HaSoTec Color Frame Grabber

FG-30 PCMCIA
FG-31 ISA
FG-32 PCI
FG-33 CardBus
FG-34 PCI
FG-35 Low-Profile-PCI

MS-DOS Software

User program

for

ET4000 graphic boards with HiColor RAM-DAC

ET4HICOL.EXE

Version 4.87

Contents

1.   System requirements

This program can be executed on PCs which are compatible to industrial standard and equipped with at least a 80286 CPU. A higher performance CPU is recommended, however. To display live video, a format of 384x288 is used. This program supports ET4000 graphic boards with HiColor mode (32,768 colors) running at a resolution of 800x600 pixels. The program has been tested successfully with more than 20 different ET4000 and ET6000-based VGA boards. On modern PCs one can reach image rates of about 8 images/s. The color quality can be compared with the presentation quality of high-quality television sets.
The system requirements are as follows:

-   Industrial standard AT with 286 CPU or higher with a minimum of 640 KByte main memory
-   ET4000 / ET6000 graphic board with 800x600 HiColor mode, ISA, PCI, AGP
-   HaSoTec Color frame grabber FG-3x
-   external storage capacity as needed to save images

2.   Program features

This program can be used to grab single images with a resolution of 24 bits per pixel. It was designed for users working predominantly not under Microsoft Windows.
It was developed for users using other graphic software under DOS such as for color image processing, color image integration, color image printing, presentation or image data bases. It can be used for online presentation of a video source and for saving frozen images in various image formats, supporting pixel depths of 24 bits.
There are only small requirements regarding PC memory. But this does not mean that the pixel depth is reduced. This program digitizes all images with 16,7 million colors per pixel. In HiColor mode, the graphic board shows 32,768 colors.
All essential working parameters can be adapted while the video source is presented online.

3.   Functions

3.1.   General tips

The operation with pull-down menus in this program version is realized by keyboard inputs. In all menu entries one character is marked. The marked character belongs to that key, which activates the menu entry function.
With the escape key [Esc] one can leave activated submenus without executing a function.

Dialog boxes contain numeric and text fields. While presentation of a dialog box all input fields can be reached with arrow key selections. The actual contents of the input fields compares to the actual value of the input fields. Changes will be accepted on the enter key [<) ‑]. On escape key the previous values are taken. After changing all input field of a dialog box the selected values are set on activation of the "OK" button. On activation of the "Cancel" button the previous values are taken. The buttons will be activated with the enter key [<) ‑].

The description of the program functions follows the same order like the arrangement of the menu entries. The chapters have the same names as their appropriate menu items. Keys which activate the menu function are written in brackets.

3.2.   [F]ile

3.2.1.   [L]oad...

All image files saved from this program can be reloaded and will be transferred in full pixel depth into memory. The presentation takes place immediately after loading is completed. Inputs of path names and file names are possible in this dialog box. File names have to be entered with an extension to specify the file format.

3.2.2.   [S]ave...

The actual shown image can be saved with this function. The possible file formats are shown in a dialog box.
The default path name is taken with the [<) ‑] key, that's why it is recommended to create a standard directory for image files. The dialog box closes when saving has completed successfully.
Error messages can appear on invalid path names.

3.2.3.   [V]ersion

This menu entry shows a text box containing information about the software and the version number. The first digit of the version number should be identical with the version number of your user documentation.

3.3.   [C]amera

3.3.1.   Show [V]ideo source

This function can be used for online presentation of a video source. The presentation takes place with a resolution of 384 x 288 pixels, which compares to a reduction of the entire image area at a scale

1:2.

While presenting a video source one can change almost all settings. The presentation of a video source can be frozen with the [x]-key. Freezing can take place also during dialog box inputs. The presentation in the selected image size takes place immediately after closing the dialog box. At the same time, additional image data is written to memory, which guarantees a full pixel depth of 24 bits for image files.
While presenting a video source large amounts of data have to be transferred. The performance of the PC is important for achieving high frame rates. Modern PCs can reach a frame rate of 25 images per second. A high clock frequency of the PC is only of importance in that it speeds up the throughput to the memory of the graphic board.

3.3.2.   [S]elect Video source...

Three video sources can be selected with this software. The function "Select a Video source" selects one of these inputs.
There exists a separate data set for each video input, which contains all settings. This means that the video sources can be configured separately.
In the case of S-Video sources (separate chrominance and luminance signals), input 2 should be used. To connect S-Video sources to the FG-3x either a Mini-DIN connector or two Cinch connectors are provided.
After selection of the video source, a dialog asks you to define the video recorder option. This setting should be activated so as to reach optimal results in digitizing video recorder tapes. Cameras and television studios supply exact row frequencies. Due to the mechanical parts of a videotape recorder, signals from tape are less stable and require special videotape settings. Incorrect settings result in line-shifts reminiscent of poor TV reception.

3.3.3.   [I]mage size...

This software is limited to two predefined image sizes. With this function one can switch between them. The frame grabber can select any image part up to a total resolution of 768x576 pixels. The largest image resolution of this software is 592 x 442 pixels. To digitize at this resolution, 766,5 KBytes of uncompressed image data is generated. This resolution requires a high quality video source. Color cameras with less then 700 pixels per line do not utilize the sharpness which would be possible between neighboring pixels. Because of the video standard definition, a 2:1 interlaced mode is used for all TV signals to combine the fields to get a TV frame. These fields are captured in the FG-3x's internal buffer in real time. Video standards have frame rates of either 20 milliseconds (PAL, SECAM) or 16,7 milliseconds (NTSC).
High-speed moving objects can cause an offset every second row. This effect appears on a TV screen as well, but the eye does not detect it, because it is visible only for 1/25 or 1/30 of a second. Frozen images exhibit this effect, however. Some cameras can minimize this effect by means of stroboscopic CCD sensors. Today, even low-priced cameras offer activation times of 1/500 or 1/1000 as standard. (If one activation time can be applied for both fields, then this effect disappears entirely, but only few cameras offer this feature.)
The default position of the 592x442 section of an image is the top-left corner of the entire image. One can change the values of "distance to left border" and "distance to top border" to move the 592x442 section within the 768x576 (640x480) image .
The color decoder of the FG-3x boards work at 4:2:2 broadcast standard. This means that every two horizontal following pixels have individual luminance information on the same color value. With 2:1 data reduction an image results in a 4:4:4 standard. In such images every pixel contains individual luminance and color information.

One can also select a further image size of 384x288 pixels. In this case, every second horizontal and vertical pixel is written into the FG-3x's frame buffer. The memory and disk capacity required decreases to 324 KByte. This resolution has several additional advantages. Since the image data is now taken from a single field, high speed movements can be grabbed without any influence on the interlaced nature of the video standard.

The color decoder of the FG-3x board works at 4:2:2 broadcast standard. This means that every other pixel in a line has individual luminance information of the same color value as its neighbor. With a 2:1 data reduction, an image with 4:4:4 standard is created. Now every pixel contains individual luminance and color information. Thus 384x288 pixel resolution results in a 2:1 scaled image containing much more information than a fragment from an interlaced image.

3.3.4.   [C]olor Standard...

On selection of this menu item, a dialog (3 pages) to control **TV-and Color standard** settings appears.

The **TV standard** allows you to select between 50 Hz and 60 Hz video standards. The position "automatic" lets FG-3x detect the vertical frequency. Automatic mode is generally appropriate for video signals of good quality in one of the 50 Hz or 60 Hz TV standards. The other two settings are required when signals are noisy or differ from a given TV standard. They will force the signal processing to use the respective frequency.

The group **Color adjustments** contains several components that influence the color channel. The **force color on** check box is used for noisy signals to let FG-3x always decode the color burst. By default, this check box is not marked. With black and white video sources this switch would force FG-3x to produce color from noise. Therefore this switch should be turned off in this case.

The **SVHS**-switch defines the type of video source. This setup forces

FG-3x to distinguish between composite video signals and S-Video signals. S-Video sources contain separate chrominance and luminance signals (Y/C). To work in this mode the FG-30 ISA has to be equipped with the SVHS option. All other FG-3x boards must be switched to input 2 without any further adjustments. SVHS technology results in a higher resolution of the grey-level part in the video signal.

On the second page of the dialog, the **Switch Level** for the PAL and SECAM standard thresholds is requested. Values between 0 and 255 can be selected. A lower value allows the utilization of the color burst on higher noise parts in the video signal.

All settings described in this chapter are relevant to technical details only, which you may skip if your aim is to capture color images for normal applications in conjunction with standard home video equipment.

For a digital aperture bandpass filter, the aperture can be selected in 4 steps by **aperture band pass** and **Band pass threshold.** This filter also has an influence on grey-level images. To use the full scale of 256 grey levels this filter must be adjusted correctly. In a grey bar test image, a histogram would present a more-or-less horizontal line. For normal grey images you should not have missing codes. Such missing codes are visible as periodic gaps in a histogram. These are caused by incorrect settings and are typical scaling effects arising with digital filters.

Chroma Prefilter influences both color and grey-level signals. In the case of composite video signals, this filter eliminates noise for color operation and can reduce color burst influences to grey-level images. The Edit field allows you to adjust possible delays between the color burst and other parts of the video signal. The edit field **Color level** is one of the coefficients on the video chip for calculating color values.

The **phase** value can correct false color effects. This value has different effects in different video standards. In some cases its value

can correct effects from long cables where reflections appear. In cases where a video source does not operate with a correct phase - input values from 0 ... 127 will cause a phase change between 0° and 179° and values from 128 ... 255 cause a phase change from -180° to -1.4°.

There is no automatic switching to SECAM mode implemented in this program. You must switch manually to SECAM with **SECAM Mode**. The cross color effect typical of the SECAM TV standard can be reduced by activating the **cross color filter**.

3.4.   [P]arameter

3.4.1.   [P]osition of frame...

This dialog can be used to adjust the image position. Chapter 3.3.3. describes the definition of the image position values and which effects can appear using an image size of 384 x 288 pixels. Normally, the values 84 and 14 need not be changed. A **Left Side Offset** of 84 is the normal position for the left border. A **Top Side Offset** of 14 means that the first 14 rows after the vertical sync impulse do not hold image information. These rows contain extra information which is used, for example, in video text decoders.

The range of these values is very limited and a value which is too high can make captures impossible.

3.4.2.   [G]ain Control...

Even if standard video sources claim to produce a 1 Volt video signal on 75 ohm termination, real life is different.

Some video cameras do not use gain control at all and images with a changing illumination may produce video signals with dynamic changes that are too large to deal with within an 8-bit grey scale. **Gain control** can compensate for much of these problems. However,

simple solutions for realizing gain control have many disadvantages. Because a video signal contains not just visual information, it cannot be amplified so easily. Professional video systems often use a black-level clamping gain control – the FG-3x uses this as well.

A video signal consists of black-level porches before and after each horizontal sync pulse. These shoulders provide good reference points for defining the black level for a video signal. The values **horizontal clamp begin** and **horizontal clamp stop** can define a window in time during which FG-3x samples the value for the video level "black". If correctly adjusted, even video sources with some timing differences can be adapted. Both values have individual variables for **50 Hz** and **60 Hz** standards. Before making changes, the required standard should be selected.

Automatic **gain control** also has a time characteristic which is selectable in four steps: **fast, medium, slow** and **off**. Gain control is not limited to a CVBS signal. In the case of S-Video signals a second loop controls the chrominance signal.

The value **horizontal sync position** has no influence on the operation of FG-3x, but it may have an influence on additional hardware connected to feature connectors that are available on FG-32, FG-34 and FG-35.

The group **vertical sync** has an influence on how reliably even and odd frames are detected. Four selections are possible: for working with a **noise filter**, using a **search window**, running **auto deflection** mode or working **without** any **filter**s.

For use with standard video sources we recommend that the noise filter be selected.

3.4.3.   [S]ync parameters...

To find the black level porches it is important to have exact values of the position for the horizontal sync pulse. The values **horizontal sync begin** and **horizontal sync stop** define a search window

where the horizontal sync pulse appears. Again, these values point to individual variables for 50 Hz and 60 Hz signals. Incorrect values cause FG-3x to switch to a mode where gain control works differently. To test whether the settings are correct, turn off the camera's gain control and try to capture a completely black image (cover the lense with your hand). If FG-3x is in the correct mode, the captured image is black, otherwise grey levels with a value around 80 will appear.

3.4.4.   Service, [A]djustments...

This dialog box contains settings which are useful for remote diagnosis of problems with the FG-3x.

3.4.5.   Service, [F]rame type...

This dialog box contains settings which are useful for remote diagnosis of problems with the FG-30.

3.5.   [O]ptions

3.5.1.   Screen [C]olors...

This dialog makes color changes to menus, submenus and dialogs possible. The color settings are stored in the configuration file FG3x.CFG. If inappropriate settings are entered, e.g. red fonts on a red background, we recommend that you erase the configuration file and restart the system. In this case all other adjustments have to be repeated as well.

3.5.2.   [H]ardware options...

This dialog shows information about the hardware equipment used by

FG-3x. In the dialog box item **base address**, one can switch to other FG-30 boards in the same system

3.5.3.   [S]ave all options

This menu item saves all settings to be used as defaults into a file named FG3x.CFG.

3.6. [Q]uit

Answer "yes" to quit the program..