

PSK-31



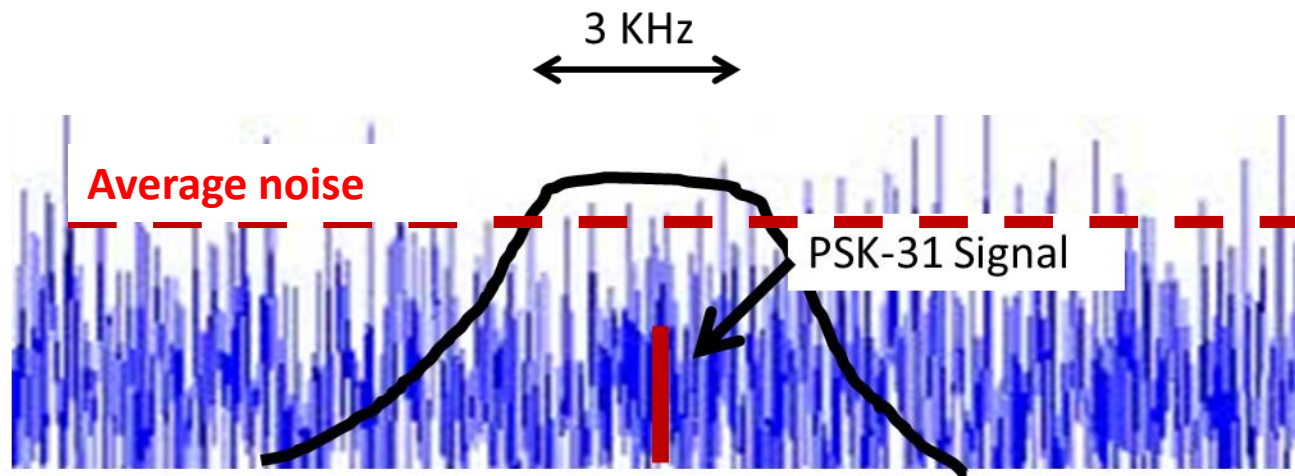
Presentation to the Inland Empire VHF club November 10, 2011

What is PSK 31?

- **It is a digital Mode**
- **Text, ASCII transmission**
- **Narrow Bandwidth (PSK 31Hz)**
- **Low power - less than 25 watts**
- **Outperforms Teletype and Packet**
- **Low cost interface**
- **Simple to use**

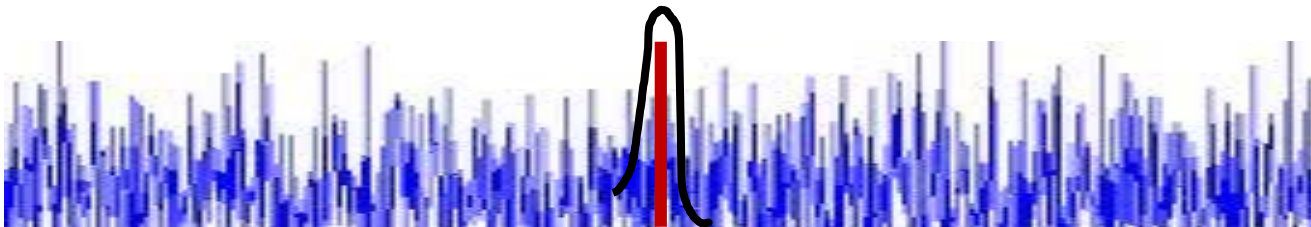
The narrowest SSB Signal

The normal SSB signal bandwidth compared to a PSK-31 signal



Bandwidth vs. Signal to Noise

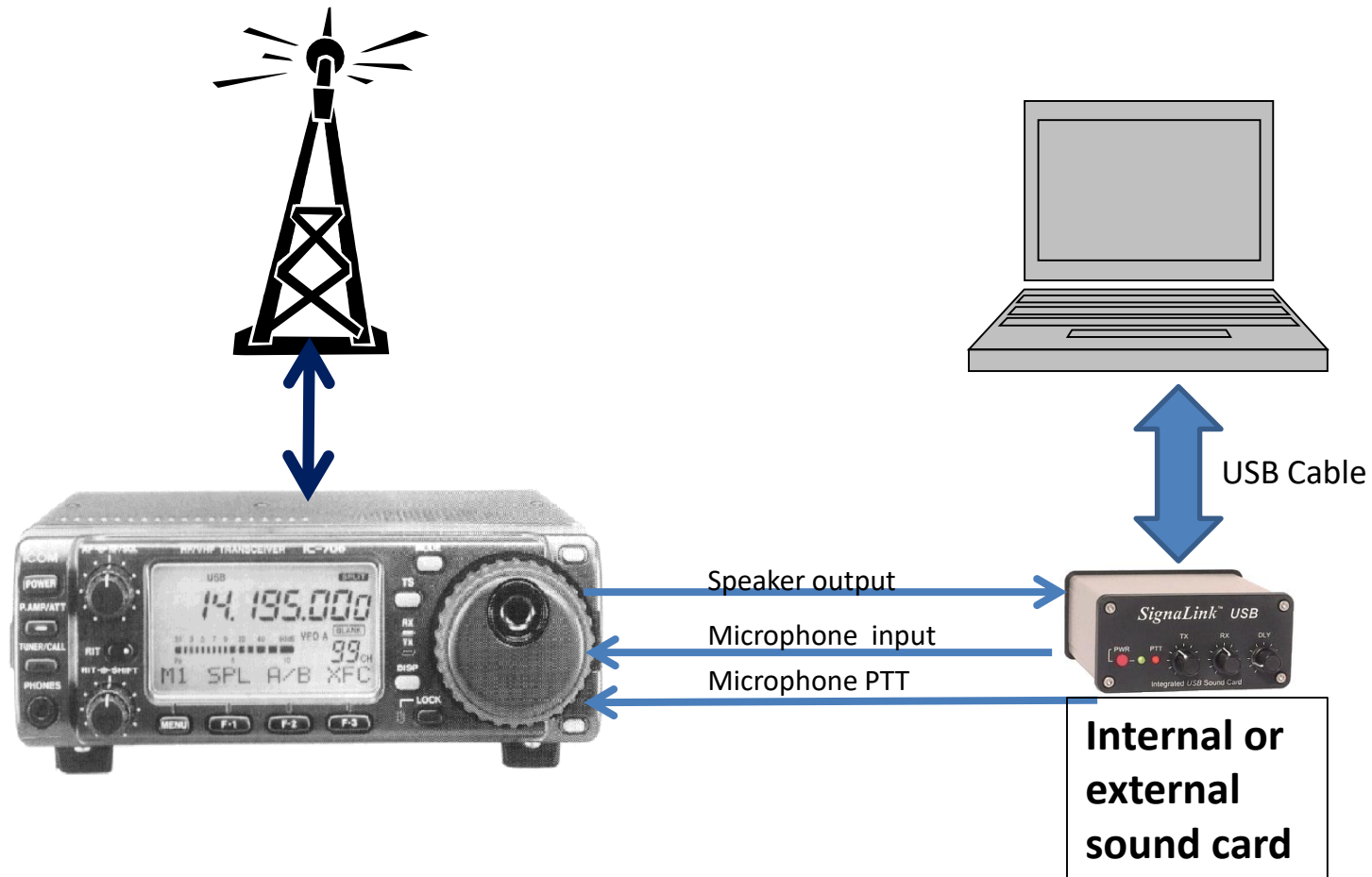
- Using a narrow bandwidth removes unwanted signals and noise
- This allows for improved (higher) signal to noise ratio on the received signal.
- Because of the narrow bandwidth signals that would normally be lost in the noise can be received clearly.



Why use PSK-31

- **Useable well into the noise of SSB.**
- **Use an available radio and any computer.**
- **Use low power and normal antenna.**
- **Uses very little bandwidth.**
- **Free software on the internet.**
- **Can be used on all bands and satellite.**
- **Simple setup and operation.**

Simple to Set Up And Use



What Kind of Signal is it?

- **PSK-31 uses special CW characters.**
- **Most used letters have the shortest code.**
- **Lower case letters type faster.**
- **Frequency shift keying (FSK) is used.**
- **Signal uses about 15 Hz of bandwidth.**
- **Communication rate is about 3 characters per second.**

What Does it Sound Like?

- **Each signal sounds like a single tone.**
- **Each tone warbles ± 15 Hz.**
- **Your SSB Receiver can receive many PSK-31 stations at the same time.**
- **You will hear all the stations at once if you turn up the receive volume.**
- **The computer and software pick out the station you want to work**

Set & Forget Your Radio

- **Set your radio to the established frequency**
- **Use USB regardless of band**
- **Turn off all filters, compression and DSP functions and let the computer and software do these functions.**
- **PSK-31 software acts like a digital signal processor(DSP)**

Digital frequencies

BAND	PSK-31	SSTV	RTTY	ASCII	MFSK
160 Meters	1.812	1.981	1.812	1.812	1.812
80 Meters	3.580	3.845	3.580	3.580	3.580
40 Meters	7.070	7.228	7.080	7.080	7.073
30 Meters	10.137	-----	10.130	10.130	10.130
20 Meters	14.070	14.230	14.080	14.080	14.073
17 Meters	18.100	-----	18.100	18.100	18.104
15 Meters	21.070	21.340	21.080	21.080	21.073
12 Meters	24.925	-----	24.920	24.920	24.925
10 Meters	27.120	28.680	28.080	28.080	28.080

How is PSK 31 Tuned

- **PSK-31 is a continuous carrier signal.**
- **Use spectrum/waterfall display for tuning.**
- **Left mouse click sets receiving frequency.**
- **Right mouse click sets transmit frequency.**
- **Computer displays frequency above transceiver setting.**
- **Listening is unnecessary.**

The PSK-31 Screen

The screenshot displays the DigiPan software interface for PSK-31 digital communication. The window title is "DigiPan" and it features a menu bar with options: File, Edit, View, Settings, Rig Control, Clear Rcv, Clear Xmit, DemoMode, and Help.

Control Panel:

- Call: [Clear] [CQ] [CALL] [BTU]
- Name: [Signoff] [Equip] [Undefined] [Undefined] [Undefined]
- RST: [999] [Log It] [Undefined] [Undefined] [CW ID] [Tune] [Pause]
- Panel: [F1] [F2] [F3] [F4] [F5] [F6] [F7] [F8] [F9] [F10] [F11] [F12]
- Home: [Home]
- Auto Mac: [Auto Mac]

Text Area:

!Nwm _ tn cm Rkc6t de ve6ux rr good copy Bill. Naml octoer eE a e 'Ra rit itegÁ Radio is an icom 735 running 100w to a sloper. software digipan. how copy? kc6t de ve6uxfaX DE KC6T

Good copy Bob - - your station doing quite a nice job. Your sigs peak at 569 569 here

Station XCVR: FT-10MP, 30W
Antennas: 3 element Yam invertevee
Computer: 866MHz P3
Software: DigiPan ver. 2.0
Interface: Home Brew

Our WX is clear and windy. Temp right now is iAthe mid to high

Control Panel (Bottom):

- Zoom: [Zoom In] [Zoom Out]
- Freq: RX [1606] TX [1663]
- Mode: [8PSK]
- Display Gain: [Slider]
- Receiver: [AFC] [Nar] [2AFC] [2Nar]
- RTTY: Baud [45.5] Shift [170] [UOS] [Feed]
- CW/WPM: TX [15] RX [15]
- Options: [Options] [HAM Del]
- 2754 Hz

Graphs:

- Spectrum: [Spectrum] [Waterfall] [Input] [Data Sync]
- Waterfall: [1000] [2000]

Status Bar:

Receiving CPU = 11% CLK: ppm = 100 21 Jan 2007 19:22:11 UTC

The Receive Text Area

The screenshot displays the HamScan software interface. At the top, the window title is "G:\HamScan e 1.54 -- K6AIX". The menu bar includes "File", "Edit", "View", "Settings", "Rig Control", "Clear Rcv", "Clear Xmit", "Demo Mode", and "Help". Below the menu bar is a control panel with buttons for "Call", "Clear", "CQ", "CALL", "CALL", "BTU", "Panel", "Name", "Signoff", "Equip", "Undefined", "Undefined", "Undefined", "Home", "RST", "Log It", "Undefined", "Undefined", "CW ID", "Tune", "Pause", and "Auto Mac".

The main text area contains the following text:

inWm _ In cm Rkc6t de ve6ux rr good copy Bill. Naml oetoe r eÉ a e Ra rit itegA Radio is an icom 735 running 100w to a sloper. software digipan. how copy? kc6t de ve6uxrfaX DE KC6T

Good copy Bob - - your station doing quite a nice job. Your sigs peak at 569 569 here

Station XCVR: FT-10MP, 30W
Antennas: 3 element Yam invertvee
Computer: 866MHz P3
Software: DigiPan ver. 2.0
Interface: Home Brew

Our WX is clear and windy. Temp right now is i4the mid to high

Overlaid on the text area is the text "Receive Text Here" in large yellow font.

At the bottom of the interface is a control panel with various settings:

- Zoom: [Left Arrow] [Right Arrow]
- Freq: RX [1606], 2RX [1100], TX [1663]
- Mode: BPSK
- Display Gain: [Slider]
- Receiver: [Slider], [AFC] [Nar], [2AFC] [2Nar], [Dual Receive], [Reverse Polarity]
- RTTY: Baud [45.5], UOS [], Shift [170], Fixed [], Options, HAM Def
- Buttons: Spectrum, Waterfall, Input, Data Sync

The bottom status bar shows "Receiving", "CPU = 11%", "Clk: ppm = 100", and "21 Jan 2007 19:22:11 UTC".

The Transmit Text Area

The screenshot displays the HamSoft 1.54 software interface. At the top, the title bar reads "G: HamSoft v 1.54 -- K6AIX". The menu bar includes "File", "Edit", "View", "Settings", "Rig Control", "Clear Rcv", "Clear Xmit", "Demo Mode", and "Help". Below the menu bar is a control panel with buttons for "Clear", "CQDX", "CQ", "CALL", "BTU", "Signoff", "Equip", "Undefined", "Undefined", "Undefined", "Log It", "Undefined", "Undefined", "CW ID", "Tune", "Pause", "Panel", "Home", "Auto Mac", and a green "Rx" button with a green dot.

The main text area is divided into two sections. The top section, labeled "Receive Text Here" in yellow, contains the following text:
iNwm _ tn cm Rkc6t de ve6ux rr good copy Bill. Naml octoer eE a e`Ra rit itegÁ Radio is an icom 735 running 1Q@w to a sloper. software digipan. how copy? kc6t de ve6uxrfaX DE KC6T
Good copy Bob -- your station doing quite a nice job. Your sigs peak at 569 569 here
Station: XCVR: FT-10MP, 30W
Antennas: 3 element Yarn invertedvee
Computer: 866MHz P3
Software: DigiPan ver. 2.0
Interface: Home Brew

The bottom section, labeled "Transmit Text Here" in green, is currently empty.

Below the text area is a control panel with various settings:
Zoom: 100 Hz
Freq: RX 1606, 2RX 1100, TX 1663
Mode: BPSK
CW/WPM: TX 15, RX 15
RTTY: Baud 45.5, Shift 170, UOS, Fixed, Options, HAM Def
Receiver: AFC checked, Noise unchecked, 2AFC unchecked, 2Nar unchecked, Dual Receive unchecked, Reverse Polarity unchecked
Spectrum: 2754 Hz

The bottom status bar shows "Receiving", "CPU = 11%", "CB: ppm = 100", and "21 Jan 2007 19:22:11 UTC".

The Control and Mode Setting Area

The screenshot displays the HamScope 1.54 software interface. At the top, the title bar reads "HamScope 1.54 -- K6AIX". The menu bar includes "File", "Edit", "View", "Settings", "Rig Control", "Clear Rcv", "Clear Xmit", "Demo Mode", and "Help". Below the menu bar, there are several control buttons: "Clear", "COOK", "CQ", "CALL", "BTU", "Panel", "Home", "Auto Mac", "LogIt", "Undefined", "CW ID", "Tune", and "Pause".

The main display area is divided into three sections:

- Receive Text Here:** A black area containing received text. The text includes: "Good copy Bob -- your station doing quite a nice job. Your sigs peak at 569 569 here", "Station: XCVR: FT-10MP, 30W", "Antennas: 3 element Yam inverteev", "Computer: 866MHz P3", "Software: DigPan ver. 2.0", and "Interface: Home Brew".
- Transmit Text Here:** A black area for entering text to be transmitted.
- Control and Mode Settings:** A grey area with various controls. It includes "Zoom" (RX, TX), "Freq" (1606, 1100, 1663), "Mode" (BPSK), "Display Gain", "Receiver" (AFC, Nar, 2AFC, 2Nar), "RTTY" (45.5, 170), "UDS", "Fixed", "Options", "HAM Del", "Dual Power", and "Reverse".

At the bottom, there is a spectrum display showing a green waveform. The status bar at the very bottom indicates "Receiving", "CPU = 11%", "Cik ppm = 100", and "21 Feb 2007 19:23:11 UTC".

The Spectrum Display Area

The screenshot shows the HamScope 1.54 software interface. At the top, there is a menu bar with options like File, Edit, View, Settings, RigControl, ClearRcv, ClearXmit, DemoMode, and Help. Below the menu bar are several control buttons for Call, Name, RST, and LogIt. The main display area is divided into three sections: a text message area, a transmit text area, and a control and mode settings area. The text message area contains a message from Bob: "Good copy Bob -- your station doing quite a nice job. Your sigs peak at 569 569 here". The transmit text area is currently empty. The control and mode settings area includes fields for Freq (1606), Mode (BPSK), and various receiver and transmitter settings. Below the settings is a spectrum display showing a signal peak at 1606 Hz. The status bar at the bottom indicates "Receiving", CPU usage at 11%, and the date/time as 21 Jan 2007 19:23:11 UTC.

Receive Text Here

Transmit Text Here

Control and Mode Settings

Spectrum Display

The Waterfall Display Area

The screenshot displays the HamScope 1.54 software interface. At the top, there is a menu bar with options: File, Edit, View, Settings, Rig Control, Clear Rev, Clear Xmit, Demo Mode, and Help. Below the menu bar are various control buttons for Call, Name, RST, and other functions. The main display area is divided into several sections:

- Receive Text Here:** A black area containing text from a radio log, including "BTU VE6UX DE KC6T" and "PSE kkc6t de ve6ux ok Logic8 ish f s sepiedoee i. will have a look for that later. I wanted something to track WAS with and of course t e ste aet SfinQat on i wn. Actually the winter here is quite mild. seems all the bad weather is south of us or in the far north of here. we did =oery Xèiioell in November and then for two (s fer Xmas though but can't como lain. Lots of snow 1Çe5&got two feet on the ground hi. e ndid I get that right..... Logic8? kc6rde ve8l eee . e)t VE6UX DE KC6T".
- Transmit Text Here:** A green area for entering transmit text.
- Control and Mode Settings:** A pink area containing various control panels for Zoom, Freq, Mode (BPSK), Display Gain, Receiver (AFC, 2AFC, 2Nar), and other settings. The frequency is set to 1614 and the mode is BPSK.
- Waterfall Display:** A blue area showing a waterfall display of the received signal. The text "WATERFALL DISPLAY" is overlaid in a blue box.

At the bottom of the interface, there is a status bar showing "Receiving", "CPU = 13%", "Clk ppm = -100", "IMD = -18 dB", "21 Jan 2007 19:28:21 UTC", and "7:28 PM".

How many stations at once?

- **All within a 3000Hz Bandwidth**
- **Each PSK-31 signal requires about 100Hz allowing for ample signal separation**
- **30 stations visible ($3000/100= 30$)**

How is the TX Signal Generated?

- **The Computer generates an audio tone using its sound card (or external modem).**
- **The audio tone is sent to the SSB transmitters microphone input.**
- **The transmitter output frequency is the carrier frequency setting + the audio tone frequency.**
- **Microphone gain is adjusted down for a maximum of 25 watts output.**

Why Such Low Power?

- **You are transmitting a CW carrier signal full time.**
- **The narrow band signal has to be low distortion.**
- **The use of high power produces distortion and Spurious over entire band**

The PSK-31 Display

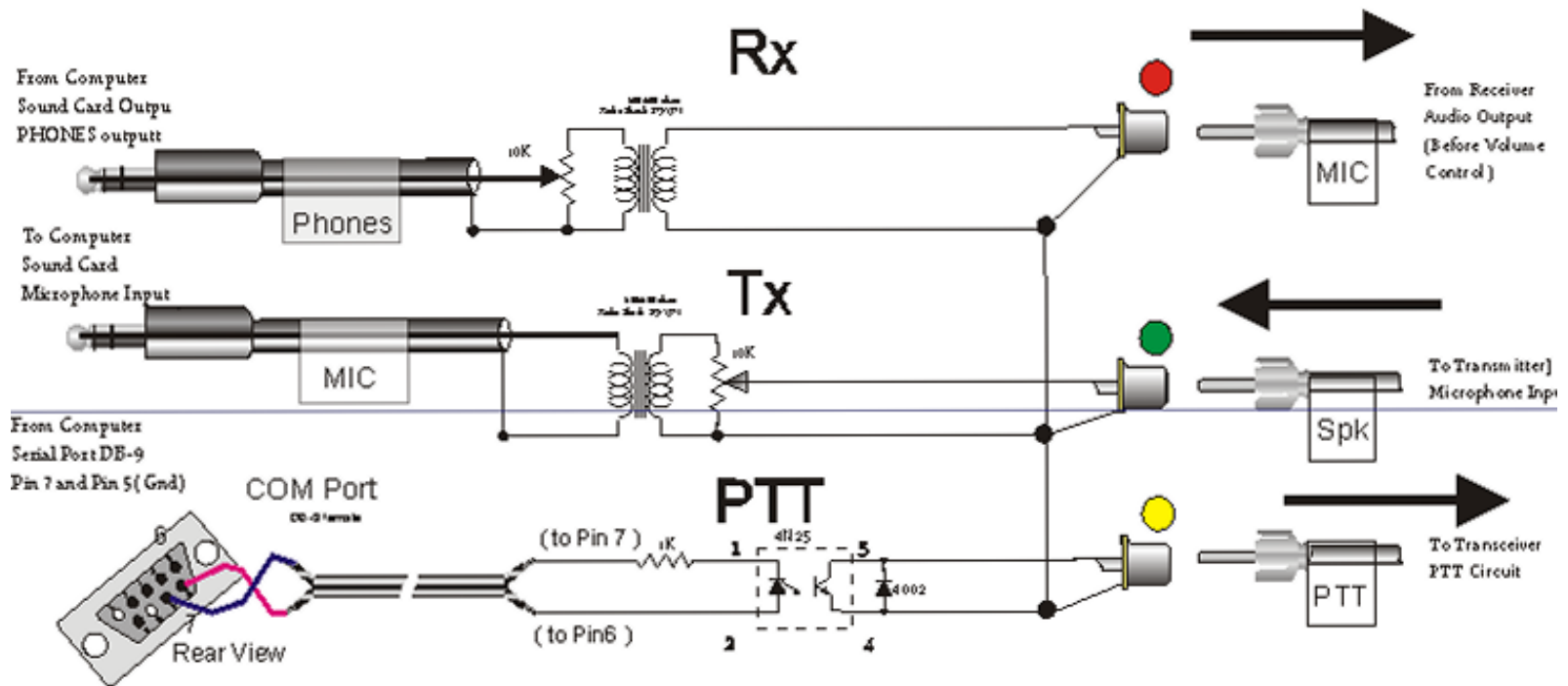
- **Requires Pentium II or better with color VGA Monitor.**
- **Standard sound card (or modem).**
- **A mouse.**
- **Software (available free)**
 - **DigiPan**
 - **HamScope**
 - **WINPSK**
 - **W1SQLPSK**

Sound Card Adapter

Available from

- **Home Brew**
- **Rigbladster**
- **Tigertronics**
- **MFJ**

Home Brew Wiring Diagram



HF Rig Requirements

- **160 thru 10 Meters (or the bands you want to work).**
- **Always use USB, even below 10 MHz.**
- **Use under 25 watt (on a 100watt transceiver).**
- **Digital tuning (preferably synthesized) tuning necessary for frequency stability.**
- **On VHF and UHF Audio Frequency Shift Keying (AFSK) is used.**

Other Digital Modes

- **QPSK, BPSK, MFSK**
- **PSK-64**
- **RTTY, MMTY**
- **SSTV, MMSSTV**
- **Hellsreiber**
- **CW**
- **Packet**

On The Web

Free Software down load sites:

www.qsl.net/hamscope

www.digipan.net

<http://hamsoft.ca/>

Questions?

