NOTICE

The drivers and utilities for Octagon products, previously provided on a CD, are now in a self-extracting zip file located at the Octagon Systems web site on the product-specific page. Download this file to a separate directory on your hard drive, then double click on it to extract the files. All references in this manual to files and directories on the CD now refer to files in the Utilities zip file.

5420 Super VGA Video Card

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OCTAGON SYSTEMS®

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Westminster, CO 80030   **Tech. Support:** 303–426–4521

IMPORTANT!

Please read before installing your product.

Octagon's products are designed to be high in performance while consuming very little power. In order to maintain this advantage, CMOS circuitry is used.

CMOS chips have specific needs and some special requirements that the user must be aware of. Read the following to help avoid damage to your card from the use of CMOS chips.

Using CMOS Circuitry in Industrial Control

Industrial computers originally used LSTTL circuits. Because many PC components are used in laptop computers, IC manufacturers are exclusively using CMOS technology. Both TTL and CMOS have failure mechanisms, but they are different. This section describes some of the common failures which are common to all manufacturers of CMOS equipment. However, much of the information has been put in the context of the Micro PC.

Octagon has developed a reliable database of customer-induced, field failures. The average MTBF of Micro PC cards exceeds 11 years, yet there are failures. Most failures have been identified as customer-induced, but there is a small percentage that cannot be identified. As expected, virtually all the failures occur when bringing up the first system. On subsequent systems, the failure rate drops dramatically.

■   Approximately 20% of the returned cards are problem-free. These cards, typically, have the wrong jumper settings or the customer has problems with the software. This causes frustration for the customer and incurs a testing charge from Octagon.

■   Of the remaining 80% of the cards, 90% of these cards fail due to customer misuse and accident. Customers often cannot pinpoint the cause of the misuse.

■   Therefore, 72% of the returned cards are damaged through some type of misuse. Of the remaining 8%, Octagon is unable to determine the cause of the failure and repairs these cards at no charge if they are under warranty.

The most common failures on CPU cards are over voltage of the power supply, static discharge, and damage to the serial and parallel ports. On expansion cards, the most common failures are static discharge, over voltage of inputs, over current of outputs, and misuse of the CMOS circuitry with regards to power supply sequencing. In the case of the video cards, the most common failure is to miswire the card to the flat panel display. Miswiring can damage both the card and an expensive display.

■   **Multiple component failures** - The chance of a random component failure is very rare since the average MTBF of an Octagon card is greater than 11 years. In a 7 year study,

Octagon has <u>never</u> found a single case where multiple IC failures were <u>not</u> caused by misuse or accident. It is very probable that multiple component failures indicate that they were user-induced.

■ **Testing "dead" cards** - For a card that is "completely nonfunctional", there is a simple test to determine accidental over voltage, reverse voltage or other "forced" current situations. Unplug the card from the bus and remove all cables. Using an ordinary digital ohmmeter on the 2,000 ohm scale, measure the resistance between power and ground. Record this number. Reverse the ohmmeter leads and measure the resistance again. If the ratio of the resistances is 2:1 or greater, fault conditions most likely have occurred. A common cause is miswiring the power supply.

■ **Improper power causes catastrophic failure** - If a card has had reverse polarity or high voltage applied, replacing a failed component is not an adequate fix. Other components probably have been partially damaged or a failure mechanism has been induced. Therefore, a failure will probably occur in the future. For such cards, Octagon highly recommends that these cards be replaced.

■ **Other over-voltage symptoms** - In over-voltage situations, the programmable logic devices, EPROMs and CPU chips, usually fail in this order. The failed device may be hot to the touch. It is usually the case that only one IC will be overheated at a time.

■ **Power sequencing** - The major failure of I/O chips is caused by the external application of input voltage while the Micro PC power is off. If you apply 5V to the input of a TTL chip with the power off, nothing will happen. Applying a 5V input to a CMOS card will cause the current to flow through the input and out the 5V power pin. This current attempts to power up the card. Most inputs are rated at 25 mA maximum. When this is exceeded, the chip may be damaged.

■ **Failure on power-up** - Even when there is not enough current to destroy an input described above, the chip may be destroyed when the power to the card is applied. This is due to the fact that the input current biases the IC so that it acts as a forward biased diode on power-up. This type of failure is typical on serial interface chips.

■ **Serial and parallel** - Customers sometimes connect the serial and printer devices to the Micro PC while the power is off. This can cause the failure mentioned in the above section, *Failure upon power-up*. Even if they are connected with the Micro PC on, there can be another failure mechanism. Some serial and printer devices do not share the same power (AC) grounding. The leakage can cause the serial or parallel signals to be 20-40V above the Micro PC ground, thus, damaging the ports as they are plugged in. This would not be a problem if the ground pin is connected first, but there is no guarantee of this. Damage to the printer port chip will cause the serial ports to fail as they share the same chip.

■ **Hot insertion** - Plugging cards into the card cage with the power on will usually not cause a problem. (**Octagon urges that you do not do this!**) However, the card may be damaged if the right sequence of pins contacts as the card is pushed into the socket. This usually damages bus driver chips and they may become hot when the power is applied. This is one of the most common failures of expansion cards.

■ **Using desktop PC power supplies** - Occasionally, a customer will use a regular desktop PC power supply when bringing up a system. Most of these are rated at 5V at 20A or more. Switching supplies usually require a 20% load to operate properly. This means 4A or more. Since a typical Micro PC system takes less than 2A, the supply does not regulate properly. Customers have reported that the output can drift up to 7V and/or with 7-8V voltage spikes. Unless a scope is connected, you may not see these transients.

■ **Terminated backplanes** - Some customers try to use Micro PC cards in backplanes that have resistor/capacitor termination networks. CMOS cards cannot be used with termination networks. Generally, the cards will function erratically or the bus drivers may fail due to excessive output currents.

■ **Excessive signal lead lengths** - Another source of failure that was identified years ago at Octagon was excessive lead lengths on digital inputs. Long leads act as an antenna to pick up noise. They can also act as unterminated transmission lines. When 5V is switch onto a line, it creates a transient waveform. Octagon has seen submicrosecond pulses of 8V or more. The solution is to place a capacitor, for example 0.1 μF, across the switch contact. This will also eliminate radio frequency and other high frequency pickup.

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DESCRIPTION

The 5420 VGA Card is a small, low power, video card that supports a wide variety of CRT and flat panel displays for high performance applications. The 5420 has 512K of video memory and 1 MB of VRAM for frame buffering when using simultaneous displays, or for accelerated performance when using one display.

The 5420 interfaces easily with standard VGA monitors with analog inputs using a DB–15 connector. Flat panel displays are connected to the 5420 using a 50–position IDC connector.

MAJOR FEATURES

• Fully VGA, EGA, CGA, MDA and Hercules compatible

• Supports analog CRT monitors, interlaced and non–interlaced, up to 800 x 600 x 256 colors, or 1024 x 768 x 16 colors

• Supports monochrome LCD, EL and plasma flat panels up to 1280 x 1024 with 67 gray scales

• Supports TFT LCD panels with 185,193 color palette

• Supports single drive and dual drive color STN LCD panels with 226,981 color palette

• Drives CRT and flat panel displays simultaneously

• Adjustable Vee Bias supply for LCD panel

• 5V operation

• –40° to 70° C

HARDWARE INSTALLATION

The 5420 SVGA Video Card requires one slot in a Micro PC card cage. Any slot in the card cage will work. The card plugs directly into the backplane.

WARNING: Octagon assumes no responsibility for any damage caused to flat panel displays and/or Micro PC video cards if the display is connected incorrectly.

Equipment

You will need the following equipment (or equivalent):
- 5420 SVGA Video Card and utility disk
- Octagon PC Control Card
- Micro PC Card Cage
- Power Module
- IBM compatible monitor w/cable or flat panel display w/cable
- PC SmartLINK
- Your PC

To install the 5420:
1.   Please refer to Figure 1 for the location of various connectors and option jumpers before installing the 5420.
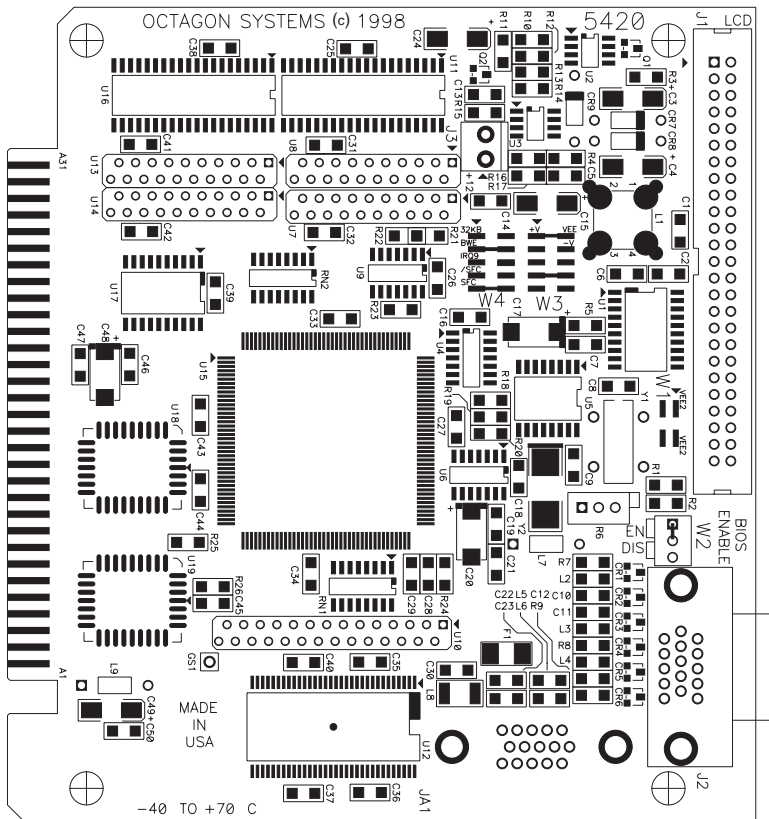

Figure 1—5420 Component Diagram

The 5420 SVGA Video Card contains static–sensitive CMOS components. The card is most susceptible to damage when it is plugged into a card cage. The 5420 card becomes charged by the user, and the static discharges to the backplane from the pin closest to the card connector. If that pin happens to be an input pin, even TTL inputs may be damaged. To avoid damaging your card and its components:

1.   Ground yourself before handling the 5420 card.

2.   Disconnect power before removing or inserting the card.

Take care to correctly position the 5420 card in the card cage. The Vcc and ground signals must match those on the backplane. Figure 2 shows the relative position of the 5420 card as it is installed in the card cage.

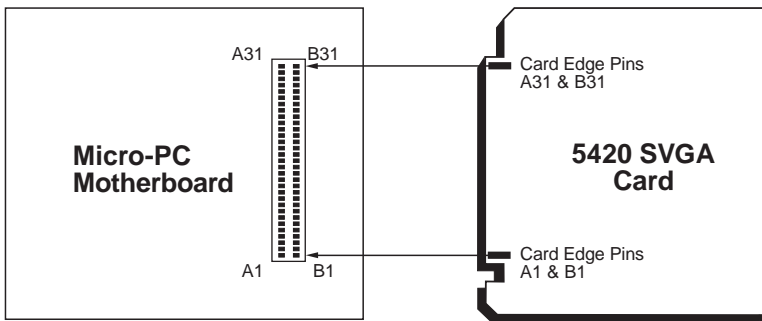Figure 2—Edge Connector Orientation

2.   The 5420 is factory configured and programmed for a VGA analog monitor and a 640 x 480 STN color dual drive LCD flat panel. Make sure the W2 BIOS enable jumper is in the enable position, W2[1–2]. If you are using a different monitor or flat panel display, you must reprogram the video BIOS for the appropriate display. See "Programming the 5420 Video BIOS."

3. Slide the 5420 into the Octagon card cage. The components on the card should face to the left or upward depending on the type of card cage.

4. Power on your system.

5. Refer to Figure 3 for a functional diagram of the 5420 card:
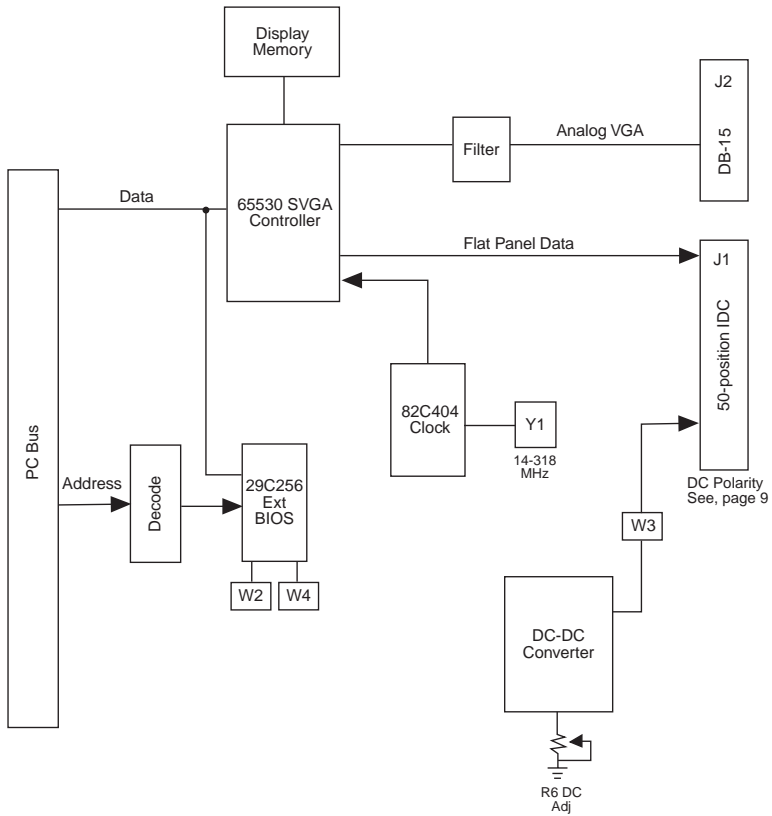

Figure 3—5420 Functional Diagram

PROGRAMMING THE 5420 VIDEO BIOS

The 5420 is factory configured and programmed to support a standard VGA monitor and a 640 x 480 STN color dual drive LCD flat panel. If you are using the default monitor and/or flat panel video BIOS, skip to the "Connecting the Monitor/Display" section.

If you are using a monitor/display other than the default settings, please read the following instructions. Programming the 5420 requires a serial communications link between your PC and the Octagon Control Card.

Micro PC Control Systems

• If you are installing your Micro PC™ Control Card for the first time, follow the instructions in the Control Card user's manual for using a video card and continue with the steps in the section "To program the 5420".

  or

• If you have already installed the Control Card to boot from a flash EPROM or static RAM, reconfigure your Control Card to boot from the BIOS drive (refer to your user's manual). Establish a serial communications link between your PC and Control Card with COM1 as the main console. Continue with the steps in "To program the 5420".

To Program the 5420

NOTE: The following instructions assume you are using the 5420 in a Micro PC system.

1. Power off the 5420.

2. Make sure W4[3–4] is installed.

BIOS Video Write Enable: W4	
Pins Jumpered	**Description**
[1-2]*	On* = use 32K BIOS; Off = use 64K BIOS
[3-4]*	BIOS Write Enable

 * = default

3. Set jumper W2[2–3] on the 5420. This disables the 5420 and allows you to use the serial port on your Control Card for terminal emulation.

BIOS Enable/Disable: W2	
Pins Jumpered	**Description**
[1-2]*	Enables the video BIOS
[2-3]	Disables the video BIOS

* = default

4. Start PC SmartLINK on your desktop PC.

5. Power on the Micro PC system. The Control Card logon message should display on your PC monitor.

6. Download the file, PGMVIDEO.EXE, and the *.DAT file for your display (e.g. EL640.DAT) to your Control Card. Refer to your Control Card user's manual for detailed information on downloading files to the Control Card using the TRANSFER program.

    NOTE: For previous users, the PGM5420.EXE has been enhanced and renamed to PGMVIDEO.EXE.

    NOTE: If you are using a flat panel display, refer to the README.DOC file on the 5420 Utility Disk for a list of the supported displays. Refer also to Octagon's web site, www.octagonsystems.com, for the latest listing of supported flat panels. If your particular display is not currently listed, please contact Technical Support for assistance. The direct line to Technical Support is 303–426–4521 and the e–mail address is support@octagonsystems.com.

7. Change the W2 jumper to W2[1–2]. This enables the 5420 BIOS.

    NOTE: Do not power off the 5420 when changing the jumper setting at W2.

8. To program the 5420 for the appropriate monitor/display, type the following:

    ```
    <drive>:PGMVIDEO  <drive>:Flatpanel.DAT
    ```

    NOTE: "Flat panel" is the generic name. To obtain the correct flat panel name specific to your model, refer to your 5420 Utility Diskette.

The <drive> designator is the RAMDISK where you trans-
ferred the files from your PC. The *.DAT file will change
depending on the type of display you are using. The following
message will be displayed:

```
             VIDEO BIOS programming utility
-----------------------------------------------------
 PGMVIDEO Vers. x.xx Copyright (c) Octagon Systems Corp
-----------------------------------------------------

You must reboot after running this program.

Make sure the jumper labeled EN-DIS is at the EN
position.

Do you want to continue?  (Y/[N])
```

9.   Enter 'Y' when asked if you want to proceed. The program
     PGMVIDEO then updates the video BIOS on the 5420. The
     system displays the following message:

```
Programming ... Please wait ...
Verifying ... Please wait ...

PGMVIDEO completed.
```

     If verification errors occur, confirm that the CPU shadowing is
     disabled for the C000-C800 memory range; then retry pro-
     gramming.

10. Power off the 5420 and connect your monitor/display.

NOTE: Removing W4[3–4] disables the video BIOS write enable.
This prevents unintentional programming of the video BIOS.

INVERTED SHIFT CLOCK: W4

The 5420 provides a shift clock signal for flat panels. For some
panels, such as EL (electroluminescent), which may require the
shift clock to be inverted, W4[9-10] can be moved to W4[7-8].

Shift Clock: W4	
Pins Jumpered	**Description**
[7-8]	Inverted Shift Clock
[9-10]*	Shift Clock

* = default

CONNECTING THE MONITOR/DISPLAY

The 5420 supports both a CRT monitor and a flat panel display.
The programs CT.COM and FP.COM allow you to toggle between
displaying the monitor and the flat panel. The program SM.COM
allows you to display from the monitor and the flat panel simulta-
neously. However, this option is video BIOS/flat panel dependent
and may not work with every flat panel. These programs are
found on the 5420 Utility Disk along with other diagnostic and
configuration utilities.

Analog Monitor

1. The DB–15 connector at J2 supports an analog VGA color or
    monochrome monitor. Plug the cable supplied with your
    monitor directly into J2.

Analog Connector: J2	
Pin#	Function
1	Red
2	Green
3	Blue
4	NC
5	Digital Gnd
6	Analog Gnd
7	Analog Gnd
8	Analog Gnd
9	+5V safe
10	Digital Gnd
11	NC
12	NC
13	H Sync
14	V Sync
15	NC

2. Make sure the video BIOS jumper is enabled — W2[1–2].

3. Configure and program your Micro PC Control Card for use
    with a video card and monitor. Refer to your Control Card's
    manual.

4. Boot your Micro PC system.

5. A BIOS and DOS message similar to the following should appear on your video monitor:

```
Octagon 50xx BIOS vers x.xx
Copyright (c) 1992-1995, Octagon Systems Corp.
All Right Reserved.
```

Flat Panel Display

Some panels require a BIAS voltage for contrast control. This voltage is available on J1, pins 24 and 25. Refer to the data sheet that comes with your flat panel. Steps 1, 2, 3, and 8 only apply to panels that require a BIAS voltage.

1. Configure jumper block W3 for the polarity of the voltage required and voltage positive/negative select:

BIAS Polarity	
Pins Jumpered	**Description**
W1[1-2]	Vee +/- to J1, pins 22 & 23; pins 24 &25
W3[1-2]*	Positive DC output to J1, pins 24 & 25
W3[2-4]	Negative DC output to J1, pins 24 & 25

* = default

2. Verify that W3(7-8) is installed.

Range Adjustment Select: W3	
Pins Jumpered	**Description**
7-8	Adjustable ± 12 to ± 31
No jumper	Disable bias Vee adjustability

* = default

3. Power on the 5420 and measure Vee at J1, pin 24 and adjust R6 to the correct voltage for your display. Refer to the "Programming the 5420 Video BIOS" section.

WARNING: To avoid damage to your panel, initially set the voltage low and adjust to the specifications of your panel.

NOTE: Without a flat panel BIOS programmed into the EEPROM and W2[1-2] installed, Vee will not come up.

4. Power off the 5420 and connect the flat panel display to the 5420 using a 50–position IDC connector.

WARNING: Improperly attaching a flat panel to the 5420 SVGA card could damage the Chips & Technologies video chip. The problem is due to flat panels having connector pins that are not clearly marked and assumptions are made as to the location of pin 1. For example, Sharp LM32008F and other Sharp Quarter VGA panels have this problem.

The silk-screen for CN1 on these panels is placed next pin 12. This causes the user to assume that pin 12 is pin 1 and as a result, the panel is wired backwards. This in turn causes damage to the video chip.

Carefully read the flat panel documentation and diagrams, which clearly identify the placement of pin 1, so that damage to the 5420 can be avoided.

WARNING: Octagon assumes no responsibility for any damage caused to flat panel displays and/or Micro PC video cards if the display is connected incorrectly.
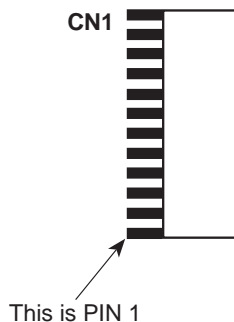
CN1

This is PIN 1

Figure 4—LM32008F Quarter VGA Panel

The following table lists the pin number and function for the flat panel connector at J1:

Flat Panel Connector: J1			
Pin #	Function	Pin #	Function
1	ACDCLK	2	Gnd
3	FLM	4	Gnd
5	LP	6	Gnd
7	BLANK*	8	Gnd
9	SHFCLK	10	Gnd
11	ENAVDD*	12	Gnd
13	PNL0	14	Gnd
15	PNL1	16	Gnd
17	PNL2	18	Gnd
19	PNL3	20	Vdd (+5V)
21	Vdd (+5V)	22	Vee2
23	Vee2	24	Vee, +/-BIAS
25	Vee, +/-BIAS	26	PNL4
27	Gnd	28	PNL5
29	Gnd	30	PNL6
31	Gnd	32	PNL7
33	Gnd	34	PNL8
35	Gnd	36	PNL9
37	Gnd	38	PNL10
39	Gnd	40	PNL11
41	Gnd	42	PNL12
43	Gnd	44	PNL13
45	P8	46	PNL14
47	P9	48	PNL15
49	P10	50	P11

* = active low

NOTE: Several of these pins are multifunctional and change depending on the BIOS loaded. Refer to the README file on the 5420 Utility Disk for more information.

5. Make sure the BIOS jumper is enabled — W2[1–2].

6. Power on your Micro PC System.

7. A BIOS and DOS message similar to the following should appear on your display:

```
Octagon 50xx BIOS vers x.xx
Copyright (c) 1992-1995, Octagon Systems Corp.
All Rights Reserved.
```

8. Due to loading of the Vee source, the Vee voltage will probably require additional adjustments at this time in order to obtain proper contrast. With the power on, remeasure Vee at J1 pin 24 and adjust R6 for the correct voltage.

USING THE 5420 IN A DESKTOP PC WITH A FLAT PANEL

Programming the 5420 video BIOS while in a desktop PC is possible to do, but certain cautions must be heeded. Memory manager software, such as HIMEM.SYS, QEMM, and 386MAX, for example, must **NOT** be running, and any memory shadowing, as well as CPU cache, must be disabled. If these situations exist while programming the video BIOS, the video BIOS will become corrupted and the desktop system will lock up with **NO** way to reprogram the 5420 without using an Octagon Micro PC Control Card.

To program a 5420 video BIOS in a desktop PC:

1. Disable all memory shadowing and CPU cache in the desktop PC configuration setup.

2. Power off and disable the video in the desktop PC. Install the 5420 SVGA card and attach the PC monitor to the 5420 DB-15 connector.

3. Boot the desktop PC with a SYSed DOS diskette without a CONFIG.SYS or AUTOEXEC.BAT file. This diskette will also need the file PGMVIDEO.EXE and the .DAT file to be programmed into the 5420 card.

4. **To program the 5420 for the appropriate flat panel display, type the following:**

```
A:PGMVIDEO <file>.DAT
```

The .DAT file will change depending on the type of display you are using. The following message will be displayed:

```
              VIDEO BIOS programming utility
---------------------------------------------------
 PGMVIDEO Vers. x.xx Copyright (c) Octagon Systems Corp
---------------------------------------------------

You must reboot after running this program.

Make sure the jumper labeled EN-DIS is at the EN
position.

Do you want to continue?  (Y/[N])
```

5. **Enter 'Y' when asked if you want to proceed. The program PGMVIDEO then updates the video BIOS on the 5420. The system displays the following message:**

```
Programming ... Please wait ...
Verifying ... Please wait ...

PGMVIDEO completed.
```

If verification errors occur, confirm that the CPU shadowing is disabled for the C000-C800 memory range and that CPU caching is disabled as well; then retry programming.

6. **Power off the CPU, connect the flat panel display and power on the desktop PC again.**

EMI NOISE REDUCTION

If EMI noise generation becomes a consideration, EMI noise can be reduced by grounding the metal VGA connector to chassis ground by using braided wire and wire lugs.

TECHNICAL DATA

Power Specifications
5V +/–5% at 380 mA

Environmental Specifications
–40° to 70° C operating
–40° to 90° C nonoperating
RH 5% to 95%, noncondensing

Interface
8–bit ISA bus

I/O Map
Standard IBM compatible video I/O addresses

ROM BIOS
C000:0H—C000:7FFFH

Video Memory
512K Display Memory at A000H—BFFFH

Monitor Type
Analog RGB DB–15 connector VGA monochrome and VGA color

Flat Panel
50–position IDC connector
Supports LCD, EL and plasma flat panels.

Flat Panel Mating Connector
Use Thomas & Betts Ansley 609-5030
or equivalent mating connector

Size
4.5 in. x 4.9 in.
For further information, refer to the Chips & Technology data
sheets on the following chips:

- 65530 High Performance Flat Panel/CRT VGA Controller
- 82C404A

PC BUS PINOUTS

Micro PC "A"					
Pin#	**Description**	**Signal**	**Pin#**	**Description**	**Signal**
A1	I/O CH CK*	O	A17	A14	I
A2	D7	I/O	A18	A13	I
A3	D6	I/O	A19	A12	I
A4	D5	I/O	A20	A11	I
A5	D4	I/O	A21	A10	I
A6	D3	I/O	A22	A9	I
A7	D2	I/O	A23	A8	I
A8	D1	I/O	A24	A7	I
A9	D0	I/O	A25	A6	I
A10	I/O CH RDY	O	A26	A5	I
A11	AEN	I	A27	A4	I
A12	A19	I	A28	A3	I
A13	A18	I	A29	A2	I
A14	A17	I	A30	A1	I
A15	A16	I	A31	A0	I
A16	A15	I			

* = active low

Micro PC "B"					
Pin#	Description	Signal	Pin#	Description	Signal
B1	GND	I	B17	DACK1*	I
B2	RESET	I	B18	DRQ1	O
B3	+5V	O	B19	DACK0*	I
B4	IRQ2	O	B20	CLOCK	I
B5	–5V	Not used	B21	IRQ7	O
B6	DRQ2	O	B22	IRQ6	O
B7	–12V	O	B23	IRQ5	O
B8	Reserved	Not used	B24	IRQ4	O
B9	+12V	O	B25	IRQ3	O
B10	Analog Gnd	O	B26	DACK2*	O
B11	SMEMW*	I	B27	T/C	O
B12	SMEMR*	I	B28	BALE	I
B13	IOW*	I	B29	Aux +5V	O
B14	IOR*	I	B30	OSC	I
B15	DACK3*	I	B31	Aux Gnd	O
B16	DRQ3*	O			

* = active low

FLAT PANEL CONNECTOR REFERENCE

The following table references the functional nomenclature for pins of the various flat panels that can be driven by the 5420 card.

Flat Panel Connector Summary						
5420 Video Card		**Corresponding Flat Panel Signal Names**				
Flat Panel Connector: J1 Pin#	**Function**	**Mono Single Panel**	**Mono Dual Panel**	**Color TFT 4–bit**	**Color STN 4–bit Pack**	**Color STN Extended 4–bit Pack**	**Color STN DD 16–bit**
13	PNL0	P0	UD3	B0	B2...	R0 – G0...	UG1
15	PNL1	P1	UD2	BI	R3...	B0 – R1...	UB1
17	PNL2	P2	UD1	B2	G3...	G1 – B1...	UR2
19	PNL3	P3	UD0	B3	B3..	R2 – G2...	UG2
26	PNL4	P4	LD3	G4	R4...	B2 – R3...	LG1
28	PNL5	P5	LD2	G5	G4...	G3 – B3...	LB1
30	PNL6	P6	LD1	G6	B4...	R4 – G4	LR2
32	PNL7	P7	LD0	G7	R5...	B4 – R5...	LG2!

Flat Panel Connector Summary *continued*							
5420 Video Card		**Corresponding Flat Panel Signal Names**					
Flat Panel Connector: J1 Pin#	**Function**	**Mono Single Panel**	**Mono Dual Panel**	**Color TFT 4–bit**	**Color STN 4–bit Pack**	**Color STN Extended 4–bit Pack**	**Color STN DD 16–bit**
34	PNL8	—	UD7	—	R0...	—	UR0...
36	PNL9	—	UD6	—	G0...	—	UG0...
38	PNL10	—	UD5	—	B0...	—	UB0...
40	PNL11	—	UD4	—	R1...	—	UR1...
42	PNL12	—	LD7	—	G1...	—	LR0...
44	PNL13	—	LD6	—	B1...	—	LG0...
46	PNL14	—	LD5	—	R2...	—	LB0...
48	PNL15	—	LD4	—	G2...	—	LR1...
45	P8	—	—	R0	—	SHFCLKU	—
47	P9	—	—	R1	—	—	—
49	P10	—	—	R2	—	—	—
50	P11	—	—	R3	—	—	—

Flat Panel Connector Summary *continued*							
5420 Video Card		**Corresponding Flat Panel Signal Names**					
Flat Panel Connector: J1 **Pin# Function**		**Mono Single Panel**	**Mono Dual Panel**	**Color TFT 4–bit**	**Color STN 4–bit Pack**	**Color STN Extended 4–bit Pack**	**Color STN DD 16–bit**
9	SHFCLK	CL2	CL2	CL2	CL2	SHFCLKL	CL2
1	ACDCLK	M	M	M	M	M	M
3	FLM	FLM	FLM	FLM	FLM	FLM	FLM
5	LP	LP	LP	LP	LP	LP	LP
7	BLANK/(DE)	—	—	—	—	—	—
20, 21	+5V	—	—	—	—	—	—
24, 25	VEE	—	—	—	—	—	—
22, 23	VEE OPTION	—	—	—	—	—	—
2, 4, 6, 8, 10	GND	—	—	—	—	—	—
12, 14, 16, 18	GND	—	—	—	—	—	—
27, 29, 31, 33, 35	GND	—	—	—	—	—	—
37, 39, 41, 43	GND	—	—	—	—	—	—

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