Hilfe zum ELSA WINman

ELSA WINman is a program for the adaptation of the ELSA graphics board and the ELSA Windows driver to your monitor.

For further help click on one of the following key words or search in the index:

WINman Start Dialog

Monitor Properties

Modifying a Graphics Mode, Adjusting Color Depth/Resolution/Timing

Graphics Mode / Monitor Timing

ELSA WINman

ELSA WINman is a program for the adaptation of the ELSA graphics board and the ELSA Windows driver to your monitor.
If the dialog "Properties for Display" is not opened, click here: .
If in the dialog "Properties for Display" the WINman dialog is not opened, click on the tab " ELSA WINman".

Scheme (Data Set):
If you have stored a graphics mode earlier, you may switch back to it.

Monitor:
Your monitor must be entered. Please click on "Change..." and check the entered values.
Most important is the maximal horizontal scan frequency (in kHz) of your monitor (see determining monitor data).

Color Depth:
Select your wanted color depth, e.g. 256 colors. For more information click on: color depth.

Visible and Virtual Resolution:
Adjust your wanted screen resolution, e.g. 1024 x 768. For more information click on: resolution.

Refresh Rate:
Select your wanted refresh rate, e.g. 75 Hz. For more information click on: refresh rate.
A more acurate adjustment you may do after clicking on the "Details..." button.

OK or Apply:
When you have a stable test pattern, you should first save the settings and restart Windows, and then begin adjusting display size and position.
Try to adjust the display size and position at the monitor. When this has no success you also can adjust the monitor timing with WINman.

Modifying a Graphics Mode, Adjusting Color Depth/Resolution/Timing

Upon entering the desired color depth, resolution and refresh rate, a monitor timing is generated. This timing can be saved as new graphics mode.

This requires that the maximum allowed horizontal scan frequency (in kHz) of your monitor is known (see Determining monitor data).

First select the desired color depth (normally 8 bpp = 256 colors). With higher color depths, the maximum possible pixel clock is automatically reduced. Adjust the wanted resolution. Common resolutions are 800 x 600 for a monitor size up to 15", 1024 x 768 for 16"..18", and 1280 x 1024 for 19" and larger.
Enter the desired refresh rate in Hz.
For applications with a mainly black background, 60 Hz may be sufficient. Applications with a brighter background (e.g. Windows) should run at least at 75 Hz or more, to prevent the display from flickering. Usually a refresh rate of 85 Hz is optimal. Refresh rates over 100 Hz usually don't provide any more visible improvement.

When you have a stable test pattern, you should first save the settings and restart Windows, and then begin adjusting display size and position.
Try to adjust the display size and position at the monitor. When this has no success you also can adjust the monitor timing with WINman.

Test Screen

Before a new monitor timing can be saved, WINman checks if the new timing is suitable for your monitor.
For this purpose, a test screen is displayed for a short time.
While the test screen is displayed, you can abort it at any time by pressing the Escape key (Esc).
Afterwards, you are asked if the test pattern was OK.

When you have a stable test pattern, you should first save the settings and restart Windows, and then begin adjusting display size and position.
Try to adjust the display size and position at the monitor. When this has no success you also can adjust the monitor timing with WINman.

Graphics Mode (Videomode), Monitor Timing

A graphics mode (or videomode) is a data set, which describes a certain color depth, a certain resolution, a certain monitor timing, and possibly other technical data associated to a certain operating mode.

A monitor timing is a data set, which defines the temporal behavior of the monitor signals.
Basically these are pixel clock, horizontal scan frequency and frame refresh rate.
It is more precisely described by horizontal and vertical display time, frontporch, synchronization pulse (Sync) and backporch.
The display time is the time when the electron beam is drawing pixels to the screen. Subsequently, a certain time is needed to return the electron beam to the start position. This blanking time consists of frontporch (time between end of display time and start of sync pulse), sync pulse (duration of the synchronization pulse) and backporch (time between end of sync pulse and start of next display time). This applies to both horizontal and vertical timing.

Color Depth / bpp

The color depth can be measured in bpp or numebr of colors.
bpp means bits per pixel and indicates the amount of video memory available for each pixel. For example, 8 bpp means that each pixel uses 8 bits, allowing 256 (= 2 to the power of 8) colors to be stored and displayed.
The number of colors indicates how many colors can be displayed simultaneously (if there are enough pixels on the screen).

Under Windows, normally 256 colors (= 8 bpp) are used, as this is normally the best compromise between display fidelity and memory consumption/display speed. With lower color depths, the image quality decreases and often requires dithering. With higher color depths, memory consumption increases, normally the Windows driver gets slower, and often a display with these color depths is only possible with a reduced resolution or reduced refresh rate at the same resolution.
A general recommendation could be:
256 colors (8 bpp) for usual office applications,
32768 or 65536 colors (15 or 16 bpp) realcolor for videos or 3-D applications and
16,7 million colors (24 oder 32 bpp) truecolor for sophisticated image processing.

Common color depths:

number of colors	color depth in bpp	comment
2	1	blach/white, monochrom
16	4	palette, e.g. VGA 640x480
256	8	palette, standard mode of usual HiRes graphics board
32768	15	realcolor 5 + 5 + 5 bpg
65536	16	realcolor 5 + 6 + 5 bpg
16.7 mill	24 or 32	truecolor 8 + 8 + 8 bpg

With 4 or 8 bpp, the color number is translated to the actual color to be displayed using a palette (RAM DAC color table). These palettes offer e.g. 262144 different color entries (with 6 bpg) or 16.7 million color entries (with 8 bpg).

bpg should not be confused with bpp: bpg indicates the color depth per RGB color share (bpg = bits per gun). For example, with 16 bpp RealColor, 5 + 6 + 5 bpg indicates the number of bits available for the three color shares Red, Green and Blue.

Screen Size, visible and virtual Screen Resolution

Screen size

The value for the monitor size is the nominal diagonal size of the picture tube (CRT). This value is a bit higher than the diagonal size of the visible display area. Typical values are listed in the following table:

nominal diagonal size (inch)	nominal diagonal size (cm)	approx. visible area (cm)	common resolutions
14"	35,5	27 x 20	800 x 600
17"	43	32 x 24	1024 x 768
20"	51	38 x 29	1280 x 1024

" means inch, 1 inch = 2.54 cm.

Visible resolution

The resolution indicates the number of pixels that can be displayed. For example, 1024 x 768 means that 1024 pixels are displayed in each horizontal row and 768 pixels in each vertical column. The total number of pixels on the screen is thus 1024 x 768 = 786432.

Normally the resolution is set to 640 x 480 for monitors up to 13", 800 x 600 for 14"..15", 1024 x 768 for 16"..18", and 1280 x 1024 for 19" and larger. However, the best resolution depends on other factors as well, such as the dot pitch size and the maximum allowed horizontal scan frequency.

The resolution can also be stated in dots per inch (dpi).

Virtual resolution (Panning)

When the virtual screen is activated, the Windows working area is larger than the visible screen display (in other words: the virtual resolution is larger than the visible resolution).
The hidden areas become visible as soon as the mouse cursor is moved to a screen border. The visible screen contents are then scrolled. This is also called 'Panning'.

Pixel Clock / MHz

The pixel clock or pixel rate is stated in MHz (Megahertz). The value normally lies in the range from 10 to 250 MHz. For example, a resolution of 1024 x 768 at 75 Hz would require a pixel clock of 79 MHz. The pixel clock value indicates how many million pixels are written per second.

Horizontal Scan Frequency / kHz

The horizontal scan frequency or deflection frequency is measured in kHz. The value normally lies in the range from 30 to 110 kHz. For example, a resolution of 1024 x 768 at 75 Hz would require a horizontal scan frequency of 60 kHz. The value indicates how fast the pixel lines are written, i.e. how many thousand times per second the electron beam in the picture tube moves from the left to the right.

Refresh Rate / Hz

The frame refresh rate or vertical deflection frequency is measured in Hz. The value normally lies in the range between 60 and 100 Hz. Hz is the abbreviation of Hertz. 75 Hz means that 75 frames are displayed per second.

For applications with a mainly black background, 60 Hz may be sufficient. Applications with a brighter background (e.g. Windows) should run at least at 75 Hz or more, to prevent the display from flickering. Usually a refresh rate of 85 Hz is optimal. Refresh rates over 100 Hz usually don't provide any more visible improvement.

In normal non-interlaced operation, the frame refresh rate is equal to the vertical deflection frequency.
In the past, the interlaced display method was often used to give the impression of a high refresh rate even with low horizontal scan frequencies. In this display mode, each frame is split into two half frames. In the first half frame, all the even lines are drawn, then, after a shift by one line, all the odd lines are drawn in the second half frame. The vertical deflection frequency is thus twice the frame refresh rate.
This display method is e.g. used for television and by the IBM 8514/A video adapter.
A better display quality, however, is achieved in non-interlaced mode.

The frame refresh rate is an important factor for monitor ergonomics. Refresh rates below 75 Hz or interlaced operation are classified as non-ergonomic.
Of course, ergonomics are affected by other characteristics as well, such as low radiation or a resolution suited to monitor size and dot pitch.

MULTIman

MULTIman is a program for using Windows on multiple screens. You must have installed more than one ELSA graphics boards in your computer. Please pay attention that not every board may be combined with any other board, only special combinations are allowed. Best results you will get with two equal ELSA boards with equal memory size.

Font Size

The font size usual used by Windows is adjustable. Normally you will use at resolutions up to 800x600 a font size of 96dpi (small) and with 1024x768 and higher of 120dpi (large).

Determining Monitor Data

To adapt the ELSA graphics board to your monitor, the operating data and limits of your monitor must be determined.
Here the maximum allowed horizontal scan frequency of your monitor (in kHz) is of special importance. If this limit is exceeded, in extreme cases your monitor can be damaged.

Monitor manufacturer, monitor model name

Normally you will find the manufacturer and the model name on a label on the back of your monitor; otherwise you have to consult your monitor manual.

Nominal monitor size

The value for the monitor size is the nominal diagonal size of the picture tube (CRT). This value is a bit higher than the diagonal size of the visible display area. Typical values are
14" (35.5 cm), 17" (43 cm) or 20" (51 cm). The " character means inch (2.54 cm).

Horizontal scan frequency range in kHz,
vertical refresh rate range in Hz

You can find the minimum and maximum horizontal scan frequency and refresh rate in your monitor manual.
Here the maximum allowed horizontal scan frequency of your monitor (in kHz) is of special importance. If this limit is exceeded, in extreme cases your monitor can be damaged. The other values may be left zero if they can't be determined.

Determine monitor properties

There are several ways to determine the characteristics of a monitor:

Monitor manual:
You can take the technical specification of your monitor from the manual supplied with the monitor.

VESA DDC:
If your monitor is equipped with a VESA DDC connector and your graphics board is VESA DDC compatible, the monitor data can be send automatically to the graphics board over the monitor cable.

VESA VDIF monitor description file (*.VDA):
If your monitor was supplied with a VESA VDIF monitor description file (*.VDA), the required data can be read from this file. In WINman you will find a button for reading VDIF files while entering the monitor data.

ELSA monitor short description file WINman.MON:
If your monitor is contained in the ELSA monitor short description file WINman.MON, the monitor data can be taken from this file. This is done automatically, if you select the manufacturer and model name of your monitor during entering the monitor data.

Monitor Manual

For the best possible adaptation of your ELSA graphics board to your monitor, you should try to find the following data in the manual of your monitor:

Monitor manufacturer, Monitor model name, nominal diagonal monitor size in inches or cm (= diagonal CRT size in inch or cm), min. and max. horizontal scan frequency in kHz (= horizontal deflection frequency = scan rate), min. and max. vertical frame refresh rate in Hz (= vertical deflection frequency).

Here the maximum allowed horizontal scan frequency of your monitor (in kHz) is of special importance. If this limit is exceeded, in extreme cases your monitor can be damaged.

WINman.MON

If your monitor is contained in the ELSA monitor short description file WINman.MON, its operational limits can be read from this file. The file contains the major characteristics and limits of some known monitors.

In this ASCII text file, each describes a monitor. The entries are:
Monitor manufacturer, monitor model name, nominal diagonal monitor size in inches, min. and max. horizontal scan frequency in kHz, min. and max. vertical frame refresh rate in Hz, pixel size/dot pitch in millimeters.

Such a monitor description line might e.g. read as follows:
ELSA, GDM-17E40, 17", 29-82kHz, 50-150Hz, 0.26mm

VESA VDIF Monitor Decription File

VDIF is a VESA standard, which defines a file format to describe monitor specifications. A VDIF file contains several monitor characteristics (e.g. the diagonal screen size), keeps the operating limits of the monitor (e.g. the maximum allowed horizontal scan frequency (kHz)) and describes some monitor timing data sets specially suited to the monitor (in the [PREADJUSTED_TIMING] sections).

Using VDIF files, monitor data can be saved, passed on and reused later.

*.VDA VDIF files are ASCII files and can be created or modified with any standard text editor.
*.VDB VDIF files are binary coded files and can only be used by special software.
WINman can read and write *.VDA VDIF files. When writing a file, WINman only fills in those items that are relevant for WINman. If the file created by WINman is to be used by other software, the missing information must be inserted in the blank spaces right of the '=' character using a text editor.

*.VDA VDIF files consist of several sections:

[VERSION]:
Version number of the VESA standard.

[MONITOR_DESCRIPTION]:
General monitor description, e.g. Manufacturer = monitor manufacturer, ModelNumber = monitor model name, CRTSize = diagonal screen size.

[OPERATIONAL_LIMITS]:
Monitor operating limits, e.g. MinHorFrequency = min. horizontal scan frequency, MaxHorFrequency = max. horizontal scan frequency, MinVerFrequency = min. vertical refresh rate, MaxVerFrequency = max. vertical refresh rate.

[PREADJUSTED_TIMING]:
Monitor timing data set, e.g. PreadjustedTimingName = Timing name, HorPixel/VerPixel = X/Y resolution, HorFrequency = horizontal scan frequency, VerFrequency = vertical refresh rate, PixelClock = pixel clock rate, TotalTime = total time, AddrTime = display time, BlankStart = time between display start and blanking start, BlankTime = blanking time, SyncStart = time between display start and sync pulse start, SyncTime = duration of a sync pulse.

Reading a VESA VDIF Monitor Description File

To adapt the ELSA graphics board to your monitor, the operating data and limits of your monitor must be determined. If a VESA VDIF monitor description file (*.VDA) exists for your monitor, it should be used for this purpose. Other methods are described under the headword determining monitor data.

In the WINman dialog "Read VESA VDIF Monitor Description File", first select the desired color depth (normally 8 bpp = 256 colors). With higher color depths, the selection of allowed monitor timings is automatically reduced. Afterwards, select the desired monitor timing. The first two values stand for the X and Y resolution (horizontal and vertical). Common resolutions are 800 x 600 for a monitor size up to 15", 1024 x 768 for 16"..18", and 1280 x 1024 for 19" and larger. The next value indicates the frame refresh rate in Hz (frames per second).
For applications with a mainly black background, 60 Hz may be sufficient. Applications with a brighter background (e.g. Windows) should run at least at 75 Hz or more, to prevent the display from flickering. Usually a refresh rate of 85 Hz is optimal. Refresh rates over 100 Hz usually don't provide any more visible improvement.
The abbreviations i or ni stand for interlaced and non-interlaced, respectively.
The kHz values indicate the horizontal scan frequency. They must not exceed the maximum horizontal scan frequency of the monitor (it is not exceeded in a VDIF file). The MHz values indicate the pixel clock. The graphics board must be able to generate it (WINman checks that).

Saving a Monitor Timing as VESA VDIF File

In the WINman dialog "Save as VESA VDIF Monitor Description File", the new monitor timing is saved in a VESA VDIF monitor description file (*.VDA).

Here Windows will not be switched to the new graphics mode.

VDIF is a VESA standard, which defines a data format to describe monitor characteristics. A VDIF file contains several monitor data (e.g. the diagonal screen size), keeps the operating limits of the monitor (e.g. the maximum allowed horizontal scan frequency (kHz)) and describes some monitor timing data sets specially suited to the monitor (in the [PREADJUSTED_TIMING] sections).
Using VDIF files, monitor data can be saved, passed on and reused later.

WINman creates a template for a new VDIF file. Not all items are filled in, however. WINTM only fills in those items it would need to reload the file for its own use. If the file is to be used by other programs, the other items must be filled in as well. The keywords are already present, but where the place right of the '=' character is left blank, the missing information must be inserted. This can be done with any standard text editor, as the *.VDA VDIF file is a pure ASCII file.
WINman creates a new file for every monitor timing. If several monitor timings belong to the same monitor and are to be combined, the [PREADJUSTED_TIMING] sections of the other files must be appended to the end of the first file using a text editor.

VDIF filename:
The first three characters of the filename of the VDIF file should indicate the monitor manufacturer, while the following five letters or digits should represent the monitor model name. The filename extension must be .VDA. If possible, the entered path name should be a harddisk directory and not a floppy disk drive, as the latter would need a considerably longer saving time.

Nominal monitor size:
The value for the monitor size is the nominal diagonal size of the picture tube (CRT). This value is a bit higher than the diagonal size of the visible display area. Typical values are
14" (35.5 cm), 17" (43 cm) or 20" (51 cm). The " character means inch (2.54 cm). The program uses only the inch value. To determine this value, you may also state the diagonal size in cm or measure the visible screen area in cm.

kHz horizontal scan frequency range,
Hz vertical refresh rate range:
You can find the minimum and maximum horizontal scan frequency and frame refresh rate in your monitor manual.
Here the maximum allowed horizontal scan frequency of your monitor (in kHz) is of special importance. If this limit is exceeded, in extreme cases your monitor can be damaged.

VESA DDC (Display Data Channel)

If your monitor supports VESA DDC, the monitor cable is suitable for DDC and your graphics board is VESA DDC compatible, the monitor data can be send automatically to the graphics board over the monitor cable.

There are different standards, DDC1, DDC2B, and DDC2AB.

DDC1:
A line in the monitor cable is used to send a continuous unidirectional data stream from the monitor to the graphics. In the case of a standard IBM VGA compatible 15-pin monitor connector, pin 12 (formerly used as monitor ID bit 1) is used for data transmission, and the Vertical Sync signal of pin 14 is used as transmission clock (VCLK). An EDID data set (Extended Display Identification) of 128 bytes is sent repeatedly, from which the major monitor data can be read in the computer. It contains e.g. the three-letter manufacturer-EISA-CFG-key, the monitor size, the extent of DPMS support, color characteristics and a list of supported VESA monitor timings, and some free definable monitor timings.

DDC2B:
A bidirectional data channel based on the I2C protocol is used for the communication between monitor and graphics board. In the case of a standard IBM VGA compatible 15-pin monitor connector, pin 12 (formerly used as monitor ID bit 1) is used for data transmission (SDA), and the pin 15 (formerly used as monitor ID bit 3) is used as transmission clock (SCL). The graphics board can request the short EDID information (see DDC1) as well as the more comprehensive VDIF information (VESA Display Identification File).

DDC2AB:
With DDC2AB additionally to DDC2B the computer may send commands for controlling the monitor, e.g. for adjusting the screen position or the brightness (similar to ACCESS bus).

VESA DPMS

Display Power Management Signaling.

The VESA DPMS standard describes a method to switch the monitor to an energy-saving mode in periods where it is not used. This can e.g. be triggered automatically by screen saver programs, which cause the monitor to enter an energy-saving mode, when the keyboard and the mouse have not been used for a certain time. As soon as a key is pressed or the mouse is moved, the monitor is switched back to normal operation.

Four different DPMS states are defined:

ON:
No enery saving, normal operation, display active.

STANDBY:
Little energy saving, short reactivation time.
This is signaled to the monitor by blanking the screen and switching the horizontal Sync signal off.
This mode is not always supported.

SUSPEND:
Considerable energy saving, longer reactivation time.
This is signaled to the monitor by blanking the screen and switching the vertical Sync signal off.

OFF:
Maximum energy saving, longest reactivation time.
This is signaled to the monitor by blanking the screen and switching both the horizontal and the vertical Sync signal off.