



Digital Modes

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Digital Modes

- Popular Modes (RTTY, PSK, JT65)
- Required Equipment (Radio, PC, Interface)
- Popular Software (FLDIGI, DXLabs, HRD, WSJT)

RTTY (Radio Teletype)

- Derived from landline Baudot Code in 1874
- Commercial radio use widespread
- Amateur Radio use Post WWII
- 45.45 Baud, 60 WPM, 170Hz shift (250 Hz RX)
- Still used today for contests, DX, casual QSOs

BPSK31 & BPSK63

- Developed by G3PLX in 1998
- Binary Phase Shift Keying
 - Narrow bandwidth reduces noise
 - But does not work well for transpolar routes
- 31 baud, 50 WPM, 31 Hz shift, < 100 Hz RX
- Very popular conversation mode

JT65A & JT9

- Invented by K1JT in 2003: weak signal reception of EME (-250 dB)
- Encoding designed for high loss, phase shifts, fades, etc.
- MFSK 65 tones <180 Hz per signal.
- RX Bandwidth wide open allowing 12+ signals in 2.5 KHz
- Exchange is call signs, location
- Great for QRP and poor antennas, making it very popular.
- JT9 was designed for HF < 16 Hz wide (120+ QSOs in 2.5 KHz RX)
- Both can decode signals that c

Required Equipment

- Radio that can run SSB (5-25 watts typical)
- Soundcard Interface (external or built-in)
- Cables (radio to interface and rig control)
- PC with software (Windows 7 preferred)
- Accurate Time (+/- 1 sec) for JT65 & JT9

Radios

- Almost any rig – QRP is fine!
- Should be modern enough to have rig control



Most Popular Interface

- Signalink USB see: <http://www.tigertronics.com/>
 - Interface Box
 - Configuration Header
 - Audio/PTT cables
- Costs \$95-\$140 (with cables and header)
- Transformer Isolated Sound, PTT from audio
- NOTE: Does NOT provide Rig Control (Freq)

Signalink USB



Note: Signalink cables deal with Audio and P T
Frequencies/Modes/Bands/Filters/Etc.

Rig Control Cable

- Allows you to control frequency, modes, bandwidth, power, etc via PC
- Avoid "Proliferation" of cheap cables
- Mfg Cables are EXPENSIVE
- "OEM" Cables \$40s
- Check out Amazon



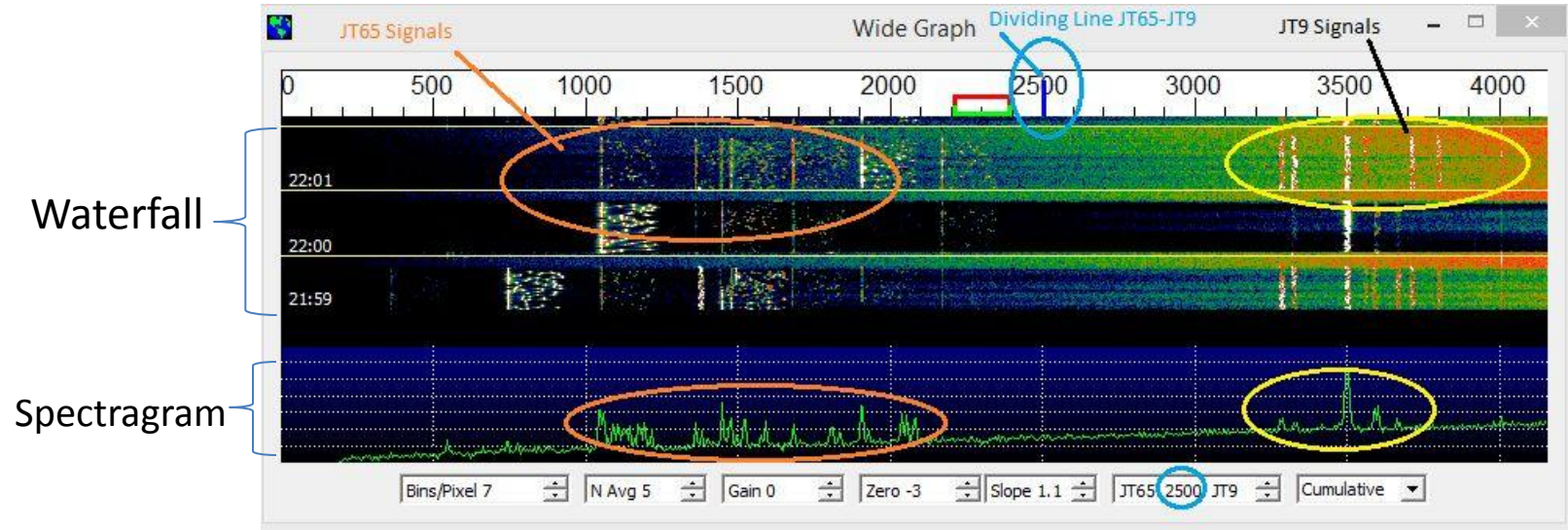
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Digital Mode Software

- Purpose is to decode the RX audio and encode the TX using a soundcard
- Typically has tuning
- Generally radio stays on a fixed frequency and user clicks on desired
- Often integrates logging

What's a Waterfall



Waterfall

Spectrogram

Upper: Shows Time vs Frequency -- Use it as a tuning aid, signal identification, strength, quality, or finding an open freq.

Lower: Signal Strength vs Frequency

FLDIGI (Fast Light Digital)

- Free
- Many Digital Modes
- Part of NBEMS suite of software
- Find it at <http://www.w1hkj.com/Fldigi.html>

FLDIGI

The screenshot shows the FLDIGI software window titled "fldigi - WB4SON". The interface includes a menu bar (File, Op Mode, Configure, View, Logbook, Help), a status bar (RigCAT - K3), and a main display area. The status bar shows "RigCAT - K3", "Freq 14073.460", and "On 0115 Off 0115". The main display area shows "14070.000" and "Call K0CW". Below the main display area is a text input field containing "I am about 13 Miles south of Los Angeles, CA." and "How copy? BTU Charles, K0CW de wd9dui pse kn <DC2>,MD". The bottom of the window features a macro button bar with buttons for "CQ", "ANS", "QSO", "KN", "SK", "Me/Qth", "Brag", "T/R", "Tx", "Rx", and "TX". Below the macro buttons is a waterfall display showing a spectrum plot with a frequency scale from 500 to 4000 Hz. The waterfall display shows a signal at approximately 14070 Hz. The bottom status bar shows "Olivia-8-250", "s/n: -2.8 dB", "f/o +0.0 Hz", and various control buttons like "WF", "NORM", "QSY", "Store", "Lk", "Rv", "T/R", and "SQL".

Rig Control and Logging

Incoming

Outgoing

Macro Buttons

Waterfall

NOTE: Mode is Olivia 8/250, a 8 tone MFSK FEC Mode

DXLabs WinWarbler

- Free
- Written by David Bernstein, AA6YQ
- Updated Frequently
- Used by many Dxers and Contesters
- Find it at <http://www.dxlabsuite.com/>

DXLabs WinWarbler

Logging

Three areas for incoming text

Macros

Waterfall

Rig Control

Broadband Decoder

The screenshot displays the WinWarbler software interface, which is divided into several functional areas. On the left, there are panels for logging (GSO Info), text processing (three stacked text areas), macros (a grid of function keys), and a waterfall display. On the right, there is a rig control panel with frequency readouts and mode selection, and a broadband decoder window showing a table of stations heard.

call	frequency	qual	strength	age	#	with	data
K149NO	7036.217	82	76	000	01	K4FBP	K4FBP DE K149NO SKRlc
K2RHK	7036.995	91	96	000	06	CQ	K CQ CQ de K2RHK K2RHK
Q149NO	7036.217	68	67	000	01	IK4FBP	K4FBP DE K149NO SKRlc
K4FBP	7036.217	86	79	000	02	K149NO	K4FBP DE K149NO SKRlc
LJ1M	7036.964	27	12	000	01		TR e TR

NOTE: Decoding a PSK31 Signal

Ham Radio Deluxe DM780

- Originally Free, now commercial \$99
- Written by Simon Brown HB9DRV
- Considered the best at digital modes
- JT65 and JT9 being added by Joe Taylor
- Find it at: <http://www.ham-radio-deluxe.com/>

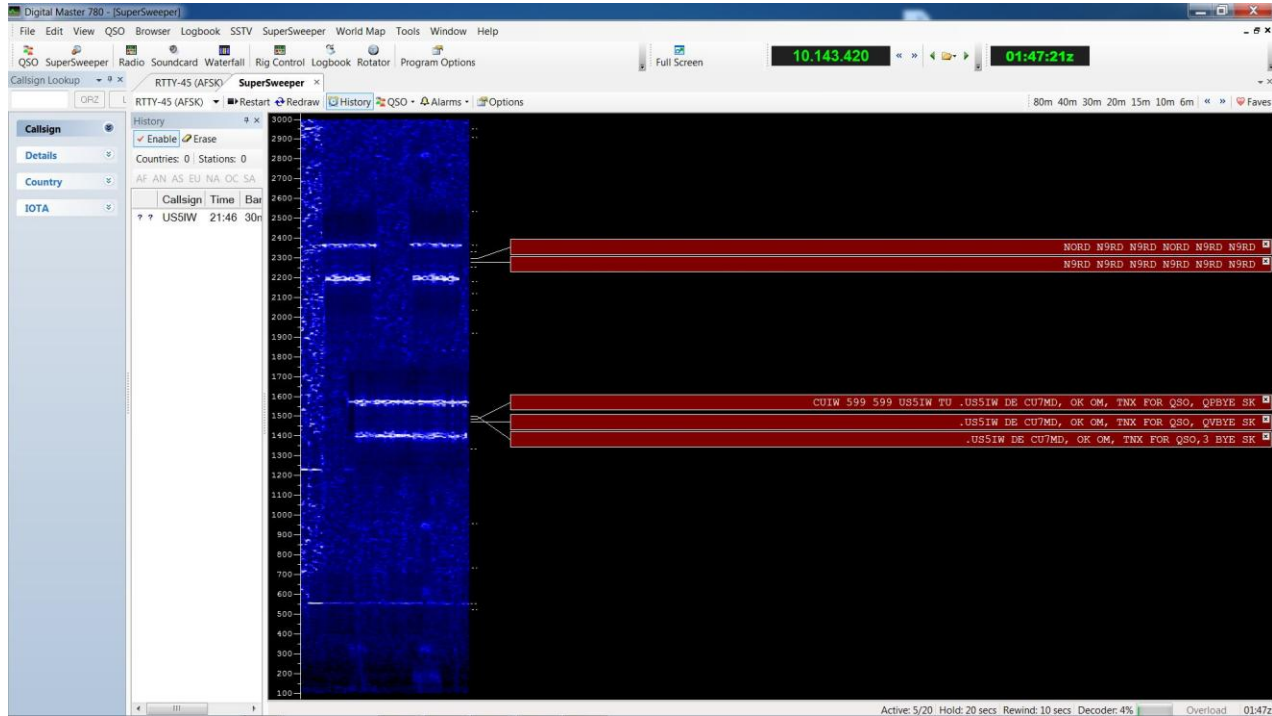
Ham Radio Deluxe DM780

The screenshot displays the Ham Radio Deluxe DM780 software interface. The main window is titled "Digital Master 780 - [RTTY-45 (AFSK)]". The interface is divided into several sections:

- Logging:** On the left side, there is a "Logging" panel with fields for "Add Log Entry", including "Start" (01:40), "End" (01:47), "Name", "Loc", "Country", "Frequency" (10.143.420), "Band" (30m), "Mode" (RTTY), "Speed", "Pilot", and "Remark".
- Inbound Text:** The central text area displays received RTTY data, including call signs like "RYYR CQ CQ DE CUMD CU7MD CUMD PSE" and "VK CU7M CU7MD DE ARNG AK4NG AK4NG RN".
- Outbound & Macros:** Below the text area, there are controls for sending text, including "Send (F1)", "Auto (F2)", "Pause (F3)", "Stop (F4)", and "Repeat".
- Waterfall:** At the bottom, there is a "Waterfall" display showing a frequency spectrum from 100 to 3000 Hz. The signal is centered around 1486 Hz, as indicated by the "Signal: 1486" label.

Annotations with blue brackets point to these specific areas: "Logging" on the left, "Inbound Text" on the right, "Outbound & Macros" on the right, and "Waterfall" on the left.

Ham Radio Deluxe DM780



SuperSweeper decoding RTTY signals

WSJT-X

- Free
- Written by Joe Taylor, K1JT
- JT65 and JT9 only (for now)
- Find it at: <http://www.physics.princeton.edu/pulsar/K1JT/wsjsx.html>
- JTAlert: <http://hamapps.com/>

WSJT-X

Wideband Decodes

Waterfall

Macros

JTAlert

The screenshot displays the WSJT-X v1.3.13673 interface. The 'Band Activity' table shows the following data:

UTC	dB	DT	Freq	Message
2108	-9	1.1	1519	CQ N9NJS EM58
2108	-1	1.4	1696	VON VIERSEN
2108	-2	0.1	1995	CQ EA3CS JN11
2109	-2	1.8	1253	EA7CI EA3HKA JN11
2109	-14	1.0	487	WSSLT DH2KO 73
2109	-4	0.4	878	VA3TFS KB4TOH -04
2109	-6	0.1	1517	N9NJS OE6GH JO65
2109	-3	0.1	1690	G7JUR WB3D -17
2110	-1	0.4	1256	DJ8DI EA7CI 73
2110	-9	0.0	301	CQ KD8RDH EN51
2110	-14	0.6	487	DH2KO WSSLT 73
2110	-10	1.3	894	KB4TOH KD4VRI FM16
2110	-3	0.2	1064	CQ DJ0QO JN39
2110	-7	0.1	1518	OE6GH N9NJS -03
2110	-2	1.4	1695	VON VIERSEN
2110	-1	0.1	1995	CQ EA3CS JN11
2111	-9	-0.3	1252	EA7CI RRR 73
2111	-18	0.0	299	KD8RDH IZ0EJW JW61
2111	-15	1.0	485	WSSLT DH2KO 73
2111	-18	0.1	794	CQ 3A2MW DX
2111	-7	0.1	1517	N9NJS OE6GH R-11
2111	-3	0.1	1698	G7JUR WB3D -17
2111	-2	1.9	1926	R2DAR EA3HKA UN11
2111	-21	0.3	2221	UT7KF KA3UJE -19

The 'Rx Frequency' table shows the following data:

UTC	dB	DT	Freq	Message
2108	-3	0.3	1257	DJ8DI EA7CI -06
2109	-2	1.8	1253	EA7CI EA3HKA UN11
2110	-1	0.4	1256	DJ8DI EA7CI 73
2111	-9	-0.3	1252	EA7CI RRR 73
2111	-18	0.1	794	CQ 3A2MW DX

The 'Waterfall' view shows a spectrogram of the received signals. The 'Macros' list includes:

- 3A2MW WB4SON FN41
- 3A2MW WB4SON -18
- 3A2MW WB4SON R-18
- 3A2MW WB4SON RRR
- 3A2MW WB4SON 73
- CQ WB4SON FN41

The 'JTAlert' section shows a list of active alerts, including '3A2MW'.

NOTE: Decoding 8 JT65 signals in ~1800 Hz