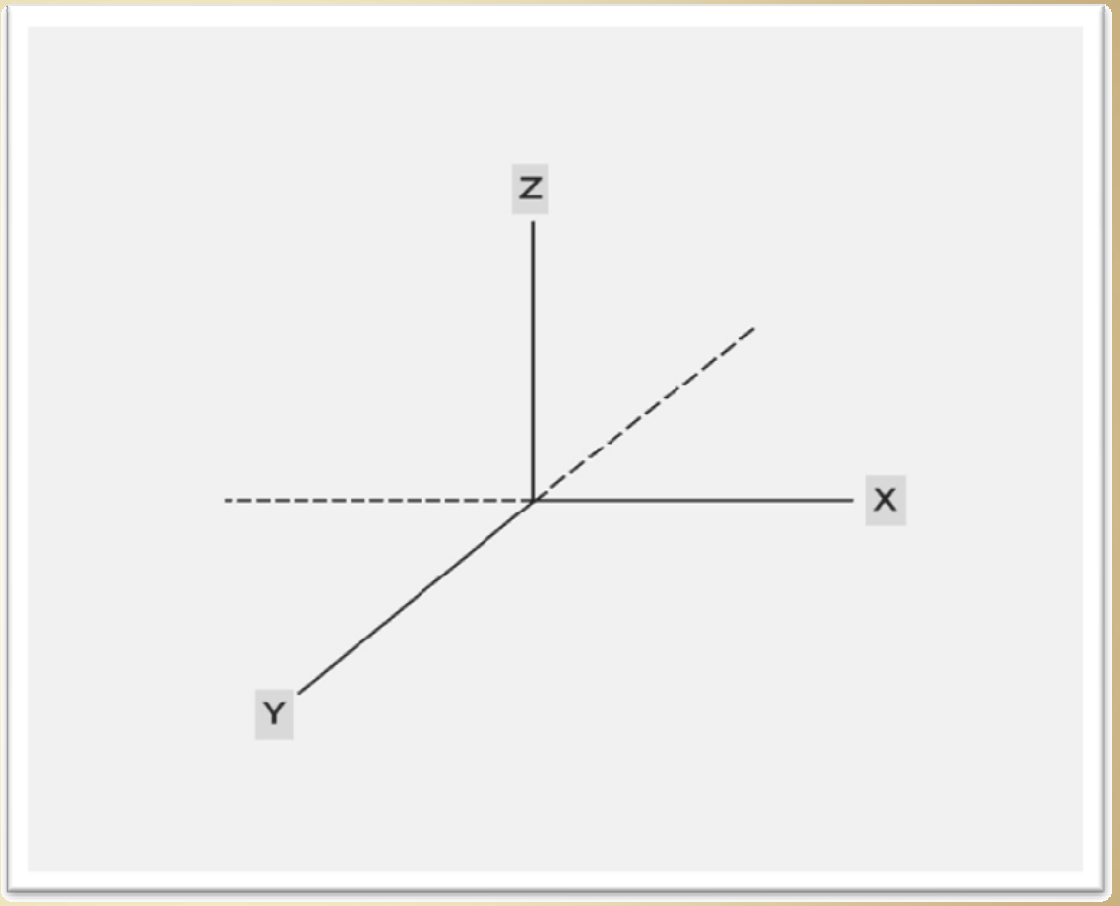
EZNEC Antennas for Home & Field Day

By Jack Morgan – KF6T

A quick tour of EZNEC –

Using 3D coordinates



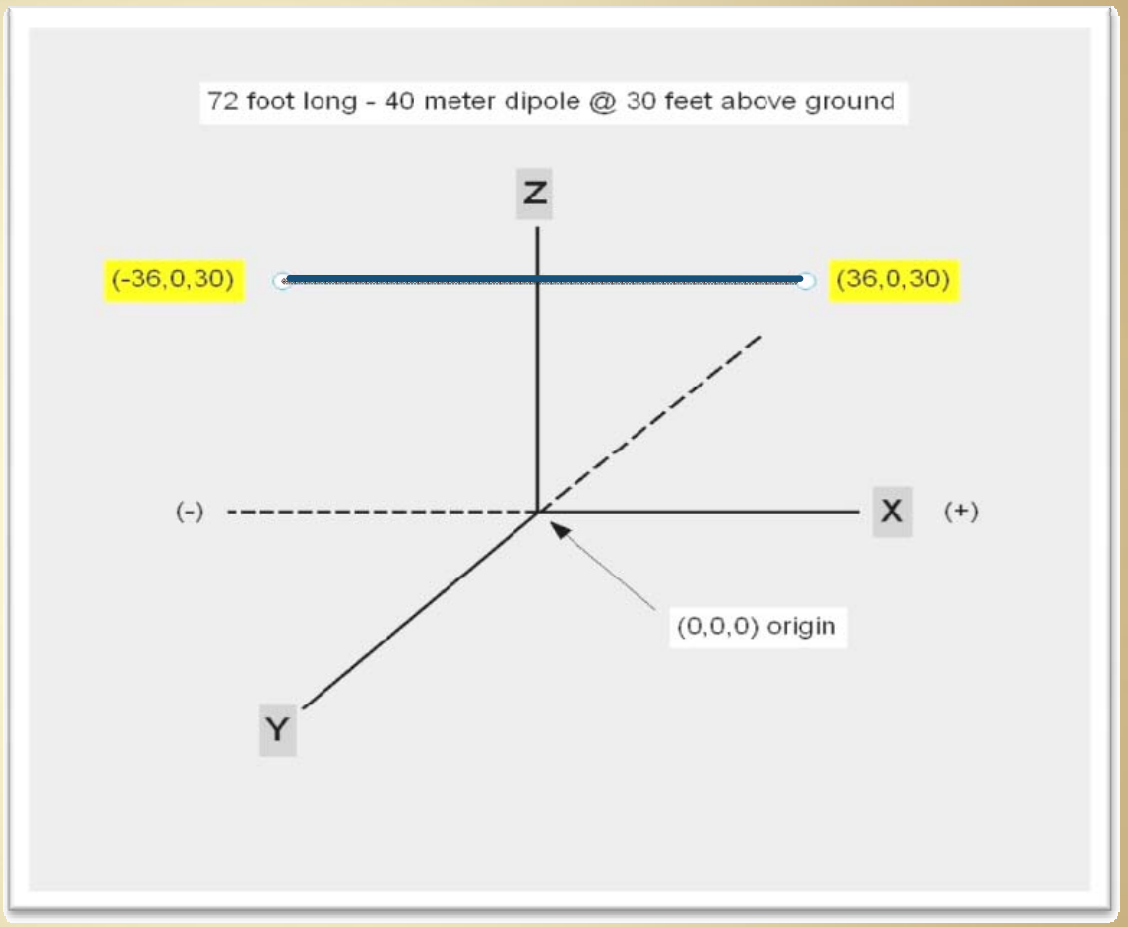
Using 3D Coordinates

Add a 72 foot dipole
30 feet above ground

The dipole is centered
on the origin, plus
and minus 36 ft

The dipole is aligned
directly over the X-axis
so Y = 0

EZNEC XYZ coordinates
are shown in yellow



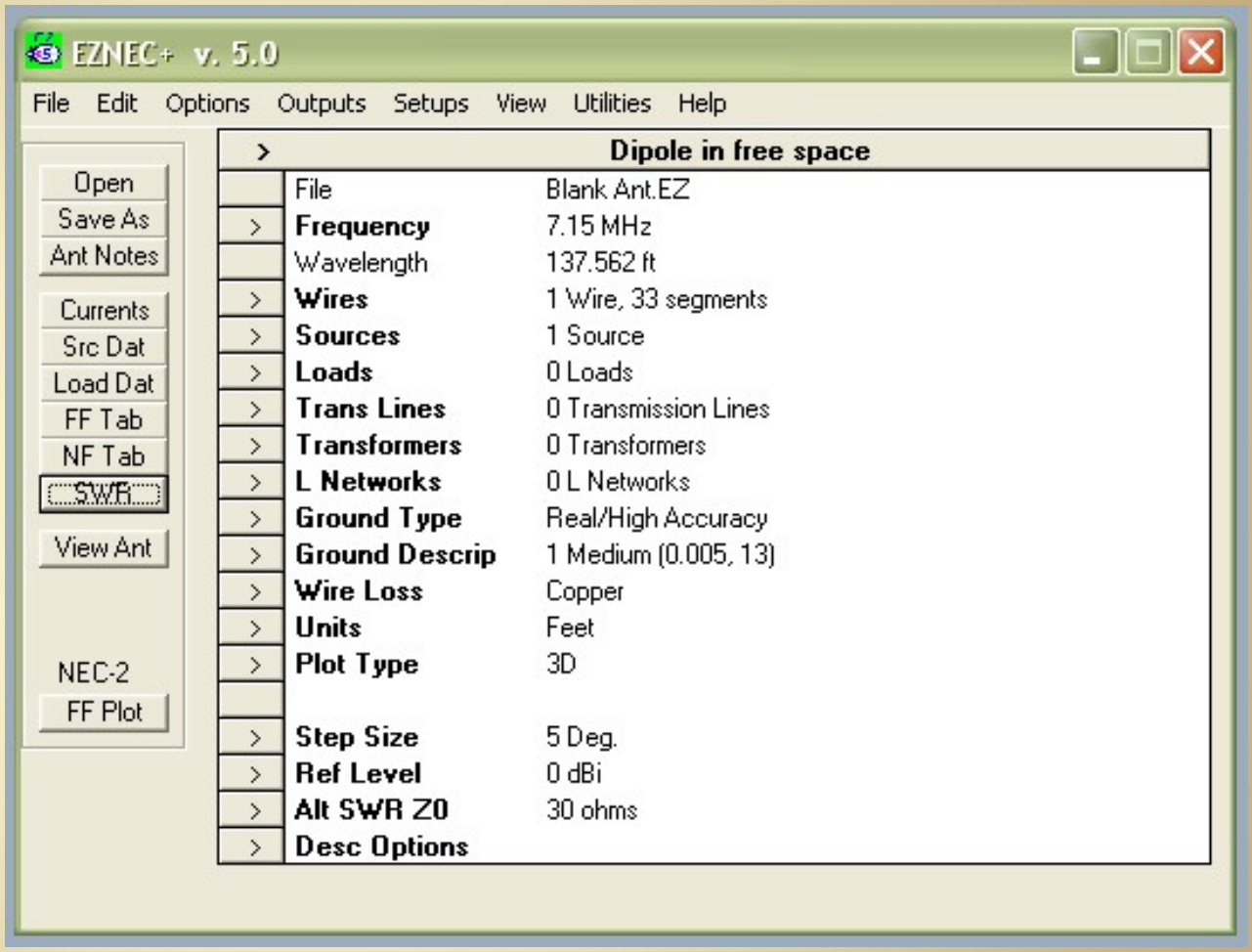
The EZNEC home screen

Frequency is set to 7.15

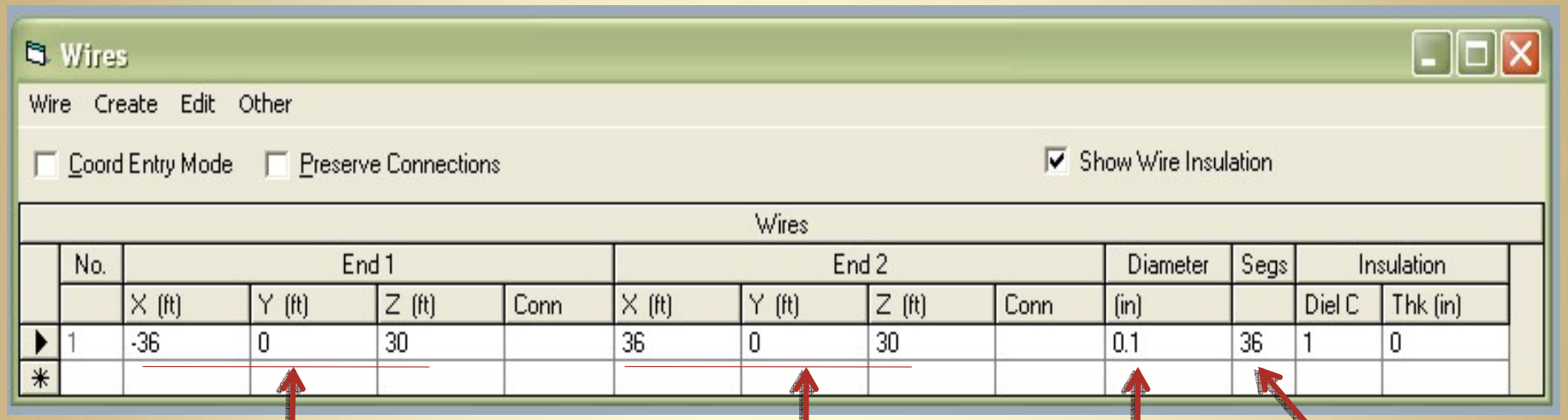
Dipole is fed in center

Dimensions are entered in the “wires” table

Look at VSWR first



Wires table -



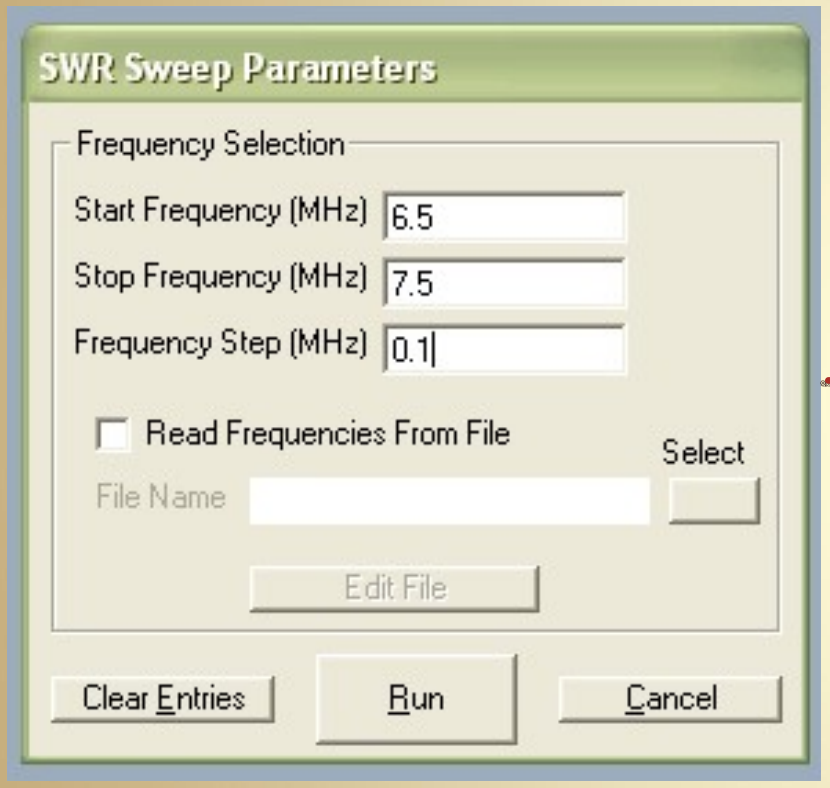
Left end data

Right end data

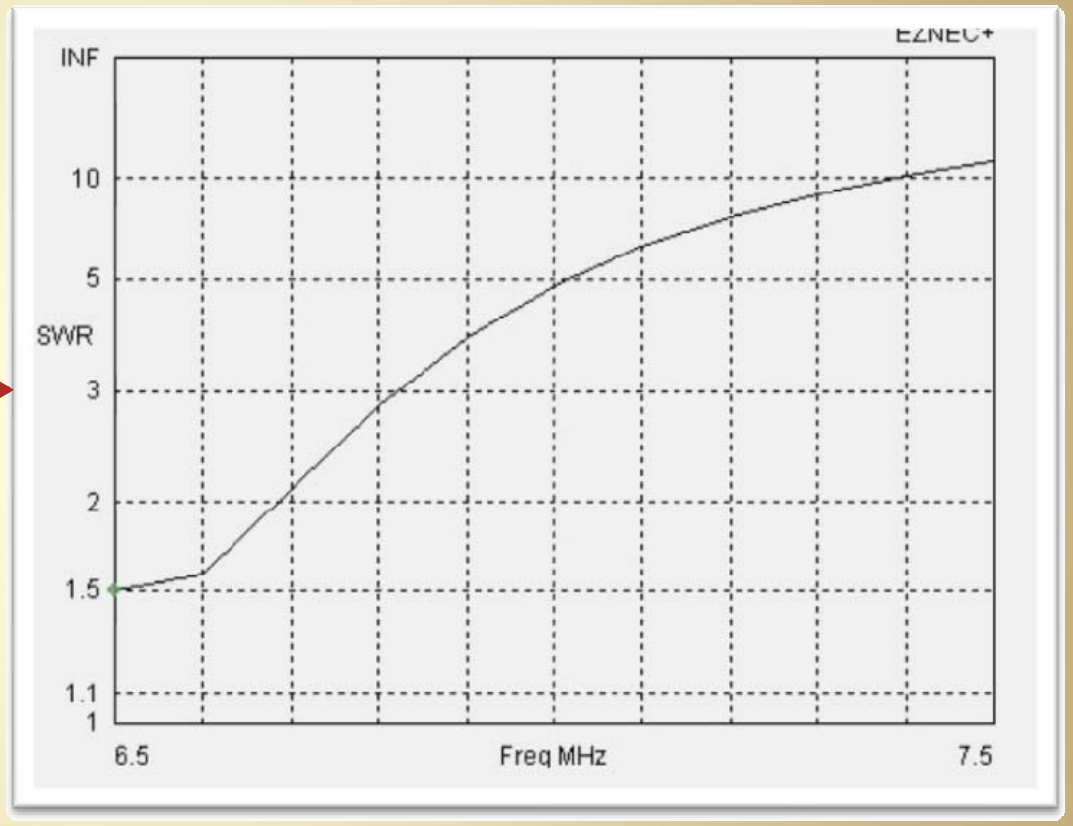
Wire dia

#Segs

VSWR sweep setup box



Resulting VSWR – too low in freq!



“Wires” List

Wires

Wire Create Edit Other

☐ Coord Entry Mode ☐ Preserve Connections ☑ Show Wire Insulation

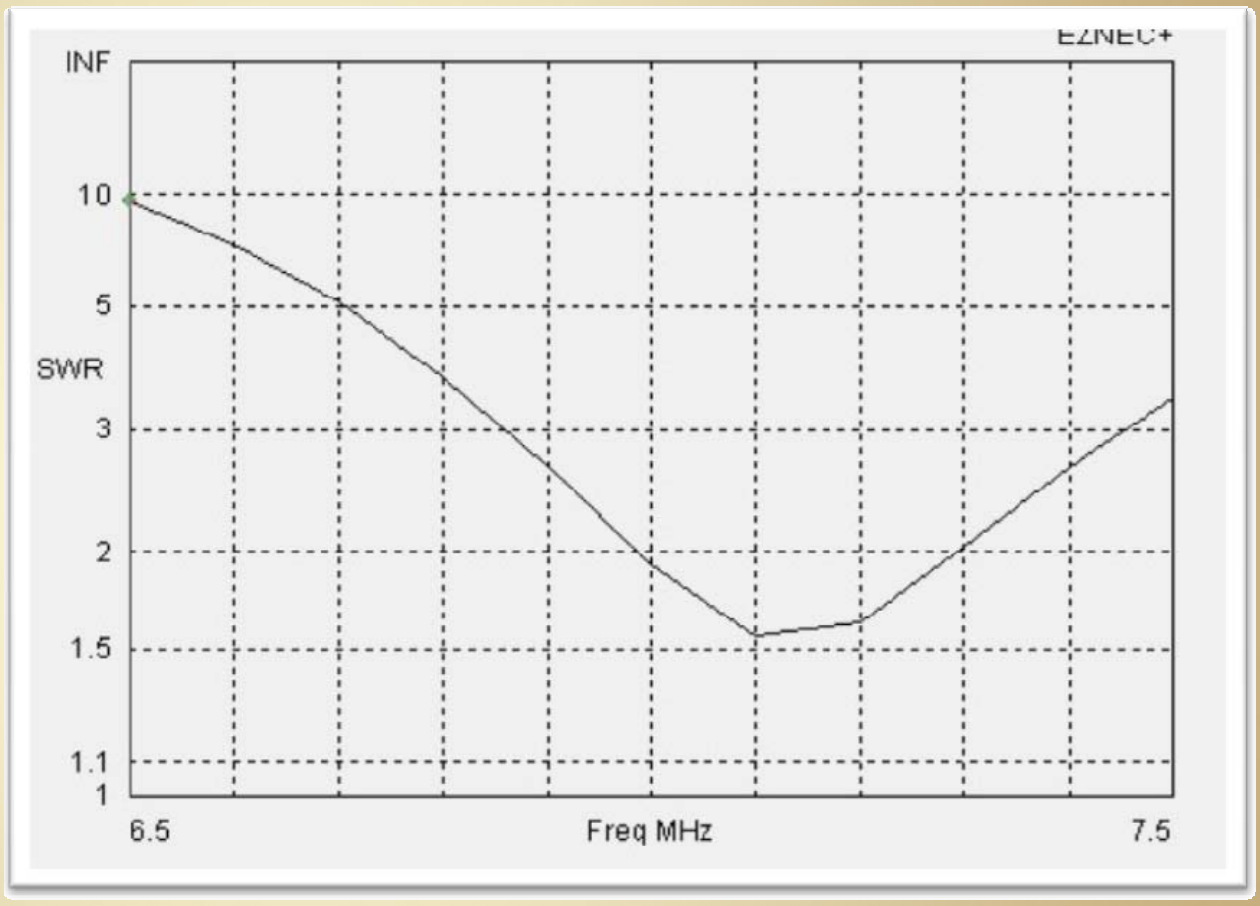
Wires

	No.	End 1				End 2				Diameter	Segs	Insulation	
		X (ft)	Y (ft)	Z (ft)	Conn	X (ft)	Y (ft)	Z (ft)	Conn	(in)		Diel C	Thk (in)
▶	1	-33	0	30		33	0	30		0.1	66	1	0
*													

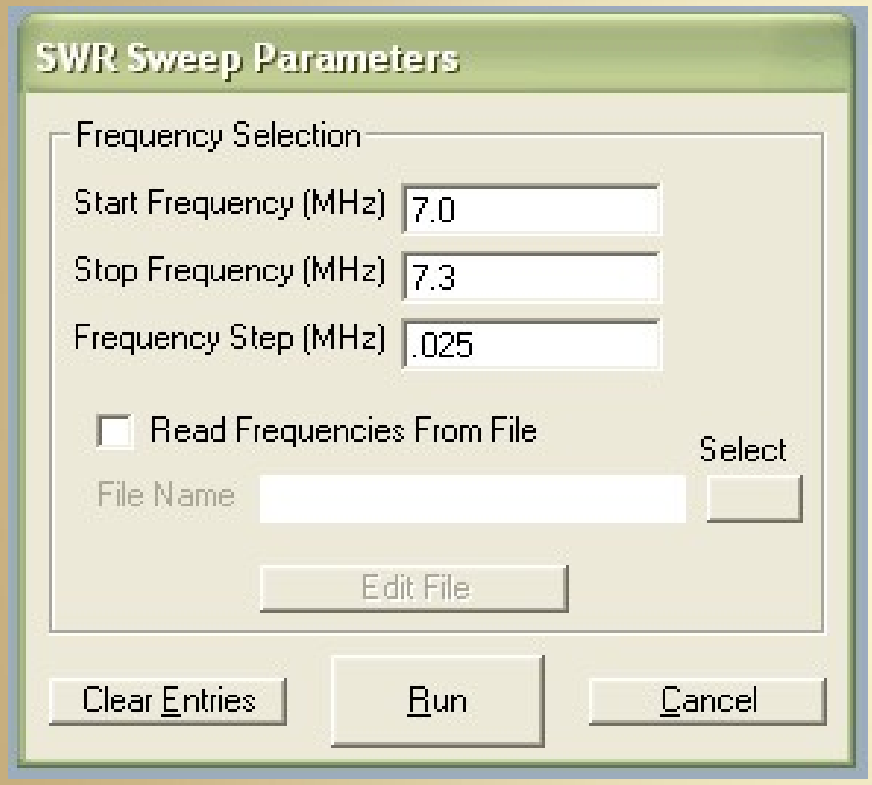
Making it shorter - 36 ft down to 33 (66 feet overall)

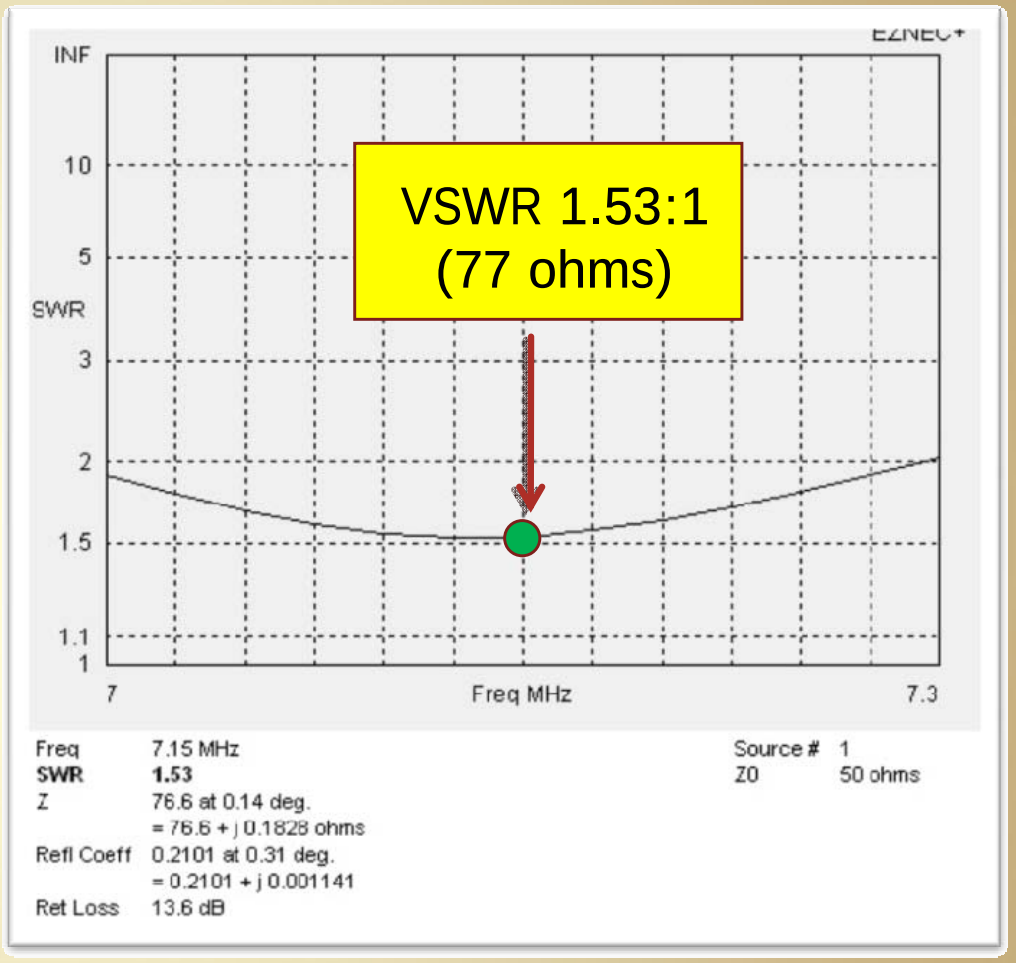
Resonance point now appears to be 7.1 mHz

We need to tighten the frequency scan and take a closer look

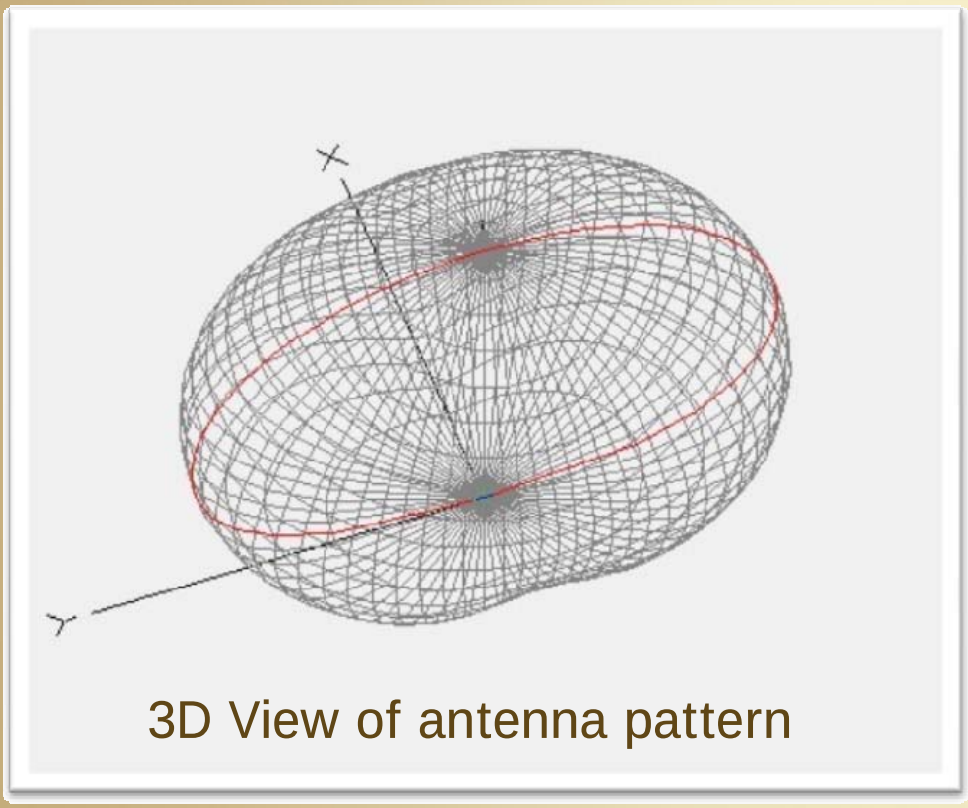


Scanning 7.0 to 7.3 mHz with .025 mHz steps (gives 12 points)

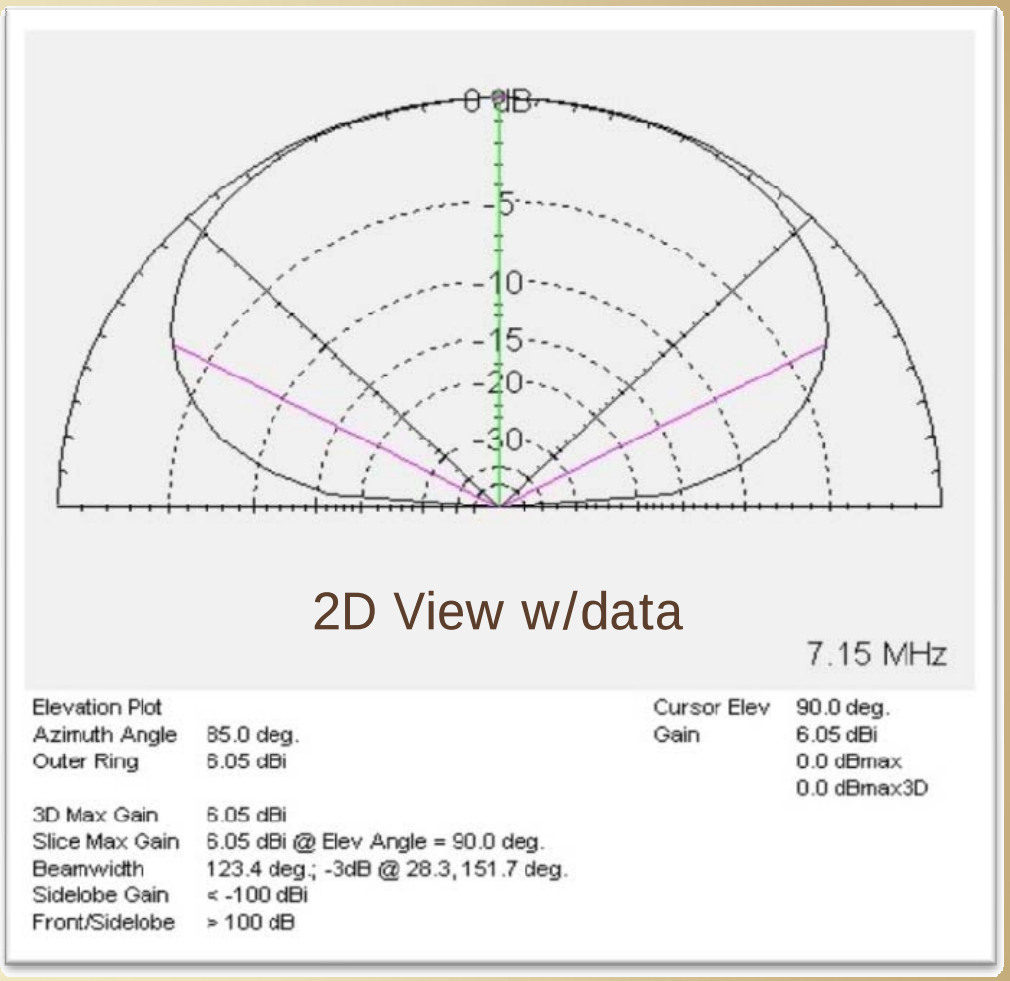




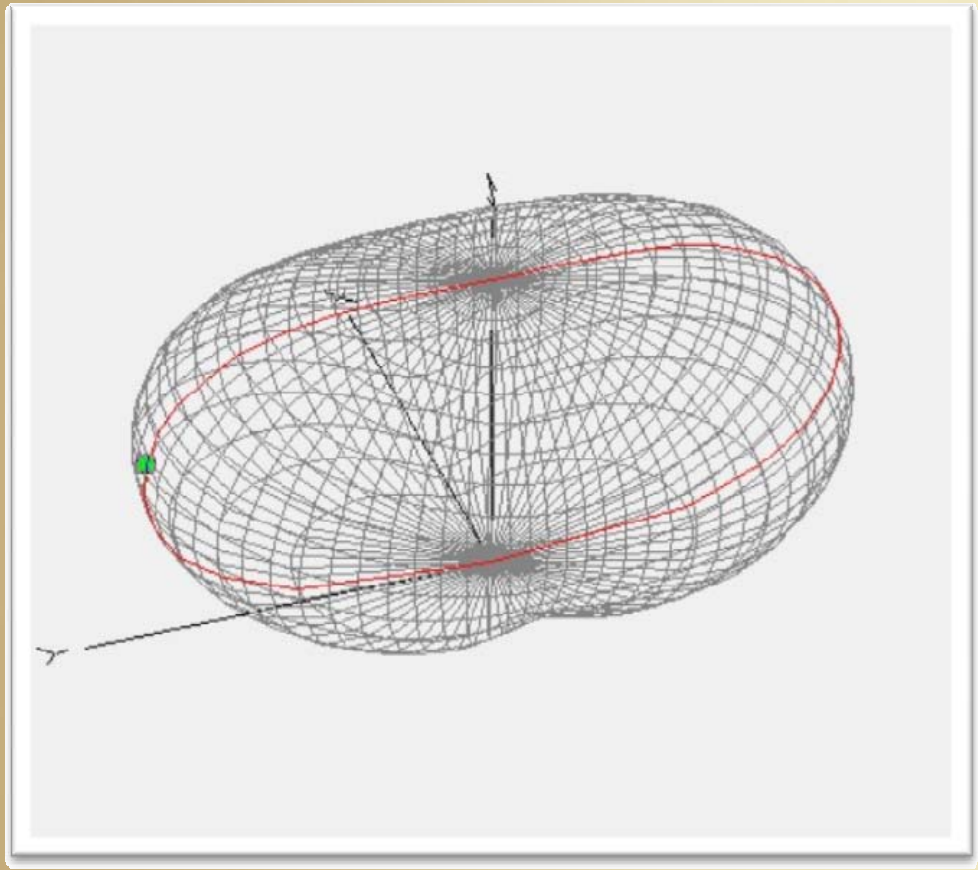
3D View - 40m dipole at 30 feet - A nice “cloud warmer”



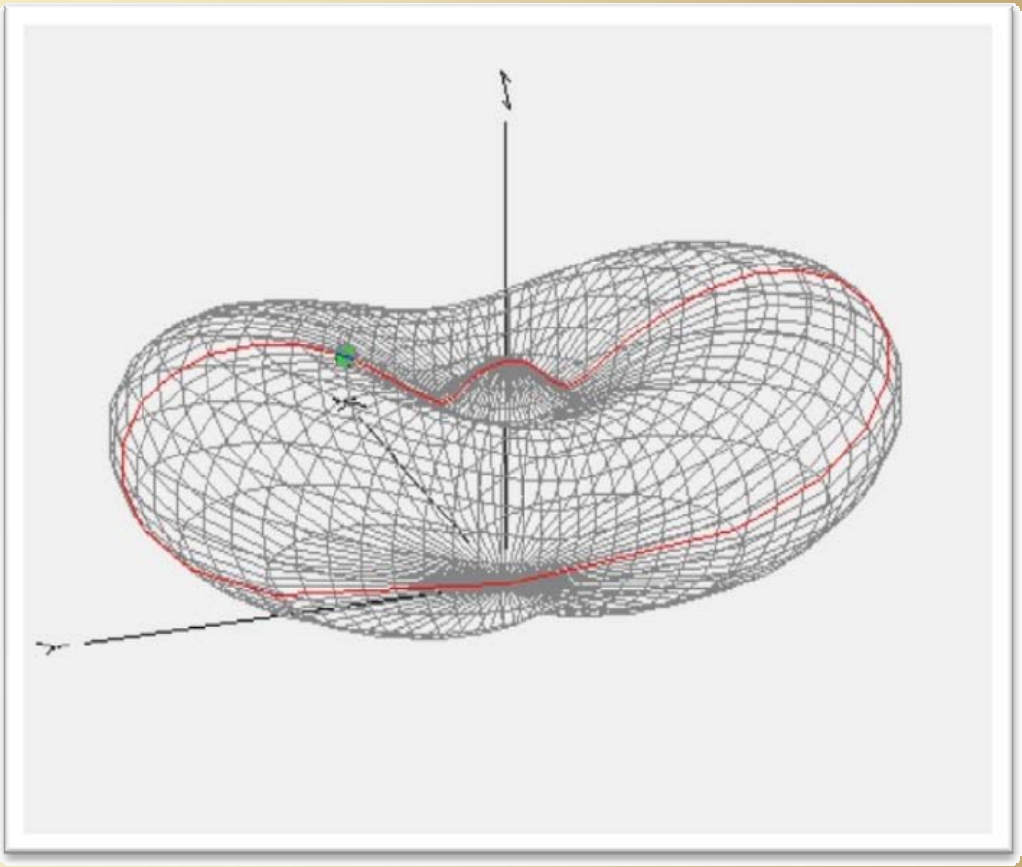
3D View of antenna pattern



40m dipole at **50** feet



40m dipole at **70** feet



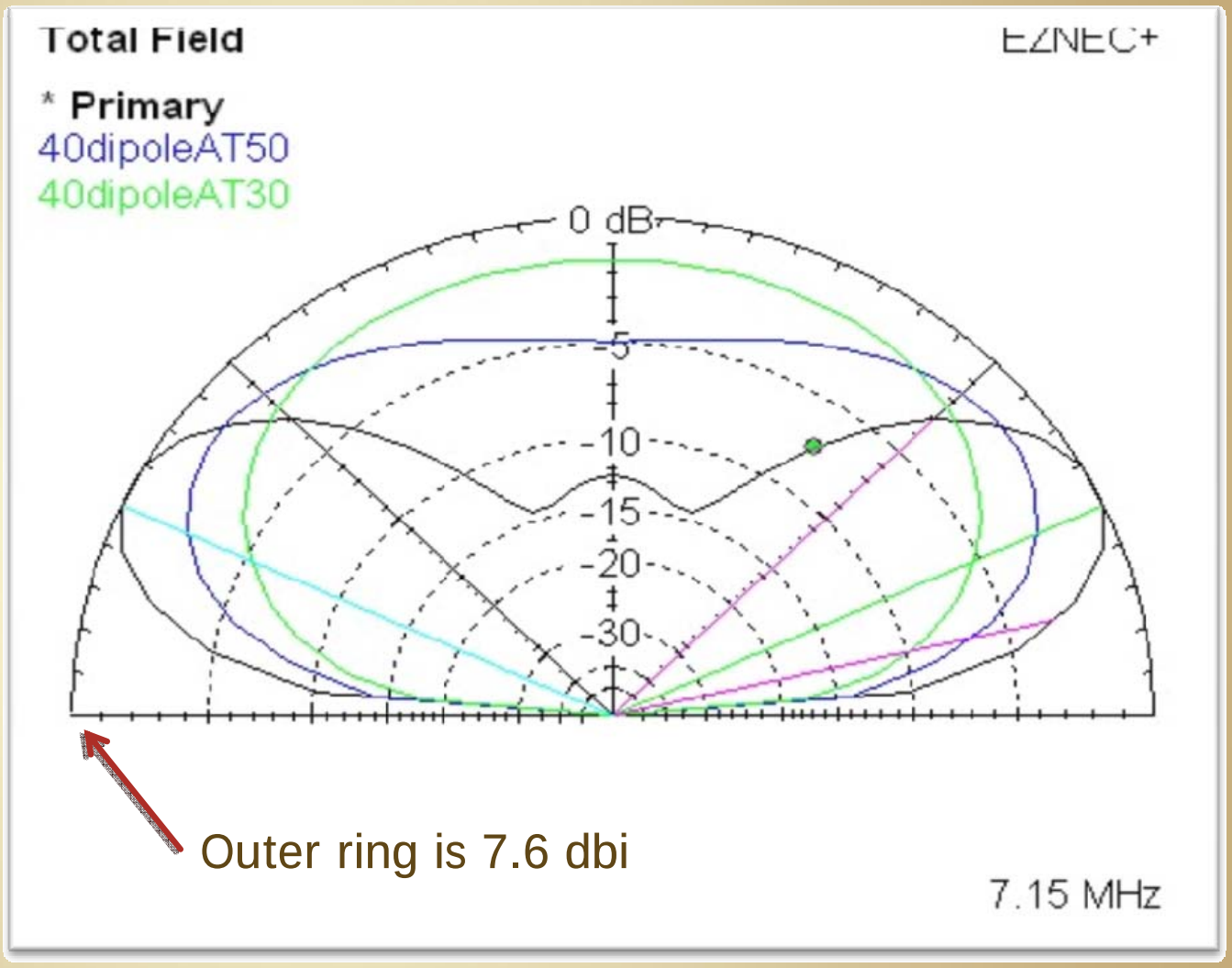
Plot Overlays

Green trace = 30 ft

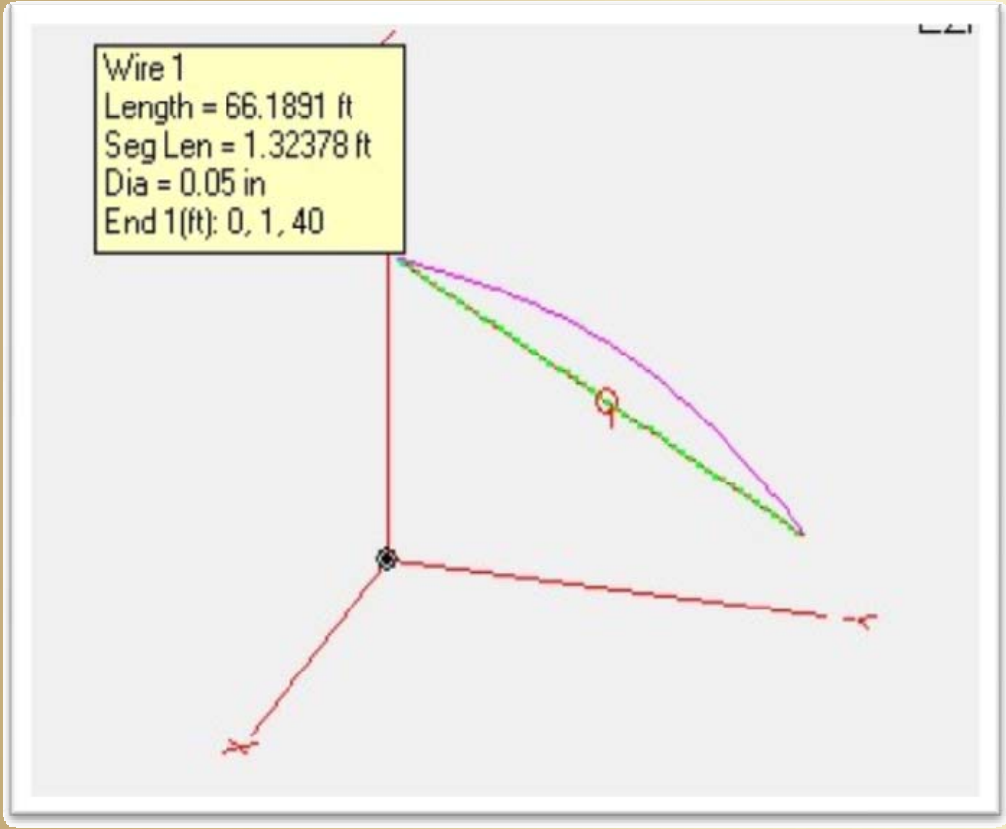
Purple trace = 50 ft

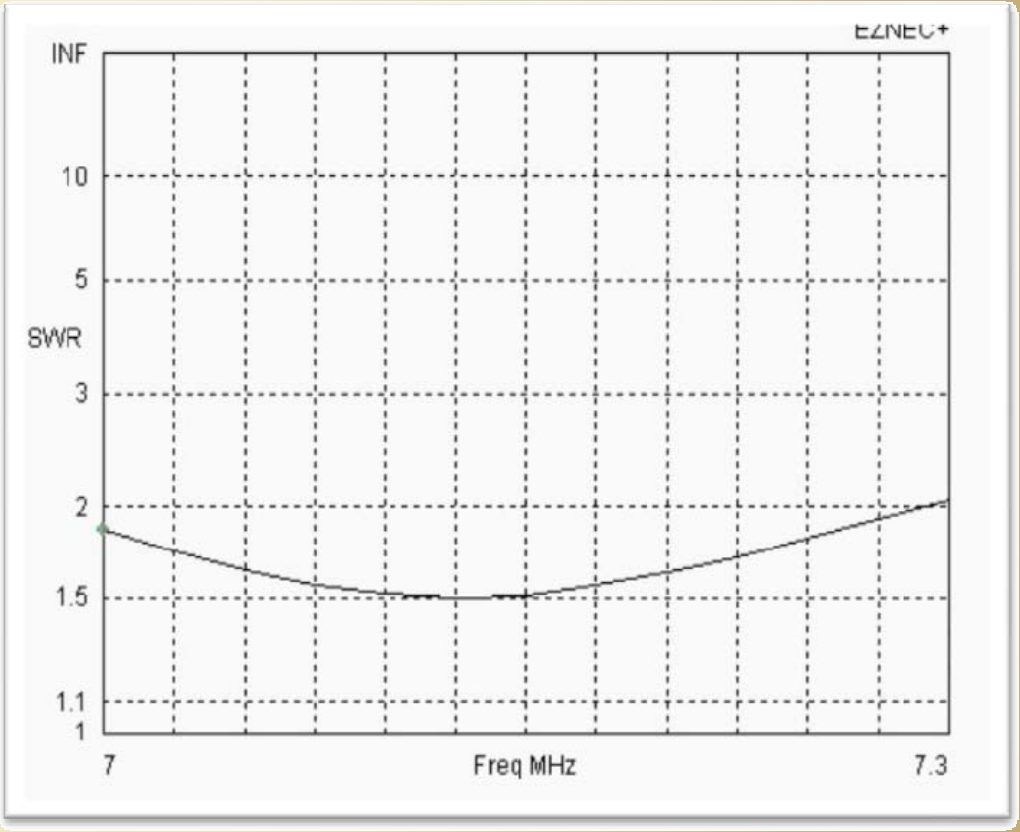
Black trace = 70 ft

Dipole @ 50 feet looks to be best compromise for Field Day



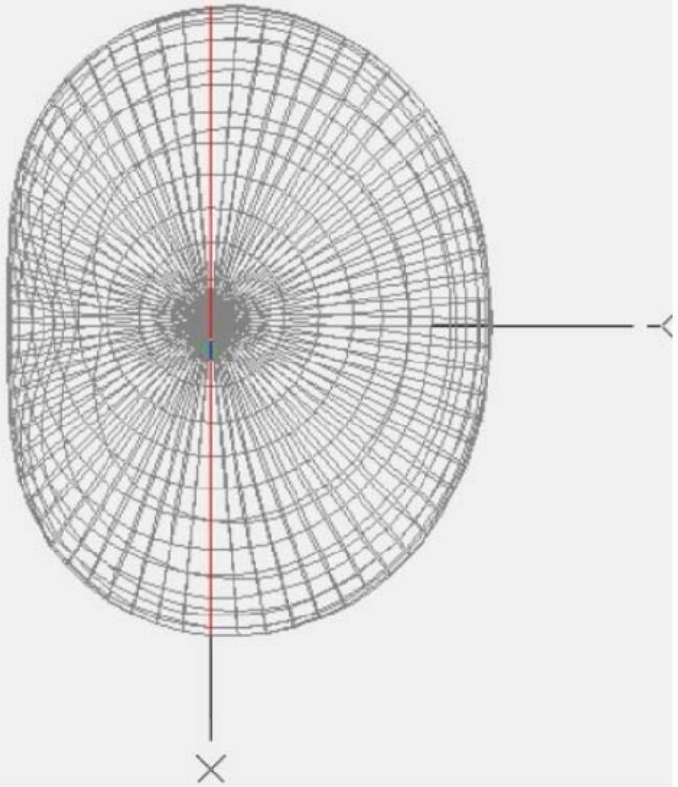
40 meter sloper – top is @ 40 ft, bottom @ 10 ft

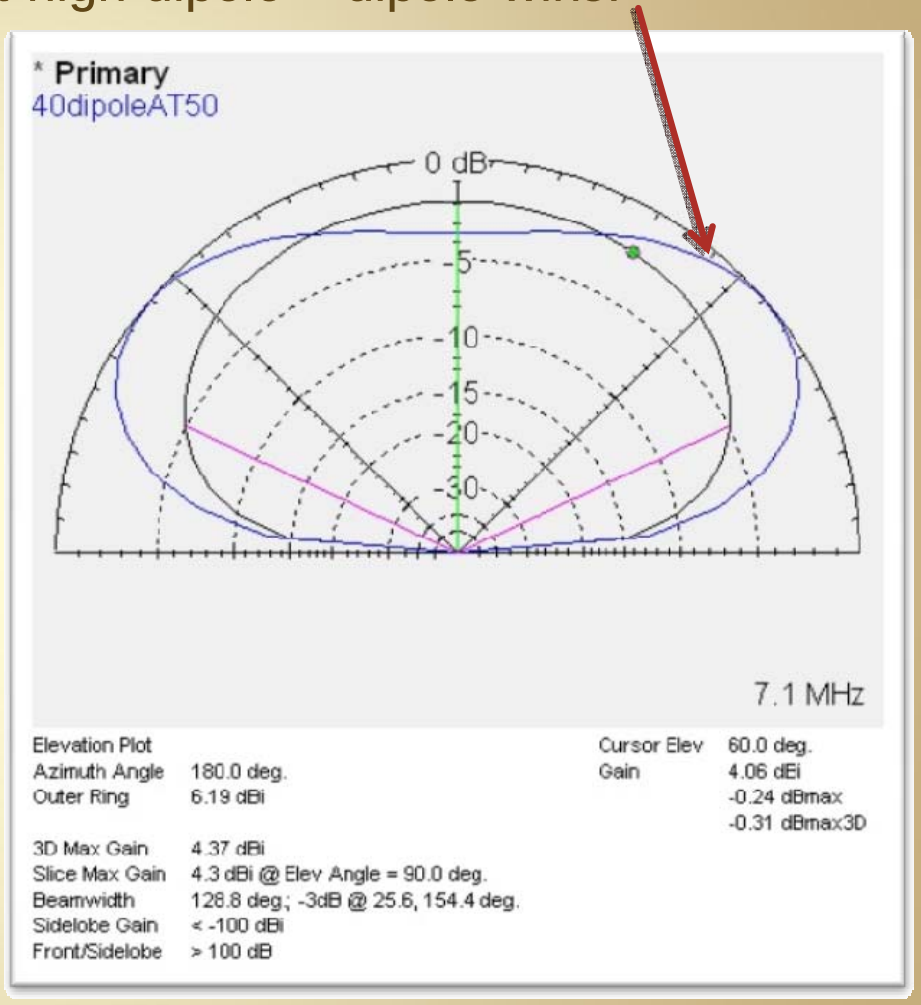




Comparing our sloper to 50 ft high dipole – dipole wins!

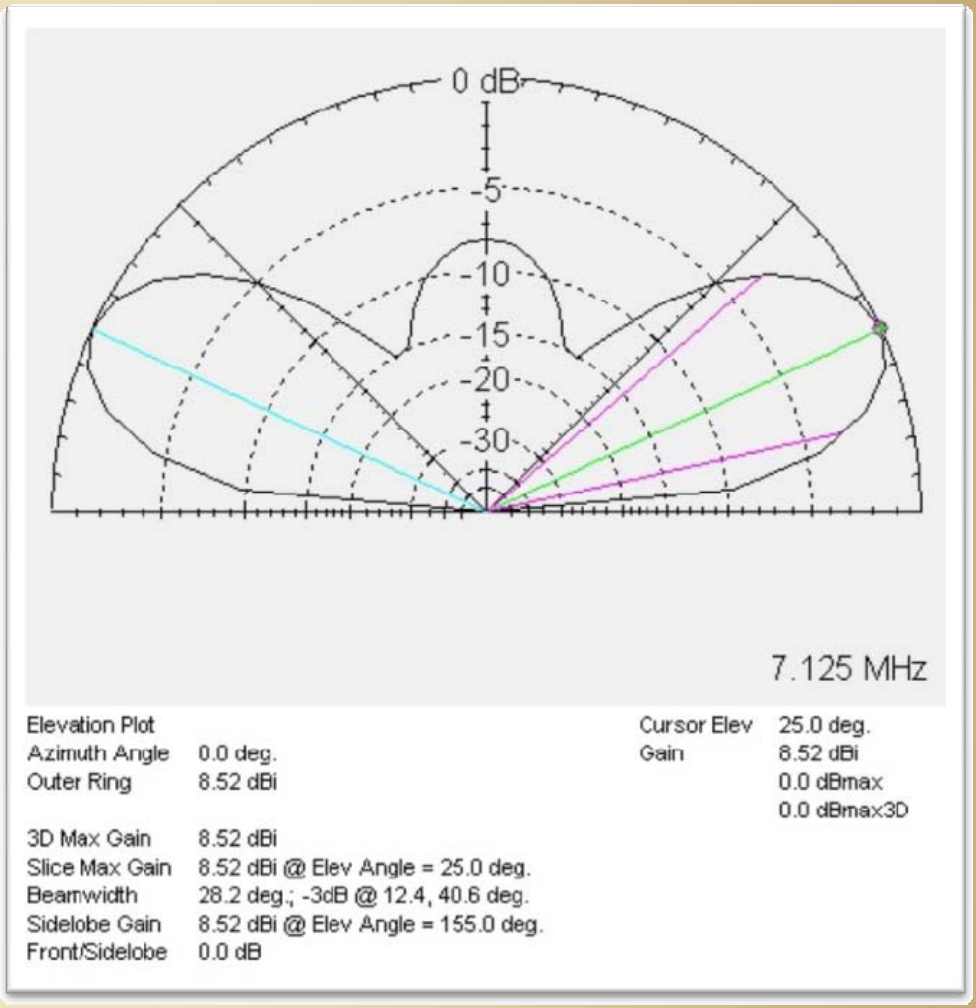
40 meter sloper pattern





40 Meter Rotary Dipole

54 foot element – toroidal loading



Elevation Plot		Cursor Elev	25.0 deg.
Azimuth Angle	0.0 deg.	Gain	8.52 dBi
Outer Ring	8.52 dBi		0.0 dBmax
			0.0 dBmax3D
3D Max Gain	8.52 dBi		
Slice Max Gain	8.52 dBi @ Elev Angle = 25.0 deg.		
Beamwidth	28.2 deg.; -3dB @ 12.4, 40.6 deg.		
Sidelobe Gain	8.52 dBi @ Elev Angle = 155.0 deg.		
Front/Sidelobe	0.0 dB		

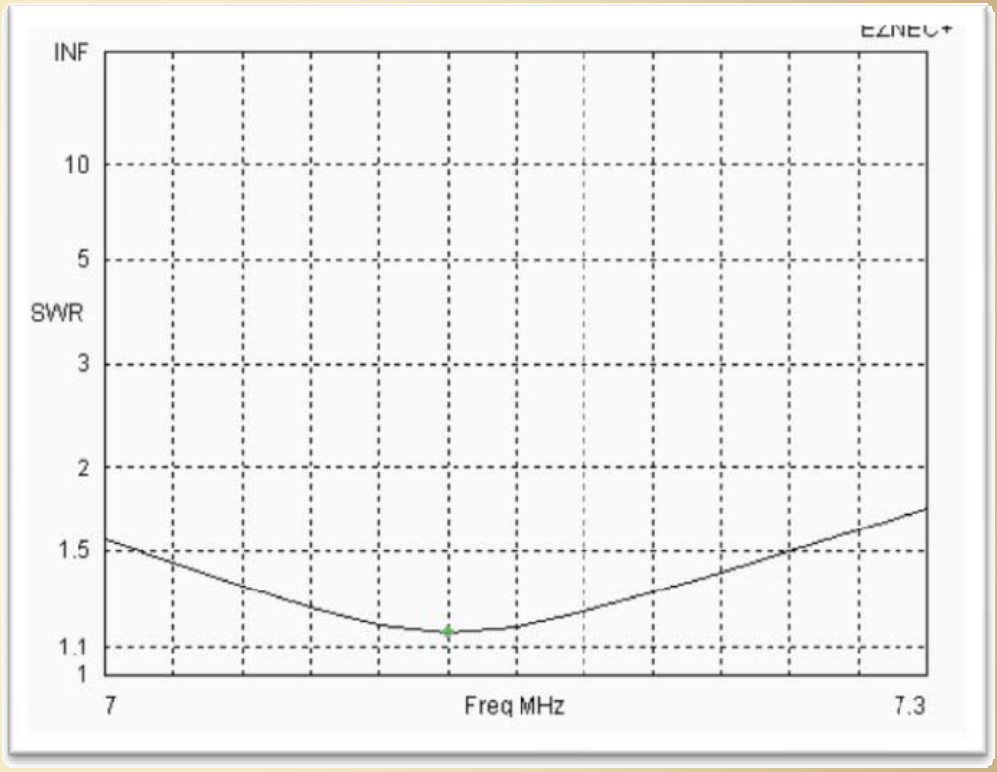
40 Meter Rotary Dipole

Full size is too big – 67’

Shorter (38-42 feet) loaded designs have higher VSWR and don’t cover all of the band

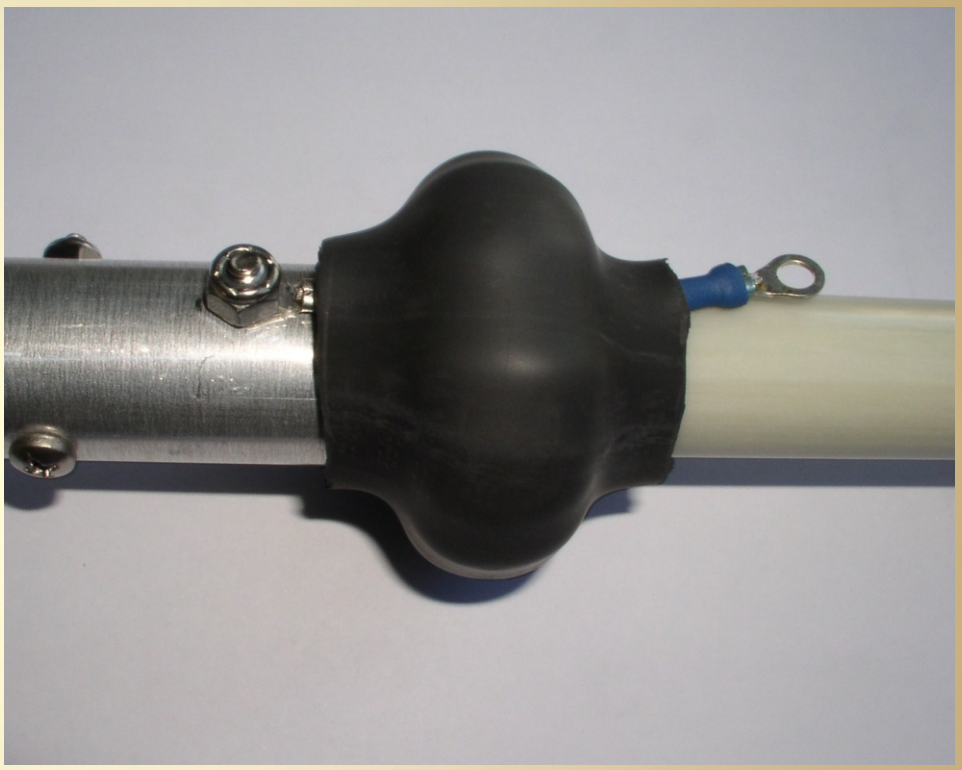
The “sweet spot” is at 54’

This design uses toroidal loading coils



40 Meter Rotary Dipole

Toroidal loading coil on element



Raychem “gooey” shrink tubing – very compact, strong w/low wind resistance

40 Meter Rotary Dipole

Fiberglass reinforced center section

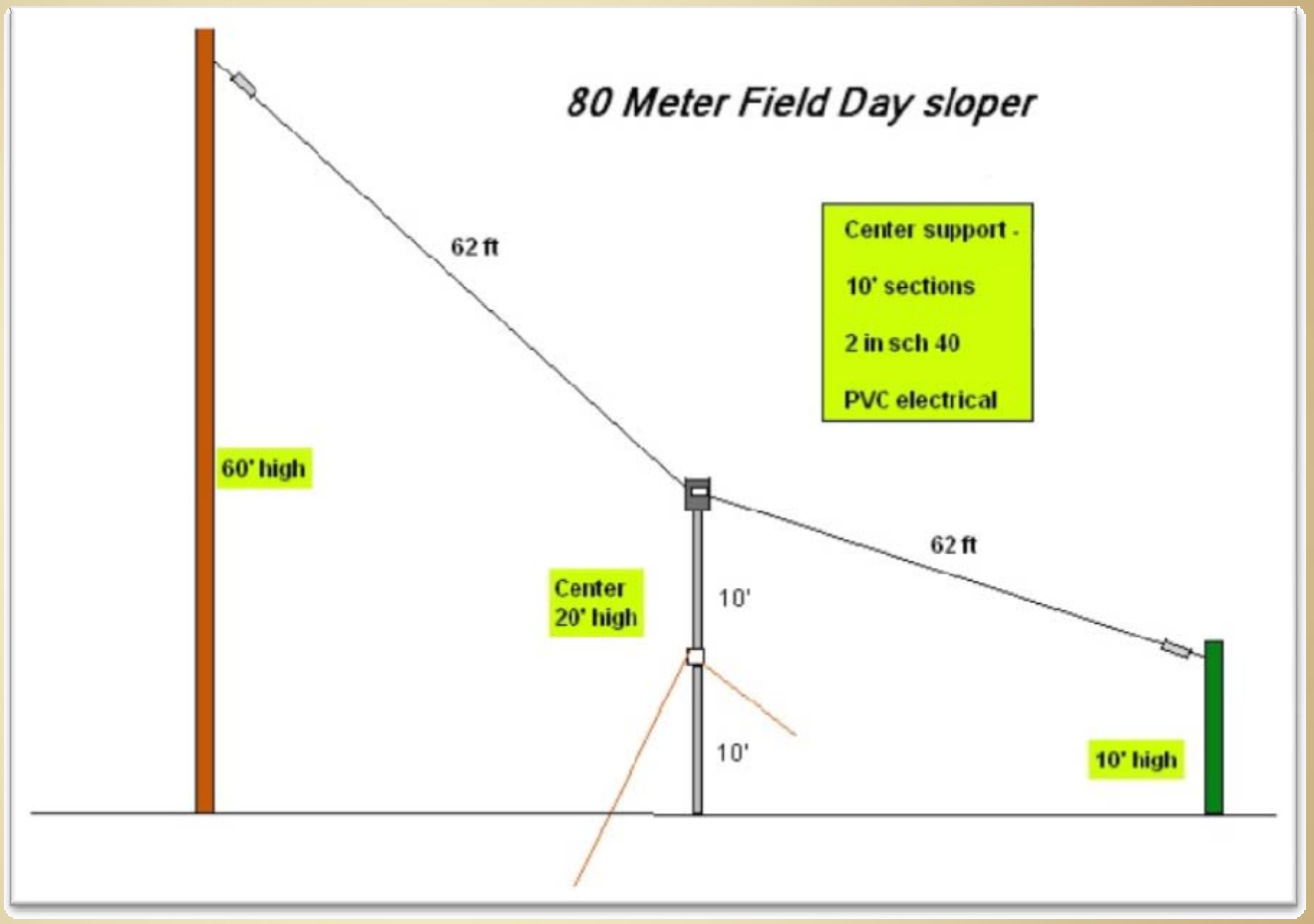
Direct feed – 50 ohms
VSWR < 1.5:1 typ full band

80/75 Meter Sloper

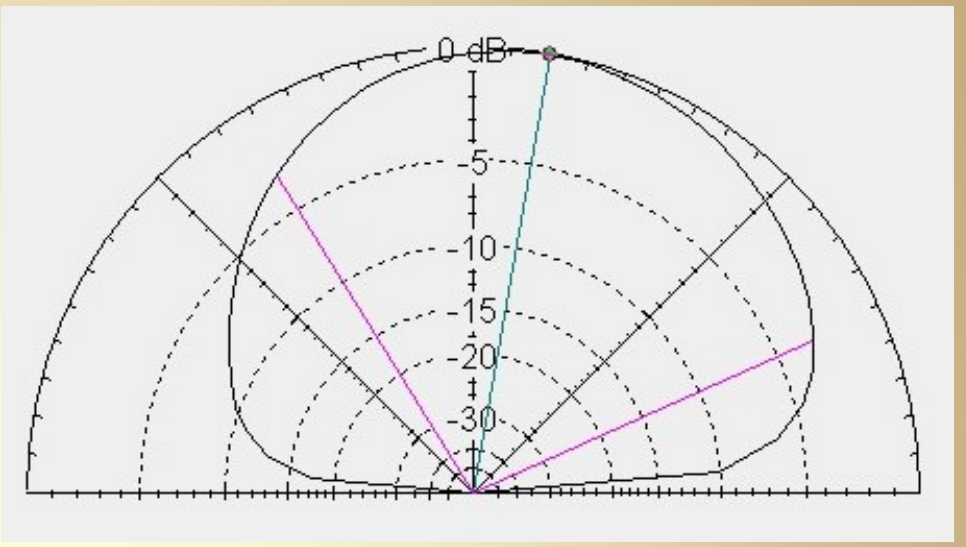
One tall support

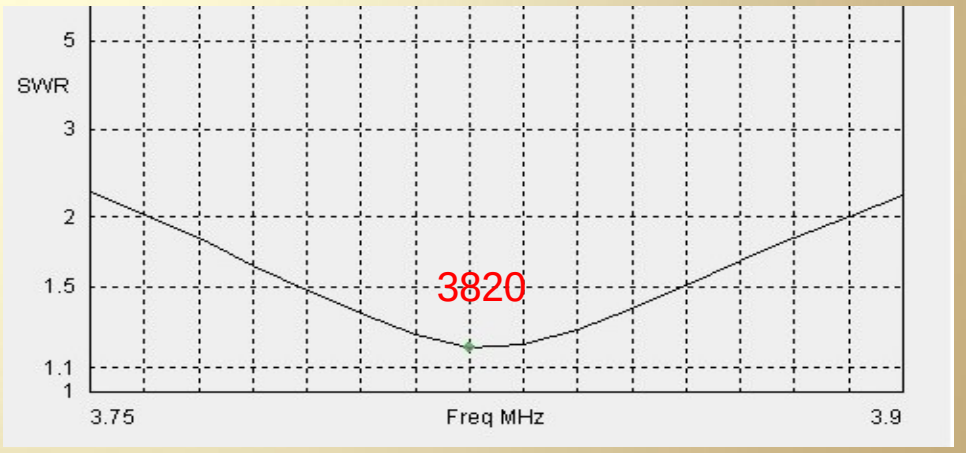
Remotely Switched
- 80 to 75

Minimal support
side pull



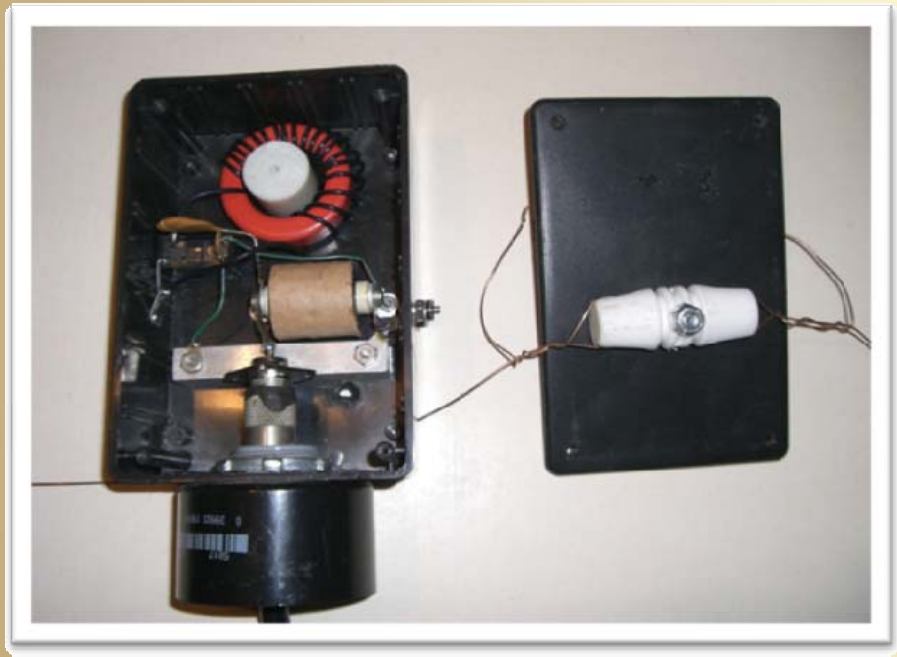
80/75 Meter Sloper



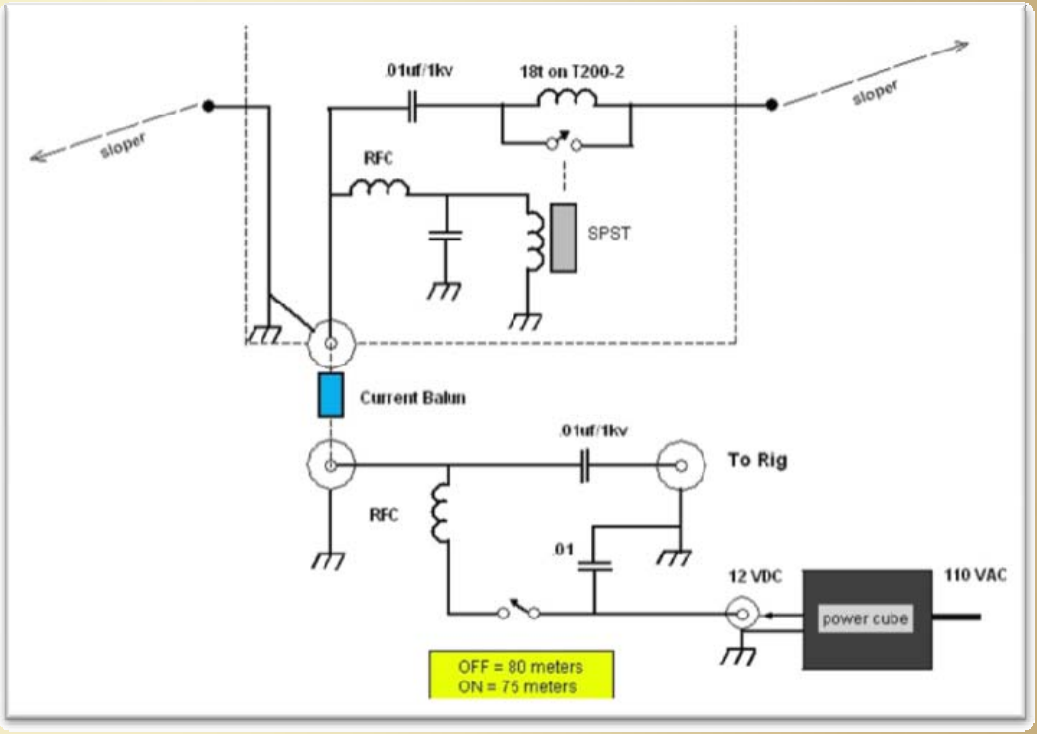


80/75 Meter Sloper

Switch box sits on 20’ PVC pole



Relay shorts out 6 uH inductor for 75 m



80/75 Switchbox

Located at the bottom (middle) of my 80m Delta Loop

Direct feed – 50 ohm

Relay inserts 10 uH for operation on 80

Folded balun shown

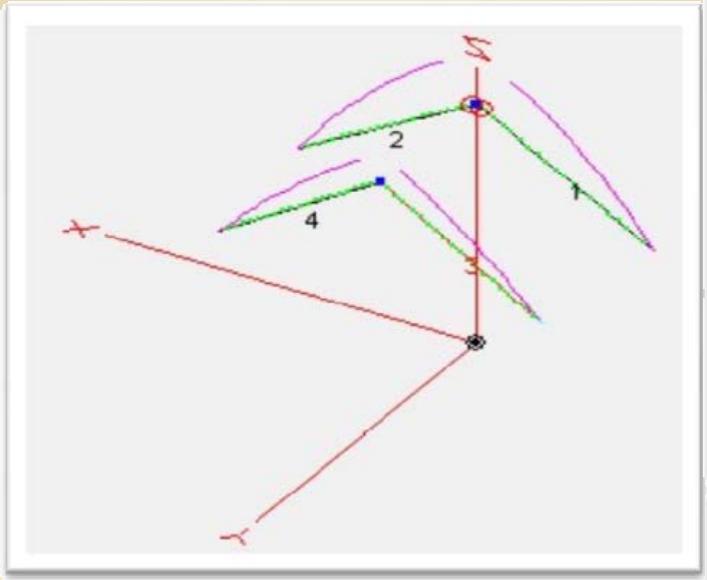
40 m 2 el inverted V

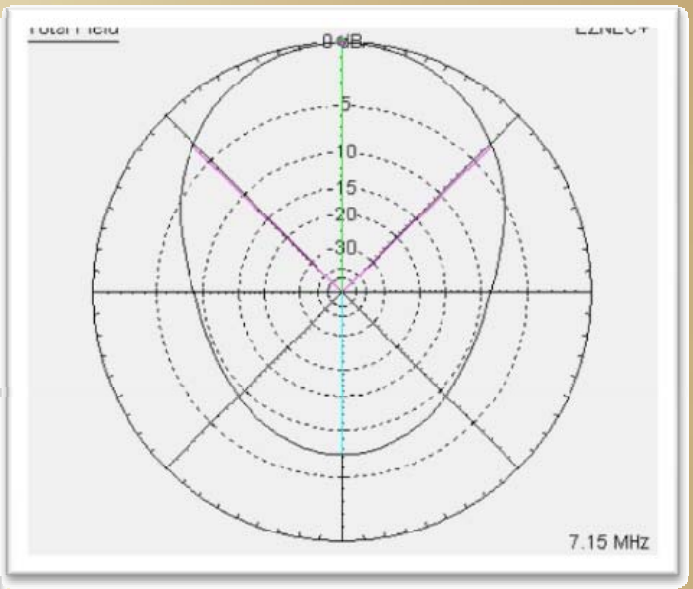
Hang from catenary between two trees

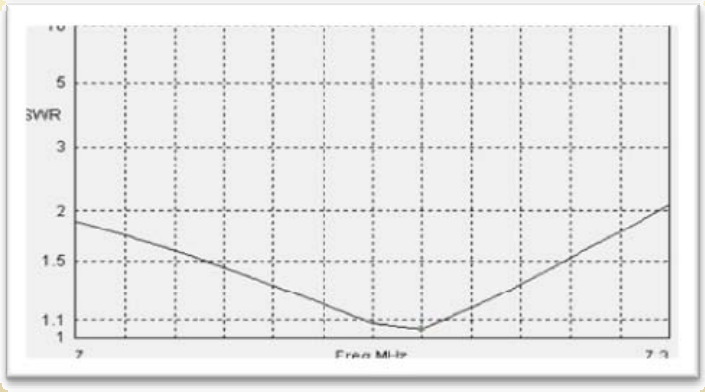
Solid performer at K6AO FD site 5 yrs

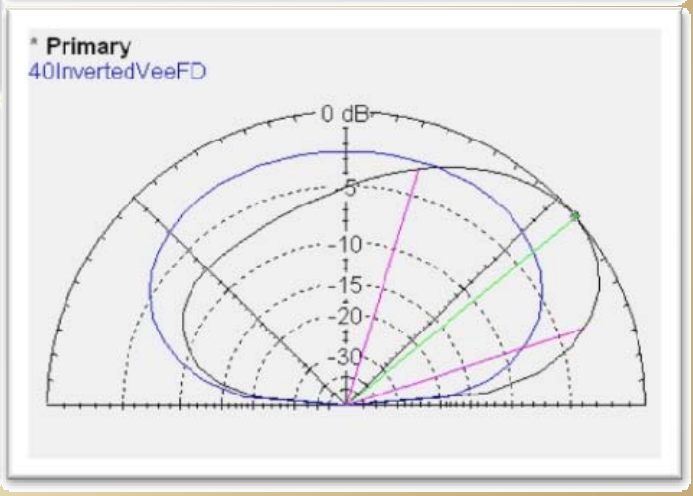
Dims: apex @ 50 ft
ends @ 30 ft high
spacing – 25 ft
DE ½ L – 34 ft
Ref ½ L – 32 ft

Gain ~ 8 dbi









20 m 2 el “Hammock”

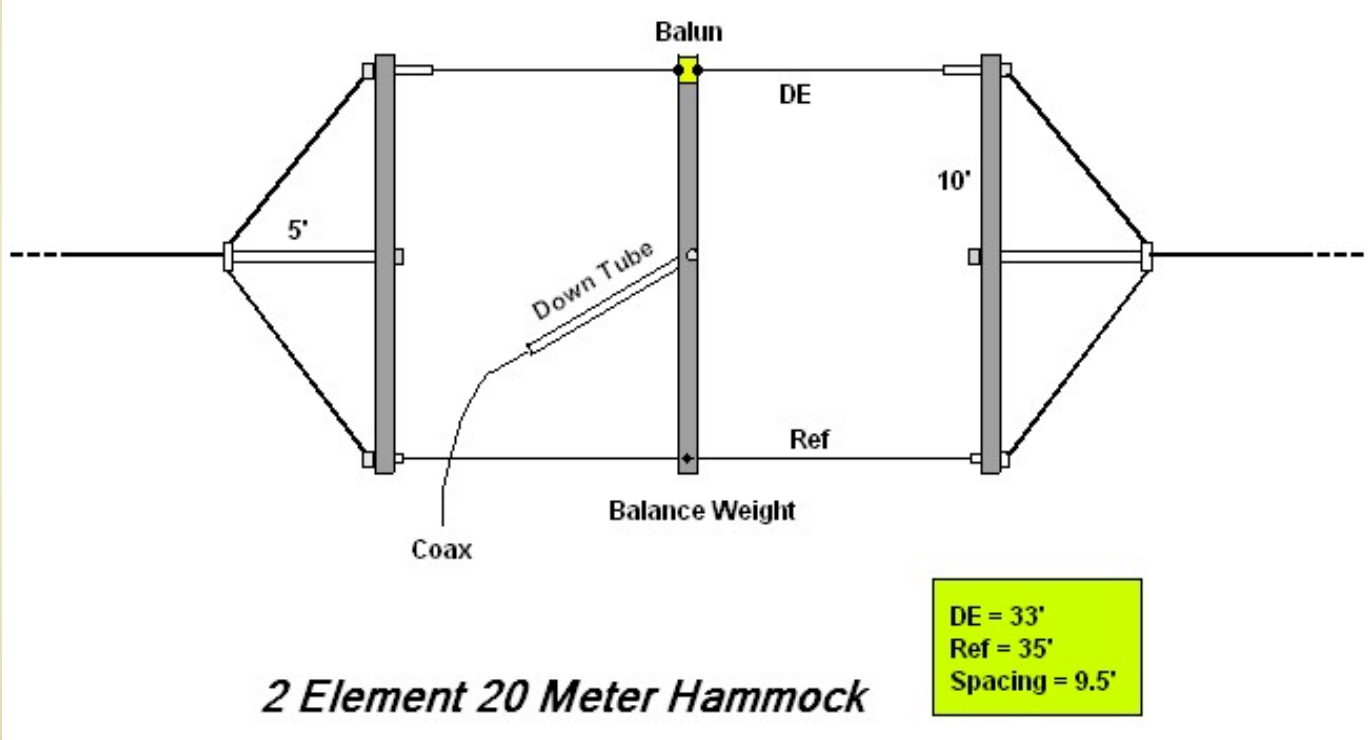
Spreaders – 2” ABS

Insulators – ½” PVC

Wind stable

50 ohm direct feed

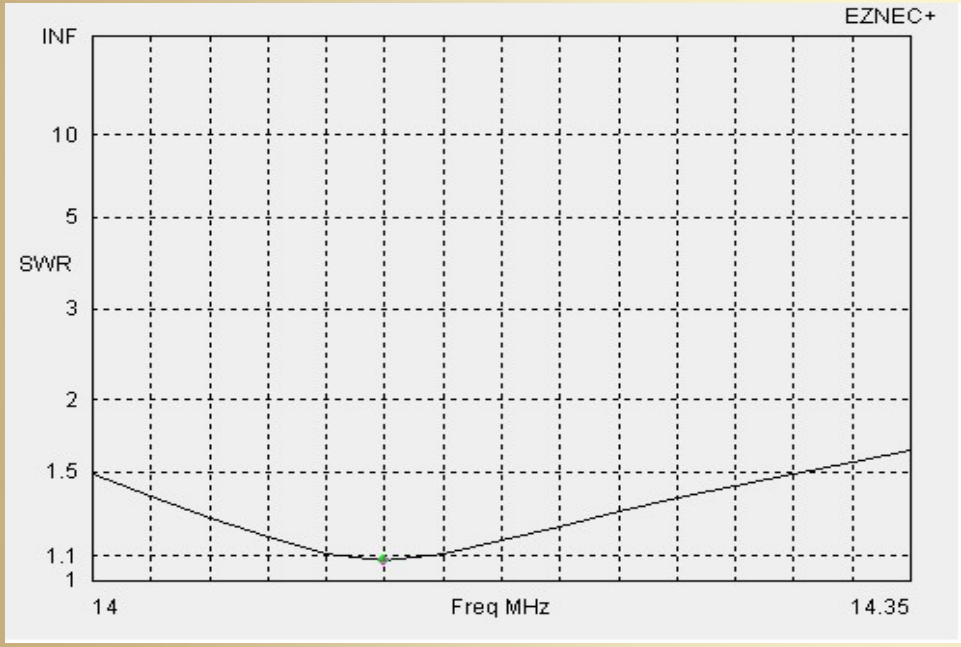
Gain – 10 dbi
F/B – 16 db



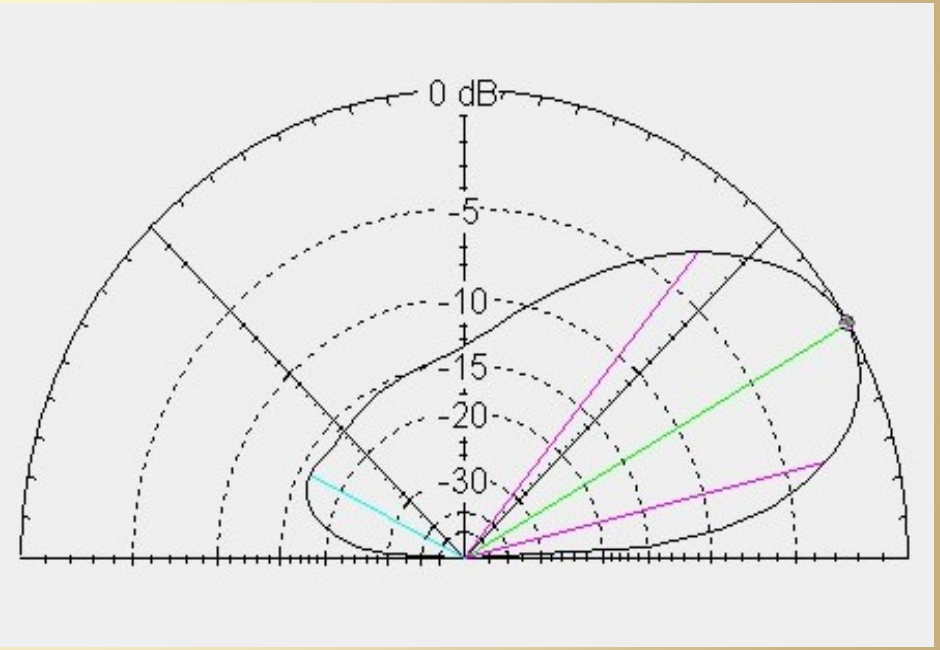
2 Element 20 Meter Hammock

20 m 2 el “Hammock”

Good VSWR with no matching



Gain: 10 dbi at 30’ above ground



15 m 2 el “Square Boom”

K6AO FD site 2007

Quick field assembly

Self aligning elements

Direct feed 50 ohm

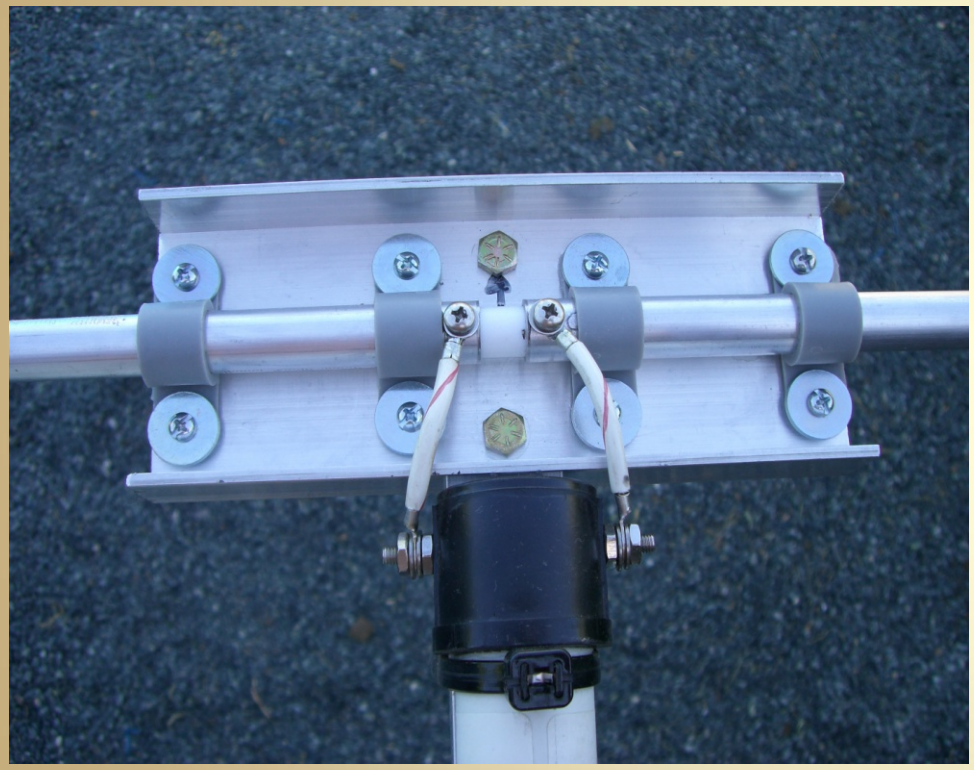
½ in aluminum tubing

Novel element clamps

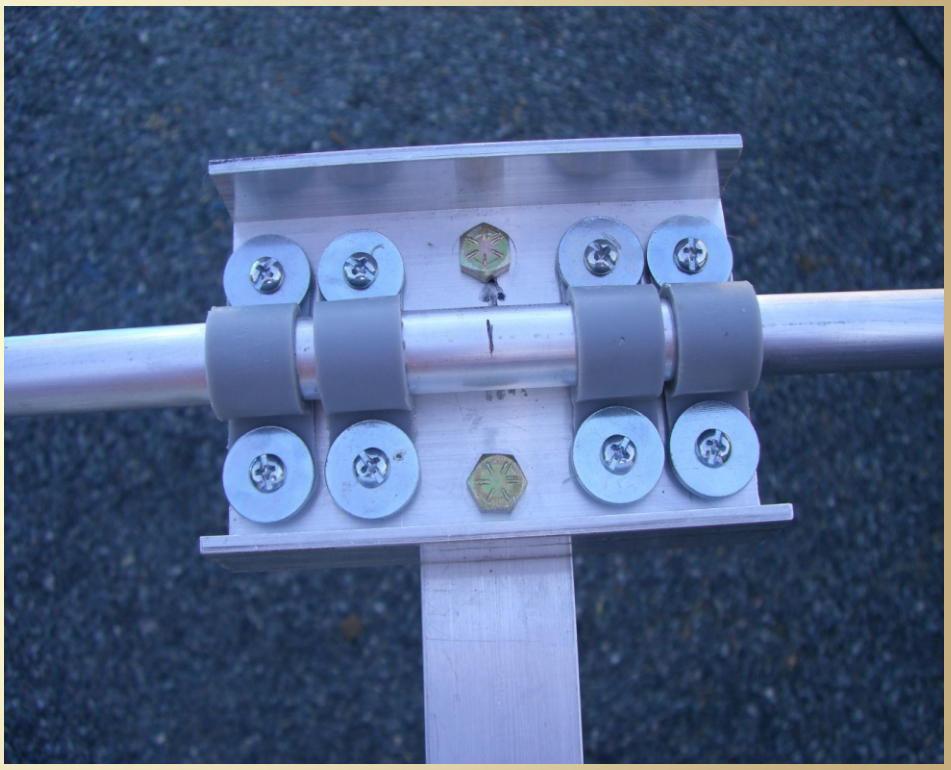
July 2008 QST Cover
Plaque Award winner

15 m 2 el “Square Boom”

DE assembly - insulator and balun

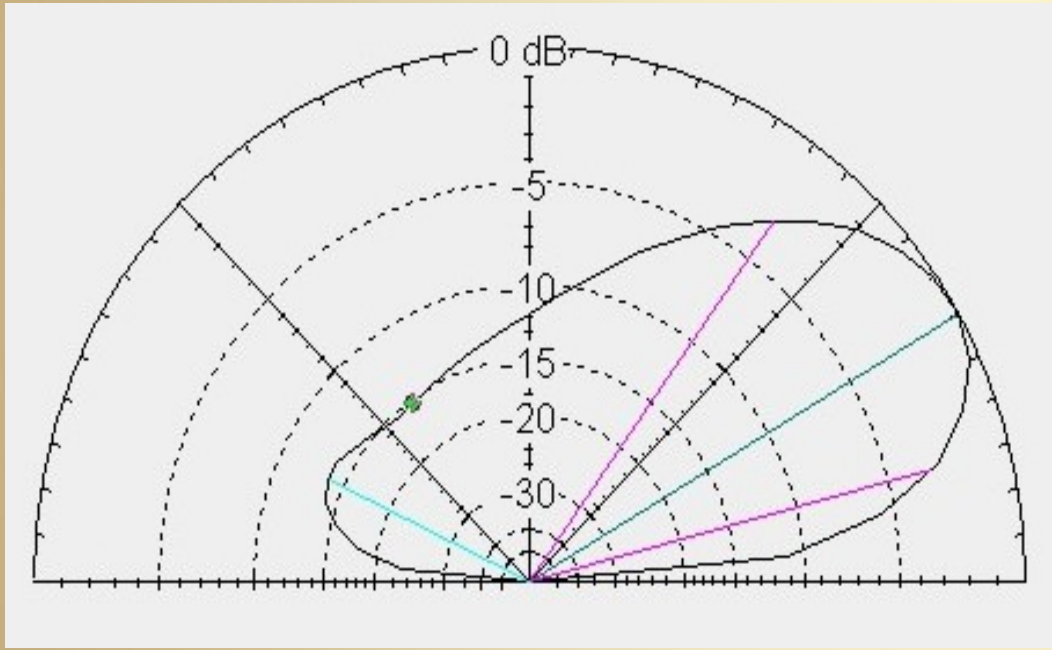


Reflector assembly – EMT clamps

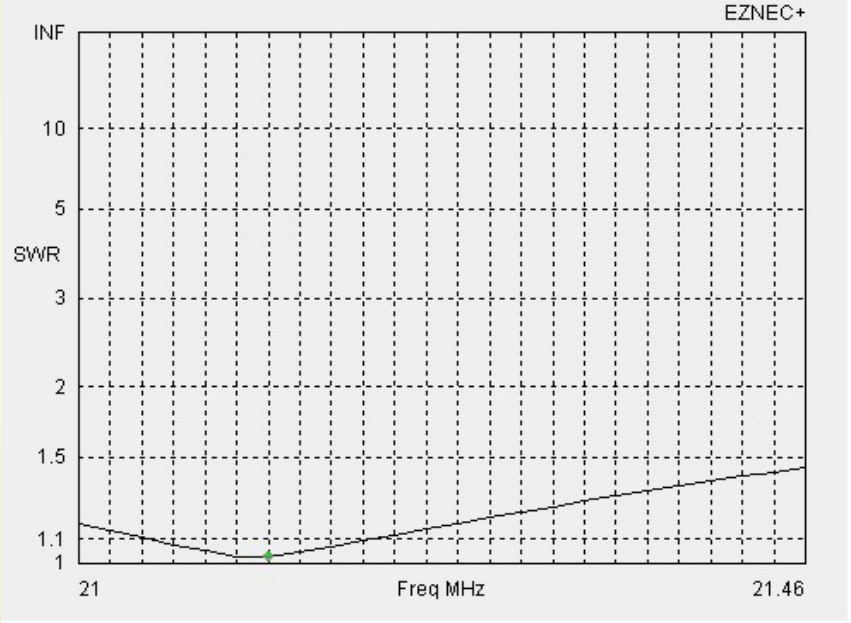


15 m 2 el “Square Boom”

Gain >10 dbi, F/B ~ 15 db



Direct feed – low VSWR



Summary -

EZNEC

Using EZNEC is a fast way to develop or modify antennas.
It gives you a feel about what is critical and what is not.
You can see interactions between your antennas.
The results are generally accurate in the real world.
Download the free demo program and get started!

FIELD DAY

Do a site survey and note available trees or other supports
Use Google Earth to measure ground distances
Decide on best antennas for the site features