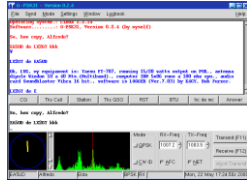
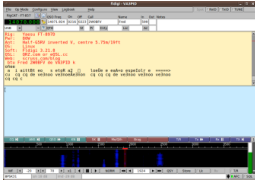


## PSK31 Digital Mode




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### Some general Information about PSK31

- PSK31 was designed by G3PLX, Peter Martinez and introduced in 1998
- It is based on the RTTY mode of operation
- It is useful for live keyboard to keyboard QSO's
- It is easy to use and monitor

#### Operating parameters

- It works at 31.25 baud but uses varicode character coding that gives ~ 50 wpm
- It is suitable for QRP operation as you can receive very good copy under low Eb/No numbers (ratio of Energy per Bit "Eb" to the Spectral Noise Density "No"), a measure of signal to noise ratio for a digital communication system
- It uses advanced DSP and narrow band (31 Hz) techniques
- It uses BPSK or QPSK decoding instead of FSK
- Self-synchronizing, the character separator – "00" – never occurs inside a character

#### It does not offer

- Error free links
- The ability to transmit files or access mailboxes

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### PSK31 what is it?

PSK31 stands for "Phase Shift Keying" 31 baud. It is becoming a popular radioteletype mode used to conduct real-time keyboard-to-keyboard chat.

The unique quality about PSK31 is that it is specifically tuned to have a data rate close to typing speed. And with an extremely narrow bandwidth many conversations can be carried in the same bandwidth as a single voice channel.

The narrow bandwidth also helps to concentrate the RF energy required allowing relatively low-power transmitters to communicate globally using skywave propagation.

Instead of the traditional Frequency-shift keying the BPSK (Binary Phase Shift Keying) modulation system transmits the information using patterns of polarity-reversals, sometimes referred to as 180-degree phase shifts.

Like other narrow band digital modes, PSK31 can often overcome interference and poor propagation conditions in situations where voice or other methods of communication fail. But due to its relatively slow speed and limited error control it is not suitable for transmitting large blocks of data or text, or data requiring high immunity from errors.

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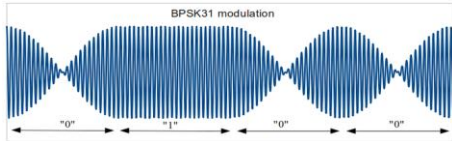
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## PSK31 implementation

Typically you would use a transceiver connected to the sound card of a computer running PSK31 software. When the software sends a message it produces an audible tone that is fed into the transceiver that sounds, to the human ear, like a continuous whistle with a slight warble.

From the transmitters perspective the tone amounts to little more than somebody whistling into the microphone. However there is a rapid phase shift of the audio signal between two states (hence the name "phase-shift" keying) that forms the character codes. These phase shifts serve the same function as the two tones used in traditional RTTY and similar systems.



Here is what it sounds like: 🗣️



## The ASCII Varicode Alphabet

The codes are transmitted left bit first, with "0" representing a phase reversal on BPSK and "1" representing a steady carrier.

A minimum of two zeros is inserted between characters. Some implementations may not handle all the codes below

32.

- 1 space
- 11 e
- 101 t
- 111 o
- 1011 a
- 1111 n

.....

101011011 Z

No "00" used.

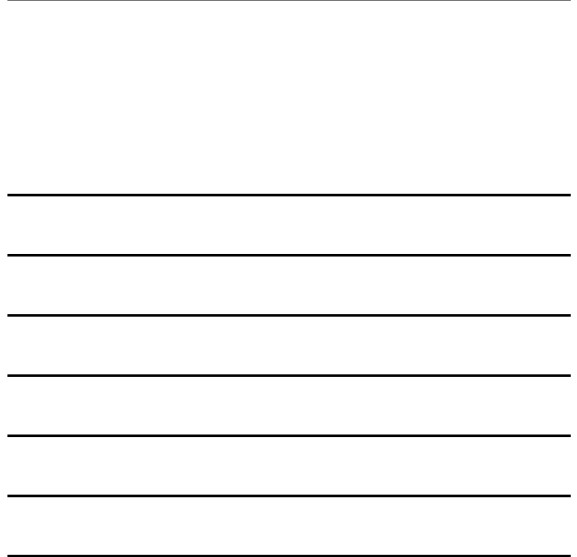
Lower case are shorter than upper case.

ASCII	Varicode	ASCII	Varicode	ASCII	Varicode
0 (NUL)	001000000	0	11001111	V	11011001
1 (SOH)	001001001	1	11000101	W	10101100
2 (STX)	001010000	2	11000010	X	10110000
3 (ETX)	001011001	3	10101111	Y	10111001
4 (EOT)	001000011	4	10000110	Z	10000100
5 (ENQ)	010001110	5	10110011	[	11110011
6 (ACK)	001010010	6	10001010	]	11001011
7 (BEL)	001011100	7	11010101	^	11110011
8 (BS)	001010110	8	10110111	_	10001111
9 (HT)	11001111	9	10110011	?	10110101
10 (LF)	1100	10	10010010	a	10010111
11 (VT)	110100111	11	10100011	b	1011
12 (FF)	001001000	12	10000100	d	100110
13 (CR)	1111	13	11000011	e	100111
14 (SO)	110010001	14	10010011	f	100100
15 (SI)	110000011	15	11100001	g	11
16 (DL)	001010011	16	10011001	h	111001
17 (DC1)	001010000	17	11001001	i	100101
18 (DC2)	110010000	18	10001001	j	100011
19 (DC3)	110001011	19	11000101	k	110011
20 (DC4)	110000101	20	10000101	l	11100101
21 (NAK)	110100011	21	10010110	m	101110
22 (SYN)	110010010	22	11110101	n	110111
23 (FB)	110000101	23	11000101	o	110011
24 (CAN)	110011001	24	10001001	p	1111
25 (EM)	110011001	25	10010001	q	111111
26 (SUB)	110010111	26	11001011	r	111111
27 (ESC)	110000001	27	11000011	s	10011011
28 (FS)	110001101	28	11111001	t	100011
29 (GS)	110010101	29	10000001	u	100111
30 (RS)	100111001	30	11111101	v	101111
31 (US)	100110101	31	10111001	w	111101
32 (SP)	1	32	10111101	x	100101
.	11111111	.	10001011	y	10011111
,	10001111	,	10011011	z	11001011
#	11110001	#	10010001	{	10010001
\$	11001011	\$	10000101		10010001
%	10010000	%	10000001	}	10010001
&	10001101	&	11001101	~	10010001
^	10011111	^	10000111	!	10010001
~	11111001	~	11001111	@	10010001
!	11100011	!	11001001	127	11001001
?	10010111	?	10000111		

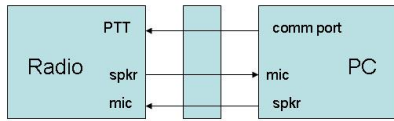
PSK31's efficiency and narrow bandwidth make it highly suitable for low-power and crowded band operation. PSK31 contacts can be conducted at less than 100 Hz separation. So, with disciplined operation, at least 20 simultaneous PSK31 contacts can be carried out side-by-side in the 2.5 kHz bandwidth required for just one SSB voice contact.

## Common operating frequencies

- 1.838 MHz – 160 meters
- 3.580 MHz – 80 meters
- 7.035 MHz – 40 meters (region 3)
- 7.040 MHz – 40 meters (regions 1,2)
- 10.142 MHz – 30 meters
- 14.070 MHz – 20 meters
- 18.100 MHz – 17 meters
- 21.080 MHz – 15 meters
- 24.920 MHz – 12 meters
- 28.120 MHz – 10 meters
- 50.290 MHz – 6 meters



### Hardware Required



Amateur Transceiver

PC / Tablet / Smartphone

Sound Card Interface or Radio Interface to the PC

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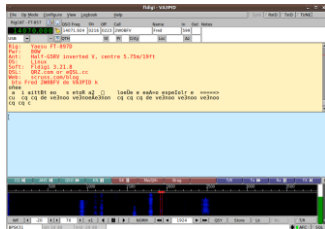
### Software Required

Windows: Fldigi, DigiPan, HamScope and many others

Linux: PSK31 for Linux, G-PSK31

Mac: Multimode

Android: DroidPSK




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Information from the following sources:

PSK31 "Official" Homepage - <http://www.aintel.bi.edu.es/psk31.html>

Wikipedia

<http://hamradio.arc.nasa.gov/meetings/PSK31presentation.html>

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