VI - 710 Series

USER'S MANUAL

INTRODUCTION

This manual has been designed to be useful for several purposes. If the VI-710 series is already set up in a functioning system, it will be helpful to review the manual to become familiar with the features of the board and where things are. This will be helpful in the unlikely event there is a problem with the system.

For those who want to alter the board's configuration or upgrade it, the manual will serve as a guide to both procedure and specifications. While the necessary information is included in the manual, we recommend that unless you feel confident of your ability to do the work, it would be best to have your dealer or a local service shop do it. Before making alterations to the system, check to see whether it will violate the system warranty or not with such alteration. If it does, have the work done by an authorized dealer.

The "chip set" consists of VGA Controller CL-GD5426, that incorporates most of the logic required for a low-cost, highly integrated IBM PC AT-compatible computer.

IMPORTANT: The chip set requires correct configuration information; otherwise a malfunction may result.

CAUTION: Static electricity can cause serious damage to integrated circuit chips. To avoid building up a static electric charge on your body, touch a grounded object before touching the chips and at frequent intervals as you handle the chips. If chips are handed from one person to another, the two should touch hands first, then pass the chips.

Information presented in this publication has been carefully checked for reliability; however, no responsibility is assumed for inaccuracies. The information contained in this document is subject to change without notice.

Contact your dealer for warranty details.

Trademarks

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Chapter 1

Introduction

This chapter will cover the general specifications and features of the VI-710 series.

1.1   General Specifications and Features

The VI-710 series graphic display cards work with VESA bus slot to bring you super-high resolution, 256-color capability, fast screen redraw, compatibility with most software and hardware.

1.1.1 Feature Overview

- Support 80486 VESA Local Bus interface up to 50 MHz.
- Support 132 column text display.
- Hardware BITBLT for Microsoft Windows.
- Independent video clock and DRAM clock.
- 16-bit host memory and I/O interface.
- 15- (32K), 16-(64K), 24-bit (16M) direct-color pallette DAC.
- Dot clock up to 75 MHz.
- 64x64 hardware cursor.
- Support 15-pin D-type female VGA connector.

1.1.2 General Specifications

Processor   CIRRUS LOGIC CL-GD5426 video chip.

Architecture   16-bit memory transfer directly accessed by CPU via local bus.
                   8 bit I/O transfer accessed from VESA local bus.

Memory   1MB, 2MB optional display memory;
                   For the VI-710, 256Kx4 bit DRAM are installed.
                   For the VI-710A, 4 pieces of 512Kx8 bit DRAM are installed on U17, U18, U19, U20 (2MB).
                   For the VI-710B, by 4 pieces of 256Kx16 bit DRAM are installed on U12, U13, U14, U15 (2MB).
                   For the VI-710C, two piece 256Kx16 bit DRAM are installed on U13,U14 (1MB) and 8 pieces of 256Kx4 bit DRAM are installed on U2, U3, U4, U5, U7, U8, U9, U10 (2MB).

Resolution	1280x1024x256 colors interlaced 1024x768x32K or 64K colors interlaced 1024x768x16 or 256 colors interlaced and non-interlaced 800x600x32K, or 64K colors 640x480 16M colors
BIOS	8-bit CIRRUS BIOS access.
Form Factor	4 layers DIP Design

Chapter 2

Configuring Your VGA Adapter

This chapter will assist you with setting-up the VI-710 series before you install it in a system case. If your VI-710 series have already been installed and you do not wish to change the configuration settings, you can skip over this section.

2.1   Hardware Configuration

Figure 2.1/2.2 are diagram of the VGA graphics adapter to show the location of the jumpers and connectors.

2.2   Jumper Settings and Connectors

The VI-710 series have several jumper that must be set to define a system configuration. You can adapt the VGA adapter for special hardware configurations using the given jumpers on the card.

The table below summarizes the functions and settings of each jumper on the VI-710 series.

Jumper Settings	Function
JP1 pin 1,2 closed JP1 pin 2,3 closed	OSC (14.318MHz) from ISA slot OSC(14.318MHz) from X'TAL
JP2 opened JP2 closed	DRAM Type of 512Kx8 bit for 710A use DRAM Type of 256Kx16 bit and 256Kx4 bit for 710B and 710C use

There are two connectors located on the VI-710 series. The functions are listed below:

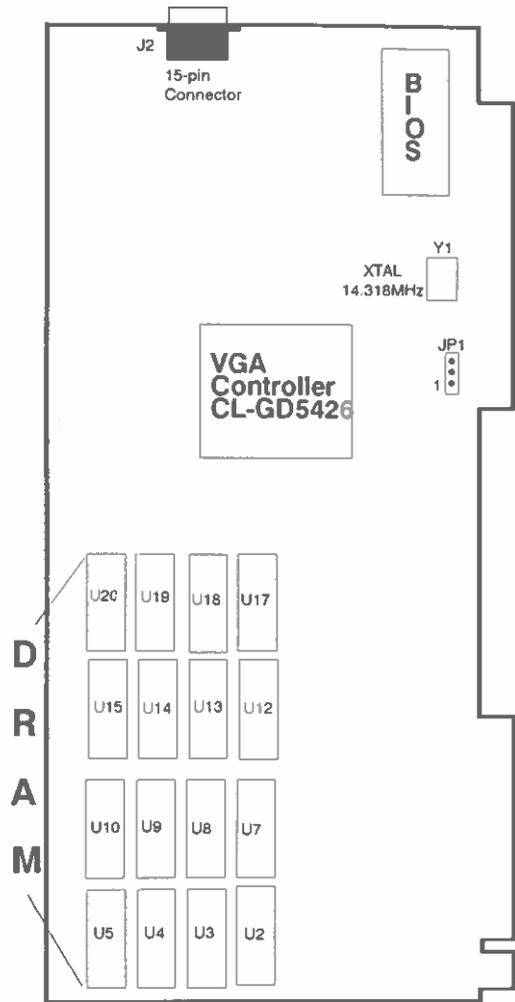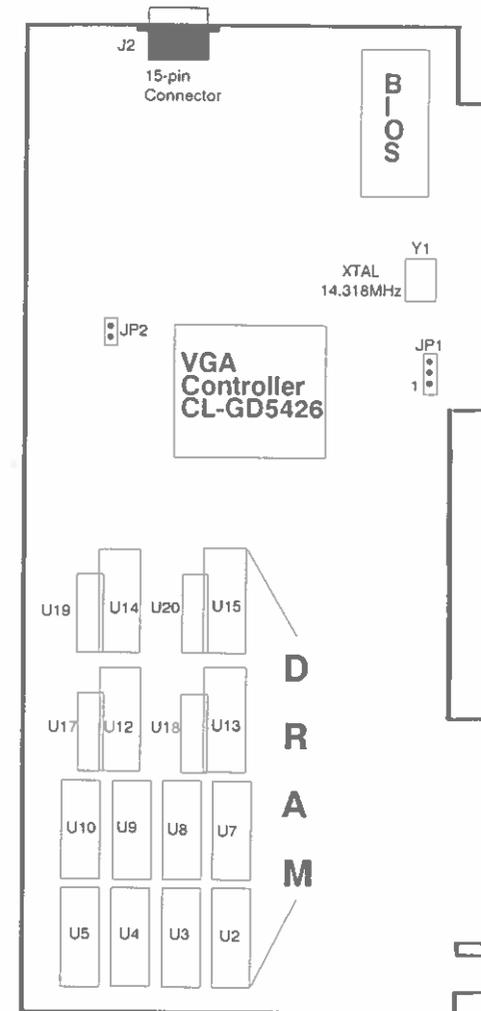| Connector	Function
J2	15-pin female VGA Connector

Figure 2.1 VI-710 BOARD LAYOUT

Figure 2.2 VI-710A/ 710B/ 710C BOARD LAYOUT

2.3 Memory Configuration

The following table lists all the possible DRAM module combinations and the total amount for each option.

■ **For the VI-710:**

Option	Setting	Memory Amount
1	U17,U18,U19,U20	512 K
2	U12,U13,U14,U15 U17,U18,U19,U20	1 MB
3	U2,U3,U4,U5 U7,U8,U9,U10 U11,U12,U13,U14 U17,U18,U19,U20	2MB

■ **For the VI-710A:**

Option	Setting	Memory Amount
1	U17,U18,U19,U20 (512Kx8)	2 MB

■ **For the VI-710B:**

Option	Setting	Memory Amount
1	U13,U14 (256Kx16)	1 MB
2	U12, U13, U14, U15 (256Kx16)	2 MB

■ **For the VI-710C:**

Option	Setting	Memory Amount
1	U13, U14 (256Kx16)	1MB
2	U13,U14 (256Kx16) U2, U3, U4, U5, U7, U8, U9, U10 (256Kx4)	2 MB

Chapter 3

VGA Utilities and Software Drivers

3.1 Utility software

Several utility programs are supplied with you Cirrus Logic VGA. The following section describes these utilities and how to use them.

Clmode is a program supplied with your Cirrus Logic VGA to configure its various options.

SetRES lets the user change the operating resolution and the number of colors from within Windows.

3.1.1 Clmode

The Clmode utility allows the user to define the type of monitor attached and set the video modes supported by the Cirrus Logic VGA.

■ **Using Clmode's Menu-Driven Interface**

At the DOS prompt type:

```
CLMODE[Enter]
```

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 if you intend to use a mouse with Clmode, then a mouse driver should first be installed prior to running the Clmode utility.

■ **Choosing the Attached Monitor Type**

Selecting the proper monitor type will allow the Cirrus Logic VGA 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. A description of the available monitor types is given in a table at the end of this section.

The high refresh option of Clmode allows the user to force some video modes to a higher refresh rate. The option will not work on some monitors. If high refresh is selected, the user must verify that the connected monitor can support the option by using Clmode from the command line to set video mode 12 . If any problems are observed, disable the option by typing CLMODE 3 m-[Enter] from the directory containing CLMODE.EXE.

Select the Monitor Type button. The Monitor Type setup window will be displayed. The current monitor type and refresh rate will be highlighted initially. Use the keyboard or the mouse to choose the type of monitor attached. To move down to the Refresh Rate selection box, use the mouse or press the [Tab] key. Press the **Save** button to set the new monitor type. Press the **Cancel** button to discard any changes. Press the **Help** button to get a detailed explanation on the monitor types and the VGA refresh rates.

On some 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 you AUTOEXEC.BAT file. You will be given this choice after selecting the Save button.

■ Available Video Modes

Select the Video Mode button. The Video Mode Setup window displays all the modes supported according to the monitor type attached and the amount of video memory present. This list of video modes will tell you which are available in your current configuration for use with extended resolution drivers.

■ Retrieving the Current VGA Controller Status

The information in the main window displays the VGA controller type, the BIOS version number and the amount of video memory present.

■ Getting Help

Clmode provides Help for the following items: Monitor Type, Video Modes, Mouse, Keyboard and About Clmode. The Monitor Type help window explains the different capabilities of each monitor type. The Video Mode help window defines the information given in the Video Mode window. The Keyboard and Mouse help windows explain how to use the keyboard and the mouse to make selections. The About window displays the Cirrus Logic copyright message and the Clmode version number.

■ Exiting the Clmode

To exit Clmode at any time, press [Alt] and [F4] keys simultaneously, or click the left mouse button on the system button of the main window (i.e. The top left corner button of the window which is shown as a dot), or select the **Exit** button. When the Clmode utility exits, the current video mode, monitor type, and VGA refresh rate will be displayed.

■ 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, monitor type, video mode and refresh rate will be set at the DOS prompt. The command line options for CLMODE.EXE are:

CLMODE [[modenum][+*-]] [m[montype][refresh]]
[modenum] mode number
[+*-] + selects 400 lines (default)
* selects 350 lines
- selects 200 lines
[montype]　monitor type
[refresh]high or low VGA refresh rate (+ or -)

For example, to select mode 3 with high VGA refresh for a Super VGA monitor, type the following command at the DOS prompt:

```
CLMODE 3+ m2+[Enter]
```

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

Following is a table of common monitor types. Resolutions with more than one entry per line in the vertical frequency column signify the availability of the high refresh option.

Monitor Type	Examples	Horizontal Frequency (KHz)	Vertical Frequency (Hz)	Display Resolutions
0	IBM 8512, 8513, 8503	31.5	60 or 70	640 x 480
1	IBM 8514, 8515	31.5 35.5	60 or 70 43.5 - interlaced	640 x 480 1024 x 768
2	NEC 2A	31.5 35.2	60 or 70 56	640 x 480 800 x 600
3	NEC II	31.5 35.2 35.5	60 or 70 60 43.5 - interlaced	640 x 480 800 x 600 1024 x 768
4	NEC 3D	31.5 37.8 37.8	60 or 70 60 43.5 - interlaced	640 x 480 800 x 600 1024 x 768
5	Sony CPD-1304, NEC 3FGx, Nanao 9065S, 9070U	31.5 48.0 48.0 48.0	60 or 70 72 60 43.5 - interlaced	640 x 480 800 x 600 1024 x 768 1280 x 1024

Monitor Type	Examples	Horizontal Frequency (KHz)	Vertical Frequency (Hz)	Display Resolutions
6	NEC 4D, 4FG, Nanao T240i	31.5 48.0 56.0 48.0	60 or 70 72 70 43.5 - interlaced	640 x 480 800 x 600 1024 x 768 1280 x 1024
7	NEC 5D, 5FG, 6FG, Nanao T550i, T560i, T660i, F550i, F750i,	31.5 48.0 58.3 48.0	60 or 70 72 72 43.5 - interlaced	640 x 480 800 x 600 1024 x 768 1280 x 1024

Monitor Type Examples

3.2 SetRES

SetRES is a utility that runs under Windows 3.x. It allows the user to change the screen resolution, number of screen colors, and select either large or normal fonts and system resources.

After new options have been selected, the user can either immediately restart Windows, in which case the new resolution will take effect immediately, or continue working in the current resolution, in which case the new resolution will take effect the next time Windows is started. Note that under Windows 3.0 large and normal font selection is not allowed.

This application assumes that the Windows drivers have been correctly configured using Windows Setup. For information on installing and configuring Windows display drivers using setup, please refer to the Microsoft Windows section in this manual. From Windows Setup select the **Multi-Resolution** entry. This will correctly configure the driver for Windows 386 enhanced mode operation, and copy the necessary font files to your hard disk.

■ Installation
1. Start Windows.
2. In the Program Manager, choose File Run.
   Specify the diskette drive where the Windows Drivers and Utilities Diskette is inserted, and run the install program. For instance if the floppy is in drive A:, type
   `A:\INSTALL[Enter]`
3. When prompted, specify to copy the files to the Windows directory.

SetRES may now be run by selecting the SetRES icon.

Use the SetRES utility to select supported colors and resolutions.

If your are unsure what resolutions and colors your video card can support, refer to the section on Clmode for information on how to determine supported resolutions.

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

3.3 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.

It can support improved text resolution, providing greater readability when using the supplied drivers in text-based word processing programs. It also supports higher graphics resolutions, providing greater detail when using the supplied drivers in graphics-based programs.

In each application section, there will be a brief introduction describing the application and the revision level of the application supported by the supplied display drivers.

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 Cirrus Logic Drivers Diskette is located in drive A:. If drive B: is used, the instructions should be changed appropriately.

The installation utility (INSTALL.EXE) should be used to copy display drivers directly to the appropriate application directories where they may be configured by the application software.

■ Before You Begin
It is assumed that the user is familiar with DOS and certain DOS commands. Please review the installation instructions and the associated DOS commands before attempting the actual installation.

Not all video modes will be available on all systems. If an extended mode driver is installed for a video mode that is not available, the application program will not function properly. There are a number of things that determine the list of available video modes. Some of these include the current monitor type, the amount of installed memory, and the revision of the VGA controller. To determine which modes are available before beginning the driver installation, it is recommended that the user run the Clmode program and examine the list of available video modes.

3.3.1   Microsoft Windows

3.3.1.1   Installing Windows 3.1 Display Drivers

To install the Windows 3.1 drivers from the DOS prompt, proceed as follows:

1. Insure that Windows 3.1 is already installed on your computer.
2. From your Windows directory, at the DOS prompt, type SETUP[Enter] to run the Windows SETUP.EXE program. Follow the instructions on the screen. When you come to the screen which lists the hardware and software components such as display adapter (e.g. VGA, CGA, etc.), keyboard type, mouse type, etc., go to the **Display** selection by using cursor keys to move the highlighted bar and press [Enter].
3. From the next menu listing of display options, scroll to the bottom of the list, and highlight the following text:
   Other (Requires disk provided by a hardware manufacturer)
   Press [Enter], and when prompted, insert the Windows Display Driver diskette into drive A: and type A:\[Enter].
4. You will see the list of drivers and their associated resolutions, such as:

   Cirrus 542 x v1.2, 1024x768x16 Large font
   Cirrus 542x v1.2, 1024x768x16 Small font
   Cirrus 542x v1.2 1024x768x256 Large font
   Cirrus 542xv1.2 1024x768x256 Small font
   Cirrus 542xv1.2 1280x1024x16 Large font
   Cirrus 542xv1.2 1280x1024x16 Small font
   Cirrus 542xv1.2 640x480x16
   Cirrus 542xv1.2 640x480x16.8M True Color
   Cirrus 542xv1.2 640x480x256
   Cirrus 542xv1.2 640x480x64k Color
   Cirrus 542xv1.2 800x600x16
   Cirrus 542xv1.2 800x600x256
   Cirrus 542xv1.2 800x600x64k Color

5. Highlight the desired choice by moving the cursor to the correct display driver, and then press [Enter].
6. Continue with the remainder of the setup procedure.

To install the Windows 3.1 drivers from within Windows, proceed as follows:

1. Insure that Windows 3.1 is already installed on your computer and start Windows.
2. From the **Main** window of the Program Manager run the Windows 3.1 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 OEM)....**
5. Insert the Windows display driver diskette into drive A: and type A:\[Enter] as the pathname, then click on **OK.**
6. You will see the list of available drivers and their associated resolutions, such as:

   Cirrus 542 x v1.2, 1024x768x16 Large font
   Cirrus 542x v1.2, 1024x768x16 Small font
   Cirrus 542x v1.2 1024x768x256 Large font
   Cirrus 542xv1.2 1024x768x256 Small font
   Cirrus 542xv1.2 1280x1024x16 Large font
   Cirrus 542xv1.2 1280x1024x16 Small font
   Cirrus 542xv1.2 640x480x16
   Cirrus 542xv1.2 640x480x16.8M True Color
   Cirrus 542xv1.2 640x480x256
   Cirrus 542xv1.2 640x480x64k Color
   Cirrus 542xv1.2 800x600x16
   Cirrus 542xv1.2 800x600x256
   Cirrus 542xv1.2 800x600x64k Color

7. Highlight by moving the cursor to the desired display driver, and then click on **OK.**
8. Continue with the remainder of the setup procedure. The changes will not take effect until Windows is restarted.

3.3.1.2   Installing Windows 3.0 Display Drivers

To install the Windows 3.0 drivers, proceed as follows:

1. Insure that Windows 3.0 is already installed on your computer.
2. From your Windows directory, at the DOS prompt, type SETUP[Enter] to run the Windows setup program. Follow the instructions on the screen. When you come to the screen which lists the hardware and software components such as display adapter (e.g. VGA, CGA, etc.), keyboard type, mouse type, etc., go to the Display selection by using cursor keys to move the highlighted bar and press [Enter].
3. From the next menu listing of display options, scroll to the bottom of the list, and highlight the following text:
   Other (requires disk provided by a hardware manufacturer)
4. Press **[Enter]**, and when prompted, insert the Windows display driver diskette into drive A and type
   A:[Enter].

You will see the list of drivers and their associated resolutions, such as: **Cirrus 54xx v1.2, Multi-res 16 color**

Cirrus 54xx v1.2, Multi-res 256 color

Highlight the correct choice by moving the cursor to the desired display driver, and then press [Enter].

Later you will be asked to insert the **Cirrus Logic GD54xx Windows 3.0 Driver Diskette,** this time use the WIN30 directory. For example, type the following: `A:[Enter]`. Setup will complete the installation.

3.3.1.3   Configuring the drivers for Windows 3.0

The GD54xx Multi-Resolution color drivers require that a section be present in your SYSTEM.INI file. The Windows 3.0 setup program must be used to select the default configuration of the 16 or 256 color drivers. After exiting the Setup, edit the SYSTEM.INI file to change the resolution manually. Any text editor may be used, including Edlin, or Edit that came with your version of DOS, or Notepad found in the accessories group of your Windows 3.0 installation. Find the section [CLVGA]. The [CLVGA] section will not exist when you first setup Windows 3.0. You must add one to the end of the SYSTEM.INI file. Type in the appropriate section from the following table:

Resolution	16 Color Drivers	256 Color Drivers
640 x 480	[CLVGA] VIDEOMODE = 18	[CLVGA] VIDEOMODE = 95
800 x 600	[CLVGA] VIDEOMODE = 106	[CLVGA] VIDEOMODE = 92
1024 x 768	[CLVGA] VIDEOMODE = 93	[CLVGA] VIDEOMODE = 96
1280 x 1024	[CLVGA] VIDEOMODE = 108	Not available

Windows 3.0 CLVGA Entries

You will find that it is easiest to use the SetRES utility that comes with your Cirrus Logic VGA to configure resolutions and color selections. Run the install utility on the Windows driver disk to copy the drivers and the SetRES utility to your hard drive (see the SetRES section of this manual). Then run SetRes from within Windows to configure your installation.

3.3.2   Autodesk Device Interface (ADI) Drivers

Two drivers are provided which conform to the Autodesk Device Interface (ADI) standard, defined by Autodesk, Inc. to allow their software products (e.g. AutoCAD and AutoShade) to run on peripherals which have capabilities beyond the base-level PC standards. The first driver, Display List Driver 386-VGA (DLD386-VGA), is designed to support Autodesk products which run in 386 protected mode, including AutoCAD 10/386, 11/386, AutoShade 2.0 with RenderMan, and 3D Studio. The second driver, DLD-VGA, supports Autodesk real mode applications - AutoCAD 10/286, 11/286, AutoShade 1.1, and AutoSketch Version 3. DLD-VGA can also be used with some of the protected mode applications, but the performance gain will not be as marked as that achieved using DLD386-VGA. The drivers include support for display list processing in AutoCAD, which speeds up such AutoCAD functions as Redraw and Zoom compared to the performance of the standard VGA driver provided by Autodesk. They provide increased resolution and/or colors for AutoShade, AutoSketch and 3D Studio. The latter products do not support a display list capability, so no increased performance can be expected. AutoShade 2.0 and 3D Studio can support 65,536 and 16.8 million color rendering on some Cirrus Logic VGA adapters with one megabyte or more of video memory.

Also included with the Cirrus Logic VGA are the Custom Color utilities to modify the screen colors displayed in most Autodesk products when using the DLD drivers. COLOR16.EXE is to be used when a 16 color mode is selected in the DLD driver, and COLOR256.EXE is for 256 and higher color modes.

The following three sections describe how to install and use the DLD drivers and Custom Colors utilities provided with the Cirrus Logic VGA.

3.3.2.1   Display list driver 386 - VGA

The Display List Driver 386-VGA (DLD386-VGA) supports AutoCAD Release 10/386, 11/386, AutoShade 2 with RenderMan and 3D Studio products using the Autodesk Device Interface (ADI). The driver can be configured to run at any resolution supported by the Cirrus Logic VGA. Utilities are provided to customize the screen colors displayed in AutoCAD and AutoShade in both 16- and 256-color modes.

DLD386-VGA does two things to increase AutoCAD performance:

1. Creates and maintains a display list - a fast-displaying vector list of the current drawing - dramatically increasing performance on pans and zooms.
2. Creates and maintains a prescaled fast redraw list, allowing redraws to display an average of eight times faster than without the driver.

The only resource used by DLD386-VGA is memory. The driver itself takes up about 35 Kilobytes of RAM from extended memory, which means it does not affect normal DOS operation. The driver is loaded by AutoCAD when it is started.

3.3.2.2 Installing DLD386-VGA

1. Run the Cirrus Logic installation program (INSTALL.EXE), and choose the option for the AutoCAD drivers and specify the drive and directory where you want them copied to (such as C:\DLD386).
2. Go to the new directory (C:\DLD386 using the example above) and run DLDSETUP.EXE, following the instructions on screen (press [?] at any prompt to get context sensitive help). A complete description of DLDSETUP.EXE can be found below. Select your desired resolution from the list presented.
3. Copy the FASTACAD.BAT file created by DLDSETUP.EXE to your AutoCAD directory. This file needs to be executed prior to running AutoCAD.
4. Run Color16 (for 16 color VGA setup) or Color256 (for 256 color VGA setup) to configure the driver with the colors you want to use for AutoCAD and AutoShade.
5. Reconfigure AutoCAD to use the ADI P386 display device; see the AutoCAD 'Installation and Performance Guide' for details.

NOTE: You may wish to purchase and install additional RAM before installing DLD386-VGA, since it shares memory with AutoCAD Release 11 (or AutoCAD 386). If AutoCAD is using a lot of memory, DLD386-VGA may not have enough. If there is significant hard disk activity while you are using DLD386-VGA, it may be an indication that you should add more memory to your system.

3.3.2.3 Using DLDSETUP.EXE

Make sure you're in the directory that you copied DLD386-VGA into and type DLDSETUP[Enter] to start the configuration program. At any time, you can press the question mark [?] key to get help information pertaining to the current DLDSETUP.EXE prompt. Please note that the DLDSETUP.HLP file must be present in the current directory for help text to be displayed.

An information screen about DLDSETUP.EXE will appear. Press any key to continue once you have read the overview.

The Single vs Dual Text Screen option is used to tell the driver if you want to operate on only one screen (the one attached to the VGA board) or two - in case you also have a Monochrome Display Adapter (MDA) in the same system as the VGA. If you choose Automatic, the driver will run single screen if AutoCAD is started on the VGA, and dual screen if you start AutoCAD from the monochrome display. Selecting Always Dual will cause the driver to always run in dual screen mode - don't select this mode if you don't have a monochrome board in your system in addition to the Cirrus Logic VGA.

The Flip Screen Method is a fail-safe feature. In virtually all cases the Instant selection will suffice, but in some rare cases the combination of a certain VGA with a system may result in artifacts on the display when doing a flip screen back to the graphics display in AutoCAD. If this occurs on your system, use the Force Redraw option to eliminate these artifacts. The forced redraw will occur at normal AutoCAD speed, not DLD386-VGA redraw speed. This should not be necessary in 256 color modes since in these modes you are always running in the force redraw mode.

You may choose what font size you would like to use for your AutoCAD menus, pull-downs, and dialog boxes: 8x8, 8x14, or 8x16. All the fonts are 8 pixels wide, but the height varies. For resolutions above 800x600 we recommend the 8x16 font selection. The default is the 8x14 font.

Enter the method for updating the display list: Remove/Overwrite/Disable. For trouble-free operation, we suggest that you choose Overwrite initially. When an object is erased or moved, the Remove option causes its vectors to be removed from the display list. The Overwrite option causes new 'erase' vectors to be added to the display list so the object will be drawn, then rubbed out on screen updates. This option avoids the potentially major list update delay associated with the Remove option, but increases redraw time and makes the display list larger (you can clean up the display list with the DLDCLEAN command - see DLD386-VGA Features and Commands below for more information). Disable disables the display list - the fast redraw list is still maintained unless you specifically disable it as well.

Enter the method for updating the fast redraw list: Remove/Overwrite/Disable. For trouble-free operation, we suggest that you choose Overwrite initially. When an object is erased or moved, the Remove option causes its vectors to be removed from the fast redraw list. The Overwrite option causes new erase vectors to be added to the fast redraw list so the object will be drawn, then rubbed out on screen redraws. This option avoids the potentially major list update delay associated with the Remove option, but increases redraw time and makes the fast redraw list larger. Disable disables the fast redraw list, slowing redraws to pan/zoom speed.

Enter the number of lines of text you would like to appear at the bottom of your AutoCAD screen. You may select a number anywhere between 1 and 10. If you do not want any lines of text at the bottom of the display, use AutoCAD to disable the command area (see your AutoCAD Installation manual for more information). The default for this prompt is 3.

Select the resolution that you want to run AutoCAD and AutoShade at. Press the [F10] key once you have made your choice.

Once all changes are made, press the [F10] key to save the configuration information. The batch file FASTACAD.BAT will be created in the current directory, and the configuration file DLDSETUP.DAT will be created in either the directory pointed to by the DLDCFG environment variable or, if DLDCFG is not set, in the current directory. The FASTACAD.BAT file contains four lines that set four separate environment variables: DLDCFG - used by DLD386-VGA to find all of its configuration files; and DSPADI, RCPADI, RDPADI - used by AutoCAD, AutoShade 2.0 w/RenderMan, and

3D Studio to find the driver file. Configuration information for DLD386-VGA is located in the file DLDSETUP.DAT.

NOTE: If you need to make a change to an existing configuration, running DLDSETUP again will start with all the prompts defaulting to the values selected in the current configuration. If you want to start with the default values, just delete DLDSETUP.DAT in the directory pointed to by the DLDCFG environment variable. Also, if at any point during the configuration process you want to change an item on a previous menu, just press the [Esc] key until you have returned to the desired menu. Pressing [Esc] at the Driver Selection prompt will return you to DOS without making any changes to your configuration.

Configure your colors by running one of the CustomColors utilities - COLOR16.EXE if you are using the 16 color VGA modes, or COLOR256.EXE if you are using the 256 color VGA modes. See DLD Custom Color Utilities for more information on configuring your AutoCAD colors.

Copy the newly created FASTACAD.BAT to your boot drive root directory, your AutoCAD directory, or into any directory in your DOS path. Run the FASTACAD.BAT file when you want to load DLD386-VGA. FASTACAD.BAT only needs to be run once per system boot.

You can modify your AUTOEXEC.BAT file to add a line to run FASTACAD to the end of it; i.e., FASTACAD. This assumes that the directory in which FASTACAD.BAT resides is in your DOS path. If you have DOS 3.2 or earlier, the command needs to be at the end of your batch file because DOS can't return to the AUTOEXEC.BAT file after running the FASTACAD batch file. If you have DOS 3.3 or subsequent versions of DOS, use the command CALL FASTACAD instead, anywhere in the AUTOEXEC.BAT file. As an alternative, you may want to just copy the contents of the FASTACAD.BAT file into your AUTOEXEC.BAT file. If you don't wish to put the command(s) in your AUTOEXEC.BAT file, you may put it in a batch file which also starts AutoCAD, or simply remember to run FASTACAD.BAT before starting AutoCAD.

If you get a message such as 'Out of Environment Space' when you run FASTACAD.BAT, you will need to increase the size of the DOS environment. If you are running MS-DOS 3.2 or later, this is accomplished by adding

```
SHELL=C:\COMMAND.COM /P /E:768
```

to your CONFIG.SYS file. The /E:768 specifies an environment size of 768 bytes. Change this number as appropriate. You will need to reboot if you modify your CONFIG.SYS file.

3.3.2.4   Using DLD386-VGA with AutoCAD 386

DLD386-VGA is NOT installed as a TSR, instead, AutoCAD uses the DSPADI environment variable to determine where the display driver can be found and what the driver's name is. AutoShade and 3D Studio both require the RCPADI and RDPADI environment variables to be set.

You must run the FASTACAD.bat batch file before starting AutoCAD, unless your AUTOEXEC.BAT file includes a line to invoke it.

The first time you use AutoCAD with DLD386-VGA, you must change the AutoCAD display device configuration by selecting option 5, 'Configure AutoCAD' from the main menu. From there, select option 3, 'Configure Video Display'. Choose the ADI P386 display driver option as your display device. For more details, please refer to the 'AutoCAD Installation and Performance Guide'.

If you are going to be using AutoShade 2.0 w/RenderMan or 3D Studio with this driver, read the section entitled Using DLD386-VGA with AutoShade and 3D Studio below.

You are now ready to use your accelerated AutoCAD. If you are not sure that AutoCAD is using DLD386-VGA, type DLDUSAGE[Enter] at the AutoCAD command prompt while editing a drawing. If DLD386-VGA is loaded and running, this command should return information about memory usage. If AutoCAD reports an error instead, your DLD386-VGA is not properly loaded.

3.3.2.5   DLD386-VGA Features and Commands

Among the additional features not accessible through the installation program are a memory meter, a command to manually clean up the display lists, and a current color indicator.

■ **Memory Meter**

While in AutoCAD, you can check to see how much memory the display list and fast-redraw list are occupying at any time. This is done by typing DLDUSAGE[Enter] at the Command: prompt. Information about how much memory each viewport is occupying will be displayed. Since AutoCAD can support up to sixteen viewports, it is possible to have up to sixteen display lists. But multiple viewports don't necessarily have to use multiple display lists, even though each viewport will have its own fast-redraw list, because of an AutoCAD feature known as slave viewports. If a viewport is a slave of another viewport (known as the master viewport), then the slave and the master share the same display list, and therefore only the master viewport will show any memory in use for a display list when using this feature.

■ **Display List Cleanup**

While in the Overwrite mode for display list maintenance, the display lists can get quite large because of multiple ERASEs, MOVEs, ROTATEs, etc. (the Remove/Overwrite Option below). And the same may occur, although at a slower pace, in the Remove mode. Instead of having to do a REGEN to recreate the display lists from scratch, you can use the DLDCLEAN command to clean up the display lists. The DLDCLEAN command removes all deleted objects from the display lists and requires as much time as an AutoCAD REDRAW to perform its operation. Note that the whole display will be erased and recreated as part of this clean up process. In a multiple viewport setting, this means that all viewports and their associated lists will be cleaned up.

■ **Current Color Indicator**

Another feature that will simplify drawing under AutoCAD is the addition of a small, outlined box on the left edge of the status line. Inside the box is the current AutoCAD drawing color. If the status line is disabled, this box will not appear.

DLD386-VGA supports a number of new AutoCAD command line commands designed to allow advanced users better control over display list processing:

■ **DLDHELP**

Provides a one-line summary for every special DLD386-VGA command. It's recommended that you flip to the text screen to view the output.

■ **DLDVER**

Displays DLD386-VGA version and serial number.

■ **DLDDLMODE**

Displays the current mode of your redraw and display list (i.e. Remove, Overwrite, or Disabled).

All of the following force a DLDCLEAN to be processed when executed:

■ **DLDFREEMEM**

Frees up all display list memory currently in use by DLD386-VGA, and performs a DLDCLEAN. This is useful when DLD386-VGA has gone a long time without a DLDCLEAN and has allocated more memory than is necessary. You may want to use this command instead of DLDCLEAN.

■ **DLDDLISTRM**

Puts the display list in Remove mode.

■ **DLDDLISTOV**

Puts the display list in Overwrite mode.

■ **DLDDLISTDS**

Disables the display list.

■ **DLDFLISTRM**

Puts the fast redraw list in Remove mode.

■ **DLDFLISTOV**

Puts the fast redraw list in Overwrite mode.

■ **DLDFLISTDS**

Disables the fast redraw list.

3.3.2.6 Memory Usage and Lists

DLD386-VGA shares extended memory with AutoCAD via the Phar Lap Virtual Memory Manager. This means that DLD386-VGA will automatically page to disk if it uses up all the RAM that AutoCAD has left for its use. See Appendix A.3 in the 'AutoCAD Installation and Performance Guide' for more information on Virtual Memory Management. Please note that if you start seeing excessive hard disk accesses during PANs, REDRAWs, and ZOOMs while using AutoCAD with DLD386-VGA, try using the DLDCLEAN command more often. If this doesn't affect the amount of disk access it's probably time to add more memory to your system. Contact your AutoCAD dealer for assistance in upgrading your memory.

Regarding display list memory, it's important to realize that DLD386-VGA speeds up AutoCAD operations by creating a display list in memory, and sending that list to the VGA for pans and zooms. Redraws are run from the fast redraw list, which is even faster. But both of these lists take up memory.

How much memory? For production use, we recommend that at least one megabyte be available for DLD386-VGA. To determine how much memory AutoCAD is using, use the status command while in AutoCAD (refer to the 'AutoCAD Installation and Performance Guide' for more information).

A simple drawing like the shuttle Columbia might only require twenty kilobytes for the display list. Complex drawings may require several megabytes. We have seen display lists for a drawing range from one-tenth the size of the drawing file to three times the size. In general, the display list averages about the same as the drawing file size. The fast redraw list will also occupy some memory, with the worst case being that it occupies as much as the display list. This means that you should count on both lists generally taking up as much as twice the drawing file size. Also, complex objects such as circles and text 'expand' when translated into display list format, so a drawing with a lot of complex objects and text will have a larger display list than a simpler drawing.

Text takes up a disproportionate amount of space in the display list. To keep the list small, put text in its own layer of the drawing. Then don't display the text layer when editing the rest of the figure. This will keep memory consumption down and speed execution.

The AutoCAD manuals have an excellent section on performance, concentrating on memory usage. To get the most performance out of the program, read the appropriate sections of those manuals as well as this one.

If you find that your DLD386-VGA REDRAWs, PANs, and ZOOMs are causing excessive hard disk accesses (due to paging or swapping), you are probably running out of RAM space. At this point you have three options:

1. Start using the DLDCLEAN command more frequently
2. Disable the fast redraw list, which will slow down your redraws and give you a little more RAM to play with.
3. Buy at least one or two more megabytes of 32-bit RAM. The latter will greatly improve your productivity under AutoCAD.

You may want to use the DLDUSAGE command described in the previous section to keep tabs on your display list usage as time goes on.

3.3.2.7　The remove/overwrite option
During installation, you are asked if you wish to maintain the display list and the fast redraw list by removing or overwriting erased vectors. (You also have the option of disabling either or both lists, though this option is not needed for normal operations). The Remove and Overwrite options come into play when you erase or move an object (moving is the same as erasing and then redrawing somewhere else). When you erase or move or rotate an object, the display list and fast redraw list must be updated to get rid of the "displaced' object. There are two ways to do this:

1. Remove option - search the list for the offending vectors and remove them. This is the elegant solution, but the search takes a measurable amount of time. For small drawings, the extra time will not be noticeable, but for large drawings it most likely will be. If you are editing large portions of sizeable (over 100K) drawings, make sure to use the Overwrite option documented below.
2. Overwrite option - add more vectors to the list to overwrite the offending vectors with new vectors in the background color. This avoids the time loss to find and remove the vectors, but causes a strange effect: when the screen is updated, the erased object is drawn, then disappears as it's overwritten by the new vectors in the background color! This slows each redraw, and the extra 'overwrite' vectors add to the length of the list. Fortunately, if things get too messy, all you need to do is use the DLDCLEAN command (documented in DLD386-VGA Features and Commands above), which will clean up the display list in about the time it would take for AutoCAD to perform one of its REDRAWs.

We recommend that you use remove mode for both lists for small drawings or if you have a relatively small amount of memory for the lists. For medium-sized drawings, you may want to go to overwrite mode for at least the fast

redraw list, so that redraws will be speeded, but the display list will still be updated correctly. This will minimize the strange 'draw then undraw' effect for erased objects. For even larger drawings, where searching and updating a list takes a lot of time, you will want to go to overwrite mode for both lists. Remember to use the DLDCLEAN command occasionally as you erase and move more objects.

NOTE: DLD386-VGA allows you to change the display and fast redraw list modes on the fly using the commands listed at the end of DLD386-VGA Features and Commands above.

3.3.2.8　DLD386-VGA Tips and Tricks
Since DLD386-VGA is totally transparent to users with respect to using normal AutoCAD commands to REDRAW, PAN, and ZOOM, you still have to suffer from some of AutoCAD's nuances. One of these nuances is that ZOOM ALL and ZOOM EXTENTS both force a REGEN, because Auto-CAD does not keep track of various boundaries necessary to avoid the REGENs. And REGENs are rather time-consuming and don't use any display list processing to speed themselves up. One way around this problem is to use another of AutoCAD's built-in features, namely the VIEW command.

When you first load your image and see the whole drawing on the screen at once, just type VIEW SAVE ALL[Enter], which will save the display position you see under a view named 'All'. Then, after you've done some detailed editing and want to return back to the big picture, type VIEW RESTORE ALL[Enter], instead of ZOOM ALL[Enter] or ZOOM EXTENTS[Enter], and the full drawing will be restored to the display at display list speeds, without a REGEN.

Another nuance of AutoCAD is that if you zoom in too far or pan over too far, you may inadvertently cause a REGEN. AutoCAD again provides a very simple solution: the REGENAUTO command. Just type REGENAUTO OFF[Enter] at the AutoCAD command prompt, and automatic REGENs will be disabled. The REGENAUTO setting is also saved as part of your drawing file, so you only need to execute it once per drawing. You may even want to set REGENAUTO OFF[Enter] in your ACAD.DWG drawing template so that all your drawings are created with REGENAUTO set off.

If you find that you are frequently using the DLDCLEAN[Enter] command, you may want to add it to your pull-down menus. We recommend adding it to the Display menu. This can be done by editing the file ACAD.MNU, which contains the commands for all your pull-downs, as well as the side menus. Make sure to make a backup copy of ACAD.MNU first. Search the file for the Display menu definition (usually found after a line that says ***POP4). Go to the end of the definition, just past the line that starts off with [Set Viewports...], and add the following two lines:

```
[~--]
[Clean Display List]^C^CDLDCLEAN
```

Once these two lines have been added, save the edited ACAD.MNU file and run AutoCAD. Pull up a drawing that uses the standard AutoCAD menus, and AutoCAD will recompile the ACAD.MNU file into ACAD.MNX. Once this compilation is complete, you should be able to use the Clean Display List pick off of the Display menu to clean up DLD386-VGA's display lists for all your normal drawings.

3.3.2.9   AutoShade 2.0 with RenderMan

To configure AutoShade v2.0 to use DLD386-VGA, start AutoShade with SHADE /R[Enter], which will allow you to reconfigure AutoShade. For the display device, select P386 Autodesk Device Interface display driver, and for the rendering display select the P386 Autodesk Device Interface rendering driver. If you are running the display and rendering screen on the same monitor (i.e. single monitor), make sure to tell AutoShade this. A single monitor approach will require a redraw of the display screen after a rendering screen.

3.3.2.10   AutoDesk 3D Studio

To configure 3D Studio, you need to edit the 3DS.SET file, located in your 3DS directory. Locate the line that starts with DEFAULT-DISPLAY. You want to modify it so that the line reads: **DEFAULT-DISPLAY = "RCPADI"**. Do the same with the line that starts with MAIN-DISPLAY (i.e. **MAIN-DIS-PLAY = RCPADI**). Make sure to remove the ';' in front of these lines. Also, if you selected to use the 256 color VGA driver during the set up, you may change the MATERIAL-DISPLAY line in 3DS.SET as well. Save your changes, and you're ready to use 3D Studio. See your 3D Studio installation documentation for additional information on configuring 3D Studio.

3.3.2.11   Display List Driver - VGA

The Display List Driver - VGA (DLD-VGA) is a memory-resident driver which speeds up AutoCAD REDRAWs, PANs, and ZOOMs. The driver can be configured to run at any resolution supported by the Cirrus Logic VGA. Installing the driver does not change any of the AutoCAD program files or alter any of the drawing files stored on disk. It also allows AutoShade and AutoSketch to be run at the higher resolutions provided by the Cirrus Logic VGA. There is no change to the user's interface with AutoCAD, AutoShade, or AutoSketch.

DLD-VGA does two things to speed AutoCAD:

1. Creates and maintains a display list - a fast-displaying vector list of the current drawing - dramatically increasing performance on pans and zooms.

2. Creates and maintains a prescaled fast redraw list, allowing redraws to display an average of eight times faster than without the driver.

The only resource used by DLD-VGA is memory. The driver itself takes up about 45 Kilobytes of RAM from below the DOS 640 Kilobyte limit. DLD-VGA uses only the memory you set aside for it. We recommend at least 1 Megabyte be set aside for display list Driver-VGA. You can also allow the display list to overflow to disk, which prevents your system from slowing back down to normal AutoCAD speed, but which also does not give you the same performance as working entirely out of RAM would.

Installing DLD-VGA:

1. Run the Cirrus Logic installation program (INSTALL.EXE), and choose the option for the AutoCAD drivers and specify the drive and directory where you want them copied to (such as C:\DLDVGA). DLD-VGA requires approximately 280K of disk space for all of its files.
2. Go to the new directory (C:\DLDVGA using the example above) and run DLDSETUP, following the instructions on screen (press [?] at any prompt to get context sensitive help). A complete description of DLDSETUP can be found below.
3. Select your video card and desired resolution from the list presented.
4. Copy the FASTACAD.BAT file created by DLDSETUP to your AutoCAD directory. This file needs to be executed prior to running AutoCAD.
5. If you are using AutoCAD 386, AutoShade 386 or Extended Auto-Lisp, pre-allocate the memory. If possible, set aside at least one megabyte for the driver.
6. Run one of the CustomColors utilities - COLOR16.EXE (for 16 color VGA setup) or COLOR256.EXE (for 256 color VGA setup) - to configure the driver with the colors you want to use for AutoCAD and AutoShade.
7. Reconfigure AutoCAD to use the ADI 4.0 display device; see the AutoCAD 'Installation and Performance Guide' for details.

You may wish to purchase and install additional RAM before installing DLD-VGA. At least one megabyte of memory should be available for the driver. Use expanded (LIM/EMS) memory or an EMS emulator program for top performance. We recommend, but do not require, at least 64K of expanded memory. If this is not available, the display list can be stored in extended memory or on disk. Rerun the install program, DLDSETUP, if you change the amount of memory in your system.

3.3.2.12 Using DLDSETUP

Make sure you're in the directory that you installed DLD-VGA into and type DLDSETUP[Enter] to start the configuration program. An information screen about what DLDSETUP does will appear. Press any key to continue once you have read the overview. At any time, you can press the question mark [?] key to get help information pertaining to the current DLDSETUP prompt. Please note that the DLDSETUP.HLP file must be present in order for help to appear. Also, if at any point during the configuration process you want to change an item on a previous menu, just press the [Esc] key until you have returned to the desired menu.

A prompt requesting the drive for display list overflow will appear. With DLD-VGA, you have the option to allow the display list and the fast-redraw list to overflow to disk in the event that the display lists run out of RAM storage space. At the prompt, enter the drive letter of the overflow disk. Note that you can run DLD-VGA entirely off of the disk using this feature. You can also have this point to a RAM disk (or VDISK). To disable the overflow, leave this prompt blank.

The memory configuration menu will appear. A display of your available system resources will appear, listing the amount of expanded (LIM/EMS) and extended memory available. Check that the amounts listed are correct. If you have extended memory on a 386 machine, you may wish to use or purchase a driver which allows the extended memory to be used as expanded (LIM/EMS) memory, because expanded memory is faster to access than extended. Also, using only extended memory will increase the base amount of memory used by the driver. For more information about the memory types, see 'Memory usage and lists' below.

The first option on the memory configuration menu is whether or not you want to pre-allocate expanded or extended memory. If you are planning on running AutoCAD 386, AutoShade 386, or Extended AutoLisp, you must set this option to yes. For regular AutoCAD or AutoShade operation, either setting will be fine. Enter the amount of expanded (LIM/EMS) memory you wish to use for the driver, or use the default amount displayed. The minimum amount of expanded memory you can enter is 64 Kilobytes. The driver will use expanded memory until it runs out, then will use any allocated extended memory. If extended memory also runs out, the driver will overflow the remaining display list information to disk, if so configured. Enter the amount of expanded (LIM/EMS) memory you wish to use for AutoCAD, or use the default amount displayed. The sum of the expanded memory used for DLD-VGA and for AutoCAD must be less than or equal to the total amount of expanded memory available. Any expanded memory not in use by Auto-CAD and DLD-VGA is available for use by other programs. The number you enter for memory size will be rounded up to the next multiple of 16 as soon as you go to the next field. If you specify more memory than is actually available, an error message will appear when you try to accept the entries you have made for configuration.

NOTE: If you pre-allocate expanded memory, the only way you'll be able to free it up is by unloading the driver (see DLD-VGA Features and Commands below for more information) or by rebooting your system.

Enter the amount of extended memory you wish to use for the driver, or use the default amount displayed. Next, enter the amount of extended memory you wish to use for AutoCAD and AutoLisp, or use the default amounts displayed. The sum of the extended memory used for DLD-VGA, Auto-CAD, and for AutoLisp must be less than or equal to the total amount of extended memory available. Any extended memory not in use by DLD-VGA, AutoCAD, and AutoLisp is available for use by other programs.

Press [F10] to move to the next menu. The 'Single vs Dual Screen' option is used to tell the driver if you want to operate on only one screen (the one attached to the VGA board) or two (in case you also have a monochrome display adapter in the same system as the VGA). If you choose automatic, the driver will run single screen if AutoCAD is started on the VGA, and dual screen if you start AutoCAD from the monochrome display. Selecting Always Dual will cause the driver to always run in dual screen mode - don't select this mode if you don't have a monochrome board in your system. The next item on this menu is the 'Interrupt Vector' to use for communicating with AutoCAD. The default is 7A (hexadecimal). Don't change this number unless you have a serious need to do so, and if you do change it, make sure to reconfigure AutoCAD to use the new vector number.

The 'Flip Screen Method' is a fail-safe feature. In virtually all cases the instant selection will suffice, but in some rare cases the combination of a certain VGA with a system may result in artifacts on the display when doing a flip screen back to the graphics display. If this occurs on your system, use the force redraw option to eliminate these artifacts. This option should not be necessary when you have selected the 256 Color VGA driver, since in the these modes you are always running in the Force Redraw mode.

You may choose what Font size you would like to use for your AutoCAD menus, pull-downs, and dialog boxes: 8x8/8x14/8x16. All the fonts are 8 pixels wide, but the height varies. For resolutions above 800x600 we recommend the 8x16 font selection. The default is the 8x14 font.

Enter the method for updating the display list: remove, overwrite, or disable. For trouble-free operation, we suggest that you choose overwrite initially. When an object is erased or moved, the Remove option causes its vectors to be removed from the display list. The Overwrite option causes new erase vectors to be added to the display list so the object will be drawn, then rubbed out on screen updates. This option avoids the potentially major list update delay associated with the remove option, but increases redraw time and makes the display list larger (you can clean up the display list with the DLDCLEAN command - see DLD-VGA Features and Commands below for more information). Disable disables the display list - the fast redraw list

is still maintained unless you specifically disable it as well. See the 'Remove/Overwrite Option', below, for complete information.

Enter the method for updating the fast redraw list: remove, overwrite, or disable. For trouble-free operation, we suggest that you choose overwrite initially. When an object is erased or moved, the remove option causes its vectors to be removed from the fast redraw list. The overwrite option causes new 'erase' vectors to be added to the fast redraw list so the object will be drawn, then rubbed out on screen redraws. This option avoids the potentially major list update delay associated with the remove option, but increases redraw time and makes the fast redraw list larger. Disable disables the fast redraw list, slowing redraws to pan/zoom speed.

Select the resolution that you want to run AutoCAD and AutoShade at. Press the [F10] key once you have made your choice.

Once all changes are made, press the [F10] key to save the configuration information. The batch file FASTACAD.BAT will be created in the current directory, and the configuration file DLDSETUP.DAT will be created in either the directory pointed to by the DLDCFG environment variable or, if DLDCFG is not set, in the current directory. The FASTACAD batch file contains several SET commands which set memory options for AutoCAD and point to the directory in which DLD-VGA can find current configuration information. Then the file runs the DLDVGA.EXE file (for 16 color VGA modes, or DLDVG256.EXE for the 256 color modes) which installs DLD-VGA in memory. The driver examines the SET commands to determine how to use available memory. The actual configuration information for DLD-VGA is located in the file DLDSETUP.DAT, which was created or modified when you last ran DLDSETUP.

NOTE: If you need to make some change to an existing configuration, running DLDSETUP again allows you to reconfigure DLD-VGA with all the prompts defaulting to the values you had selected during your previous configuration. If you want to start with a completely fresh installation, just delete DLDSETUP.DAT in the directory pointed to by the DLDCFG environment variable.

Configure your colors by running the appropriate CustomColors utility - COLOR16.EXE if you are using the 16 color VGA modes, or COLOR256.EXE if you are using the 256 color VGA modes. See DLD Custom Color Utilities for more information on configuring your AutoCAD colors.

Copy the newly created FASTACAD.BAT to your boot drive root directory, your AutoCAD directory, or into any directory in your DOS path. Then, whenever you want to load DLD-VGA, just run the FASTACAD.BAT file.

You can modify your AUTOEXEC.BAT file to add a line to run FASTACAD to the end of it; i.e., 'FASTACAD'. This assumes that the directory in which FASTACAD.BAT resides is in your PATH. If you have DOS 3.2 or earlier, the command needs to be at the end of your batch file because DOS can't return to the AUTOEXEC.BAT file after running the FASTACAD.BAT batch file. If you have DOS 3.3 or a newer version of DOS, use the command 'CALL FASTACAD' instead, anywhere in the AUTOEXEC.BAT file. If you don't wish to put the command in your AUTOEXEC.BAT file, you may put it in a batch file which also starts AutoCAD, or simply remember to run FASTACAD[Enter] before starting AutoCAD.

3.3.2.13 Using DLD-VGA with AutoCAD

You must run the FASTACAD batch file before starting AutoCAD, unless your AUTOEXEC.BAT file includes a line to invoke it.

The first time you use AutoCAD with DLD-VGA, you must change the AutoCAD display device configuration by selecting select option 5, Configure AutoCAD, from the main menu. From there, select option 3, Configure Video Display. Choose the ADI display v.4.0 as your display device. For more details, please refer to the 'AutoCAD Installation and Performance Guide'.

You are now ready to use your accelerated AutoCAD. If you are not sure that AutoCAD is using DLD-VGA, type DLDUSAGE[Enter] at the Auto-CAD command prompt while editing a drawing. If DLD-VGA is loaded and running, this command should return information about memory usage. If AutoCAD reports an error instead, your DLD-VGA is not properly loaded.

3.3.2.14 DLD-VGA Features and Commands

Among the additional features not accessible through the installation program are a memory meter, a command to manually clean up the display lists, a current color indicator, and the ability to unload or "uninstall' DLD-VGA.

■ Memory Meter

While in AutoCAD, you can check to see how much memory the display list and fast-redraw list are occupying at any time. The way to do this is by typing DLDUSAGE[Enter] at the Command: prompt. DLDUSAGE will return information about how much EMS and extended memory is still available, and how much memory each viewport is occupying. Since AutoCAD can support up to four viewports, it is possible to have up to four display lists. But multiple viewports don't necessarily have to use multiple display lists, even though each viewport will have its own fast-redraw list, because of an AutoCAD feature known as slave viewports. If a viewport is a slave of another viewport (known as the master viewport), then the slave and the master share the same display list, a d therefore only the master viewport will show any memory in use for a disp. ' list when using DLDUSAGE.

■ Display List Cleanup

While in the Overwrite mode for display list maintenance, the display lists can get quite large because of multiple ERASEs, MOVEs, ROTATEs, etc. (see Chapter 7 - The Remove/Overwrite Option). And the same may occur, although at a slower pace, in the Remove mode. Instead of having to do a REGEN to recreate the display lists from scratch, you can use the DLDCLEAN command to clean up the display lists. The DLDCLEAN command removes all deleted objects from the display lists and requires as much time as an AutoCAD REDRAW to perform its operation. Note that the whole display will be erased and recreated as part of this clean up process. In a multiple viewport setting, this means that all viewports and their associated lists will be cleaned up.

■ Current Color Indicator

Another feature that will simplify drawing under AutoCAD is the addition of a small, outlined box on the left edge of the status line. Inside the box is the current AutoCAD drawing color. If the status line is disabled, this box will not appear.

■ Uninstall

Once you are done using AutoCAD and want to run some other application, it really doesn't make sense to have the driver loaded anymore. Therefore, we have implemented the capability to uninstall DLD-VGA. To unload the driver from memory, just type DLDVGA -U[Enter] (or DLDVG256 - U[Enter]) in the directory that DLDVGA.EXE (or DLDVG256.EXE) resides in, and unless you have loaded some other memory resident programs after loading DLD-VGA, the memory occupied by the driver will be returned to the pool of free memory used by DOS.

NOTE: If you have changed the interrupt vector that DLD-VGA uses to communicate with AutoCAD, you will have to make sure that the DLDCFG environment variable points to the directory containing your DLDSETUP.DAT configuration file, since it contains information on which vector DLD-VGA is installed at. (The last line of the FASTACAD.BAT file should list the proper command line options to use when uninstalling the driver.)

DLD-VGA supports a number of new AutoCAD command line commands designed to allow advanced users better control over display list processing:

■ DLDHELP

Provides a one-line summary for every special DLD-VGA command. It's recommended that you flip to the text screen to view the output.

■ DLDVER

Displays DLD-VGA version and serial number.

■ DLDDLMODE

Displays the current mode of your redraw and display list (i.e. Remove, Overwrite, or Disabled).

All of the following force a DLDCLEAN to be processed when executed:

■ DLDFREEMEM

Frees up all display list memory currently in use by DLD-VGA, and performs a DLDCLEAN. This is useful when DLD-VGA has gone a long time without a DLDCLEAN and has allocated more memory than is necessary. You may want to use this command instead of DLDCLEAN.

■ DLDDLISTRM

Puts the display list in Remove mode.

■ DLDDLISTOV

Puts the display list in Overwrite mode.

■ DLDDLISTDS

Disables the display list.

■ DLDFLISTRM

Puts the fast redraw list in Remove mode.

■ DLDFLISTOV

Puts the fast redraw list in Overwrite mode.

■ DLDFLISTDS

Disables the fast redraw list.

■ Memory usage and lists

DLD-VGA uses two types of memory: program memory (also referred to as conventional memory), which is the memory in the first megabyte of your PC, normally where DOS resides; and display list memory, which can consist of expanded memory, extended memory, and disk space.

With respect to conventional memory, DLD-VGA occupies approximately 45K of conventional memory when used with at least 64K of expanded (LIM/EMS) memory. If sufficient expanded memory is not available, DLD-VGA will have to allocate an additional 32K of conventional memory (for a total of 77K) for its internal use.

Regarding display list memory, it's important to realize that DLD-VGA speeds up AutoCAD operations by creating a display list in extended or expanded memory, and sending that list to the VGA for pans and zooms. Redraws are run from the fast redraw list, which is even faster. But both of these lists take up memory.

How much memory? For production use, we recommend that at least one megabyte be set aside for DLD-VGA. The display list for a simple drawing like the shuttle Columbia might only require twenty kilobytes for the display list. Complex drawings may require several megabytes. We have seen Display Lists for a drawing range from one-tenth the size of the drawing file to three times the size; in general, the display list averages about the same as the .DWG file size. The fast redraw list will also occupy some memory, with the worst case being that it occupies as much as the display list. This means that you should count on both lists generally taking up as much as twice the .DWG file size. Also, complex objects such as circles and text expand when translated into display list format, so a drawing with a lot of complex objects and text will have a larger display list than a simpler drawing.

Text takes up a disproportionate amount of space in the display list. To keep the list small, put text in its own layer of the drawing. Then don't display the text layer when editing the rest of the figure. This will keep memory consumption down and speed execution.

In most cases, the memory you set aside for the display list driver will not affect the underlying performance of AutoCAD significantly. AutoCAD uses paging to support drawings larger than the amount of available memory. Setting AutoCAD memory too low will make the program swap pages more often, which will lead to a visible increase in disk activity. This activity will generally only occur during a REGEN, which recreates the display list and causes the drawing file to be accessed directly.

The AutoCAD manuals have an excellent section on performance, concentrating on memory usage. To get the most performance out of the program, read the appropriate sections of those manuals as well as this one.

If you are occasionally running out of memory for the display list, you are probably running out of memory more often for the fast redraw list, slowing performance. If so, buying one or two megabytes of RAM will greatly improve your productivity under AutoCAD. We recommend that you purchase expanded memory, or extended memory and an EMS emulator program like those mentioned below.

What happens when the lists grow beyond the amount of memory you set aside? If you have enabled an overflow drive for the display list, the list will simply expand out to disk. Otherwise, when the driver first runs out of memory, it abandons the fast redraw list, slowing redraws to the speed of the fast zooms. But if the display list continues to grow until it, too, runs out of memory, it is also abandoned, slowing all screen updates. Drawing speed reverts to AutoCAD standard speed.

Given the different ways people use AutoCAD, the only way to determine the amount of memory you need for DLD-VGA is by trial and error. Once you are using the driver, if it runs out of room for the display list, it stops using the list, at which point zooms, pans, and redraws will occur at normal

AutoCAD speed. The following message will appear in the AutoCAD scroll area to notify you that the display list has run out of memory:

3.3.2.15 Display List Overflow
If you see this message frequently, you need to increase the amount of memory set aside for the driver, disable the fast redraw list, and/or enable disk overflow. There is no separate message for the fast redraw list, but losing it does not have as drastic an effect on performance as losing the display list. Large numbers of ERASEs, MOVEs, and ROTATEs can also increase the display list size, so you may want to occasionally use the DLDCLEAN command (see the previous section) to keep your lists fresh and therefore smaller.

You may want to use the DLDUSAGE command described in the previous section to keep tabs on your display list usage as time goes on.

Allowing DLD-VGA to use expanded memory will increase your redraw, pan, and zoom performance by as much as forty percent over using extended memory directly. This is because extended memory can only be accessed in protected mode, and must be copied back and forth, creating a lot of extra operating overhead. Expanded memory, on the other hand, can be easily paged in and out, and requires virtually no overhead.

Additionally, DLD-VGA will only use 45K of conventional memory when used with expanded memory, instead of the 77K that is required if no expanded memory is available.

If you have a 386 PC with extended memory beyond the DOS 640 Kilobyte limit, we recommend that you get 386-to-the-Max, Quarterdeck's QEMM, or some other product which allows 386 extended memory to be accessed as expanded memory. These products may also allow you to put the forty-five kilobytes or so required by the driver itself into high memory, preserving space below the DOS 640 kilobyte line.

It's impossible to predict how performance for your drawings, on your specific hardware setup, will be affected by a given set of DLD-VGA configuration parameters. We suggest that if you are running in a low-memory situation you run a few tests to help determine the best way to configure AutoCAD with DLD-VGA. Use one of the larger drawing files you regularly work with and bring it up without DLD-VGA, then redraw, pan, and zoom, and time how long each step takes. Then try the same test with varying amounts of memory set aside for AutoCAD and the driver. This will give you solid information to use in determining how best to configure DLD-VGA for use on your system, with your drawings.

3.3.2.16 The remove/overwrite option
During installation, you are asked if you wish to maintain the display list and the fast redraw list by removing or overwriting erased vectors. (You also have the option of disabling either or both lists, though this option is not needed

for normal operations). The Remove and Overwrite options come into play when you erase or move an object (moving is the same as erasing and then redrawing somewhere else). When you erase or move or rotate an object, the display list and fast redraw list must be updated to get rid of the displaced object. There are two ways to do this:

- Remove option - search the list for the offending vectors and remove them. This is the elegant solution, but the search takes a measurable amount of time. For small drawings, the extra time will not be noticeable, but for large drawings it most likely will be. If you are editing large portions of sizeable (over 100K) drawings, make sure to use the Overwrite option documented below.

- Overwrite option - add more vectors to the list to overwrite the offending vectors with new vectors in the background color. This avoids the time loss to find and remove the vectors, but causes a strange effect: when the screen is updated, the erased object is drawn, then disappears as it's overwritten by the new vectors in the background color. This slows each redraw, and the extra overwrite vectors add to the length of the list. Fortunately, if things get too messy, all you need to do is use the DLDCLEAN command (documented in DLD-VGA Features and Commands), which will clean up the display list in about the time it would take for AutoCAD to perform one of its REDRAWs.

We recommend that you use Remove mode for both lists for small drawings or if you have a relatively small amount of memory for the lists. For medium-sized drawings, you may want to go to Overwrite mode for at least the fast redraw list, so that redraws will be speeded, but the display list will still be updated correctly. This will minimize the strange 'draw then undraw' effect for erased objects. For even larger drawings, where searching and updating a list takes a lot of time, you will want to go to Overwrite mode for both lists. Remember to use the DLDCLEAN command occasionally as you erase and move more objects.

3.3.2.17 DLD-VGA Tips and Tricks

Since DLD-VGA is totally transparent to users with respect to using normal AutoCAD commands to REDRAW, PAN, and ZOOM, you still have to suffer from some of AutoCAD's nuances. One of these nuances is that ZOOM ALL and ZOOM EXTENTS both force a REGEN, because Auto-CAD does not keep track of various boundaries necessary to avoid the REGENs. And REGENs are rather time-consuming and don't use any display list processing to speed themselves up. One way around this problem is to use another of AutoCAD's built-in features, namely the VIEW command.

When you first load your image and see the whole drawing on the screen at once, just type `VIEW SAVE ALL[Enter]`, which will save the display position you see under a view named 'All'. Then, after you've done some detailed editing and want to return back to the big picture, type `VIEW`

`RESTORE ALL[Enter]`, instead of `ZOOM ALL[Enter]` or `ZOOM EXTENTS[Enter]`, and the full drawing will be restored to the display at display list speeds, without a REGEN.

Another nuance of AutoCAD is that if you zoom in too far or pan over too far, you may inadvertently cause a REGEN. AutoCAD again provides a very simple solution: the REGENAUTO command. Just type `REGENAUTO OFF[Enter]` at the AutoCAD command prompt, and automatic REGENs will be disabled. The REGENAUTO setting is also saved as part of your drawing file, so you only need to execute it once per drawing. You may even want to set REGENAUTO OFF[Enter] in your ACAD.DWG drawing template so that all your drawings are created with REGENAUTO set off.

3.3.2.18 DLD Custom Color Utilities

With DLD386-VGA, you receive the CustomColors color configuration utilities which give you the ability to modify all your AutoCAD colors, including menu colors, text colors, dialog box colors, and drawing colors. There are separate CustomColors utilities for 16 and 256 color modes COLOR16.EXE and COLOR256, respectively. Color changes have no effect in video modes with more then 256 colors.

CustomColors simulates an AutoCAD screen, complete with all possible objects. Once you enter the utility, you are provided with the following configuration menu at the bottom of the screen:

> (O)bject
> (D)rawing
> (P)hysical
> (A)DI pal
> (V)GA pal
> (R)eset
> (L)oad
> (S)ave
> (E)xit

NOTE: In COLOR256, there is no (D)rawing option.

The following functions are performed when these menu items are selected:

■ Object

Selecting this option will allow you to change the color of any AutoCAD screen object, such as the graphics area background color, the menu area text color, or the border line color. Select the object whose color you want to change by moving the highlight box around with the left and right cursor control keys and pressing [Enter] when you have highlighted the desired object. Note that a one line description of the object type is displayed at the can't find another background color that "feels' right and still want to use the one that was causing you problems with the highlight box, you can

choose a different background color and then modify the associated physical color to suit your needs.

■ Physical

Choosing the Physical option from the menu allows you to alter the red, green, and blue components of the physical colors. A highlight box will appear in the row of 16 physical colors at the bottom of the screen in COLOR16 or somewhere in the large block of 256 physical colors in COLOR256. Use the arrow keys to select the color you wish to edit and press [Enter]. Three "sliders' will appear near the bottom of the display, with the horizontal position of the slider for each of the color components (red, green, or blue - RGB) indicating the relative intensity of the component. You can use the left and right arrow keys to move the slider for the selected component, or type in a number from 0 to 255. Note that VGA only supports 64 intensities per color component, so an intensity of 0 is the same as an intensity of 3. The up and down arrows allow you to select which component you want to alter. As you manipulate the sliders, all objects on the display that are of the same color as the selected physical color will change in hue. This way you can visually determine the most appropriate setting for your display. Pressing [Enter] will set the RGB values you have selected for the physical color you were modifying.

■ ADI pal

This constructs a default ADI color palette, as defined in the Autodesk Device Interface Driver Development Kit.

■ VGA pal

This constructs a default VGA color palette, as defined when you select the VGA display device during AutoCAD configuration.

■ Reset

This option will reset the physical colors to their initial state. The initial state depends on which of the two palettes (ADI or VGA) you selected prior to choosing this command. If you are selecting this option in a freshly loaded version of COLOR16 or COLOR256, the initial palette will be assumed to be the ADI palette.

■ Load

This reloads the color information from the file DLDCOLOR.DAT. It will be loaded from the directory pointed to by DLDCFG, or from the current directory if DLDCFG is not set. If DLDCOLOR.DAT cannot be found, an error message will be displayed. This command is useful because it allows you to go back to your previously edited color configuration in case you have made some mistakes in configuring your colors that you want to undo.

NOTE: Don't accidently wipe out your changes. Selecting ADI pal, VGA pal, Reset or Load will irrevocably wipe out any current color changes you may have made, unless you have just saved your new

---

setting, so use them only when you really need to, such as when you have made so many color changes that you can't seem to get back to a reasonable place and just want to start over.

■ Save

Save the current color palette to DLDCOLOR.DAT. It will be saved to the directory pointed to by DLDCFG, or to the current directory if DLDCFG is not set.

■ Exit

Exits CustomColors. If you have made palette changes, but not saved them, you will be asked if you want to save your changes before exiting CustomColors.

3.3.3   GEM/3

■ Installing GEM/3 display drivers

To install the GEM drivers the first step is to build a GEM driver pak.

1. In the following three steps, you create a disk known as the GEM DRIVER PAK. Using the standard DOS FORMAT utility, format a blank diskette by inserting it in drive A and typing the following:
   ```
   FORMAT A: /V [Enter]
   ```
   The DOS format utility will then prompt for the volume label by displaying: **Volume Label? (11 characters max) Press Enter for none.**

   At this prompt, type the following volume-label name in upper case:
   ```
   GEM DRIVRPK [Enter]
   ```

2. Using the DOS COPY utility, copy the following files from the GEM/3 system master diskette (comes with GEM/3) to the newly formatted GEM DRIVRPK diskette. Type the following sample commands assuming that the GEM/3 system master diskette is in drive A: and the GEM DRIVRPK diskette is in drive B:
   ```
   COPY A:GEMVDI.EXE B: [Enter]
   COPY A:MDGEM?.SYS B: [Enter]
   ```

3. Insert the Cirrus Logic drivers diskette into Drive A:. Run the Cirrus Logic installation program (INSTALL.EXE), and choose the option for the GEM/3 drivers and specify the drive and directory where you want them copied to (such as B:\). GEM/3 requires that the drivers be installed from the root directory of a floppy disk in drive A:. Be sure to install the drivers to the root of drive A: or drive B: and then place the diskette in drive A: before proceeding.

4. Install GEM/3 (following the instructions provided in the product's manual), selecting the standard EGA (IBM Enhanced Card and 16-Color Display (640x350)) driver.

5. After successfully completing installation, insert the GEM/3 System Master Disk in drive A.

6. Move to drive A by typing A: [Enter]. Please note that you must install from the A: drive.

7. Then type GEMSETUP[Enter].
    Follow the GEM/3 installation instructions up to the **CHANGE EXIST-
    ING CONFIGURATION** stage. Then, choose "**CHANGE YOUR CUR-
    RENT SETUP**". When prompted for a screen driver choice, highlight:
    OTHER (DRIVER PACK)

8. When prompted to insert a screen driver into drive A, insert the newly
    created GEM DRIVRPK diskette.

9. Select one of the following:
    >**Cirrus Logic VGA 16 Color 800x600**
    >**Cirrus Logic VGA 16 Color 1024x768**

10. Continue with the remainder of the installation.

3.3.4   Lotus 123 v2.x, Symphony, and Report Writer

To install a Lotus display driver, proceed as follows:

1. Run the Cirrus Logic installation program (INSTALL.EXE), and choose
    the option for the Lotus 123 and Symphony drivers and specify the drive
    and directory where you want them copied to (such as C:\LOTUS).

2. From within the Lotus sub-directory type:
    >`INSTALL [Enter]`

3. From the next menu, select **Advanced Options.**

4. From the next menu, select **Add New Drivers to Library.**

5. From the next menu, select **Modify Current Driver Set.**

6. From the next menu, select one of the display and resolution configura-
    tions.

7. From the next menu, select **Return To Menu.**

8. From the next menu, select **Save Changes.**

9. Enter the name you have selected for the driver set. We recommend that
    the driver set name reflect or include the driver's resolution (e.g. 132x43)

NOTE: The default driver set name assigned by the program is 123.SET.

You may create multiple driver sets with different display resolutions. To run
Lotus 1-2-3 or Symphony with a specific driver set, type:

>`123 SETNAME [Enter] or`
>`SYMPHONY SETNAME [Enter]`

where `SETNAME` is the name of the desired driver set.

3.3.5   Lotus 123 v3.x

To install a Lotus 3.0 or 3.1 display driver, proceed as follows:

1. It is assumed that Lotus 1-2-3 v3.0 or 3.1 is already installed on your hard
    disk, using the standard Lotus installation utility. To install this driver,
    make the directory containing 1-2-3 v3.0 the current directory. For exam-
    ple, if 1-2-3 is in the directory named 123R3, then type the following
    command:
    >`CD \123R3[Enter]`

2. One of the files used in the driver installation is named INSTALL.DDF.
    This is a text file used by the 1-2-3 installation utility, containing informa-
    tion on each of the drivers and modes of operation. If you have been using
    a driver supplied with another graphics adapter, you may want to make
    a backup copy of the INSTALL.DDF file currently in your 1-2-3 direc-
    tory.
    >`COPY INSTALL.DDF INSTALL.BAK [Enter]`

3. Run the Cirrus Logic installation program (INSTALL.EXE), and choose
    the option for the version of Lotus 123 that you are using and specify the
    drive and directory where you want them copied to (such as C:\123R3).
    If the INSTALL.DDF has been copied to a backup file (see step 2 above),
    answer YES to the prompt to confirm overwriting the file.

4. Now run the Lotus installation utility by typing:
    >`INSTALL[Enter]`

5. Select Change selected equipment from the list. Note: If you are currently
    using another driver supplied with a graphics board, it may be necessary
    to choose First-time installation.

6. Select Modify Current DCF, or Choose another DCF to modify, accord-
    ing to your preference. The following procedure is valid for either
    selection.

7. Select Change Video Display. This will present you with a list of all the
    display types provided with the 1-2-3 distribution, with two additional
    choices. GD542x 100 Column Display (800x600 resolution) supports
    100x31, 100x42, and 100x75 16 color modes. GD542x 128 Column Display
    (1024x768 resolution) supports 128x40, 128x54, and 128x96 16 color
    modes. Select a resolution that best meets your requirements.

8. After you selection is made, choose the Save Changes option from the
    menu. Note that when some high-resolution modes are selected, a mes-
    sage may appear asking for the drive letter of the floppy disk. Before
    entering the drive letter, insert the disk that is requested in the floppy
    drive. After inserting the disk, you may enter the drive letter containing
    that diskette.

3.3.6   OS/2 2.0

This installation guide assumes the user to be familiar with the mouse interface of the OS/2 2.0 Desktop Shell environment. If additional instructions are needed, please consult the OS/2 Tutorial in the Information folder.

■ To Install OS/2 2.0 PM Display Driver

1. Save a copy of the DISPLAY.DLL in \OS2\DLL.
   If you are currently running OS/2 2.0, open a DOS session by double clicking on a DOS Full Screen icon from the OS/2 Command Prompts folder. The Command Prompts icon is in the OS/2 System folder.
   Move to the \OS2\DLL directory by typing at the DOS prompt

           CD \OS2\DLL[Enter].

   Type   COPY DISPLAY.DLL IBMVGA.DLL /B[Enter]

   at the DOS prompt to make a backup copy of DISPLAY.DLL.

   If you are currently running MS-DOS, follow the above steps for a DOS session to make a backup copy of the DISPLAY.DLL. Boot OS/2 to continue with the installation.

2. Invoke OS/2's Device Driver Install utility to copy device drivers from the Driver and Utilities for OS/2 diskette to the hard disk.
   Insert the Drivers and Utilities for OS/2 diskette in drive A:.
   Double click on the Device Driver Install icon in the System Setup folder. The System Setup icon is in the OS/2 System folder.
   Click on the Install button from the OS/2 2.0 Device Driver Installation pop up window. The Select Device Drivers pop up window will display a list of device drivers such as:

   > **Super VGA - 1024x768x16, at 70 Hz vertical scan frequency**
   > **Super VGA - 800x600x16, at 60 Hz vertical scan frequency**
   > **Super VGA - 800x600x16, at 56 Hz vertical scan frequency**
   > **Super VGA - 800x600x16, at 72 Hz vertical scan frequency**
   > **Super VGA - 1024x768x16 interlaced, at 43.5 Hz vertical scan frequency**
   > **Super VGA - 1024x768x16, at 72 Hz vertical scan frequency (check if monitor and adaptor supports freq)**
   > **Super VGA - 640x480x16, at 72 Hz vertical scan frequency**
   > **Super VGA - 1024x768x16, at 60 Hz vertical scan frequency**

   To assist in determining what capabilities your monitor has, refer to the table in the Clmode section.
   Select the device driver to be installed from the list and click on the **OK** button. Device drivers are copied to their corresponding directories.
   Click on the **Exit** button, then the **Yes** button. If the current DISPLAY.DLL is in use, a dialog box will pop up to notify the user that changes will be in effect on the next reboot. Click the OK button to exit the installation utility.

3. Modify the CONFIG.SYS file in the root directory so that OS/2 will install the correct device driver on the next reboot.
   Click on the OS/2 System Editor icon from the Productivity folder which resides in the OS/2 System folder.
   Select **Open** from the **File** menu. Open CONFIG.SYS from the root directory.
   Search for the command line which contains **vvga.sys.** For example, DEVICE = C:\OS2\MDOS\VVGA.SYS.
   Select **Find** from the **Edit** menu.
   Type VVGA.SYS in the **Find: edit** box.
   Uncheck the **Case Sensitive** option if it is checked.
   Click on the **Wrap** option so that a tick mark appears in the check box.
   Click on the **Find** button.
   Once the command line is located, select the **Cancel** button.
   Highlight the command line with the mouse, then select **Copy** from the **Edit** menu.
   Click at the end of the command line, press the [Enter] key to insert a new line below the current command line.
   Select **Paste** from the **Edit** menu to make a copy of the command line.
   Type REM at the beginning of the original command line.
   Change VVGA.SYS in the pasted command line to CLVSVGA.SYS.
   Select **Save** from the **File** menu and save the changes.
   Double click on the **SYSTEM** icon to exit the editor.

4. Shutdown the system and reboot for the changes to take effect.

■ To Install Windows 3.0 Drivers for OS/2 2.0:

This section assumes that the WIN-OS/2 Support has been installed. If that option has not been selected at the initial OS/2 installation, please use the Selective Install utility that is in the System Setup folder to first install WIN-OS/2 Support.

1. If you do not currently have a WIN-OS/2 session running, start one.
   Open a WIN-OS/2 session by double clicking on a WIN-OS/2 icon from the OS/2 Command Prompts folder. The Command Prompts icon is in the OS/2 System folder.

2. Run the Install program to copy the WIN-OS/2 Drivers and SetRES Utility to the hard disk.
   In the Program Manager, choose **File Run.**

   Specify the diskette drive where the Drivers and Utilities for OS/2 Diskette is inserted, and run the install program.

           A:\INSTALL[Enter]

3. When prompted, specify to copy the files to the \OS2\MDOS\WINOS2 directory.

4. The resolution may now be selected by running the SetRes Utility. Execute SetRES by double clicking on the SetRES icon. Use the SetRes utility to select either 16 or 256 colors and the desired resolution for future Win-OS/2 sessions.

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

3.3.7 Ventura Publisher

To install the Ventura Publisher driver, proceed as follows:

1. Install Ventura Publisher V2.0 as instructed in the product's manual, specifying the Hercules driver.
2. Insert the Cirrus Logic drivers diskette into Drive B:. Run the Cirrus Logic installation program (INSTALL.EXE), and choose the option for the Ventura Publisher drivers and specify the drive and directory where you want them copied to (such as A:\). Ventura Publisher requires that the drivers be installed from the root directory of a floppy disk in drive A:. Be sure to install the drivers to the root of drive A: or drive B: and then place the diskette in drive A: before proceeding.
3. Change to drive A: by typing A:[Enter].
   After the A: prompt appears, run the VPDRV2_0.EXE program by typing VPDRV2_0[Enter]. Note that VPDRV2_0.EXE can only be executed from the A: drive.
   Follow the step-by-step installation procedure as it appears on the screen and select one of the following drivers when prompted:

   Cirrus Logic VGA 800x600 16 of 256K colors or greys.
   Cirrus Logic VGA 1024x768 16 of 256K colors or greys.

Ventura Publisher V2.0 is now configured for the selected screen resolution and 16 color graphics.

3.3.8 Microsoft Word

The high resolution Microsoft Word 5.0 display driver supplied with your Cirrus Logic VGA supports both high resolution text and graphics. When using a Microsoft Mouse with the driver, please ensure that your mouse driver version level is 7.0 or above.

■ **Installing Word Display Drivers**

To install the Word high resolution text driver supplied with your Cirrus Logic VGA, follow these instructions:

1. If you have not already done so, install Microsoft Word onto your computer system. Follow the instructions supplied with Word. When asked for a screen display type, choose IBM PS/2 model 50/60/70/80 VGA or compatible.
2. Run the Cirrus Logic installation program (INSTALL.EXE), and choose the option for the Microsoft Word drivers and specify the drive and directory where you want them copied to (such as C:\WORD5).
3. The new driver is now installed, and to use it, run Word as you normally would. To view and change the screen resolutions, select Options, move the cursor to display mode, and press [F1]. Choose the desired screen resolution from the list presented.

4. A sub-menu will appear, listing all the choices of resolutions supported by the Cirrus Logic text driver. Select the desired resolution.

3.3.9 WordPerfect 5.1

The high resolution WordPerfect version 5.1 driver supplied with your Cirrus Logic VGA supports both high resolution text and graphics. WordPerfect allows graphics and text drivers to be set up separately, so be sure to install both of these drivers.

■ **Installing WordPerfect 5.1 Display Drivers**

To install the WordPerfect high resolution text driver supplied with your Cirrus Logic VGA, follow these instructions:

1. If you have not already done so, install WordPerfect onto your computer system. Follow the instructions supplied with WordPerfect.
2. Run the Cirrus Logic installation program (INSTALL.EXE), and choose the option for the WordPerfect drivers and specify the drive and directory where you want them copied to (such as C:\WP51).
3. Start WordPerfect, and go into **SETUP** by typing [Shift-F1].
4. Choose **Display** [2], then text screen type by pressing [3].
5. Move the cursor to where Cirrus Logic VGA appears on the list, and choose SELECT

   ● 132x25 16
   ● 132x43 16

6. A sub-menu will appear, listing all the choices of resolutions supported by the Cirrus Logic text driver. Select the desired resolution.

To install the WordPerfect high resolution graphics driver supplied with your Cirrus Logic VGA, follow these instructions:

1. If you have not already done so, install WordPerfect onto your computer system. Follow the instructions supplied with WordPerfect.
2. Run the Cirrus Logic installation program (INSTALL.EXE), and choose the option for the WordPerfect drivers and specify the drive and directory where you want them copied to (such as C:\WP51).
3. Start WordPerfect, and go into **SETUP** by typing [Shift-F1].
4. Choose **Display** [2], then graphics screen type by pressing [2].
5. Move the cursor to where Cirrus Logic VGA appears on the list, and choose SELECT

   ● Cirrus 1024x768-16
   ● Cirrus 640x480-16
   ● Cirrus 800x600-16

6. A sub-menu will appear, listing all the choices of resolutions supported by the Cirrus Logic graphics driver. Select the desired resolution.

3.3.10 WordStar and WordStar 2000

The WordStar display drivers support both WordStar version 5.5 and 7.0 and above and WordStar 2000 version 3.5.

■ Installing WordStar Drivers

To install the WordStar high resolution text driver supplied with your Cirrus Logic VGA, follow these instructions:

1. If you have not already done so, install WordStar onto your computer system. Follow the instructions supplied with WordStar.
2. Run the Cirrus Logic installation program (INSTALL.EXE), and choose the option for the WordStar drivers and specify the drive and directory where you want them copied to (such as C:\WS).
3. Using a text editor enter the file FONTID.CTL in the WordStar directory and change the CRT_TYPE line to read:
   ```
   CRT_TYPE=CL800.WGD
   ```
4. When WordStar is executed, the display driver will be used for page preview mode.

■ Installing WordStar 2000 Drivers

To install the WordStar 2000 high resolution text driver supplied with your Cirrus Logic, follow these instructions:

1. If you have not already done so, install WordStar 2000 onto your computer system. Follow the installation supplied with WordStar 2000.
2. Run the Cirrus Logic installation program (INSTALL.EXE), and choose the option for the WordStar 2000 drivers and specify the drive and directory where you want them copied to (such as C:\WS2).
3. Using a text editor the file FONTID.CTL in the WordStar 2000 directory and change the CRT_TYPE line to read:
   ```
   CRT_TYPE=CL1024.WGD
            CL800.WGD
   ```
4. When WordStar 2000 is executed, the display driver will be used for page preview mode.