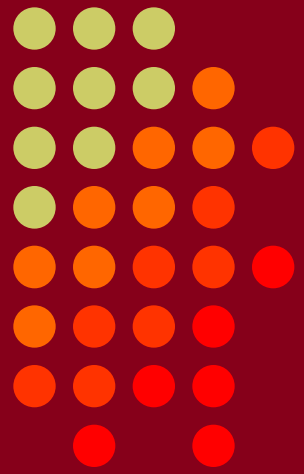
CTU 2019 Presents

Digital Contesting is Fun!

Ed Muns, W0YK



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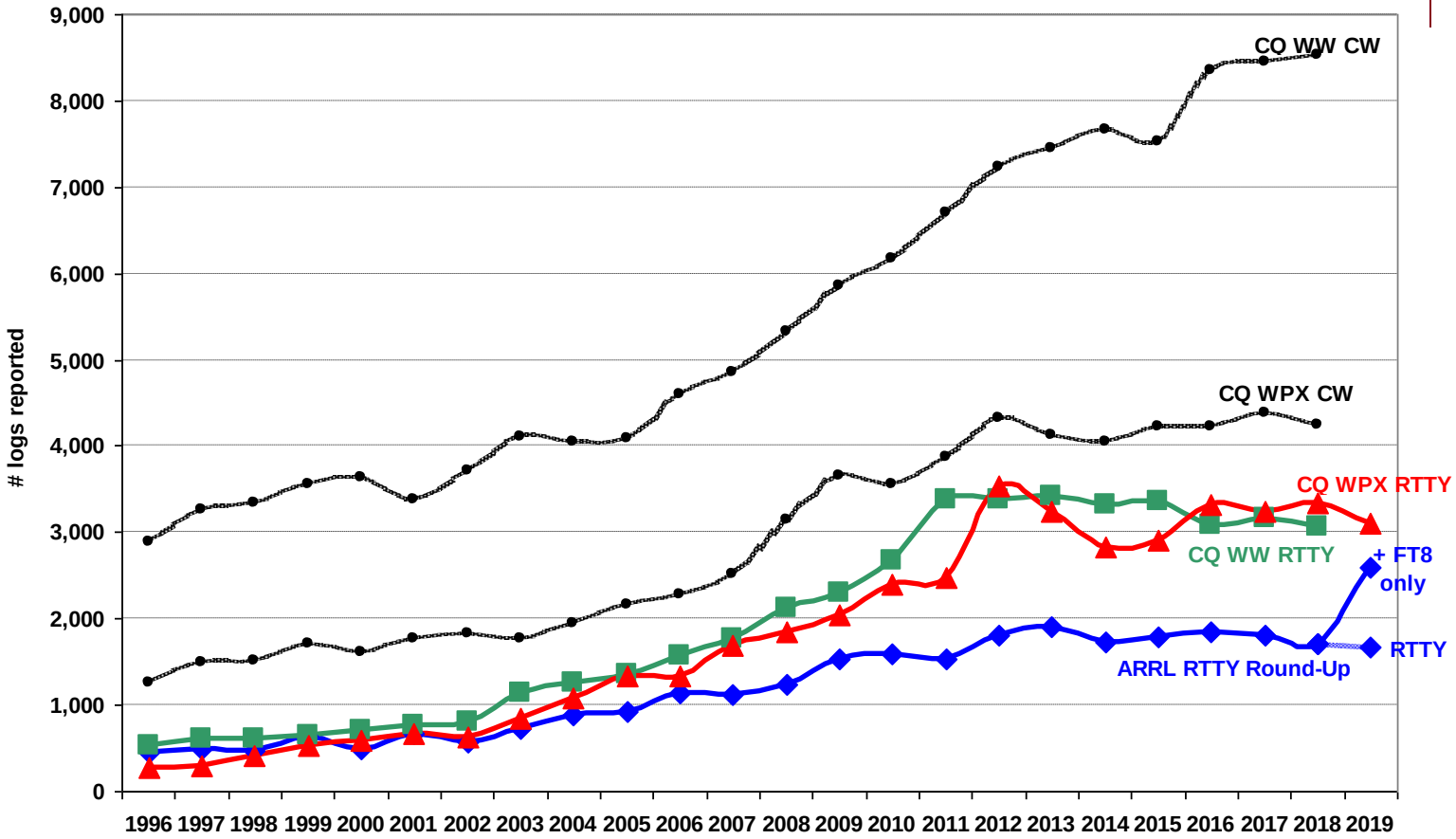
ICOM

Digital Contesting is Fun!

- RTTY Contesting → Digital Contesting
- RTTY
  - Operating
  - Setting Up
    - Hardware
    - Software
- Introduction to FT8
- 2nd session: "*Taking Digital Contesting to the Limit*"

Three Largest RTTY Contests



Lots of Digital Contests

> two/month

- **Biglies (7)**
  - CQ WW RTTY (last weekend in Sep)
  - CQ WPX RTTY (2nd weekend in Feb)
  - ARRL RTTY Roundup (1st weekend in Jan) + FT8
  - BARTG (3rd weekend Jan, 3rd weekend Mar)
    - 75 Baud (Apr & Sep)
  - WAE RTTY (2nd weekend in Nov)
- **NCJ contests (4)**
  - NAQP RTTY (3rd Sat. in Feb, 2nd Sat. in Jul)
  - Sprint RTTY (2nd Sat. in Mar & Oct)
- **Other popular RTTY contests (20)**
  - ~~Ten-Meter RTTY~~ (1st Sat. in Dec) FT8 Roundup
  - JARTS, Makrothen, SARTG (2)
  - FT8 DX Contest (Apr), FT8 Makrothen (Jun), SCC FT8

What Makes a Great RTTY Contester?

1) Contester who happily logs casual callers
2) Uses CW & SSB techniques where useful
3) Strives to exploit RTTY uniqueness
   - Auto-decode frees operator time … use it to do things difficult with CW & SSB, e.g., SO3R!
   - Speed is ~2x CW
4) Applies learning back to CW & SSB

What is RTTY?

compared to CW

CW

1) ***One*** RF carrier

2) Local audio ***pitch***

3) On ***or*** off
   - key up is data 0
   - key down is data 1

4) ***Morse*** code
   - typically 25-40 wpm

RTTY

1) ***Two*** RF carriers 170 Hz apart *(Space & Mark; Shift)*

2) Local audio ***tones***

3) One on ***and*** other off
   - Space is data 0
   - Mark is data 1

4) ***Baudot*** code
   - constant 60 wpm *(or 45.45 Baud)*

What is RTTY?

Figures Shift

- 5-bit code→32 chars.
- 2 sets:
  - Letters set & Figures set
  - 6 common control chars.
    - LTRS (unshifted)
    - FIGS (shifted)
    - Null, Space, LF, CR
- LTRS or FIGS toggle set

Code	Control Characters		
11111	LTRS		
11011	FIGS		
00000	Null		
00100	Space		
01000	LF		
00010	CR		
	Letters	Figures	
		ITA2	USTTY
00011	A	-	
11001	B	?	
01110	C	:	
01001	D	ENQ	$
00001	E	3	
01101	F		!
11010	G		&
10100	H		#
00110	I	8	
01011	J	BELL	'
01111	K	(	
10010	L	)	
11100	M	.	
01100	N	,	
11000	O	9	
10110	P	0	
10111	Q	1	
01010	R	4	
00101	S	'	BELL
10000	T	5	
00111	U	7	
11110	V	;	
10011	W	2	
11101	X	/	
10101	Y	6	
10001	Z	"	

What is RTTY?

code history

- Bacon's cipher (1605)
- Gauss & Weber (1833)
- Baudot code (1870)
  - Manual bit entry
  - 5-bit ITA1 code
  - Two 32-bit character sets
    - letters
    - figures
- Murray code (1901)
  - Teletype character entry
  - Western Union variation
- **5-bit ITA2 code (1930)**
  - **USTTY variation**
- ASCII (1963)
  - 7-bit ITA5 code

Code	Control Characters		
11111	LTRS		
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00010	CR		
	Letters	Figures	
		ITA2	USTTY
00011	A	-	
11001	B	?	
01110	C	:	
01001	D	ENQ	$
00001	E	3	
01101	F		!
11010	G		&
10100	H		#
00110	I	8	
01011	J	BELL	'
01111	K	(	
10010	L	)	
11100	M	.	
01100	N	,	
11000	O	9	
10110	P	0	
10111	Q	1	
01010	R	4	
00101	S	'	BELL
10000	T	5	
00111	U	7	
11110	V	;	
10011	W	2	
11101	X	/	
10101	Y	6	
10001	Z	"	

What is RTTY?

Figures Shift

- The *LTRS* and *FIGS* characters do not print
  - The code for the characters “Q” and “1” is the same; which one prints depends on if you are in Letters or Figures set
  - Note that the *LTRS*, *FIGS* and *Space* characters appear in both sets
- Example: “***KI7GUO DE K4GMH***” gets sent as:
  - *LTRS* ***K I*** *FIGS* ***7*** *LTRS* ***G U O*** *Space* ***D E*** *Space* ***K*** *FIGS* ***4*** *LTRS* ***G M H***
- Why do we care to understand this?
  - If a burst of static garbles the *LTRS* or *FIGS* character, then what prints after that is from the wrong set until the next *LTRS* or *FIGS* character appears

What is RTTY?

UnShift on Space

- UnShift On Space (USOS or UOS)
  - Increases noise immunity for alpha text
  - Space character forces a shift to the Letters set
- Contest exchanges are alpha and numeric
  - Should UOS be on or off?
  - Should Space or Hyphen delimit exchange elements?
    - 599 JOHN NY or 599-JOHN-NY
- *Recommendation:*
  - *Turn on both RX & TX UOS and use Space delimiters*

What is RTTY?

audio tones

- Space and Mark audio tones
  - Default: 2295 and 2125 Hz (“high tones”)
  - Less fatiguing: 1085 and 915 Hz (“low tones”)
- Analogous to CW pitch
  - Operator choice
  - Each operator can use different tone pairs
  - Transmission is two RF carriers 170Hz apart
- Must be same in radio and decoder/encoder

What is RTTY?

AFSK vs. FSK

Two methods of transmission:

- AFSK (Audio Frequency Shift Keying)
  - keyed audio tones into SSB transmitter via:
    - Mic input, or
    - Auxiliary audio input. e.g., Line In
- FSK (Frequency Shift Keying)
  - on/off keys the transmitter just like CW

Note: Receiving is the same in either case.

What is RTTY?

dial frequency

spots are often wrong

- RTTY RF is independent of local audio tones and whether LSB or USB is used:
  - The higher RF frequency is the Mark *(14090.000 kHz)*
  - The lower RF frequency is the Space *(14089.830 kHz)*
  - The difference between the two is the shift *(170 Hz)*
- FSK displays Mark *(14090.000 kHz)*
- AFSK displays suppressed carrier which varies with local audio tones and sideband used!
  - For Mark tone of 2125 Hz (Space tone of 2295 Hz):
    - LSB *(14092.125 kHz)*
    - USB – Mark & Space tones reversed *(14087.005 kHz)*

What is RTTY?

AFSK vs. FSK

AFSK

- Indirect *(tones → Mic input)*
- Any SSB radio *(esp. legacy)*
- SSB (wide) filtering
- Dial = sup. car. frequency
- VOX
- Audio cable *(a'la FT8, JT65/9, PSK31)*
- Must use high tones

NET (automatic TX tone control)

Less bandwidth (depends on radio)

Easier hook-up; NET

FSK

- Direct *(like CW keying)*
- "Modern" radios
- RTTY (narrow) filtering
- Dial = Mark frequency
- PTT
- COM FSK keying cable
- Can use low tones

No audio level adjust

No disabling speech proc.

No erroneous sound keying

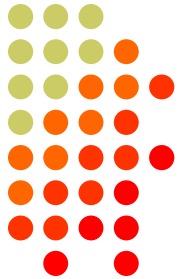
Less pitfalls

What is RTTY?

summary

- Uses 5-bit Baudot (actually, USTTY) code with two sets of 32 characters: Letters and Figures
- Space & Mark frequencies separated by 170 Hz “Shift”
- Local Space & Mark tones analogous to pitch in CW
- Constant 45.45 Baud (60 wpm) asynchronous character stream with 5 data bits and 2-3 sync bits
- Figures Shift & Letters UnShift
  - Use optional UnShift-On-Space (UOS), plus space delimiter
- AFSK vs. FSK transmission (receiving is the same)
  - Radio dial frequency differences
  - 100% duty cycle!

The Cynics Say …



- "The RTTY decoder/encoder does everything."

  however, this attribute …

  - frees the operator to improve other skills
  - enables more contest participants
  - provides mode diversity for contest junkies

- "RTTY is a pain to set up and get working."

  … stay tuned, it's really not that difficult!

RTTY Considerations

Much like CW and SSB, except:

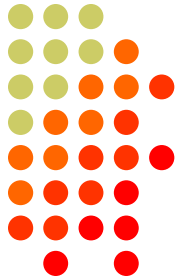
- Non-human decoding implications
  - *serial number repeat, universal "fist" or "voice"*
- Distractions are tempting
  - *watch TV, do email, read, etc.*
- RTTY established practice
  - *'CQ' at end of CQ message*
- Whisper-level headphone volume; low tones
  - *just to detect presence & timing*
- Key-down transmission … 100% duty cycle

RTTY Sub-Bands

- 10 meters: 28080-28100, during contests 28080-28200
  - JA: 21070-21150
- 15 meters: 21080-21100, during contests 21080-21150
  - JA: 21070-21150
- 20 meters: 14080-14100, during contests 14080-14150
  - JA: 14070-14150
- 40 meters: 7025-7050 & 7080-7100, during contests 7025-7100
  - JA: 7030-7100
- 80 meters: 3580-3600, during contests 3560-3600
  - JA: 3520-3575 and 3599-3612
- 160 meters: No RTTY contesting

RTTY Sub-Bands

don't QRM!



- Avoid audio-digital operations near:
  - e.g., 14070-14080
- Avoid the NCDXF beacons:
  - e.g., 21150 and 14100

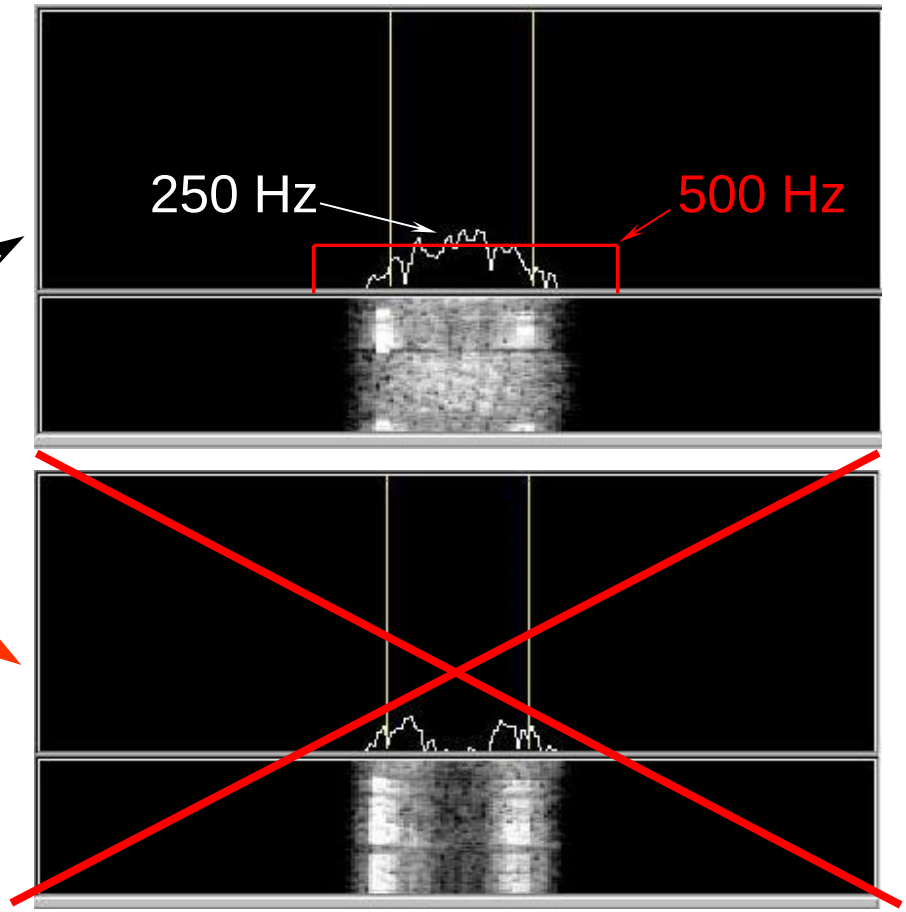
- More details:

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

Receiving

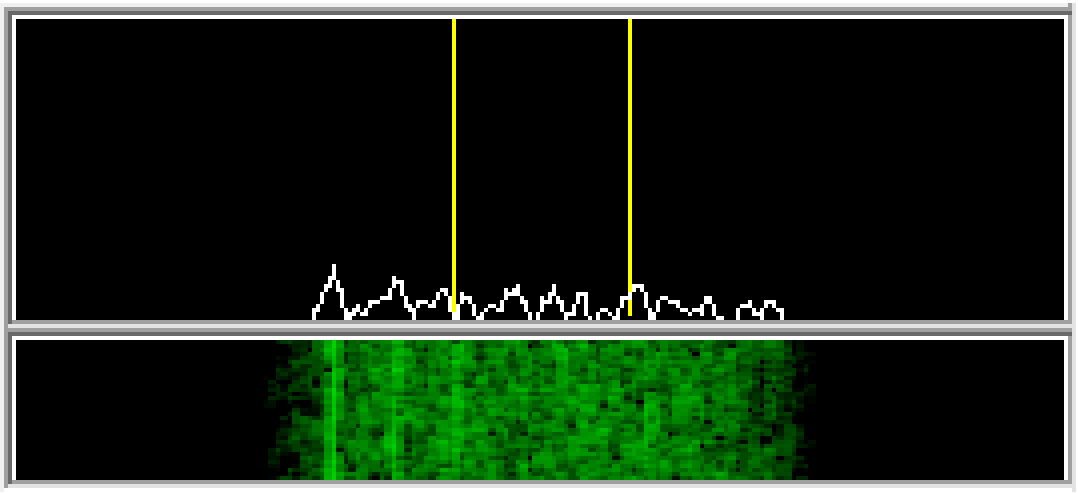
radio IF filtering

- PC Audio isolation
  - Transformer
  - Commercial interface
  - Some radios (K3, Flex)
- Narrow IF filters (Roofing & DSP)
  - 500 Hz - normal
  - 250 Hz - extreme QRM only
  - Tone filters – don't use!
    - Icom Twin Peak Filter
    - K3 Dual-Tone Filter



Receiving

adjust audio

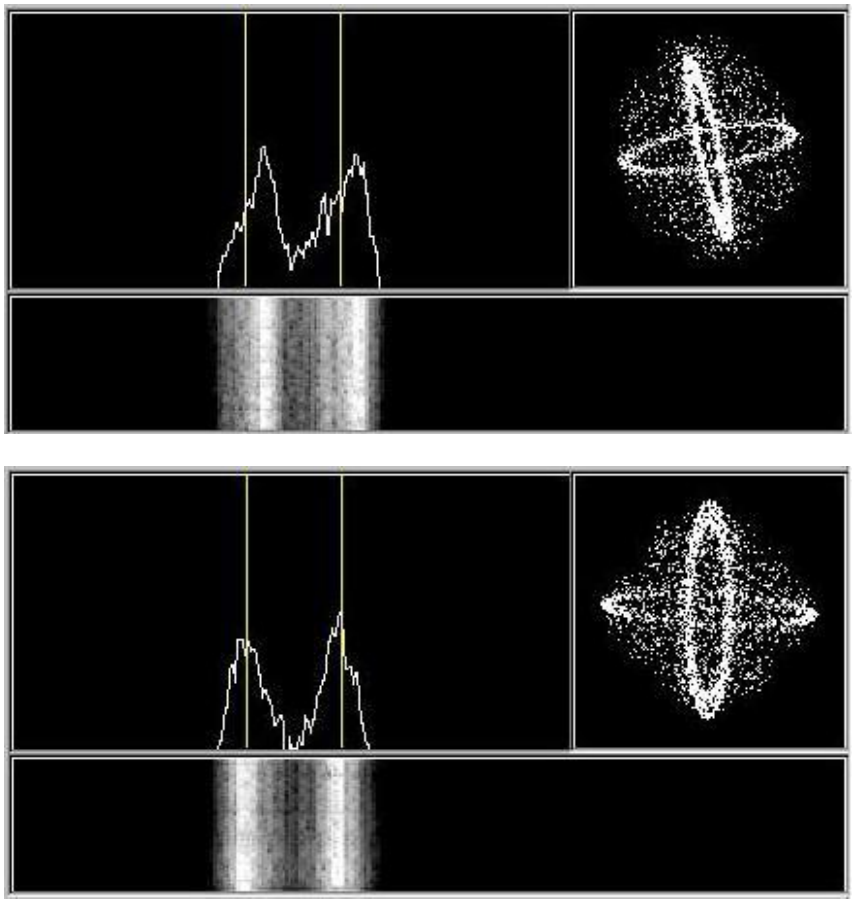


- Set RX audio level for noise 5% of full-scale
  - Receiver audio out level control, and/or
  - *Windows* Recording Volume Control applet

Receiving

tuning a RTTY signal

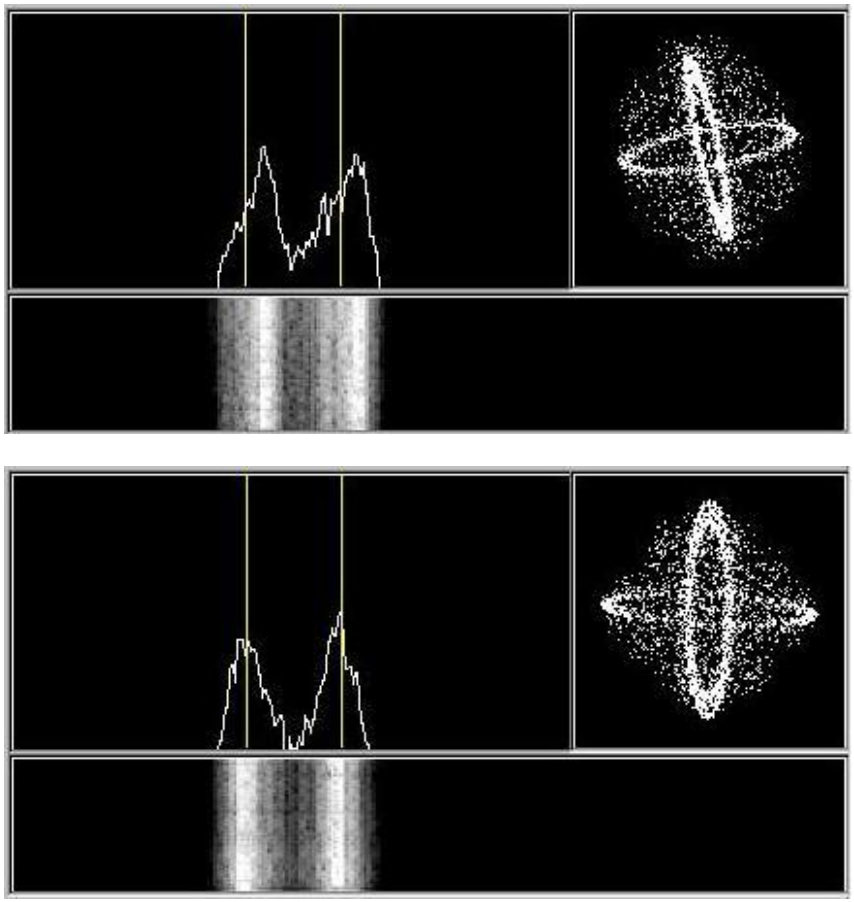
- Use narrow filtering
  - CW filters ~ 500 Hz
- Set RX audio level
  - noise 5% of full-scale
- Learn to tune by ear
  - practice with eyes closed
  - get within 10-20 Hz



Receiving

MMTTY AFC

- Use narrow filtering
  - CW filters ~ 500 Hz
- Set RX audio level
  - noise 5% of full-scale
- Learn to tune by ear
  - practice with eyes closed
  - get within 10-20 Hz
- AFC On or Off
  - ‘On’ may cause TX frequency to be off



Transmitting

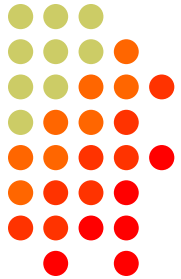
AFSK adjustment

Insure SSB processor (compression) is Off.

- Adjust:
  - the *Windows* Playback Volume control, and
  - the transmitter Mic (or auxiliary audio input)
- Such that:
  - ALC is just backed off to zero, and
  - full power output is attained.

Transmitting

FSK adjustment



- None!

(That's the whole point of FSK.)

Basic RTTY Contest QSO

CQ WPX RTTY Contest

- ***WPX K5AM K5AM CQ***
- ***ZC4LI ZC4LI***
- ***ZC4LI 599 1349 1349***
- ***[K5AM] TU 599 985 985***
- ***[ZC4LI] TU K5AM CQ***

K5AM: running station

ZC4LI: S&P station

RTTY Messages

CQ WPX RTTY Contest

- Short, as with CW/SSB
- No extraneous info
- 599 (not 5NN) once
- Serial number twice
- Space (not hyphen)
- Omit ‘DE’
- RTTY chars (%R, %E)

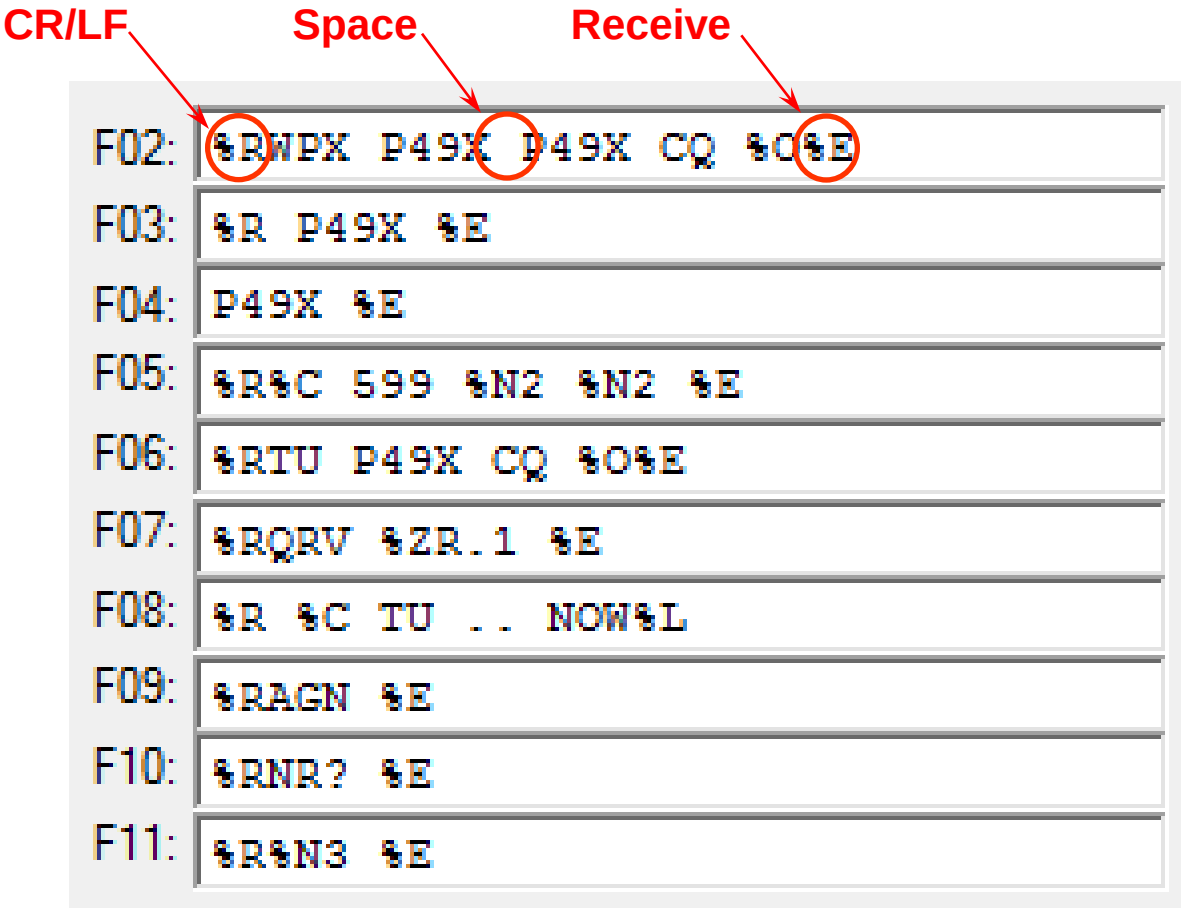
www.rttycontesting.com/tutorials/messages

F02:	%RWPX P49X P49X CQ %O%E
F03:	%R P49X %E
F04:	P49X %E
F05:	%R%C 599 %N2 %N2 %E
F06:	%RTU P49X CQ %O%E
F07:	%RQRV %ZR.1 %E
F08:	%R %C TU .. NOW%L
F09:	%RAGN %E
F10:	%RNR? %E
F11:	%R%N3 %E

F02:	%RWPX P49X P49X P49X CQ %O%E
F03:	%RQSL LOTW OR W0YK %E
F04:	%R%C %E
F05:	%RTU 599 %N2 %N2 %L%E
F06:	%RKB %H P49X CQ %L%O%E
F07:	%RQRV %ZS.1 %E
F08:	%R%H %C KB .. NOW%L
F09:	%RQRZ %E
F10:	%RCALL? %E
F11:	? %E

RTTY Messages

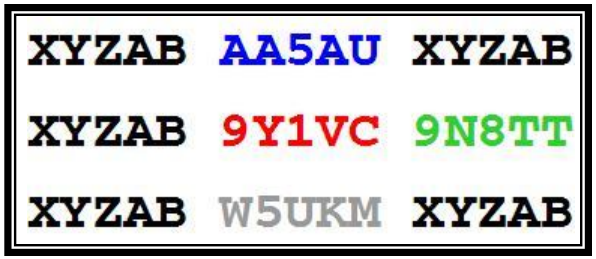
formatting



Super Check Partial

call sign selection

- SCP (Super Check Partial) enables computer to select call signs in receive window
  - Unworked calls (no mult)
  - New mults and double mults
  - Dupes

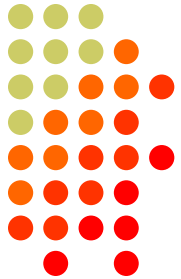


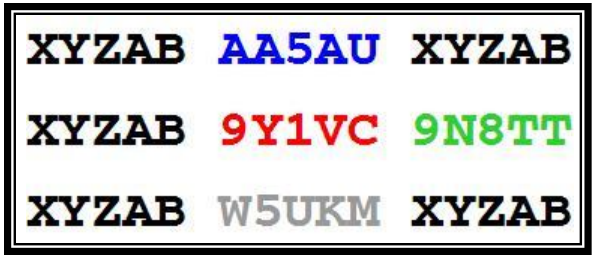
N1MM Logger

- Use main SCP from CW/SSB/RTTY contests
  - RTTY SCP is a subset

Super Check Partial

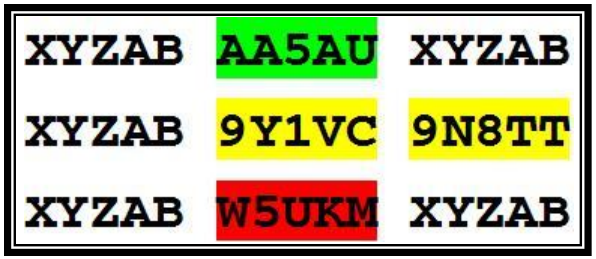
logger differences



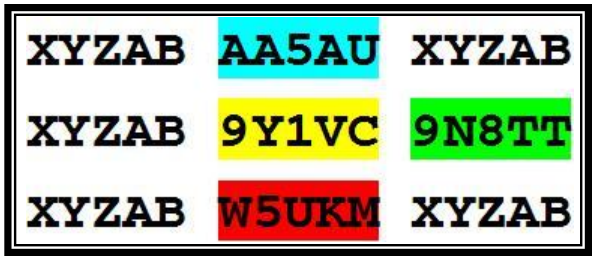


- ***Background option***
- ***Custom colors***

N1MM Logger



WriteLog

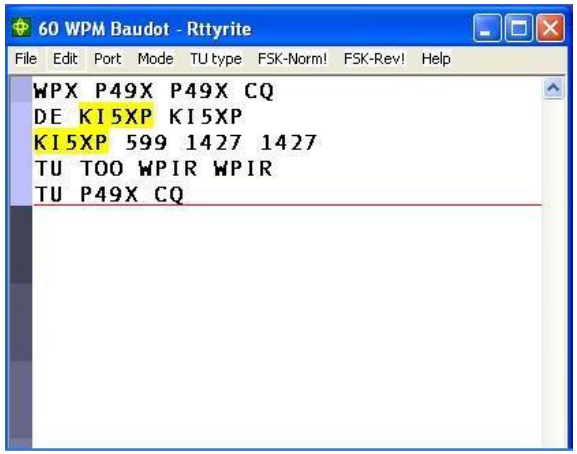


Win-Test

Tips

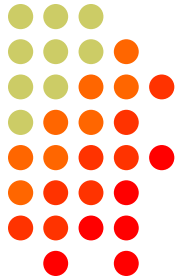
"All I receive is gibberish!"

- "Upside-down"
  - Reverse Mark & Space
  - LSB vs. USB
- Figures vs. letters
  - TOO=599, WPIR=2084
  - UOS should be on
  - Shift-click to convert, or look at top two rows
- Audio-In level, tones, flutter
- (Other station's signal)



Tips

"They never answer me!"



- "Upside-down"
  - FSK: polarity switch in radio
  - AFSK: LSB vs. USB; polarity select in software
- Off frequency
  - AFC on with NET (AFSK only) off [recommend RIT instead]
  - AFC & NET are on by default; changes non-sticky
    - Change defaults in USERPARA.INI
- AFSK: Mic & SC levels; speech processor on
- Radio mode, tones, FSK interface

More Tips

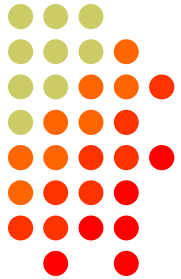
- 100% duty cycle … *caution!*
- Practice
  - During RTTY contests (~ two per month)
  - NCCC Thursday night practices (weekly)
- Multi-Ops

RTTY Operating

summary

- Many casual RTTY contest participants
- RTTY sub-bands; 10-80 only; avoid audio-digital & beacons
- 500 Hz receive filtering; USOS on
- Messages (“macros”)
  - Short, ~~5NN~~, unique exchange twice, Space delimiter
- Common problems
  - “Upside-down” (reversed Space/Mark or LSB vs. USB)
  - Figures vs. Letters
  - Audio:
    - RX audio output level and TX (AFSK only) audio input level
    - Unmuted soundcard inputs and outputs
    - Space and Mark tone consistency between decoder and radio
  - Off-frequency tuning (AFC & NET); band conditions

The Cynics Say …



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  however, this attribute …

  - frees the operator to improve other skills
  - enables more contest participants
  - provides mode diversity for contest junkies

- "RTTY is a pain to set up and get working."

  … stay tuned, it's really not that difficult!

How Do I Set it Up?

overview

- ***Acquire*** and set up hardware and/or software to convert between the RTTY signal and text:
  - RTTY ***receive*** decoder
  - RTTY ***transmit*** encoder
  - PC-radio interface
- ***Configure*** decoder/encoder
- ***Integrate*** decoder/encoder with logger

The rest of the station setup is the same as for CW and SSB

How Do I Set it Up?

RTTY decoder/encoder

- RTTY ***receive*** decoder converts printed characters from the two RTTY tones.
  - CW decoders seldom used
  - Ears/brain/hands for CW/SSB
- RTTY ***transmit*** encoder converts typed characters (or messages) into the two tones (AFSK) or keying (FSK).
  - logger *CW keyers and SSB DVKs are also used, similar to RTTY encoders*
  - Otherwise, brain/hands/mouth for CW/SSB

How Do I Set it Up?

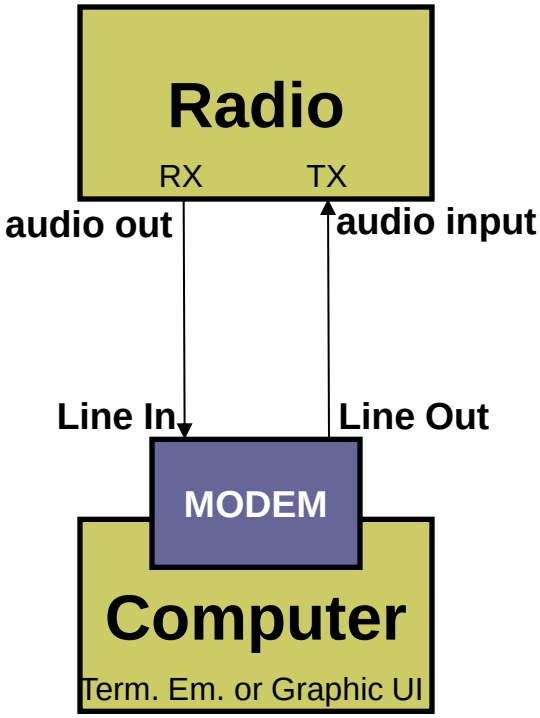
decoder/encoder terminology

- The RTTY ***transmit encoder*** and ***receive decoder*** is sometimes referred to as a MODEM or a TNC:
  - MODEM = MOdulator DEModulator
  - TNC = Terminal Node Controller
- MODEMs can be:
  - a hardware box, or
  - a software application driving a PC soundcard

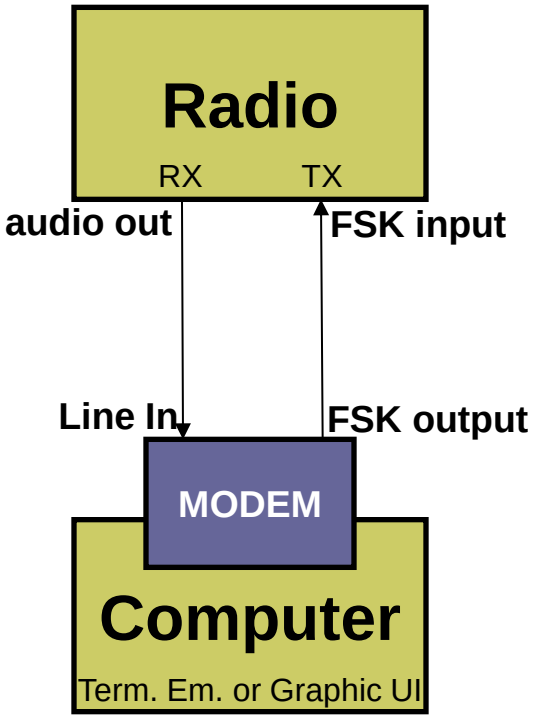
How Do I Set It Up?

hardware MODEM

AFSK



FSK



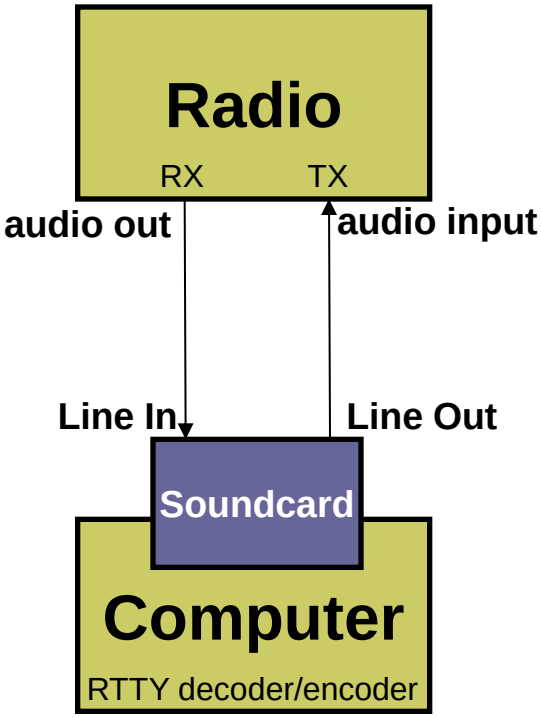
How Do I Set It Up?

hardware MODEM

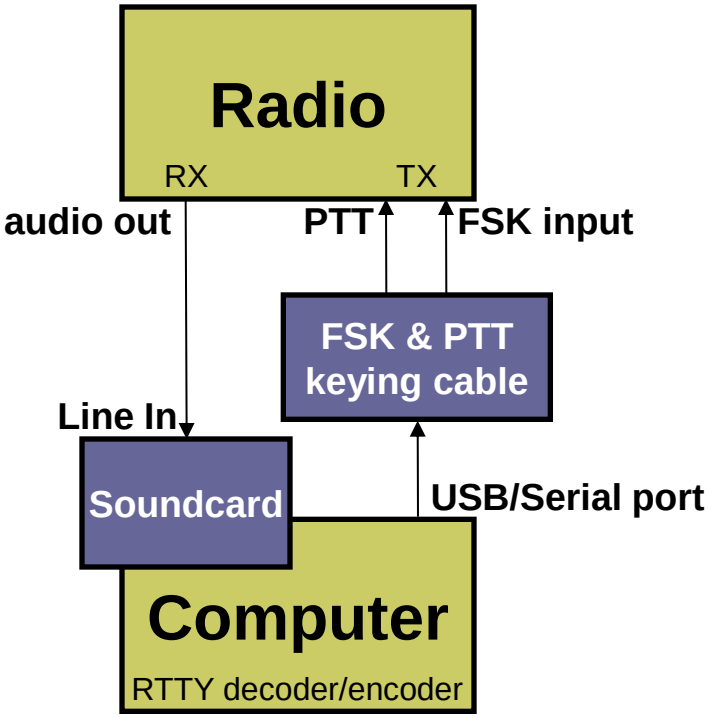
How Do I Set It Up?

software application & soundcard

AFSK



FSK



How Do I Set it UP?

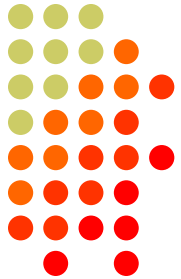
cables

- Receive:
  - RX audio out to soundcard
  - ***Optional DSP filter***
- Transmit:
  - AFSK: TX audio in from soundcard, ***or***
  - FSK: FSK/PTT keying

- Receive:
  - 1:1 isolation transformer
  - ***JPS NIR-12, or …***
- Transmit:
  - 1:1 isolation transformer,
    or
  - Keying interface

How Do I Set It Up?

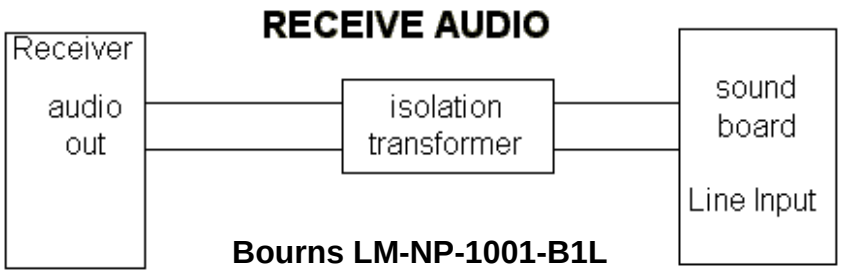
ground loops



- Eliminate ground loops between radio and PC
- Otherwise insert 1:1 audio isolation transformer on:
  - RX output
  - TX Mic input *(AFSK only)*
- Alternatives:
  - Bourns LM-NP-1001-B1L transformer → homebrew cable
  - Ground loop isolators
  - W2IHY iBox
  - Commercial RTTY interfaces
  - K3 (uses Bourns LM-NP-1001-B1L on LINE IN & OUT)

How Do I Set It Up?

homebrew audio isolation



Bourns LM-NP-1001-B1L

-90 dBc 3rd order IMD

How Do I Set It Up?

ground loop isolators

Radio Shack $19.49 or eBay $6.99

-64 dBc 3rd order IMD

eBay $3.35

eBay $5.50

eBay $7.45

How Do I Set It Up?

W2IHY iBox audio isolation

How Do I Set It Up?

commercial interface audio isolation

Rascal

How Do I Set It Up?

radio audio isolation

K3 audio isolation

How Do I Set It Up?

SDR digital audio isolation

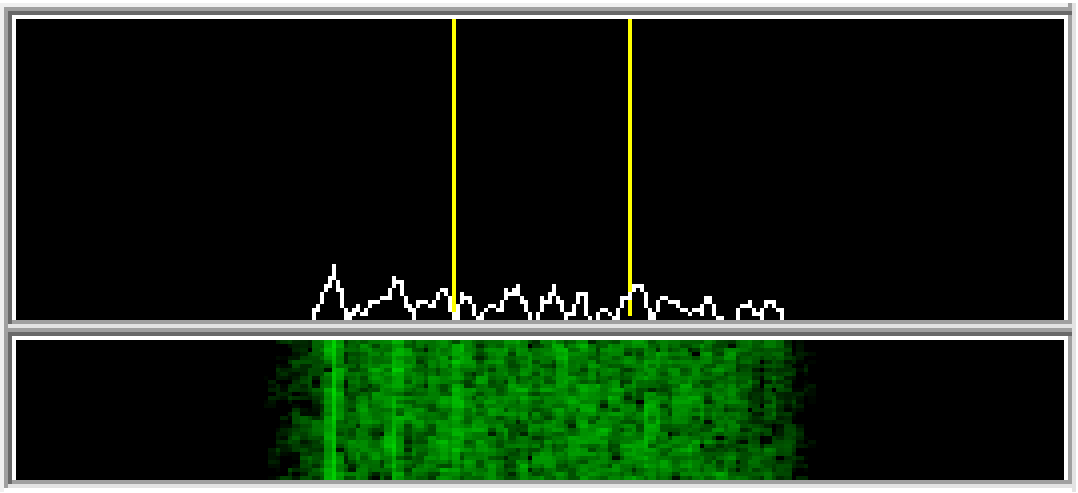
How Do I Set It Up

optional radio AF filtering

- PC Audio isolation
  - Transformer
  - Commercial interface
  - Some radios (K3, Flex)
- Narrow IF filters (Roofing & DSP)
  - 500 Hz - normal
  - 250 Hz – extreme QRM only
  - Tone filters – don't use
    - Icom Twin Peak Filter
    - K3 Dual-Tone Filter
- Audio filtering
  - JPS NIR-10/12
  - Timewave DSP-599zx
  - Modern DSP rigs

How Do I Set It Up?

adjust RX audio



- Set RX audio level for noise 5% of full-scale
  - Receiver audio out level control, and/or
  - *Windows* Recording Volume Control applet

How Do I Set It Up?

adjust AFSK audio

Insure SSB processor (compression) is Off.

- Adjust:
  - the *Windows* Playback Volume control, and
  - the transmitter Mic (or auxiliary audio input)
- Such that:
  - ALC is just backed off to zero, and
  - full power output is attained.

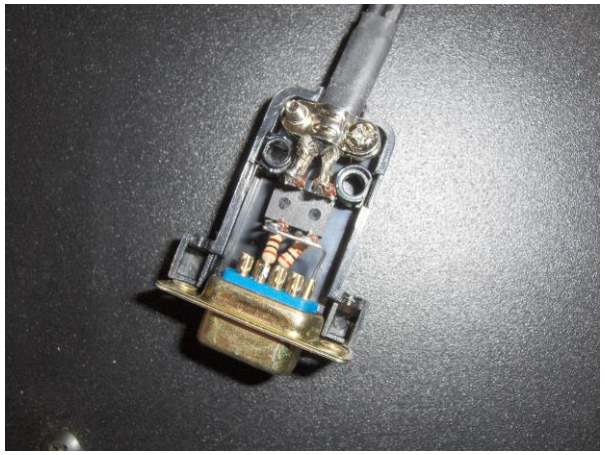
How Do I Set It Up?

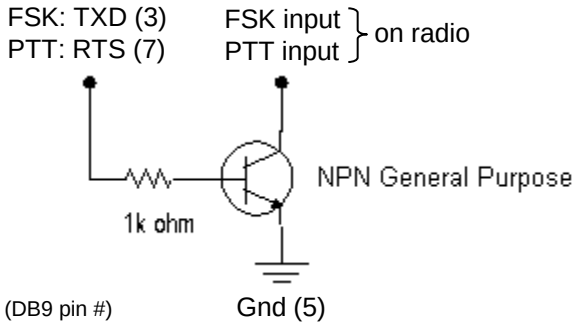
PTT vs. VOX

- AFSK uses VOX or PTT
  - radio Mic input will allow VOX
  - rear panel auxiliary audio input may not; then PTT
  - PTT can usually be keyed via the radio CAT cable
- FSK uses PTT
  - Serial port controls FSK and PTT signals

How Do I Set It Up?

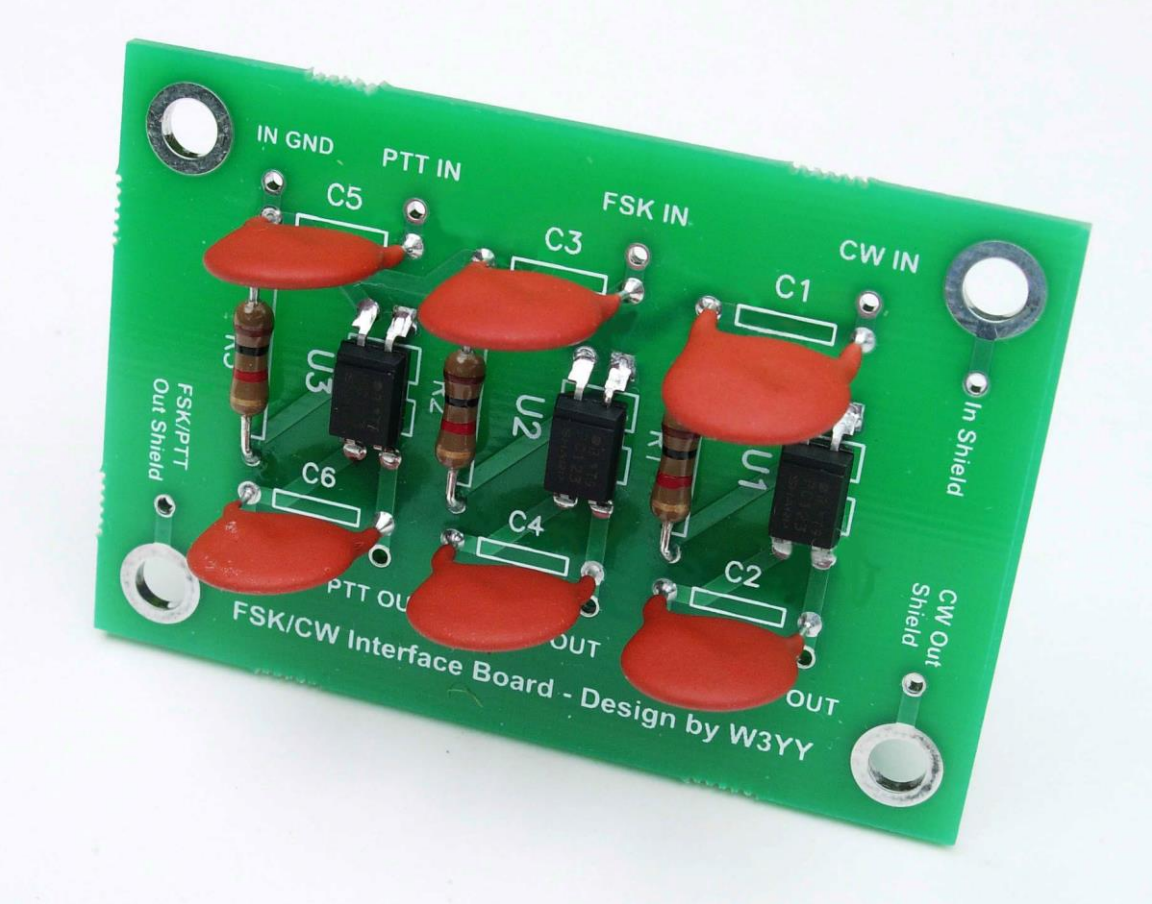
homebrew FSK & PTT keying cable





How Do I Set It Up?

W3YY *FSK & PTT keying cable*



How Do I Set It Up?

commercial interfaces

RASCAL

RIGblasters

How Do I Set It Up?

RigExpert Interfaces

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How Do I Set It Up?

commercial interfaces

Vendor	Model	Price	PC In'fc	PTT	Soundcard	Level ctrl	FSK	CW	WinKey	Voice	Radio in'fc
generic (with K3)	(2) 3.5mm M-M audio cables	$ 10	-			√					
Buxcomm	Rascal-IIB or -IIIA	$ 69	-								
Buxcomm	Rascal GLX	$ 79	Serial	√							
Tigertronics	SL-1+	$ 80	-	auto							
Tigertronics	USB	$ 110	USB	auto	√	√					
MFJ	1273B	$ 60	Serial	√							
MFJ	1275	$ 110	Serial	√							
MFJ	1279	$ 140	Serial	√	√						
Mountain Radio	RIGblaster Nomic	$ 60	Serial/USB	√							
Mountain Radio	RIGblaster Plug & Play	$ 120	USB	√				√			some
Mountain Radio	RIGblaster Plus II	$ 160	USB	√			√ or CW	√ or FSK			some
Mountain Radio	RIGblaster Advantage	$ 200	USB	√	√	√	√ or CW	√ or FSK			√
Mountain Radio	RIGblaster Pro	$ 300	Serial/USB	√			√	√			√
Navigator	Navigator	$ 417	USB	√	√	√	√	√	√		√

See May-June 2012 NCJ, "RTTY Contesting" column

How Do I Set It Up?

microHAM interfaces

One Radio

SO2R

How Do I Set It Up?

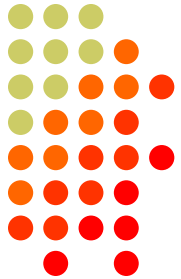
RigExpert & microHAM interfaces

Vendor	Model	Price	PC In'fc	PTT	Soundcard	Level ctrl	FSK	CW	WinKey	Voice	Radio in'fc	SO2R
RigExpert	Tiny	$ 120	USB	√	√			√		√	√	
RigExpert	Standard	$ 265	USB	√	√	√	√	√	√	√	√	
RigExpert	TI-5	$ 365	USB	√	√	√	√	√	√	√	√	
microHAM	USB Interface II	$ 179	USB	√				√			√	
microHAM	USB Interface III	$ 225	USB	√	√	√		√			√	
microHAM	Digi KEYER II	$ 369	USB	√	√	√	√	√	√		√	
microHAM	microKEYER II	$ 479	USB	√	√	√	√	√	√	√	√	
microHAM	micro2R	$ 369	USB	√		√	√	√	√	√	√	√
microHAM	MK2R	$ 899	USB	√		√	√	√	√	√	√	√
microHAM	MK2R+	$ 999	USB	√	√	√	√	√	√	√	√	√

See May-June 2012 NCJ, "RTTY Contesting" column

How Do I Set It Up?

summary - receive



1. Connect receiver audio output, via isolation, to …
   - MODEM Audio In,
     or
   - MMTTY via Soundcard Line In (or Mic In with pad):
     - Enable/adjust soundcard Line In (or Mic) input, disable/mute other inputs
2. Optional receive audio filtering

How Do I Set It Up?

summary - AFSK

1. Connect radio's Line In (or, Mic In with pad), via isolation, from:
   - MODEM Audio Out

     or …
   - Soundcard Line Out
2. Speech processor off
3. Enable/adjust SC audio level
   - Disable or mute all other SC outputs

How Do I Set It Up?

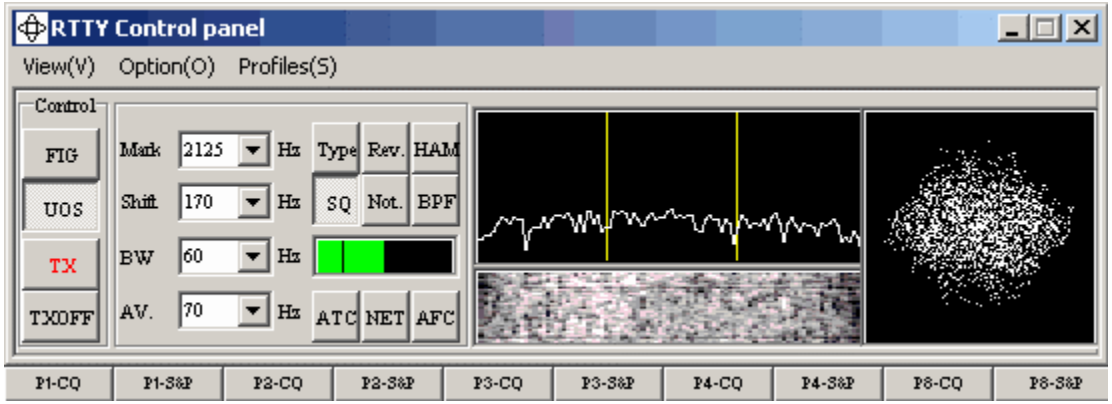
summary - FSK

1. Connect the radio FSK and PTT inputs to:
   - the MODEM FSK and PTT outputs and connect the MODEM Serial port to the PC (USB adapter)

     or, if MMTTY …
   - the RTTY interface FSK and PTT outputs and connect the interface Serial port to PC (USB adapter)
2. If no PC Serial port, then use a USB-Serial adapter.
   - Beware that some won't key FSK properly. Edgeport USB-Serial adapters are known good.

Decoders

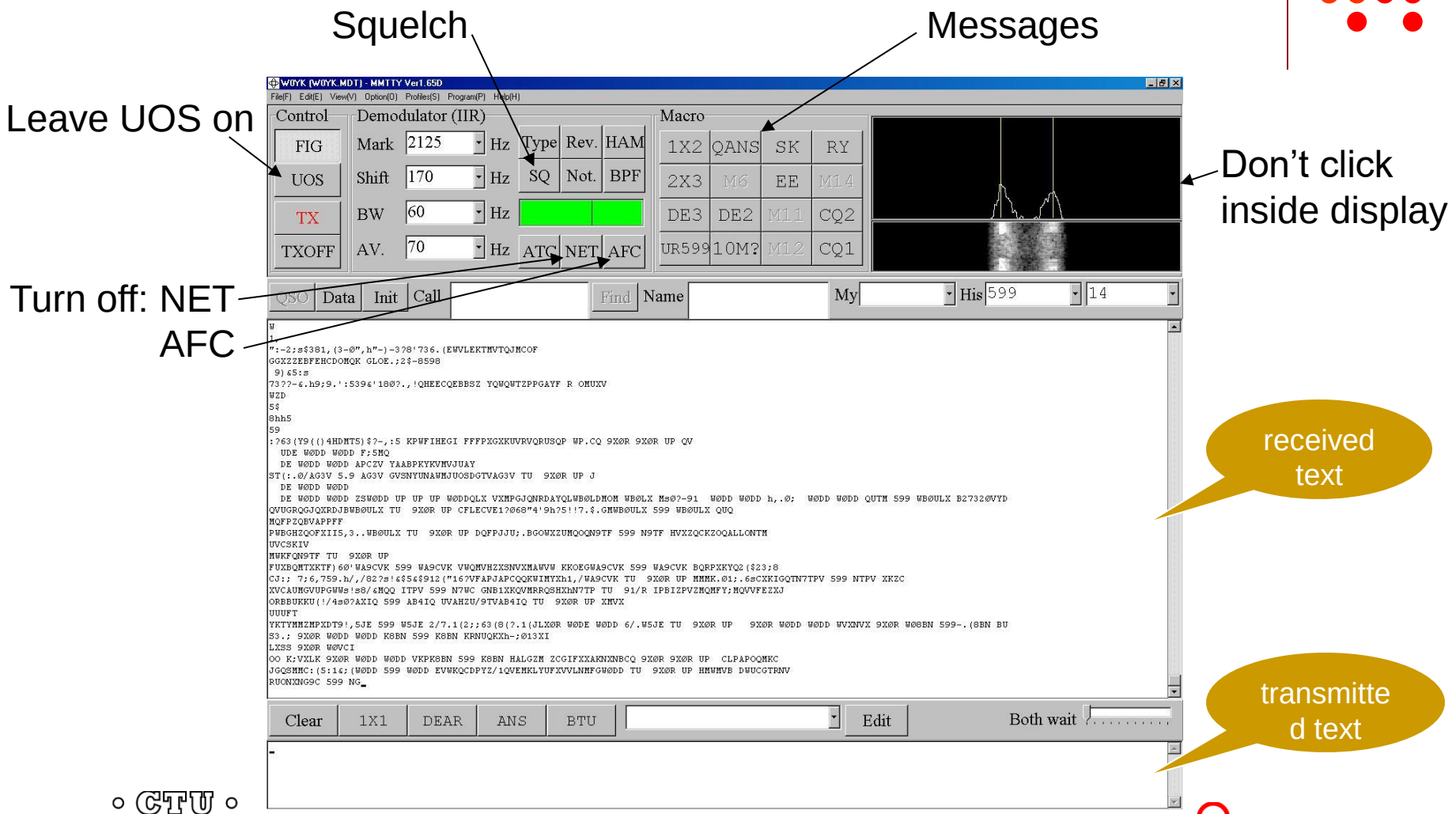
MMTTY



- Dominant soundcard MODEM in use today
- Exceeds performance of most other MODEMs
- Freeware since introduction in 2000
- Written by Mako, JE3HHT

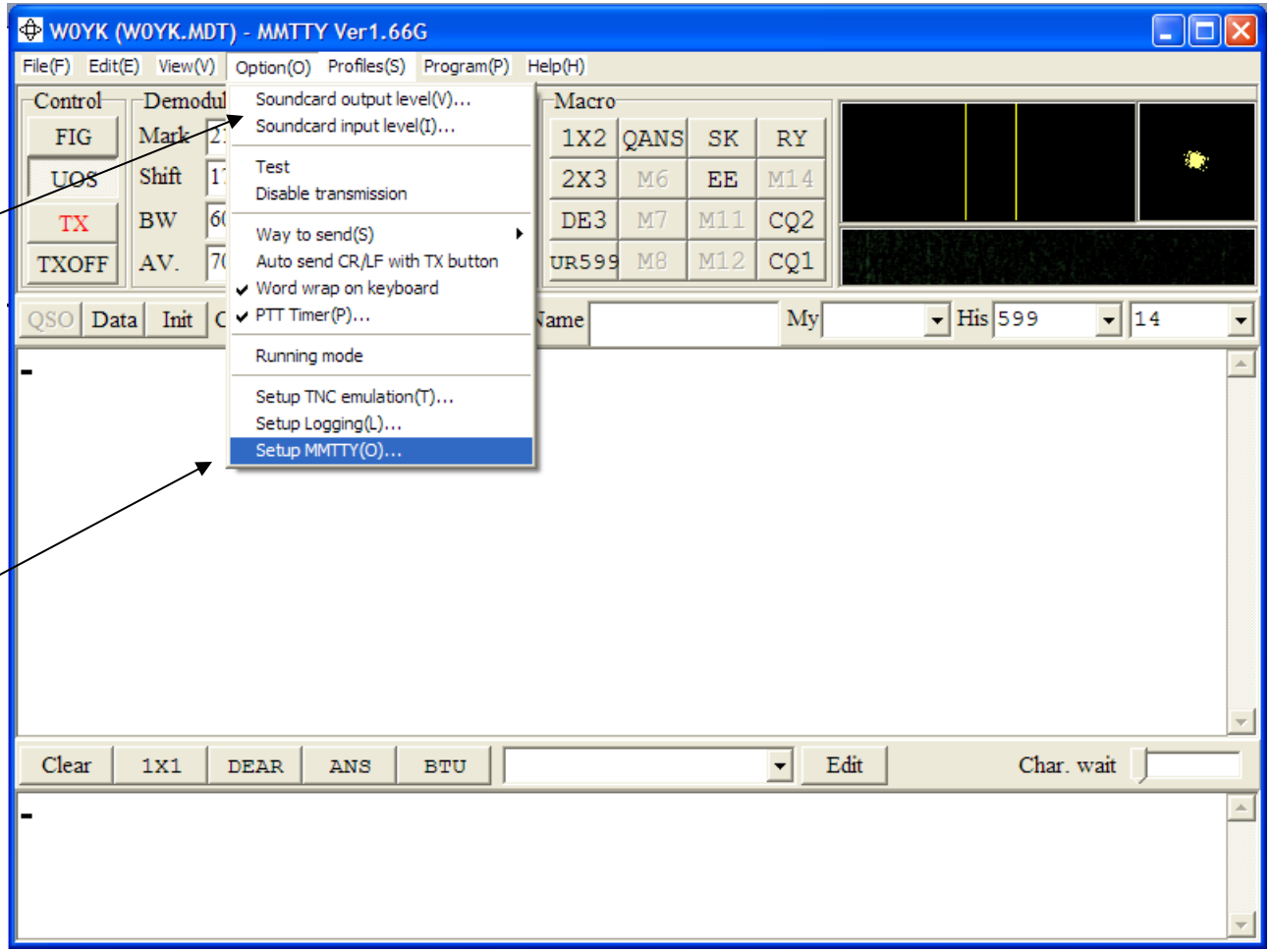
How Do I Set It Up?

MMTTY standalone



How Do I Set It Up?

MMTTY Option menu

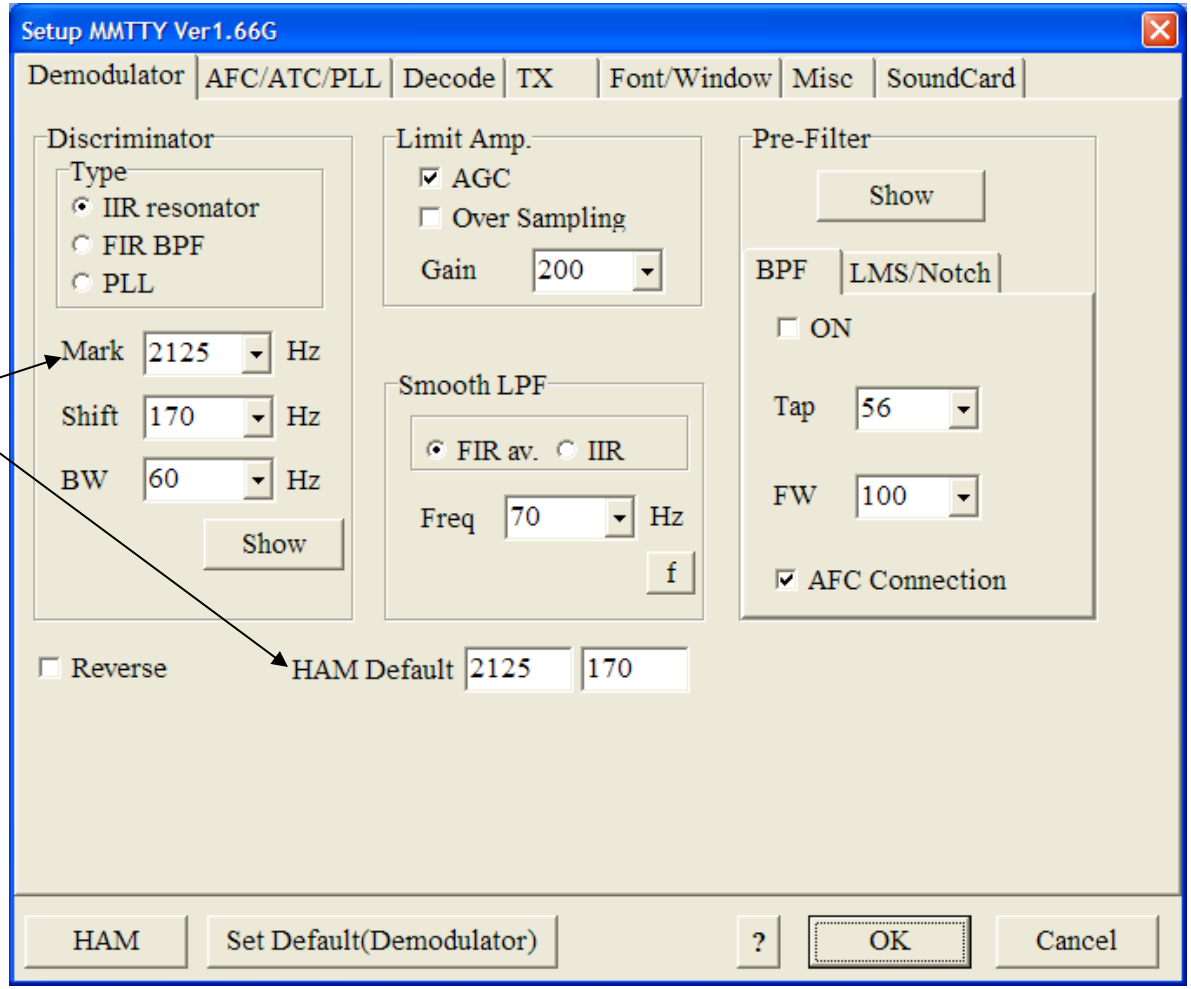


Soundcard levels

MMTTY setup

How Do I Set It Up?

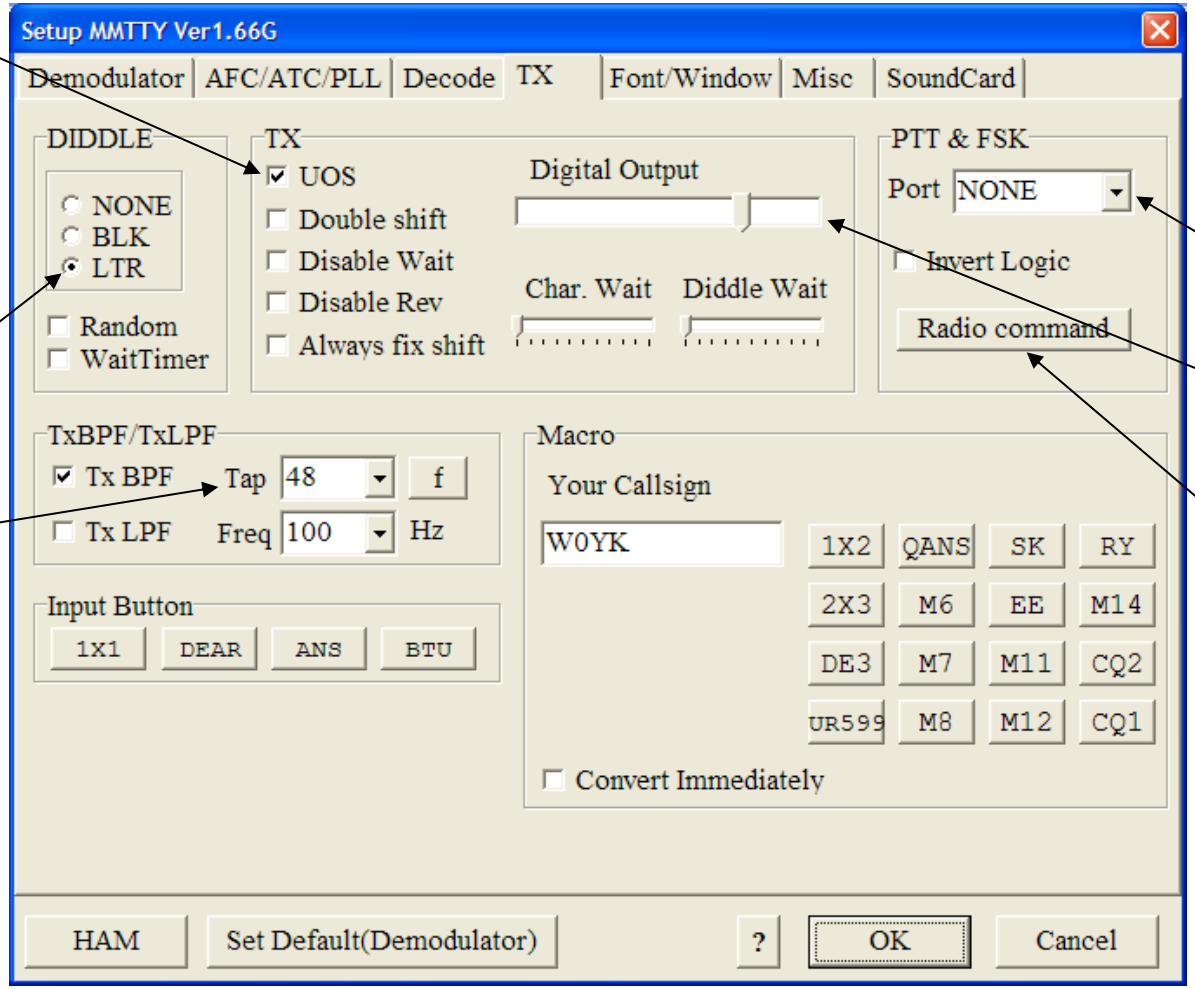
MMTTY Option/Setup/Demodulator



Set tones
(radio same)

How Do I Set It Up?

MMTTY Option/Setup/TX



TX UOS on

Select LTR

512 Tap,
if PC has perf.

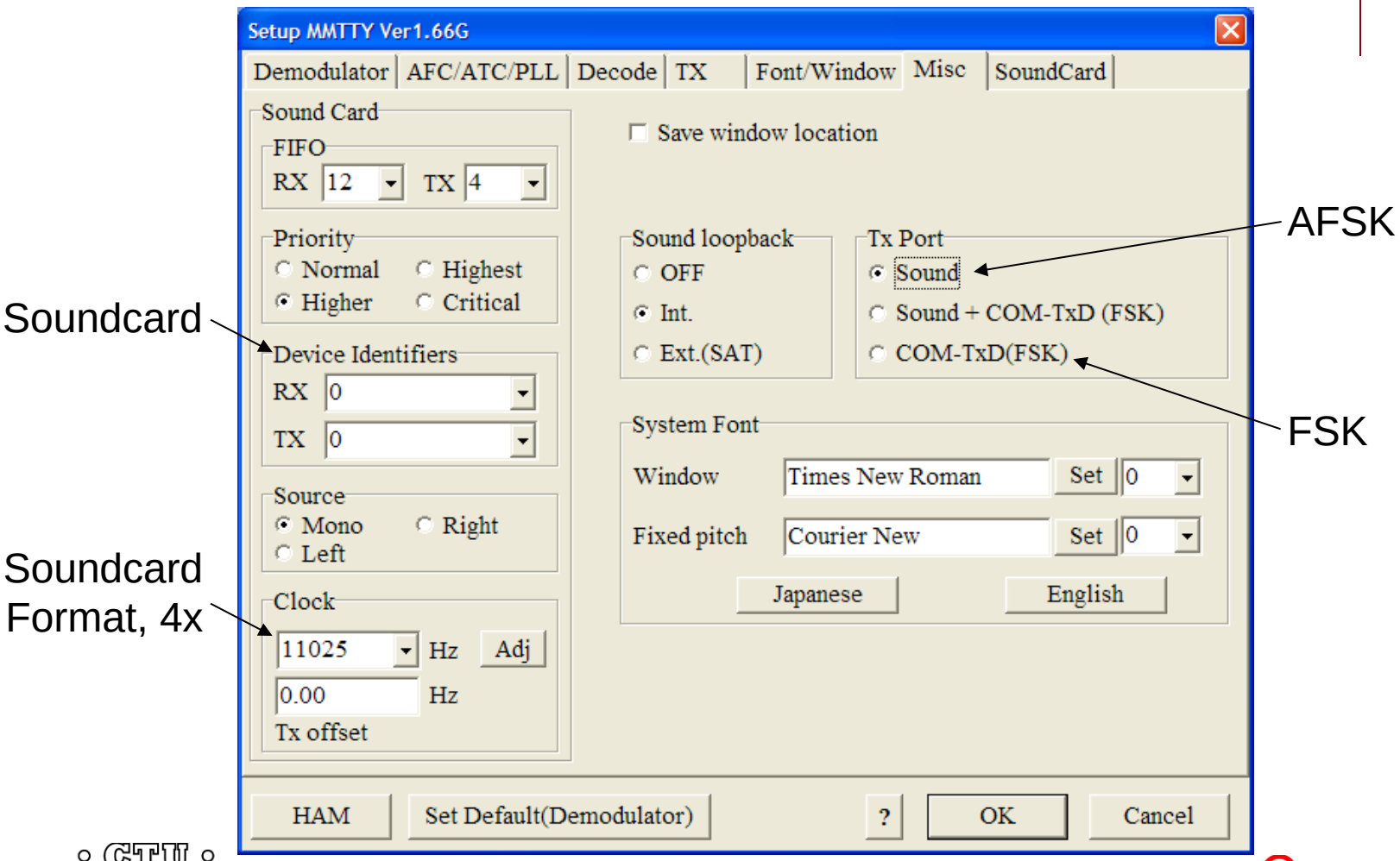
FSK/PTT port

Soundcard
Line Out level

AFSK PTT

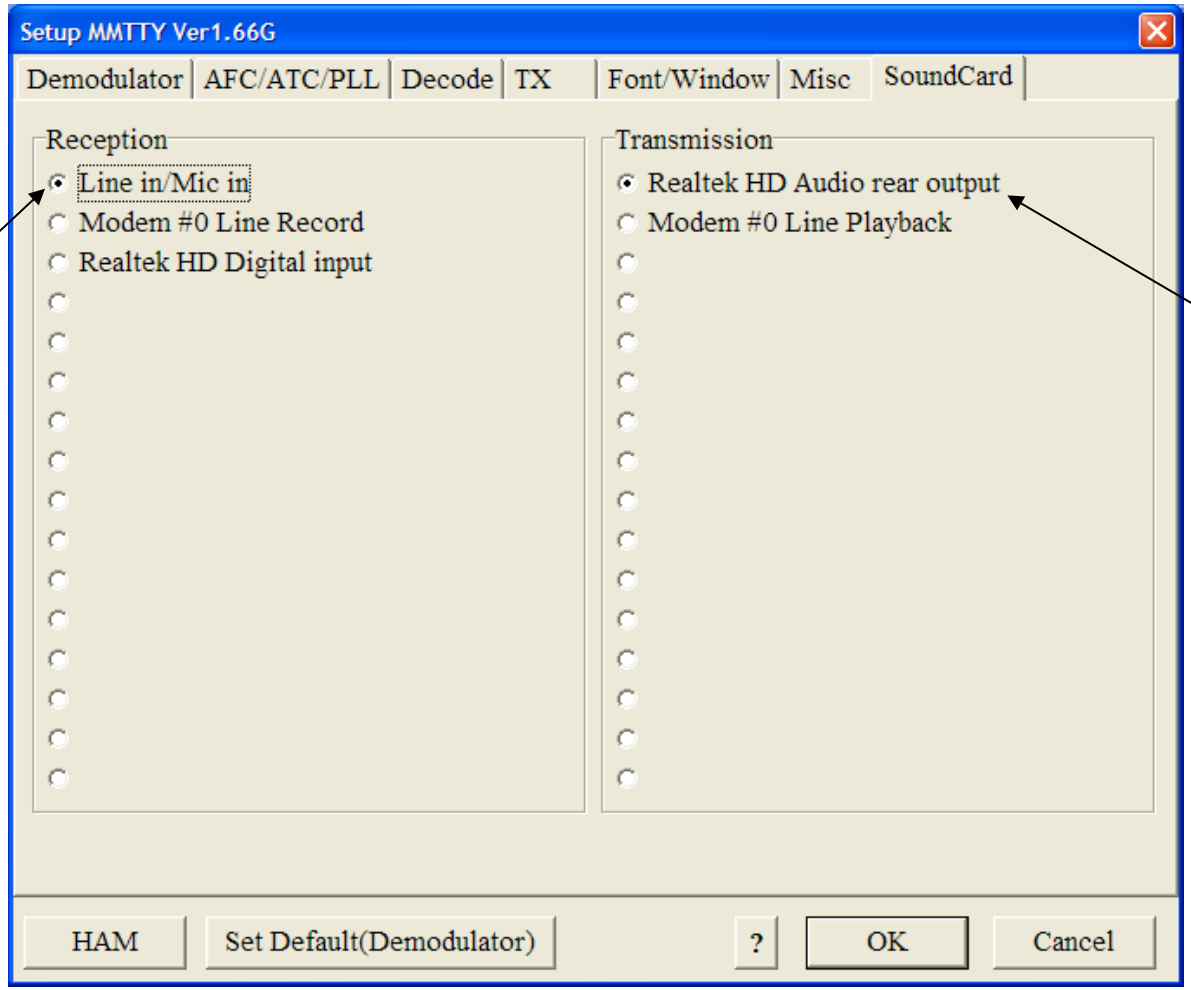
How Do I Set It Up?

MMTTY Option/Setup/Misc



How Do I Set It Up?

MMTTY Option/Setup/SoundCard

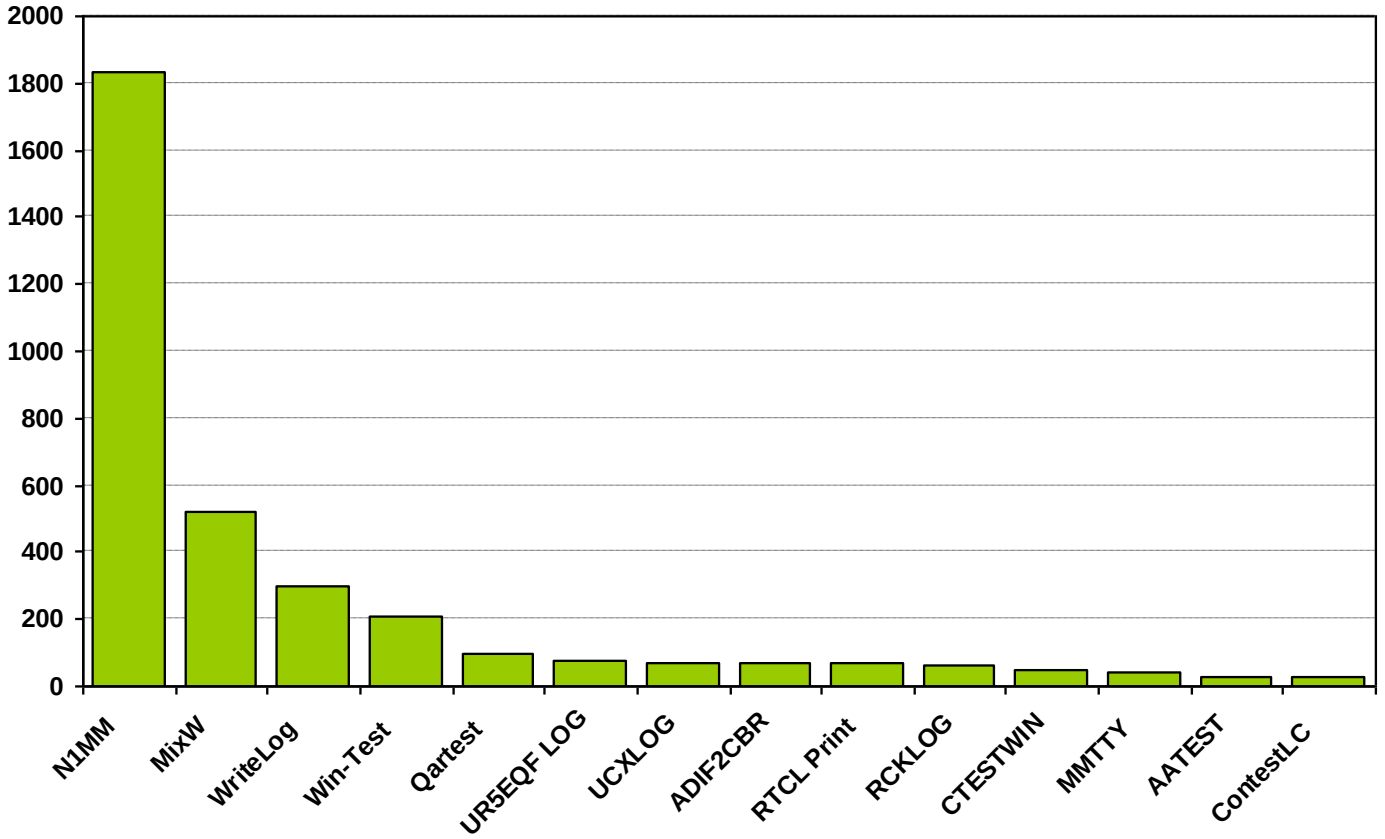


Select receive Soundcard

Select transmit Soundcard (AFSK only)

2012 CQ WPX RTTY

3550 submitted logs



RTTY Contest Loggers

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

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

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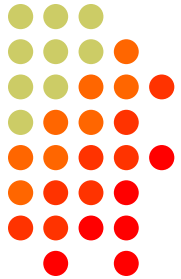
A Blizzard of Details!

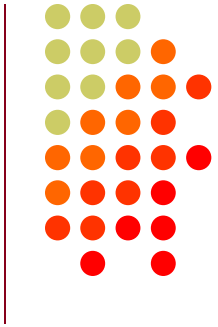
this is fun??



Start Simple, then Enhance

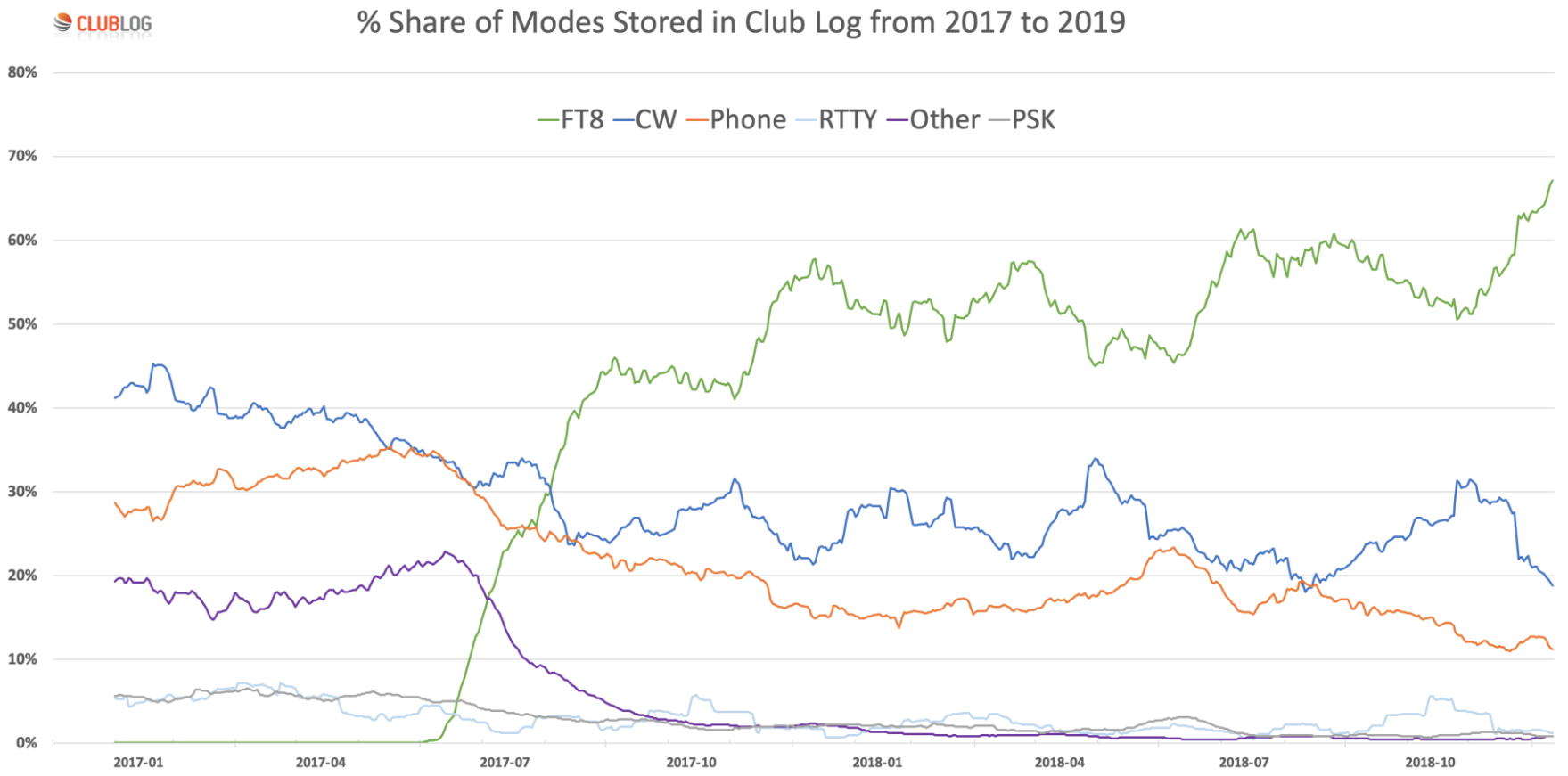
- MMTTY *(free)*
  - get RX working *(std audio cable from radio to PC)*
  - get TX working; use either:
    - AFSK *(2nd std audio cable from radio to PC)*
    - FSK *(keying cable or commercial interface)*
- Integrate MMTTY with logging software
- Enhance later
  - Audio isolation *(highly recommended)*
  - Higher capability interface (DIY or commercial)
  - Advanced setup: SO2V, SO2R, multiple decoders, ...

Resources



- www.rttycontesting.com premier website
  - Tutorials and resources (beginner to expert)
  - WriteLog, N1MM Logger+ and MMTTY
- rtty@groups.io Email reflector
  - RTTY contester networking
  - Q&A
- Software web sites
  - hamsoft.ca/ (MMTTY)
  - n1mm.hamdocs.com/tiki-index.php (N1MM Logger+)
  - www.writelog.com (WriteLog)
  - www.win-test.com (Win-Test)
- Software Email reflectors
  - mmtty@yahoogroups.com (MMTTY)
  - N1MMLoggerplus@groups.io (N1MM Logger+)
  - Writelog@contesting.com (WriteLog)
  - support@win-test.com (Win-Test)

Clublog QSOs by Mode



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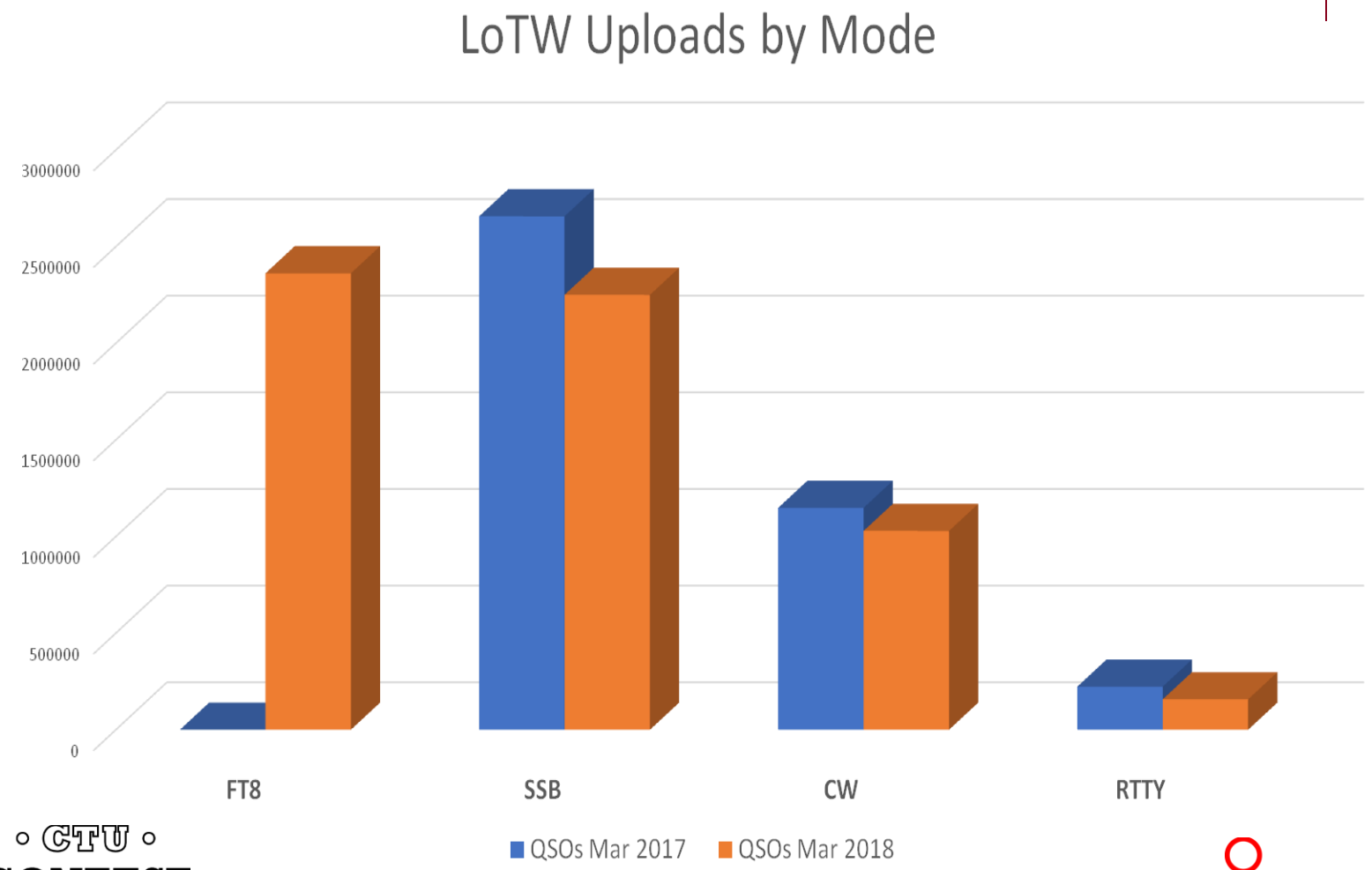
The FT8 Explosion



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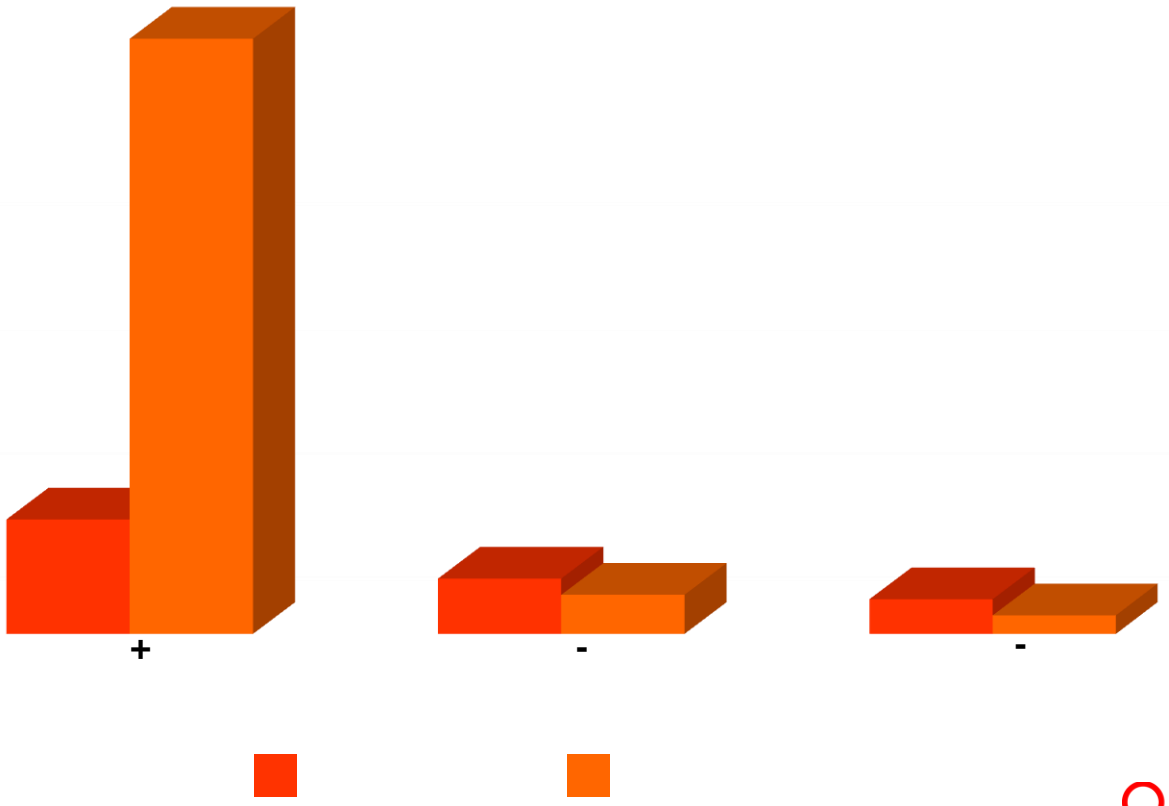
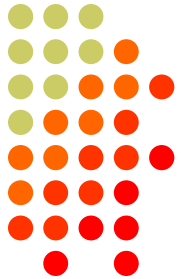
Digital Mode Trends



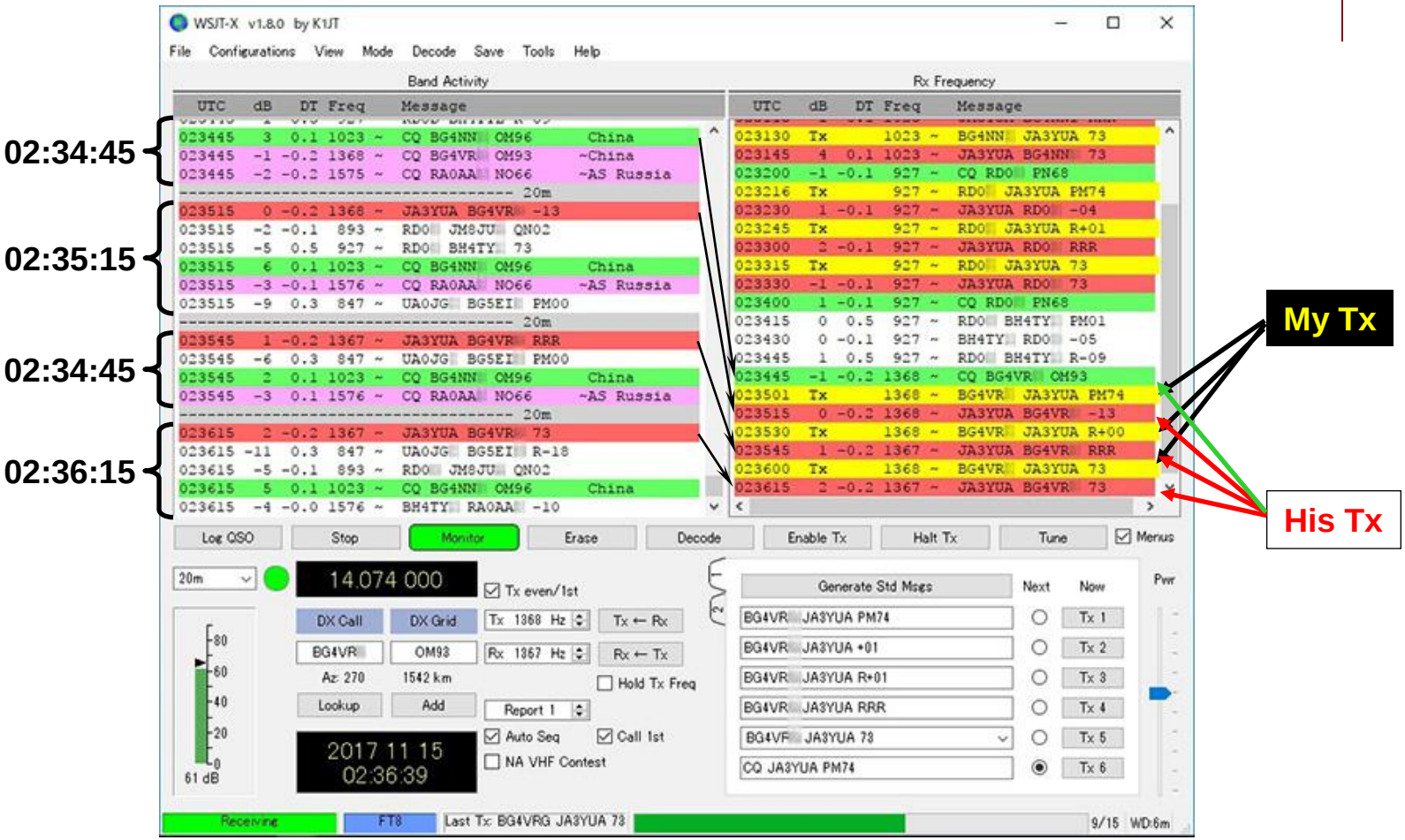
WSJT & WSJT-X Overview



- Weak Signal communication by Joe Taylor - eXperimental
- Developed for EME; adopted by HF
- Several modes (JT65, JT9, FT8, etc.)

+ Multi-channel
+ Weak signal (inaudible)
  + Longer DX
  + Lower power
  + Compromised antennas and/or QTH
+ Narrow bandwidth (4-176 Hz)
+ “Perfect” copy

FT8 Multi-Channel Reception

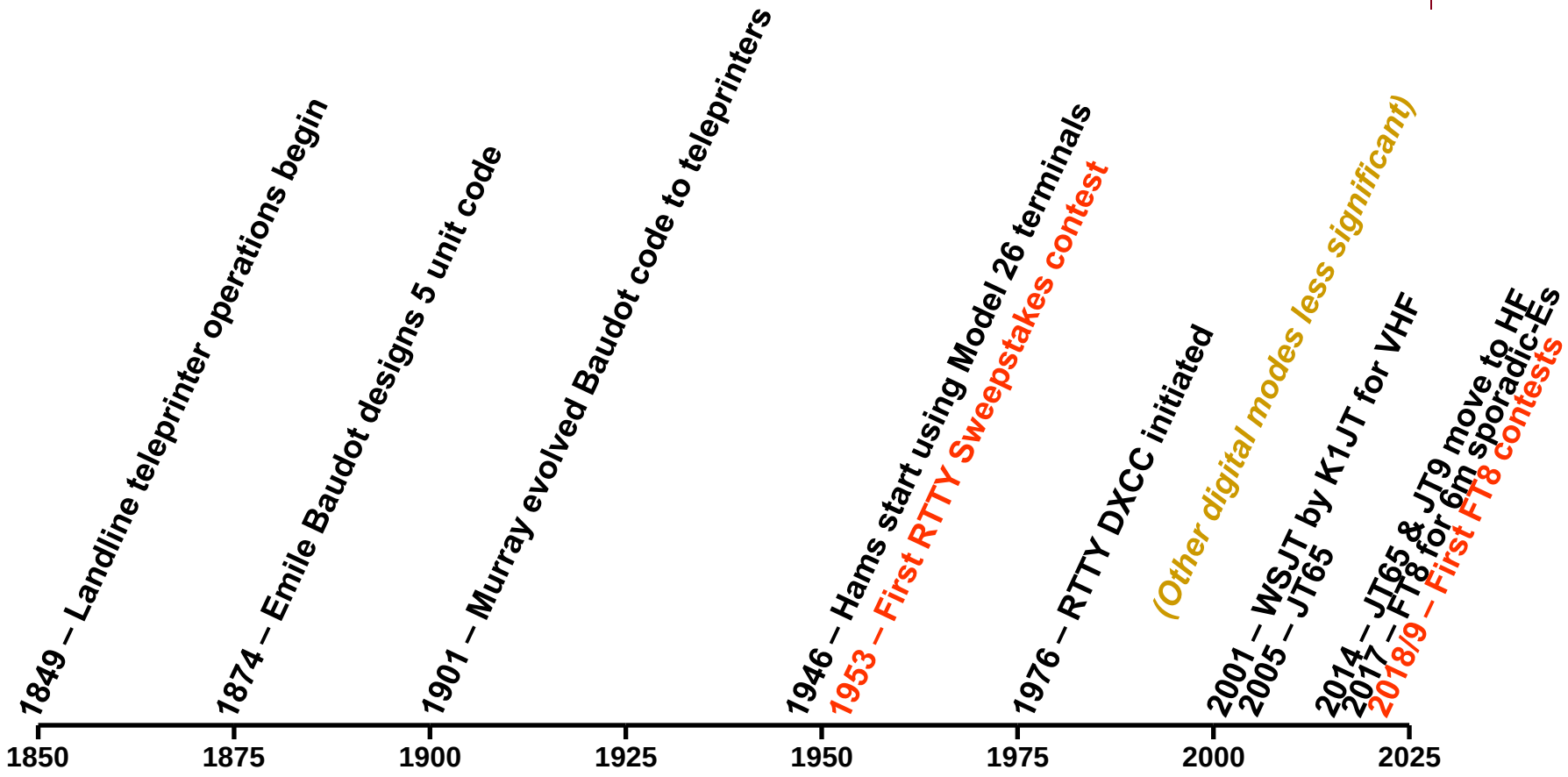


WSJT & WSJT-X Overview

- Weak Signal communication by Joe Taylor - eXperimental
- Developed for EME; adopted by HF
- Several modes (JT65, JT9, FT8, etc.)

+ Multi-channel
+ Weak signal (inaudible)
    + Longer DX
    + Lower power
    + Compromised antennas and/or QTH
+ Narrow bandwidth (4-176 Hz)
+ “Perfect” copy
- Slow 1-6 minutes/QSO
- Limited, fixed messages

RTTY & WSJT History



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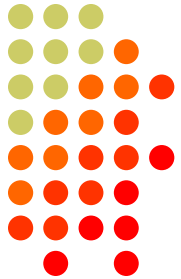
WSJT & WSJT-X History

- 2001: FSK441 for meteor scatter
- 2002: JT6M for ionospheric scatter
- 2003: JT65 VHF/UHF EME
  - Adopted for QRP HF DXing; 176 Hz bandwidth; 60 sec. transmission
- 2014: JT9 for LF, MF and HF
  - 2 dB more sensitive than JT65; 16 Hz bandwidth
- Jun 2017: FT8 for 6m Es & HF
  - 50 Hz bandwidth; 15 second transmission
- May 2018: Baker Is. DXpedition > 11,000 FT8 HF QSOs
- *Dec 2018: FT8 Roundup (first WSJT-X HF contest)*
- *Jan 2019: ARRL RTTY Roundup (FT8 permitted)*
- *Apr 2019: FT8 DX Contest*
- *Jun 2019: FT8 Makrothen (tentative)*
- *Sep 2019: SCC FT8 (tentative)*

FT8 Standard QSO

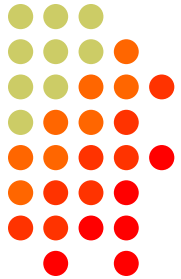
90 sec./QSO



- CQ K1ABC FN42
- W9XYZ K1ABC -11
- W9XYZ K1ABC RRR
- K1ABC W9XYZ EN37
- K1ABC W9XYZ R-09
- K1ABC W9XYZ 73

FT8 Short-Cycle QSO

75 sec./QSO



- **CQ K1ABC FN42**
- **W9XYZ K1ABC R-11**
- **W9XYZ K1ABC 73**
  <CQ K1ABC>
- **K1ABC W9XYZ -09**
- **K1ABC W9XYZ RR73**

60 sec. rolling QSOs

FT8 DXpedition QSO

75 sec./QSO
60 sec./5 QSOs

QSO period 1
QSO period 2
QSO period 3

- **CQ KH1/KH7Z**
- **K1ABC KH7Z -12**
  <"CQ" for others>
- **K1ABC RR73**
  W9XYZ KH7Z -08
  W0YK KH7Z -13
  <"CQ" for others>
- **W9XYZ KH7Z RR73**
  W0YK KH7Z RR73

- **KH7Z K1ABC FN42**
- **KH7Z K1ABC R-14**
  KH7Z W9XYZ EN37
  KH7Z W0YK CM97
  etc.
- **KH7Z W9XYZ R-11**
  KH7Z W0YK R-15
  KH7Z K9YC CM87
  KH7Z W6OAT CN87
  etc.

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FT8 Contest QSO

75 sec./QSO
30 sec./rolling QSO

QSO period 1
QSO period 2
QSO period 3

- CQ RU K1ABC FN42
- W9XYZ K1ABC R 589 MA
  (CQ for others)
- W0YK K1ABC R 569 MA
  (final QSL for W9XYZ)
  (CQ for others)
- P49X K1ABC R 559 M
  (final QSL for W0YK)
- P49X K1ABC 73
- K1ABC W9XYZ 579 WI
- K1ABC W9XYZ RR73
  K1ABC W0YK 559 CA
- K1ABC W0YK RR73
  K1ABC P49X 529 1743
- K1ABC P49X RR73

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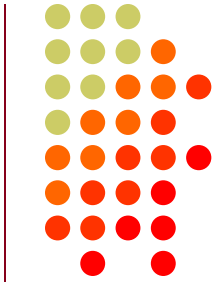
FT8 Roundup

- 1-2 December 2018
- Replaced Ten-Meter RTTY Contest for 2018
  - Future TBD
- ARRL RTTY Roundup rules, except:
  - FT8 only
  - 100 watts maximum
  - Multi-channel Rx (no UNASSISTED SO)
  - Multi-stream Tx (no WSJT-X support yet)
  - Log submittal robot: ft8-ru@cqww.com; 7 day deadline
- *Results:*
  - *1277 logs submitted*
  - *Winner was a new ham*

FT8 in ARRL RTTY Roundup

- **8-9 January 2019**
- **FT8 added to list of allowable digital modes**
- **FT8 QSOs → SO Unlimited (assisted only)**
  - **Due to multi-channel decoding of WSJT-X**
- ***Results:***
  - ***Record 2,598 logs submitted***
    - ***1,675 RTTY and RTTY/FT8 logs about normal***
    - ***923 FT8-only logs incremental***
  - ***FT8 is the first non-RTTY digital mode to be significant***
  - ***FT8 rate exceeded RTTY rate in some scenarios***
  - ***Participation decrease impact between modes was low***
  - ***Cross-mode QRM negligible***

FT8 DX Contest 2019



- 13-14 April 2019 (12z to 12z)
- Sponsor: European FT8 Club
- ARRL RTTY Roundup rules
  - Low Power (100 watts), QRP (5 watts)
  - SO, MO [MS only??]
  - [QSO spotting assistance probably OK]
- Must use WSJT-X 2.0 or MSHV 2.14

FT8 Makrothen

- **Possibly in June 2019**
- **Sponsor: K6TU & PL259 evaluating**
- **WSJT-X ARRL VHF Contest mode supports Makrothen**

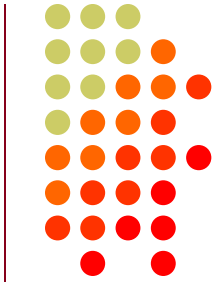
SCC FT8 Contest

- **Possibly in September 2019**
- **Sponsor: SCC (Slovenia Contest Club)**
- **Details to be announced**

Setting Up for FT8

- Download/install WSJT-X
  - Alternatively MSHV
- Hardware (radio and PC) same as AFSK
- Study the:
  - Quick Start Guide to WSJT-X 2.0, and
  - the WSJT-X User Guide

Conclusions



- **FT8 is controversial**
  - ***Explosive adoption threatens RTTY***
  - ***Fear of robotic, unattended operation***
  - ***Threatening to many "legacy" hams, but more appealing than CW/SSB/RTTY to new hams***
- **FT8 has instantly entrenched itself as:**
  - ***A primary amateur mode***
  - ***The pre-eminent digital DXing mode***
- **Will contest rules let FT8 be all it can be?**
- **Will FT8 subsume RTTY in digital contesting or become an additional mode? *(Contest participation will determine)***
- **Multiple digital modes in a single contest:**
  - \+ **Increases overall participation**
  - \- **Dilutes per-mode participation**
  - = **Net?**

Resources

- **WSJT-X 2.0 web site with download link:**
  https://physics.princeton.edu/pulsar/k1jt/wsjtx.html
- **WSJT-X 2.0 Quick-Start Guide:**
  https://physics.princeton.edu/pulsar/k1jt/Quick_Start_WSJT-X_2.0.pdf
- **MSHV web site:**
  http://lz2hv.org/mshv
- **FT8 Roundup web site with tutorial:**
  https://www.rttycontesting.com/ft8-roundup
- **ARRL FT8 Press Release:**
  http://www.arrl.org/news/ft8-to-be-permitted-in-2019-arrl-rtty-roundup