

DIGITAL HAPPENINGS #17

(December 2013)

By W0NAC ("Matt")

The Christmas season has been a very busy one for the Matthew family and I'm sure for your families too. Having many of our children, grandchildren, and our 2 year old great granddaughter with us over Christmas has been super nice, but carving out time to write this issue of Digital Happenings has been tough. As a result, this month's article will again be a bit shorter than usual (maybe this is a good trend?). My hope is that all of you had a meaningful and merry Christmas and that you are having a great 2014 new year so far! Now on to the main subject for this month's article....

JT65 & JT9 Modes (Re-visited)

Even though I have discussed both JT65 and JT9 modes in past articles, there have been changes and updates (especially in software) that affect both modes. Because of these new changes, I would like to re-visit both of these modes this month.

I have come to think of JT65 and JT9 modes as "hidden treasures" for county hunting. I believe this is true for several reasons. First, they are unbelievably popular not only in the US, but all over the world. One can find stations to work using these modes when every band appears to be dead!

Second, they are the absolute best modes you can use for working weak signals on HF. This weak signal capability allows one to use low power and less than optimum antennas (like most mobile antennas and attic antennas) and still make reliable contacts.

If you give them a try, I think you will find JT65 and JT9 to be very helpful for working new counties for your USACA or Nth time as well as adding to your **USA – Digital Award** and **5 – Mode Award** totals. Also, for those county hunters that like to work DX, the JT65 and JT9 modes can help you reach your DXCC goals.

JT65 HF Mode General Description – The JT65-HF mode is based on JT65A code from the WSJT Project (headed by Joe Taylor - K1JT), but has been specially adapted for use on HF by Joe Large - W6CQZ. JT65 is a tightly structured protocol that sends a very limited set of short structured messages or a small 'free text' message limited to a maximum of 13 characters. It is not a free form data transmission protocol like most other modes, but each transmitted 'frame' is of a fixed length, starting and ending at a predefined time. In any one minute frame you can send any one of the structured messages, 13 characters of text or any of the 3 shorthand messages. Nothing more, nothing less. Each new transmission starts precisely 1 second into a new minute and ends ~47 seconds later when a decoding interval starts for anyone listening to your signal. This structure, its timing, modulation method, and heavy Forward Error Correction (FEC) are what allow JT65 to work so well at very low signal levels (as low as -25 dB S/S+N ratio). The bandwidth of a JT65 transmission is 175 Hz. A typical QSO requires 5-6 message exchanges, each lasting 1 minute for a total QSO time of 5-6 minutes.

JT65-HF Links For Downloads/Setup Manuals, etc:

- 1) JT65-HF Setup Manual & Technical Details -
<https://dl.dropboxusercontent.com/u/26171574/JT65/jt65-hf-setup.pdf>
- 2) JT65-HF Install/Setup program -
<https://dl.dropboxusercontent.com/u/26171574/JT65/setup-JT65-HF-1093.exe>
- 3) Link to download the TimeSync 2.0 Program (which you **will** need for **both** JT65 and JT9):
<http://ravib.com/timesync/>
- 4) Excellent article on communicating with JT65 by W6DTW:
https://dl.dropboxusercontent.com/u/26171574/JT65/2010_10_JT65A-Part-1_Compressed.pdf

Typical Band/Frequencies (Xcvr Dial Setting - USB) used for JT65-HF:

160 Meters	- 1.838 MHz
80 Meters	- 3.576 MHz
40 Meters	- 7.076 MHz
30 Meters	- 10.139 MHz
20 Meters	- 14.076 MHz
17 Meters	- 18.102 MHz
15 Meters	- 21.076 MHz
12 Meters	- 24.917 MHz
10 Meters	- 28.076 MHz

JT9 Mode General Description – This mode is a relatively new mode contained in the WSJT-X version of WSJT, developed by the WSJT Project (headed by Joe Taylor - K1JT). JT9 is similar to JT65 and also uses a tightly structured protocol that sends a very limited set of structured messages or a small ‘free text’ message type limited to a maximum of 13 characters.

JT9 is currently optimized for the 1.8 MHz, 472 kHz, 137 kHz, and HF bands. It is about 2 dB more sensitive than JT65 while using less than 10% of the bandwidth.

JT9 offers five choices for the duration of timed T/R sequences (sub-modes). These sub-modes are JT9-1, JT9-2, JT9-5, JT9-10, and JT9-30 which use 1, 2, 5, 10, and 30 minute transmission periods respectively. Using longer transmissions trades reduced throughput for smaller bandwidth and increased sensitivity. The slowest sub-mode, JT9-30, has total bandwidth of only 0.4 Hz and operates at signal-to-noise ratios as low as -42 dB measured in the standard 2.5 kHz reference bandwidth! JT9-1 is the most commonly used sub-mode unless you really need the additional sensitivity of a slower mode. Probably 99% of all JT-9 contacts made today use the JT9-1 sub-mode.

Like JT65, JT9 is not a free form data transmission protocol, but each transmitted ‘frame’ is of a fixed length, starting and ending at a predefined time. Unlike JT65, JT9 offers 5 sub-modes using different

length 'frames'. JT9's unique structure, timing, modulation method, and heavy Forward Error Correction (FEC) are what allow JT9 to work even better than JT65 at very low signal levels.

The JT9 mode is only available from within a special software program named WSJT-X. Early versions of WSJT-X did not contain JT65 optimized for use on HF. This is probably what inspired W6CQZ to create the JT65-HF software package. The very latest version of WSJT-X software will operate in either JT65 or JT9 modes (or both simultaneously!). Whether or not the WSJT-X version of JT65 will supersede JT65-HF remains to be seen. Personally, I still prefer to use the JT65-HF software as it seems to be more user friendly, but you will need to decide for yourself which software to use. The nice thing is that you can have **both** software programs installed on your computer. You just can't run them both at the same time.

JT9 Links For Downloads/Setup Manuals, etc:

1) WSJT-X Page For Downloading/Manuals/Etc. -

<http://www.physics.princeton.edu/pulsar/K1JT/wsjsx.html>

2) Latest Version of WSJT-X install (Contains Both JT9 & JT65) -

https://dl.dropboxusercontent.com/u/26171574/WSJT-X%20Beta%20Version%201.2.1%20r3590/WSJTX_121r3590.exe

3) Latest WSJT-X Users Guide Ver 1.1 (PDF) -

https://dl.dropboxusercontent.com/u/26171574/WSJT-X%20Beta%20Version%201.2.1%20r3590/WSJT-X_Users_Guide_v1.1.pdf

4) Latest Change Log for WSJT-X -

https://dl.dropboxusercontent.com/u/26171574/WSJT-X%20Beta%20Version%201.2.1%20r3590/wsjsx_changelog.txt

Detailed Properties For JT9 Sub-Modes:

Sub-Mode	Bandwidth	Sensitivity	Total QSO Time
JT9-1	15.6 Hz	-27 dB	6 Minutes
JT9-2	7.0 Hz	-30 dB	12 Minutes
JT9-5	2.6 Hz	-34 dB	30 Minutes
JT9-10	1.3 Hz	-37 dB	60 Minutes
JT9-30	0.4 Hz	-42 dB	180 Minutes

Typical Band/Frequencies (Xcvr Dial Setting - USB) used for JT9:

160 Meters - 1.840 MHz

80 Meters - 3.578 MHz

40 Meters - 7.078 MHz
30 Meters - 10.141 MHz
20 Meters - 14.078 MHz
17 Meters - 18.104 MHz
15 Meters - 21.078 MHz
12 Meters - 24.919 MHz
10 Meters - 28.078 MHz

I'm certain that by now, all this technical chatter has boggled your mind, at least a little bit. All I can advise at this point is for you to download the manuals (using the links given earlier), print them out, and then start studying. Also, don't be afraid to install the software, set it up, and start using it on the air. As the little boy sitting on a potty said in an earlier article, "Nothing worthwhile is accomplished without effort!" Trust me - learning how to operate using these two new modes will pay you back "in spades"! Besides, if you need help or don't understand something, I will be pleased to help. All you need do is contact me at 303-799-3658 or w0nac@comcast.net. If needed, we can even set up a help session (using Teamviewer) where I can control your computer remotely and help sort things out.

By now, you are probably asking yourself "How could any mode that takes 5-6 minutes for a single QSO be useful in county hunting?" The answer is that both JT65 and JT9 are far too slow to use for "putting out" counties while mobile. However, they can be very productive while doing what I call "trolling". Trolling is where you are just calling CQ or answering other's CQs using JT65 or JT9. You can "troll" while you are operating fixed or mobile. In theory, you can complete 10-12 QSOs per hour and if all of these contacts are new, you could "bag" 10-12 new counties during this hour. Compare this to working mobile stations on the net. Here, assuming 10 minute runs, you can make a maximum of only 6 QSOs per hour. To be fair, logging fellow county hunters will probably yield more "goodies" (Stars, MG, MP, MD, etc.) than random fixed stations will, but "trolling", as described earlier, can be very productive toward new counties for USACA, call prefixes, new modes for the **5 – Mode Award** and new counties for the **USA – Digital Award**.

All the above is theoretical and there are many factors that will cut back on the "goodies" you can log for both scenarios. However, if you look on "trolling" as a supplement to working mobiles and NOT as a replacement, "trolling" can be very useful and a lot of fun at the same time!

December Activities:

Digital activities during December remain low. The only digital stations spotted on W6RK were:

11/30	W0NAC/N0LXJ	Clear Creek/Gilpin, CO	PSK-63, RTTY-45, MFSK-32, DOMINO-22
12/06	KA4RRU	Fauquier, VA	PSK-63
12/27	NA8W	Holmes, OH	PSK-63

There were undoubtedly many other digital stations out there, but they were not county hunters and were not spotted on W6RK.

The updated Table 3 is given below:

Table 3 - Active Digital County Hunters Award Status

#	CALL	NAME	STATUS* (M,F,I)	USA - DIGITAL COUNTIES (of 3077)	(1 MODE)	(2 MODES)	FIVE MODE COUNTIES (3 MODES)	(4 MODES)	(5 MODES)	TOTAL	% 5-Mode Completed
1	AA8R	Randy	F	1000+	-	-	-	-	-	0	0.0%
2	AC0B	Cliff	F	205	-	-	-	-	-	0	0.0%
3	AD1C	Jim	F	-	-	-	-	-	-	0	0.0%
4	K0DEQ	Bill	F	-	-	-	-	-	-	0	0.0%
5	K0PVW	Rob	F	-	-	-	-	-	-	0	0.0%
6	K0WJ	Lou	F	-	-	-	-	-	-	0	0.0%
7	K4PBX	Jim	F	136	2903	121	7	2	0	3033	19.7%
8	K5GE	Gene	F	26	1893	575	8	0	0	2476	16.1%
9	K5SF	Dick	F	-	-	-	-	-	-	0	0.0%
10	K5WAF	Bill	F	599	3044	?	?	?	?	3044	19.8%
11	K7REL	Tom	F	-	-	-	-	-	-	0	0.0%
12	K8QWY	Ed	F	-	-	-	-	-	-	0	0.0%
13	K8ZZ	Ed	F	-	-	-	-	-	-	0	0.0%
14	KA4RRU	Mike	F	774	3077	2902	749	40	1	6769	44.0%
15	KA8JQP	Pamela	M/F	22	202	64	53	28	4	351	2.3%
16	KC3X	Hollis	F	-	-	-	-	-	-	0	0.0%
17	KC6AWX	Bob	F	450	3077	1592	264	59	14	5006	32.5%
18	KC7YE	Jack	F	-	-	-	-	-	-	0	0.0%
19	KD5YUK	Billy	F	-	-	-	-	-	-	0	0.0%
20	KD7KST	Bill	M/F	1792	-	-	-	-	-	0	0.0%
21	KF7PKL	Davis	F	379	879	211	48	15	1	1154	7.5%
22	KG5RJ	Greg	F	613	3049	2083	565	195	63	5955	38.7%
23	KM1C	Bill	F	-	-	-	-	-	-	0	0.0%
24	KU4YM	Dave	F	30	2782	29	10	2	1	2824	18.4%
25	KM6HB	Mark	F	714	3077	2936	694	87	1	6795	44.2%
26	N0KV	Barry	M/F	445	3077	3026	2257	312	66	8738	56.8%
27	N0LXJ	Sharon	M/F	1362	3077	2263	1208	474	237	7259	47.2%
28	N1API	Al	F	500	3077	1786	400	199	119	5581	36.3%
29	N3HOO	Ed	F	-	-	-	-	-	-	0	0.0%
30	N4JT	Jim	F	736	3077	3064	743	235	150	7269	47.2%
31	N5MLP	Ron	M/F	391	3077	409	54	37	9	3586	23.3%
32	N6PDB	Dennis	M/F	713	3077	2826	793	444	320	7460	48.5%
33	N8CIJ	Dick	F	676	3077	3014	668	303	229	7291	47.4%
34	N8HAM	Jim	I	0	3077	0	0	0	0	3077	20.0%
35	N9WNN	Steve	F	0	2180	0	0	0	0	2180	14.2%
36	NA8W	Darl	F/M	579	3022	852	381	212	99	4566	29.7%
37	NF0N	Mike	F	785	3077	3077	915	108	50	7227	47.0%
38	NN9K	Pete	F	816	3077	859	78	1	0	4015	26.1%
39	NT2A	Gene	F	-	-	-	-	-	-	0	0.0%
40	NU4C	Paul	F	-	-	-	-	-	-	0	0.0%
41	NW6S	Jim	F	722	3077	3077	743	59	35	6991	45.4%
42	NX4W	Lloyd	M/F	1135	3077	1274	436	290	97	5174	33.6%
43	W0NAC	Matt	M/F	1812	3077	2828	1970	1078	429	9382	61.0%
44	W3DLM	Don	F	359	3077	2390	298	101	55	5921	38.5%
45	W3ZUH	Dick	F	5	3077	2048	11	2	0	5138	33.4%
46	W4IHI	Gary	F	-	-	-	-	-	-	0	0.0%
47	W4SIG	Kerry	F	-	-	-	-	-	-	0	0.0%
48	W4YDY	Dave	F	883	3077	3077	1041	361	181	7737	50.3%
49	W5QP	Rick	M/F	244	3077	2598	252	113	83	6123	39.8%
50	W6RK	Risto	F	-	-	-	-	-	-	0	0.0%
51	W6RLL	Joe	F	-	-	-	-	-	-	0	0.0%
52	W7FEN	Larry	F	25	3077	2975	32	1	0	6085	39.6%
53	W7IN	Larry	F	-	-	-	-	-	-	0	0.0%
54	W7QQ	Bill	M/F	-	-	-	-	-	-	0	0.0%
55	W9JR	Rich	F	90	3077	1674	44	0	0	4795	31.2%
56	W9SUQ	Larry	F	-	-	-	-	-	-	0	0.0%
57	WA4EEZ	Leslie	F	1053	3077	1420	572	153	21	5243	34.1%
58	WA4UNS	Doug	F	-	-	-	-	-	-	0	0.0%
59	WA6OCV	Susan	M/F	328	3077	328	320	130	10	3865	25.1%
60	WA7JHQ	Sterling	F	-	-	-	-	-	-	0	0.0%
61	WB0M	Jeff	F	-	-	-	-	-	-	0	0.0%
62	WB2ABD	Paul	F	-	-	-	-	-	-	0	0.0%
63	WD4OIN	Jack	F	849	3077	3070	860	288	137	7432	48.3%
64	WQ7A	Terry	F	201	3077	3028	206	132	112	6555	42.6%
65	WY4D	Ben	F	265	3077	287	36	15	9	3474	22.3%

How To Get Your 5 – Mode Statistics Updated:

Several past Digital Happenings articles have given detailed instructions on a new and easy way to update your digital statistics for Table 3 by using a small program called “Digital Report Utility”. This new program will create a report for you showing your progress for both the **USA – Digital** and the **5 – Mode Awards** and email it to W0NAC. Instead of repeating these instructions every month I have included them in a Microsoft Word document that you can download by clicking on the following link: <https://dl.dropboxusercontent.com/u/26171574/Happenings/5%20Mode%20Update.doc>

Possible topics for the coming months include (in no particular order):

“How To Log Your Digital Contacts In Logger”

“Macros – Revisited”

“New Digital Awards?”

“Digital Software Installation – Revisited”

“Award Difficulty Index”

Come on Guys and Gals! I still really need (and welcome) your suggestions on topics for future articles! Or, if you have something you wish to contribute I will certainly try to include it. Short stories describing your experiences/joys/frustrations/etc. in getting started in digital ops would be especially welcome. Summaries of your digital trips would also be good. I look forward to hearing from you. Don't be shy!

Please email me with your comments/suggestions at w0nac@comcast.net and don't forget to send your updated status for the **USA – Digital** and **5 - Mode Awards** so I can update the Active Digital County Hunters Award Status list again next month.

73's and we hope to see you on our waterfall again real soon!

Matt – W0NAC