

MVA 1024

Owner's Manual

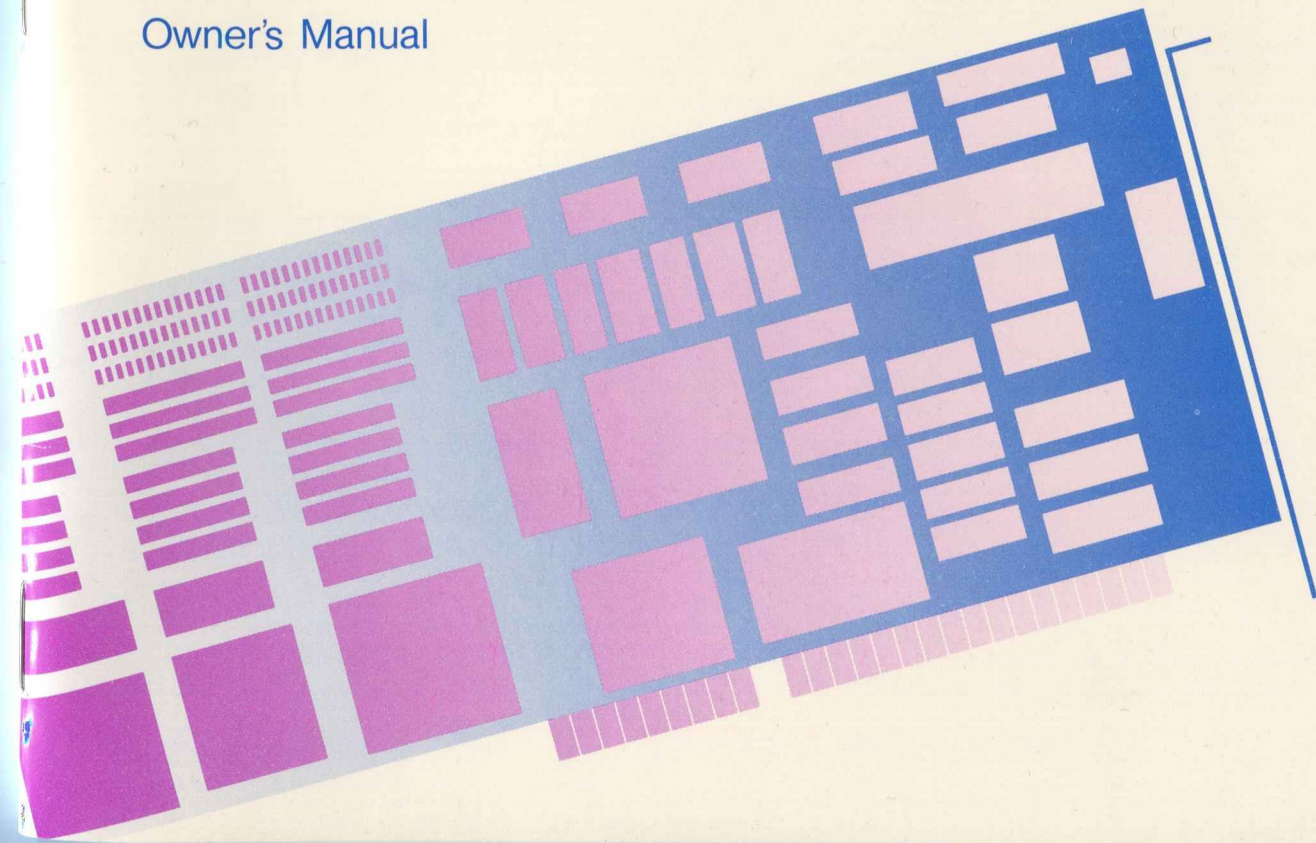


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FCC Information

This equipment has been tested with a Class A computing device and has been found to comply with Part 15 of FCC Rules.

Operation in a residential area may cause unacceptable interference to radio and TV reception requiring the operator to take whatever steps are necessary to correct the interference.

Warning: This equipment generates, uses and can radiate radio frequency energy and if not installed and used in accordance with the instructions manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operating in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

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

Introduction

The MVA 1024 is an advanced video display adapter card that provides IBM AT and AT compatible users the ability to drive the NEC family of MultiSync monitors in a variety of resolutions and with software compatible with the most popular IBM PC/XT/AT video standards. The MVA 1024 gives you:

- All of the capabilities of the IBM Enhanced Graphics Adapter.
- A Texas Instruments 34010 graphics processor for use with software written for the Direct Graphics Interface Standard (DGIS) and IBM Professional Graphics Controller (PGC or PGA) Standards. Compatibility with this (PGA) standard is provided through the Professional Graphics Language (PGL) supplied with the MVA 1024.
- Extended EGA compatibility including support for 640x480 pixel operation and 132 column text support for selected, popular software applications. (Uses special drivers supplied with the MVA 1024. Information on these drivers may be found in the *MVA 1024 Software Manual*.)
- Compatibility with the IBM Color Graphics Adapter (CGA) card.
- 256KB of DRAM Memory to support CGA, EGA and Enhanced EGA compatible operation. (Standard with the minimum configuration of the MVA 1024.)
- 512KB of graphics processor program memory. This memory holds the DGIS and PGL-Professional Graphics Language interfaces. (Standard with the minimum configuration of the MVA 1024.)
- 384KB of Video RAM Memory to support PGL and DGIS compatible operation. (Standard with the minimum configuration of the MVA 1024.)
- The ability to add an additional 384KB of display memory to the MVA 1024 to achieve 256 simultaneous colors in PGL and DGIS modes of operation instead of the 16 provided with the minimum configuration. The MVA 1024 will automatically configure itself for the amount of memory installed.

General Information

The MVA 1024 consists of two nearly independent video circuits: The first provides EGA and CGA compatible operation. The second provides high performance, processor assisted operation through the use of the Texas Instruments 34010 graphics processor. Software compatibility with this mode is achieved through the use of the DGIS and PGL graphics interface standards provided with your MVA 1024.

The IBM Color Graphics Adapter (CGA) and Enhanced Graphics Adapter (EGA) standards support a substantial amount of software. Most software written for the PC/XT/AT standard runs on one or both of these modes. Additionally we have provided enhanced EGA modes allowing selected popular software packages to run on the MVA 1024 in special higher resolution graphics and 132 column text modes.

The high resolution, high performance (34010) modes of the card support two software interfaces. The Direct Graphics Interface Standard (DGIS) from Graphic Software Systems and Professional Graphics Language (PGL) from Vermont Microsystems. These modes support the most popular software packages that require a high performance interface. The user has the choice of these modes through the MVA.EXE menu. Choosing the 8 bit mode with either DGIS or PGL makes up to 256 simultaneous colors available to the application. The 4 bit mode allows for only 16 simultaneous colors but gives significantly increased drawing speed.

A simple to use program (MVA.EXE) that we have provided allows you to choose the appropriate mode for the software that you will be using with your MVA 1024. Instructions for use of this utility appear later in this manual.

We know you will enjoy many years of service from your MVA 1024. If you ever need help with the installation or use of your MVA 1024:

1. Double check this manual. Many times, the answers you need are right here. Warranty and service procedures will be found in Appendix C and D of this manual.
2. Contact your dealer. This is your best source of information.

If you call or write us regarding your NEC MVA 1024 installation, please supply or have the following information ready: The name of the NEC product in question, the brand and model of computer in which it is installed, configuration details including the amount of memory in the system and all other adapter cards in the system and current switch/jumper settings for both the system board and the NEC product.

You may write or call us at:

NEC Home Electronics (U.S.A.) Inc.
Attn: PC Technical Support
1255 Michael Drive
Wood Dale, Illinois, 60191-1094, USA
Telephone: (800) NEC-SOFT
Fax: (312) 860-5739

System Requirements

You will need the following computer system components to use the MVA 1024:

- An IBM AT or equivalent computer with a hard disk, high density floppy disk drive and at least 256KB of memory.
- One of the MultiSync family of computer monitors from NEC Home Electronics.
- IBM or Microsoft DOS version 3.0 or later.

System Restrictions

The following condition applies to your MVA 1024 installation:

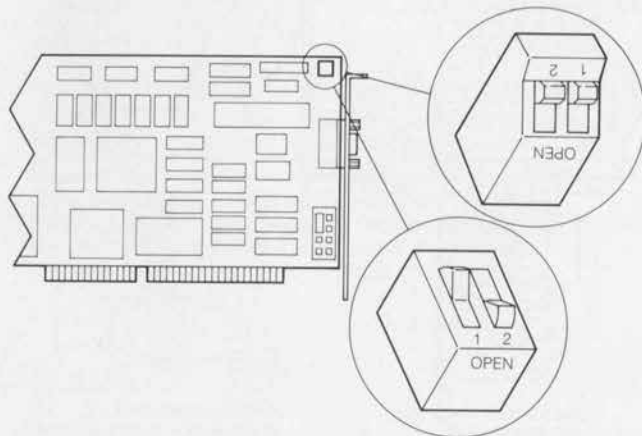
- The MVA 1024 must be the primary video card in your system, and any other video cards in your system must be IBM Monochrome Display Adapter (MDA), Hercules or compatible configured for IBM "Mode Mono."

Tools you will need to install your MVA 1024

To install the MVA 1024, you will need a medium size flat blade screwdriver or a $\frac{3}{16}$ " nutdriver or wrench.

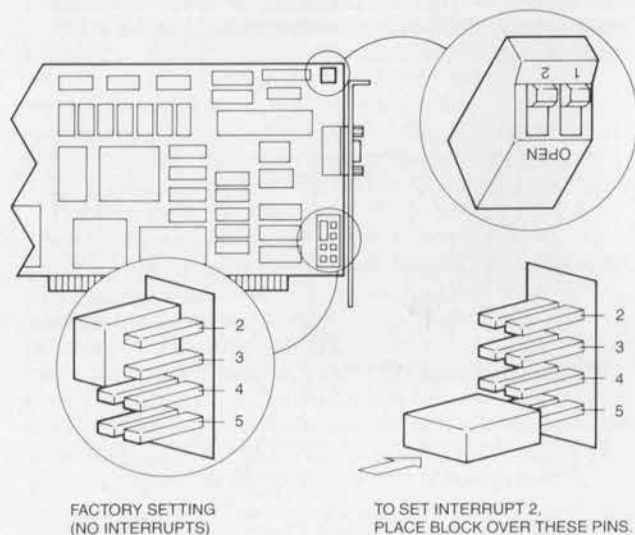
How to set DIP switches

This manual will make frequent reference to switches with rows of levers called DIP switches. These switches appear on the MVA 1024 and the system boards of the various computer systems in which the MVA 1024 may be installed. Dip switches come in several styles including slide switches and rocker switches. Refer to the figure below for a detailed view of the MVA 1024. Some styles of DIP switches use the designations OPEN and CLOSED instead of OFF and ON, respectively.



Layout of the MVA 1024

The following figure shows the features and controls of the MVA 1024. Study it and make sure that you can identify these items. They will be referenced throughout this manual. The paragraphs below briefly describe the function of each item called out in the illustration.



Video Connector: This 9 pin socket is where you will connect either a MultiSync, MultiSync Plus or MultiSync XL Monitor.

Setup Switch: This two lever DIP switch lets you set the MVA 1024 for the kind of monitor you will use and whether you wish the card to default to EGA or CGA operation when you start your computer system.

IRQ Jumper: This jumper controls whether or not the MVA 1024 uses interrupts during operation. Normally, this option will only be used if you plan to run PGL compatible software under the XENIX operating system. If this will be the case, please refer to the manual provided with your PGL software for the specific interrupt required. In all other cases, this jumper should be left in the factory (disabled) position. A later section of this manual details how to set this jumper if necessary.

Memory Expansion Sockets: These sockets are provided to increase the amount of video display memory that may be used for PGL and DGIS mode operations from 384KB to 768KB. Adding this memory increases the number of simultaneous on-screen colors from a maximum of 16 to a maximum of 256 when running DGIS or PGL compatible software. A later section of this manual will cover the installation of this memory.

MVA 1024 and Computer System Compatibility

The MVA 1024 may be installed in and used with the IBM AT and AT compatible computers.

MVA 1024 and Monitor Compatibility

The MVA 1024 supports the NEC MultiSync family of monitors including the MultiSync II monitor, the MultiSync Plus and the MultiSync XL.

MVA 1024 Software/Resolution Compatibility

The MVA 1024 supports the following compatibilities and resolutions depending upon the model of MultiSync monitor you will use:

Compatibility	Resolution	Colors On-screen	Color Palette	Monitor(s)
CGA	40/80 Column Text	16	16	All
CGA	320 × 200	4	4	All
CGA	640 × 200	2	2	All
EGA	40/80 Column Text	16	64	All
EGA	320 × 200	16	64	All
EGA	640 × 200	16	64	All
EGA	640 × 350	16	64	All
EGA + *	640 × 480	16	64	All
EGA + *	132 Column Text	16	64	All
PGL	640 × 480***	16/256**	16.7 Million	Plus, XL
PGL & DGIS	960 × 720	16/256**	16.7 Million	Plus, XL
PGL & DGIS	1024 × 768	16/256**	16.7 Million	XL

*Requires drivers, supplied with MVA 1024 for selected applications.

**256 with optional video RAM memory expansion kit installed.

***The 640 × 480 PGL mode does not fill the screen on the MultiSync PLUS or XL. Refer to the section titled "Professional Graphics Controller Emulation and PGL640" in this manual.

Expanding MVA 1024 Processor Memory

The MVA 1024 in its base configuration, comes with 384KB of video memory for use by the 34010 Graphics Processor. Adding an additional 384KB of memory will enable you to view 256 rather than 16 simultaneous screen colors in PGL and DGIS modes of operation.

The appropriate expansion memory kit consists of 12 "ZIP packaged" type memory chips. Only an NEC authorized service center may install the memory expansion kit. Please contact the NEC Regional Service Center at (800)NEC-TECH for information regarding the memory upgrade.

After installation of the memory expansion kit, the MVA 1024 will automatically configure itself to its new memory configuration. No modification to switch or jumper settings is necessary.

Configuring The MVA 1024

Configuration of the MVA 1024 is as simple as possible. Most installations require only the setting of a single two lever DIP switch. Some PGL software may require that an additional jumper be set.

Setting the DIP Switch Levers

Refer to the illustration on Pg. 9. Find the 2 lever DIP switch on the MVA 1024. Set the levers as appropriate to your installation for both monitor type and desired default condition.

Default Mode @ Power-Up	Lever 1
EGA Operation	OFF
CGA Operation	ON

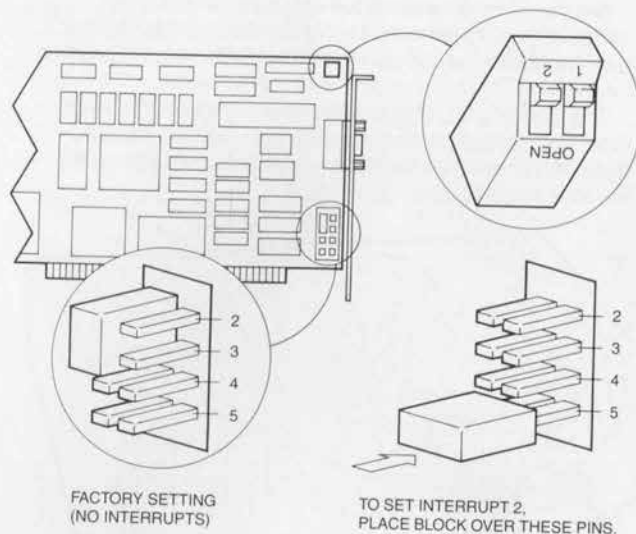
Monitor Type	Lever 2
MultiSync or MultiSync Plus	ON
MultiSync XL	OFF

Please note: You determine mode preference (EGA or CGA) at power-up by setting lever 1. The supplied utility program MVA.EXE can override this setting. Additional information about MVA.EXE can be found later in this manual.

Checking the position of the IRQ Jumper

Find the IRQ jumper in the illustration below. Check to be sure that it is set as shown. If you will be using PGL compatible applications, you may have to select an IRQ setting other than the factory (disabled) setting shown below. The manual that accompanied your PGL compatible software will advise you whether this is necessary.

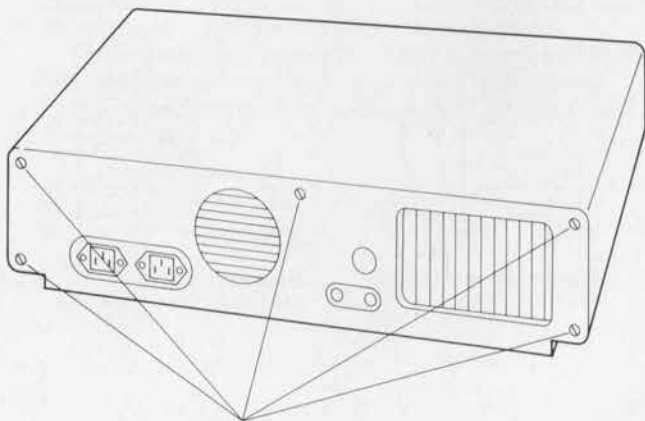
To set one of the four possible active IRQ settings simply remove the jumper block from its factory setting (interrupts disabled), choose the appropriate IRQ setting and place the jumper block over the corresponding pair of pins as shown.



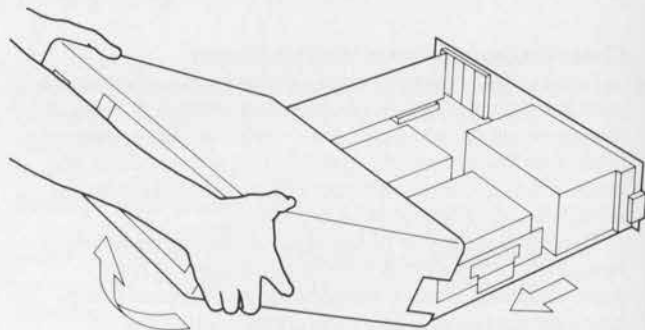
Opening Up Your Computer System

Before you open your system, be sure that you have turned off your system unit and all devices connected to it. It is also a good idea to disconnect all cables from the back of the system. This will give you more room to work.

The following figure illustrates the locations of the cover mounting screws on a typical IBM AT computer. All cover mounting screws are located on the back of the computer. Remove these screws.



COVER MOUNTING SCREWS



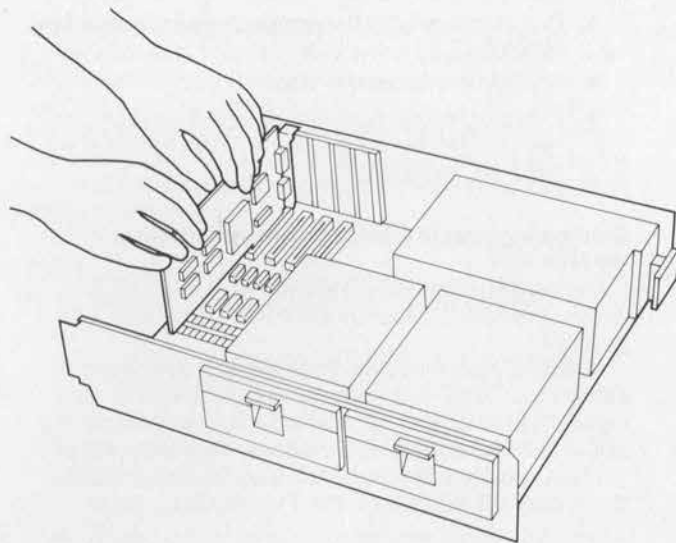
Carefully slide the system unit cover forward. When the cover will not go any further, tilt it up as shown below and lift it away.

Installing the MVA 1024 in Your Computer System

Is The Power Off?

Refer to the following figure. If necessary, remove a system expansion slot cover by removing its retaining screw and lifting it out. Save the screw.

- Hold the MVA 1024 by its top corners and slide it into the expansion slot. Make sure that the Card is fully seated in the expansion slot.
- Secure the Card with the screw that you removed in the step above.



Before You Close Up, Check Your Work

- Did you properly set the jumper and switches on the MVA 1024?
- Replace and secure the system cover.
- Plug your MultiSync monitor into the 9 pin video connector at the rear of the MVA 1024. Use the cable supplied with your monitor.

Configuring your MultiSync Monitor for use with the MVA 1024

Standard MultiSync Monitors: Set the ANALOG-TTL switch located on the back of the monitor to the ANALOG position.

MultiSync XL or MultiSync Plus Monitors: Set the control switch BNC-DSUB switch located under the access door on the front of the monitor to the BNC position. Set the ANALOG-TTL switch located on the back of the monitor to the ANALOG position. Set the ANALOG LEVEL switch located on the back of the monitor to the .7 volt position.

Using an Expanded Memory (EMS or EEMS) Board

The MVA 1024 occupies the same standard memory locations as an IBM EGA card with some additional space used by the BIOS. You must be sure that your EMS or EEMS board does not conflict with these memory locations. Check with the manufacturer of your EMS board for information on

configuring your EMS board for use with an EGA. The computer system locations occupied by the MVA 1024 range from A000 through C67F.

Configuring Your Computer for the MVA 1024

The IBM AT and AT compatible computers use a program generally called SETUP to perform the configuration function. The SETUP program is usually part of the package of programs provided with your AT or AT compatible computer. Your Guide To Operations (or equivalent manual) will detail the use of this program. The general steps are outlined below:

1. Boot your system with the setup/diagnostics diskette supplied with your system. (This procedure may vary in compatible systems.)
2. Run SETUP (this function may be selected from a menu of options or may be a separate program) 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. Answer YES. If you are presented with a list of video options, select the option for EGA support. If you don't see an option for EGA, try the option for "NO MONITOR", "RESERVED" or "SPECIAL". These will usually work. If not, see your dealer for the appropriate response.
3. At the conclusion of the SETUP program, the computer will restart as if you had just turned on the power. Your system is now ready for operation.

All Users: Your MVA 1024 installation is now complete. If you have any problems, please refer to the troubleshooting guide later in this manual for assistance. If you still have problems, consult the dealer from which you purchased your MVA 1024.

Configuring Your Application Software

Many application software packages include a setup or configuration program to prepare them for operation on the particular hardware that comprises your system. For best results in terms of resolution and color choices, you should, if given a choice, configure your software for EGA modes of operation or in the case of software that supports PGL or DGIS, choose one of these options.

Using the MVA 1024

If you have followed the installation instructions in this manual, you are now ready to use your MVA 1024 equipped computer system. EGA compatible software will run automatically on your system. Just turn on your computer system, install your application package as instructed by the manufacturer to enjoy the benefits of EGA.

Much of the software that is written for the IBM CGA (Color/Graphics adapter) card will run on the MVA 1024 in EGA mode. If you have trouble running a CGA package in EGA mode, use the supplied program MVA.EXE to switch the card to CGA mode. Detailed instructions for MVA.EXE appear in the next section.

MVA 1024 Software Diskette

The enclosed diskette contains many programs and files that are provided to support your use of the MVA 1024 in its various modes of operation. This manual contains information on the installation and use of the more often used MVA 1024 programs and utilities. More detailed information on the use of all the supplied software is contained in the *NEC MVA 1024 Software Manual*.

INSTALL.EXE: This program will automatically perform the following tasks for you:

- Create a subdirectory on your hard disk called \MVA-1024.
- Copy files from the MVA 1024 distribution diskette to that subdirectory.
- As necessary, create or modify the CONFIG.SYS file on your booting hard disk drive so that the PGL device driver is active each time you start your computer system.
- As necessary, create or modify the AUTOEXEC.BAT file on your booting hard disk drive so that the \MVA-1024 subdirectory is part of the PATH = list each time you start your computer system.
- Modify the AUTOEXEC.BAT file in the root directory of your hard disk so that NECKEY.COM will be executed each time you start your system allowing you to switch the active visible page of the MVA 1024 between the DGIS/PGL screen and the EGA/CGA screen through the use of the ALT,ESC key sequence.

The install program is invoked by following these steps:

- At the DOS prompt (A), B), C), etc.), insert the supplied MVA 1024 distribution diskette.
- Type in the following:

A: INSTALL [enter]

([enter] is the enter key.)

- Then follow the on-screen prompts and answer the questions posed by the program.

Please Note: It is recommended that novice users let the Install program set up their system for them. Experienced users will recognize the intent of the install program from the description above and may bypass the install program and tailor their MVA 1024 software installation to meet their needs.

If you allow INSTALL.EXE to modify the AUTOEXEC.BAT file on your booting hard disk so that the newly created subdirectory MVA 1024 is part of the path command, you will be able to invoke MVA.EXE (see next section) any time your hard disk is the default disk drive.

MVA.EXE

This program lets you override the default mode of the card specified by lever 2 of the DIP switch, lets you select any of the other downward compatibility modes available on the MVA 1024 and allows the user to load either PGL or DGIS

into the card prior to running an application compatible with these modes of operation. MVA.EXE also lets you "boot" or start a game disk that otherwise might not run on your MVA 1024 (or other EGA cards) because of exotic copy protection schemes.

If you have run the install program as outlined above you will be able to run MVA.EXE by typing MVA [enter] at the DOS prompt. To invoke this program, simply make sure that your computer system's hard disk is the default drive (usually the C: drive) and type:

MVA [enter]

You will be presented with a simple menu listing several options. Use the up and down arrows to select the feature you wish to access. When the desired feature is selected (highlighted), press the [ENTER] key.

You may also specify any MVA option from the DOS command line bypassing the menu. This is useful if you wish to incorporate MVA.EXE commands into a batch file.

This is how you can set the various MVA.EXE parameters from the DOS prompt:

MVA [enter] Brings up the MVA menu.

MVA EGA [enter] Switches to EGA operation from CGA, PGL or DGIS modes.

MVA CGA [enter] Switches to CGA mode from the current mode. This mode

will survive a warm boot (Control-Alt-Del key sequence) enabling you to boot into copy-protected games like Microsoft Flight Simulator.

MVA PGL4 Prepares the card to run PGL compatible software in 16 color mode. The monitor will not change in appearance but a PGL compatible application can be run after this action is taken.

MVA PGL8 Prepares the card to run PGL compatible software in 256 color mode. The monitor will not change in appearance but a PGL compatible application can be run after this action is taken. If the necessary memory has not been installed in the MVA 1024 then the card will be setup for 16 color mode.

MVA DGIS4 Prepares the card to run DGIS compatible software in 16 color mode. The monitor will not change in appearance but a DGIS compatible application can be run after this action is taken.

MVA DGIS8 Prepares the card to run DGIS compatible software in 256 color mode. The monitor will not change in appearance but a DGIS compatible application can be run after this action is taken. If the

necessary memory has not been installed in the MVA 1024, then the card will be setup for 16 color mode.

If you make a mistake in typing the MVA command, the program will give you the option of using the MVA menu or returning to DOS.

NECKEY.EXE

As mentioned earlier, the MVA 1024 is really two video cards (one EGA and CGA compatible and one DGIS/PGL compatible) that share a single monitor as its output device. Both of these "cards" are always active, that is, they are both capable of displaying data at all times. However, software that you will run on the MVA 1024 will only display on one or the other of these "logical" video cards. Most software that you will run on the card will "know" how to connect the monitor to the logical video card that it will use.

NECKEY.EXE is a TSR program that lets you switch back and forth between these logical video cards. "TSR" is short for "terminate and stay resident". Once invoked, this program stays in the background and waits for a specific key sequence to be typed in at the keyboard. When it "sees" this sequence typed, it will switch the image that you see on the MVA 1024 monitor between the two logical video cards.

If you have already installed the MVA 1024 software using INSTALL.EXE and you elected to have NECKEY.EXE execute each time that you start your system then this program is now active. To switch between the logical video

cards that comprise the MVA 1024, simply type the [ESC] key while holding down the [ALT] key. This key sequence will be referred to as ALT,ESC from here on.

Note to advanced users: If default NECKEY - ALT, ESC "hot key" sequence conflicts with other TSR type programs, you may invoke NECKEY to use the [ALT] key and any other printable character. For example, if you wish to use NECKEY with the [ALT] Z key sequence just invoke NECKEY as shown:

NECKEY Z [enter]

XMODE.EXE

Because of the lack of compatibility of some earlier DGIS compatible devices with EGA and CGA video modes, some DGIS compatible programs assume that you will be running with a two monitor system. Programs that make this assumption will send their text output, for example, AUTOCAD's help screens to the CGA/EGA device.

In order to keep you from having to use the ALT, ESC key sequence (see the description of NECKEY.EXE above) to switch between the DGIS and EGA/CGA screens to view AUTOCAD's text output, we have provided XMODE.EXE. This program redirects this kind of text output to the DGIS screen of the MVA 1024 so that it will not be "lost" from view. XMODE.EXE may also be used to reset text output to the CGA/EGA screen.

Use the command: XMODE 80,2 to redirect text output to the DGIS screen.

Use the command: XMODE co80 to redirect text output to the CGA/EGA screen.

The sample command sequence shown below is an example of how to use XMODE.EXE. The text appearing after the semicolons are comments and not part of what you type.

DGISADI	; Invokes the AUTOCAD ; DGIS driver
MOUSE	; Invokes your mouse driver ; prior to running AUTOCAD
MVA DGIS8	; Loads DGIS into the MVA ; 1024
XMODE 80,2	; Sends text output to DGIS ; screen
ACAD	; Runs AUTOCAD
XMODE co80	; Resets text output to ; EGA/CGA

These commands may be typed at the DOS prompt or entered into a batch file.

Note to advanced users: Other memory resident drivers that redirect DOS text output such as ANSI.SYS may conflict with XMODE.EXE.

Professional Graphics Controller Emulation and PGL640

Some software that is compatible with IBM's Professional Graphics Controller will assume that the maximum screen dimensions are no larger than the 640 by 480 pixel resolution of IBM's PGC. Such applications, when run on the MVA 1024 with the MultiSync Plus or MultiSync XL, will display in the lower left portion of the 960 x 720 or 1024 x 768 PGL screens. The PGL640.EXE program on the *MVA 1024 Utilities* disk will allow these programs to be displayed centered on the screen, but they will remain reduced in size (62% on the XL and 66% on the Plus). The smaller size is because the MVA 1024 must use the same pixel clock in the 640 x 480 resolution PGC emulation as in the high resolution PGL modes.

Note: Not all PGC compatible software will require the PGL640 program since some PGC software knows about different screen resolutions.

To use PGL640.EXE to enable the 640 by 480 PGC emulation of the MVA 1024, type:

PGL640 [enter]

at the DOS prompt after loading PGL in 4 or 8 bit mode with the MVA utility. The MVA 1024 installation program described above automatically copies PGL640.EXE to your "MVA 1024" subdirectory. Your application will run as a window centered on the screen under the PGC emulation.

Type:

PGLHIRES [enter]

or run the MVA utility again to re-enable the high resolution PGL modes.

Diagnostics

The MVA 1024 comes with a built-in diagnostic mode which continuously tests the 34010 graphics processor and its memory until either PGL or DGIS are loaded. To view this test mode:

- Start your computer system from a power-off condition.
- Make sure that NECKEY has been invoked. (See previous section.)
- Type ALT,ESC. (This must be done before loading either DGIS or PGL.)

At this point you will see the diagnostic pattern on the screen. It consists of a continuously changing pattern of solid colors. Typing the ALT, ESC sequence again will return the monitor view to the DOS prompt or application.

Copy protection

None of the programs we supply are copy protected in any way. You may use the DOS COPY command to copy them to the diskette or hard disk of your choice. We recommend that you back up your EGA software as soon as possible.

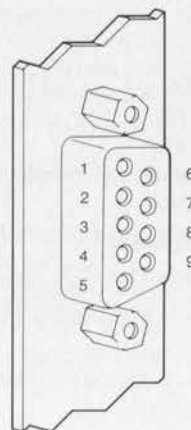
Troubleshooting Your MVA 1024 Installation

Here are some typical symptoms and solutions to installation problems:

Symptom	Solution
One long beep & two short beeps on power up of system/ or "F1-CRT Error"	Setup program not run. See installation section of this manual and the documentation that accompanied your computer system.
Same as above.	MVA 1024 not properly seated in expansion slot or expansion slot connector dirty. Reseat or clean "gold fingers". A pencil eraser works well.
No display or distorted display on any monitor type.	System and/or MVA 1024 not configured appropriately for the monitor type in use. See the installation section of this manual for details.
Same as above.	MultiSync not configured correctly. Several switches must be set. See the installation section of this manual for details.
Same as above.	MultiSync signal and/or power cable not properly plugged in.
Same as above.	MultiSync not turned on.
Same as above.	MultiSync brightness and/or contrast controls not turned up far enough.

Appendix A—Video Output Connector Pinout

PIN	Signal Function
1	Red Analog Video
2	Green Analog Video
3	Blue Analog Video
4	Composite Sync
5	No Connection
6	Red Analog Ground
7	Green Analog Ground
8	Blue Analog Ground
9	Digital Ground



Appendix B—NEC Home Electronics (USA) Bulletin Board System

NEC Home Electronics (USA) Inc. operates a Technical Support Bulletin Board System (BBS) available for use by NEC customers. The Bulletin Board System allows registered users of the MVA 1024 access to the most current information on NEC graphics board and monitor products. This information includes:

- Software drivers developed since shipment of the product
- Latest compatibility reports
- Newest product introductions

Please note the following information regarding the NEC BBS:

- Users must be registered to utilize the BBS. Registration information can be obtained by accessing the BBS at (800) NEC-RBBS.
- Remote BBS service is available 24 hours a day, except during occasional system maintenance.
- The system provides on-line support for users and software developers.
- Uploading and downloading is performed by using XMODEM, XMODEM CRC or YMODEM software exchange protocols at 300, 1200 or 2400 baud rate.
- Messages can be entered or received.
- For further information regarding the BBS, please contact NEC Technical Support at (800)NEC-SOFT.

Appendix C—Service Information

If experiencing problems with your graphics board, please contact the NEC Technical Support Department at (800) 632-7638. They can determine whether the problem exists in hardware or software.

If the problem is one requiring servicing, the technician will issue a Return Material Authorization (RMA) and put you in touch with a regional service center. Please remember the product must be returned to the service center accompanied by the RMA number, a return address, and a brief description of the problem. By omitting any of these items, you risk delays in returning the graphics adapter to you. Be sure that the product is securely packaged and mail it postpaid. NEC will not be liable for any damage incurred during shipment, nor will they accept any C.O.D. packages.

If the repair is required during the warranty period, enclose proof of purchase. During the warranty period, NEC will repair or replace your NEC product without charge.

If the repair is required after the warranty period, there will be a service charge. When contacting the Service Center, please question the center regarding repair prices for any out of warranty product.

For information regarding warranty, please refer to Appendix D of this manual.

Appendix D—Limited Warranty

NEC HOME ELECTRONICS (U.S.A.) Inc. (hereinafter "NEC") warrants that this Product is free from defective material and workmanship and, subject to the conditions set forth below and agrees:

to repair or replace any part of the enclosed unit which proves defective by reason of improper workmanship or materials for a period of one (1) year labor and one (1) year parts from the date of original retail purchase, without charge for parts and labor.

This warranty is limited to the original purchaser of the Product.

This warranty shall not be effective unless the Product was purchased from a dealer or other person authorized by NEC to sell Products.

The product shall be shipped, freight prepaid, or delivered to a facility authorized by NEC to render the services provided hereunder in either the original package or a similar package affording an equal degree of protection.

The Product shall not have been previously altered, repaired or serviced by anyone other than a service facility authorized by NEC to render such service; the serial number on the Product shall have not been altered or removed; the Product shall not have been subject to accident, misuse, or abuse or operated contrary to the instructions contained in the accompanying manual.

NEC SHALL NOT BE LIABLE FOR DIRECT, INDIRECT, INCIDENTAL, CONSEQUENTIAL, OR OTHER TYPES OF DAMAGES RESULTING FROM THE USE OF ANY NEC PRODUCTS OTHER THAN THE LIABILITY STATED ABOVE. THESE WARRANTIES ARE IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

THIS WARRANTY APPLIES ONLY WHEN THIS PRODUCT IS PURCHASED AND USED SOLELY IN THE UNITED STATES OF AMERICA.

NEC