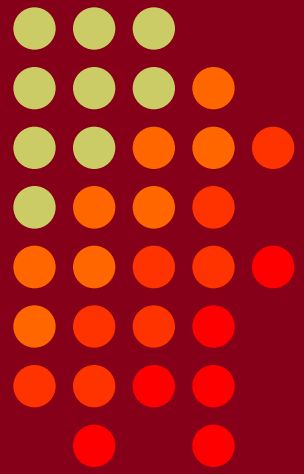
CTU 2015 Presents

RTTY Contest Operating Topics

Ed Muns, W0YK



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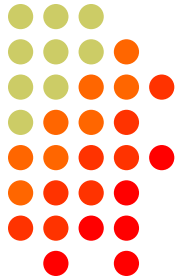
RTTY Contesting

Operating Topics

- User interface
  - Keyboard
  - Mouse vs. trackball
  - Accelerator keys
- Optimizing messages
  - UnShift On Space *(USOS or UOS)*
  - Space vs. hyphen
- Call sign stacking *("slow down to win")*
- SO2V, SO2R-SOnR
- RTTY contest loggers
  - WriteLog
  - N1MM Logger
  - Win-Test
- Sharing the road

RTTY vs. CW/SSB

Key Difference

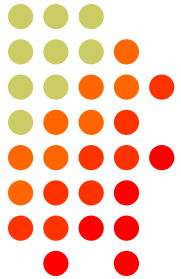


Technology exploitation replaces ***operating skill*** in encoding/decoding the RTTY signal.

- *The 2 cornerstones of ham radio!*
- *RTTY technology is very important.*

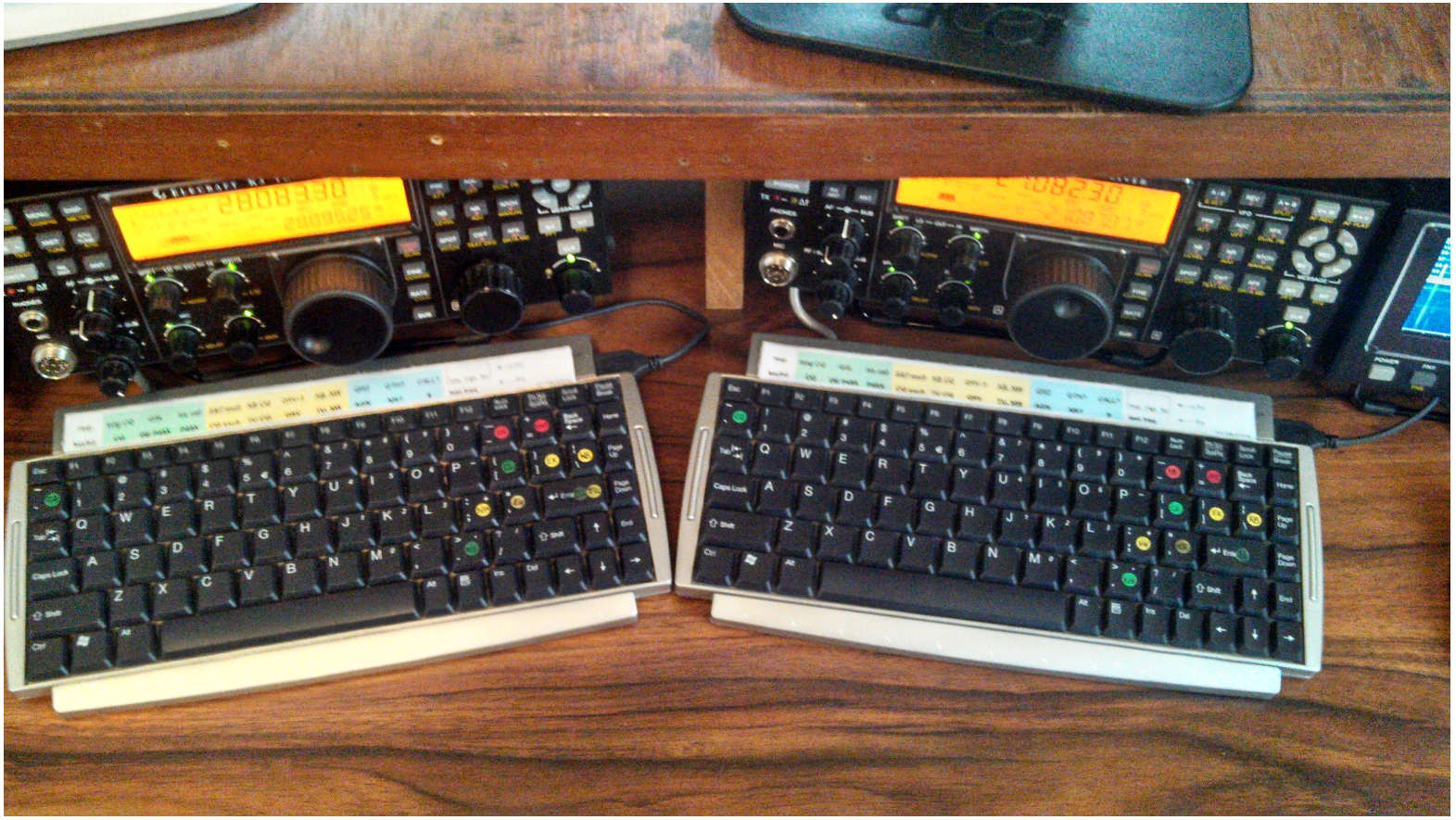
User Interface

focused keyboard



- Predominantly a few function keys
  - Minimal QWERTY typing
- Compact size is efficient for RTTY
- Key labeling
  - Organized by QSO phase
  - Phases 1 & 3 mapped to keys surrounding Enter
- SOnR scaling (networked PC per radio)

Focused Keyboard



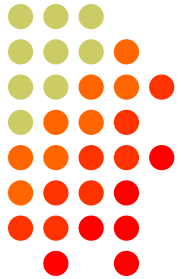
User Interface

pointing device

- Mouse
  - Most familiar and popular
- Trackball
  - Space efficient
  - No mousepad or surface requirement
- SO2R with PC/radio
  - Ambidextrous skill (ala paddle sending)
    - Train non-dominant hand daily on home/office PC

User Interface

keyboard or mouse?



RTTY requires little touch typing →

Keyboard

- Array of function keys
- RTTY doesn't require eyes on screen 100%
- Easier motion
- Easy for 2-kybd SO2R

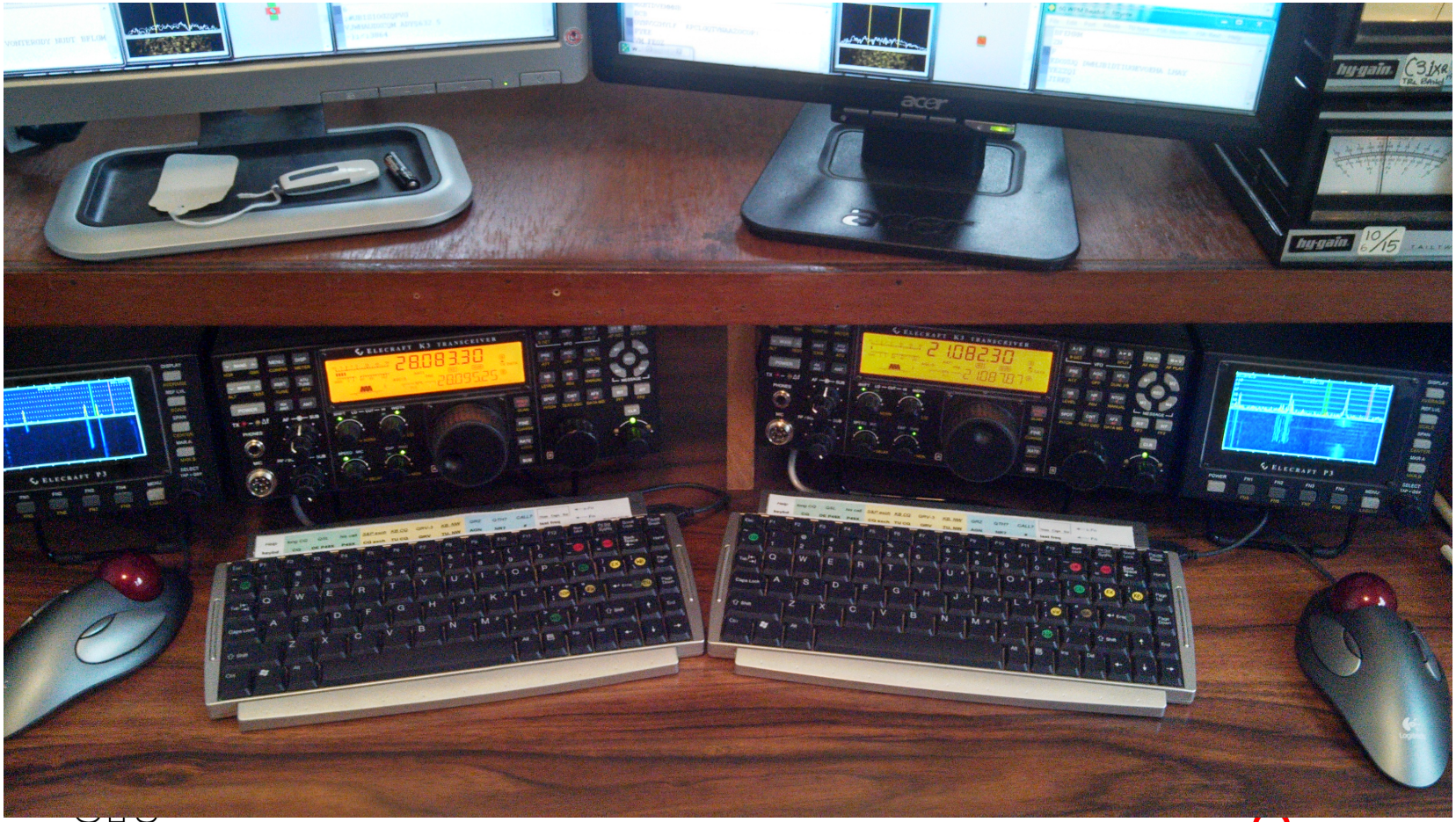
Mouse/Trackball

- Clickable screen buttons
- Keeps eyes on screen
- Usable higher % of time
- Easy for single PC SO2R
- Strong vocal advocates
  - Esp. N1MM users

→ ***Personal preference***

Trackballs

SO2R PC/radio



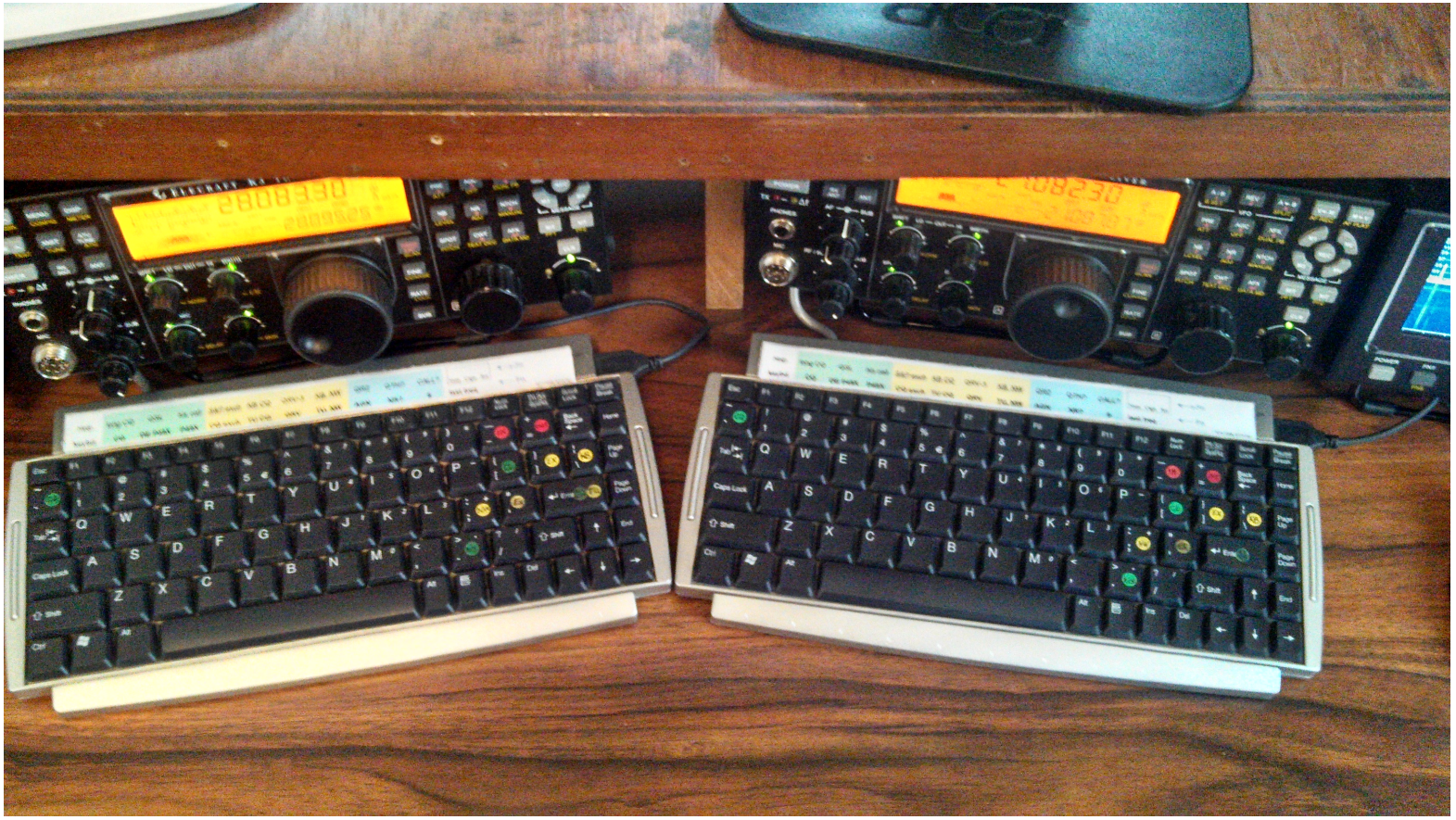
User Interface

accelerator keys

- CT accelerator keys
  - INSERT: grab call sign and send exchange
  - PLUS: log QSO and send TU/QRZ (use ESM)
- ESM (Enter Sends Message)
- Remapped keys for compact efficiency
  - Around Enter key
  - CQ, exchange, TU/QRZ; My Call, S&P exchange
  - Call sign stack manipulation
- Use Fn keys for fill messages

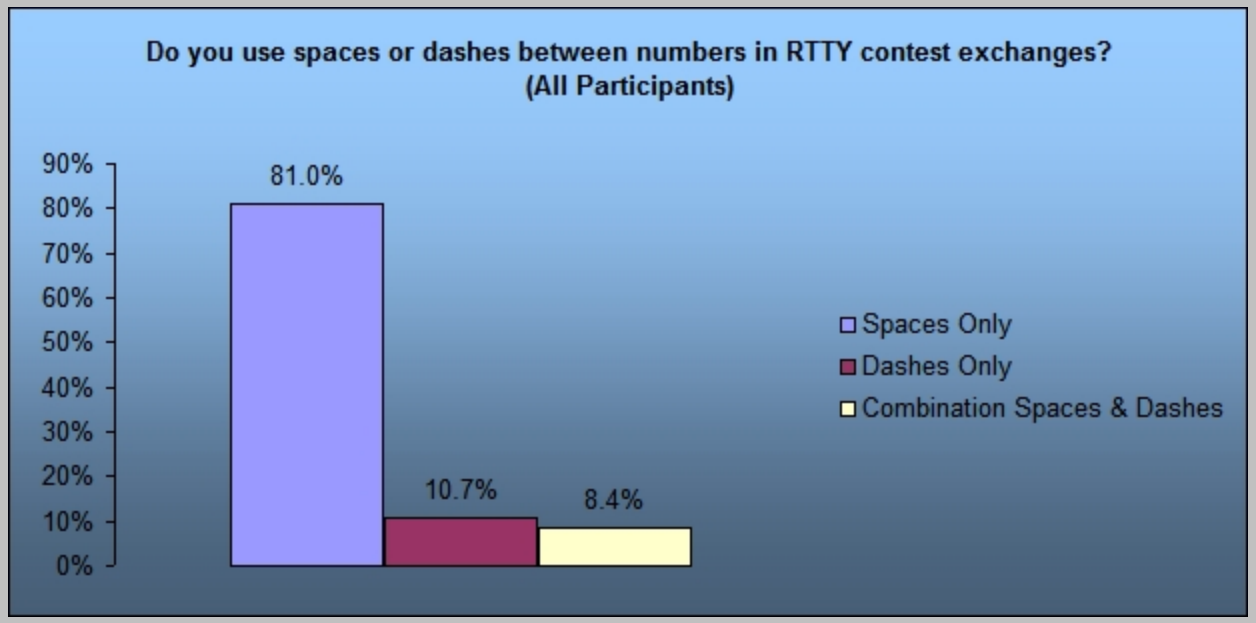
Focused Keyboard

accelerator keys



Space Delimiters

2010 survey



Space Delimiters

*UnShift On Space**

**UOS or USOS*

- Protocol that provides some noise immunity for shift characters by:
  - forcing the Letters set after a received Space
  - sending a FIGS character after a Space when the next character is in the Figures set
- MMTTY:
  - RX UOS and TX UOS can be independently enabled or disabled

TX RX	599 123 123	599 CA CA
UOS on	f599 f123 f123	f599 CA CA
UOS on	f599 f123 f123	f599 CA CA
UOS on	f599 f123 f123	f599 CA CA
UOS off	f599 f123 f123	f599 :- :-
UOS off	f599 123 123	f599 lCA CA
UOS on	f599 QWE QWE	f599 lCA CA
UOS off	f599 123 123	f599 lCA CA
UOS off	f599 123 123	f599 lCA CA

f: FIGS character

l: LTRS character

Garbled copy

Space Delimiters

UOS and a noise hit

	TX RX	599 123 123	599 123 123	599 CA CA	599 CA CA
best case	UOS on	f599 f123 f123	f599 f123 f123	f599 CA CA	f599 CA CA
	UOS on	xTOO f123 f123	f599 xQWE f123	xTOO CA CA	f599x:- CA
	UOS on	f599 f123 f123	f599 f123 f123	f599 CA CA	f599 CA CA
	UOS off	xTOO f123 f123	f599 xQWE f123	xTOO CA CA	f599x:- :-
	UOS off	f599 123 123	f599 123 123	f599 lCA CA	f599 lCA CA
	UOS on	xTOO QWE QWE	f599xQWE QWE	xTOO lCA CA	f599 x:- CA
worst case	UOS off	f599 123 123	f599 123 123	f599 lCA CA	f599 lCA CA
	UOS off	xTOO QWE QWE	f599xQWE QWE	xTOO lCA CA	f599 x:- :-

f: FIGS character

l: LTRS character

x: noise hit

Garbled copy

Turning on UOS for both RX and TX is the best hedge:

- Most other stations will be that way
  - MMTTY default; 78% of survey respondents use MMTTY
- With only one noise hit, at least one of the important exchange elements is received properly

Hyphen Delimiter?

UOS is defeated: so all four cases have identical noise results

TX RX	599-123-123	599-123-123	599-CA-CA	599-CA-CA
UOS on	f599-123-123	f599-123-123	f599-lCAf-lCA	f599-lCAf-lCA
UOS on	xTOOAQWEAQWE	f599x123-123	xTOOAlCAf-lCA	f599-x:-f-lCA
UOS on	f599-123-123	f599-123-123	f599-lCAf-lCA	f599-lCAf-lCA
UOS off	xTOOAQWEAQWE	f599x123-123	xTOOAlCAf-lCA	f599-x:-f-lCA
UOS off	f599-123-123	f599-123-123	f599-lCAf-lCA	f599-lCAf-lCA
UOS on	xTOOAQWEAQWE	f599x123-123	xTOOAlCAf-lCA	f599-x:-f-lCA
UOS off	f599-123-123	f599-123-123	f599-lCAf-lCA	f599-lCAf-lCA
UOS off	xTOOAQWEAQWE	f599x123-123	xTOOAlCAf-lCA	f599-x:-f-lCA

f: FIGS character

l: LTRS character

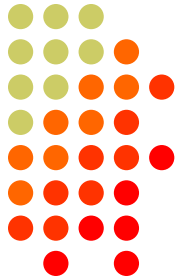
x: noise hit

Garbled copy

- Sending Hyphen instead Space “defeats” UOS and speeds up the message slightly by eliminating the FIGS character
  - However, if the first FIGS character is hit by noise, then the entire exchange is garbled
- Space with USO enabled is a slightly better hedge
  - Majority of stations use MMTTY with UOS enabled so at least one of the important exchange elements is received

LTRS/FIGS Characters

noise immunity



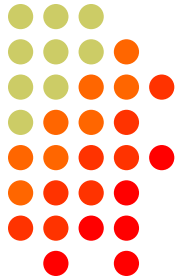
- MMTTY Double Shift may be enabled to send two LTRS or FIGS characters instead of one
- Eliminates single noise hits on LTRS and FIGS characters
- Small speed penalty for all transmissions

Probably not a good trade-off

(very low probability of a noise hit on just the shift character)

Callsign Stacking

"Slow Down to Win"



- Sailboat racing analogy:
  - Pinwheel effect at mark-rounding
- Let pile-up continue 0.5-3 seconds after getting first call sign
  - Increase chance for another call sign or two
  - Increase chance for QSO-phase-skip
- Apply same tactic for tail-enders … pause before sending TU/CQ message

The 4 Phases of a QSO

Normal Run mode flow:

1. **CQ:** Enter or F1 (CQ)
   - repeat
   - AGN?
2. **Pile-up**
3. **Send exchange:** Insert or ‘
   (grab call sign, send exchange)
   - Send fill(s)
4. **receive exchange:**

➢ check pre-fill, click their exchange

- AGN? or NR? or QTH? or NAME?

1. **TU/CQ:** Enter or +
   (log contact, send TU/CQ)
   - optionally send F7 *(QRV message)*

Normal S&P mode flow:

1. **Find CQ**
2. **Send call:** Enter or F4
   - repeat
3. **Receive exchange**

➢ check pre-fill, click their exchange

- AGN? or NR? or QTH? or NAME?

4. **Send exchange:** Enter or F5
   - Send fill(s)
1. **Find next CQ**

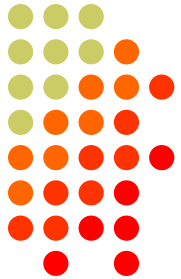
Callsign Stacking

skip 2 phases

Normal	***Shortened***
1. *WPX P49X P49X CQ, or K3LR TU P49X CQ*	1. (skip CQ)
2. *K3LR K3LR K5ZD K5ZD*	2. (skip pile-up)
3. *K3LR 599 2419 2419*	3. *K3LR TU NW K5ZD 599 2420 2420*
4. *TU 599 842 842*	4. *TU 599 1134 1134*

Callsign Stacking

tail-ender



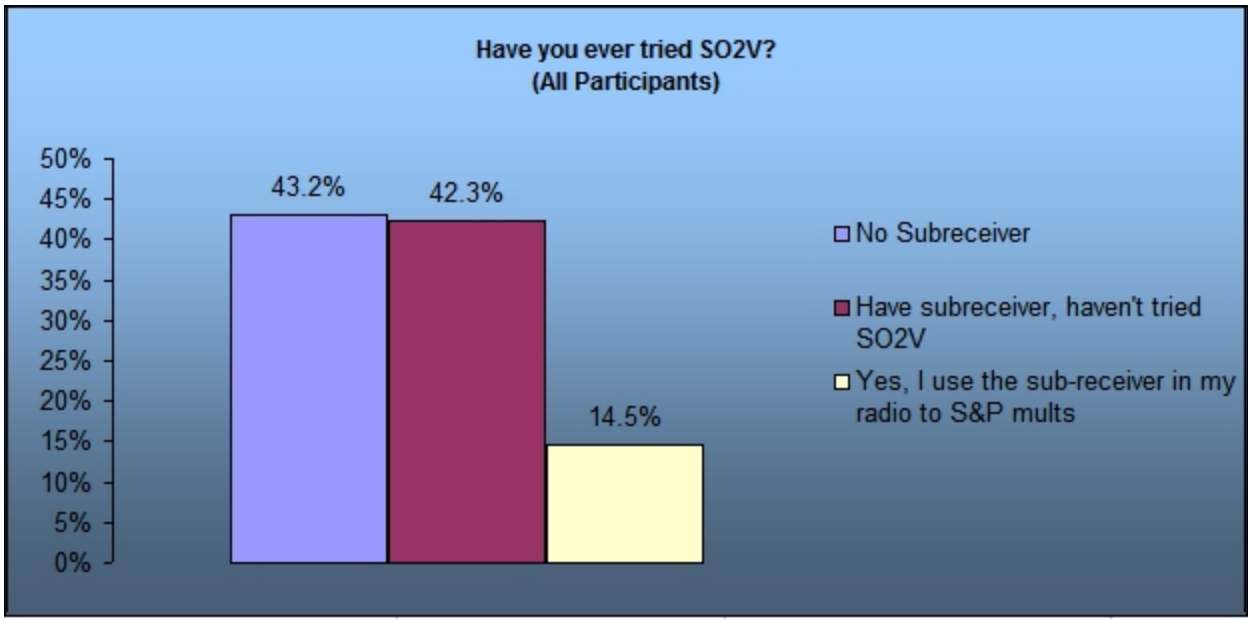
Normal	***Shortened***
1. *WPX P49X P49X CQ, or K3LR TU P49X CQ*	1. (skip CQ)
2. *K3LR K3LR*	2. (skip pile-up)
3. *K3LR 599 2419 2419 K5ZD*	3. *K3LR TU NW K5ZD 599 2420 2420*
4. *TU 599 842 842*	4. *TU 599 1134 1134*

Callsign Stacking

- Efficiently work:
  - multiple callers in a pile-up, and
  - tail-enders
- Calls pushed onto the stack as they arrive
- Message parameter pops call off of the stack into the Entry window
- Eliminates 2 of 4 QSO phases, which doubles rate

SO2V

2010 survey

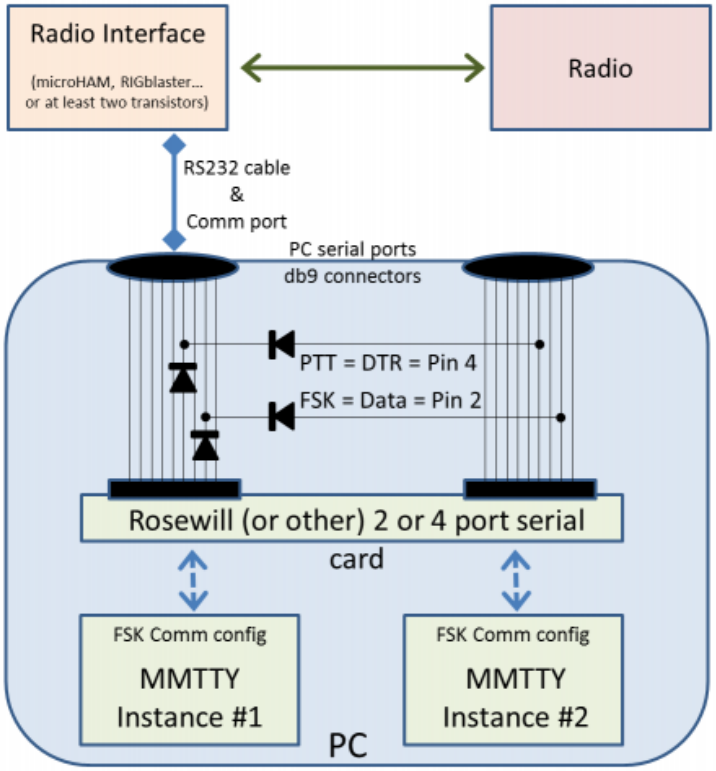


- Almost 15% have tried SO2V

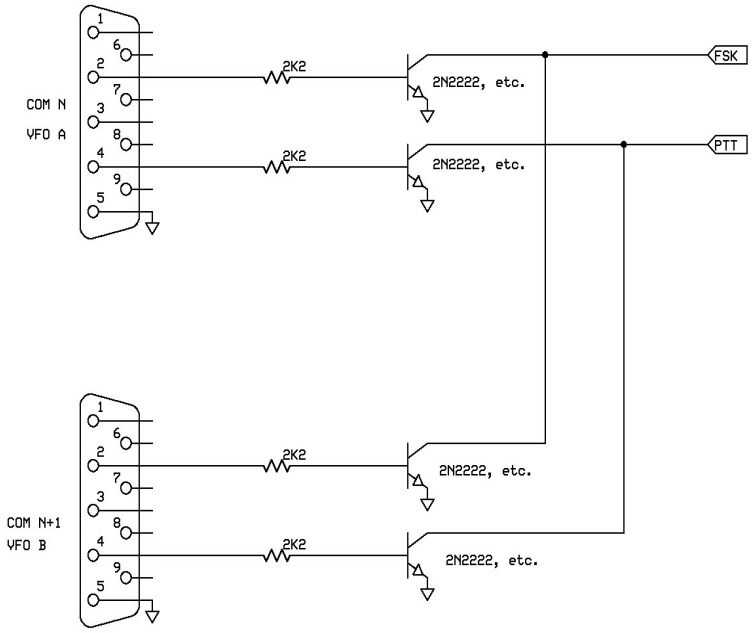
SO2V

1. If Assisted and running on VFO-A, then
   - A<>B
   - Click spot, tune, ID station, work station
   - A<>B, resume running
2. Or, setup decoder windows on A and B
   - Radio must have two true receivers
   - Monitor both frequencies simultaneously with right/left channels of sound card
     - Right-click call from 2nd RTTY window into VFO-B Entry Window
   - Two ways to transmit on VFO-B:
     A. A<>B, work the mult, A<>B
     B. SPLIT, work the mult, ~~SPLIT~~, resume running
        - Requires “wire-OR’d” FSK or AFSK and two transmit RTTY windows
        - K3/WriteLog invokes SPLIT when call is left-clicked in Sub-RX

SO2V Wire-OR FSK/PTT

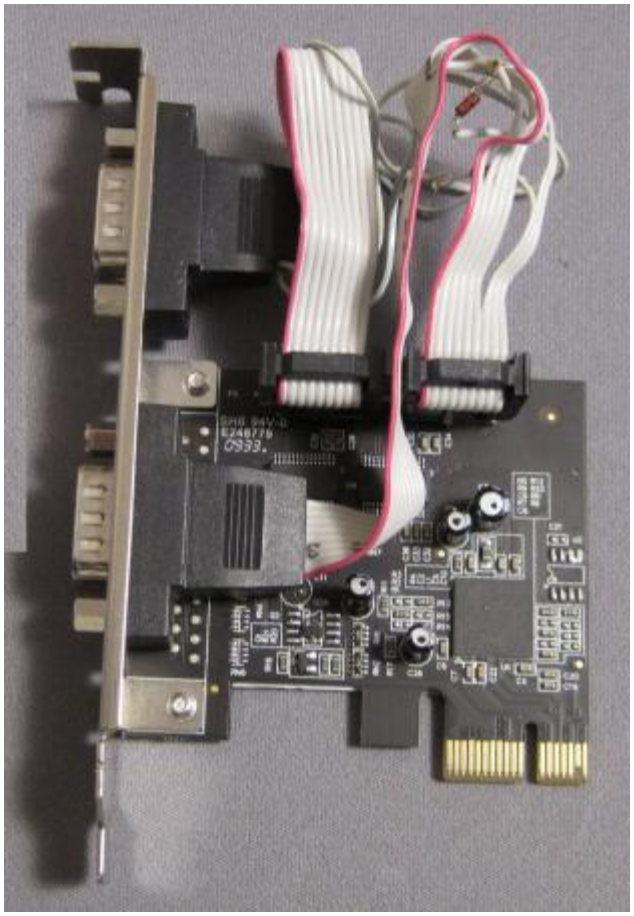


Serial Signals (K8UT)



FSK/PTT Signals (W0YK)

SO2V Wire-OR FSK/PTT

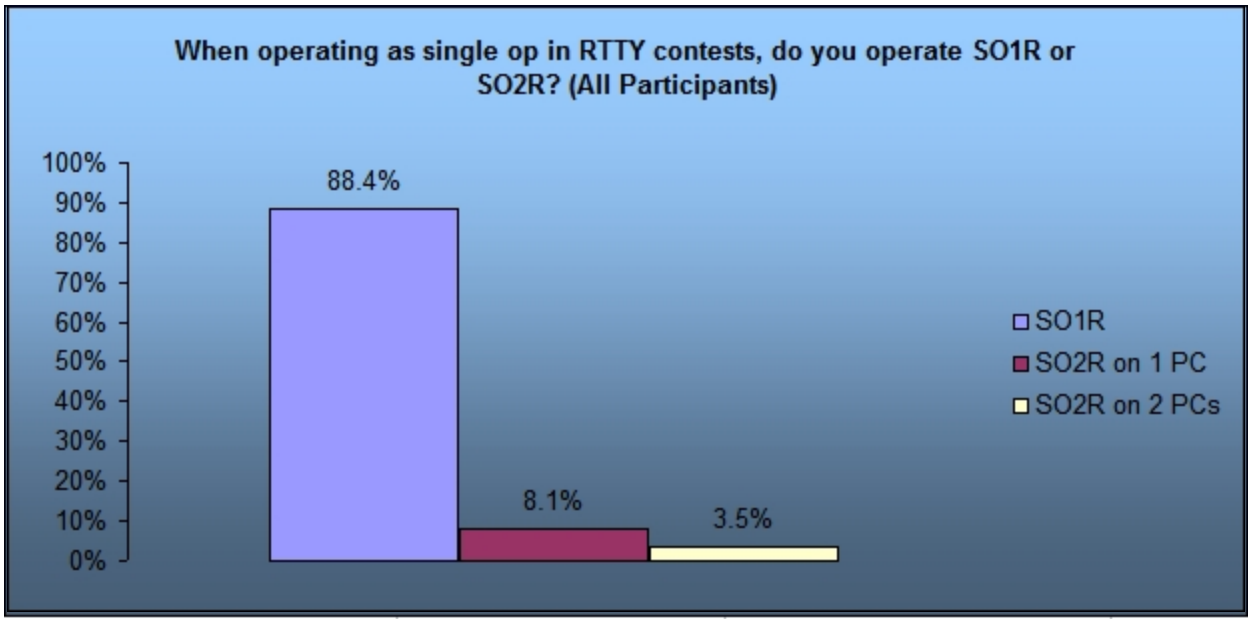


Serial Signals (K8UT)

FSK/PTT Signals (W0YK)

SO2R

2010 survey



- 12% operate SO2R
- 30% of SO2R users use 2 PCs

SO2R

- Eliminates SO1R RTTY boredom
- Think beyond run and S&P:
  - Dueling CQs; run on two bands simultaneously
  - S&P on two bands simultaneously, esp. w/Packet
  - SO2V on one or both radios (SO4V!)
- Two networked computers:
  - Eliminates PC focus swapping
  - RTTY doesn't require much typing
    - Mini-keyboards ideal for RTTY
  - 2 x SO2V=SO4V for picking up mults on both run bands
  - Easily extendible to SO4R

No time to watch TV or do email!

SO2R

M2 configuration

SO2R in the NA Sprint

- Set VFOs at least 10 kHz apart on both radios
- Find a clear spot on one radio and CQ while you tune the other radio for a station to work
- If you don't find a station to work quickly (within a minute), find a clear frequency and duel CQ
- After a QSO swap VFOs on that radio, search for up to a minute, then resume dueling CQ
- Don't waste time trying to work the "couplet" … CQing is OK in Sprint!

SOnR

> 2 radios

- Simplify antenna/filter band-decoding:
  - Dedicate a band/antenna to the 3rd (or 4th) radio
- Networked PC/radio simplifies configuration
- RTTY (vs. CW or SSB) easier for operator
  - PC decodes for operator
  - Low tones & high tones allows two radios per ear
    - Classic audio headphone mixer provides radio 1, radio 2 or both

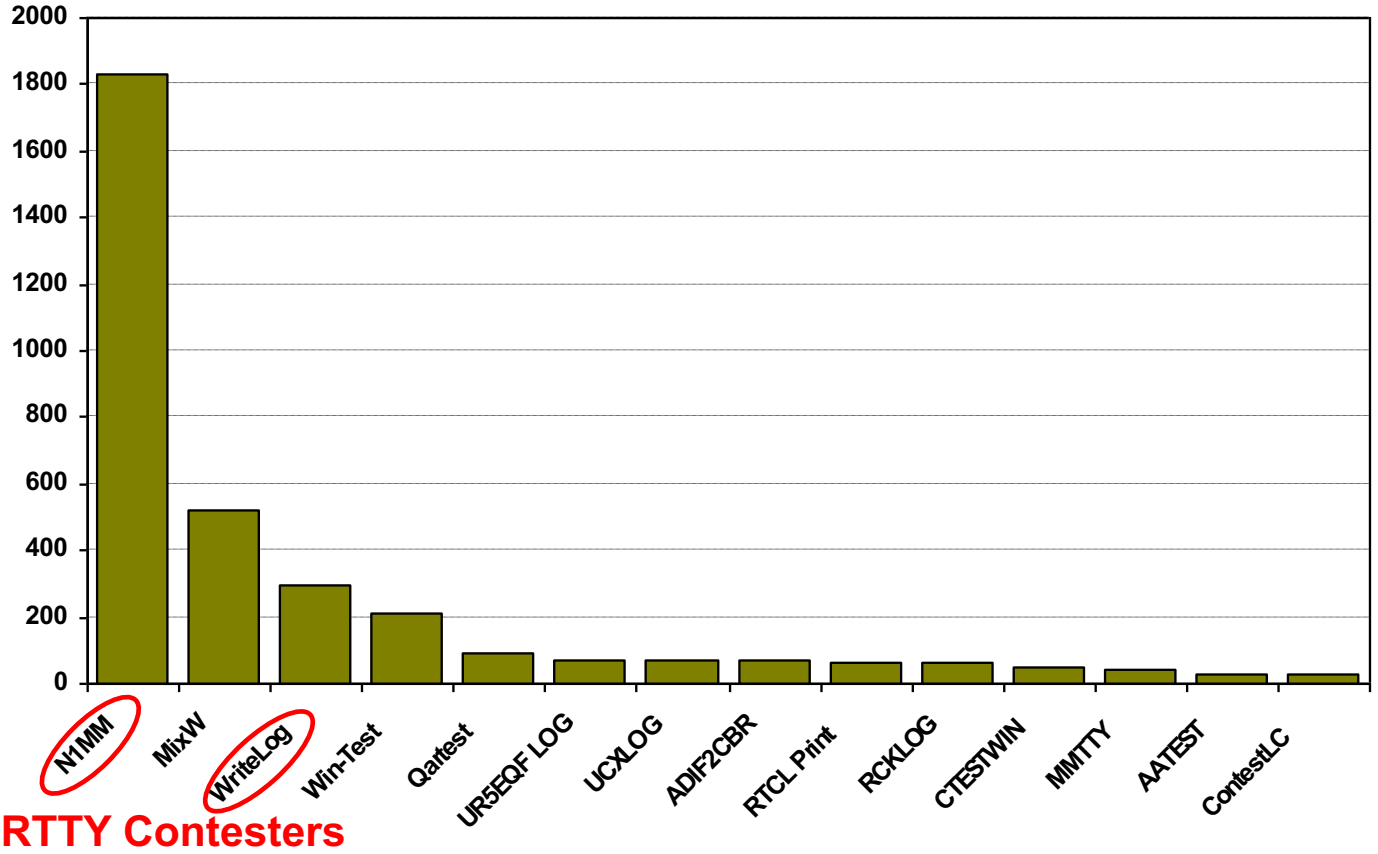
SOnR

Multi-Multi configuration

dedicated
to 10 meters

2012 CQ WPX RTTY

3550 submitted logs



Top RTTY Contesters

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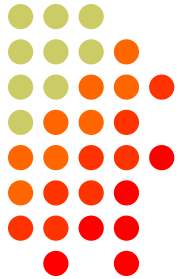
Logging Software

- WriteLog *(1994)*
  - created for RTTY *(CW & SSB came later)*
  - *www.rttycontesting.com* web site
- N1MM Logger *(2000; dedicated RTTY software designer)*
  - Free
- Win-Test *(2003; RTTY is low priority)*

All three integrate MMTTY and have similar functionality for basic RTTY contesting.

Logging Software

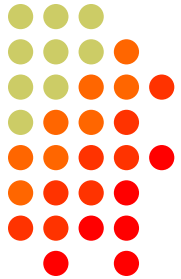


	WriteLog	N1MM	Win-Test
MMTTY	☻	☻	☻
2Tone	☻	☻	-
other decoders	☻	some	none
Call sign acquisition	☻	☻	☻
Contests supported	☻	☻	fewer
Advanced RTTY	☻	☻	none

- *All three are entirely adequate for basic RTTY contesting*
- *Use the logger you are already familiar with for CW & SSB*

Logging Software

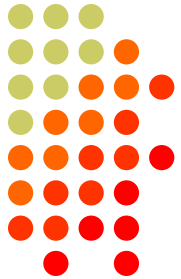
WriteLog, N1MM Logger, Win-Test



- 13 features compared
  - Simplifying assumption: features equally weighted
  - Rated 0 to 5
- All three score ‘5’ on:
  - MMTTY integration
  - Stateful Enter key (ESM: Enter Sends Message)
  - Accelerator keys
  - QRV message parameter
- Another 9 advanced RTTY features distinguish these loggers

Logging Software

MMTTY integration



- Install free MMTTY software
- Logger integrates MMTTY

- All three loggers
- Integrated excellent encoder/decoder

Logging Software

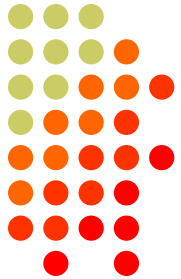
stateful Enter key

- Stateful Enter key (ESM=Enter Sends Message)
  - Cursor in call sign field:
    1. Sends CQ if Call Sign Window empty, else
    2. Sends call sign & exchange
  - Cursor in exchange field:
    3. Sends TU/CQ
- N1MM Logger highlights active key(s)

- All three loggers
- Efficient keyboarding

Logging Software

accelerator keys



- Insert grabs call sign & sends exchange
- + logs QSO & sends TU/CQ

- All three loggers
- Saves keystrokes

Logging Software

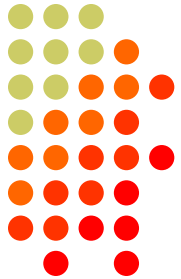
automatic QRV

- *QRV 28079.3*
- Message parameter for other radio's VFO

- All three loggers
- Efficient QSY, mult move or "self-spotting"

RTTY Contest Loggers

relative ratings

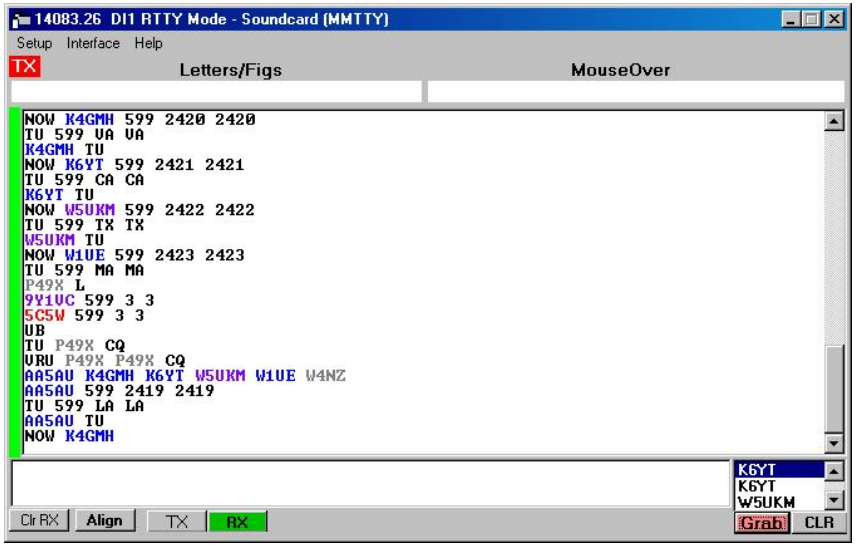


WL	*N1*	*WT*	***Logger***
5	5	4	• RTTY window readability
5	4	0	• Multiple decoders
5	4	0	• multiple MMTTY or 2Tone
0	5	3	• ESM mouse ctrl & Sprint mode
5	5	0	• SO2V
5	3	3	• M2 SO2R configuration
5	4	5	• Re-mapped keys
5	5	3	• Call sign stacking
5	4	5	• AFSK/FSK flexibility
40	***39***	***23***	***Overall***

Logging Software

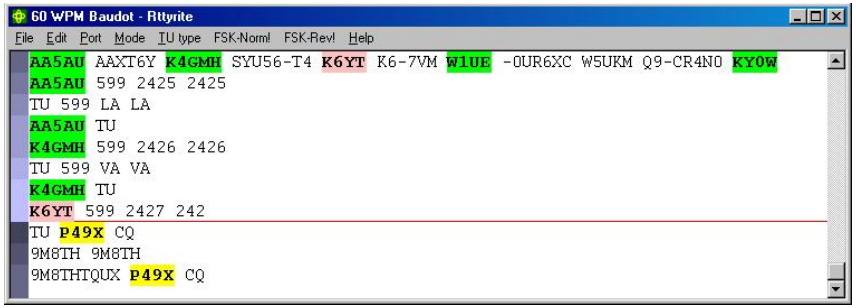
RTTY Window Readability

N1MM Logger



Colored text is difficult to read, especially the dark blue (unworked call) which has negligible contrast to black text or black background. The dark blue cannot be changed by the user. ***HOWEVER …***

WriteLog

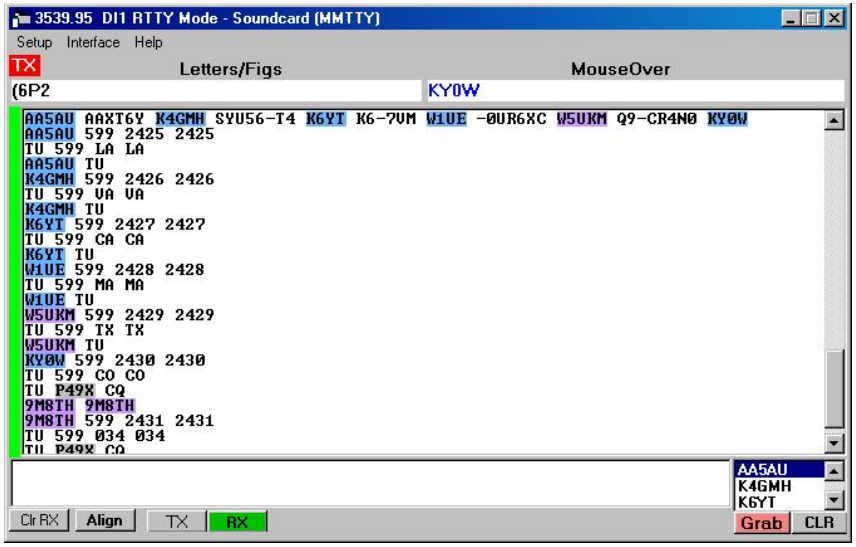


Colored highlighting has outstanding readability. The text all remains black for maximum contrast and the highlighting does not detract. Rather the large highlight area around the text make it extremely easy to zero in on the call sign of interest, especially when quickly moving one's eyes between multiple windows.

Logging Software

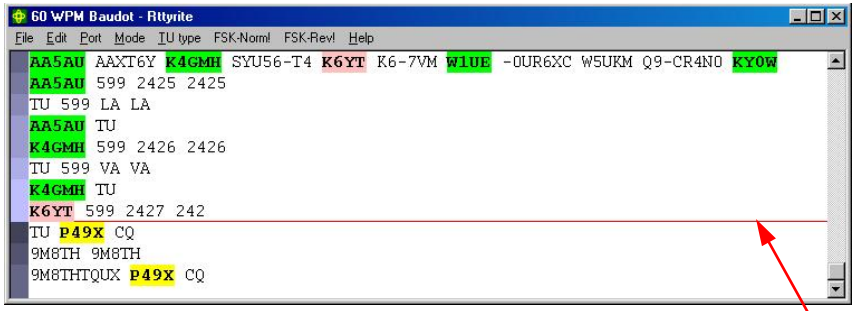
RTTY Window Readability

N1MM Logger



Colored text is difficult to read, especially the dark blue (unworked call) which has negligible contrast to black text or black background. The dark blue cannot be changed by the user. ***HOWEVER, there is now an option for highlighting like WriteLog and WinTest.***

WriteLog

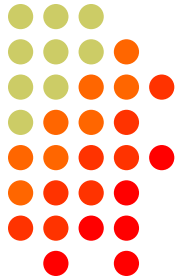


Colored highlighting has outstanding readability. The text all remains black for maximum contrast and the highlighting does not detract. Rather the large highlight area around the text make it extremely easy to zero in on the call sign of interest, especially when quickly moving one's eyes between multiple windows.

WriteLog is unique in having a NON-SCROLLING RTTY window, so you don't have to chase text up the screen!

Logging Software

multiple decoders

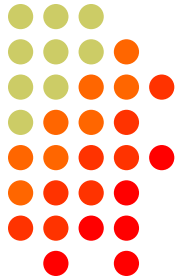


- N1MM Logger limited to 4 total, but has best DXP38 support
- WriteLog has 10 additional decoders per rcvr and the most hardware MODEMs
- Win-Test only supports one instance of MMTTY

- WriteLog & N1MM Logger only
- Multiple parallel decoders for marginal copy

Logging Software

ESM mouse control

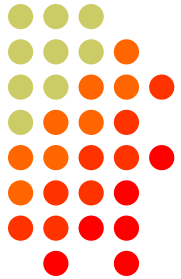


- Left-click enters call sign or exchange
- Right-click (ESM) sends exchange or TU/CQ
- QSOs can be worked entirely with mouse action, except for the rare instance where a call or exchange must be typed in

- N1MM Logger only
- Minimizes keyboarding for efficiency

Logging Software

SO2V

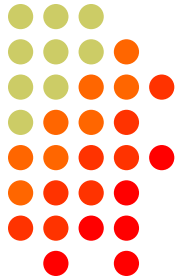


- Basic capability with two VFOs
- Advanced capability with two receivers
  - Requires second receiver in radio
  - Independent RTTY window for second receiver
  - radio/logger SPLIT mode

- N1MM Logger & WriteLog
- Interleave S&P QSOs on Run band

Logging Software

SO2R M2 configuration

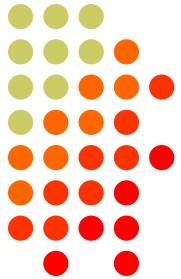


- PC & UI per radio; networked
- Single signal interlock
- Extendible to SOnR

- Only WriteLog
- Another user preference alternative; SOnR

Logging Software

key re-mapping



- Soft re-definition of keyboard keys
- Examples:
  - Insert → ‘
  - = → PopCallFromStack
- WriteLog provides a rich built-in function set for key shortcuts

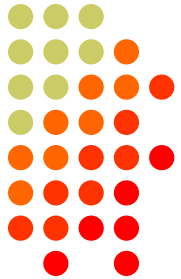
- WriteLog & Win-Test remap keys and functions
- N1MM Logger uses HotKeys
- Relocates keys for efficiency

Logging Software

re-mapped keys

Logging Software

callsign stacking



- N1MM Logger can automatically fill stack
- WriteLog has convenient stack management
- Win-Test script can use partner stack

- All three loggers
- Doubles rate by skipping CQ & pile-up

Logging Software

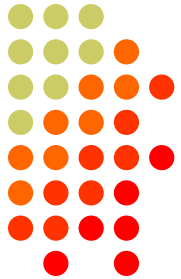
callsign stacking

- N1MM Logger automatically pushes calls into the Grab window.
  - It can also explicitly push calls onto the Call Stack (like WriteLog and Win-Test)
  - There is a rich list of stack functions and ESM integration
- WriteLog explicitly right-clicks calls onto the call stack
- Win-Test requires a LUA script to push calls onto the Partner Stack

Automatic vs. explicit pushing is personal pref.

Logging Software

AFSK & FSK flexibility

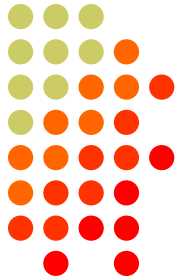


- WriteLog has built-in AFSK & FSK
  - Can be used with any supporter decoder
- N1MM relies on MODEM for AFSK or FSK
  - TinyFSK & rpiFSK available

- WriteLog
- Independence from MODEM for transmit

RTTY Contest Loggers

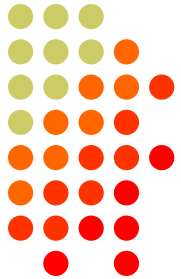
relative ratings



WL	*N1*	*WT*	*Logger*
5	5	4	RTTY window readability
5	4	0	Multiple decoders
5	4	0	multiple MMTTY or 2Tone
0	5	3	ESM mouse ctrl & Sprint mode
5	5	0	SO2V
5	3	3	M2 SO2R configuration
5	4	5	Re-mapped keys
5	5	5	Call sign stacking
5	4	5	AFSK/FSK flexibility
40	***39***	***25***	***Overall***

Sharing the Road

RTTY sub-bands



- FCC rules govern, not band plans
  - You have a right to use amateur frequencies!
- Respect band plans when possible
  - Avoid common sub-band “claims” unless it’s the only clear freq.
- Insure frequency is not in use
  - You may not be able to hear or copy some modes
  - There may be one-way propagation

RTTY Sub-Bands

- 10 meters: 28080-28100, during contests 28060-28200
  - JA: 28070-28200
- 15 meters: 21080-21100, during contests 21060-21150
  - JA: 21070-21150
- 20 meters: 14080-14100, during contests 14060-14140
  - JA: 14070-14150
- 40 meters: 7025-7050 and 7080-7100, during contests 7025-7100
  - JA: 7030-7100
  - EU: below 7050
  - US: can go to 7125
- 80 meters: 3580-3600, during contests 3560-3600
  - JA: 3520-3575
- 160 meters(no RTTY contesting): 1800-1810
  - JA: 1907.5-1912.5

Common Frequency Claims
don't QRM!

- Avoid PSK-31 operations near:
  - 28120, 21070-2, 14070-2, 7070 and 3580
- Avoid the NCDXF beacons:
  - 28200, 21150, and 14100

- More details:

  www.aa5au.com/rtty/rtty-sub-bands/

Resources

- NCJ RTTY Contesting columns
  - Spaces vs. hyphens: Sep/Oct 2013
  - Call sign stacking: Jul/Aug 2010 and Jan/Feb & Mar/Apr 2015
  - SO2R in Sprint: May/Jun & Sep/Oct 2014
  - Sub-bands: Mar/Apr 2013
- Prior CTU RTTY presentations
  - 2014 CTU textbook from DXE ($19.95)
- AA5AU website: www.rttycontesting.com
  - Tutorials and resources (beginner to expert)
  - WriteLog/N1MM Logger and MMTTY/2Tone
- Email reflector: rtty@contesting.com
  - RTTY contester networking
  - Q&A
- Logging Software web sites
- Logging Software Reflectors