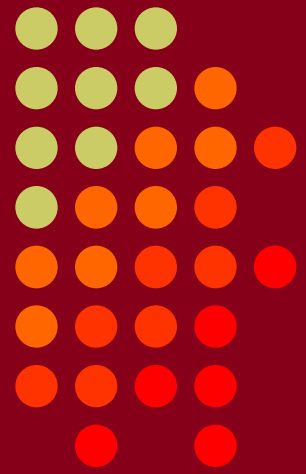
Optimizing your Station for Contest Operations

Doug Grant, K1DG

CTU May 2020



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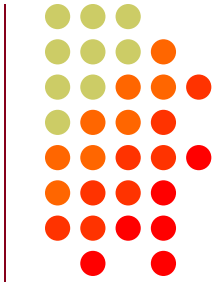
“Optimize”

- 1. to make as effective, perfect, or useful as possible
- 2. to make the best of

- Today we will discuss optimizing within some set of constraints

You Have a Station, you want to use it for Contesting



- Determine your goals
- Establish your budget
- Indoors
- Outdoors

Determine your goals

- What contests do you prefer?
  - Domestic (NAQP, SS, Sprint…)
  - DX (CQWW, ARRL DX…)
  - World-works-world (WPX, IARU…)
  - VHF

- What mode(s) do you prefer?
  - CW, SSB, RTTY, Digi

Do you want to…

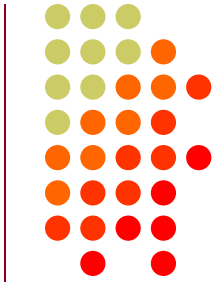
- …do better than last year?
- …beat the guy across town that beat you last year?
- Win your (section, state, call area, Division, country, world)?

Be realistic!

Don’t be unrealistic

- “Contesting looks like fun…what will it take for me to win the CQWW DX Contest for the USA this year? (p.s. I live in an HOA-restricted community in Wisconsin and only have a trap dipole in the attic).”

Do a fair assessment of your situation



- How much operating experience do you have?
  - Beginner, intermediate, expert?
- What is your station's real capability today?
  - Antennas, equipment
- Are there real limitations on possible improvements?
  - Living situation, HOA, etc.

Establish your budget and timeline

- Improving your station capabilities costs money (“TANSTAAFL”)
- Improvements can be incremental over a period of months, seasons, years
- Improving your operating skill costs nothing (just time)

Spending money

- *“I just got a call from a guy who wants me to build a remote contest station for him in Maine. He wants to win the CQWW. His budget is $500k. I sent him a contract”*

  – W2RE, January 2020

- Not everybody has that kind of money to spend on a contest station

Indoor improvements

- Equipment - transceiver
  - Modern (2010 vintage or later) transceiver
  - Look for a radio with >75-80 dB dynamic range for SSB; >85-90dB for CW
  - Rigs designed for mobile use are usually inadequate
  - Choose one with a user interface you like
  - Don’t get hung up on buying the latest, greatest thing

The CQWW Top USA score has been made several times using 20-year old radios and even older amplifiers

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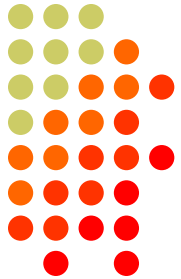
Optimizing Radio Performance



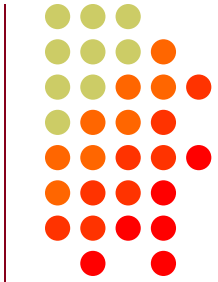
- Receiving
  - Don’t use the preamp except maybe on 10M
  - Learn how to adjust your filters

- Transmitting
  - Use the speech processor (but don’t turn it up to “11”)
  - Listen to your monitor so you sound good
  - Learn how to use your VOX
  - Adjust your CW rise time if necessary

Indoors - other

- Amplifier (if you want to enter HP category)
  - Used tube amps becoming available as guys upgrade to solid-state/autotune
  - 1500W from a used Alpha 76 are just as loud as 1500W from a KPA-1500
- Computer capable of running contest software
- Comfortable headset, wattmeter, tuner if needed, maybe a remote antenna switch control

Software, automation and all that jazz



- Don’t get carried away with the software
- Automate only the basics (CW sending, radio frequency control, antenna/band switching)
- Many logging programs have too many features/distractions
- Spend more time on the air, less time configuring/debugging ports, databases, etc.

Get rid of unnecessary gear

- Often-touched equipment should be easy to reach
- Everything else should not be taking up space on the desk
- Lots of monitors/displays may impress visitors but won't help you make QSOs

A very cool station…but not for contesting!

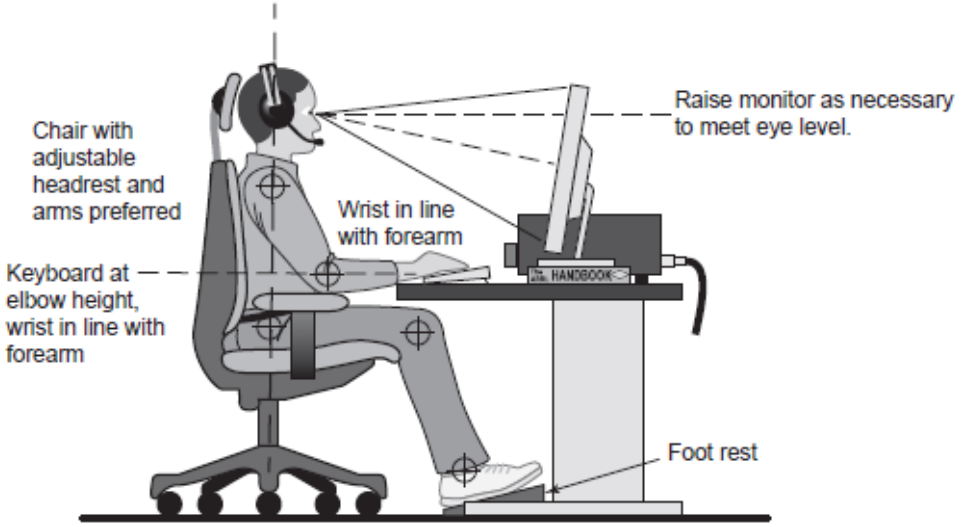
Ergonomics

- If you want to increase Butt-in-Chair time, improve your chair!

- Try used office furniture stores or big-box office store sales (“secretarial” and “gamer”) chairs

Forward leaning – Bad

Backward leaning – Bad



Correct posture ARRL1735

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Ergonomics, 2

Desk Height as a Function of Operator Height

Operator Height, inches	*Desktop height, inches*
61-63	25-26
64-66	26-27
67-72	27-28.5
73-77	28.5-32

- Arrange equipment so you can easily reach important stuff
- Move less-often-touched items away

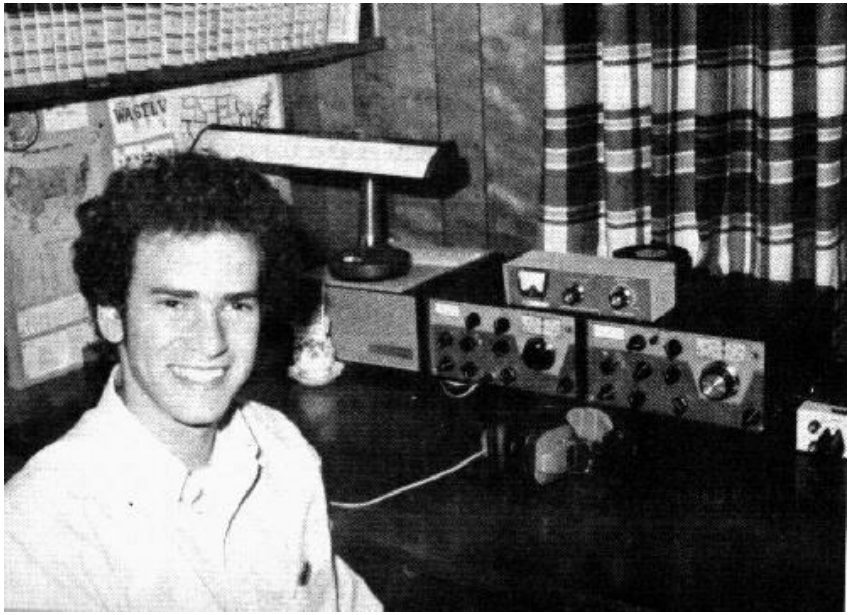
How well do you know your station?

- How long does it take you to change bands?
  - 5 seconds or less should be your goal
  - What takes the most time, and can you automate it?
- Are all controls that require adjustment clearly marked and intuitive?
- Are there intermittent things you know you should fix?

(Hint: they will break during the contest)

Incremental improvements over time add up like compound interest

1970 +/-



1975

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N6TV (station) 2012

N6TV 2020

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Some quick looks at contest stations that could be improved

Radios too far apart…paddle & keyer too far from left radio

Too many speakers, not enough rotators

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Enough rotators! (too many)

No rotators needed! Buy some chairs (and a real keyboard)!

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Radios and monitor too high

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SO4RLP or am I seeing double?

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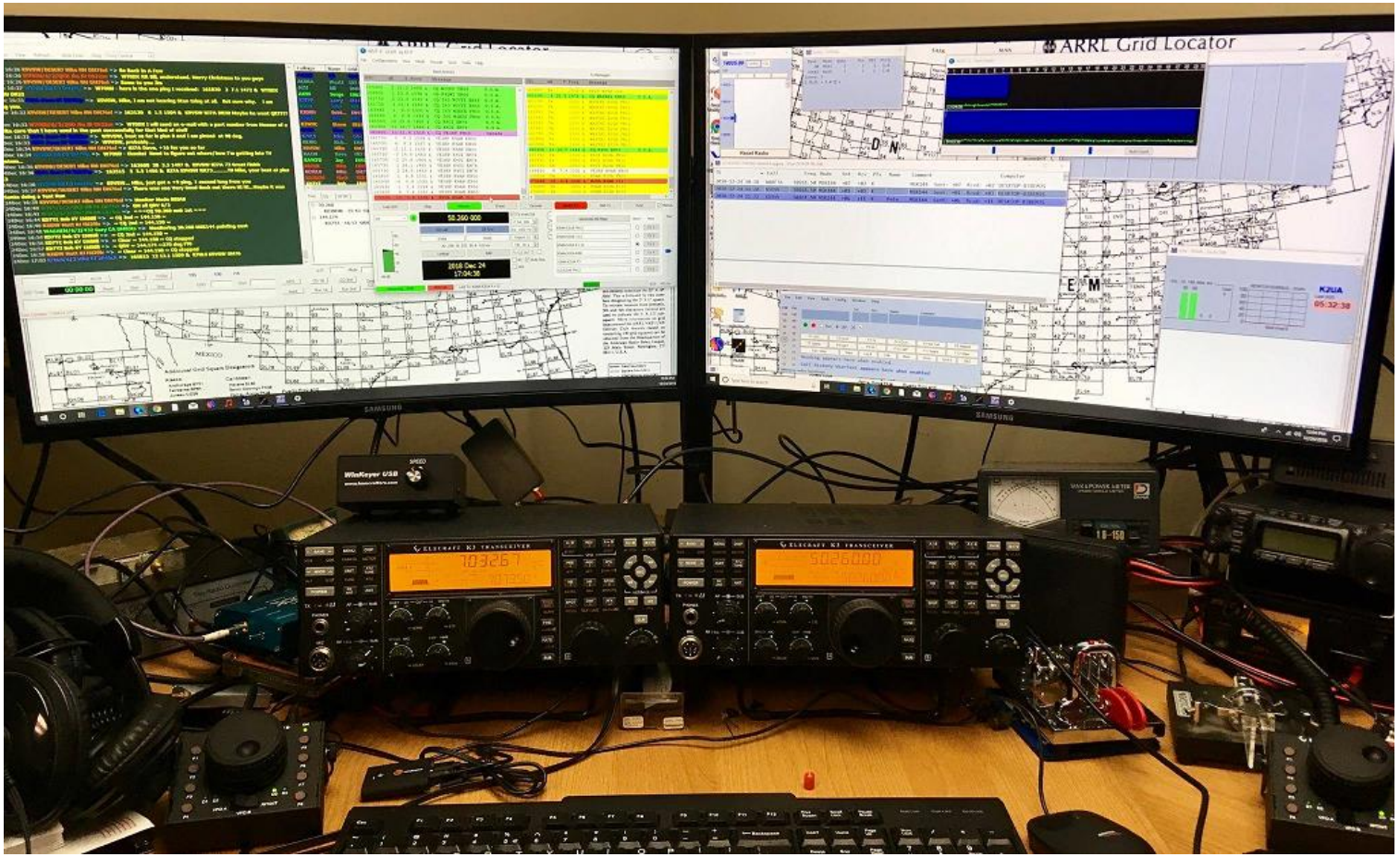
Much too neat

Much too manual

VHF Left, SO2R HF right

BIIIIIIG Monitors!



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Outdoor improvements

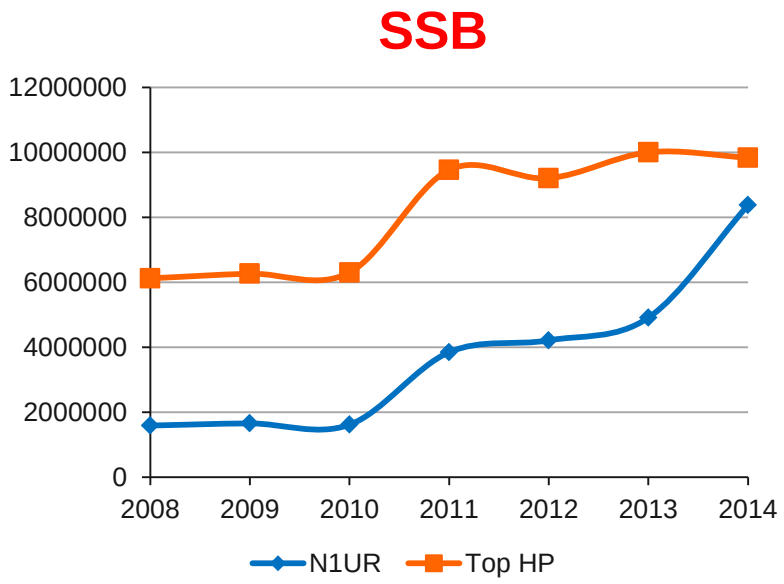
- Antenna *system*
  - *(including feedlines, connectors, etc.)*
- Optimum type, height may be different for different types of contests and your location
- Lots of other talks about this in past CTUs
- Antenna system improvements are usually the best bang-for-the-buck in station improvements

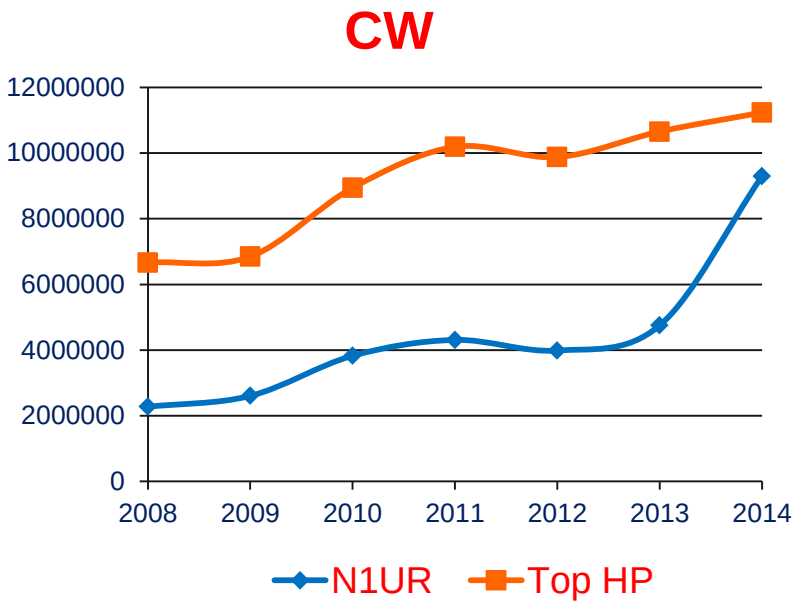
1dB Improvement in Signal = 6% Improvement in Contest Score

- You can improve your score by moving from low power to high power

- N1UR example in CQWW
  - Same op, same antennas, same QTH
  - Moved from LP category to HP category
  - Increased score (normalized to top HP scorers) by about 70%

N1UR vs Top USA HP scores in CQWW





Normalized score increase is approximately 75% for 13dB increase in power

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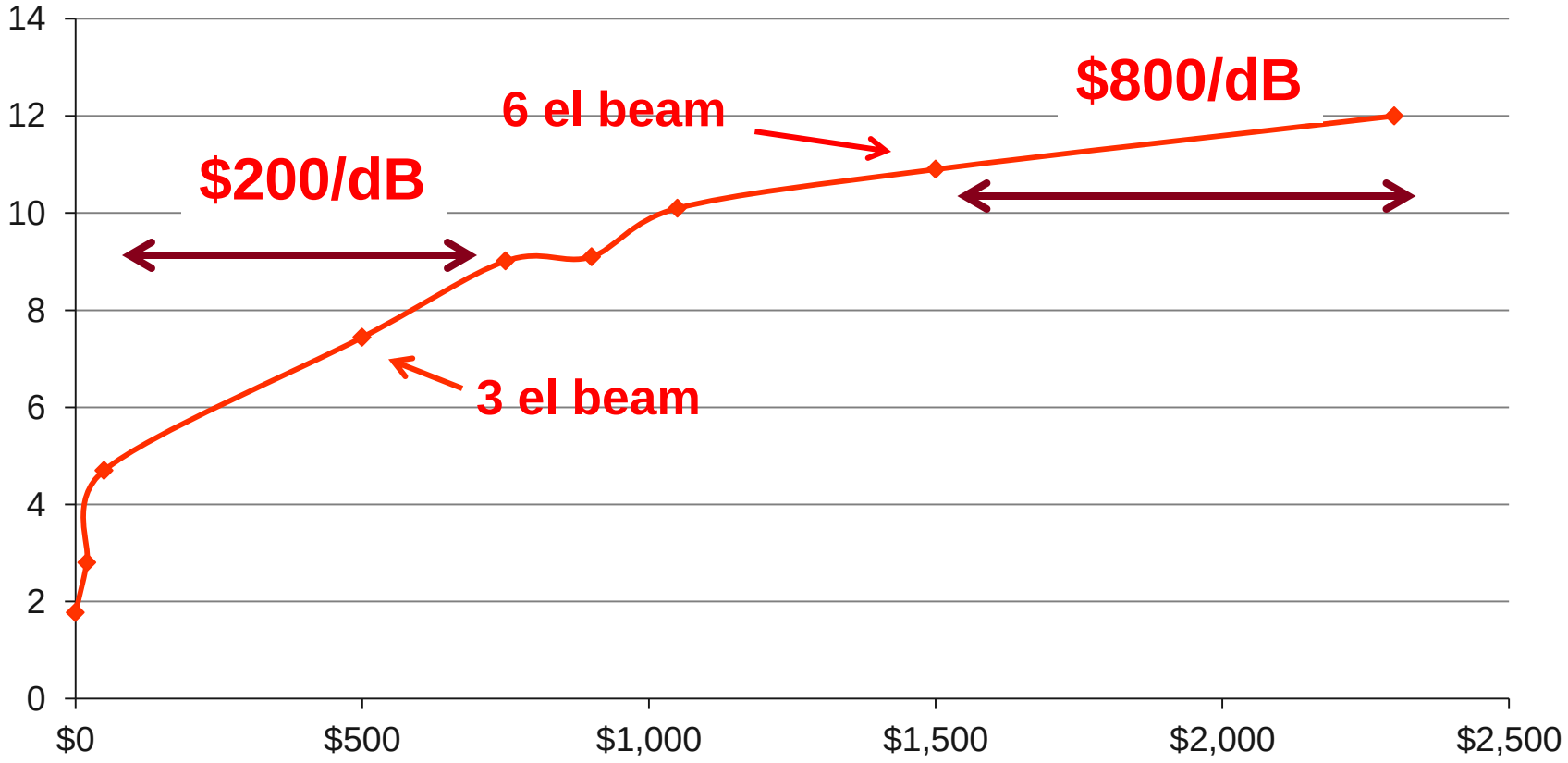
Improving your antenna by 1dB will improve your score in the same category

- The first few dB are not too expensive
  - On 15 Meters
    - GP on poor ground = 0 dBi
    - 40M dipole = 2.8 dBi; cost USD50, USD18/dB
    - 2-el wire beam = 5 dBi; cost USD100, USD20/dB

After 10dB improvement, each dB costs a lot!



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For the high bands…

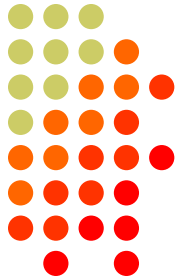
- Tower-mounted beams are very nice
  - Lots of hidden costs, though
  - Rotator, rotator cable, mast, concrete, guy wires, etc.
  - Many options…fixed, guyed, free-standing, crank-up, tilt-over…
- Safety first!
  - Contesting should not be a life-threatening sport!
  - Hire competent help and learn from them

Low band improvements are hard

- 40M
  - Start with inverted Vee at 60 feet
    - (1.6 dBi FS, 6 dB over real ground but very high angle)
  - Move to 2-el shorty beam at 60 feet
    - ($1000 + rotator, gives 5-6 dBi gain in FS, 9-10 over real ground)
  - 4 dB for $1000 = $250/dB; 25% increase in score
    - Probably much better due to lower angles
  - Vertical or sloper array

- 80M/160M
  - Start with inverted Vee at 60 feet
  - Consider half-sloper or vertical array
    - Verticals need lots of radials
    - Arrays need phasing boxes, build or buy
  - Adding a Beverage to receive better is <$50

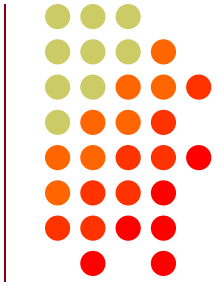
Improve your feedline



- Assume a tribander at 60 feet, 140 feet from the shack, fed with RG8X
  - Loss of 200’ of RG8X on 10M: 4 dB
  - Replace with 200’ LMR400, loss: 1.6 dB
    - Gain 2.4 dB for $200 = $83/dB
    - Equivalent to raising power by 1.7x AND helps on receive
  - Replace with surplus ¾” CATV line, loss of 0.4 dB
  - Gain 3.6 dB (20% score increase!) for $?

- W3LPL’s rule: “Feedline should have no more than 1dB of loss on the band of interest”

Test your antenna system periodically



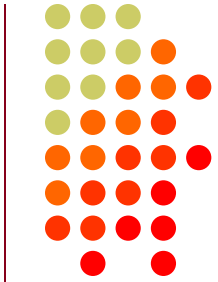
- Most contest station failures arise from poorly-installed or poor-quality connectors
- Learn to install connectors correctly
  - Solder carefully
  - Crimp with the right tool
- Many stations are compromised by using “mystery coax” (get an antenna analyzer and measure the loss before you use it!)

A few words about location…

- It takes a Herculean effort and lots of $ to overcome location problems
  - Geography
  - Terrain

- The right location can make all the difference
  - Hilltop, coastal = GOOD
  - Valley, desert = BAD (maybe OK for SS..)

If you are in the wrong location…



- Move
- Guest-op
- Remote

The Most Important part of your Contest Station

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Equipment?

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Antennas?

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Location?

The most important part of your station

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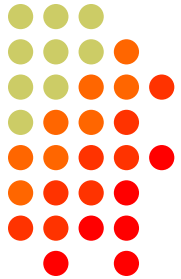
How to Improve your Operating Skill

- Practice, practice, then practice some more
  - REAL, NO-KIDDING, BUTT-IN-CHAIR PRACTICE (NOT CLUSTER-CLICKING)!
- Operate lots of little contests, even if only a few hours
- Operate between contests – even FT8!
- Work on CW copying, SSB timing, callsign recognition, knowledge of propagation

A game you can play: "Beat the Spots"



- Tune through a band for 5-10 minutes (depending on activity) and write down all the calls you can copy
- Check the DX Cluster or RBN to see how many you found (and how many you missed!)
- Skills: moving quickly, identifying calls

Another non-obvious way to improve your skills

- Read the contest writeups, especially the line scores
- If you see the same calls over and over, they will find their way into your subconscious memory (human Super Check Partial)
- During a contest, you will be able to respond to a full call even if you only hear a few letters

Improving your operator skills

- No shortcuts
- You can't buy time
- The "10,000-hour rule"*

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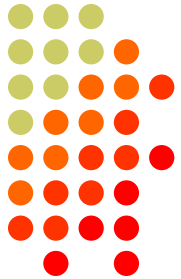
Ummm…10,000 hours?
200> 48-hour single-ops?!?!



- *: The 10,000-hour rule applies to becoming one of the world's **best** (Chess grandmaster, Beatles, Larry Bird, Bill Gates, CT1BOH…). See K. Anders Ericsson's work.

- Kaufman argues that after 20 hours of deliberate practice you are "competent enough to recognize your mistakes and self-correct" (Search Josh Kaufman "The First 20 hours" TED talk on YouTube)

A 20-hour Success Story: The "other Admiral" N4OC

- N4OC and KØDQ operated as P4ØN in ARRL DX SSB 2010
- N4OC's first contest in 30 years, and first outside the U.S.
- First time using computer logging
- Shaky at first, but after <20 hours, he was running at 150+/hour

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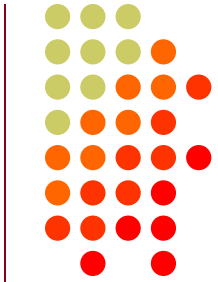
A supportive family is important



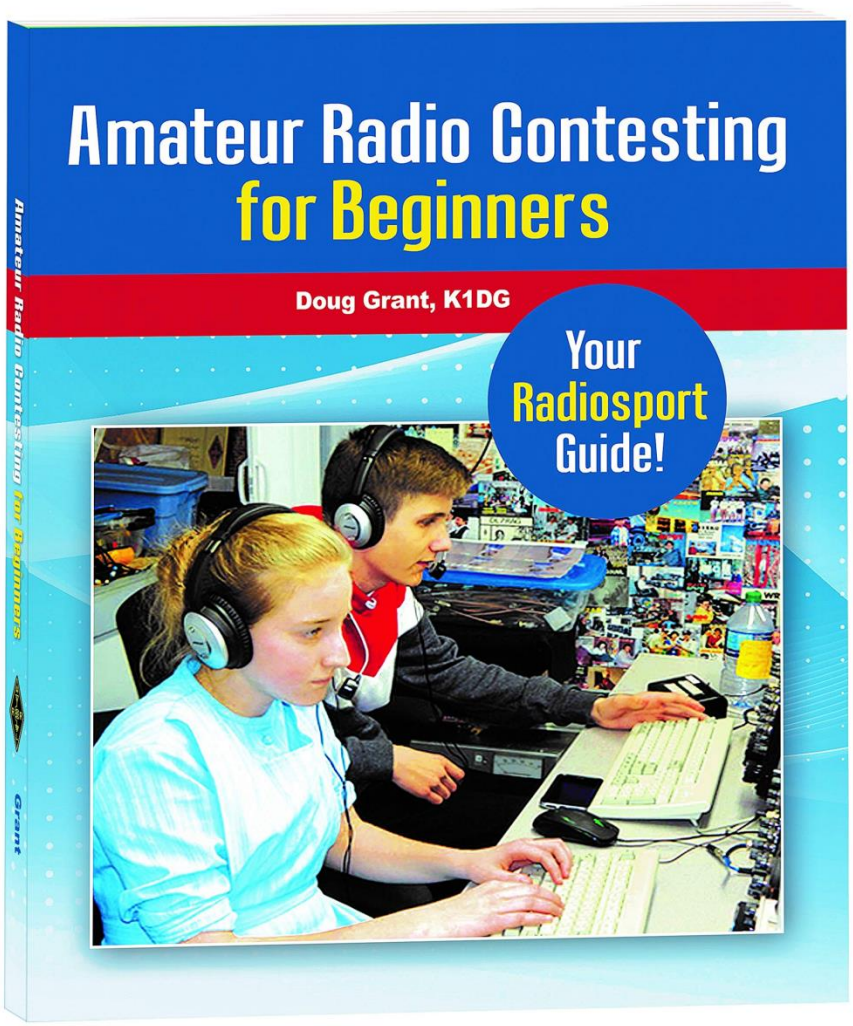
- “There is nothing like having a wedding anniversary fall on ARRL DX CW weekend ... ask my first wife.”
- ‘Reserve” contest weekends well in advance
- Verify dates for scheduled events like concerts
- Balancing family, work, and hobby is key to a happy life

Final thoughts

- Your contest station is a system
  - Equipment
  - Antennas
  - Location
  - Operator

- Optimizing your station requires equal attention to all pieces of the system

A good way to spend $20 to learn the game



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