



dB for Free!

An Antenna Exercise for Little Pistols

Hank Garretson, W6SX

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



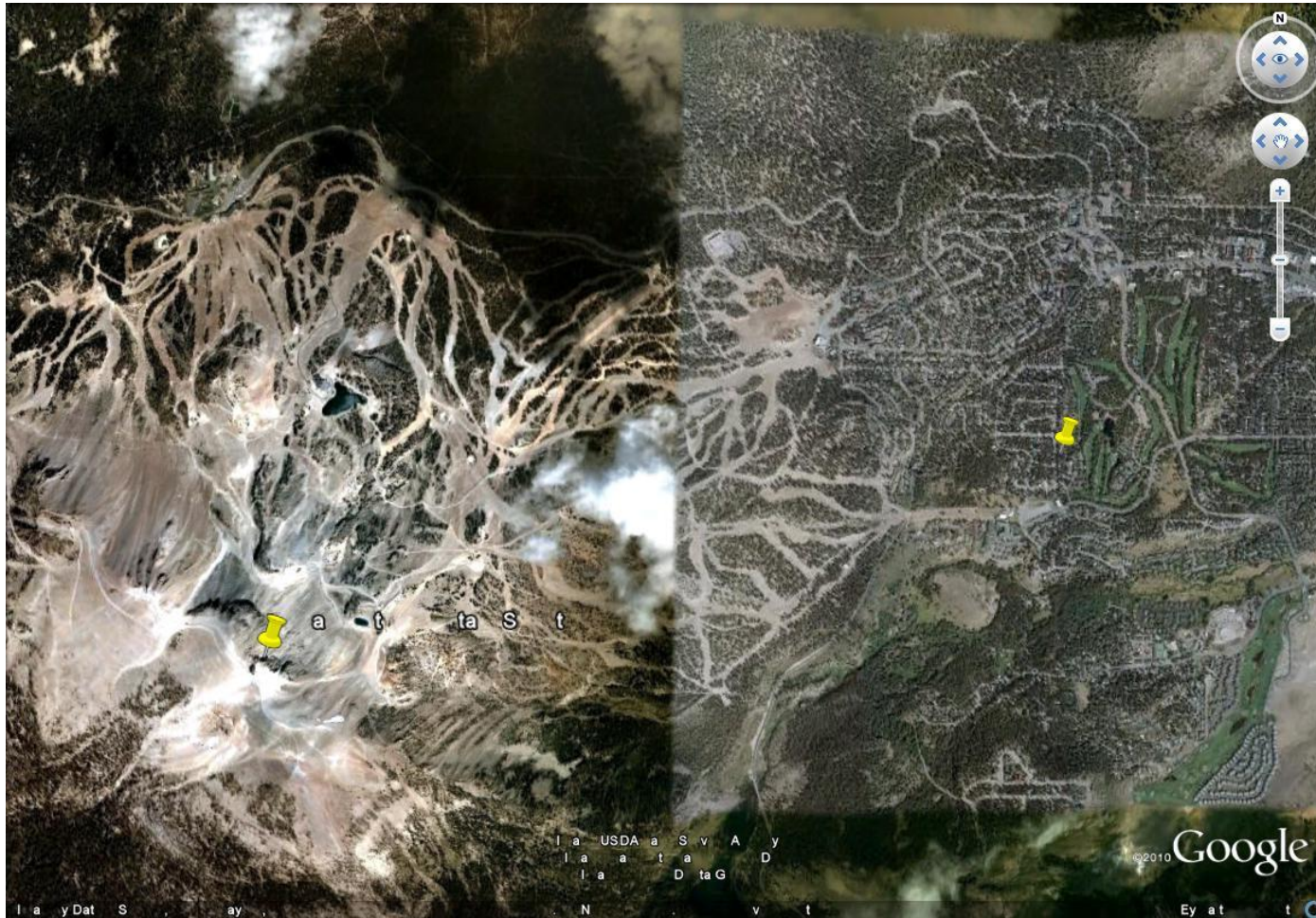
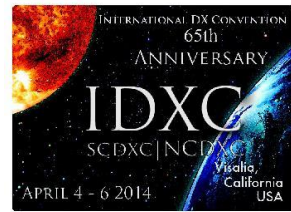
The W6SX Situation

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

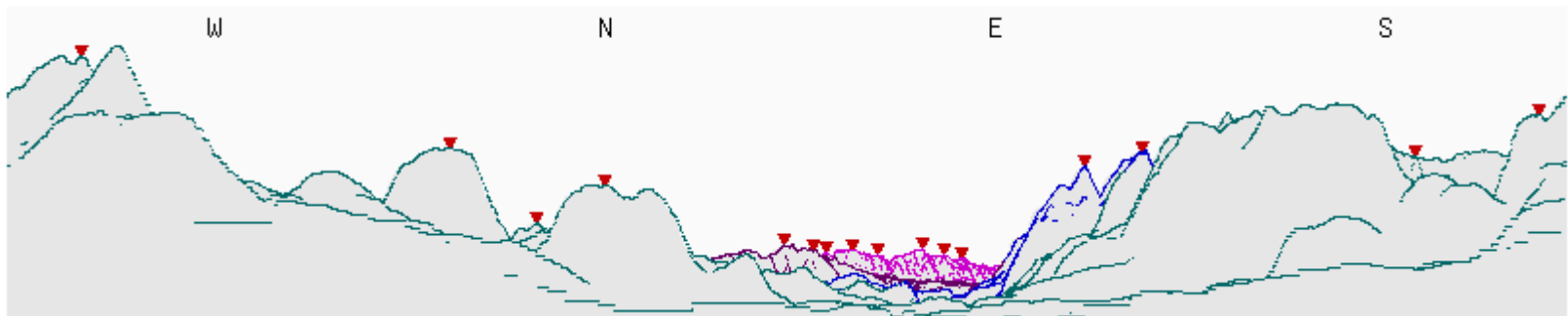
The QTH



The Bigger Picture



The Topography



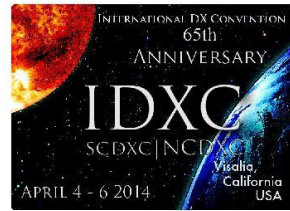
<http://www.heywhatsthat.com/>

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.**
 - **54 feet of snow two years ago.**
 - **High gusty winds.**

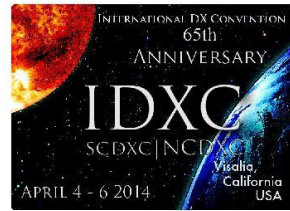
Snow



Wind



The W6SX Situation

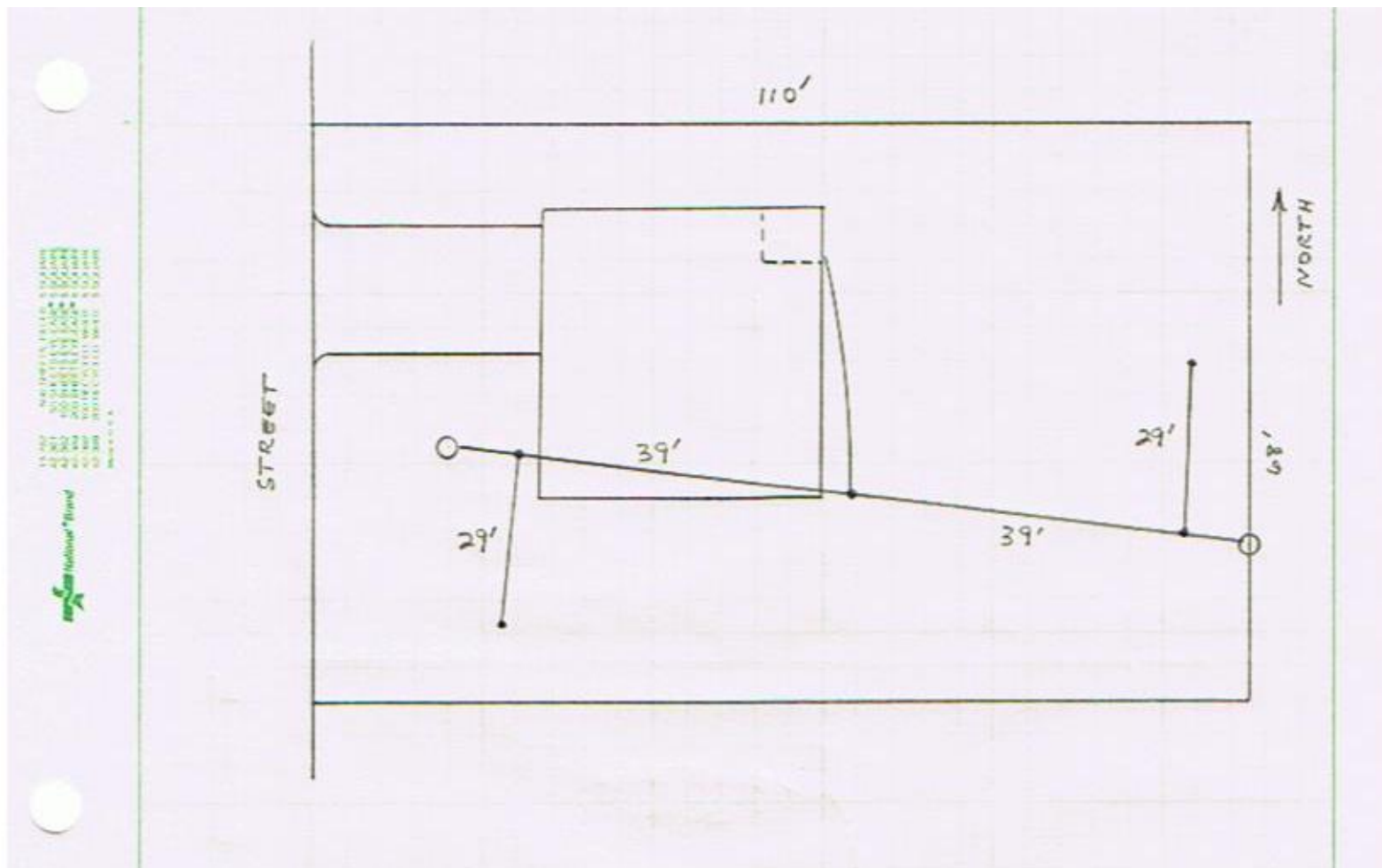


- **Single-family house on a 0.17-acre lot in residential neighborhood.**
- **No towers. No masts. Two Jeffrey Pine trees spaced 93 feet apart.**
- **Very severe weather. High gusty winds. 54 feet of snow two years ago.**
- **80-meter dipole at 46 feet with poly ladder-line and Matchboxes.**

The Antenna



The Antenna



The **Process**

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



W6SX Objective(s)

- Domestic Contests



W6SX Objective(s)

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

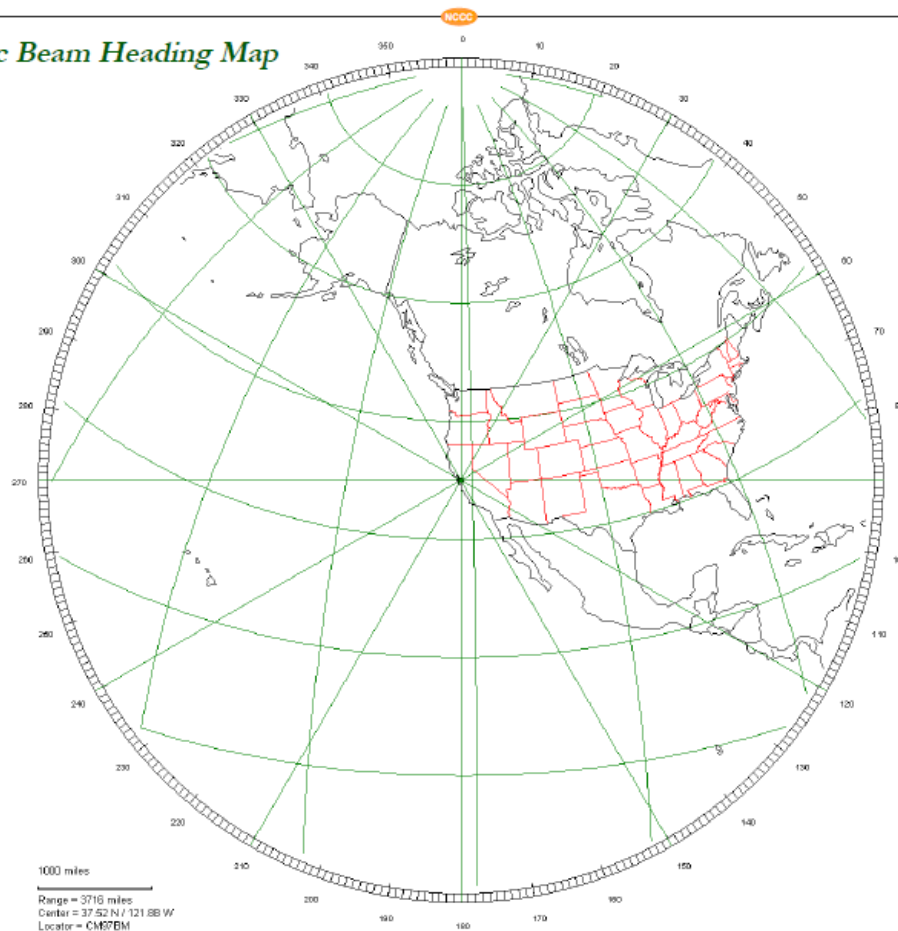


W6SX Objective(s)

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

Beam 070

Domestic Beam Heading Map





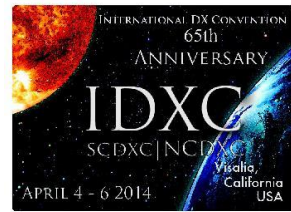
W6SX Objective(s)

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

The Process

- Present Situation
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- **Analysis**
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- Results

Modeling Is Your Best Friend

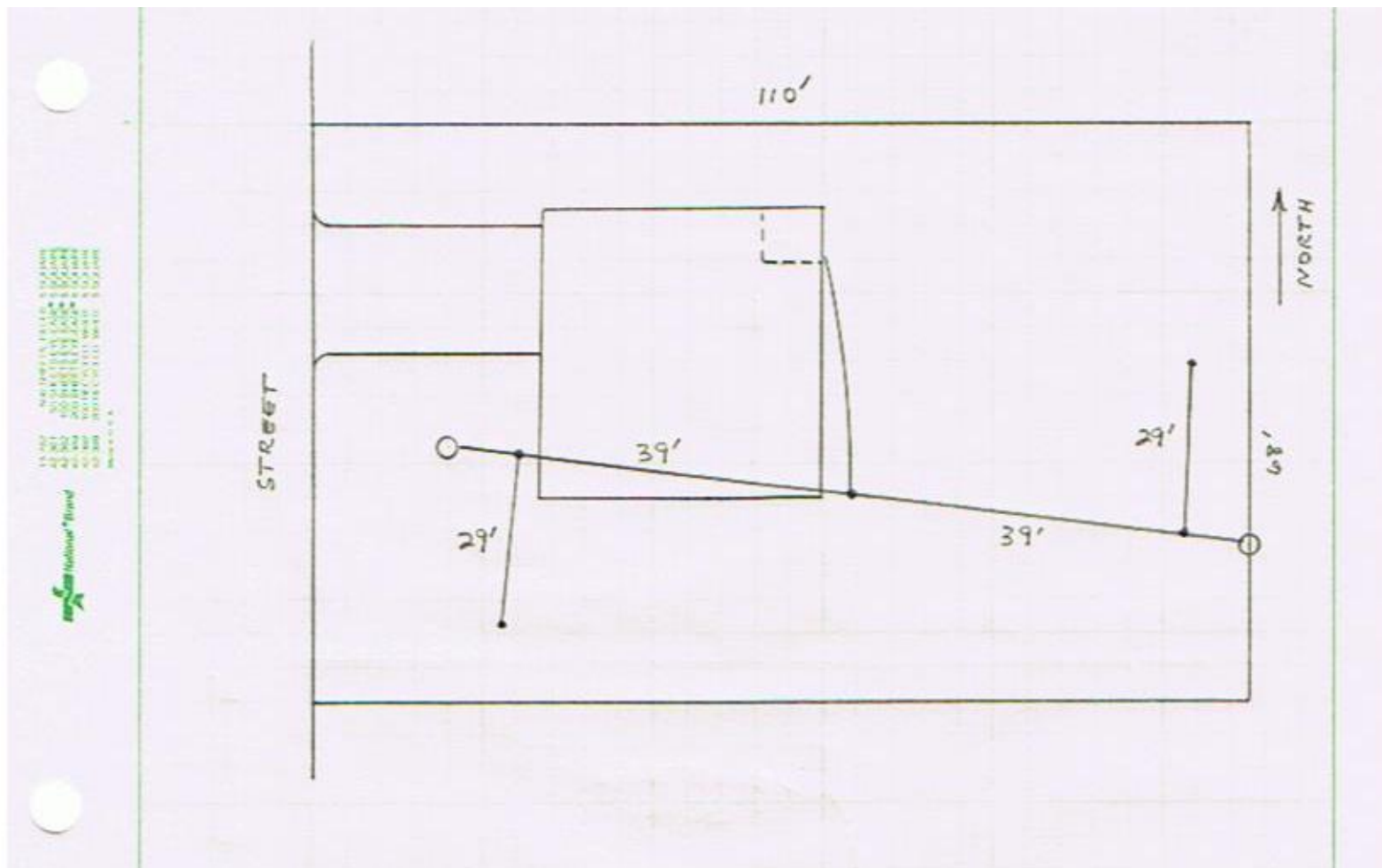


- Numerical Electromagnetics Code
- NEC2
 - EZNEC <http://www.eznec.com/>
 - 4NEC2 <http://www.qsl.net/4nec2/>
- Not rocket science, especially for simple antennas
- KISS is my NEC2 mantra.
- Albert Einstein

Analysis

- Original Antenna

The Antenna



4NEC2

Original Antenna

W6SX.NEC - 4nec2 Edit

File Cell Rows Selection Options

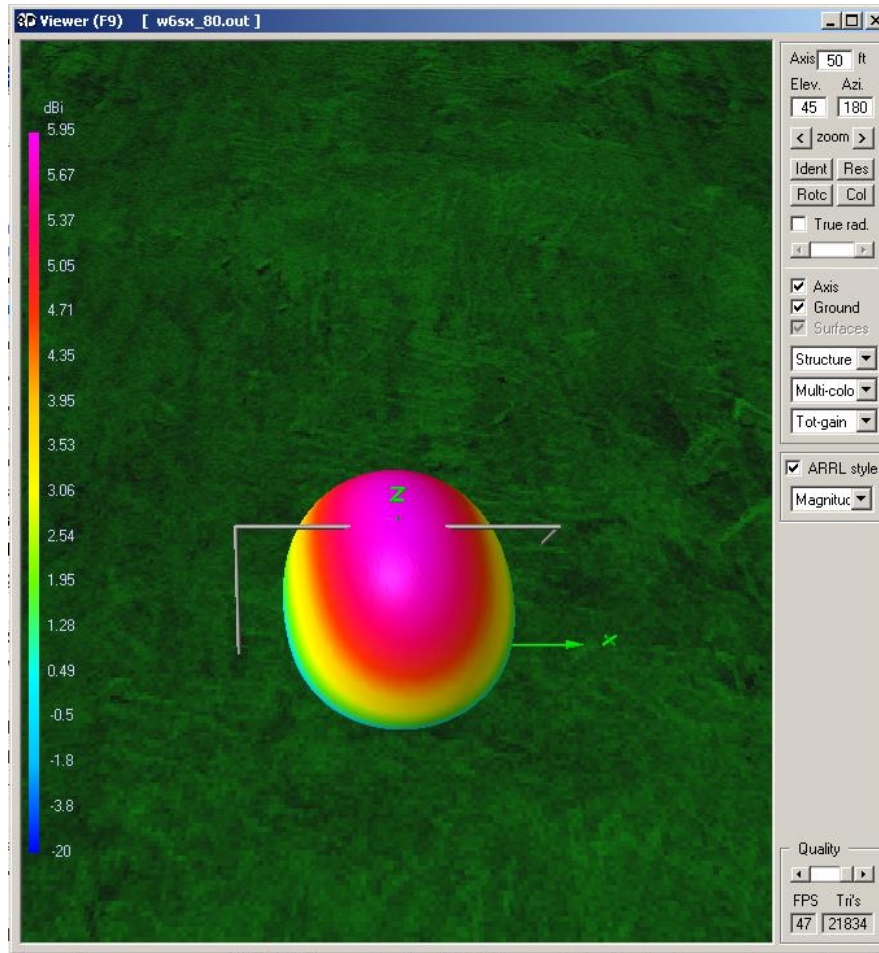
☐ Upd

Symbols **Geometry** Source/Load Freq./Ground Others Comment

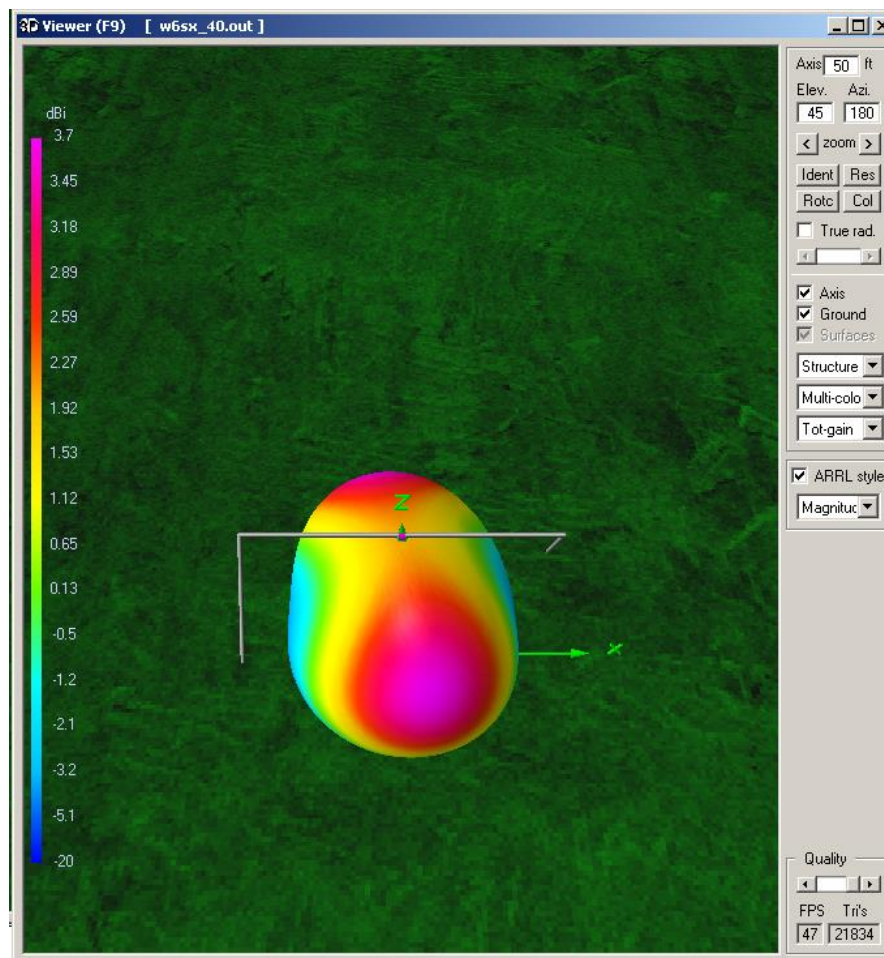
Geometry (Scaling=Feet) ☐ Use wire tapering

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											

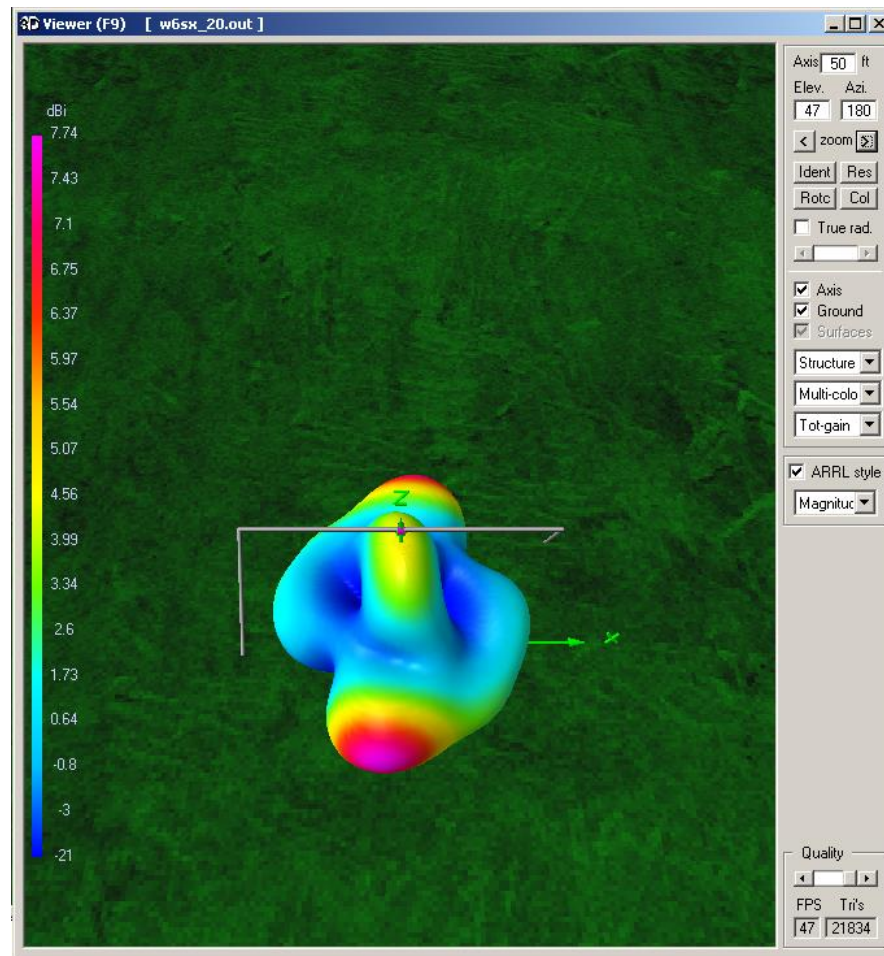
Original Antenna 80 Meters



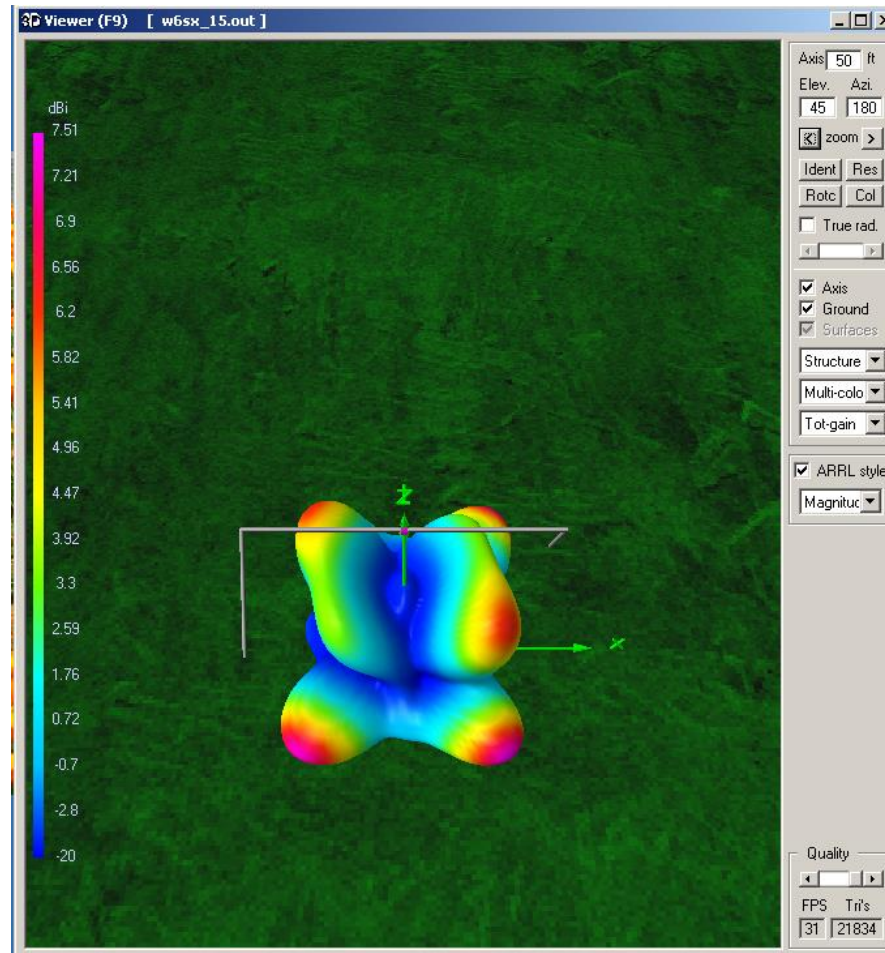
Original Antenna 40 Meters



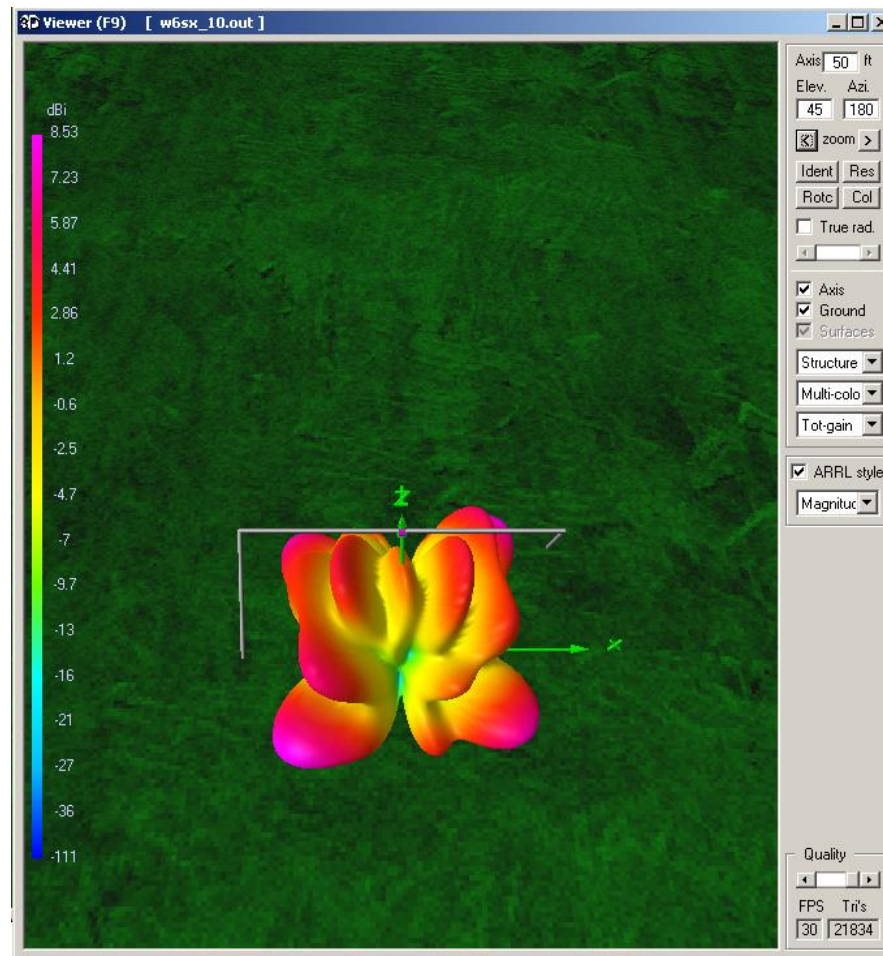
Original Antenna 20 Meters



Original Antenna 15 Meters



Original Antenna 10 Meters



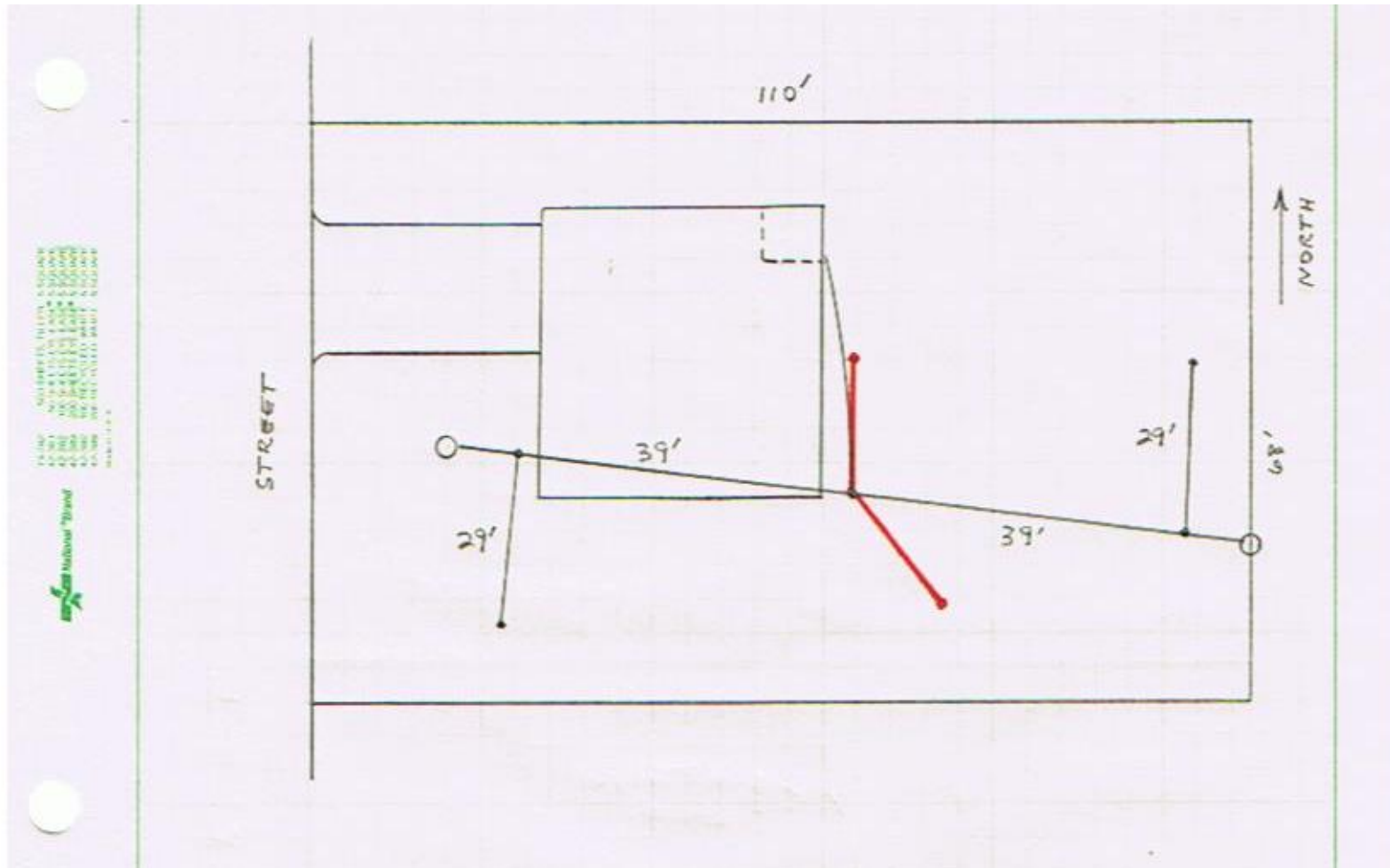
Analysis

- Original Antenna
- Candidate One
- Candidate Two
- HFTA

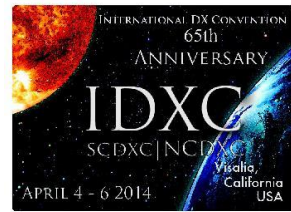
The Process

- Present Situation
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- **Choice**
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Candidate 2



Candidate 2




http://www.73cnc.com/product_p/ls100.htm

4NEC2

Candidate 2

w6sx+20+40Vbeams.nec - 4nec2 Edit

File Cell Rows Selection Options

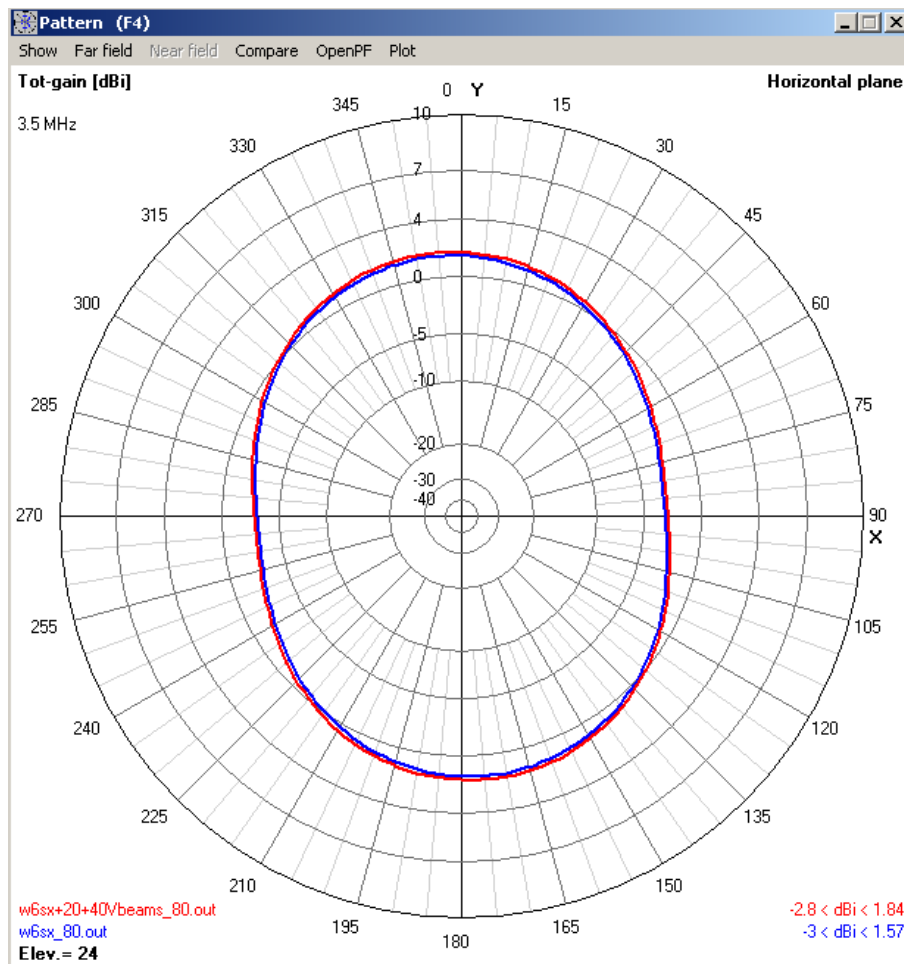
☐ Upd ☐ Ins. ☐ Del.  

Symbols **Geometry** Source/Load Freq./Ground Others Comment

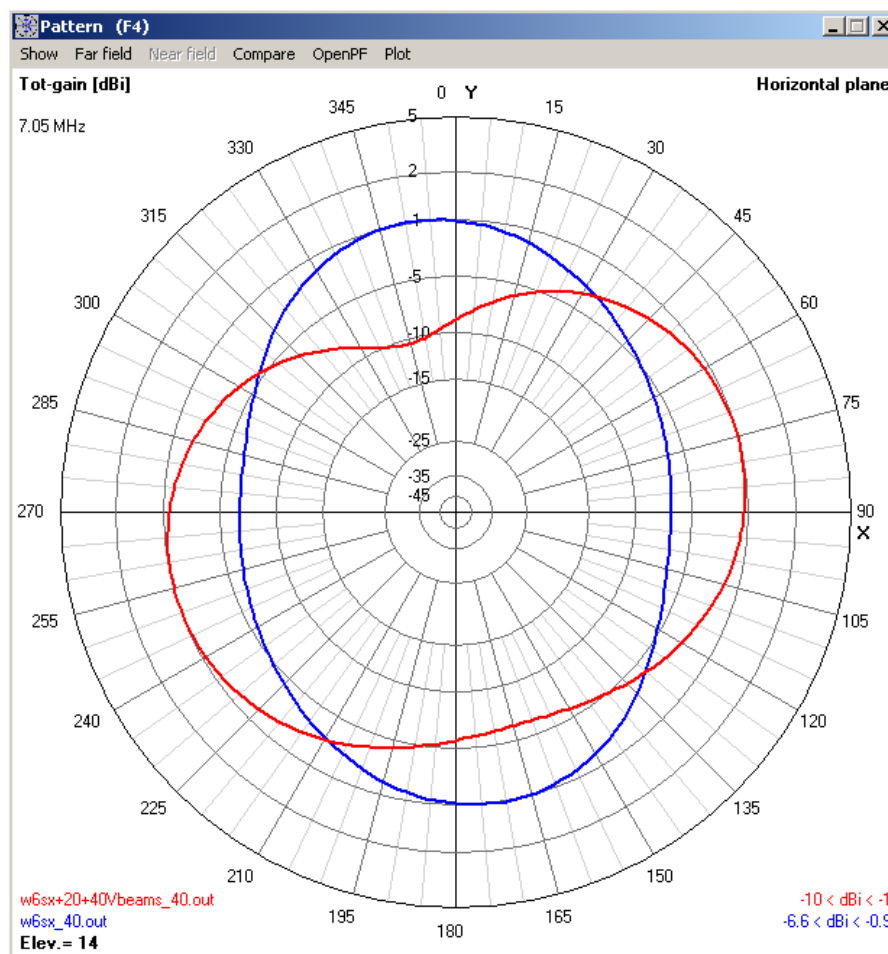
Geometry (Scaling=Feet) ☐ Use wire tapering

Nr	Type	Tag	Segs	X1	Y1	Z1	X2	Y2	Z2	Radius	
1	Wire	1	77	-38.5	0	46	-1.5	0	46	#10	
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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	

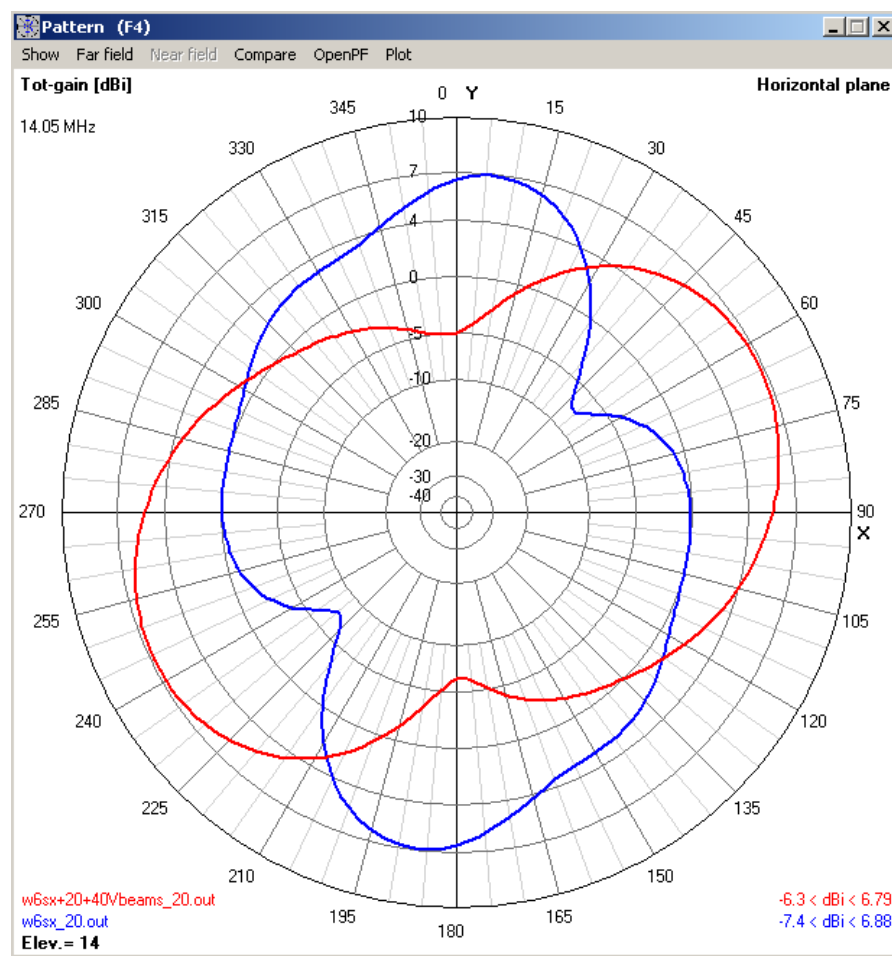
Compare 80 Meters



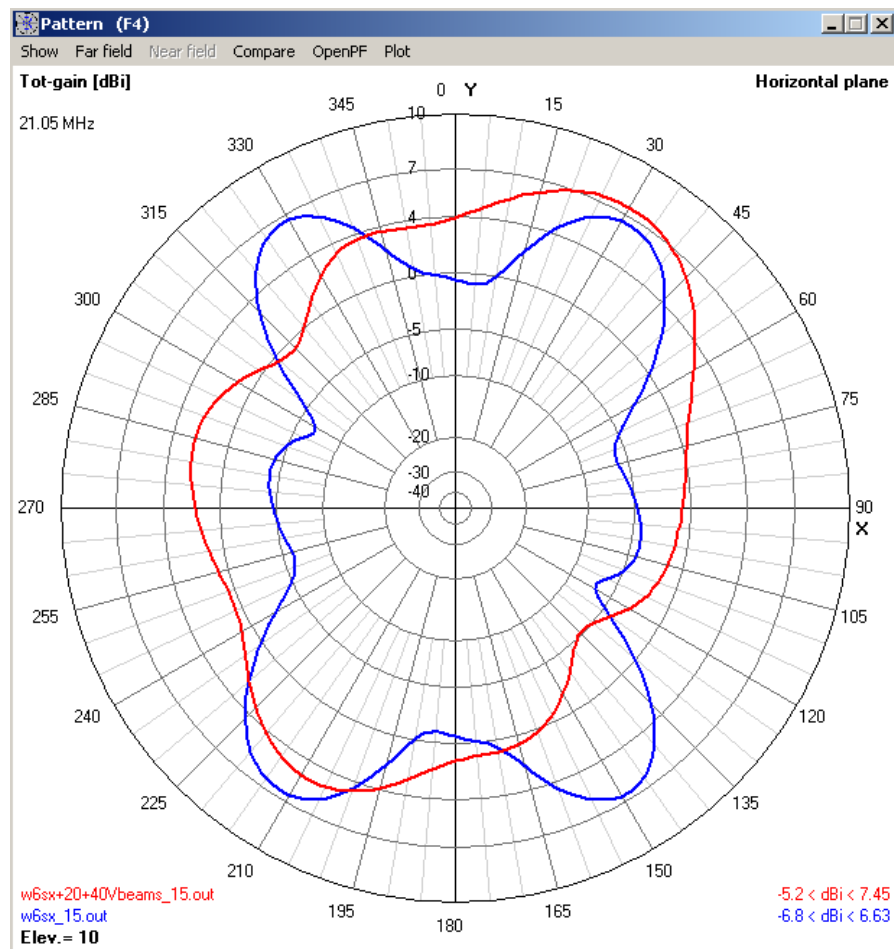
Compare 40 Meters



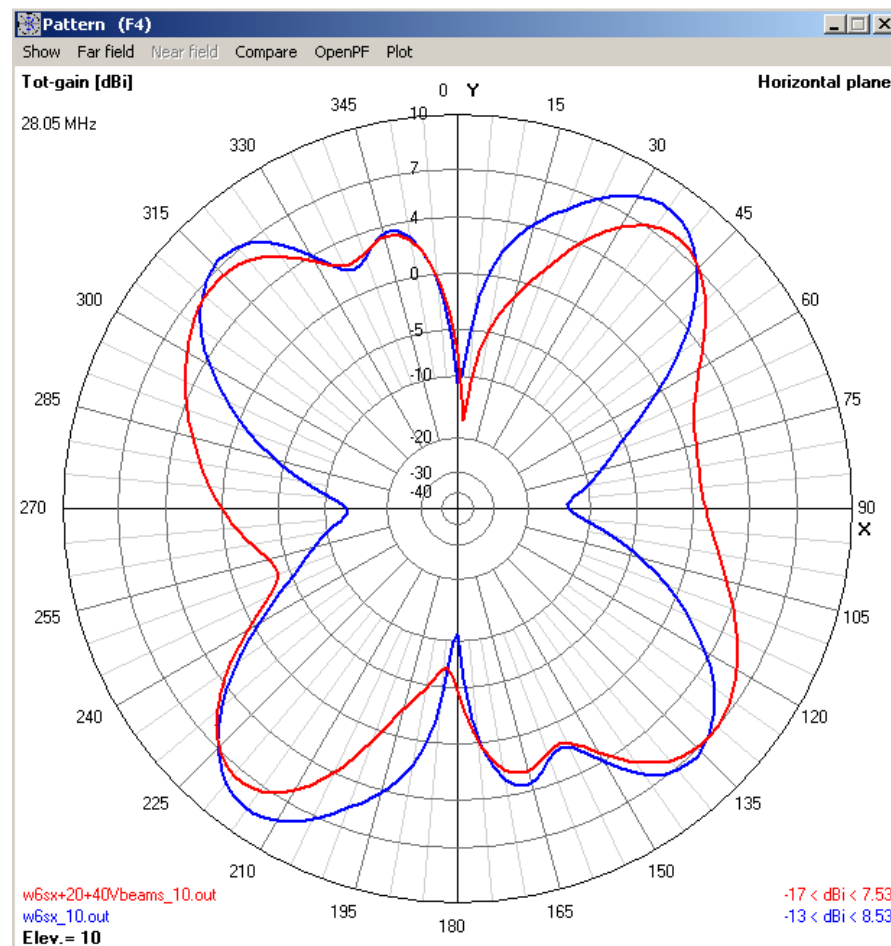
Compare 20 Meters



Compare 15 Meters



Compare 10 Meters



The Process

- Present Situation
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Test

- **How do you do A-B comparison?**
- **N3RC to the rescue: A-B-C**
- **Reverse Beacon Network**
 - **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.”**

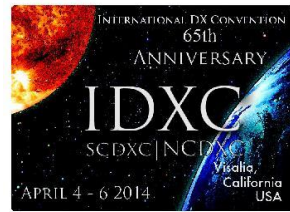
Results

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

The **Process**

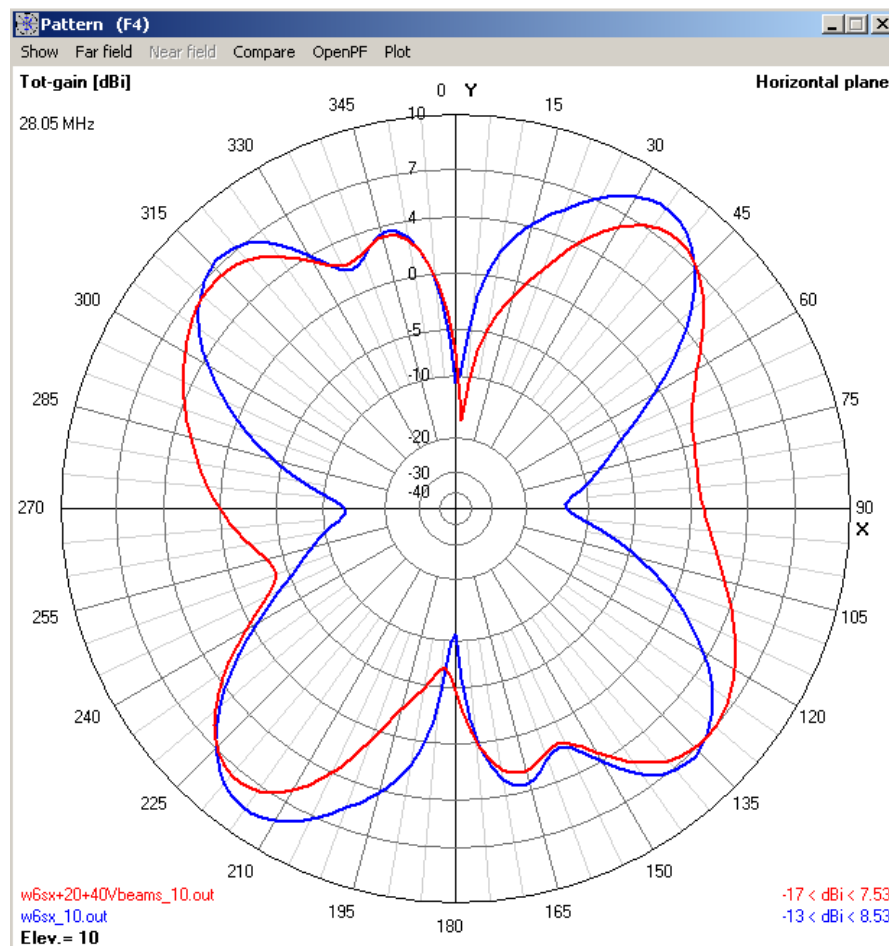
- Present Situation
- Objective(s)
- Analysis--Extra brains very helpful
- Choice
- Test
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Epilogue



- **Added ten-meter elements.**

Compare 10 Meters



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.**

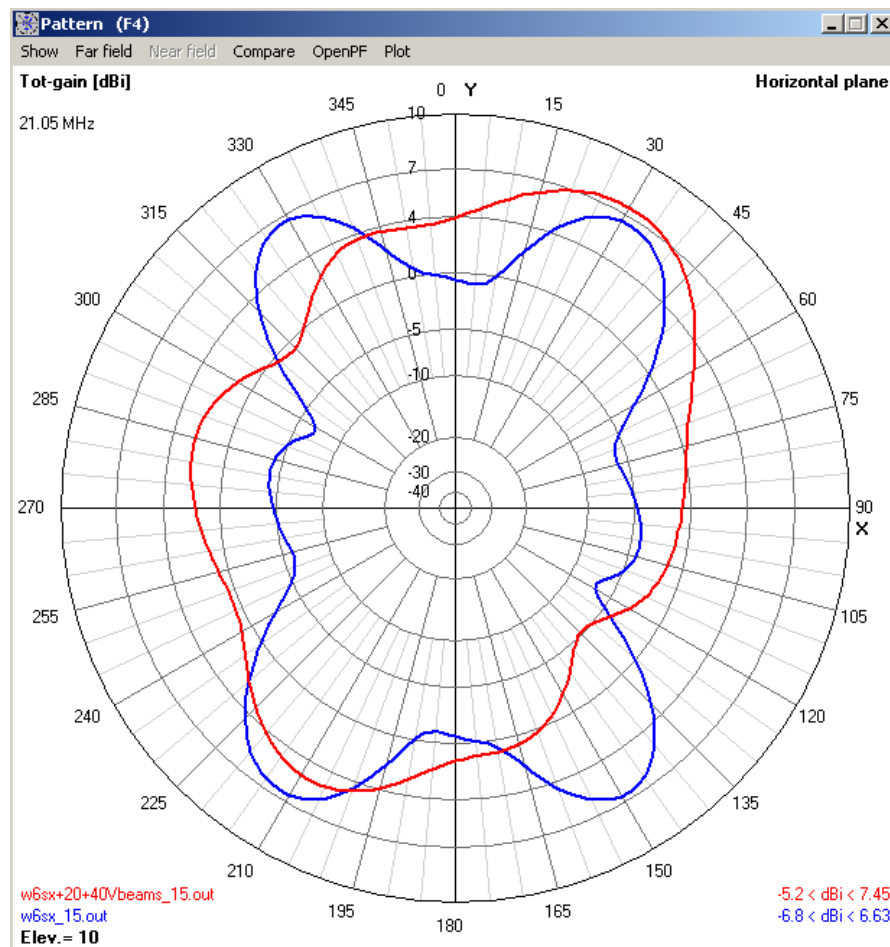


**Don't let the
naysayers keep
you down!**

The **Process**

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

Compare 15 Meters





Thank You

Roger Cooper, N3RC

Dean Straw, N6BV

Jim Brown, K9YC

Bill Myers, K1GQ

Bud Hippisley, W2RU

Jim Michener, K9JM



Questions?



Questions

**I'll be in and out of convention
common area this afternoon.**

Hank, W6SX w6sx@arri.net



W6SX Prime Directive

**The first rule of
contesting is to
have fun.**