

UniVBE™/Pro 5.0

User's Guide

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Introduction

What is it?

The Universal VESA VBE (or UniVBE™ for short) is a small Terminate and Stay Resident (TSR) program that extends the Video BIOS of SuperVGA video cards to make them compatible with the Video Electronics Standards Association (VESA) recommended Video BIOS Extensions (VBE). Many new programs like Microsoft Flight Simulator 5 rely on a fully functioning VBE in order to obtain the highest performance possible. UniVBE provides the latest VBE 1.2 standard so you can be sure these programs will not only work correctly, but will run as fast as possible on your system. UniVBE comes in two flavours, the Shareware or unregistered trial version (UniVBE/Shareware) and the full professional version (UniVBE/Pro). The professional version also includes a high performance 32 bit protected mode interface based on the soon to be released VBE 2.0 standard, and programs written to take advantage of this can run with blinding speed compared to normal VESA VBE implementations. The shareware version is not a cut down version, but a full featured trial version of UniVBE/Pro. You have 21 days after installing UniVBE to try out all of its features, before you are required to register your copy with SciTech Software (if you received a Bundle version of UniVBE/Lite or UniVBE/Pro with some application software, you do not need to register UniVBE).

Apart from making your programs run faster and better, UniVBE/Pro can also save you money and help the environment at the same time! UniVBE/Pro fully supports the new VESA VBE/PM and DPMS standards for Energy Star compliance, and comes with the UniPOWER™ power management screen savers. If you have one of the new Energy Star compliant video monitor that supports the Display Power Management Standard (DPMS), you can install the UniPOWER DOS and Windows screensaver programs to power down the monitor when not in use. This allows your monitor to shut down and use less than 5 watts of power while you are having a coffee break or otherwise engaged!

And lastly, to help you configure your video card for optimum results with your monitor, UniVBE/Pro comes with the UniCENTER™ utility program, that allows you to adjust the centering and sizing for all video modes supported by UniVBE/Pro. Fantastic for getting those video modes to look just right!

Note that if you received a bundle version of UniVBE/Lite or UniVBE/Pro with some application software, the UniCENTER and UniPOWER utility programs will not have been included. You will need to purchase the full registered version of UniVBE/Pro from SciTech Software in order to obtain these utilities.

Why use it?

You may already have a vendor supplied VESA VBE TSR program for your video card, or your video card may have VESA VBE compliance built into the BIOS, so why would you want to use this program?

The simple answer is that most of the vendor supplied TSR's that exist today, and a lot of the not-so-new SuperVGA cards that are around implement an older version of the VESA VBE interface (if any at all), or they are just plain buggy. For this reason, many of the latest games and graphics related programs that use the advanced features of the new VBE 1.2 standard will probably not work with the TSR or BIOS that you currently have.

UniVBE fully implements the VBE 1.2 standard, which supports the following advanced features:

- SuperVGA double buffering. High performance animation programs can use your card to full potential to implement double buffering in all video modes. Smooth, flicker free animation in 800x600 and 1024x768 video modes with 256 colors is no longer a fantasy. Or even the new 32k and 64k color modes, if you have enough memory on your card.
- SuperVGA virtual screens. Programs may set up a huge virtual display resolutions, and smoothly scroll a window with less physical resolution around within this buffer.
- Support for the 32k, 64k and 16.7 million color video modes. As well as supporting the industry standard 16 and 256 color video modes for resolutions from 320x200 right up to 1600x1200.
- Speed. The bank switching code in UniVBE tends to run as fast or faster than the routines embedded in the VIDEO BIOS of most video cards.
- Extremely small size. When the TSR is resident in your computer it only requires about 5k of memory which is smaller than the size of most vendor supplied TSR's that support only a single video card!

The professional version, UniVBE/Pro also includes the following features:

- High speed 32 bit protected mode interface. Many of the latest programs are being developed in 32 bit protected mode, which changes many of the rules related to obtain high performance from your video card. UniVBE/Pro's 32 bit protected mode interface will give programs written to take advantage of it that extra zing of performance.
- Supports emulation of all 640x350 and 640x400 resolution video modes on video adapters that do not directly support this. Works for all 256, 32k and 64k color video modes, which is perfect for high speed animation.

- Supports mapping out video modes not available on your particular video card.
- Supports the UniCENTER™ program for adjusting the supported video modes for optimum performance on your video monitor.
- Can be loaded into high memory. UniVBE/Pro also comes with an option to force it to load high if the normal DOS loadhigh command fails.
- Can be unloaded from memory once installed for use in batch files.
- Supports the new VBE/PM 1.0 standard for correctly signalling power management states to DPMS compliant video monitors. Supports the following states:
 - Standby
 - Suspend
 - Off

Installation

Hardware requirements

UniVBE will run on any 80x86 based IBM PC compatible running MSDOS, or an OS/2 2.x DOS shell. In order to take advantage of the 32 bit protected mode interface of UniVBE/Pro, you must have at least an 80386 based computer. Currently UniVBE supports the following SuperVGA cards, and more are being added as they are released:

- ATI Technologies 18800, 28800, Mach32
- Ahead A & B
- Chips & Technologies 82c451/452/453/450, 655x0
- Everex EvNR
- Genoa Systems GVGA
- OAK Technologies OTI-037C/057/067/077/087
- Paradise PVGA1A, WD90C00/10/11/20/21/26A/30/31/33
- NCR 77C20/21/22E/32BLT
- Trident 88/8900/9000/8900CL/8900D/9200CXr/9400CXi/GUI9420
- Video7 VEGA, HT208/209/216
- Tseng Labs ET3000, ET4000, ET4000/W32
- S3 86c911/924/801/805/928
- Advance Logic AL2101/2201/2228/2301 SuperVGA
- MXIC 86000/86010 SuperVGA
- Primus 2000 SuperVGA
- RealTek RTG3103/3105/3106 SuperVGA
- Cirrus Logic CL-GD6205/15/25/35/45, 5402/20/22/24/26/28/29/30/34
- UMC 85c408
- Hualon HMC86304
- Weitek 5086/5186/5286 (on P9000 based boards)
- Compaq IVGS/AVGA, QVision QV1024/1280

Automated Installation

Installing UniVBE on your system is a snap. Simply following these 6 simple steps:

1. Insert the UniVBE distribution diskette into drive A or drive B.
2. Type 'A:INSTALL' or 'B:INSTALL' (depending on which drive you inserted the diskette into), and then press the Enter key.

The installation program will start, and you will be presented with a screen describing the installation configuration.

3. Verify the installation directories for installing UniVBE into, and change them if necessary. If you are installing the UniPOWER screensaver for Windows, change

the Windows directory to the place where you have installed Windows. By default this is C:\WINDOWS.

4. Select the options you wish to install (by default all options will be turned on).
5. Click the 'INSTALL' button, and the installation program will begin the installation process.
6. Follow the instructions on the screen, and eventually you will be prompted to enter your name to register UniVBE. Enter your full name and hit the Enter key and follow the instructions until you are returned to the DOS prompt (simply click Cancel to install UniVBE as the unregistered trial version).

That's it! When the installation is completed, you will be returned into the directory that you installed UniVBE into (by default C:\UNIVBE). If you selected the option to update your AUTOEXEC.BAT file, you will need to reboot your machine before UniVBE will be active.

Command line options

UniVBE supports a number of different command line options. Running UNIVBE.EXE with the -h command line option will provide you with a list similar to the following:

```
-s<x>      - Force detection of SuperVGA (-s0 for list)
-c<x>      - Force detection of SuperVGA chipset (-c0 for list)
-m<size>  - Force memory size to 'size'
-d<x>      - Force DAC type (-d0 for list)
-g         - Regenerate default .ini file
-u         - Unload the Universal VESA VBE from memory
-b         - Swap RED and BLUE bytes in 24 bit modes
-l         - Force resident code to be loaded high
-i         - Ignore a buggy underlying VBE BIOS
-p         - Disable Power Management (PM) extensions
-x         - Disable 32 bit protected mode interface
```

Following is a detailed reference to all of the command line options:

-S

The -s command line option is used to force UniVBE to only run the detection logic for a particular type of SuperVGA chipset. It is possible that the detection logic for some of the video cards supported by UniVBE will hang the machine in some configurations. If this happens, you can try forcing UniVBE to only run the detection logic for your video card for maximum compatibility. If UniVBE is behaving strangely on your system, this is the first option that you should try.

Specifying a command line of -s0 will provide you with a list of all supported SuperVGA types.

-c

The `-c` command line option is used to force UniVBE to use a particular chipset revision. Within each SuperVGA type, there is usually a number of different chipset revision levels that UniVBE must identify in order to work correctly. UniVBE can normally automatically detect the chipset revision correctly, however you can use this option to force a chipset revision if UniVBE incorrectly detects this. Note that this command line option is handled for you in the automated installation program.

Specifying a command line of `-c0` will provide you with a list of all supported chipset revisions for your video card.

-m

The `-m` command line option is used to force UniVBE to recognise a specific amount of video memory. Generally UniVBE can automatically detect the correct amount of video memory installed on your video card, however in some cases UniVBE may detect this value incorrectly, and you will have to force the correct amount (consult your video card documentation for your proper memory configuration). Note that this command line option is handled for you in the automated installation program.

The amount of memory is specified on the command line in units of 1Kb, so the value for a 1Mb video card would be `-m1024`.

-d

The `-d` command line option is used to force UniVBE to recognise the presence of a different type of RAMDAC. The RAMDAC is used by the video card to convert the image in video memory to the correct colors to be sent to the video monitor, and different RAMDAC's support different maximum color resolutions (some support only 256 colors, while others support 32k, 64k or even 16.7 million colors). Generally UniVBE will be able to automatically detect the correct RAMDAC installed on your video card, however in some cases this may be incorrectly identified. Note that this command line option is handled for you in the automated installation program.

Note that UniVBE is unable to detect the presence of some 16 bit RAMDAC's, and these may be misidentified as 15 bit RAMDAC's.

Specifying a command line of `-d0` will provide you with a list of all supported RAMDAC's.

-g

The `-g` command line option is used to generate the default .INI file for UniVBE/Pro. This is normally handled automatically for you by the installation program, however you can use the command line option to do this

manually if you wish. In order to do this, you must first install UniVBE/Pro, then run with the -g option to re-generate the .INI file, and the finally un-install UniVBE/Pro and re-install again (the changes will not come into effect until you re-install UniVBE/Pro).

-u

The -u command line option is used to unload UniVBE/Pro from memory. This allows you to create batch files to install UniVBE/Pro into memory, run a specific program and then remove UniVBE/Pro from memory when you are finished running the program.

-b

The -b command line option is used to swap the RED and BLUE byte ordering in 24 bit or 16.7 million color modes. On some video cards (most notably the Diamond cards that include the SS24 RAMDAC) the order of the RED and BLUE bytes in video memory is different to that supported by most other video cards. This command line option is used to force these order to be changed. If the colors look ridiculous in the 24 bit video modes of your favorite applications, then you probably need to use this command line option.

-l

The -l command line option is used to force UniVBE/Pro to be loaded high. This is similar to the normal MSDOS LoadHigh command, however because of the size of the non-resident portions of UniVBE/Pro sometimes this command will fail and load UniVBE/Pro normally into low memory. This command line option will then force UniVBE/Pro to relocate the resident portion into high memory, leaving only a few hundred bytes in low memory.

Note that this option is fully compatible with your normal LoadHigh command, and can be used in combination with any of these commands.

-i

The -i command line option is used to force UniVBE/Pro to ignore an underlying VBE BIOS if one is present. By default UniVBE/Pro will use pass through techniques to support functions provided by the underlying BIOS that UniVBE/Pro does not provide. In some severe cases the underlying BIOS is buggy and will cause UniVBE/Pro to behave incorrectly, so you will need to force UniVBE/Pro to ignore it.

-p

The -p command line option is used to disable the VBE/PM and DPMS power management features of UniVBE/Pro. You would only want to use this option if you have a vendor supplied TSR or BIOS that you wish to use instead of

UniVBE/Pro's built in support.

-X

The -x command line option is used to disable the 32 bit protected mode interface provided by UniVBE/Pro. Normally you will want to leave this option active, however this option is useful for testing purposes to ensure that software works correctly both with and without the protected mode interface installed (and to see how slow it runs without it!).

386 Memory Managers

Sometimes a 386 memory manager can conflict with the correct operation of UniVBE for certain video card configurations. If you have a 386 Memory Manager installed such as EMM386, QEMM, QRAM or 386MAX and when attempting the install UniVBE the machine just hangs, or an application attempting to use UniVBE hangs you possibly have a memory manager conflict. Specifically if you have an ATI Mach32 or Mach64 based video card (Graphics Ultra Pro, Graphics Ultra Turbo) you will need to exclude the video BIOS region for correct operation, so proceed to step 2. To attempt to solve this, try the following steps (you might also like to refer to the documentation on your memory manager - QEMM for instance has a long section on troubleshooting such installation problems):

1. First do a clean boot (with no memory managers or TSR programs installed apart from HIMEM.SYS and MSDOS) and attempt to install UniVBE. If UniVBE works in this configuration, then you have a conflict, and proceed to step 2. If UniVBE still does not work, then you possibly have a video card that is not fully supported by UniVBE - please contact SciTech Software and let us know so that we can attempt to rectify this in a future release.
2. Use the EXCLUDE option of your memory manager to exclude the entire video BIOS region, reboot your machine and attempt to install UniVBE once again. For EMM386 and QEMM the command to put on the command line is:

X=C000-CFFF

3. If step 2 is successful, you can try to reduce the amount of memory excluded with the above option which will provide you with more high memory for TSR programs. To do this, lower the value in the second number from CFFF to a value such as C7FF and lower. C7FF will probably work with most configurations.

Whats the .INI file for?

For most installations, UniVBE will automatically determine the video modes that your card supports. However on some video configurations, some video modes that UniVBE thinks are possibly available aren't and so an error will occur if a program tries to set the video mode. The UNIVBE.INI file is used to remove support for those video modes. If you selected the 'Generate UniVBE.INI file' option in the installation program, the installation program will automatically determine which modes are not

available and produce an appropriate UniVBE.INI file for you. If you did not select this option, or the automatic UniVBE.INI file generation procedure does not work on your system, you can edit the UniVBE.INI yourself.

The format of the UniVBE.INI file is simple. All the video modes removed by the program are listed under the section '[remove]' in the .INI file. They are listed as the hexadecimal internal mode numbers used by the TSR (see the section 'Video Modes supported by UniVBE' below for more information). An example UniVBE.INI file might be:

```
[remove]
10D
10E
```

The UniVBE.INI file is also used to contain the information generated by the UniCENTER program to adjust the centering and sizing of the video modes supported by UniVBE.

Upgrading your video card

When the time comes to replace the video card in your system with a new one, rest assured that UniVBE will probably work just as well with the new video cards as with your old one. However when you do so, you will need to delete the UNIVBE.INI file from your \UNIVBE directory, and then should re-install UniVBE in order to correctly generated a new UniVBE.INI file for the new video card, or use the -g command line option to do so manually. You will also need to re-center all of your video modes using the UniCENTER program if you did this with your old video card.

Video modes supported by UniVBE

UniVBE fully supports the VESA VBE 1.2 standard, which defines a number of standard video modes numbers. The new version of the VESA VBE specs will allow the vendor to extend the video numbers used to whatever values they wish, so we have taken the liberty to extend the mode numbers used by the UniVBE to include modes not originally specified in the VBE 1.2 specs, but supported by a number of popular video cards on the market. Depending on how well your applications have been written, they may or may not be able to use those modes. If you are a developer wishing to take advantage of these modes, please consult the SuperVGA Kit (available from SciTech Software) for more information and programming examples. Specifically, the video modes supported are (along with internal modes numbers used by UniVBE):

- 102 - 800x600 16 color
- 104 - 1024x768 16 color
- 106 - 1280x1024 16 color
- 123 - 1600x1200 16 color
- 11C - 640x350 256 color
- 100 - 640x400 256 color
- 101 - 640x480 256 color
- 103 - 800x600 256 color

- 105 - 1024x768 256 color
- 107 - 1280x1024 256 color
- 124 - 1600x1200 256 color
- 10D - 320x200 32k color
- 11D - 640x350 32k color
- 11E - 640x400 32k color
- 110 - 640x480 32k color
- 113 - 800x600 32k color
- 116 - 1024x768 32k color
- 119 - 1280x1024 32k color
- 125 - 1600x1200 32k color
- 10E - 320x200 64k color
- 11F - 640x350 64k color
- 120 - 640x400 64k color
- 111 - 640x480 64k color
- 114 - 800x600 64k color
- 117 - 1024x768 64k color
- 11A - 1280x1024 64k color
- 126 - 1600x1200 64k color
- 10F - 320x200 16m color
- 121 - 640x350 16m color
- 122 - 640x400 16m color
- 112 - 640x480 16m color
- 115 - 800x600 16m color
- 118 - 1024x768 16m color
- 11B - 1280x1024 16m color
- 127 - 1600x1200 16m color
- 128 - 640x480 16m+A color (32 bits per pixel)
- 129 - 800x600 16m+A color (32 bits per pixel)
- 12A - 1024x768 16m+A color (32 bits per pixel)
- 12B - 1280x1024 16m+A color (32 bits per pixel)
- 12C - 1600x1200 16m+A color (32 bits per pixel)

UniVBE also fully supports the new 32 bits per pixel 16.7 million color video modes popular on the latest video cards. These modes usually run much faster than the equivalent 24 bit modes, but take up considerably more memory (you need at least 2Mb to run 640x480x32bit).

Note however that even though UniVBE may support a particular video mode, this mode will only be available if there is enough video memory installed, and if the underlying video hardware can support it. UniVBE fully supports the 640x350, 640x400 and 640x480 modes with 256/32k and 64k colors on all video cards that have enough video memory, using propriety emulation techniques if the underlying VIDEO BIOS does not directly support it.

UniVBE does not provide support for any of the extended text modes that your video card may provide, but will provide support for any extended text modes supported by an underlying VESA VBE compliant BIOS or TSR. Thus if your video card already has a VBE compliant BIOS or you install your vendor supplied VESA VBE TSR for

your video card before installing UniVBE, an automatic pass-through mechanism will be used to ensure the extended text modes still work correctly.

Testing UniVBE

UniVBE is also installed with the SVTEST16.EXE, SVTEST32.EXE and VBETEST.EXE programs for testing the operation of UniVBE. The SVTest16 and SVTest32 programs are 16 bit real mode and 32 bit protected mode applications built with the SuperVGA kit. These programs will allow you to fully test all the different video modes that UniVBE supports. The VBETest program is a stress test and conformance testing program to full test the VESA VBE implementation for compliance. You might want to run this program on your current VBE BIOS or TSR, and then run it with UniVBE installed to see how much better UniVBE is.

If UniVBE/Pro is installed, the SVTest32 program will use the high speed 32 bit protected mode interface for maximum performance. You can try turning off this interface with the -x command line option to see how much slower the program runs without it.

UniPOWER

UniPOWER is a power management screen saver that will shut down any DPMS compliant video monitor via the VESA VBE/PM interface (provided by UniVBE/Pro). UniPOWER comes in two flavours, the UniPOWER.EXE screensaver for DOS and the UniPOWER.SCR screensaver for Windows. By default the installation program for UniVBE will install both UniPOWER for DOS and UniPOWER for Windows.

The UniPOWER.SCR program is a standard Windows screensaver, so you can use it just like you use all your normal Windows screensavers. By default the installation program will have installed and activated the UniPOWER for Windows screensaver. However you can change the way that UniPOWER for Windows operates. First you need to open up the Windows Control Panel, and then hit the 'Setup' button for the installed screensaver (which should be 'UniPOWER DPMS'). This will bring up a dialog box allowing you to modify UniPOWER's configuration. Extensive online help is provided for UniPOWER for Windows, so please consult the online documentation for more information.

Problems with the Standby State

By default when you installed UniPOWER, the Standby state is disabled. Some monitors do not support this particular state, and on some video card configurations, this state is difficult to signal correctly. You may notice that when the Standby state has been activated, the video monitor goes directly in the Off state, rather than the Standby state. If this happens then your video card was not able to correctly signal this state to the video monitor, and it should be disabled.

If you wish to activate the Standby state, be sure to test it for correct operation with your video monitor using the provided TEST button in the UniPOWER for Windows configuration dialog box. If the state is not working correctly, you will not damage your video card or your monitor, but the monitor will incorrectly detect this state as the Off state.

What do the DPMS states mean anyway?

In late 1993 the Video Electronics Standards Association (VESA®) completed and ratified the Display Power Management Signalling, or DPMS standard. The DPMS standard allows normal VGA or SuperVGA video cards to communicate with DPMS compliant video monitors via a special signalling system. This signalling system allows the video card to tell the monitor to go into a number of different *power management* or *power saving* states, which effectively allow the monitor to turn itself off when it is not in use. The primary benefit of this is dramatically decreased (up to 90%!) power consumption when your computer is sitting idle, but it also saves you money.

There are basically four states that a DPMS compliant monitor can be in, and they are usually enter into one after the other in a sequential fashion. Each of the different states provides a tradeoff between minimum power consumption and minimum recovery time (the time it take before you can see the picture again!). The following table outlines the currently defined power management states, and how they relate to each other. Also included are some ballpark figures for power consumption and recovery times, but you should consult the documentation that comes with your video monitor for more accurate figures:

<i>State</i>	<i>Power</i>	<i>Recovery Time</i>	<i>Notes</i>
On	100%	N/A	Normal use
Standby	< 80%	~1 sec	Minimal power reduction (optional)
Suspend	< 30 watts	~4 secs	Substantial power reduction
Off	< 5 watts	~8-20 secs	Lowest level or power - non operational

Note that the Standby state is optional and may not be provided by some monitors.

UniCENTER

If you have installed the UniCENTER utility program, it will have been placed into the directory where you also installed UniVBE/Pro. To use UniCENTER, first change to the directory where UniVBE is installed (the following example assumes the default installation):

```
CD \UNIVBE
```

Then run the UniCENTER program with the following command:

```
UNICENTR
```

You will then be presented with a hierarchy of menus allowing you to display and adjust the parameters for each of the video modes supported by your UniVBE/Pro installation. To adjust a video mode, simply follow the instructions on the screen and using the arrow keys to move and size the image. When you are finished hit the enter key - if you adjust the image too far and it goes out of sync, hit the ESC key and you will be dropped back to the previous menu.

When you have finished, exit UniCENTER and the adjustments will be saved into the UNIVBE.INI file (note that you must re-install UniVBE/Pro for the changes to take effect). That's all there is to it!

Video cards tested with UniVBE

The following is a list of video cards that have been fully tested and are known to work correctly with UniVBE (if you want to add your card to the list, please forward the details to SciTech Software and it will be added):

Thoroughly tested by SciTech Software:

Actix GE32+ ISA 1Mb (S3 86c801 TrueColor DAC)
Actix GE32+ VLB 1Mb (S3 86c805 TrueColor DAC)
Diamond Stealth VRAM ISA 1Mb (S3 86c924)
Diamond Stealth 24 VLB 1Mb (S3 86c805 TrueColor DAC)
STB WINDX ISA 1Mb (S3 86c911)
NCR 77C32BLT VLB 2Mb (TrueColor DAC)
Cirrus Logic 5422 ISA 1Mb (TrueColor DAC)
Cirrus Logic 5226 VLB 1Mb (TrueColor DAC)
Cirrus Logic 5428 VLB 2Mb (TrueColor DAC)
Orchid Kelvin VLB 2Mb (Cirrus Logic 5434 TrueColor DAC)
Tseng Labs ET3000 ISA 512k
Orchid Pro Designer II ISA 1Mb (Tseng Labs ET4000)
MegaEva/2 ISA 1Mb (ET4000 HiColor DAC)
MegaEva/32i/VL VLB 2Mb (ET4000/32i TrueColor DAC)
Video 7 VRAM II ISA 1Mb (HT209)
ATI VGA Wonder ISA 512k (18800)
ATI Graphics Ultra Pro VLB 2Mb (Mach32 68800-6 TrueColor DAC)
Trident 8900C ISA 512Kb/1Mb
Trident 9000 ISA 512Kb
Oak OTI-037C 512k
Oak OTI-067 512k
RealTek RTVGA 3106 ISA 1M
Paradise VGA Plus Card ISA 256k (8 bit PVGA1A)
Paradise ISA 256k (16 bit PVGA1A)
Paradise Windows Accelerator ISA 1Mb (WD90C31 HiColor DAC)
Cardex C33 VLB 2Mb (WD90c33 TrueColor DAC)
Western Digital in Toshiba T4440C Laptop 512k (WD90C30)
Western Digital in Toshiba T6600 Laptop 512k (WD90C26A)
Everex Viewpoint VRAM ISA 1Mb (Ev623 + Tseng ET4000AX)

Reported to work from UniVBE users:

UMC 85c408 512k with HiColor DAC
HMC 86304 256k, 512k
Trident 9000i 512k with HiColor DAC
Trident 8900C 1Mb
Trident 8900B 1Mb
MXIC 86000 512k
Avance Logic ALG2101 1Mb with HiColor DAC

Oak OTI-077 1Mb
Oak OTI-087 1Mb with HiColor DAC
Oak OTI-067 256k
Western Digital WD90c31 1Mb with TrueColor DAC (AT&T 20c492)
Western Digital WD90c33 1Mb with TrueColor DAC (Sierra SC15025)
NCR 77C22E 4Mb
Tseng Labs ET4000AX 1Mb with TrueColor DAC (SS24)
Tseng Labs ET4000/W32 1Mb with TrueColor DAC (AT&T 20c490)
Tseng Labs ET4000/W32i 2Mb with TrueColor DAC (Sierra SC15025)
Tseng Labs ET4000/W32i 1Mb with TrueColor DAC (Sierra SC15025)
Tseng Labs ET3000AX 512k
Primus P2000 2Mb with TrueColor DAC (AT&T 20c492)
Acumos AVGA2 512k (actually a Cirrus 5421 equivalent chipset)
Cirrus Logic 5420 512k with HiColor DAC
ATI Graphics Ultra Pro 2Mb with TrueColor DAC (TI34075)
Weitek 5186 256k (on a P9000 board)
Western Digital WD90c24 1Mb with HiColor DAC
RealTek RTG3105 512k
Trident 9000B 512k
Cirrus Logic 5426 2Mb
Chips & Technologies 82c450 in Macintosh Quadra 800 with DOS card.