

*Pacificon 2005*

*Antenna Ideas for HF Portable  
Operations*

*by*

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# Antenna Ideas for HF Portable Operations

*“Portable” is defined in the New American Dictionary as:*

- *Capable of being carried*
- *Easily carried or moved*

*Therefore, our radio, power source, accessories and antenna, if used for portable operation, should be capable of being carried*



# Antenna Ideas for HF Portable Operations



*N6IS/6 Northern Santa Barbara  
County - 1977*



*AC7A/7 Southern Cochise  
County - recent*



# Antenna Ideas for HF Portable Operations

*Wire antennas – versatile allies for portable operation*

- *lightweight*
- *easy to pack*
- *usually have low losses*
- *can often be used for multiple bands when an ATU and twinlead feeder are employed*



## Antenna Ideas for HF Portable Operations

*Portable wire antennas can be classified by the number of supports required, usually 1 or 2.*

*Common Single (1) support portable antennas*

- *Inverted “V”*
- *Vertical monopole  $\lambda/4$ ,  $\lambda/2$ ,  $5\lambda/8$*
- *Delta loop – feed point location affects pattern*
- *Sloping or vertical dipole*



# Antenna Ideas for HF Portable Operations

## *Dual (2) support portable antennas*

- *Dipole and variations: G5RV, collinear, etc*
- *$\lambda/4$  vertical +  $\lambda/4$  horizontal, fed at corner*
- *Half square*



## Antenna Ideas for HF Portable Operations

*Always consider the type of support available and the height when making an antenna decision*

- *Remember for 20 meters a  $\lambda/4$  is about 16.5 feet and a  $\lambda/2$  about 33 feet. Twice these heights for 40 meters*
- *Trees are usually the first choice for supports when available*
- *Trees can be difficult to utilize due to foliage, structure, and surrounding trees*



## Antenna Ideas for HF Portable Operations

### *Launching antenna lines into trees*

- *Use an appropriate line and guide when launching the antenna*
- *The old “rock and rope” often produces less than satisfactory results. Resist the temptation!*
- *A short length of fishing line between the guide and rope can serve as an emergency breaking point*
- *Get information on ropes and knots*



## Antenna Ideas for HF Portable Operations

<i>Rope type</i>	<i>Advantages</i>	<i>Disadvantages</i>
<i>Fishing line</i>	<i>Lightweight Good leader</i>	<i>Twisting Limited loading Hard to see</i>
<i>Polypropylene</i>	<i>Lightweight Strong Waterproof &amp; floats</i>	<i>Sun deterioration Ends unravel Knots are difficult</i>
<i>Nylon</i>	<i>Lightweight Strong Good leader</i>	<i>Knots &amp; clumping Ends unravel Almost too flexible</i>
<i>Polyester + Kevlar<sup>®</sup> core</i>	<i>Very strong Durable Sun hardy</i>	<i>Heavier than others Ends unravel</i>



# Antenna Ideas for HF Portable Operations

## *Launch Methods*

- *Water bottle “heave ho”*
  - *Use water filled 8.5 oz. or slightly larger bottle*
  - *Bottle is smooth and passes through limbs*
  - *Use nylon or thin polypropylene line*
  - *Good for about 30 to 40 foot height*
- *Wrist rocket*
  - *Use about 1 to 2 oz. fishing sinker*
  - *Use heavy fishing line or thin nylon line*
  - *Good up to about 70 feet*
  - *Watch for campground restrictions regarding slingshots*



# Antenna Ideas for HF Portable Operations

## *Launch Methods continued:*

- *Bow & arrow, line casting, and tennis rackets all require skill. Trees don't often understand that you're skilled!*
- *Remember - antennas requiring 2 supports also require 2 lines to be successfully launched.*



# Antenna Ideas for HF Portable Operations

## *Portable Masts:*

- *Commonly available in 22 to 33' lengths*
- *Collapsed size is usually 3 to 4 feet in length*
- *They have very limited load capacity at the tip*
- *Guying is necessary*
- *DK9SQ, MFJ, and WorldRadio magazine are sources*



# Antenna Ideas for HF Portable Operations

- *Fishing polls are available that break down into short sections. Their lengths approach 20 feet.*
- *Home improvement centers offer collapsible painting poles that can serve as a mast.*



## Antenna Ideas for HF Portable Operations

*When masts or trees are not an option self-contained antennas may be the best solution*

*Collapsible vertical and dipole antennas are available from many commercial sources (no endorsement implied)*

- *Super Antennas MP-1 vertical*
- *W3FF Buddipole dipole*
- *MFJ 1621 vertical*
- *Ventenna HFp vertical and HFp dipole*
- *Yaesu ATAS and others*



# Antenna Ideas for HF Portable Operations

- *An internet search and check of the eHam product reviews will provide many leads*



## Antenna Ideas for HF Portable Operations

- *For a full size, ground independent antenna such as a dipole the efficiency approaches 100%*
- *Dipole losses increase when placed close to the earth*
- *Portable verticals usually require radials. Space may be a factor*



# Antenna Ideas for HF Portable Operations

- *A big consideration with “small” antennas is their efficiency ( $\eta$ ):*

$$\eta \% = 100 * [R_r / (R_r + R_l)]$$

*where:  $R_r$  is radiation resistance*

*$R_l$  is loss resistance*

- *$R_l$  is primarily coil losses for loaded dipoles*
- *$R_l$  is both coil and ground return losses for verticals*



## Antenna Ideas for HF Portable Operations

- *For example let's find the efficiency for a short, portable 40-meter vertical. Let  $R_l = 10\Omega$  and  $R_r = 5\Omega$ , then*

$$\eta \% = 100[5 / (10 + 5)] = 33\%$$

- *The 5W output from a transceiver would result in only 1.67W being radiated*
- *The problem is much worse on 80 meters, but less of a problem on the higher bands due to higher  $R_r$*



## Antenna Ideas for HF Portable Operations

*A portable vertical kit is available from Pacific Antenna, the PAC-12™ Antenna (no endorsement)*

- *Breaks down to elements about 12" long*
- *Total length is about 8.5'*
- *Some assembly required*



# Antenna Ideas for HF Portable Operations

## *Roll your own option*

- *Portable, self-contained antennas can be fabricated from materials available at home improvement centers*
- *AD5X presented a portable, 40-10 meter vertical in July 2002 QST. Updated July 2005*
- *The antenna breaks down into sections about 20" long*
- *Plumbing nipples and couplings fastened to the ends of the sections provide the mechanical connections*
- *The antenna element can be made of plastic risers, or brass or aluminum tubing*



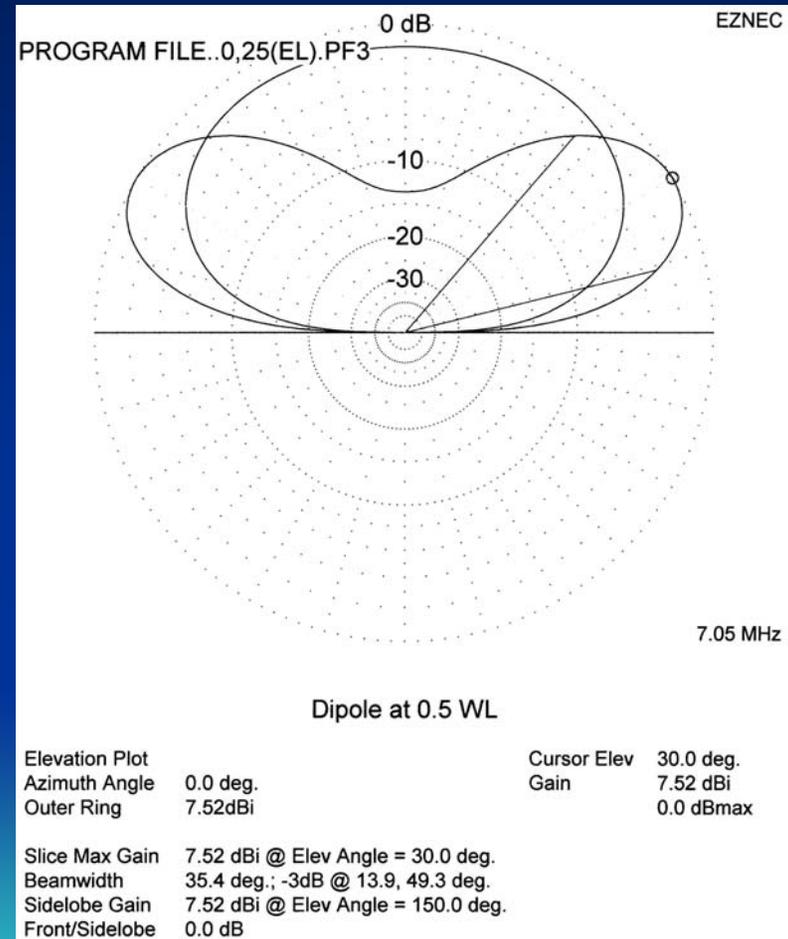
# Antenna Ideas for HF Portable Operations

## Portable Antenna performance plots

- Consider multiband performance
- Consider the affects of antenna height

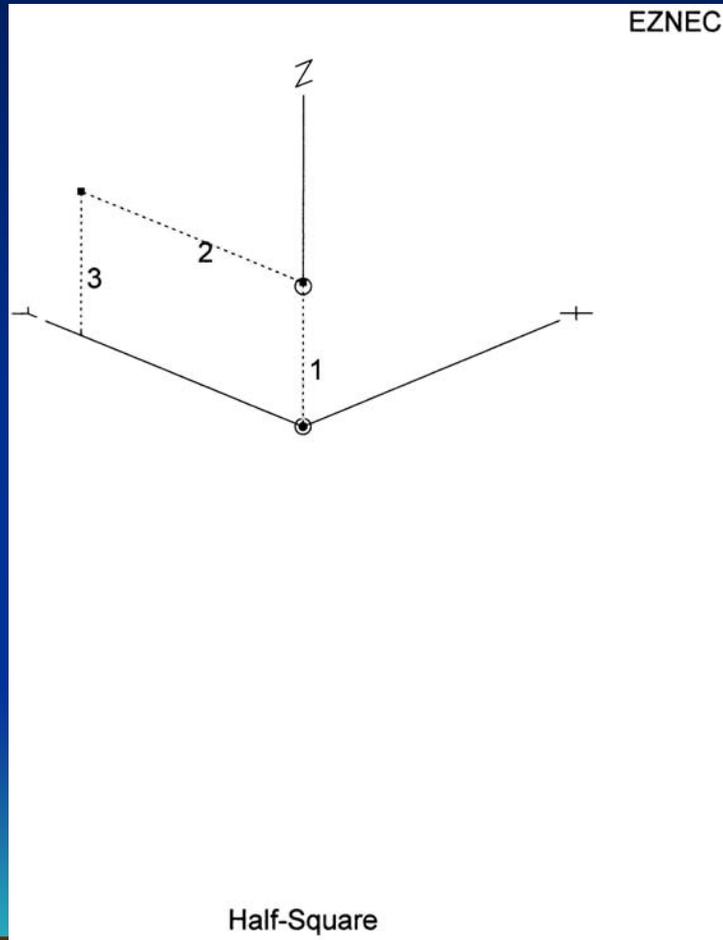
Here a dipole is compared  
at  $\frac{1}{4}\lambda$  and  $\frac{1}{2}\lambda$  height

$\frac{1}{2}\lambda$  (wide plot)  $\frac{1}{4}\lambda$  (tall plot)

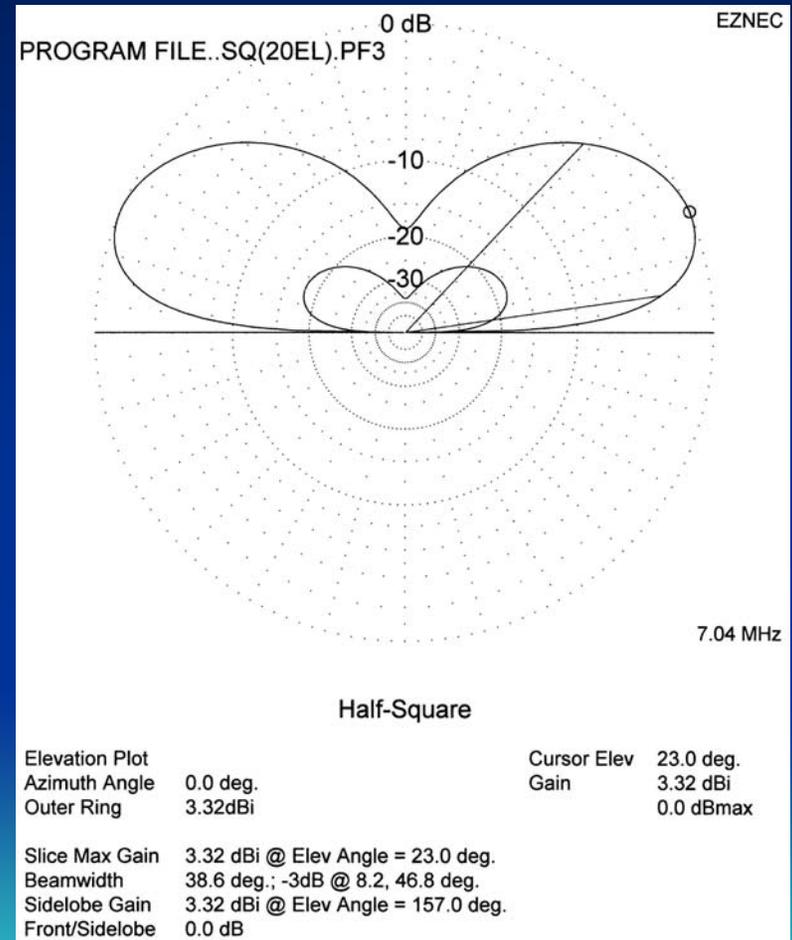


# Antenna Ideas for HF Portable Operations

Half-Square



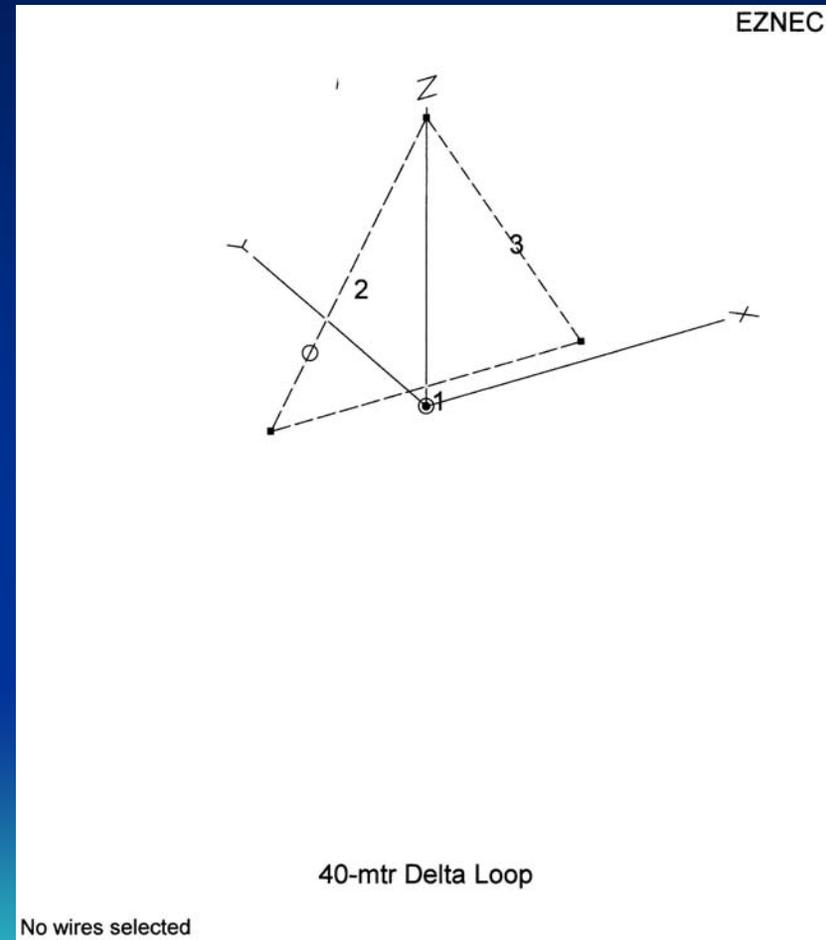
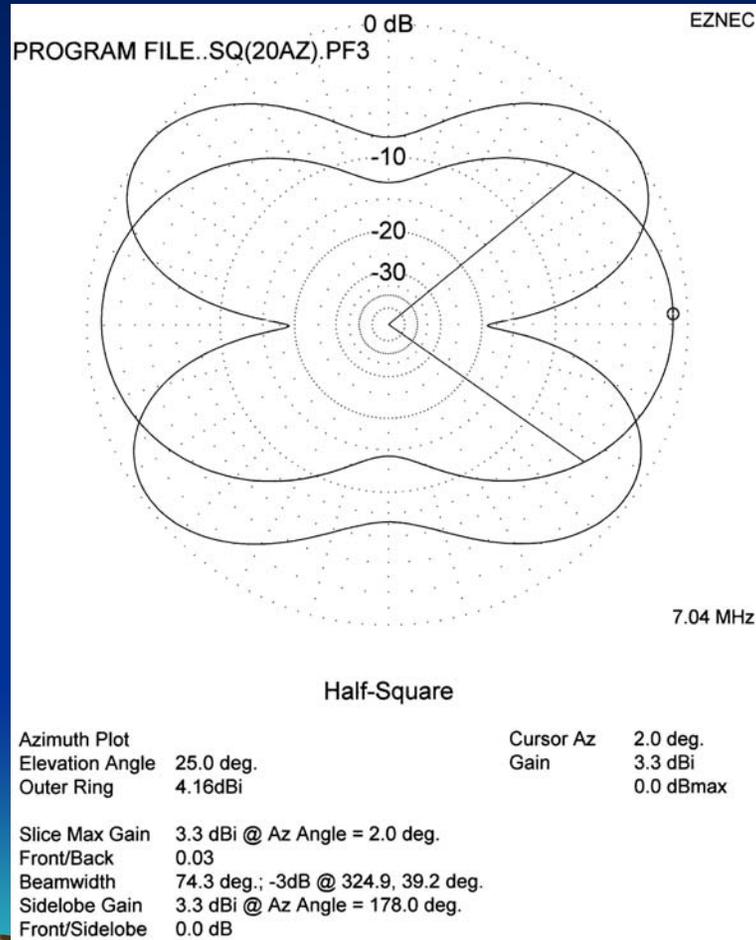
40m (outside) 20m null (inside)



# Antenna Ideas for HF Portable Operations

*Half-Sq. 40m (peanut) 20m (clover)*

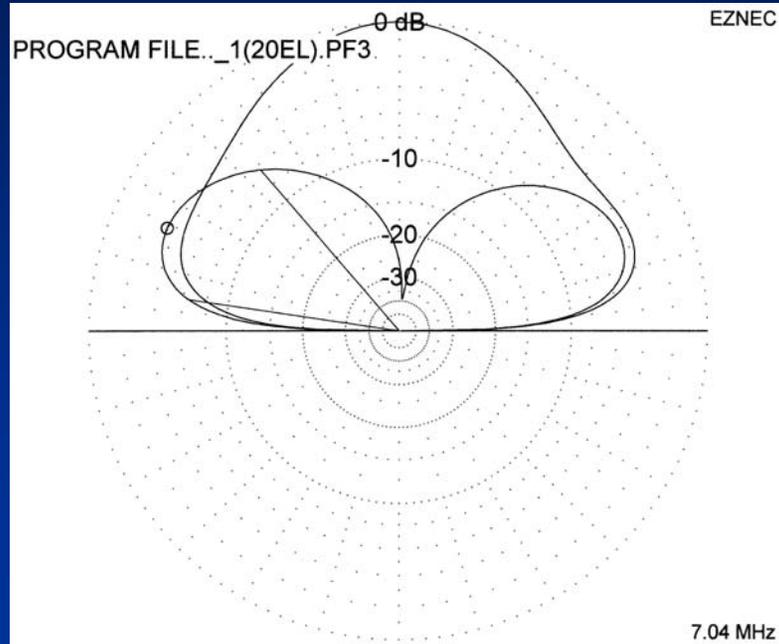
*Delta-loop – side feed*



# Antenna Ideas for HF Portable Operations

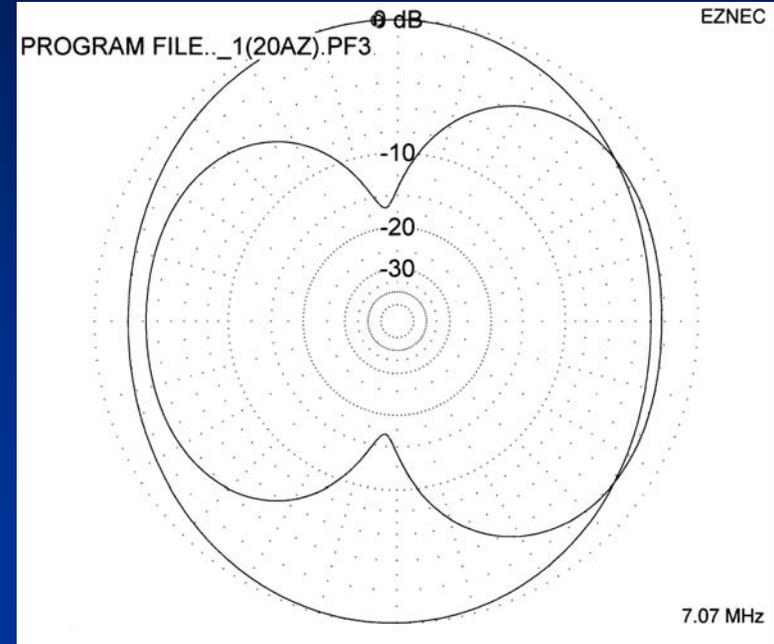
*Delta-loop 40m (low) 20m (tall)*

*40m (outside) 20m (inside)*



40-mtr Delta Loop

Elevation Plot		Cursor Elev	156.0 deg.
Azimuth Angle	0.0 deg.	Gain	-1.41 dBi
Outer Ring	2.03dBi		0.0 dBmax
Slice Max Gain	-1.41 dBi @ Elev Angle = 156.0 deg.		
Beamwidth	40.8 deg.; -3dB @ 130.7, 171.5 deg.		
Sidelobe Gain	-2.28 dBi @ Elev Angle = 23.0 deg.		
Front/Sidelobe	0.87 dB		



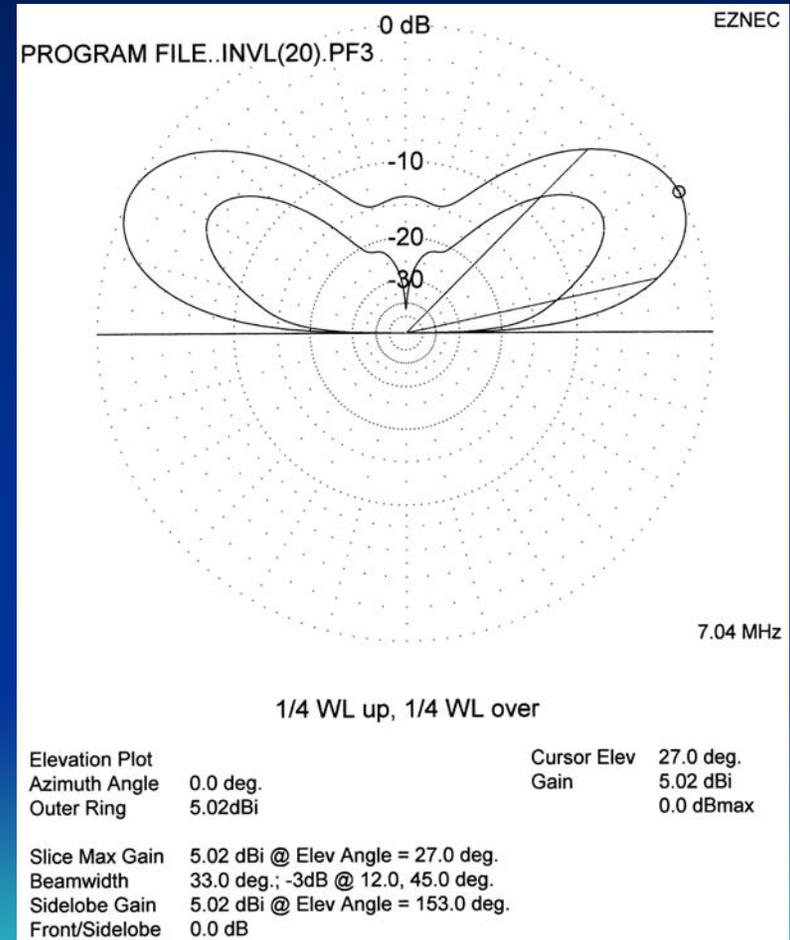
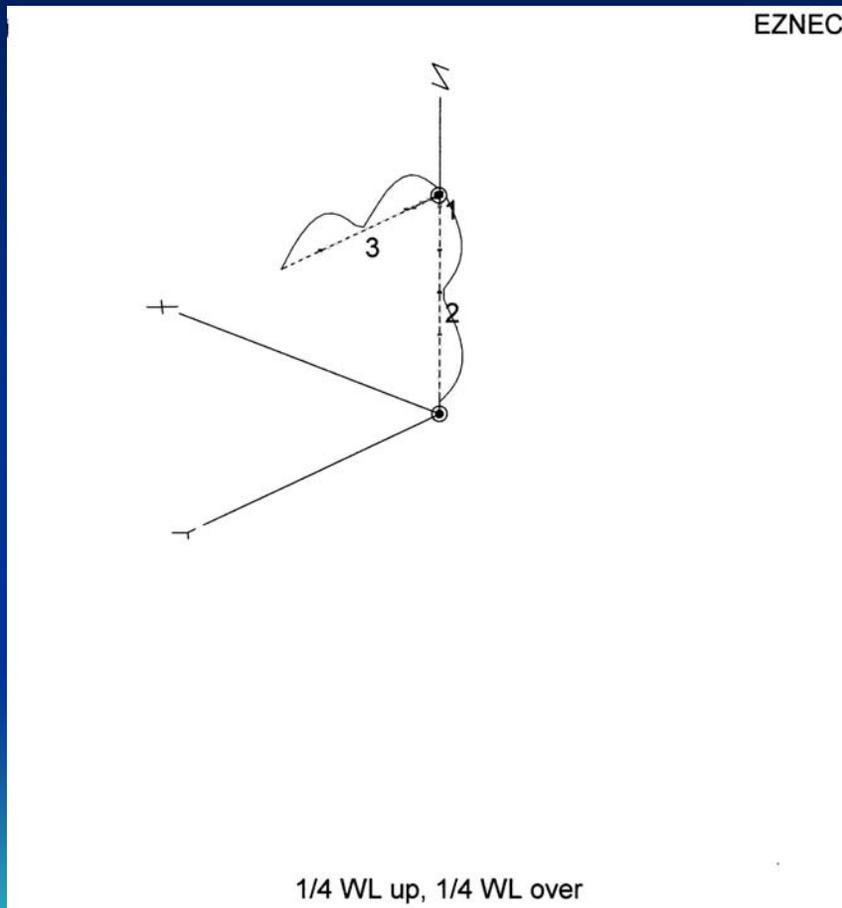
40-mtr Delta Loop

Azimuth Plot		Cursor Az	94.0 deg.
Elevation Angle	25.0 deg.	Gain	0.59 dBi
Outer Ring	0.59dBi		0.0 dBmax
Slice Max Gain	0.59 dBi @ Az Angle = 94.0 deg.		
Front/Back	0.04		
Beamwidth	?		
Sidelobe Gain	0.59 dBi @ Az Angle = 266.0 deg.		
Front/Sidelobe	0.0 dB		

# Antenna Ideas for HF Portable Operations

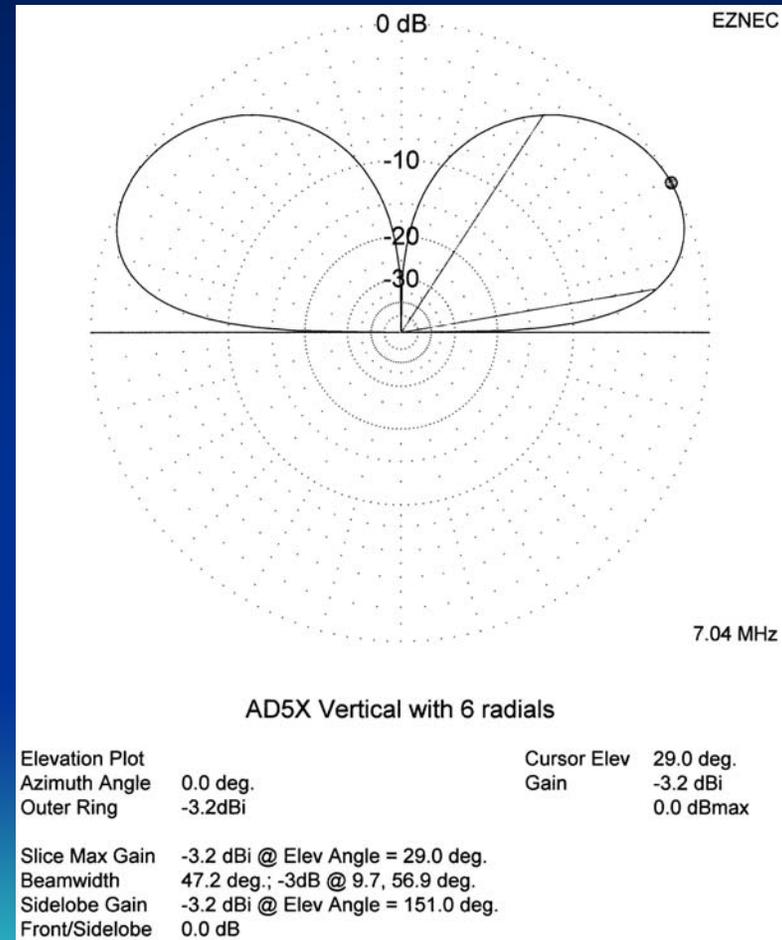
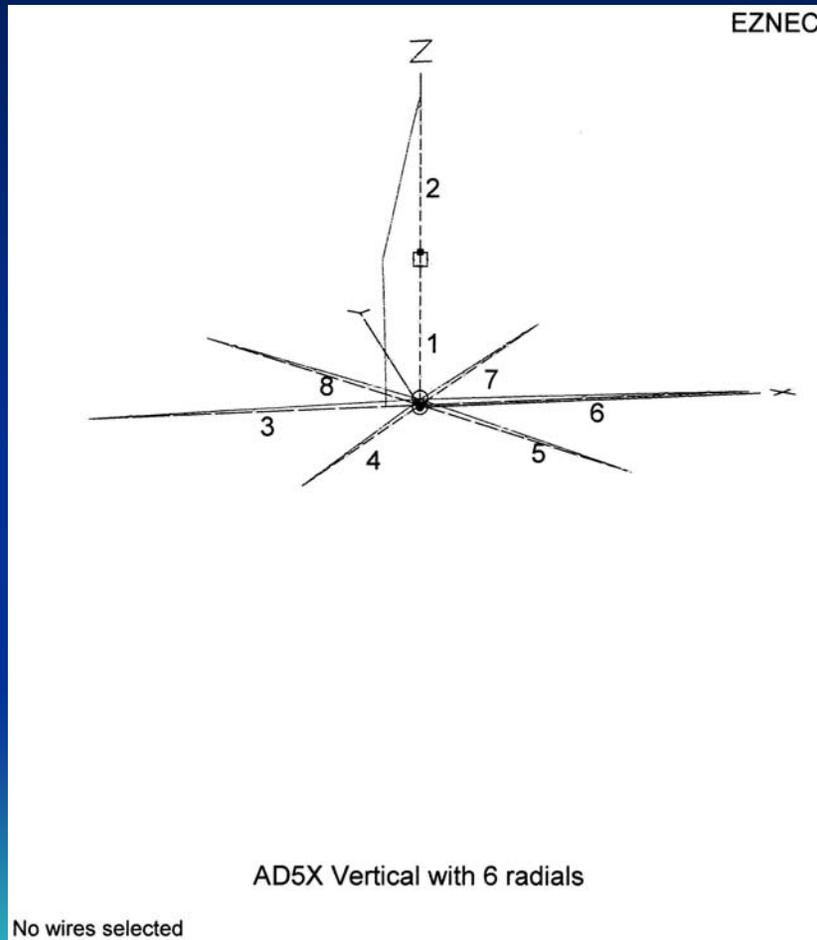
$\frac{1}{4}\lambda$  up,  $\frac{1}{4}\lambda$  over

40m (outside) 20m (inside)



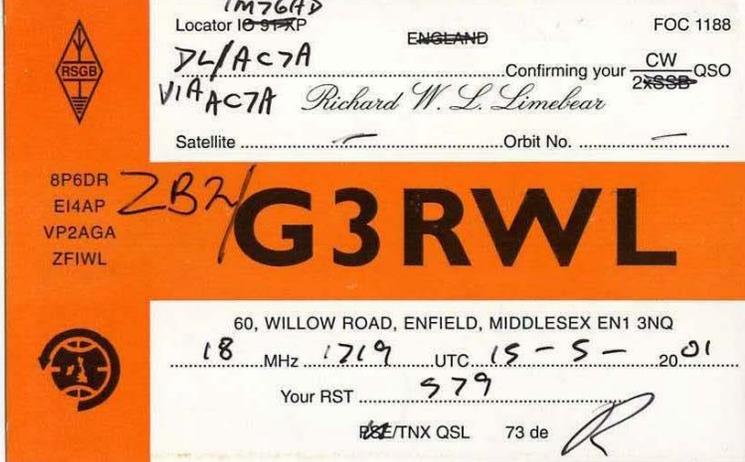
# Antenna Ideas for HF Portable Operations

## AD5X portable vertical on 40m

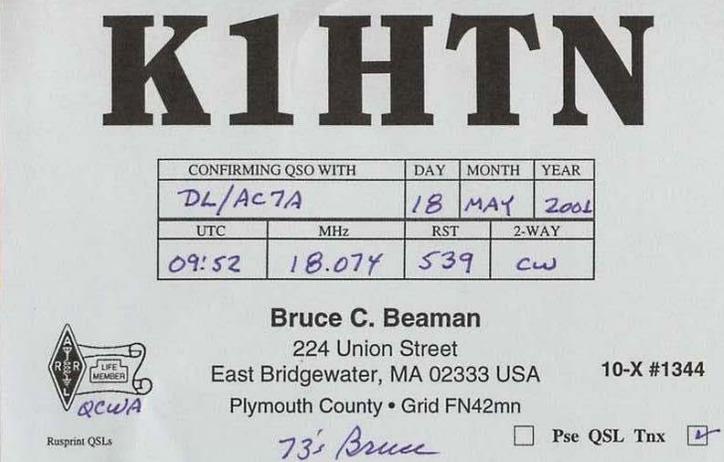


# Antenna Ideas for HF Portable Operations

QSL's from my K2 + delta loop, portable operation in Germany




 Locators: <sup>1M76AD</sup> DL/AC7A, <sup>0-9FKP</sup> ENGLAND, FOC 1188  
 Confirming your <sup>CW</sup> ~~2xSSB~~ QSO  
 via AC7A *Richard W. L. Limebear*  
 Satellite ..... Orbit No. ....  
**G3RWL**  
 8P6DR  
 EI4AP  
 VP2AGA  
 ZFIWL  
 60, WILLOW ROAD, ENFIELD, MIDDLESEX EN1 3NQ  
 18 MHz 1719 UTC 15-5-2001  
 Your RST 579  
 TXN QSL 73 de *R*



**K1HTN**  

CONFIRMING QSO WITH		DAY	MONTH	YEAR
DL/AC7A		18	MAY	2001
UTC	MHz	RST	2-WAY	
09:52	18.074	539	CW	

 Bruce C. Beaman  
 224 Union Street  
 East Bridgewater, MA 02333 USA 10-X #1344  
 Plymouth County • Grid FN42mn  
 *QCWA*  
 Rusprint QSLs  
 73's Bruce  Pse QSL Tnx



**S57UUL** S5  
 ZONE 15 ITU 28 Loc.JN76TN  
 Konrad A. Uršič  
 Kajuhova 19 - 2000 Maribor - Slovenia - Europe  
 Confirming QSO with:  
**DL/AC7A op. Tom via AC7A**  

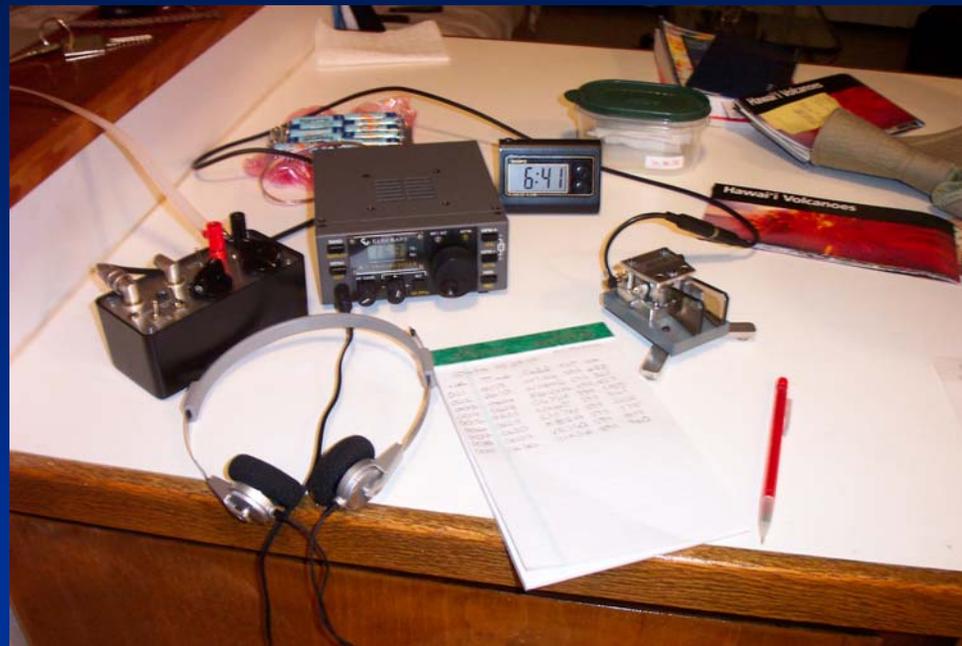
Date	UTC	Mhz	RST/V	2-WAY
16.05.2001	12:08	10.107	559	CW

 TNX FOR NICE QSO QSL DIRECT OR VIA BUREAU  
 GOOD DX AND VY 73s de *Konrad* SLOVENIA



*Greetings from Kosovo*  
  
**4N8/LZIBJ**  


# Antenna Ideas for HF Portable Operations



*K1 portable set-up inside  
20 mtr. sloping dipole outside*

*Kona, Hawaii  
2005*