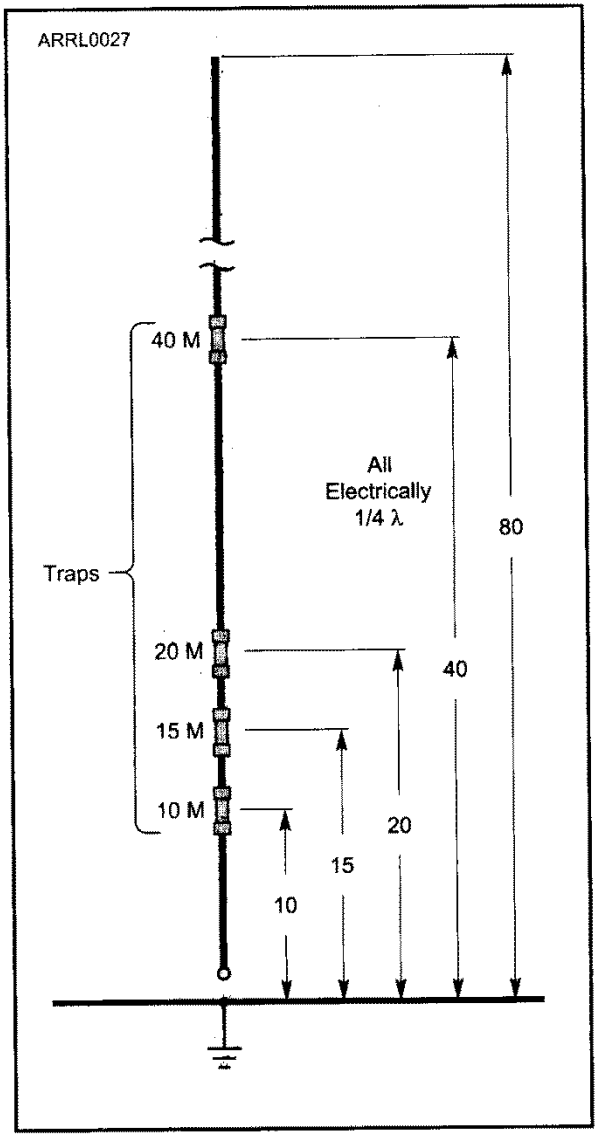
- 80, 40, 20, 17, 12, & 10 meter typical.
- A tuner may be required.
- Some designs use ~80/20 ratio instead of 66/33
- 4:1 balun is used for 200 ohm feedpoint

Baluns are often used as the center insulator and provide both impedance matching and balance

Multiband Verticals



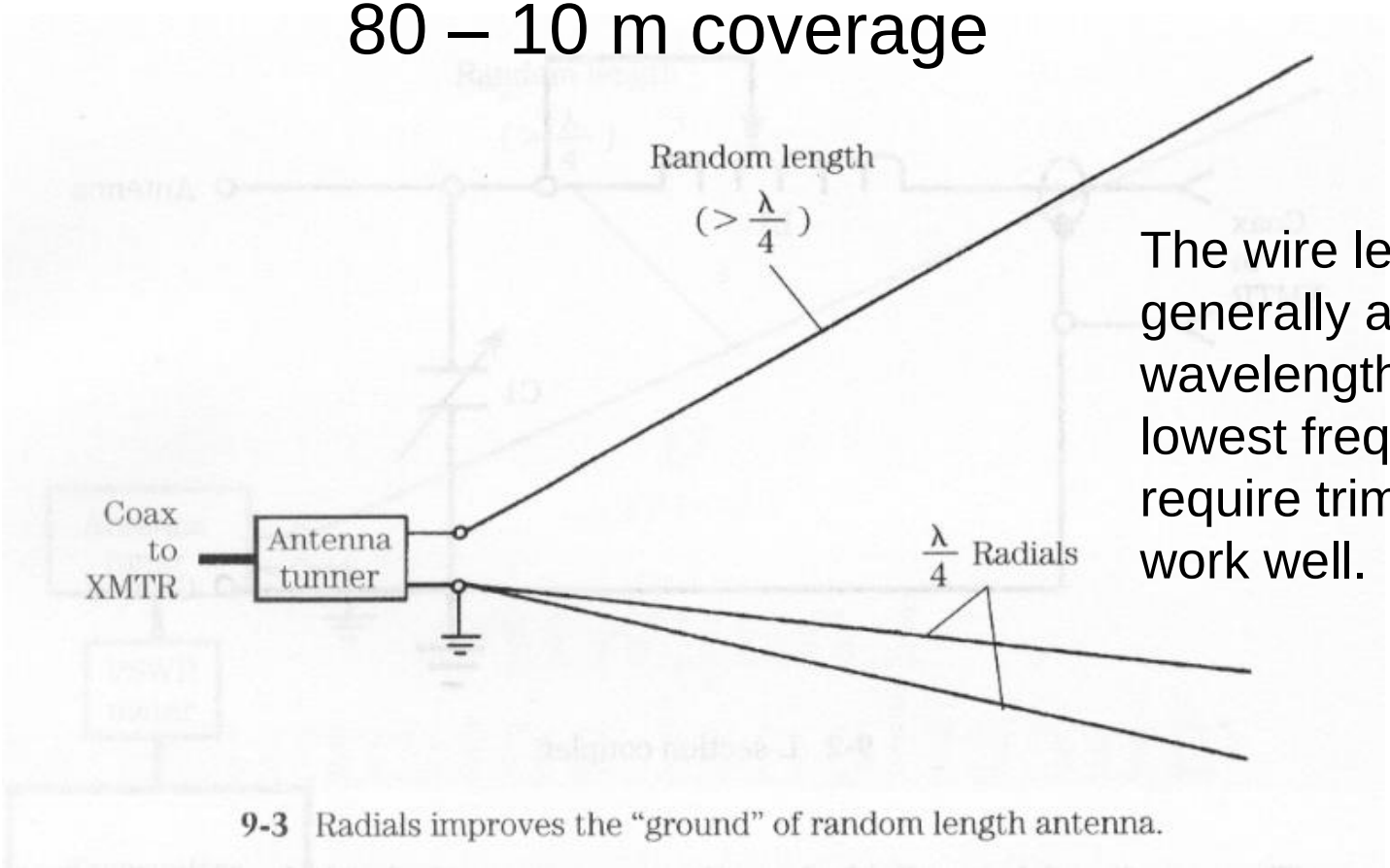
Vertical with a Tuner



Trap Vertical

Random-Wire All Band

80 – 10 m coverage

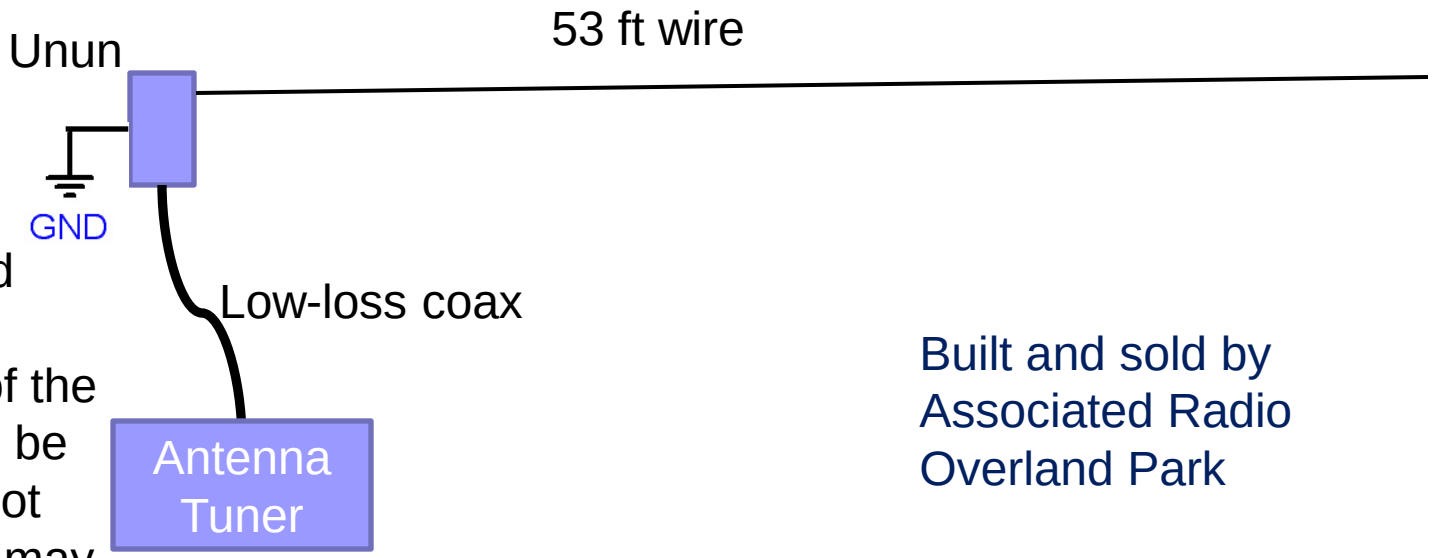


9-3 Radials improves the "ground" of random length antenna.

The wire length is generally at least ¼ wavelength on the lowest frequency. May require trimming to work well.

End Fed Wire

- The Princeton EF53 is a form of random-wire antenna that uses an unun for part of the impedance matching.



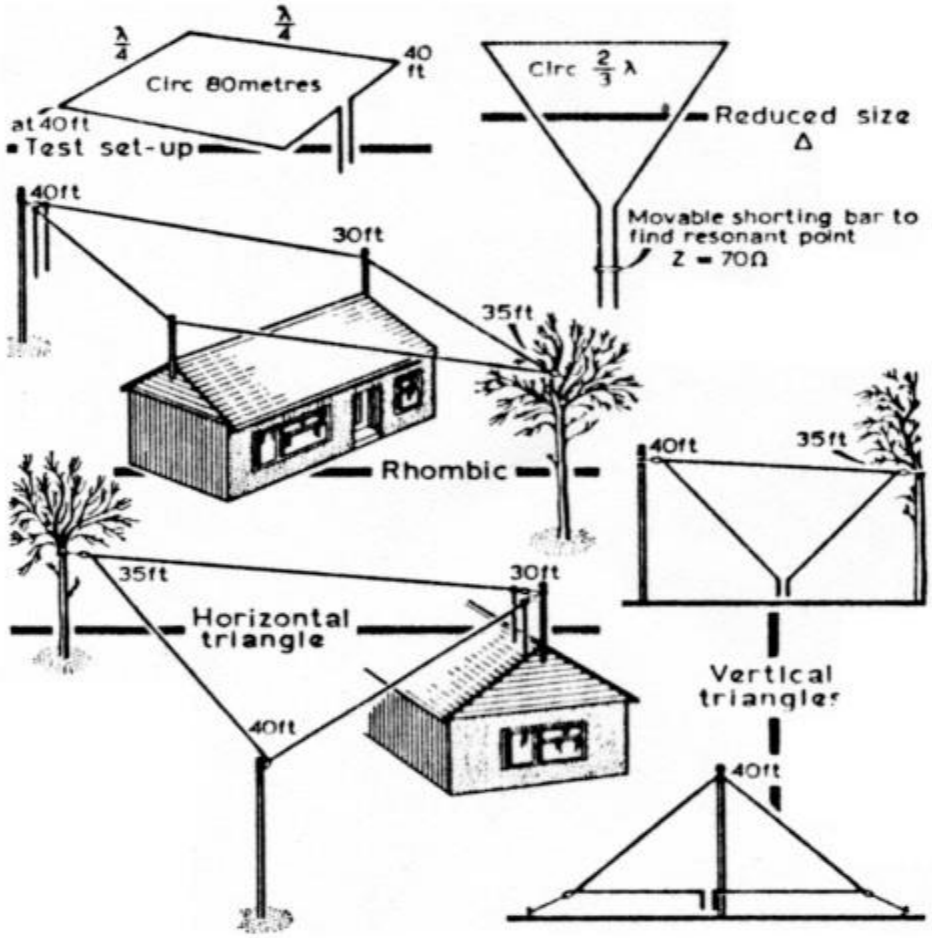
Coax shield may be the other half of the antenna so be careful of hot RF issues, may need coax choke at tuner.

Built and sold by Associated Radio Overland Park

Provides 80m through 6m operation

Loop Antennas

- Loop between 2, 3 or 4 supports.
- Multi-band with tuner and ladder line.
- Loops can be any shape (triangle, square, circle, etc)
- May be less noisy than other antennas.



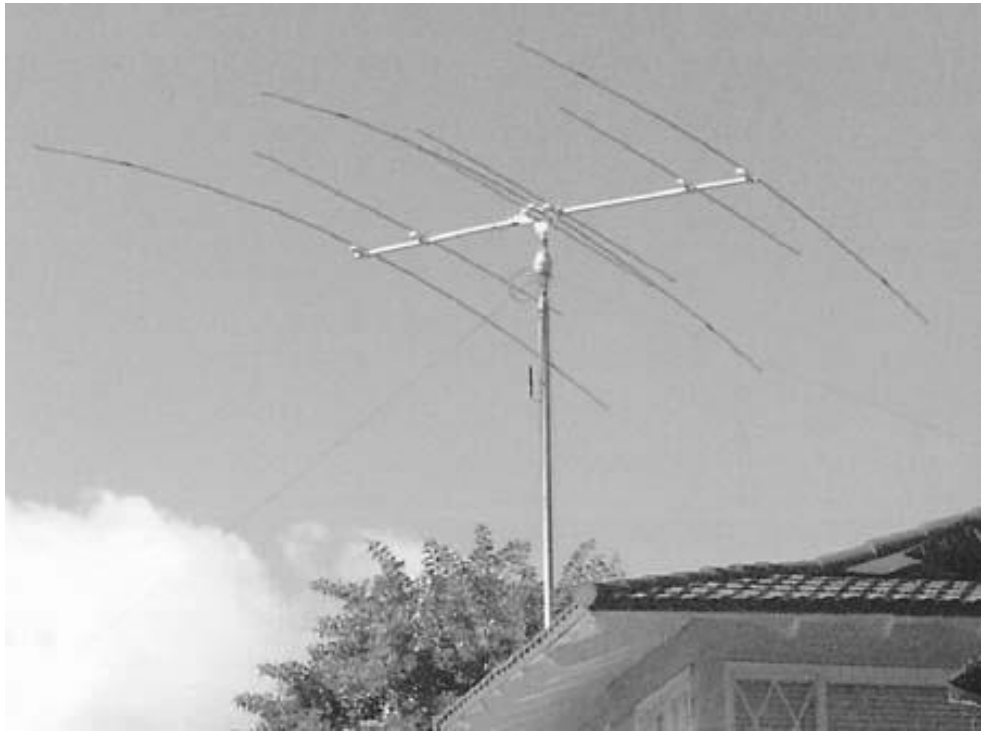
Antenna Tuners

Manual Tuner

Automatic Tuner – remote or local location

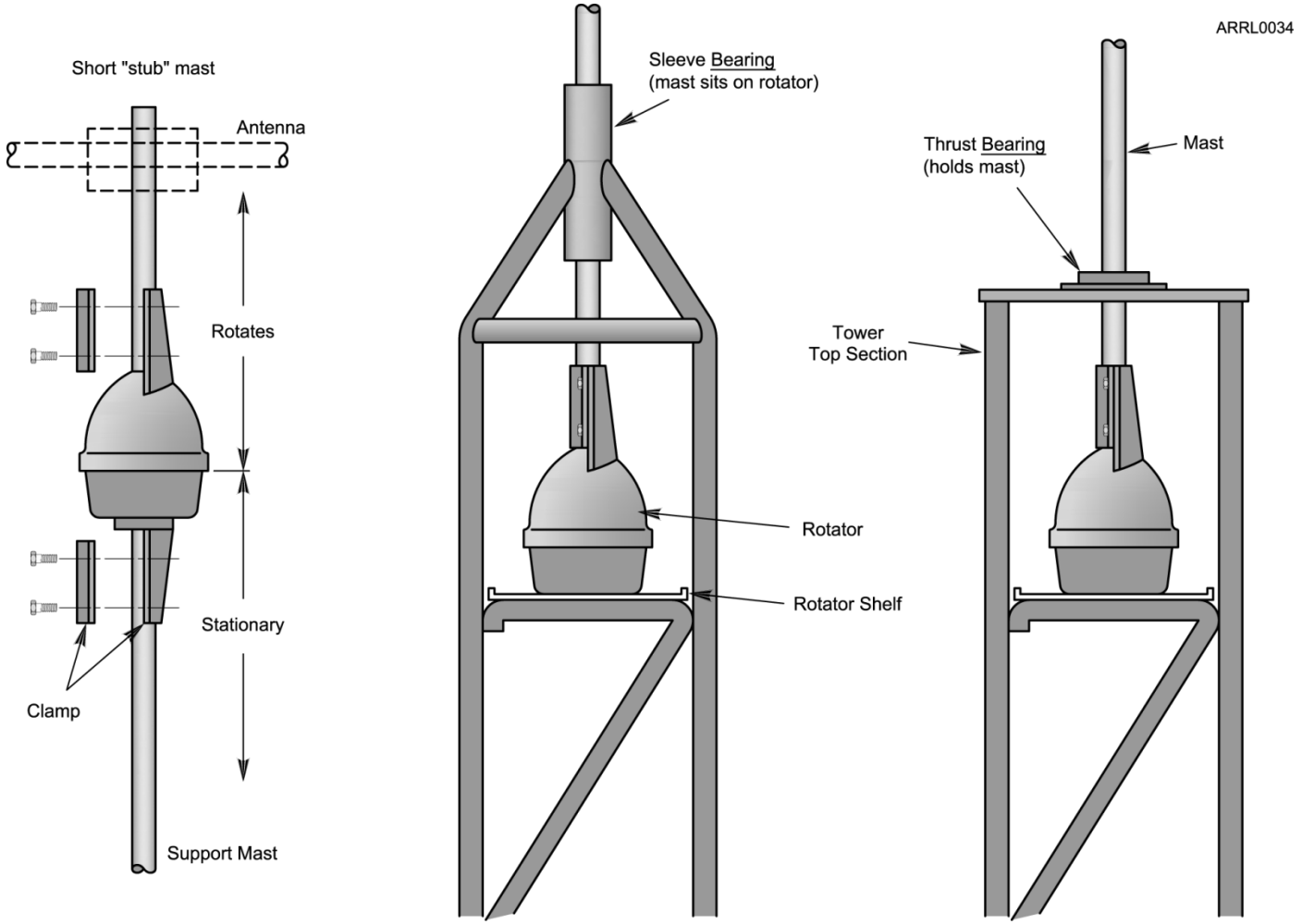
Directional Yagi

Monoband Beam



Multiband Beam

Antenna Rotor Mounting



Safety

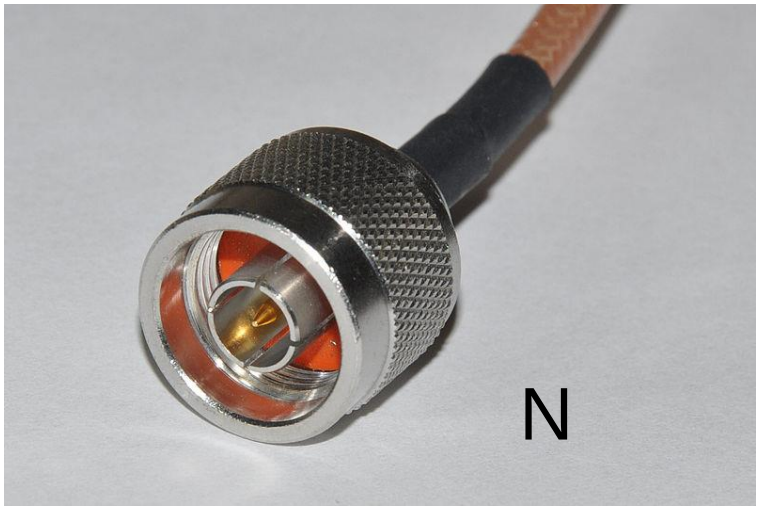
- Use a safety belt when climbing towers or poles
- **Stay clear of power lines**
- Mount antennas so others cannot touch the antenna when you're transmitting
- Lighting arrestors help protect you and your equipment

Antenna Connectors

UHF or

PL-259

BNC



SMA

Coax Loss

Tech Pg 4-16
Gen Pg 7-19

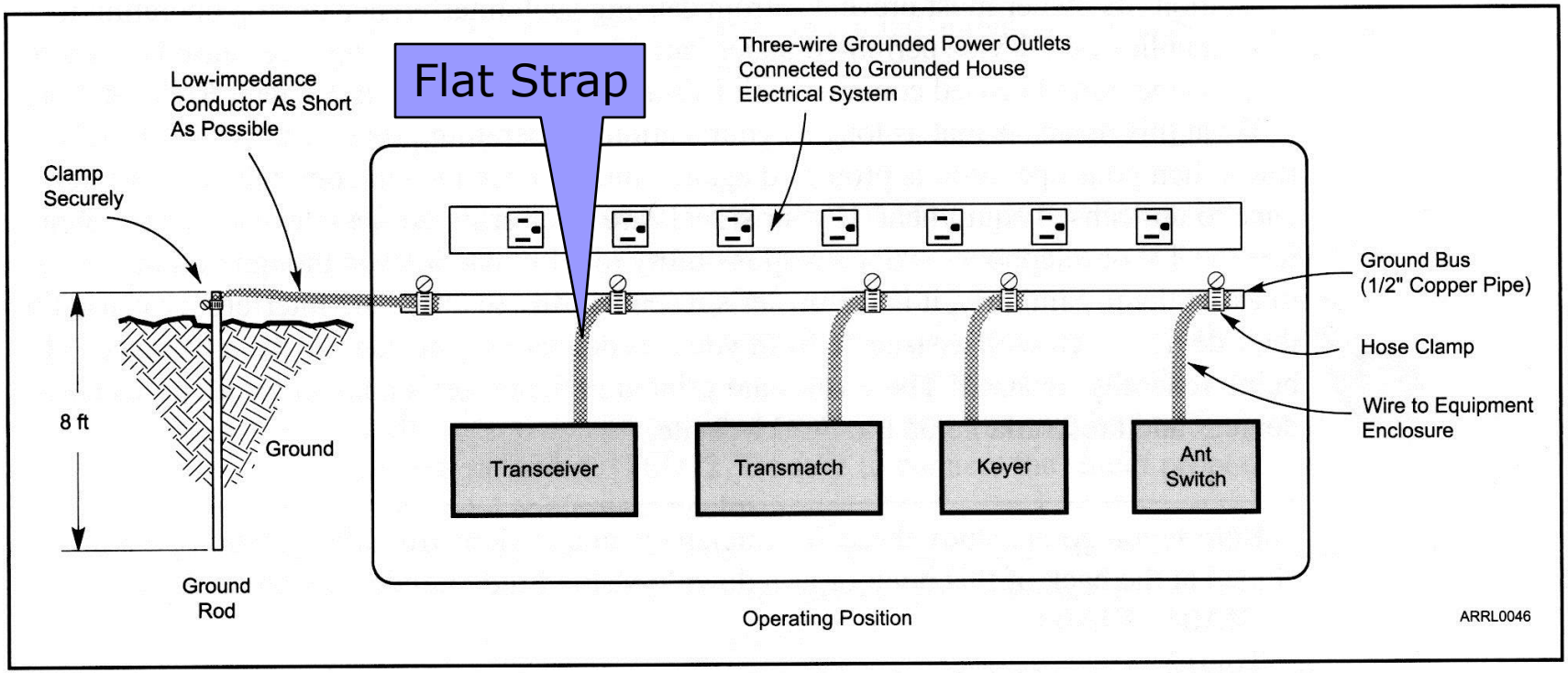
- Remember: 3 dB of loss = ½ of your power is lost

Loss in dB (decibels) per 100 feet of cable

Cable Type	Diameter Inches	3.9MHz 80m	30MHz 10m	144MHz 2m	222MHz 1.25m	440MHz 70cm	1 GHz
RG-74	.101	2.2	5.6	10,5	13.5	20	30
RG-58A	.193	0.8	2.6	6.1	8	12.3	21.4
RG-8X (mini 8 foam)	.242	0.7	2	4.5	5.7	8.4	13.5
RG-8 or RG-213	.405	0.4	1.3	2.7	3.4	5	8.5
RG-8 foam	.405	0.3	.9	2.2	2.9	4.4	7
9913 or LMR400	.405	0.26	.8	1.6	1.9	2.7	4.5

Grounding

Pg 5-24



If you cannot drive a ground rod, consider grounding to a metal cold water pipe. Wide braid for strap, if needed.

Noise Sources and RFI

- Common Noise Sources
  - Power lines
  - Wall warts with switching power supplies
    - Cell phone chargers, ethernet, cable TV, PC
- Individually turn off each circuit breaker in your house to help locate the source
- Use a lowpass filter (LPF) on the HF radio
- Ferrite chokes on audio & telephone lines

Hambands

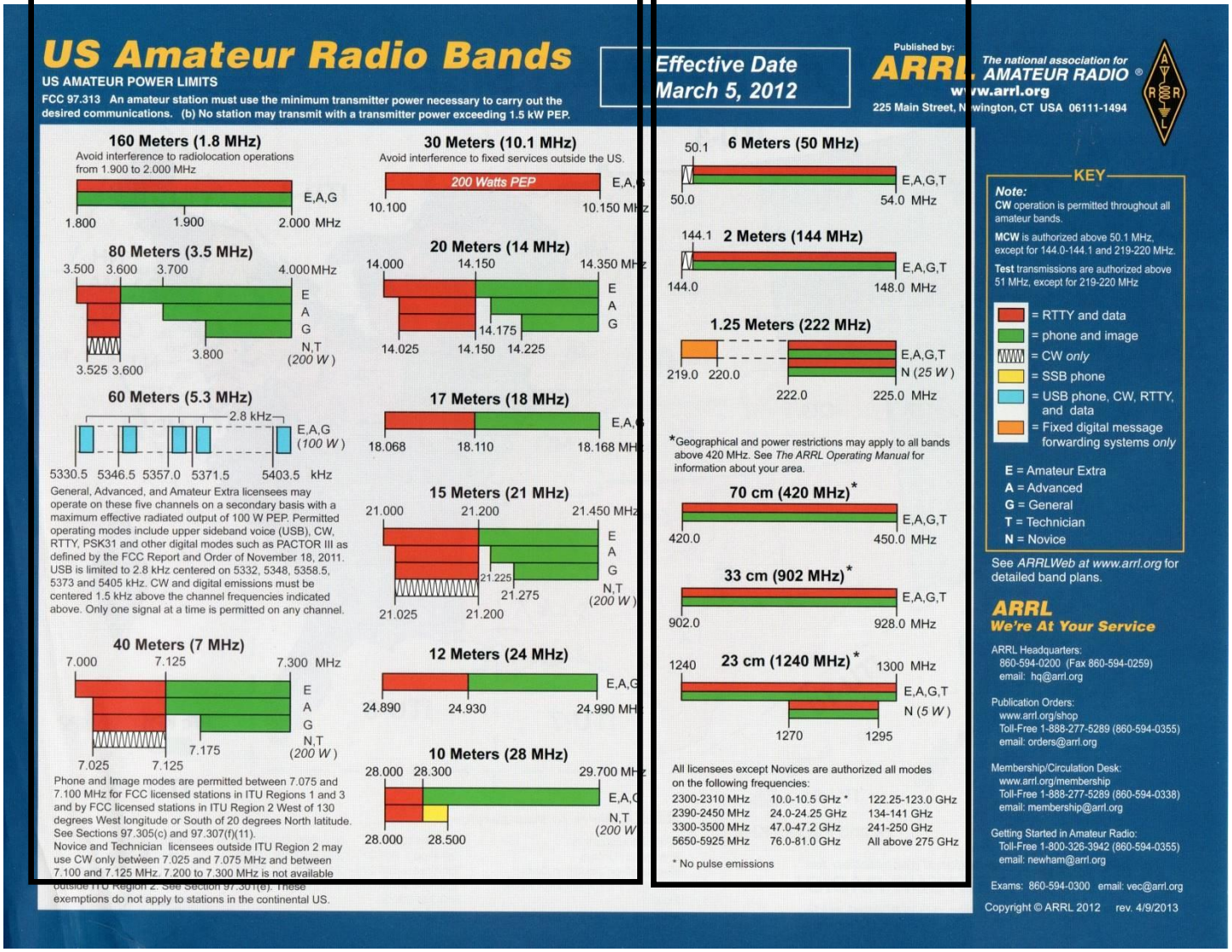
Ionospheric Skip

Line of-Sight

Tech Pg 1-22
Gen Pg 7-14

HF (High Frequency)

VHF / UHF



Grid Squares Popular on 6m
(EM28 – for southern KC metro area)

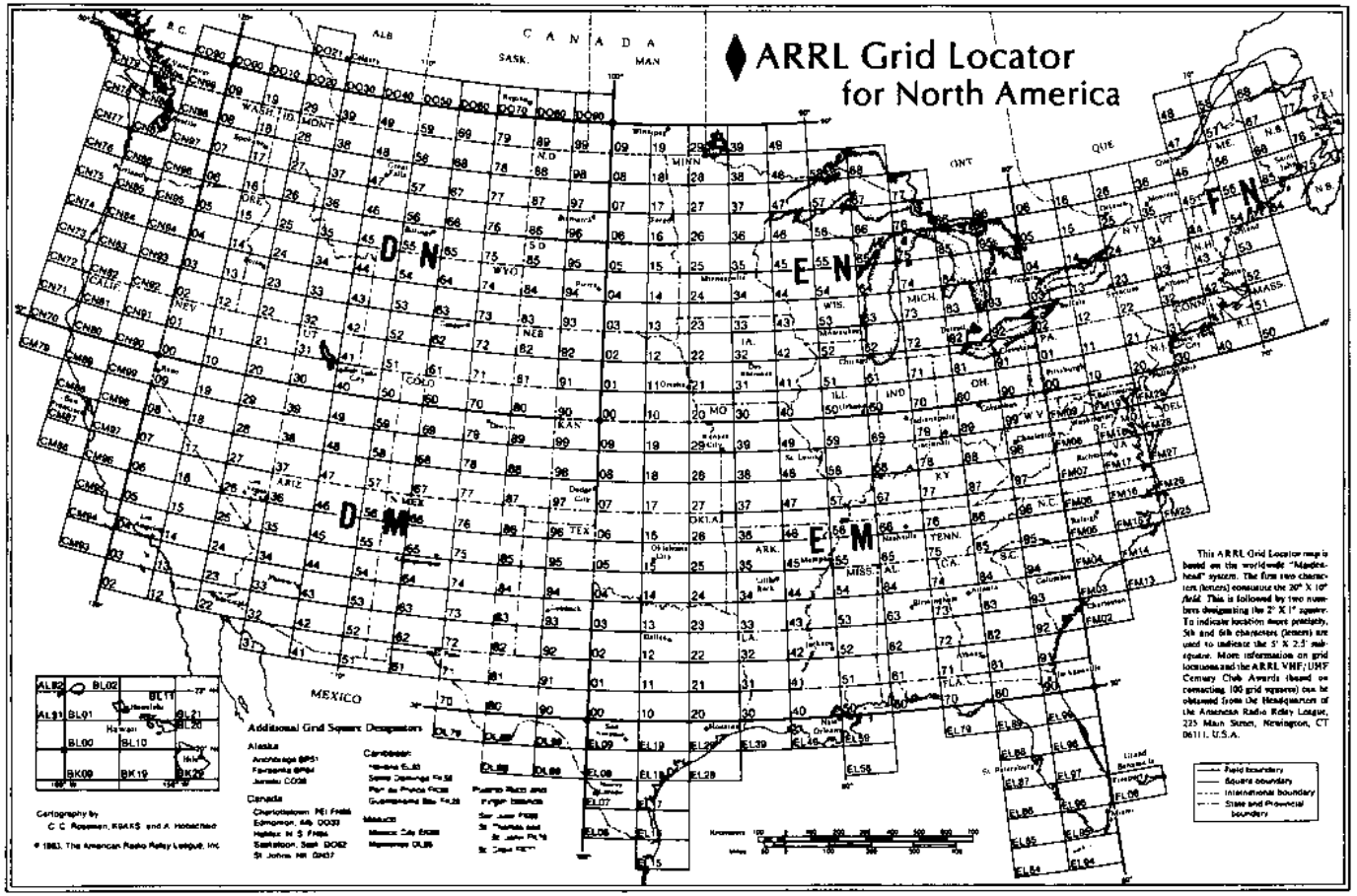
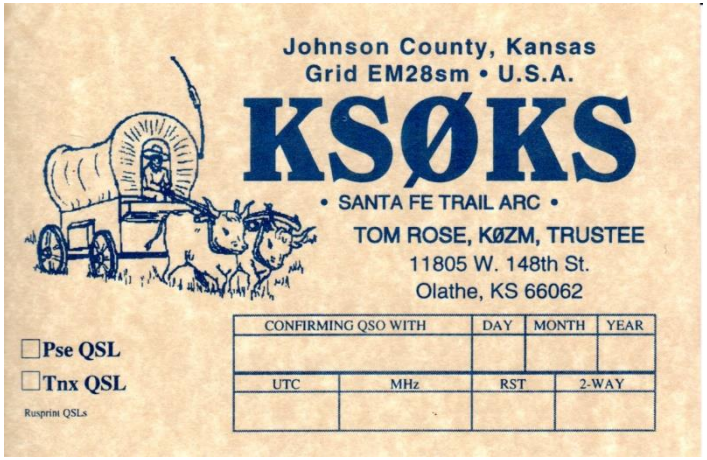


Figure 9-1—This map shows grid squares, used to specify your location for VHF and UHF SSB/CW operation.

QSL Cards

- Available from many sources and in many styles
- May be very basic or include a custom photo or sketch
- N0TT is a source at local hamfests



QSL Card

SPAIN

EA3AKN

WAS.10.15.20. WAZ. JCC500. JCG300. W.I.A. DXCC Honour Roll. WAJA. ADXA. DUF. EADX100. WACAN. WAVA. WA-VK-CA. WAP. AAA EWWA. WAC-10x. WAS-10x.

ITU 37
Grid:JN11JQ
10 X 42092

Jim, KI0KH:

Confirming our two-way 20M SSB QSO
on 17 Aug 2002 at 01:20 Your RS(T) was 57.
Thanks for your QSL.
ea3akn@retemail.es

FT-1000MP
AL-1200
ANT: X9

Eric Constant, Box 117, E-17310 LLORET DE MAR, Spain.

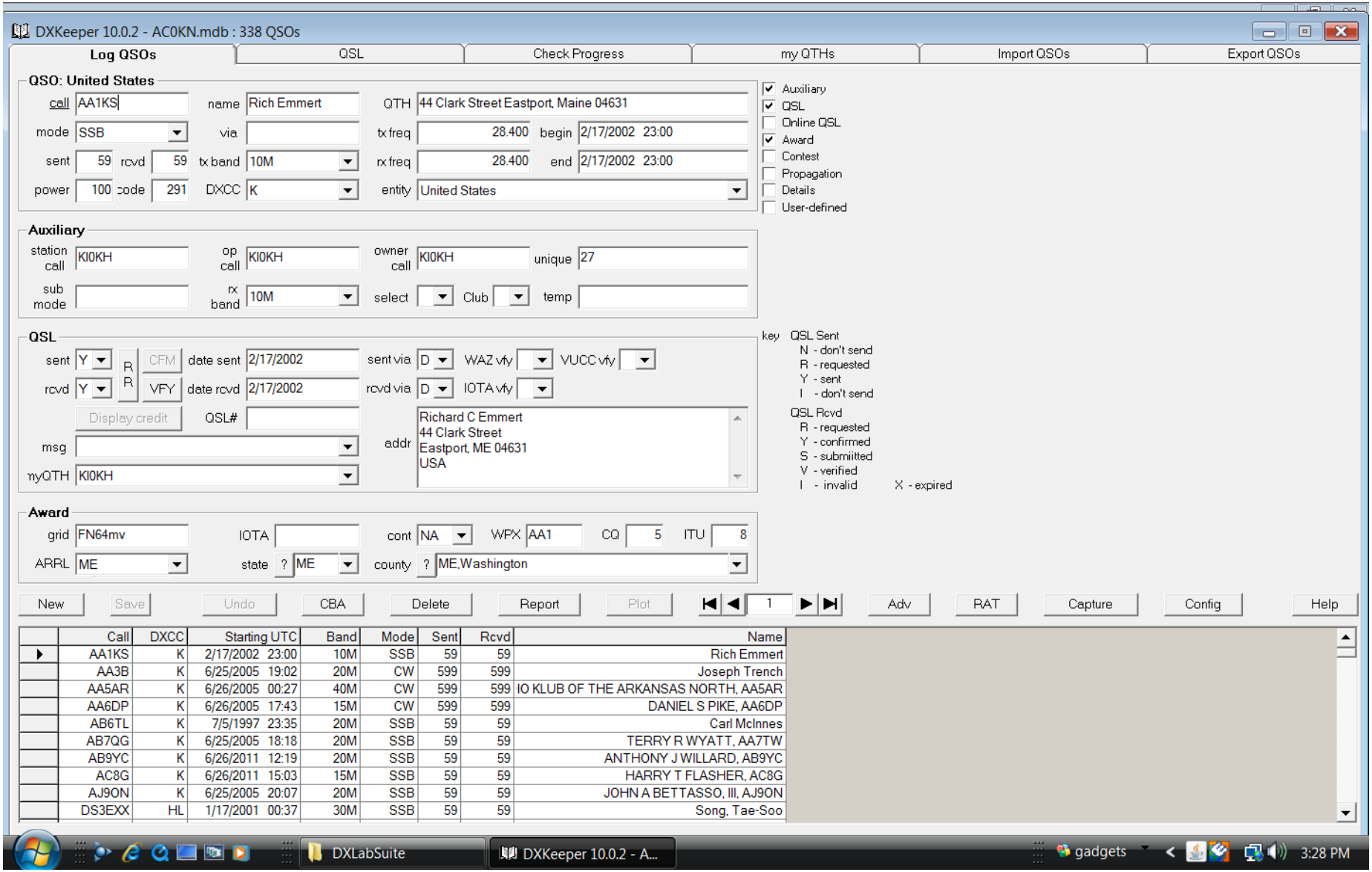
Log Book

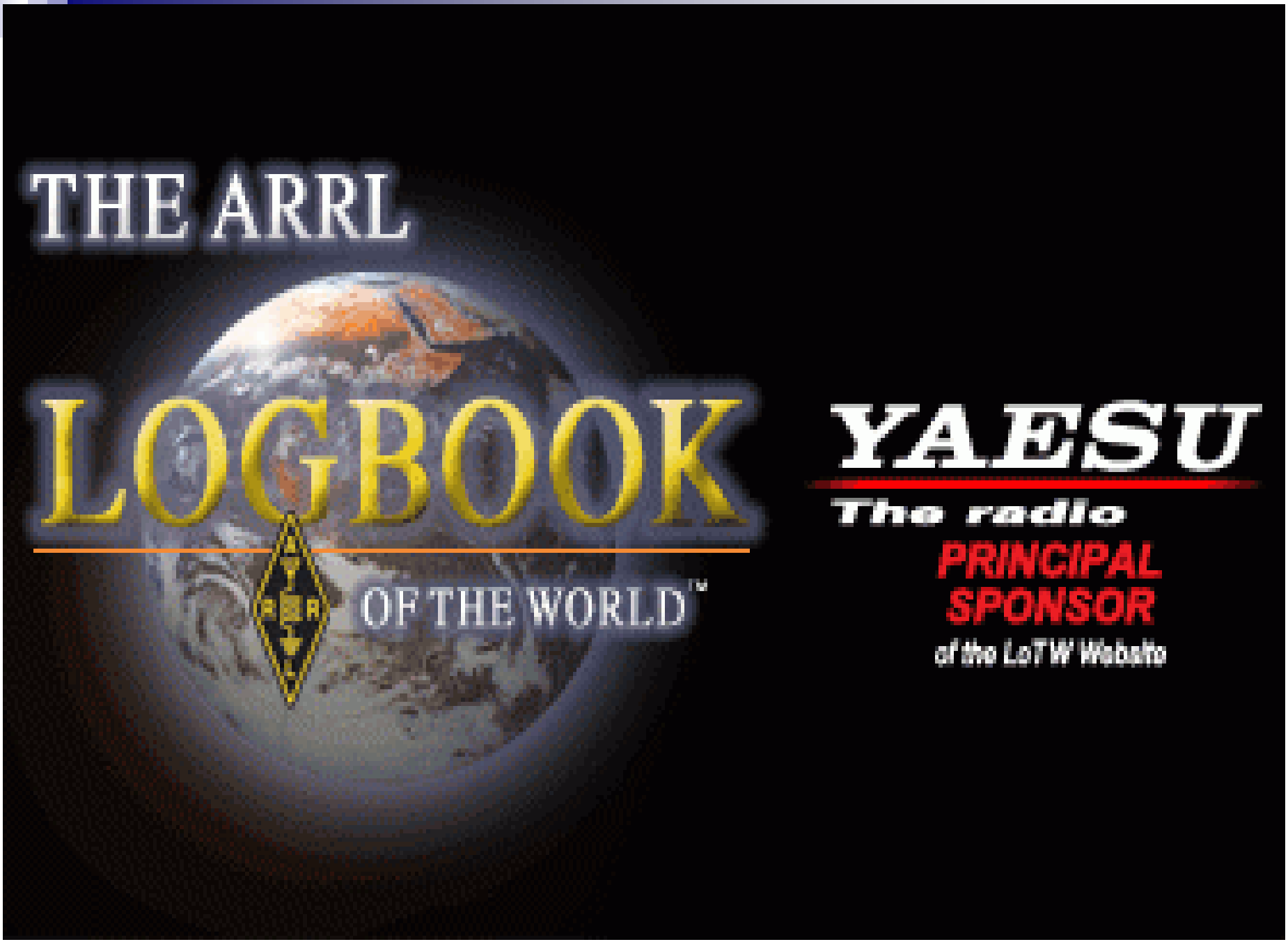
- Logging is no longer required BUT
- It is highly recommended that you keep a paper logbook
- It will allow you and others to see your contacts years later. No PC problems.
- Helps if FCC asks about your operating

WWW.DXLABSUITE.COM

Electronic Logging Software

DXKeeper - Log QSOs




THE ARRL
LOGBOOK
OF THE WORLD™
YAESU
The radio
PRINCIPAL
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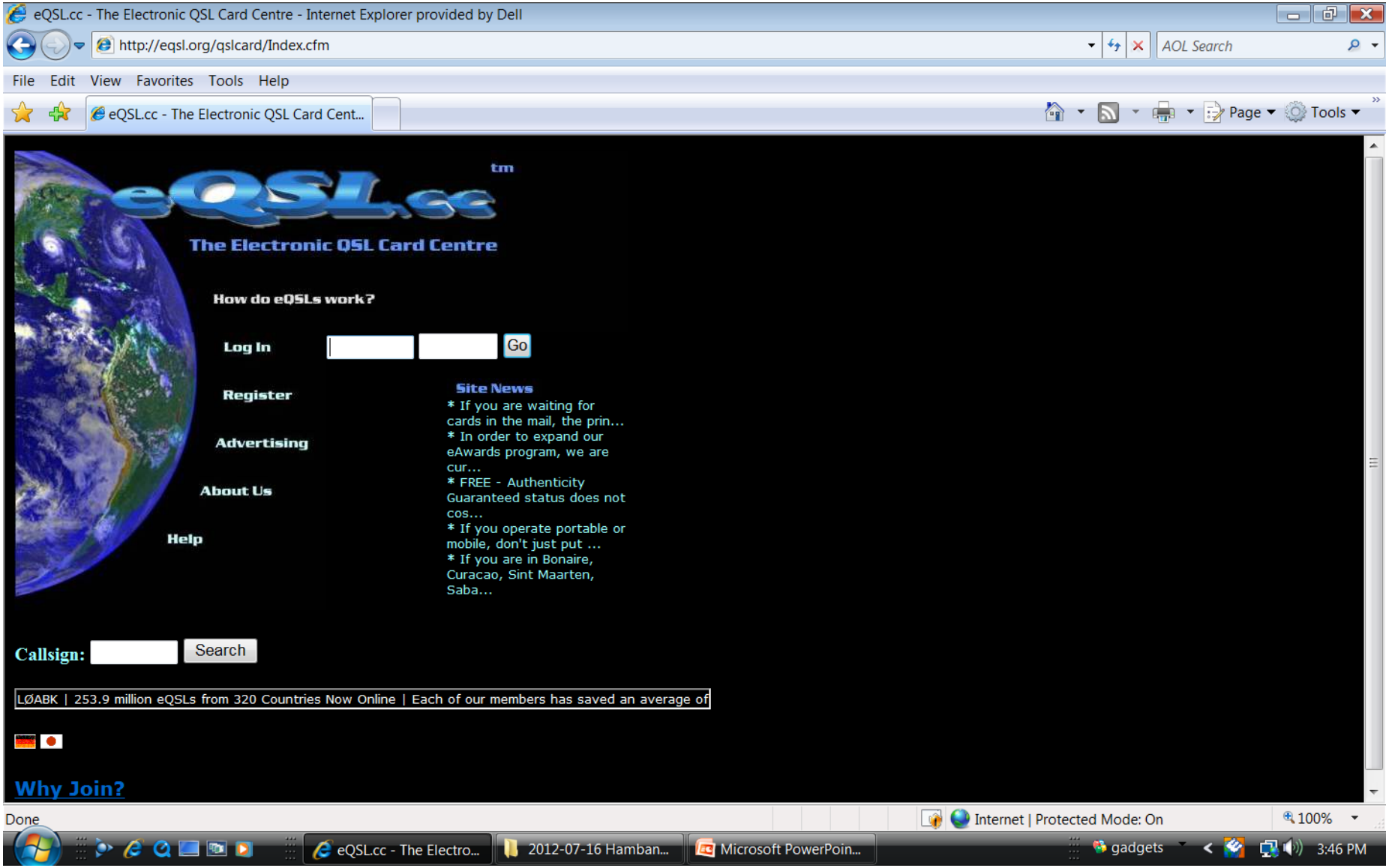
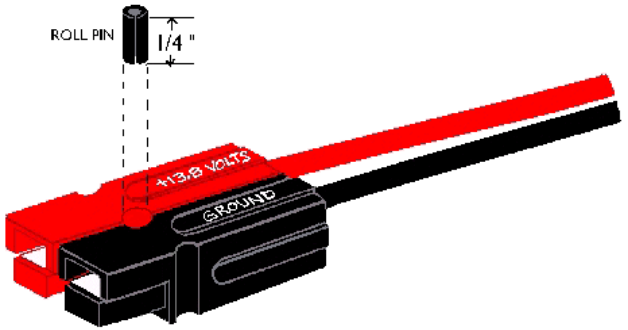
of the LoTW Website

eQSL.org

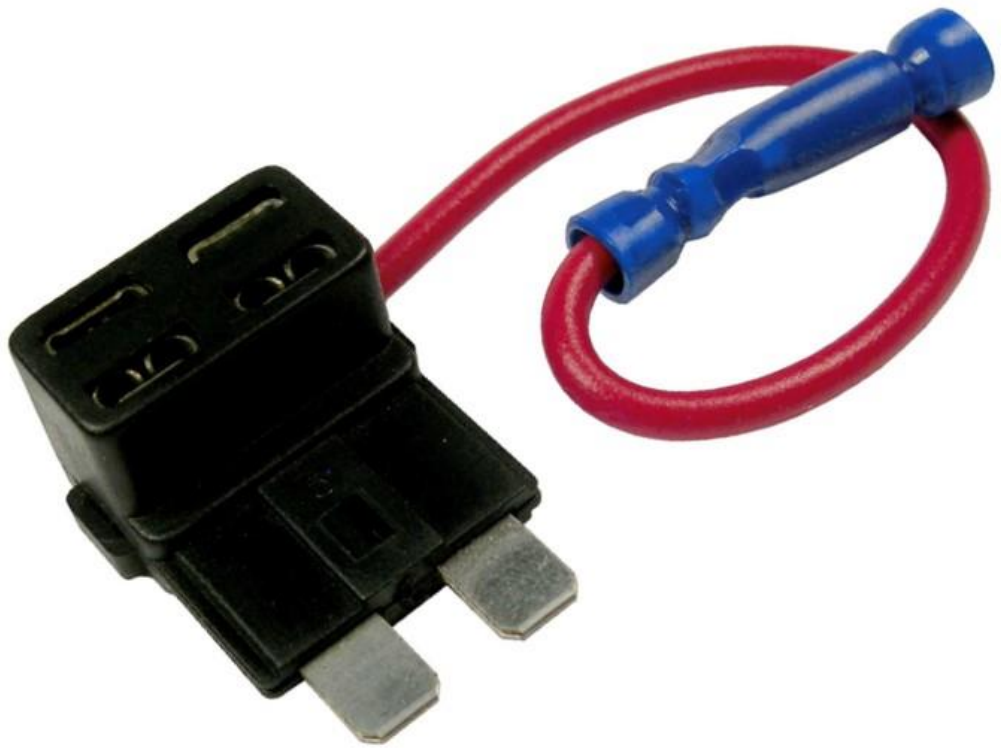

eQSL.cc - The Electronic QSL Card Centre - Internet Explorer provided by Dell
http://eqsl.org/qslcard/Index.cfm
AOL Search
File Edit View Favorites Tools Help
eQSL.cc - The Electronic QSL Card Cent...
Page Tools
eQSL.cc tm
The Electronic QSL Card Centre
How do eQSLs work?
Log In
Go
Register
Advertising
About Us
Help
Site News
* If you are waiting for cards in the mail, the prin...
* In order to expand our eAwards program, we are cur...
* FREE - Authenticity Guaranteed status does not cos...
* If you operate portable or mobile, don't just put ...
* If you are in Bonaire, Curacao, Sint Maarten, Saba...
Callsign:
Search
LØABK | 253.9 million eQSLs from 320 Countries Now Online | Each of our members has saved an average of
Why Join?
Done
Internet | Protected Mode: On
100%
eQSL.cc - The Electro...
2012-07-16 Hamban...
Microsoft PowerPoin...
gadgets
3:46 PM

Making DC Power Connections

- Accessory/Lighter Plug
  - Inadequate for higher power radios (100 W or more)
- Tap into fuse block
  - Tap accessory available at auto-supply stores (check current rating of the fuse in the tap)
- Go direct to battery
  - Requires going through the firewall.
  - Don't forget to turn the radio off!
- Consider adding Anderson Power-pole connectors



Fuse-Block Tap uses plug-in Fuse



Radio Stores & On-line Sources

- Associated Radio 8012 Conser, Overland Park
- D&L Antenna Products – Hamfests
- WB0W antenna products – St Joe – Hamfests
- Amateur Electronic Supply – Milwaukee, WI
- Giga Parts – Huntsville, AL
- DX Engineering – Tallmedge, Ohio
- Texas Towers – Plano, TX
- Numerous other on-line/catalog stores

Area Hamfests

- Feb – LaCygne, KS
- April 16, 2016 - Ararat Shrine – KC MO
- August 21, 2016 – KS ARRL convention – Salina, KS
- October – Southside – Belton, MO
- November 12, 2016 – Raytown, MO

Radio Brands

- Most popular New HF Radios:
  - Icom
  - Kenwood
  - Yaesu
  - Alinco
  - Chinese: Wouxun, BaoFeng, TYT, …

- Old Radios:
  - Collins, Drake, Swan, Hammerlund, …
  - Heathkit (kit built)

Antenna Brands

- Comet (mostly VHF and UHF)
- Diamond (mostly VHF and UHF)
- Cushcraft, (HF, VHF and UHF)
- Jetstream (lower cost; mostly VHF and UHF)
- Hustler (HF, VHF and UHF)
- Larsen (Commercial grade VHF and UHF)
- Hy-Gain, Mosley and many others

Vanity Call Signs

- Choose your call from those available
- Nominal fee for application and renewal

Enjoy your hobby - keep learning!

- Thanks for being part of our class
- HamNation – twit.tv/shows/ham-nation
- We hope to see you at the SFTARC meetings, breakfasts and activities.
  - Breakfast, Sat 7am at Perkins in Olathe
  - Tech Night, 7pm 3rd Friday, Faith Tech, Olathe
  - Field Day, 4th weekend in June, Ensor Museum