

The VGA video expansion adapter features:

- \* Full IBM Personal System/2 VGA Display adapter compatibility.
- \* Support of 132-column text modes.
- \* A color palette of more than 262,000 possible colors
- \* Compatibility with Tandy's VGM-100, VGM-200, and VGM-300 monitors, as well as equivalent monitors.

NOTE: The 132 column modes might require special software. Check to see whether your application software supports these modes.

#### MONITOR AND SOFTWARE COMPATIBILITY

The VGA adapter is compatible with software written for the following video standards on color or monochrome VGA analog monitors:

- \* VGA (Video Graphics Array)
- \* MCGA (Multi-Color Graphics Array)
- \* EGA (IBM Enhanced Graphics Adapter)
- \* CGA (IBM Color Graphics Adapter)
- \* MDA (IBM Monochrome Display Adapter)
- \* Hercules graphics (Hercules Graphics Card)

To emulate one of these standards, use the VGA.EXE utility found on the Utilities Diskette. This utility is discussed in SETUP.

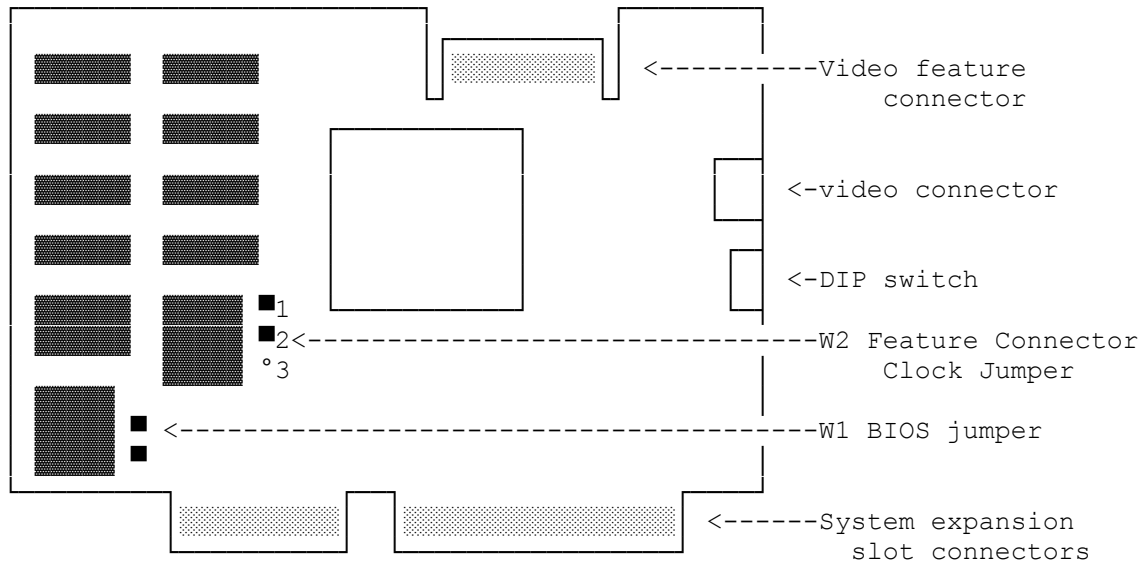
#### DEFAULT CONFIGURATIONS

The VGA adapter defaults to monochrome text mode for a monochrome monitor (or equivalent) or to 80 column color text mode for a color monitor. The VGA.EXE utility enables you to switch between color and monochrome modes.

DIP Switch	Default Position	Note
1	OFF	ON is for special multi-frequency displays.
2	OFF	ON enables monochrome modes on color monitors.
3	OFF	Not used.
4	ON	ON=16-bit operation with AutoSense enabled. OFF=8-bit operation with AutoSense disabled.

The primary video adapter configuration is set to color. If you replace the VGA adapter with a monochrome or CGA video display adapter, you need to run the Setup Utility to switch the configuration to monochrome. If you replace the VGA adapter with an EGA adapter, it is not necessary to run the Setup utility.

## VGA Board Layout



- \* VIDEO CONNECTOR. Connect your VGA-compatible monitor to this 15-pin socket. The VGA adapter supports monochrome VGA and RGB VGA analog monitors.
- \* DIP SWITCH. The switches on this four-section DIP switch define the video configuration of your computer.
- \* VIDEO FEATURE CONNECTOR. This connector is provided to maintain complete compatibility with the IBM VGA standard. Normally, there will be no need to use this connector. It is reserved to support future enhancements.
- \* FEATURE CONNECTOR CLOCK JUMPER (W2). This jumper activates and deactivates Video Feature Connector. The default jumper setting (pins 1 and 2 connected) enables 132-column text modes and disables the video feature connector. Changing the jumper setting so that pins 2 and 3 are connected disables the 132-column text modes and enables the Video Feature Connector. NOTE: Leave this jumper in the default setting for normal system use.
- \* SYSTEM EXPANSION SLOT CONNECTORS. These connectors plug into the expansion slots inside your computer.

## Monitor and Software Compatibility

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- \* VGA (Video Graphics Array)
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- \* EGA (IBM Enhanced Graphics Adapter)
- \* CGA (IBM Color Graphics Adapter)
- \* MDA (IBM Monochrome Display Adapter)

\* Hercules graphics (Hercules Graphics Card)

## 132-COLUMN TEXT

The VGA adapter supports text modes that are 132 columns wide. These modes provide screen formats of 132 characters by 25 or 43 lines. (Standard text format is 80 characters by 25 lines.)

Check to see whether your application software supports these modes.

## Default Configurations

The VGA adapter automatically configures itself to VGA text mode when you turn on your system. Specifically, it defaults to monochrome text mode for a monochrome monitor (or equivalent) or 80-column color text mode for a color monitor. The vga.exe utility, described later in "VGA Adapter Software," enables you to easily switch between color and monochrome modes. If you will be using the VGA adapter with a second video adapter/monitor combination, refer to "Systems Using Two Monitors" for information on the limitations of such configurations.

## OPERATION

Most application software that is designed for VGA or EGA video support will run automatically on your computer system with VGA. Just turn on the computer, and install the application package as instructed by the software manufacturer.

## CONFIGURING THE SOFTWARE

Many application software packages include a setup, installation, or configuration program to prepare the application with the particular hardware that you are using. Most newer software will be able to run in the default VGA configuration for the VGA adapter.

Because some software packages are written specifically for certain non-EGA, non-VGA video hardware, you might need to configure the VGA adapter to emulate the video adapter need by the software.

STANDARD VIDEO MODES		
Mode (text or graphic)	Resolution (columns by rows)	Simultaneous (colors [1]/ mapping[2])
VGA, EGA, and MCGA modes (startup defaults)		
Monochrome Text	80 x 25	-/monochrome
Color Text	80 x 25 40 x 25	16/color 16/color
132-Column Text [4]	132 x 25 132 x 43 132 x 25 132 x 43	16/color 16/color -/monochrome -/monochrome
Graphics	320 x 200 [3] 640 x 200 [3]	4/color 2/color

	320 x 200 [3] 640 x 200 [3] 640 x 350 640 x 350 320 x 200 [3] 640 x 480 640 x 480	16/color 16/color 16/color -/monochrome 256/color 2/color 16/color
CGA mode		
Color Text	80 x 25 40 x 25	16/color 16/color
Color Graphics	320 x 200 [3] 640 x 200 [3]	4/color 2/color
Hercules Graphics mode and MDA mode		
Monochrome Text	80 x 25	-/monochrome
Monochrome Graphics	720 x 348	-/monochrome
<p>[1] Simultaneous colors refers to the number of colors or shades that can be displayed at one time.</p> <p>[2] Simultaneous mapping refers to the type of old-style display for which the mode was originally designed.</p> <p>[3] 200-line vertical resolution modes are double-scanned to display 400 lines on the screen.</p> <p>[4] You might need application-specific drivers to operate in these modes.</p>		

#### SOFTWARE TIPS

- \* The best-looking display can usually be achieved by selecting the highest resolution mode available when you install your application software packages.
- \* Some applications automatically detect the type of video adapter and monitor combination installed and configure themselves to take best advantage of the available hardware.
- \* If your software specifies that it is VGA, PS/2 video, or EGA, install the software for the appropriate adapter. This enables your software to run on your VGA adapter in the adapter's startup configuration.
- \* If your software does not specify a VGA, PS/2 video, or EGA option and you are using an RGB color analog monitor, try installing the software for color, if available. This usually works with your VGA adapter's default color mode on color monitors.
- \* To enable the VGA adapter to run software that will not run on VGA hardware, you must configure the VGA adapter to operate in

another mode (such as CGA or Hercules), using the VGA.EXE utility.

- \* Hercules-compatible software and CGA-compatible games require using the VGA.EXE utility to set the VGA adapter to the appropriate video standard.
- \* Software that requires a certain video mapping may require you to use the VGA.EXE utility to set the VGA adapter to color or monochrome text as needed. For example, if the VGA adapter was set for color VGA text mode and you want to run software that requires monochrome text, you can use the VGA.EXE utility to switch modes.
- \* The VGA adapter default mapping depends on the type of monitor being used. If you are using the color monitor, the default mapping will be color. If you are using the monochrome monitor, the default mapping will be monochrome.

#### VGA Adapter Software

Normally, the default video standard for the VGA adapter is VGA. If a program requires mapping standards that are incompatible with VGA, you can use the vga.exe utility on the Utilities Diskette to override the VGA setting. Vga.exe enables you to choose from the VGA, CGA, and Hercules standards.

You can also use a LOCK command to make your particular configuration the new default mode (instead of VGA mode).

In addition, the vga.exe utility switches between color and monochrome VGA mapping modes.

If you have a hard disk installed, you can copy the vga.exe utility to the hard disk. We recommend making a backup copy of the VGA utility.

To access vga.exe:

1. Start up your computer.
2. At the MS-DOS prompt, insert the Utilities Diskette into Drive A.
3. Type a:vga. Then press ENTER.

A simple menu appears, listing some of the options available.

4. Use the up and down direction keys on your keyboard to select your desired feature, and then press ENTER. Choose Exit or press ESC to exit and return to the operating system.

If you wish, you can bypass the vga.exe menu by including the desired option when accessing vga.exe. Use one of the following commands either at the MS-DOS prompt or in a batch file.

VGA VGA - Sets the VGA adapter to VGA mode (the default configuration).

VGA CGA - Sets the VGA adapter to CGA mode. This mode emulates the video capabilities of the IBM Color/Graphics Adapter. Press CTRL+ALT+DEL to return to VGA mode.

VGA MDA - Sets the VGA adapter to emulate the Hercules Graphics Card with no graphics memory allocated. This configuration is equivalent to IBM's text-only Monochrome Display Adapter. Press CTRL+ALT+DEL to return to VGA mode.

VGA HERC - Sets the VGA adapter to emulate the Hercules Graphics Card with one page of graphics memory allocated. This configuration is equivalent to using the Hercules HGC HALF command. Press CTRL+ALT+DEL to return to VGA mode.

VGA HERC1 - Sets the VGA adapter to emulate the Hercules Graphics Card with two pages of graphics memory allocated. This configuration is equivalent to using the Hercules HGC FULL command. Press CTRL+ALT+DEL to return to VGA mode.

VGA COLOR - Changes the VGA adapter to color mapping as needed. This setting supports video modes that require color mapping.

VGA MONO - Changes the VGA adapter to monochrome mapping as needed. This setting supports video modes that use monochrome mapping (such as monochrome text mode).

VGA 13225 - Switches the VGA adapter to 132-column, 25-line color text mode. This mode is only for specific application programs that have been designed to take advantage of this mode's extended text capabilities.

VGA 13243 - Switches the VGA adapter to 132-column, 43-line color text mode. This mode is only for specific application programs that have been designed to take advantage of this mode's extended text capabilities.

VGA LOCK - Locks in the current video configuration as the new default configuration. This command can also be used in conjunction with another parameter to lock in that particular mode. For example, the command VGA CGA LOCK will enable the VGA adapter to survive a reboot with the VGA adapter configured as a color/graphics adapter. Any specific video mode command such as VGA CGA unlocks the VGA adapter unless you include LOCK in your particular command. If you enter an incorrect VGA command, the program displays a prompt and gives you the option of using the vga.exe menu or returning to MS-DOS.

The LOCK option does not work with either the 13243 option or the 13225 option.

#### Mouse Users

If you are installing your mouse driver using a program such as mouse.com, or you already have your mouse driver installed through the config.sys file, you may have problems using the vga.exe utility to switch to non-VGA Hercules, CGA, or MDA mode.

When using the Microsoft Mouse driver Version 6.1, you need to use a special procedure to switch from VGA mode to Hercules mode or CGA mode. Choose Set Hercules Mode, and then select the Reboot System in Current Mode option. This option allows your system to reinitialize in the currently selected video mode. At this point, reinstall your mouse. (If your mouse is installed in config.sys, it will reinstall automatically.)

Use the following procedure to switch from VGA to CGA, MDA, or Hercules mode when the mouse driver is installed.

1. At the vga.exe menu, select your desired option. (Set CGA, Hercules, or MDA.)
2. Choose the Reboot System in Current Mode option. The system restarts. Reload any drivers or TSR utilities you want to run.
3. To return to VGA mode, run the vga.exe utility and select a VGA option.

Refer to your mouse installation guide for further instructions.

#### Notes:

- \* Using the Reboot System in Current Mode option is equivalent to activating the vga.exe utility's Lock Current Mode option and then pressing CTRL+ALT+DEL. Subsequent restarts cause the VGA adapter to come up in the selected mode (Hercules, MDA, or CGA). Using the vga.exe utility to select any other mode causes subsequent restarts to come up in the default VGA mode.
- \* The Reboot System in Current Mode option can be accessed from the MS-DOS command line or through an MS-DOS batch file by using the REBOOT parameter. For example, to switch from VGA mode to Hercules mode when the mouse driver has been loaded, use the following command:  
VGA HERC1 REBOOT

#### SYSTEMS USING TWO MONITORS

The VGA adapter may be used with a second video adapter and monitor combination. The second video adapter/ monitor pair must be either a monochrome display/ adapter and a monochrome monitor, or a color/graphics adapter and an RGB color monitor. These are the only multiple monitor and video adapter installations that will work with the VGA adapter.

#### NOTES:

- \* When you install the VGA adapter with another video adapter, you are restricted to modes that do not conflict with those of the complementary video adapter. IBM-compatible computer systems allow only one video adapter to be mapped as a monochrome adapter and one to be mapped as a color adapter.
- \* If you use the VGA adapter with a monochrome display adapter, the VGA adapter is limited to color-mapped modes. The monochrome VGA modes, Hercules graphics, and MDA modes will not

be available on the VGA adapter.

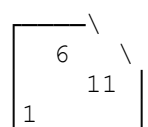
- \* If you use the VGA adapter with a color/graphics adapter, the VGA adapter will be limited to monochrome operation. Color modes will not be available on the VGA adapter.
- \* The VGA adapter is always the primary video display adapter. Whenever you start or reset your computer, the VGA adapter is always the default display.
- \* Use the MS-DOS MODE.EXE command to switch between the two video adapters.
- \* Whether you are installing one or two video adapters in a computer, always run the Setup utility as if you are installing an EGA adapter or a VGA adapter.
- \* Do not use two VGA or EGA adapters together. If one adapter in a two-monitor system is VGA or EGA, the other adapter must be something other than VGA or EGA.

#### TROUBLESHOOTING

Symptom	Solution
1 long beep and 2 short beeps when you turn on the system.	* The VGA adapter is not properly seated in the expansion slot is dirty. Reseat the VGA adapter, or clean the connectors with a clean pencil eraser.
No display	* The monitor and/or power cable is not properly plugged in. * The monitor is not turned on. * The brightness and/or contrast control on the monitor is not turned up far enough.
F1 SETUP error when you start up the system.	* The Setup utility was not run.
Distorted images or a blank screen when you run your software.	* The software is not configured or compatible with the VGA graphics adapter's current video configuration. Run VGA.EXE.

#### Video Port Connector Pin Out

Pin	Function
1	Red Video
2	Green Video
3	Blue Video
4	Monitor ID Bit 2 (not used)





5	Ground	7
6	Red Return (ground)	12
7	Green Return (ground)	2
8	Blue Return (ground)	8
9	Key (no pin)	13
10	Sync return (ground)	3
11	Monitor ID Bit 0 (Not Used)	
12	Monitor ID Bit 1 (Not Used)	14
13	Horizontal Sync	4
14	Vertical Sync	10
15	Not Used	15
		5 /
		/

Monochrome-type monitors use Green Video for all video input and ignore Red Video and Blue Video. Monitor ID Bits are not Used. The monitor type is determined when your system is turned on.

Video Feature Edge Connector Pinout			
Front		Back	
Pin	Function	Pin	Function
Y1	C0 color bit 0	Z1	GROUND
Y2	C1 color bit 1	Z2	GROUND
Y3	C2 color bit 2	Z3	GROUND
Y4	C3 color bit 3	Z4	SELECT INTERNAL VIDEO
Y5	C4 color bit 4	Z5	SELECT INTERNAL SYNC
Y6	C5 color bit 5	Z6	SELECT INTERNAL DAC
Y7	C6 color bit 6	Z7	NOT USED
Y8	C7 color bit 7	Z8	GROUND
Y9	DAC CLOCK	Z9	GROUND
Y10	DAC BLANKING	Z10	GROUND
Y11	EXT HORZ SYNC	Z11	GROUND
Y12	EXT VERT SYNC	Z12	NOT USED
Y13	GROUND	Z13	NOT USED