Introduction to Digital Modes

Scott Simpson, KF5WAY

Digital Modes

- What is a "Digital Mode"?

- Examples

- Where can I find them?

- How do I use them?

What is a "Digital Mode"?

- CW was the first digital mode

- Frequency or Phase Shift Keying

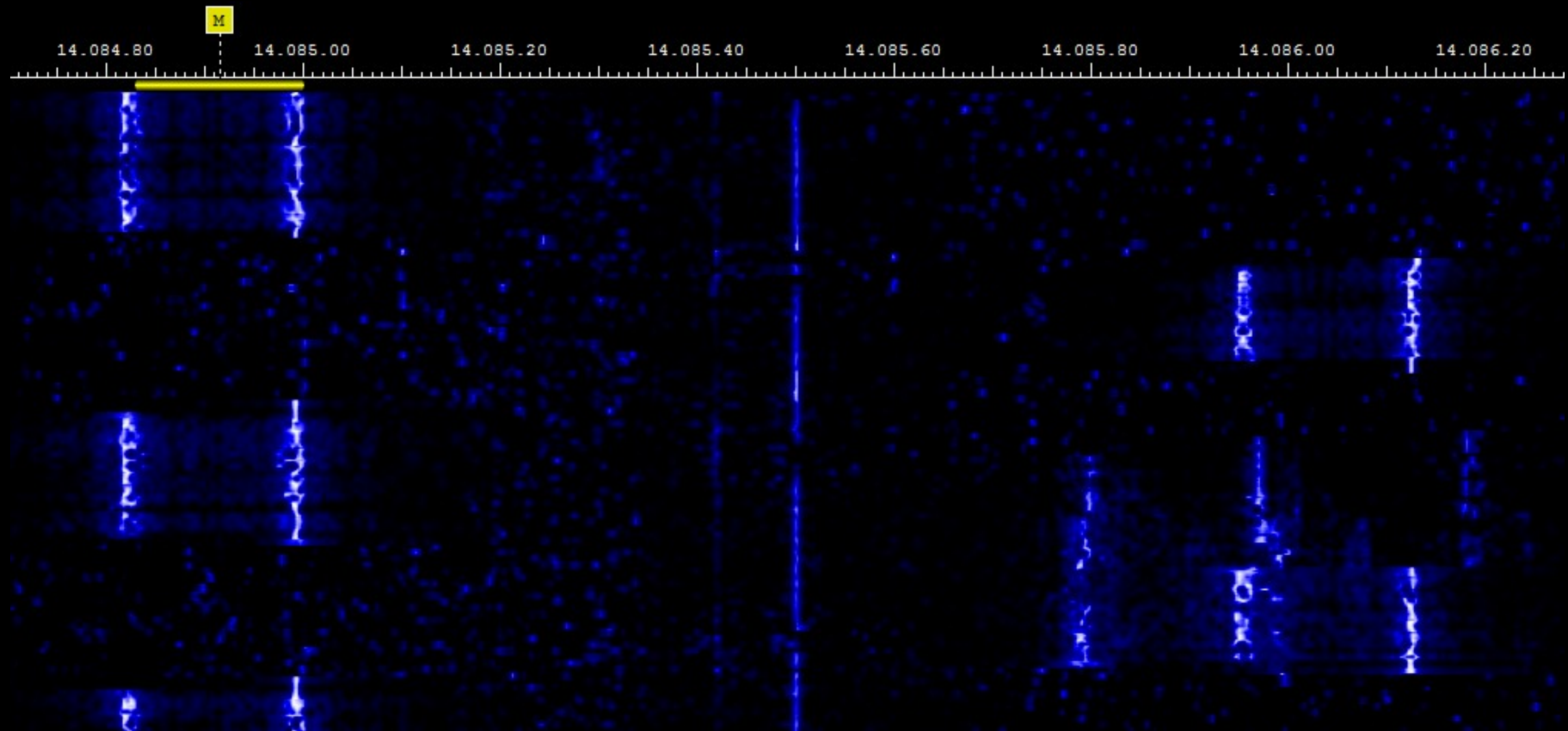- Encodes data as signals

- Decodes signals to text

Popular Examples on HF

- RTTY

- PSK (31/63/125)

- JT65/JT9

- Olivia

- Contestia

RTTY

- RadioTeleTYpe
- FSK and AFSK
  - Frequency Shift Keying
- Based on Baudot coding
- Low spectral efficiency
- No error correction
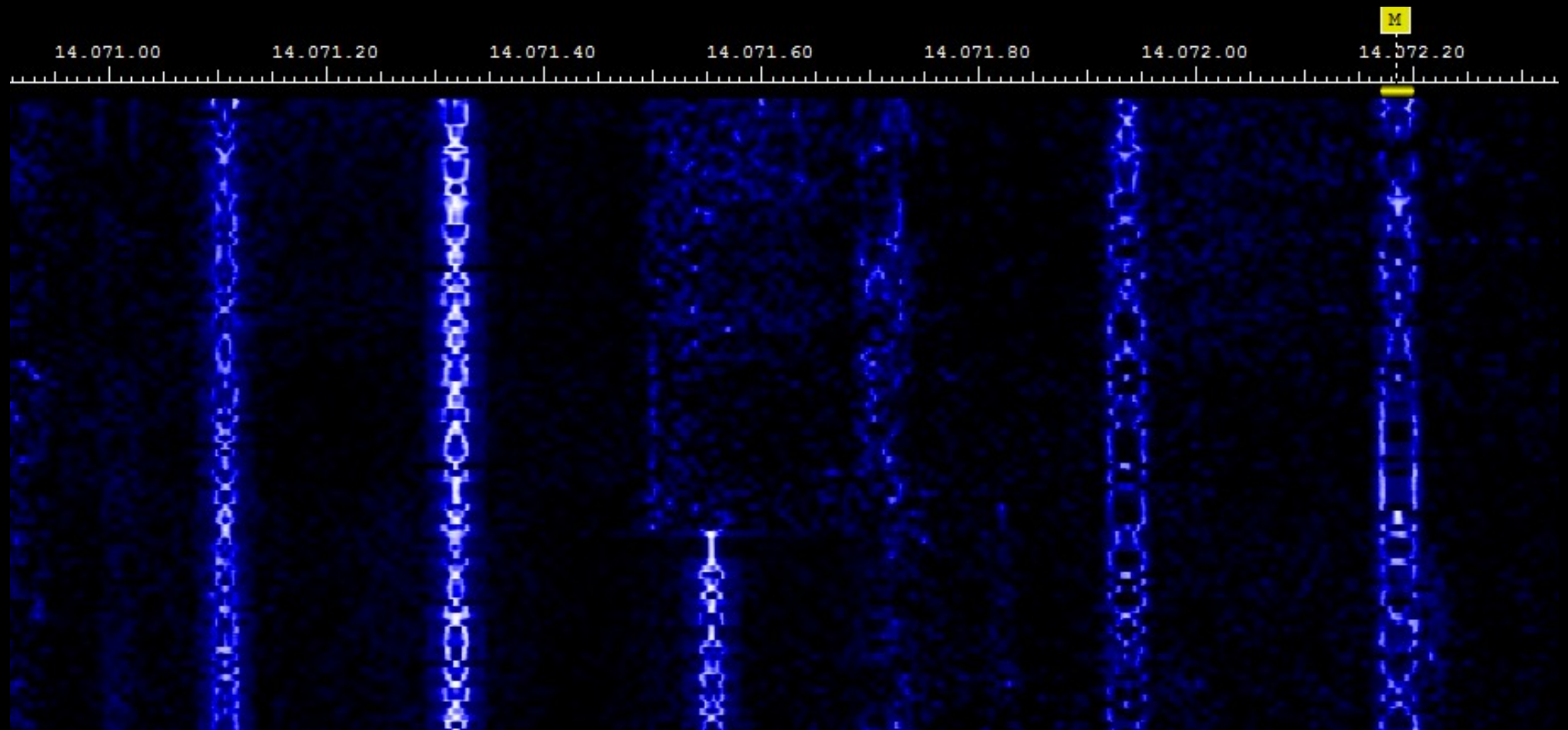- 170 Hz bandwidth

RTTY

PSK

- Phase Shift Keying

- Binary and Quadrature PSK

- Common Baud Rates for BPSK

  - 31

  - 63

  - 125

- No error correction

- 30-130 Hz bandwidth
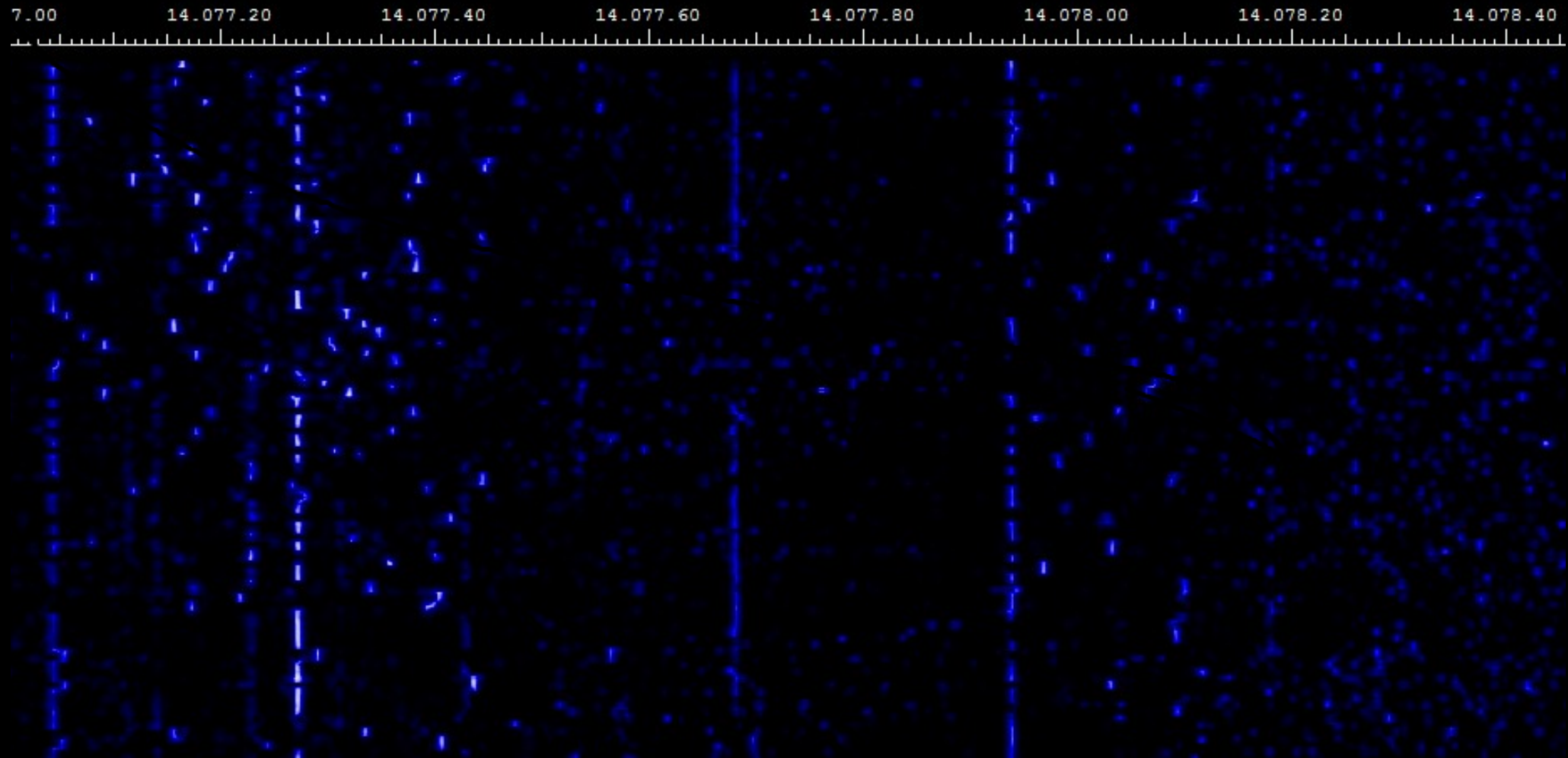
- QPSK faster in same bandwidth

PSK

JT65

- Multiple Frequency Shift Keying (MFSK)

- Weak signal mode

- Intended for EME or Troposcatter

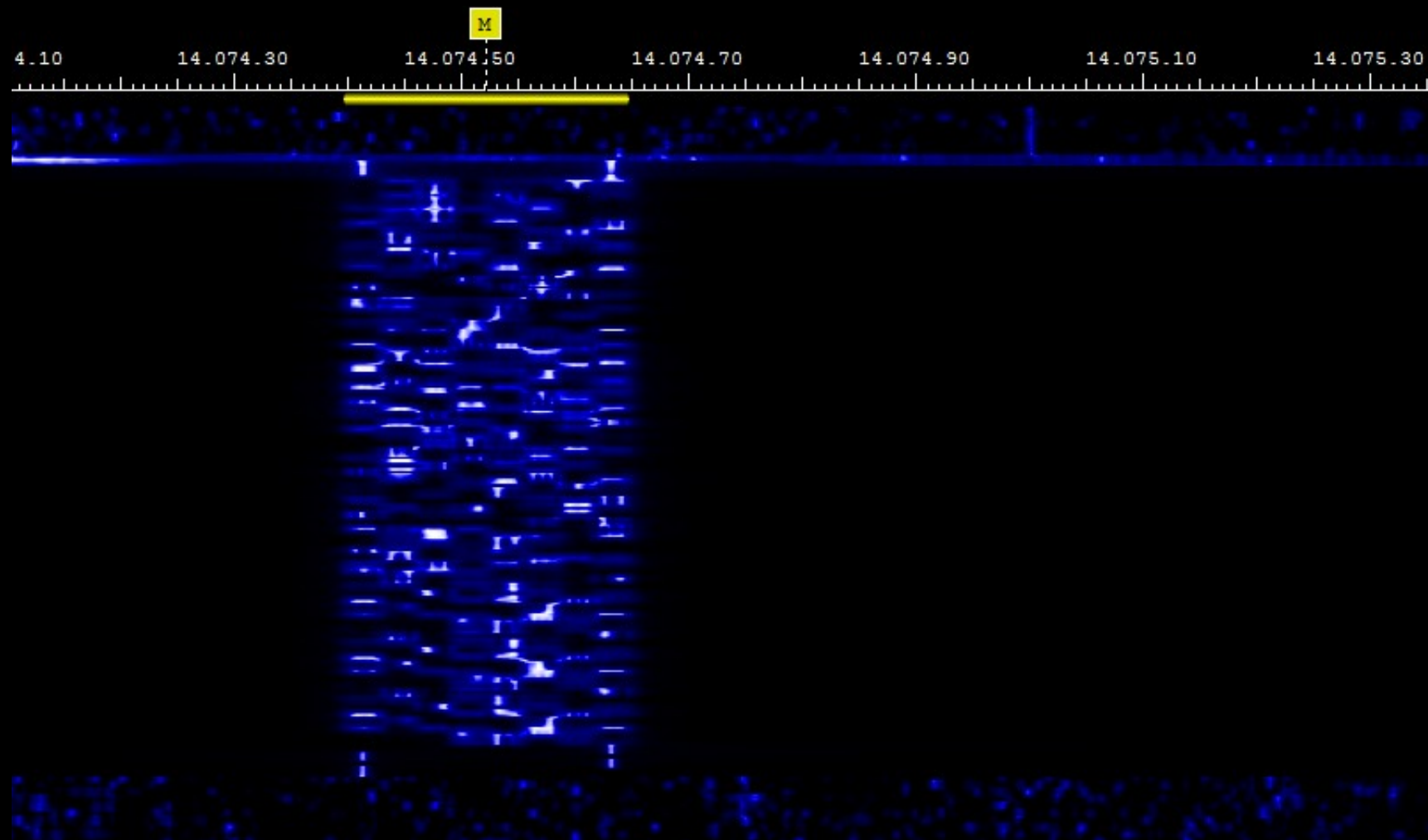- Highly synchronized in minute intervals

- No error correction

JT65

Olivia

- Multiple Frequency Shift Keying (MFSK)

- # of tones/bandwidth

  ○ ex Olivia 16/500 or 8/250

  ○ more tones == more redundancy

  ○ more tones == slower transmission

- Great in difficult conditions

  ○ 10-14dB below NF

- Error Correcting

Olivia 8/250

Other modes

- Pactor/Winlink

- Hellschreiber (Hell)

- Throb

- Domino
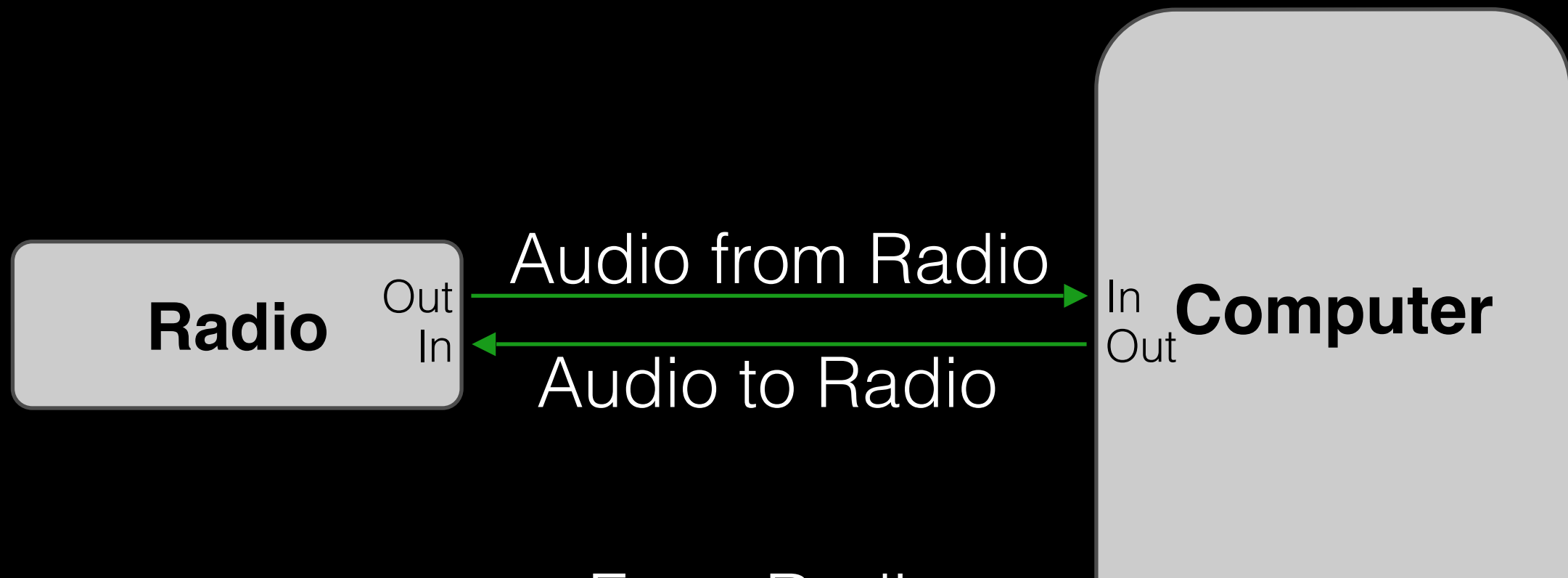
- Thor

- WSPR

- APRS

Where can I find them?

- Look at the ARRL band plans.
- Digital Modes fall in Data/RTTY space

Example for 3 bands			
Band	PSK	RTTY	JT65
10 m	28.070	28.070-28.150	28.076
15 m	21.070	21.070-21.100	21.076
20 m	14.070	14.070-14.095	14.076

How do I use them?

- You need:

- Radio

- Computer with sound card

- Digital Mode Software

- Optional:

- external sound card or SignaLink

Basic Setup

Radio — Out / In

Audio from Radio →

← Audio to Radio

Computer — In / Out

From Radio

Audio Out == Data Out

Audio In == Data In

Software

- Ham Radio Deluxe
  - v6+ $99
  - v5 Free
- FLDigi
  - OpenSource aka Free
- DXLab
  - Freeware

Ham Radio Deluxe

- Ham radio software package includes:

  - Radio control app

  - Digital modes app

  - Logging app

  - Satellite tracking app

  - Rotator control app

  - http://www.ham-radio-deluxe.com/

Ham Radio Deluxe

JT65 Software

- wsjtx

  - http://physics.princeton.edu/pulsar/K1JT/wsjtx.html

- JT65-HF

  - http://jt65-hf.sourceforge.net/

wsjtx

Useful Links

- Digital Modes, sound and pictures (http://hfradio.org.uk/html/digital_modes.html)

- ARRL Digital Modes (http://www.arrl.org/digital-modes)

- Digital Modes audio samples (http://www.kb9ukd.com/digital/)

- PSKReporter (http://pskreporter.info)

More Links

- Passband Modulation (http://en.wikipedia.org/wiki/Modulation)

- FLDigi (http://www.w1hkj.com)

- DX Lab Suite (http://www.dxlabsuite.com)

- Tigertronics, SignaLink (http://www.tigertronics.com)