VGA-16

User's Guide

FCC Notice

FCC ID: D2A62LTJWBJC Certified to comply with the limits for a Class B computing device in accordance with the specifications in Subpart J, Part 15 of FCC Rules. See instructions below if interference to Radio or Television reception is suspected.

Radio and Television Interference

The equipment described in this manual generates radio-frequency energy. If it is not installed and used properly it may cause interference with radio and television reception. The monitor you purchase must also comply with the limits for Class B computing devices in accordance with the specifications in Subpart J, Part 15, of FCC rules. These rules are designed to provide reasonable protection against such interference in a residential installation.

The cable connection between the computer and the monitor must be a shielded cable with the shield properly grounded. There is no guarantee that interference will not occure in a particular installation, especially if a telescoping-rod type antenna is used. You can determine if your equipment is the cause of interference by turning it off. If the interference stops, it was probably caused by the computer or the monitor. To correct the problem try:
1.   Turning the TV or radio antenna until the interference stops.
2.   Moving the computer further away from the TV or radio.
3.   Moving the computer from one side of the TV or radio to the other.
4.   Plugging the computer into an outlet on a different circuit breaker or fuse than the TV or Radio.
5.   Installing a rooftop antenna connected to your TV and radio with coaxial cable.
6.   Identifying the offending piece of hardware (e.g., monitor or computer) by selectively turning them off one at a time an checking for interference.

If necessary, you should consult your computer dealer for additional suggestions. You may find the booklet How to Identify and Resolve Radio-TV Interference Problems prepared by the Federal Communications Commission helpful. This booklet is available from the U.S. Government Printing Office, Washington, DC 20402. Refer to Stock Number: 004-000-00345-4.

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Copyright Notice

Patent Pending

P/N 700-0234

VGA-16 USER'S GUIDE

TABLE OF CONTENTS

Part 3: Application Software

Appendices

PART 1: VGA-16 INSTALLATION

WHAT YOU NEED

❑ Computer 100% compatible with IBM PC/XT/AT or PS/2 Model 30

❑ Open 8-bit or 16-bit System Expansion Slot

❑ MS-DOS or PC-DOS operating system, version 2.0 or later (for installation software)

❑ Medium Flat Blade Screwdriver

ABOUT THIS MANUAL

This manual is designed so you can get your new VGA-16 installed and running fast . . . whether you are new to computers or an "old pro".

Symbols and Conventions

Symbols in this manual have these special meanings:

�֎ indicates a **WARNING** or other very important information

☞ draws your attention to **NOTES** *which may be further emphasized by being in italics*

✓ is followed by a **REMINDER**; something that has been covered before or that you probably know but need to be sure to remember

DOS Commands

Instructions for entering DOS commands are shown in typewriter style with special keys (e.g. ENTER) shown in brackets:

```
INSTALL [ENTER]
```

Overviews

Many sections in this guide begin with an overview that looks like this:

OVERVIEW
❑   Each major section begins with a box which provides an overview of the information which follows.

Most Up-to-Date Information

Before you begin installation, place the VGA-16 Utilities Diskette in Drive A and type:

```
README [ENTER]
```

This gives you information available after this manual was published.

If you're new to computers:

Use easy-to-follow, complete instructions for each installation step.

If you have some computer experience:

1. See "Quick Start Guide" for overview of installation process.

2. Use the Overview at the beginning of each installation step for essential information pertaining to steps of the installation process.

3. Complete installation, referring to detailed instructions for further clarification and information as needed.

If you're experienced with computers:

1. Use "Quick Start Guide" to complete installation.

2. Refer to overviews and detailed instructions if you need more information about a particular installation step.

3. See appendices for additional technical information as desired.

�æ *Words of Caution . . . Before You Touch*

OVERVIEW
❏   Exercise usual precautions to prevent static electric damage to microcircuits.

Static can cause severe damage to microcircuits. There are some ways to minimize damage to your VGA-16 and your computer:

❏   Handle the VGA-16 by the edges only. Don't touch edge connectors or exposed circuitry.

❏   Leave the VGA-16 in the anti-static protective bag until ready to actually install the VGA-16 in your computer.

❏   If possible, ground your body when handling your VGA-16. The metal power supply housing is generally considered the best place to ground yourself.

❏   Do not wear polyester clothing or have plastic, vinyl, or styrofoam in the areas where you are working.

❏   Do not place the VGA-16 on a metal surface.

❏   Make the least possible movement to avoid building up static electricity from your clothing, carpets and furniture.

Parts of Your VGA-16 Card

This drawing will help you identify the location of switches, jumpers, and connectors on your VGA-16 board.

Video Feature Connector

Switch Block

Video Connector
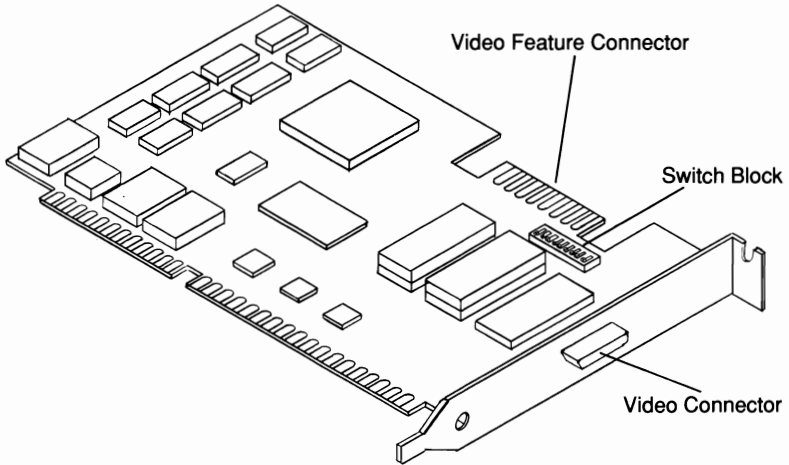
QUICK START GUIDE

☞ This is a very lean description of the VGA-16 installation process. It enables experienced computer users to be "up and running" in minutes!

✔ Check README file for the most recent information.

Step 1 Set VGA-16 Switches

☞ Default settings for the VGA-16 Switches are best in most cases. If you have difficulties, check page 13, *"Setting VGA-16 Switches"*.

Step 2 Prepare Your Computer

❑ Turn off, then unplug computer and external options from electrical connections.
❑ Remove cover mounting screws and cover.

Step 3 Configure Your Computer

❑ For IBM PC/XTs and compatibles, set DIP Switch SW1, positions 5 and 6 to ON.

❑ For IBM ATs and XT Model 286s, slide Display Adapter switch toward the front of your system unit. (Some AT's don't have this switch -- in which case, no action is required.)

Step 4 Install VGA-16 in Expansion Slot

✳ *Refer to "Appendix A - Two Monitor Systems" if appropriate.*
❑ Press VGA-16 board into any empty full length (16-bit slot is best) expansion slot.
❑ Secure the adapter with expansion slot screw.

Step 5 Close Your Computer

❑ Slide cover on and secure with cover mounting screws.
❑ Connect monitor to 15 pin "D" shaped video connector at the outside rear of VGA-16.
❑ Reconnect power to external devices and system unit.
☞ Special Instructions:
   ○ **For PC AT** -- Run the menu driven "SETUP" Program to complete the installation.
   ○ **For PS/2** -- Don't use your system video connector; use VGA-16 connector.
   ○ **For Multisync/Multiscan** -- Set your monitor for "Analog" operation.
   ○ **For Expanded Memory (EMS) Board** -- Designate exclusions for "A000" through "CA7F" when invoking your EMS driver.

Step 6 Run VGA-16 Installation Program

❑ Put VGA-16 Utility Diskette in Drive and type:

INSTALL [ENTER]

❑ Follow the menu instructions to install RAMBIOS Driver and Screen Saver

✓ *If you need further information, check the instructions in this guide and "Appendix C - Troubleshooting the VGA-16 Installation".*

VGA-16's COMPATIBILITY

WITH YOUR COMPUTER

The VGA-16 Card can be installed in any full length, 8-bit or 16-bit slot in computers compatible with the IBM PC/XT/AT and PS/2 Model 30.

☞ For significantly faster performance, install your VGA-16 in a 16-bit slot rather than an 8-bit slot whenever possible.

16 Bit Slot

8 Bit Slot
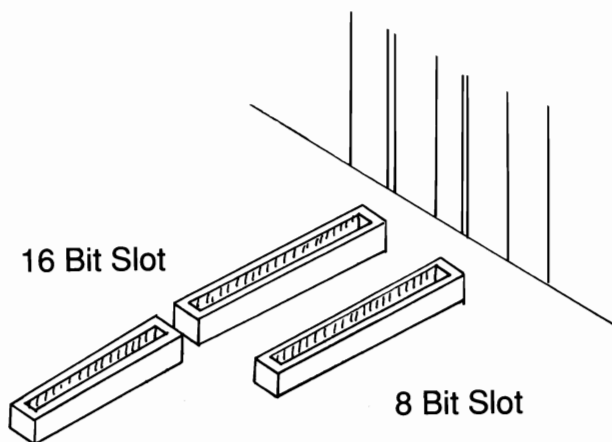
☞ *If you have an Older IBM PC . . .*

The VGA-16 is 100% compatible with IBM's standards for VGA. IBM designed the Video Graphics Array to run with the BIOS ROM dated on or after October 27, 1982.

The VGA-16 will not work with:
- ❏ **IBM PCs with a BIOS dated before October 27, 1982.**
- ❏ **IBM compatible computers with BIOS which is not compatible with IBM's BIOS standards on or after October 27, 1982.**

It's easy to check the date of your computer's BIOS ROM:

Step 1 Boot up your system.

Step 2 Place VGA-16 Utility Diskette in Drive A.

Step 3 At the Drive A system prompt, type:

ROMDATE [ENTER]

Step 4 Check BIOS ROM date for your computer displayed on the screen.

a. If the displayed date is prior to October 27, 1982, the VGA-16 will not work properly.

b. If the displayed date is on or after October 27, 1982, continue with the installation of your VGA-16.

VGA-16's Compatibility
With Your Monitor

The VGA-16 works properly with monitors compatible with the IBM PS/2 analog displays, models 8503, 8512, 8513 and 8514.

�֍ *If you have a Two Monitor System or a System with Built-In Video, See Appendix A.*

VGA-16's Compatibility
With Your Software

❏ Extended resolution 800 X 600 graphics mode and 132-column text modes require a variable frequency display such as the NEC MultiSync or Sony Multiscan.

❏ The VGA-16 is designed to work with software written for these video standards:

VGA - IBM Video Graphics Array

EGA - IBM Enhanced Graphics Adapter

CGA - IBM Color/Graphics Adapter

MDA - IBM Monochrome Display Adapter

HGC - Hercules Graphics Card

SETTING THE *VGA-16* SWITCHES

The default setting for switches on your VGA-16 are generally the best option for most systems. Should you have difficulties, you may want to try some different switch settings. This section gives information about switch settings.

Switches 1 through 3

Switches 1 through 3 are reserved for future use, and should be left OFF.

Switch 4
Switch 4 is reserved for future use and *must be left OFF.*

Switch 5

Switch 5 ENABLES/DISABLES your VGA-16's capability to provide backwards compatibility emulation. To activate this feature, you will run the VGA.COM program included in your VGA-16 software.

Switch 5

ON   Allow Emulation   **(Default Setting)**

OFF   Disallow Emulation

Switches 6 and 7

At start-up, VGA-16 detects whether your computer has 16-bit or 8-bit ROM and Memory access. It is possible that some IBM compatible computers will not allow your VGA-16's automatic sensing system to work properly. In this case, you may reset Switches 6 and 7 as follows:

Switch 6

ON	Allow 16-bit ROM access	**(Default Setting)**
OFF	Force 8-bit ROM access	

Switch 7

ON	Allow 16-bit Memory access	**(Default Setting)**
OFF	Force 8-bit Memory access	

Switch 8

VGA-16 offers extension registers beyond the IBM VGA's standard. Some operating environments are sensitive to the use of these extension registers. If Switch 8 is ON, the VGA BIOS will not access any extension registers after initialization.

Turning Switch 8 ON will also prevent the BIOS from accessing extended modes such as 800 x 600 16-color mode. The VGA-16 software contains the VGA.COM program which allows you to enable access to these modes even if Switch 8 is ON.

Switch 8

ON	Force Standard VGA Mode (IBM specifications only - no access to extension registers after initialization)
OFF	Allow VGA-16 extensions **(Default Setting)**

PREPARING YOUR COMPUTER

OVERVIEW
❏   Turn off, then unplug computer and external options from electrical connections
❏   Unplug external options cables from computer
❏   Remove cover mounting screws and slide cover off

�֎ *Drawings and instructions in this manual are of IBM PC/XT/AT and PS/2 Model 30 computers. Most IBM compatible computers look essentially the same. Refer to your system user's guide for further information as needed.*

Step 1   Switch off your computer and all external options (printer, display, and others) and unplug all power cords from electrical source.

Step 2   Note the position of all external options cables connected to the rear of computer and disconnect them.

Step 3   Remove the cover-mounting screws and save
them for reinstalling the cover.

☞ If the screws are not visible, your system unit may
have a protective rear cover panel. It should pull
right off. See your system manual to avoid
damaging your computer.

Mounting   Screws
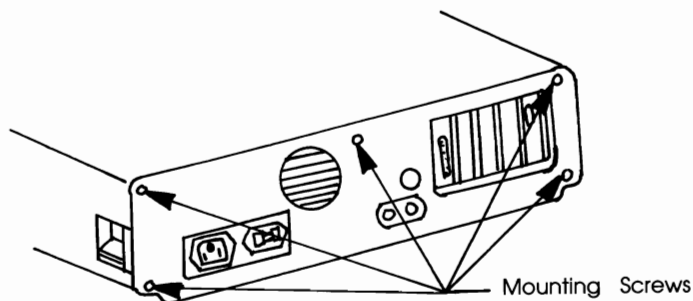
☞ *If your system has a key lock,* unlock it and remove
the key.

Step 4   Facing the front of the computer, hold onto both
sides of the system cover. Slide the cover toward
you. As the rear edge of the cover reaches the
front of the PC, tilt the front of the cover upward,
remove it and set it aside.
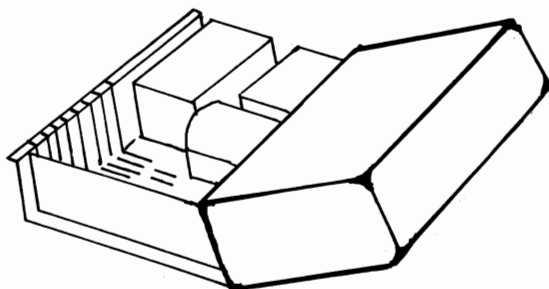
CONFIGURING YOUR COMPUTER

OVERVIEW
❑ For IBM PC/XTs and compatibles, set DIP Switch SW1, positions 5 and 6 to ON
❑ For IBM ATs and XT Model 286s, slide Display Adapter switch toward the front of your system unit.

Step 1 Use the drawings/descriptions that follow to help identify the type of computer you have while locating system switches.

☞ *Switches are located on the system board -- the base of the unit into which adapters are plugged -- and the descriptions/drawings are from the perspective of looking toward the back wall of the computer case*

IBM PCs have two switch blocks; one about six inches away from and almost exactly perpendicular to the keyboard connector and the other slightly to the left of the first.

IBM PC/XTs have one switch block about six inches away from and slightly to the left of the keyboard connector.

PC   PC/XT

Switch
Block 1
(SW1)

Front of Computer   PAGE 17
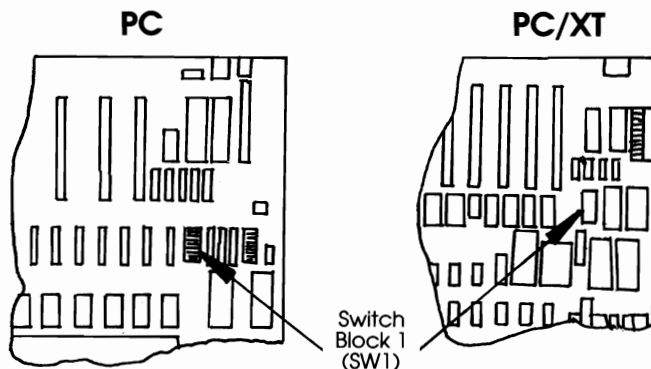
IBM ATs and XT Model 286s have a Display Adapter switch within a couple of inches and slightly to the right of the keyboard connector.

☞ Some early release IBM ATs don't have a Display Adapter switch.

The **IBM PS/2** series does not have this switch.

PC/AT

Front of Computer

Display Adapter Switch
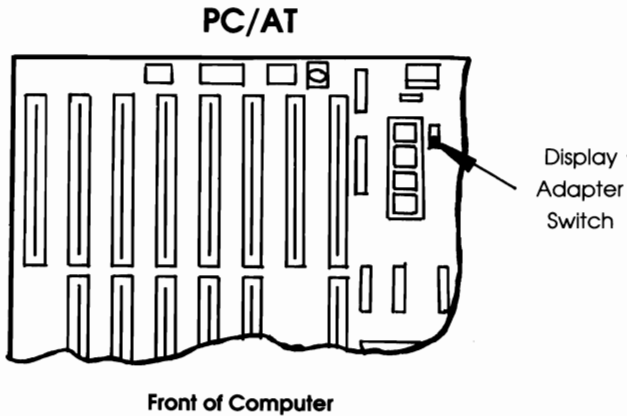
Step 2 A *For the IBM PC/XT or compatible*:
Set the switch you just located - positions 5 and 6
to ON as shown below:
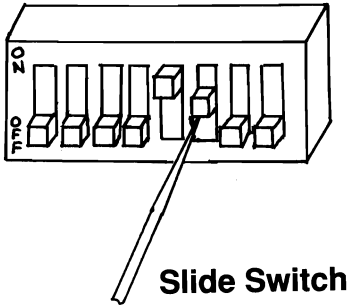
Slide Switch

Step 2 B **For IBM ATs and 286s** *or compatible*s:
Slide the Display Adapter switch so that it is
toward the front of the computer.

☞ The switch may already be in the forward position
if there is/was already some type of color graphics
adapter card installed.

PC/AT

Front of Computer
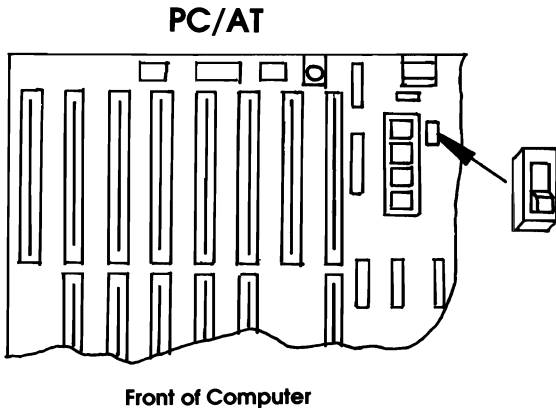
INSTALLING VGA-16 CARD

IN EXPANSION SLOT

OVERVIEW
❏ Use any empty full length expansion slot.
❏ Hold the VGA-16 board by the edges and align it with the support brackets. Firmly press VGA-16 connector board into the expansion slot/socket.
❏ Secure the adapter with expansion slot screw.

�֎ *Important!*

❏ Refer to "A Word of Caution" on Page 6 for proper procedures in handling the VGA-16 board.

❏ *Refer to "Appendix A - Two Monitor Systems" if you intend to have more than one video card installed in your system.*

Step 1 The VGA-16 can be installed in any full-length expansion slot. (Use a 16-bit slot if possible.) If the expansion slot still has the metal expansion slot cover attached, remove it with a screwdriver. Save the screw for installing the VGA-16 board.

☞ If you just removed an adapter, you can use that slot for installing the VGA-16 card.
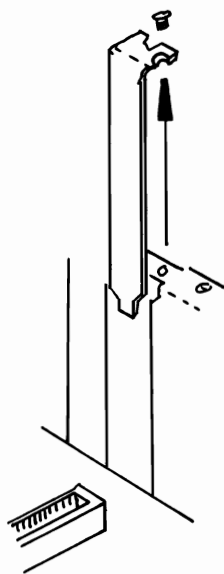
Step 2   Hold the VGA-16 by the edges, align it with the
support brackets, and press the VGA-16 board
connector firmly into the expansion slot/socket.
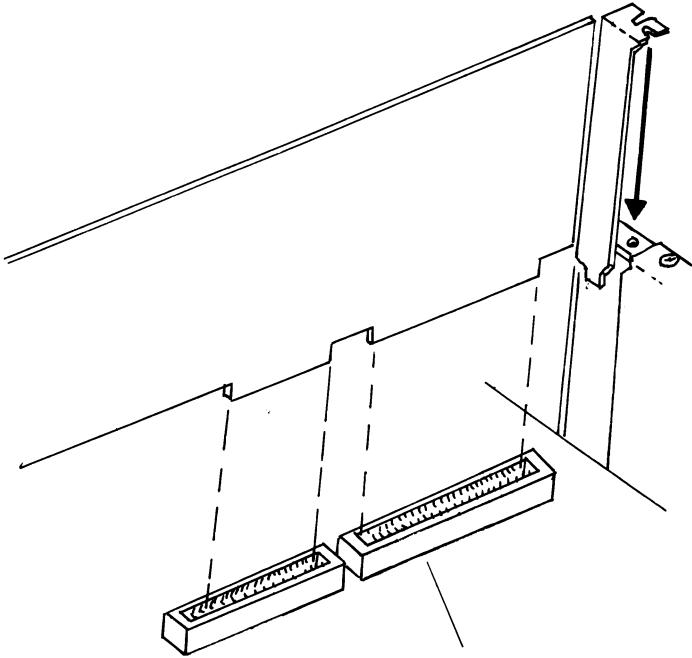
Step 3   Align the slot in the mounting bracket of your
VGA-16 with the screw hole in the rear panel of
the computer case.

Use the screw you removed from the expansion
slot cover to secure your VGA-16 in place.

CLOSING YOUR COMPUTER

OVERVIEW
❑   Close System Unit in usual manner
❑   Reconnect external device cables
❑   Reconnect power to external devices and system unit

Before you close your computer, be sure to:

✓   Review all Installation Steps for accurate completion.

✓   Properly set all switches.

Step 1   Secure ribbon cables by gently pushing them down and out of the way before you replace the system cover.

Step 2   Facing the front of the computer, hold onto both sides of the system cover, and slide the cover towards the rear of the system.

Step 3   Align the cover mounting screws with the screw holes at the rear of the computer. Insert and tighten screws.

Step 4   Reconnect all cables that were previously attached to the rear of the computer.

Step 5   Attach your monitor cable to your VGA-16's 15-pin video connector.

☞   See "Appendix B - Technical Information" if you want more information on cable connectors.

Special Instructions

❑ **For PC/AT owners only:**
Run your computer's "SETUP" Program to complete the installation. Answer setup questions per your configuration.

If you have an IBM PC/AT compatible, check your manual to determine what is required for system setup. If there is a special "IBM EGA/VGA" option in the setup menu, choose this option. If your setup menu has options for "IBM EGA", "Other Display" or "No Display", try each setting to determine the proper configuration.

❑ **For PS/2 and compatibles owners:**
Your system monitor is to be connected to 15 pin "D" shaped video connector at the rear of VGA-16 rather than the system board connector.

❑ **For Multisync/Multiscan owners:**
Set your monitor for "Analog". If necessary, see your Monitor Owner's Manual or check with your display equipment dealer for further instructions about how to do this.

❑ **For Expanded Memory (EMS) Board Owners:**
The VGA-16 uses the memory location designated by the IBM standard for EGA cards ("A000" through "CA7F") for the extended video BIOS. EMS boards can conflict with these locations. Check with the manufacturer of your EMS board for information about designating exclusions for these locations when invoking your EMS driver.

ABOUT YOUR APPLICATIONS SOFTWARE

Your software must run in the appropriate mode for the text and graphics you choose. To run software in VGA-16's extended mode, support must be provided in the software to allow you to choose the VGA-16 extended graphics resolution or text modes and colors.

Once your VGA-16 is installed, see the *Application Software* section of this manual for details on reconfiguring many software programs to take full advantage of your VGA-16's enhanced capabilities (beyond standard VGA) including graphics modes with higher resolution that allow finer detail in drawings and other graphics:

Resolution	Colors	Monitor Timing Vertical	Horizontal
800 x 600	16	56 Hz	35.0 KHz
720 x 540	16	60 Hz	35.0 KHz
752 x 410	16	70 Hz	31.5 KHz
640 x 480	16	60 Hz	31.5 KHz
640 x 400	256	70 Hz	31.5 KHz

VGA-16 INSTALLATION PROGRAM

The VGA-16 can be used with a hard or a floppy disk drive system. If you have correctly set and installed the VGA-16, the DOS prompt will appear on your monitor when you boot up your system. If your system does NOT boot up as you intended, check to see that the installation instructions were properly followed, or refer to *"Appendix C: Troubleshooting the VGA-16 Installation."*

�֎ **Back up the VGA-16 Utility Diskette!**
Before using the VGA-16 Utility Diskette, we strongly recommend that you make a backup copy and store the original in a safe place.

The Installation Program is menu-driven and helps you configure your system for use with the VGA-16. To run the Installation Program:

Step 1   Insert the VGA-16 Utility Diskette in Drive A (or make the Drive with the VGA-16 INSTALL.COM the current Drive/directory).

Step 2   At the DOS prompt, type

```
INSTALL [ENTER]
```

Step 3   Follow the menu instructions.

SCREEN SAVER

VGA-16 Screen Saver "shuts off" your screen display if no key is pressed on your keyboard within some period of time. This feature is described completely in the section beginning on page 32 of this manual.

The *VGA-16 Installation Program* modifies or creates an AUTOEXEC.BAT file that will automatically set up the *VGA-16 Screen Saver* feature when you turn your computer on.

Step 1   Insert the VGA-16 Utility Diskette in Drive A (or make the Drive with the VGA-16 INSTALL.COM the current Drive/directory).

Step 2   At the DOS prompt, type

```
INSTALL [ENTER]
```

Step 3   Choose "Set up VGA-16 Screen Saver" from the VGA-16 Installation Program Menu.

Step 4   Follow the menu instructions.

RAMBIOS Dʀɪᴠᴇʀ

RAMBIOS.SYS allows you to install the VGA-16 BIOS in memory (about 24K memory required) to enable some programs to run faster. Choosing "Install VGA-16 RAMBIOS Driver" from the Installation Program menu adds the necessary device driver command in a CONFIG.SYS file.

The Installation Program will create a CONFIG.SYS file if you do not have one, or will modify your existing file.

Step 1   Insert the VGA-16 Utility Diskette in Drive A (or make the Drive with the VGA-16 INSTALL.COM the current Drive/directory).

Step 2   At the DOS prompt, type

```
INSTALL [ENTER]
```

Step 3   Choose "Install VGA-16 RAMBIOS Driver" from the VGA-16 Installation Program Menu.

Step 4   Follow the menu instructions.

Optional Installation from DOS Prompt

With a Hard Disk:

Step 1   Copy the file "RAMBIOS.SYS" from the VGA-16 Utility Diskette into the root directory on your hard disk.

Step 2   Create/modify your CONFIG.SYS file by adding the following to the first line of the file:

```
DEVICE=C:\RAMBIOS.SYS
```

✓   Refer to your DOS Manual if you need instructions for creating/editing a CONFIG.SYS file.

With a Floppy Drive:

Step 1   Insert the VGA-16 Utility Diskette in Drive A.

Step 2   Insert your DOS boot-up diskette into Drive B.

Step 3   Copy the file RAMBIOS.SYS from the VGA-16 Utility Diskette onto your DOS boot-up diskette.

Step 4   Create/modify your CONFIG.SYS file by adding the following to the first line of the file:

```
DEVICE=A:\RAMBIOS.SYS
```

✓   Refer to your DOS Manual if you need instructions for creating/editing a CONFIG.SYS file.

PART 2: VGA-16 UTILITIES

VGA UTILITY MENU

With the VGA Utility Menu, you can:

❑   Set Screen Saver Options

❑   Select Emulation Mode

❑   Switch Monitor Type

It can be used with a hard or a floppy disk drive system. To run the VGA Utility Menu program :

Step 1   Insert the VGA-16 Utility Diskette in Drive A (or make the Drive with VGA.COM the current Drive/directory).

Step 2   At the DOS prompt, type

```
VGA [ENTER]
```

Step 3   When the VGA menu appears, select the feature option you want.

Additional menus will appear to guide you through procedures for the configuration you want. More details for each feature option follow.

SCREEN SAVER

Feature Description

VGA Screen Saver can extend the life of your monitor by preventing images from being "burned" into your screen due to long periods of inactivity such as when you are away from your computer.

VGA Screen Saver "shuts off" your screen display if no key is pressed on your keyboard within some period of time. (The default setting for time elapsed without activity is five minutes.) Generally, your screen display is returned by pressing any key on your keyboard. Pressing the "NUMLOCK" key is thought to be one of the best choices because this key usually has little or no effect on a program in progress.

You may *not* want to activate Screen Saver if you will use:

- ❏ a mouse and will not be using the keyboard for some time

- ❏ software that causes the screen to "shut off" even when you are using the keyboard (See *"When Software Does Not Work With Screen Saver"* for more information.)

You may want to alter the Timeout Value -- the length of time elapsed before Screen Saver "shuts off" your screen display -- if you use software that combines the use of a pointing device and the keyboard.

You can make adjustments to Screen Saver:

- ❏ with the VGA Utility Program

- ❏ by entering a command at the DOS prompt or from within a batch file

☞ The VGA-16 Screen Saver feature is designed exclusively for use with the VGA-16. It will only work when your video output is directed through the VGA-16. If you have a co-resident adapter and have directed the video output through that board, the VGA-16 Screen Saver feature will have no effect.

Adjusting Screen Saver with the VGA Utility Program

Step 1 Insert the VGA-16 Utility Diskette in Drive A (or make the Drive with VGA.COM the current Drive/directory).

Step 2 At the DOS prompt, type

```
VGA [ENTER]
```

Step 3 Choose *"Set Screen Saver Options"* from the VGA Utility Program menu.

Step 4 Choose the option you want when this menu appears:

```
Screen Saver Options:

1.  Turn Screen Saver ON

2.  Turn Screen Saver OFF

3.  Set Timeout Value

Enter option number:
```

Step 5 Follow the instructions on the screen to return to the menu.

Adjusting Screen Saver from the DOS Prompt

These are the Screen Saver commands and their functions:

VGA SAVE:ON   Enables Screen Saver feature -- turns off the screen when there has been no keyboard activity for 5 minutes.

VGA SAVE:(n)   Enables you to change the number of minutes before Screen Saver turns off the display. The letter "n" represents the number of minutes.

VGA SAVE:OFF   Disables Screen Saver

VGA NOSAVE   Disables Screen Saver

Step 1   Copy the file "VGA.COM" from the VGA-16 Utility Diskette into a directory on your hard disk.

    ✓   Include the directory in the search path if you place VGA.COM in other than your root directory.

Step 2   At the DOS prompt:

❑   to enable the Screen Saver feature, type:

```
VGA SAVE:ON [ENTER]
```

❑   to change the number of minutes before Screen Saver turns off the display, type the following command substituting the number of minutes you want for the letter "n":

```
VGA SAVE:"n" [ENTER]
```

❑   to disable Screen Saver, type:

```
VGA SAVE:OFF [ENTER]
```

```
              or
```

```
VGA NOSAVE [ENTER]
```

When Software Does Not Work With Screen Saver

The VGA-16 Screen Saver feature will not work correctly with software that doesn't pass on your keystrokes properly. You will know this is a problem if:

❑   The screen goes blank while you are using the keyboard.

❑   Striking a key does not return an image to your screen after it has gone blank.

If either of these symptoms occur, try:

❑ Restoring the screen by hitting the NUMLOCK key.

❑ Exiting your program "blind" by using the normal sequence. This allows you to save the work you have done and return to DOS.

❑ Rebooting your machine.

After regaining the screen via one of the above options, disable Screen Saver and resume using your program.

Important Points

☞ To deactivate Screen Saver once it is activated during boot up by your AUTOEXEC.BAT, type:

```
VGA SAVE:OFF
```

☞ To change your setup so that Screen Saver will not be automatically enabled during startup, delete "VGA SAVE:ON" from your AUTOEXEC.BAT file and reboot your system.

☞ To automatically disable Screen Saver whenever you use a program that doesn't work with Screen Saver, use a batch file to invoke the program and include *one* of the following:

```
VGA SAVE:OFF   or   VGA NOSAVE
```

EMULATION MODES

Feature Description

The VGA Emulation Modes are needed for programs that make direct access to the Color Graphics Adapter (CGA) or Hercules Graphics Card (HGC) registers (or ports). You should run your program first, without using the VGA Emulation Modes. An Emulation Mode may be necessary if:

❑ a program that works with a CGA or HGC fails to work properly on the VGA-16

❑ a program's documentation specifically states that the program needs a CGA or HGC

With the exception of HGC compatible software, most programs written since the introduction of EGA do not require the Emulation Modes because they do not make direct access to the CGA registers.

You can enable or disable Emulation Modes:

❑ with the VGA Utility Menu program

❑ by entering a command at the DOS prompt or from within a batch file

About Monochrome Emulation

The Monochrome Mode allows you to configure the VGA-16 to emulate the Hercules Graphics Card (HGC).

The HGC has 64K of video graphics memory. Your VGA-16 can run software written to utilize the graphics capabilities of the Hercules Graphics Card in two ways:

❑ FULL mode, configured to use the full amount of memory (two graphics pages, or 64K)

❑ HALF mode, configured to use half that amount (one graphics page of memory, or 32K).

The advantage of HALF mode is that it allows an IBM compatible CGA card to co-exist with the VGA-16 (in Hercules compatible mode) in another slot. Color output is directed through the co-resident CGA.

About 100% VGA Compatibility

VGA-16 offers extension registers beyond the IBM VGA's standard. Some operating environments are sensitive to the use of these extension registers. In order to prevent the VGA-16 from accessing any extension registers, type:

```
VGA PURE:ON [ENTER]
```

This also prevents the VGA-16 from accessing its extended modes. To enable access to these modes (even if Switch 8 is ON), type:

```
VGA PURE:OFF [ENTER]
```

Enabling/Disabling Emulation Modes with the VGA Utility Program

Step 1   Insert the VGA-16 Utility Diskette in Drive A (or make the Drive with VGA.COM the current Drive/directory).

Step 2   At the DOS prompt, type

```
VGA [ENTER]
```

Step 3   Choose *"Select Emulation Mode"* from the VGA Utility Program menu.

Step 4   Choose the option you want when this menu appears:

```
Emulation Mode Options:


1.  Color Display Options

2.  Monochrome Display Options


Enter option number:
```

Step 5   Follow the instructions on the screen to complete the procedure and to return to the menu.

Enabling/Disabling Emulation Modes from the DOS Prompt

These are the Emulation Mode commands and their functions:

VGA CGA:ON   Configures the VGA-16 to emulate the CGA.

VGA CGA:OFF   Deactivates CGA Emulation.

VGA MONO:ON   Configures the VGA-16 to emulate HGC with 64K of memory. This is the same as VGA MONO:FULL.

VGA MONO:OFF   Deactivates HGC emulation.

VGA MONO:FULL   Configures the VGA-16 to emulate HGC and use 64K (two graphics pages) of memory. *The VGA-16 cannot have a CGA co-resident.*

VGA MONO:HALF   Configures the VGA-16 to emulate HGC and use only 32K (one graphics page). *Use this configuration if you have a co-resident CGA in your system.*

Step 1   Copy the file "VGA.COM" from the VGA-16 Utility Diskette into a directory on your hard disk.

    ✓   Include the directory in the search path if you place VGA.COM in other than your root directory.

Step 2   At the DOS prompt:

❏   to enable CGA Emulation; configure your VGA-16 to emulate the IBM CGA, type:

```
VGA CGA:ON [ENTER]
```

❏   to deactivate CGA Emulation, type:

```
VGA CGA:OFF [ENTER]
```

❏   to enable HGC Emulation; configure your VGA-16 to emulate the Hercules Graphics Card, type:

```
VGA MONO:ON [ENTER]
```

❏   to deactivate HGC Emulation, type:

```
VGA MONO:OFF [ENTER]
```

❏   to enable HGC Emulation -- FULL; configure your VGA-16 to emulate HGC and use the full 64K (two graphics pages) of memory, type:

```
VGA MONO:FULL [ENTER]
```

❏   to enable HGC Emulation -- HALF; configure your VGA-16 to emulate HGC and use only 32K (one graphics page) type:

```
VGA MONO:HALF [ENTER]
```

SWITCH MONITOR TYPE

Feature Description

Your VGA-16 is equipped to work with both color and monochrome analog monitors. While any mode can be run on either kind of monitor, it is necessary to match the monitor type with the emulation mode desired. For example, in order to emulate HGC on a color monitor, you must first switch the monitor type to monochrome. Similarly, in order to emulate CGA on a monochrome monitor, you must first switch the monitor type to color.

You can change the monitor configuration:

❑ with the VGA Utility Menu program

❑ by entering a command at the DOS prompt or from within a batch file

MULTIPLE VGA COMMANDS

VGA commands can be combined on one line (up to 80 characters). You can save time by combining commands. For example:

If you want to configure your VGA-16 to emulate CGA and, at the same time, set the SAVE feature for a 15 minute delay, you would type:

```
VGA CGA:ON SAVE:15 [Enter]
```

BACKWARDS COMPATIBILITY

Feature Description

The VGA-16 will run most programs written for any of the popular IBM graphics standards: EGA, CGA, and HGC.

EGA Compatibility

The VGA-16 is fully BIOS compatible with the EGA. Because the EGA and the VGA are very closely related at the hardware level, BIOS-level compatibility enables virtually all EGA software to run without problems. Should you experience difficulties, you should contact the software manufacturer to see if their software package requires an update to work properly on a VGA.

CGA Compatibility

In order to run CGA-specific programs, CGA emulation must be turned on with the VGA.COM program. (See page 13.) You will know that you are in emulation mode because the VGA-16 uses a different text font when emulating CGA. Running a program which accesses a mode not available on the CGA will automatically switch you back into VGA mode. Before running another CGA program, you must again use the VGA utility program to re-enable CGA emulation.

HGC Compatibility

While in HGC emulation, the VGA-16 will automatically switch into VGA mode if a mode is accessed which is not available on the HGC. Before running another Hercules program, you must again use the VGA utility program to re-enable HGC emulation.

VGAANSI.SYS

The DOS ANSI.SYS device driver will only work with standard text modes (40 x 25 and 80 x 25). Your VGA-16 Utility Diskette includes a VGAANSI.SYS device driver that provides support for standard modes as well as all VGA-16 extended text modes.

Using VGAANSI.SYS

� If your CONFIG.SYS file includes the command:

```
DEVICE=[directory]ANSI.SYS
```

you must remove it when adding VGAANSI.SYS.

To use VGAANSI.SYS; allow use of all the VGA-16 modes:

Step 1   Copy the file "VGAANSI.SYS" from the VGA-16 Utility Diskette into the root directory on your hard disk.

Step 2   Create/modify your CONFIG.SYS file by adding the following to the file:

```
DEVICE=C:\VGAANSI.SYS
```

✓   Refer to your DOS Manual if you need instructions for creating/editing a CONFIG.SYS file.

Step 3   Reboot your computer for the change to take effect.

DIRECTORY LIST UTILITY

The VGA Directory Listing Utility takes advantage of the entire screen. This utility can be used in any mode and displays directory information in as many columns as can be accommodated on the screen.

Step 1   Copy the file "DU.COM" from the VGA-16 Utility Diskette into a directory on your hard disk.

    ✓   You may wish to include the directory in the search path if you place DU.COM in other than your root directory.

Step 2   At the DOS prompt, to get a list of all files in the current directory, type:

```
DU [ENTER]
```

You can:

❑   use `[Esc]` to stop the resulting display;

❑   pause the display by pressing any key except `[Esc]`;

❑   specify multiple search strings on the command line. For example:

```
DU *.exe *.com [ENTER]
```

❑   display only sub-directories by using the option **/d** on the command line like this:

```
DU /d [ENTER]
```

❑   display the contents of a sub-directory by using
    wildcards after the sub-directory name. For
    example, for the contents of \MYFILE, type:

```
DU \MYFILE/*.* [ENTER]
```

❑   include hidden files with the display of a
    directory's contents by using the option **/h** on the
    command line. Include a space before typing
    "/h" like this:

```
DU /h [ENTER]
```

❑   include system files with the display of a directory's
    contents by using the option **/s** on the command
    line. Include a space before typing "/s" like this:

```
DU /s [ENTER]
```

ENHANCED MODE CLEAR SCREEN UTILITY

To clear the entire screen in any text mode, type:

```
CLR [ENTER]
```

SETTING TEXT MODES

The VGA-16 Utility Diskette includes a program called *Enhancement Selection Utility (ESU)* that allows you to change text modes very easily. You can set a text mode by using the menu driven feature of ESU or by entering commands at the DOS prompt.

Setting Text Modes with the ESU Menu

Step 1 Insert the VGA-16 Utility Diskette in Drive A (or make the Drive with ESU.COM the current Drive/directory).

Step 2 At the DOS prompt, type

          ESU [ENTER]

Step 3 Choose the type of monitor you are using from the list presented.

�֎ *DO NOT choose Variable Frequency Monitor unless you are using one of these monitors. Setting up to use the modes available with these monitors can cause damage to a system using other monitors.*

Step 4 A list of text modes available for the monitor you choose will appear. Choose the text mode you want.

Setting Text Modes from the DOS Prompt

Step 1   Copy the file "ESU.COM" from the VGA-16 Utility Diskette into a directory on your hard disk.

Step 2   At the DOS prompt, type:

```
ESU /[mode number from below] [ENTER]
```

List of Text and Graphics Mode Numbers

☞ This list can also be accessed through DOS by typing:

```
ESU /? [ENTER]
```

Mode	Resolution	Colors	Monitors	Type
40	80 x 43	16	VFD, AD	Text
43	80 x 60	16	VFD, AD	Text
44	100 x 60	16	VFD, AD	Text
60	752 x 410	16	VFD, AD	Graphics
61	720 x 540	16	VFD	Graphics
62	800 x 600	16	VFD	Graphics
66	640 x 400	256	VFD	Graphics

Monitors: AD -   Analog Display
VFD -   Variable Frequency Display

DIAGNOSTICS PROGRAM

The Diagnostics Program on the VGA-16 Utility Diskette will help you spot problems that may occur with your display adapter. The program is run from the DOS prompt by typing:

```
VGADIAG [ENTER]
```

First, the Diagnostics program will display:

❑   The amount of video memory available on your VGA-16. This should be 256kB.

❑   Primary and secondary graphics adapters

❑   Monitor configurations

❑   Motherboard ROM Date

❑   VGA-16 BIOS Date/Version

❑   Switch Settings

If the information shown is incorrect, refer to Appendix C - Troubleshooting Your VGA-16 Installation. Then run the Diagnostics program again.

If the information shown is correct, continue with the program. You will be shown a series of self-explanatory screens demonstrating various attributes and capabilities of the VGA-16.

If the Diagnostics program indicates a problem, refer to Appendix C - Troubleshooting Your VGA-16 Installation. Run the Diagnostics program again.

PART 3: APPLICATION SOFTWARE

INTRODUCTION

The capabilities of the VGA-16 go beyond the VGA standard. Your new VGA-16 can:

❑ drive a variable frequency display in an extended graphics mode with 800 x 600 dot resolution and 16 simultaneous colors.

❑ display 256 color graphics in 640 x 400 dot resolution on any supported monitor

To take advantage of these enhancements, your VGA-16 is packaged with software support for several popular software programs. This section describes the procedures necessary to configure these programs and/or install special drivers to give you the best performance from your software.

The applications programs described are:

❑ AutoCAD and AutoShade

❑ Lotus 1-2-3 and Symphony

❑ Windows 2.0x
(*All* applications that run under Windows will take full advantage of your VGA-16.)

Before You Begin

�֍ *To avoid damage* to your monitor and other parts of your computer system, be sure you have correctly installed the VGA-16 before you attempt to configure the software as described in this section.

☞ VGA-16's extended 800 x 600 graphics resolution requires a variable frequency monitor such as the NEC MultiSync or Sony MultiScan.

Graphics resolutions beyond 640 x 480 are not supported on the IBM PS/2 8503, 8512, 8513, or 8514 monitors or compatible displays.

☞ You may have to adjust the horizontal and vertical size and position controls when using extended resolution modes.

AutoCAD

The AutoCAD drivers enable AutoCAD users to use the
VGA-16 to produce high resolution graphics. There are two
drivers provided on the VGA-16 Utility Diskette.
VGAREL9.COM and VGAADI2.COM are for AutoCAD
Release 9 and AutoCAD version 2.18 or above. The
VGAREL9.COM driver supports the new ADI version 3 and
above interface. It supports Fast Vector mode and Packet
modes of the version 3 ADI interface. The VGAREL9.COM
AutoCAD driver also supports AutoShade and AutoSketch.

The instructions which follow assume that you have copied
the files VGAREL9.COM, VGAADI2.COM, and
VGAINST.COM to your hard disk. The following instructions
refer explicitly to the VGAREL9.COM driver. The operation
of the VGAADI2.COM driver is identical to VGAREL9.COM
and the same instructions should be followed for both.

AutoCAD Release 9 Installation

The Release 9 AutoCAD ADI driver comes with one AutoCAD display driver and an installation program. The installation program allows you to change the currently selected resolution of AutoCAD's graphics screen, as well as modify the software interrupt vector used by AutoCAD to communicate with the ADI display driver, and finally to modify the colors used in several areas of the AutoCAD graphics screen.

Before you can begin working with AutoCAD you must load the ADI driver into your computer's memory. This procedure must be done, every time you turn your computer on, or when you perform a warm boot. It is therefore suggested that the command to load the ADI driver be placed in your AUTOEXEC.BAT file.

To install the ADI driver, type:

```
VGAREL9 [ENTER]
```

This command will load the ADI driver into the computer's memory. The driver will then display identification information on the screen, and confirm that it has been installed. The driver will also notify you as to which interrupt vector will be used to communicate with AutoCAD.

AutoCAD ADI Configuration

AutoCAD need only be configured for the ADI General
Display Driver once. Even if you turn off your computer or
reboot it, AutoCAD will remember that the ADI General
Display Driver has been installed. Follow the procedure
outlined below to configure AutoCAD:

Step 1   Start AutoCAD as described in the documentation
supplied with that program.

Step 2   When AutoCAD's Main Menu appears, select:
"Configure AutoCAD".

This will be done automatically if AutoCAD senses
that it has not yet been configured. If you have
not copied the AutoCAD device driver files,
AutoCAD will ask you where the display device
drivers can be found. Place the VGA-16 Utility
Diskette with the AutoCAD drivers into drive A and
respond by typing:

                    A: [ENTER]

Step 3   After reviewing you current configuration, press
the [ENTER] key.

Step 4   Select: "Configure Video Display".

Step 5   Enter: Y (select different video display)

Step 6   Enter: 1 (chooses ADI)

Step 7   AutoCAD will ask you a series of questions, press
the [ENTER] key for each choice. Consult the
AutoCAD Installation & Performance Guide for
more details on these options.

Step 8   Enter: Y (to save configuration)

AutoShade ADI Configuration

The following AutoShade instructions are applicable to the
VGAREL9.COM driver only. When AutoShade is first run it
will request some information from you in order to properly
configure itself.

When AutoShade requests the selection of the Display
Device simply respond with a "1" (AutoDesk Device
Interface rendering driver). The interrupt vector initially
used should be "7ah" and should correspond to the
interrupt vector to which the ADI driver has been
configured.

When AutoShade requests you to select the Rendering
Display Device, again enter "1" (AutoDesk Device Interface
rendering driver). Use the default "7ah" interrupt driver as
outlined above. Respond to the question "Do display and
rendering devices share a single screen?" with "YES".

Controlling Resolution and Colors

The VGA-16 AutoCAD ADI driver allows you to choose different screen resolutions, colors, and interrupt vectors through the use of the Install Program (VGAINST.COM).

Step 1   At the DOS prompt, type:

```
VGAINST [ENTER]
```

This command will run the VGA-16 install program. The install program should respond by putting an introductory message on the computer screen. The install program will prompt you for several responses.

Step 2   Enter name of driver to be modified (VGAREL9.COM):

The text contained between the brackets will be the default response. To accept the default response simply press the [ENTER] key. The name of the driver is required because the install program will modify both the memory resident version of the ADI driver and the file on your hard disk. This way any changes you make now will be remembered for all future sessions with AutoCAD. You may wish to create several different versions of the driver to support different resolutions or colors. To do this simply copy the supplied driver to a file with a different name and then modify it to the desired settings.

Step 3   You will then be prompted for an interrupt vector number. The only reason you will ever want to modify this interrupt vector is if the default value conflicts with some other software you might have in your system. The supplied default will work correctly under most circumstances.

Step 4   You will see:

```
Resolution Data
Current Resolution is (640 x 480)
Available Resolutions are:
    1:  640 x 480 by 16 colors
    2:  752 x 410 by 16 colors
    3:  640 x 350 by 16 colors
    4:  720 x 540 by 16 colors
    5:  800 x 600 by 16 colors

Enter desired resolution [0=current]:
```

☞ The list of available resolutions may change as higher resolutions and more colors are supported within the driver.

Step 5   The following three choices are for experienced AutoCAD users. We suggest that you use the defaults.

```
Configuration Data
Enter desired number of Status Lines [1]:
Enter desired number of Screen Menu
    Characters [8]:
Enter desired number of Command Prompt
    Lines [3]:
```

Step 6   Supply the screen colors as requested. This chart shows the numbers and the colors available:

Number	Color
0	black
1	red
2	yellow
3	green
4	cyan
5	blue
6	magenta
7	white

For the Graphics Area Background color of the drawing area, you may select either a dark (black) or a light graphics area background. If you select a light graphics area background, then lines drawn in color 7 will be drawn in black instead. This choice most closely resembles a black ink drawing on paper. Graphics area and text area background colors are applicable only to the VGAREL9.COM driver.

Some of the colors you will be selecting will not correspond to the table listed above. This is because the color you are selecting will be XOR'd with the color it is overlaying. In particular this is true of the XOR color, the Menu Highlight color, the grid dot color, and the cursor color. With some experimentation you will be able to control these colors easily and selection will not be too difficult.

It is possible to change the screen colors while you are in AutoCAD. Use the AutoCAD SHELL command and run VGAINST.COM and then type "EXIT" to return to AutoCAD.

Lotus 1-2-3 and Symphony

☞ Lotus drivers included on your VGA-16 Utility Diskette require Lotus 1-2-3 Version 2.0 or later or Symphony.

Step 1   Make a backup copy of the 1-2-3 or Symphony Utility diskette. Use the backup diskette throughout these steps.

Step 2   Copy the following files from the VGA-16 Utility Diskette to the 1-2-3 or Symphony backup Utility diskette:
GD640V20.DRV
GD752V20.DRV
GD800V20.DRV
VD80X60.DRV
VD100X60.DRV

Step 3   Place the 1-2-3 or Symphony Utility diskette in Drive A and type:

```
INSTALL [Enter]
```

Step 4   Follow screen directions to **MAIN MENU**. Select:

```
ADVANCED OPTIONS [Enter]
```

Then select:

```
ADD NEW DRIVERS TO LIBRARY [Enter]
```

Follow directions to add drivers.

Step 5   Return to the **ADVANCED OPTIONS** menu. Select:

```
MODIFY CURRENT DRIVER SET [Enter]
```

Then select:

```
GRAPHICS DISPLAY [Enter]
```

The display will list all drivers available. Select the driver you wish to install.

Step 6   Select:

```
SAVE CHANGES [Enter]
```

Follow the instructions to name the new driver set or make it the default driver set.

Step 7   After changes have been saved, follow instructions to exit the INSTALL program.

WINDOWS 2.0x

Step 1   Place Microsoft Windows Setup diskette in Drive A
and type:

```
SETUP [ENTER]
```

Step 2   Run Setup Program as described in the Microsoft
Windows documentation.

Step 3   When asked for type of display adapter, choose
"other" and place the VGA-16 Utility Diskette in
Drive A.

Step 4   Follow directions provided on your screen.

Appendix A:

Two Monitor Systems

You have the option of using another video adapter and monitor in conjunction with the VGA-16 and associated monitor. The VGA-16 will only work with certain combinations of an additional video card/monitor.

✱ DO NOT use any EGA or VGA card as a second adapter when using the VGA-16

You may use either a monochrome display adapter (MDA) or a Hercules Graphics Adapter (HGA) with a monochrome monitor. You may also use a Color Graphic Adapter (CGA) with either a RGB or EGA color monitor.

☞ **The capability of your VGA-16 and Primary Display is altered by the type of second display adapter/monitor combination.**

All Display Adapters use a portion of a computer's memory for color and monochrome attributes. The simple concept to remember is that *in your computer'smemory, you cannot have two things occupying the same space*:

❑ If your second display adapter/monitor combination is color, then the color capability of your VGA-16/monitor will not be available.

❑ If your second display adapter/monitor combination is monochrome, then the monochrome capability of your VGA-16/monitor will not be available.

APPENDIX B:

TECHNICAL INFORMATION

Connector Pinouts

Video port connector pinout:

Pin	Function
1	Red Video
2	Green Video
3	Blue Video
4	Monitor ID Bit 2
5	not used
6	Red Return (ground)
7	Green Return (ground)
8	Blue Return (ground)
9	Key (no pin)
10	Sync Return (ground)
11	Monitor ID Bit 0
12	Monitor ID Bit 1
13	Horizontal Sync
14	Vertical Sync
15	not used

Programmer's Information

The VGA-16 supports all the standard graphics and text modes and several proprietary extended modes:

Mode	Resolution	Colors	Monitors Supported
40	80x43	16	Variable Frequency and Analog Display
43	80x60	16	Variable Frequency and Analog Display
44	100x60	16	Variable Frequency and Analog Display
60	752x410	16	Variable Frequency and Analog Display
61	720x540	16	Variable Frequency
66	640x400	256	Variable Frequency

The interface to these modes is:
   Input
   AH = 6Fh
   AL = 05h
   BL = MODE NUMBER (see list above)

☞ The following books may be of further assistance for programming:

   EGA/VGA - A Programmers Reference Guide,
   Bradley Kliewer
     Intertext Publications
     McGraw-Hill Book Company
     11 W. 19th, New York, NY 10011
   Copyright 1988

   Programmer's Guide to PC and PS/2 Video Systems,
   Richard Wilton
     Microsoft Press
     16011 N.E. 36th Way, Box 97017
     Redmond, WA 98073
   Copyright 1987

APPENDIX C:

TROUBLESHOOTING

THE VGA-16 INSTALLATION

Step 1   Make sure the VGA-16 is firmly seated in its expansion slot, and that it is not touching other boards in your system.

Step 2   Check the monitor cable to insure that it is properly connected to the VGA-16, and that it has the proper "pinout" configuration.

Step 3   Make sure your computer is an IBM PC XT, PC/AT, or a PS/2 Model 30, or 100% compatible.

Step 4   If an IBM PC, check that your ROM BIOS module is up to date. See "VGA-16 Compatibility With Your Computer" section in this User's Guide for information on how to find out the date of the ROM BIOS module installed in your system.

Step 5   Check your computer's switch and jumper settings, and those on the VGA-16 to insure that all settings are correct for your computer system.

Step 6   Check your software. The VGA-16 can emulate five different display adapters. Be sure you are using the correct software configuration.

Step 7   Check your monitor. The VGA-16 can work with a number of different monitor types. Be sure you have the VGA-16 configured for the monitor you are using.

Commonly asked questions about monitors:

Q. *Why does the picture shift when changing modes on my multiple frequency monitor with my VGA-16?*

A. Some multiple frequency monitors don't synchronize properly to the signals coming from the graphics board, so the image seems to shift. *To rectify this situation, simply adjust the horizontal and vertical positions to center the image.*

Q. *Why does the image take a few moments to "settle" on the screen when changing modes or when first turned on?*

A. It is normal for any monitor to "warm-up" for at least 30 minutes before producing a completely stable image. If the monitor has been on for longer than 30 minutes and still produces a "shaky" image that doesn't settle for a few moments, the reason is that the monitor is not synchronizing properly to the signals coming from the graphics board. (See the question/answer above.)

Step 8 Make sure you are using the correct VGA.COM commands when in HGC or CGA compatibility modes.

Step 9 Run VGA-16 Diagnostics Program.