

H A M V I E W

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di Bene I2PHD

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**** W A R N I N G ****

If upgrading from version 2.10, delete the HAMVIEW.INI file. The new INI file has new keywords added, and it will be recreated by the program. HAMVIEW will try to keep your station coordinates, though.

DISCLAIMERS

If you are eager to read all the disclaimers and legalese stuff, go to the end of this document. Most important things first.

WHAT IS HAMVIEW ?

To say it in a few words, HAMVIEW is a weak-signals reception program that:

- gets an audio signal either from a Sound Blaster(TM) compatible card or from a .WAV file
- performs a windowed spectral analysis on the incoming signal
- displays the signal spectrum on the video screen using a carefully matched color scheme
- performs some enhancement on the signal using signal processing methods
- plays the filtered signal at the output of the audio card
- and last but not least, all these goodies are done in real time! (well, to be honest with about one tenth of a second of delay from the input to the output, due to the data windows used for signal analysis and processing).

The program was especially developed for radio amateurs interested into all those communication techniques where signals very close to (or more often below) the receiver noise floor are used, like EME, VLF, and so on.

However we believe that Hamview will be of value also for HF and VHF CW lovers (try it... we never found a point-and-click CW filter on a commercial receiver!!!).

All the hardware needed is:

- a Pentium computer with MS-DOS or PC-DOS 6.xx or greater (a W95 DOS session is OK). Windows NT is not supported, as the program needs to talk directly to the hardware, bypassing any driver, and this is not allowed under NT.
- a Creative SB16 sound card or better. Compatible cards should work, provided that 100% hardware compatibility is assured, and the card is full-duplex compatible.

The program was developed in an effort to improve the capabilities of amateur radio communications using the power of digital signal processing, and is continuously evolving. Check the Hamview web page (<http://www.freeyellow.com/members/padan>) for further news.

If you find some interest in the program, please send an E-mail or a QSL to one of the authors, saying (if possible):

- where you discovered this program
- how did you use it
- if it was of some use to you
- what kind of computer and operating system you use
- what addition would you like to see in the next version of Hamview

This information will not be delivered to anybody except the authors of Hamview, and will not be used for commercial purposes. They will be treated according to current laws for privacy, and have the sole purpose of helping us to improve the next version of Hamview.

PREREQUISITES

To run **HAMVIEW**, you need the following:

- - A Pentium CPU (minimum 90 MHz). The program has been tested also with a 100 MHz DX2 486 CPU. It runs, but the percentage of CPU used is dangerously near to 100%, with all the filters off. If you want to use the 'Fast' setting, you need at least a 200 MHz Pentium.
- - Native DOS or a full-screen DOS session of Win 95.
- - A Sound Blaster 16 card. A fully compatible card can also be used, but the compatibility must be at the hardware level. This means that if you need to load drivers to achieve such compatibility, this card won't work with HAMVIEW. The SB AWE-32 and AWE-64 cards are hardware compatible with the SB 16.

*The new PCI cards (SB Live, SB 128, etc.) are (unfortunately) ***not*** supported.*

This is due to a lack of technical info from Creative Labs, which are unwilling to release the technical specs needed to support their PCI cards.

The sound card must have both the DMA channels defined, and they must not use the same number. If you use Win 95, this can be checked by opening ControlPanel->System->DeviceManager and verifying which resources the sound card is using. Both DMA channels must be present, with the second DMA channel set either to 5, 6 or 7. If using native DOS, if your card is ***not*** PnP (Plug-and-Play), just check if the jumpers are set correctly. If your card is PnP, as it will probably be, you must use a PnP Configuration Manager to set the card. If you have an original Creative Labs, this Config. Manager should have been installed by the card setup procedure. If not, consult the documentation for the card.

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- - A SVGA video card capable of at least one of the following video modes:

640 x 480 x 256 colors (8-bit mode)
800 x 600 x 256 colors (8-bit mode)
1024 x 768 x 256 colors (8-bit mode)

The card must be VESA-compliant, either by itself, or by using a driver, like the Display Doctor by Scitech. Almost all the video cards on the market today meet these requirements (what?!? Are you still using an HGC card?!?). HAMVIEW supports all three resolutions, but, of course, the best quality is achieved when working at 1024 x 768.

GETTING STARTED

Unpack the HAMVIEW.ZIP file to a directory of your choice on your hard disk.

Connect the input audio to the line-input jack of the sound card. This is the default input. You can change it in the INI file, by specifying :

InputSource **Mic** (Mic or Line are allowed here)

The input sensitivity can also be set in the INI file, with this keyword :

InputGain **nn** (where nn can range from 0 to 31)

If you want to hear the filtered audio you need of course at least one speaker connected to the sound card output (left or right it doesn't matter, the same signal is routed to both channels).

Make sure that you have an environment variable BLASTER, set as follows:

BLASTER=Annn lx Dy Hz (other values can follow)

where: **Annn** is the I/O port address (usually A220 or A240)
 lx is the IRQ used by the sound card (usually I5 or I7)
 Dy is the low DMA channel (usually D0 or D1)
 Hx is the High DMA channel (can only be H5 or H6 or H7)

other values can be present (e.g. T6 E620 P330).
They are not needed nor used by Hamview.

To invoke HAMVIEW use the following syntax from the DOS command line:

HAMVIEW [filename] [-v0 | -v1 | -v2] [-m | -f]

where:

filename, if present, indicates the name of the file to be used for the playback mode. If absent, real-time mode is assumed.

-v0 sets the resolution at 640 x 480 x 256

-v1 sets the resolution at 800 x 600 x 256

-v2 sets the resolution at 1024 x 768 x 256 (this is the default)

-m sets the speed to medium

-f sets the speed to fast (more on this later). If this parameter is omitted, it defaults to normal.

The program searches the current directory for a file named **HAMVIEW.INI** which is used to set the station coordinates, in order to have a correct display of the moon azimuth and elevation (this program is especially targeted to EME users). If the file is not present, a default one is generated, with the station coordinates of I2PHD. If you need to have the moon data displayed correctly, you can change it with a standard text editor. The format is self-explanatory.

Upon starting, you will be presented with the program main (and only) screen. The vertical axis is the frequency scale. The program's range is from

20 - 4094 Hz in normal mode,

20 - 8188 Hz in medium mode and

20 - 12282 Hz in fast mode.

Only a part of this range can be shown on the screen. You can scroll up and down with the **PgUp** and **PgDown** keys. Near the bottom-left corner there is an input level indicator. Adjust input level to keep the level in the green part, with only occasional excursions in the red zone. The mouse pointer (a small cross) can be moved, and the frequency corresponding to its vertical position is displayed on the status line.

On the extreme left part of the screen a real-time spectrum-analyzer-like display is shown, updated every half second in normal mode, 4 times a second in medium mode, and six times a second in fast mode. On the central part of the screen a moving bar will paint behind itself the color corresponding to the magnitude of each frequency bin. The higher the amplitude of the incoming signal at a given frequency, the brighter the color of the point shown. Each point corresponds to a bandwidth of 2, 4 or 6 Hz (depending on the speed), and the bar moves with steps of half, one fourth or one sixth of a second, again depending on the speed setting. These values are the consequence of the sampling rate chosen (8192, 16384 or 24576 samples/sec), and the buffer size (two flip-flop buffers, 4096 entries each).

On the right part of the screen there are 9 mouse-selectable large buttons, used to set or reset various functions or parameters. Their color toggles from Red (function active) to Green (function not active) when single-clicked.

The settings are remembered from one execution to the next, so you don't have to reset your favorite mode.

From the top:

ESTIMATOR selectable from Blackmann/Tukey or FFT. Default Blackmann/Tukey. This selects which kind of spectral estimator the program must use. BT gives a better signal-to-

noise ratio, but has the tendency to mask very weak signals when more than a signal is present. FFT is the usual Fourier Transform estimator.

SMOOTH computes a moving average of the spectrum. Default OFF. Can be used to smooth out the noise. The integration is done on the nine past values.

SCALE can be set to LOG or LIN. Default is LOG. Selects whether the mapping between magnitude and colors is linear or logarithmic. LOG works best with the Blackmann/Tukey estimator. The program has an interlock such that when you select the FFT estimator, the scale is also changed to LIN, if not already set.

DENOISER selects the LMS denoiser. Default OFF. The LMS denoiser is of the Widrow type, and works best when the signal amplitude is above a given minimum level.

BANDPASS selects the FIR bandpass filter. Defaults to OFF. This filter has very steep skirts and a flat passband. This passband is indicated by a red portion on the moving bar. To set the low cut and high cut frequencies, use the mouse. The left button sets the low cut, and the right one the high cut. This can be done only when the CW filter is not active.

CW PEAK activates the CW filter. Its center frequency is indicated by a yellow spot on the moving bar. This frequency can be set with the left mouse button. Its value is saved by the program, and recalled when the program is restarted.

TRACK selects the automatic tracking of the CW filter. If the BandPass filter is active, it limits the excursion of the automatic tracking. The CW PEAK filter is automatically centered on the strongest signal. It is suggested to disable this feature as soon as the desired center frequency is acquired, to avoid having the filters jumping back and forth, when the signal-to-noise ratio is very low. Default OFF.

MARKER when ON, the moving bar leaves tiny marks behind itself spaced 100 Hz. Default OFF.

CONTRAST sets the mapping gain between signal magnitude and color. Default HIGH. When receiving CW signals strong enough to be normally heard, as is the case on the HF bands, the best results can be obtained by setting the gain to LOW.

When the program runs, the following keys are active:

- **R** recording. Activates the recording of the incoming audio into the file **HVddhhmm.WAV**, where **dd** is the day, **hh** and **mm** are the hours and minutes when Hamview started. If pressed again, the recording pauses until a new pressure. When rerecording after a pause, the file is appended.
- **Ctl** Passthrough mode. The incoming audio is simply rerouted to the output, with no processing. Very useful when tuning, as the processing delay between audio input and output is suppressed when in passthrough mode. The activation of the passthrough mode is signalled on the up left corner of the screen by a prominent upper case **P**, white on red background. The visual (on screen) processing of the input signal is unaffected.
- **Cursor UP and DOWN** The cursor UP and DOWN keys adjust the output volume, from zero to the maximum. Useful when listening with headsets.
- **PLUS and MINUS** keys The PLUS key increases the speed from normal to medium to fast, while the MINUS key does the opposite. When changing speed the vertical axis is redrawn accordingly.

- **Z** The Z key clears the screen.
- **PgUp and PgDown** The PgUp and PgDown keys move up and down the frequency range displayed on the screen. The scrolling amount is indicated in the INI file. The default is 200 Hz.
- **ESC** terminates the program, after resetting the sound card mixer to the state found at program initialization.

All of the mouse-selectable buttons can also be toggled by typing the first letter of the command itself (i.e. '**E**' for Estimator, '**F**' for Filter), with the exception of Scale, which is toggled with the '**L**' key, and the CW Peak filter, which is toggled with the '**P**' key. Case is immaterial.

The status line reports the percentage of CPU used by the program. As an example, with a 225 MHz Pentium this value ranges between 19.8 % with all the functions off and 29.4 % with all the functions on, in normal speed.

For EME operations, a real time clock shows to the operator the one-minute period used for trasmission exchange between east and west stations.

The EME period can be changed in the INI file with the keyword :

EMEPeiod n

where n is the number of minutes desired.

To properly set the clock, you must set the environmental variable "**TZ**", using the DOS command:

SET TZ=<string>

This string is composed of:

- three characters denoting the name of the time zone (i.e. GMT, CET, PST, and so on),
- a number showing the difference between GMT and local time
- an optional string denoting that daylight saving time is currently used.

Here is an example for Italy :

SET TZ=CET-1

and if we are in daylight saving time this becomes

SET TZ=CET-1DST

Remember: the only important parts of the variable are the number giving the difference between GMT and local time and the daylight-saving-time indicator!

Every EME period you will notice that the clock background changes, and a letter "**E**" or "**W**" close to the clock reminds to the operator which period ("**east**" or "**west**") is current. At the base of the spectrum display the same color is used to trace a thin line, to ease the identification of the stations.

Any remarks, suggestions, praises, complaints, whatever you may have on this program are welcome. Please feel free to contact the authors at the email addresses below.

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Thanks to Ethan Brodsky for his full duplex Sound Blaster routine.

