



# JT65 & JT9 Digital Modes on HF

*Kevin Culp*

*KZ3L*

*Feb 23, 2017*

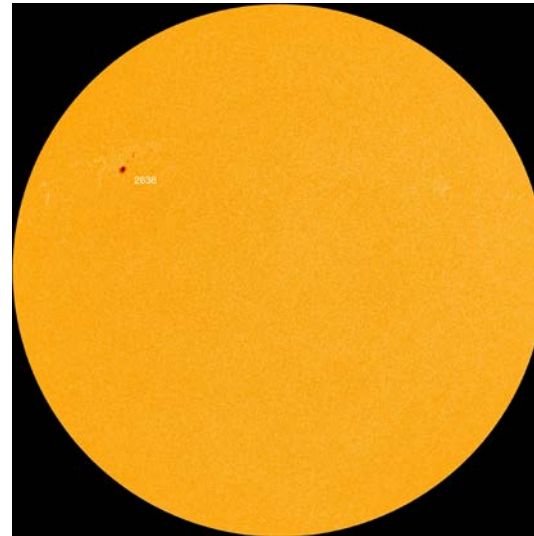


# Sun Spots = Propagation

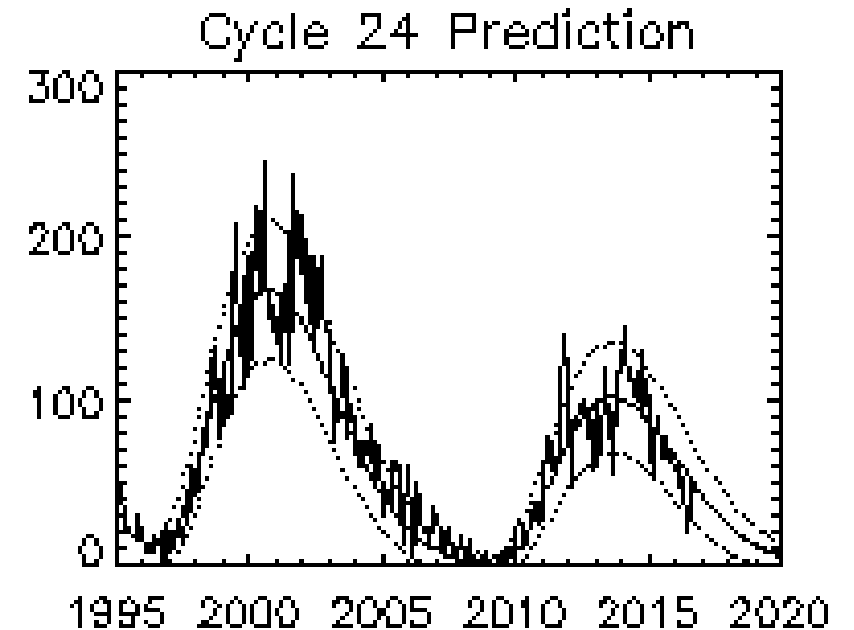


## Spotless Days:

2017 total: 11 days (22%)\*  
2016 total: 32 days (9%)  
2015 total: 0 days (0%)  
2014 total: 1 day (<1%)  
2013 total: 0 days (0%)  
2012 total: 0 days (0%)  
2011 total: 2 days (<1%)  
2010 total: 51 days (14%)  
2009 total: 260 days (71%)



Our sun on  
Feb 23, 2017



\* As of 23 Feb 2017



## What Are JT65 & JT9?



- Developed by Joe Taylor, K1JT
- Protocol for extremely weak signals
- Originally optimized for Earth-Moon-Earth (VHF)
- Great during sunspot minimum
- Error-correcting features
- Plain text message: max 13 chars
- "The Musical Mode"





## What Are JT65 & JT9?



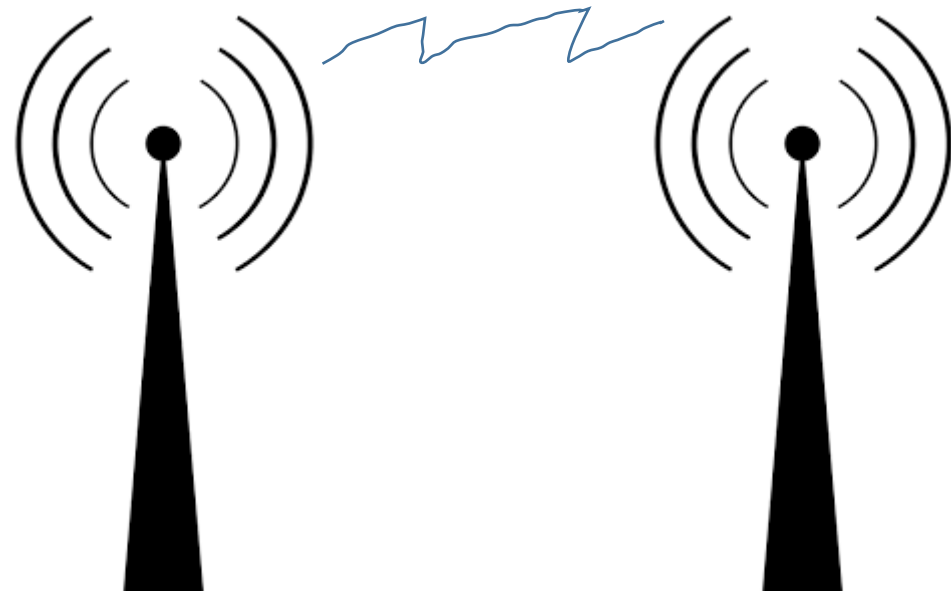
- Audio Frequency Shift Keying (AFSK)
- JT65 = 65 tones; JT9 = 9 tones
- One-minute TX/RX sequences
  - TX/RX:  $t = 1$  sec to  $t = 47.8$  sec
  - Decoding occurs in remainder of each minute
- Requires precise time sync w/UTC
- Low power/full duty cycle
  - Usu. 5-20W; don't burn up your rig!

**NIST**



# What is a QSO?

- Communication between two or more parties
- Minimum content?
  - Call signs
  - Signal report





# QSO Format



- Meets minimum QSO (call, sig report -dB, grid)

**(1) CQ KZ3L EM58**

**(2) KZ3L F1ABC JN16**

**(1) F1ABC KZ3L -06**

**(2) KZ3L F1ABC R-13**

**(1) F1ABC KZ3L RRR**

**(2) KZ3L F1ABC 73**



# Standard Frequencies (USA)

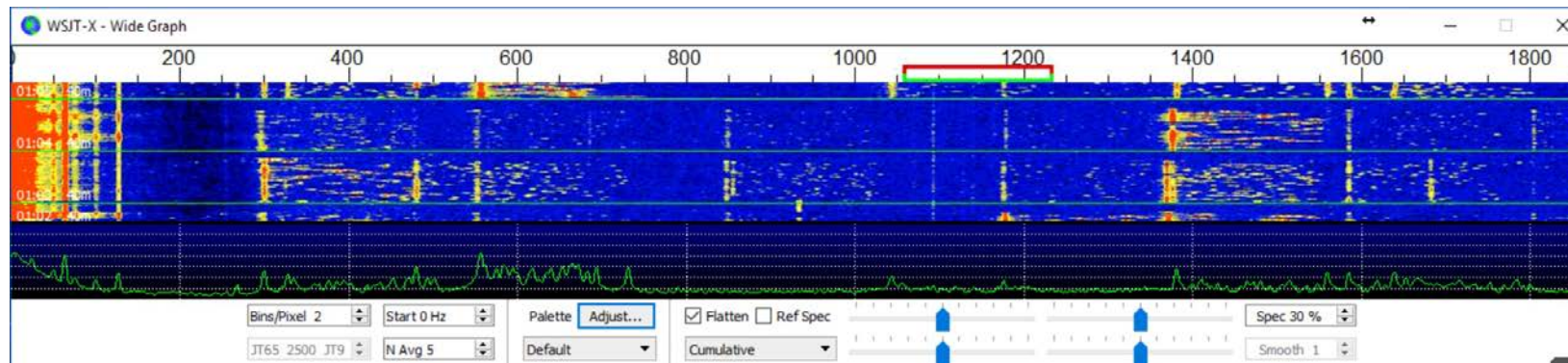


## • JT65:

- 3.576 MHz
- 7.076
- 14.076
- 21.076
- 28.076

## • JT9:

- 3.578 MHz
- 7.078
- 14.078
- 21.078
- 28.078







# Hardware



Computer  
(PC or Linux)



Sound card  
(internal or  
external)



Rig





## Software



- Reliable time sync program (I use "Dimension 4")
- WSJT-X (my choice), JT65-HF, MultiPSK
- Optional:
  - JTAlert-X –Notification of unworked stations; integrates with other programs to log QSO
  - Logging software (my choice: Log4OM)
  - Rig control software
  - Remote access software



## Links



- Dimension 4: <http://www.thinkman.com/dimension4/>
- WSJT-X: [http://physics.princeton.edu/pulsar/k1jt/wsjt-x-doc/wsjt-x-main-1.5.0-rc2.html#MAKE\\_QSOS](http://physics.princeton.edu/pulsar/k1jt/wsjt-x-doc/wsjt-x-main-1.5.0-rc2.html#MAKE_QSOS)
- JTAlert-X: <http://hamapps.com>
- Log4OM: <http://www.log4om.com/dl/>



# Demonstration