

Practical Considerations

SFTARC

2016 Technician/General
License Class



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



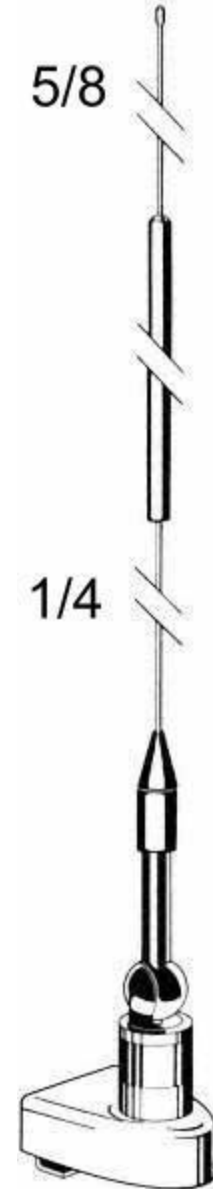
Mobile VHF/UHF Antennas

- Mono band, dual band, triband
- $\frac{1}{4}$ wave, $\frac{5}{8}$ 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

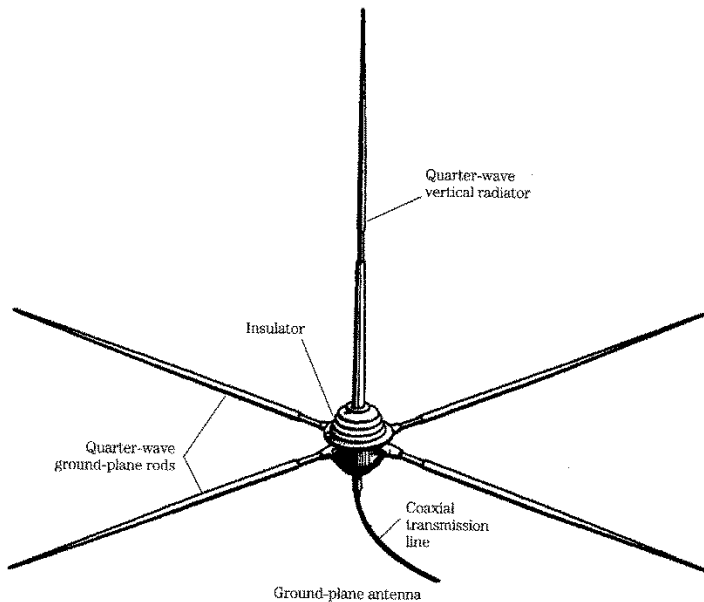
NMO Mounts for VHF/UHF



Mobile Antenna Options

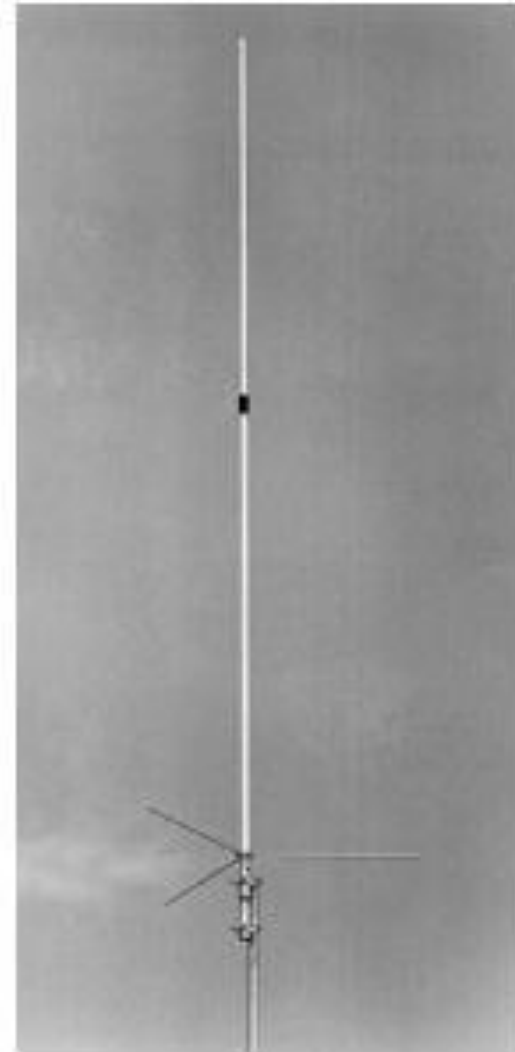


Base Station VHF/UHF Antenna

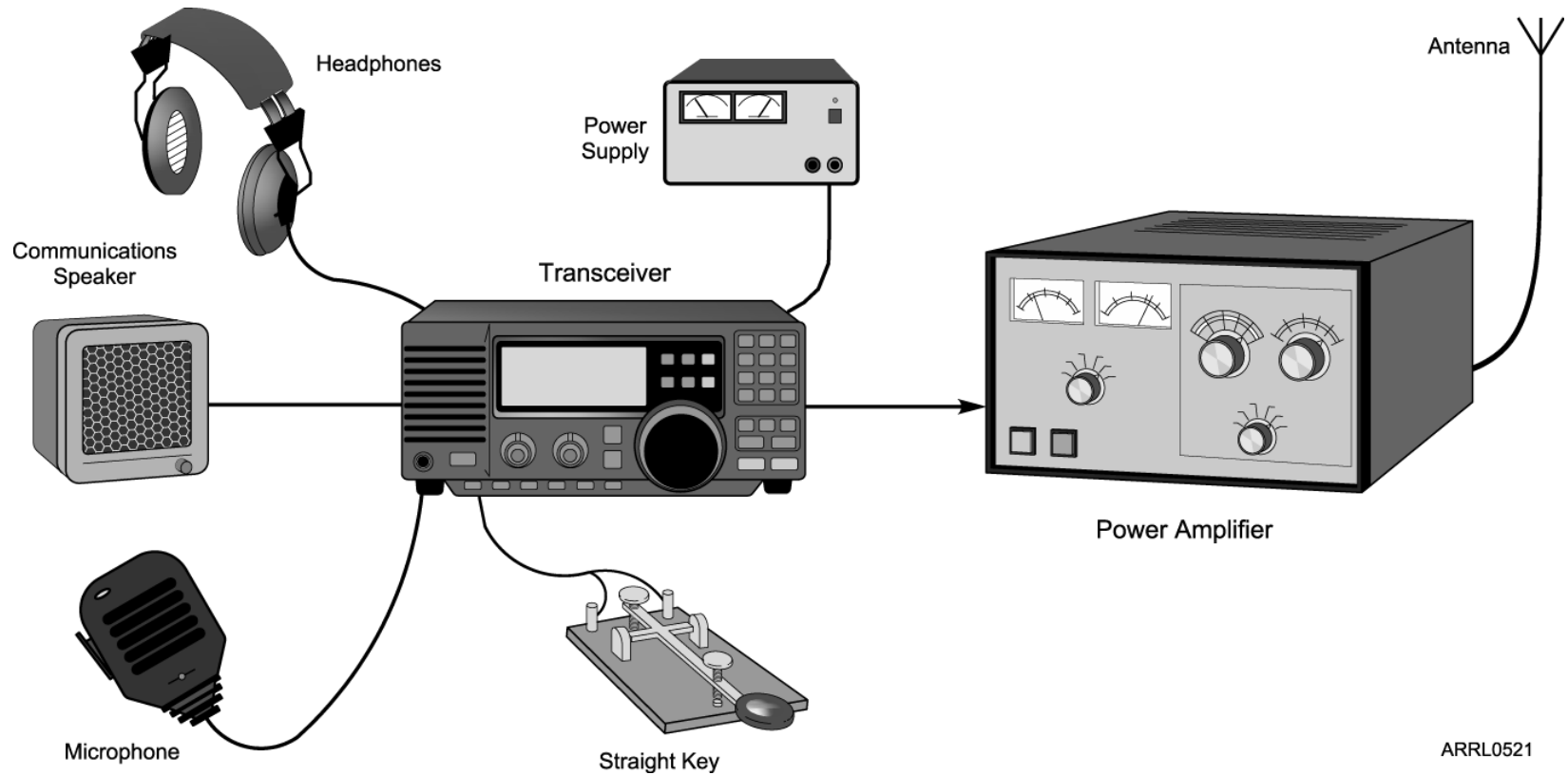


A Simple Ground-plane Antenna can be effective

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

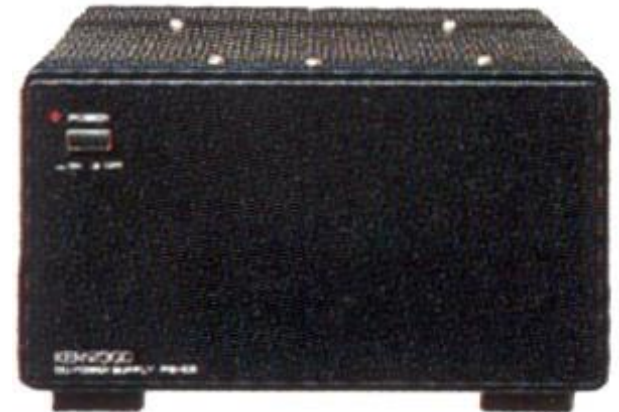
QRP radios are also an option

- 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 supplied with the radio



- SWR meter (may be built into the radio)

- Dummy load

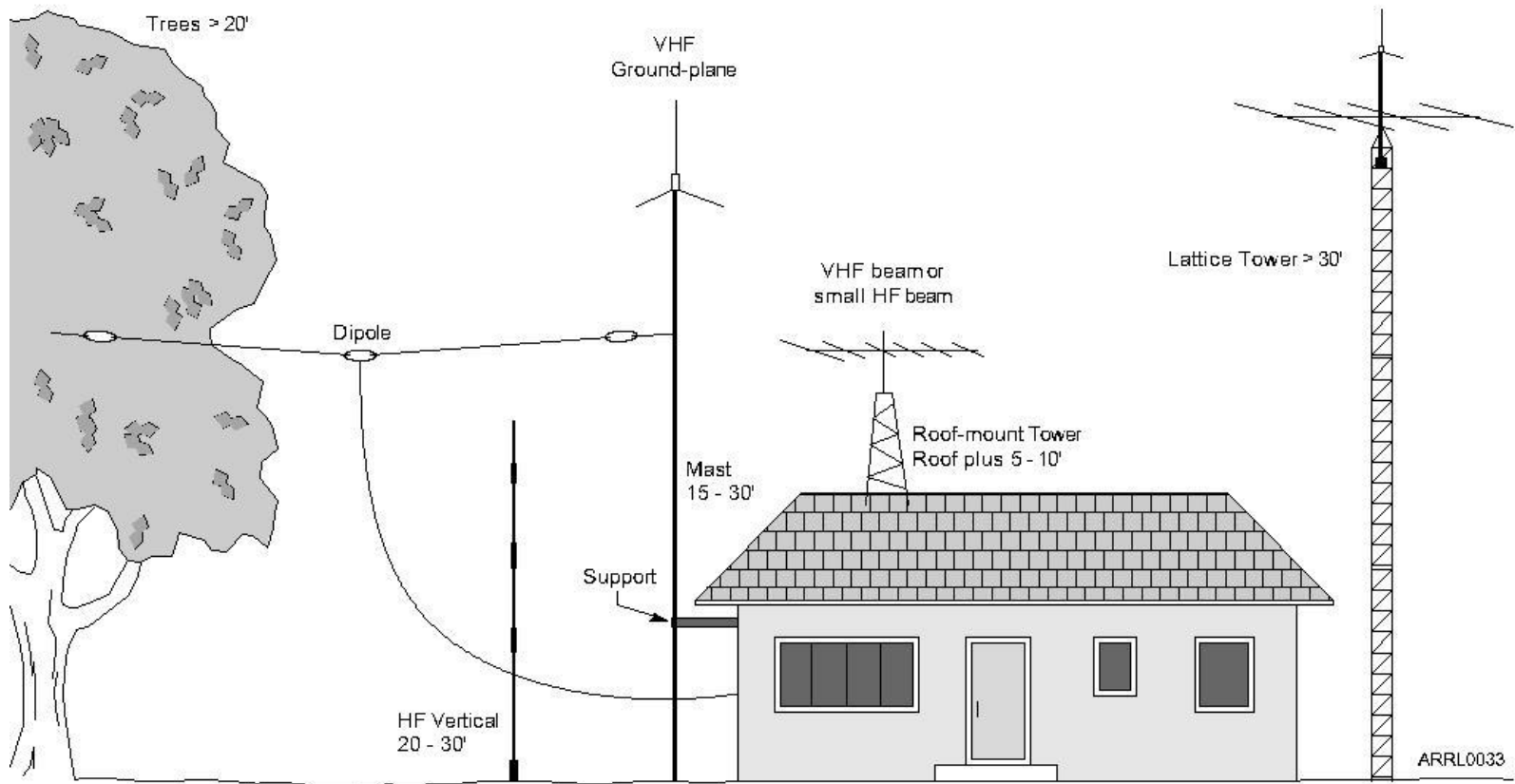


- Linear amplifier – very optional

- Code key or keyer and paddles



Base Station Antennas



Simple HF Antennas

■ Dipoles

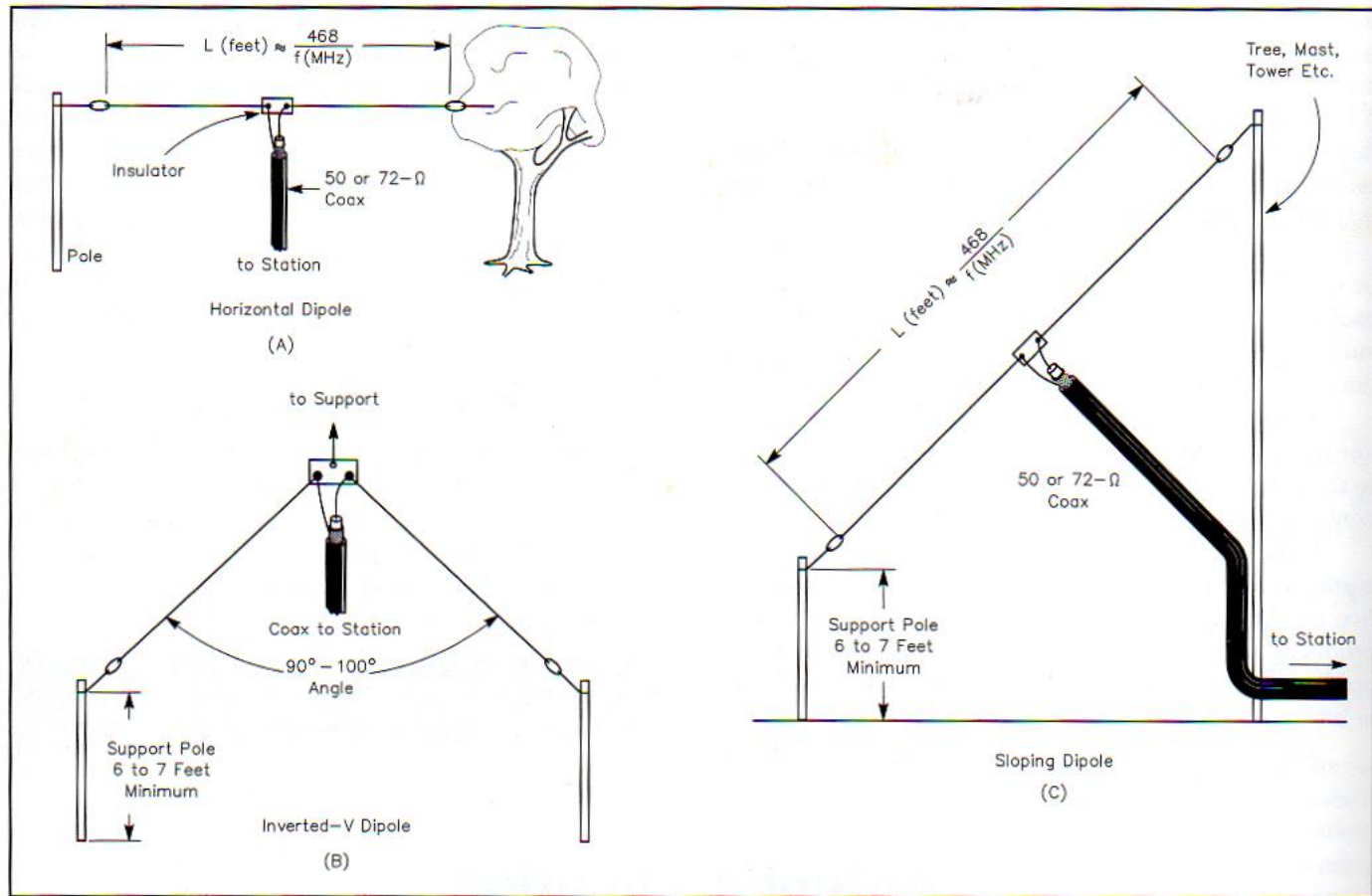
- Single band
- Trapped or fan multiband
- Multiband with tuner
- Multiband Off-Center-Fed Dipole (Windom)

■ Vertical

- Trapped multiband
- Multiband with tuner at the base

■ Random Wire with a tuner

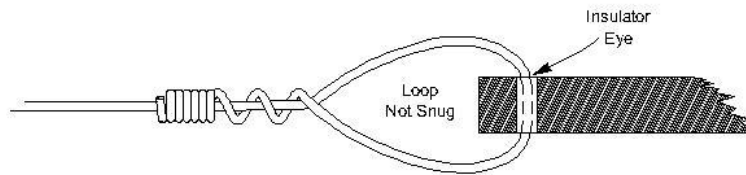
Dipole Variations



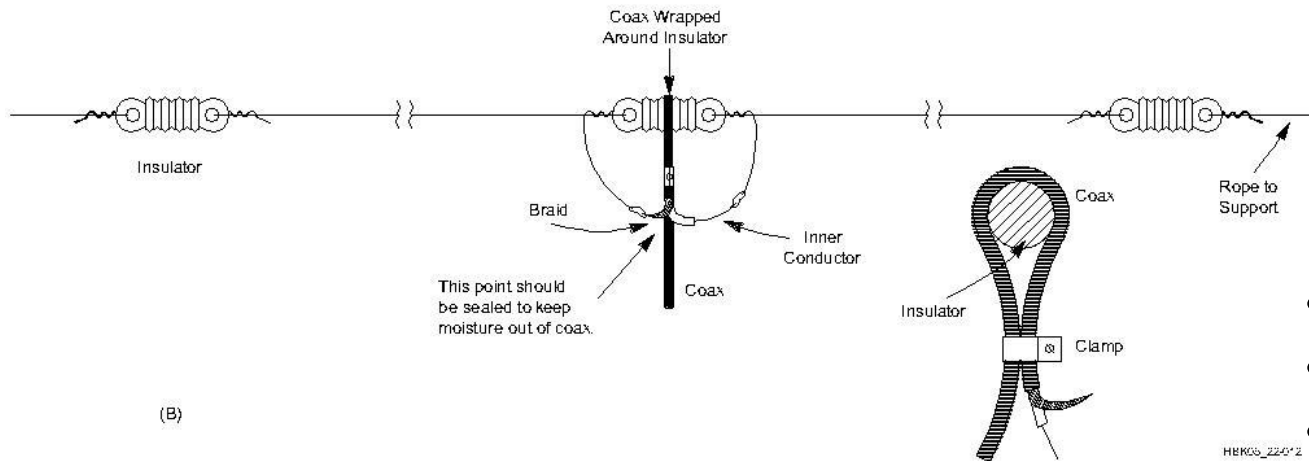
- **The efficiency of a simple dipole is hard to beat.**
- **Most simple dipoles work only one band, however a 40m dipole will tend to also work on 15m.**

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



(A)



(B)

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

$$L = 468/f \text{ MHz}$$

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

HEKOS_224'2

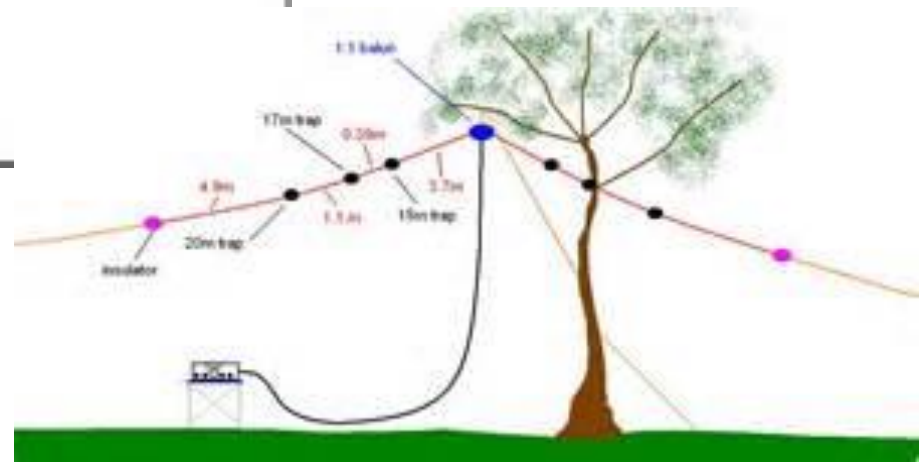
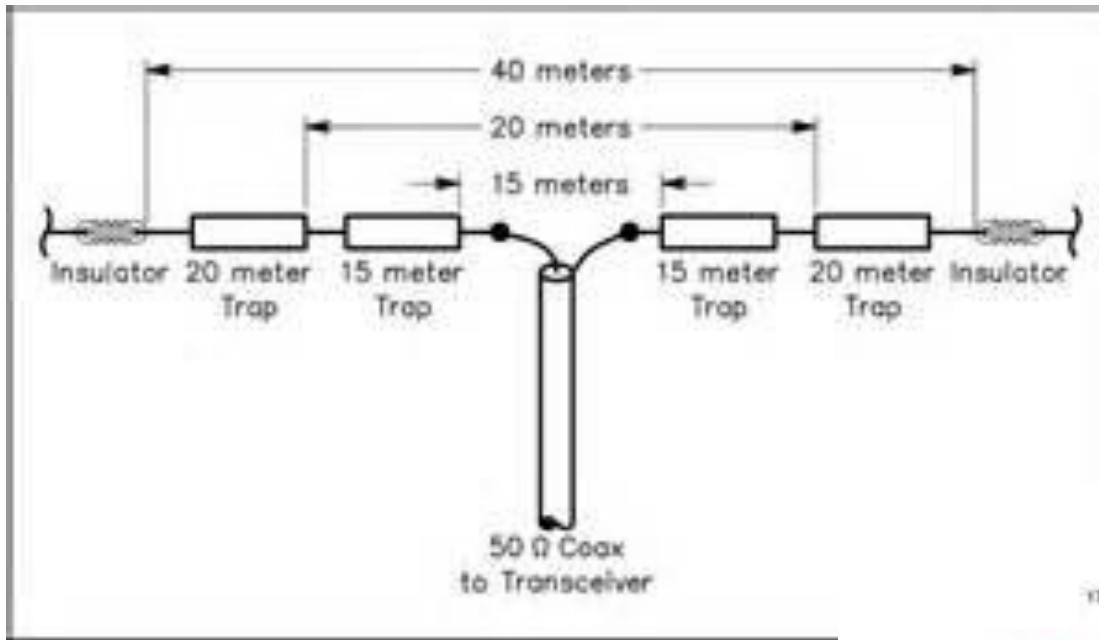
Dipole Length

- Typical lengths for common ham bands

<i>Wavelength</i>	<i>Frequency</i>	<i>Length</i>
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

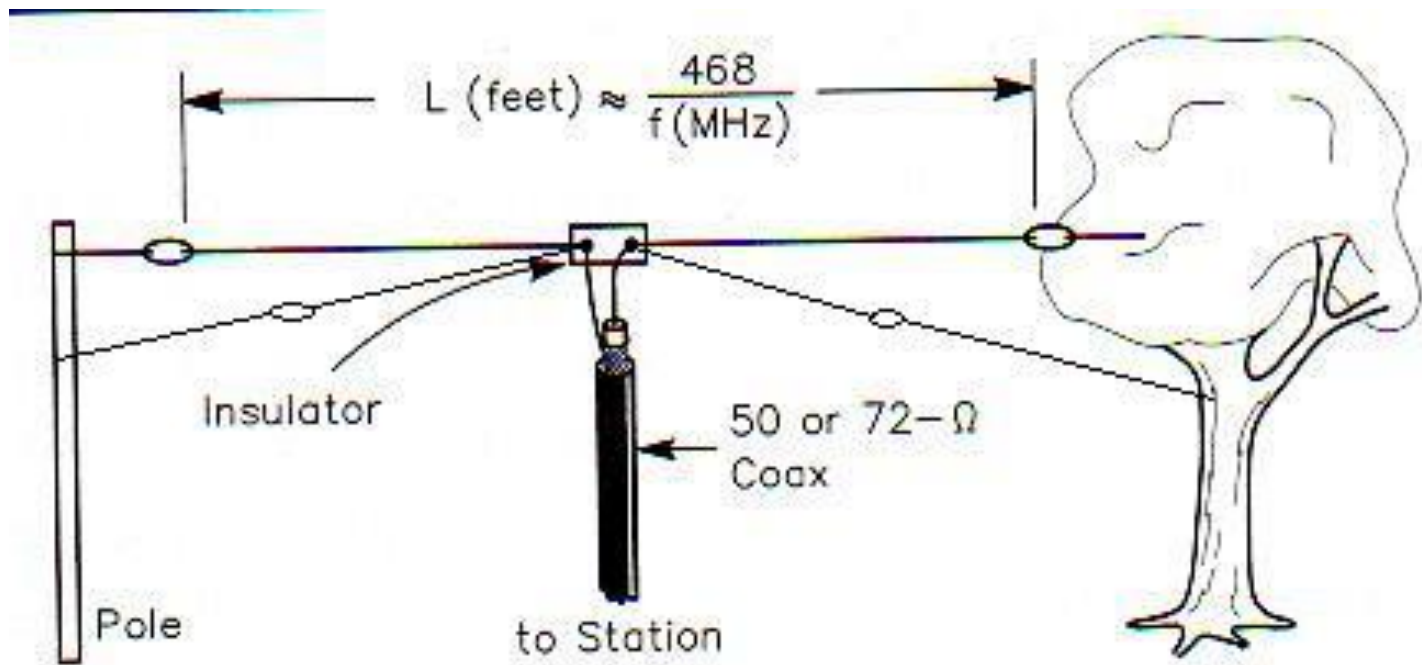
We shorten the antenna to raise the frequency

Trap Dipole – Multiband



Fan Dipole – Multiband

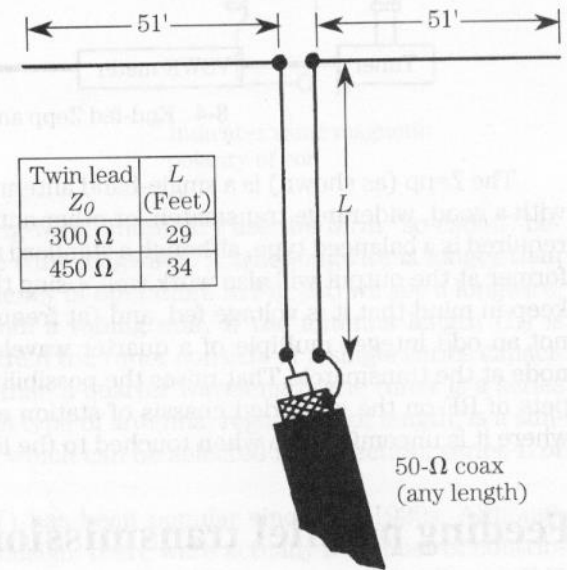
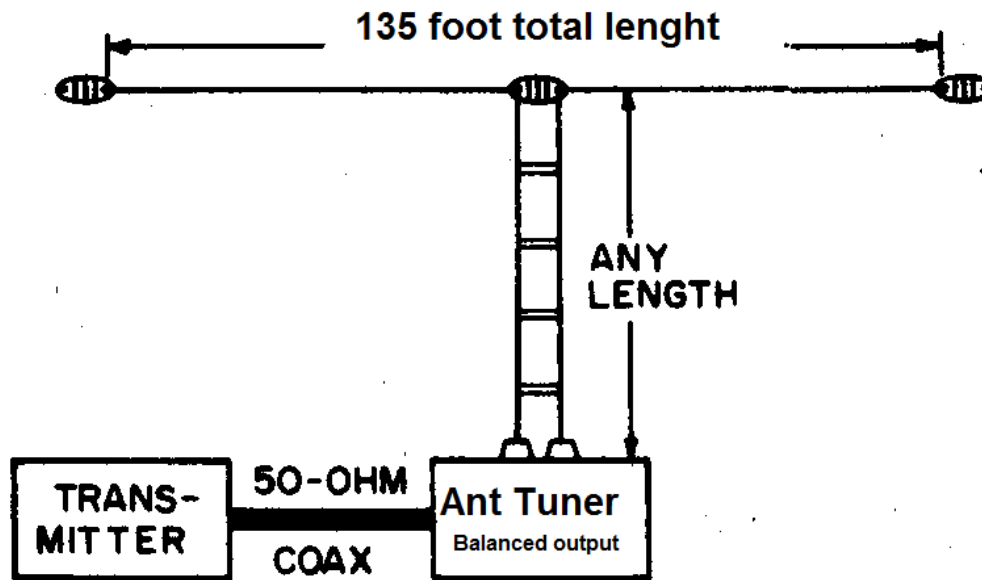
Add wires to dipole design



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

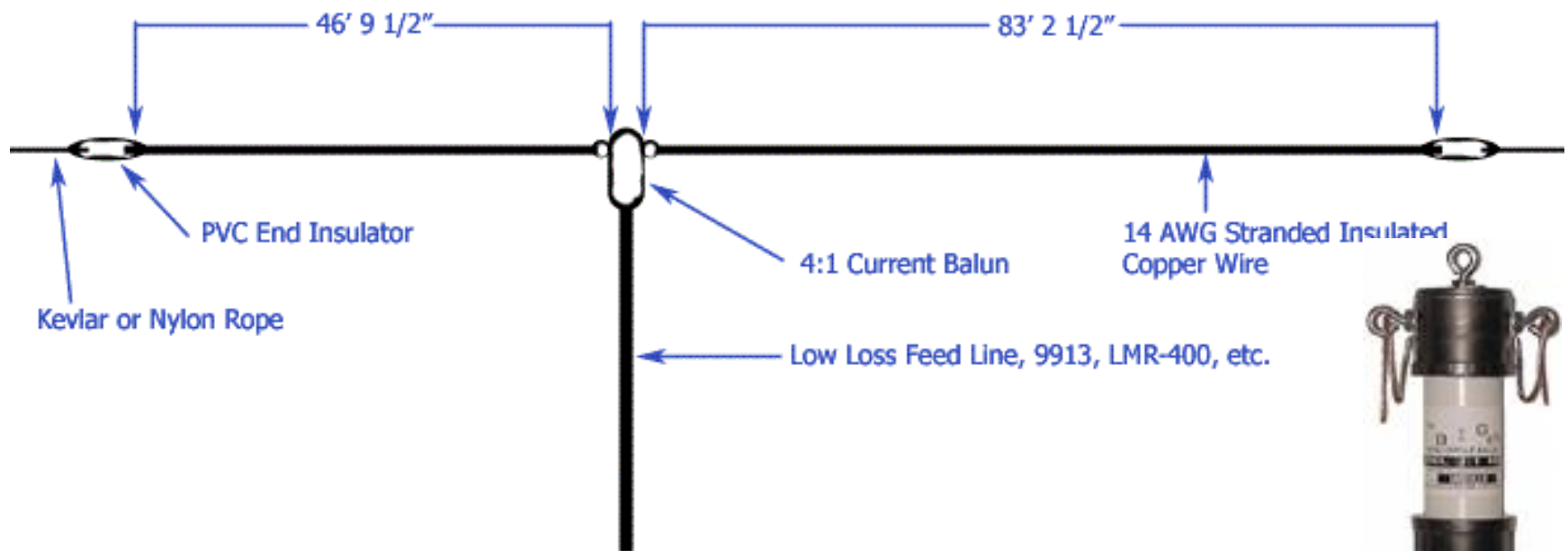


–A center-fed antenna system for multiband use.

80m Dipole fed with ladder line (Zepp)

G5RV (1:1 balun @ coax)

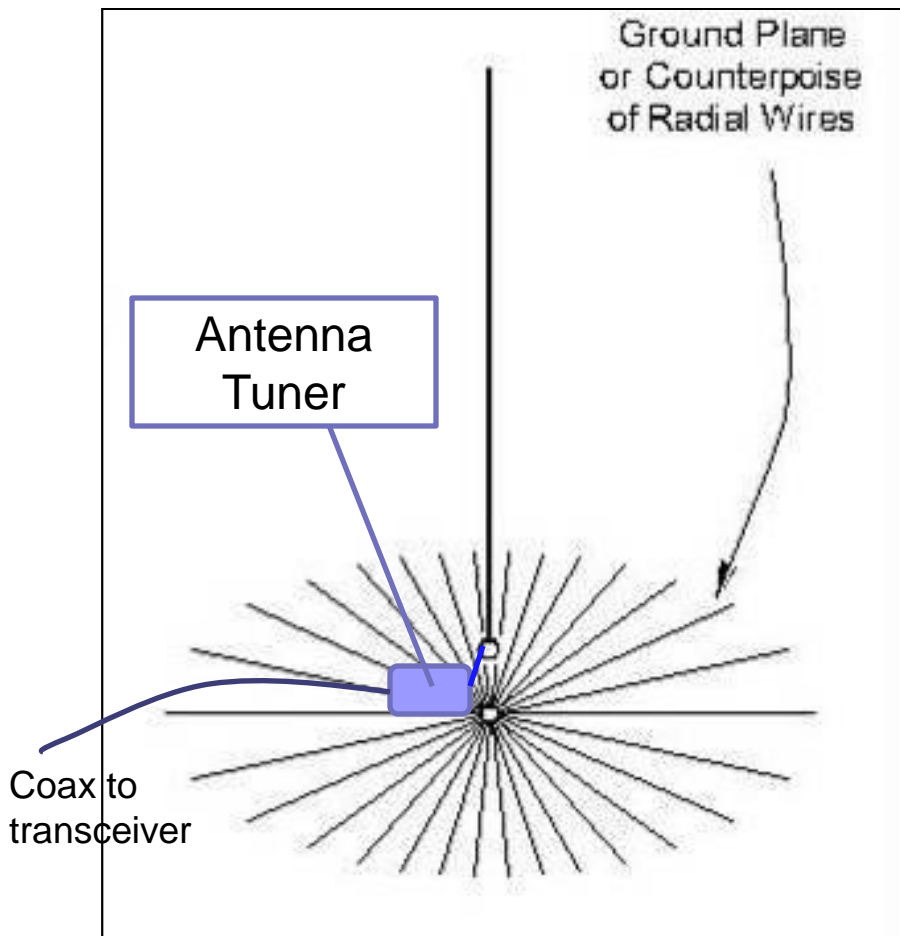
Off-Center-Fed Dipole (Windom)



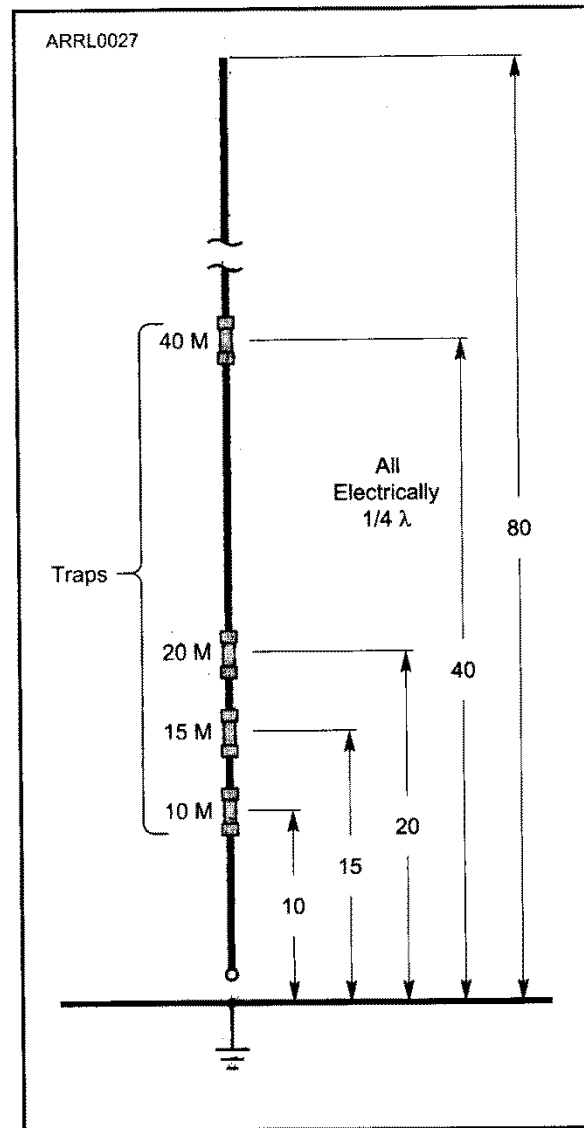
- 80, 40, 20, 17, 12, & 10 meter typical.
- A tuner may be required.
- Some designs use ~80/20 ratio instead of 66/33
- 4:1 balun is used for 200 ohm feedpoint

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

The wire length is generally at least $\frac{1}{4}$ wavelength on the lowest frequency. May require trimming to work well.

Coax
to
XMTR

Antenna
tuner

Random length

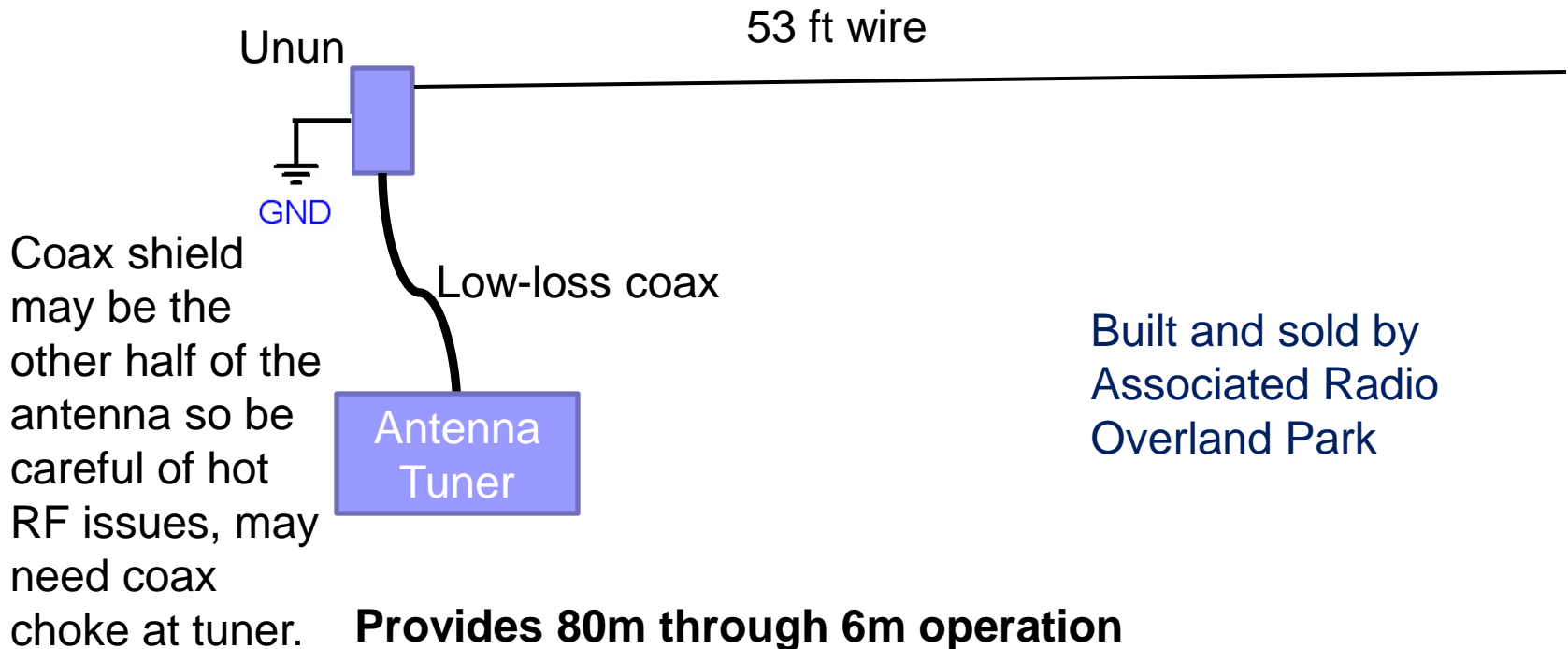
$(> \frac{\lambda}{4})$

$\frac{\lambda}{4}$ Radials

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

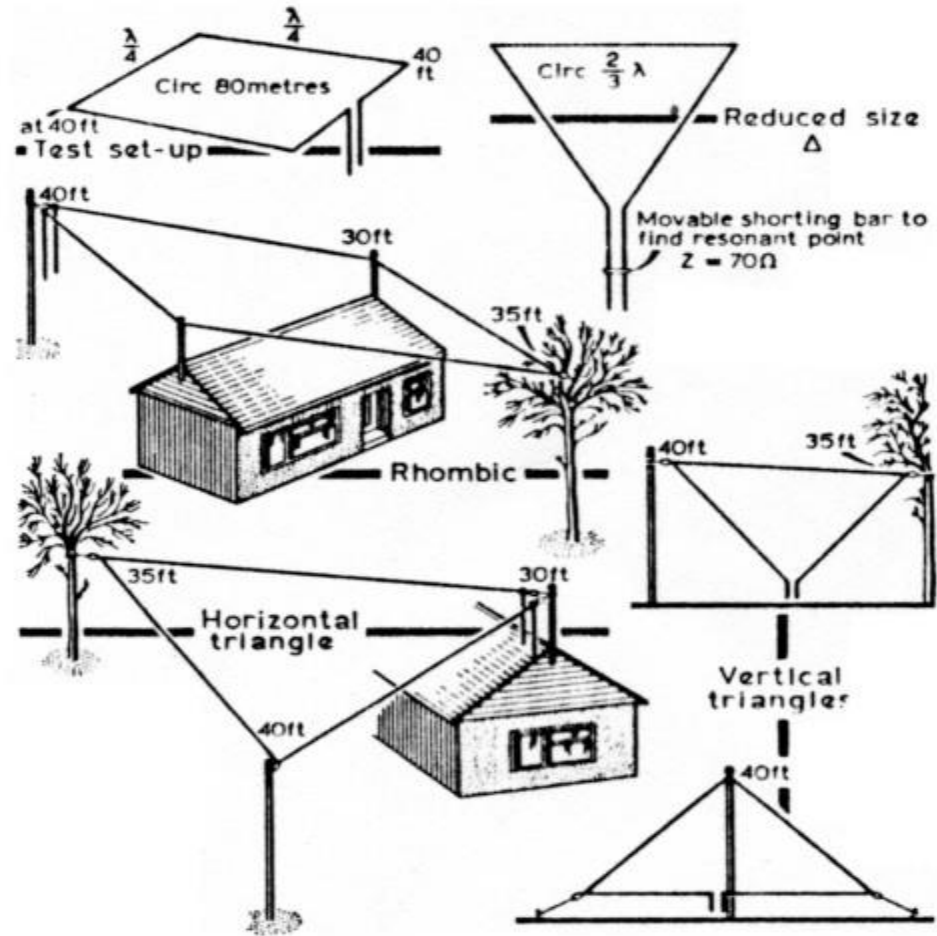
End Fed Wire

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



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

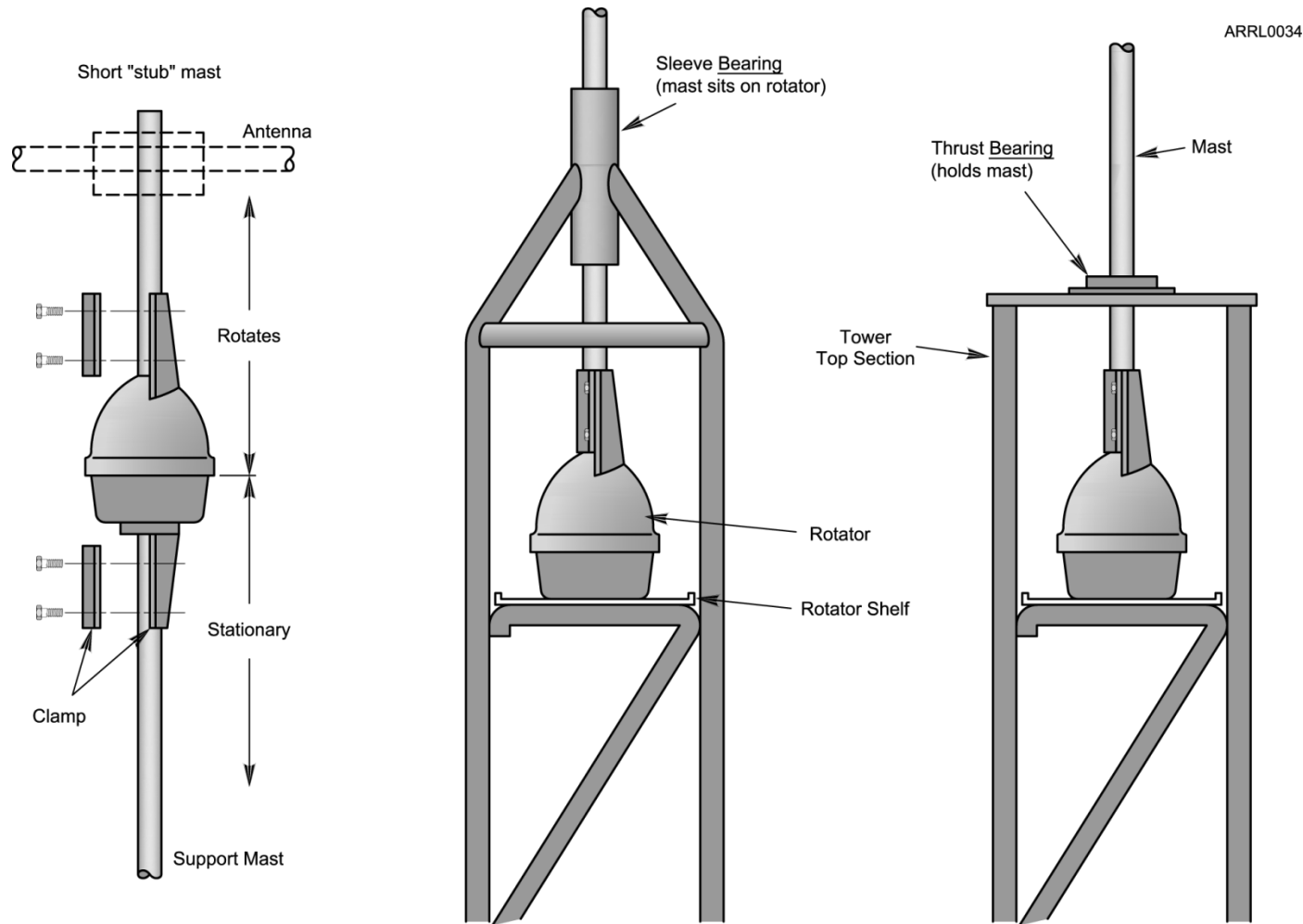


Monoband Beam



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
- Lightning arrestors help protect you and your equipment

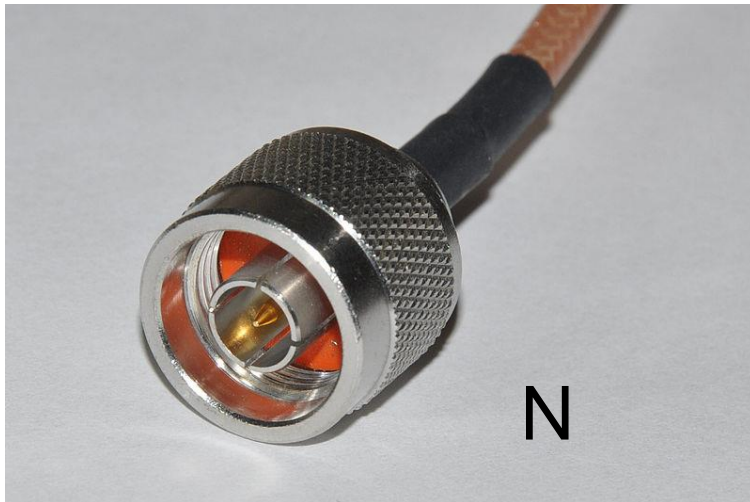


Antenna Connectors

UHF or
PL-259



BNC



N



SMA

Coax Loss

Tech Pg 4-16

Gen Pg 7-19

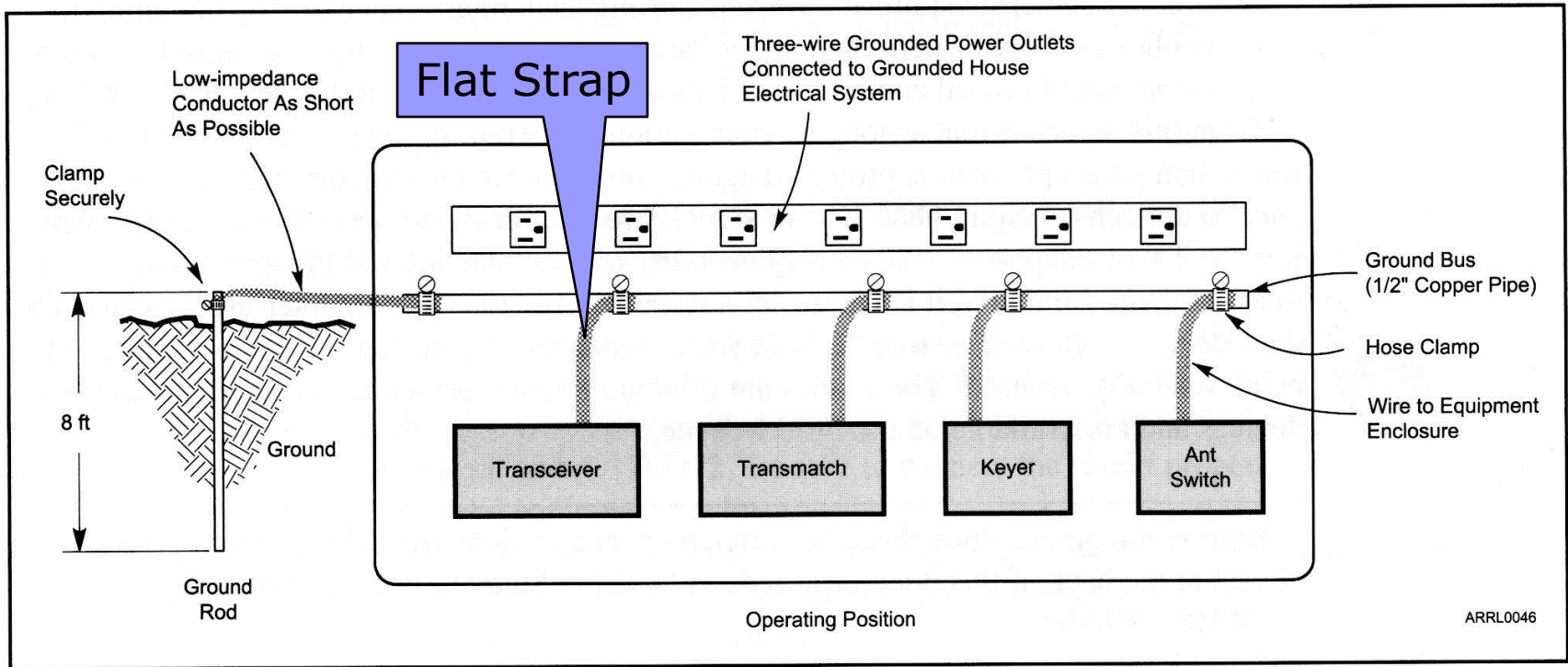
- Remember: 3 dB of loss = $\frac{1}{2}$ of your power is lost

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

Ionospheric Skip

Hambands

Line of-Sight

Tech Pg 1-22
Gen Pg 7-14

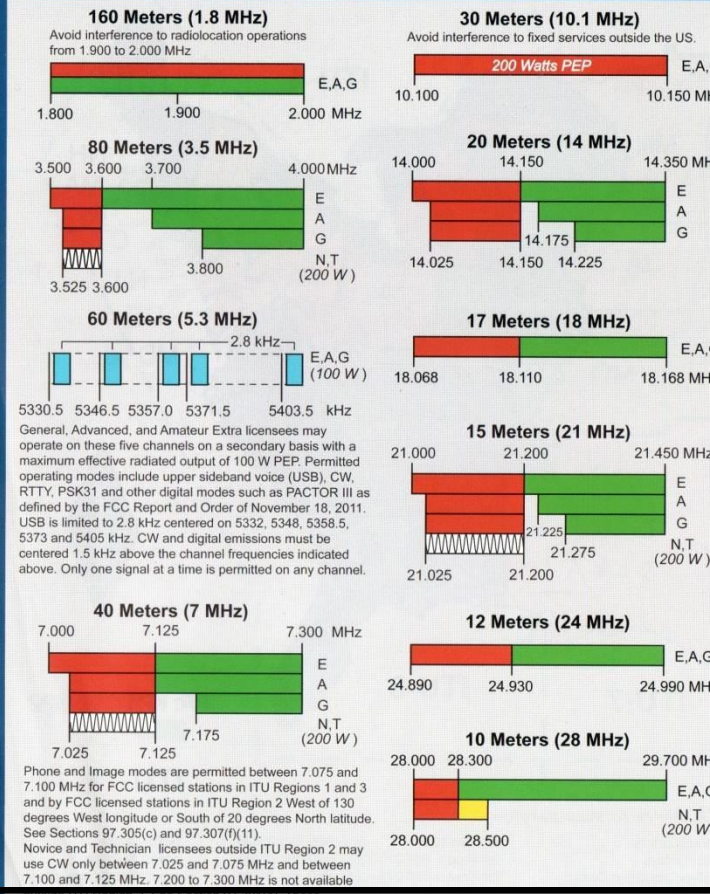
HF (High Frequency)

VHF / UHF

US Amateur Radio Bands

US AMATEUR POWER LIMITS

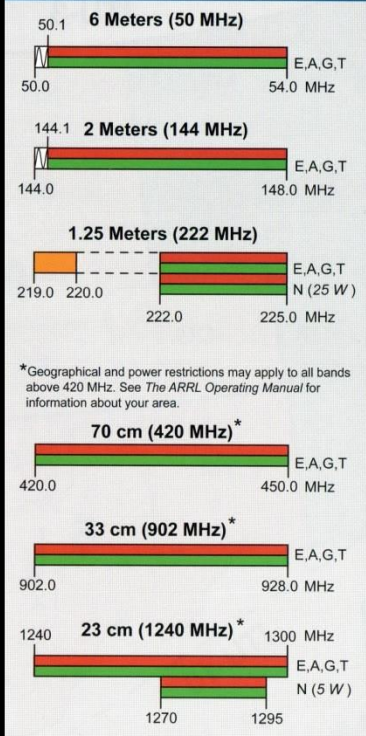
FCC 97.313 An amateur station must use the minimum transmitter power necessary to carry out the desired communications. (b) No station may transmit with a transmitter power exceeding 1.5 kW PEP.



Phone and Image modes are permitted between 7.075 and 7.100 MHz for FCC licensed stations in ITU Regions 1 and 3 and by FCC licensed stations in ITU Region 2 West of 130 degrees West longitude or South of 20 degrees North latitude. See Sections 97.305(c) and 97.307(f)(11).
Novice and Technician licensees outside ITU Region 2 may use CW only between 7.025 and 7.075 MHz and between 7.100 and 7.125 MHz. 7.200 to 7.300 MHz is not available outside ITU Region 2. See Section 97.301(e). These exemptions do not apply to stations in the continental US.

Effective Date
March 5, 2012

Published by:
ARRL The national association for
AMATEUR RADIO
www.arrl.org
225 Main Street, Newington, CT USA 06111-1494



*Geographical and power restrictions may apply to all bands above 420 MHz. See *The ARRL Operating Manual* for information about your area.

All licensees except Novices are authorized all modes on the following frequencies:
2300-2310 MHz 10.0-10.5 GHz * 122.25-123.0 GHz
2390-2450 MHz 24.0-24.25 GHz 134-141 GHz
3300-3500 MHz 47.0-47.2 GHz 241-250 GHz
5650-5925 MHz 76.0-81.0 GHz All above 275 GHz

* No pulse emissions

KEY

- Note:**
CW operation is permitted throughout all amateur bands.
MCW is authorized above 50.1 MHz, except for 144.0-144.1 and 219-220 MHz.
Test transmissions are authorized above 51 MHz, except for 219-220 MHz.
- = RTTY and data
 - = phone and image
 - = CW only
 - = SSB phone
 - = USB phone, CW, RTTY, and data
 - = Fixed digital message forwarding systems only
- E = Amateur Extra
A = Advanced
G = General
T = Technician
N = Novice

See *ARRLWeb* at www.arrl.org for detailed band plans.

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

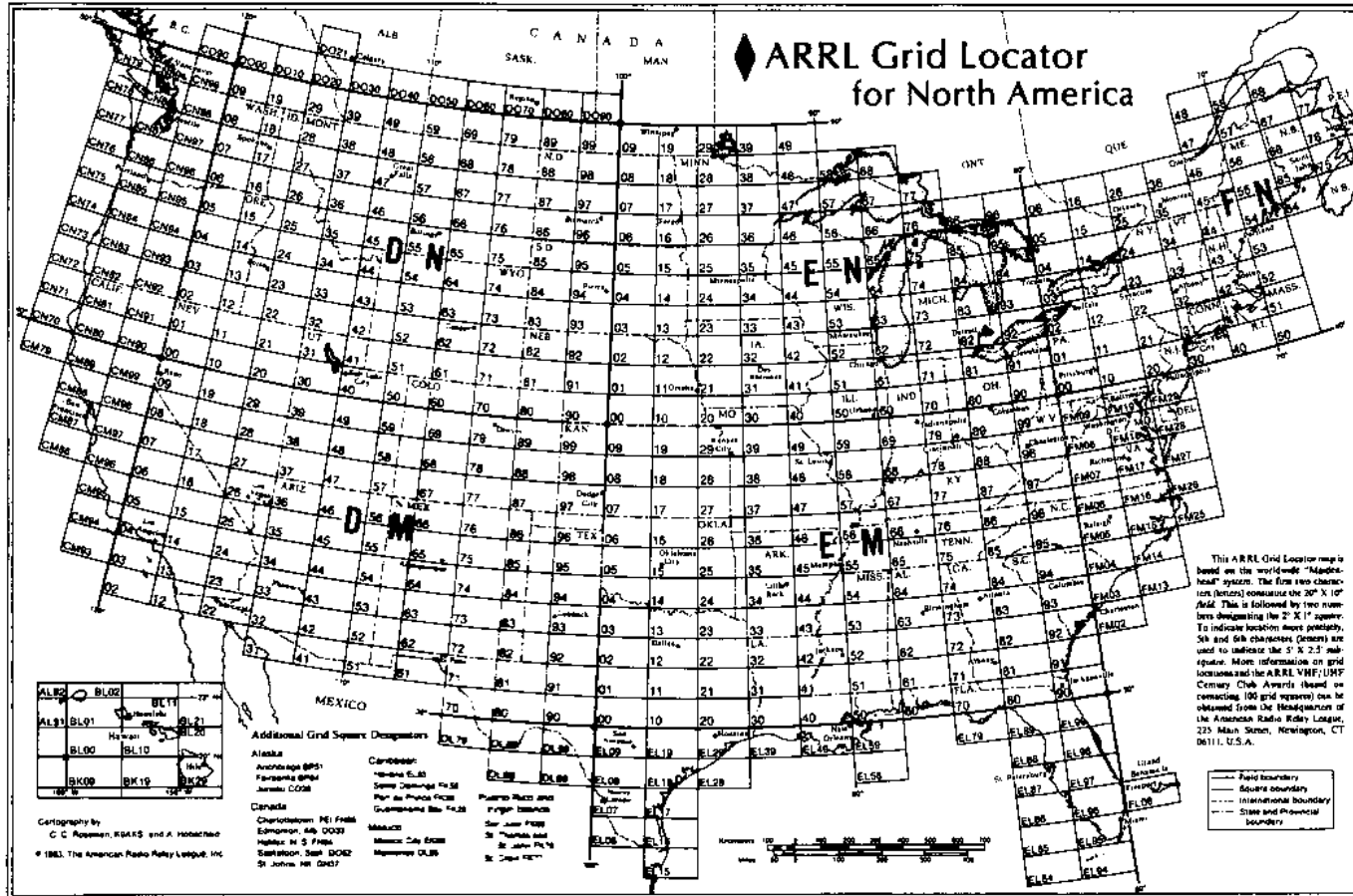
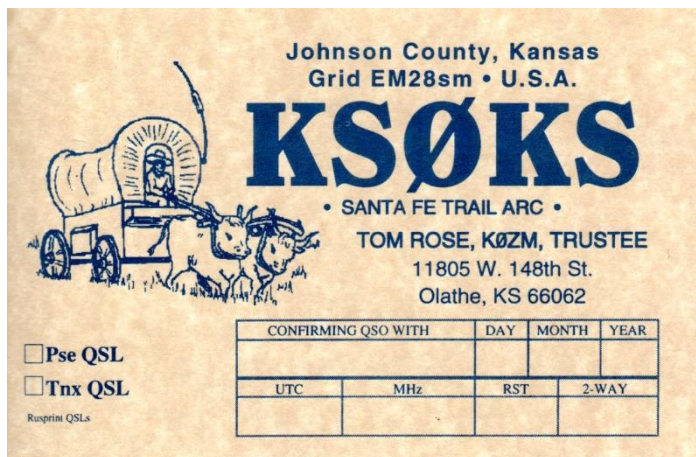


Figure 9-1—This map shows grid squares, used to specify your location for VHF and UHF SSB/CW operation.

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



Logging and Confirming Contacts

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 EWVA. WAC-10x. WAS-10x.

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

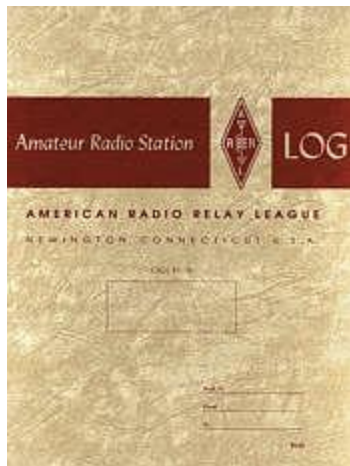
73 ERIC

*ITU 37
Grid: JN11JQ
10 X 42092*

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

DXLab - Internet Explorer provided by Dell

http://dxlabsuite.com/ AOL Search

File Edit View Favorites Tools Help

DXLab

Commander DXView DXKeeper Launcher Pathfinder PropView SpotCollector WinWarbler

DXLab Overview

DXLab: Better DXing Through Software

Overview Xcvr_Control DX_Info Logging Digimodes QSL_Info DX_Spots Propagation Management Documentation Download

DXLab is a **freeware** suite of eight interoperating applications that can be installed independently in any order. When multiple applications are running, they sense each other's presence and automatically interoperate to support your [Amateur Radio DXing](#) activities:

- [Transceiver control with bandwidth](#) - controls up to 4 Alinco, Elecraft, FlexRadio, Icom, JRC, Kachina, Kenwood, TenTec, Yaesu transceivers, with frequency and mode tracking by an independent transceiver, receiver, SDR-based panadaptor, or skimmer
- [Rotator control](#) - AlfaSpid, ARSWIN, Heath, Hygain, M2, N1MM Rotor,
- [Award tracking and submission](#) - AJA, Canadaward, Challenge, DDFM, DOK, DXCC, Holyland, IOTA, JCC, JCG, Maidenhead Fields & Squares, Marathon, RDA, SRR, TopList, VUCC, USA-CA, WAB, WAC, WAE, WAJA, WAIP, WAHUC, WAS, WAZ, WPX, WAJA, WITU
- [QSL route discovery](#) - provides access to more than 80 online sources

Done Internet | Protected Mode: On 100%

Microsoft PowerPoin... DXLab - Internet Expl... gadgets 3:32 PM

DXKeeper - Log QSOs

DXKeeper 10.0.2 - AC0KN.mdb : 338 QSOs

Log QSOs QSL Check Progress my QTHs Import QSOs Export QSOs

QSO: United States

call: AA1KS name: Rich Emmert QTH: 44 Clark Street Eastport, Maine 04631

mode: SSB via: tx freq: 28.400 begin: 2/17/2002 23:00

sent: 59 rcvd: 59 tx band: 10M rx freq: 28.400 end: 2/17/2002 23:00

power: 100 code: 291 DXCC: K entity: United States

Auxiliary
 QSL
 Online QSL
 Award
 Contest
 Propagation
 Details
 User-defined

Auxiliary

station call: KI0KH op call: KI0KH owner call: KI0KH unique: 27

sub mode: rx band: 10M select: Club: temp:

QSL

sent: Y R CFM date sent: 2/17/2002 sent via: D WAZ vfy VUCC vfy

rcvd: Y R VFY date rcvd: 2/17/2002 rcvd via: D IOTA vfy

msg: QSL#: Display credit

myQTH: KI0KH addr: Richard C Emmert
44 Clark Street
Eastport, ME 04631
USA

key: QSL Sent
N - don't send
R - requested
Y - sent
I - don't send
QSL Rcvd
R - requested
Y - confirmed
S - submitted
V - verified
I - invalid X - expired

Award

grid: FN64mv IOTA: cont: NA WPX: AA1 CQ: 5 ITU: 8

ARRL: ME state: ? ME county: ? ME, Washington

New Save Undo CBA Delete Report Plot 1 Adv RAT Capture Config Help

Call	DXCC	Starting UTC	Band	Mode	Sent	Rcvd	Name
AA1KS	K	2/17/2002 23:00	10M	SSB	59	59	Rich Emmert
AA3B	K	6/25/2005 19:02	20M	CW	599	599	Joseph Trench
AA5AR	K	6/26/2005 00:27	40M	CW	599	599	IO KLUB OF THE ARKANSAS NORTH, AA5AR
AA6DP	K	6/26/2005 17:43	15M	CW	599	599	DANIEL S PIKE, AA6DP
AB6TL	K	7/5/1997 23:35	20M	SSB	59	59	Carl McInnes
AB7QG	K	6/25/2005 18:18	20M	SSB	59	59	TERRY R WYATT, AA7TW
AB9YC	K	6/26/2011 12:19	20M	SSB	59	59	ANTHONY J WILLARD, AB9YC
AC8G	K	6/26/2011 15:03	15M	SSB	59	59	HARRY T FLASHER, AC8G
AJ9ON	K	6/25/2005 20:07	20M	SSB	59	59	JOHN A BETTASSO, III, AJ9ON
DS3EXX	HL	1/17/2001 00:37	30M	SSB	59	59	Song, Tae-Soo

Windows taskbar: DXLabSuite, DXKeeper 10.0.2 - A..., 3:28 PM

THE ARRL

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OF THE WORLD™



YAESU

The radio

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eQSL.org


eQSL.cc - The Electronic QSL Card Centre - Internet Explorer provided by Dell

http://eqsl.org/qslicard/Index.cfm

File Edit View Favorites Tools Help

eQSL.cc - The Electronic QSL Card Cent...

Home RSS Print Page Tools



eQSL.cctm

The Electronic QSL Card Centre

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- * 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:

LØABK | 253.9 million eQSLs from 320 Countries Now Online | Each of our members has saved an average of

Why Join?

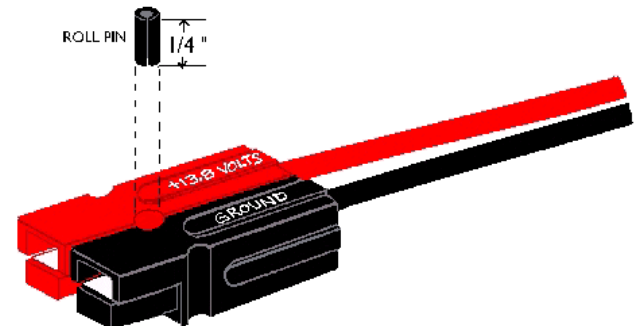
Done

Internet | Protected Mode: On 100%

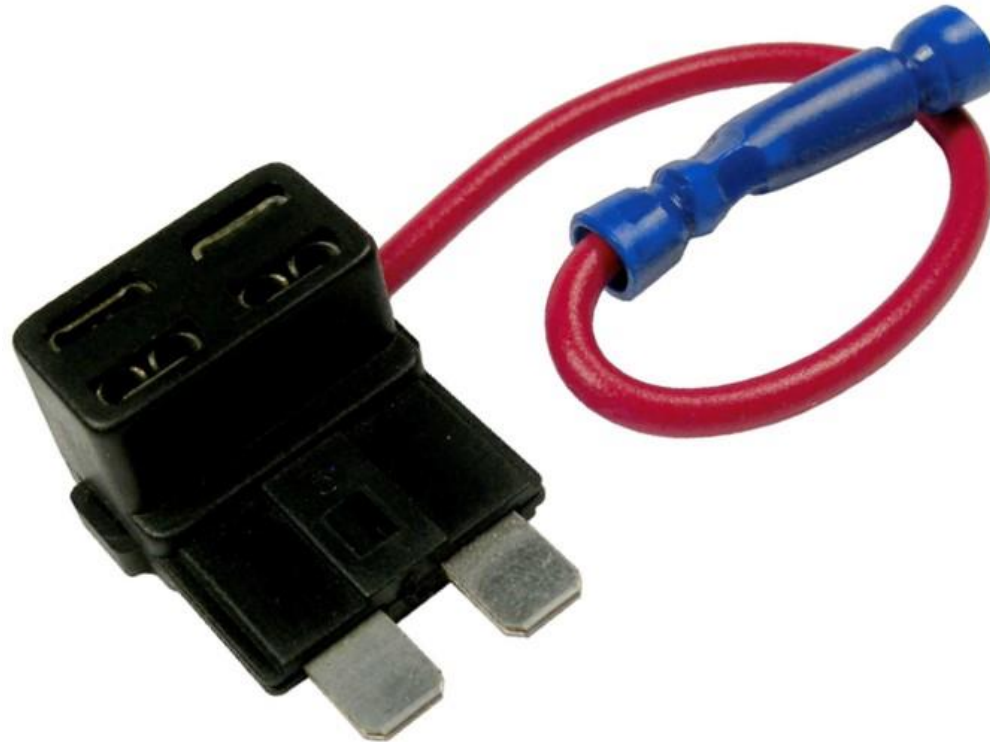
eQSL.cc - The Electro... 2012-07-16 Hamban... Microsoft PowerPoin... gadgets 3:46 PM

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