Sound Card Digital Modes



K3EUI Barry



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Overall Plan

- Part I Modulation
- Part II AM, CW, SSB, FM
- Part III Sound Cards
- Part IV EMCOMM Winlink vs. NBEMS

Sound Card Modulation Methods

What do <u>AM</u> and <u>CW</u> have in common?

What do <u>Olivia</u>, <u>Thor</u>, <u>MFSK</u>, and <u>FT8</u> have in common?

What do <u>PSK, VARA, 8PSK</u>, and <u>MT63</u> have in common? AM and CW are <u>amplitude</u> shifts

RTTY, Olivia, Thor, MFSK, FT8 <u>frequency</u> shifts (constant amplitude)

PSK, VARA, 8PSK, and MT63 <u>phase</u> shifts (not constant amplitude)

Types of QSO

Chat modes and image modes PSK31, CW, RTTY, MMSSTV, Easy Pal

DX modes - pull out the weak signals from noise JT65, FT8, FT4, CW, PSK31

Contest modes - log them as fast as you can RTTY, CW, PSK31, FT4/FT8

EMCOMM - accuracy and speed for traffic Pactor, VARA, Packet, THOR, MFSK

Guess that mode

Can you identify the "mode" by its sound?

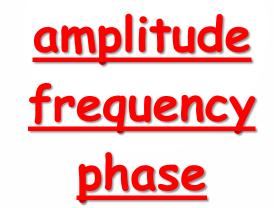
Let's try this out.....

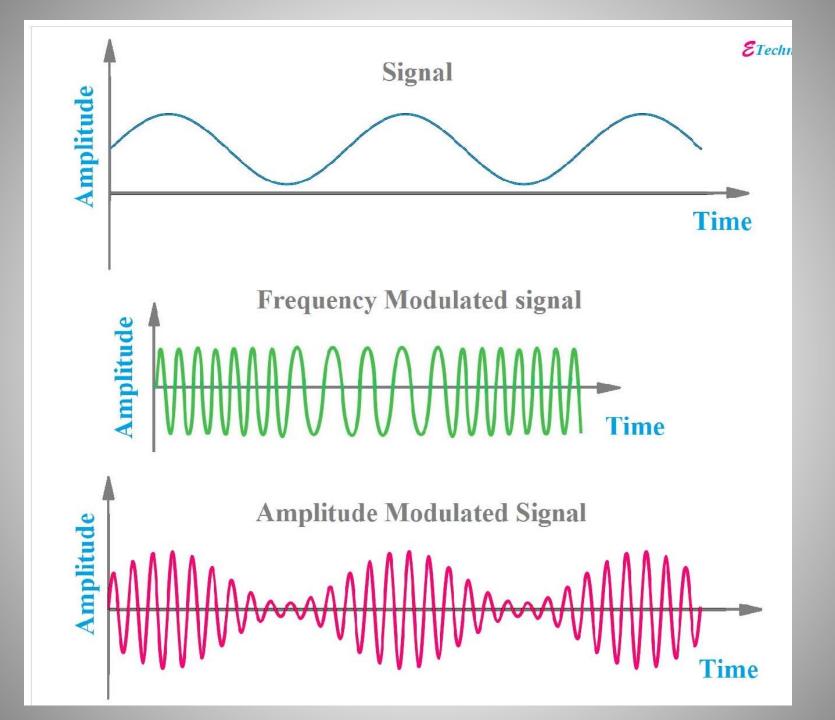
I will send



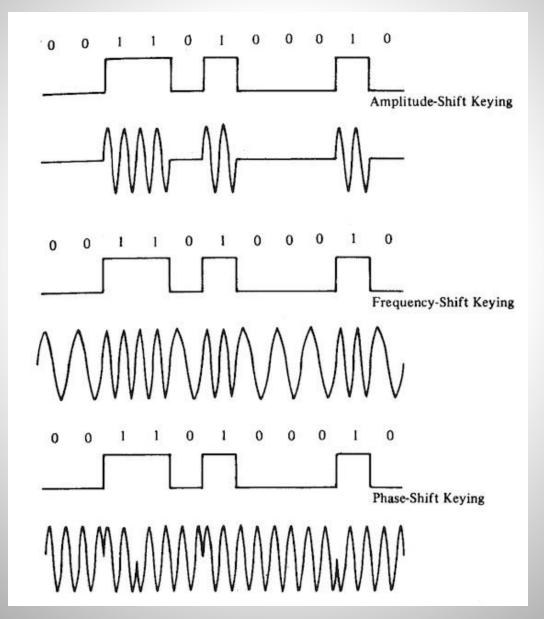
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Modulation - adds information or content to a radio frequency (RF) electromagnetic wave by altering the

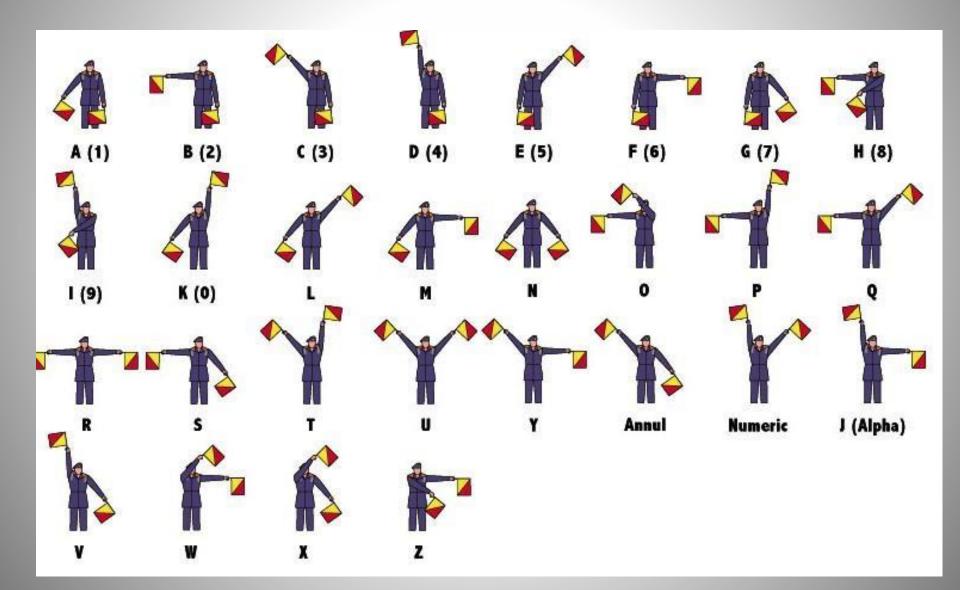




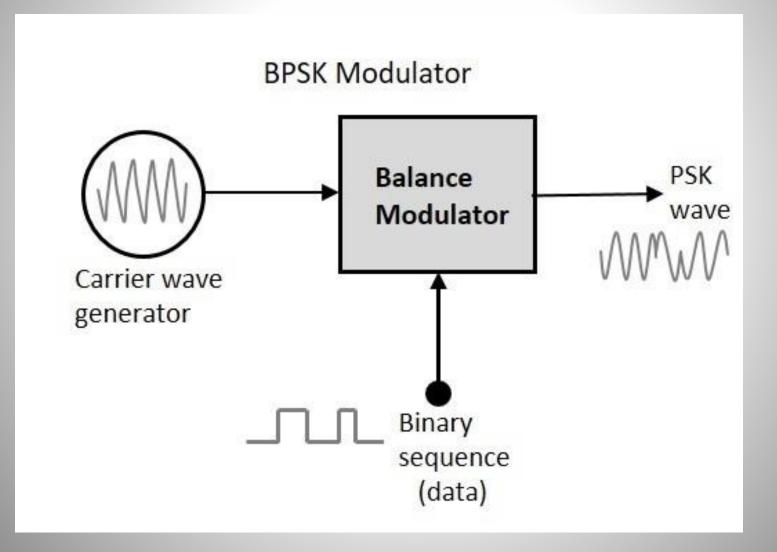
sending DATA by AM, FM, PM



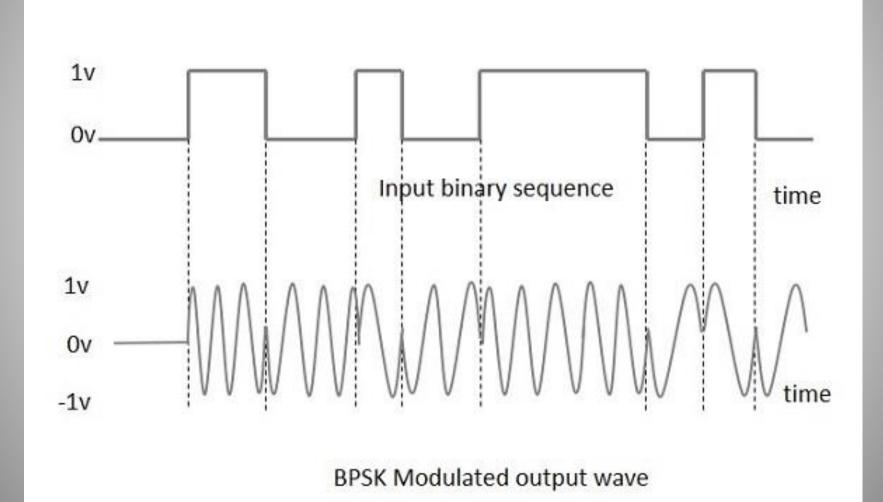
Only two flags can send a lot of information by altering position (<u>phase</u>) of flags



PSK modulator - PHASE shifts

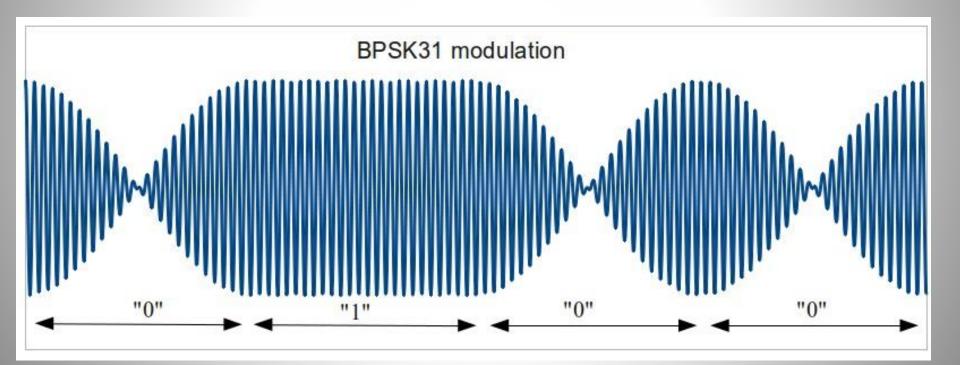


PSK (Phase Shift Keying)

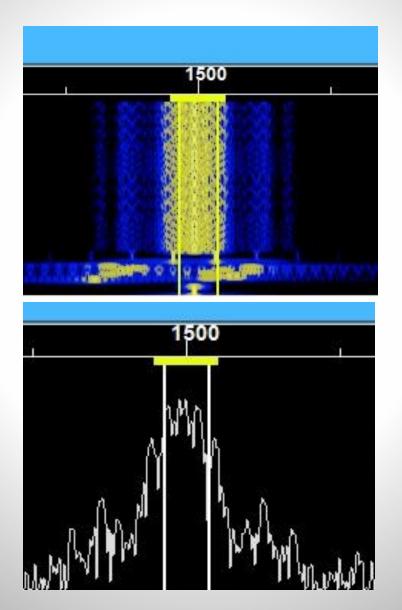


PSK31

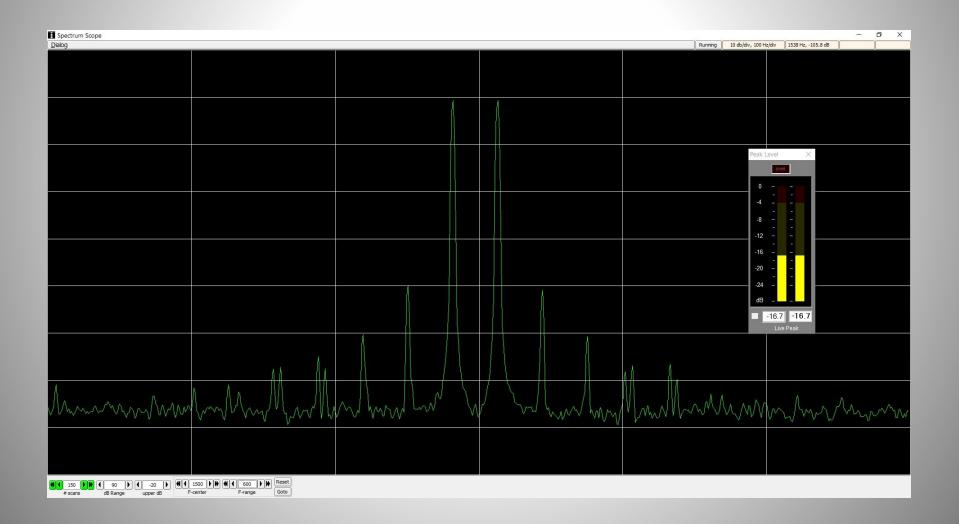
Amplitude changes accompany phase changes to minimize the bandwidth



PSK31 on the waterfall 50 Hz BW



Clean PSK31 Spectrum 100 Hz vertical bars harmonics down -40 dB



Watering Holes for PSK31

Typical HF frequencies 80 meters: 3.580 MHz 40 meters: 7.070 MHz 20 meters: 14.070 MHz 15 meters: 21.070 MHz 10 meters: 28.120 MHz

What does the RF spectrum look like for a carrier with NO modulation?

RF carrier at 145.690 MHz (no modulation)

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	145.69 MHz ±10.340 kHz	-130 -140 -150
		x2 > •

These slides were produced by sending with an Icom 706MIIG transmitter on 145.690 MHz

and

receiving with a SDRplay and SDR Console 3 software What does the RF spectrum look like for an AM signal modulated by a 1 kHz audio TONE?

AM modulation by a 1 kHz sine wave note: original "carrier" plus USB and LSB bandwidth about 2 kHz @ -35 dB

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AM <u>overmodulated</u> with a 1 kHz TUNE note: multiple harmonics (splatter) and wider bandwidth about 6 kHz

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Home View Receive Transmit Rec/Playback Favourites Memories Tools Help H	Off Off Off Off Off Off Off Off	Stole - S
Radio Radio 145 13 5 7 9 $+20$ $+40$ 40 $+60$ $+35$ 56 56	RX Frequency Extras Wideband DSP Support	7.200 +45 Auto +40 +35 -10 +30
+25 +20 +15 +10		+25 -20 +22 -30 +15 +10
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① 145.670 145.675 145.680 RSPduo, BW = 2.000 MHz	145.685 145.690 145.695 145.700 145.705 CPU: 16.9%	150 145.710 ≤ x2 → ↔ Audio: 64ms

What does the RF spectrum look like for an **UPPER SIDEBAND** signal with a 1 kHz audio tone?

USB signal with 1 kHz audio note: carrier and LSB <u>suppressed 40 dB</u>

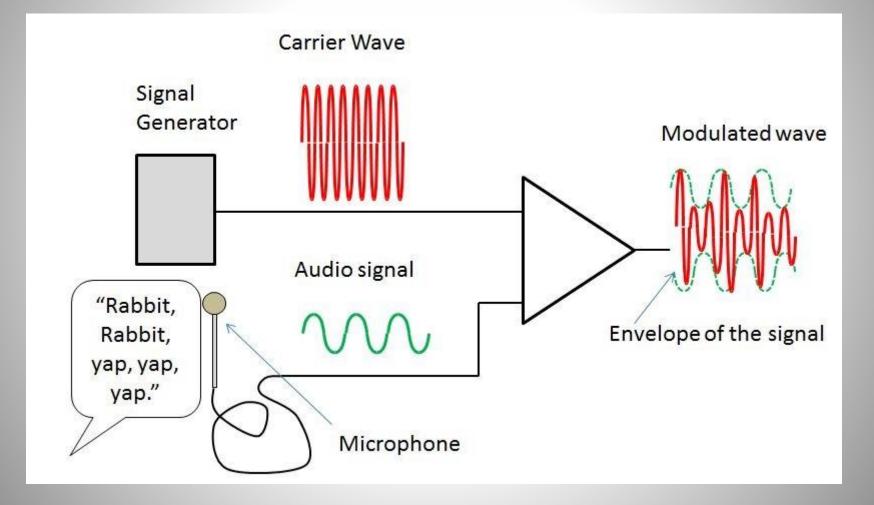
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	Freq: 145.69 MHz Span: ±10.340 kHz	-150
		x2 ▶ ⊕
RSPduo, BW = 2.000 MHz		o: 47ms

What does the RF spectrum look like for an **LOWER SIDEBAND** signal with a 1 kHz TUNE audio?

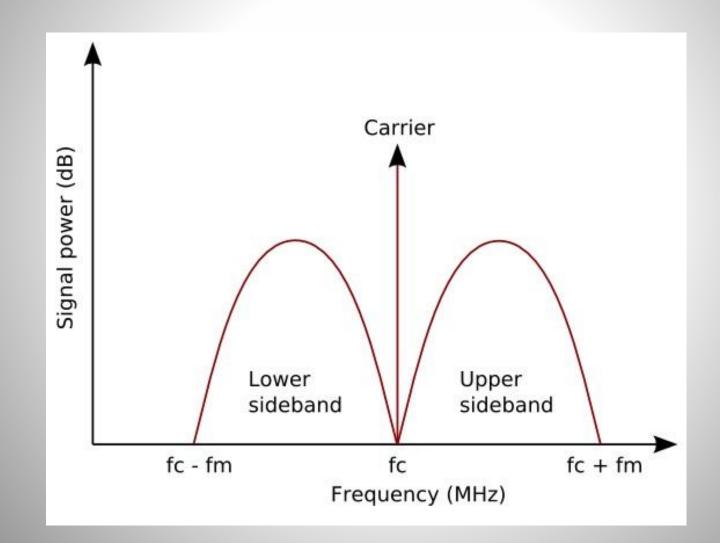
LSB signal with 1 kHz audio note: carrier and USB suppressed 35 dB

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⊙ 145.670 145.680 145.685 RSPduo, BW = 2.000 MHz 145.685 145.680 145.685	145,695 145.700 145.705 145.710 🗯 x2 . CPU: 12.5% ፲ Audio: 48ms	• ••

<u>Voice</u> Amplitude Modulation Double Sideband with Carrier

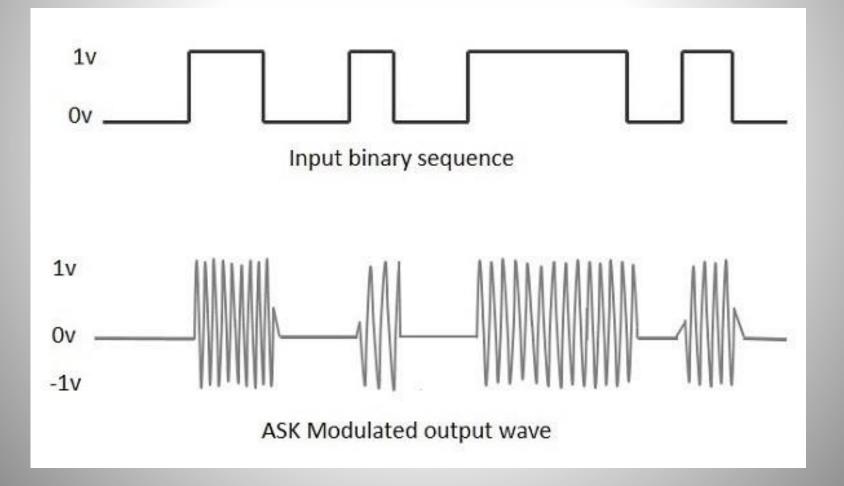


This results in both a CARRIER and a LOWER and an UPPER (redundant) sideband

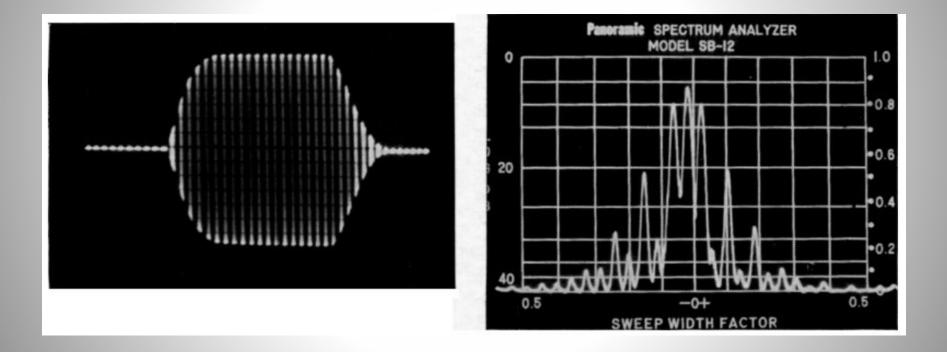


Is the mode CW a form of Amplitude Modulation?

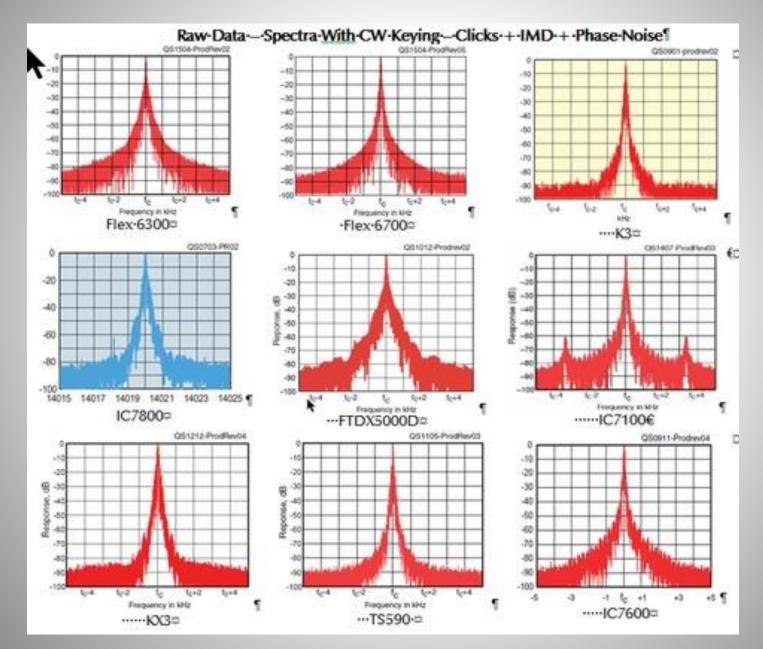
CW or ASK or OOK (amplitude shift keying, on/off keying)



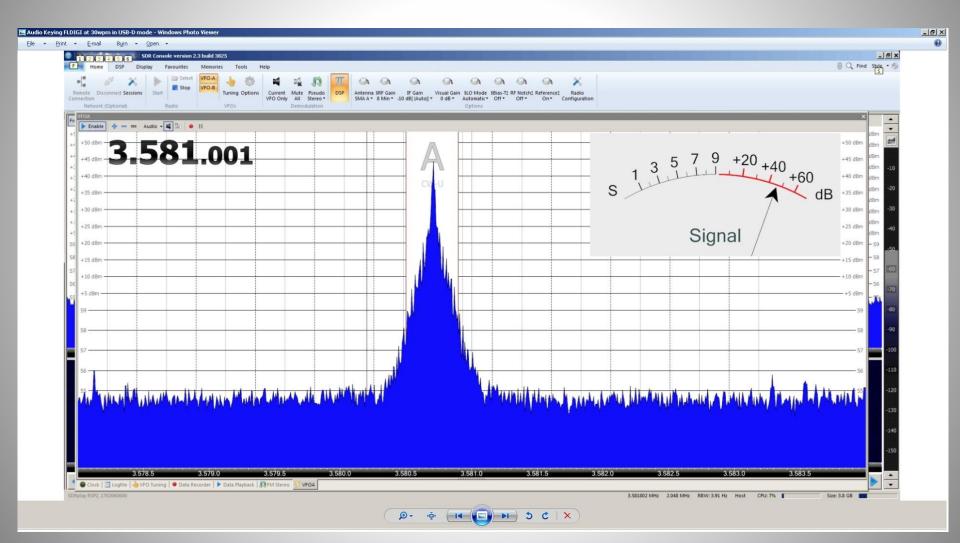
CW keying shape and bandwidth Rise and Fall times of RF about 4 milliseconds



Keying Bandwidth varies from rig to rig



SDRplay capture of W1AW CW RF signal received at k3eui on 3581.5 kHz



What makes CW a digital mode?

CW is binary because 0 = no RF (silence) 1 = RF (sound)

The dit (short sound) is represented by 1 The dah (long sound) is represented by 111 standard dash/dot radio is a 3:1

You need the 0 to represent silence

Binary nature of CW

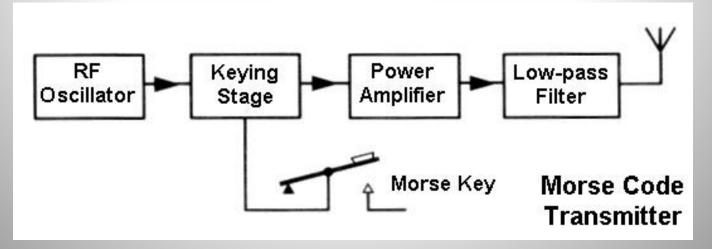
- E = 1 T = 111
- I = 101
- **S** = 10101

- M = 1110111 O = 11101110111
- H = 1010101

Longer spaces between letters: 000 Longer spaces between words: 00000

Typical method of generating a CW signal Turn RF on/off by a mechanical switch

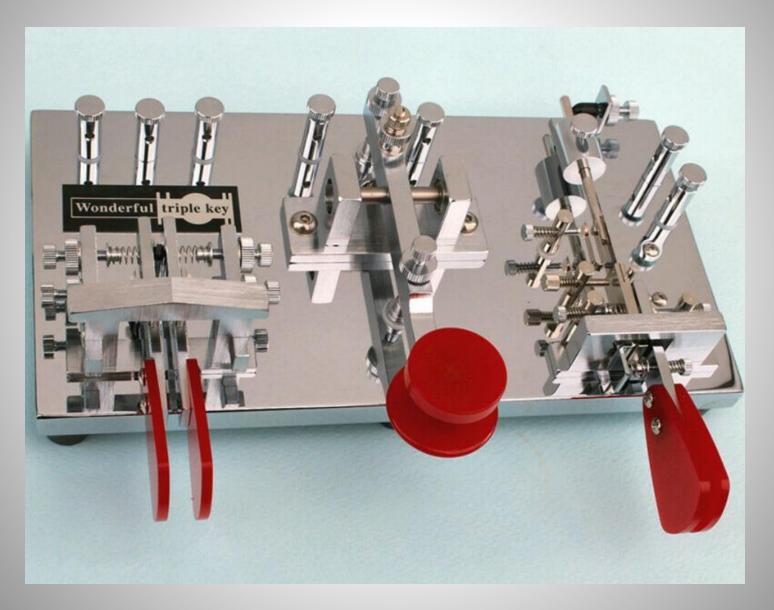




More advanced: mechanical "bug" (sliding weight controls speed of the dits)

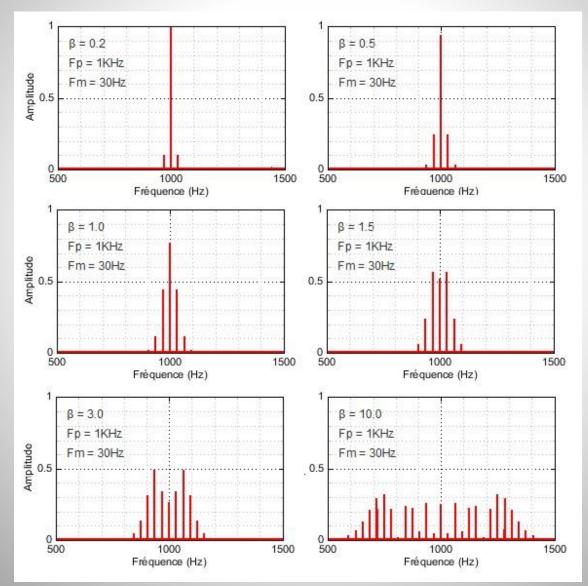


For those who like a choice



What does the RF spectrum look like for a FREQUENCY modulated signal with a single audio tone?

RF carrier: FREQUENCY modulated by an single audio tone at different levels (amplitude) LOUDER audio ==> more harmonics ==> wider bandwidth



FM signal (145.690 MHz) with 1 kHz audio note: multiple sidebands out to 10 kHz

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RSPduo, BIV = 2.000 MHz	CPU: 11.1% I Audio: 63ms	and the second se

DEVIATION

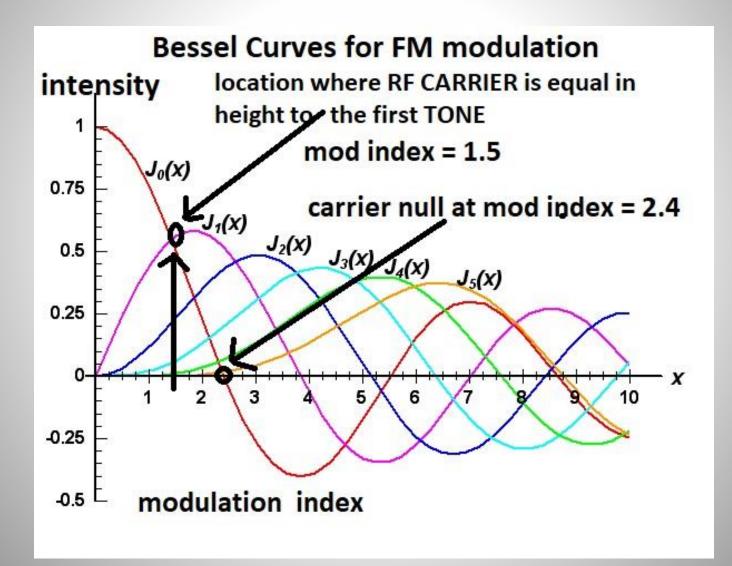
The "deviation" of an FM signal is proportional to the <u>AMPLITUDE</u> of the audio signal

Narrow Band FM ==> <5 kHz deviation

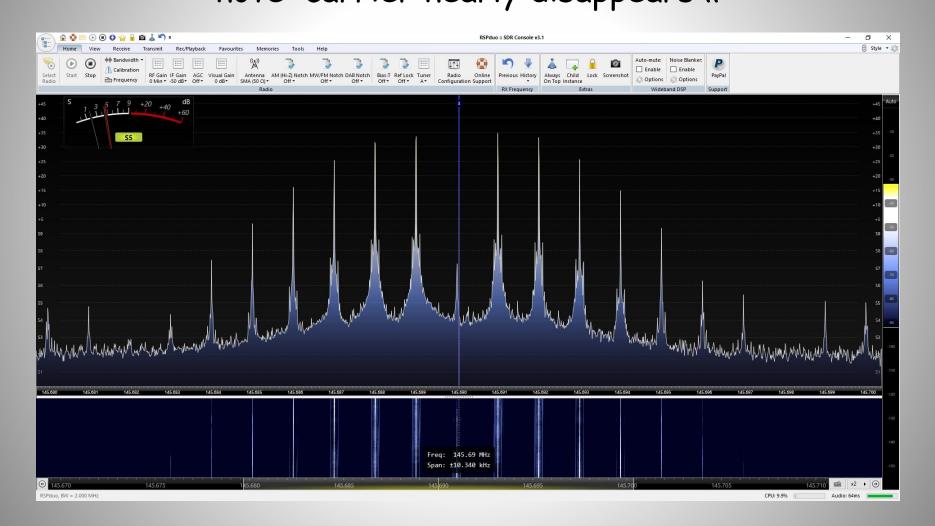
Deviation is related to modulation index

Deviation (kHz) = Modulation Index × Audio frequency (kHz)

Bessel curves for FM



FM signal with a 1 kHz audio tone and modulation index of 2.4 note: carrier nearly disappears !!



FM signal with 1 kHz audio <u>overmodulated</u> to distortion note bandwidth about 18 kHz

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€ 145.670 145.675 145.67 RSPduo, BW = 2.000 MHz	30 145.685 145 <mark>690</mark>	145.695 145.7	do 145.705 145.710 mm x2 → ④ . CPU: 11.8% Audio: 71ms

Pre-emphasis (transmit audio) De-emphasis (receive audio)

FM radios employ an <u>audio filter</u> on both the TX and RX to improve S/N

TX - boost the high audio frequencies

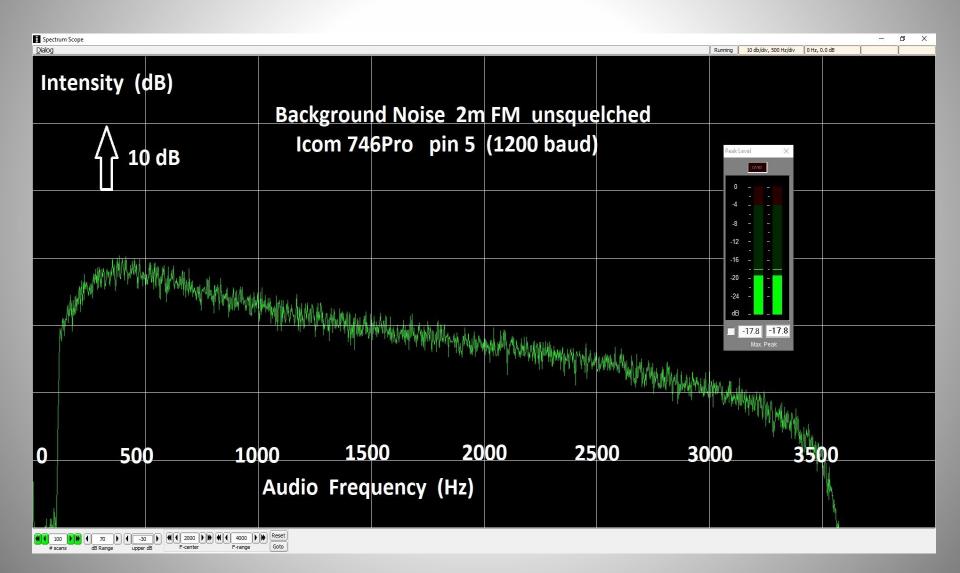
Rx - reduce the high audio frequencies

Overall ===> "flat audio"

Background Noise sampled 2m FM radio unsquelched audio at discriminator – 9600 baud path

						Running 10 db/div, 500 Hz/div	0 Hz, 0.0 dB
							Peak Level >
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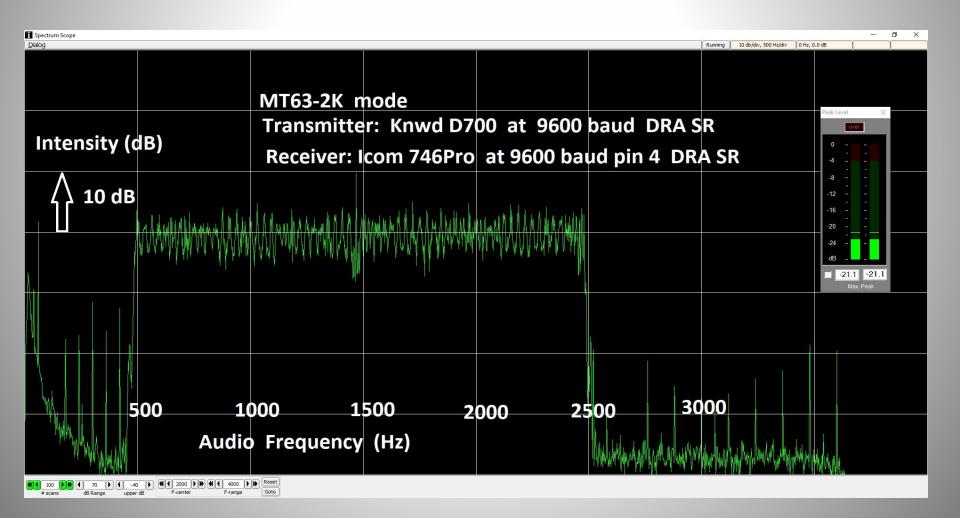
Background Noise 2m FM unsquelched Icom 746 Pro pin 5 (1200 baud)



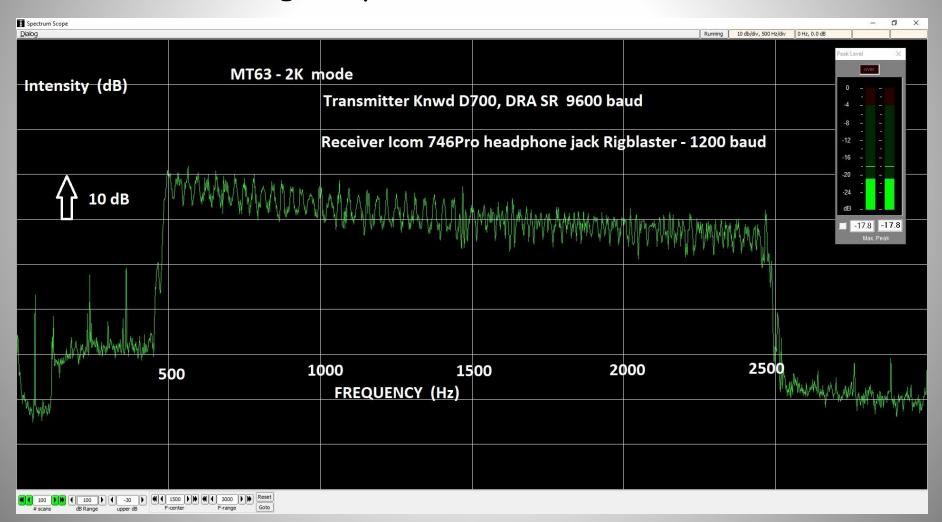
Reception at 9600 baud (flat) vs. Reception at 1200 baud (filtered)

How will processing of TX and RX audio affect various digital modes?

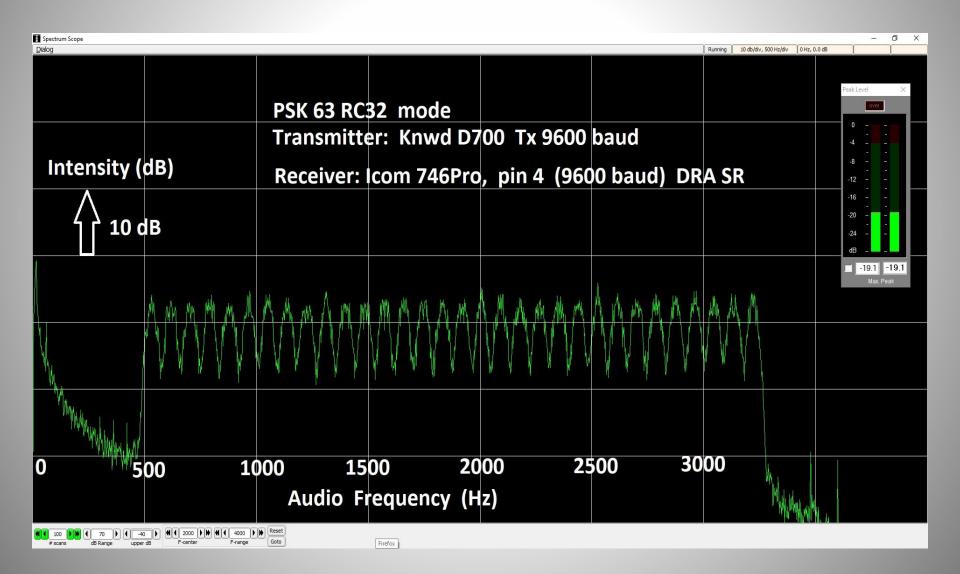
MT63 - 2K mode - bandwidth 500-2500 Hz 64 carriers - each PSK mod Received with FLAT (9600) audio



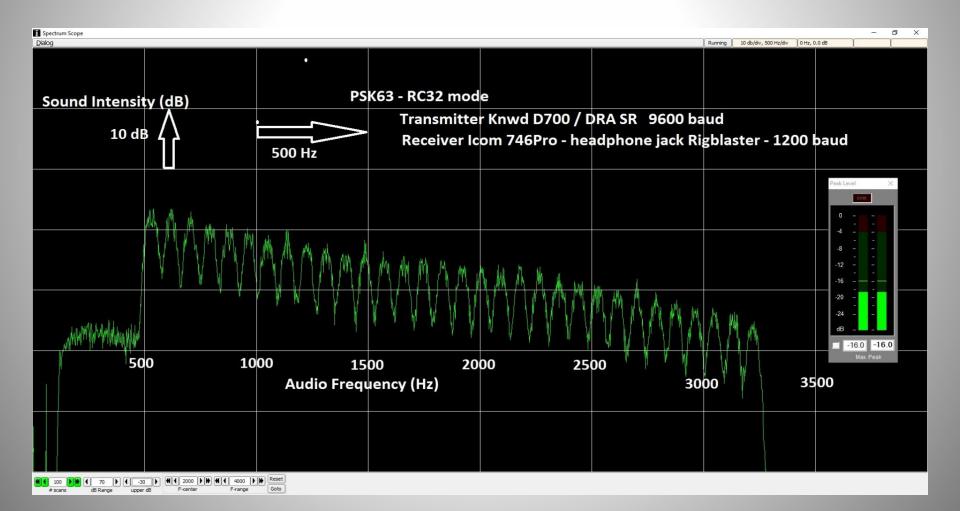
MT63 - 2K mode: bandwidth 2000 Hz 64 carriers - each PSK mod Now received at 1200 baud path higher pitch 15 dB reduced



PSK63-RC32 very wideband signal: 500 - 3200 Hz Received at 9600 baud (FLAT audio) Receiver Icom 746Pro pin 4



PSK63-RC32 wideband signal 500 - 3200 Hz Received at 1200 baud (de-emphasized audio) Receiver Icom 746Pro pin 5 higher pitch audio 15 dB reduction



Emission Types

- CW A1A on/off amplitude shift keying (ASK)
- SSB J2D data, multi-carrier (MT63, VARA)
- FM F1B data, frequency modulation (FSK RTTY)
- FM F2B data, frequency modulation (AFSK RTTY)
- PM G1B data, phase modulation (PSK, 4PSK, 8PSK)

FREQUENCY modulation 0 = F1 1 = F2 (one at a time) note: there is no time of silence 1v 0v Input binary sequence time 1v 0v -1v time f_1 f_2 FSK Modulated output wave

Two methods to generate RTTY

FSK - **RTTY** - <u>direct</u> frequency shift keying by <u>DATA</u> pulses TNC VFO changes by 170 Hz: MARK / SPACE Note: not all HF rigs have FSK keying option

AFSK - RTTY - <u>audio</u> frequency shift keying sound card emits two different audio frequencies (pitch) audio fed to any SSB rig (either USB/LSB mode)

Results: FSK and AFSK are <u>nearly</u> identical (sort of) (watch that transmitter ALC reads zero with AFSK)

Early "teletype" mechanical printer (1940)



Typical RTTY station of the 1950's mechanical RTTY printer (extra credit: name the receiver, transmitter, and mic)



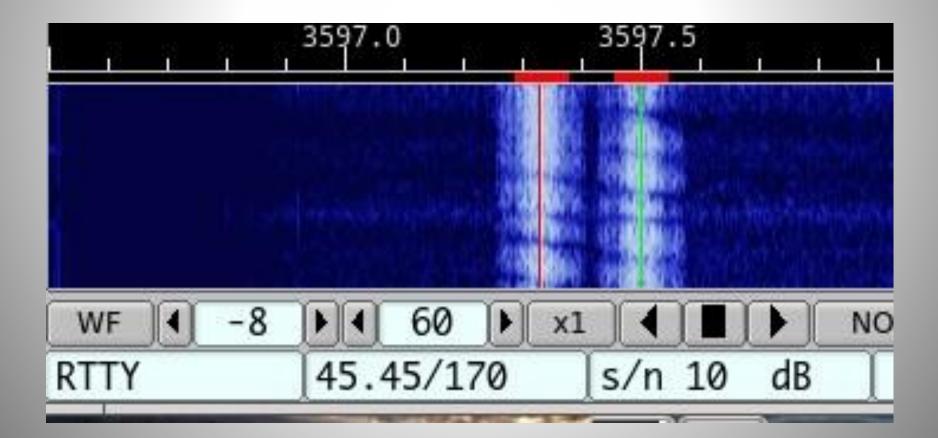
1990's Multi-mode TNC (CW, Pactor, Amtor, RTTY) could hook up to a "dumb" terminal



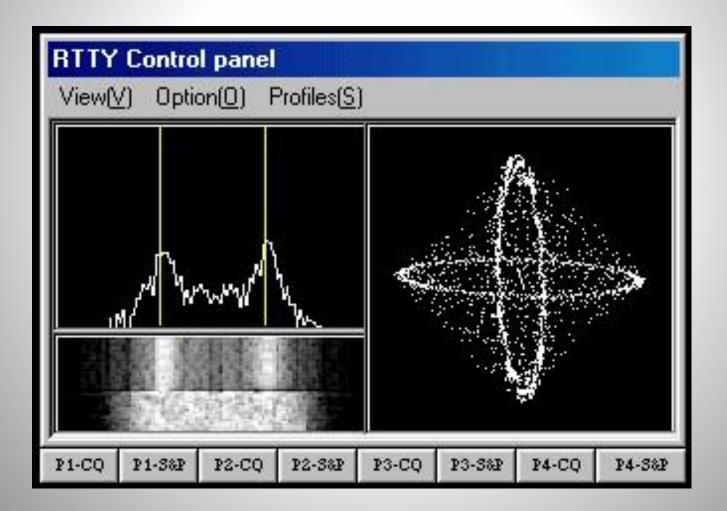
www.ziggta.com



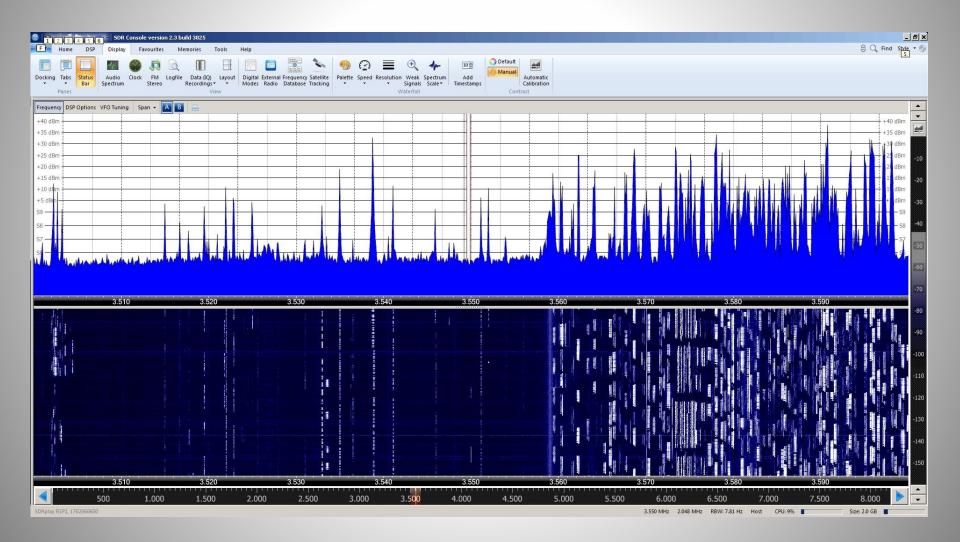
Common AFSK RTTY - waterfall image AFSK RTTY: <u>two</u> audio tones converted <u>two RF waves</u> 2 parallel tracks, 170 Hz separation 45.45 baud, 60 wpm



MMTTY - popular app in 1990's (free) FSK or AFSK RTTY signal using your sound card 2 tones, 170 Hz shift



Was this a RTTY contest? 80 meters



Symbols, Baud, Bits and Speed

 $37 (x+a)^{n} - \sum_{k=0}^{n} {\binom{n}{k}} x^{k} 33^{n-k} a 1^{2} + 3b^{2} = c^{2} 33 A \pi r^{2} (1) + x)^{n} = 1 + \frac{nx}{1!} + \frac{n(n-1)}{2!}$ $760x = \frac{-b \pm \sqrt{b^{2} - 4ac}}{2} 227 = 63r + xyz$ ex=1+x+x2+x3+x3+..., - 00 < x < 00 43 +697ab=z 719 (z+b) x 256 (a+f)=t a2 $\frac{1}{29a} = 28b(1+x)n = 1 + \frac{nx}{11} + 0$ $37(x+a)^n - \sum_{k=0}^{n} {\binom{n}{k}} x^k + \frac{\sqrt{33-1}}{3k^2 - m^2} + \alpha 2^n$ $= c^{2} 33 A\pi r^{2} (1) + x)^{n} = 1 + \frac{nx}{1!} + \frac{n(n-1)}{2!}$ ex=1+x+x2+x3+x3+..., - 00 < x < 00 43 $+697ab = 2719(2+b) \times 256(a+f) = ta^{2}$ $A = \pi r^{2} 29a = 28b(1+x)n = 1 + \frac{nx}{1!} + \frac{n}{2}$ - b= Vb2-4ac = 4AB =

Baud: number of changes per second made to a radio carrier's amplitude, frequency or phase

Also called "symbol rate" (in a <u>two-state</u> system like RTTY or CW)

Current legal baud (rate) on HF < 300 baud

Current debate with FCC rules: baud vs. bandwidth

BAUD and Word/minute

 CW
 20 baud = 24 wpm

 PSK31
 31 baud = 50 wpm

 RTTY 45
 45 baud = 60 wpm

 Olivia 8 / 500
 63 baud = 30 wpm

 MFSK 32
 32 baud = 120 wpm

 THOR 22
 22 baud = 78 wpm

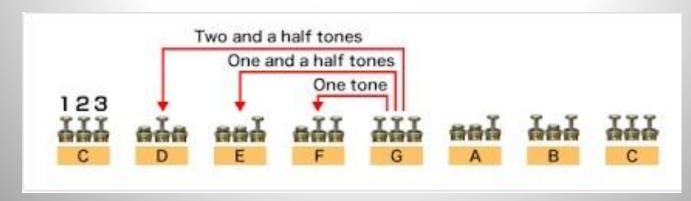
 8PSK 1000F
 1000 baud = 3386 wpm

Why can a TRUMPET play more notes than a BUGLE ?



Valves change LENGTH of tubing changes <u>wavelength</u> of the resonance sound





Multiple Tone Modes can send more data per second

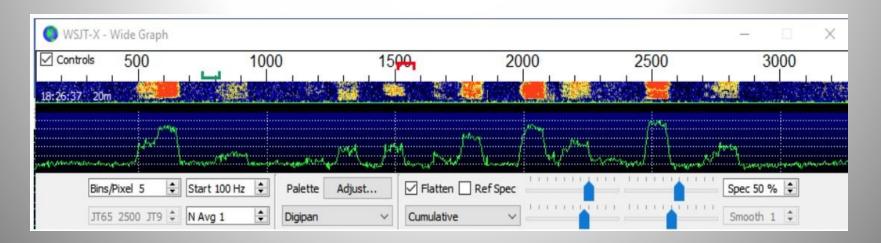
JT 65, FT8, FT4 **MFSK** 517155 THOR OLIVIA MMSSTV VARA 5.5:119:5 OFDM

Bandwidth (99% of energy)

- AM phone SSB phone CW **PSK 31** Olivia 8/500 FT8 MT63-2K **THOR 100 MFSK 128** Pactor III VARA
- = 6 kHz (double sideband)
- = 2-3 kHz
 - = 100 300 Hz
 - = 50 Hz
- = 500 Hz
- = 50 Hz
- = 2000 Hz
- = 1800 Hz
- = 1920 Hz
- = 2400 Hz
- = 500 Hz or 2300 Hz

JT modes (one tone at a time)

- JT65 <u>65 tones</u>, 1 minute transmissions copy down to -24 dB S/N 175 Hz bandwidth
- FT8 <u>8 tones</u>, 15 second transmissions copy down to - 20 dB S/N (2500 BW) 50 Hz bandwidth
- FT4 8 tones, 7 seconds, narrow bandwidth



JT modes https://physics.princeton.edu/pulsar/k1jt/



JOE TAYLOR, K1JT

- Joe Taylor is a professor at Princeton University, and obtained the Nobel Prize in Physics back in 1993 for his work in pulsars.
- Significant research in Moon-bounce (EME)
- WSJT (Weak Signal Joe Taylor)
- WSPR (Weak Signal Propagation Reporter, pronounced "Whisper")
- FSK441, JT-65, JT-9, FT8

https://www.nobelprize.org/prizes/physics/1993/taylor/auto-biography/

Joe Taylor K1JT



Ideal Digital DX Mode

Copy under weak S/N Print reliably with QRM, QRN, QSB **Reject** noise Narrow bandwidth Low power Work with common sound cards Print at a reasonable speed No COST and works on any platform

FT8 Positive Features

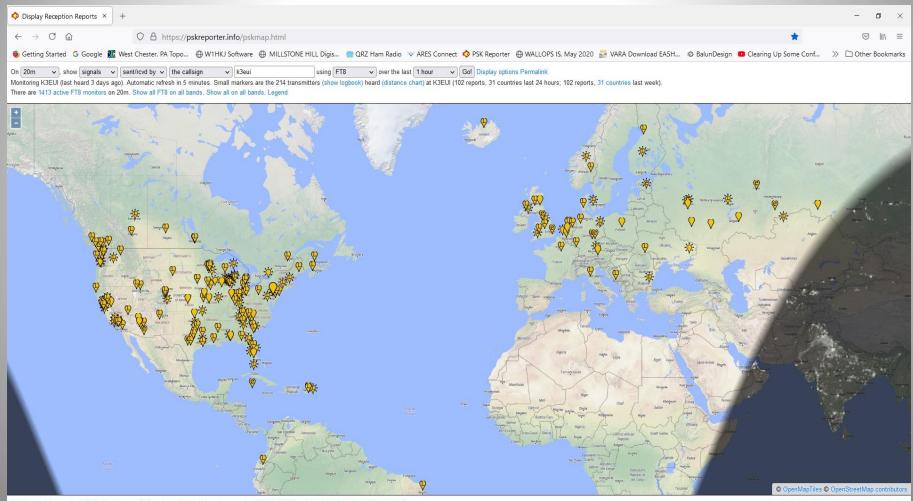
Can work the world with 1 watt and simple antennas

Software is free and works on multiple platforms

Bandwidth about 50 Hz and S/N to - 20 dB copy

Can complete a QSO (call, grid, signal report, confirm) in about two minutes

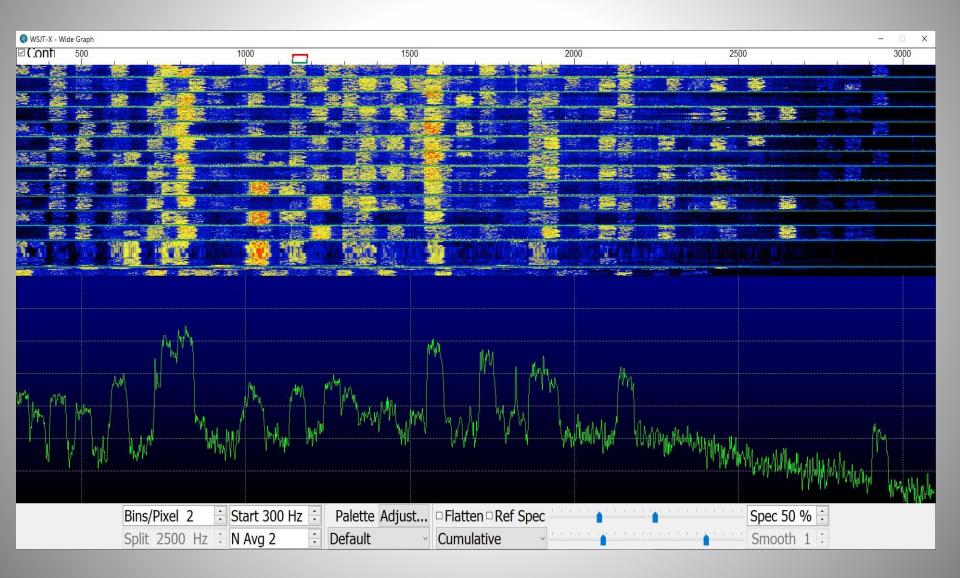
All of these FT8 stations were heard on 20 meters by K3EUI at 10 am on Jun 09 2021 with a simple HF SSB rig and vertical antenna



Statistics - Comments to Philip Gladstone - Online discussions - Reception records: 20,658,006,072 - Hosting by Fast Serv Networks, LLC

PSKREPORTER.INFO

FT8 can decode <u>ALL</u> of these FT8 signals <u>at the same time</u> over 3 kHz passband



Signals decoded during a 15 second interval at K3EUI on June 09 at 1400 hr UTC

SULT-X v2.3.0 by			Ioda	Decode Save Tools	Help										-	
	ingle-Peri				Tielp						Average	Decodes				
	-	' Freq		Message			UTC	dB	DT	Freq	Message					
	LI U.L	1110		WEST MODEN DD72		^										^
144545	-6 0.4 5 0.1			WF3J W9RZX RR73 CQ W3QP FN20												
	-9 -0.0			KC1HXR KF0ARQ -2	24											
144545	9 1.1			CQ VY2JC FN76												
144545		1242		GM0GDD VE7TOM R-	- <mark>08</mark>											
	-3 0.0			W2YR AC4DH 73												
144545 -:				KC50W KP4JRS -10												
144545 -: 144545 -:		725		AJ6F KC9JXJ EN62 CQ PD7RF J022	2											
144545 -: 144545 -:		2703		CQ E72X JN83												
144545 -:		2908		WA4CAS N5EYT EM	79											
144545 -:	15 0.1	1492	~	LU8HH AF6N DM13		-										
CQ only	Log Q	50		<u>S</u> top <u>M</u> or	nitor	<u>E</u> rase		Decode	Э	E <u>n</u> abl	e Tx	<u>H</u> alt Tx		Tune	⊠M	enus
20m ~ 🔍			14.0	74 000	⊠Tx eve	en/1st □Hold	Tx Free	I E L				S/N (dE	3)		~	Pwr
r r					Tx 114	2 Hz÷		2				N List			•	-
80	D	(Call		DX Grid									19985			-
		A1RB			Rx 114	1 Hz÷						Max dB	/0		•	1
60			_	JN86	Repor	t -15 🗧						N Slots	5		•	-
40		Az: 5	0	7115 km	Auto S		st					CQ			~	-
-	<u>L</u> o	okup		Add			JU					□More	<u></u>			
20														aaat		-
			2024	1 00									ĸ	eset		-
L ₀				Jun 09 1 6:09												-
66 dB																-
Receiving F	-T8		13											9/	15 WC):6m

Where to look for FT8 signals

Table 1FT8 FrequenciesAll frequencies are upper sideband (USB).							
Band (Meters)	Frequency (MHz)						
160	1.840						
80	3.573						
40	7.074						
30	10.136						
20	14.074						
17	18.100						
15	21.074						
12	24.915						
10	28.074						
6	50.313						

QSO K3EUI with VK3LDB Australia

40 meters, 10 watts, home made vertical antenna note time (UTC) and signal strength (dB) received by me DT (time difference) and Audio Frequency of our QSO

					Rx Frequency	
UTC	dB	DT	Freq		Message	
105330	-5	-0.7	1495	~	CQ VK3LDB QF2	21
105345	Тх		1495	~	VK3LDB K3EUI	FM29
105400	-6	-0.7	1430	~	K3EUI VK3LDB	-13
105415	Тх		1430	~	VK3LDB K3EUI	R-06
105430	-6	-0.7	1430	~	K3EUI VK3LDB	RRR
105445	Тх		1430	~	VK3LDB K3EUI	73
105500	-6	-0.7	1430	~	K3EUI VK3LDB	73

FT8 concerns

Low Speed 12 word/minute equivalent Limit to 13 characters per transmission 15 second transmissions @ 0,15,30,45 seconds Need to synchronize clock to +/- 1 sec UTC Limited frequencies (watering holes) unlike CW 3.574, 7.074, 14.074 MHz

Not much of a conversation possible might get boring after some time

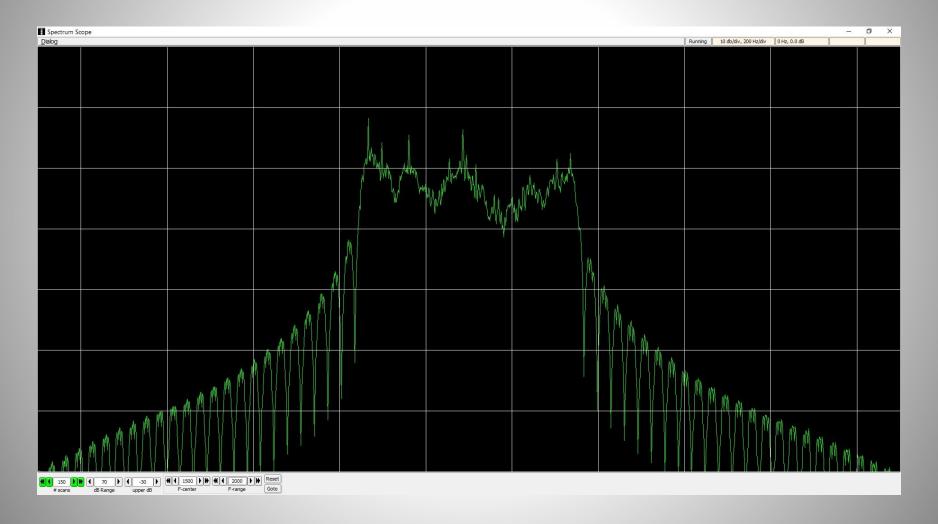
Other Multiple Tone modes common on HF SSB compare time to send a 1.6 kB file (Gettysburg Address txt file)

MODE	FILE size	Time	Bandwidth (Hz)	Emission Type
MFSK16	1.6 kB	4m 40s	316	16 FSK
MFSK32	1.6 kB	2min 20s	630	16 FSK
MFSK64	1.6 kB	1m 10s	1260	16 FSK
MFSK128	1.6 kB	36 s	1920	16 FSK
THOR 16	1.6 kB	4m 38s	355	18 carriers
THOR 22	1.6 kB	3m 22s	524	18 carriers
THOR 50x1	1.6 kB	1m 31s	900	18 carriers
THOR 25x4	1.6 kB	3m 02s	1800	18 carriers
THOR 100	1.6 kB	46s	1800	18 carriers
OFDM500F	1.6 kB	51	500	4-PSK
OFDM750F	1.6 kB	30	750	3-PSK

MFSK 32 32 baud, 120 wpm F1B emission type 16 different tones = 2⁴ = **4 bits/symbol**

::53::56::59:20:40::1	Cal	Cn Off 1512 In Out Op Az			Spot r RvdD	
MFSK 3			at a time at fted (FSK)			
CQ 2x Him de ME	DEN macro	TEST 3x W3STW call	Me/Qth Brag	Γ/R T× ₩	Rx 📕	TX 🔰 1
SIG 4 −26 ► 4				Store		ΓT/R

MFSK32 audio spectrum 630 Hz bandpass



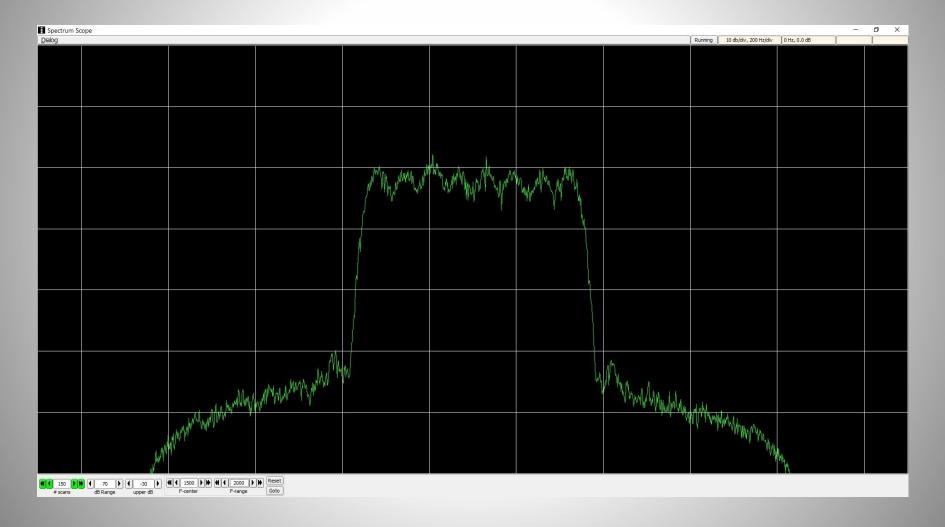
Small image sent with MFSK128 on 2m FM in 2 minutes



Olivia 8/500 8-FSK very robust in noise 8 tones, sent one at a time 500 Hz, 63 baud = 30 wpm

fidigi - k3eui Ele Op Mode Configure View Logbook U O <tr< th=""><th></th><th></th><th>f Spot (f RxII</th><th></th></tr<>			f Spot (f RxII	
Olivia 8 - 500 8 tones, 500 Hz bandwidt note both frequency and amplitude changes	T			
CQ 2x Him de ME DEN macro TEST 3x W3STW call Me/Qth Brag	T/R	Tx 🕨	Rx 📕	
	QSY Stor		[Rv [1 -15.0 ▶] ▶ ● []	(TTR) FC (ISQL) (KPSQL)

Olivia 8/500 8-FSK F1B emission can copy with S/N = - 14 dB



THOR (18 tones) and IFSK modulation

THOR - "incremental frequency shift keying" <u>CHANGE</u> in frequency from one tone to the next tone determines the characters to be printed on screen

THOR has FEC (forward error correction)

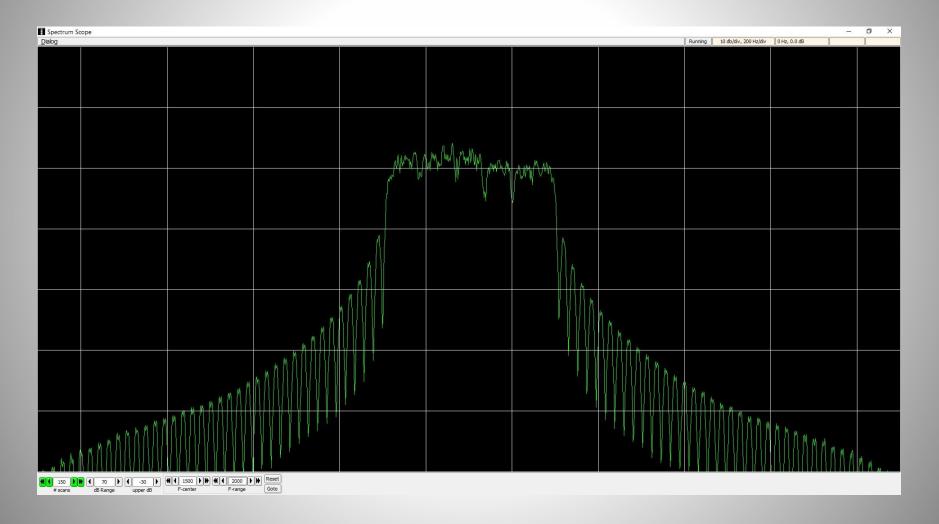
THOR has a "second" audio channel where you can display your call, name, qth

Thor can send small images

THOR 22 F1B emission THOR is nearly constant amplitude

If digi - k3eui Ele Op Mode _ Configure _ View _ Logbook _ Help O _ OOOO _ So _ Frq 1500 _ On _ Off 1525 _ In _ Out Call _ Op _ Op _ Az : : : S3 : : : S6 : : : 59 :: 20 :: 40 ::			j∵Spot (r RxID	
THOR 22 22 baud, 78 wpm, 524 Hz band nearly constant amplitude F1B			pe	
CQ 2x Him de ME DEN macro TEST 3x W3STW call Me/Qth Brag	T/R	Tx 🕨	Rx 📗	TX 🔰 1
SIG PAUSE <td>SY Sto</td> <td></td> <td> </td> <td>(FT/R C (ESQL) FKPSQL</td>	SY Sto			(FT/R C (ESQL) FKPSQL

THOR 22 audio spectrum 525 Hz bandpass

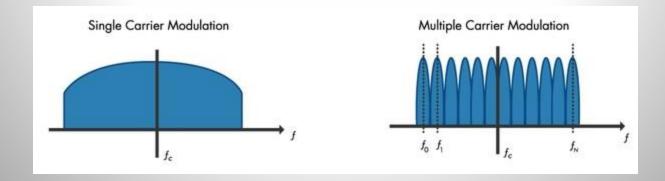


Multiple PSK "carriers"

multiple sub-carriers (parallel signals)

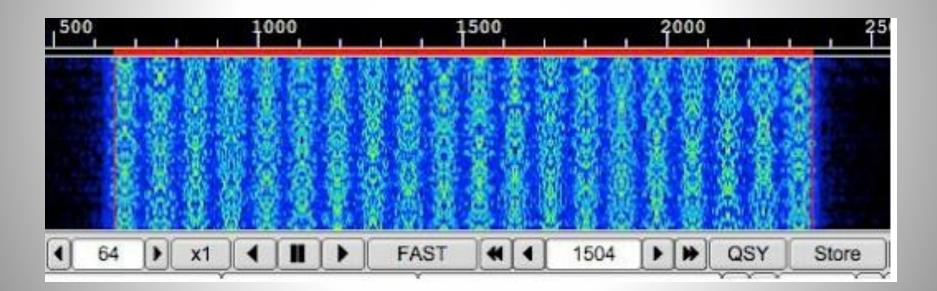
Each sub-carrier could be phase-shifted independently from its neighbor, but at a common baud

Thus, more information per second And more BW !

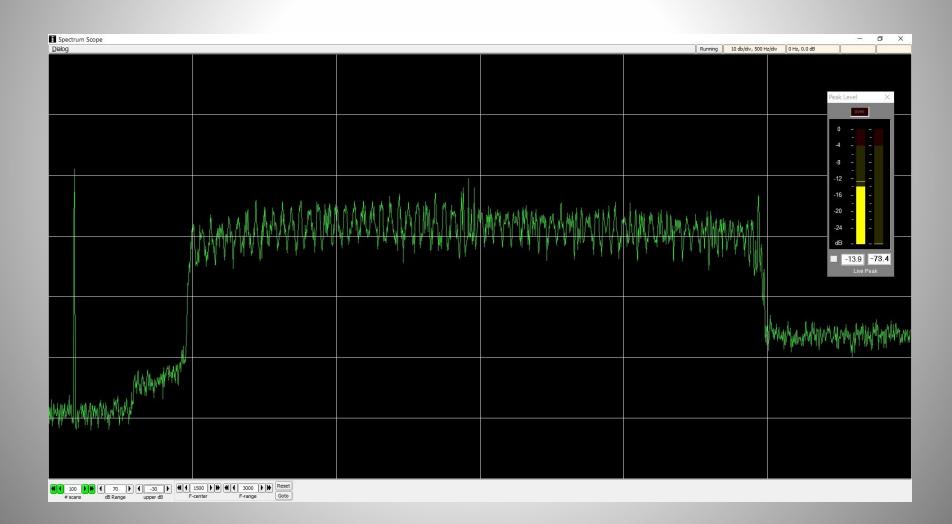


PSK modulation with 20 carriers

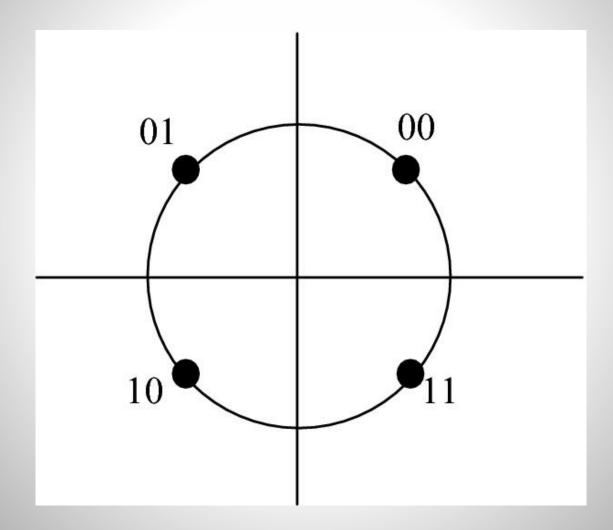
More data per second but at a cost of greater bandwidth



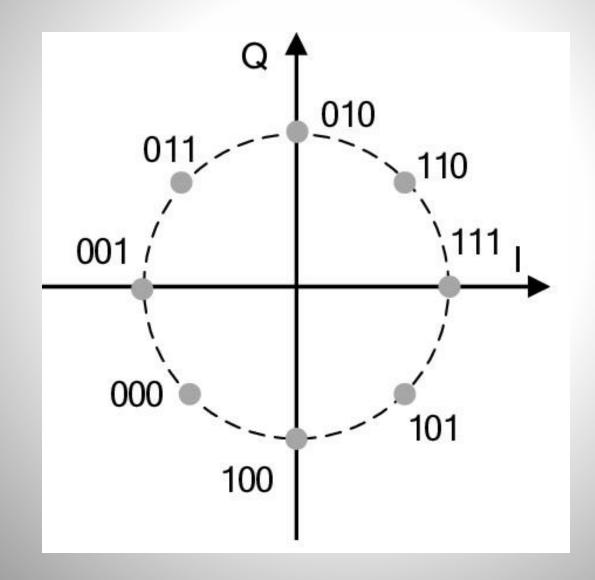
MT63 2kHz wide 64 carriers – each low-baud PSK



What is QPSK or 4PSK?



8PSK signals show a 45 degree phase change



NEW 8PSK modes for higher speed

BPSK = shifts of 0 or 180 degrees QPSK = 90 degree phase shifts (0,90,180,270)

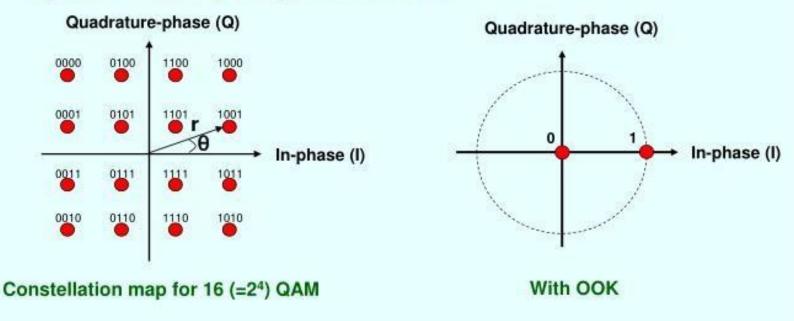
8PSK => 45 degree shifts = 3 states/symbol 8PSK500F, 8PSK1000F, and 8PSK1200F

Thus, 8PSK is a higher "data rate" requires a greater bandwidth than BPSK Works well on a noise-free FM circuit

Quadrature Amplitude Modulation (QAM) format

Features of QAM format:

- Two carriers with the same frequency are amplitude-modulated independently.
- The phase of the two carriers is 90 deg. shifted each other.
- 2^N QAM processes N bits in a single channel, so it has N times spectral efficiency compared with OOK.



EMCOMM



Popular Modes for EMCOMM

Thor - multi-tone, constant amplitude, strong FEC MFSK - multi-tone, constant amplitude, strong FEC Olivia - multi-tone, constant amplitude, strong FEC

MT63: 64 carriers, PSK modulation 3 bandwidths: 500 Hz, 1000 Hz, 2000 Hz Can work reasonably well with "acoustic coupling"

8PSK - very fast (up to 3000 wpm) for FM VHF/UHF OFDM - Orthogonal Frequency Division Multiplex VARA HF SSB and VARA FM (VHF/UHF) Pactor III - requires a special TNC (hardware)

Winlink: RMS Express

(linked modes)

HF SSB:

Pactor II, III (requires TNC) VARA HF SSB ARDOP

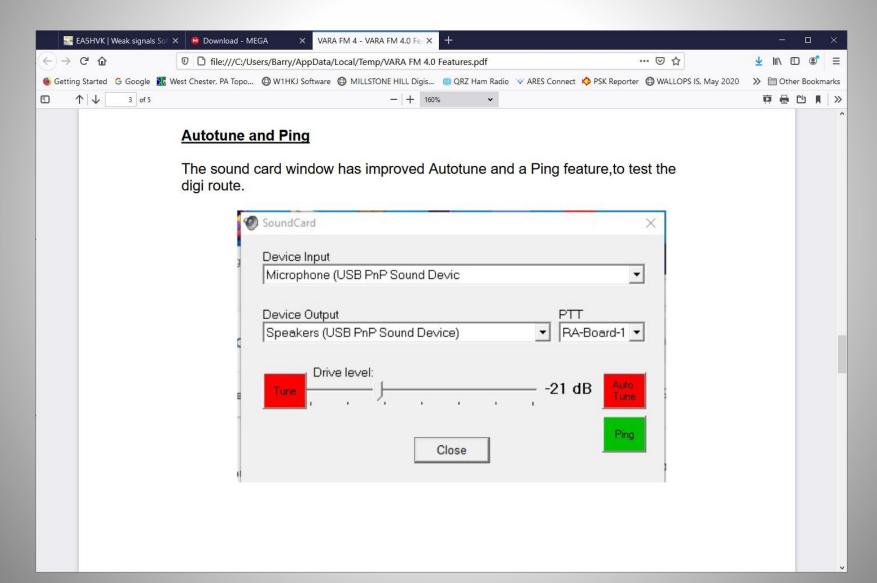
VHF/UHF FM :

Packet (TNC or Sound Modem) VARA FM (sound card)

Register your call with Winlink.org

Il Signs		Contact Information (Optional)	
My Callsign: K3E	UI My Password:	,, ,	
Callsign suffix (optional):	(Case sensitive) Show password	Name:	Barry Feierman
Calisign sum (optional).	(Used for country code)	Street address 1:	105 Broadway Ave
Password recovery e-mail:	k3euibany@gmail.com	Street address 2:	
(Non-Winlink e-mail addre	ss where lost password will be sent when requested)	City:	West Chester
Remove Callsign	Request password be sent to recovery e-mail	State/Province:	Pennsylvania
		Country:	USA
iliary Callsigns and Tactical	Addresses	Postal code:	19382
	Add Entry	Web Site URL (optional):	
	Remove Entry	Phone number:	i i
	Edit Entry	Non-Winlink e-mail:	k3eui@aol.com
		Additional information (optional):
			~
My Grid Square: FM29EW	Lat/Lon to Grid Square		
Winlink Express registration	key:		<u> </u>
ervice Codes		Recalculate HF path quality if SFI	changes more than: 30
PUBLIC		Keep logs for 2 🛓 weeks.	Keep deleted messages for 30
(Use PUBLIC for ham call si	gns. Separate multiple service codes by spaces.)	Display list of pending incoming	g messages prior to download
	s, you must update the list of channels.	Warn about connections to sta	
			be sent to the Winlink Development T eta) versions of Winlink Express
		Automatically install field test in	etal versions of Vvinlink Evpress

Set your Sound Card device, PTT method and DRIVE level (Tx audio)



Winlink uses RMS Express software Winlink GATEWAY, or Peer-to-Peer (P2P) variety of "modes" to choose from

Winlink Express 1	.5.32.0 - K	3EUI						_ <u>3</u> %		×
K3EUI -	Settings	Message	Attachments	Move To:	Saved Items	✓ Delete	Open Session:	Telnet Winlink	~	Logs
Help		× 101 / 24	<u> ->⊢</u> ⊚					Telnet Winlink Packet Winlink	^	
No active session	, 1. ⊑							Pactor Winlink Robust Packet Winli		
System Folders Inbox (0 unread) Read Items (17) Outbox (1) Sent Items (17) Saved Items (7) Deleted Items (0)		Date/Time	Message I	D Siz	ze Source	Sender	Recipient	Winmor Winlink Ardop Winlink Vara HF Winlink Vara FM Winlink Iridium GO Winlink		
Drafts (0) Personal Folders	×							Packet P2P Pactor P2P Robust Packet P2P Winmor P2P Ardop P2P		< >

New Message format

From:	K3EUI ~	Send as: W	inlink Message	~	Request me	ssage receipt	Set Defaults	Ĩ.
<u>T</u> o:	NY3J;	W	inlink Message idio-Only Message					
<u>C</u> c:	K3EUI;	Pe	erto-Peer Messag	e				
Subject:	TEST American	Red Cross - [aily Shelter Re	port				
	CONTRACTOR CONTRACTOR CONTRACTOR							
	DRILL message							
IS IS A ST fron y 23, 20	DRILL message	1.0 kHz						
IS IS A ST fron y 23, 20	DRILL message h k3eui to ny3j 21	4.0 kHz						
IS IS A ST fron y 23, 20	DRILL message h k3eui to ny3j 21	4.0 kHz						

Send a TEMPLATE American Red Cross Templates

elect	Close	Add	Remove	Edit
	rd Template	s (version	1.0.158.0)	
	C Forms			
	ARC 204 V			
1× × 1	ARC 213 N			
	ARC 6409			
10 01	ARC 6409			
			r Receipt Form	1.txt
	ARC Daily			
1.	ARC Staff		xt	
1	STATE For			
	NADIAN Fo			
-	M Medical	Assistanc	e	
-	MA Forms			
100	RE Forms NERAL For			
-	NERAL FOR			
	STATE form		ms	
1	S Forms	15		
-	U Forms			
1	USA Forms			
	STATE For			
1000	DIOGRAM		ms	
H- SH	ARES Form	s		
TX E	STATE For	ms		
+ US	GS			
+ WA	STATE Fo	ms		
. WE	ATHER Fo	ms		
	Hurricane I	Report.txt		
	Local Wea			
L	Severe W>	Report to	kt 🗌	
Global	Templates			

American Red Cross Daily Shelter Report

Daily Shelter Report	×	+								—	
\leftarrow \rightarrow C () F	ile C:/RMS%	20Express/K3E	UI/Temp	/Daily_Sh	el <mark>ter_</mark> Rep	ort_Initial	.html	Q 6	₹]	Ē	
America Red Cros	an _{Daily} S	helter Repo	rt								
<u> </u>		[oad ARC Da	illy Shelter Re	port Data			Form Info			
Date 07-04-2021 Incident/ I	DR # 0001	Shelter I		West Ches		/ Shelter					
			SHEER		Anon						
Shelter Address West Chester Unive											
Shelter Phone Number (s) 610 999 9	999										
	1			TERING ST	AFF			<u></u>			
POSITION Shelter Manager	Mr Joe	NAN	ΛE				-	PHONE	3		
Day Shift Supervisor	Mi Joe										
2nd Shift Supervisor											
Night Shift Supervisor											
								-			
Total Number of Sheltering Workers		10. States 4200	ay Shift 5			2nd Shift	5		Night Shift	2	
		OTHEI	R FUNCTIO	ONS OR AC	TIVITIES S	TAFF					
# Disaster Health Services		# Casework and Re	ecover Plann	ing							
# Disaster Mental Health		# Feeding	0								
# Disaster Spiritual Care]	Other					#				
			SHELT	ER POPUL/							
Age Groups (yea Nighttime Population Submitted Last N		0-3	5	4-7	8-	12	13-18	5	9-65	65 +	
	vigni	7	-				7	7		7	
Daytime Population Today			7		7		1	1			
Total NEW Shelter Dormitory Registra	tions Since Last Night:	[12]									
			OPERAT	IONAL REP	ORTING						
Breakfast	Lunch Dinne	r Snacks/Drinks	Cots	Blankets	Comfort Kits	Clean-up Kits	Other Bulk Items	Signage Kits			
	12 12	12	15	15	5	5	5				
#Available Tomorrow											
# Needed Tomorrow											
				NOTES							
								1			

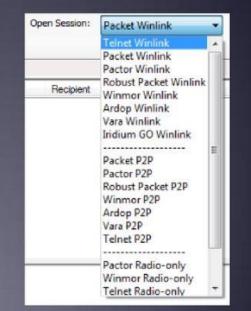
Severe Weather Report

Daily Shelter Report X Severe WX Report Entry X +	- 0
\leftrightarrow \rightarrow C (i) File C:/RMS%20Express/K3EUI/Tem α c ζ	¥ 🕀 🙎
SEVERE WEATHER REPORT	
Load Severe WX Data	
Sender [K3EU] Report Date/Time (local) Click to Add Date/Time Report Version (Select one): Initial Update Final	Message
Fill in what you can. This form sends data as plain text to your recipient(s).	
Reporting Party Name	
Reporting Party Phone Number	
Reporting Party Email Address	
EVENT AREA	
State/Province/Region County	
Optional Decimal GPS Coordinates EX:32:5042,-116.9834 Auto filled via a connected GPS dev (If entering GPS coordinates manually, use decimal format. Example: 32:5042,-116.9834 Note the comma)	ce or enter manually
OBSERVED EVENT CONDITIONS	
Check All That Apply.	
Flood: Choose 🗸	
Hail: Choose	
High Wind Speed: Choose View Wind Speed guidelines	
Tornado / Funnel Cloud: Choose	
Wind Damage: Choose	
Winter Precipitation: Choose 🗸	
Snow: Choose	

Winlink sends emails via RF to internet GATEWAYS

Winlink Connection Modes

- HF WINMOR/ARDOP "Poor man's Pactor". Not as good as Pactor, but operates with an inexpensive sound card device (\$100), speeds between Pactor 2 and 3.
- HF Pactor 1, 2, 3 and 4 Fast and reliable but requires an expensive modem (\$1500+). Pactor 4 not permitted in US.
- Vara Muli-carrier OFDM with 2.4kHz bandwidth. HF speeds approaching PACTOR 4 (possible optimization for FM coming)



All RF modes can be Peer-to-Peer (P2P).

HF SSB VARA Gateways

Exit Se	lect Updat	e Via Internet	Update \	Via Radio	Map	Forecast	RMS			
Callsign	Frequency (kHz)	Mode	Grid Square	Hours	Group	Distance (km)	Bearing (Degrees)	Path Reliability Estimate	Path Quality Estimate	
AC2SV	3591.700	V2300	FN20UR	00-23	PUBLIC	143	052	87	55	
KC2FBI	3595.500	V2300	FN21RS	00-23	PUBLIC	223	024	86	54	
NA1DX	3593.500	V2300	FM18QT	00-23	PUBLIC	152	215	85	53	
K1EHZ	3596.500	V2300	FN42EX	00-23	PUBLIC	474	043	85	54	
W1EO	3597.900	V2300	FN42IM	00-23	PUBLIC	462	050	85	54	
N2LEE	3595.000	V2300	FM18HX	00-23	PUBLIC	184	235	84	53	
K3DO	3595.500	V2300	FM19GL	00-23	PUBLIC	165	252	84	53	
N3MLB-10	3587.500	V2300	FN10KJ	00-23	PUBLIC	137	292	84	53	
WD10	3589.500	V2300	FN53IX	00-23	PUBLIC	689	047	82	52	
KN4LQN	3592.000	V2300	FM17EI	00-23	PUBLIC	336	212	81	51	
WD10	7104.500	V2300	FN53IX	00-23	PUBLIC	689	047	81	55	
VA2XMP-10	5348.000	V2300	FN35BQ	00-23	PUBLIC	654	012	79	53	
W4TAK	7101.300	V500	EM95CH	00-23	PUBLIC	747	228	79	52	
VA3ETN	3566.500	V2300	FN02FW	23-12	PUBLIC	466	317	78	50	
VE3AWN	5373.000	V2300	FN15SM	00-23	PUBLIC	624	354	78	52	
W5DMH	7103.500	V2300	EN83HG	00-23	PUBLIC	742	302	77	51	
VE3HJL	3587.000	V2300	FN03IR	00-23	PUBLIC	519	325	77	50	
WGIDS	7061.500	V500	EM79NV	00-23	PUBLIC	788	273	77	50	
WGIDS	7084.500	V500	EM79NV	00-23	PUBLIC	788	273	77	50	
VE3HJL	3611.050	V2300	FN03IR	00-23	PUBLIC	519	325	77	50	
KC8YJJ	3589.500	V2300	EN90PL	00-23	PUBLIC	435	280	76	49	
AJ4FW	3595.000	V2300	FM07BC	00-23	PUBLIC	486	231	76	49	
W1EO	1845.000	V500	FN42IM	00-23	PUBLIC	462	050	76	49	
VA3QT	5348.000	V2300	FN04DI	00-23	PUBLIC	594	327	76	50	
N2GWK	7106.500	V500	EM77GU	00-23	PUBLIC	881	258	74	47	
VA2XMP-10	7105.000	V2300	FN35BQ	00-23	PUBLIC	654	012	73	52	
VE3EQV	7095 500	V2300	EN86PJ	00-23	PUBLIC	918	324	72	48	

HF Pactor Gateways

Exit Se	lect Upda	te Via Internet	Update \	/ia Radio	Map	Forecast	SFI All R	MS	•	
Callsign	Frequency (kHz)	Mode	Grid Square	Hours	Group	Distance (km)	Bearing (Degrees)	Path Reliability Estimate	Path Quality Estimate	Î
W3JY	3591.000	P3, P2, P1	FN20FA	00-23	PUBLIC	12	041	99	99	
W3JY	7100.400	P2, P1	FN20FA	00-23	PUBLIC	12	041	96	96	L
W3JY	14113.900	P2, P1	FN20FA	00-23	PUBLIC	12	041	92	92	
K1EHZ	3596.500	P3, P2, P1	FN42EX	00-23	PUBLIC	474	043	85	54	
W1EO	3597.900	P3	FN42IM	00-23	PUBLIC	462	050	85	54	L
K3DO	3595.500	P3, P2, P1	FM19GL	00-23	PUBLIC	165	252	84	53	L
N2LEE	3595.000	P3	FM18HX	00-23	PUBLIC	184	235	84	53	
KQ4ET	3589.000	P3, P2, P1	FM16XU	00-23	PUBLIC	345	186	82	52	L
WD10	3589.500	P3, P2, P1	FN53IX	00-23	PUBLIC	689	047	82	52	L
WD10	7104.500	P3, P2, P1	FN53IX	00-23	PUBLIC	689	047	81	55	L
VE3AWN	5405.000	P4, P3, P2, P1	FN25GF	00-23	PUBLIC	588	001	79	52	
KZ5ED	7103.700	P3, P2, P1	EM85WX	00-23	PUBLIC	719	234	78	51	L
W5DMH	7103.500	P3	EN83HG	00-23	PUBLIC	742	302	77	51	L
WGIDS	7061.500	P2, P1	EM79NV	00-23	PUBLIC	788	273	77	50	L
W6IDS	7084.500	P2, P1	EM79NV	00-23	PUBLIC	788	273	77	50	
W1EO	1845.000	P2, P1	FN42IM	00-23	PUBLIC	462	050	76	49	L
AJ4FW	3595.000	P3, P2, P1	FM07BC	00-23	PUBLIC	486	231	76	49	L
KC8YJJ	3589.500	P3, P2, P1	EN90PL	00-23	PUBLIC	435	280	76	49	L
VE1YZ	7096.500	P4, P3	FN84BQ	00-23	PUBLIC	1099	057	71	47	
WW4MSK	7102.500	P3, P2, P1	EM83DS	00-23	PUBLIC	992	229	71	44	
WW4MSK	7064.500	P2, P1	EM83DS	00-23	PUBLIC	992	229	70	44	
KZ5ED	3595.000	P3, P2, P1	EM85WX	00-23	PUBLIC	719	234	68	46	
W5DMH	3587.500	P3	EN83HG	23-08	PUBLIC	742	302	67	46	
VE1YZ	5405.000	P4, P3	FN84BQ	00-23	PUBLIC	1099	057	67	45	Ų,

Local FM 2m Packet 1200 baud Gateways

Stations found	l within 300 kil	ometers of ye	our grid square.				
Callsign	Frequency (MHz)	Baud	Grid Square	Group	Distance (km)	Bearing (Degrees)	^
N3MEL-10	145.010	1200	FM29DX	PUBLIC	008	303	
W3JY-10	145.010	1200	FN20FA	PUBLIC	012	041	
W3DRA-10	145.070	1200	FM29FU	PUBLIC	013	142	
W3AVP-10	145.010	1200	FN10WC	PUBLIC	046	293	
WA3WLH-10	145.010	1200	FN20FJ	PUBLIC	052	008	
K3KH-10	0.146	1200	FN20LE	PUBLIC	057	061	
WA3ERQ-10	145.610	1200	FN20MC	PUBLIC	060	072	
NY3J-10	145.610	1200	FN20MC	PUBLIC	060	072	
KC2TXB-10	145.070	1200	FM29KL	PUBLIC	067	140	
K3IR-10	145.030	1200	FN10SE	PUBLIC	076	292	
W3HZU-10	145.010	1200	FN10PA	PUBLIC	092	276	
KC3MDK-10	145.090	1200	FM19SI	PUBLIC	097	228	
K3ARH-10	145.090	1200	FM19VD	PUBLIC	101	210	
W3CBW-10	145.710	1200	FM19OL	PUBLIC	112	243	
K3CHB-10	145.010	1200	FN10MF	PUBLIC	118	286	
K2GE-10	145.050	1200	FN20TL	PUBLIC	122	060	
W3AAC-10	145.010	1200	FM19QD	PUBLIC	123	225	

Local 2m/70cm FM VARA Gateways

Vara FM C					T	P.	×
	ct Channel	6 72 52	le Via Intern		e Table Via R	adio	
Stations found	d within 300 kil	ometers of you	ur grid square.	6	1		
Callsign	Frequency (MHz)	Channel Width	Grid Square	Group	Distance (km)	Bearing (Degrees)	Í
N3MEL-10	145.040	Wide	FM29DX	PUBLIC	008	303	
W2KBF-10	441.050	Narrow	FM29IR	PUBLIC	037	129	
WA3WLH-10	145.010	Narrow	FN20FJ	PUBLIC	052	008	
NY3J-10	145.610	Wide	FN20MC	PUBLIC	060	072	
WA3ERQ-10	145.610	Narrow	FN20MC	PUBLIC	060	072	
W3CBW-10	145.710	Narrow	FM19OL	PUBLIC	112	243	
W3AAC-10	145.010	Wide	FM19QD	PUBLIC	123	225	
N3HU-10	145.030	Wide	FM19SA	PUBLIC	125	215	
AB3YY-10	145.010	Narrow	FM19SA	PUBLIC	125	215	
W8IS-10	145.050	Wide	FM19LL	PUBLIC	131	247	
W8IS-10	441.000	Wide	FM19LL	PUBLIC	131	247	
N3MLB-10	441.025	Wide	FN10KK	PUBLIC	139	294	
N3HU-15	145.050	Wide	FM18QT	PUBLIC	152	215	1
NA1DX-10	145.050	Wide	FM18QT	PUBLIC	152	215	
WM3M-10	145.090	Narrow	FM19KB	PUBLIC	162	233	
ALOY-3	146.610	Wide	FN20VW	PUBLIC	164	047	
KM4DC-10	145.065	Wide	FM18HX	PUBLIC	184	235	

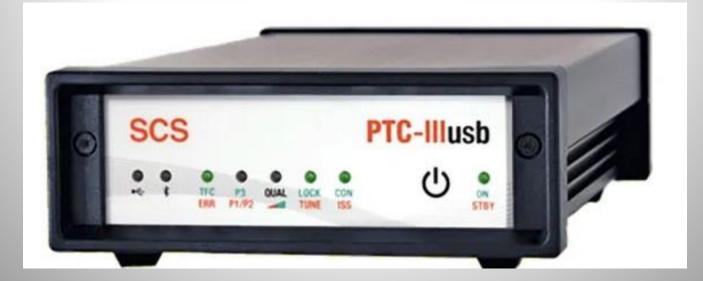


Pactor II and III (**PSK** modulation) Higher speed, more robust, higher bandwidth



PACTOR III

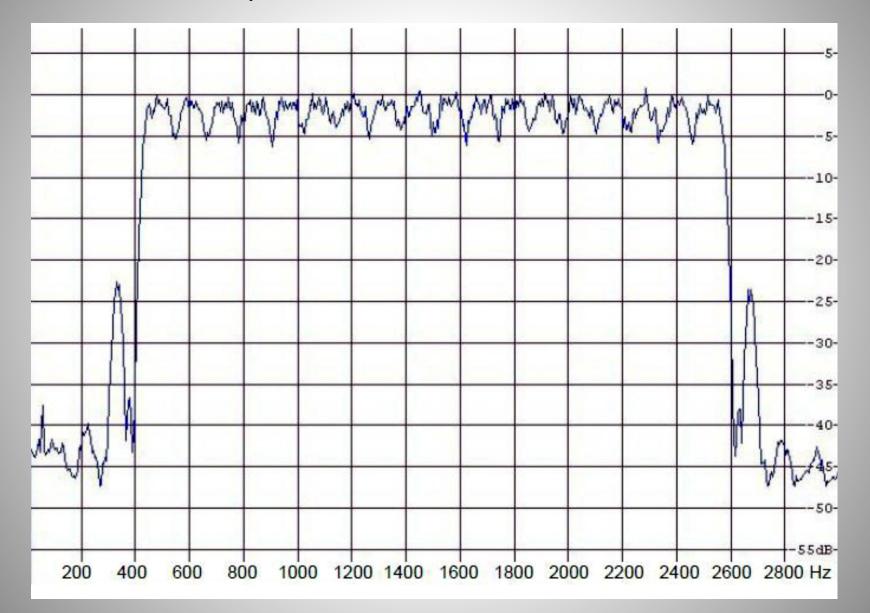
- Proprietary mode used for message and traffic handling over an HF radio circuit
- Use of Pactor-III protocol is limited for NA hams and some other countries due to the very wide bandwidth
- Only the embedded hardware (modem) from the German company that owns the rights to this mode, is capable of operating Pactor-III.
- No software solution available
- EXPENSIVE modems!



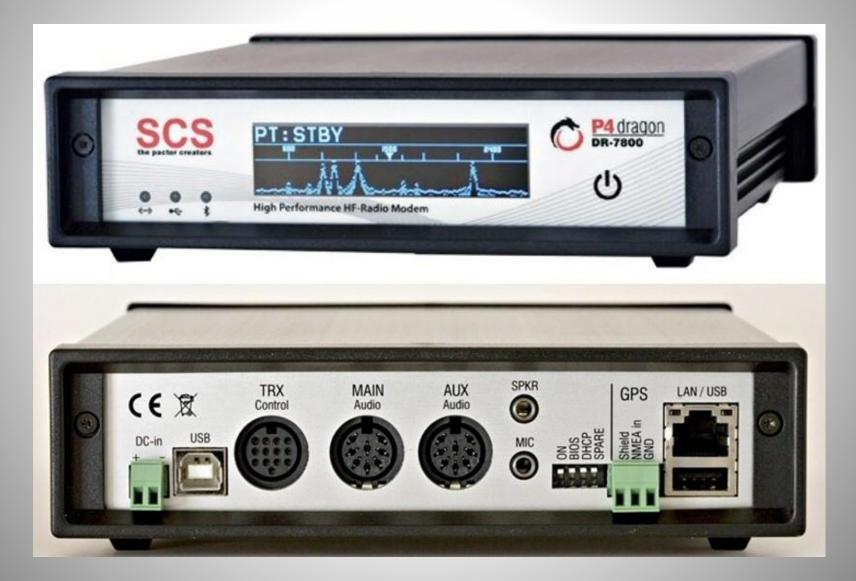
Pactor III modes or speeds (gears) Requires a TNC

Speedlevel	Number of tones	Code Rate	Modulation Type
1	2	1/2	DBPSK
2	6	1/2	DBPSK
3	14	1/2	DBPSK
4	14	1/2	DQPSK
5	16	3/4	DQPSK
6	18	8/9	DQPSK

Pactor III spectrum: 2.2 kHz 18 PSK carriers



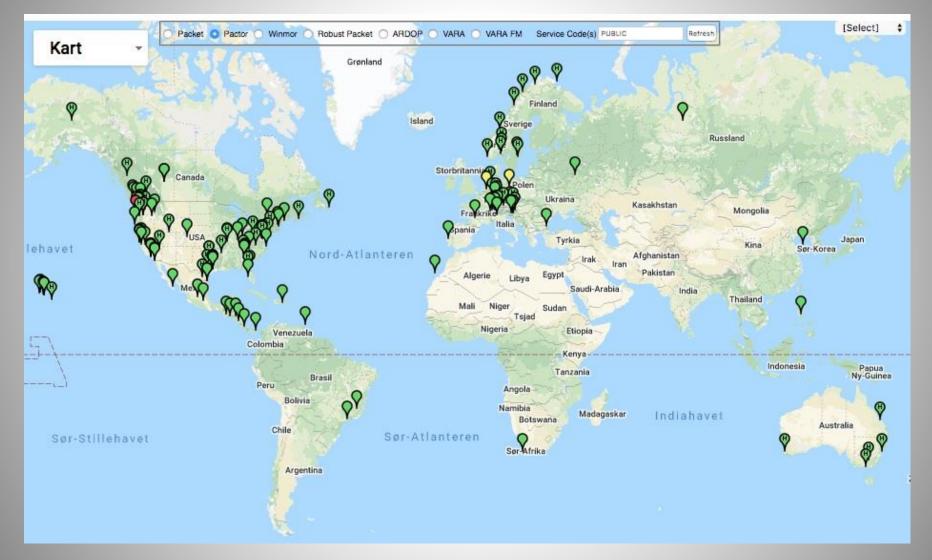
Pactor IV - 1800 baud (not legal yet in USA)



Pactor IV speeds

Speedlevel	Modulation	Gross rate	Net rate [bps]
1	2-Ton-Chirp	113	46,9
2	DQPSK, Spread-16	225	85,32
3	DQPSK, Spread-16	225	147,2
4	DQPSK, Spread-8	450	300,8
5	BPSK	1800	433,1
6	BPSK	1800	1096,5
7	QPSK	3600	2199,5
8	8-PSK	5400	3304,5
9	16-QAM	7200	4407,5
10	32-QAM	9000	5512,5

Pactor World Stations (date unknown)



VARA HF/FM uses sound cards

NS7C - Si Help	ttings Message Attachments Mov	e To: Saved Items - Delete Open Ser	
DAAAAA	Contraction of the second property spectral second second		sion: Vara Winlink - Logs
😸 Vara Winlink Session -			_ O X
K6SDR Cen	e Peer-to-Peer Channel Selection Forecas ter Freq. (kHz): 7104.500 Dial Freq.	it Bestichan. Nextichan. Show/Hide TNC Star (kHz): 7103.000 Bearing: 182 Quality: 46	
Favorites: Channel Busy In: 776/780	VARA HF Modern v1.9.1 NS7C Settings Log* Help		
RMS Trimode 1.3 18.4 Welcs NS7C has 1437 minutes rema [WL2K.5.0.82FWIHJMS] .PQ: 16520650 CMS via K6SDR > .FW: NS7C [RMS Express-1.5.11 3-B2F .PR: 20465304 : K6SDR DE NS7C (CN87M FF :PM: NS7C 2XMOSAXA4JJ FC EM 2XMOSAXA4JJ 2211 F> 41 FS Y *** Receiving 2XMOSAXA44.		1000 800 600 400 200 0 DATA	
	Audio Input -11 dB CPU	CPU	AFC S/N 34 Hz S/N (2500 Hz); +5.5 dB

VARA User interface

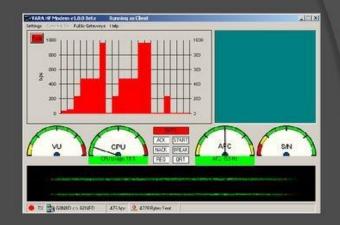
TX Mode

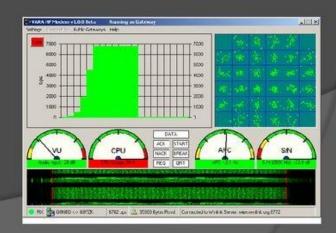
Link throughput and Data block delivery is presented as a dynamic moving time-line display

RX Mode

Received data blocks are shown on the moving time-line display

Signal quality and mode selection is presented as an adaptive **Constellation display**





Winlink's VARA HF SSB (sound card) wide 2300 Hz and narrow 500 Hz

VARA HF v4.0.0 Speed Levels

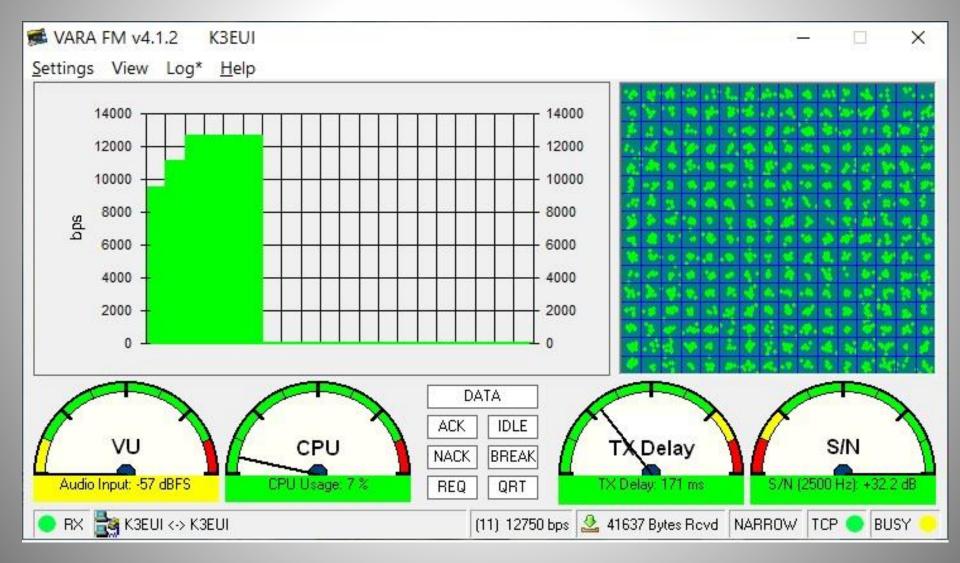
		VARA	HF 2300		VARA HF 500				
Level	Symbol Rate	Carriers	Mod.	Net Rate (bps)	Symbol Rate	Carriers	Mod.	Net Rate (bps)	
1	23	32	FSK	18	23	11	FSK	18	
2	47	16	FSK	41	47	11	FSK	41	
3	47	16	FSK	82	47	11	FSK	61	
4	94	16	FSK	175	94	2	BPSK	88	
5	94	3	4PSK	270	94	2	4PSK	177	
6	94	4	4PSK	363	94	3	4PSK	270	
7	94	6	4PSK	549	42	11	4PSK	441	
8	94	8	4PSK	735	42	11	4PSK	588	
9	94	10	4PSK	922	42	11	4PSK	705	
10	42	49	4PSK	2011	42	11	8PSK	884	
11	42	49	4PSK	2682	42	11	8PSK	1060	
12	42	49	4PSK	3219	42	11	16QAM	1286	
13	42	49	8PSK	4025	42	11	32QAM	1543	
14	42	49	8PSK	4830					
15	42	49	16QAM	5872	1				
16	42	49	32QAM	7050	1				

Winlink's VARA FM 4.0 VHF/UHF WIDE BW (6 KHz) needs 9600 baud pins NARROW BW (2 kHz) uses 1200 baud pins

VARA FM v4.0.0 Speed Levels

		VARA	FM WIDE			VARA FI	NARROW	1
Level	Symbol Rate	Carriers	Mod.	Net Rate (bps)	Symbol Rate	Carriers	Mod.	Net Rate (bps)
1	42	14	4PSK	566	42	14	4PSK	549
2	42	29	4PSK	1188	42	29	4PSK	1181
3	42	58	4PSK	2390	42	58	4PSK	2390
4	42	98	4PSK	4040	42	58	4PSK	3188
5	42	98	4PSK	5387	42	58	8QAM	4252
6	42	98	8QAM	7185	42	58	16QAM	5668
7	42	98	16QAM	9580	42	58	32QAM	7087
8	42	116	16QAM	11340	42	58	64QAM	8505
9	42	116	32QAM	14144	42	58	64QAM	9567
10	42	116	64QAM	16932	42	58	128QAM	11162
11	42	116	64QAM	19003	42	58	256QAM	12750
12	42	116	128QAM	22102	-			
13	42	116	256QAM	25210				

Sample Rx Window VARA FM k3eui connected to k3eui



55kB file sent in 23 sec ==> 140 kB/minute on 2m FM simplex

🗱 Vara FN	1 Peer-to-l	Peer Session - I	(3EUI						<u>/18</u> /		×
Exit Settin	gs Switch	to Winlink Session	Channel Selection	Start Sto	p Abort	I.					
Connection	Direct	 K3EUI 	via			Freq.: 14	5.690 Ra	inge:	Bearin	ng:	
Favorites:				•	Select	Add to favorit	es Remo	ve from	favorites		
In: 48733/5	5206 Out	: 0/0 BPM: 12:	3270 Disconne	cted/Listenin	ng						
;FW: K3EUI [RMS Express K3EUI DE K3I ;FW: K3EUI [RMS Express-1 ; K3EUI DE K3E ;PM: K3EUI AQ FC EM AQ4TY9 F> F1 FS Y Receiving AQ AQ4TY93111 Bytes: 55687 FF FQ End of ses Messages Re Disconnecte	-1.5.36.0-B2F EUI > .5.36.1-B2FH EUI (FM29EW 4TY9311H3R 311H3R 563 24TY9311H3 H3R - 56372/ 7, Time: 00:23 sion at 2021/ nt: 0. Total b aceived: 1. T d from Peer: H	M\$] /) 8 55206 K3EUI test 72 55206 0	VARA WIDE k3eu ed 0036 00:52, bytes/minu : 55687, Total sess 11 15:01:26	i to k 3eui ne: 0 ion time: 00:52,	22						

FLDIGI (Fast Light Digi)

Narrow Bandwidth Emergency Message System

FLDIGI www.w1hkj.com

FREE program

Works on Windows, Linux, Macs Updated regularly Good for casual qso or EMCOMM Low memory required Works on older Win7 laptops/desktops

[Does NOT do Packet, Pactor, JT modes]

Components of FLDIGI

- FLDIGI main sound card program
- FLMSG preformed message types
- FLAMP sends longer files in blocks
- FLRIG CAT or Rig Control options
- FLLOG logging program

FL Message: FLMSG

FILES are "wrapped" for <u>error detection</u> Weather reports American Red Cross messages ICS emergency messages Spreadsheets (CSV files) ARRL RadioGram

CUSTOM FORMS - (local WX)

FLMSG: Severe Weather Reports

FLMS	G: 2.0.10	D					_ _ x
File	F <u>o</u> rm	<u>T</u> emplate	Config	AutoSend	Help		
Severe	Wx Re	eport	file	e: default.s2	s		\bigcirc
Report	Narra	ative					Ť
Date			Time			Meas.	Est.
State	Sele	ct State		County -	Select Cou	unty	
City						Store	Default
	Tor	nado					
	Fun	nel cloud					
	Wal	l cloud					
	Hail	Size	Select Hail si	ze 💌			
	High	n Wind	MPH	Meas'	i Est'		
	Floo	bd					
	Flas	sh Flood	Any	damage? \	Yes 🗌 No	\checkmark	
	Oth	er	Any	injuries?	res 🗌 No	\checkmark	
Co	mp ba	ase64	Olivia-8-5	00 🔽 🌂	166 bytes	/ 59 secs	

ICS 213 emergency message

FLMSG: 4.0.17	– 🗆 X							
File Form Template Config AutoSer	end Utilities							
ICS-213 report file: ICS Originator Responder	CS_213_WCU_Shelter_Report_Drill.213							
Inc: ICS 213 Shelter Report West Cheste	ter University auditorium							
ToW3EOC	Pos. Chester County EOC							
Fm Shelter manager via k3eui	Pos. amateur radio operator							
Sub. Daily Report from West Chester Unive	versity Shelter							
Message: Date 2020-1	-11-24 🔟 Time 0940L							
This is a morning report from the West Chester University Shelter. The shelter now has 22 occupants: 15 adults and 7 children including two pets (dogs). We have enough cots and food for 35 occupants. We have need for two additional first aid kits. No immediate medical conditions to report. The shelter has two DES officials and two volunteers.								
App'd Shelter Manager	Pos.							
Comp 8PSK1000F * 839 bytes	es / 3 secs							
ARQ Send NOT CON	NNECTED							

Spreadsheets (csv files)

CSV Viewer	Ret, "Barn Loos, M				
FIVE County VHF/UHF ARES nets Bucks Co. ARES Chester Co. ARES/RACES Net Chester Co. ARES/RACES Net Chester Co. ARES/RACES Net Chester Co. ARES/RACES Net Delaware Co. ARES/RACES Net Montgomery Co. ARES/RACES Net Montgomery Co. ARES/RACES Net MAARC Traffic Net MAARC Traffic Net Philadelphia ARES Net Philadelphia ARES Net Philadelphia ARES Net	Coverage Area Bucks Co., PA Chester Co., PA Chester Co., PA Chester Co., PA Chester Co., PA Delaware Co., PA Montgomery Co., PA Montgomery Co., PA Main Line, PA Main Line, PA Philadelphia, PA Philadelphia, PA Philadelphia, PA	Freq 147.090+ 446.525- 446.175- 448.875- 146.940- 446.925- 146.835- 449.125- 147.060+ 145.130+ 147.030+ 444.800+ 147.030+	PL 131.8 100.0 100.0 131.8 173.8 88.5 131.8 131.8 91.5 186.2 91.5	Mode FM FM FM FM FM FM FM FM FM FM FM FM	Schedule Time 2100 ET Wed 1930 ET Thurs 1930 ET Thurs 1930 ET Thurs 1930 ET Thurs 1930 ET Mon 1900 ET Thurs 1900 ET Thurs 2030 ET M,W,F 2030 ET M,W,F 2100 ET Sun 2100 ET Sun 1900 ET Tues
<)		Þ
				ĺ	Close

American Red Cross - Custom forms

FL	MSG: 4.0.17		5 <u>663</u> 5		×
File	Form Temp	ate Config AutoSend Utilities		He	lp
Blank	Drag-n-Drop Blank CAP CSV	file: new.b2s			
	MARS Plaintext Radiogram	ARC Client Incident Report V.1 ARC Safe and Well v1.1 ARC-213 V1.1 ARC_Emergency_Welfare_Inquary_Form_v_1.0 ARC_ICS-204_Work_Assignment_V.1 ARC_Requisition_6409_v2.2 ARC_Requisition_6409_v2.2 ARC_Staff_Injury_Illness_Record V.1 ARC_Staff_Request_Form_V.1			
	omp THOR22				
ARQ	Send	NOT CONNECTED			

FLAMP

Larger File is broken into multiple smaller BLOCKS

Each "BLOCK" has its own check-sum

Missing Blocks? Send a REPORT Resend only the "missing blocks" save time

FLAMP: breaks a longer message into "blocks" 3.17 kB file is sent in 11 seconds with 19 "blocks"

¥ FLAMP: 2.2.02		x
<u>File</u> Script Help		
Receive Transmit Events Configure		
Send to QST		
File heat_wave.txt		
Descrip		
Blk size 128 Xmt Rpt 1 Hdr Rpt 2	# Bks 19	
base64	1 secs	
Comp 🗌 Transmit unproto (plain text, 7bi	t ASCII)	
blocks	Fet	ch
Transmit Queue Xmit Xmt All Remove Ad	d Di	nD
C:\Users\bfeierman\NBEMS.files\FLAMP\rx\heat_wave.txt		

FLAMP: Rich Text Format 4.2 kB file (24 blocks) sent compressed via 2m FM repeater by 8PSK1000F in 18 seconds

FLAMP: 2.2.05.02 - 🗆 🗙
<u>File Script Help</u>
Receive Transmit Events Configure
Send to QST
File FD 2020 Planning.rtf
Descrip
Blk size 4 144 Xmt Rpt 4 1 Hdr Rpt 4 2 H # Bks 24
base64
Comp Transmit unproto (plain text, 7bit ASCII)
blocks Fetch
Transmit Queue Xmit Xmt All Remove Add DnD
C:\Users\Barry\NBEMS.files\FLAMP\rx\2020_05_19\FD 2020 Planning.rtf

FLAMP: 9.8 kB email (eml) file sent on UHF FM repeater 56 blocks sent in 40 seconds via **8PSK1000F**

FLAMP:	2.2.05.02 — 🗆	×
File Scrip	ipt <u>H</u> elp	
Receive	Transmit Events Configure	
Send to	QST MARITIME RADIO HISTORICAL SOCIETY,1 April 2020,, 'Spe	cial Bu
	▲ 144 ▶ Xmt Rpt ▲ 1 ▶ Hdr Rpt ▲ 2 ▶ # Bks 5	6
2	base64 8PSK1000F 9862 bytes / 40 secs Comp Transmit unproto (plain text, 7bit ASCII))
blocks		tch DnD
-	Barry\NBEMS.files\FLAMP\rx\2020_04_02\MARITIME RADIO	HIS

PANBEMS 80m net

Sunday mornings: 7:30 am to 9 am Frequency: 3583.0 kHz (USB) Mode: THOR 22 for check-in MFSK32 for traffic experiment with OFDM modes

Propagation: NVIS (skywave) 10-300 miles

PA NBEMS net information

https://groups.io/g/panbems

Net control ops in Eastern PA NY3J Ron Bucks County K3EUI Barry2 Chester County K3UG Barry4 Chester County

PA NBEMS net

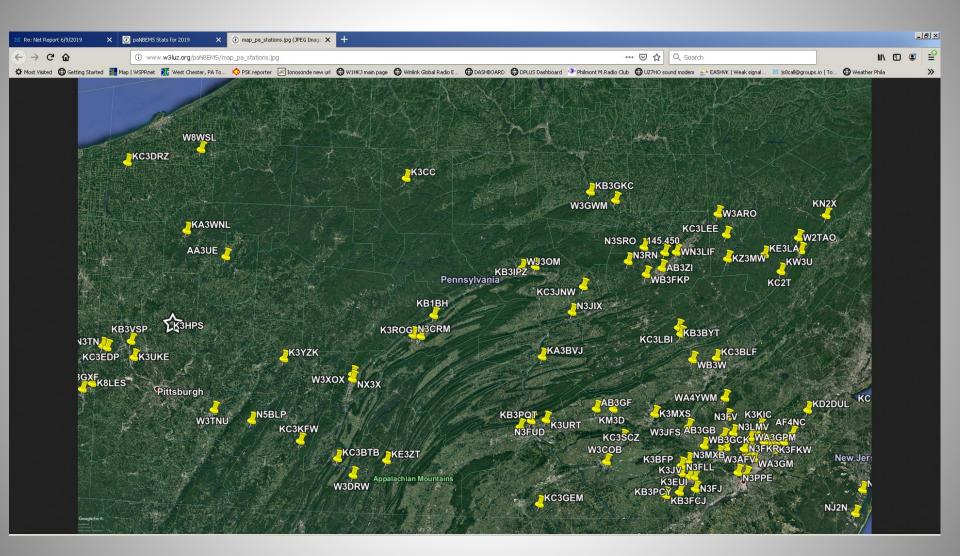
Stations check in first from PA by region Emergency, QRP, EOC WPA, CPA, and EPA (by county)

then from call regions 1,2,3,4,8,9, Canada

Propagation via NVIS: 10 to 400 miles Typical Log 50-80 stations

- Group Email Addresses
- Post: panbems@groups.io
- Subscribe: <u>panbems+subscribe@groups.io</u>
- Unsubscribe: panbems+unsubscribe@groups.io
- Group Owner: panbems+owner@groups.io
- Help: <u>panbems+help@groups.io</u>

Pa stations checking in regularly on 80m



HF NBEMS regional nets

NY NBEMS

Saturday 8:00 am 3584.0 kHz (USB)

NJ NBEMS

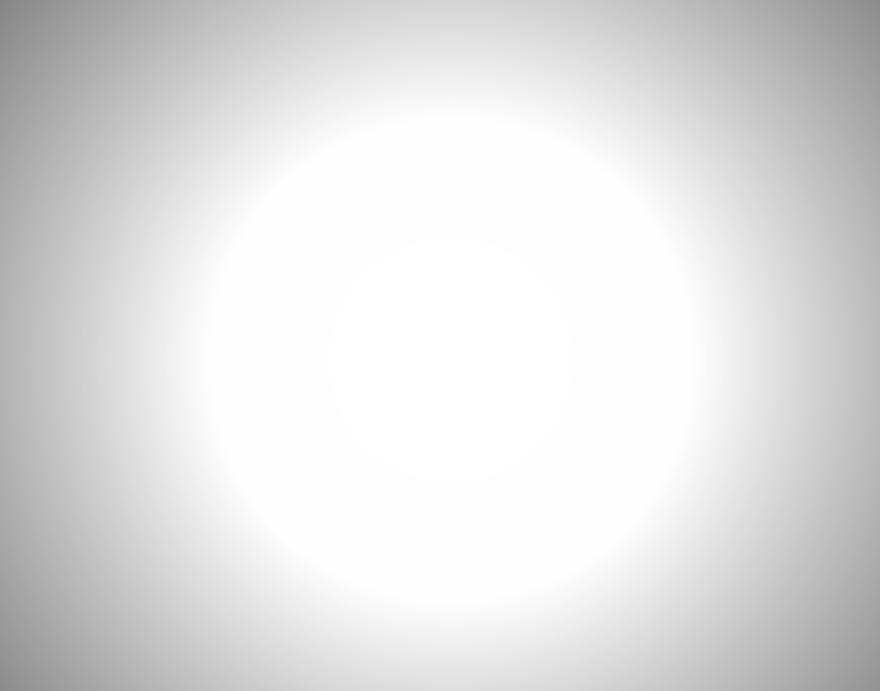
Sunday 9:30 am 3584.5 kHz (USB)

NH Digital Net Saturday 7:30 am 3582.0 kHz (USB)

SATERN net: Saturdays 20 meter (14.065)

Time for a Coffee Break and Questions





Complete Winlink/NBEMS FLDIGI station Icom 706MIIG (HF/VHF/UHF) SSB-FM USB-serial converter COM port PTT and CAT (rig control) SignaLink usb audio and HF antenna tuner Pactor III TNC for HF Pactor 3 and VHF PACKET



Hardware needed

- RADIO HF SSB or VHF/UHF FM or HT TX: input port - MIC or DATA port RX: output port - speaker/headphone or DATA port
- Sound Card analog/digital conversions Sound Card INPUT - Rx analog audio from radio Sound Card OUTPUT - Tx analog audio to radio PTT - COM port or VOX (voice relay) GND - common ground cable

Interface Requirements

Goals: set proper RX and TX levels, provide a means to SEND (PTT) avoid RF feedback

Optional Rig Control (CAT)

Sound Cards (for older desktops) 1990's

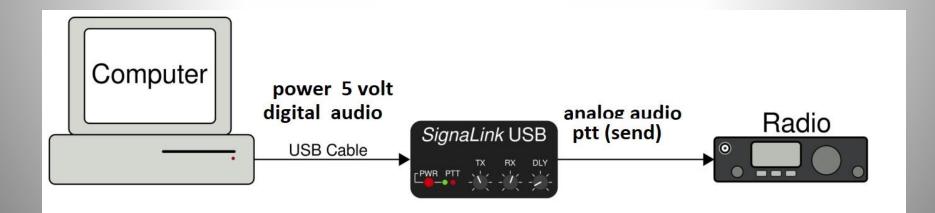


USB audio - getting smaller and smaller MIC input and HEADPHONE output VOL control, MONO/STEREO

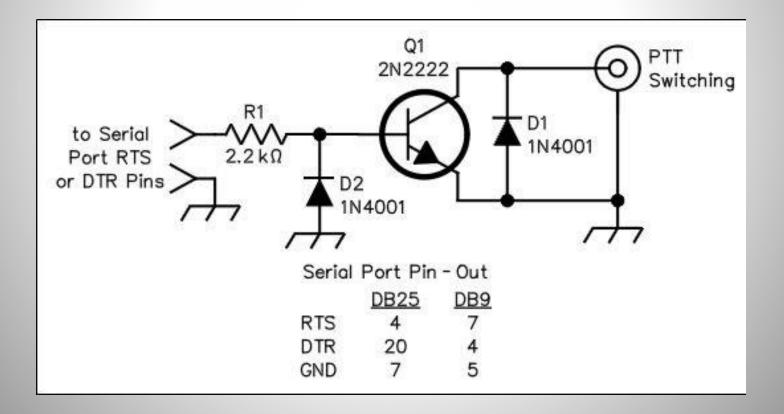


Typical setup with external sound card digital - usb cable to computer analog - audio cable to radio

advantage: PTT by VOX (no COM port)



Simple PTT (send) Circuit using a serial COM port Positive voltage on pins (RTS or DTR) grounds the PTT switching circuit



Tigertronics - SignaLink (no COM port)

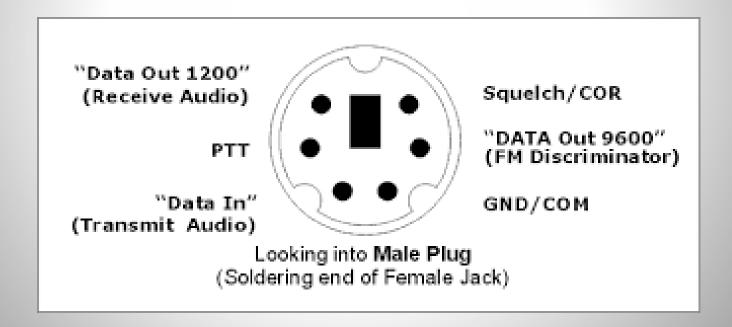
USB sound card: power from usb 5 volts Has its own VOX circuit for PTT and Delay (hang time) Rx and TX audio level adjustments



Note (8 pin) RJ45 socket to RADIO USB port to COMPUTER MON = listen to TX audio SPKR/AUX = alternative RX inputs from headphone



6 pin "MINI-DIN" port common on all dual-band FM rigs one TX port one PTT port TWO RX ports: 1200 or 9600 baud 9600: FLAT audio 1200: processed audio

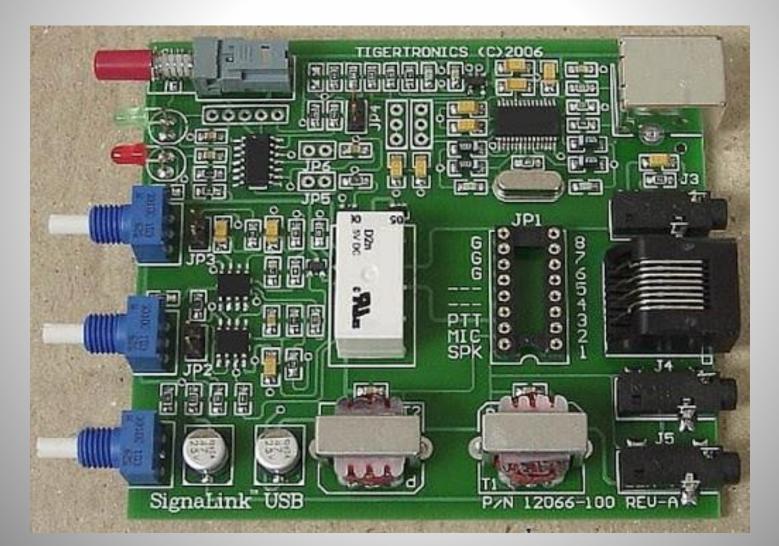


SignaLink - rear connections

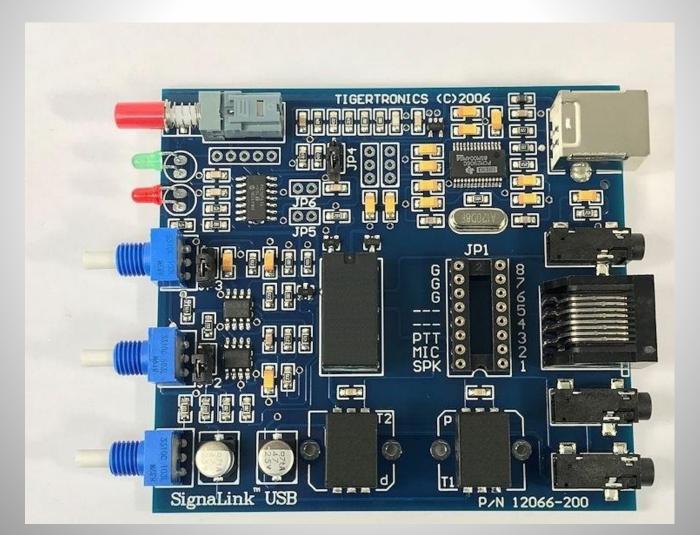
USB power and digital audio to computer Radio Cable: RJ-45 to specific plug for radio model MON jack - listen to your TX audio in headphones



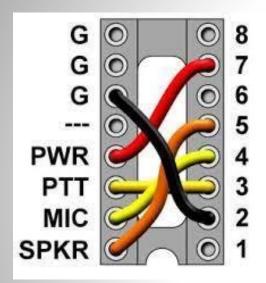
SignaLink: pre 2018 Circuit board Tx: Left channel only - early transformers limited audio < 3 kHz mechanical (slow) relay for PTT via VOX noisy at very low audio frequencies <300 Hz



SignaLink post 2018 newer transformers - higher audio response range > 3 kHz better voltage regulation still MONO only - Tx/RX - Left channel only



SignaLink connects to variety of radios via Jumper block to set function of pins 1-8





Signalink SLCAB13K Cable Diagram			
RB RJ45 Pin		Kenwood ACC2	Function
1		12	TX Audio Gnd
2		8	PTT Gnd
3		4	RX Audio Gnd
4		13	PTT (Mic Active)
5	///	NC	
6		9	PTT (Mic Muted)
7		11	TX Audio
8		3	RX Audio



Rigblaster "interface" (needs external sound card) Transmit: L/R/both channels with isolation transformer VOX or Com Port for PTT (send) TX audio plugs into ANY radio's <u>microphone</u> jack



Rigblaster "Advantage"

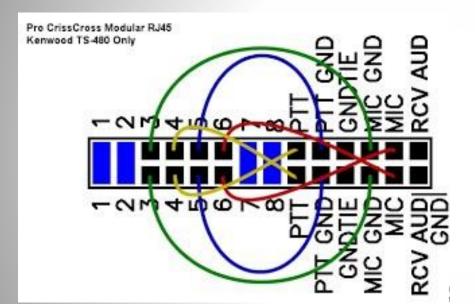
USB based sound card - very low noise plugs into any MIC /speaker port, or DATA port 1 COM port for: PTT, Rig Control, CW keying, FSK RTTY TX PTT via VOX or COM port (toggle switch) Individual GAIN knobs: Tx, Rx, VOX hang time

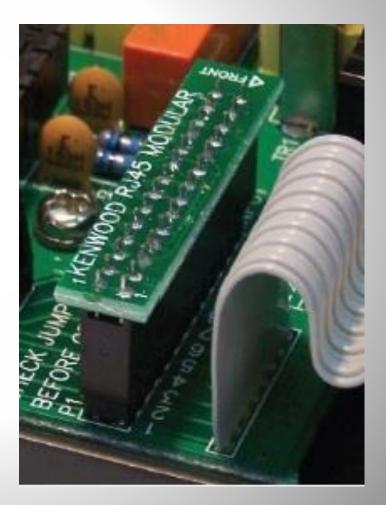


Rigblaster Advantage - rear view USB or Serial RS232 Com Port CAT (rig control) CW keying or FSK keying for RTTY LINE in (receive audio) PTT (external switch) and MIC (to radio's MIC jack)



Rigblaster Unique wiring pattern for each radio cable plug in jumper blocks make connections easy





shielded audio style cable 3-conductor cable for Icom's CI-V CAT control optional for "rig control" by computer app



Rigblaster "NOMIC" (no sound card) conditions Tx audio and PTT via serial COM port (you still need a sound-card)

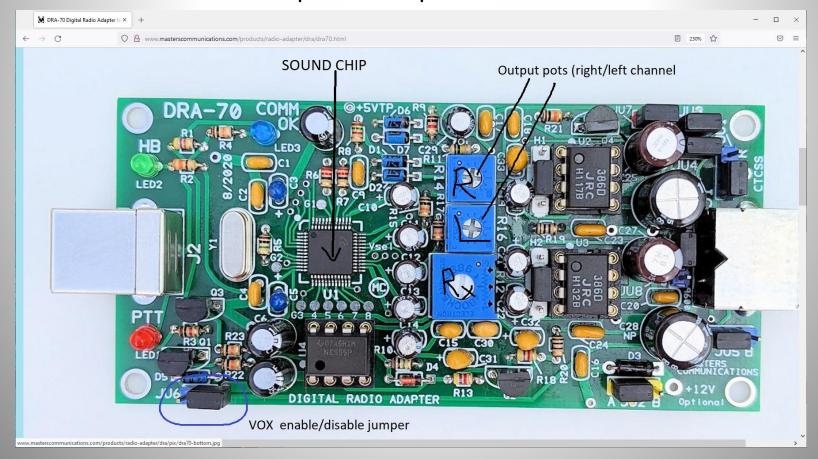


External USB Sound Blaster (low noise, high quality) need audio cables to fit YOUR rig (Tx/PTT /Rx)

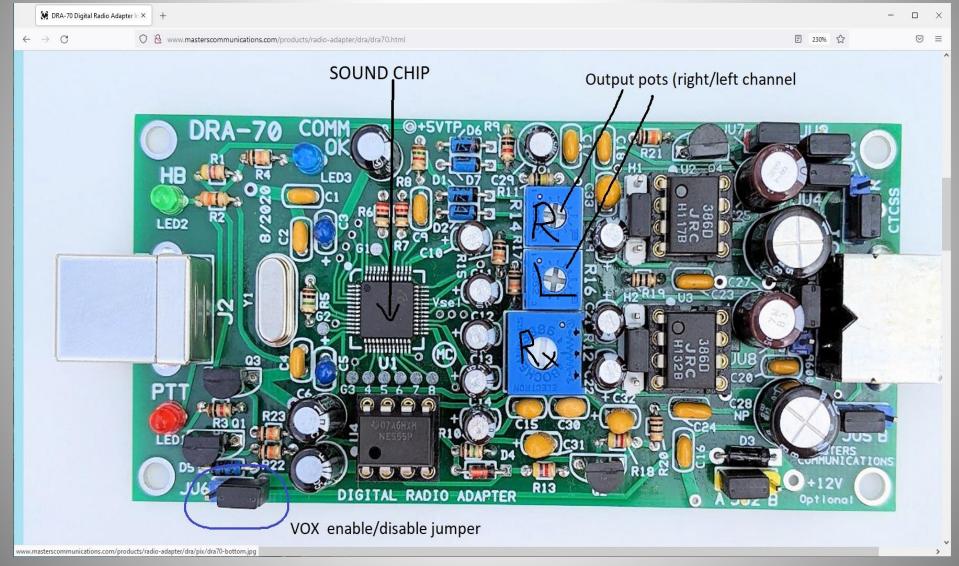


DRA70 sound card - Masters Communications

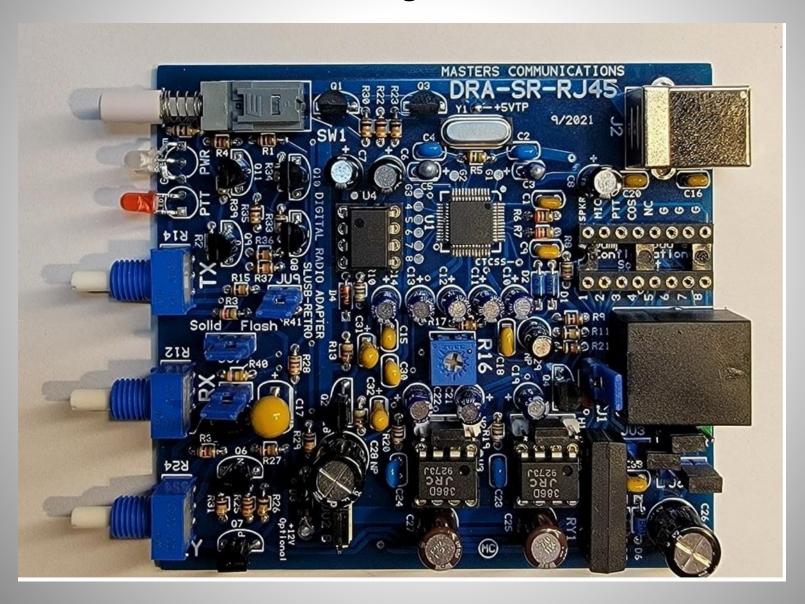
Left and Right Tx channels (small blue potentiometers) wide bandwidth >10 kHz - no transformers software asserted PTT by GPIO or VOX (L/R) narrow and wide bandwidth modes (VARA FM wide) plenty of power output with LM386 amplifiers on both L/R USB to computer - 6 pin MINI-DIN to radio

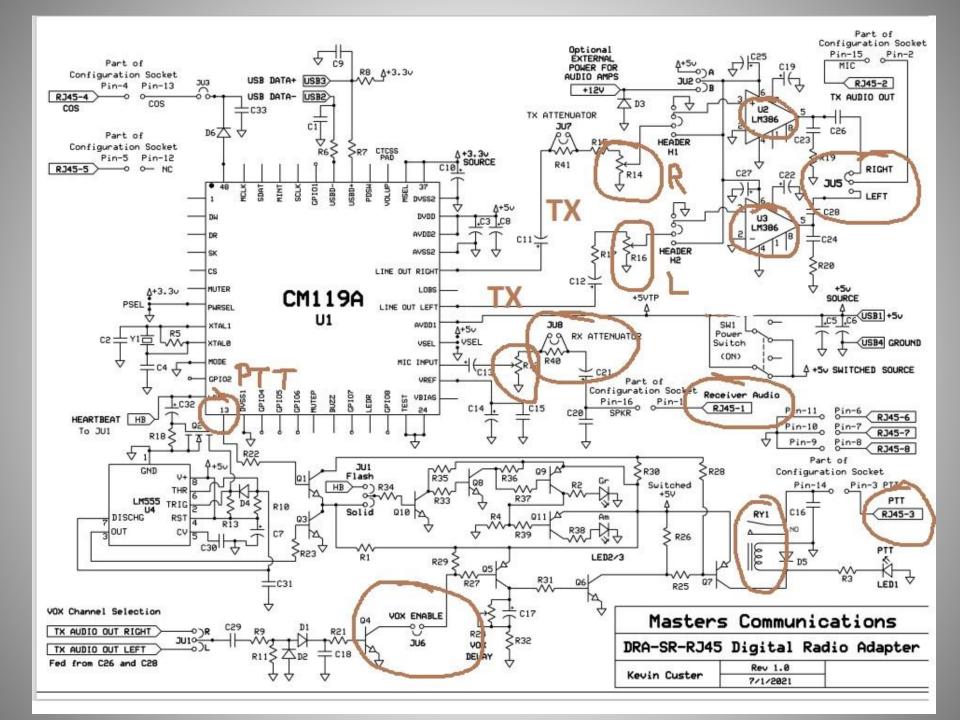


Left and Right Channel VOX enable/disable

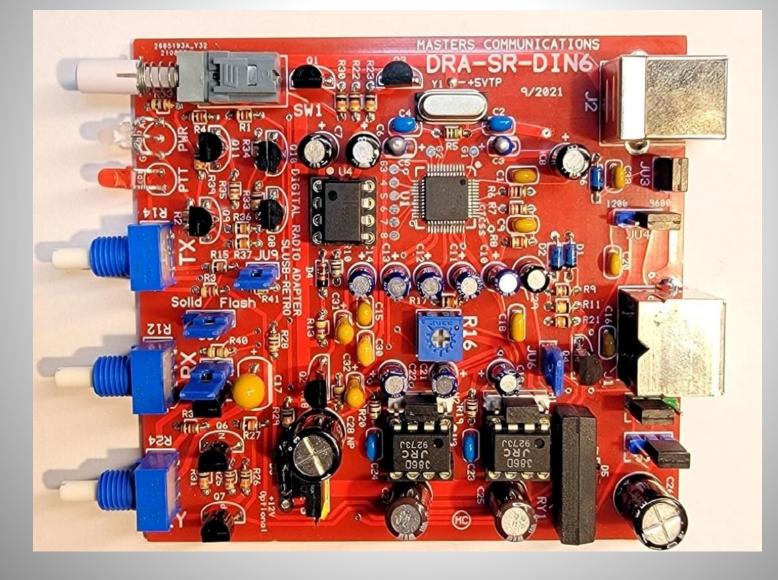


DRA SR RJ45 output socket fits in SignaLink Box





DRA SR with MINI DIN socket to radio



Other popular sound cards





MINIMUM method: shielded cable with TX and RX audio 1:1 isolation transformers



Many modern rigs have built-in sound cards



