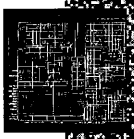
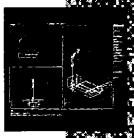
VERTICOM

HX

SERIES

WORKSTATION GRAPHI PERSONAL COMPUTERS

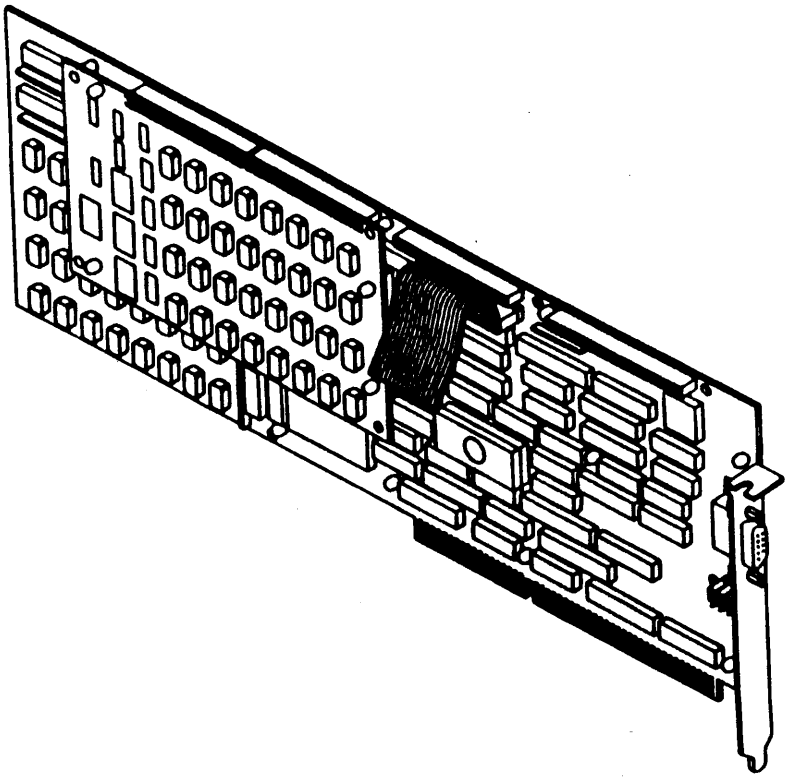




OWNER'S MANUAL

Verticom

HX-Series Display Adapter



Owners Manual

FCC Notice:

Certified to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules. See instructions if interference to radio reception is suspected.

Warning: This equipment generates and uses radio frequency energy and if not installed and used properly, that is, in strict accordance with manufacturer's instructions, may cause interference with radio and television reception. It has been type tested and found to comply with the limits for a Class A computing device in accordance with the specifications in Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient the receiving antenna.
- Relocate the computer with respect to the receiver.
- Move the computer away from the receiver.
- Plug the computer into a different outlet so that the two devices are on different branch circuits.

If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions. The user may find the following booklet prepared by the Federal Communications Commission helpful:

"How to Identify and Resolve Radio-TV interference problems." This booklet is available from the U.S. Government Printing Office, Washington, DC 20402, Stock No. 004-000-00345-4

Please note: In order for an installation of this product to maintain compliance with the limits for a Class A device, shielded cables must be used for the connection of any devices external to this product.

Table of Contents

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Introduction

Scope of this Manual

This manual is designed to enable both experienced and novice computer users to install their Verticom HX-Series display adapter into a computer system. HX-Series display adapters are shipped with a number of special drivers that allow popular software packages and operating environments to take advantage of the special modes of operation available. The installation and operation of these drivers is also discussed in the Verticom HX-Series Software Users Guide.

The HX-Series Display Adapters

The Verticom HX Series display adapters are high performance video cards optimized for microcomputer CAD and graphically based operating systems like Microsoft Windows. The HX/MC is designed for the Micro Channel™ hardware environment, and the HX/AT is designed for the AT bus hardware environment. HX Series display adapters are designed to be used in conjunction with standard AT or PS/2 compatible video subsystems.

Each model comes in two versions denoted by the model number suffix: 16/ or 256/. This refers to the number of simultaneous colors available at the 1024 by 768 and 640 by 480 resolutions. You may upgrade either 16-color model to a 256-color model by installing the HX-256C upgrade kit available from your Verticom dealer.

The HX/AT may be used with MDA, CGA, EGA or VGA display adapters using separate monitors for the HX and companion display adapter. A single monitor installation may be used in conjunction with a VGA card, using the supplied VGA pass-through cable.

The HX/MC automatically provides pass-through of the PS/2 VGA video and may be used in a single or dual monitor installation.

Features of both cards include:

- Verticom's TwinFocus™ AutoCAD 9 driver.
- Automatic pass-through of VGA signals to your monitor.
- Custom VLSI design to provide processing and display capabilities of over 17 million pixels per second in 256 simultaneous color mode.
- Drivers to support the Autodesk™ software line at 1024 by 768 by 16 or 256 colors.
- Drivers to support Microsoft Windows 2.1 at 1024 by 768 by 16 or 256 colors.
- An implementation of the IBM 8514A video standard providing 16 or 256 simultaneous colors at non-interlaced resolutions of 1024 by 768 and 640 by 480.
- Operation with advanced multi-frequency monitors.
- Dual monitor operation for CAD environments.

Computer System Compatibility

The HX/MC is designed to install in an IBM PS/2 Micro Channel or equivalent system. The model HX/AT is designed to install in an IBM AT or equivalent system. Where there are differences in installation or operation of these two models, this manual will specifically make reference to each board model.

Types of HX-Series Installations

There are many possible combinations of equipment that you may use with your HX-series display adapter.

- As mentioned earlier, there are AT and PS/2 (Micro Channel) models.
- Your HX display adapter can be used in a single or dual monitor configuration.
- Your HX display adapter can be equipped to display either 16 or 256 simultaneous colors.

Each of these variables influence how your computer system will work with different types of software. In every case, the HX-Series display adapter must be installed in conjunction with another display

adapter or video card. If you have an AT bus compatible system, this display adapter may be either an MDA, CGA, EGA or VGA add-in card. If you have a Micro Channel compatible system, this companion display adapter will be the PS/2 VGA video circuitry built into the motherboard of your system.

Regardless of what kind of system you have, for the purposes of this discussion, we will refer to this board as the companion video device. We will refer to the HX as the high performance video device.

AT Bus Installations

Two Monitor AT Bus Installation: When you implement a two monitor installation in an AT bus environment, the companion video device may be an MDA, CGA, EGA or VGA card. A high performance monitor capable of 1024 by 768 mode operation is connected to the HX card and a monitor of appropriate capability is connected to the companion display device.

The visual output from the companion display device will be displayed on the monitor connected to that card and the output of the HX card will be seen on the high performance monitor. This type of installation is useful in a CAD environment where your application software package allows simultaneous display of text or menu information on the standard video device and high resolution graphics on the HX display adapter and monitor.

Single Monitor AT Bus Installation: Another option in the AT bus environment is to use the HX display adapter in conjunction with a VGA card and single monitor. In this case, all output from both the VGA card and the HX display adapter is routed through the same high performance multi-frequency monitor. If you don't need to use two monitors at the same time, this is the preferred installation. This installation requires the VGA pass-through cable supplied with your HX/AT card.

Micro Channel Bus Installations

In the Micro Channel environment, the companion video device will always be the PS/2 VGA circuitry on the motherboard of the computer system. VGA pass-through is accomplished automatically when you plug the HX/MC card into the Micro Channel slot that is reserved for display adapters. You may in this case implement either a single or dual monitor installation. You will always connect a high performance multiple-frequency monitor to the HX/MC and optionally you may connect a VGA compatible monitor to the motherboard video connector at the back of the system cabinet.

Monitor Compatibility

In a single monitor installation, your HX-Series display adapter provides support for advanced multi-frequency monitors. This monitor should be capable of supporting the screen resolutions from 640 by 480 through 1024 by 768 with the capability of supporting horizontal scan rates from 31.5 through 50 KHz.

In a dual monitor configuration, the monitor connected to the HX display adapter must be capable of supporting a screen resolution of 1024 by 768, vertical and horizontal sync frequencies will be 57.5 Hz and 46.3 KHz. respectively. The monitor connected to the other (companion) video card in a two monitor system should be of appropriate capability for connection to that device.

In a single monitor system, software packages supported though Verticom supplied direct drivers will run directly on the HX display adapter in high performance mode. Since, in this configuration, both the HX/MC and HX/AT provide automatic pass-through of VGA signal information to your monitor, you can run all of your PS/2 or VGA compatible software transparently on your HX equipped system.

In a dual monitor installation, software packages supported through Verticom supplied direct drivers will run directly on the HX display adapter in high performance mode. Video output from these

programs may be seen on the monitor connected to the HX display adapter. Software packages compatible with the companion display adapter will also run on your system. The video output from these packages will be seen on the monitor connected to the companion display adapter.

Installation

Tools you will need

To install your HX display adapter you may need some or all of the following tools:

- A medium size flat blade screwdriver
- A medium sized phillips head screwdriver
- A 3/16" nutdriver or wrench

Configuration of the HX/AT & HX/MC Cards

HX/AT users should read the section below on setting the HX/AT monitor sync jumpers. HX/MC users should skip this section as sync selection is taken care of under software control and is discussed in the manual section entitled "Configuring Your PS/2 Style Computer System".

HX/AT Monitor Sync Jumpers

The HX/AT is provided with three (3) sets of jumpers to control the polarity and composition of the signals that synchronize the image that appears on the monitor. The appropriate setting for these jumpers depends on how many BNC type connectors are provided at the back of your monitor.

The Figure 1. illustrates the three jumpers found on the HX/AT . Each jumper is shown in the factory setting with the block over pins 1 and 2. To change these settings, remove the block from pins 1 and 2 and slip it over pins 2 and 3.

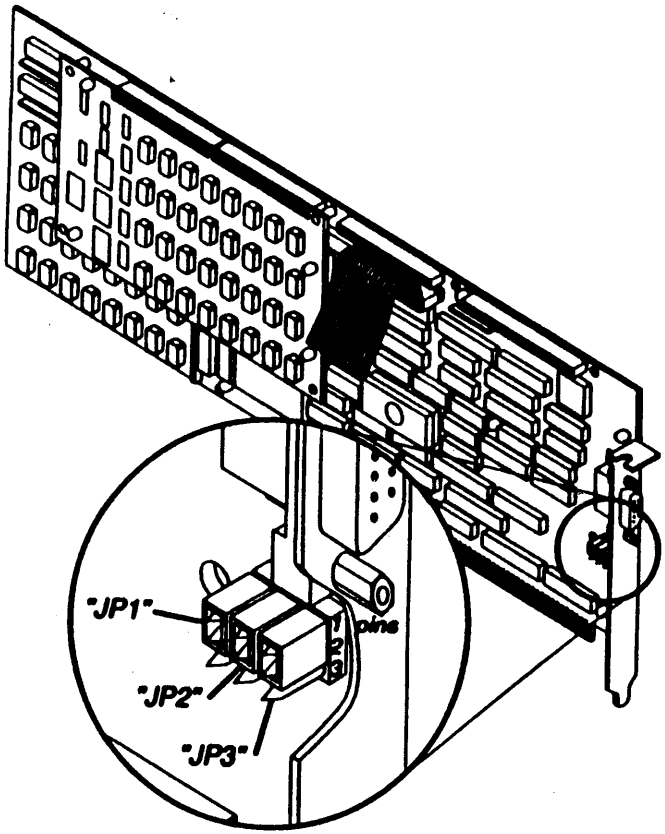


Figure 1 - The HX/AT showing jumpers JP1, JP2 and JP3

High performance monitors such as the one you will use with your HX-Series card use "twist-lock" type connectors known as BNC connectors for the various signals from which the screen image is generated. In all cases there will be either 3, 4 or 5 of these connectors. Regardless of cable type, you should normally set all three jumpers to the 1-2 (default) position as shown in the illustration above.

In the case of a monitor with 3 BNC connectors, these connectors will be marked as RED, GREEN/SYNC and BLUE. Sometimes these markings will be abbreviated as R, G/S and B. If the markings used on your monitor are not clear to you, please refer to the manual that accompanied your monitor.

In the case of a monitor with 4 connectors, these connectors will be marked as RED, GREEN, BLUE and COMPOSITE SYNC. Sometimes these markings will be abbreviated as R, G, B and CS. If the markings used on your monitor are not clear to you, please refer to the manual that accompanied your monitor.

In the case of a monitor with 5 connectors, these connectors will be marked as RED, GREEN, BLUE, VERTICAL SYNC and HORIZONTAL SYNC. Sometimes these markings will be abbreviated as R, G, B, V and H or Composite. In most cases, this monitor will only require 4 cable connections. Use those marked R, G, B and Composite as in the four connector above.

Some monitors with 5 BNC connectors will not provide an input that will accommodate composite sync. In this case only, you will use a 5 BNC connector cable and set the HX/AT Jumpers as follows:

JP1	JP2	JP3
2-3	2-3	1-2

Note: In a 5 BNC cable installation, if you can not get a clear image, try setting JP3 to position 2-3. If the markings used on your monitor are not clear to you, refer to the manual that accompanied your monitor.

VGA Pass-Through Connector: This connector appears only on the HX/AT card and is used only in a single monitor, VGA companion installation. It, along with the included VGA pass-through cable, provides a path for the signals that will be routed from the companion VGA card through the HX/AT card and on to the monitor. The HX/MC does not need this connector as VGA pass-through is accomplished automatically when the HX/MC is plugged into the Micro Channel slot that is reserved for display adapters.

Please Note: In order to implement a single monitor AT bus installation, the add-in VGA card that will function as the companion display device must have a Feature Connector that is physically and electrically identical to the one found on the IBM add-in VGA display adapter. **Not all third party VGA compatible cards provide Feature Connectors. Be aware of this in choosing a companion display adapter.**

Upgrading to 256 Color Operation

The HX16/AT and HX16/MC are capable of displaying 16 simultaneous colors at the 1024 by 768 resolution. By adding the HX-256C expansion kit you may upgrade to 256 simultaneous colors at this resolution. If you purchased the HX256/AT or the HX256/MC your display adapter is already capable of 256 simultaneous color operation and will require no further expansion.

To Install the HX-256C expansion board on your HX series display adapter, lay the display adapter on a flat surface, component side up using the anti-static packing bag that your HX came in as a cushion.

Refer to the Figure 2. to determine the correct alignment for the expansion board. Be sure that all of the connector pins on the expansion board line up with the appropriate connector holes on the HX card.

When you are sure that the expansion board is correctly lined up with the HX card, gently press the connector pins home. Do this in several steps pushing the two units together a little at a time.

Check to be sure that the 3 or 4 plastic standoff pins on the expansion board are lined up with the corresponding holes on the HX card. Press on the expansion card at each standoff until the end of the standoff pin has "popped" through the hole on the HX card.

Check once more to see that there are no left over pins at the end of each connector and that the two units are squarely lined up. The circuit boards of the two units should be parallel.

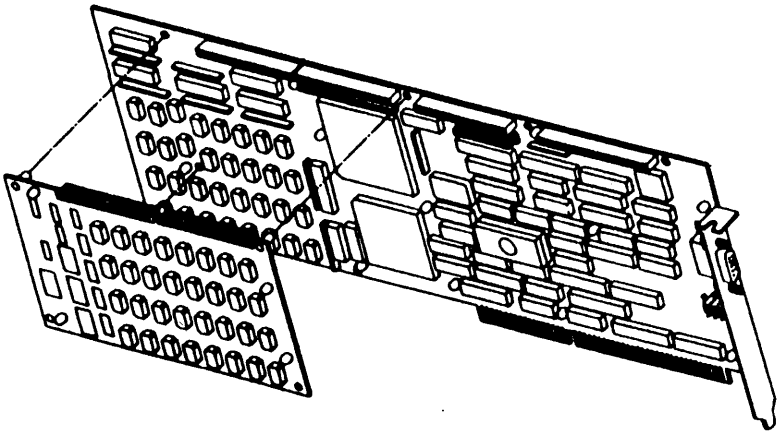


Figure 2 -Fitting the HX256/C to the HX/AT display adapter

Preparing your Computer for HX/AT Installation

You must perform several steps before you install your HX-Series card into your computer system. This section outlines procedures required prior to actual physical installation of the HX/AT card in your computer system.

Opening the Computer System

Before you open your system, be sure that you have turned off your system and all devices connected to it. You may also want to disconnect the cables from the back of the system in order to give yourself more room to work. Be sure to note how any cables are connected prior to disconnecting them.

Remove the cover mounting screws from the back of your system.

Most AT compatible systems will require a screwdriver, most PS/2 compatible systems provide thumbscrews.

Carefully slide the system unit cover forward. When the cover will go no further, tilt it up as shown below and lift it away.

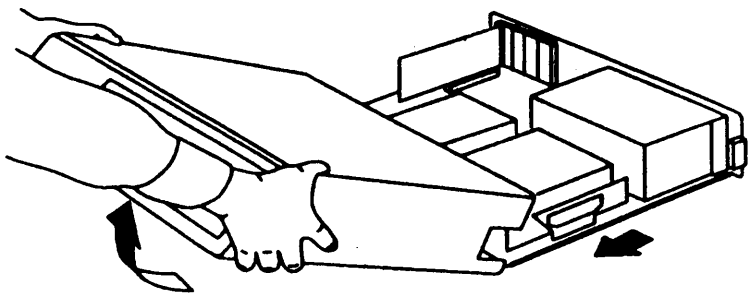


Figure 3 -Removing the cover from your computer system

Choosing an Expansion Slot for your HX/AT Card

It is very important that your HX/AT card be installed only in a 16 bit expansion slot. IBM AT and AT compatible computers (including some 80386 based computers) generally provide both 8 and 16 bit expansion slots. 16 bit slots have two connectors, 8 bit slots have only one.

Choose an expansion slot suitable for the companion display adapter that you will be using. If you are preparing a two monitor installation, any available slot will suffice as long as it meets the physical and electrical requirements of the companion display device. If you are preparing a single monitor installation, this slot should be close enough to the HX/AT card to accommodate the VGA pass-through cable which will carry signals between the two devices.

Choosing an Expansion Slot for your HX/MC Card

The HX/MC is designed as an add-in display adapter for the Micro Channel environment. As such, it will fit only in the expansion slot reserved for add-in video. Please refer to Figure 4. It shows the two kinds of available micro channel expansion slots. The one with the 3 segment connector is where you will plug in your HX/MC.

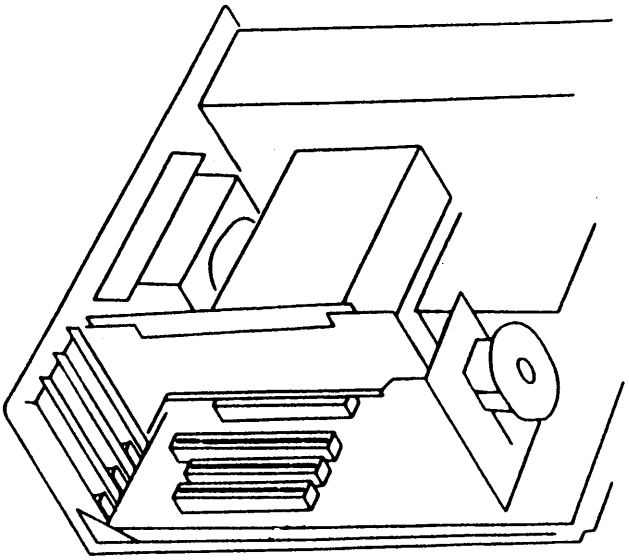


Figure 4 - Installing the HX/MC Display Adapter

Installing the HX Card In your Computer

WARNING: To avoid possible damage to the HX-Series card from ESD (ElectroStatic Discharge), be sure to ground yourself before handling the card and avoid touching any components on the card.

- Check that the power is turned off.
- Select an appropriate expansion slot for the HX card as described in the preceding section. If necessary, remove a system expansion slot cover by removing its retaining screw and lifting it out. Save the screw.

- If you are installing a companion display device (HX/AT only) choose an expansion slot for it at this time. If this is to be a single monitor installation, this expansion slot must be in close enough physical proximity to the slot chosen for the HX/AT so that the VGA pass-through cable will reach between the two cards. If necessary, remove a system expansion slot cover by removing its retaining screw and lifting it out. Save the screw.

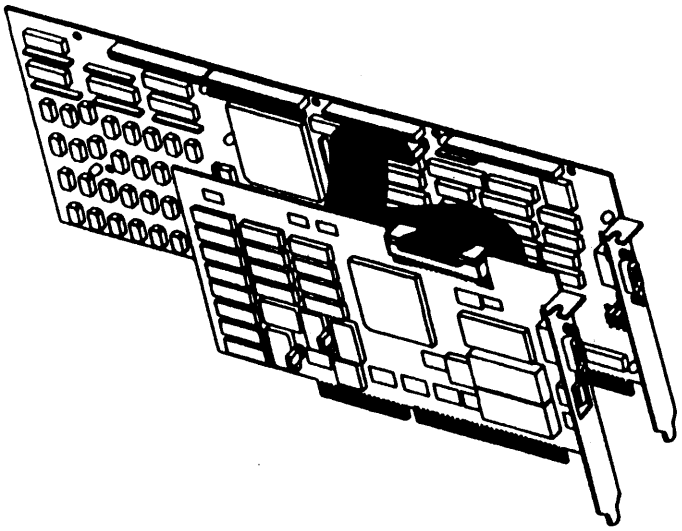


Figure 5 - The HX/AT connected to a VGA display adapter

- If this is a single monitor HX/AT installation, plug the HX end of the pass-through cable into the connector on the HX card at this time. The VGA pass-through cable has been "keyed" so that you will not be able to plug it in backwards. However, care must be taken when mating the cable to the HX/AT card so that all pins on the HX/AT connector line up with the holes in the cable connector.
- Hold the HX/AT Card by its top corners and slide it into the system unit. Make sure that the HX/AT card is correctly seated in the expansion slot.

- If not already installed, hold the companion display device by its top corners and slide it into the system unit. Make sure that it is correctly seated in the expansion slot. Plug the VGA end of the pass-through cable onto the VGA card. This end of the cable is also keyed to prevent plugging the cable in backwards.
- Secure one or both of the display devices with the screw(s) that you removed in the steps above.
- Replace and secure the system cover.
- Plug the cable from your high performance display into the 9 pin connector at the back of the HX card.
- If this is a two monitor installation, plug the cable from your companion video display into the connector at the back of the companion display device

Configuring a Multi-Frequency Monitor

- Some multi-frequency monitors are equipped with a switch marked with the legends "DSUB" and "BNC" These designations refer to the type of signal cable that will be used to connect the HX card to the monitor. "DSUB" refers to the use of a D shaped connector similar to the connector on the HX/AT card. "BNC" refers to a set of 3, 4 or 5 twist-lock type connectors. Set this switch to "BNC" position.
- If available, set the ANALOG-TTL switch located on the back of the monitor to the ANALOG position.
- If available, set the ANALOG LEVEL switch located on the back of the monitor to the .7 volt position.

Configuring your AT Style Computer System

After you have physically installed your HX/AT card into your AT compatible system, use the SETUP program supplied with your system to tell your computer about the equipment installed in your system. When using AT and compatible SETUP programs with the HX/AT card, please follow these steps:

- Run [SETUP] to configure your system.
- When you arrive at the part of the program where video support is specified, the program may ask you if the monitor you are looking at will be the primary monitor. Enter Y. Regardless of whether you are installing a single or dual monitor system, if you are presented with a list of video options, select the option for the type of card that corresponds to the companion video display device.

- At the conclusion of the SETUP program, the computer will restart as if you had just turned on the power.

Configuring your PS/2 Style Computer System

The first time you start your system after installation of the HX/MC, your computer will display error #165. This means that the list of equipment that the computer thinks has been installed does not match the equipment it has actually found to be installed. The system will [prompt you] to insert your Reference diskette (this is the diagnostics diskette supplied with your system).

When asked if you want to run an automatic configuration, respond with a NO. This will take you to a menu of options. If you are not using a backup copy of the Reference diskette, select the option to make such a backup copy. You will need it for the next step.

After you have copied the Reference diskette and have again arrived at the menu, make sure that the copy of the Reference diskette you have just made is in the diskette drive. Now select ["Copy an Option diskette"]. This option does not actually copy the option diskette. It does, however, copy one or more files from the option (HX/MC) diskette to the Reference (diagnostics) diskette.

Your system will now [prompt you] to insert the option (HX/MC) diskette. This is the HX/MC utilities diskette. You may be prompted to switch diskettes several times. At the completion of this process, the copy of your reference diskette will contain information about the HX/MC.

Now restart your system with the updated copy of the Reference diskette in the diskette drive. When asked if you wish to execute an automatic configuration, this time, respond with a [YES]. The system will configure itself then perform another system restart.

The hardware portion of your HX card installation is now complete. At this point you should be able to boot up (start) your computer

system and run VGA and EGA compatible software with no further installation.

If you have any problems, please refer to the troubleshooting guide later in this manual for assistance.

Operation

Using the HX/AT Card

I as software that takes explicit advantage of the HX/AT hardware may be run on your system.

Two Monitor Installations: When you start your system the default display will be the one connected to the companion display device. This will be the display connected to the MDA, CGA, EGA or VGA display adapter Only when you are running software that explicitly takes advantage of the features of the HX/AT will output appear on the high performance monitor.

Single Monitor Installations: In a single monitor installation the output from both the VGA device and the HX/AT will appear on the same monitor. The HX/MC will switch in and out of VGA pass-through mode automatically as necessary.

Using the HX/MC Card

If you have followed the installation instructions in this manual, you are now ready to use your HX/MC equipped computer system. Most software that is compatible with IBMs Personal System/2, VGA or EGA will run automatically on your system using the pass-through mode of the HX/MC card. Just turn on your computer system and install your application package for "PS/2 model 50, 60, 70 or 80 video", "VGA", or "EGA" as instructed by the software manufacturer.

Two Monitor Installations: In a two monitor configuration VGA (companion video) output will appear on both monitors. Software packages that explicitly take advantage of the features of the HX/MC will display their output on the high performance monitor only. While you are running such an application package, the companion or VGA monitor will either be blank or show the last output that was sent to that monitor. Sometimes while you are running software that is written for the HX high performance mode, the "left over" image on the companion display will change color or become distorted. This is normal, the companion display will revert to normal when you are through using the high performance mode.

Single Monitor Installations: In a single monitor installation the output from both the PS/2 video and the HX/MC will appear on the same monitor. The HX/MC will switch in and out of VGA pass-through mode automatically as necessary.

Appendix A - Installation Troubleshooting

Here are some typical symptoms and solutions to installation problems:

One long beep & two short beeps on power-up of system.

— HX/AT card not properly seated in expansion slot or expansion slot connector is dirty. Reseat or clean gold fingers. A pencil eraser works well. Be careful to remove all residue before inserting the card into the system.

No display.

— Monitor signal and/or power cable not properly plugged in/monitor not turned on.

— Brightness and/or contrast controls on monitor not turned up far enough.

— System not configured appropriately for a VGA card. See the installation section of this manual for details.

F1 CRT or SETUP error in an AT type computer on start-up.

— SETUP program not run. See installation instructions supplied with your computer and installation section of this manual.

Screen displays distorted images or screen goes blank when software is executed.

— Software not configured for or compatible with the companion video card Re-configure software for CGA, VGA, EGA or MDA as appropriate.

— Check that your monitor was powered on prior to starting your computer system. The HX/AT Card may recognize some color monitors as monochrome when they are powered off during start-up. This will result in your HX/AT Card operating in "monochrome" mapped modes and your software may be configured for "color" operation. Restart your computer system with the monitor powered on.

Unable to display 1024x768 or 640x480 HX modes.

Double check the installation of the drivers provided with your HX display adapter

Appendix B - Glossary

Analog monitor: A variety of video displays that use continuously variable color control voltages to allow an extremely large number of colors to be displayed while requiring only a few inputs. The IBM PS/2 displays, models 8503, 8512 and 8513 are analog monitors. Most multi-frequency monitors can be set to operate as analog monitors.

AI: Adapter interface; IBM's 8514 display adapter software interface and graphics command language. AI makes available to application software packages, a variety of low level screen drawing commands that are executed by the host processor (the 80286 or 80386 in your computer system) and displayed by the graphics processor on the HX/AT card. The purpose of such a command language/interface is to free the author of application packages from having to write the hardware specific, low-level code needed to perform the basic tasks of drawing lines, constructing simple geometric figures and filling in screen areas with color.

Companion display or adapter: In any HX-Series display adapter installation, the HX display adapter will be used in conjunction with some form of standard video card. In Micro Channel installations, this companion video will be the VGA video circuitry built into the motherboard of your system. In AT installations, the companion display adapter may be an MDA, CGA, EGA or VGA display adapter.

When the companion display adapter is a VGA compatible device, all screen output may be viewed on one display. A two display system is optional.

CGA: The IBM Color/Graphics Adapter and the video standard defined by the Color/Graphics Adapters video hardware and capabilities.

Color display: A type of monitor capable of displaying information

in color, sometimes referred to as an RGB monitor. The letters R, G, and B refer to the arrangement of electrical signals necessary to drive this device and to the primary colors: red, green and blue, from which all other colors are derived. Your HX/AT Card is capable of displaying 64 different levels of each primary color: red, green and blue on a color display.

Default mode: The default mode refers to the set of capabilities and resolutions currently available as well as the current display mode of the HX/AT card upon system start up. The default display mode of the HX/AT card is always VGA text mode unless you use the HX.EXE utility to lock or re-boot the board in another mode.

Driver: The part of a software application program that deals with a specific piece of equipment in the system. Some applications have different drivers for different types of video boards. Your HX display adapter includes drivers that support Microsoft Windows and products from Autodesk in the 1024x768 mode of operation.

EGA: The IBM Enhanced Graphics Adapter and the video standard defined by the EGAs capabilities. Because of the similarities between the EGA and VGA standards it will often be necessary to treat your HX/AT card as if it were an EGA when the companion display adapter in an HX/AT installation is a VGA card.

Expansion slot connector: This is a bus which connects the HX display adapter to the system. Through this connector the HX display adapter communicates with the computer system and vice-versa. The HX/AT card will connect into any 16 bit expansion slots in IBM AT and compatible computers. The HX/MC will connect into the slot reserved for video cards in the PS/2 or equivalent Micro Channel environment.

Fixed frequency monitor: An analog monitor that operates using a fixed horizontal sync frequency. Vertical sync frequencies vary to accommodate different screen resolutions. The IBM PS/2 displays, models 8503, 8512 and 8513 are fixed frequency monitors.

MDA: The IBM Monochrome Display Adapter and the video standard defined by the Monochrome Display Adapters video hardware and capabilities.

Multi-frequency monitor: A monitor that will accept variable horizontal and vertical sync frequencies. Such a monitor will typically support a large range of video signals. A multi-frequency monitor is required to support the range of video modes and resolutions provided by your HX display adapter if you intend a single monitor installation.

Palette: A range of colors. The HX/AT supports a color palette with up to 256 simultaneous colors selected from a range of up to 16.7 million colors.

Primarydisplay: In a two monitor system, the one that is active when you start the system. The primary display is always connected to the companion video device either directly or through the HX display adapter in pass-through mode.

VGA: The set of video capabilities that is standard equipment on IBM PS/2 models 50, 60 and 80. The VGA video standard drives analog display monitors and provides access to 262,144 different colors on color monitors. VGA stands for video graphics array.

Appendix C - Connector & Sync Information

Connector Pin-out

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

Sync Frequencies

Mode	Horizontal Sync	Vertical Sync
640 by 480	31.4KHz.	61.4Hz.
1024 by 768	46.3KHz.	57.5Hz.

Please Note: Sync signal information is given for HX high performance modes only. Sync rates for other modes depends on what kind of companion display adapter is chosen.

Appendix D - Warranty and Service Information

Verticom Limited Warranty

Verticom/Western Digital Imaging warrants this Verticom product to be in good working order and free from defects in materials and workmanship for a period of two (2) years from the date of purchase. Verticom's liability shall be limited to replacing or repairing, at its option, any defective product which is returned to Verticom, but in no case is any product to be returned to Verticom without obtaining the written permission of Verticom. Verticom shall not be responsible for shipping charges for such a return nor for any loss or damage to the product occurring during the return. Products which have been subject to abuse, misuse, alteration, neglect or unauthorized repair or installation are not covered by this warranty. Verticom shall make the final determination as to the existence and cause of any alleged defect. No warranty is made with respect to custom products produced to the customers specifications except as specifically stated in writing by Verticom

This warranty is in lieu of any other warranty express or implied. VERTICOM makes no other warranties express or implied, including any warranty of fitness for a particular purpose or of merchantability. In no event shall VERTICOM be liable for indirect, special or consequential damages such as loss of profits or business opportunities.

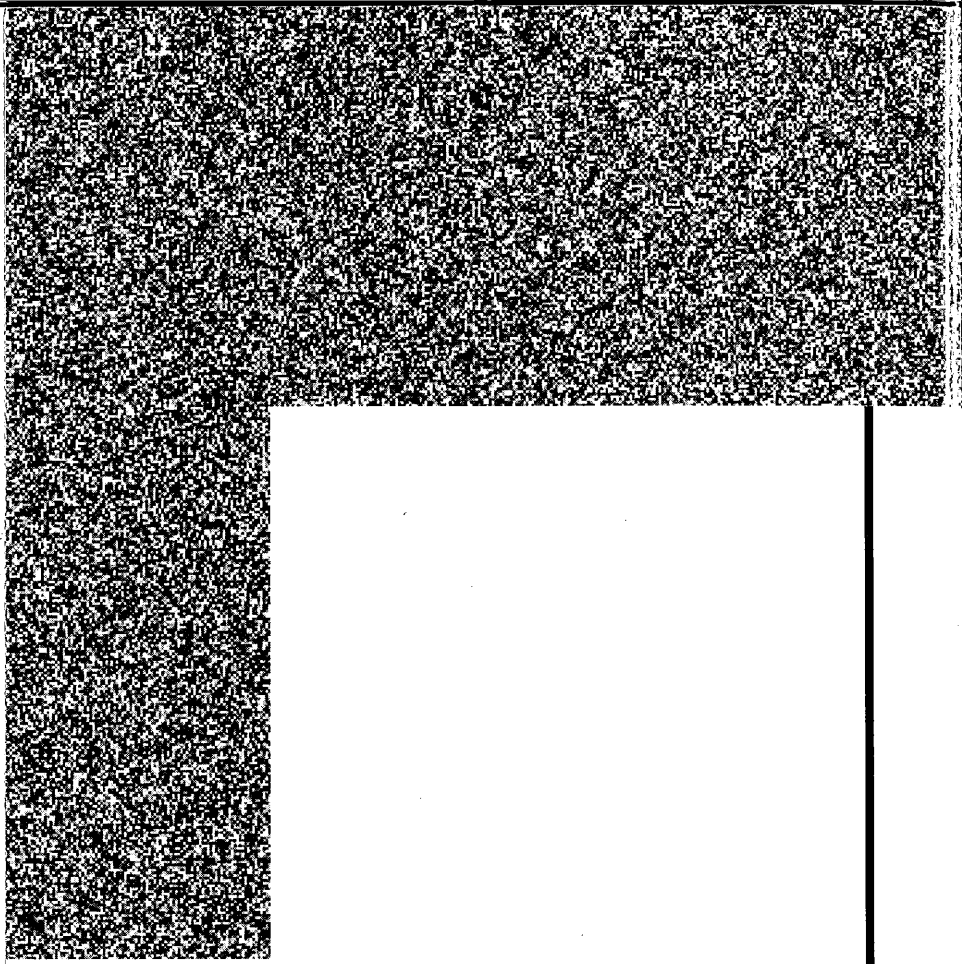
How to Obtain Warranty or Non-Warranty Service

If this Verticom product ever needs service, check with your dealer first. If he can't help you please contact Verticom.

Verticom Inc.
Western Digital Imaging
800 East Middlefield Road
Mountain View, CA 94043
(415) 960-3353
FAX: (415) 968-1842

Customer Support:
Inside California (415) 960-1664
Outside California (800) 356-5787

Warranty and non-warranty service is available from Verticom. However, no product may be returned to us without first obtaining a Service and Return Information Form. This form may be secured by calling your local Western Digital Corp. sales office. No un-authorized shipments will be accepted.



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