CTU Presents

Improving Single Operator 2 Radio (SO2R) Techniques

Presented by

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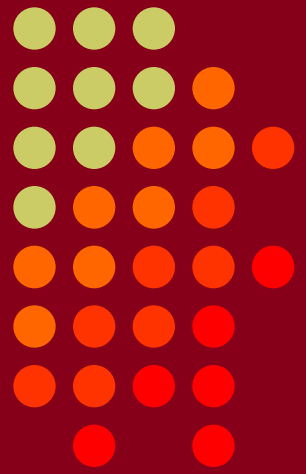


Scope of presentation

- Explore the evolution of SO2R and present different setups
- Everyone's setup will be different, no one way to do it.
- Emphasize spatial awareness and 2 keyboard use.
- Improve your ergonomics, and present ways to practice.
- Show new ideas such as dual pileups and diversity reception
- Ideas on how to improve your Rate
- Our purpose is not to show you how to setup hardware and software, but how to maximize your setup to it's full potential.

What is SO2R

- Single Op/2 Radios. One operator uses 2 radios at the same time to increase band presence.
- There are many ways to accomplish this.
- Use 2 radios and 1 computer.
- Use 2 radios and 2 computers.
- Use a single radio with 2 receivers.
- Use a single radio with 2 receivers and transmitters.
- Flex Radio with built in SO2R (beta testing now)

Evolution
Caveman SO2R

earliest known Cabrillo Log

Found by archaelogists

Some History by DL1IAO

Historical tidbits

- First documented in 1952 by W4KFC
- 1970´s: Some US contesters use 2 radios connected to one keyer (not allowed nowadays).
- 1993: DK3GI wins German XMAS Sprint with 100W and 2 radios-

CQ WW CW 1999: LY6M (LY1DS) sets new SOAB HP EU record

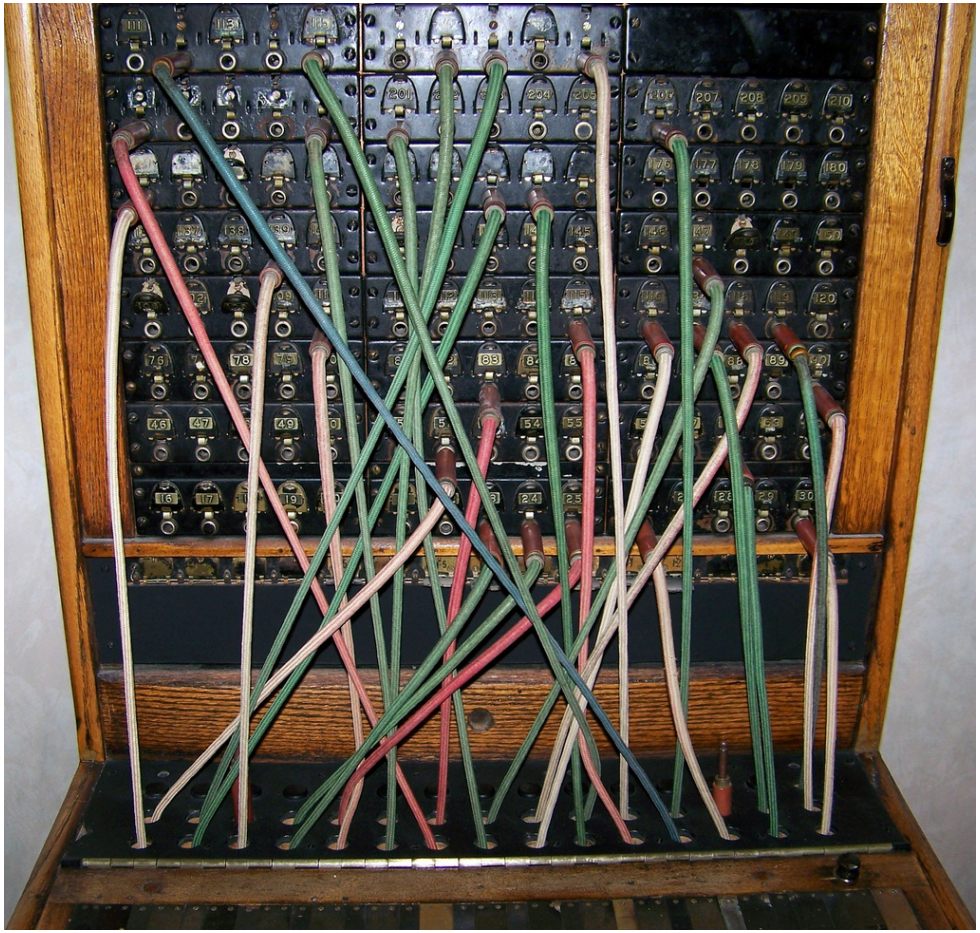
Today:

Many US-contesters do it - but only a few Europeans!

Brief History of SO2R

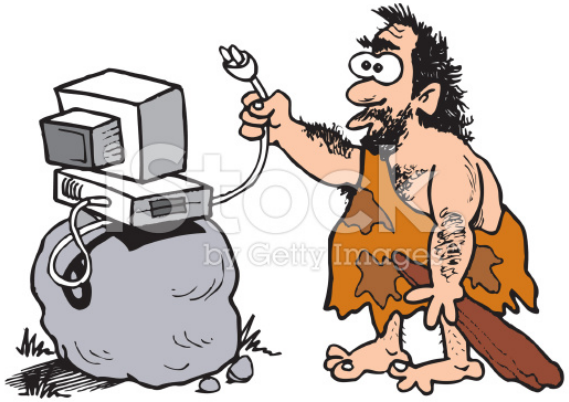
- Before computer logging, some contesters used hardware solutions for quicker band changing.
- I used a device called the “Ultimate Sprinter”.
- This was basically a telephone switchboard, changing headphones, amp keying lines and CW key lines from one radio to another.

Closest approximation of Ultimate Sprinter. Unfortunately I never took a picture of it. Much like an old telephone switchboard, it had push button switches to change bands, operating 4 to 5 different radios.



Earliest known SO2R box also found by Archaelogists

I Still use the box today!



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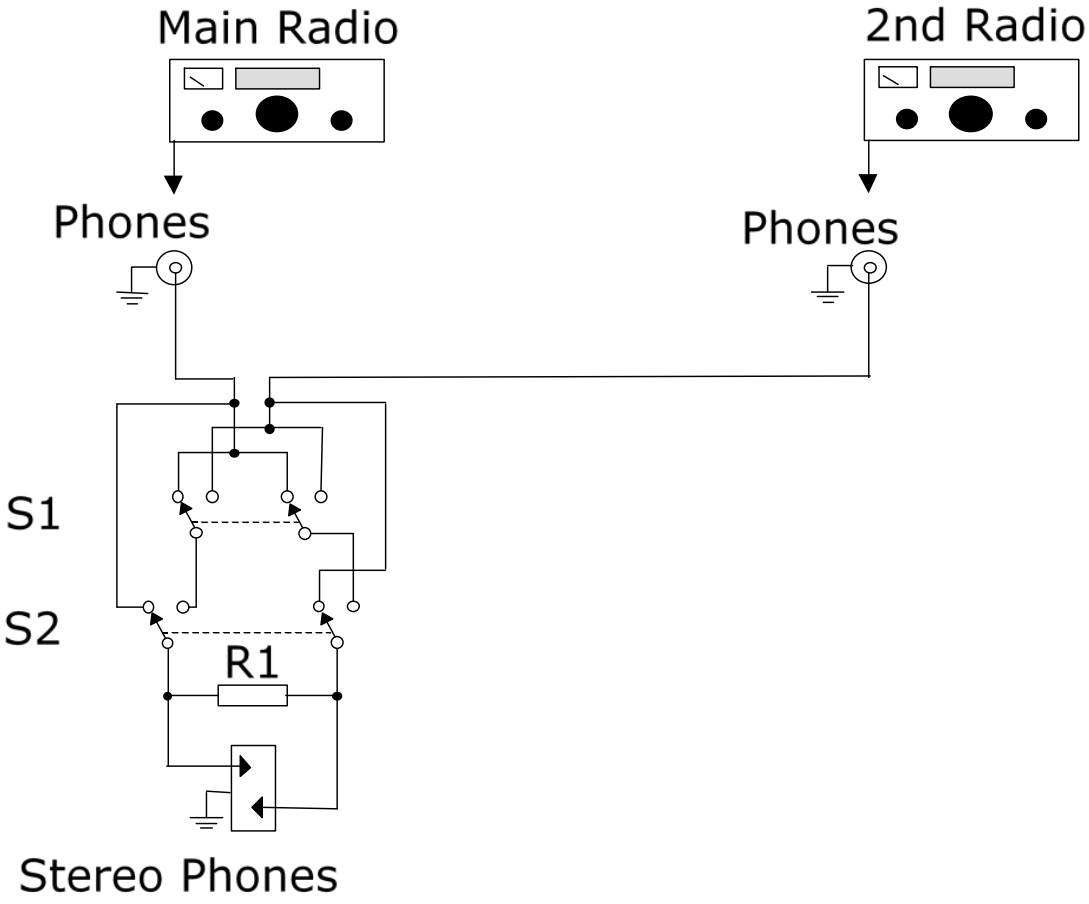
Simple Audio Switch



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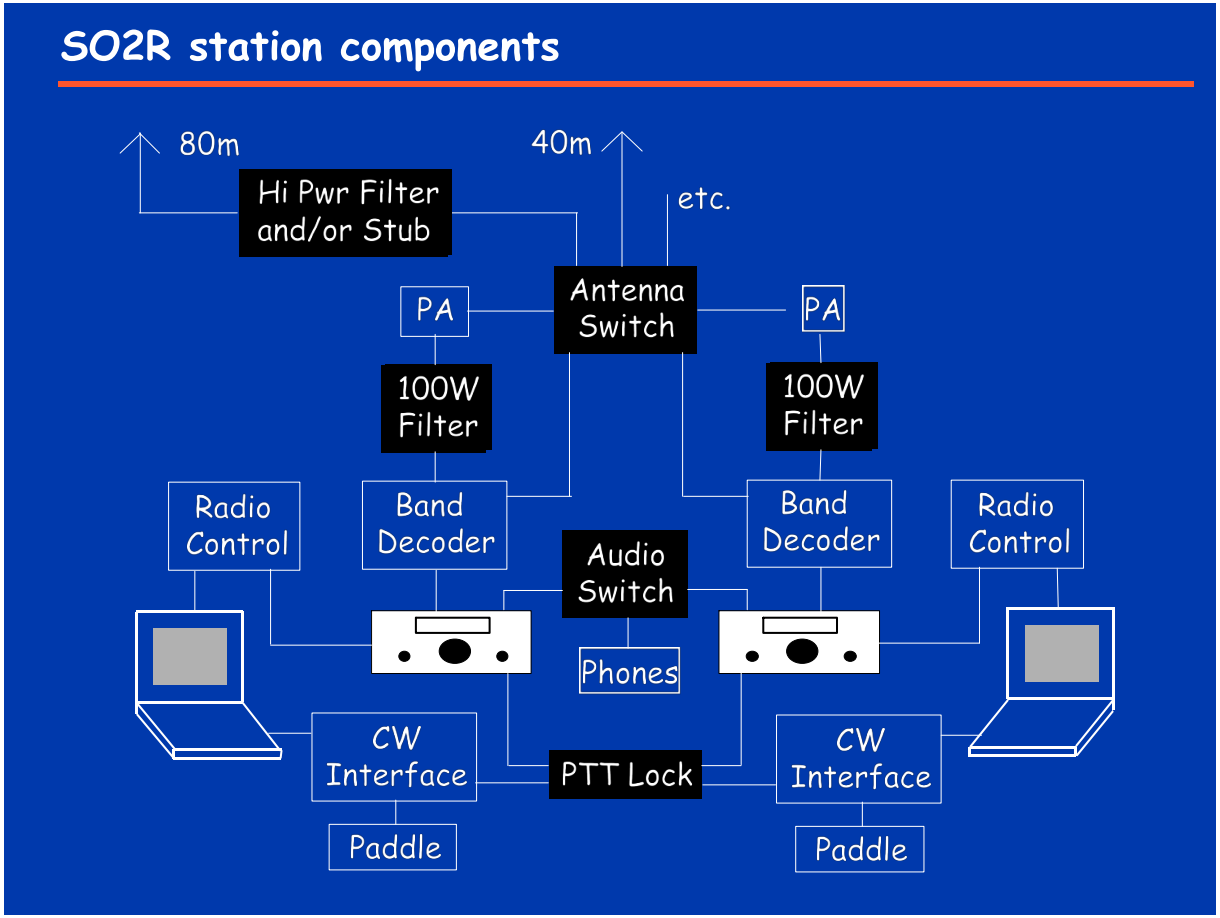
Typical simple SO2R setup
Filters are key to hearing on 2 bands at once.



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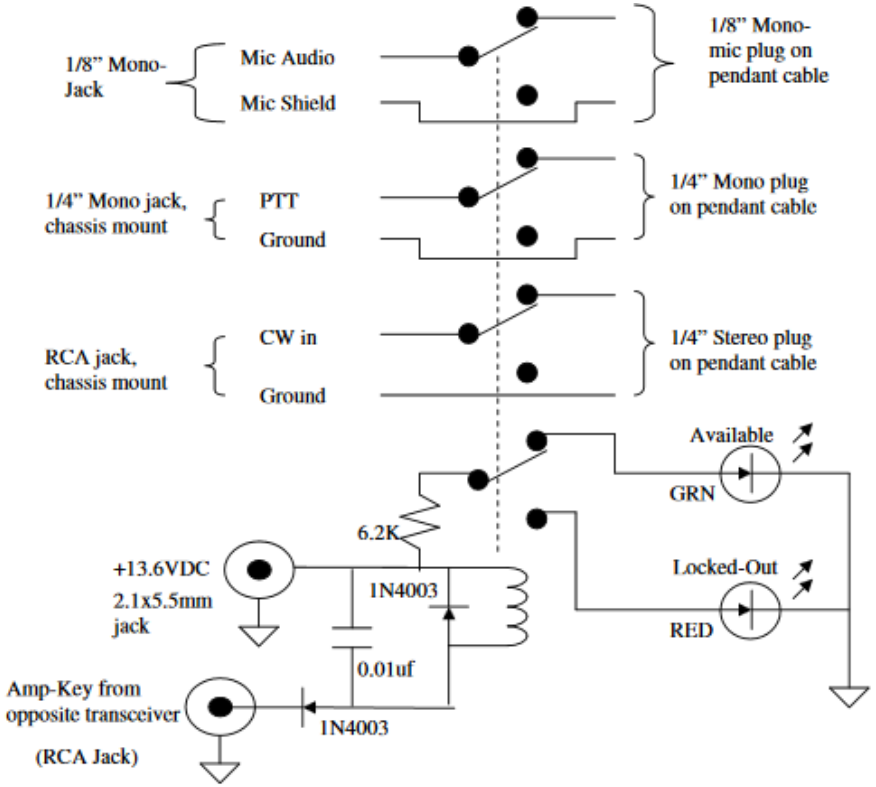
If you have no SO2R box AD5X Simple lockout



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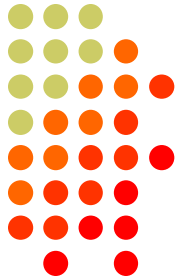
Why is SO2R important?

- A wise ham once said “RATE is KING”
- There is no wasted time while Cqing, increasing RATE
- You are present on 2 bands at once, increasing RATE
- New techniques such as dual pileups increase your RATE
- Did I mention it will increase RATE?

How can I increase my rate?



- Practice, Practice, Practice.

- Use software such as MorseRunner by VE3NEA to simulate pileups.
- N1MM+ has the capability to log using MorseRunner
- Get on the air and operate, especially mini contests such as CWT, and Sprints.
- Practice Cqing and tuning at the same time.
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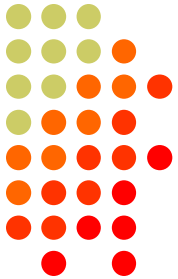
Spatial Awareness is important

All major Contest Logging programs interface with SO2R boxes



- N1MM +
- Win-Test
- Writelog
- The purpose of this presentation is not to recommend logging software. The user must decide which is better for them.
- SO2R setup is available in each suite and should be set up according to the individual needs

Commercial Solutions
Top Ten Devices
LPT control

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Microham Micro2R
Very powerful
Setup can be challenging

www.microham.com

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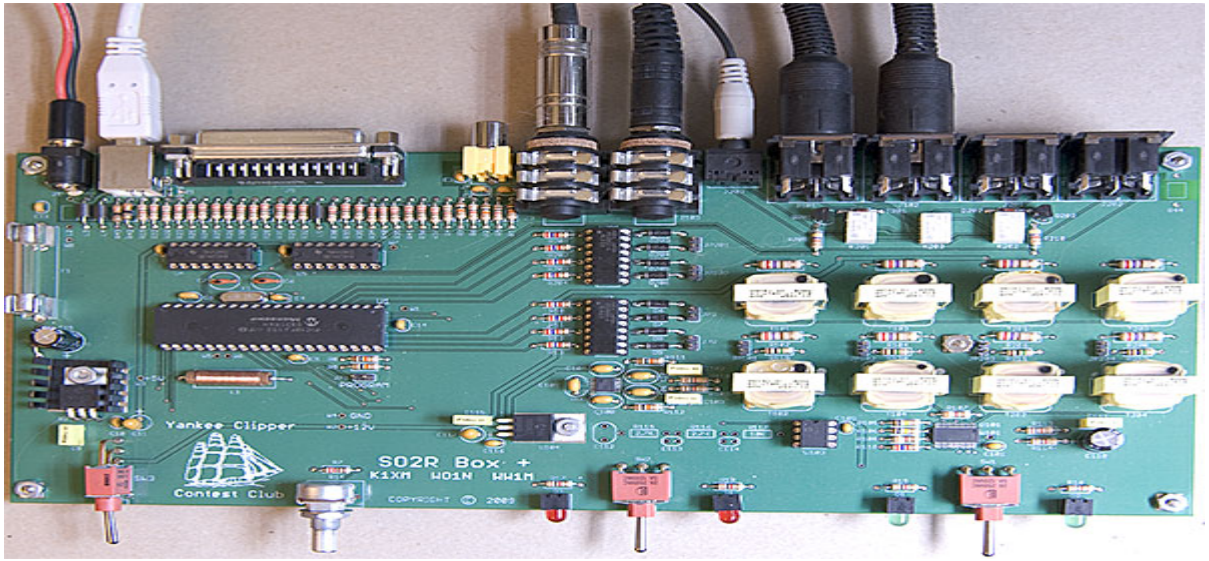
YCCC SO2R by K1XM
Kit only
OTRSP



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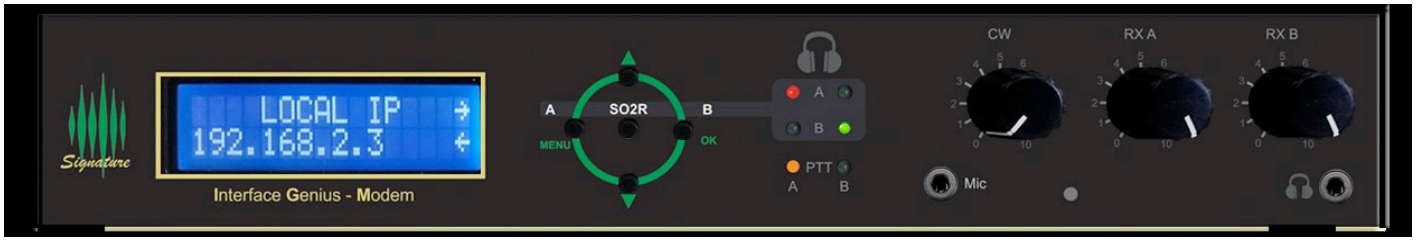
4O3A Interface Genius
LAN based SO2R
Very Powerful and highly configurable



- Using communication through LAN, the interface genius will allow full audio and keying control of each radio using 2 PCs.
- Allows for more powerful configurations.
- If you use 2 computers, no trouble with lockouts, other boxes need external solutions.

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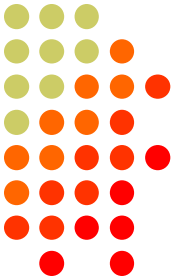
ERGONOMICS for Maximum EFFICIENCY

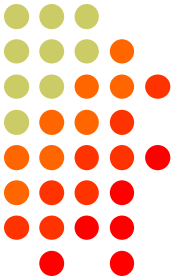
- Keep you hands on the keyboard as much as possible. Use macros and redefine keys.
- Use footswitches to emulate keys
- Keep radios close enough that you don't have to reach for controls
- Monitor(s) should be at eye level to minimize neck movement.
- Try to keep spatial awareness with radios and monitors

Use macros and scripts for frequently used features such as RIT



- For WinTest users, Bob N6TV has written many LUA scripts to emulate functions; Available here: http://www.kkn.net/~n6tv/wtscripts/
- RIT, DVK, ESM, K3 control, P3 control, SwapFocus, and many others
- eg. I use F8 and F9 for RIT control
- N1MM+ is also highly configurable.

Advantages of 2 computers or keyboards



- Classic SO2R uses one computer and an interface to change RX/TX focus
- 2 Computer or 2 keyboard SO2R will allow better Spatial Awareness
- Dual pileups can be “queued” easier
- No chance of entering calls in the wrong window

2 computers add redundancy

- If something fails on one computer you can continue logging.
- No chance of losing log
- Hardware lockout is required to prevent 2 signals at once. (except with interface genius)

N1MM + and WinTest now have dual keyboard capability
For those who prefer one computer:

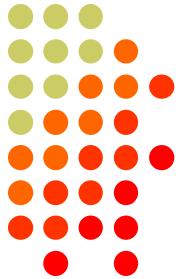
- N2IC has added 2 keyboard support to N1MM+
- SM5AJV has written an LUA script for WinTest 2 keyboard support.
- When you type on the second keyboard, it automatically enters the information in the proper window.

Use Macros to shorten keystrokes

- X-keys for keyboard key substitutes
- Macros for key simulations
- Redefine your keyboard keys to make frequent keystrokes easier.
- OTRSP scripts help define your goals
- Footswitches can save keystrokes

X Keys makes wonderful programmable keys.
Connect via USB, program keys or macros easily.

ESM mode /Enter Sends Message



- First introduced by N6TR in Trlog, ESM is a very intuitive way to use your logging software.
- Most loggers have this feature.
- It is highly configurable, and you can use macros to your advantage.
- Less thinking of which keys to hit, the computer knows.
- At N2NT I have used Xkeys footswitches to emulate the Enter key.
- Frees up your hands to do other things.
- Introduces unintended consequences, I had severe leg cramps the first 48 hour contest with it.

Dual footswitch for ESM
Frees up hands for other things

X keys Headphone switch
Uses macros to activate OTRSP Protocol

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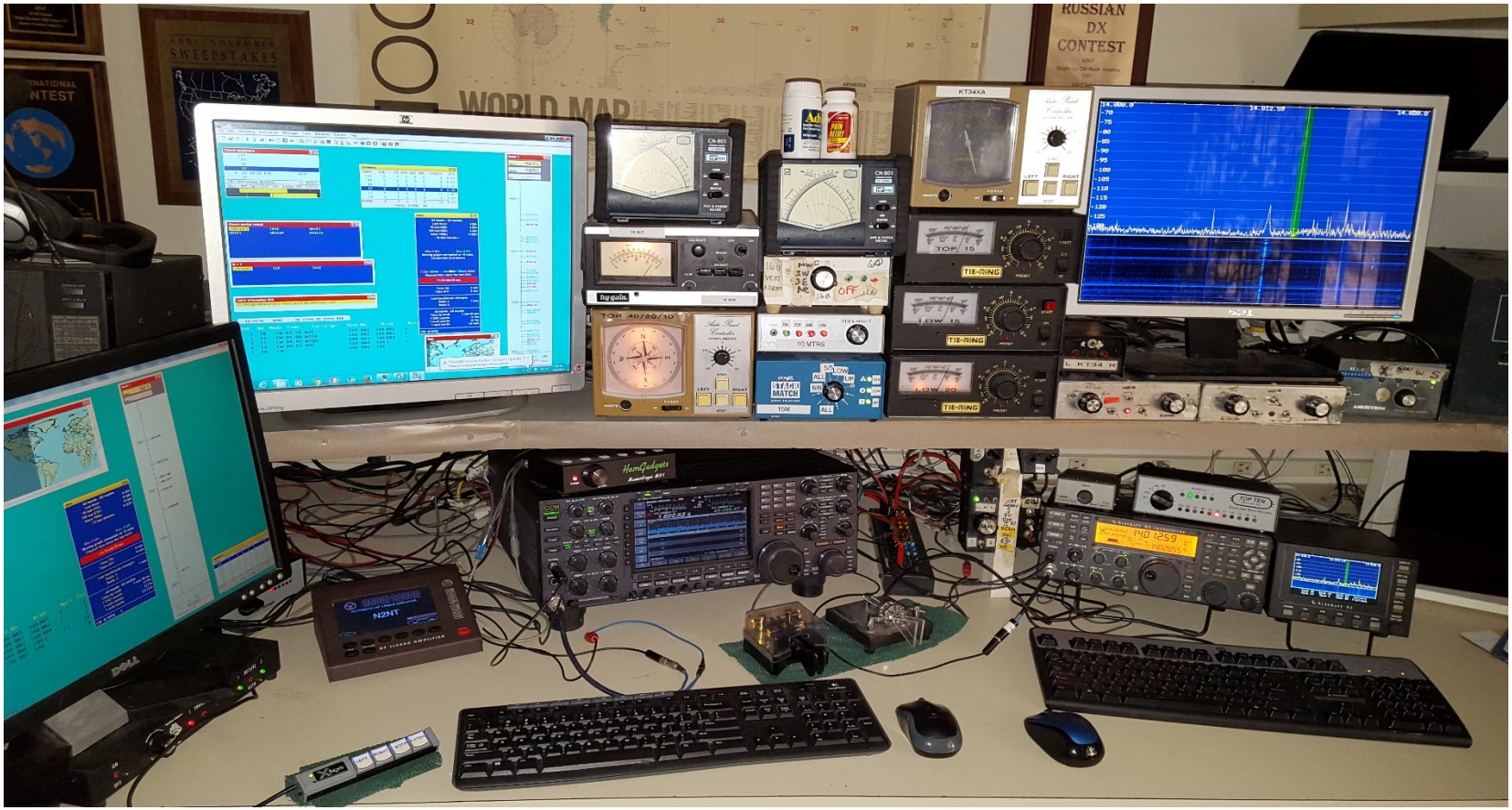
N9RV SO2R with Trlog and 1 computer
Radios stacked for easy access.
Note Remote tuning knob near keyboard

Typical SO2R station layout using 2 discreet stations
UR0MC/UW2M

N2NT SO2R

Monitors move depending on Operator preference

Advil placed in middle for easy access



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V47T SO2R 2 laptops 2 keyboards Cheetos in the middle for easy access

Don AA5AU has written an excellent Primer on RTTY SO2R. RTTY is a natural fit for SO2R because you can have the computer decode callsigns without paying attention to the other radio.

You can point and click when ready, thus maximizing your rate.

Check out http://www.rttycontesting.com/lagniappe/so2r/ for more information,

N6MJ at ZF1A setup 2015
The most QSOs Single Op ever in CQWW CW

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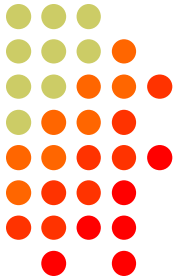
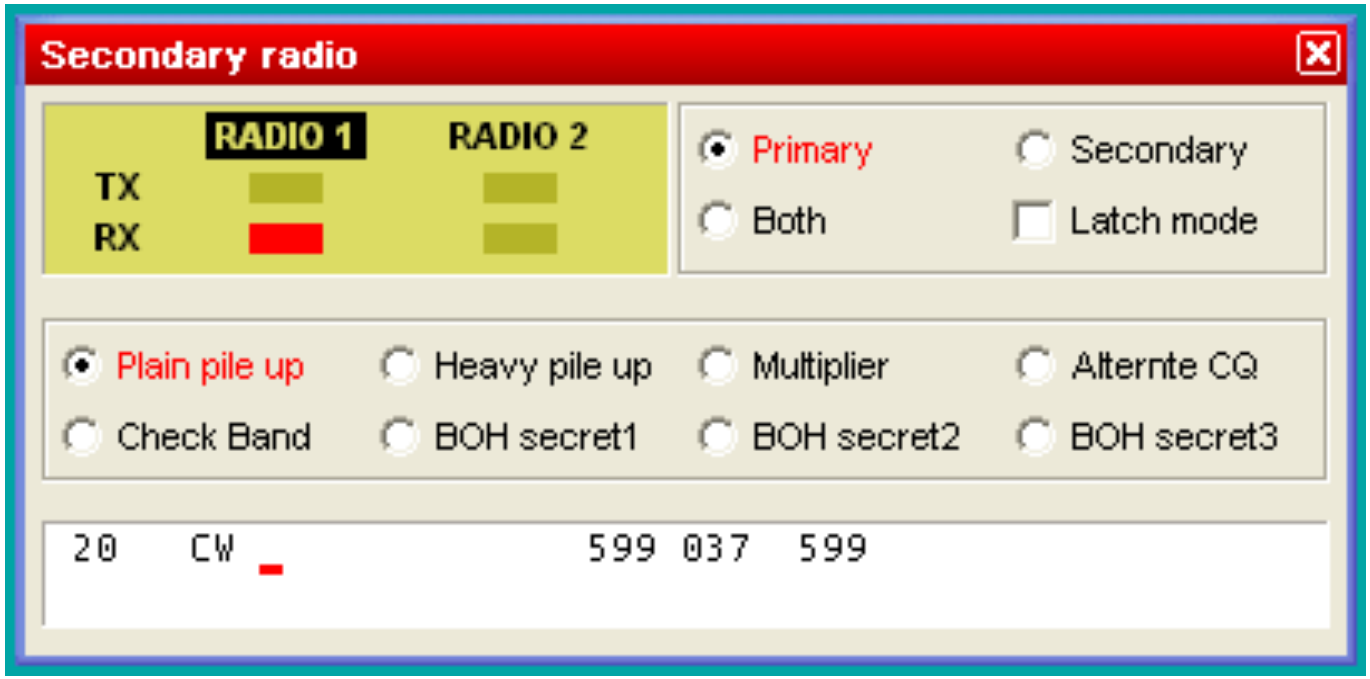
What do you do between CQ's?



- If you want to compete, you must make use of idle time.
- Standard SO2R/Listen on another band while you CQ.
- Use the second VFO to tune SAME BAND in between CQ's. SO2V will support this in N1MM+.
- SO2R is better if you have another antenna you can listen on the same band while you are Cqing.
- If you are using a skimmer or cluster, you can use the band map to line up QSOs in between your run. Don't just work multipliers, use it for regular QSOs. Your rate will increase easily.
- You must practice to avoid losing your run frequency. Learn the keystrokes for returning to your CQ frequency quickly.
- Use the bandmap to give a mental picture of the band.
- Enter frequency of everyone you hear into the bandmap, if you are single op Unassisted.

WinTest uses a secondary window for 2nd radio entry
Scenarios increase flexibility



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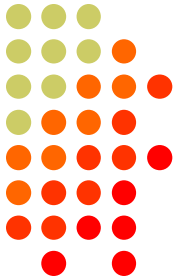
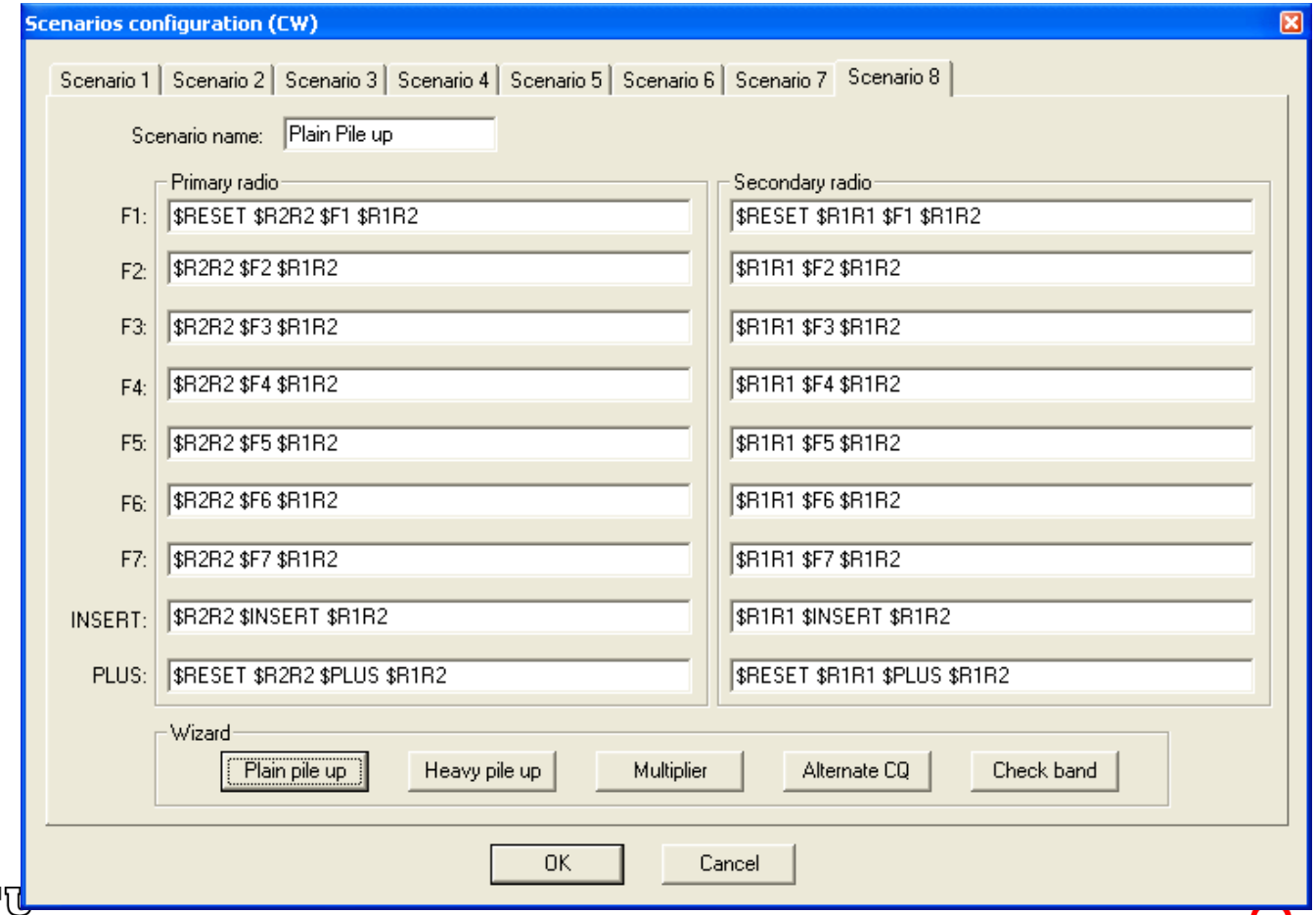
Using scenarios, you can configure your SO2R box to adapt to different operating conditions





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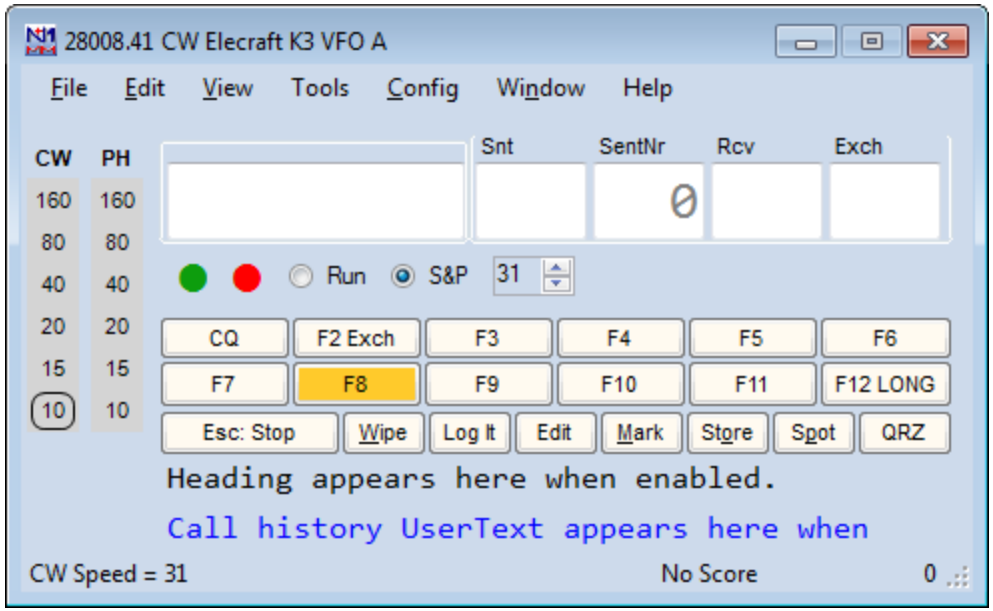
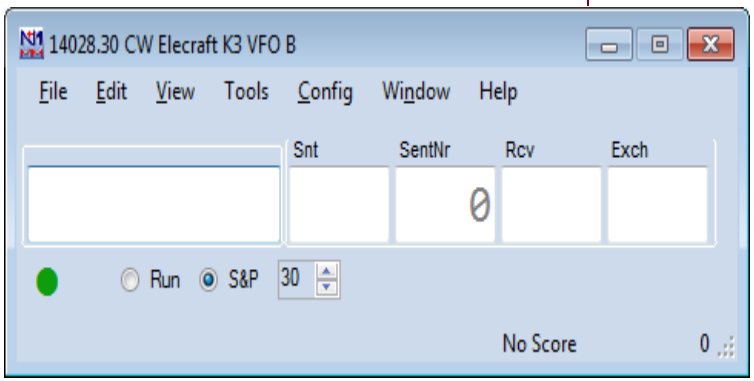
Typical SO2R setup in N1MM+
Support for SO2V also available





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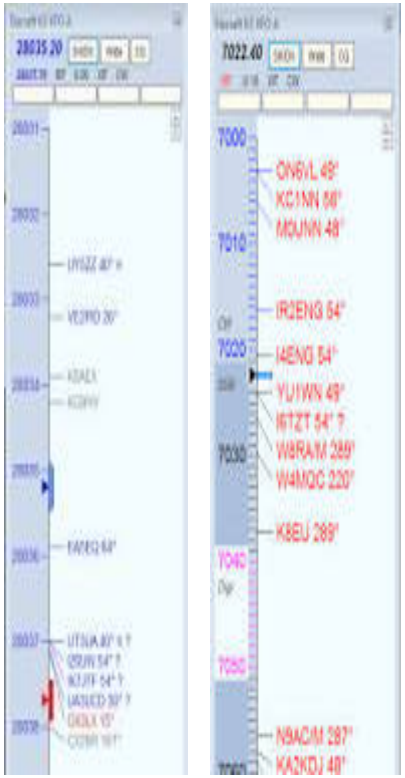
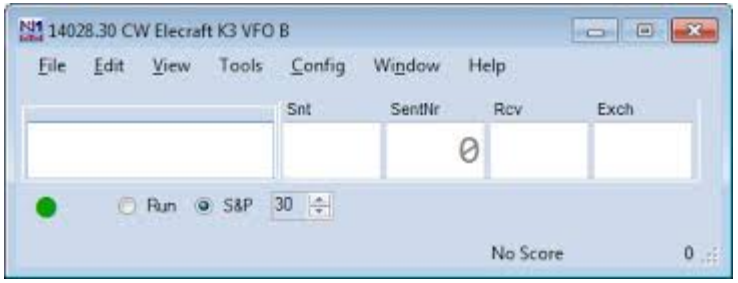
Typical SO2R setup with N1MM+





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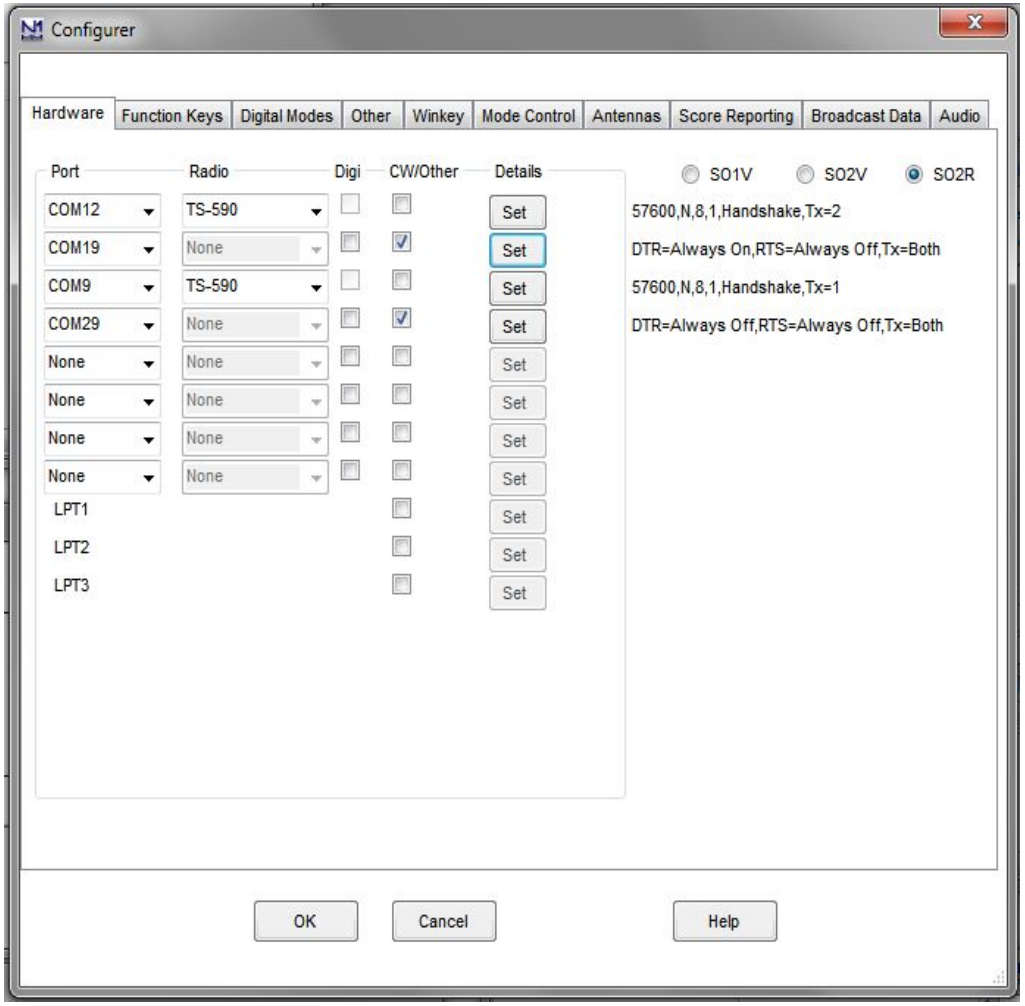
N1MM+ SO2R configuration for YCCC box



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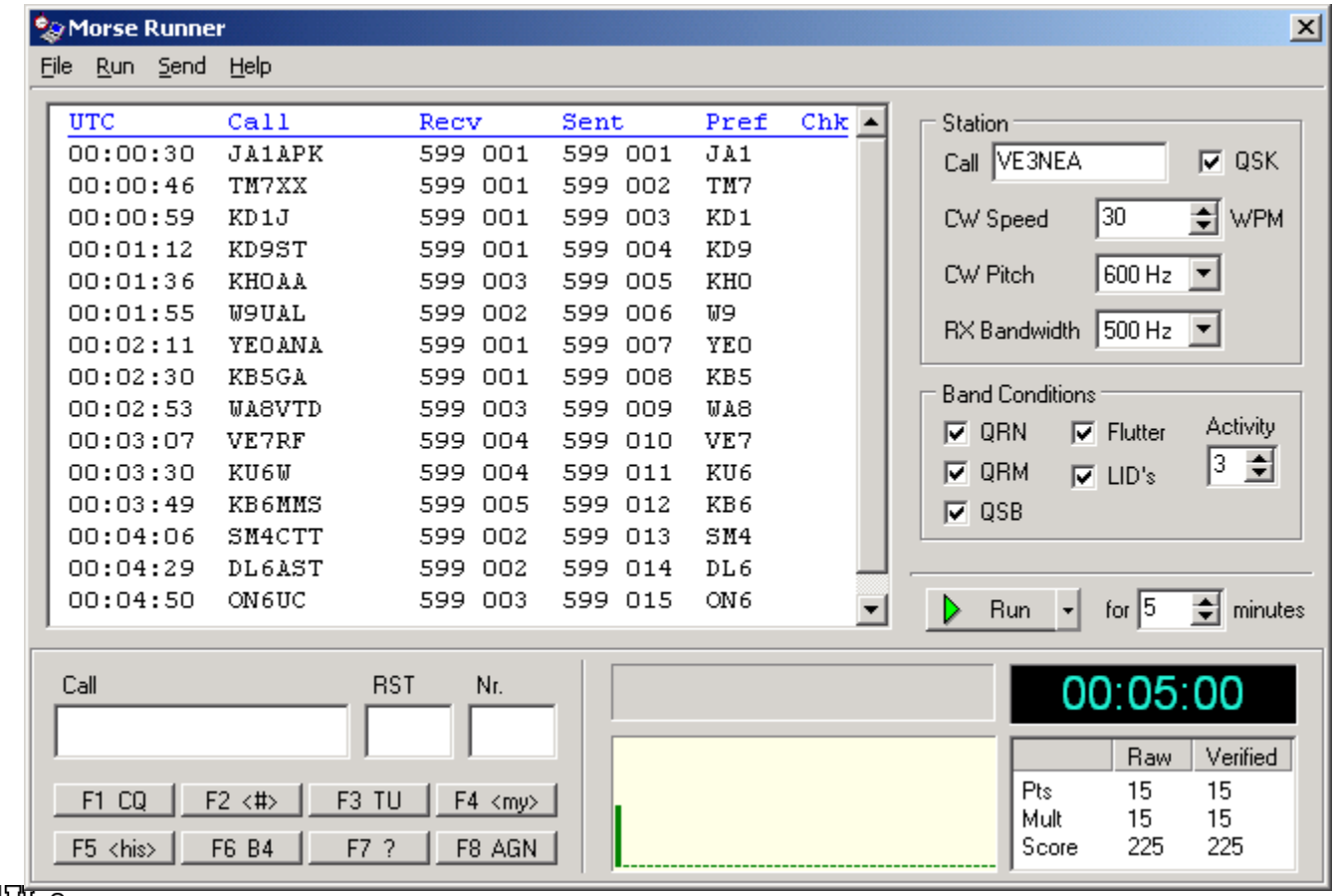
Morse Runner by VE3NEA is a fabulous CW training tool. Amazingly realistic.



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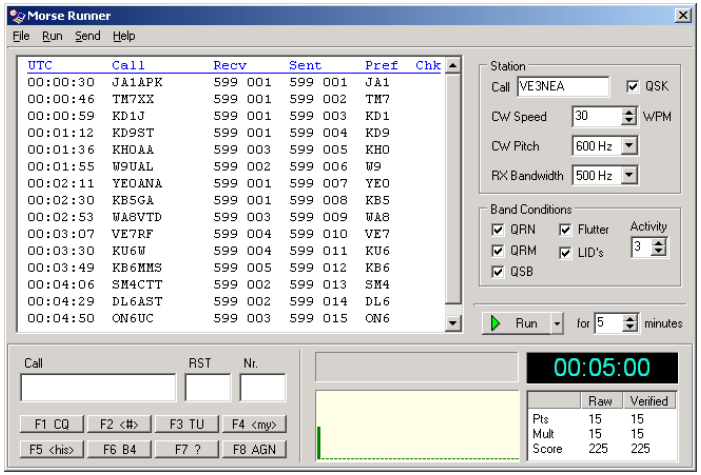
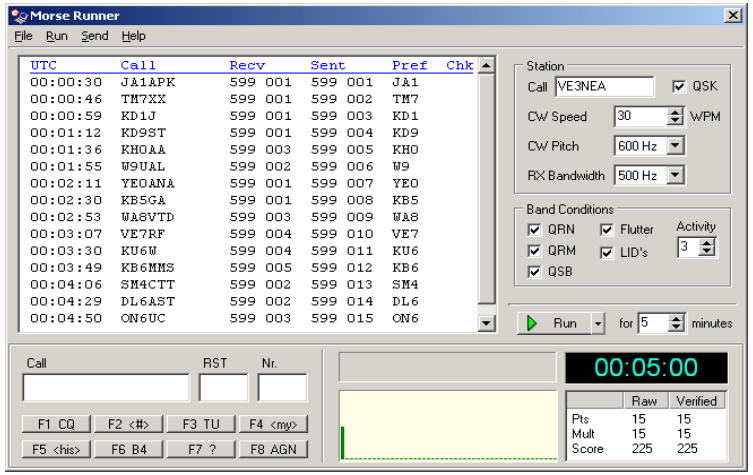
Morse Runner on Steroids. Dual Pileup practice

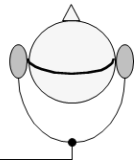




Laptop 1

Headphone Switch L/R/Both

Laptop 2



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Rates with 1 and 2 pileups

2014 CQWW CW

- 280 TO7A UT5UGR Dual
  258 P40C KU1CW Single
  257 V47T N2NT Dual
  249 KL7RA NN1N Single
  247 VE2IM VE3DZ Single
  238 UP0L UN9LW Single
  236 OH0V OH6LI Dual
  229 A71BX K5GN Single
  228 P40W(LP) W2GD Single
  227 VY2TT K6LA Single

2015 CQWW CW

- 371 ZF2MJ (N6MJ) Dual (mutant Lid)
  301 V47T (N2NT) Dual (Lid
  272 CR6K (CT1ILT) Dual
  267 CR3OO (CT1BOH) Dual
  264 SW9AA (LZ3FN) Dual (80/40!)
  247 KP2M (KT3Y) Single
  247 VE2IM (VE3DZ) Single
  237 OH0X (OH6KZP) Single
  236 TI5W (M0DXR) Single
  234 *VP2VVV (K9VV) Single
  228 LP1H (LU5DX) Single
  227 OH0Z (OH6EI) Single
  226 NN1N Single (Lid)
  224 *P40W (W2GD) Single (LP with a band change!)
  224 UP0L (UN9LW) Single
  222 OH0V (OH6LI) Dual (and a band change!)
  220 UW2M (UR0MC) Dual (80/40)
  219 KQ2M Single
  219 YW4D (YV1DIG) Single (includes a 3-band jump with VE2IM)
  217 K0DQ (@K8PO) Single (Lid)

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Dual CQ Technique

- Practice with Morse Runner to see how long to CQ.
- Short CQ's are better. Send faster. Keep the pileups small.
- It is better to be spotted LESS for smaller pileups (when you are DX).
- Try to limit "Auto CQ"s or Blind CQ's. Sometimes they are launched on top of other established Cqers and cause interference.
- If you don't answer anyone and just keep Cqing, you sound like a lid. Unfair to the ops calling you.

If you have 2 bands open, use the dual pileup technique. If you are good at it, it can increase your rate by 20-50%

- Keep your headphones in stereo mode.
- Timing is everything. If you get confused, go back to one pileup.
- Works great even if the rate is slow.
- Easier in CQWW, copying zones is less intense.
- USA is easier to run, well behaved.
- If you are calling a dual CQer, don't give up. There might be a long delay before he gets to you

NO3M 3 Receiver technique http://no3m.net/

- SO2R-3RX

- Three Receiver Operating Technique

1. An effective technique for lowband contesting is to utilize three independent receivers when operating SO2R, otherwise referred to as SO2R-3RX. The implementation I have successfully used is specific to the Elecraft K3 and Microham MK2R/MK2R+, other equipment has not been tested but may work equally as well. When the K3 is in diversity mode, in this case only the “run” radio, the main and sub receivers in the radio are phase locked, tracking not only frequency, including RIT, but also filter bandwidth/shift. This permits the use of receive antennas aimed in different directions

   while running, increasing the effective azimuthal coverage.

Diversity and spatial separation

- Using the MK2R/MK2R+, “RADIO1-A” and “RADIO2-A” audio streams are routed to the “LEFT EAR” channel, while “RADIO1-B” and “RADIO2-B” audio to the “RIGHT EAR” channel. With the “run” radio (ie. RADIO1) in diversity mode, the main and sub receiver’s audio within that radio are streamed only to the left and right earpieces respectively, typically with no cross-over between earpieces (in rare cases certain phase relationships can cause the audio to “center” momentarily) . The second (ie. S&P) radio’s main receiver audio, another K3 with sub-RX OFF, is routed to both earpieces, resulting in audio that is spatially centered in the headphones with the K3’s AFX setting turned ON and in BIN (binaural) mode. However, the use of the K3’s AFX also depends on the headphones used. I have a favorite pair of old Lafayette headphones that require AFX be turned off using the above audio routing. Some Heil headsets have a phase selection switch, which can be toggled to produce the desired effect regardless of the AFX setting, which may lend themselves to use with other radios in the S&P position.

Minimize interstation interference

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