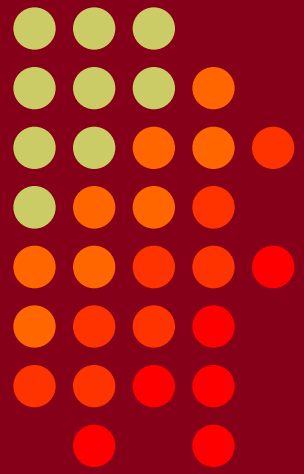
dB for Free!



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dB for Free!

An Antenna Exercise for Little Pistols

Hank Garretson, W6SX

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Disclaimer

8,000 feet elevation doesn't help

8,000 feet is a very small fraction of the height of the ionosphere. The extra elevation has negligible effect. What's important is close-in surrounding terrain.

The Process

- Present Situation
- Objective(s)
- Analysis
- Choice
- Test
- Results

The W6SX Situation

- **Single-family house on a 0.17-acre lot in residential neighborhood.**

The QTH

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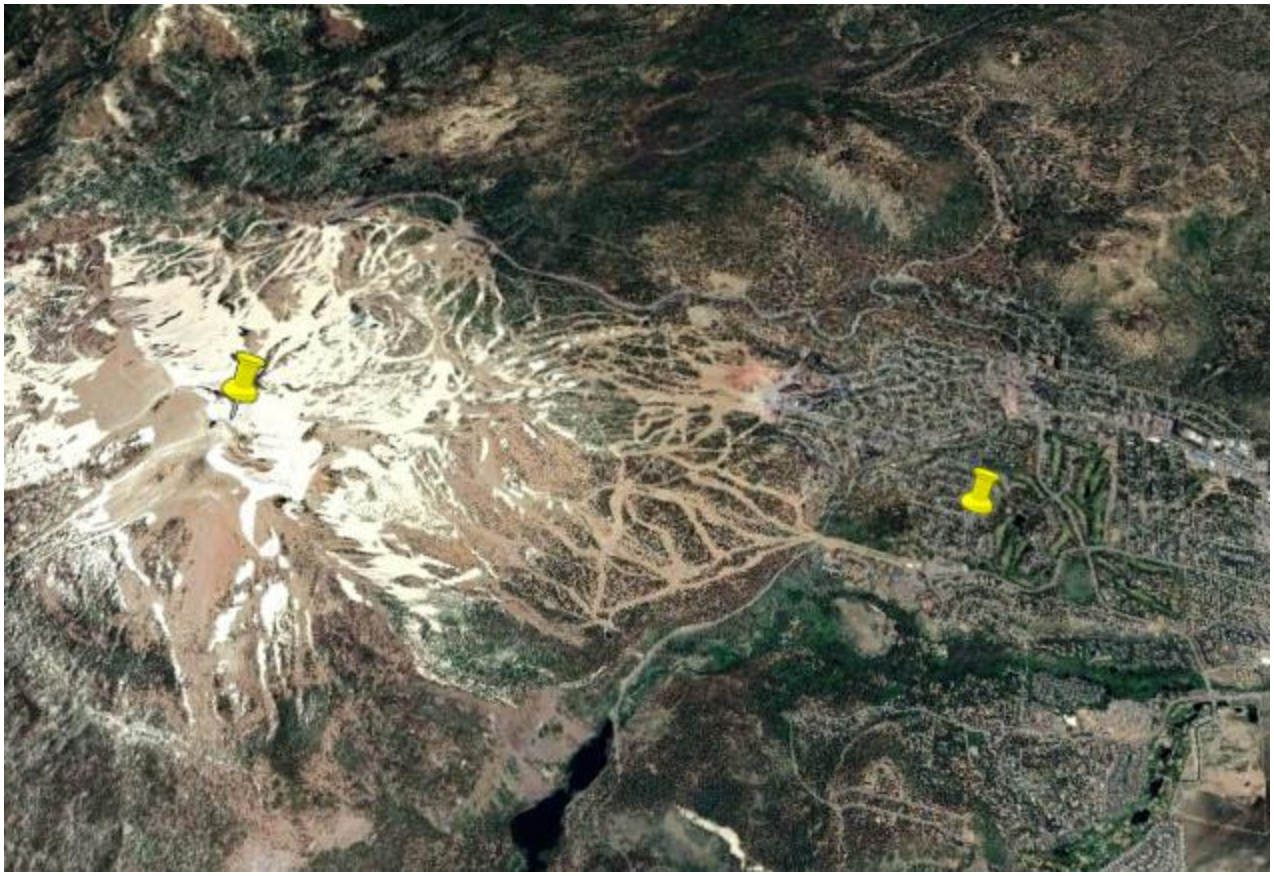
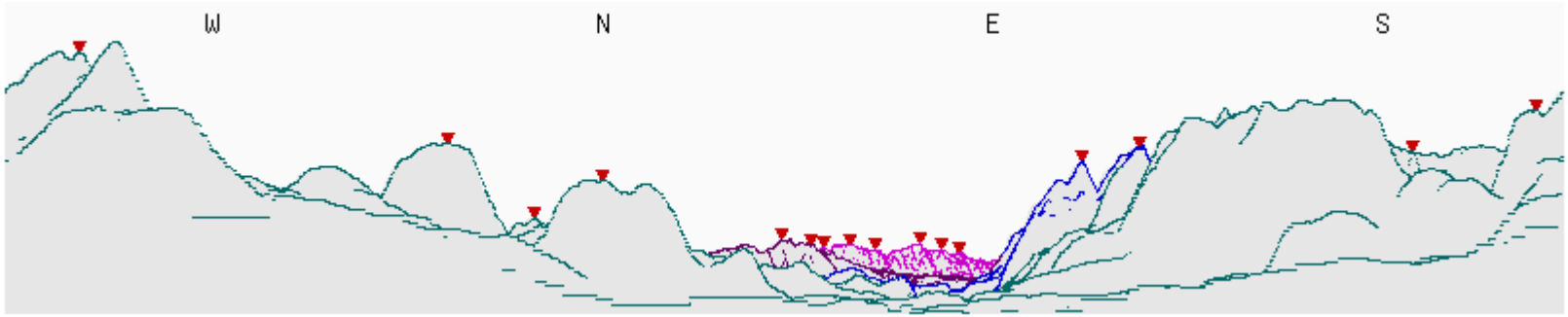
The Bigger Picture



The Topography



http://www.heywhatsthat.com/

The W6SX Situation

- **Single-family house on a 0.17-acre lot in residential neighborhood.**
- **No towers. No masts. Two Jeffrey Pine trees spaced 93 feet apart.**

The W6SX Situation

- Single-family house on a 0.17-acre lot in residential neighborhood.
- No towers. No masts. Two Jeffrey Pine trees spaced 93 feet apart.
- Very severe weather.
  - 96 feet of snow two winters ago .
  - High gusty winds.

Snow

Snow

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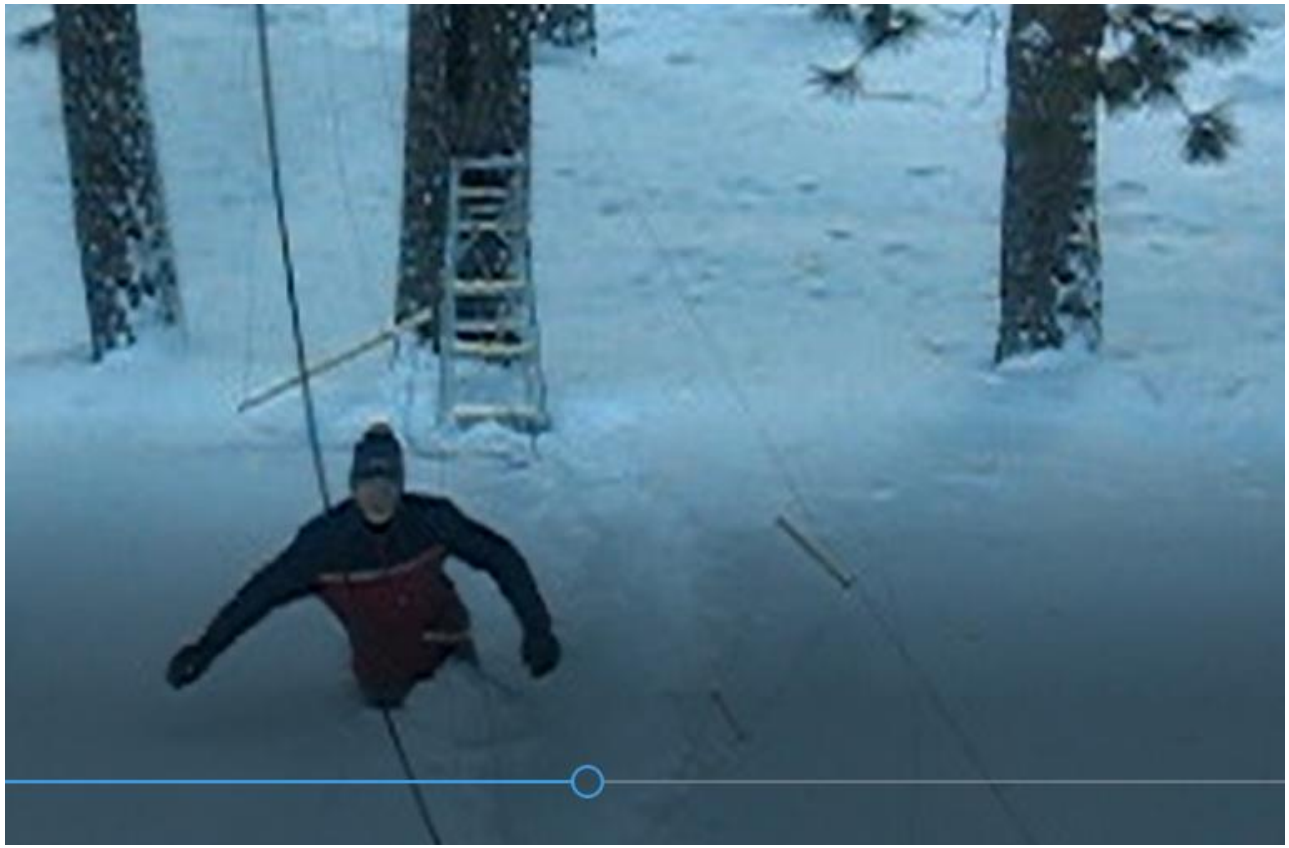
Wind

So Much for Robustness!



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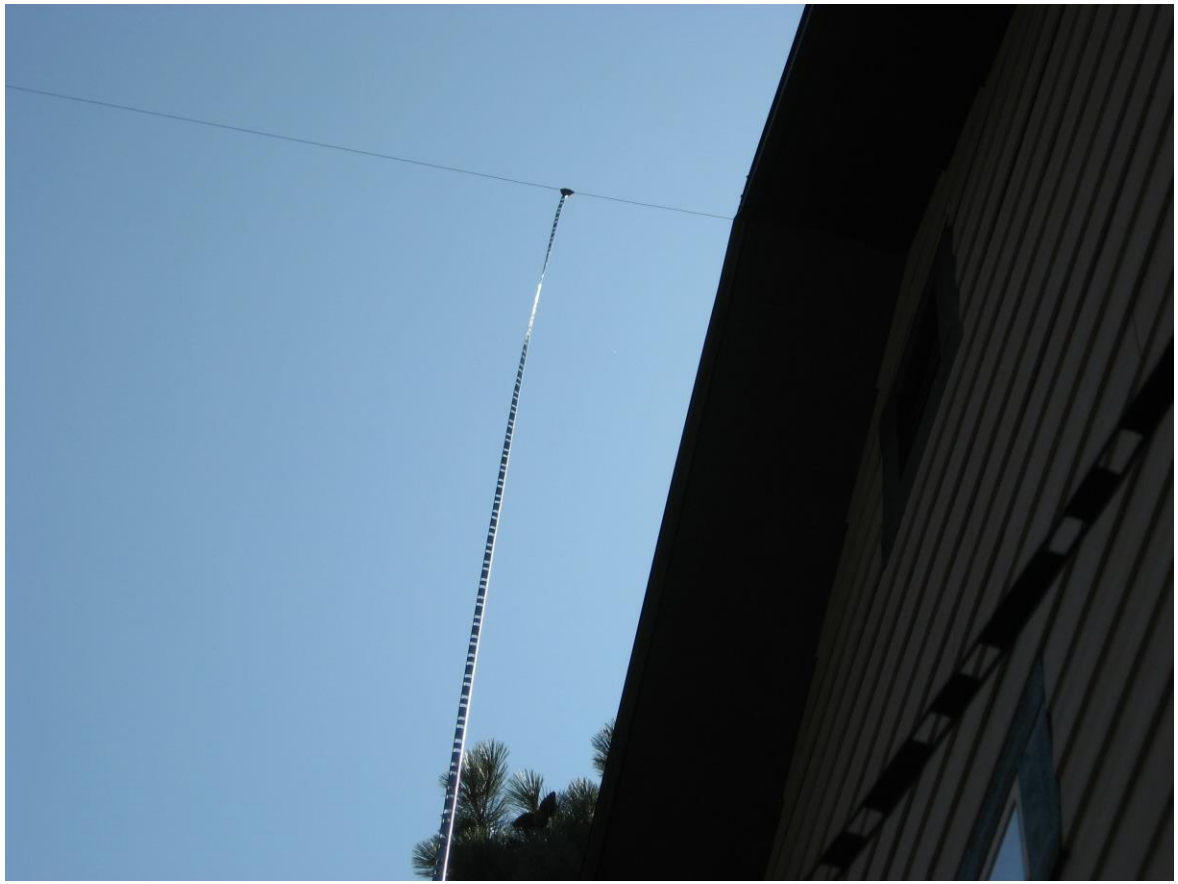
Two Days Later

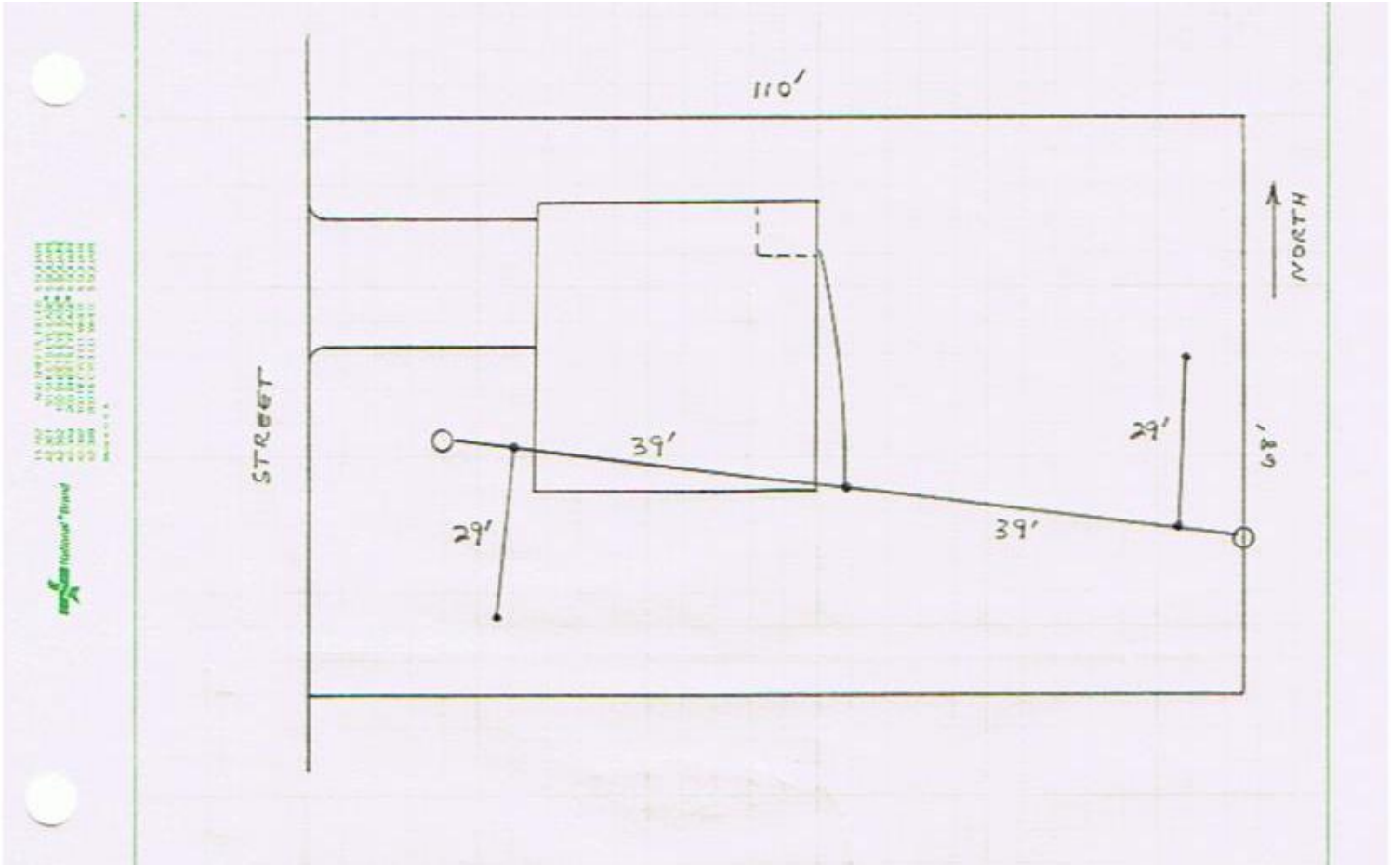
The W6SX Situation

- Single-family house on a 0.17-acre lot in residential neighborhood.
- No towers. No masts. Two Jeffrey Pine trees spaced 93 feet apart.
- Very severe weather.
  - 96 feet of snow two winters ago .
  - High gusty winds.
- 80-meter dipole at 46 feet with poly ladder-line and Matchboxes.

The Antenna



The Antenna



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The Process

- Present Situation
- **Objective(s)**
- Analysis
- Choice
- Test
- Results

W6SX Objective(s)

- **Domestic Contests**

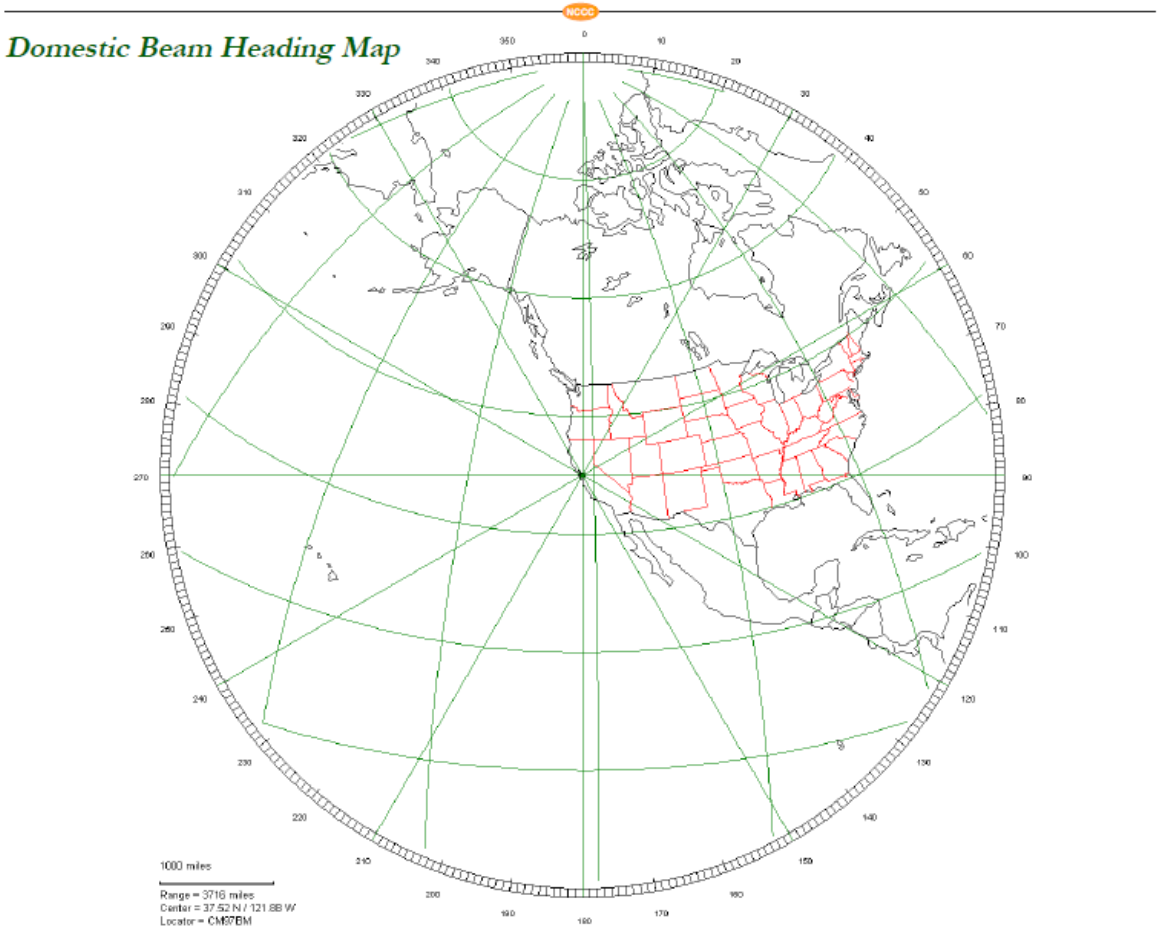
W6SX Objective(s)

- **Domestic Contests**
- **80-10 Contest Bands**

W6SX Objective(s)

- Domestic Contests
- 80-10 Contest Bands
- Beam 070

Beam 070



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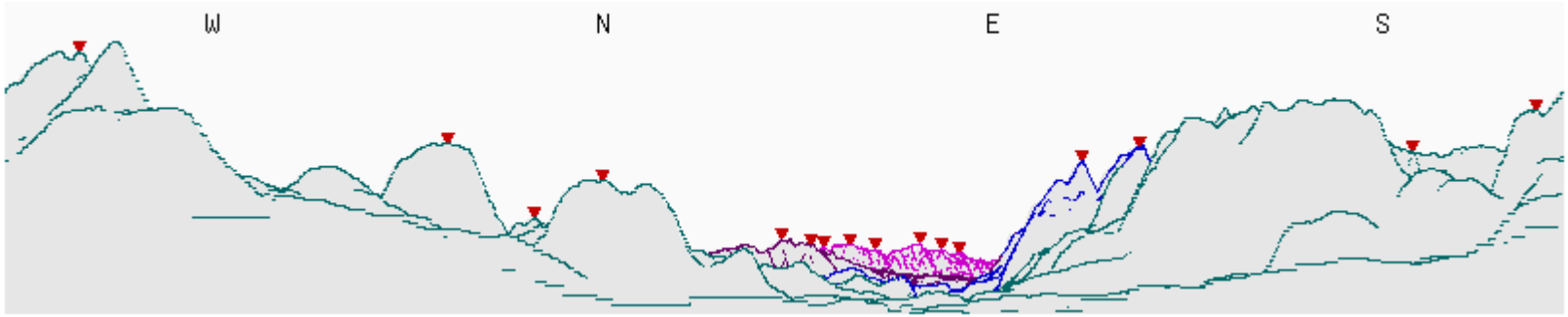
The Topography



http://www.heywhatsthat.com/

W6SX Objective(s)

- Domestic Contests
- 80-10 Contest Bands
- Beam 070
- Low takeoff angles

The Process

- Present Situation
- Objective(s)
- **Analysis**
- Choice
- Test
- Results

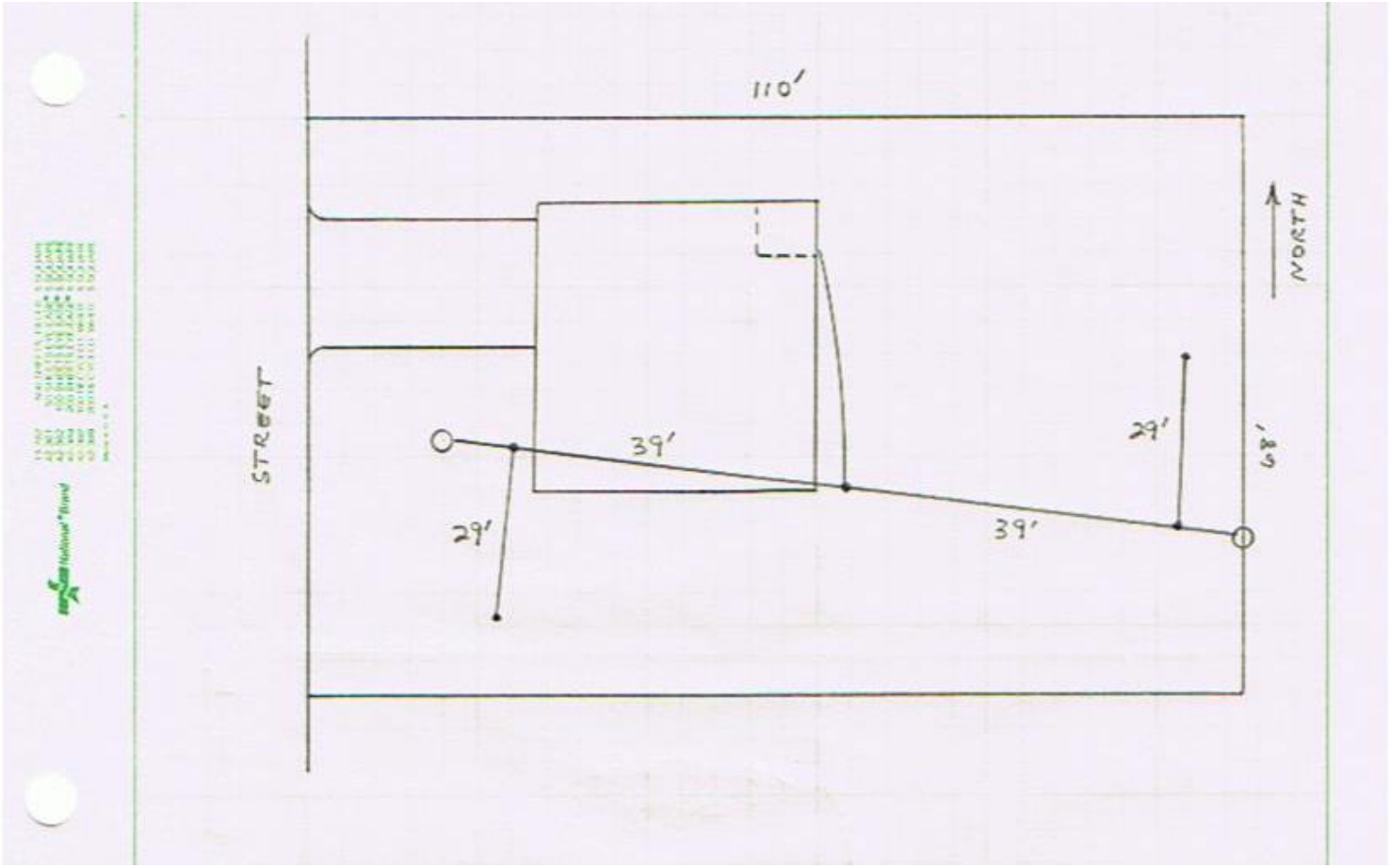
Modeling Is Your Best Friend

- Numerical Electromagnetics Code
- NEC2
  - EZNEC http://www.eznec.com/
  - 4NEC2 http://www.qsl.net/4nec2/
- Not rocket science, especially for simple antennas
- KISS is my NEC2 mantra.
- Albert Einstein

Analysis

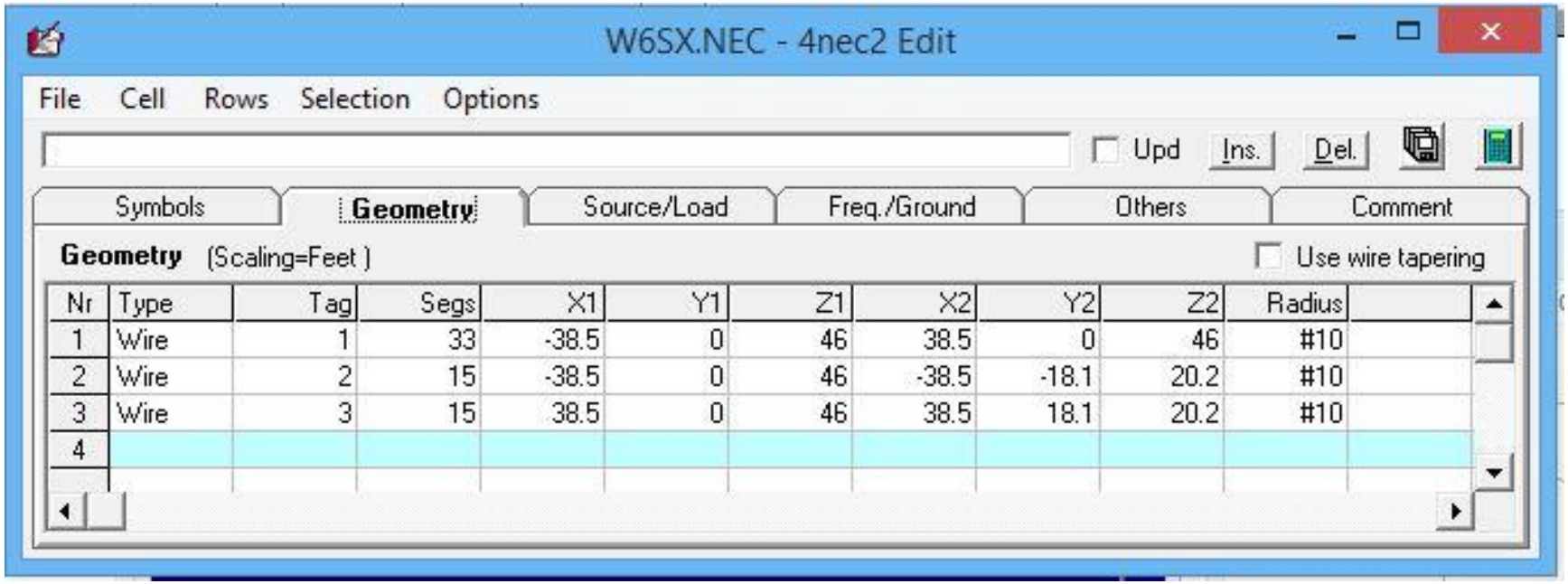
- Original Antenna

The Antenna



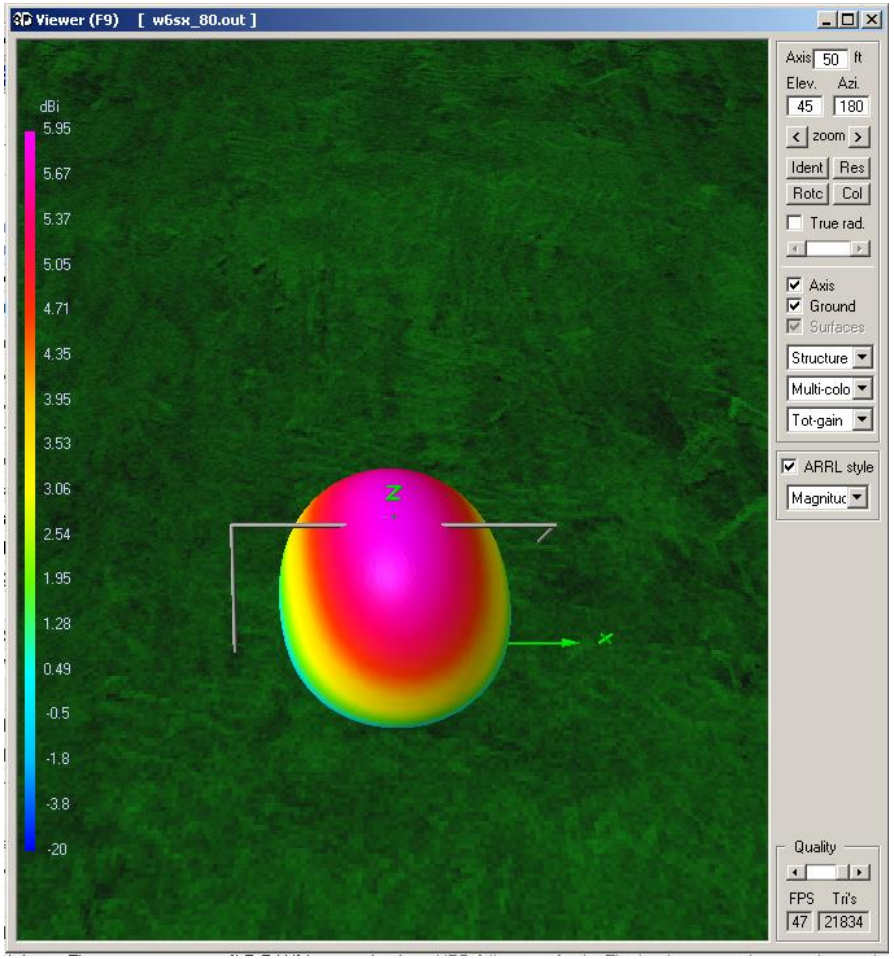
4NEC2

Original Antenna



Nr	Type	Tag	Segs	X1	Y1	Z1	X2	Y2	Z2	Radius
1	Wire	1	33	-38.5	0	46	38.5	0	46	#10
2	Wire	2	15	-38.5	0	46	-38.5	-18.1	20.2	#10
3	Wire	3	15	38.5	0	46	38.5	18.1	20.2	#10
4										

Original Antenna 80 Meters



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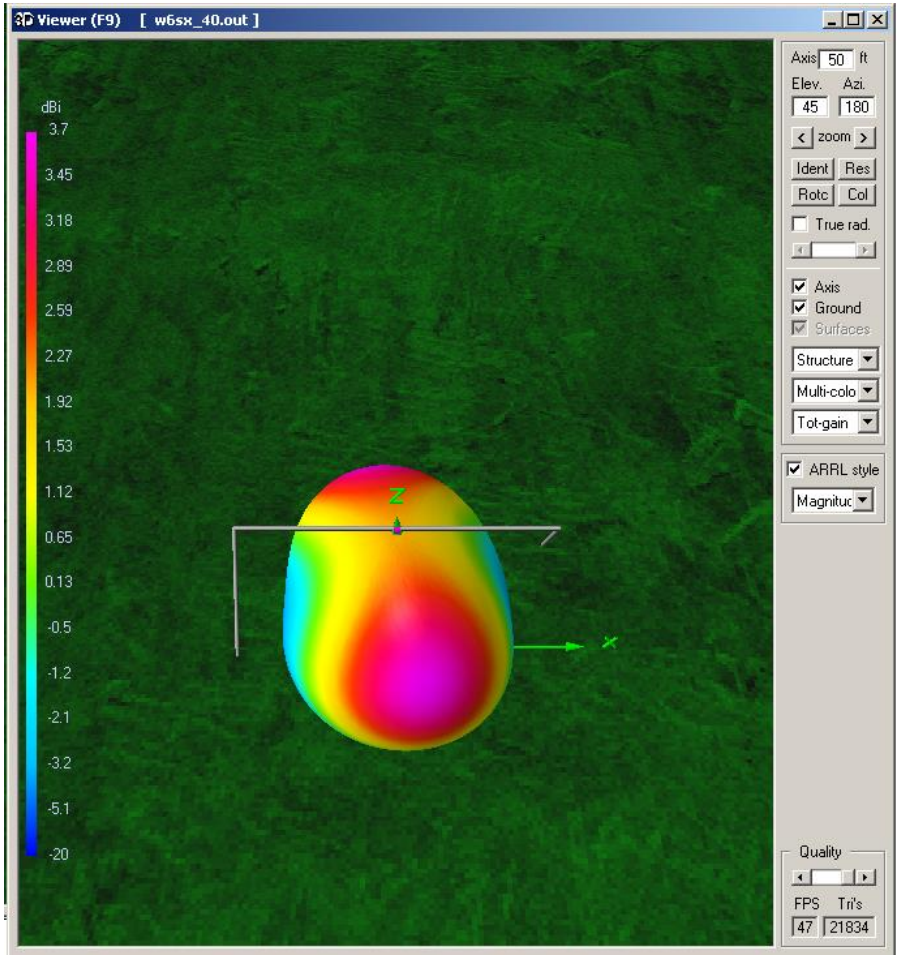
Original Antenna 40 Meters



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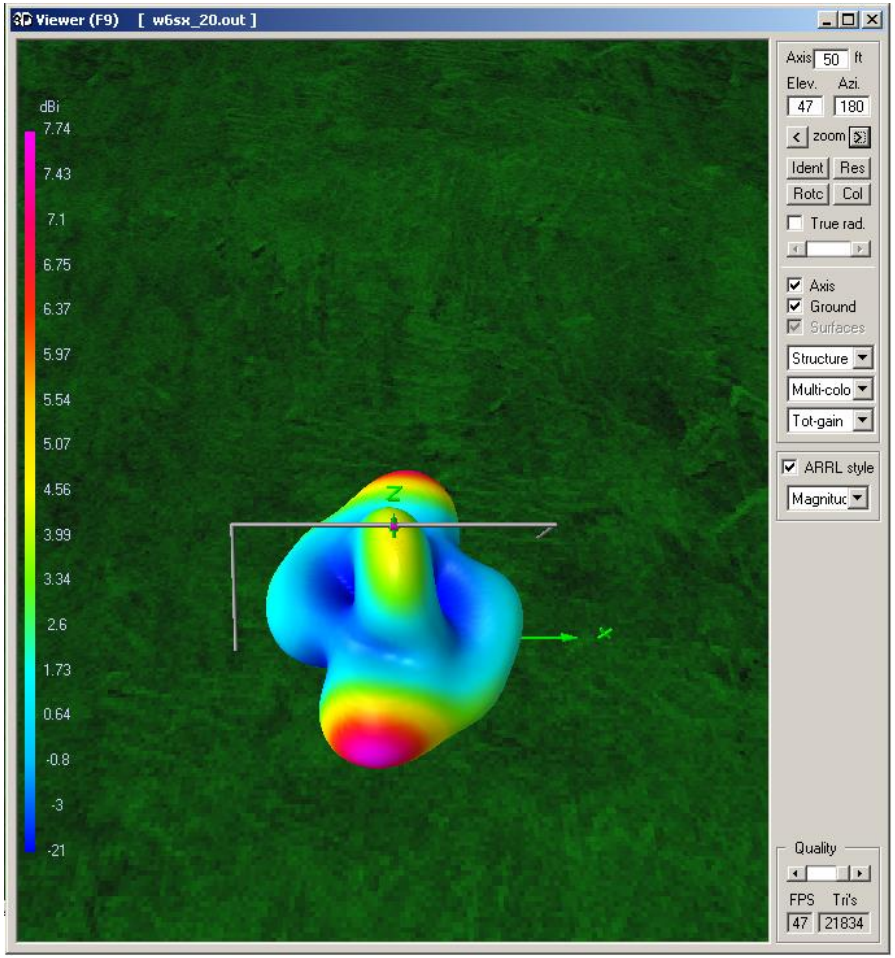
Original Antenna 20 Meters



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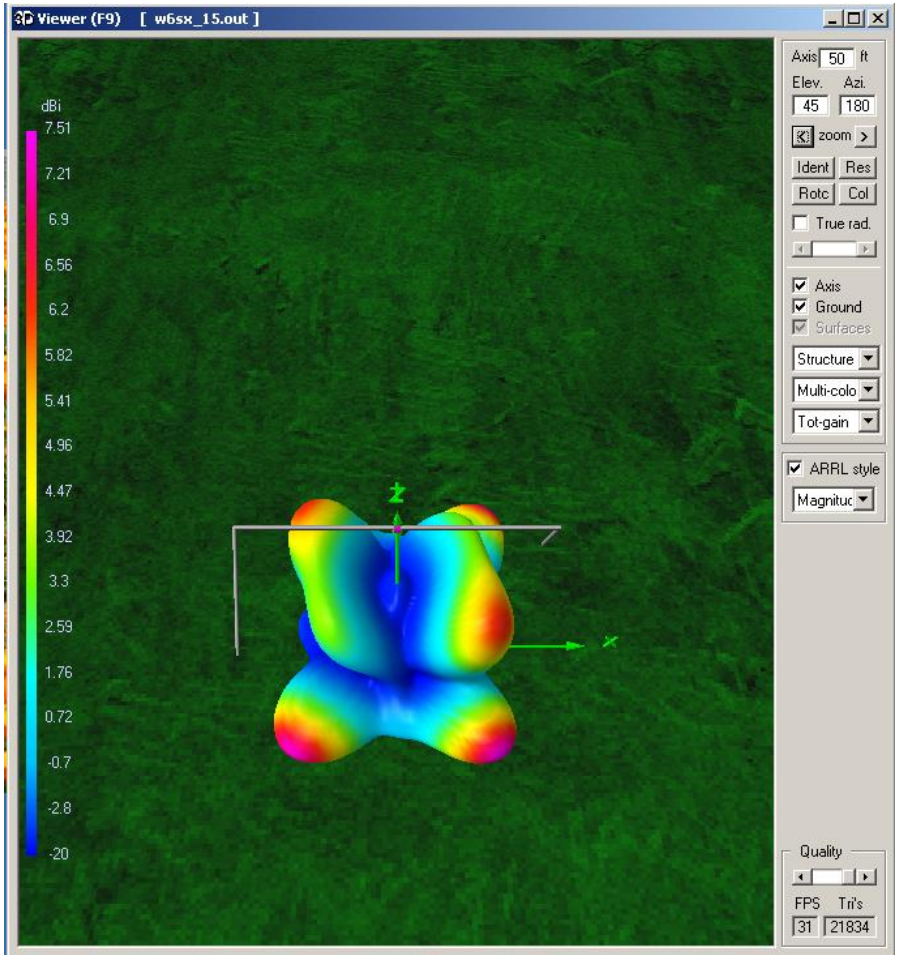
Original Antenna 15 Meters



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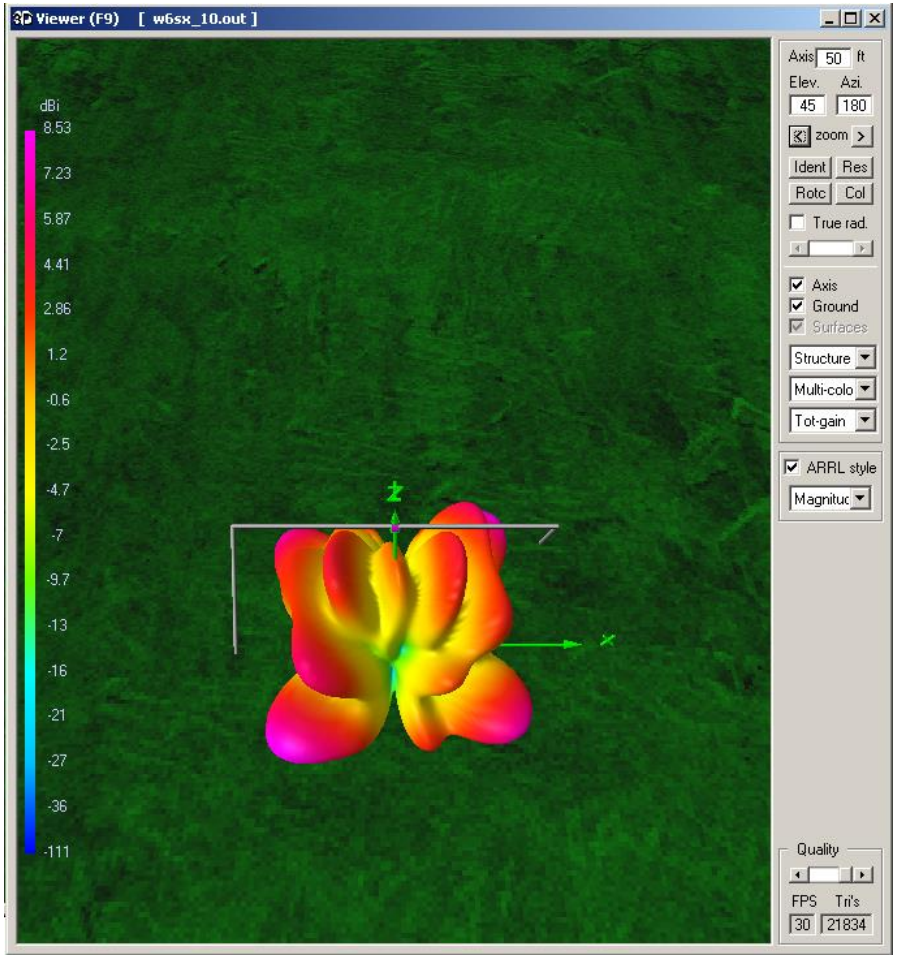
Original Antenna 10 Meters



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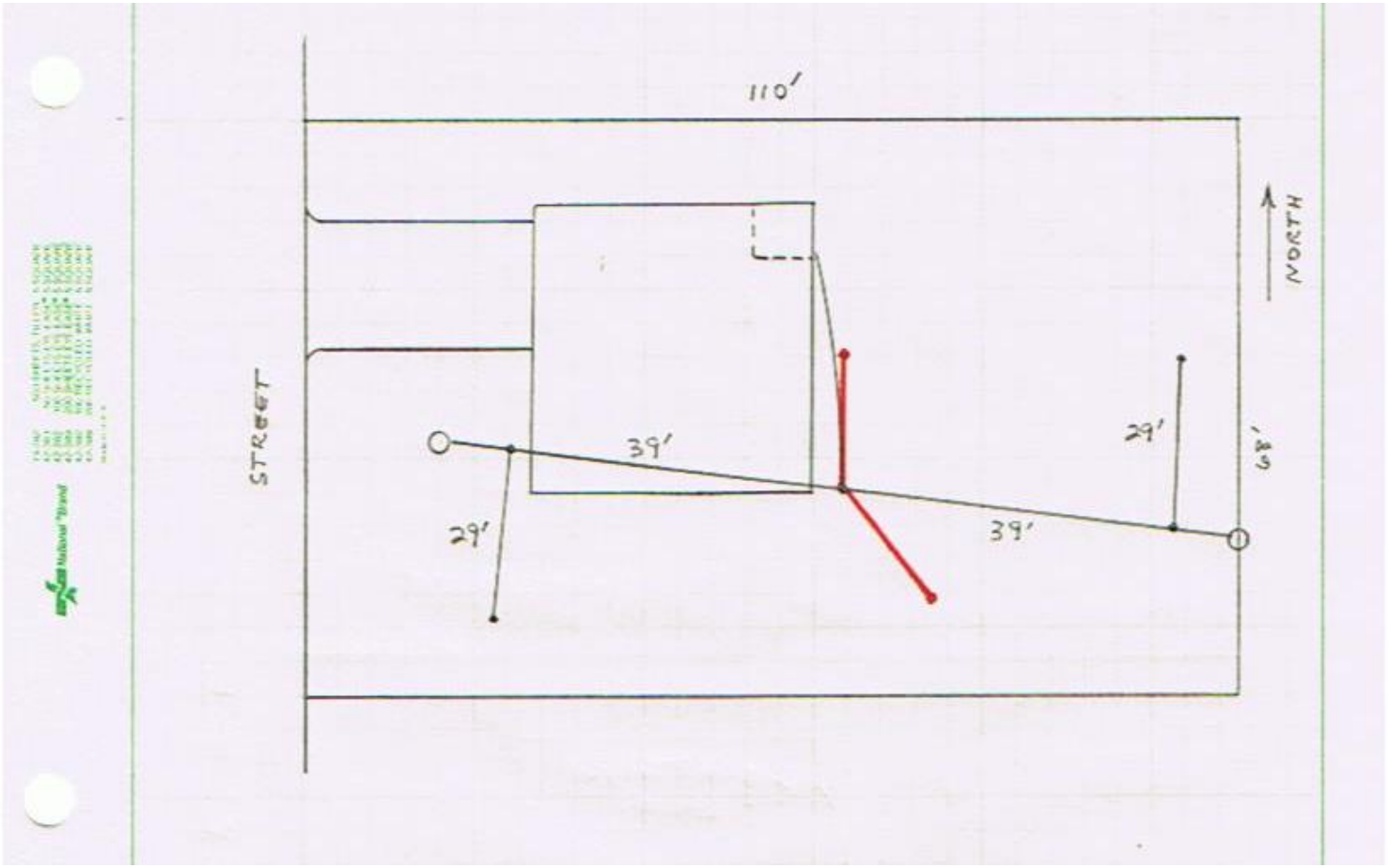
Analysis

- Original Antenna
- Candidate One
- Candidate Two
- HFTA

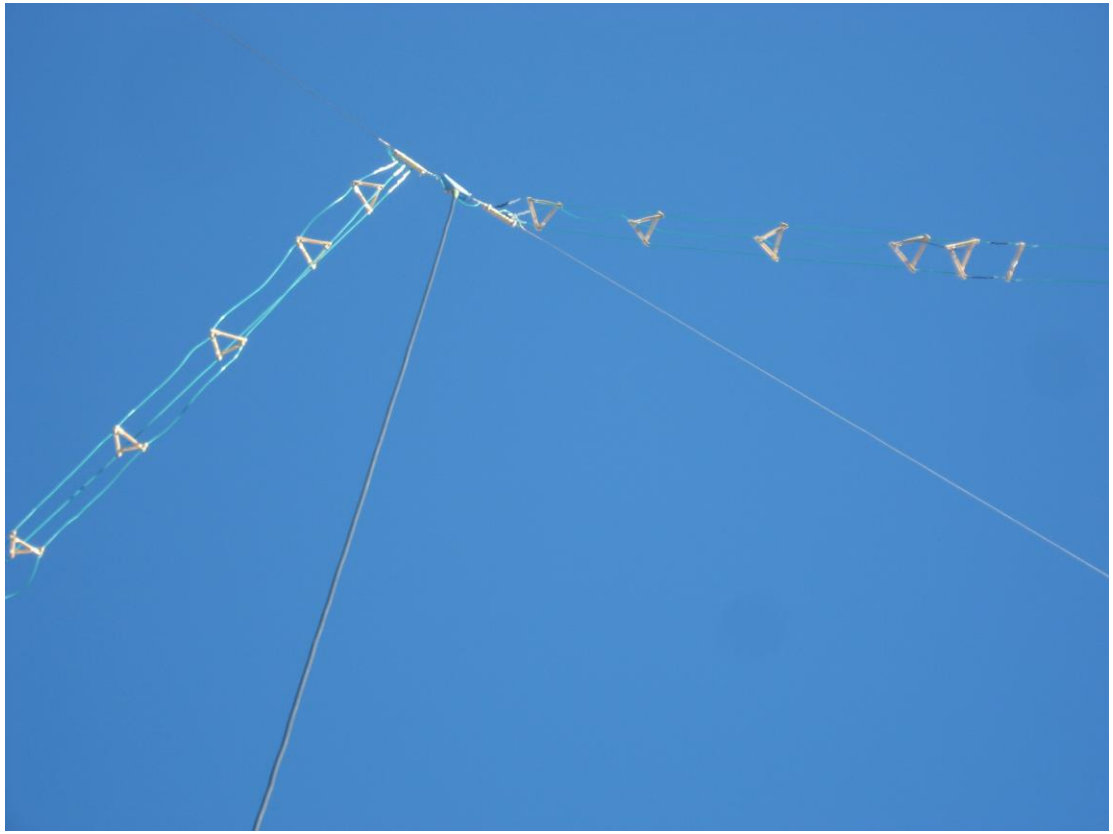
The Process

- Present Situation
- Objective(s)
- Analysis
- **Choice**
- Test
- Results

Candidate 2



Candidate 2



http://www.dtsohio.com/73cnc/laddersnap.html

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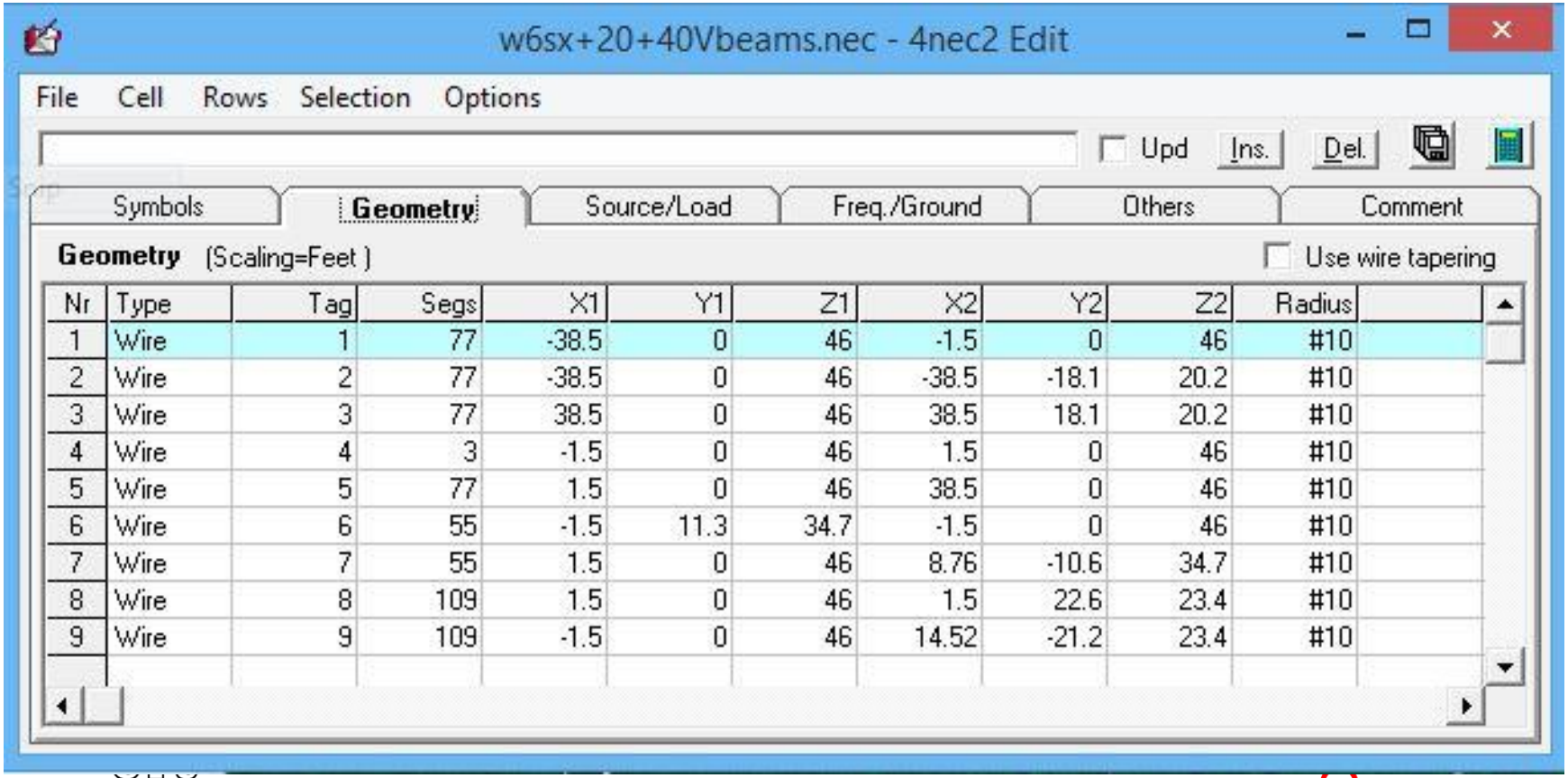
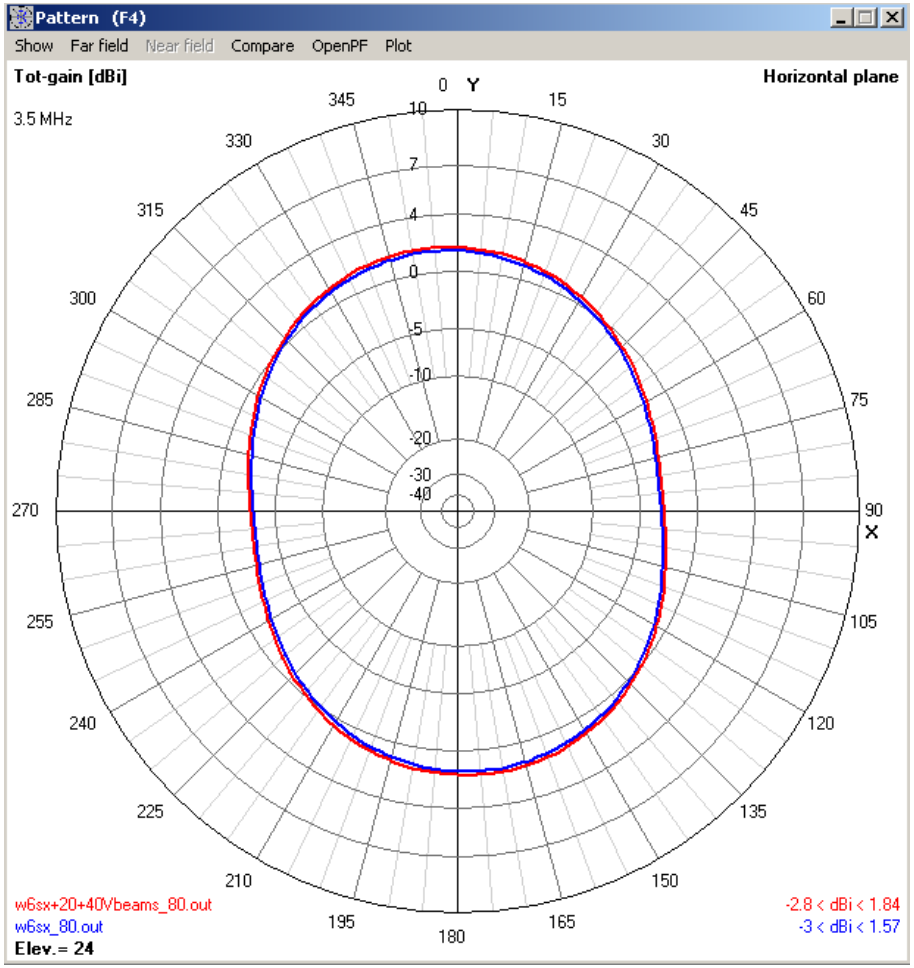
4NEC2

Candidate 2



Nr	Type	Tag	Segs	X1	Y1	Z1	X2	Y2	Z2	Radius
1	Wire	1	77	-38.5	0	46	-1.5	0	46	#10
2	Wire	2	77	-38.5	0	46	-38.5	-18.1	20.2	#10
3	Wire	3	77	38.5	0	46	38.5	18.1	20.2	#10
4	Wire	4	3	-1.5	0	46	1.5	0	46	#10
5	Wire	5	77	1.5	0	46	38.5	0	46	#10
6	Wire	6	55	-1.5	11.3	34.7	-1.5	0	46	#10
7	Wire	7	55	1.5	0	46	8.76	-10.6	34.7	#10
8	Wire	8	109	1.5	0	46	1.5	22.6	23.4	#10
9	Wire	9	109	-1.5	0	46	14.52	-21.2	23.4	#10

Compare 80 Meters



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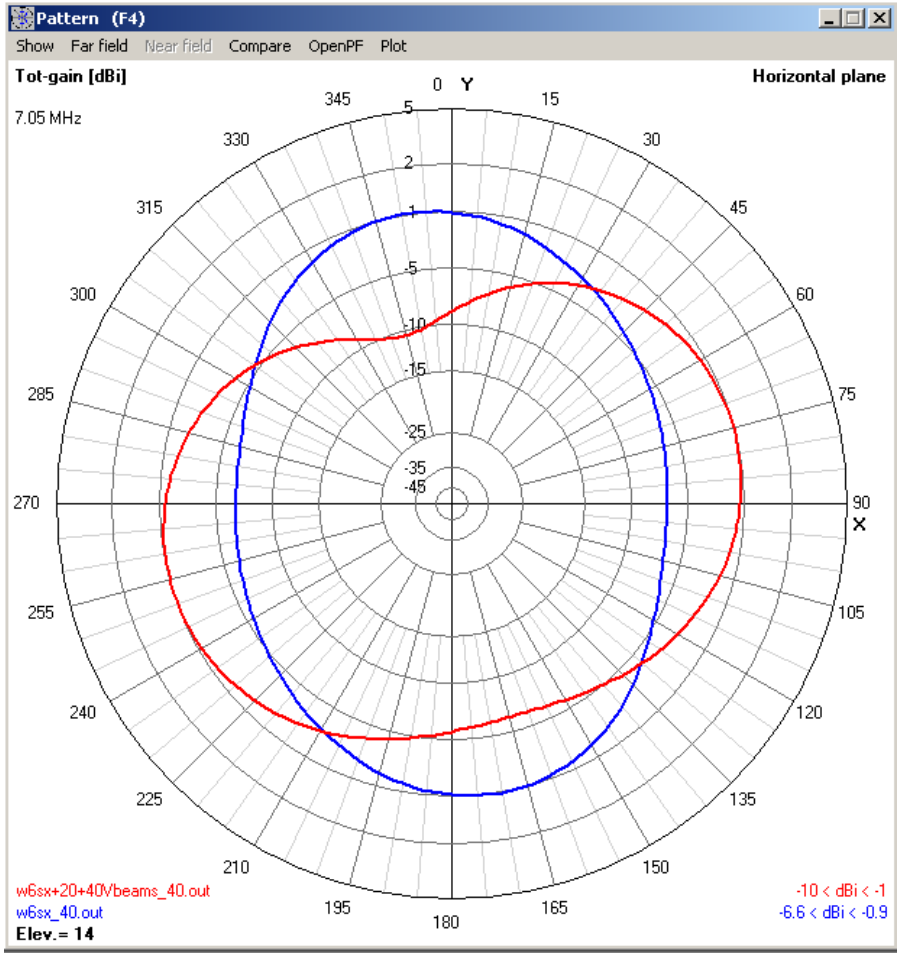
Compare 40 Meters



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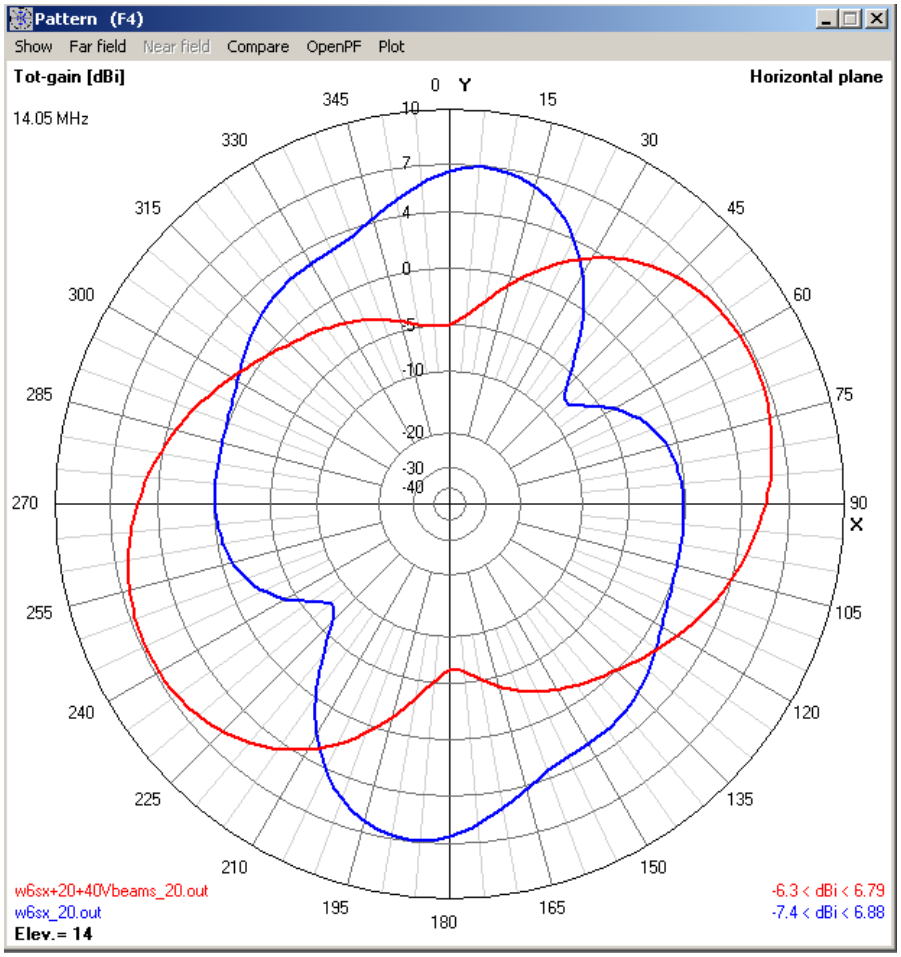
Compare 20 Meters



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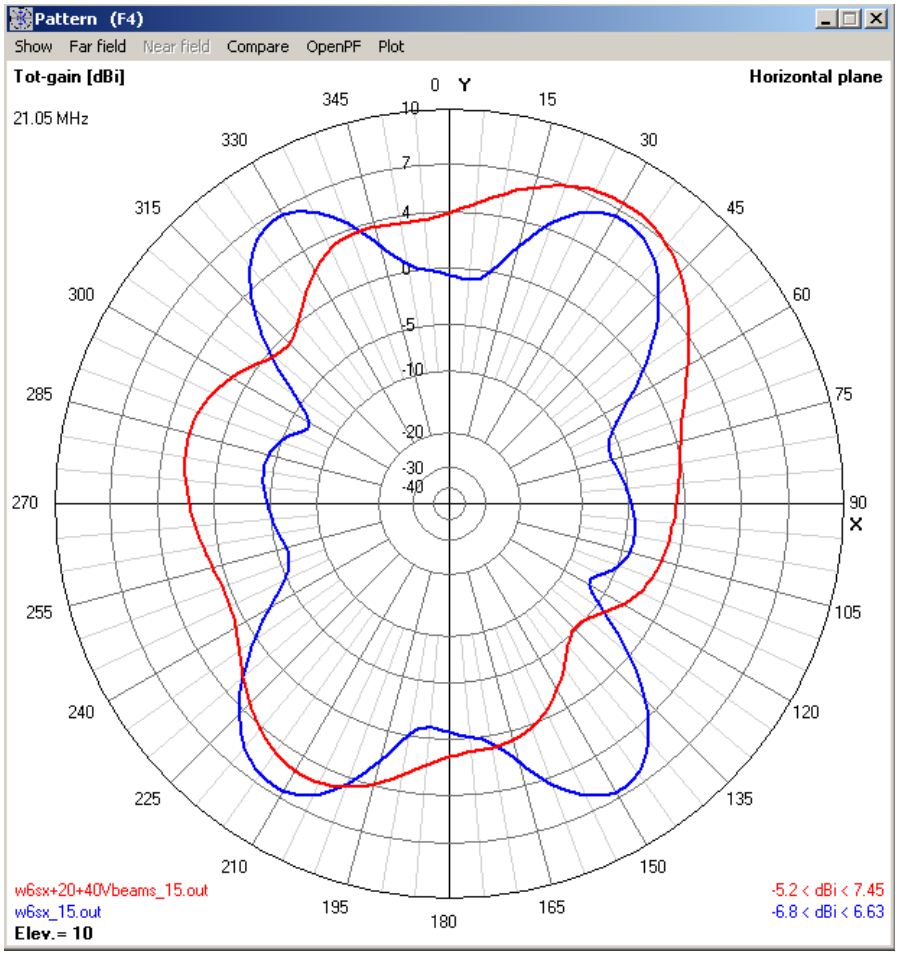
Compare 15 Meters



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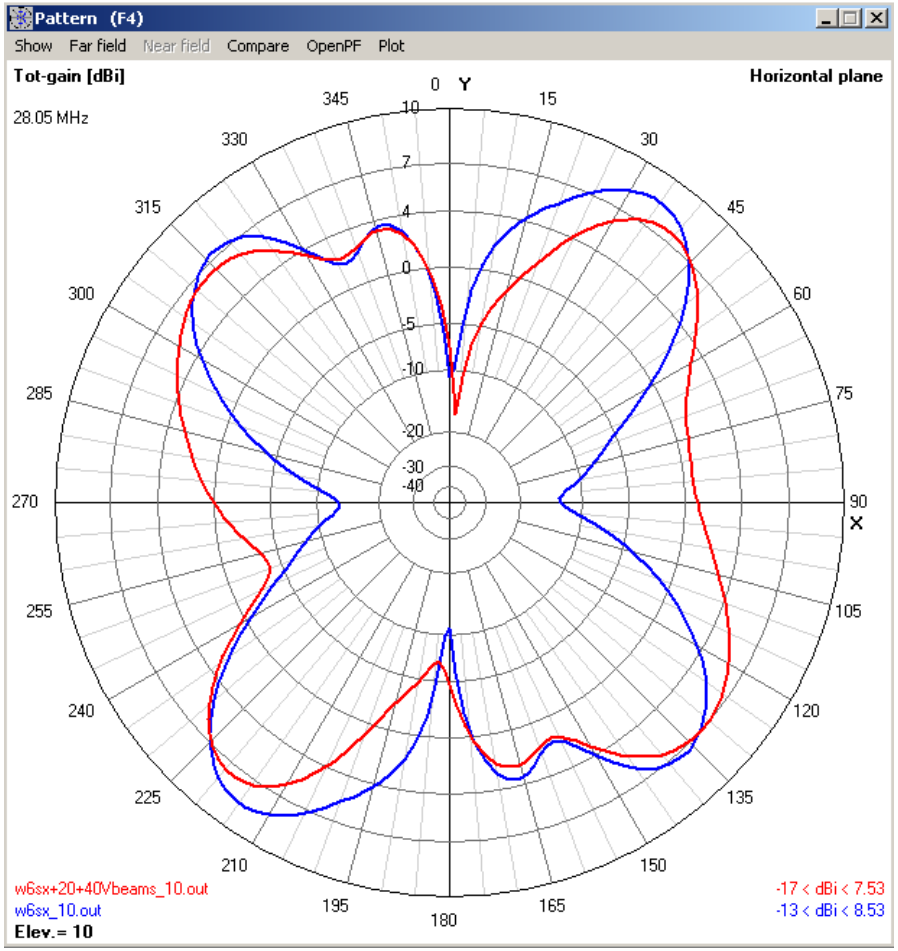
Compare 10 Meters



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The Process

- Present Situation
- Objective(s)
- Analysis
- Choice
- **Test**
- Results

Test

- How do you do A-B comparison?
- N3RC to the rescue: A-B-C
- Reverse Beacon Network
  - http://www.reversebeacon.net/index.php
  - Need Lots of Test Points
  - Took data with Original Antenna
  - Took data with Candidate Two Antenna
  - Repeat
  - Took Hundreds of data points

The Process

- Present Situation
- Objective(s)
- Analysis
- Choice
- Test
- **Results**

Results

- 6 dB+ on 40, 20, 15, and 10 at design 070 heading
- As N3RC says, “dB For Free.”

Results

- 6 dB+ on 40, 20, 15, and 10 at design 070 heading
- As N3RC says, “dB For Free.”
- It works
  - 1616 contacts in California QSO Party
  - 1139 contacts in CW SS

The Process

- Present Situation
- Objective(s)
- Analysis--Extra brains very helpful
- Choice
- Test
- Results

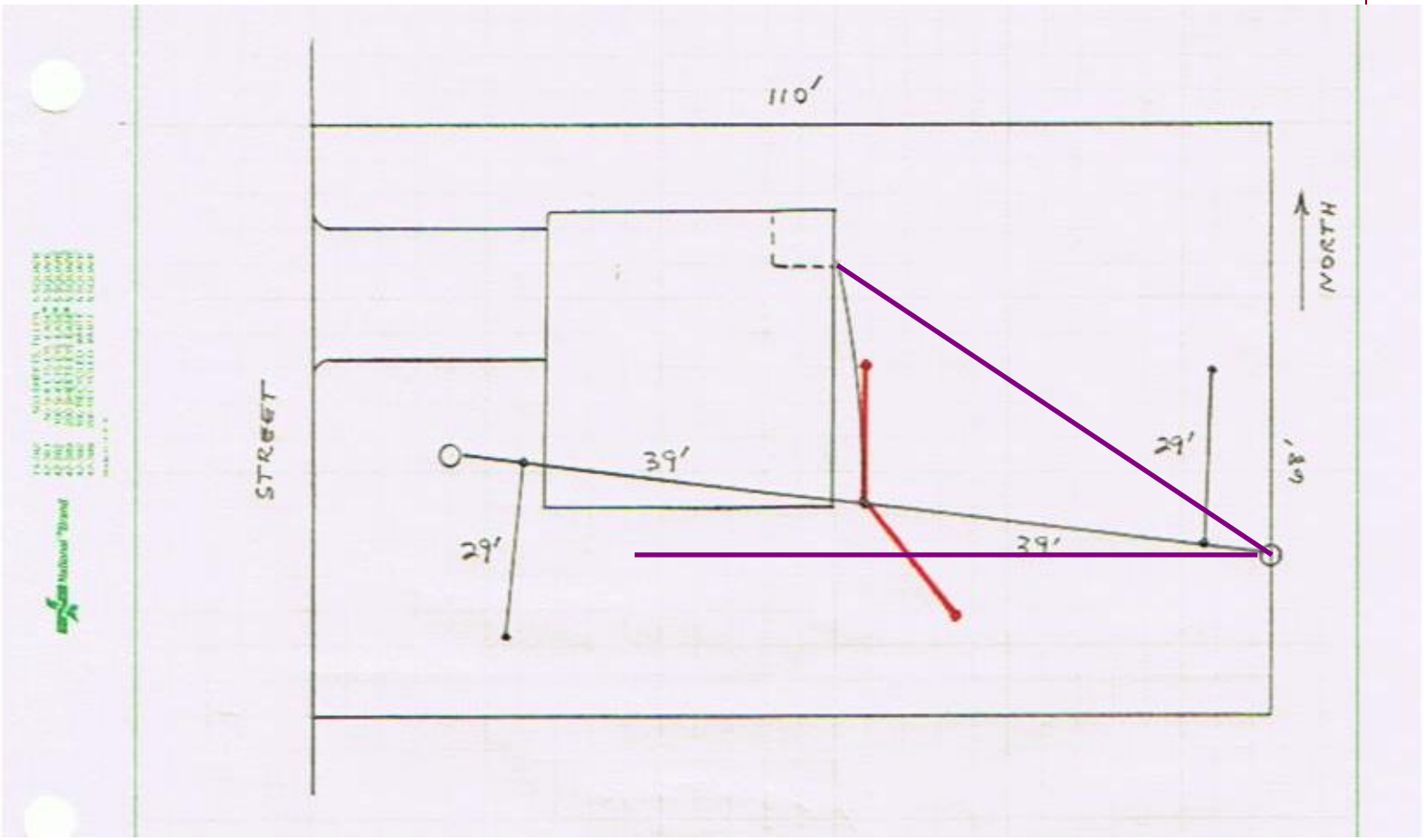
Epilogue

- Added ten-meter elements.
- Replaced ladder-line feed with RG-213.

Epilogue

- Added ten-meter elements.
- Replaced ladder-line feed with RG-213.
- 160-meter T fed against single 134-foot elevated counterpoise.

160-Meter Counterpoise



Epilogue

- Added ten-meter elements.
- Replaced ladder-line feed with RG-213.
- 160-meter T fed against single 134-foot elevated counterpoise.
  - Works–at least stateside.
  - WAS in one weekend.
  - WAC.

Don’t let the naysayers keep you down!

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The Process

- Present Situation
- Objective(s)
- Analysis--Extra brains very helpful
- Choice
- Test
- Results
- **Repeat**

Thank You

Roger Cooper, N3RC

Dean Straw, N6BV

Jim Brown, K9YC

Bill Myers, K1GQ

Bud Hippisley, W2RU*

Jim Michener, K9JM

Practical Antenna Handbook

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Questions?

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Questions

Hank, W6SX w6sx@arrl.net

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- **W6SX Prime Directive: The first rule of ham radio is to have fun.**
- **W6SX First Corollary: Share the fun.**
- **W6SX Second Corollary: We all get better together.**