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EXM-13B
VGA Controller
Hardware Reference

RadiSys® Corporation

15025 S.W. Koll Parkway

Beaverton OR 97006

(503) 646-1800

FAX: (503) 646-1850

http://www.radisys.com

07-0294-00 January 1996

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NOTES

Table of Contents

1. Product Description....1
Introduction....1
Specifications....2
2. Installation....3
Insertion in an EXM Carrier....3
Configuring the BIOS Setup....4
Enabling the EXM module with Phoenix BIOS....4
Enabling the EXM module with Award BIOS....5
3. Connectors....7
Standard VGA Connector....7
Feature Connector....8
4. Programming Interface....11
Register Descriptions....11
Display Memory....11
Video BIOS ROM....12
Supported Resolutions....12
5. Support and Service....15
Technical Support....15
World Wide Web....15
Bulletin Board....16
Repair Services....16
Warranty Repairs....16
Non-Warranty Services....17
Arranging Service....17
Other Countries....18

Appendix A: Video Modes and Supported Drivers....A-1

NOTES

1. Product Description

Introduction

This manual contains the information required to install and use the EXM-13B VGA graphics accelerator expansion module.

The EXM-13B is a high-performance VGA and SVGA graphics controller and accelerator that is based on the Cirrus Logic CL-GD5434 or better VGA controller chip. The EXM-13B is available with 1MB or 2MB of display memory, which it accesses via a 64-bit-wide data path. It supports the standard 640 x 480 resolution VGA modes and many SVGA modes all the way to 1280 x 1024 x 8 (256 colors) at a 60 Hz non-interlaced refresh rate.

Video display drivers supplied by Cirrus Logic are shipped with the EXM-13B. These drivers support DOS, Windows, and Windows NT. Windows 95 drivers come standard with the operating system. SCO Unix drivers are available from Santa Cruz Operations. For information about additional operating systems or operating environments supported with the EXM-13B, contact RadiSys Technical Support at the number listed in Chapter 5. For information about software drivers provided with the EXM-13B, refer to Appendix A.

Please note that the EXM-13B uses DRAMs, rather than faster VRAMs, for display memory. At 16 colors and 256 colors, memory speeds are not an issue. However, at 65,536 and 16.8 million colors performance differences may be noticable.

1 1

Specifications

Table 1 defines the environmental and electrical specifications of the EXM-13B.

Characteristic		Value
Environmental		
Temperature	operating	0° to 60° C (* see below)
	storage	-40° to 85° C
Humidity	operating	5% - 95% (non-condensing)
	storage	5% - 95% (non-condensing)
Vibration	operating	.015"displacement with 2.5 g peak (max) acceleration over 5 to 2000 Hz
	storage	.030" displacement with 5 g peak (max) acceleration over 5 to 2000 Hz
Shock	operating	30g 11 msec duration, half-sine shock pulse
	storage	50g 11 msec duration, half-sine shock pulse
Electrical		
Current	maximum typical	5V @ 530 mA (TBD) 5V @ 250 mA (TBD)

Table 1. EXM-13B Environmental and Electrical Specifications.

* Upper temperature limit degrades 2° C per 1000 ft. elevation. Maximum elevation 10,000 ft.

The EXM-13B meets the IEC-801-2:1991 standard for Electromagnetic Compatibility at 8 kV contact discharge and 8 kV air discharge.

2. Installation

2 2

Before installing the EXM-13B, unpack and inspect it for shipping damage.

- **DO NOT REMOVE THE MODULE FROM ITS ANTI-STATIC BAG UNLESS YOU ARE IN A STATIC-FREE ENVIRONMENT. THE EXM-13B, LIKE MOST OTHER ELECTRONIC DEVICES, IS SUSCEPTIBLE TO ESD DAMAGE. ESD DAMAGE IS NOT ALWAYS IMMEDIATELY OBVIOUS, IN THAT IT CAN CAUSE A PARTIAL BREAKDOWN IN SEMICONDUCTOR DEVICES THAT MIGHT NOT IMMEDIATELY RESULT IN A FAILURE.**
- **ENSURE THAT THE INSTALLATION PROCESS AS DESCRIBED HEREIN IS ALSO PERFORMED IN A STATIC-FREE ENVIRONMENT.**

Insertion in an EXM Carrier

Insertion of the EXM-13B into an EXM carrier is straightforward. Remove a blank EXM panel from the carrier (by unscrewing the thumbscrews) and insert the EXM-13B into the card guides. Firmly press the EXM-13B front panel to ensure that the module is properly seated in the subplane and secure it with the thumbscrews. DO NOT OVERTIGHTEN.

- **MAKE SURE THAT POWER TO YOUR SYSTEM IS OFF. THIS EXM IS NOT DESIGNED TO BE INSERTED OR REMOVED FROM A LIVE SYSTEM.**
- **WHEN INSERTING THE EXM, AVOID TOUCHING THE CIRCUIT BOARD, AND MAKE SURE THE ENVIRONMENT IS STATIC-FREE.**
- **INSERT IT WITH ADEQUATE CONTINUOUS FORCE RATHER THAN TAPPING OR HAMMERING ON IT.**

2 2

Configuring the BIOS Setup

Once the EXM-13B is inserted into the carrier, turn the system on and start to boot it up. The EXM configuration data in the EPC to which the EXM-13B is connected now must be modified to recognize and enable the card and select from the available options.

Refer to your specific EPC hardware manual for more complete information about setting up an EXM mondule.

Enabling the EXM module with Phoenix BIOS

If you are using the EPC-8, EPC-9, EPC-26A, or EPC-27, you will be using the Phoenix BIOS to configure your EXM-13B. To access the BIOS Setup Menus, press the F2 functio key during the start of the boot process. You cannot reach the BIOS from the command line.

The BIOS Main Menu has a sub-menu for EXM configuration: the EXM menu. Press the right-arrow key until you reach the EXM menu.

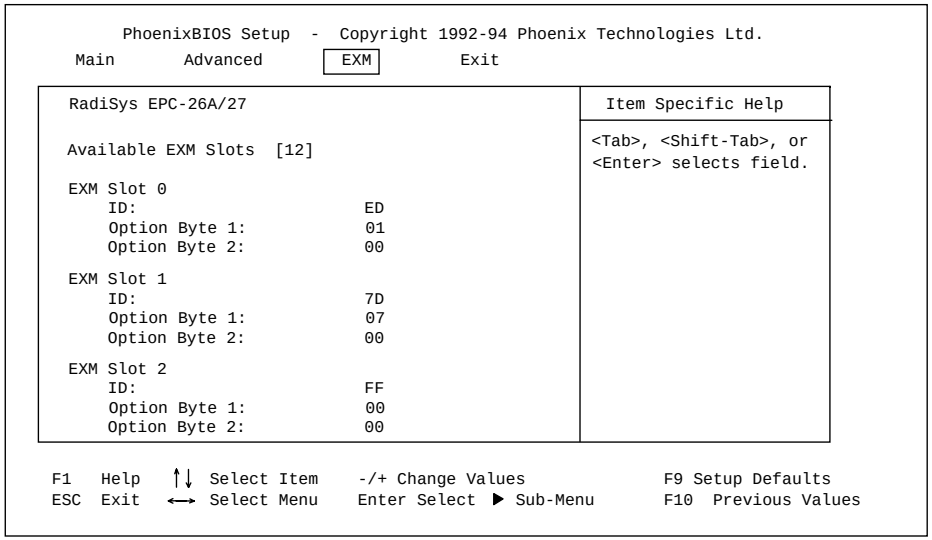


Figure 1. Phoenix BIOS EXM Menu.

Refer to Figure 3 for a discussion of EXM slot numbering. Once you determine the slot number the EXM-13B occupies, enter the configuration information into the ID and option byte sections of the EXM table. Defaults for the EXM-13B are an ID of **ED** and OB1 set to **01**, with OB2 set to **00**. Continue reading this chapter for more information.

Enabling the EXM module with Award BIOS

If you are using an EPC-4, EPC-5, EPC-6, EPC-7, EPC-21, EPC-22, EPC-23, EPC-24, or EPC-26, you will be using the Award BIOS. Invoke the BIOS setup function from the command line by pressing the CTRL-ALT-ESC keys simultaneously.

Once in the setup program, a menu displays specifying which function keys are available for further configuration. Press the F2 function key to invoke the EXM menu. The screen display resembles the figure below.

```
          ID OB1 OB2
Slot 0    DC  00  00
     1    DB  C1  00
     2    ED  01  00
     3    DE  00  39
     4    F5  05  00
     5    DC  F5  00
```

Figure 2. EXM Setup Screen.

The EXM Setup Screen displays the EXM configuration data (in hexadecimal) stored in nonvolatile memory which the EPC uses at power-up to recognize and configure each installed EXM. An example of configuration data for the EXM-13B is shown in bold in slot 2. The displayed data shows SLOT, ID, OB1 and OB2. These are defined as follows:

SLOT — indicates the slot in which the EXM is installed. See the diagram below to determine which EXM slot the EXM-13B occupies. Note that dashed lines indicate EXM slots that may not be available on all systems.

2 2

EXM Slots

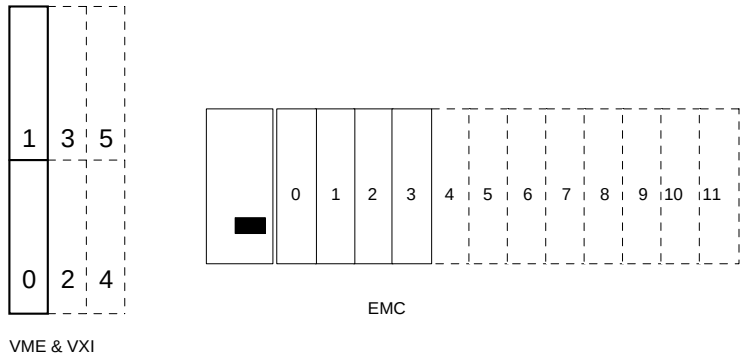


Figure 3. EXM Slot Numbering.

ID is a hard-wired ID value. Each EXM has a unique ID value.

OB1/OB2 are two bytes of option information.

Note that all slots are listed on the screen even if the actual system configuration does not have all the possible EXM slots. All slots **not** occupied by an EXM module should show an ID of FF and OB1/OB2 of 00 00 indicating no EXM is present.

To add or change an EXM configuration, use the cursor keys (arrows) to move between the fields on the screen. Move the cursor to the appropriate slot entry and type in the correct value.

The **ID** for the EXM-13B should be set to **ED**h. **OB1** is a hexadecimal value derived by combining the following:

Reserved (bits 7 through 1)	Card Enable (bit 0)
Set to 0	0 disable 1 enable

Figure 4. OB1 Register.

OB1 contains only the card enable bit. Thus a typical OB1 value is **01**h, indicating that the card is enabled.

OB2 is not used and should be set to **00**.

3. Connectors

Standard VGA Connector

The primary connector on the EXM-13B front panel is an industry standard 15-pin VGA connector. The pinout of this connector is as follows:

Pin	Function
1	Red (analog)
2	Green (analog)
3	Blue (analog)
4	
5	GND
6	AGND
7	AGND
8	AGND
9	
10	GND
11	
12	
13	Horizontal Sync
14	Vertical Sync
15	

Table 4. VGA Connector Pin-Out.

3 3

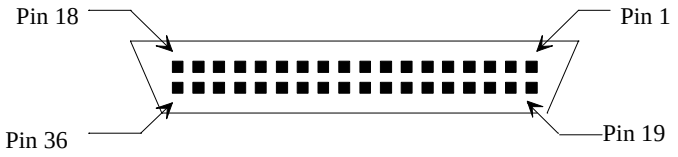
Feature Connector

The EXM-13B also has a feature connector for use with flat panels. This is a 36-pin female shielded connector equivalent to a 3M 10236-5212VE. This connector provides sufficient ESD protection for most applications. The pinout of this connector is shown in the following table. There are two ways to view the pinout. The pin number in column A refers to the pins on the connector as shown in the figure. Column B represents the signal order of a flat cable.

A	B	Signal	A	B	Signal
1	1	EVIDEO	19	2	GND
2	3	P7	20	4	P0
3	5	GND	21	6	P1
4	7	DCLK	22	8	P2
5	9	EDCLK	23	10	GND
6	11	P6	24	12	P3
7	13	GND	25	14	P4
8	15	-BLANK	26	16	P5
9	17	HSYNC	27	18	GND
10	19	VSYNC	28	20	ESYNC
11	21	GND	29	22	GND
12	23	RESERVED	30	24	GND
13	25	RESERVED	31	26	GND
14	27	RESERVED	32	28	GND
15	29	GND	33	30	GND
16	31	ANALOG RED	34	32	GND
17	33	ANALOG GRN	35	34	GND
18	35	ANALOG BLUE	36	36	GND

Table 5. Feature Connector Pinout.

Notes:



P0-P7 are the digital inputs to the DAC.

DCLK is the dot clock to the DAC.

-BLANK is the blanking signal to the DAC.

HSYNC and VSYNC are the horizontal and vertical sync signals on the VGA connector.

EDCLK when high enables the DCLK from the CL-GD5434 controller otherwise DCLK is sourced from the feature connector.

EVIDEO when high enables the color signals from the CL-GD5434 controller, otherwise they are sourced from the feature connector.

ESYNC when high enables the blank signal and the vertical and horizontal sync signals from the CL-GD5434 controller, otherwise they are sourced from the feature connector.

EDCLK, EVIDEO and ESYNC have internal pullups, so that they default to the normal mode when nothing is connected to the feature connector.



NOTES



4. Programming Interface

This chapter contains information needed to write custom software drivers for the EXM-13B. Anyone using the EXM with software drivers other than provided with the product should read this chapter.

Register Descriptions

If the ~EXMID bus signal is asserted, the EXM-13B responds to accesses to I/O addresses 100h and 102h. A read from 100h returns the assigned device ID value of EDh. Writes to 100h are ignored. Only bit 0 of 102h is implemented. This is the readable and writeable card enable bit. It is cleared at any EXM interface reset, thereby totally disabling the EXM-13B until it is explicitly enabled.

The CL-GD5434 chip has a multitude of registers at various I/O locations. They correspond to IBM VGA standard I/O addresses and are far too numerous to enumerate here. Also, the CL-GD5434 responds to memory locations in the address range of A0000h through BFFFFh as well as the range of C0000h through C7FFF (BIOS). The CL-GD5434 is reset and disabled while the card enable bit is cleared and will not respond to any of the above addresses.

Display Memory

The CL-GD5434 supports display memory in either 1 MB or 2 MB configurations. The EXM-13B will use 256K x 16 (4 Mbit) DRAMs. Display memory is programmable up to an MCLK rate of 50 MHz.

Video BIOS ROM

The BIOS ROM responds to memory reads in the address range of C0000h through C7FFFh, provided that the EXM-13B is enabled. The BIOS is in a one-time-programmable, surface-mount 256Kx8 device.

Supported Resolutions

The EXM-13B supports the display modes shown in the following tables. Many configurations can operate with only 1 MB of display memory, but those same configurations may achieve much higher performance with 2 MB of display memory.

Windows 3.1

Resolution	Colors	Memory (MB)	43i Hz	60 Hz	70 Hz	72 Hz	75 Hz
640x480	16	1	NA	X	NA	X	X
640x480	256	1	NA	X	NA	X	X
640x480	65536	1	NA	NA	NA	NA	X
640x480	16.8 M	2	NA	NA	NA	NA	X
800x600	16	1	NA	X	NA	X	X
800x600	256	1	NA	X	NA	NA	NA
800x600	65536	1	NA	X	NA	NA	NA
800x600	16.8 M	2	NA	X	NA	NA	NA
1024x768	16	1	X	NA	NA	NA	NA
1024x768	256	1	X	X	NA	NA	X
1024x768	65536	2	X	NA	X	NA	X
1280x1024	16	1	X	NA	NA	NA	NA
1280x1024	256	2	X	NA	NA	NA	NA

Table 6. Windows 3.1 Resolutions.

X=supported

NA = not supported

Windows NT v3.5

Resolution	Colors	Memory	43i Hz	60 Hz	70 Hz	72 Hz	75 Hz
640x480	16	1	NA	X	NA	NA	X
640x480	256	1	NA	X	NA	NA	X
640x480	65536	1	NA	X	NA	NA	X
640x480	16.8 M	2	NA	NA	NA	NA	NA
800x600	16	1	NA	NA	X	X	X
800x600	256	1	NA	X	NA	X	X
800x600	65536	1	NA	X	NA	X	X
800x600	16.8 M	2	NA	NA	NA	NA	NA
1024x768	16	1	X	X	X	NA	X
1024x768	256	1	X	X	X	NA	X
1024x768	65536	2	X	X	X	X	X
1280x1024	16	1	X	X	NA	NA	NA
1280x1024	256	2	X	X	NA	NA	NA

Table 7. Windows NT Resolutions.

X=supported

NA = not supported



OS/2 v2.1, v3.0

Resolution	Colors	Memory	43i Hz	60 Hz	70 Hz	72 Hz	75 Hz
640x480	16	1	NA	NA	NA	NA	NA
640x480	256	1	NA	X	NA	X	NA
640x480	65536	1	NA	X	NA	X	NA
640x480	16.8 M	2	NA	X	NA	X	NA
800x600	16	1	NA	NA	NA	NA	NA
800x600	256	1	NA	X	NA	X	X
800x600	65536	1	NA	X	NA	X	X
800x600	16.8 M	2	NA	NA	NA	NA	NA
1024x768	16	1	NA	NA	NA	NA	NA
1024x768	256	1	X	X	X	X	X
1024x768	65536	2	NA	X	NA	X	NA
1280x1024	16	1	NA	NA	NA	NA	NA
1280x1024	256	2	X	X	NA	NA	NA

Table 8. OS/2 Resolutions.

The RAMDAC and clock generators are internal to the CL-GD5434. They are capable of operating at up to 135 MHz.

X=supported

NA = not supported

5. Support and Service

Technical Support

RadiSys maintains a technical support phone line at the phone number listed on the front page of this document. The support phones are staffed weekdays (except holidays) between 8 AM and 5 PM Pacific time. If you have a problem outside these hours, you can leave a message on voice-mail using the same phone number. You can also request help via electronic mail or by FAX addressed to RadiSys Technical Support. The RadiSys FAX number is also listed on the front page of this manual. The RadiSys E-mail address on the Internet is *support@radisys.com*. If you are sending E-mail or a FAX, please include information on both the hardware and software being used and a detailed description of the problem, specifically how the problem can be reproduced. We will respond by E-mail, phone or FAX by the next business day.



Technical Support Services are designed for customers who have purchased their products from RadiSys or a sales representative. If your RadiSys product is part of a piece of OEM equipment, or was integrated by someone else as part of a system, support will be better provided by the OEM or system vendor that did the integration and understands the final product and environment.

World Wide Web

RadiSys Corp. maintains a page on the World Wide Web. Our home-page URL is *http://www.radisys.com*. The site contains regularly updated information about the company and locations of sales offices, new and existing products, who to contact for sales, service, or technical support information, and allows you to send E-mail to us. Requests for sales, service, and technical support information will receive prompt response.

Bulletin Board

RadiSys operates an electronic bulletin board (BBS) 24 hours per day to provide access to the latest drivers, software updates and other information. The bulletin board is not monitored regularly, so if you need a fast response please use the telephone or FAX numbers listed above. The BBS operates at up to 14400 baud. Connect using standard settings of eight data bits, no parity, and one stop bit (8, N, 1). The telephone number is listed on the front page of this manual.

Repair Services

Factory Repair Service is provided for all RadiSys products. Standard service for all RadiSys products covers factory repair with customers paying shipping to the factory and RadiSys paying for return shipment. Overnight return shipment is available at customer expense. Normal turn-around time for repair and re-certification is five working days.

5 5

Quick Exchange services (immediate shipment of a loaner unit while the failed product is being repaired) or other extra-cost services can be arranged, but need to be negotiated in advance to allow RadiSys to pool the correct product configurations. RadiSys does not maintain a general "loaner" pool: units are available only for customers that have negotiated this service in advance.

RadiSys does not provide a fixed-price "swap-out" repair service, as customers have indicated that issues of serial number tracking and version control make it more convenient to receive their original products back after repair.

Warranty Repairs

Products under warranty (see warranty information in the front of this manual) will have manufacturing defects repaired at no charge. Products sent in for warranty repair that have no faults will be subject to a recertification charge. Extended Warranties are available and can be purchased at a standard price for any product still under warranty. RadiSys will gladly quote prices for Extended Warranties on products whose warranties have lapsed; contact the factory if this applies.

Customer induced damage (resulting from misuse, abuse, or exceeding the product specifications) is not covered by the standard product warranty.

Non-Warranty Services

There are several classes of non-warranty service. These include repair of customer induced problems, repairs of failures for products outside the warranty period, recertification (functional testing) of a product either in or out of warranty, and procurement of spare parts.

All non-warranty repairs are subject to service charges. RadiSys has determined that pricing repairs based on time and materials is more cost-effective for the customer than a flat-rate repair charge. When product is received, it will be analyzed and, if appropriate, a cost estimate will be communicated to the customer for authorization. After the customer authorizes the repair and billing arrangements have been made, the product will be repaired and returned to the customer.

A recertification service is provided for products either in or out of warranty. This service will verify correct operation of a product by inspection and testing of the product with standard manufacturing tests. There is a product-dependent charge for recertification.

There are only a few components that are generally considered field-repairable, but, because RadiSys understands that some customers want or need the option of repairing their own equipment, all components are available in a spares program. There is a minimum billing charge associated with this program.



Arranging Service

To schedule service for a product, please call RadiSys Technical Support directly. Have the product model and serial numbers available, along with a description of the problem. A Technical Support representative will issue a Returned Materials Authorization (RMA) number, a code number by which we track the product while it is being processed. Once you have received the RMA number, follow the instructions of the Technical Support representative and return the product to us, freight prepaid, with the RMA number clearly marked on the exterior of the package. If possible re-use the original shipping containers and packaging. In any case, be sure you follow good ESD-control practices when handling the product, and ensure that anti-static bags and packing materials with adequate padding and shock-absorbing properties are used.

Ship the product, freight prepaid, to the address listed on the front page of this manual.

When shipping the product, include the following information: return address, contact names and phone numbers in purchasing and engineering, and a description of the suspected problem. Any ancillary information that might be helpful with the debugging process will be appreciated.

Other Countries

Contact the sales organization from which you purchased your RadiSys product for service and support.

Appendix A - Video Modes and Supported Drivers

Video Controller Hardware

The EXM-13B contains an SVGA graphics controller using the Cirrus Logic SVGA CL-GD**5434** chip. SVGA memory options are 1 and 2 MBytes. This provides standard VGA modes on a CRT. The video controller chip provides super VGA modes up to 1280x1024x8 in 256 colors (non-interlaced).

Display Drivers and Utilities Software

The SVGA Driver and Utilities Software is supplied by Cirrus Logic. There are five diskettes: one for DOS/Windows 95, two for Windows 3.1x, one for OS/2, and one diskette for Windows NT (versions 3.1 and 3.5). Be sure to check for **README.TXT** files on any diskette you are about to use before starting the installation.

For DOS-only systems, the **CLMode** utility program is used to configure options, define the type of monitor attached, and set the video modes supported by the Cirrus Logic chipset. **CLMode** is supplied with your Cirrus Logic SVGA software. The following section describes these utilities and how to use them.

For Windows users, the **WinMode** utility is used to configure Windows for use with the Cirrus Logic chipset, just as **CLMode** works for DOS.

A A

Contacting Cirrus Logic

If there are any newer versions of the software provided with your SVGA adapter, they are located on the Cirrus Logic BBS or their Web site.

The BBS is a WILDCAT! BBS. The phone number is (510) 440-9080. It can handle modems running up to 9600 baud. The modem should be set to NO parity, 8 data bits, 1 stop bit. Before you are able to download software, you must join the conference(s) for the product(s) that you are interested in.

The URL for the Web site is **HTTP://WWW.CIRRUS.COM.**

DOS Installation

The installation utility is provided to facilitate the smooth installation of the display drivers and utility software. The installation program is menu-driven and allows you to select and install only those display drivers for software and applications currently in use.

It is important to note that some display drivers need to have the associated vendor's application program already installed on the system prior to loading the Cirrus Logic SVGA display drivers. In other cases, the loading of the display driver may be an integral part of the vendor's product installation process. Please review the driver product section below for specific instructions prior to running the installation program.

DOS Installation

The DOS installation utility is located on the diskette labeled **Windows 95 & DOS**. To install the desired DOS display drivers and utilities, insert the diskette into the A: drive, then type the following:

```
A:
CD DOS
INSTALL
```

This begins the installation of the software. Follow the instructions on the screen to install the listed display drivers and Cirrus Logic software. The installation process asks you the destination directory, then proceeds. At any time you may press [ESC] to abort the installation process and go back to DOS.

Application-Specific Display drivers

The Cirrus Logic video controller is 100% VGA compatible. The display drivers described in this manual are supplied to improve the resolution for each supported software application package.

The installation instructions for each display driver will follow the introduction section. Follow the instructions carefully to be sure that each display driver is correctly installed. All of the installation instructions assume that the diskette is located in drive A:. If drive B: is used, the instructions should be changed appropriately.

CLMode

The **CLMode** utility allows you to configure options, define the type of monitor attached, and set the video modes supported by the Cirrus Logic chipset.

Note: Some extended memory manager software may interfere with the correct operation of CLMode.

Using CLMode's menu-driven interface

At the DOS prompt type: CLMODE

The main popup window consists of a number of buttons. Each button represents a different option or menu. The underlined letter of a button name specifies the hot key combination for that item. For example, press the [ALT] and the underlined letter keys simultaneously or just the underlined letter key to select an option. Note that to use a mouse, a mouse driver should be installed prior to running the **CLMode** utility in order to use the mouse pointer for button selection.

Configuring the attached monitor

In order to configure your monitor, you must select the correct monitor refresh rates for your brand and model. From DOS, this requires that you know the values to insert for the four refresh rates. **CLMode** cannot automatically detect these settings. If you are unsure, try running **WinMode**'s auto-detect feature. Otherwise, use the settings discussed in your monitor's hardware reference manual.

Selecting the proper monitor refresh rate allows the Cirrus Logic chipset to display the highest quality output that it is capable of with the attached monitor. The monitor type determines what video modes will be available to your system. It will also determine the vertical refresh rates available. Generally, the higher the refresh, the better the screen will look.

Monitor Brand. Set for "Other Brand."

Monitor Model. Set for "Other Brand."

Monitor Refresh Rates. **CLMode** displays several options for refresh rates at various settings. For some settings, there may be only one refresh rate option available. Note also that some of the higher resolutions may not be supported.

Refer to your monitor's hardware reference manual for information about your monitor. If this documentation is incomplete or missing, try running **WinMode** and setting the monitor brand and model. The auto-detect feature will list available refresh rates.

Completing the Configuration

There are six option buttons available once you are satisfied with the brand, model, and refresh selections.

Help. Use the Help button to access detailed information about this screen and the information being requested in **CLMode**.

Undo. Use the Undo button to return the selections to the default settings.

Option. Use the Option button to access additional Flat Panel setup selections.

About. Use the About button to determine the software revision number.

Preview. Select the Preview button to view each of the new video timings that you have selected to verify that they are compatible with your monitor. A list displays with various settings. Select Show to display your selection. After each test screen is displayed, press [Enter] to see the next video mode. If there is a problem, press [ESC] to return to the dialog box. Try a slower setting for the resolution that did not work and preview your choices again. Press Quit to exit the Preview mode.

Exit. Use the Exit button to exit the application. Your selections are saved. A window displays to ask permission to make changes to the **AUTOEXEC.BAT** file. Answer Yes to have the system automatically insert a line that invokes **CLMode** with the proper settings.

On many systems the monitor type will be remembered from one session to the next. To test this, select a monitor type and exit the **CLMode** program. Turn the computer off for ten seconds. After rebooting the computer, run **CLMode** and verify whether or not the monitor that you selected is still enabled. If it is, it should not ever need to be set again in normal use. If the monitor type was not kept then you should select the option to have **CLMode** save the monitor type in your **AUTOEXEC.BAT** file. You are given this choice after selecting the Exit button.

Current controller status window

The information in the current controller status window displays the controller type, the BIOS version number, the amount of video memory present, the presence of the EEPROM, and whether the Centering TSR is loaded.

Using CLMode's command line options

When command line options for **CLMODE.EXE** are given at the DOS prompt, the menu-driven windows will not be displayed. Instead, configuration, monitor type, video mode and refresh rate will be set at the DOS prompt. The command line options for **CLMODE.EXE are** listed below:

CLMODE {modenum} {montype} | {s n} }

Where:

`{modenum}` mode number

`{montype}` monitor type

Valid mode numbers:

0 VGA
1 8514
2 Super VGA
3 Extended Super VGA
4 Multifrequency
5 Extended Multifrequency
6 Super Multifrequency
7 Extended Super Multifrequency

Valid monitor types:

t6=x(Hz)	640x480 @ (0 = 60, 1 = 72)
t8=x(Hz)	800x600 @ (0 = 56, 1 = 60, 2 = 72)
t1=x(Hz)	1024x768 @ (0 = 87i, 1 = 60, 2 = 70)
t2=x(Hz)	1280x1024 @ (0 = 87i, 1 = 60, 2 = 70)
s	List status information.

For example, to set video mode 3:

```
CLMODE 3
```

For example, to select custom monitor timings with 640x480 at 60Hz and 800x600 at 72Hz refresh type:

```
CLMODE t6=0 t8=2
```

Typing an invalid option will display the command line help text. Typing [S] as a command line option will display the current **CLMode** settings.

Windows 3.1

Before upgrading drivers from a previous release

Before installing the new drivers you should use Windows Setup to select the VGA or SUPERVGA video driver so that when you install the new drivers, there is no chance of overwriting the driver that Windows is using to control your screen. Next go to the system directory, and find a file that is named **OEM?.INF** where the question mark is a number. There may be more than one of these. These files are the different **OEMSETUP.INF** files that have been used to configure Windows for different devices. Using a text editor, such as Notepad or Edit, look at them until you find the one that is for the previous version of the Cirrus Logic video drivers and delete it. This is not completely necessary, but if you don't delete old files the drop down box for Setup soon becomes very cluttered with different versions of the same files. Also, in many cases the old files have been overwritten by newer ones, so no longer exist anyway.

Installation

The Windows installation utility is located on the diskette labeled **Windows 3.1 Disk 1 of 2**. There are two diskettes used for the Windows 3.1 installation. You must be running Windows in order to install the desired Windows display drivers and utilities. Insert the diskette into the A: drive, then either use File Manager or the File/Run method to execute **A:\INSTALL.EXE**.

Follow the instructions on the screen to install the listed display drivers. A warning message displays informing you that you should be using the standard Windows VGA or SVGA driver to proceed.

You can tailor the installation to your needs by selecting the destination drive and directory. Be sure to enter a directory so that the installation does not simply dump files into your root or into the large C:\WINDOWS directory. The installation program provides a default location of C:\WINDOWS\VGAUTIL. Once the software is copied from the distribution diskette, the installation creates a Cirrus Logic group and icon. After the installation is complete, start the **WinMode** application and supply information about your current monitor and drivers. Note that you can cancel out of **WinMode** if necessary.

WinMode

The **WinMode** utility runs under Windows 3.1 and allows the user to change the screen resolution, number of available colors, and to select either large or normal size fonts and system resources.

WinMode is run by selecting the **WinMode** icon. The first time that you run **WinMode**, the settings for the current driver won't be correct, after you set them once, they will be correct from then on.

The following selections are made in **WinMode**:

Monitor Brand. Select the Monitor Brand button. The Monitor Brand setup window displays. The current monitor brand is highlighted initially. Use the cursor keys or the mouse to choose the brand of monitor attached. If your brand is not present, you may want to check with Cirrus Logic to see if later versions of the **WinMode** software support your monitor brand.

Monitor Model. Select the Monitor Model button. When you select the Monitor Model button above, a list of recent models sold under that brand name displays. If your model is not present, you may want to check with Cirrus Logic to see if later versions of the **WinMode** software support your monitor model.

Monitor Refresh Rates. Once the brand and model are selected, **WinMode** displays several options for refresh rates at various settings. For some settings, there may be only one refresh rate option available. Note also that some of the higher resolutions may not be supported.

Colors. You can choose 16, 256, 32K, 64K, or 16M colors.

Resolution. You can choose 640x480, 800x600, 1024x768, or 1280x1024 resolution.

Font Cache Size. You can increase or decrease the font cache size, depending on your needs. The font cache is memory available for saving bitmaps of frequently used fonts. **WinMode** tries to set the optimum cache size for you, but you can make adjustments as necessary.

Operating System. Choose between DOS-Windows and OS/2-Windows depending on your system.

Font Size. You can choose between large and small fonts. With smaller monitors, the larger fonts are more readable. Small fonts are for large monitors with higher resolutions.

After new options have been selected, click the OK button. You are asked if you are ready to restart Windows in order for your changes to take effect. If you say No, then the changes you made are discarded.

For help on the WinMode utility, select **Help** from the program menu.

If an incompatible display setting is inadvertently selected such that the display is unviewable, exit Windows and use the DOS CLMode utility to select a different setting. CLMODE.EXE is located in the C:\WINDOWS\VGAUTIL directory.

Windows 95

To install the utility:

1. Go to Start, Programs, Windows Explorer.

2. Highlight the Win95 folder of drive A:.

3. Highlight the ref_rate.inf file and click the right mouse button, go to install.

To use the utility:

1. Go to MY COMPUTER icon and double click on CONTROL PANEL.

2. Double click on DISPLAY. There will be a refresh tab for changing the rates.

Windows NT

Windows NT 3.1 display drivers installation:

1. Start Windows NT.

2. From the MAIN window of the Program Manager run the Windows NT Setup program.

3. Select Change Systems Settings from the Options menu of Setup.

4. Click on the down arrow at the right side of the DISPLAY: line. Scroll to the end of the list of available display drivers and select OTHER display (requires disk from hardware manufacturer).

5. Insert the Windows NT display driver diskette into drive A: and type A:\NT31 for the pathname, then click on OK.

6. You will see the list of available drivers, their associated resolution and monitor refresh rates.

7. Highlight by moving the cursor to the desired display driver, click on OK, and then click on Close.

8. Continue with the remainder of the setup procedure. The changes will not take effect until the computer is restarted.

9. After you have installed the Windows NT driver, to select another display resolution, follow steps 2 and 3 above, then click on the down arrow on the right side of the DISPLAY: line to select the desired resolution from the list of available display drivers.

These Windows NT drivers only support systems or video adapters with 1MB of DRAM or more.

Deleted

Windows NT 3.5 display drivers installation:

1. Select Control Panel from the Main group.

2. Select the Display icon.

3. Select Change Display Type.

4. Select Change from the Adapter Type area.

5. Select Other.

6. Insert the Windows NT display driver diskette into drive A: and type A:\NT35 for the pathname, then click on OK.

7. Select Install and click "Yes" when the Installing Driver dialog box appears.

8. When the Windows NT Setup dialog box appears, the path should be A:\NT35. Click "Continue".

A message will appear stating that the drivers were successfully installed. Click "OK". Remove diskette from drive A, click “OK”, and then “Restart Now” to restart Windows NT 3.5.

To change display settings:

1. Select Control Panel from the Main group.

2. Select Display icon.

3. Select Color Palette to change between 16 colors, 256 colors and 65536 colors.

4. To select desktop resolution size, go to the Desktop area and use the slide bar to change resolution from 640x480, 800x600, 1024x768, and 1280x1024.

5. Select Test to test the resolution. If the display test screen was good then select "Yes" when the Test Mode dialog box appears. If the display test screen was bad then select "No". Windows NT will give you an error message.

   If the display screen was good and you selected "Yes", Windows NT 3.5 will prompt you to restart Windows NT 3.5.

OS/2

Note: System must be operating in standard VGA display mode before installing these drivers!

Note: OS/2 DOS support must be present to install the Cirrus Logic device driver.

Note: The following procedures apply to OS/2 versions 2.1 and 3 (Warp).

CLMode Installation:

To install the DOS display adapter utility, CLMODE.EXE, do the following:

1. Open an OS/2 full-screen or OS/2 window session.

2. Insert the diskette labeled 'Cirrus Logic VGA drivers for DOS/Windows 95'.

3. Select drive A and change directory to A:\DOS.

4. Type INSTALL and press [Enter].

The install program will prompt you for a target location for the utility files. The default selection is C:\VGAUTIL. Press [Enter] to accept the default. One of the files, ZCLMODE.EXE, is a self-extracting ZIP file.

5. Change drive and directory to C:\VGAUTIL.

6. Type ZCLMODE and press [Enter]. For information on program usage and options, refer to the DOS Installation section earlier in this manual.

OS/2 Video Driver Installation:

To install the Cirrus Logic device driver, do the following:

1. Insert the diskette labeled 'Cirrus Logic VGA drivers for OS/2' into drive A.

2. Open an OS/2 full-screen or OS/2 window session.

3. At the OS/2 command prompt, type the following command to copy all necessary files to the OS/2 drive:

A:SETUP A: C:

and press enter.

4. When prompted to do so, remove the diskette from drive A, perform a shutdown, and then restart the computer.

5. Open the OS/2 System folder.

6. Open the System Setup folder.

7. Open the Display Driver Install object. When the Display Driver Install windows appears, select Primary Display Driver and then select OK.

8. When the Display Driver List window appears, select 'Cirrus Logic (IBM BBS)' and then select OK.

9. When the Monitor Configuration/Selection Utility windows appears, the default installation is preselected. Select OK to install using default settings.

If you select Install Using Display Adapter, you will be prompted for a path to the adapter program. Enter 'C:\VGAUTIL\CLMODE.EXE' (or the location chosen during the CLMode installation) and select OK. For information on CLMode operation, see the DOS installation section earlier in this manual.

Note: At this point, the screen will blank for a few seconds while the DSPINSTL program determines hardware configuration.

10. When the Source Directory windows appears, insert the Cirrus Logic diskette in drive A and select Install.

11. When the installation is complete, you will need to shutdown and restart the system for any changes to take effect. Remove the diskette from drive A.

To change display settings:

1. Open the OS/2 System folder.

2. Open the System Setup folder.

3. Open the System object.

4. When the Settings notebook appears, select the Screen tab. Then go to page 2.

5. On Screen page 2, select your display from the display list. If your display does not appear in the list, select Default.

6. Return to page 1 and select a screen resolution and a refresh rate.
7. Close the Settings notebook.
8. Perform a shutdown and restart the computer.

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