
VIDEO CONTROLLERS

Table of Contents of the Video Controllers

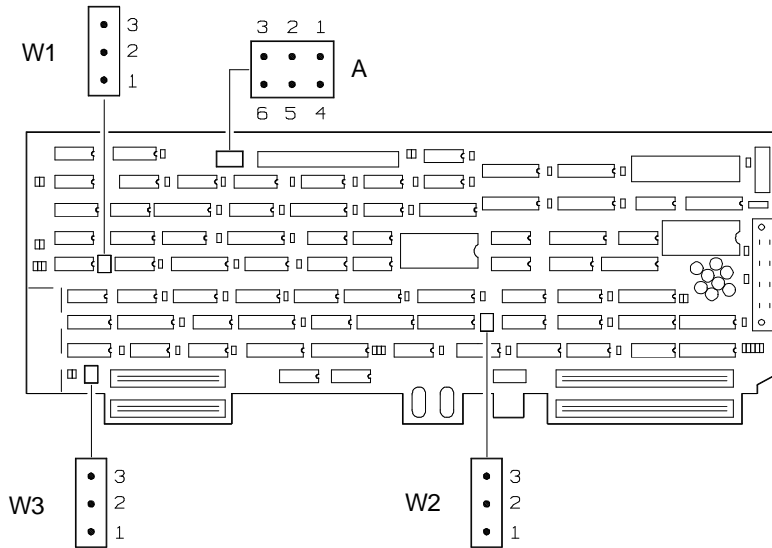
GO317 - GO318 - GO380 - GO709	C - 2
E.G.C. GO329 (Enhanced Graphic Colour).....	C - 3
O.G.C GO708 (Olivetti Graphics Controller).....	C - 4
P.G.C. GO423 (Positive Graphics Controller).....	C - 4
O.E.C. GO4511 - GO467 - GO491 (Olivetti E.G.A. Compatible).....	C - 5
O.V.C. GO470 - GO481(Olivetti V.G.A. Compatible).....	C - 6
AGC 26-386 Graphics Enhancement Board	C - 7
HGC 1282 KIT High Resolution Graphics Expansion Board	C - 9
XGC High Resolution Graphics Expansion Board	C - 10
ATI 8514 ULTRA Graphics Accelerator Board	C - 12
1570 SX Rev. A (GO2021) VGA-Compatible Video Controller Board	C - 13
VISION-40 (GO 2019) Video Controller Board	C - 14
REALITY-40 (MATROX) GO2027 - GO2049 Video Controller Board	C - 18
1580 (GO2030) Video Controller Board	C - 22
Smarty PCI Video Controller Board	C - 24
VD-5428 Video Controller Board	C - 28
VD-5428 Video Controller Board	C - 28
MATROX Impression Plus GO2062 Video Controller Board	C - 29
MATROX Millennium GO2089 Video Controller Board	C - 32
ATI MACH64 VT GO2215 Video Controller Board	C - 35

C

GO317 - GO318 - GO380 - GO709 (For M21, M24 and M28 PCs)

FIRMWARE

FUNCTION	POSITION	EVOLUTION
RAM decoder	5H	PL68
EPROM character generator	7C	PBFA PBFK PBFS



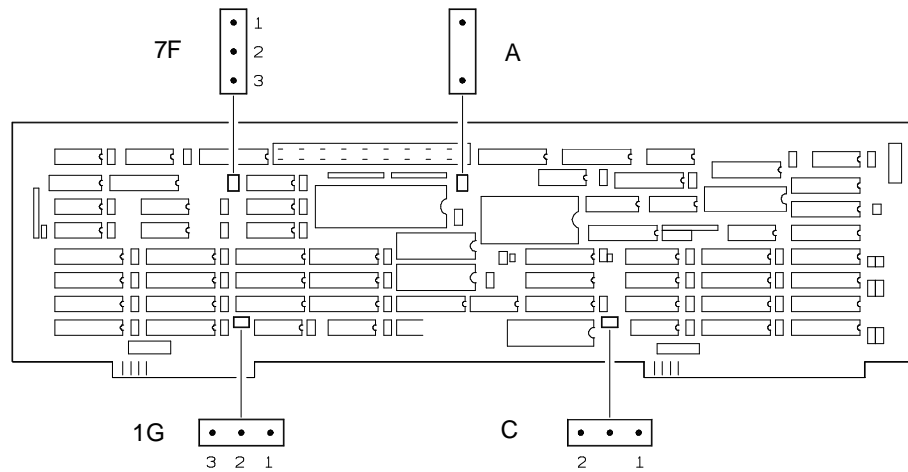
JUMPER	POSITION	FUNCTION
W1	1 - 2	Controller disabled
	2 - 3	Controller enabled
W2	1 - 2	M24
	2 - 3	M24 SP / M28
W3	1 - 2	M24
	2 - 3	M24 SP / M28

JUMPERS GROUP A	FUNCTION
2 - 3	Only video adapter
5 - 6	
2 - 3	Video adapter + E.G.C. board
4 - 5	

NOTE: To disable the GO317 and GO318 boards, proceed as follows:

- 1) Desolder component 74LS00 (6H)
- 2) Solder a block of jumpers
- 3) Jump connect pins 6 - 7 and pins 8 - 11 - 3 - 14
- 4) Between pins 3 and 14, insert a 2.2 K OHM resistor

E.G.C. GO329 (Enhanced Graphic Colour)



CHARACTERISTICS:

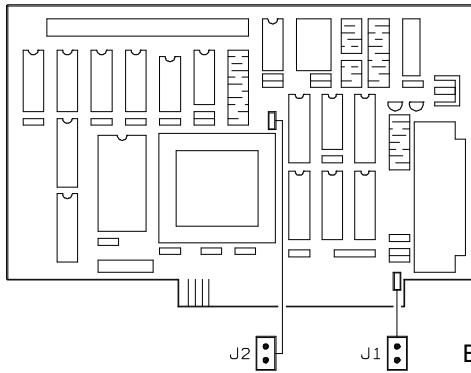
- 3 additional pages 640 x 400
- Software-controlled colour look-up table
- 16 x 16 high resolution characters
- Continuous video scrolling
- Graphic and A/N modes enabled
- Display of 16 colours in 640 x 400 resolution

JUMPER	POSITION	FUNCTION
A	IN	Monitor connected to adapter board
	OUT	Monitor connected to EGC board
C	C - 1	All Personal Computer models
	C - 2	For future applications
G / F	1 - 2	M24
	2 - 3	M24 SP - M28 - M24 with APB

SOFTWARE

Needed: DEVICE = DEVICE.SYS

O.G.C GO708 (Olivetti Graphics Controller) for M240



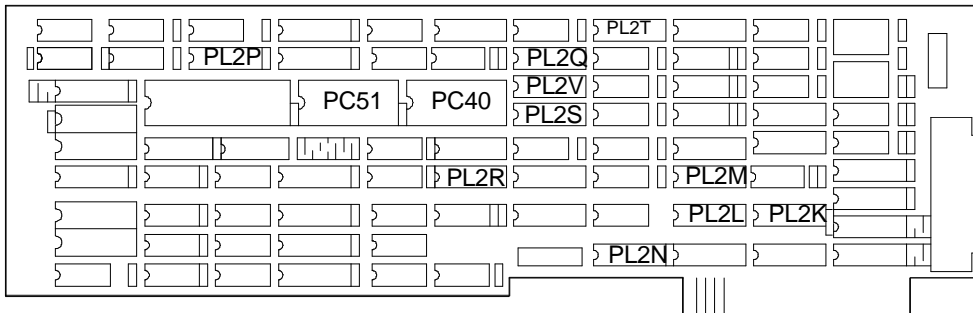
CHARACTERISTICS:

Graphic mode: - 640 x 400
 - 640 x 200
 - 320 x 200
 (4 colours from a range of 16)
 A/N mode: - 80 x 25 (8 x 16)
 - 40 x 25 (16 x 16)
 32 KB RAM Memory

JUMPERS		FUNCTION	VIDEO TYPE
J1	J2		
X	OUT	200 line NTSC	RGB. Use a 25 x 9 pin adapter cable
OUT	IN	400 line Olivetti	
X	IN	200 line IBM	RGB. Use a -pin adapter cable
IN	OUT	200 line NTSC	
IN	IN	200 line IBM	Composite

X: Jumper position is don't care.

P.G.C. GO423 (Positive Graphics Controller) For M240 - M280 - M290 - M380

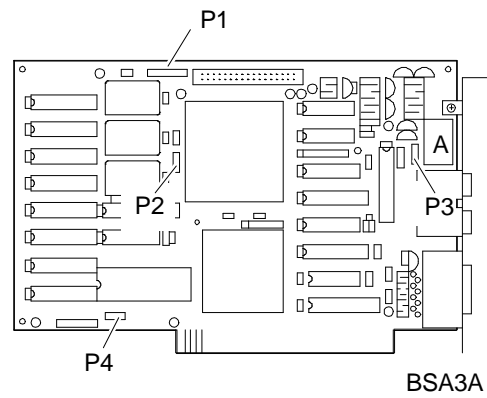
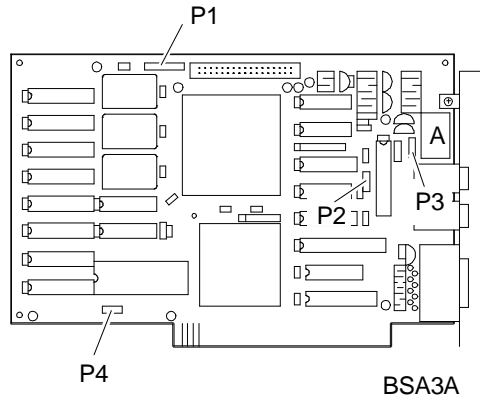


BSA4A

CHARACTERISTICS:

Graphic mode: - 640 x 480
 - 640 x 400
 - 640 x 200
 - 320 x 400
 - 320 x 200
 A/N mode: - 80 x 32 (8 x 15)
 - 80 x 25 (8 x 16)
 - 40 x 25 (16 x 16)

**O.E.C. GO4511 - GO467 - GO491 (Olivetti EGA Compatible)
For M240 - M280 - M290 - M380 - M380 XP**



C

DIP SWITCH A

SWITCH	POS.	FUNCTION
SW1	OFF *	Primary adapter
	ON	Secondary adapter
SW2	OFF	Monochromatic monitor
	ON	Colour monitor
SW3	ON *	Reserved
SW4	OFF	CGA/EGA emulation
	ON	Auto-switching
SW5	OFF	EGA emulation
	ON	CGA emulation
SW6	OFF	Reserved

CHARACTERISTICS

Graphic Mode: - 640 x 400/640 x 350
 - 640 x 200/320 x 200
 A/N mode: - 80 x 25 (8 x 8 CGA)
 - 80 x 25 (8 x 16 Oliv.)
 - 80 x 25 (8 x 14 EGA)
 Memory: - 256 KB
 16 colours from a range of 64

SW4	SW5	
ON	OFF	Autoswitch mode
OFF	ON	CGA emulation
OFF	OFF	EGA + Olivetti emulation

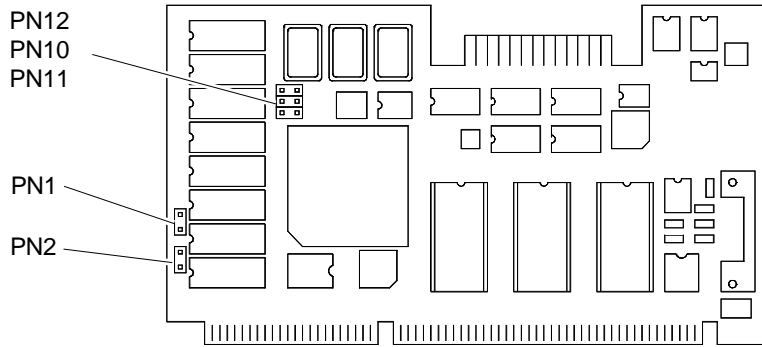
* Default Position

JUMPERS

JUMPER	POSITION	FUNCTION
P2	1 - 2	I/O address range board OEC 3XX H (Normal)
	2 - 3	I/O address range board OEC 2XX H
P3	1 - 2	Composite signal sent to J1 (normal)
	2 - 3	J1 connected to Features connector
P4	1 - 2	24 MHz oscillator selection (normal)
	2 - 3	14 MHz oscillator selection
P1		Reserved

FIRMWARE

ROM BIOS LEVEL	COMPATIBILITY
Lev. 5.20	Problems: - No B/W monitor management - No installation in PC M380 and M280
Lev. 5.26 PCFY	Solves: - Problems with the previous board
Lev. 5.28 PDPL	Solves: - Problems with autocad Rel. 2.18 New printed circuit 3.31 implemented Seiko chip PEGA2 implemented
Lev. 5.32	Operation with EGA under the XENIX and OS/2 operating systems Solves: - Problems with 3270 Rev. 11 emulation - Problems with IBM BASIC compiler



O.V.C. GO470 - GO481 (Olivetti VGA Compatible) For M380 XP

CHARACTERISTICS:

- Graphic Mode: - 640 x 480
 - 640 x 400
 - 640 x 350
 - 640 x 200
 - 320 x 200 (256 colours from a range of 256 K)
- A/N mode: - 80 x 25 (8 x 8 CGA)
 - 80 x 25 (8 x 16 Olivetti)
 - 80 x 25 (8 x 14 EGA)
 - 80 x 25 (9 x 16 VGA)
- Memory: 256 KB
 Monitor: Analog
 ROM BIOS 32 KB at address C000:0

NOTE: Must be used with DOS 3.30.

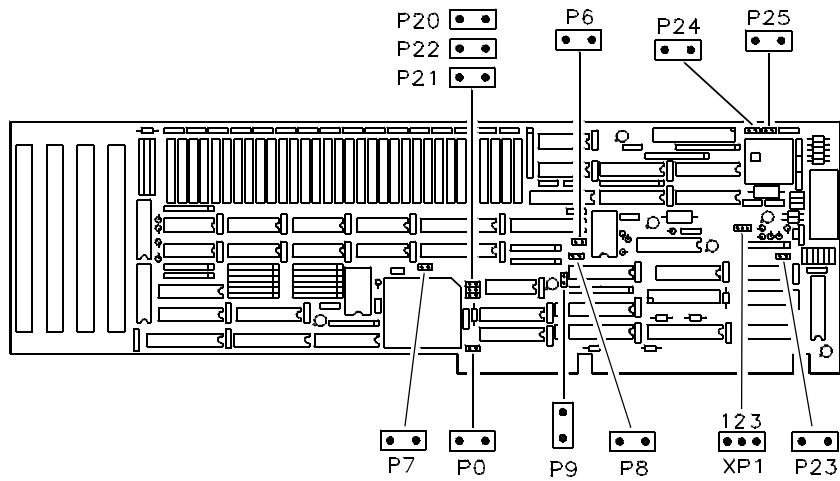
JUMPERS

JUMPER	POSITION	FUNCTION
PN1	IN	ROM 16-Bit (normal)
	OUT	ROM 8-Bit
PN2	IN	RAM 16-Bit (normal)
	OUT	RAM 8-Bit
PN10	IN	Enables 41.5 MHz oscillator (normal)
PN11	IN	Enables 25.175 MHz oscillator (normal)
PN12	IN	Enables 28.322 MHz oscillator (normal)

ROM BIOS

	EVOLUTION	
ROM BIOS 32 KB	PDPS / PDPT Rev. 1.03	PDP5 / PDP7 Rev. 1.06

AGC 26-386 Graphics Enhancement Board
For M300-01 M300-05 M300-10 M386/25 M380-40 M380/XP9 M486 SCSI M486 ESDI



C

Board settings

JUMPER	POSITION	FUNCTION
P0	IN * OUT	16 bit on BUS AT 8 bit on BUS AT
XP1	IN su 1 - 2 * IN su 2 - 3	D7000 board memory address C6400 board memory address
P6	IN *	Reserved
P8	IN * OUT	512 KB board memory 1 MB board memory (after expansion)
P9	IN *	Reserved
P20	IN OUT *	Double screen configuration Single screen configuration
P21	IN OUT *	"Green" signal synchronism enabled "Green" signal synchronism disabled
P23	IN *	Reserved
P24	IN *	Reserved

Jumpers P7, P22 and P25 are not selectable, reserved jumpers.

IN: Jumper inserted

OUT: Jumper not inserted

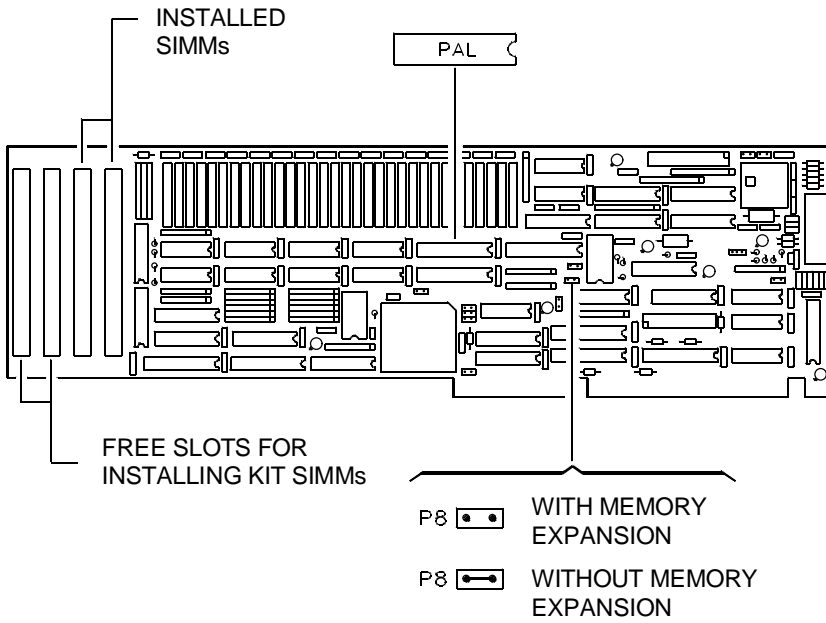
(*) Default position.

The memory of AGC 26-386 can be expanded by installing a memory expansion KIT **EXM 26-388**.

Contents of this KIT are:

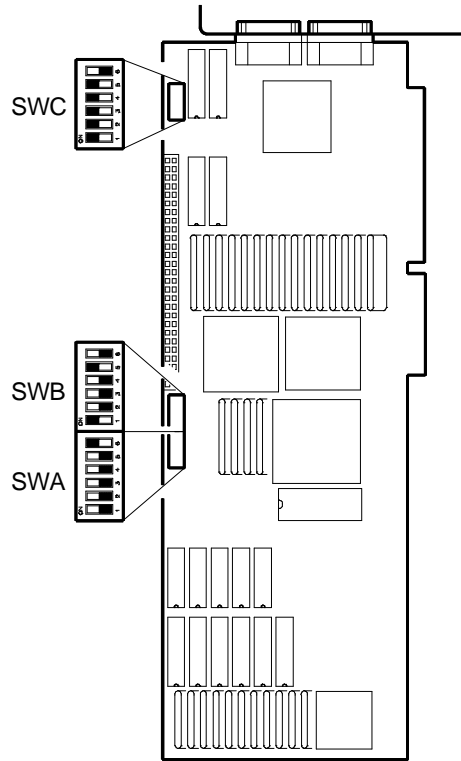
- 2 SIMM modules 256 Kb X 8
- PAL

Install SIMM modules and PAL in system board connectors shown below.



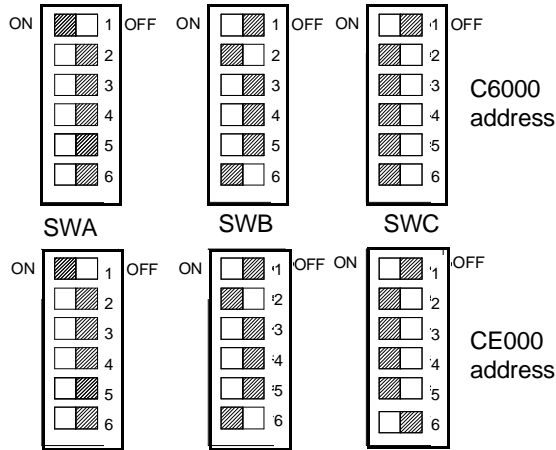
HGC 1282 KIT High Resolution Graphics Expansion Board

C

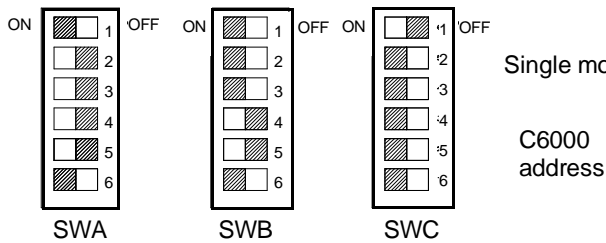
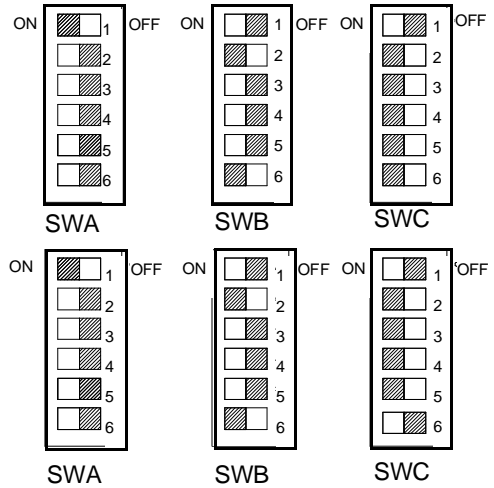


ELA1A

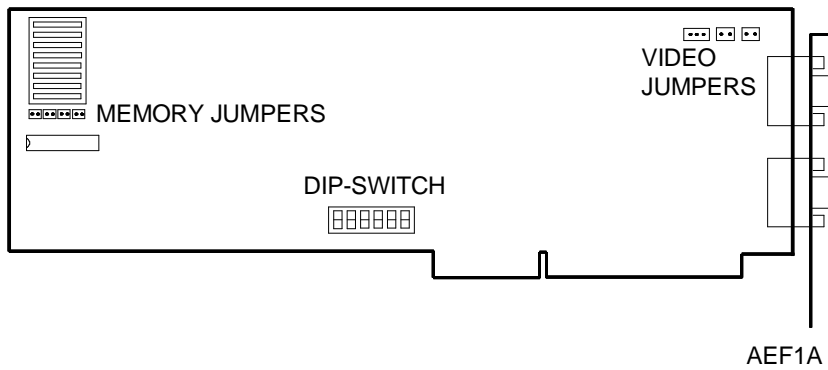
Single monitor configuration with VGA controller



Dual monitor configuration



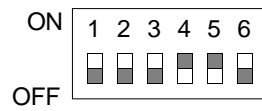
XGC High Resolution Graphics Expansion Board



CARACTERISTICS

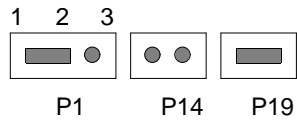
Resolution	1280x1024
Operation	High resolution or VGA
Video memory	1.3 MB

DIP-SWITCH



DIP-SWITCH	POSITION	DESCRIPTION	DEFAULT POSITION
DP1	OFF	Reserved	OFF
DP2	OFF	Reserved	OFF
DP3	OFF	Reserved	OFF
DP4	OFF	Double video configuration	ON
	ON	Single video configuration	
DP5	OFF	I/O decode from 300H to 304H	ON
	ON	I/O deode from 200H to 204H	
DP6	OFF	Reserved	OFF

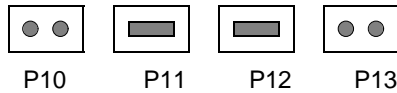
JUMPERS P1 P14, P19 - These jumpers set video operation.



C

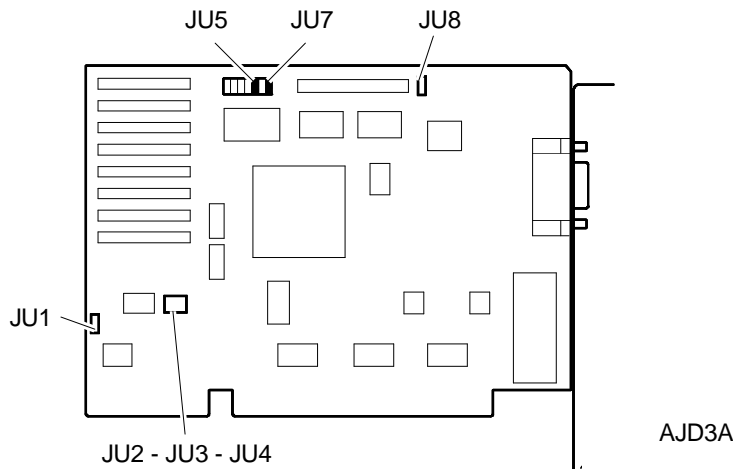
JUMPERS	POSITION	DESCRIPTION	DEFAULT POSITION
P1	1 - 2	Blank pedestal on	1 - 2
	2 - 3	Blank pedestal not off	
P14	IN	Green synchronism on	OFF
	OUT	Green synchronism off	
P19	IN	Composite external syncs for videos with 4 BNC)	ON
	OUT	Separate external syncs (for videos with 5 BNC)	

JUMPERS P10, P11, P12, P13 - Board memory capacity setting.



P10	P11	P12	P13	DESCRIPTION	NOTES
OUT	IN	IN	OUT	1 MB DRAM	Default
OUT	OUT	IN	IN	4 MB DRAM	After upgrade kit installation

ATI 8514 ULTRA Graphics Accelerator Board for the M400-60



CARACTERISTICS

- BUS 16-bit ISA
- Video memory 512 KB expandible to 1 MB by installing two memory chips in the appropriate two sockets on the system board.
- Resolution 1024 x 768 16 or 256 colors
800 x 600 16 or 256 colors
640 x 480 16 or 256 colors
- Drivers Turbo AI (8514/A and XGA Adapter Interface)
AutoCAD rel. 10/11
Windows 3.0, 3.1 (1024 x 768 & 800 x 600)

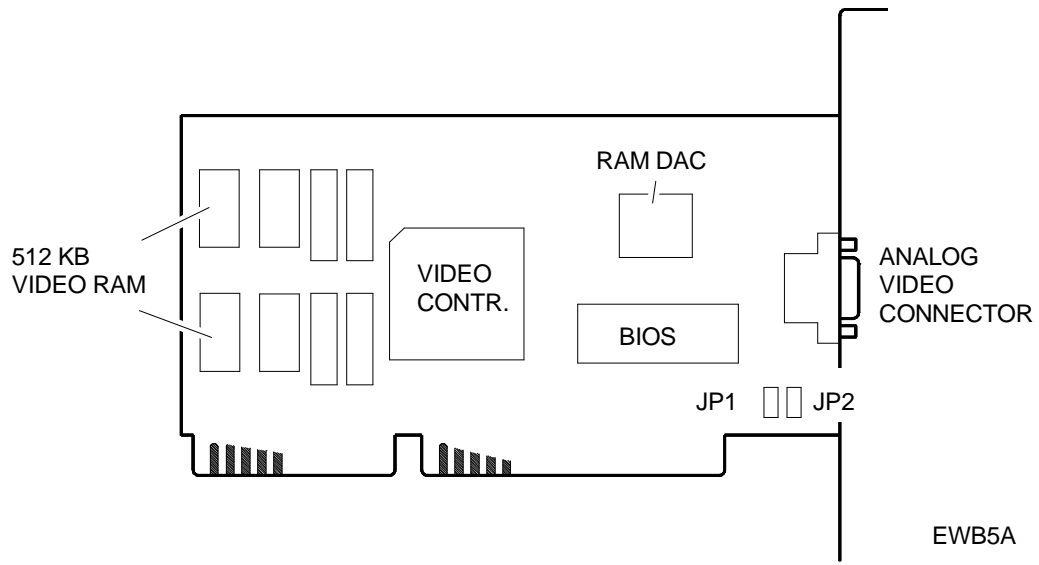
JUMPERS

JUMPER	FUNCTION	SETTING	DESCRIPTION
JU1	Selects board mode of operation.	2 - 3 1 - 2 *	8-bit mode of operation 16-bit mode of operation
JU2 JU3 JU4	Selects the interrupt level - These jumpers are not used.	JU2 JU3 JU4 IN OUT OUT OUT IN OUT OUT OUT IN	Interrupt level 2 Interrupt level 3 Interrupt level 4
JU5	EPROM enable	1 - 2 2 - 3 *	Disabled Enabled
JU7	Video memory size	IN OUT	512 KB 1 MB
JU8	Pixel clock selection	1 - 2 2 - 3	Bar clock Clock

* indicates the default setting.

NOTE: The board must also be configured using the software utilites supplied on diskette

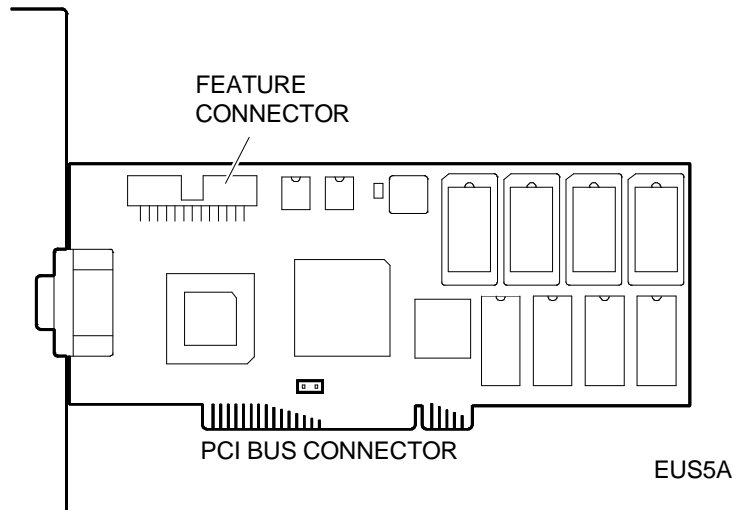
**1570 SX Rev. A (GO2021) VGA-Compatible Video Controller Board
For the M6-850 M6-860, M6-880.**



JUMPERS

JUMPERS	SETTING	DESCRIPTION
JP1	On 1 - 2 On 2 - 3	Interlaced video (default) Non-interlaced video
JP2	Reserved	

VISION-40 (GO 2019) Video Controller Board
For the M4-82, PCS 52E, M6-750 750S, M6-760/ 760S, M6-770/770S, M6-640.



CONNECTABLE MONITORS

The following table gives the refresh rates and resolutions supported by some of the monitors that can be connected to this video controller board.

RESOLUTION	640 x 480		800 x 600			1024 x 768		
	60 Hz	72 Hz	56 Hz	60 Hz	72 Hz	60 Hz	72 Hz	87 Hz Inter-laced
DSM 25-314/PY DSM 26-314/LE	X							
DSM 27-039 (CDU 1435E/GS11) DSM 27-028 (CDU 1435) DSM 27-140/LE	X		X					X
DSM 27-141/PS	b	X ^a	a	X ^c			X	
DSM 27-414/TM (CDU 1448TS/PH01)	X				X ^c	X		
DSM 27-514/MS (CDU 1458/HA) DSM 27-615 DSM 27-117 (CDU 1764/SA01) DSM 27-120 (CDU 2082/FI01)	b	X ^a	a		X ^c		X	

X^a: Up to 65,000 colors only.

X^c: Up to 256 colors only.

a: Use the driver to obtain up to 65,000 colors (see the documentation provided with the driver).

b: Use the driver to obtain up to 16,000,000 colors (see the documentation provided with the driver).

CONFIGURING THE VISION-40 VIDEO CONTROLLER BOARD

To configure this video controller, insert the diskette with the configuration program into drive A.

NOTE: In systems with preinstalled software, this diskette will have to be recreated by copying the configuration program onto diskette. This copy can be made by using the utilities which allow the downloading of the preinstalled software from hard disk.

- 1 - Type **a:install** and press Enter.
- 2 - The INSTALL program Menu is displayed; this program offers the following utilities:
 - Set Power-up Configuration
 - Set Current Video Mode / Configuration
 - Test Graphics Adapter
 - Install Video Adapter Utilities
 - Install Device Driver
 - Install CRYSTAL Fonts
 - Install Adapter Interface (AI)
- 3 - Only the first three utilities will be explained, which allow you to configure the board according to the type of monitor connected. For information on the other utilities, see the documentation provided with the personal computer .

C

1 - Set Power-up Configuration

Selecting this utility displays the following menu.

Set Power-up Configuration
Monitor Type : VGA Power-up video mode : VGA (CV80) Coprocessor BUS I/O : Auto-select VGA BUS I/O : 8 bits Memory Aperture : Disabled VGA Memory Size : Shared

A) Monitor Type

This field allows you to configure the type of monitor connected to the video controller so the best possible picture can be displayed. Selecting this field displays a list with the monitors that can be connected to the system. If the monitor you are going to connect is not displayed in the list, select the **CUSTOM** option. Selecting this option displays the menu shown on the side.

Select Applicable Resolution and/or Mode
640 x 480... 800 x 600... 1024 x 768...

Each resolution is displayed with a list of possible refresh rates.

Adjust 640 x 480 Mode
60 Hz Non - interlaced 72 Hz Non - interlaced

Adjust 800 x 600 Mode
Not Supported 56 Hz Non - interlaced 60 Hz Non - interlaced 70 Hz Non - interlaced 72 Hz Non - interlaced 89 Hz Interlaced 95 Hz Interlaced

Adjust 1024 x 768 Mode
Not Supported 60 Hz Non - interlaced 70 Hz Non - interlaced 72 Hz Non - interlaced 87 Hz Interlaced

The screen on the side is displayed after having selected the vertical refresh rate.

WARNING:

If a distorted picture is displayed, select a new vertical refresh rate since the monitor does not support the one selected.

Press the h abd v keys to adjust the horizontal and vertical sizes of the picture displayed. This operation has no effect on multifrequency monitors.

Press the ↑, →, ↓ and ← keys to center the picture on the screen.

If the picture's horizontal and vertical sizes must be further adjusted, use the <, >, [e] keys.

NOTE: These picture display adjustments must be repeated for each resolution selected.

640 x 480 Screen Adjustment
-- Screen centering operations -- press ← to move screen left press → to move screen right press ↑ to move screen up press ↓ to move screen down
-- Screen sizing operations -- press < to reduce horizontal display press > to increase horizontal display press [to reduce vertical display press] to increase vertical display
-- Polarity adjustment operations -- press h to toggle the horizontal sync polarity press v to toggle the vertical sync polarity press ESC to return without changes press RET to accept current screen position

After having adjusted all the resolutions to be used, press the ESC key to display the following message:

Is your Custom (Y/N)?

Press Y to accept the new configuration.
Press N to continue adjusting the picture on the screen.

NOTE: The video configuration created using these utilities can be cancelled by pressing the ESC key when the Set Power-up Configuration menu is displayed.
The following message is displayed:

Discard Selected Power-Up ... (Y/N)?
Pressing Y cancels the video configuration.

B) Power-Up Video Mode

This field allows you to define the video mode at system power on (VGA, EGA, CGA or MDA). The VGA video mode should normally be selected.

C) Coprocessor Bus I/O

This field allows you to define the graphics coprocessor operating mode: either 8-bit or 16-bit I/O BUS. Selecting this field displays the following three options:

- **Auto-Select** In this case the selection between 8 bits and 16 bits is made automatically depending on the system processor.
- **16-Bit** In this case the graphics coprocessor will work at 8 bits.
- **8-Bit** In this case the graphics coprocessor will work at 16 bits.

D) VGA BUS I/O

This field is nearly identical to the previous, the only differences being that it concerns the VGA controller and that it does not offer the Auto-Select option.

E) Memory Aperture

This field allows you to map video memory as system memory. This improves the system's graphics performance, and offers the following two options: Enabled or Disabled.
By selecting Enabled, video RAM is mapped beyond the last MB of system system memory with a free space of 2 MB.

The following example may help clarify this concept:
If the system has 8 MB of RAM, the video memory base address will be:
8 MB + 2 MB = 10 MB

NOTE: This option cannot be used if the system has more than 12 MB of memory.

F) VGA Memory Size

The following options are available:

- Shared Memory is shared between the VGA video controller and the graphics accelerator. This option allows the video drivers installed in the system to use all the video memory available, and therefore is useful for the majority of applications. However, it cannot be used for applications that require that the contents of video memory be maintained (for example, DOS windows in the Windows environment).

- 256/512/1 In this case you can select the memory size which is dedicated to the VGA video controller. Memory size has an effect on the combinations of resolutions and colors supported when SVGA drivers are used.

C

2 - Set Current Video Mode / Configuration

This option allows you to change the video's mode of operation during a work session. These settings are lost when the system is reset.

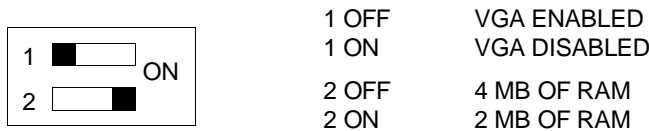
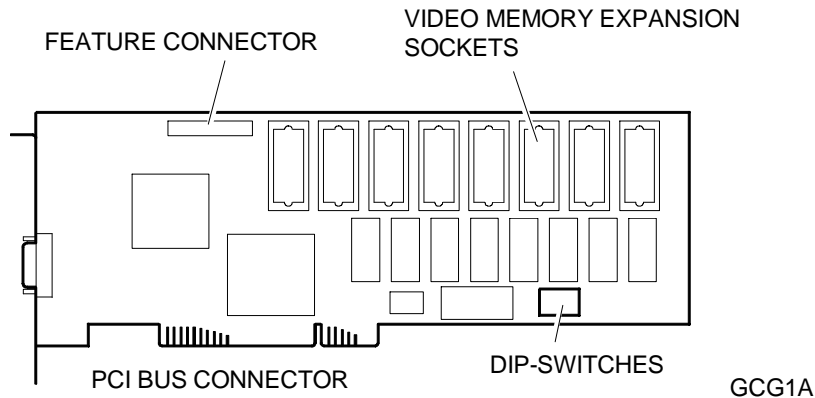
3 - Test Graphics Adapter

This option allows you to run tests on the VGA video controller and on the graphics accelerator.

The following tests are run:

- TEST VGA COLOR MODE
- RUN ACCELERATOR DIAGNOSTICS

REALITY-40 (MATROX) GO2027 - GO2049 Video Controller Board
For the M4-82, PCS 52E, M6-750/750S, M6-760/760S, M6-770/770S, M6-640



REALITY-40 VIDEO CONTROLLER BOARD CONFIGURATION

The board configuration diskette contains the drivers, utilities and applications which allow the system to take full advantage of the performance offered by this video controller.

NOTE: In systems with preinstalled software, this diskette will have to be recreated by copying the configuration program onto diskette. This copy can be made by using the utilities which allow the downloading of the preinstalled software from hard disk.

This configuration program requires at least 4 MB of free space on the hard disk.

To install this configuration program on hard disk, insert the diskette containing the configuration program into drive A and type a:install. This command launches a utility which copies onto hard disk the files contained on diskette. These files are copied into the MGA directory.

A menu is displayed which lists the application and configuration programs that can be installed on hard disk.

MGA Series
Software Installation Utility
(Version X.XX) Copyright Matrox

Main Menu

Utilities and Set up Program

Windows 3.1 Drivers and Control Panel

Windows WinSqueeze

Windows Consistent Color

AutoCAD/3D Studio DynaView Driver

Exit

Press (ESC) to abort Installation. Press (ENTER) to continue.

Using the arrow keys you can select the configuration programs and software applications to install on hard disk.

Only the first option which allows you to configure the board according to the type of monitor connected is explained below. For information on the other options, see the documentation provided with the Personal Computer.

Utilities And Set Up Program

1) Setup

This program allows you to configure the board. It allows you to define the:

- vertical refresh rate
- resolution depending on the type of monitor connected to the system

To run this program, go to the MGA/SETUP directory into which the Setup program has been copied using the utility seen earlier. Type the following command to launch this program:

c:\mga\setup\setup

The menu shown on the side is displayed.

a) Board Selection

This option must only be used if there are two boards installed in the system.

b) Show Board Information

This option displays board status and information. The following screen gives an example of what can be displayed after selecting this option.

```

Main Menu
Board Selection
Show Board Information
Monitor Selection
Graphics Mode Test
Exit

```

```

Board Type:      MGA PCI  VGA:      Enabled
On board VRAM:  2 Mb
Bus:             PCI      Memory map Address:  AC000
Accelerator:     MGA II   Operation Mode       32 bit
3D Capabilities No      Monitor Sync:       Separate
Z-Buffer DRAM   No
Monitor Name:   Multi-frequency up to 1600 x 1200, all @ 60 Hz

```

c) Monitor Selection

Selecting this option displays a list with the display capabilities of the monitor connected to the system. Information concerning the monitor's display capabilities for each operating mode (640x480x16, 640x480x256, ..., up to the maximum capacity) will be stored in a file called MGA.MON which the board is capable of reading.

```

----- Monitor Selection -----
Multi-frequency monitor (up to 1024x768 60 Hz)
Multi-frequency monitor (up to 1024x768 70 Hz)
Multi-frequency monitor (up to 1280x1024 60 Hz)
Multi-frequency monitor (up to 1280x1024 72 Hz)
Multi-frequency monitor (up to 1600x1200 60 Hz)
Multi-frequency monitor (up to 1600x1200, all 60 Hz)
NTSC monitor
PAL monitor

Use [↑] and [↓] to move. Press [ENTER] to confirm.

```

d) Graphics Mode Test

This option allows you to perform the following operations:

- 1 - Check the monitor information stored in the MGA.MON file
- 2 - See the non-Super VGA graphics modes available
- 3 - Check whether the monitor is connected correctly
- 4 - Make monitor adjustments.

Selecting this option displays the following interactive screen page.

MGA Series Software Setup Utility (Version x.xx) copyright Matrox 1993				
Monitor: Multi-frequency monitor (up to 1600x1200 60 Hz)				
VRAM on board: 2 Mb				
Resolution	Board support			Monitor support
	256 col	32K col	16M col	(NI, I, NA)
640 x 400	YES	YES	YES	NI
800 x 600	YES	YES	YES	NI
1024 x 768	YES	YES	YES	NI
1152 x 882	YES	YES	NO	NI
1200 x 1024	YES	NO	NO	NI
1600 x 1200	NO	NO	NO	NI
NTSC	NO	NO	NO	NA
PAL	YES	YES	YES	NA
Use [↑] and [↓] to move. Press [ENTER] to confirm.				

Use the cursor movement keys to select the different resolutions and number of colors available.

An error message will be displayed if a particular combination is not supported.

If a combination is valid, a picture is displayed in the selected color configuration and resolution.

The following tables give the relation between the resolution and vertical refresh rate supported by this video controller board with the different Olivetti monitors that can be connected to these systems.

RESOLUTION AND VERTICAL REFRESH RATE	DSM 27-028 DSM 27-039	DSM 25-314/PY DSM 26-314/LE	DSM 27-415/LE	DSM 27-140/LE	DSM 27-141/PS	DSM27-414/TM	DSM 28-143/PS	DSM 28-143/ PS-2
640 X 480 60 Hz	X	X		X		X		
640 X 480 72 hZ			X		X		X	X
640 X 480 75 Hz								
800 X 600 56 Hz	X			X				
800 X 600 60 Hz					X			
800 X 600 72 Hz						X	X	X
800 X 600 75 Hz								
1024 X 768 87i (Not supported)	X			X	X			
1024 X 768 60 Hz						X	X	X
1024 X 768 72 Hz								
1024 X 768 75 Hz								
1280 X 1024 60 Hz								
1280 X 1024 75 Hz								

RESOLUTION AND VERTICAL REFRESH RATES	DSM 27-514/MS	DSM 27-615	DSM 27-117	DSM 27-120	DSM 28-144 MS	DSM 28-171 HR	DSM 28-201 HR
640 X 480 60 Hz							
640 X 480 72 hZ							
640 X 480 75 Hz	X	X	X	X	X	X	X
800 X 600 56 Hz							
800 X 600 60 Hz							
800 X 600 72 Hz							
800 X 600 75 Hz	X	X	X	X	X	X	X
1024 X 768 87i (not supported)							
1024 X 768 60 Hz							
1024 X 768 72 Hz	X						
1024 X 768 75 Hz		X	X	X	X	X	X
1280 X 1024 60 Hz			X				
1280 X 1024 75 Hz				X	X	X	X

2) Utilities

When choosing to install the Utilities and Setup Program onto hard disk, the MGAVESA.COM file is also copied into the MGA/SETUP directory. This is a Terminate and Stay Resident (TSR) program which remains active in background.

This program generates the compatibility for the SuperVGA video modes with the VESA standard.

When using programs that are compatible with the VESA standard (such as Animator Pro, Personal Designer), the following string must be added to the AUTOEXEC. BAT file:

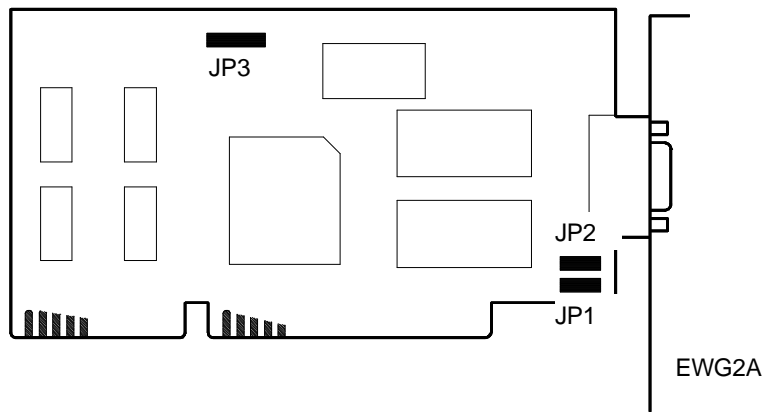
C:\MGA\SETUP\MGAVESA

The following VESA SuperVGA video modes are supported:

SUPPORTED VIDEO MODE	RESOLUTION	Nº OF COLORS
100 h	640 x 400	256
101 h	640 x 480	256
102 h	800 x 600	16
103 h	800 x 600	256
104 h	1024 x 768	16
105	1024 x 768	256

**1580 (GO2030) Video Controller Board
For the M4-82, PCS42**

The following figure shows the location of the jumpers on this video controller board.



JUMPERS	SETTING	FUNCTION
JP1	On 1 and 2 On 2 and 3	VESA mode SVGA mode
JP2	On 1 and 2 On 2 and 3	Interlaced video Non-interlaced video
JP3	On 1 and 2 On 2 and 3	Normal operation Turbo mode

The following table indicates the this board's most common operating modes and relative jumper settings.

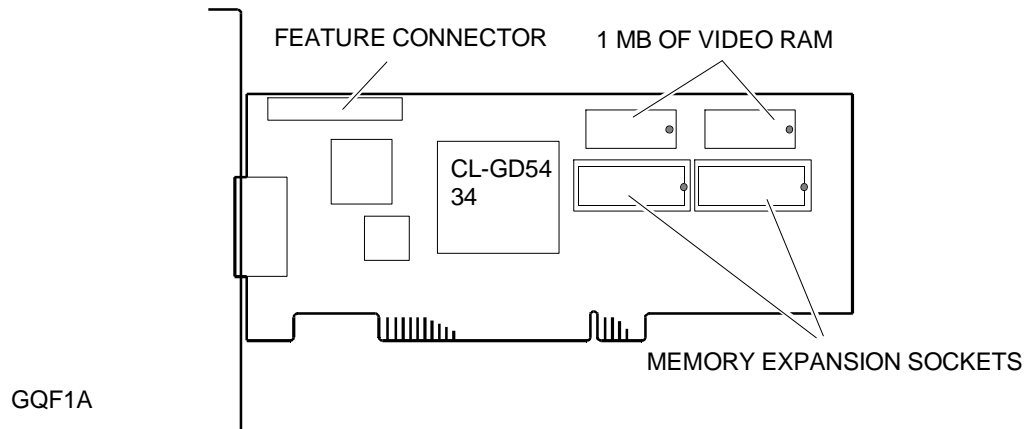
	JUMPER SETTINGS		
		JP1 on 1-2 JP2 on 2-3 JP3 on 2-3	JP1 on 2-3 JP2 on 2-3 JP3 on 2-3
RESOLUTION	VERTICAL REFRESH RATE		
1024 x 768 x 16 colors	70 Hz	60 Hz	87 Hz interlaced
1024x768x256 colors	70 Hz	60 Hz	87 Hz interlaced
800 x 600 x 16 colors	72 Hz	56 Hz	56 Hz
800 x 600 x 256 colors	72 Hz	56 Hz	56 Hz
640 x 480 x 256 colors	72 Hz	60 Hz	60 Hz

The following table indicates the refresh rates and resolutions supported by some of the monitors that can be connected to this video controller board.

RESOLUTION	640 x 480		800 x 600		1024 x 768		
	60 Hz	70 - 72 Hz	56 Hz	70 - 72 Hz	60 Hz	70 - 72 Hz	87 Hz Interlaced
DSM 25-314/P DSM 26-314/LE (MDU 1441LE/PH01)	X						
DSM 27-039 (CDU 1435E/GS11) DSM 27-028 (CDU 1435) DSM 27-140/LE	X		X				X
DSM 27-141/PS	X	X	X			X	
DSM 27-414/TM (CDU 1448TS/PH01)	X			X	X		
DSM 27-514/MS (CDU 1458/HA) DSM 27-615 DSM 27-117 (CDU 1764/SA01) DSM 27-120 (CDU 2082/FI01)	X	X	X	X	X	X	X

C

**Smarty PCI Video Controller Board
For the M4-82**



The following table gives the refresh rate and resolutions supported by some of the monitors that can be connected to this video controller board.

RESOLUTION	640 x 480		800 x 600			1024 x 768					1280 x 1024
	60 Hz	72 Hz	56 Hz	60 Hz	72 Hz	60 Hz	70 Hz	72 Hz	75 Hz	87 Hz Interlaced	87 Hz Interlaced
DSM 25-314/PY DSM 26-314/LE	X										
DSM 27-415/LE	X	X									
DSM 27-114/LE	X									X	
DSM 27-140/LE DSM 27-028 DSM 27-039	X		X							X	
DSM 27-141/PS	X	X								X	
DSM 27-414/TM	X				X	X					
DSM 28-143/PS DSM 28-143/PS-2	X	X			X	X					
DSM 27-514/MS	X				X		X				
DSM 28-144 MS DSM 27-615	X				X				X		
DSM 27-117 DSM 27-120	X				X				X		X
DSM 28-171 HR DSM 28-201 HR	X				X				X		X

CONFIGURING THE SMARTY PCI VIDEO CONTROLLER BOARD

The board configuration diskettes contain the drivers, utilities and applications that allow this system take full advantage of the performance offered by this video controller.

NOTE: In systems with preinstalled software, this diskette will have to be recreated by copying the configuration program onto diskette. This copy can be made by using the utilities which allow the downloading of the preinstalled software from hard disk.

Software Configuration Utilities

Three types of utilities allow the video controller board to be configured:

- 1) **CLMODE** Allows the board's different options to be configured
- 2) **TSRFONT** Makes available a complete set of 8 x 14 characters which are directly displayed on the screen without requiring the intervention of the BIOS.
- 3) **WINMODE** Allows the operator to change monitor resolution and number of colors during a Windows work session

This section only explains the **CLMODE** Utility used to configure the board. The other utilities are described in the documentation provided with the video controller board.

C

CLMODE Utility

With this utility you can define the type of monitor connected to the video controller board and set the video mode to be supported.

Proceed as follows to use this utility:

- 1) Type **CLMODE** at the DOS prompt and press Enter.
- 2) An interactive interface menu is displayed. Each key designed in the menu corresponds to a specific configuration option.
Each key is identified with a name. The underlined letter of this name indicates the key sequence which must be pressed to select the option. The different options can therefore be selected either with the mouse or through a key sequence.
Listed below are the different configuration options.

a) Configuration of the Monitor Connected to the Board

With this option you can select the type of monitor connected to the board. Monitor type selection in turn determines the following other parameters:

- Resolutions available for the monitor connected
- Vertical refresh rates available for the connected monitor. Usually the highest vertical refresh rate grants the best monitor yield.

Selecting the **Monitor Type** key displays the **Monitor Type Setup** menu listing the different monitors that can be connected. With the cursor movement keys, select the type of monitor to be connected.

The following table lists the different monitors that can be connected to the video controller board.

MONITOR TYPE	MONITOR	RESOLUTION	HORIZONTAL FREQUENCY	VERTICAL REFRESH RATE
0	IBM 8512, 8513, 8503 OLIVETTI DSM 25-314/P-Y OLIVETTI DSM 26-314/LE OLIVETTI DSM 27-415/LE	640 x 480	31.5 KHz	60 Hz
1	IBM 8514, 8515 OLIVETTI DSM 27-114/LE	640 x 480 1024 x 768	31.5 KHz 35.5 KHz	60 Hz 43.5 Hz Interla.
2	NEC 2A	640 x 480 800 x 600	31.5 KHz 35.2 KHz	60 Hz 56 Hz
3	NEC II OLIVETTI DSM 27-140/LE OLIVETTI DSM 27-028 OLIVETTI DSM 27-039	640 x 480 800 x 600 1024 x 768	31.5 KHz 35.2 KHz 35.5 KHz	60 Hz 56 Hz 43.5 Hz Interla.
4	NEC 3D OLIVETTI DSM 27-141/PS	640 x 480 800 x 600 1024 x 768	31.5 KHz 37.8 KHz 37.8 KHz	60 Hz 60 Hz 43.5 Hz Interla.

MONITOR TYPE	MONITOR	RESOLUTION	HORIZONTAL FREQUENCY	VERTICAL REFRESH RATE
5	NEC 3FGx SONY CPD-1304 NANAO 9065S, 9070U OLIVETTI DSM 27-414/TM OLIVETTI DSM 28-143/PS OLIVETTI DSM 28-143/PS-2	640 x 480 800 x 600 1024 x 768	31.5 KHz 48.0 KHz 48.0 KHz	60 Hz 72 Hz 60 Hz
6	NEC 4D, 4FG NANAO T240i OLIVETTI DSM 27-514/MS	640 x 480 800 x 600 1024 x 768	31.5 KHz 48.0 KHz 56.0 KHz	60 Hz 72 Hz 70 Hz
7	NEC 5D, 5FG, 6FG NANAO T550i, T560i, T660i, F550i, NANAO F750i OLIVETTI DSM 27-615 * OLIVETTI DSM 27-117 OLIVETTI DSM 27-120 OLIVETTI DSM 28-201 HR OLIVETTI DSM 28-144 MS * * = 1280 x 1024 mode not supported	640 x 480 800 x 600 1024 x 768 1280 x 1024	31.5 KHz 48.0 KHz 58.3 KHz 48.0 KHz	60 Hz 72 Hz 75 Hz 43.5 Hz Interla.

b) Customizing the Timings of the Connected Monitor

Selecting the **Advanced Monitor Type** option allows you to change the timings of the monitor used.

To change the timings of the monitor connected to the board, use the mouse or the TAB key on the keyboard to select the **Set Advanced** option. This option is only available if the **Advanced Monitor Type** option has been previously selected.

Selecting this option displays a new interface screen with *pull-down menus* for each resolution available for the type of monitor connected.

You can now select the horizontal frequencies and vertical refresh rates for each resolution.

WARNING: Selecting an incorrect vertical refresh rate could seriously damage the monitor.

After making all the correct settings, select the **OK** button on the menu. If problems arise or you wish to change the settings just made, press the **CANCEL** button.

Before saving the video configuration, you can check the settings made. To do so, select the **Verify** button to display the resolutions and timings set for each video mode selected. This will enable you to make sure that your settings are compatible with the monitor connected.

After the video test mode has been displayed, press Enter or the left-hand mouse button to move on to the next video mode test.

If problems arise, press the ESC key or the right-hand mouse button to return to the **Monitor Type Setup** and correctly reconfigure the video subsystem.

If everything is correct, select the **SAVE** button to store the video configuration. Just select **CANCEL** if you do not wish to store the new configuration.

Make sure the system keeps its monitor configuration. To do so, after correctly configuring the type of monitor exit the CLMODE utility and power off the system. Power the system back on again and run the CLMODE utility to see whether the monitor configuration has changed or not:

- 1) **The configuration has changed** - In this case, select the option that puts the **CLMODE save the monitor type** command in the AUTOEXEC.BAT file. This option is only displayed after selecting the SAVE button in the Monitor Type menu.
- 2) **Video configuration has not changed** - You do not have to do anything in this case.

C

c) Video Modes Available

Selecting the **Video Modes** button on the screen displays the **Video Modes Preview** window which shows all the video modes supported by the monitor connected to the system, in addition to the video memory capacity available on the Smarty PCI video controller board.

This list indicates the available video modes so that they can be used with the drivers and application software so that extended resolutions can be used.

To see all the video modes supported by the connected monitor, select the **Preview** button. After the video mode test is displayed, press either the Enter key or the left-hand mouse button in order to test the next video mode.

Press either the ESC key or the right-hand mouse button to interrupt the display.

d) Video Screen Centering and Polarity Selection

The Video Screen centering option is available under the **Video Mode Preview** option. Pressing the cursor control keys allows you to center this screen.

NOTE: Video screen centering has predefined limits, and in most cases it is not necessary to proceed as explained to center the screen.

The horizontal and vertical positions of the video screen are saved when exiting from the CLMODE utility. These parameters are stored in a file called CENTER.COM, which is a TRS program active in background. This file can be loaded at any time, even without the CLMODE utility.

Another possible monitor adjustment is the **SYNC POLARITY** which is active at the same time as the horizontal and vertical centering adjustments.

To adjust the polarity of the selected video mode, press the PGUP and PGDN keys on the keyboard to select between the following options available:

+ / + ; + / - ; - / + ; - / -

where the + and - signs indicate:

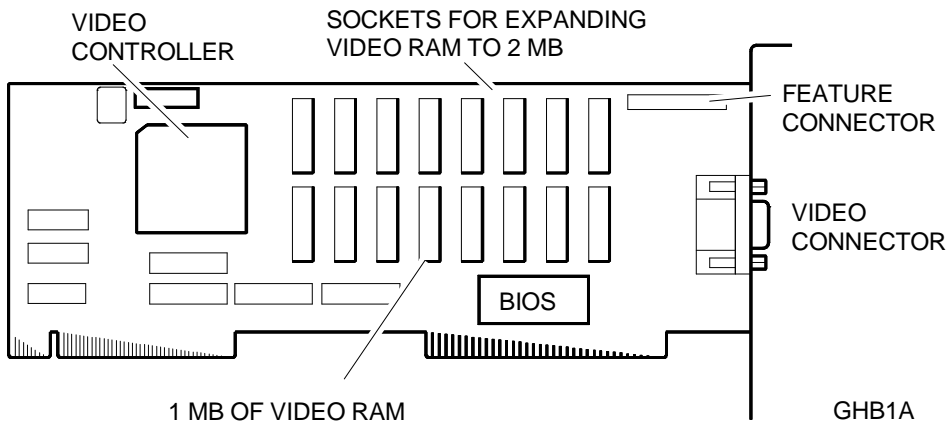
Vertical sync polarity/horizontal sync polarity.

Exiting CLMODE

You can exit CLMODE in the following three ways:

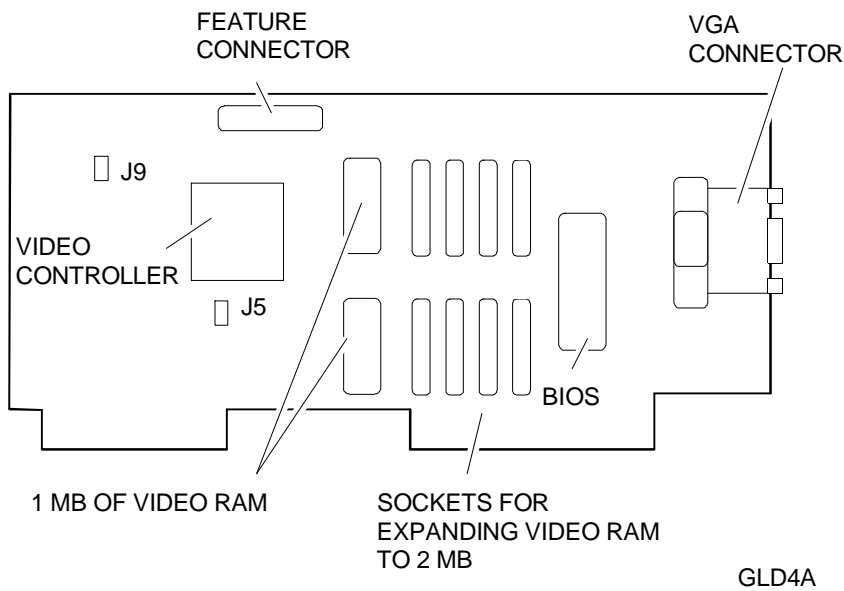
- Pressing the ALT and F4 keys simultaneously
- Pressing the left-hand mouse button with the cursor on the top left-hand corner of the screen
- Selecting, with the mouse cursor, the EXIT button displayed in every CLMODE utility screen.

**VD-5428 Video Controller Board
For the PCS42**



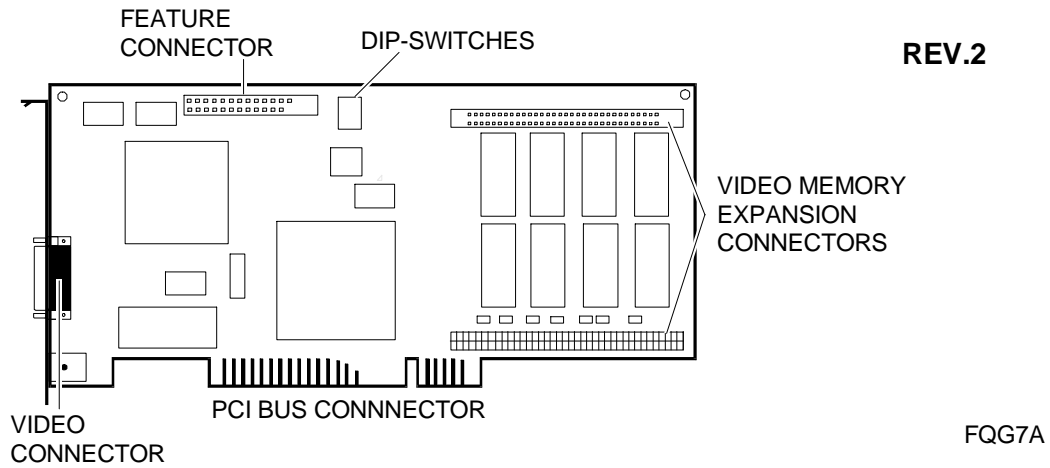
NOTE: Board layout can change but will always use the **CIRRUS 5428** video controller.

**VD-5428 Video Controller Board
For the PCS42**

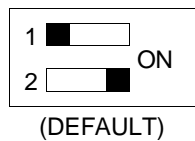
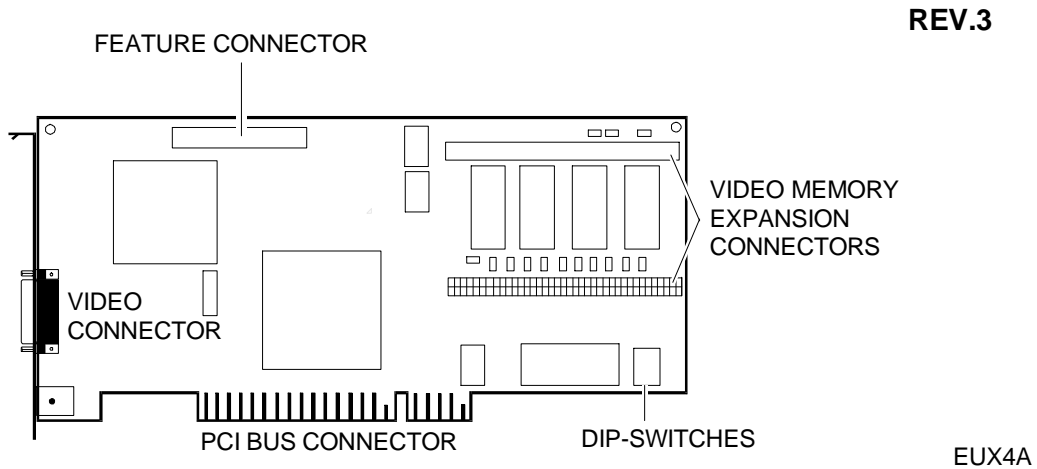


JUMPERS	SETTING	FUNCTION
J5	IN OUT	Enables IRQ9 Disables IRQ9 (Default)
J9	On 1 - 2 On 2 - 3	486 DX - 40 / 50 MHz 486 DX - 25 / 33 MHz or 486 DX2 - 50 / 66 MHz (Default)

**MATROX Impression Plus GO2062 Video Controller Board
For the M6-650/670/680/690/650DP/680DP/690DP**



C



- | | |
|-------|-------------------------------|
| 1 OFF | VGA ENABLED |
| 1 ON | VGA DISABLED
(Dual Screen) |
| 2 OFF | HORIZONTAL REFRESH AT 45 KHz |
| 2 ON | NORMAL HORIZONTAL REFRESH |

Since the Impression Plus video controller board is based on the PCI standard, it does not require any hardware setting in order to be able to interface the system.

The following table lists the video modes that are supported by this video controller.

RESOLUTION	N° OF COLORS	VERTICAL REFRESH RATE				
		56 Hz	60 Hz	72 Hz	75 Hz	87 Hz Interlaced
640 x 480	16		x	x	x	
	256		x	x	x	
	64 K		x	x	x	
	16 M		x	x	x	
800 x 600	16	x	x	x	x	
	256	x	x	x	x	
	64 K	x	x	x	x	
	16 M	x	x	x	x	
1024 x 768	16		x	x	x	x
	256		x	x	x	x
	64 K		x	x	x	x
	16 M *		x	x	x	x
1280 x 1024	16		x	x	x	
	256		x	x	x	
	64 K *		x	x	x	
	16 M *		x	x	x	
1600 x 1200	16		x			
	256		x			
	64 K *		x			

* 4 MB of video memory are required to support this resolution.

VIDEO SUBSYSTEM CONFIGURATION

At system power on the video subsystem (controller board + video) is set to operate in the standard VGA mode (640x480, 16 colors). To set a video mode according to the characteristics of the monitor in use, run the controller board configuration program and install the specific drivers capable of handling the different resolutions to be used.

For DOS/Windows users, the video subsystem configuration procedures (monitor and video mode selection) result as being easier if performed **under Windows** by using the tools associated to the **MGA Power Desk** group. This group contains different tools:

a) MGA Board Information: Screen containing information on the video controller board such as type and size of VRAM, memory address, etc.

b) MGA Monitor Selection: Program used to select the type of monitor connected to the board. It also allows the activation of a test screen for each display mode (resolution and number of colors). Proceed as follows to activate this test:

- In the **MGA Power desk** group, select **MGA Monitor selection**
- Click on the **Monitor Selection** button
- A list of monitors that can be connected to the board is displayed. Select the one to use.
- Click on the **Test** button. An interactive window is displayed through which it is possible to select the display mode to check.
- The test will display a grid and colored bars in the resolution and with the number of colors selected.

NOTE: If this is a first installation, activate this program immediately so that the video controller can recognize the monitor connected to the system.

c) MGA Control Panel: Program used to configure up to four different display modes which can be selected without needing to exit from Windows.

d) MGA Quick Access: This tool allows the use of a dialog box through which it is possible to quickly access some of the main MGA Control Panel features.

This video and display mode configuration can also be performed directly in **MS-DOS**. In this case proceed as follows:

C

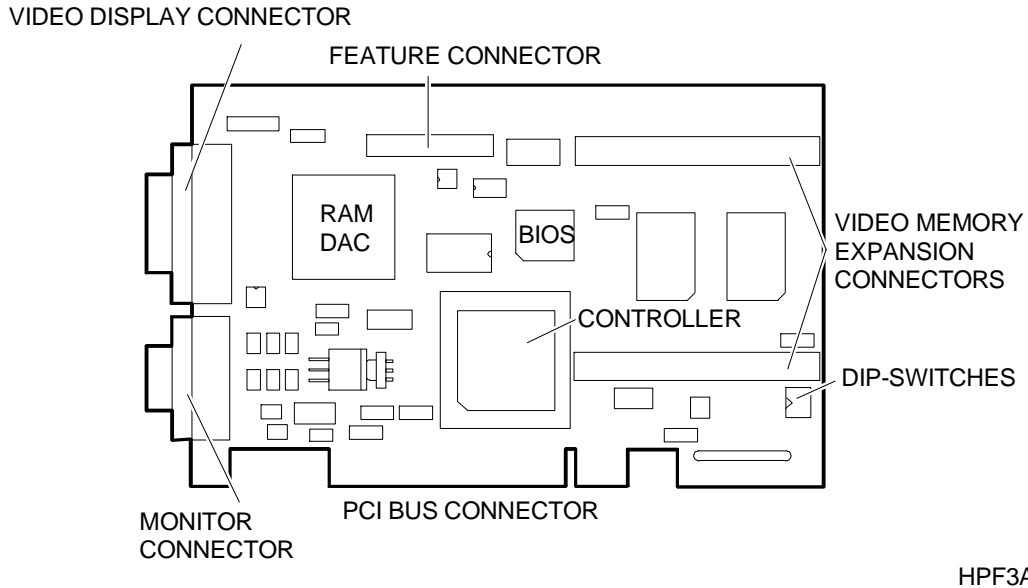
- At the MS-DOS prompt, type the following:

C:\MGA\SETUP\SETUP

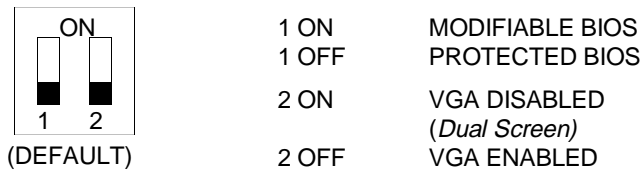
- A menu with the following options is displayed:

Show Board Information	Displays board status and information, such as the VRAM present on the board, the memory address, etc.
Monitor Selection	Used to select the type of video that can be connected to the board.
Graphics Mode	Activates a <i>screen test</i> for each video display mode (resolution and number of colors).

MATROX Millennium GO2089 Video Controller Board
For the M4-Pxx/PCS 51xx/PCS 61xx/M6-950/M6-6200



HPF3A



Since the Millennium is a video controller board based on the PCI standard, it does not require any hardware setting to interface the system.

Proceed as follows to **update the video BIOS** present on the board:

- Make it possible to modify the video BIOS by setting switch 1 to ON.
- Insert the diskette containing the video BIOS upgrade utility into the diskette drive and type **UPGRADEBIOS -i <infile.ext>**. The "-d" option displays the information relating to the BIOS.

The following table shows the video modes supported by this video controller board.

RESOLUTION	N ^o OF COLORS	VERTICAL REFRESH RATE				
		56 Hz	60 Hz	72 Hz	75 Hz	87 Hz Interlaced
640 x 480	16		x	x	x	
	256		x	x	x	
	64 K		x	x	x	
	16 M		x	x	x	
800 x 600	16	x	x	x	x	
	256	x	x	x	x	
	64 K	x	x	x	x	
	16 M	x	x	x	x	
1024 x 768	16		x	x	x	x
	256		x	x	x	x
	64 K		x	x	x	x
	16 M *		x	x	x	x
1280 x 1024	16		x	x	x	
	256		x	x	x	
	64 K *		x	x	x	
	16 M *		x	x	x	
1600 x 1200	16		x			
	256		x			
	64 K *		x			

C

* 4 MB of video memory are required to support this resolution.

VIDEO SUBSYSTEM CONFIGURATION

Video subsystem configuration (controller board + video) optimizes the display of the images related to the different programs and applications in use, improving picture display with respect to what is offered by the standard VGA mode that these systems are provided with.

The resolution (number of horizontal pixels times the number of vertical pixels) and the number of colors with which these images are displayed depend upon:

- The type of monitor
- The system video controller and associated video memory
- The video drivers (EVD).

Since the video drivers vary depending on the different operating environments, the appropriate EVDs need to be installed in order to take full advantage of the performance offered by the video and its controller.

Changing Video Resolution

To change the video resolution use the **Display** application of the Control Panel. The available graphics modes can be displayed with the **List all modes...** button.

Monitor Configuration

The monitor default vertical refresh rate taken on by the video driver is 60 Hz. If the monitor connected to the system is capable of using higher frequencies, the type of monitor in use can be modified by means of the **MGA Monitor** application of the Control Panel, which should have been copied into the *SystemRoot\SYSTEM32* directory by the MGA driver for Windows NT installation program.

NOTE: If the monitor connected to the system supports the DDC feature, there is no need to modify the type of monitor by means of the MGA Monitor application since this information is provided automatically by the video controller.

To personalize the type of monitor connected to the system:

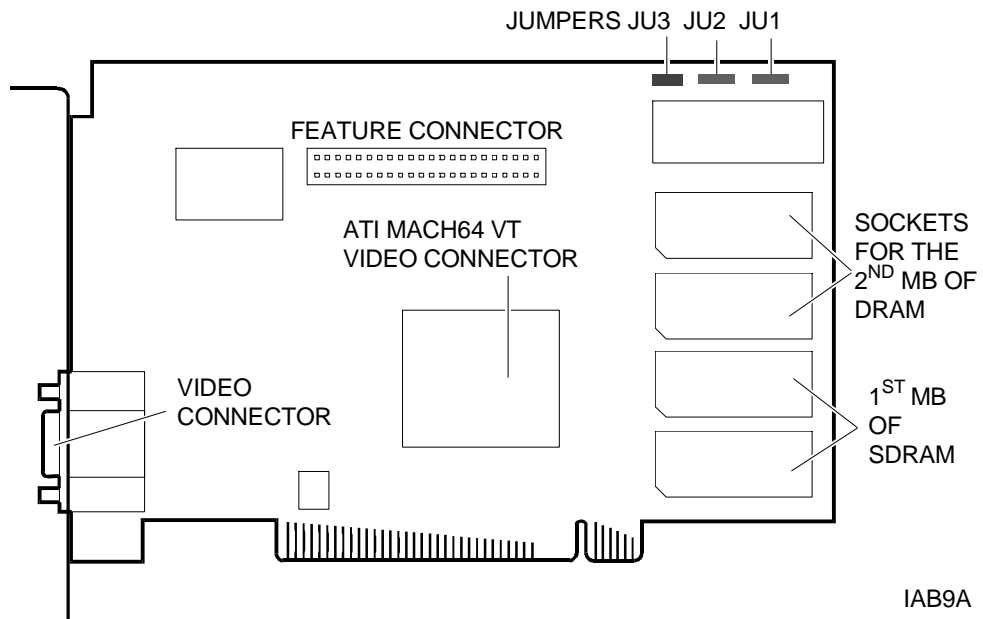
- Open the Control Panel **MGA Monitor** application.
- From the list of monitors, select the most appropriate one or one whose maximum vertical refresh rate coincides with that of the monitor connected to the system. The *mga.inf* file is generated in the *SystemRoot\SYSTEM32* subdirectory.

To check whether the newly created *mga.inf* file is the correct one for the monitor being used:

- Activate the Control Panel **Display** application.
- Select the resolution and color intensity to be checked.
- Click on the **Test** button. A check is made using the parameters selected in MGA Monitor.
- If the monitor does not display a stable picture, the parameters set by the *mga.inf* file are not correct for the monitor being used. Click on the Cancel button to close the Display application and repeat the monitor selection operation by means of the MGA Monitor application. Repeat this check.
- After having selected the required vertical refresh rate, restart Windows NT to activate the settings stored in the *mga.inf* file.

The list proposed by the Display application will only contain the resolutions set by the parameters stored in the *mga.inf* file. Cancelling this file means removing the restrictions imposed on the resolutions but the *refresh* rate will be reset to the standard value of 60 Hz.

**ATI MACH64 VT GO2215 Video Controller Board
For the Modulo Pxxx T**



C

JUMPERS	SETTING	FUNCTION
JU1	1-2	Disables the interrupt (Default)
	2-3	Enables the interrupt
JU2	1-2	Disables the VGA
	2-3	Enables the VGA(Default)
JU3	1-2	I/O decode: Random
	2-3	I/O decode: Block (Default)

The following table lists the video modes supported by this video controller.

RESOLUTION	MAXIMUM VERTICAL REFRESH	
	1 MB SGRAM	2 MB SGRAM
640x480x4bpp	60 Hz	60 Hz
640x480x8bpp	120 Hz	120 Hz
640x480x16bpp	120 Hz	120 Hz
640x480x24bpp	85 Hz	90 Hz
640x480x32bpp		85 Hz
800x600x4bpp	60 Hz	60 Hz
800x600x8bpp	100 Hz	100 Hz
800x600x16bpp	75 Hz	75 Hz
800x600x24bpp		70 Hz
1024x768x4bpp	60 Hz	60 Hz
1024x768x8bpp	75 Hz	100 Hz
1024x768x16bpp		75 Hz
1280x1024x4bpp	47 Hz interlaced	60 Hz
1280x1024x8bpp		75 Hz

VIDEO SUBSYSTEM CONFIGURATION

In Windows 95, proceed as follows to adapt the video settings to the optional Olivetti monitors:

- Double click on the **Display** icon of the *Control Panel*.
- Select **Settings**.
- Select **Change Display Type**.
- Select **Change** along side the *Monitor Type* box.
- Select **Olivetti** from the list of manufacturers to access the list of available Olivetti monitors. Select the desired model and click on the **OK** and **Close** buttons in this order.
- Set the colors and resolution, then click on **OK**. The computer will ask you to confirm its restart with the new settings made.
- Confirm by clicking on **Yes**.

NOTE: This procedure applies only to monitors that are not equipped with the **DDC-1/2B**, feature; it is not necessary for all other monitors.

After having made the changes, power the system off and then on again so that they are activated.

