CQ CHATTER

FEBRUARY 2017 VOLUME B16 •ISSUE 12

WOOD COUNTY AMATEUR RADIO CLUB

Kick-off Brunch

The annual WCARC kick-off brunch was held on January 8th. Attendance was somewhat lower than in past years, but everyone had a good meal and conversation at the French Quarter. The nominated slate of officers was elected: President-N1RB, Vice President-KD8VWU, Secretary-WB8NQW, Treasurer-KD8NJW, Board Member-KE8CVA. The Club looks forward to an exciting and rewarding 2017. ■

Amateur Radio Parity Act--Another Try

from ARRL Letter

H.R. 555 — a new "Amateur Radio Parity Act" bill — has been passed by the U.S. House of Representatives. The bill's language is identical to that of the 2015 measure, H.R. 1301, which passed in the House late last summer but failed in the waning days of the US Senate to gain the necessary support. As with H.R. 1301, the new measure introduced on January 13 and was passed on January 24th. It was sponsored by Rep. Adam Kinzinger (R-IL), with initial co-sponsorship by Rep. Joe Courtney (D-CT) and Rep. Greg Walden, W7EQI (R-OR). Walden now chairs the House Committee on Energy and Commerce, to which the new bill has been referred. H.R. 555 got an initial airing in the Subcommittee on Communications and Technology. When H.R. 1301 came up in committee, Walden spoke forcefully in favor of the measure, which ultimately attracted 126 House cosponsors. "Rep. Kinzinger has again stepped forward to introduce this important legislation," said ARRL CEO Tom Gallagher, NY2RF. "His commitment stems from exposure to what the Amateur Radio community brings to the service of all communities. The ARRL and radio amateurs nationwide owe Rep. Kinzinger a resounding 'Thank You!' for his efforts on their behalf."

H.R. 555 calls on the FCC to establish rules prohibiting the application of deed restrictions that pre-

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NET CHECK INS

Jan 3 Traffic: 0

KD8VWU (NCS)
K8BBK
KD8NJW
N1RB
KD8RNO
KE8CVA
K8JU
WB8NQW
N8YAE (9)

Jan 10 Traffic: 0

KD8NJW (NCS)
KE8CUZ
K8JU
N8PYA
WB8NQW
KE8CVA
KG8FH
W8TER
KD8VWU
N1RB
K8OVO
K8BBK
KA8VNG
KE8DSE
K8LL
WD8ICP (16)

Jan 17 Traffic: 0

NM8W (NCS)
K8BBK
KE8CUZ
WB8NQW
WD8JWJ
KA8VNG
WD8LEI
N8PYA
KD8RNO
KD8NJW
KD8VWU

BRAIN TEASERS

1. If the boom of a Yagi antenna is lengthened and the elements are properly retuned, what usually occurs?

a.) the gain increases

b.) the SWR increases

c.) the front-to-back ratio increases

d.) the gain bandwidth decreases rapidly

2. What digital code consists of elements having unequal length?

a.) ASCII

b.) AX.25

c.) Baudot

d.) Morse code

3. For single-sideband phone emissions, what would be the bandwidth of a good crystal lattice band-pass filter?

a.) 6 kHz at -6 dB

b.) 2.1 kHz at -6 dB

c.) 500 Hz at -6 dB

d.) 15 kHz at -6 dB

February Contests

The contest lineup for the month of February is given below. Please note that the WARC bands (60, 30, 17 and 12 m) are never open to contesting.

Feb 4-5	*0000 to 2359 Z*	160 m to 10 m
Vermont QSO Party		**all modes**
Feb 4-5	*0001 to 2359 Z*	10 m
10-10 Int'l Winter 'test		**SSB**
Feb 4	*1400 to 2359 Z*	160 m to 10 m
Minnesota QSO Party		**all modes**
Feb 4-5	*1600 to 0400 Z*	160 m to 10 m
British Columbia QSO Party		**all modes**
Feb 4-5	*1800 to 1759 Z*	80 m to 10 m
Mexico Int'l RTTY 'test		**RTTY**
Feb 11-12	*0000 to 2359 Z*	80 m to 10 m
CQ WW RTTY WPX 'test		**RTTY**
Feb 11-12	*1200 to 1200 Z*	160 m to 10 m
Dutch PACC 'test		**CW SSB**
Feb 13-17	*1300 to 2359 Z*	160 m to 10 m
ARRL School Club Roundup		**CW SSB**
Feb 18-19	*0000 to 2359 Z*	160 m to 10 m
ARRL Int'l DX 'test		**CW**
Feb 18-19	*1200 to 1159 Z*	160 m to 10 m
Russian PSK WW 'test		**PSK**
Feb 25-26	*0600 to 1800 Z*	80 m to 10 m
REF (France) DX 'test		**SSB**
Feb 25-26	*1300 to 1300 Z*	80 m to 10 m
UBA (Belgium) DX 'test		**CW**

Digital Communications in Amateur Radio IV

by Jeff Kopcak, K8JTK

Got a new rig for Christmas? How about working digital? The most popular digital modes in ham radio are conversational modes (keyboard-to-keyboard). The best way to describe these is as the instant messaging or text messaging of ham radio digital modes. One station sends a message to another station. The other station does the same in return. Conversations can be about anything – the weather, where that person lives, traveling, or life stores – for as long as you want. These modes include (in order of popularity): PSK, RTTY, MFSK, and Olivia. All, except Olivia, are available on the W1AW digital operating schedule. Others will pop up on the bands from time-to-time too, or you may choose to play around with a buddy using other modes.

For the popular flavors of these digital modes, I performed a transmit time test. The text was one paragraph of "Lorem Ipsum" with 83 words consisting of 569 characters. I recorded how long it took to transmit the message in minutes and seconds to compare the speed of each flavor. The results were close between equivalent modes. PSK-31 and RTTY-45, for example, took about 2 minutes. This indicates that the advantage is not necessarily in speed, but in which mode works better in a particular situation. Popular HF frequencies are also listed. There is a lack of consensus on some of the exact frequencies. It isn't uncommon to hear these modes in other portions of the data sub-bands. Different flavors tend to operate on the same frequency to stir up activity.

Commonalities among conversational modes include the RSID (Reed-Solomon Identification) tones which universally identify a digital signal at the beginning and, occasionally, the end of a transmission. RSIDs are more popular on rarer and wider modes like PSK-63, MFSK, Olivia, and other rare modes. An RSID tone is about 170 Hz so announcing your PSK-31 signal at 31 Hz will interfere with other conversations.

It is common to give a signal report using the IARU **RSQ** reporting system. Like the **RST** system of "59," **RSQ** adds an additional number "599." These numbers stand for:

Readability
(percentage of good text received):

5: 95+%, perfectly readable.
4: 80%, little to no difficulty.
3: 40%, considerable difficulty and many missed characters.
2: 20%, occasional words distinguishable.

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February Contests continued

Feb 25-26	*1500 to 0159 Z*	160 m to 10 m
South Carolina QSO Party		**all modes**
Feb 25-26	*1800 to 0559 Z*	80 m to 10 m
North American QSO Party		**RTTY**
Feb 26-27	*1500 to 0059 Z*	80 m to 10 m
North Carolina QSO Party		**all modes**

February Hamfests

February 19. Livonia ARC. Civic Park Senior Center, Livonia, MI. **web:** **http://livoniaarc.com/index.php?page=swapshop**

February 19. Intercity ARC. Richland County Fairgrounds, Mansfield, OH. **web:** **http://www.w8we.org**

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1: 0%, unreadable.

Strength

(measure how strong the signal trace is on the waterfall, there are only five):

9: Very strong trace.
7: Strong trace.
5: Moderate trace.
3: Weak trace.
1: Barely visible trace.

Quality

(measure of unwanted artifacts in the signal: pops, clicks, splattering, harmonics, and unwanted modulation):

9: Clean signal.

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NET CHECK INS

Jan 17 cont.

KE8CVA
KC8EKT
N8YAE (16)

Jan 24 Traffic: 0

K8OVO (NCS)
KD8RNO
KE8EZT
K8JU
K8BBK
KG8FH
KE8CVA
KC8EKT
KD8NJW
KD8VWU
WB8NQW
KA8VNG
N1RB
N8YAE
KE8CUZ
WD8LEI (16)

Jan 31 Traffic: 0

WB8NQW (NCS)
WD8JWJ
KE8DSE
N8YAE
KE8CVA
KD8NJW
N8VNT
N1RB
KG8FH
KD8VWU
KC8EKT
K8JU (12)

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7: One barely visible sidebar pair.
5: One clearly visible sidebar pair.
3: Multiple visible sidebar pairs.
1: Splattering over much of the spectrum.

Also, brush up on CW pro-sign shorthand as these abbreviations are used in exchanges. Commonly used abbreviations: **BTU** (back to you), **TNX** (thanks), **K** (any station may transmit), **KN** (specific station only may transmit), **SK** (done transmitting, clear), **PSE** (please), **DE** (from).

Reminder: review the first two articles in the series for information that will be omitted here, including some modes, operating your transceiver at 100% duty cycle, using upper sideband (USB), and not driving the transmitter with too much audio as the signal will be wider than intended.

PSK

PSK-31 is the most widely used HF digital mode. It's popular because of its narrow signal. PSK was at the forefront of the digital sound card revolution in 2000. It was discovered that ordinary sound cards and computers had enough power to become digital-to-analog converters. Peter, G3PLX, created PSK-31 to perform well with weak signals and to operate on a narrow bandwidth. In a perfect world, in a bandwidth of 3 kHz, you could potentially have nearly 100 individual QSOs taking place at once.

Brain Teaser answers: (E) 1-a, 2-d, 3-b

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DON'T FORGET!
10 meter informal net meets
Sunday@ 2030 year round
on 28.335 MHz

WCARC Weekly Net

Tuesdays at 2100 all year

147.18 MHz 67 Hz PL

Net Control Roster

Jan 31	WB8NQW
Feb 7	N1RB
Feb 14	KD8VWU
Feb 21	KD8NJW
Feb 28	NM8W
Mar 7	K8OVO

NEXT MEETING

Business Meeting

Monday, February 13th

TIME: 7:30 pm/7:00 EB

PLACE:

Sheriff's Training Room

at

W. Gypsy Lane &

Dunbridge Rd.

Bowling Green, OH

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PSK stands for Phase Shift Keying, the modulation method used to generate the signal. It's a common mistake to believe that 31 stands for the amount of bandwidth the signal occupies. It does occupy 31 Hz, however 31 stands for the bit rate of 31.25. There are other flavors of PSK: PSK-63, PSK-125, and PSK-250 each less likely to be seen on the bands than the previous.

It might be observed that software applications may have BPSK and QPSK in their list of operating modes. BPSK stands for Binary Phase Shift Keying and QPSK Quaternary Phase Shift Keying. The differences between these two are significant. When people refer to PSK, 99% of the time they are referring to BPSK. QPSK is a better choice under adverse conditions because it adds a significant amount of error correction ensuring nearly 100% copy of the transmission during signal fade or interference. However, both stations need to be on frequency, within 4 Hz, for error correction to work correctly. It takes a lot more work for two stations to be in sync with each other using QPSK.

Some stations may request an IMD (Inter-Modulation Distortion) report. This metric can only be observed while the other station is in transmit mode but no text is being sent; idle in other words. The station might type a message saying

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they're looking for an IMD report and leave it idle for 10, 15 seconds, or more. There will be a measurement displayed on screen in negative dB; the lower the negative number the better. Readings in the -25dB to -30dB rage are considered very good, -20dB or greater is considered bad. A bad reading is usually caused by driving the transmitter with too much audio.

Transmit test: PSK-31: 1:58, PSK-63: 1:00

Frequencies: 3580 kHz, 7070 kHz, 10140 kHz, 14070 kHz, 21070 kHz, 28120 kHz.

RTTY

After six decades of use by hams, RTTY, known as radio teletype, is still a very popular mode for contesting and DXing on the low bands. RTTY has a long history, and HF digital operators are very comfortable with it. Many transceivers also have RTTY built in. This mode works better in decoding large pileups than other modes. RTTY is efficient in that it works at a speed of about 60 words per minute – which is about the fastest one person can type. Other modes are typically much slower.

RTTY is based on the Baudot digital code, which represents each character as a series of bits for telephone or radio communication. W1AW will refer to RTTY as Baudot on their operating schedule. Looking at a RTTY signal on a waterfall, the 1's and 0's are represented by twin tones for the *mark* (1) and *space* (0) tones. The two data streams are separated by the *shift* or space between them. When people refer to RTTY, they will most commonly refer to RTTY-45 (baud) but 75 baud can be seen as well. Inverted RTTY flips the mark and space data streams.

Transmit test: RTTY-45: 1:53, RTTY-75: 1:09.

Frequencies: 3580-3600 kHz, 7040-7100 kHz, 14080-14099 kHz, 21080-21100 kHz, 28080-28100 kHz.

MFSK

Multi-Frequency Shift Keying, known as MFSK, is "super-RTTY" which uses multiple tones instead of the two used in RTTY. The most popular is MFSK-16 using 16 tones. MFSK was developed as a flexible point-to-point solution to combat multi-path propagation problems. It is very good at detecting noise and reducing transmit errors with error correction, all the while utilizing low bandwidth. MFSK is slow to decode, so be patient!

An exciting addition to some MFSK flavors is the ability to send small images. MFSK-16 can send images but not MFSK-8. A 320x256 sized color image took 4:26 using MFSK-16. It's unlike Slow Scan TV, where the software will size the im-

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age and overlay a template. The image needs to be fully prepared before it can be transmitted.

Transmit test: MFSK-16: 1:45, MFSK-8: 2:48.

Frequencies: 7072 kHz, 14072-14076 kHz

Olivia

MFSK is good in poor band conditions but Olivia offers even better performance. Developed by Pawel , SP9VRC, it is named after his daughter, Olivia. It is called the JT65 of conversational modes because it's incredibly slow but unlike JT65, it's not a structured exchange.

There are different combinations of bandwidth and number of tones used, such as 500/16 is 500 Hz with 16 tones. *Fldigi* reverses these numbers for some odd reason and will read "Olivia 16 – 500." Locking on to an Olivia signal may take 15 seconds. If the software is not decoding after that time, the bandwidth might be correct but the number of tones maybe wrong. For this reason, a call for "CQ" may take a minute or longer, so stations can lock on and return a call. Be patient!

Olivia is great for poor band conditions because a trace may not be seen on the waterfall but a signal might be decoded! One example I can share, is when a buddy of mine and I tried operating Olivia. We established contact and had strong traces on the waterfall using only 1.5 watts. We decided to compare it to sideband voice. We couldn't contact each other on sideband until we were nearly up to 100 watts!

Transmit test: Olivia 500/16: 4:56, Olivia 500/8: 3:20.

Frequencies: 1835-1838 kHz, 3583.25 kHz, 3577 kHz, 7035-7038 kHz, 10141-10144 kHz, 14072-14075.65 kHz, 14106.5 kHz, 18102.65 kHz, 21072 kHz, 24922 kHz, 28122 kHz.

Software

I love and recommend software applications that are capable of operating multiple modes (multimode) using one application. This keeps the clutter down of installing multiple applications for each mode. The two I use are *Digital Master 780 (DM780)* as part of the *Ham Radio Deluxe* suite:

(http://ham-radio-deluxe.com/). This package is not free, and is only available on Windows. If that is out of your budget, then I recommend *Fldigi*: (http://www.w1hkj.com/). It's free, open source, and cross platform, available on Windows, Mac, and Linux, including Raspberry Pi. Both of these applications support many different modes and are constantly being updated and with newer modes.

MixW (http://mixw.net) and *MultiPSK*:

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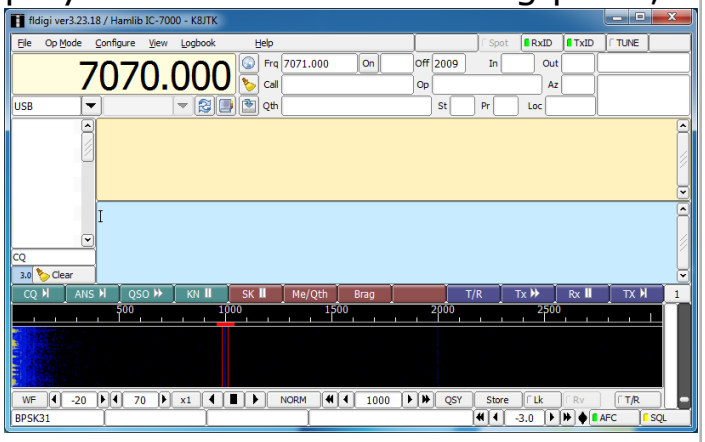
(http://f6cte.free.fr/index_anglais.htm) are alternatives and support most modes. There are specific mode applications like *DigiPan* (http://www.digipan.net/) for PSK and *MMTTY* for RTTY (http://hamsoft.ca/pages/mmtty.php). Neither are still maintained, but both are reported to work well with later versions of Windows. Other programs have known issues with versions of Windows later than Vista. Keep that possibility in mind when trying older programs.

The software applications are similar in setup and operation. Exact labeling might be different from application to application. I am going to reference *Fldigi*, though not going in-depth with settings, it should get you started. Install *Fldigi* with the default options. A configuration wizard will appear the first time the application is started. Fill out all your station information. Select the sound card interface (USB Audio Codec for *SignaLink*). If the transceiver is using something other than the *SignaLink* for keying, select the appropriate radio and COM port for TX control.

There are many parts to the *Fldigi* window. Standard menu options are seen like "File," "Op Mode," "Configure," etc, where operating modes or *Fldigi* configuration can be changed. Below that is Radio Control and Logging. When using internal logging, you'll want the frequency to be correct.

Rig control will help greatly to automatically log the correct frequency as you change the VFO. Below that is the tan-colored box where received messages will be displayed as well as transmitted messages. The blue box is the transmit window where messages are composed for transmitting. If you have a white box to the left of the transmit and receive panes, this is the signal browser. This will display all conversations taking place,



FLDigi window-RX (tan); TX (blue); Waterfall (black)

using the same mode, on the same frequency at once! Below the transmit text box is a line of colored buttons which are macros. Macros are pre-populated and commonly exchanged texts designed so you don't have to keep typing them in (right-click the button to edit). Below that is the frequency scale in Hz and the waterfall. Below the waterfall are the waterfall controls. The

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line below that are the status messages and readings. To the right of the waterfall are two vertical white and a gray bars which indicate the strength of the decoded digital signal and squelch setting.

Tune your radio to one of the PSK frequencies to get set up. 20 meters is better during the day and 40 m at night. The waterfall should start turning blue and yellow. If it is black, check the audio paths between the radio and computer, verify the audio input is set correctly in the *Fldigi* setup. Radios with a main and sub-band often cause confusion as to which band sends audio to the computer. If there is blue and yellow but a lot of black on the waterfall, check and disable radio filtering. Pro tip: the waterfall is a great educational place to visualize the filtering changes of the radio.

Now from the menu select "Op Mode," "PSK", then "BPSK-31." To select a digital signal on the waterfall, simply click on the waterfall and the cursor will move to that location. Signals under the cursor will be displayed in the receive pane. It's important to move the cursor on screen, so do not adjust the radio's VFO. Once a strong PSK signal is selected, you'll notice the white squelch bar fills with green. The green needs to be above the light gray squelch slider to break squelch and decode. This is the first place to look if the cursor is over a signal but it is not decoding. Having the squelch set too high will miss decoding weaker signals and having the squelch too low will produce a lot of garbage text in the receive window. If a specific signal is strong but not decoding, the signal could also be multi-pathing, thus confusing the program. Watch conversations for a good while to make sure you understand how the program works and for learning conversation syntax. Many programs have a "Signal Browser" or "Signal Sweeper" *(DM780)* which will decode multiple conversations at one time! In *Fldigi*, this can be broken out in a separate window under the "View" menu option.

Someone calling CQ will send CQ two or three times. I am K8JTK and Steve – W8HF will be the other station in these examples.

CQ CQ CQ de K8JTK K8JTK K8JTK
CQ CQ CQ de K8JTK K8JTK K8JTK

Repetition is good for weaker stations that might miss a letter or two. A responding station may respond with: **K8JTK K8JTK de W8HF W8HF pse kn.**

The two stations might begin the exchange using *macros*. These are good conversation starters. Macro messages typically include age of the operator, when they were licensed, radio and antenna, digital

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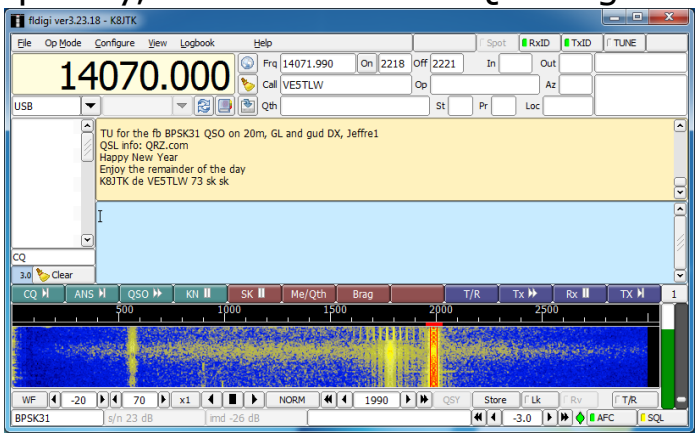
software program (e.g. *Fldigi*), computer operating system, physical location, etc, etc. This macro is called the "Brag" macro because you brag about your station. Beware though, for slower modes like Olivia, it can take a LONG time to send the same macro that takes seconds using PSK. The two stations could conclude the exchange or go back and forth typing out messages using the keyboard.

When receiving a message from another station, the responding station can begin typing a response in the blue transmit window even before the other station has finished transmitting. Always begin with something like "**W8HF de K8JTK**" so the other station knows you are responding to him, then continue with your message. If you're conversing with a station and he doesn't respond after your message, he may have lost your signal, his program crashed, or he became distracted. I typically wait from 30 seconds to 1 minute, and then try a quick call back to the other station: **W8HF W8HF W8HF de K8JTK K8JTK K8JTK, did I lose you? W8HF de K8JTK pse kn**. I'll try this 2-3 times, and if they don't return, I'll log the QSO and move on.

The end of a transmission should conclude with something like "**btu Steve W8HF de K8JTK pse kn**" noting the station is turning it back over to the other station. Concluding the conversation will end with something like: **tnx for QSO Steve, 73, W8HF de K8JTK sk**.

Other stations will end with a similar macro that includes their QSL information or where they upload their logs. To transmit CQ, find an open space on the waterfall and click to bring the cursor to that spot. Tones will be generated in the same place as the cursor on the waterfall during transmission. Tune up on frequency, and then call CQ using the



End of PSK31 QSO with waterfall shown

"CQ" macro. Some macros start and/or stop transmitting on their own. The "T/R" button under the waterfall is your best friend to start or stop transmitting in case something goes wrong. Some of the macros have the sequence "^r" at the end. This is an *Fldigi* command to change from transmit mode to receive mode, aka "transmission complete". This can be typed in manually at the end of messages too. *PSK Reporter*

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(http://pskreporter.info/) can be used just like JT65 to see how far you're reaching. Logging is fairly straight forward. RTTY and Olivia are logged as their respective mode only. BPSK is logged as PSK31, PSK63, etc. QPSK31, MFSK8, and MFSK16 are all logged as listed. If an RSQ was exchanged, log it accordingly. IMDs for either station can be recorded in the comments for future reference.

One idiosyncrasy with *Fldigi*: the position of the cursor in the transmit pane is critical. *Fldigi* will remain idle during transmission until the cursor is moved further down or moved to the end of the message. Many people are confused by this behavior and other programs don't seem to follow this convention. For example if you had a sentence with "this that" and positioned the cursor after "this," characters before the cursor will be transmitted until the point of the cursor was reached. The word "this" would be transmitted, but then *Fldigi* will remain idle in transmit mode until the cursor is moved. When moved, "that" will be transmitted until the program reaches the cursor again. Position the cursor at the end of the message during transmit and all will be well.

That's it. These conversational modes are very open and very free-form. Contesting will have a structure but casual operating is very informal. This outline can lead to operating other modes like Contestia, Thor, Throb, MT63, or Hell. Yes "Hell," short for Hellschreiber, is a facsimile based mode where there is a reason everything is printed twice.

Below are some sources for you to find out more information:

"PSK31: A New Radio-Teletype Mode" by G3PLX:
http://www.arrl.org/files/file/Technology/tis/info/pdf/x9907003.pdf

"Get on the Air with HF Digital" book:
https://www.arrl.org/shop/Get-on-the-Air-with-HF-Digital

"RTTY/PSK31 for Radio Amateurs" book:
https://www.arrl.org/shop/RTTY-PSK31-for-Radio-Amateurs-2nd-Edition/

"Nifty E-Z Guide to PSK31 Operation" book:
https://www.arrl.org/shop/Nifty-E-Z-Guide-to-PSK31-Operation/

"How to get started with PSK-31 Ham Radio" by K7AGE on YouTube:
https://www.youtube.com/playlist?list=PL8D7C6EBD6E2081E2 ■

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clude Amateur Radio communications on their face or as applied. Deed restrictions would have to impose the minimum practicable restriction on Amateur Radio communications to accomplish the lawful purposes of homeowners association seeking to enforce the restriction. ■

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