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**MT63** **Winmor**

**RTTY** **Olivia**

**HF Sound Card Modes for EmComm**

Ross Mazzola  
KC2LOC / AAR2BX

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**Key Take-Aways**

- Learn about the various digital modes, their advantages and disadvantages
- Learn about the equipment needed to hook-up your PC to your rig for quick and easy decoding of signals
- Learn about the various software options
- Where to get additional information

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### Digital Modes



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### Why Digital Modes?

- Low cost, easy to use equipment and software
- Low power requirements
- Signals punch through when voice signals can't
- Lots of "Virtual Elmer-ing" available
- Ideal option for emergency communications when conditions are too poor for handling messages by voice

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### Name that Tune

-  CW
-  PSK31
-  Olivia
-  RTTY
-  XYL



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### Popular Sound Card Digital Modes

- RTTY \*
- Olivia \*
- PSK-31
- Throb
- Hellschreiber
- MT-63 \*
- MMTTY
- Clover
- Winmor \*
- MEPT-JT
- SSTV
- Morse
- Contestia

*\* Best Suited for EmComm Use*

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### RTTY

- Radio TeleTYpe
- In use longer than any other digital mode (except for CW)
- Implemented with commonly available PC sound card software
- Very simple technique which uses a five-bit code to represent all the letters of the alphabet, the numbers, some punctuation and some control characters.
- 45 baud (typically). Corresponds to a typing speed of 60 WPM.
- Noise and interference can have a seriously detrimental effect.



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### Olivia

- One of the most robust methods of text keyboarding
- Performs superbly for long distance communications in ionospheric noise conditions where other modes fail
- Many different combinations of formats, but only about 6 Olivia MFSK bandwidth/tone formats are in common use



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### MT-63

- Good for paths that experience fading and interference from other signals
- Provides a "cushion" of error correction at the receiving end while still providing a 100 WPM rate
- Less desirable on crowded ham bands because of wide bandwidth
- A fast PC (166 Mhz or faster) is needed to use all functions of this mode
- Simple to use
- Very tolerant of tuning (as much as 100 Hz of mistuning)




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### Winmor

- Intended for sending messages and binary data (file attachments)
- Designed to handle difficult HF conditions-low S/N levels, moderate propagation, frequency drift
- Handles sound card error rate and drift well
- No broadcast application available at this time




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### Digital Modes Summary

Mode	Waveform		Usage			Speed	Reliability	Weak Signals	Other
	Linked	Non-Linked	Station-to-station	Station-to-net	Breakout				
RTTY		√	√	√	√	Slow	Moderate	Prone to fading	Requires High Power Interoperable with US Forces
Olivia		√	√	√	√	Very Slow	Very High	Superior	Potential interoperability with US Forces
MT-63		√	√	√	√	Moderate	Very High	Operates well	Potential interoperability with US Forces
Winmor	√		√						

*All can play a role in the EmComm toolbox!*

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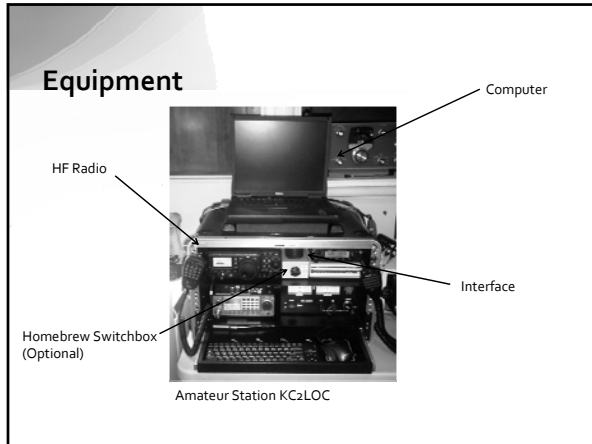
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### Equipment



Computer

HF Radio

Homebrew Switchbox (Optional)

Interface

Amateur Station KC2LOC

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### HF Radio

- QRP Radios
- Transceiver Kits
- Any HF Radio will work
  - Mic Connector
  - Aux Connector



Yaesu FT-817ND

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### Personal Computer

- Computer
  - Desktop
  - Laptop
  - Notebook
  - Netbook
- Operating System
  - Windows XP or newer (Older OS might work too)
  - MacOS and Linux (limited soundcard available)
- Hardware:
  - Serial port or USB (for connection to radio)
  - Sound Card



Asus Eee PC 1005HA

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### Sound Card

- Internal
  - Quality matters, but not critical
- External (Leaves computer sound card settings intact)
  - USB
    - Cheap
    - Quality is all over the map
  - Built into interface
    - Tigertronics SignalLink USB
    - MicroHam USB Interface II



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### Sound Card Interface

- Computer Speakers & Microphone
- Direct Cable
- DIY Interface
- Commercial Interface

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### Sound Card Interface- Mic & Speakers

- Computer Speakers & Microphone
- Laptops and notebooks have them built in!
- Receive Only
- Great for beginners



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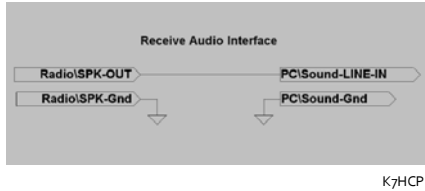
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### Sound Card Interface- Simple Cable

- For receive only
- Direct Cable- SPKR Out/Line In
- Simple, cheap, easy
- Could be problems with RF and ground loops!



K7HCP

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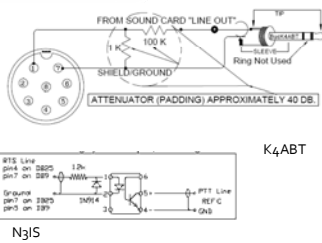
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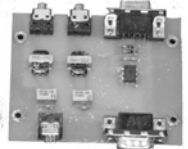
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### Sound Card Interfaces- DIY

- Homebrew
- Internet search will find lots of designs



K4ABT



W7JI

N3JS

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### Sound Card Interfaces- Commercial



West Mountain RIGblaster nomic



Tigertronics Signalink



Donner Digital Interface



BuxComm Rascal GLX

**\$40 - \$180**

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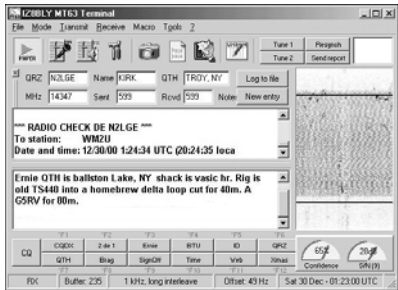
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### Software



The screenshot shows the IZ8BLY MT63 Terminal window. It features a menu bar (File, Mode, Terminal, Receive, Macro, Tgolo, ?), a toolbar with icons for various functions, and a main text area displaying a radio check message from station WM2U. The message includes the call sign, date and time (12:30:00 12/31/00), and a description of the station's equipment. A status bar at the bottom shows various technical parameters like QZ, CGDX, QTH, and a date/time of Sat 30 Dec - 01:23:00 UTC.

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### Software for Digital Modes

- Windows
  - Fldigi
  - Ham Radio Deluxe (DM780)
  - MultiPSK
  - MixW
  - Hamscope
  - IZ8BLY MT63 Terminal
  - MmRTTY
  - TrueTTY
- MacOS
  - Cocomodem
- Linux
  - Fldigi

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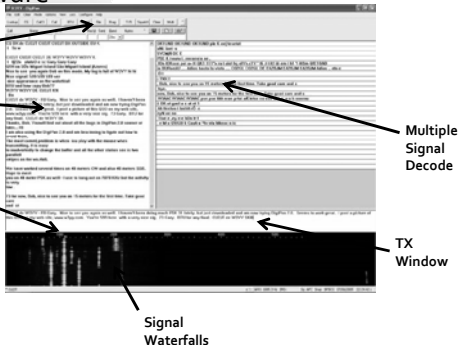
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### Software



The screenshot shows a software interface with several components labeled with arrows: 'Macro Buttons' points to a toolbar at the top; 'RX Window' points to a large text area on the left; 'Signal Selector' points to a list of signals below the RX window; 'Signal Waterfalls' points to a waterfall plot at the bottom; 'Multiple Signal Decode' points to a window on the right; and 'TX Window' points to a window at the bottom right.

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### It's Demo Time!



Amateur Station AAR2BX

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### Additional Information



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### Hints & Tips for Digital Modes

- Never, ever run any ALC. Overdriving causes splatter
- Turn off DSP. Processing make it more difficult for the receiving station to decode your signal.
- There is NO need to tune your receiver. You do your tuning with your mouse splatter
- Use LOW power. Achieved by adjusting soundcard output levels, interface attenuation, gain settings (dig or mic)
- You can easily check whether your PC is generating output tones by connecting a pair of headphones or speakers to the *line out / headphones / speaker connector* when software is in transmit mode.

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