Digital Modes and Sound Card Interfaces for Amateur Radio

Presented by:
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**For the Regular Meeting of the Oak Forest Amateur Radio Club, KE5TRB
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Setup for Digital Modes

Load the following Apps:

- MultiPSK

- Laptop Computer Sound Card

- Sound Files

Soundcard Digital Modes

- Overview
  - With modest computer and free software you can get on the air with CW, RTTY, PSK, Fax, SSTV and other modes through the mic input in SSB.
  - Easy to learn CW computer decoding
  - Interfaces easy to make or purchase for under 100
  - Less crowded on the HF bands
  - Lower power requirements ~ for DX 50 to 100 miles per watt
  - Just plain fun

Soundcard Digital Modes

- Caution
  - Digital modes for PSK, RTTY and others run at **Continuous Duty Cycle**
  - **Power is cut back to 50%**
  - Long QSO can cause overheating

Theory

- Shift in tone, frequency and bit sequence used for RTTY, ASCII, Olivia and other modes

- Shift in phase of signal use in Binary Phase Shift Keying

- Raster (line by line) transmission used in Fax and FeldHell.

Sound Card Digital Modes

Interfaces

You can purchase an interface to connect your transceiver to your computer, OR you can make your own for a few dollars.

Sound Card Digital Modes

- AF or speaker out from the radio connected to the computer through the audio in (microphone, sound in, aux)

- Speaker out connects to the microphone or phone patch

- With a commercial interface, cables run through the auxiliary port.

Sound Card Digital Modes

Connecting the radio to the computer

Sound Card
LINE IN

XCVR
AUDIO OUT

Receive Audio connection. Connect an audio cable between the transceiver audio output and the soundcard LINE IN jack.

LINE
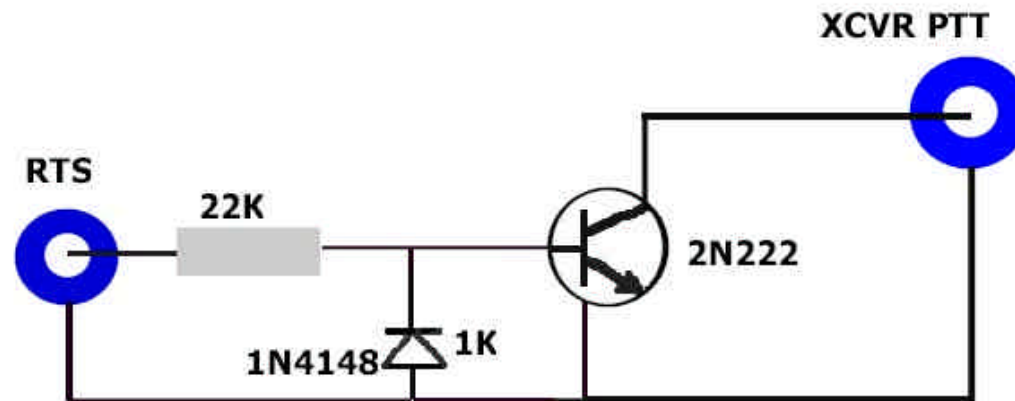OUT

XCVR
MIC/LINE IN

100K

1K
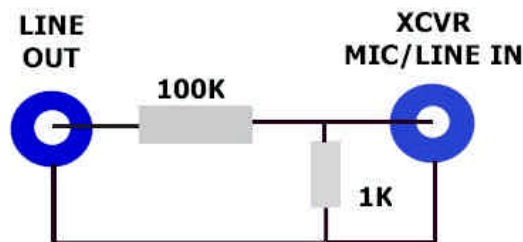
Transmit Audio Connection: Connect a shielded audio cable between the transceiver MIC input and the soundcard LINE OUT jack through a 40 db attenuator. If your transceiver has a LINE input, no attenuation is required. (eliminate the 2 resistors)

Sound Card Digital Modes

Connecting the Radio to the Computer

T/R Connection:

PTT is controlled via the RTS and/or DTR outputs of the computer's RS-232 serial port. This is eliminated with the USB interfaces typically found in most new computers.

Sound Card Digital Modes

- For this demo we are using a Signalink USB.
- About $90 with the cables and jumpers
- Essentially an external sound interface
- Plug and play

Software

- Free software is available on the web

- Some have more modes than others.

- All typically interface with either USB or serial

- Many have logging features, rig control, DX cluster interfaces, recorders, etc.

- The free software is very good, reliable and stable.

- Getting started is easy

- Next: What are the modes and how do you copy them?

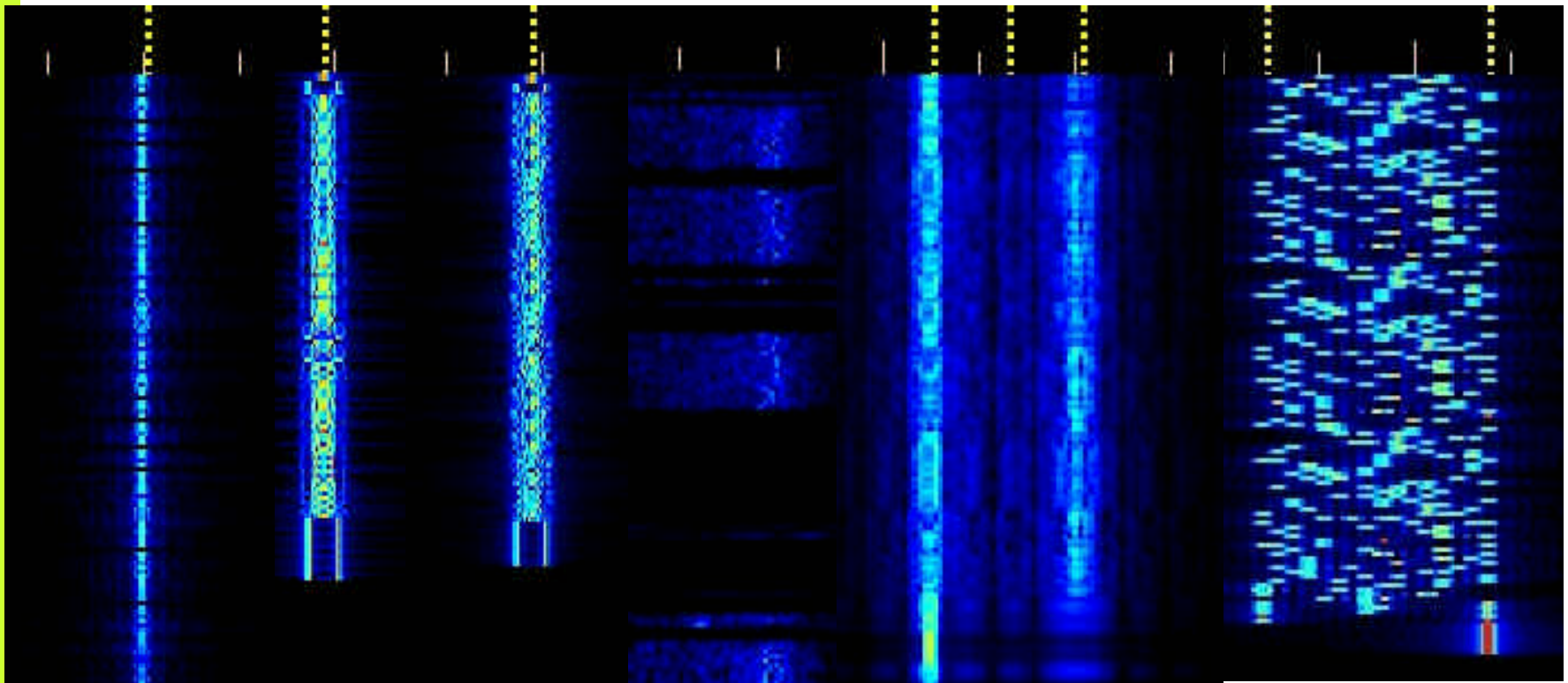*Digital Modes and Sound Card Interfaces - WB5ANN - Mark Landress*

Free Software Links

- Ham Radio Deluxe - includes rig control program - multimode
  - http://www.ham-radio-deluxe.com/
- Hamscope - multimode
  - http://www.qsl.net/hamscope/
- Digipan - PSK 31
  - http://www.digipan.net/
- Winwarbler with dxlabsuite - multimode with other nice features
  - http://www.dxlabsuite.com/
- Multipsk - multimode
  - http://f6cte.free.fr/index_anglais.htm

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Software Details

- All the interfaces run about the same. The example is multipsk which has all modes in one application.

Logging / Setup

Mode Select

Tuning Select
Waterfall / FFT

Xmt / Receive
Window

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Trace and Digital Sound

This is the waterfall trace of each mode. (Demo)

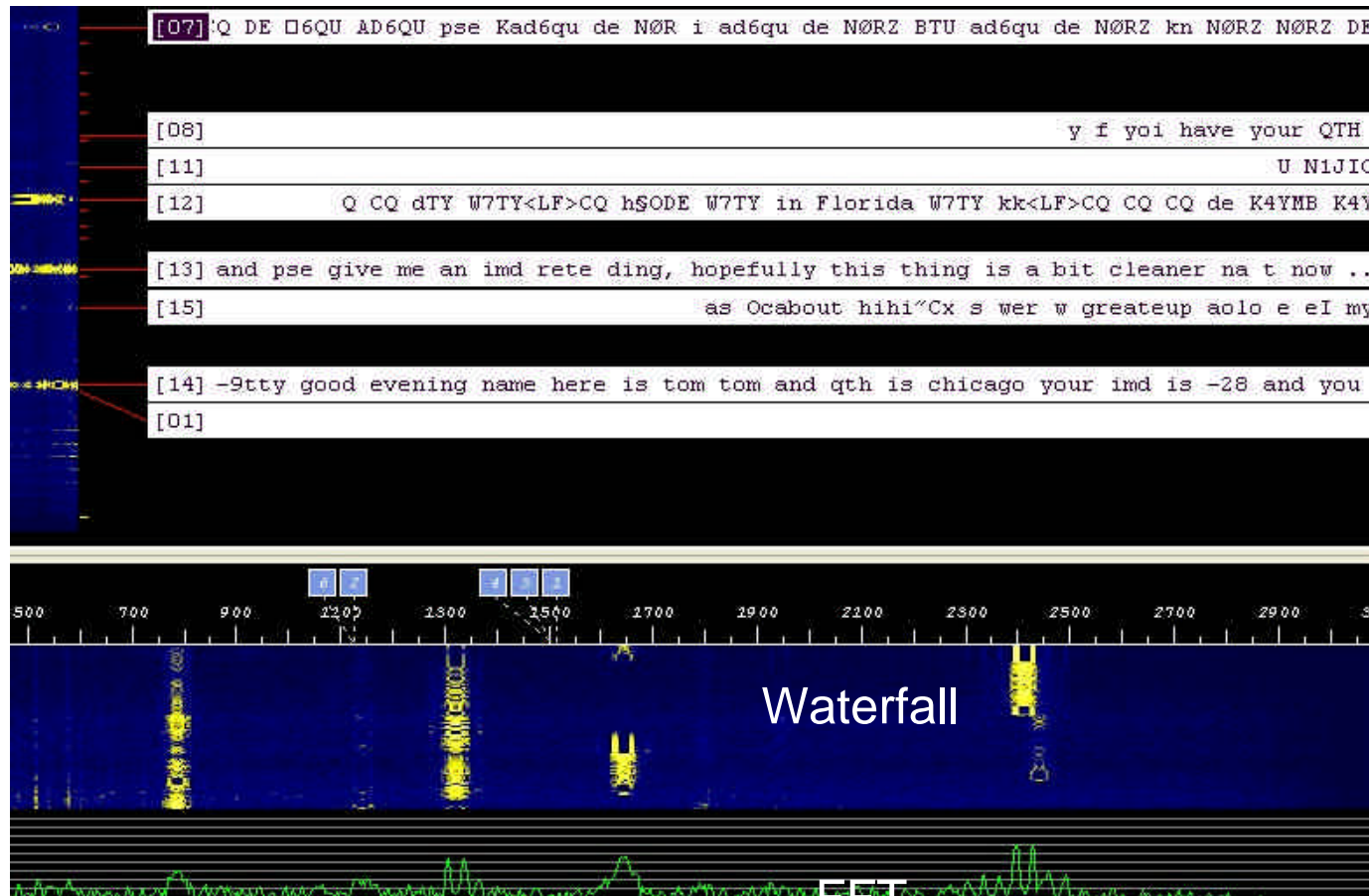| CW | PSK-31 | QPSK | PACKET | RTTY | MSK-16 |

Sound Card Digital Modes

Panoramic Views

Monitors up to 40 PSK QSO's at once

APRS
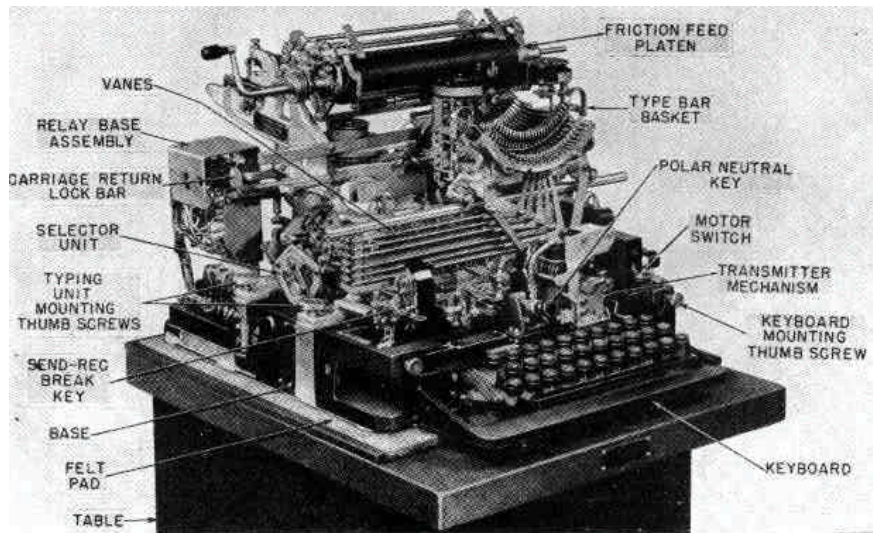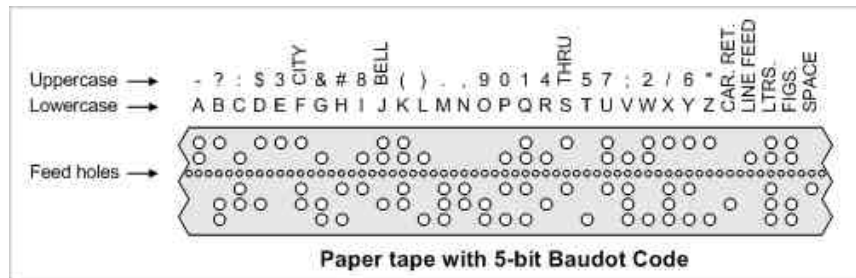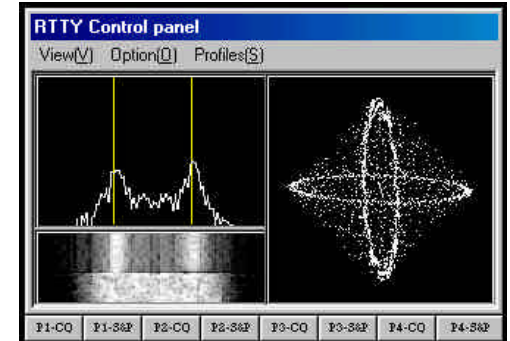
Automatic Packet Reporting (APRS)

🔊 Embedded link. (APRS is usually on 144.39 mHz)

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RTTY Then & Now

Paper tape with 5-bit Baudot Code

RTTY Control panel

BITS	LTRS	FIGS	HEX
00011	A	-	03
11001	B	?	19
01110	C	:	0E
01001	D	$	09
00001	E	3	01
01101	F	!	0D
11010	G	&	1A
10100	H	STOP	14
00110	I	8	06
01011	J	'	0B
01111	K	(	0F
10010	L	)	12
11100	M	.	1C
01100	N	,	0C
11000	O	9	18
10110	P	0	16
10111	Q	1	17
01010	R	4	0A
00101	S	BELL	05
10000	T	5	10
00111	U	7	07
11110	V	;	1E
10011	W	2	13
11101	X	/	1D
10101	Y	6	15
10001	Z	"	11
00000	n/a	n/a	00
01000	CR	CR	08
00010	LF	LF	02
00100	SP	SP	04
11111	LTRS	LTRS	1F
11011	FIGS	FIGS	1B

RTTY Art

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Packet

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HF Telefax

HF Weather Fax

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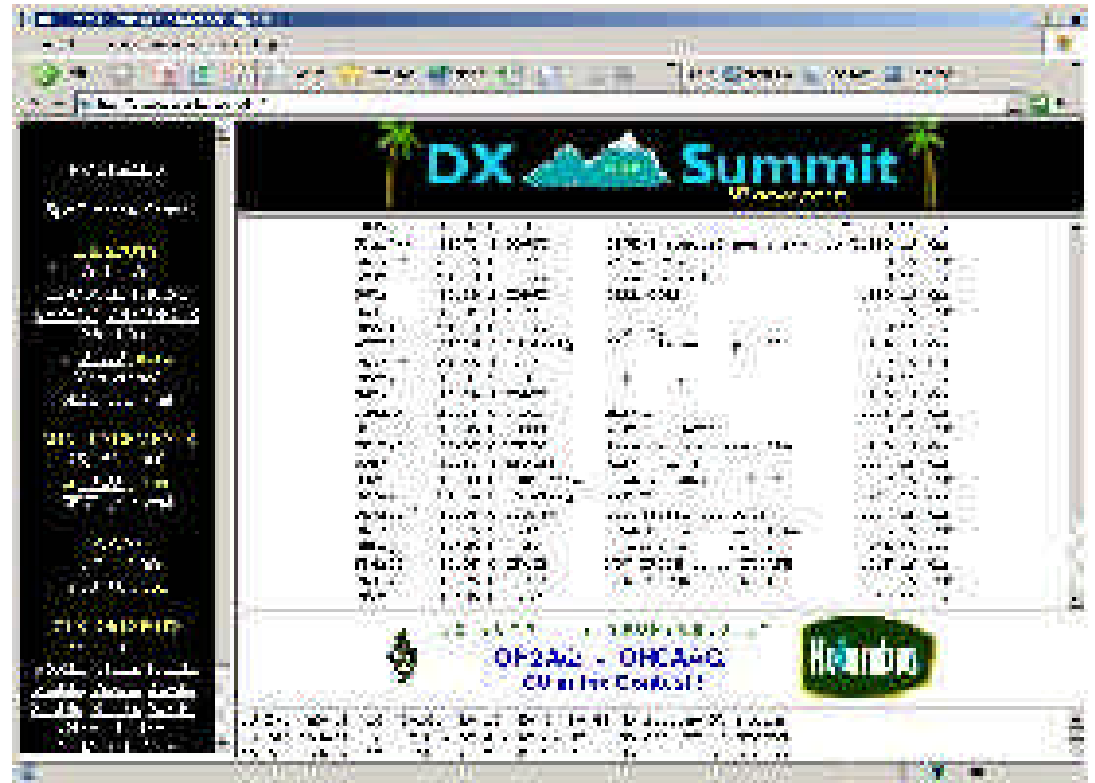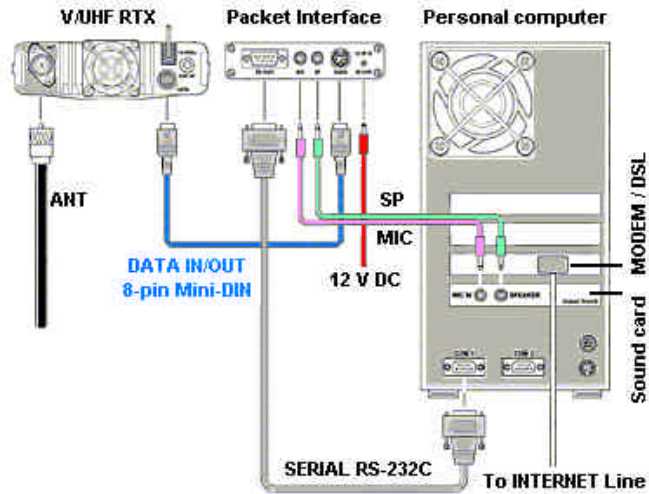
Hellschreiber

An early digital mode that is reviving with digital sound cards

ON WITH A ZERO CALL AND THE OTHER IN BC CANADA AND I WAS COP
DPYING BOTH OF THEM FB = WELL JERRY I DONT KNOW IF THE BAND
OPYING BOTH OF THEM FB = WELL JERRY I DONT KNOW IF THE BAND
D WILL HOLD UP MUCH LONGER FOR US SO WILL SEE HOW YOU ARE CO
D WILL HOLD UP MUCH LONGER FOR US SO WILL SEE HOW YOU ARE CO
COPYING = BTU JERRY W6LQR DE N0IU KN
COPYING = BTU JERRY W6LQR DE N0IU KN
N0IU de W6LQR   SOLII COS SCOT , YO U ARE STILL HO
N0IU de W6LQR   SOLII COS SCOT , YO U ARE STILL HO
HOLDING UP VERY WELL. I CHANGED THE FONT AND   PERHAPS
HOLDING UP VERY WELL. I CHANGED THE FONT AND   PERHAPS
IPS THAT WILL MAKE IT A LITTLE MORE READABLE   I
IPS THAT WILL MAKE IT A LITTLE MORE READABLE   I

Slow Scan TV
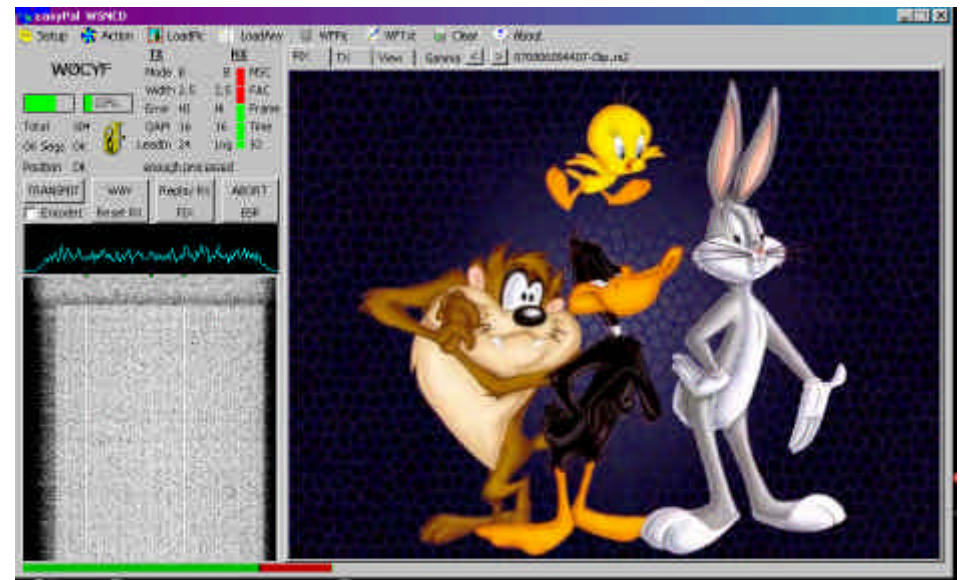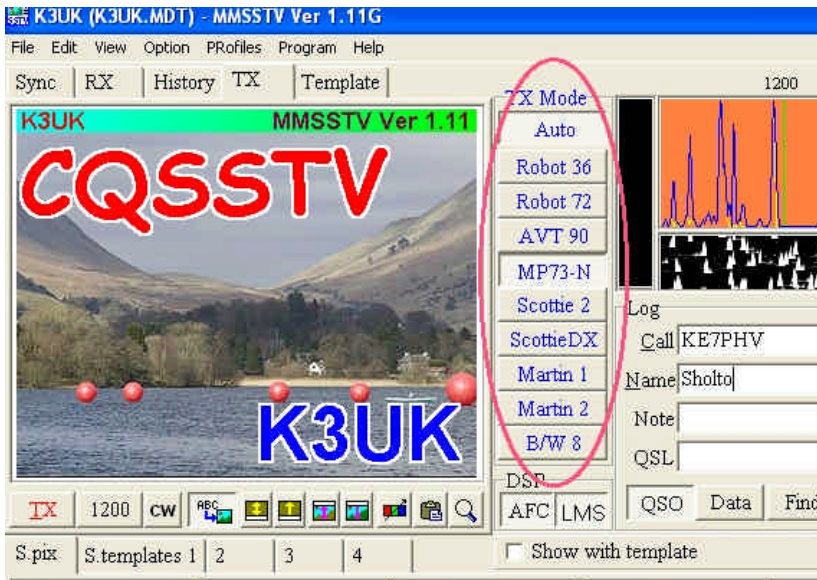
Essentially a color fax image sent with audio at 1200-2300 Hz

Sound Card Digital Modes

- Where to hear signals:
- PSK, RTTY, Olivia, Feldhell, etc.,
- xx.07-xx.100 (CW Portion of Band)
- SSTV 14.230 in Phone portion of band.
- See ARRL Band Plans
- APRS 144.39
- Packet: HF - xx.100 CW Portion of Band)

Acknowledgement

- Some photos and text from KK7LK
- Other photos and information scavenged from the web.

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