JT65

WHAT IS IT
AND
WHY SHOULD I CARE?

James Wolf, KR9U

JT65 – WHAT IS IT?

- WSJT is the Base Program
- JT65 is one of many operating modes of WSJT
- Originally Designed for Moon Bounce (EME) and Meteor Scatter Communications where every dB counts.
- Uses State-of-the-Art Encoding, Decoding and Error-Correcting Algorithms
- Constant Envelope Waveform with 65 tone FSK Modulation.
- Capable of 10-15 dB better S/N than Human Ear/Brain CW recognition
- Arbitrary Text Messages are Limited to 13 characters per Transmission

JT65 – HOW IT WORKS

- Compresses Messages into a Minimum Fixed Number of Bits
- Two Callsigns and a Grid Locator or 71 bits
- Message is not Sent Character by Character
- The 72-Bit message is augmented with 306 Error-Correction Bits using the Reed Solomon Code converting the message into Sequences of 63 six-bit Channel Symbols.
- Every Sequence used in the Code differs from every other by at least 52 of the 63 Symbols
- Message will either print error free or not at all
- Message Throughput is One Character every Three Seconds.

JT65 - HOW IT WORKS - CONT

- The Forward Error Correction (FEC) Makes it highly probable that either the Message is Received in its Entirety or not at All.
- Report messages are predefined. For Instance, an “RO” is sent by alternating two tones of Specific Frequencies and Switching Rates.
- The synchronizing signal is so important that half of every transmission is devoted to it.

JT65 - TIMING

- JT65 uses one-minute T/R sequences and requires tight synchronization of time and frequency between transmitter and receiver.
- A transmission nominally begins at t = 1 s after the start of a UTC minute and finishes at t = 47.8 s.
- Utilizes calibration of relative time and frequency errors with accuracies of about 0.03 s and 1.5 Hz

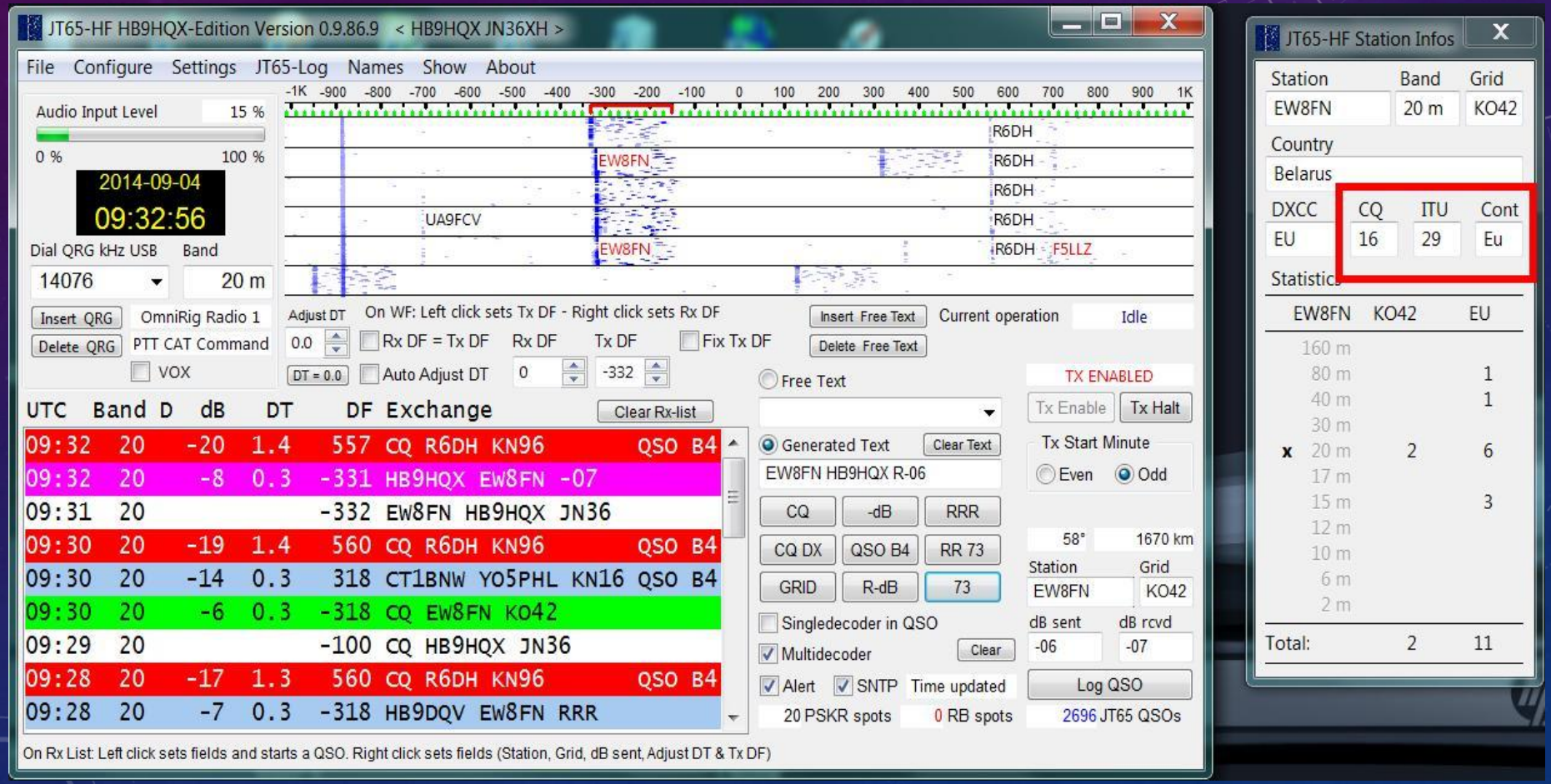
METEOR SCATTER

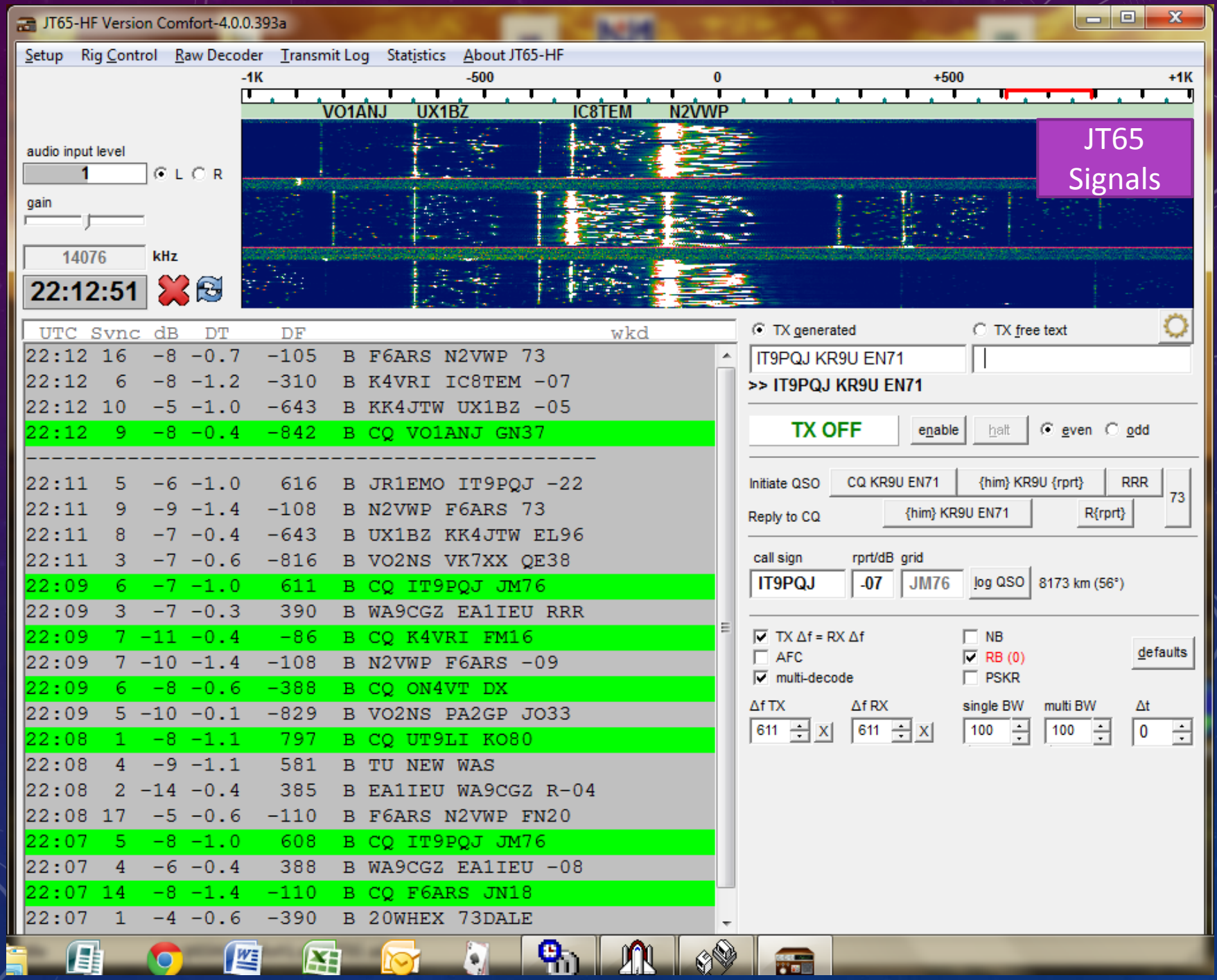
ANOTHER WSJT MODE

- Mode FSK441 is used for Meteor Scatter and Transmits at a high Rate of 147 Characters Per Second to take Advantage of Fraction-Of-A-Second Reflections from the Ionized Trails of Meteors.

- Meteor scatter QSOs in the 500 – 1400 Mile Range can made be on the VHF Bands at any time, using FSK441.

JT-65 SOFTWARE

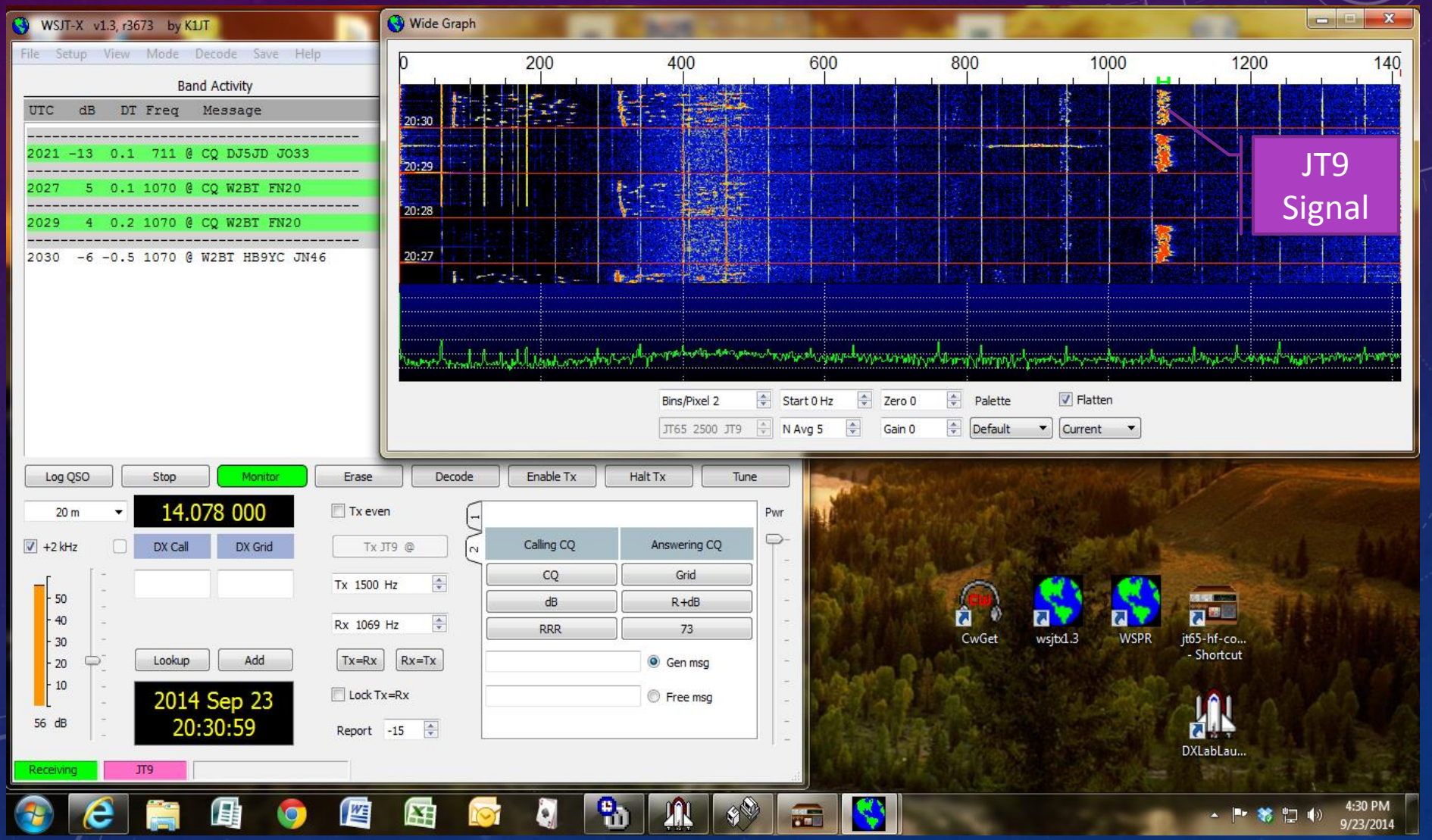



JT65-HF Version Comfort-4.0.0.393a
Setup
Rig Control
Raw Decoder
Transmit Log
Statistics
About JT65-HF
-1K
-500
0
+500
+1K
VO1ANJ
UX1BZ
IC8TEM
N2VWP
JT65 Signals
audio input level
1
L
R
gain
14076
kHz
22:12:51
UTC Sync dB DT DF wkd
22:12 16 -8 -0.7 -105 B F6ARS N2VWP 73
22:12 6 -8 -1.2 -310 B K4VRI IC8TEM -07
22:12 10 -5 -1.0 -643 B KK4JTW UX1BZ -05
22:12 9 -8 -0.4 -842 B CQ VO1ANJ GN37
22:11 5 -6 -1.0 616 B JR1EMO IT9PQJ -22
22:11 9 -9 -1.4 -108 B N2VWP F6ARS 73
22:11 8 -7 -0.4 -643 B UX1BZ KK4JTW EL96
22:11 3 -7 -0.6 -816 B VO2NS VK7XX QE38
22:09 6 -7 -1.0 611 B CQ IT9PQJ JM76
22:09 3 -7 -0.3 390 B WA9CGZ EA1IEU RRR
22:09 7 -11 -0.4 -86 B CQ K4VRI FM16
22:09 7 -10 -1.4 -108 B N2VWP F6ARS -09
22:09 6 -8 -0.6 -388 B CQ ON4VT DX
22:09 5 -10 -0.1 -829 B VO2NS PA2GP JO33
22:08 1 -8 -1.1 797 B CQ UT9LI KO80
22:08 4 -9 -1.1 581 B TU NEW WAS
22:08 2 -14 -0.4 385 B EA1IEU WA9CGZ R-04
22:08 17 -5 -0.6 -110 B F6ARS N2VWP FN20
22:07 5 -8 -1.0 608 B CQ IT9PQJ JM76
22:07 4 -6 -0.4 388 B WA9CGZ EA1IEU -08
22:07 14 -8 -1.4 -110 B CQ F6ARS JN18
22:07 1 -4 -0.6 -390 B 20WHEX 73DALE
TX generated
TX free text
IT9PQJ KR9U EN71
>> IT9PQJ KR9U EN71
TX OFF
enable
halt
even
odd
Initiate QSO
CQ KR9U EN71
{him} KR9U {rprt}
RRR
73
Reply to CQ
{him} KR9U EN71
R{rprt}
call sign
rprt/dB
grid
IT9PQJ
-07
JM76
log QSO
8173 km (56°)
TX Δf = RX Δf
AFC
multi-decode
NB
RB (0)
PSKR
defaults
Δf TX
Δf RX
single BW
multi BW
Δt
611
611
100
100
0

WSJT-X

- WSJT-X is a recent update that implements JT9 mode specifically designed for LF, MF and HF bands as well as JT65.
- JT9 is about 2 dB more sensitive than JT65 while using less than 10% of the bandwidth. JT9 has a total bandwidth of 15.6 Hz.
- A 2 kHz slice of spectrum is essentially full when occupied by ten JT65 signals. As many as 100 JT9 signals can fit into the same space, without overlap.

JT9

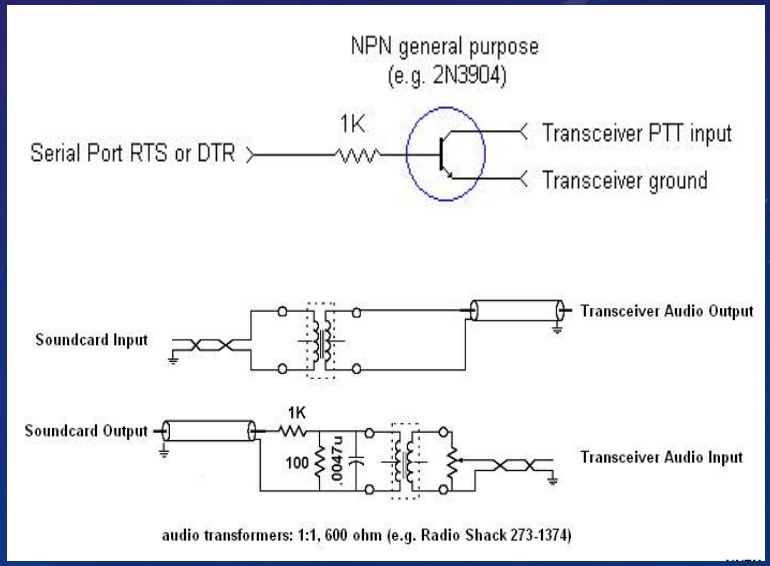

WSJT-X v1.3, r3673 by K1JT
File Setup View Mode Decode Save Help
Band Activity
UTC dB DT Freq Message
2021 -13 0.1 711 @ CQ DJ5JD JO33
2027 5 0.1 1070 @ CQ W2BT FN20
2029 4 0.2 1070 @ CQ W2BT FN20
2030 -6 -0.5 1070 @ W2BT HB9YC JN46
Wide Graph
0 200 400 600 800 1000 1200 140
20:30
20:29
20:28
20:27
JT9 Signal
Bins/Pixel 2
Start 0 Hz
Zero 0
Palette
Flatten
JT65 2500 JT9
N Avg 5
Gain 0
Default
Current
Log QSO
Stop
Monitor
Erase
Decode
Enable Tx
Halt Tx
Tune
20 m
14.078 000
Tx even
+2 kHz
DX Call
DX Grid
Tx JT9 @
Tx 1500 Hz
Rx 1069 Hz
Lookup
Add
Tx=Rx
Rx=Tx
Lock Tx=Rx
2014 Sep 23
20:30:59
Report -15
56 dB
Calling CQ
Answering CQ
CQ
Grid
dB
R+dB
RRR
73
Gen msg
Free msg
Pwr
Receiving
JT9
CwGet
wsjtx1.3
WSPR
jt65-hf-co... - Shortcut
DXLabLau...
4:30 PM
9/23/2014

OPERATING JT65

- JT65 uses only USB mode
- Use barefoot power – mostly less
- Use an accurate computer timing sync program
- A quality sound card may work better than your internal card. Reports are Signal Link has a poor sound card and can affect signal reception by as much as 20dB over a quality card.
- If you are seeing signal reports of -25 or lower – that's pretty good. Best sound cards are ~ -30
- HF Frequencies (kHz)
  - 28,076
  - 24,917
  - 21,076
  - 18,102
  - 14,076
  - 10,139
  - 7,039/36
  - 3,576
  - 1,838
  - 501/505
  - 136.13

HOOKING IT ALL UP

- Connections to the computer are the same as RTTY and other digital modes
  - Transceiver-to-Soundcard Audio connection – Receive Audio
  - Soundcard-to-Transceiver Audio connection – Transmit Audio
  - PTT Mechanism
- Good information on interfacing is found at http://aa5au.com/rtty.html



WHY SHOULD I CARE?

- JT65 will work when nothing else works
- JT65 offers another level of weak signal operation
- Great for stations with limited antennas
- Easy portable use – vacations etc.
- It’s fun