

# **DXing From a City Lot**

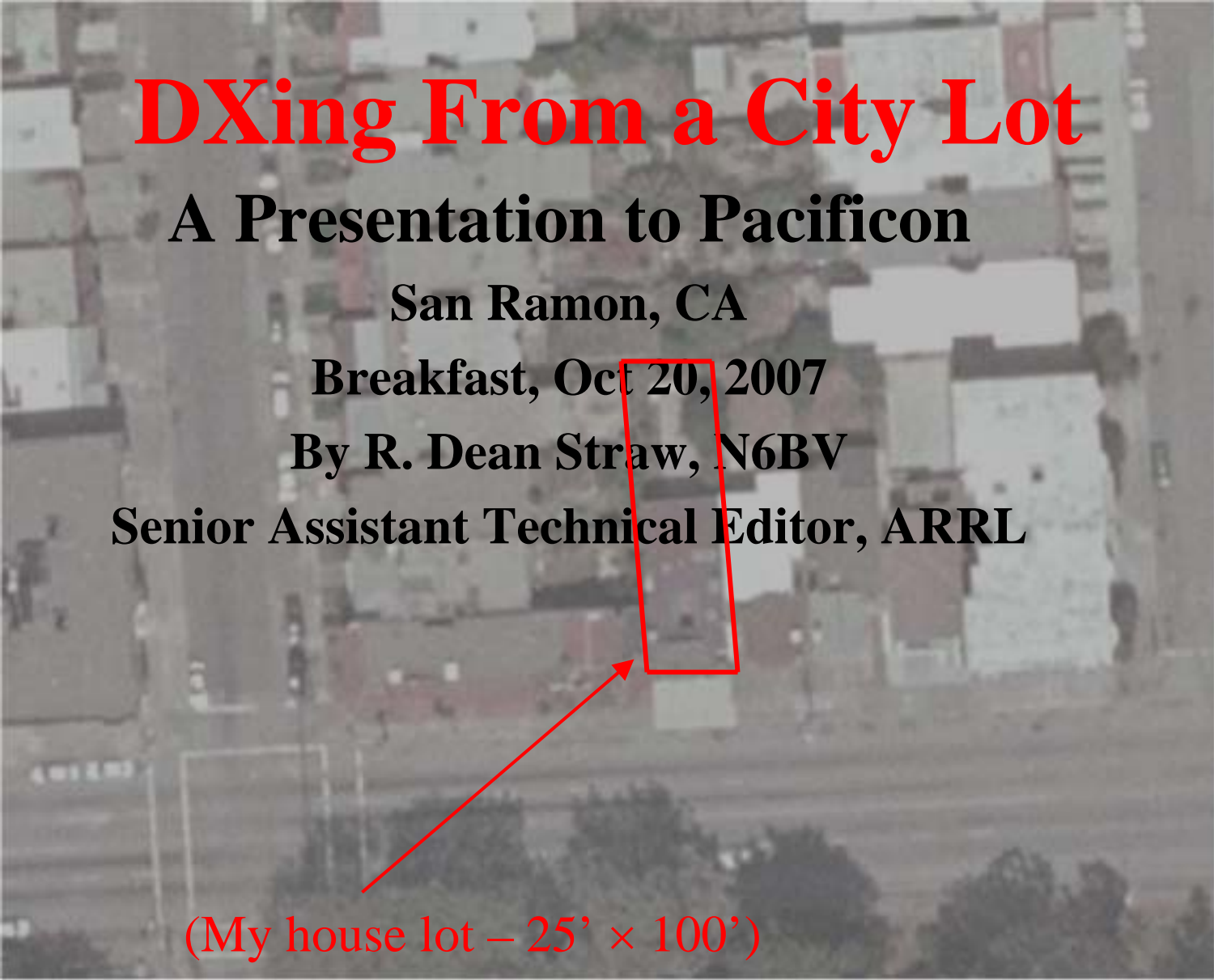
## **A Presentation to Pacificon**

**San Ramon, CA**

**Breakfast, Oct 20, 2007**

**By R. Dean Straw, N6BV**

**Senior Assistant Technical Editor, ARRL**

An aerial photograph of a city lot in San Ramon, CA. A red rectangle highlights a specific area on the lot, and a red arrow points from the bottom left towards the rectangle. The lot is surrounded by other buildings and streets.

**(My house lot – 25' × 100')**

A world map with a grid overlay, showing various cities and their corresponding times. The map is colored in shades of green and blue. The text is overlaid on the map.

**For those of you who don't know me:**

- I'm ARRL's longest-distance telecommuter.
- I live in San Francisco.
- I've been a Senior Assistant Technical Editor since 1993.
- Although my specialty is antennas, my passion in ham radio is contesting.

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- I will explore briefly how different antennas affect coverage of areas around the world.
- Then I'll talk about some practical antennas for a city lot.



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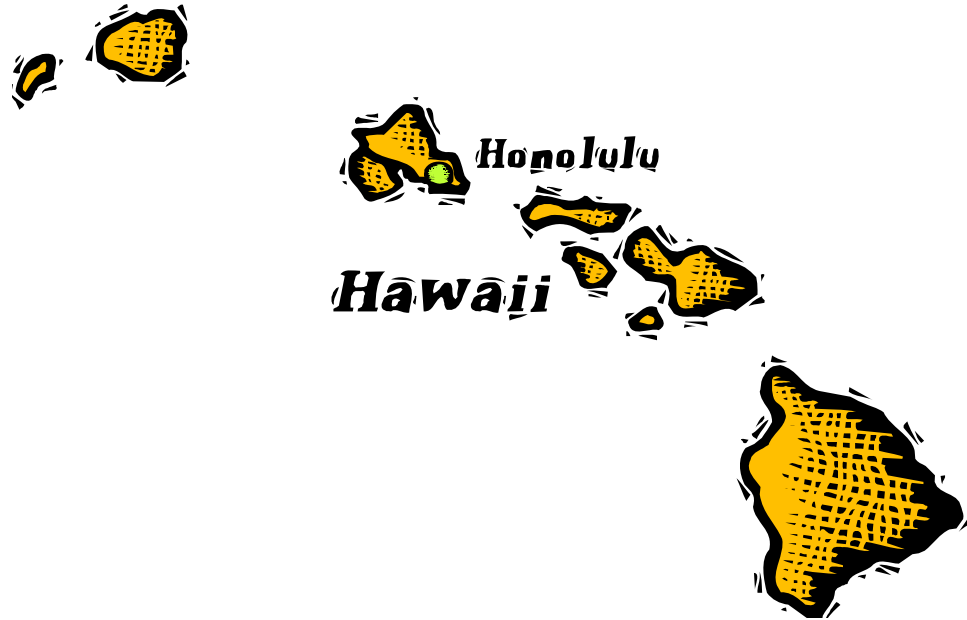
# Modern-Day Limitations

- You may be limited by Covenants, Conditions & Restrictions (CC&Rs ).
- You may be limited by the size of your lot.
- You may be limited by a lack of funds.
- Your options may be limited by spousal aesthetic restrictions (as in “That’s ugly.”).



# When I was a Kid in Hawaii in 1959

Things were simpler then. Who ever heard  
of CC&Rs back in 1959?





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# When I was a Kid in Hawaii in 1959

- My first antenna was a “long wire” with about 50 feet of #24 enameled wire strung from my window to a papaya tree.
- Being all of about 8 feet off the ground, it didn't work very well...
- But I worked some local stations. And that was thrilling for a 12-year old kid.



## Getting Better

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- My “bamboo vertical” was fed with 300- $\Omega$  twin lead, with a pair of pilot lamps as an RF output indicator.
- My homespun transmitter used a pair of 6L6s. These doubled to 20 meters from a 6AG7 oscillator. Remember that lineup?





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- I actually worked some DX on 20 meters. I distinctly remember what a thrill I had working a station in Taipei!
- Gee, had I known then, I probably could have boosted my signal 5 or 6 dB with some ground radials...



## Going Big-Time!

- Next, I really went “big-time” when I graduated to a homebrew 3-element 20-meter Yagi, mounted a magnificent 30 feet off the ground.

1963: KH6DKD in front of his beloved Viking Ranger and NC-300, showing ham radio to a neighborhood kid.





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- This was all done on a 10,000 square-foot city lot. Again, the times were simpler back in 1959, and nobody had heard of CC&Rs.
- Besides, having a KH6 call gave me at least a 10 dB advantage!



# So, How Bad Were Those Old KH6DKD Antennas, Really?

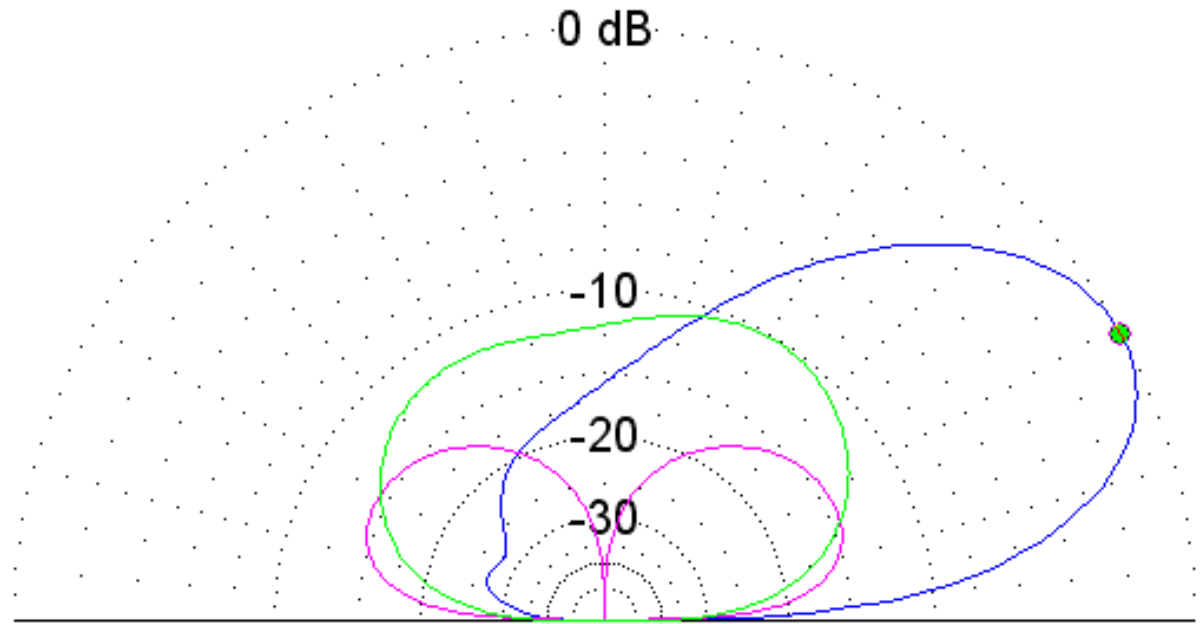
**Total Field**

**\* Primary**

3L20 at 30'

Bamboo Vertical 20m

Papaya Tree LW 20m

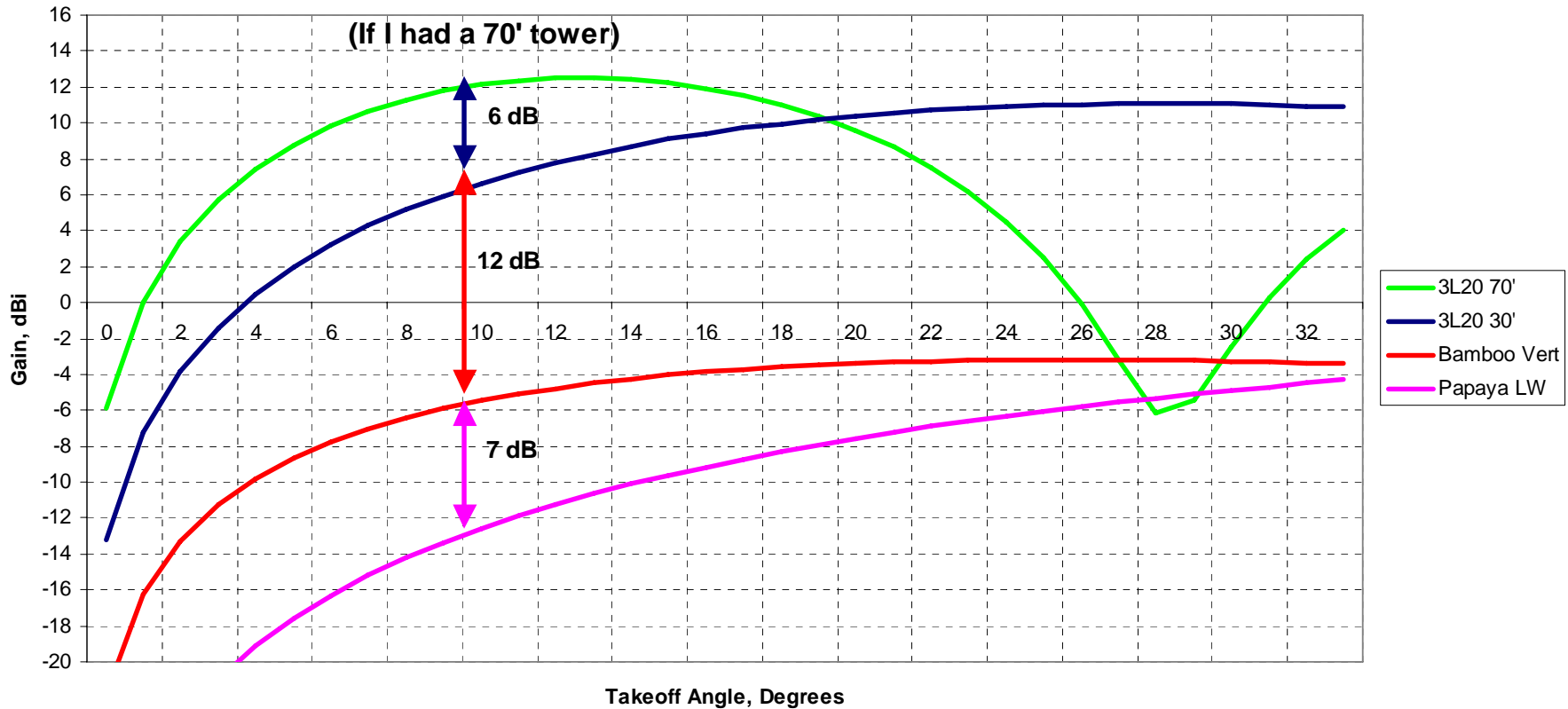


Going from an 8' high antenna to a 3-ele. Yagi “one-half wavelength” (30') high makes a *big* difference! This is all over flat ground.



# A Linear Plot -- Another Way of Looking at the Low Angles Needed for DXing

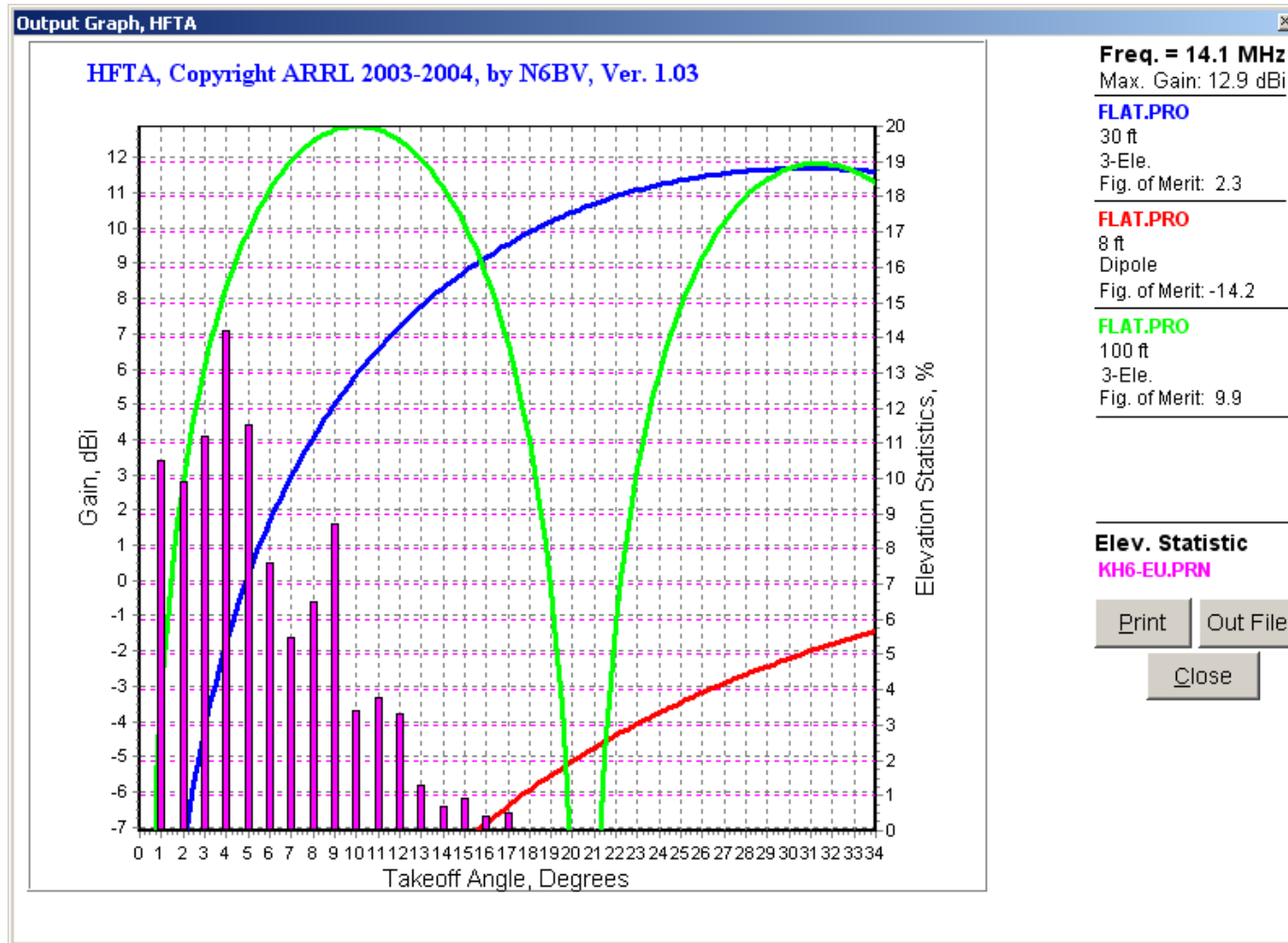
As Antennas for 20 Meters Improved at KH6DKD



25 dB = 6 S-units at 10°, comparing 70' 3L20 (I wish I had my Yagi that high back in 1959!) to the famous “Papaya Tree Longwire”



# What Angles Are Needed from KH6?



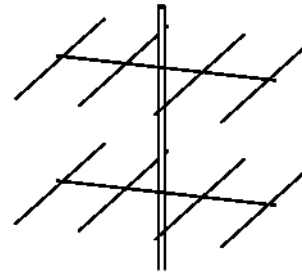
I show the 100' 3-ele. Yagi just for fun...



# *Everything Works – Sort of!*

**The range of HF antenna gain is not very large -- from about  $-10$  to  $+20$  dBi.**

- This 30-dB range covers antenna ranging from a radiating light bulb (or perhaps a “Papaya Tree Longwire”) up to a stack of Yagis.



This is like going from 1 W to 1000 W, which is about 7 S-units on a typical communications receiver.



# Area Coverage With Different Antennas

In the following, Signal-Strength calibration is in dB below 1W in the *VOAAREA* program.

VOACAP	
Signal Power at Receiver [dBW]	
S9+20	> -83
S9+10	> -93
S9	> -103
S7	> -115
S5	> -127
S3	> -139
S1	< -139
Min=-382.30	
Max= -77.10	

Let's look at San Francisco to Europe, using various antennas

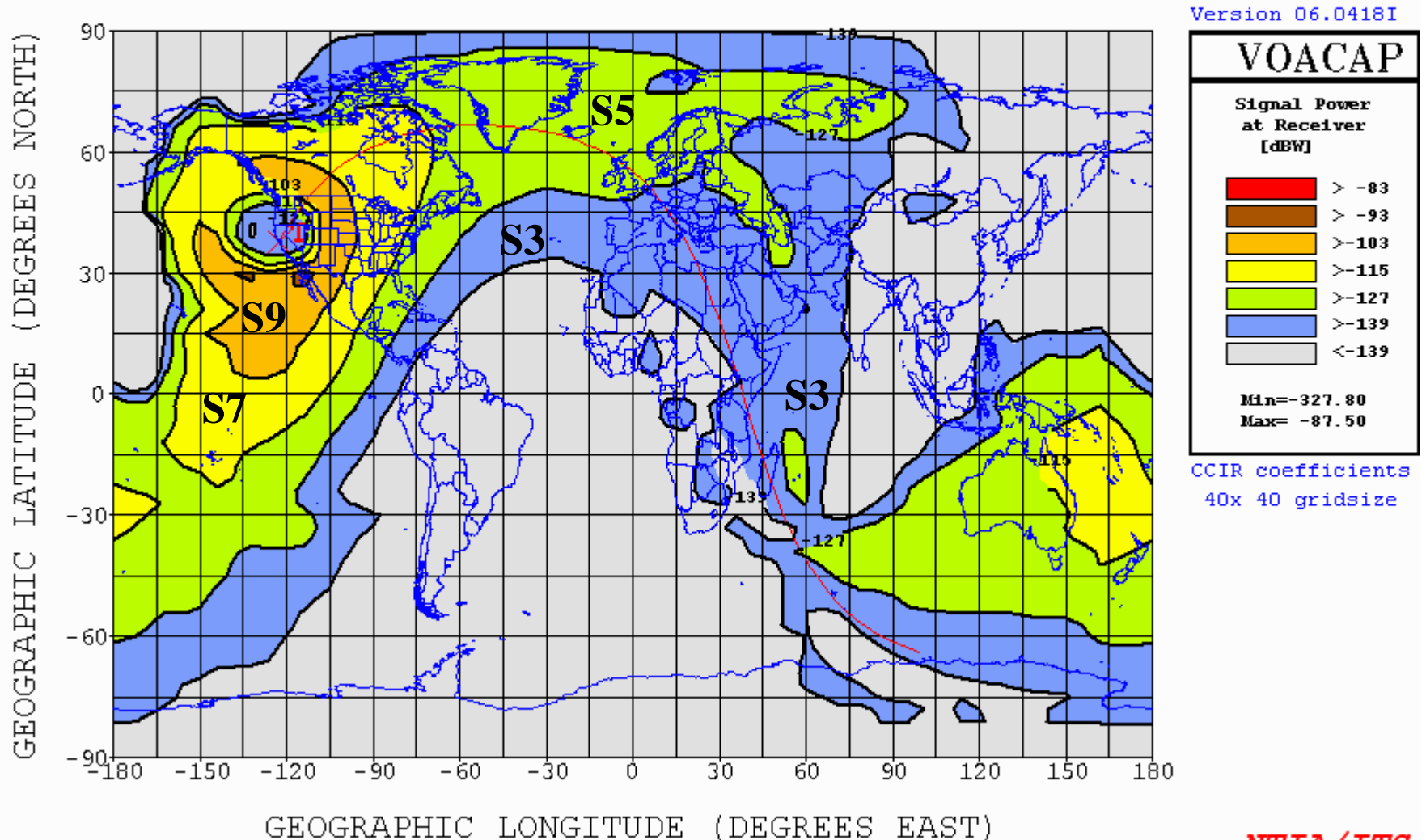
SAN FRANCISCO [Dip. 35' ] 100W 30deg 16ut 14.000MHz Dec 100ssn

SDBW

Tx location to grid of Rx

AREADATA\default\test.V11

## 20-meter dipole at 35', 100 W, High solar activity in December





# Going From the Merely Mundane to the Monstrously Magnificent



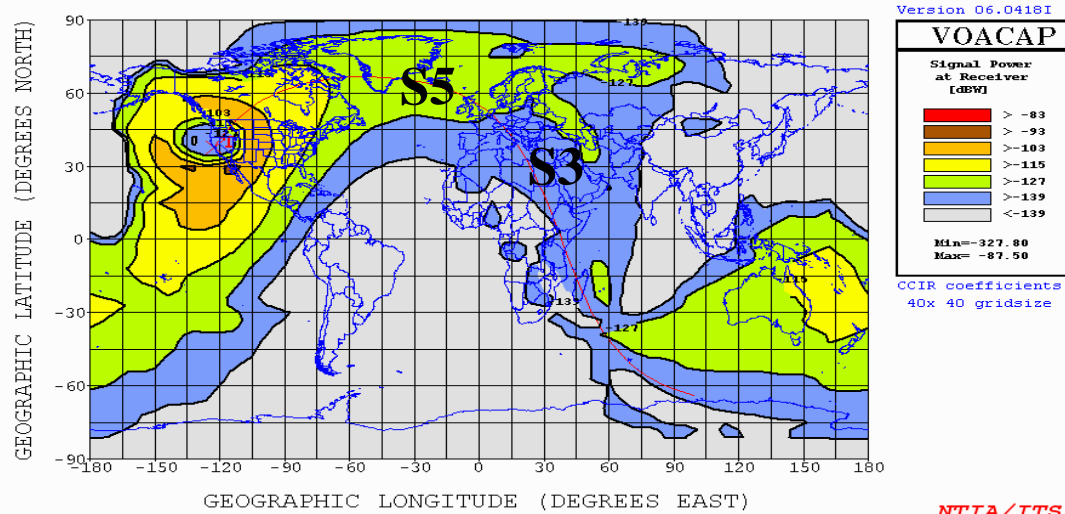
N6RO 20-Meter Stack:  
5L/5L/5L at 130'/90'/45'

A very large station for comparison. And yes, magnificence is in the eye of the beholder.



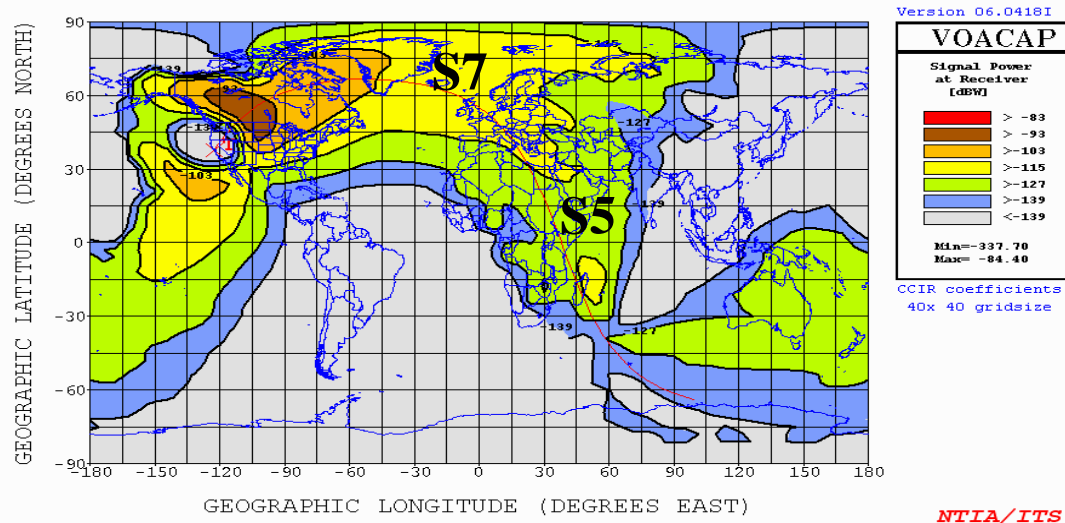
Dipole  
@35',  
100 W

SAN FRANCISCO [Dip. 35' ] 100W 30deg 16ut 14.000MHz Dec 100ssn SDBW  
Tx location to grid of Rx AREADATA\default\test.V11



SAN FRANCISCO [N6RO\_20stk] 100W 30deg 16ut 14.000MHz Dec 100ssn SDBW  
Tx location to grid of Rx AREADATA\default\test.V11

N6RO's  
5L/5L/5L  
Stack,  
@130/90/45',  
100 W

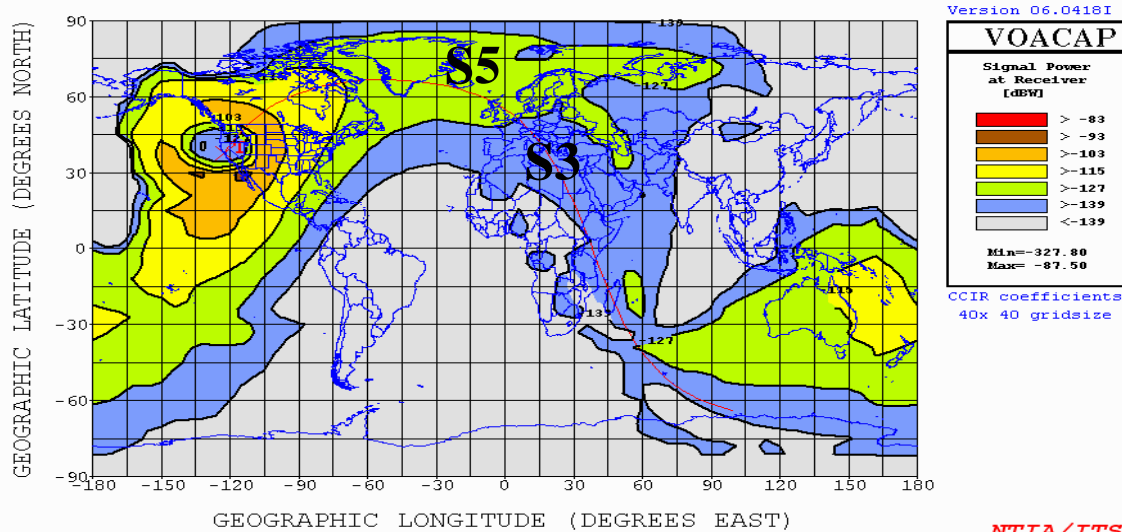




35' High  
Dipole  
at 100W

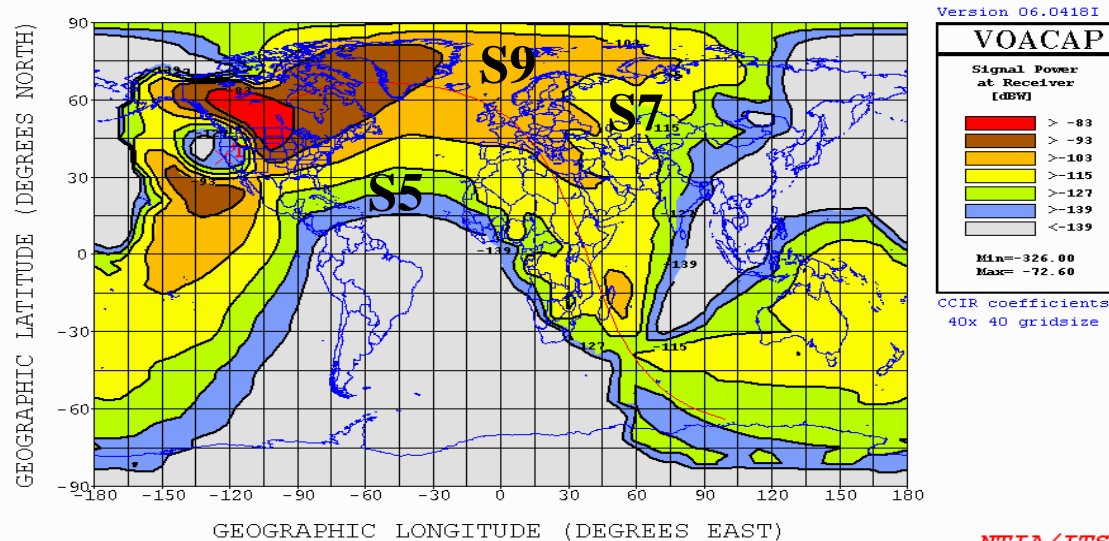
SAN FRANCISCO [Dip. 35' ] 100W 30deg 16ut 14.000MHz Dec 100ssn  
Tx location to grid of Rx

SDBW  
AREADATA\default\test.V11



SAN FRANCISCO [N6RO\_20stk] 1.5kW 30deg 16ut 14.000MHz Dec 100ssn  
Tx location to grid of Rx

SDBW  
AREADATA\default\test.V11



Reality:  
N6RO  
Stacks at  
1500W on  
20 meters

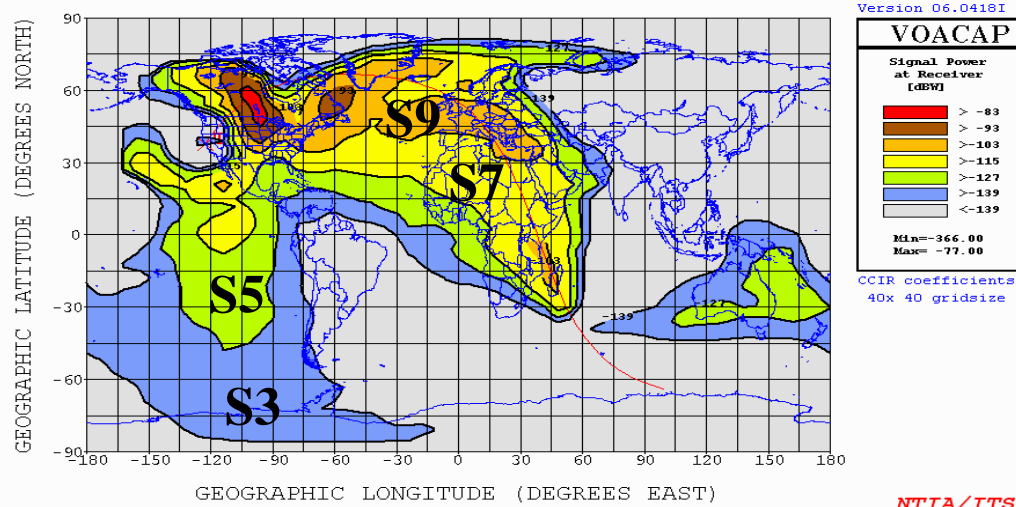


N6RO at  
1500W

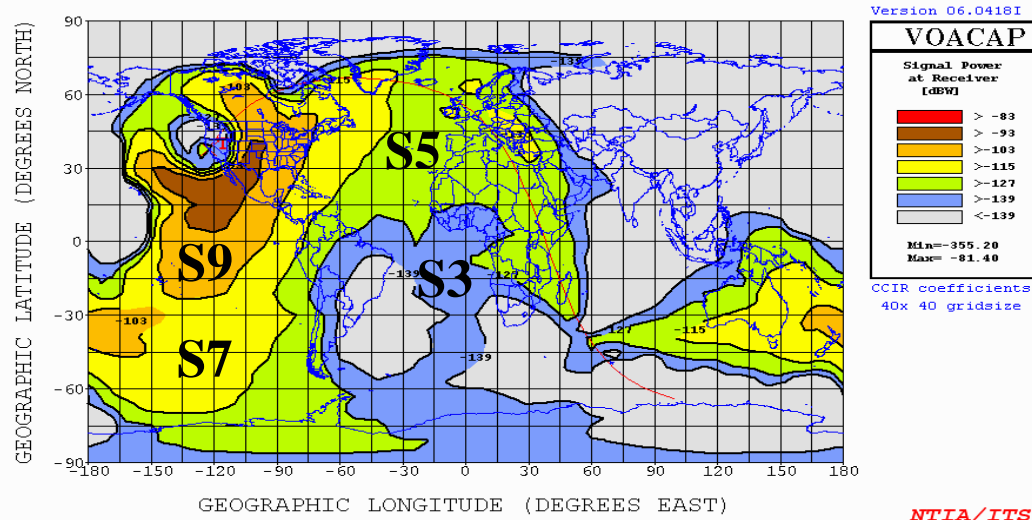
It's a little  
easier on 15  
meters, with  
1500 W

35'  
Dipole  
at  
1500W

SAN FRANCISCO [N6RO\_15stk] 1.5kW 30deg 16ut 21.000MHz Nov 100ssn SDBW  
Tx location to grid of Rx AREADATA\default\temp.V11



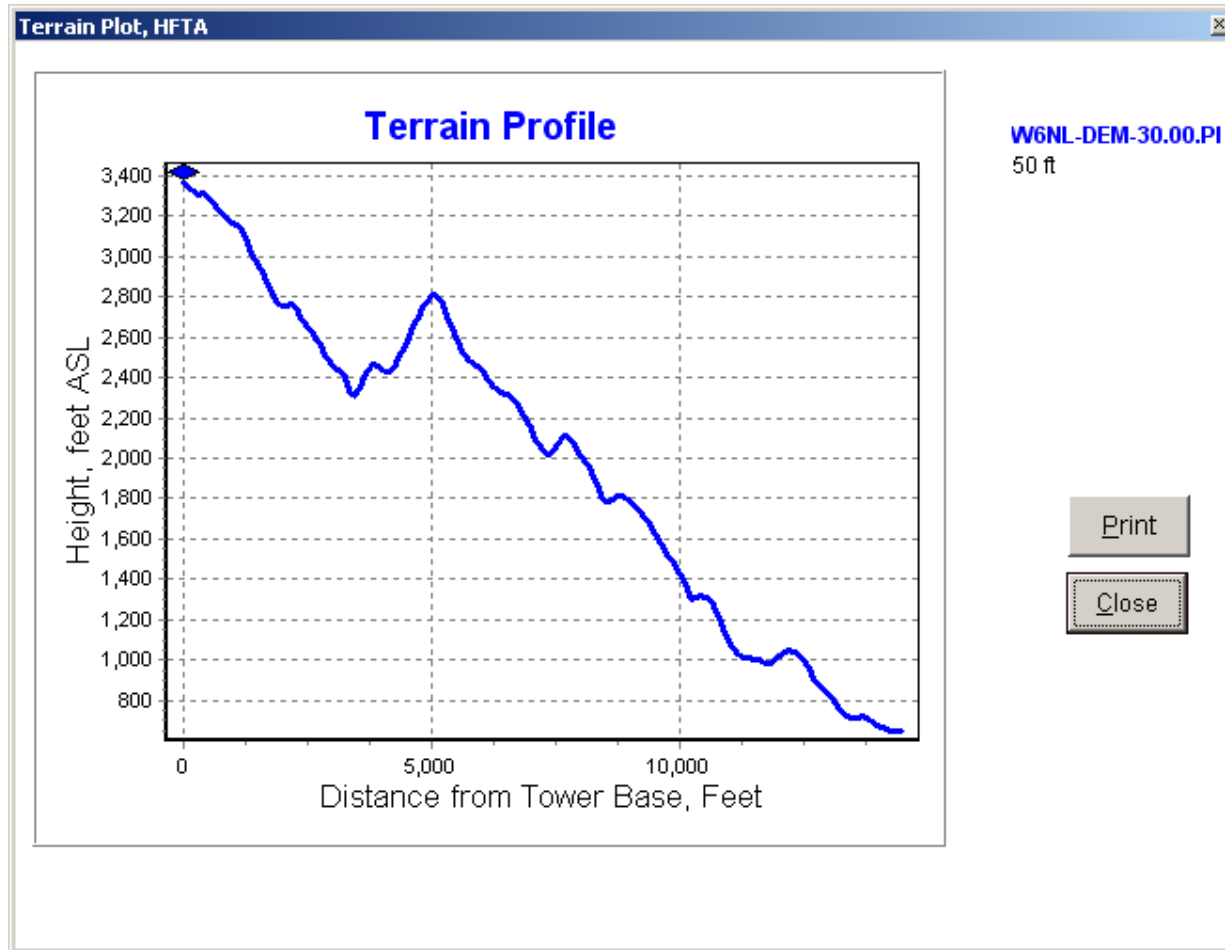
SAN FRANCISCO [Dip. 35' ] 1.5kW 30deg 16ut 21.000MHz Nov 100ssn SDBW  
Tx location to grid of Rx AREADATA\default\temp.V11







# What About a Hilltop Location? W6NL



What a breathtaking view towards everywhere from  
W6NL's place!



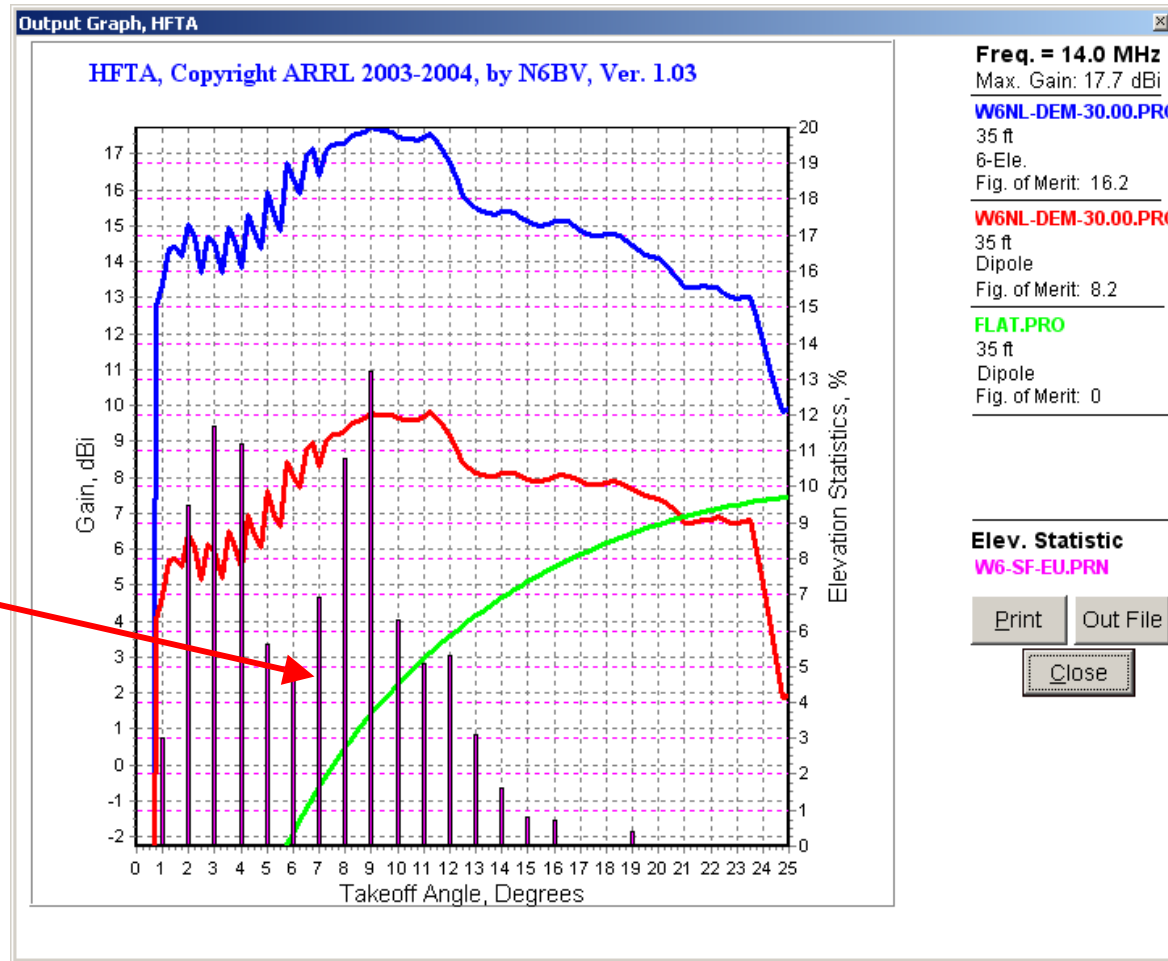
# W6NL Towards Europe





# Signals From W6NL's Hilltop Location

Elevation angles needed from SF to Europe over whole solar cycle.



At a 9° elevation, 7 dB between 6L20 and dipole at W6NL, but 16 dB over dipole over flat ground. Each 2 dB is another “layer” of DX!



# So What Does the Editor of *The ARRL Antenna Book* Have for his Own City-Lot Installation?

- A 20-meter dipole about 2 feet over my roof.



## **So What Does the Editor of *The ARRL Antenna Book* Have for his Own City-Lot Installation?**

- A 20-meter dipole about 2 feet over my roof.
- An electric trolley runs right in front of my house in San Francisco... During CW contests I can still work many stations (when the trolley isn't nearby).



## So What Does the Editor of *The ARRL Antenna Book* Have for his Own City-Lot Installation?

- A 20-meter dipole about 2 feet over my roof.
- An electric trolley runs right in front of my house in San Francisco... During CW contests I can still work many stations (when the trolley isn't nearby).
- I will soon be putting up a trapped GP vertical. At least I'll get on 40 that way, with plenty of noise, of course.



# If I Really Wanted to DX From my San Francisco QTH

- I'd put up my 20-meter dipole about 10' higher off the roof with RadioShack TV-type masts.



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- I'd put up my 20-meter dipole about 10' higher off the roof with RadioShack TV-type masts.
- I'd put a wire reflector behind the 20-meter dipole to emphasize Europe more.



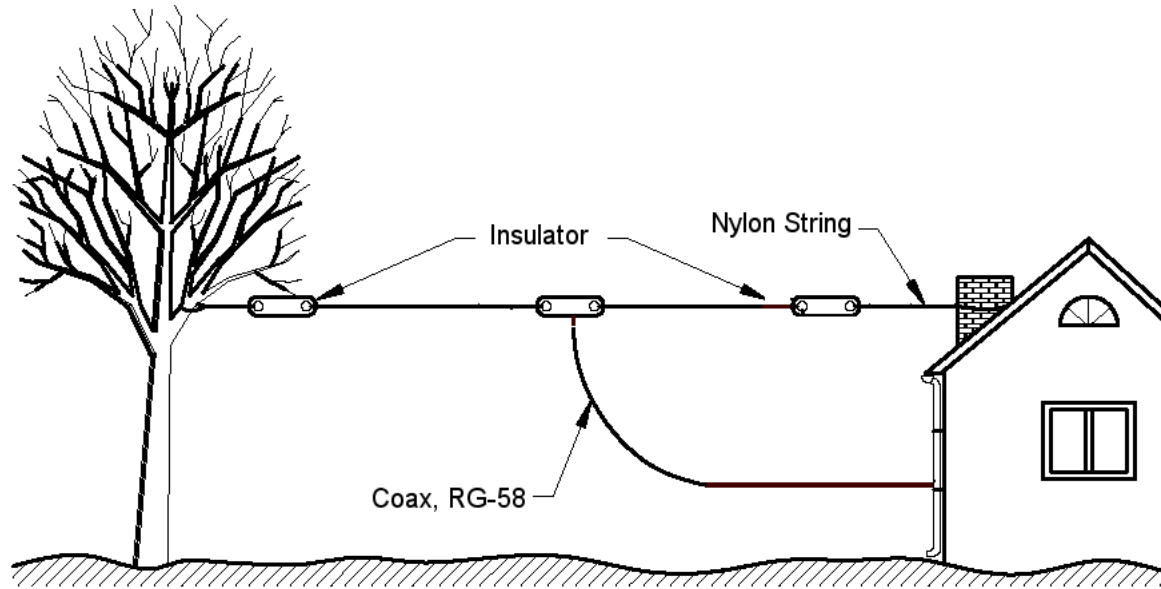


## If I Really Wanted to DX From my San Francisco QTH

- I'd put up my 20-meter dipole about 10' higher off the roof with RadioShack TV-type masts.
- I'd put a wire reflector behind the 20-meter dipole to emphasize Europe more.
- I'd put up a 40-meter dipole at right angles to the 20-meter dipole, fed in parallel. I could work 15 also with this.



# It's Hard to Beat a Simple ‘Flat-Top’ 40-Meter Dipole

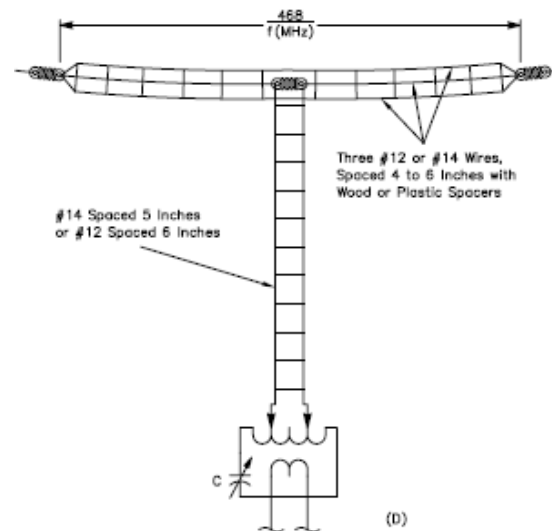


**Put it up as high as possible for best results.**



# If I Really Wanted to DX From my San Francisco QTH

- Or I'd put up a 66-foot dipole fed with open-wire feed line on my roof and use an antenna tuner for multiband 40 to 10-meter operation.

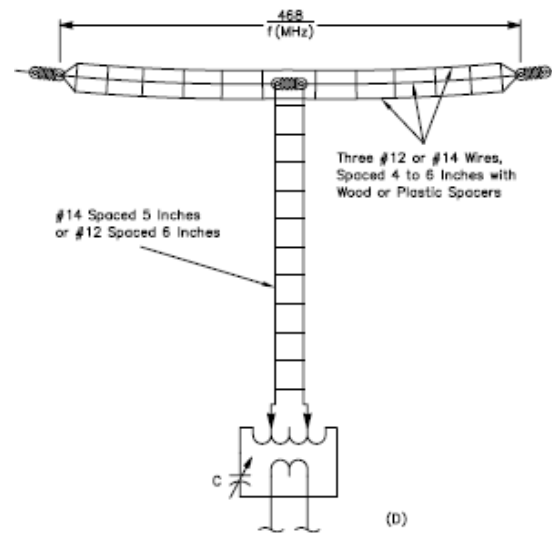




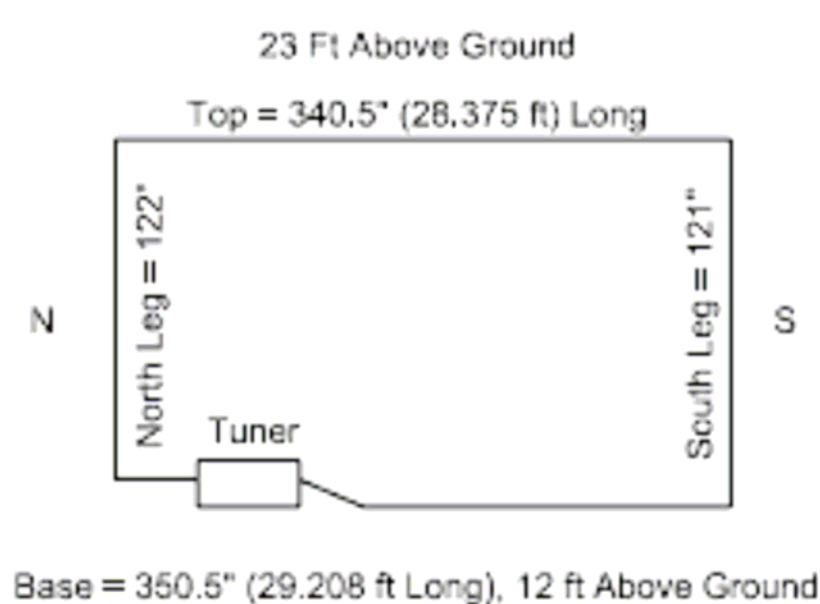
# If I Seriously Wanted to DX From my San Francisco QTH

- Or I'd put up a 66-foot dipole fed with open-wire feed line on my roof and use an antenna tuner for multiband 40 to 10-meter operation.

- After all, the electric trolleys don't run *all* the time!



# Or, I Could Try a Multi-Band Indoor Loop Like This

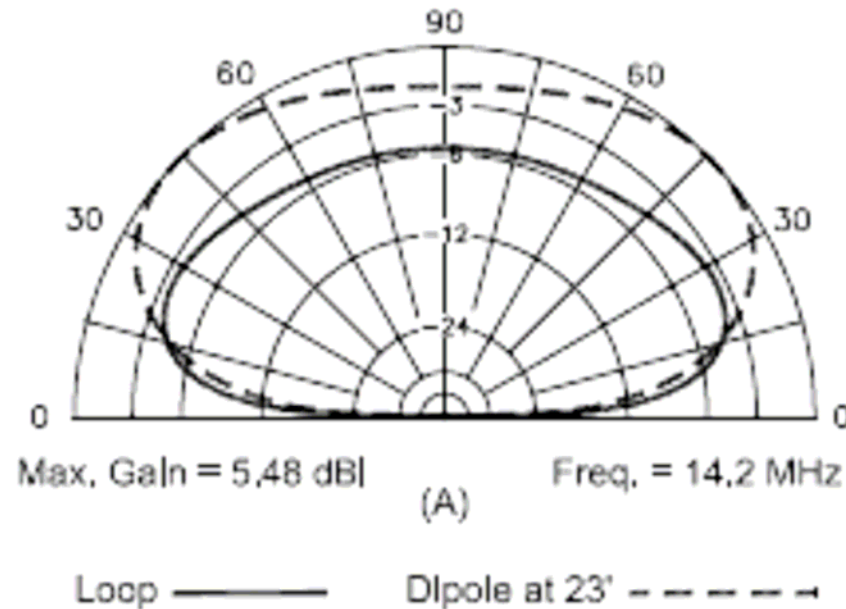


An indoor attic loop that W8TP uses in his retirement condo from 80 to 10 m.

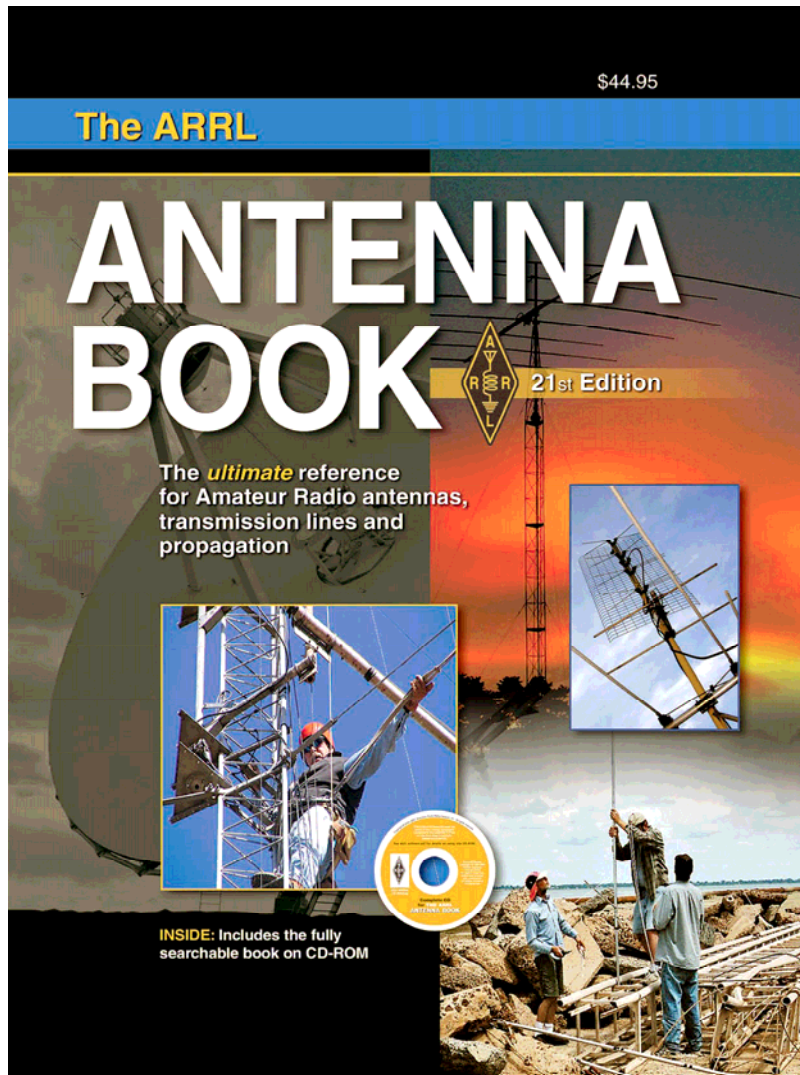


**Fig 36—Can you see W8TP's antenna in this photograph? Of course you can't—it's hidden from view inside his attic!**

# W8TP Loop



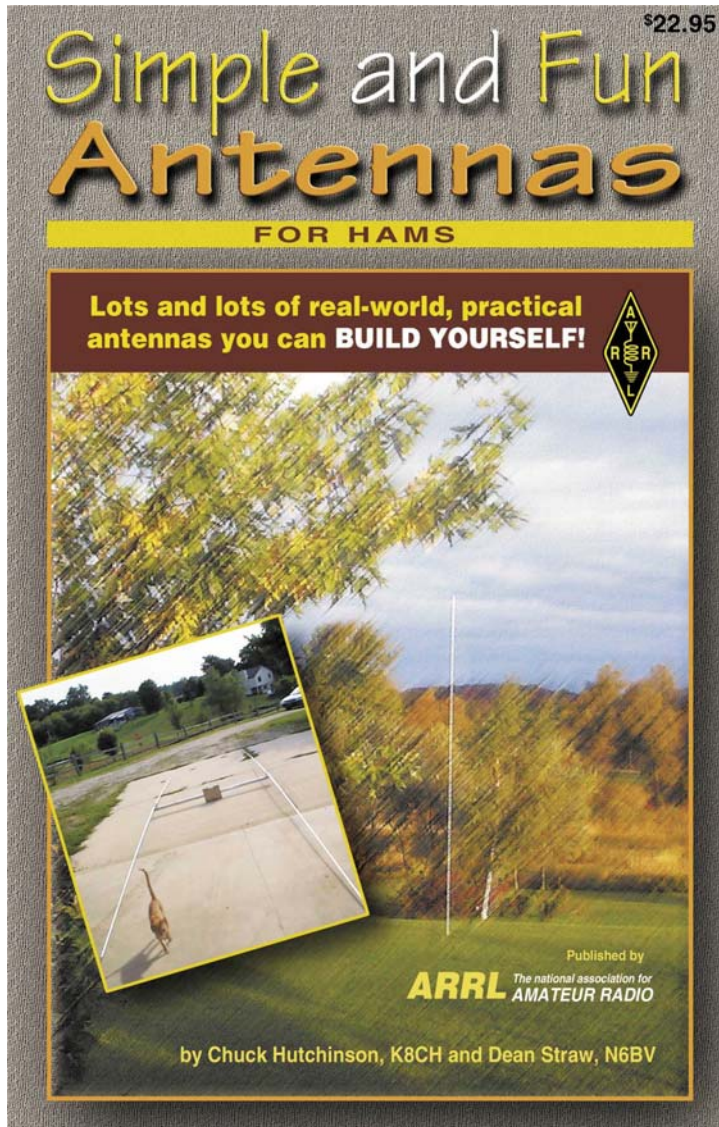
Not too bad for a stealth antenna. Does W8TP think it's as good as his old triband Yagi? Dream on... but he can still work DX and have fun! So could you.



Other resources  
for a beginner

The 21<sup>st</sup> Edition of *The ARRL Antenna Book*



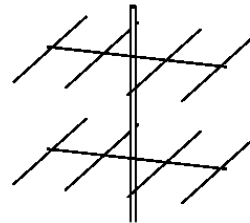


Other resources for a beginner

I call this “The Little Antenna Book, with attitude”



Remember, *Everything Works* –  
It's All a Matter of How *Well* It  
Works





# Remember This Comparison

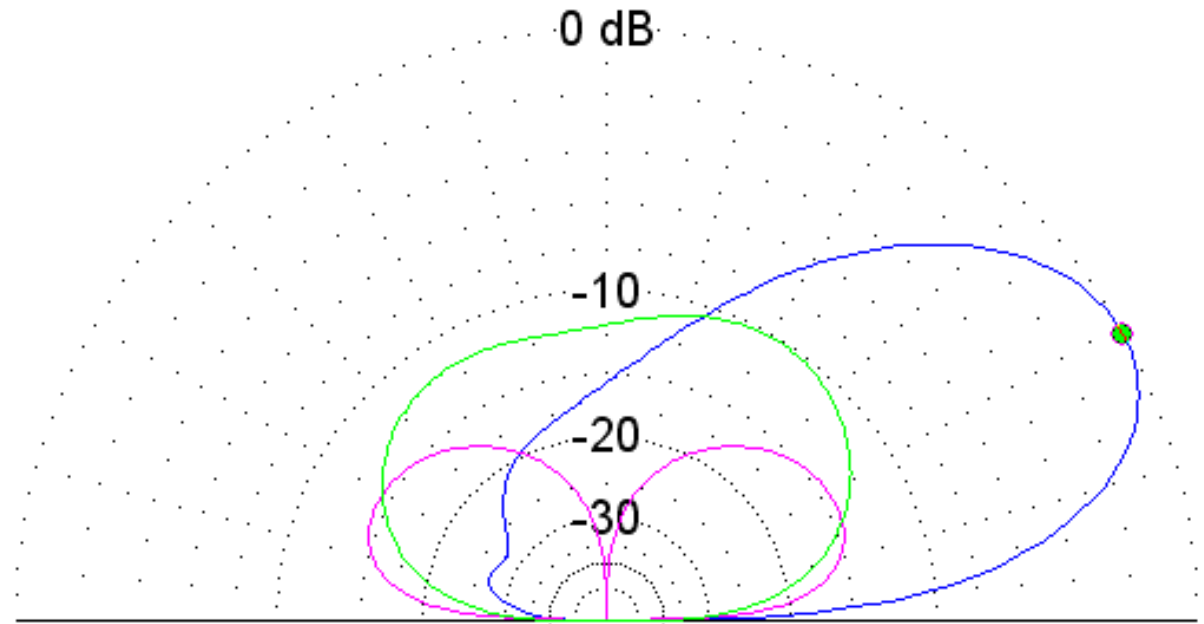
**Total Field**

\* **Primary**

3L20 at 30'

Bamboo Vertical 20m

Papaya Tree LW 20m



Going to a 3-ele. Yagi 30' high makes a *big* difference. (Even a 2-ele. Yagi on your roof can really help DXing from a small city lot!)



## Finally, Be an Elmer

- A newcomer needs the “Voice of Experience” to help sort through all the possible antenna (and operating) options.



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A newcomer needs the “Voice of Experience” to help sort through all the possible antenna (and operating) options.

- Newcomers: Don't be shy. Find an Elmer at your local radio club!
- You potential Elmers: Seek out newcomers to the fascinating world of DXing and Contesting! Otherwise, it ends with us...