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# **PC-425 User's Manual**

**Doc. #03588 Rev 0295**

**OCTAGON SYSTEMS CORPORATION®**

6510 W. 91st Ave. Westminster, CO 80030

**Tech. Support: 303-426-4521**

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## **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.

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## 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,

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Octagon has never found a single case where multiple IC failures were not 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.

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- **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  $\mu\text{F}$ , across the switch contact. This will also eliminate radio frequency and other high frequency pickup.
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## PC-425 NOTICE

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The PC-425 has an optional fourth solid-state disk which is a 1 MB flash EPROM which can be surface mounted on the back of the card. The manual references this solid-state disk as SSD3 which may/may not be available on your version of the card. If you have additional questions, please contact Octagon Technical Support.

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# TABLE OF CONTENTS

---

<b>PREFACE .....</b>	<b>1</b>
Conventions Used in This Manual .....	1
Symbols and Terminology .....	2
Technical Support .....	4
<b>CHAPTER 1: OVERVIEW .....</b>	<b>5</b>
Description .....	5
Major Features .....	5
ROM-DOS Operating System .....	5
COM1 and COM2 Serial Ports .....	5
On-card Opto Module Rack .....	5
PC/104 Interface .....	6
Four Solid-State Disks .....	6
EEPROM Stores Setup Information .....	6
LCD Display Port .....	6
Keypad Port .....	6
Watchdog Timer and Power Fail .....	7
Battery Backup and Calendar/Clock Option .....	7
LPT1 Parallel Port .....	7
80C387SX Math Coprocessor Option .....	7
Keyboard and Speaker Port .....	7
Hardware Reset .....	7
Where to go from here: .....	8
<b>CHAPTER 2: QUICK START .....</b>	<b>11</b>
Panel Mounting the PC-425 .....	11
Establishing Communications with PC-425 .....	15
Transferring Files between PC-425 & Your PC .....	17
Downloading Files to the PC-425 .....	17
<b>CHAPTER 3: RAMS AND EPROMS .....</b>	<b>19</b>
SSD1 .....	19
To Install an EPROM .....	19
SSD2 .....	20
Installing Static RAMs .....	20
To Install Battery Backup for SSD2 .....	20
SSD3 (Optional) .....	21
DRAM .....	21

---

<b>CHAPTER 4: SETUP .....</b>	<b>23</b>
Description .....	23
Running SETUP .....	24
SETUP Example .....	28
<b>CHAPTER 5: SAVE &amp; RUN PROGRAMS .....</b>	<b>29</b>
Save and Run Your Programs on the PC-425 .....	29
Saving Program and Support Files .....	29
Autoexecuting Your Program .....	32
Overriding Program Autoexecution from Flash EPROM .....	33
Running SETUP Again .....	33
Removing Jumper W3[3-4] .....	34
<b>CHAPTER 6: SERIAL PORTS .....</b>	<b>37</b>
Description .....	37
COM1 as Console I/O .....	38
COM1 as RS-232 I/O .....	39
COM1 and/or COM2 as RS-422/485 I/O .....	39
Termination Network .....	43
Disabling Interrupts .....	43
COM1CON.COM .....	43
QuickBASIC Notes .....	44
<b>CHAPTER 7: WATCHDOG TIMER &amp; NMI .....</b>	<b>45</b>
Description .....	45
Watchdog Latch .....	45
NMI .....	46
Hardware Reset .....	47
Remote Reset .....	47
<b>CHAPTER 8: LPT1 PRINTER PORT .....</b>	<b>49</b>
LPT1 Printer Port .....	49
Printer .....	50
Digital I/O Lines .....	50
LCD Display .....	50
Vacuum Fluorescent Display .....	51
Keypad .....	52

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---

**CHAPTER 9: DIGITAL I/O ..... 53**

Description .....	53
Port Addresses for J7 .....	54
Configuring J7 I/O Lines .....	55
Examples .....	56
Considerations for High Current Outputs .....	56
Driving Opto/Analog Modules from J7 .....	57
G4 Opto-isolated Modules .....	57
G5 Analog Modules .....	57
On-Card Opto Modules .....	59
G4 Opto-Isolated Modules .....	60
G5 Analog Modules .....	60
SW2 .....	61

**CHAPTER 10: SERIAL EEPROM ..... 63**

Description .....	63
Reading the Serial EEPROM .....	63
Writing to the Serial EEPROM .....	63

**CHAPTER 11: VIDEO AND KEYBOARD ..... 65**

Description .....	65
Using a Video Monitor and Keyboard .....	65
Saving a Program to the PC-425 .....	66
Transferring Files to the PC-425 .....	66
Transferring Files from the PC-425 .....	67

**CHAPTER 12: EXTERNAL DRIVES ..... 69**

Description .....	69
Floppy Disk Drive .....	69
Power Requirements .....	69
Hard Disk Drive .....	72

**CHAPTER 13 : PC/104 ..... 73**

---

<b>CHAPTER 14: USING YOUR OWN DOS .....</b>	<b>75</b>
Description .....	75
Getting Started .....	75
Selecting Boot, Memory, and Drive Options.....	76
Booting the PC-425 from Floppy/Hard Disk Drive .....	76
Booting from SSDx with/without a Floppy Drive .....	77
<b>CHAPTER 15: TROUBLESHOOTING .....</b>	<b>79</b>
Technical Assistance .....	81
<b>CHAPTER 16: TECHNICAL DATA .....</b>	<b>83</b>
Technical Specifications .....	83
Solid-State Disk 0 .....	83
Solid-State Disk 3 (Optional) .....	83
Jumper Settings .....	87
Connector Pinouts .....	91
<b>APPENDIX A: .....</b>	<b>97</b>
BINTOUSR.COM .....	98
COM1CON.COM .....	100
DISKSAVE.EXE .....	101
DISKSEND.EXE .....	103
DISKTOBIN.COM .....	107
FAST.COM .....	111
LPT1CON.COM .....	112
MAKSSD1.COM .....	113
MEMDRIVE.SYS .....	115
RESET.COM .....	118
SETUP.COM .....	119
SLEEP.COM .....	121
SLOW.COM .....	122
TRANSFER.EXE .....	123
<b>APPENDIX B: .....</b>	<b>127</b>
Programming Standard EPROMs .....	127
Custom Communication Cable.....	127
Power Supply .....	128

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---

Uploading Files from the PC-425 .....	128
Assigning Drive Designators .....	129
Example: .....	130
Extended Memory .....	131

## **WARRANTY**

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# PREFACE

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This manual provides all the information required to install, configure, and operate the PC-425 Control Card. It is part of Octagon's Micro PC user manual series. To receive the Micro PC User Manual Binder, please return the reply card included with your Control Card.

By using this manual, you will be able to:

- Interface the PC-425 Control Card to your PC and the Micro PC expansion cards.
- Set up communications between the PC-425 card and a PC.
- Gain an understanding of the operation and various options allowed in the PC-425 Control Card.

## CONVENTIONS USED IN THIS MANUAL

1. Information which appears on your screen (output from your system, commands or data that you key in) is shown in a different type face.

```
Octagon PC425 BIOS vers x.xx  
Copyright (c) 1993-1995 Octagon Systems, Corp. (TM)  
All Rights Reserved.
```

2. Italicized refers to information that is specific to your particular system or program, e.g.,

Enter *filename*

means enter the name of your file.

3. Warnings always appear in this format:

**WARNING:** The warning message appears here.

4. Paired angle brackets are used to indicate a specific key on your keyboard, e.g., <ESC> means the escape key; <CTRL> means the control key; <F1> means the F1 function key.
5. All addresses are given in hexadecimal.

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## SYMBOLS AND TERMINOLOGY

Throughout this manual, the following symbols and terminology are used:

W[ - ]	Denotes a jumper block and the pins to connect.
Autoexecution	Automatic execution of a program on power-up or reset.
BIOS drive	The solid-state disk which contains the system BIOS and ROM-DOS.
Console Port	Video card or COM1 where BIOS and DOS messages appear and keyboard input is available.
Control Card	Contains the CPU, memory, and operating system and controls the operation of all the extension cards.
DRAM	Dynamic Random Access Memory devices. DRAMs provide volatile memory with unlimited read and write cycles.
Expansion Card	The expansion cards add I/O functions to the Micro PC system, such as analog input/output, digital input/output, motion control, display, and so on.
Flash EPROM	Electrically erasable EPROM which allows approximately 10,000 writes.
Memory device	The type of static RAM, DRAM, flash EPROM or EPROM specified for either volatile or nonvolatile memory.
PC SmartLINK	A serial communications software package designed by Octagon for use with the PC-425 Control Card. Refers to all versions of PC SmartLINK.



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ROM	Read Only Memory devices. ROMs provide nonvolatile memory, have a limited number of write cycles, and include EPROMs, EEPROMs, and flash EPROMs.
ROM-DOS	DOS operating system included in Micro PC ROM.
Solid-State Disk (SSD)	A simulated disk using a high speed solid-state memory device, for example flash EPROM, EEPROM, or static RAM.
Static RAM	Static Random Access Memory device. Static RAMs provide volatile memory with unlimited read and write cycles. They may be used with a battery backup module.
TTL Compatible	Transistor transistor logic compatible; 0-5V logic levels.
Virtual Drive	A disk created in DOS or extended memory which emulates an actual disk. Provides temporary storage for files. When power to the computer is turned off the virtual drive disappears.
XMODEM	A communications protocol which allows transfer of files between two computers.
XON/XOFF	A communications protocol for asynchronous connections. The receiver can pace the sender by sending the XOFF and XON characters to stop and continue the data flow.
H	The suffix "H" denotes a hexadecimal number. A decimal number has no prefix or suffix. For example, 1000H and 4096 are equivalent.

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## TECHNICAL SUPPORT

If you have a question about the PC-425 Control Card and cannot find the answer in this manual, call Technical Support. They will be ready to give you the assistance you need.

When you call, please have the following at hand:

*Your PC-425 Control Card User's Manual*

A description of your problem.

The direct line to Technical Support is 303-426-4521.

**DESCRIPTION**

The PC-425 is a compact, single-board computer that is a complete PC based control and data acquisition system. Using a 486SLC processor, the PC-425 is a high performance, low cost solution for an industrial, embedded PC. It will interface with existing PC, Opto MUX, Pro Mux, Micro DAC and uMac systems. The PC-425 is programmable in any PC language, including C, QuickBASIC, and ladder logic.

The PC-425 can be connected in a low-cost network with up to 32 other PC-425s to control 1,024 points. The network communicates at up to 115 KBaud. The points may be digital I/O; high voltage AC/DC I/O; or analog I/O like thermocouples and 4-20 mA outputs.

**MAJOR FEATURES****ROM-DOS Operating System**

The PC-425 is an "instant DOS" system. The card includes 5.0 compatible DOS in a solid-state disk. If you wish to use your own operating system, you may install it with your application. The system boots and operates the same way as your desktop PC.

**COM1 and COM2 Serial Ports**

Both serial ports are 16450 compatible. The baud rates are programmable to 115 KBaud. Both have jumperable RS-232/422/485 interfaces. LEDs indicate transmit-and-receive activity. Both ports operate in half and full duplex. The RS-422/485 port on COM1 is opto-isolated with a 500V rating.

**On-card Opto Module Rack**

The eight position on-card opto module rack accepts both digital and analog I/O modules. The digital and analog I/O can be expanded to 32 lines by connecting an MPC-24 opto rack. Lines can be programmed as inputs or outputs in groups of four and eight. Sixteen of the 24 I/O lines can also drive external devices that require up to 100 mA per device and up to a 50V power supply. Thus, relays, small motors, displays, and other devices can be driven directly by the system. The outputs act as switches to

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ground. The 16 lines can be converted to 0–5V logic levels with a supplied jumper block.

### **PC/104 Interface**

The PC–425 provides a PC/104 interface that will accept one or more expansion cards available from more than 50 manufacturers. Up to three of these modules may be stacked on the PC–425.

### **Four Solid-State Disks**

There are four solid-state disks on the PC–425. The first contains DOS 5.0, the BIOS and utilities. The second is a flash memory device or EPROM for application programs. The flash programmer and software are built-in. The third can hold battery-backed static RAM for logging process variables and data. The fourth is an optional sectored flash EPROM for storing executable programs and data. This is a non-socketed device.

### **EEPROM Stores Setup Information**

An EEPROM is included to store setup information. This eliminates losing data when the battery fails. Storage life of the EEPROM is more than 10 years. In addition to the standard PC setup information, other information such as memory check on power-up may be stored.

### **LCD Display Port**

The PC–425 will drive displays up to four rows and 40 characters. A contrast control is provided for optimum readability of the display.

### **Keypad Port**

Matrix keypads with up to 20 keys are supported in hardware and software.

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## **Watchdog Timer and Power Fail**

The watchdog timer provides a failsafe against program crashes or processor lockups. It times out every 1.6 seconds. An additional latch feature allows a reset should the watchdog timeout. NMI is asserted if power drops below a preset level allowing applications to save critical data.

## **Battery Backup and Calendar/Clock Option**

The PC-425 has a built-in AT style calendar/clock. An external 3.6V AT clock battery plugs into the card which powers the clock during power-down.

## **LPT1 Parallel Port**

This port can be used to support PC compatible printers or it can be used as 17 TTL digital I/O lines.

## **80C387SX Math Coprocessor Option**

The optional 80C387SX coprocessor (Cyrix CX83S87-25 or Intel BOX387SX-25) dramatically increases the throughput of numerical computations in mathematics-intensive operations, thus removing this activity from the CPU.

## **Keyboard and Speaker Port**

The keyboard lines are brought out to a DIN connector which supports any AT compatible or autoswitch keyboard. The speaker is located on-card.

## **Hardware Reset**

You can reset the system without turning off the power using the hardware reset button or the RESET command. This provides a more complete reset than the <CTRL><ALT><DEL> method. A remote reset connector is also available.

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## **Where to go from here:**

Before you can begin developing your application program for the PC-425, we recommend you read Chapters 2-4. These chapters give instructions for hardware installation, downloading and saving your program, and autoexecuting your application.

Chapter 2 Quick Start	Covers the basics of setting up a PC-425 system. This chapter describes how to panel mount the PC-425, how to establish a serial communications link with your PC and how to download files to the PC-425.
Chapter 3 RAMs & EPROMs	Configuring and installing static RAMs and flash EPROMs.
Chapter 4 SETUP	Running the SETUP configuration program.
Chapter 5 Save & Run Programs	How to save your program files and autoexecute them from the PC-425.
Chapter 6 Serial Ports	Using COM1 and COM2. Setting COM1 as the main console I/O for serial communications with your PC.
Chapter 7 Watchdog Timer and NMI	Enabling the watchdog timer, the watchdog latch and NMI.
Chapter 8 LPT1 Printer Port	Using the LPT1 parallel port for a printer, digital I/O, display or keypad.

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Chapter 9 Digital I/O	Using the 24 digital I/O lines and on-card opto module rack. How to read and write to G4 opto-isolated modules and G5 analog modules.
Chapter 10 Serial EEPROM	How to read and write to the serial EEPROM.
Chapter 11 Video and Keyboard	Configuring the PC-425 with a video and keyboard.
Chapter 12 External Drives	Configuring the PC-425 with a floppy drive and/or hard drive.
Chapter 13 PC/104	PC/104 interface.
Chapter 14 Using Your Own DOS	Configuring the PC-425 with a version of DOS other than ROM-DOS.
Chapter 15 Troubleshooting	Problems encountered when using the PC-425.
Chapter 16 Technical Data	Technical specifications, jumper configuration and connector pinouts.
Appendix A Software Utilities	Description and operation of software utility programs and device drivers.
Appendix B	Using non-Octagon cables, programming standard EPROMs, uploading files from the PC-425, assigning drive designators and using extended memory.

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This chapter covers the basics of setting up a PC-425 system and tells you:

1. How to install the PC-425;
2. How to set up a serial communications link between the PC-425 and your PC; and
3. How to download files to the PC-425 and run a program from the virtual drive.

### **PANEL MOUNTING THE PC-425**

You need the following equipment (or equivalent):

PC-425 Control Card

5V Power Supply

VTC-9F Cable

Null modem adapter

PC-425 ROM-DOS & Utility Software Disk

PC SmartLINK

Your PC

Please refer to Figure 2-1 for the location of various connectors before setting up your PC-425 system. Please refer to Appendix B if you are making your own serial cable or using other non-Octagon components.

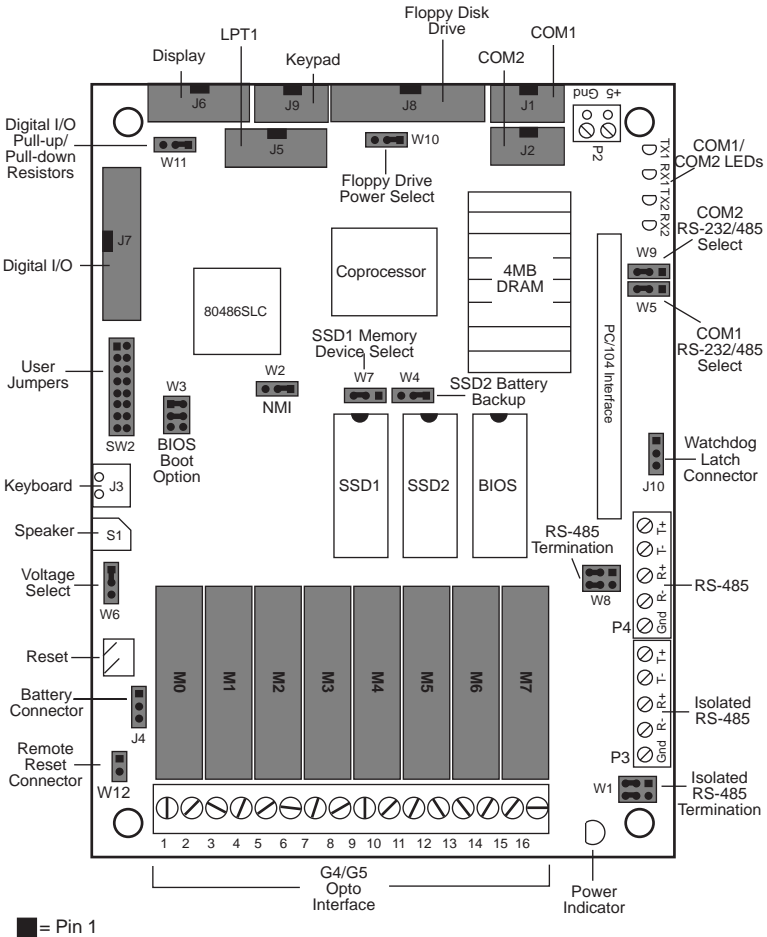


Figure 2-1 – PC-425 Component Diagram

**NOTE:** Each opto module has two screw terminals. Normally the lower number of the pair is used for inputs, e.g., for screw terminals 1 and 2, 1 is for input. However, for Rev 1 of the PC-425, inputs are associated with the high number of the pair, e.g., for screw terminals 1 and 2, 2 is for input. Also, use the M# designations when referencing opto module positions.

---

**WARNING:**

The PC-425 Control Card contains static-sensitive CMOS components.

- Ground yourself before handling the PC-425 card.
- When programming a memory device, place the device in the socket before applying power.
- Take care to correctly connect power at P2.

To install the PC-425:

1. Use #6-32 standoffs and screws to bolt down the PC-425. Figure 2-2 shows the center to center mounting hole dimensions.

**CAUTION:** When installing any component and/or PC/104 device, care should be taken to avoid excessively flexing the board.

2. A screw terminal connector at P2 is provided to supply the 5V power. Connect the proper ground and 5V wires to the terminal block at P2.
3. Connect one end of the VTC-9F cable to the null modem adapter. Connect the other end to COM1 (J1) on the PC-425.

**NOTE:** You must use COM1 on the PC-425 in order to establish a serial communications link with your PC.

4. If your PC has a 9-pin serial connector, connect the null modem adapter to serial port COM1 or COM2 on your PC. If your PC has a 25-pin serial connector, attach a 9- to 25-pin adapter to your null modem adapter, then insert the matching end of the 9- to 25-pin adapter into COM1 or COM2.

**NOTE:** Please refer to the PC SmartLINK manual for more information on using COM2 on your PC.

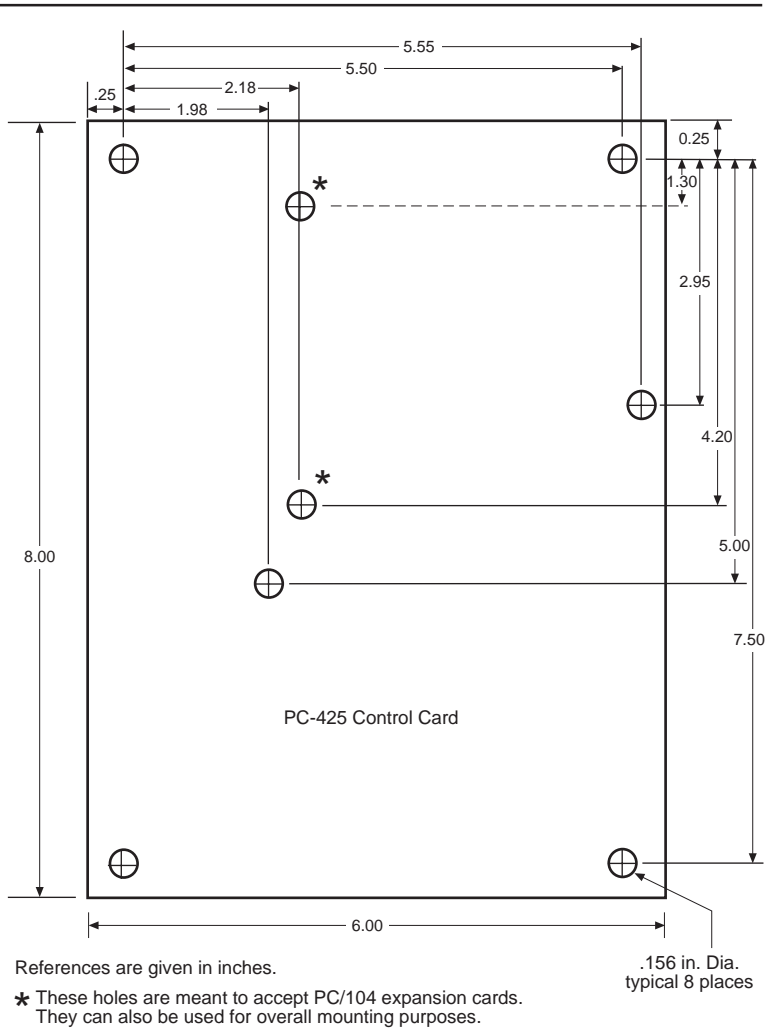


Figure 2-2—PC-425 Center to Center Hole Dimensions

You are now ready to transfer files between your PC and the PC-425. Please continue with the section, “Establishing Communications with the PC-425” in this chapter.

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## ESTABLISHING COMMUNICATIONS WITH PC-425

1. Install PC SmartLINK (or other communications software) on your PC if you have not already done so. Refer to the PC SmartLINK manual for installation instructions.
2. Copy the PC-425 files from the PC-425 utility disk to a subdirectory on your PC hard drive.
3. Start PC SmartLINK. You are now ready to establish communications between your PC and the PC-425 Control Card.
4. Power on the PC-425.
5. A logon message similar to the one below will appear on your PC monitor:

```
Octagon PC425-486-25MHz-2MB BIOS Vers x.xx  
Copyright (c) 1993-1995 Octagon Systems, Corp. (TM)  
All Rights Reserved  
640K Base RAM  
384K Shadow RAM  
3072K Extended RAM
```

```
PC-425 MEMDRIVE.SYS V1.4, formatting extended memory (xxKB)  
as drive D:
```

```
PC-425 MEMDRIVE.SYS V1.4, memory device not found in SSD1
```

```
PC-425 MEMDRIVE.SYS V1.4, memory device not found in SSD2
```

```
PC-425 MEMDRIVE.SYS V1.4, memory device not found in SSD3a
```

```
PC-425 MEMDRIVE.SYS V1.4, memory device not found in SSD3b
```

```
A>path D:\;A:\;  
A>prompt PC425 $p$g
```

```
A>showtime  
Current date/time is THU 10/28/1993 14:34:03
```

```
PC425 A:\> _
```

---

If you do not get the proper logon message:

- Check the serial parameters of your PC to make sure they are set correctly. Parameters should be 9600 baud, 8 data bits, no parity, and 1 stop bit.
  - Make sure all jumpers are set to factory defaults.
  - If the system still does not respond, refer to Chapter 15, "Troubleshooting".
6. Use the directory command to make sure your equipment and software are working properly. Type:

```
DIR <return>
```

A directory listing of ROM-DOS files stored in the BIOS drive should appear:

```
Volume in drive A is BIOS DRIVE
Directory of A:\

COMMAND      COM   26289    06-15-93  2:52p
FAST         COM    203     08-17-93  3:32p
RESET       COM    313     08-17-93  3:32p
SETUP       COM   4302     08-17-93  3:32p
SHOWTIME    COM    34      08-17-93  4:06p
SLOW        COM    203     08-17-93  3:32p
DISKSAVE    EXE  12542    08-17-93  3:32p
TRANSFER    EXE   9969    08-17-93  2:36p
CONFIG      SYS    139     08-17-93  3:54p
MEMDRIVE    SYS   3816    08-17-93  3:32p
AUTOEXEC    BAT    36      08-17-93  4:06p

    11 Files(s)                57846 bytes
                                0 bytes free
```

7. You are now ready to transfer files between your PC and the PC-425.

---

## TRANSFERRING FILES BETWEEN PC-425 & YOUR PC

Once you have established communications between your PC and the PC-425, you can download files to the virtual drive on the PC-425. The virtual drive provides temporary storage for your files until you save them to a flash EPROM or battery-backed static RAM drive. The virtual drive also allows you to test and debug your application files before permanently saving them.

You can also upload files from your PC-425 to your PC for editing and debugging. When booting from the BIOS drive, the MEMDRIVE.SYS driver allocates a virtual drive. The size of the virtual drive depends upon the "Move BIOS drive high" option in the SETUP program. The default setup moves the "BIOS drive high" which allocates a virtual drive of 3008K.

A utility program called TRANSFER.EXE resides on the BIOS drive and is used to send or receive files via COM1 of the PC-425. TRANSFER.EXE uses the XMODEM protocol, as does PC SmartLINK. The following information on downloading files between the PC-425 and your PC uses an example program, DEMO.EXE and DEMO.BAS. These files are on your PC-425 utility disk in the DEMO subdirectory.

### Downloading Files to the PC-425

The following procedures assume you are using PC SmartLINK and you have the proper serial cable hooked up. For other communication programs, refer to information on sending a file from your PC to the target system.

1. Log onto the directory on your PC which contains the file(s) you will download to the PC-425.
2. Start PC SmartLINK and power on the PC-425.
3. Execute the TRANSFER.EXE program from the PC-425 by typing:

```
TRANSFER D:DEMO.EXE
```

---

The following message displays:

```
Receiving D:DEMO.EXE
```

4. Press <ALT> + <D> to download a file.
5. Type in the name of the file to transfer, for example:

```
DEMO.EXE
```

6. Select **START**. The progress of the transfer displays in the dialog box.

**NOTE:** Transfer will timeout if the program has not been started after approximately 40 seconds. The system displays the following message:

```
Failed to receive d:DEMO.EXE  
Deleting d:DEMO.EXE
```

7. When the transfer is complete, type the following DOS command to view the virtual drive directory and confirm that your file has transferred to the PC-425:

```
DIR D:
```

The system will display the contents of drive D:

```
Volume in drive D has no label  
Directory of D:\  
  
DEMO      EXE      27264  01-01-80      2:57p  
          1 file(s) 27264 bytes
```

8. To execute the program you have just downloaded, type:

```
D:DEMO
```

9. The DEMO program displays a message on your PC.



Before you can save and boot your application from the PC-425, you must first configure the system for your particular application requirements. This chapter tells you how to install RAMs and/or EPROMs.

## SSD1

The PC-425 card includes three sockets for solid-state disks: SSD1, SSD2 and SSD3. SSD1 generally contains the program to be executed on power-up. The program is automatically loaded into DOS memory and executed. SSD1 accepts 128K or 256K flash EPROMs or a 512K EPROM. Your application program can be saved to the flash EPROM using the on-card programmer. These devices are erased automatically during the programming process. You can write to the flash EPROM a limited number of times (about 10,000), if your application program requires changes. You can also use a preprogrammed EPROM to store your tested and debugged application.

### To Install an EPROM

1. Set the jumpers at W7 for the correct memory device:

<b>W7: SSD1 Memory Device Select</b>	
<b>Pins Jumpered</b>	<b>Description</b>
[1-2]	512K EPROM
[2-3]	128K/256K Flash EPROM

2. Install the EPROM into socket SSD1.

**WARNING:** When installing the chip, be sure to match the notch in the chip with the notch in the silkscreen. Incorrect installation will destroy the chip!

**NOTE:** If a new, unprogrammed flash EPROM is present while booting, the driver MEMDRIVE.SYS will report "Device

---

not present”. You must program the EPROM using the program DISKSAVE before the EPROM is recognized. Refer to Chapter 5, “Saving Program and Support Files” and MEMDRIVE.SYS in Appendix A.

## SSD2

SSD2 only accepts 128K or 512K static RAMs. A 3.6V AT clock battery can be used to battery back SSD2 via connector J4 and jumper W4. The 3.6V AT battery will also retain the system time when the system is powered off.

**NOTE:** You can also use a DS-1213DM battery backup module with the static RAM. However, the DS-1213DM backs up only the RAM and not the DATE and TIME functions.

### Installing Static RAMs

1. For static RAMs without battery backup, install the static RAM directly into SSD2.

**WARNING:**

When installing the chip, be sure to match the notch in the chip with the notch in the silkscreen. Incorrect installation will destroy the chip!

### To Install Battery Backup for SSD2

- A 3.6V clock battery can be used to battery back SSD2 via J4. Jumper block W4[2-3] enables the battery backup for SSD2:

<b>Battery Connector: J4</b>	
<b>Pin #</b>	<b>Description</b>
1	+ Battery
2	Not used
3	Gnd
4	Gnd

---

<b>W4: SSD2 Battery Backup Select</b>	
<b>Pins Jumpered</b>	<b>Description</b>
[1-2]*	Battery backup disabled
[2-3]	Battery backup enabled

\* = default

or

- Install the DS-1213DM into socket SSD2. Insert the static RAM on top of the DS-1213DM.

**WARNING:**

When installing the chip, be sure to match the notch in the chip with the notch in the silkscreen. Incorrect installation will destroy the chip!

## SSD3 (OPTIONAL)

SSD3 is in the form of a 1 MB flash EPROM which is surface mounted to the back of the PC-425. This flash EPROM can be configured as one 1 MB drive or as two logical 512K drives.

## DRAM

To upgrade the DRAM on the PC-425 from 2 MB to 4 MB, you will need to install (4) 1MBx4 NEC D424400V80 or Toshiba TC514400ZA-80 DRAM ZIPs. These chips must meet the industrial temperature range of -40°C to +85°C .

---

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**DESCRIPTION**

The SETUP program defines the PC-425 system parameters. It is shipped with default configuration parameters stored in the EEPROM, U33. Changes are made by running the SETUP program. The SETUP program is stored on the BIOS drive and on the PC-425 utility disk.

<b>SETUP Parameters</b>	<b>Description</b>	<b>Default</b>
COM1 Console Baud Rate	Specifies communications rate between your PC and the PC-425 when no video card is in use.	9600
Power-on Memory Test	Extensive memory testing performed on bootup.	Enabled
SSD1 Device	Specifies the type of memory device installed in SSD1 for DISKSAVE.	256K Flash EPROM
SSD3 Device	Specifies the size of the logical drives configured in SSD3 for DISKSAVE.	None
Boot from	Specifies the default boot drive.	BIOS drive using ROM-DOS
Number of Floppy Drives	Specifies the number of floppy drives attached.	0
Floppy Drive Size	Specifies size of the floppy drives.	1.44 MB
Shadow 0C00H-0C7FF	The system will shadow (write protect) this segment of RAM.	Yes
Shadow 0C80H-0CFFF	The system will shadow (write protect) this segment of RAM.	Yes
Move BIOS DRIVE high	Copies the contents of the BIOS drive into high memory freeing memory address EXXX.	Yes
Number of line printers	System will automatically check to verify if a device is attached.	Auto check

---

If you are running SETUP for the first time and have not previously saved and autoexecuted your program, we recommend you keep the default setting, "Boot from: BIOS drive using ROM-DOS". The PC-425 will continue to boot from the BIOS drive until you have verified that your program files are successfully saved to SSD1. You can also test your program before setting the system to boot from your AUTOEXEC.BAT file. Once your program is tested and verified, you can run SETUP to configure the system to autoexecute your program.

## RUNNING SETUP

1. Make sure you have established a serial communications link between the PC-425 and your PC.
2. Type:

A: SETUP

**NOTE:** If you are not booting from the BIOS drive, the drive designator may differ.

3. The system displays the PC-425 setup parameters and available options. Select the option by pressing the space bar until the correct information appears, then press <ENTER>. Press <ESC> if you want to exit setup without saving your responses.

- **COM1 Console Baud Rate:**  
1200  
2400  
4800  
9600  
19200  
38400  
57600  
115200

The following messages may appear:

NOTE: To use COM1 as the console at a speed other than 9600 baud, you must install the BIOS boot jumper. (W3[3-4])

---

- **Power on memory test:**

- Enabled
- Disabled

You may want to disable the memory test to speed up the boot process.

- **SSD1 device:**

- none
- 128K FLASH (28F010)
- 256K FLASH (28F020)

NOTE: After setting the SSD1 device, use DISKSAVE/DISKSEND to program the flash EPROM. The message "Device not found" from MEMDRIVE.SYS displays until the device is programmed.

- **SSD3 Drive Description:**

- none
- 1-1 MB drive
- 2-512K drives

**NOTE:** After setting the SSD3 device, use DISKSAVE/DISKSEND to program the flash EPROM. The message "Device not found" from MEMDRIVE.SYS displays until the device is programmed.

- **Boot from:**

- BIOS drive using ROM-DOS
- SSD1 using ROM-DOS
- Floppy or Hard drive
- SSD1 using User supplied DOS/OS
- SSD3A using ROM-DOS
- SSD3B using ROM-DOS
- SSD3A using User supplied DOS/OS
- SSD3B using User supplied DOS/OS

The boot options will vary depending on the current settings of the SSD1 and SSD3 drive description.

---

If jumper W3[3-4] is not installed and you selected an option other than BOOT FROM BIOS DRIVE USING ROM-DOS, the following message also appears:

NOTE: To boot from the specified device you must install the BIOS boot jumper. (W3[3-4])

We recommend that you do not change this option until you have saved and verified your program files in SSD1.

**NOTE:** If booting from the BIOS drive, the system ignores the “No Video” jumper, W3[1-2].

- **Number of floppy drives:**  
0, 1, 2

The following message appears if you select one floppy disk and you boot from SSD1, SSD3A or SSD3B with your own DOS:

NOTE: Connect the floppy to the second floppy cable connector. The drive will be known as B:

A maximum of 1 floppy drive is possible if booting from SSD1, SSD3A or SSD3B and using your own DOS. See Chapter 14, “Using Your Own DOS” for details.

- **Floppy drive 1 size:**  
360K  
1.2 MB  
720K  
1.44 MB
- **Floppy drive 2 size:**  
360K  
1.2 MB  
720K  
1.44 MB

These options only display if you have specified that a floppy drive(s) is attached to the PC-425.



- 
- **Shadow 0C000H-0C7FFH**  
Yes  
No

This address is usually reserved for the video BIOS.

- **Shadow 0C800H-0CFFFH**  
Yes  
No

This address is usually reserved for hard disk drives, SCSI controllers, etc.

The system defaults to shadowing RAM (write protecting) which enhances performance. However, some peripheral cards require access to RAM at these locations. Please refer to your peripheral card manual for specific information regarding RAM address locations.

- **Move BIOS DRIVE high?**  
Yes  
No

You may enable the system to copy the BIOS drive (normally at E000-F000) into extended memory. This “frees” up the address space for other applications.

- **Number of line printers:**  
Auto Check  
0  
1  
2  
3

If you select Auto check, the system automatically checks the LPT1 printer port to verify that a printer is available by writing a pattern to the printer data lines during boot-up or reset. If you have a non-printing device attached to the LPT1 port, e.g., MPB-16PC and do not want data written to that port during boot-up, deselect the Auto Check option.

---

Press ENTER to SAVE the changes or  
Press ESC to EXIT without saving the changes.

Saving options.  
Options saved.

Depending on the options you have selected, the system may display the following message:

You must reset for these options to take effect.

## SETUP EXAMPLE

The following example configures a system with 256K flash EPROM in SSD1, no memory test, 9600 baud, and booting from SSD1 with ROM-DOS:

```
OCTAGON SYSTEMS CORPORATION
PC-425 SETUP UTILITY V2.1
(Press SPACE to CHANGE, ENTER to ACCEPT, ESC to EXIT)
```

```
COM1 Console Baud Rate:  9600
Power on memory test:   Enabled
SSD1 device: 256K FLASH (28F020)
SSD3 drive: none
Boot from:  SSD1 using ROM-DOS
Number of floppy drives: 0
Shadow 0C000H-0C7FFH:   Yes
Shadow 0C800H-0CFFFH:   Yes
Move BIOS DRIVE High:  Yes
Number of line printers: Auto check
```

Press ENTER to SAVE the changes or  
Press ESC to EXIT without saving the changes.

Options Saved.  
You must reset for these options to take effect.

```
PC425 A:\>
```

### SAVE AND RUN YOUR PROGRAMS ON THE PC-425

Once you have written, tested and debugged your application, you can then save it to a flash EPROM in SSD1. When you reboot the PC-425, your program automatically loads into DOS memory and executes.

This chapter tells you:

1. How to save an application program to SSD1;
2. How to autoexecute the program from the PC-425; and
3. How to override autoexecution of your program.

The information in this chapter assumes you will be using ROM-DOS in your application. Some Microsoft programs make undocumented DOS calls. With ROM-DOS, an error will be returned when an undocumented DOS call is made, causing your program to operate erratically. We recommend booting from SSD1, using your own DOS, when using programs with undocumented DOS calls. Refer to Chapter 14, "Using Your Own DOS" for more information on saving and autoexecuting programs.

This chapter also assumes you will be using the PC-425 without a video card. If you are using a video card, refer to Chapter 11, "Video and Keyboard" for more information on transferring and saving programs.

### SAVING PROGRAM AND SUPPORT FILES

In addition to your application program, you must also transfer support files to the PC-425 to ensure proper operation. These files include the ROM-DOS COMMAND.COM, CONFIG.SYS, AUTOEXEC.BAT and other files specific to your application. ROM-DOS COMMAND.COM is required to boot the PC-425 with ROM-DOS from SSD1. AUTOEXEC.BAT defines the routine for autoexecution of your program.

CONFIG.SYS defines the various device drivers of your PC-425 system. The following is an example listing of CONFIG.SYS entries for the device drivers included with the PC-425. The device drivers are discussed in greater detail in Appendix A,

---

"Software Utilities". Refer to Appendix B for more information on how the PC-425 assigns drive designators:

DEVICE=MEMDRIVE.SYS	SSD1	Accesses the SSD1 drive
DEVICE=MEMDRIVE.SYS	SSD2	Accesses the SSD2 drive
DEVICE=MEMDRIVE.SYS	SSD3A	Accesses the SSD3A drive
DEVICE=MEMDRIVE.SYS	SSD3B	Accesses the SSD3B drive
DEVICE=MEMDRIVE.SYS	BIOS	Accesses the BIOS drive
DEVICE=MEMDRIVE.SYS	EMS	Accesses the virtual drive in extended memory
DEVICE=MEMDRIVE.SYS	BASE 136	Accesses a virtual drive in DOS base memory

**NOTE:** We recommend you include in your CONFIG.SYS file the entry DEVICE=MEMDRIVE.SYS BIOS. This allows you to easily access utility programs (SETUP, TRANSFER, etc.) that are located on the BIOS drive.

### **To Save Files to the PC-425 SSD1/SSD3**

The following information steps you through transferring, saving and autoexecuting a program using the DEMO application and a flash EPROM in SSD1 or SSD3. All the files for this application are located on the PC-425 utility disk in the DEMO directory. The two programs, DISKSAVE and DISKSEND, transfer and save the files on the floppy disk to the flash EPROM. The DISKSAVE program resides on the BIOS drive of the PC-425 and the DISKSEND program resides on the PC-425 utility disk.

1. Format a floppy disk on your PC and copy the following files from the PC-425 utility disk onto the floppy disk:

```
COMMAND.COM  
CONFIG.SYS  
AUTOEXEC.BAT  
MEMDRIVE.SYS  
DEMO.EXE
```

2. Copy the file DISKSEND.EXE from the PC-425 utility disk to your PC. Make sure the file is in your DOS PATH or in your current directory.

- 
3. Connect a serial cable between COM1 on the PC-425 to a COM port on your PC.
  4. Make sure the SSD1 device or SSD3 drive description is set correctly in SETUP.
  5. Start PC SmartLINK and power on the PC-425.

**NOTE:** If you are using COM2 on your PC, you must use the /C2 switch with DISKSEND. Refer to the DISKSEND section in Appendix A for more information. The system automatically increases the baud rate to 38400 when executing DISKSAVE and DISKSEND. If you cannot communicate at 38400 baud, use the /Bxxx switch on both DISKSAVE and DISKSEND.

6. On the PC-425, execute the DISKSAVE program by typing:

```
A>DISKSAVE SSD1
```

**NOTE:** Depending on which solid-state disk you are programming, the designation will change from SSD1, SSD3A or SSD3B.

The system displays the following message:

```
Attempting connection with DISKSEND on remote host.
```

7. If you are using PC SmartLINK IV, use the following steps. For other communication programs, skip to step 8.

PC SmartLINK IV:

- Press <ALT> + <D> to download a file.
- Press <ALT> + <P> to program.
- Press <ENTER>

When prompted for the "Input drive to send", enter the drive designator for the newly created floppy disk. The system then erases and programs the flash EPROM. This takes several minutes.

Continue with step 9.

- 
8. If using another communications program, exit to DOS and type the following:

```
C>DISKSEND
```

When prompted for the “Input drive to send”, enter the drive designator for the newly created floppy disk. The system then erases and programs the flash EPROM. This takes several minutes.

9. Restart PC SmartLINK or your communications program.

If you are saving your program to flash EPROM for the first time or you are running the DEMO program, the system should boot from the BIOS drive since you did not change the default “Boot from” option in SETUP. Type:

```
RESET
```

10. Display and verify the contents of flash EPROM:

```
DIR E:
```

**NOTE:** The drive designator will vary depending on your system configuration.

11. Test run the DEMO program:

```
DEMO
```

12. If you want to boot from the flash EPROM, run SETUP to specify this option for SSD1 using ROM-DOS, SSD3A using ROM-DOS or SSD3B using ROM-DOS.

## AUTOEXECUTING YOUR PROGRAM

Once you have saved your program and other files to the flash EPROM in SSD1, SSD3A or SSD3B, you may autoexecute your program. You cannot boot from SSD2.

- 
1. Make sure jumper W3[3-4] is installed. (This is the default setting.)
  2. Establish a serial communications link between your PC and the PC-425.
  3. Make sure the name of your application program is listed in the AUTOEXEC.BAT file, e.g., DEMO.
  4. Run SETUP and specify "Boot from: SSDx using ROM-DOS"
  5. Type:

RESET

The PC-425 resets and boots from the flash EPROM. SSD1, SSD3A or SSD3B now becomes drive A.

## **OVERRIDING PROGRAM AUTOEXECUTION FROM FLASH EPROM**

If you want to 'override' autoexecution of your program, you must reboot the PC-425 from the BIOS drive. There are two options available:

1. You can rerun SETUP to change the "Boot from" option to "BIOS drive with ROM-DOS". If you included the line  
DEVICE=MEMDRIVE.SYS BIOS in your CONFIG.SYS file, you can access the SETUP program on the PC-425 BIOS drive.
2. You can remove jumper W3[3-4]. However, this may be inconvenient and/or impossible if you are making program changes from an off-site location.

### **Running SETUP Again**

1. Make sure you have established a serial link between your PC and the PC-425.

- 
2. To execute SETUP which is on the BIOS drive, type:

```
E:SETUP
```

**NOTE:** The drive designator will vary depending on the hardware configuration of the PC-425.

3. Select the “Boot from BIOS drive using ROM-DOS” option.

4. Type:

```
E:RESET
```

5. Make the necessary changes to your application and copy the new files to a floppy disk or RAM disk.
6. Rerun DISKSEND and DISKSAVE to save your new files to the flash EPROM. Verify and test your program.
7. Rerun SETUP to change the default boot drive to “SSDx using ROM-DOS”.
8. Reset the PC-425.

### **Removing Jumper W3[3-4]**

If the SETUP program is not accessible from the flash EPROM, you must remove jumper W3[3-4]. This configuration uses video and boots from the BIOS drive using ROM-DOS. If there is no video card installed, COM1 is the main console and is configured for 9600, N, 8, 1. The following message appears when you reboot the PC-425:

```
BIOS boot jumper (W3[3-4]) not installed, boot-
ing from the BIOS drive and ignoring the video
jumper setting.
```

```
.
.
```

```
PC425 A:\>
```



---

After booting from the BIOS drive, use the DISKSAVE and DISKSEND programs to download new files to SSD1. Before rebooting the PC-425, be sure to reinstall jumper W3[3-4] if you want the PC-425 to boot a device other than the BIOS drive.

---

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**DESCRIPTION**

The PC-425 has two serial ports that are Intel 8250 compatible. They can be used for interfacing to a printer, terminal or other serial device. These ports support 5-, 6-, 7-, or 8-bit word lengths, 1, 1.5, or 2 stop bits, and baud rates up to 115.2K. LEDs show the status of TX1, RX1, TX2 and RX2 signals.

<b>COM1/COM2 Serial Ports: J1 &amp; J2</b>	
<b>Pin #</b>	<b>Function</b>
1	DCD
2	DSR
3	RxD*
4	RTS
5	TxD*
6	CTS
7	DTR
8	RI
9	Gnd
10	+5

\* = active low

Use a VTC-9F cable to connect the ports to the external serial equipment. The pinout of the connector allows you to plug the cable directly into a 9-pin PC serial connector. When interfacing the PC-425 to your PC, you need to use a null modem adapter.

---

## COM1 AS CONSOLE I/O

The default settings for the PC-425 with no video card are as follows:

- W3[1-2] — COM1 used for console
- W3[3-4] — Boot using parameters defined by SETUP

<b>W3: COM1/Video and BIOS Boot Options</b>	
<b>Pin#</b>	<b>Description</b>
[1-2]* Jumpered	Use video (if enabled) or COM1 as the console.
[1-2] Not jumpered	No console port. This leaves COM1 available for use with your application program when no video card is present.
[3-4]* Jumpered	Boot using all the information saved by SETUP.
[3-4] Not jumpered	Boot using all the information saved in SETUP, except:  Boot from BIOS drive.  Boot with console port (ignores W2[1-2]).  If no video card exists, use 9600, N, 8, 1 settings for COM1 console.
[5-6]*	Not used.

\* = default

With this configuration, the PC-425 communicates via COM1 to your PC, accepting keyboard input and displaying responses over the serial link. The serial parameters of COM1 are:

---

Baud rate – Specified by the SETUP program  
Data bits – 8  
Stop bits – 1  
Parity – none  
Interface – RS-232

**NOTE:** When W3[3-4] is removed, the baud rate defaults to 9600.

The TRANSFER program defaults to COM1 as the main console port. Make sure COM1 has been configured for RS-232 via jumper block W5. If COM1 has been configured as RS-422/485, it will not function as the console.

Some programs which access video memory directly will not work properly on the PC-425 without a video card resident. Refer to the DEMO.BAS program on the utility disk for an example of required QuickBASIC modifications. Refer to Chapter 11, "Video and Keyboard," for more information on using a video as the console.

**NOTE:** If a video card is installed, the W3[1-2] jumper is ignored.

## **COM1 AS RS-232 I/O**

When you have completed developing your application and programmed the PC-425, you can use COM1 as an RS-232 serial port for connection to a printer, modem or other serial device. In order to access COM1, you must configure the PC-425 for no console port by removing jumper W3[1-2]. Otherwise, the BIOS sign-on messages will be sent to your printer, modem or other device connected to COM1.

Use a VTC-9F cable to connect the ports to the external serial equipment. The pinout of the connector allows you to plug the cable directly into a 9-pin PC serial connector.

## **COM1 AND/OR COM2 AS RS-422/485 I/O**

COM1 and/or COM2 is jumper selectable for either RS-232 or RS-485 communications at jumper blocks W5 and W9, respec-

---

tively. The COM1 RS-485 port is optically isolated for applications requiring protection against electrical noise.

Configure COM1 for RS-485 via jumper block W5 and COM2 via jumper block W9. Make sure the correct jumpers are set for RS-485 prior to using the port.

<b>W5: RS-232 or Isolated RS-485 Select for COM1</b>	
<b>Pins Jumpered</b>	<b>Description</b>
[1-2]	RS-485 Receiver selected
[2-3]*	RS-232 Receiver selected

\* = default

When using COM2 as RS-485, the transmitter and receiver are not optically isolated, therefore, you must avoid ground loops. You should only send signals through the RS-485 lines, not power or power grounds. Power grounds cannot be used as a reference ground for RS-485 signals. You will need to establish a common ground reference before implementing your 485 network. The maximum common mode voltage output is +/-7V. Refer to the EIA 485 specification for further details on grounding and safety procedures.

<b>W9: RS-232 or RS-485 Select for COM2</b>	
<b>Pins Jumpered</b>	<b>Description</b>
[1-2]	RS-485 Receiver selected
[2-3]*	RS-232 Receiver selected

\* = default

You can connect up to 32 units on a multidrop RS-485 network. However, only one transmitter can be active at a time. Although no wire type or maximum wire length is specified in the EIA 485

---

specification, the EIA 422 specification (which is very similar) lists a maximum length of 4000 feet.

The RS-485 port is accessed through COM1 via terminal block P3 and COM2 via P4. These ports support two-wire or four-wire transmissions. The following diagrams show how a typical two-wire or four-wire mode network is implemented:

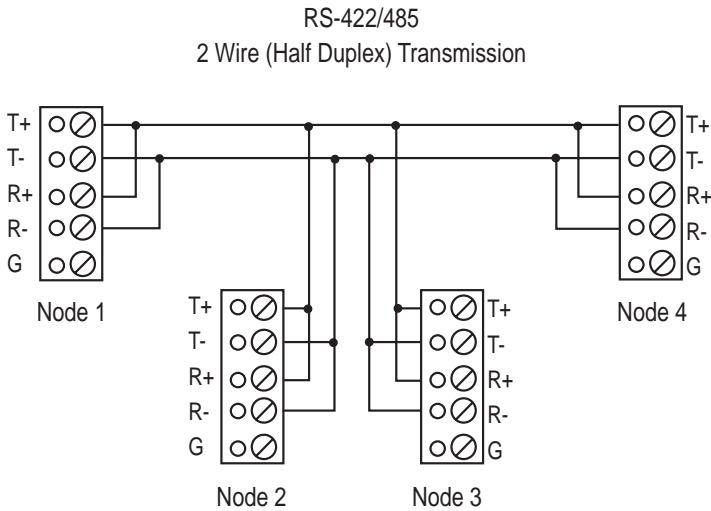


Figure 6-1—Two-Wire Network

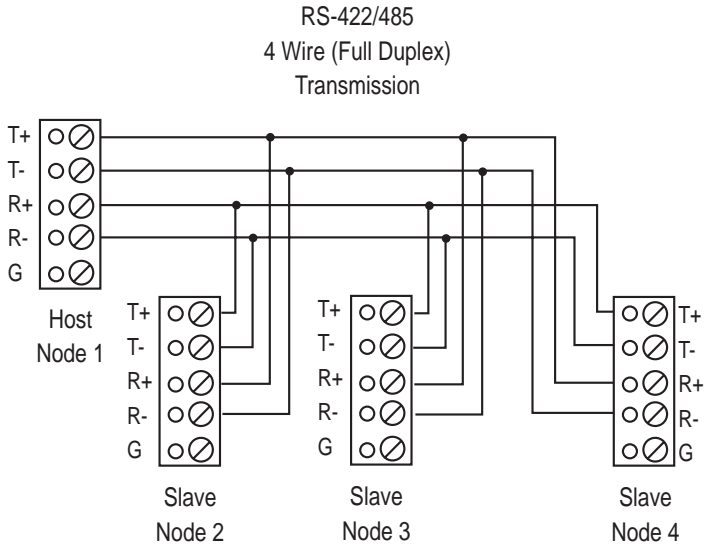


Figure 6-2—Four—Wire Network

### Transmitter Control

To turn the transmitter ON and OFF through software control refer to the following table:

<b>RS-422/485 Transmitter Control</b>		
<b>Program Statement</b>	<b>Description</b>	<b>COM Port</b>
Write a "1" to I/O location 20CH	Enables transmitter output I/O location 20CH, 1	COM1
Write a "0" to I/O location 20CH	Disables transmitter output I/O location 20CH, 0	COM1
Write a "1" to I/O location 386H	Enables transmitter output I/O location 386H, 1	COM2
Write a "0" to I/O location 386H	Disables transmitter output I/O location 386H, 0	COM2

**NOTE:** When the COM2 is enabled, the power LED turns OFF.



---

## Termination Network

Jumper block W1 installs or removes the termination network. A termination network must be installed at the last receiver of the network. Failure to do so may cause spurious oscillation on the receive line and corrupt incoming data. Only one receiver node on the network can be terminated.

<b>W1 (COM1) and W8 (COM2): RS-485 Receiver Termination</b>	
<b>Pins Jumpered</b>	<b>Description</b>
[1-3][2-4]	Termination active
[3-5][4-6]*	No termination

\* = default

## DISABLING INTERRUPTS

The PC Bus does not allow shared interrupts on the bus. You can, however, disable the COM1 and COM2 interrupts (IRQ4 and IRQ3) to allow for other devices which use these interrupts. If COM1 is the console, its interrupt (IRQ4) is in use. COM2 (IRQ3) is not used by the BIOS. To disable interrupts for COM1 write a 0 to 3FC bit 3. To disable COM2, write a 0 to 2FC bit 3.

**NOTE:** If COM1 is the main console, it is enabled and by default COM2 is disabled.

## COM1CON.COM

The COM1CON.COM program redirects video to the COM1 port when you have a video card and monitor installed. Execute COM1CON from the command line. When you are finished using the console port, reset your system. After boot-up, the system reverts to using the video card and monitor.

---

Also, some programming languages may not restore the serial parameters after using the COM1 port. COM1CON will restore COM1 as the console. To restore the serial parameters, create a batch file with your application. Specify COM1CON as the last line of the file. For example, TEST.BAT includes the following to execute a QuickBASIC V4.5 (or other language) application named USECOM1:

```
USECOM1  
COM1CON
```

Then execute TEST.BAT.

## **QUICKBASIC NOTES**

When QuickBASIC V4.5 opens COM1 as a device, and when the program is completed, it fails to restore COM1's parameters. This causes the keyboard to no longer function. Use COM1CON to restore the parameters. (See the previous section, *COM1CON.COM*.)

**DESCRIPTION**

The watchdog timer is a failsafe against program crashes or processor lockups. The watchdog times out every 1.6 seconds. The address for the watchdog timer enable port is 380H. The timer is software disabled when you write a “0” to address 380H. This is the default setting on power-up or reset.

When you want to start using the watchdog timer, write a “1” to address 380H. You must write any data to 201H within the timeout period to prevent the board from resetting. When you write to 201H, the timer resets and begins counting down again. The following table lists the software enable and strobe information:

<b>Watchdog Timer Software &amp; Strobe Addresses</b>	
<b>Enable Base Address 380H</b>	<b>Strobe Base Address 201H</b>
Timer disabled = 0*	Write any data to this address to reset timer
Timer enabled = 1	

\* = default

**WATCHDOG LATCH**

The watchdog latch allows you to add a buzzer or light in series with a button which can be reset should the watchdog timeout. The latch is available through jumper block J10:

<b>J10: Watchdog Latch</b>	
<b>Pin #</b>	<b>Description</b>
1	Gnd
2	Latch
3	Gnd

The following diagram shows a typical circuit for the watchdog latch. The LED could be replaced by a relay for driving devices that require higher voltage or current. The SCR output used is a Trecor EB103B or a Motorola MCR100-4. Refer to the appropriate data sheets for maximum ratings.

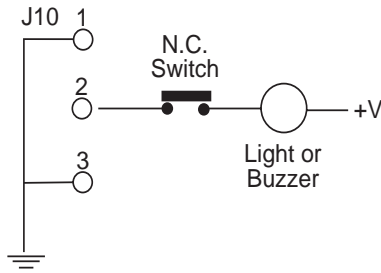


Figure 7-1—Typical Watchdog Latch Circuit

## NMI

The PC-425 will generate an NMI interrupt if power drops below a preset level. This allows you to save critical application data before power fails. The trip level is jumper selectable at W6 to monitor the on-card 5V supply or external power (usually voltage input to the power supply regulator). To preset the power fail level, use a voltmeter and adjust the level via the trim pot at R18.

<b>W6: Power Fail Voltage Select</b>	
<b>Pins Jumpered</b>	<b>Description</b>
[1-2]*	On-card 5V; Trip point approximately 4.75V
[2-3]	External voltage: Trip point determined by R18 and R19

\* = default

---

Select R18 and R19 by using the following formula:

$$V_{TP} = 1.25(1 + R19/R18)$$

where  $V_{TP}$  = trip point voltage desired

If you are monitoring powerfail, you must also set the jumper block W2{2-3}. This selects the powerfail logic as the source of the NMI interrupt. Alternately, you can configure the PC-425 to generate an NMI interrupt from the PC/104 interface should these devices require one.

<b>W2: NMI Source Select</b>	
<b>Pins Jumpered</b>	<b>Source</b>
[1-2]*	NMI from PC-104 interface
[2-3]	NMI from powerfail logic

\* = default

## HARDWARE RESET

The PC-425 has a button which allows you to reset the system without turning off the power. This provides a more complete reset than the <CTL><ALT><DEL> method. The RESET command also accomplishes the same thing as the reset button.

### Remote Reset

In addition to the pushbutton reset, there is a separate input so that the PC-425 can be remotely reset. The remote reset is accessed at W12:

<b>W12: Remote Reset</b>	
<b>Pin #</b>	<b>Description</b>
1	Reset
2	Gnd

---

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## LPT1 PRINTER PORT

The LPT1 parallel port has a 20-pin connector (J5). It can be used to support a number of devices including PC compatible printer, multiline display, matrix keypad or 17 digital I/O lines.

<b>J5: Printer/Digital I/O Port</b>		
<b>Pin #</b>	<b>Function</b>	
1	Out	STB*
2	Out	AFD*
3	I/O	0
4	In	ERR*
5	I/O	1
6	Out	INIT*
7	I/O	2
8	Out	SLIN*
9	I/O	3
10	I/O	4
11	I/O	5
12	I/O	6
13	I/O	7
14	In	ACK*
15	In	BUSY
16	In	PE
17	In	SLCT
18	+5	
19	Gnd	
20	Gnd	

\* = active low

---

**NOTE:** The printer/digital I/O connector J5 and keypad/display connector J6 are in parallel. You may only use the printer/digital I/O or a keypad/display at one time.

## **PRINTER**

To install a printer:

1. Connect a CMA-20 cable from the LPT1 port (J5) to an Octagon PSKI-1 interface card.
2. Connect your printer to the DB-25 connector on the PSKI-1.

## **DIGITAL I/O LINES**

When used only for digital I/O, a CMA-20 cable connects the LPT1 port to an Octagon STB-20 terminal board for connection of field wiring. You can also connect an Octagon MPB-16PC opto module rack to LPT1 to control high voltage/high current lines. Please refer to the documentation for each of these products for more information.

## **LCD DISPLAY**

You can connect an LCD display directly to the PC-425 via a 14-pin connector at J6. This port supports 2 x 40 and 4 x 20 LCD displays (80-character displays).

To interface a larger display to the PC-425, use the Octagon LCD-IFB interface board. A CMA-20 cable is required to connect the interface board to the PC-425 LPT1 connector. Refer to the files DISPLAY.EXE and DISPLAY.DOC on the PC-425 utility disk for information on how to initialize and use the display.



---

<b>LCD Display: J6</b>	
<b>Pin #</b>	<b>Description</b>
1	+5V
2	Gnd
3	PD4
4	+5/-V Contrast
5	PD6
6	PD5
7	NC
8	NC
9	NC
10	NC
11	PD1
12	PD0
13	PD3
14	PD2

\* = active low

## VACUUM FLUORESCENT DISPLAY

To interface a vacuum fluorescent display (DP series) to the PC-425, use the DP-IFB interface board. A CMA-20 cable is required to connect the interface board to the PC-425, LPT1 connector. The program DISPLAY.EXE, on the PC-425 utility disk, provides an easy method to use the display. Please refer to the file DISPLAY.DOC on the utility disk for information on how to initialize and use the display.

1. Connect a CMA-20 cable from the LPT1 port to the DP-IFB.
2. Connect the display cable to the interface board.
3. Refer to the file DISPLAY.DOC for more information on initializing and using the display.

**NOTE:** The DP style displays can also be driven from a serial port when used in conjunction with Octagon's SDA-1 Serial Display Adapter.

---

LPT1CON allows the display to be used as the console device. To do this, add the DISPLAY and LPT1CON commands to your AUTOEXEC.BAT file. Keyboard input can be from a local keyboard or from COM1 (if no video card is installed and if W3[1-2], no video jumper, is installed).

## KEYPAD

You can connect a 4x4 matrix keypad directly to the PC-425 via a 10-pin connector at J9.

To interface larger keypads to the PC-425, use either the LCD-IFB or DP-IFB interface board. A CMA-20 cable is required to connect the interface board to the PC-425 LPT1 connector. The program DISPLAY.EXE, on the PC-425 utility disk, provides an easy method to use the keypad. Please refer to the file DISPLAY.DOC on the utility disk for information on how to initialize and use the keypad.

<b>Keypad Port: J9</b>	
<b>Pin #</b>	<b>Description</b>
1	STB*
2	ACK*
3	PE
4	AFD*
5	INIT*
6	SLCT
7	BUSY
8	SLIN*
9	ERR*
10	Gnd

\* = active low

DESCRIPTION

The PC-425 has two 82C55 chips. One 82C55 (U1) controls 24 digital I/O lines off-card at connector J7. The other 82C55 (U2) controls the on-card opto module rack and user definable jumpers at SW2.

The 24 digital I/O lines at J7 can be used to interface to switches, turn on low-current LEDs, and other devices that have TTL input or output (for example, printers and scales). The STB-26 terminal board provides a convenient way of interfacing switches or other digital I/O devices to the 82C55 digital port on the PC-425. I/O lines at connector J7 can be connected to the STB-26 with a CMA-26 cable. Digital I/O devices are then connected to the screw terminals on the STB-26. You can also connect an MPB-8, -16 or -24 opto module rack to J7 and drive G4 opto-isolated and G5 analog modules. Figure 9-1 shows a typical terminal board and/or opto rack configuration.

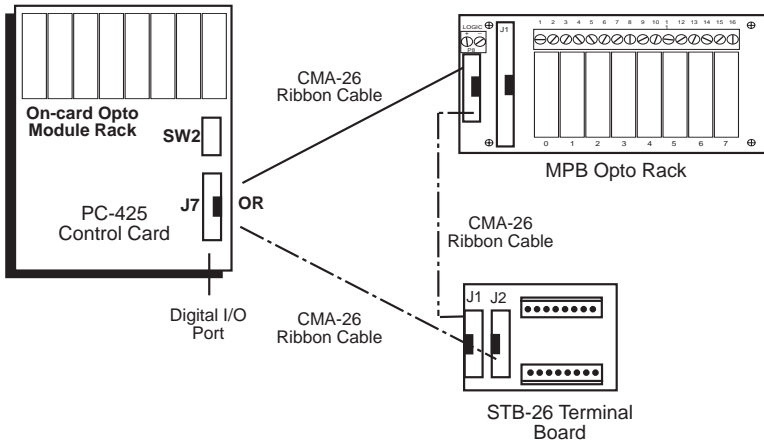


Figure 9-1—Typical Terminal Board and Opto Rack Configuration

---

## PORT ADDRESSES FOR J7

The 82C55 at base address 140H controls the 24 I/O lines at connector J7. It has three ports with eight digital I/O lines (bits) per port. Port A (140H) defaults to the high current output drivers installed in U3 and Port B (141H) defaults to the high current output drivers installed at U28. If you do not use these ports to drive high current devices, you can replace the output drivers with a DIP shunt jumper. These lines can then be used as general purpose digital I/O lines which are TTL compatible. Port C (142H) can be used as either inputs or outputs as one group of 8 lines or two groups of 4 lines. The configuration for this 82C55 is 143H.

<b>PC-425 Digital I/O Port: J7</b>		
<b>Function</b>	<b>I/O Address</b>	<b>Description</b>
Port A	140H	8 lines default to high current output driver. When TTL, 8 lines can be programmed as all inputs or all outputs.
Port B	141H	8 lines default to high current output driver. When TTL, 8 lines can be programmed as all inputs or all outputs.
Port C	142H	8 lines which can be programmed as one group of 8 lines or two groups of 4 lines as all inputs or all outputs.
Control Register	143H	

When a TTL line is configured as an output, it can sink a maximum of 2.5 mA at 0.4V and can source over 2.5 mA at 2.4V. When driving opto modules, the output can sink 15 mA at 1.0V.

The lines on J7 may be pulled up or down via jumper block W11:

<b>W11: Digital I/O Pull-up/Pull-down Resistors</b>	
<b>Pins Jumpered</b>	<b>Description</b>
[1-2]*	I/O lines pulled high
[2-3]	I/O lines pulled low

\* = default

---

## CONFIGURING J7 I/O LINES

On power-up or reset, all three ports are set as inputs. You can configure which ports are inputs or outputs by writing a control command to the control register in the 82C55. The CFG8255 procedure in the G5 examples on the PC-425 utility disk can also be used to configure the digital I/O lines. The following table shows the control commands for the control register.

<b>82C55 Control Register Commands</b>					
<b>HEX</b>	<b>DEC</b>	<b>Port A*</b>	<b>Port B*</b>	<b>Port UC*</b>	<b>Port LC*</b>
80H	128	OUT	OUT	OUT	OUT
81H	129	OUT	OUT	OUT	IN
82H	130	OUT	IN	OUT	OUT
83H	131	OUT	IN	OUT	IN
88H	136	OUT	OUT	IN	OUT
89H	137	OUT	OUT	IN	IN
8AH	138	OUT	IN	IN	OUT
8BH	139	OUT	IN	IN	IN
90H	144	IN	OUT	OUT	OUT
91H	145	IN	OUT	OUT	IN
92H	146	IN	IN	OUT	OUT
93H	147	IN	IN	OUT	IN
98H	152	IN	OUT	IN	OUT
99H	153	IN	OUT	IN	IN
9AH	154	IN	IN	IN	OUT
9BH	155	IN	IN	IN	IN

\* Ports A and B must be either all inputs or all outputs. Each half of Port C is controllable. Upper C (UC) includes bits 4 through 7 and Lower C (LC) includes bits 0 through 3.

---

## Examples

The following example shows how to configure all three ports as outputs:

```
OUT &H143, &H80
```

The following statement configures Ports A and C as input ports and B as an output port:

```
OUT &H143, &H99
```

## CONSIDERATIONS FOR HIGH CURRENT OUTPUTS

- On power-up, all high current outputs are OFF. A “1” or “ON” written to the high current port causes the output to switch low or ON.

**NOTE:** When ON, the saturation voltages are incompatible with TTL logic levels and should not be used to drive other logic devices.

- Each of the high current outputs can sink 100 mA at 50V.
- Incandescent lamps have a “cold” current of 11 times that of their “hot” current. It is recommended that lamps requiring more than 50 mA not be used.
- When inductive loads are used, protection diodes or other schemes must be used.

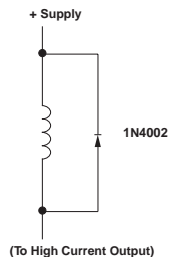


Figure 9-2—Inductive Load Protection Circuitry

- Configuring outputs in parallel for higher drive is NOT recommended and could result in damage since the outputs will not share current equally.

---

**WARNING:**

If external devices, such as 24 VDC relays are driven, the ground of the external 24V supply must be connected to J7, pin 26 and NOT the power ground. Failure to do so will produce a ground loop within the PC-425 and can cause erratic operation.

## DRIVING OPTO/ANALOG MODULES FROM J7

### G4 Opto-isolated Modules

You can interface the PC-425 to additional opto racks via a CMA-26 cable at J7. To drive the opto module racks, plug one end of a CMA-26 cable into J7 on the PC-425 and the other end into the MPB opto mounting rack. Run ground and +5V to the mounting rack. Use the following table to determine the corresponding opto channel for a particular 82C55 port:

Opto Channels		
Channel	82C55 Port	J7 Address
0-3	Lower C	142H
4-7	Upper C	142H
8-15	A	140H
16-23	B	141H

**NOTE:** Each module has two screw terminals. Normally the lower number of the pair is used for inputs, e.g. for screw terminals 1 and 2, 1 is for input. However, for Rev 1 of the PC-425, inputs are associated with the higher number of the pair, e.g. for screw terminals 1 and 2, 2 is for input. Also, use the M# designations when referencing opto module positions.

### G5 Analog Modules

#### OUTPUT

Ports A, B or C may be used and must be configured as an output by writing to the control word register of the 82C55. If you are using Ports A or B, you must install shunt jumpers at U3 and U28, respectively, to disable the high current drivers. Refer to the programming examples in the G5 directory on the PC-425 utility

---

disk for information on using G5 output modules. A file called README.G5 describes the demo programs and functions that are available in QuickBASIC and C.

**NOTE:** Octagon's 'G5 OUT' routines momentarily disable all interrupts while in use.

#### INPUT

Only Port C of J7 may be used for inputs. The frequency counter circuit used to read the G5 analog inputs is addressed at 110H–113H. The steps for reading inputs are as follows:

- Reset frequency counter circuit
- Write multiplexer channel (8–15)
- Start the conversion
- Wait until the conversion is completed
- Read the counter data
- Convert the counter data to 12-bit count

**NOTE:** G5 input channels are numbered 0–7 for on-card channels and 8–15 for off-card channels.

The following is a sample program written in QuickBASIC V4.5. This program reads a G5 input module connected to an 'off-card' opto rack. If you run this program without a video card, substitute the PRINT statement with the PRINTS function residing on the PC-425 utility disk.

```
DEFINT A-Z                                     'use integers where possible
ZC# = 250000/9                                 'zero offset factor
G5BASE = &H110                                 'base address of counter
OUT &H143, &H9B                               'config 8255 port C as inputs
FOR X = 1 TO 1000                             'take 1000 samples
  OUT G5BASE + 1, 0                           'reset freq. counter
  OUT G5BASE + 2, 8                           'select G5 channel #8 (offcard)
  OUT G5BASE, &H80                            'start conversion
  WHILE (INP(G5BASE + 3) < &H7F)             'poll until conv done
  WEND
  LSB& = INP(G5BASE)                          'read count lsb
  MSB& = INP(G5BASE + 1)                     'read count msb
  WORD& = LSB& + (MSB& * 256)                'form the word
  VALUE=INT(((ZC#-WORD&)/(WORD&/1024))+.5) 'scale value
  PRINT VALUE
NEXT X
END
```

---



---

The conversion time will be less than 1 mS maximum. The End of Conversion may be determined either by using an interrupt or by polling the status register. In the event that a conversion is started on a channel that is not connected to a G5 module, the counting circuit will time out with a count value of 7FFFH. The data that is read is contained in 12 bits. The most significant bit of the high data byte will always be a zero. The data that is read must be converted to a numeric value in the range of 0 to 4095 as per the above program example.

## ON-CARD OPTO MODULES

The PC-425 on-card opto rack is controlled via Ports A and B of the 82C55 at base address 148H. It supports up to eight G4 opto-isolated and G5 analog modules. Port A (148H) controls all outputs and Port B (149H) controls all inputs. Port C is available for user definable inputs at SW2 (14AH). The control word register for this 82C55 is at 14BH.

<b>PC-425 On-card Opto Interface</b>		
<b>Function</b>	<b>I/O Address</b>	<b>Description</b>
Port A	148H	On-card opto output
Port B	149H	On-card opto input
Port C	14AH	SW2 input
Control Register	14BH	Preconfigured by BIOS

The opto-isolated modules use standard digital I/O for interfacing. The analog modules must use dedicated hardware for input and dedicated software drivers for output. These software drivers are located on the PC-425 utility disk in the G5 subdirectory.

The default configuration for this 82C55 defines Port A as output and Ports B and C as inputs. When the input modules are used, the corresponding output bit must be 0. For example, if input

---

modules are installed in M0 and M2, bits 0 and 2 of Port A must be set to 0. When the CPU resets, Port A initializes to 0.

## **G4 Opto-Isolated Modules**

Port A is used to output data and Port B is used for input. You can arrange input and output modules in any combination, but we recommend you group the inputs in a contiguous set, justified either high bit or low bit. This simplifies the software interface. Please refer to the example program and the README.G5 file included on the utility disk in the G5 directory.

## **G5 Analog Modules**

### **OUTPUT**

Refer to the programming examples in the G5 directory on the PC-425 utility disk for information on using G5 output modules.

### **INPUT**

The frequency counter circuit used to read the G5 analog input is located at 110H-113H. The steps for reading an input are as follows:

- Reset frequency counter circuit
- Write multiplexer channel (0-7)
- Start the conversion
- Wait until the conversion is completed\*
- Read the counter data
- Convert the counter data to 12-bit count

\* When conversion is complete, IRQ10 occurs and bit 7 of 113H is set.

The following QuickBASIC 4.5 function converts a G5 analog input:

'

---

'The following is a sample program written in QuickBASIC V4.5  
'This program reads a G5 input module mounted 'on-card'  
'If you run this program without a video card, substitute the  
'PRINT statement with the PRINTS function residing on the  
'PC-425 utility disk.

```
DEFINT A-Z                                'use integers where possible
ZC# = 250000/9                             'zero offset factor
G5BASE = &H110                             'base address of counter
FOR X = 1 TO 1000
  OUT G5BASE + 1, 0                        'reset freq. counter
  OUT G5BASE + 2, 0                        'select G5 channel #0 (on-card)
  OUT G5BASE, &H80                          'start conversion
  WHILE (INP(G5BASE + 3) < &H7F)          'poll until conv done
  WEND
  LSB& = INP(G5BASE)                       'read count lsb
  MSB& = INP(G5BASE + 1)                   'read count msb
  WORD& = LSB& + (MSB& * 256)             'form the word
  VALUE=INT(((ZC#-WORD&)/(WORD&/1024))+.5) 'scale value
  PRINT VALUE
NEXT X
END
```

The conversion time will be less than 1 mS maximum. The End of Conversion may be determined either by using an interrupt or by polling the status register. In the event that a conversion is started on a channel that is not connected to a G5 module, the counting circuit will time out with a count value of 7FFFH. The data that is read is contained in 12 bits. The most significant bit of the high data byte will always be a zero. The data that is read must be converted to a numeric value in the range of 0 to 4095 as per the program example above.

## SW2

An additional eight user jumpers are connected to Port C of the 82C55 associated with the on-card opto port. The following example reads the jumpers:

```
SW2 = INP(&H14A)
```

---

The following table describes the pin numbers for SW2:

<b>SW2: User Jumpers for Opto Rack 82C55</b>	
<b>Pin #</b>	<b>Description</b>
[1-2]	Port C Bit 0
[3-4]	Port C Bit 1
[5-6]	Port C Bit 2
[7-8]	Port C Bit 3
[9-10]	Port C Bit 4
[11-12]	Port C Bit 5
[13-14]	Port C Bit 6
[15-16]	Port C Bit 7

**DESCRIPTION**

Up to 68 bytes (that is, 34 words) of user-definable data can be saved in the serial EEPROM. The serial EEPROM does not require battery backup to maintain the data when the system power is off. The serial EEPROM is easily accessible via software interrupts by most programming languages. The software interrupt used is INT 17 subfunction 0FEH (read) and INT 17 subfunction 0FFH (write).

**READING THE SERIAL EEPROM**

The following Borland C example reads word 2:

```
_AH = 0xfe;    /* read */
_BX = 2;      /* index for word in serial EEPROM (0-33)*/
_DX = 0xffff; /* always set to FFFFH */
geninterrupt(0x17); /* do interrupt */
EEdata = _AX; /* serial EEPROM data returned in AX */
```

**WRITING TO THE SERIAL EEPROM**

The following Borland C example writes 1234H to word 2:

```
_AH = 0xff;    /* write */
_BX = 2;      /* index for word in serial EEPROM (0-33)*/
_CX = 0x1234; /* Data to write */
_DX = 0xffff; /* always set to FFFFH */
geninterrupt(0x17); /* do interrupt */
```

**NOTE:** During programming of the EEPROM, the power LED may momentarily flash.

---

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**DESCRIPTION**

You can use a video monitor and a keyboard with the PC-425 instead of using your PC keyboard and monitor over a serial communications link. The speaker is located on-card. The keyboard lines are brought out to a DIN connector at J3. You can connect any AT compatible or autoswitch keyboard.

This chapter tells you:

1. How to use a video monitor and keyboard with the PC-425; and
2. How to transfer files between your PC and the PC-425 with a video monitor and keyboard only.

**USING A VIDEO MONITOR AND KEYBOARD**

You need the following equipment (or equivalent) to use your PC-425 with a video and keyboard:

PC-425 PC Control Card  
Power Module  
AT Compatible Keyboard  
PC/104 Video Display Module  
Monitor

1. Install the PC/104 video display module and monitor. Refer to the manuals for your PC/104 module.
2. Connect the keyboard to J3.
3. Boot the PC-425 from the BIOS drive. The BIOS message should appear on your video monitor:

```
Octagon PC-425 BIOS vers x.xx  
Copyright (c) 1993-1995 Octagon Systems, Corp. (TM)  
All Rights Reserved
```

---

## SAVING A PROGRAM TO THE PC-425

The following steps detail the procedures for transferring files to the PC-425 and programming the flash EPROM(s) using the DISKSEND and DISKSAVE programs. The DISKSAVE program resides on the BIOS drive of the PC-425 and the DISKSEND program resides on the PC-425 utility disk.

1. Create a bootable floppy disk with COMMAND.COM, CONFIG.SYS, AUTOEXEC.BAT, your applications and other supporting files. (Refer to Chapter 5, "Save and Run Programs" if you are using ROM-DOS. Refer to Chapter 14, "Using Your Own DOS", if using other versions of DOS.)
2. Copy the program DISKSEND from the PC-425 utility disk to your PC. Make sure the file is in your DOS PATH or current directory.
3. Connect a VTC-9F cable with a null modem adapter between COM1 of your PC to COM1 of the PC-425.
4. On the PC-425, execute the DISKSAVE program.
5. From your PC, execute the DISKSEND program by typing:

```
C>DISKSEND
```

When prompted for the "Input drive to send", enter the drive designator for the newly created floppy disk. The system will then erase and program the flash EPROM. This will take several minutes.

## TRANSFERRING FILES TO THE PC-425

The following steps detail the procedures for transferring files from your PC to the virtual drive on the PC-425. In order to transfer files from your PC to the PC-425, you must execute the TRANSFER program from both the PC-425 and your PC.



- 
1. Connect a VTC-9F cable with a null modem adapter between COM1 of your PC to COM1 of the PC-425.
  2. Execute the TRANSFER program from the PC-425 to receive a file from your PC.

```
TRANSFER /COM1 /R /V filename.ext
```

*filename.ext* is the name of the file on the PC-425 which you are receiving from your PC.

/V enables "R" characters on receipt of a block and "T" on transfer of a block.

3. Execute the TRANSFER program from your PC to send a file to the PC-425:

```
TRANSFER /COM1 /S /V filename.ext
```

*filename.ext* is the name of the file on the PC which you are sending to the PC-425.

**NOTE:** You may speed up the transfer using the /Bnnnn switch to increase the baud rate. Example: /B57600

## TRANSFERRING FILES FROM THE PC-425

1. Connect a VTC-9F cable with a null modem adapter between COM1 of your PC to COM1 of the PC-425.
2. Execute the TRANSFER program from the PC-425 to send a file to your PC.

```
TRANSFER /COM1 /S /V filename.ext
```

*filename.ext* is the name of the file on the PC-425 which you are sending to your PC.

- 
3. Execute the TRANSFER program from your PC to receive a file from the PC-425.

```
TRANSFER /COM1 /R /V filename.ext
```

*filename.ext* is the name of the file on the PC which you are receiving from the PC-425.

**NOTE:** You may speed up the transfer using the /Bnnnn switch to increase the baud rate. Example: /B57600

**DESCRIPTION**

You can use your PC-425 Control Card with one or two floppy disk drives. This chapter includes installation and operation instructions for each device.

You can boot your PC-425 from a floppy or hard disk. However, MEMDRIVE.SYS must be placed in your CONFIG.SYS file in order for the system to access the memory device in SSD1, SSD2, SSD3A, SSD3B, and the BIOS drive.

**FLOPPY DISK DRIVE**

The PC-425 supports one or two 3.5 in. or 5.25 in. floppy drives via a 34-position IDC connector at J8. Both floppy drives use DMA channel 2.

**Power Requirements**

The PC-425 requires +5V for operation. If you are using an Octagon 5814 Floppy Disk Drive, power is supplied through the FC-2-3 cable and no external supply is required. If your floppy drive does not support power through the cable, you must supply power through an external source. Additionally, if you are interfacing to 5.25 in. floppy drives, external +12V is required. Refer to your floppy drive manual for specific instructions. Set the jumpers at W10 to specify the floppy drive power source:

<b>W10: Floppy Drive Power Source</b>	
<b>Pins Jumpered</b>	<b>Description</b>
[1-2]*	Power supplied to drive through FC-7-3 cable.
[2-3]	Power supplied to drive through external power cable.

\* = default

**WARNING:**

Jumpering W10 incorrectly will cause a power to ground short when connecting the drive.

---

To install a floppy disk drive:

1. Install the PC-425 Control Card.
2. Connect the floppy disk drive cable to J8 on the PC-425 using the Octagon FC-2-3 cable for 3.5 in. drives or the FC-2-5 for 5.25 in. drives. If you are using a floppy disk drive other than the Octagon 5814, make sure the drive cable pinouts meet the following requirements:

<b>Floppy Drives: J8</b>			
<b>Pin #</b>	<b>Description</b>	<b>Pin #</b>	<b>Description</b>
1	NC	2	DSEL
3	NC	4	NC
5	NC	6	DRATE
7	+5V/Gnd	8	INDEX*
9	+5V/Gnd	10	MTR2 ON*
11	+5V/Gnd	12	DS1*
13	Gnd	14	DS2*
15	Gnd	16	MITR1 ON*
17	Gnd	18	DIR IN*
19	Gnd	20	STEP*
21	Gnd	22	WR DATA*
23	Gnd	24	WR GATE*
25	Gnd	26	TRK 0*
27	Gnd	28	WP*
29	Gnd	30	RD DATA*
31	Gnd	32	SIDE 1*
33	Gnd	34	DISK CHANGE

\* = active low

- 
3. Run SETUP to set the number of floppy drives and their size.

**NOTE:** Two drive designators will be assigned regardless of how many drives you specify in SETUP.

4. When you boot from either the BIOS SSD1, SSD3A or SSD3B drives using ROM-DOS, the floppy drive designations will be B and C.

**NOTE:** When you boot from SSD1, SSD3A or SSD3B using your own DOS, only one floppy drive will be available, since DOS thinks that the flash EPROM is drive A. Connect your floppy disk drive to the second floppy connector and access it with B:.

5. The following assumes that you are booting using ROM-DOS. If you are using your own DOS, substitute A and B for B and C, respectively.

If, in SETUP, you entered 0 drives, access to either B or C will immediately generate an error message:

```
ABORT RETRY FAIL?
```

Press <A> or <F> to cancel your request.

If, in SETUP, you entered 1 drive, you can access drive B. Requests to access drive C result in the following prompt:

```
INSERT FLOPPY INTO DRIVE B AND PRESS ANY KEY
```

Insert another floppy disk and press a key. The program then accesses your one drive as drive C. When another request for drive B occurs, a prompt gives you the opportunity to replace the original B floppy. In this way, systems with only one drive can copy files from one floppy to another.

If, in SETUP, you entered 2 drives, access to either drive B or drive C work just as they would in a PC.

If you want to boot from the floppy disk using your own DOS refer to Chapter 14, "Using Your Own DOS".

---

## **HARD DISK DRIVE**

The PC-425 can support an XT type hard drive via the PC/104 interface. Refer to Chapter 13, "PC/104" and the manual for the PC/104 module for more information on setting up a hard drive.

**NOTE:** No hard drive support is included in the PC-425 BIOS.

You can use a video monitor and a keyboard with the PC-425 via the PC/104 connector. This connector allows you to interface to a variety of PC/104 form factor modules including video, analog I/O, floppy/hard disks, etc. These modules can be stacked on top of the PC-425 to form a highly integrated control system.

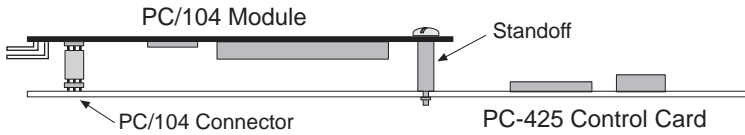


Figure 13-1—Typical PC/104 Module Stack

---

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**DESCRIPTION**

Use these instructions instead of those in Chapter 2 if you are using your own DOS and not the ROM-DOS installed on the BIOS drive. You can boot from SSD1, SSD3 or a floppy/hard disk when you use your own DOS. Initially, you will need to boot from the BIOS drive so that you can run SETUP and specify your system parameters, including the boot device.

**GETTING STARTED**

1. Verify that power to the card is OFF and install your PC-425 Control Card and peripheral equipment.
2. Install memory devices in SSD1 and SSD2 if they are not already in place. To install memory devices refer to Chapter 3, "RAMs and EPROMs".
3. A logon message similar to the one below will appear on your PC monitor:

```
Octagon PC425 BIOS vers x.xx  
Copyright (c) 1993-1995 Octagon Systems, Corp. (TM)  
All Rights Reserved
```

If you do not get the proper logon message:

- Remove W3[3-4] if you are using COM1 as the console. Check the serial parameters of your PC to make sure they are set correctly. The parameters should be 9600 baud, 8 data bits, no parity, and 1 stop bit.
  - Remove the video card from the PC/104 connector, if present.
  - If the parameters are set correctly and the system still does not respond, refer to Chapter 15, "Troubleshooting".
4. Use the directory command to make sure your equipment and software are working properly. Type:

```
DIR <return>
```

---

A directory listing of ROM-DOS files stored in the BIOS socket should appear (this is drive A:).

5. You are now ready to run SETUP to select boot, memory and drive options.

## **SELECTING BOOT, MEMORY, AND DRIVE OPTIONS**

You must specify your system's parameters before you can save and run programs with the PC-425 card. You define parameters by running the SETUP program. For a complete list of the options included in SETUP, please refer to Chapter 4, "SETUP". As shipped, the BIOS drive is selected as the default boot device.

### **Booting the PC-425 from Floppy/Hard Disk Drive**

1. Type:

SETUP

2. Select the answer to each question by pressing the space bar until the correct information appears, then press <ENTER>. Press <ESC> if you want to exit SETUP without saving your answers (or changes to the answers).

When you reach the "Boot from" option, press the spacebar until "Floppy or Hard Disk" appears then press <RETURN> until SETUP is complete.

3. After completing the information for SETUP, insert your bootable disk (which contains your DOS) into the floppy disk drive.
4. To reboot the system from the floppy disk, type:

RESET

---

## Booting from SSDx with/without a Floppy Drive

1. Create a bootable floppy disk on your PC and copy your DOS version of COMMAND.COM, all device drivers and necessary application files onto the floppy.
2. Copy the file DISKSEND.EXE from the PC-425 utility disk to your PC. Make sure the file is in your DOS PATH or in your current directory. The two programs, DISKSAVE and DISKSEND, transfer and save the files on the floppy disk to the flash EPROM. The DISKSAVE program resides on the BIOS drive of the PC-425 and the DISKSEND program resides on the PC-425 Utility Disk.
3. Start PC SmartLINK and power on the PC-425. Configure your PC as the main console for the PC-425, i.e., no video card.

**NOTE:** If you are using PC SmartLINK from COM2 on your PC, you must use the /C2 switch with DISKSEND. Refer to the DISKSEND section in Appendix A for more information. Also, if you cannot communicate at 38400 baud, use the /Bxxxx switch with both DISKSAVE and DISKSEND.

4. On the PC-425, execute the DISKSAVE program by typing:

```
A>DISKSAVE SSD1
```

**NOTE:** Depending on which solid-state disk you are programming, the designation will change from SSD1, SSD3A or SSD3B.

The system displays the following message:

```
Attempting connection with DISKSEND on remote host.
```

5. If you are using PC SmartLINK IV, use the following steps. For other communication programs, skip to step 6.

---

PC SmartLINK IV:

- Press <ALT> + <D> to download a file.
- Press <ALT> + <P> to program the flash EPROM
- Press <ENTER>

Continue with step 7.

6. If using another communications program, exit to DOS and type the following:

```
C>DISKSEND
```

7. When prompted for the “Input drive to send”, enter the drive designator for the newly created floppy disk. The system then erases and programs the flash EPROM. This takes several minutes.

8. Restart PC SmartLINK and type:

```
RESET
```

9. Display and verify the contents of SSDx:

```
DIR E:
```

10. Run SETUP and change your selection of the Boot options to:

```
SSD1 using User supplied DOS/OS
```

**NOTE:** Depending on which solid-state disk you are booting from, the designation will change from SSD1, SSD3A or SSD3B.

11. Install jumper W2[3-4], if needed, and reboot your system from SSDx, type:

```
RESET
```

If your system is not working properly, check the following items:

**No Screen Activity – Checking Serial Communications for Console**

If you do not get the sign-on message after bootup:

1. Make sure that a video card is not installed.
2. Make sure W3[1–2] is installed.  
  
or  
  
Remove W3[3–4] in order to use COM1 as the console.
3. The VTC–9F serial cable turns the PC–425 Control Card serial port into a 9–pin AT serial port. Make sure a null modem adapter is installed on the other end, and that the assembly is inserted into the proper serial port on the PC. Make sure the VTC–9F serial cable is connected to J1 on the Control Card.
4. Make sure your power module provides +5V (+/–0.25V).
5. After verifying the above conditions, you can monitor voltage levels by connecting an oscilloscope between the TxD\* line on J1 (pin 5) and ground. After power-up, you should see a burst of activity on the oscilloscope screen. The voltage level should switch between +/-8V.
6. Verify that W5 is set for RS–232 communications and not RS–485.

**Garbled Screen Activity**

If you do get activity on your screen but the message is garbled, check the following:

1. Remove W3[3–4] to force 9600, N, 8, 1 for COM1.

- 
2. If you are using PC SmartLINK, make sure you have configured the software for 9600 baud and have selected the correct serial port for communicating with your PC. Refer to the PC SmartLINK manual for information on selecting the baud rate.
  3. If you are using communications software other than PC SmartLINK, Octagon cannot guarantee the operation. Make sure that the software parameters are set to match those of the PC-425 Control Card: 9600 baud, 8 bits, 1 stop bit, no parity.

**NOTE:** The PC-425 uses the XMODEM protocol for transferring files.

**System generates a BIOS message but locks up when booting from SSDx:**

1. Remove W3[3-4] to force booting from the BIOS drive.
2. Press the reset button and reboot. Then note the drive designator for SSDx.
3. Display the directory of SSDx and verify that all the necessary boot files exist. Copy any missing files to the floppy disk and re-execute DISKSEND and DISKSAVE.
4. If no files are missing, remake SSDx to overwrite any files which may have become corrupted.

**System boots from BIOS drive even though I specified boot from SSDx using ROM-DOS:**

1. Make sure ROM-DOS COMMAND.COM resides on SSDx.

---

### **Booting from SSDx with DOS doesn't work:**

1. If you made SSDx using a floppy drive, test the boot files on the floppy drive of your PC. Also, make sure all the necessary boot files are present.

### **Cannot save programs to flash EPROM**

1. Make sure the EPROM is installed in SSDx correctly and that there are no bent pins.
2. Make sure a DS-1213D module is not in the SSD2 socket. (DM version will work.)

### **MEMDRIVE.SYS reports device not present with new flash EPROM installed.**

1. You must program the EPROM using DISKSEND and DISKSAVE. Refer to Chapter 5, "Save and Run Programs".

### **MEMDRIVE.SYS reports smaller size disk than device will hold in SSD1.**

1. Device was programmed from smaller disk than destination device using DISKSEND and DISKSAVE.

### **SSD3B still shows up after I have re-programmed SSD3 as one drive.**

1. Use DISKSAVE with the /A option. (This is only required when you change the size of the drive.)

## **TECHNICAL ASSISTANCE**

Carefully recheck your system before calling Technical Support. Run as many tests as possible; the more information you can provide, the easier it will be for the Technical Support staff to help you solve the problem. For technical assistance, please call 303-426-4521.

---

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**TECHNICAL SPECIFICATIONS****CPU**

80486SLC

**Clock**

25 MHz; PC/104 Bus always runs at 8.3 MHz.

**DRAM**

2 or 4 MB DRAM

**Solid-State Disk 0**

Contains the system BIOS. AT compatible with industrial extensions with the following exceptions:

- Uses 8-bit bus; Interrupts 9–15H not available.
- DMA 16-bit channels not available.

**Solid-State Disk 1**

Supports 128K or 256K flash EPROMs for application program. Programmer built-in.

**Solid-State Disk 2**

Supports 128K or 512K static RAMs that may be battery-backed. RAM not included. Uses same battery as calendar/clock (3.6V lithium in J4) or DS-1213DM.

**Solid-State Disk 3 (Optional)**

1 MB x 8 flash EPROM soldered on board.

**ROM-DOS**

Combined with BIOS ROM; DOS 5.0 compatible.

**Serial I/O**

COM1 (J1) and COM2 (J2) are 8250 compatible. COM1 and COM2 are jumper selectable from RS-232 to RS-485. COM1 RS-485 is optically isolated.

**Printer Interface**

LPT1 at J5 is PC compatible. Octagon PSKI-1 is required.

**Keypad Port**

Supports 4 x 4 matrix keypads at J9. Parallel with LPT1.

---

## LCD Display Port

Supports up to 80-character LCD displays at J6. Parallel with LPT1.

## Power Requirements

+5V at 725 mA typical

## Environmental Specifications

-40° to 85° C operating

-55° to 90° C nonoperating

RH 5% to 95%, noncondensing

## Size

6.0 in. x 8.0 in.

## Watchdog Timer

Default timeout is 1.6 seconds. Software enabled and strobed.

Disabled on power-up and reset. Address of the enable timer is 380H; address of strobe is 201H.

## NMI

NMI generated from on-card powerfail logic or PC/104 interface.

Jumper selectable to monitor on-card 5V or external voltage.

## Memory Map

<b>PC-425 Memory Map</b>	
<b>Address</b>	<b>Description</b>
00000-9FFFFH	System Memory
A0000-CFFFFH	Off-card memory
D0000-DFFFFH	Solid-state disks
E0000-FFFFFFH	BIOS/DOS SSD-0

D0000-EFFFFH is available off card as ROM BIOS extensions. Devices on-card that use these address ranges are switched “in” when needed and switched “out” after use. Off-card RAMs should not be mapped in these ranges.

---

## I/O Map

<b>PC-425 I/O Map</b>	
<b>Hex Range</b>	<b>Function</b>
0000-00FFH	Core logic I/O functions
0110-117H	Frequency counter circuit
110H W	Starts conversion (Write D7=1)
111H W	Resets counters & state machine
112H W	MUX ID channel select bits 3-0
	Bit 0 MUX 0
	Bit 1 MUX 1
	Bit 2 MUX 2
	Bit 3 MUX 3
113H W	No function
110H R	Reads counter data low
111H R	Reads counter data high
112H R	MUX ID channel read back
113H R	Interrupt status is bit 7 & state machine code are bits 3-0/ code of 8FH is an overflow condition bit 7 interrupt pin status, 1=active.
0140-143H	24 digital I/O lines
140H	Port A high current & MUX to analog counter
141H	Port B high current
142H	Port C
143H	Control port
148-14BH	8-channel opto port
148H	Port A (output to modules)
149H	Port B (input from modules)
14AH	Port C user jumpers
14BH	Control port

---

**PC-425 I/O Map**

<b>Hex Range</b>	<b>Function</b>
0208-020FH	Bit port
0208H	Serial EEPROM CS
0209H	Serial EEPROM data input
020AH	Serial EEPROM Clock
020BH	SSD socket select 2
020CH	COM1 485 TX enable
020DH	Not used
020EH	RS-232 charge pump powerdown
020FH	SSD A19 (banked)
02F8-02FFH	COM2 serial port
0378-037FH	LPT1 printer port
0380-0387H	Bit port
0380H	Watchdog enable
0381H	Flash program voltage on
0382H	SSD bank switch A16
0383H	SSD bank switch A17
0384H	SSD bank switch A18
0385H	SSD socket select 1
0386H	Power LED switch and COM2 485 TX enable
0387H	SSD socket enable
03F0-03F7H	Floppy disk interface
03F8-03FFH	COM1 serial port

---

## JUMPER SETTINGS

<b>SW2: User Jumpers for Opto Rack 82C55</b>	
<b>Pin #</b>	<b>Description</b>
[1-2]	Port C Bit 0
[3-4]	Port C Bit 1
[5-6]	Port C Bit 2
[7-8]	Port C Bit 3
[9-10]	Port C Bit 4
[11-12]	Port C Bit 5
[13-14]	Port C Bit 6
[15-16]	Port C Bit 7

<b>W1 (COM1) and W8 (COM2): RS-485 Receiver Termination</b>	
<b>Pins Jumpered</b>	<b>Description</b>
[1-3][2-4]	Termination active
[3-5][4-6]*	No termination

\* = default

<b>W2: NMI Source Select</b>	
<b>Pins Jumpered</b>	<b>Source</b>
[1-2]*	NMI from PC/104 interface
[2-3]	NMI from powerfail logic

\* = default

---

### **W3: COM1/Video and BIOS Boot Options**

<b>Pin#</b>	<b>Description</b>
[1-2]* Jumpered	Use video (if enabled) or COM1 as the console.
[1-2] Not jumpered	No console port. This leaves COM1 available for use with your application program when no video card is present.
[3-4]* Jumpered	Boot using all the information saved by SETUP.
[3-4] Not jumpered	Boot using all the information saved in SETUP, except:  Boot from BIOS drive.  Boot with console port (ignores W2[1-2]).  If no video card exists, use 9600, N, 8, 1 settings for COM1 console.
[5-6]*	Not used.

\* = default

### **W4: SSD2 Battery Backup Select**

<b>Pins Jumpered</b>	<b>Description</b>
[1-2]*	Battery backup disabled
[2-3]	Battery backup enabled

\* = default

### **W5: RS-232 or Isolated RS-485 Select for COM1**

<b>Pins Jumpered</b>	<b>Description</b>
[1-2]	RS-485 Receiver selected
[2-3]*	RS-232 Receiver selected

\* = default

---

<b>W6: Power Fail Voltage Select</b>	
<b>Pins Jumpered</b>	<b>Description</b>
[1-2]*	On-card 5V; Trip point approximately 4.75V
[2-3]	External voltage; Trip point determined by R18 and R19

\* = default

<b>W7: SSD1 Memory Device Select</b>	
<b>Pins Jumpered</b>	<b>Description</b>
[1-2]	512K EPROM
[2-3]*	128K/256K Flash EPROM

\* = default

<b>W8: RS-485 Receiver Termination</b>	
<b>Pins Jumpered</b>	<b>Description</b>
[1-3][2-4]	Termination active
[3-5][4-6]*	No termination

\* = default

<b>W9: RS-232 or RS-485 Select for COM2</b>	
<b>Pins Jumpered</b>	<b>Description</b>
[1-2]	RS-485 Receiver selected
[2-3]*	RS-232 Receiver selected

\* = default

---

<b>W10: Floppy Drive Power Source</b>	
<b>Pins Jumpered</b>	<b>Description</b>
[1-2]*	Power supplied to drive through FC-7-3 cable.
[2-3]	Power supplied to drive through external power cable.

\* = default

<b>W11: Digital I/O Pull-up/Pull-down Resistors</b>	
<b>Pins Jumpered</b>	<b>Description</b>
[1-2]*	I/O lines pulled high
[2-3]	I/O lines pulled low

\* = default

<b>W12: Remote Reset</b>	
<b>Pin #</b>	<b>Description</b>
1	Reset
2	Gnd



---

## CONNECTOR PINOUTS

<b>COM1/COM2 Serial Ports: J1 &amp; J2</b>	
<b>Pin #</b>	<b>Function</b>
1	DCD
2	DSR
3	RxD*
4	RTS
5	TxD*
6	CTS
7	DTR
8	RI
9	Gnd
10	+5

\* = active low

<b>J3: Keyboard/Speaker Port</b>	
<b>Pin #</b>	<b>Function</b>
1	Keyboard clock
2	Keyboard data
3	N.C.
4	Gnd
5	+5

---

<b>Battery Connector: J4</b>	
<b>Pin #</b>	<b>Description</b>
1	+ Battery
2	Not used
3	Gnd
4	Gnd

<b>J5: LPT1 Printer Port</b>		
<b>Pin #</b>	<b>Function</b>	
1	Out	STB*
2	Out	AFD*
3	I/O	0
4	In	ERR*
5	I/O	1
6	Out	INIT*
7	I/O	2
8	Out	SLIN*
9	I/O	3
10	I/O	4
11	I/O	5
12	I/O	6
13	I/O	7
14	In	ACK*
15	In	BUSY
16	In	PE
17	In	SLCT
18	+5	
19	Gnd	
20	Gnd	

\* = active low

---

<b>LCD Display: J6</b>	
<b>Pin #</b>	<b>Description</b>
1	+5V
2	Gnd
3	PD4
4	+5/-V Contrast
5	PD6
6	PD5
7	NC
8	NC
9	NC
10	NC
11	PD1
12	PD0
13	PD3
14	PD2

\* = active low

---

<b>Digital I/O: J7</b>	
<b>Pin #</b>	<b>Function</b>
19	Port A, line 0
21	Port A, line 1
23	Port A, line 2
25	Port A, line 3
24	Port A, line 4
22	Port A, line 5
20	Port A, line 6
18	Port A, line 7
10	Port B, line 0
8	Port B, line 1
4	Port B, line 2
6	Port B, line 3
1	Port B, line 4
3	Port B, line 5
5	Port B, line 6
7	Port B, line 7
13	Port C, line 0
16	Port C, line 1
15	Port C, line 2
17	Port C, line 3
14	Port C, line 4
11	Port C, line 5
12	Port C, line 6
9	Port C, line 7
2	+5V
26	Common

---

<b>Floppy Drives: J8</b>			
<b>Pin #</b>	<b>Description</b>	<b>Pin #</b>	<b>Description</b>
1	NC	2	DSEL
3	NC	4	NC
5	NC	6	DRATE
7	+5V/Gnd	8	INDEX*
9	+5V/Gnd	10	MTR2 ON*
11	+5V/Gnd	12	DS1*
13	Gnd	14	DS2*
15	Gnd	16	MITR1 ON*
17	Gnd	18	DIR IN*
19	Gnd	20	STEP*
21	Gnd	22	WR DATA*
23	Gnd	24	WR GATE*
25	Gnd	26	TRK 0*
27	Gnd	28	WP*
29	Gnd	30	RD DATA*
31	Gnd	32	SIDE 1*
33	Gnd	34	DISK CHANGE

\* = active low

---

<b>Keypad Port: J9</b>	
<b>Pin #</b>	<b>Description</b>
1	STB*
2	ACK*
3	PE
4	AFD*
5	INIT*
6	SLCT
7	BUSY
8	SLIN*
9	ERR*
10	Gnd

\* = active low

<b>J10: Watchdog Latch</b>	
<b>Pin #</b>	<b>Description</b>
1	Gnd
2	Latch
3	Gnd

<b>P3 (COM1) &amp; P4 (COM2): RS-485 Terminal Block</b>	
<b>Pin #</b>	<b>Signal</b>
1	T+
2	T-
3	R+
4	R-
5	Gnd

**INTRODUCTION**

The PC-425 ROM-DOS and Software Utility Disk comes with the utilities listed below. Some of these utilities are also available on the PC-425 BIOS drive. This appendix describes the utilities and their use.

**Support commands:**

BINTOUSR.COM  
COM1CON.COM  
DISKSAVE.EXE  
DISKSEND.EXE  
DSKTOBIN.COM  
FAST.COM  
LPT1CON.COM  
MAKESSD1.COM  
RESET.COM  
SETUP.COM  
SLEEP.COM  
SLOW.COM  
TRANSFER.EXE

**Support device drivers:**

MEMDRIVE.SYS

**NOTE:** Other utilities are included from ROM-DOS and are not mentioned in this section. Please refer to your ROM-DOS manual.

---

# BINTOUSR.COM

**BINTOUSR.COM** Support Command

**PURPOSE:** To transfer a binary image file to SSD.

**SYNTAX:** **BINTOUSR**

**REMARKS:** This program takes the output of the DSKTOBIN program and transfers the image to the PC-425 SSD.

After the copyright message displays, the following menu appears:

DESTINATION DEVICE SELECTION MENU

```
1-128K FLASH EPROM (28F010).  
2-256K FLASH EPROM (28F020).  
3-128K FLASH EPROM (28F010) for  
5805 SSD  
ESC - Exit
```

Please select the destination device:

Select an option that corresponds to the type of device that is installed in the PC-425 SSD. SSD may contain 128K or 256K flash EPROM. Make sure the PC-425 is jumpered for the type of device located in SSD.

Regular EPROMs can be put into the PC-425 SSD, but they cannot be programmed on-board. Use DSKTOBIN and an external EPROM programmer for regular EPROMs. Also see Appendix B for programming EPROMs for the PC-425 SSD.



---

The system then displays the message:

```
TEMPORARY FILE STORAGE DRIVE
```

```
Enter the drive which holds the  
FLPYIMG.001 created by DSKTOBIN  
(default __):
```

If the destination device is static RAM, the system responds with:

```
TRANSFERRING/PROGRAMMING
```

```
Transferring A:FLPYIMG.001 into the  
Static RAM.  
Binary image successfully trans-  
ferred.
```

If the destination device is flash EPROM, the system responds with:

```
TRANSFERRING/PROGRAMMING
```

```
Erasing FLASH EPROM.
```

```
Programming A:FLPYIMG.001 into the  
FLASH EPROM.
```

```
FLASH EPROM successfully pro-  
grammed.
```

If an error occurs, check the device type inserted in SSD and the jumpers associated with that device type and that the device type for SSD1 is set correctly in SETUP.

A “what next” message is displayed detailing what further action is necessary, e.g., more files need to be transferred.

---

# COM1CON.COM

**COM1CON.COM** Support Command

**PURPOSE:** Redirects video to the COM1 port when you have a video card and monitor installed in your system and restores COM1 serial parameters.

**SYNTAX:** **COM1CON**

**REMARKS:** Execute COM1CON from the command line. When you are finished using the console port, reset your system. After boot-up, the system reverts to using the video card and monitor.

Also, some programming languages may not restore the serial parameters after using the COM1 port. COM1CON.COM will restore the COM1 port as the console. You must include your program and COM1CON in a batch file and then execute the batch file to restore the console.

**SEE ALSO:** LPT1CON.COM

---

# DISKSAVE.EXE

**DISKSAVE.EXE** Support Command

**PURPOSE:** To transfer a disk into SSD1.

**SYNTAX:** **DISKSAVE**

**REMARKS:** This program saves data to SSD1. This program is used in conjunction with DISKSEND. Start DISKSAVE on the PC-425 and then start DISKSEND on your PC. The following message displays:

```
PC-425 DISKSAVE v1.01 Octagon
Systems, Corp.
Attempting connection with DISKSEND
on remote host.
```

**PARAMETERS:** Various communication parameters can be modified on the command line. If any of the default parameters are changed (other than the COM port), the same parameters MUST also be used when invoking DISKSEND.

Switch	Options	Default
/B[baud rate]	1200,2400,9600...	38400
/C[com port]	1,2,3,4	1
/D[data bits]	7,8	8
/S[stop bits]	1,2	1
/P[parity]	NONE,EVEN,ODD	NONE
/H[handshake]	ECHO,CTS,XON	CTS

For example to use 2400 baud via COM2 use the following:

```
DISKSAVE SSDx /B2400 /C2
```

**NOTE:** Depending on which solid-state disk you are programming, the designation will change from SSD1, SSD3A or SSD3B. Use SETUP to change the SSD1 or SSD3 devices and drivers.

---

Normally only the communication port for DISKSAVE and/or the baud rate for both DISKSAVE and DISKSEND will need to be adjusted.

**NOTE:** The baud rate can be different than the console baud rate set up with SETUP.

**SEE ALSO:** DISKSEND.EXE

---

# DISKSEND.EXE

**DISKSEND.EXE** Support Command

**PURPOSE:** To transfer a disk into SSD1.

**SYNTAX:** **DISKSEND**

**REMARKS:** This program reads a diskette from your PC and transfers it to the PC-425. It is used in conjunction with DISKSAVE, which programs the flash EPROM in SSD1 with the diskette image. Start DISKSAVE on the PC-425 and then start DISKSEND on your PC. The following message displays:

```
PC-425 DISKSEND v1.01 Octagon  
Systems, Corp.  
Attempting connection with DISKSAVE  
on Micro PC (tm).
```

When the system detects DISKSAVE has been started on the other end of the serial link it responds:

```
Connection established.
```

If DISKSAVE was not started, or has timed out, the system will respond:

```
Connection failed!
```

Next, DISKSEND verifies the SETUP parameters on the PC-425. If the SSD1 device is NONE, the response is:

```
The device type for SSD1 indicates  
something other than Flash EPROM.  
Please correct the device type by  
executing SETUP on the MicroPC(TM)  
card.
```

---

Otherwise the following message appears:

Input drive to send:

Input the diskette drive letter which contains the floppy you wish to send.

If you entered drive A and the PC-425 has 256K flash, the next message is:

Verifying drive A will fit into the 256K Flash EPROM.

DISKSEND reads the disk and verifies all the files on the disk actually reside in the first 256K of the diskette. If they don't one of the following is true:

1. The total size of all the files should fit into 256K but there are blank spaces between the files causing a part of a file to be beyond the 256K boundary. The following message displays:

The files on your floppy would fit into the Flash EPROM if the files were squeezed on the diskette. Delete all the files on the floppy and copy them to the floppy again to squeeze the diskette.

Either delete all the files and copy them again. If that does not work, try copying to a newly formatted floppy. Deleting files from the floppy is the main cause of the blank spaces on the floppy.

2. The total size of all the files is over the 256K. The following message displays:

You must reduce the number and/or size of files to fit into the Flash EPROM!

---

Either:

- Reduce the number of files.
- Reduce the size of the files.
- Add another 256K flash to make it 512K.
- Use SSD2 to hold some of the files.

If the contents will fit into the flash EPROM, the following displays:

```
Erasing the Flash EPROM
. . . . .
Flash EPROM erase completed.

Programming the Flash EPROM.
. . . . .
Programming complete.
```

If you receive errors during Erasing or Programming, check the following.

- Correct size for SSD1 type in SETUP.
- Flash EPROM is installed correctly with the notched corners aligned.
- Try another diskette.

**NOTE:** DISKSAVE must be started first.

**PARAMETERS:** Various communication parameters can be modified on the command line. If any of the default parameters are changed (other than the COM port), the same parameters **MUST** also be used when invoking DISKSAVE.

<b>Switch</b>	<b>Options</b>	<b>Default</b>
/B[baud rate]	1200,2400,9600...	57600
/C[com port]	1,2,3,4	1
/D[data bits]	7,8	8
/S[stop bits]	1,2	1
/P[parity]	NONE,EVEN,ODD	NONE
/H[handshake]	ECHO,CTS,XON	CTS
<source drive>:	The floppy you wish to transfer to the flash disk.	

---

For example to use 2400 baud via COM2 use the following:

```
DISKSAVE /B2400 /C2
```

Normally only the communication port for DISKSEND and/or the baud rate for both DISKSEND and DISKSAVE will need to be adjusted.

**NOTE:** The baud rate can be different than the console baud rate set up with SETUP.

You may also put commonly used parameters into a parameter file, DISKSEND.PRM using any text editor. For example, the following always transfer from drive B through COM2

```
B: /C2
```



---

# DSKTOBIN.COM

**DSKTOBIN.COM** Support command

**PURPOSE:** Converts a disk to a binary image file to program EPROMs for the EPROM in SSD1.

**SYNTAX:** **DSKTOBIN**

**REMARKS:** This program converts a disk to a binary image file, which can be input for an EPROM programmer on your PC. The output binary file can be transferred to the PC-425, using PC SmartLINK and TRANSFER.EXE, to a virtual drive on the PC-425. Or, if the system has a 5800 Floppy/Hard Disk Card with floppy support, the output binary file can be copied to the floppy on the PC, and then read on the PC-425. This program is run either on the PC or on the PC-425 with floppy support.

After the copyright message displays, the following menu appears:

DESTINATION DEVICE SELECTION MENU

```
1 - 128K EPROM (27C010) for SSD1.  
2 - 256K EPROM (27C020) for SSD1.  
3 - 512K EPROM (27C040) for SSD1.  
4 - 1MB EPROM (27C080) for SSD1.  
5 - 128K FLASH EPROM (28F010) for SSD1.  
6 - 256K FLASH EPROM (28F020) for SSD1.  
7 - 128K FLASH EPROMs (28F010) for 5805 SSD.  
ESC - Exit
```

Please select the destination device:

**NOTE:** The screen will display option 7 even though the PC-425 does not support a 5805. Use this menu to select the size of the EPROM you are programming.

---

After you select a destination device, the next prompt appears:

FLOPPY IMAGE DRIVE

Enter the floppy drive which is the image you wish to transfer to the PC-425 control card SSD1.

Image floppy drive (default A) :

Respond by entering the drive letter of the floppy drive which is to be converted to the binary image file.

The system checks to see if there are any files on the disk which will not fit into the selected device. The system may display:

WARNING

This floppy has files in areas which would not be accessible once programmed into the destination device.

You must either reduce the number and/or size of the files on the floppy to allow access to all the files.

Press any key to continue

The following warning will appear if the files will fit into the binary image but will need to be “squeezed” first:

WARNING

This floppy has files in areas which would not be accessible once programmed into the destination device.

Try formatting a new floppy and copy the files to it. This should squeeze the files into areas that would be accessible. Then re-execute DSKTOBIN with the new floppy as the image.

Press any key to continue.

---

After the warning message displays, the system defaults to the destination device selection menu. At this time you can reselect a destination device and continue.

TEMPORARY FILE STORAGE DRIVE

Enter the drive to store the temporary file(s) created by DSKTOBIN

NOTE: You may NOT use the same drive the image is created from.

Temporary file storage drive (default \_\_\_) :

Enter the drive where the files will be created. By default, this file is on the default drive and directory. These are the files used to transfer to static RAM or flash EPROM.

The program then creates the binary image file(s) and displays:

FLOPPY IMAGE CONVERSION

Creating temporary file F:FLPYIMG.001

Creating temporary file F:FLPYIMG.002

Finished creating the floppy image files.

The name and number of temporary files created depends on the size flash EPROM installed in SSD1.

A message similar to the following appears with instructions on what to do next:

WHAT TO DO NEXT

If you have a floppy and 5800 card with your PC-425 control card, copy the temporary files to a floppy starting with FLPYIMG.001.

---

or

Transfer FLPYIMG.001 to the local virtual drive on the PC-425 using the TRANSFER program and an XMODEM transfer system (such as SmartLINK).

---

# FAST.COM

**FAST.COM** Support Command

**PURPOSE:** To change CPU clock speed from 12.5 MHz to 25 MHz.

**SYNTAX:** **FAST**

**REMARKS:** The PC-425 boots with the default 25 MHz clock speed. If you changed the SETUP parameters to boot at 12.5 MHz, enter the following command in your AUTOEXEC.BAT file to automatically change to the 25 MHz clock speed during system bootup:

FAST

You can also enter <CTL><ALT><+> to switch to 25 MHz if you are using a keyboard and monitor with the PC-425.

**SEE ALSO:** SLOW.COM

---

# LPT1CON.COM

**LPT1CON.COM** Support Command

**PURPOSE:** Redirects the video to the LPT1 port.

**SYNTAX:** **LPT1CON**

**REMARKS:** If you have an LCD-IFB or DP-IFB interface board and a display connected to LPT1, executing the DISPLAY.EXE and LPT1CON.COM programs allow you to use the display as the system console. You must reset your system to change the video to the original parameters.

**SEE ALSO:** COM1CON.COM, DISPLAY.DOC on the utility disk

---

# MAKESSD1.COM

**MAKESSD1.COM** Support Command

**PURPOSE:** Saves virtual drive or floppy drive to SSD1.

**SYNTAX:** **MAKESSD1**

**REMARKS:** From the directory where this utility file is located, type:

```
MAKESSD1
```

After the copyright message displays, the following message displays:

```
Which disk do you want to copy to  
the XXXK memory device in SSD1  
(default D:)
```

(XXX will vary depending on what device  
SETUP.COM has defined for SSD1.)

```
Erasing the Flash EPROM.  
Copying drive D: into the FLASH  
EPROM (or Static RAM). . .  
Drive successfully copied.
```

Warning: Reset the system before  
accessing SSD1 as a drive. Before  
resetting change the 'Boot from'  
option in SETUP.

'Boot From' option	Desired results/Notes
BIOS drive with ROM-DOS	-To view SSD1 before trying to boot from SSD1 or to use SSD1 as a data drive.
SSD1 using ROM-DOS	-To boot with ROM-DOS on SSD1. SSD1 must contain ROM-DOS COMMAND.COM to be bootable.

---

Floppy or hard drive

-If you wish to boot from a floppy or hard drive and access SSD1 as a data drive. Copy ERAMDSK.SYS to your drive and add the following line to the CONFIG.SYS  
'DEVICE=ERAMDSK.SYS  
SSD1'.

SSD1 using user supplied DOS

-To boot with your DOS on SSD1. SSD1 must contain all required DOS boot files. See your DOS manual for more information.

Copying drive D: into the Static RAM...  
Drive successfully copied.

**NOTE:** You must use DISKSAVE/  
DISKSEND to program SSD3A/SSD3B.



---

# MEMDRIVE.SYS

**MEMDRIVE.SYS** Device Driver

**PURPOSE:** This device driver is used when the user wishes to access the on-card SSDs or virtual drives.

**SYNTAX:** **MEMDRIVE**

**REMARKS:** The following CONFIG.SYS entries allow the user to access on-card SSDs:

```
DEVICE=MEMDRIVE.SYS BIOS    Accesses BIOS
                             Drive
DEVICE=MEMDRIVE.SYS SSD1    Accesses SSD1
DEVICE=MEMDRIVE.SYS SSD2    Accesses SSD2
DEVICE=MEMDRIVE.SYS SSD3A   Accesses SSD3A
DEVICE=MEMDRIVE.SYS SSD3B   Accesses SSD3B
```

This driver first looks at the SSD to see if it looks like a valid disk. If it does, the system assigns a drive letter, after which time you can access the device as a normal disk. The drive letter for the virtual drive is dependent on the order of the devices listed in the CONFIG.SYS file. If the driver does not see a valid device, it will do one of the following:

**Flash EPROM:** If the system does not find a valid disk (i.e. a flash EPROM which has been programmed with DISKSAVE/DISKSEND) it displays the following message:

```
PC-425 MEMDRIVE.SYS V1.2, memory device not
found in SSD2.
```

**Static Ram:** The system attempts to format SSD2 as either a 128K or 512K SSD and displays the following message:

---

PC-425 MEMDRIVE.SYS V1.2, formatting  
SSD2 (128KB) as drive F:

If it is unable to format the memory area as a  
disk it displays the message:

PC-425 MEMDRIVE.SYS V1.2, memory device not  
found in SSD2

When there is a valid disk in SSD2 the  
system displays the following message:

PC-425 MEMDRIVE.SYS V1.2, assigning SSD2  
(128KB) as drive F:

**NOTE:** When booting from SSD1, you do not  
need a MEMDRIVE SSD1 entry in your  
CONFIG.SYS file.

The following CONFIG.SYS entries allow the  
user to access part of the memory normally  
used by the computer for executing programs  
as a RAM disk. This RAM disk is initialized  
whenever the system is reset. For some DOS  
systems, this is often called a virtual drive.  
The default size for this drive is 128K. The  
size can be modified.

```
DEVICE=MEMDRIVE.SYS BASE nnn  
Base memory (allocates nnnK)
```

```
DEVICE=MEMDRIVE.SYS BASE nnn /NOIFEMS  
Base memory (allocates nnnK) but only on  
systems with less than 1 MB
```

The /NOIFEMS switch is optional. If it is  
included on 1 to 4 MB systems, the virtual  
drive will **not** be available. For 512K sys-  
tems, the virtual drive is always available.  
These drives are always formatted on reset.  
Once the virtual drive is defined, it can be  
accessed as any other disk.

---

At boot-up, if the virtual drive is specified, the following message displays:

```
PC-425 MEMDRIVE.SYS V1.2 formatting
(136KB) drive in DOS memory as drive D:
```

The following CONFIG.SYS entries allow the user to access EMS memory. This is the memory above the 640K DOS memory limit.

```
DEVICE=MEMDRIVE.SYS EMS
```

All extended memory as a drive

```
DEVICE=MEMDRIVE.SYS EMS mmm sss
```

Extended memory as a drive of size mmmK. Starting address at 16K page # sss.

sss: 0 = start addr. 1MB

sss: 1 = start addr. 1MB+16K

sss: 2 = start addr. 1MB+32K

The size of the virtual drive depends on the amount of DRAM in your system:

<b>EMS Virtual Drives</b>	
<b>DRAM Installed</b>	<b>Virtual Drive Size</b>
2 MB	1024K EMS + shadow
4 MB	3072K EMS + shadow

---

# RESET.COM

**RESET.COM** Support Command

**PURPOSE:** To enable the watchdog timer and allow timeout to expire thus restarting the system.

**SYNTAX:** **RESET**

**REMARKS:** The RESET command also restarts all the expansion I/O cards on the bus. This differs from a <CTL><ALT><DEL> reboot of the system which only restarts the system but not the expansion cards. The RESET button on the PC-425 also accomplishes the same thing as the RESET command.

---

# SETUP.COM

**SETUP.COM** Support Command

**PURPOSE:** Modifies date and/or time for battery-backed clock, and modifies serial port parameters.

**SYNTAX:** **SETUP**

**REMARKS:** From the directory where this utility file is located, type:

```
SETUP <RET>
```

After the copyright message displays, the main menu appears:

```
OCTAGON SYSTEMS CORPORATION  
PC-425 SETUP UTILITY V1.1  
-----
```

```
(Press SPACE to CHANGE, ENTER to  
ACCEPT, ESC to EXIT)
```

```
COM1 Console baud rate:      1200  
                             2400  
                             4800  
                             9600  
                             19200  
                             38400  
                             57600
```

```
Power on memory test:Enabled  
                      Disabled
```

```
SSD1 Device   none  
              128K FLASH (28F010)  
              256K FLASH (28F020)
```

```
SSD3 Device   none  
              1 - 1 MB drive  
              2 - 512K drives
```

---

Boot from: BIOS drive using ROM-DOS  
SSD1 using ROM-DOS  
Floppy or Hard drive  
SSD1 using User supplied DOS/OS  
SSD3A using ROM-DOS  
SSD3B using ROM-DOS  
SSD3A using User supplied DOS/OS  
SSD3B using User supplied DOS/OS

Number of floppy drives: 0  
1  
2

Floppy drive 1 size: 360K  
1.2 MB  
720K  
1.44 MB

Shadow 0C000H-0C7FFH: Yes  
No

Shadow 0C700H-0CFFFH: Yes  
No

Move BIOS DRIVE high: Yes  
No

Number of line printers: Auto Check  
0  
1  
2  
3

Press ENTER to SAVE the changes or  
Press ESC to EXIT without saving  
the changes:

Options saved.  
You must reset for these options  
to take effect.

---

# SLEEP.COM

<b>SLEEP.COM</b>	Support Command
<b>PURPOSE:</b>	To conserve CPU power consumption.
<b>SYNTAX:</b>	<b>SLEEP</b>
<b>REMARKS:</b>	The command puts the processor in “sleep” mode, thus using less power. An interrupt awakens the processor and lets it resume its activities. The DOS clock is stopped while in sleep mode. The 18.2 per second timer tick is disabled during this time. All other interrupts (i.e., serial and keyboard) are left enabled. When the processor is awakened via an interrupt (usually via COM1 or keyboard), the timer tick is reenabled and the DOS time is updated from the CMOS clock.

---

# SLOW.COM

- SLOW.COM** Support command
- PURPOSE:** To change the CPU clock speed to 12.5 MHz.
- SYNTAX:** **SLOW**
- REMARKS:** The PC-425 boots with the default 25 MHz clock speed. If you need to change to 12.5 MHz, enter the following from the DOS prompt or in a batch file:
- SLOW
- You can also press <CTL><ALT><-> to change to 12.5 MHz if you are using a keyboard and monitor with the PC-425.
- SEE ALSO:** FAST.COM



---

# TRANSFER.EXE

**TRANSFER.EXE** Support Command

**PURPOSE:** To transfer files to or from the PC-425 over a serial port.

**SYNTAX:** **TRANSFER** *filepath* [**/S** | **/R**] [**/Bb**] [**/V**] [**/COMc**]

**PARAMETERS:** *filepath* specifies the file pathname to send or receive.

**SWITCHES:** **/S** specifies to send the file.

**/R** specifies to receive the file. This is the default.

**/Bb** specifies baud rate of transfer where *b* can be (300, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115 (115200)). The default is 9600 when using a **/COMc** switch. If COM1 is the console, the baud rate defaults to the current console baud rate.

**/V** enables the display of "R" when a block (128 bytes) is received, or "T" when a block is transmitted.

**NOTE:** Do not use **/V** when COM1 is the console device.

**/COMc** specifies the serial port to use. *c* can be 1-4. The default is 1.

**EXAMPLE 1:** To send a file named C:\MPC\DEMO\DEMO.EXE on the PC-425 when using COM1 as the console, enter the following command:

```
TRANSFER D:DEMO.EXE
```

---

On the remote PC executing SmartLINK, press <ALT> <D>, type C:\MPC\DEMO\DEMO.EXE, and then press ENTER.

**EXAMPLE 2:** To send a file named D:DEMO.BAS to the file C:\TEST.BAS on the remote PC when using COM1 as the console, enter the following on the PC-425:

```
TRANSFER /S D:DEMO.BAS
```

On the remote PC executing SmartLINK, press <ALT> <U>, type C:\TEST.BAS, and then press <ENTER>.

**EXAMPLE 3:** To send a file named C:\DEMO\DEMO.EXE from a remote PC to the file named D:\DEMO.EXE on the PC-425 at 57600 baud with a serial cable from COM2 on the remote PC and COM1 on the PC-425, enter the following command on the PC-425:

```
TRANSFER D:\DEMO.EXE /R /V /B57600
```

Then enter the following command on the remote PC:

```
TRANSFER C:\DEMO\DEMO.EXE /S /V /COM2 /B57600
```

To receive a file named D:\MYAPP.EXE from the PC-425 and name it C:\APPS\MYAPP2.EXE on the remote PC over a serial cable connected to COM1 on both systems at 9600 baud, enter the following command on the PC-425:

```
TRANSFER D:\MYAPP.EXE /S
```

---

Then enter the following command on the remote PC:

```
TRANSFER C:\APPS\MYAPP2.EXE
```

**REMARKS:**

The TRANSFER command communicates with other XMODEM compatible file transfer programs.

The serial port on the PC-425 requires a null modem adapter when connected to a serial port on the remote PC. See the section, *Serial Port*, in this manual for more information.

The maximum baud rate is dependent on the processor speeds of the remote PC and the PC-425.

The received file size is rounded up to the nearest 128 byte boundary.

**SEE ALSO:**

DISKSAVE.EXE, DISKSEND.EXE

---

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# APPENDIX B

---

## PROGRAMMING STANDARD EPROMS

The PC-425 SSD1 accepts standard EPROMs as well as flash EPROMs. You must program the EPROM before installing it on the PC-425 card, since there is no on-card programmer.

### To program an EPROM

1. Run the program DSKTOBIN.
2. Select the size of EPROM that you want to use by choosing either option 1, 2, 3 or 4:

<b>EPROM</b>	<b>DSKTOBIN Option</b>
128K (27C010)	1 – 128K (1 EPROM)
256K (27C020)	2 – 256K (2 EPROMs)
512K (27C040)	3 – 512K (4 EPROMs)
1 MB (27C080)	4 – 1024K (8 EPROMs)

DSKTOBIN creates a binary image file named FLPYIMG.001.

3. Install the EPROM into the programmer and program the chip using the binary-formatted file FLPYIMG.001.

## CUSTOM COMMUNICATION CABLE

The PC-425 card requires an RS-232 serial communications cable to interface to the PC. If you are not using a VTC series cable, you can make your own communications cable.

1. Determine if your PC requires a male or female connector.
2. Refer to the following table for cable connections for the PC-425:

---

<b>Custom RS-232 Cable</b>			
<b>COM1/COM2</b>	<b>Signal Direction</b>	<b>DB-25</b>	<b>DB-9</b>
1	DCD Input	8	1
2	DSR Input	6	6
3	TxD Output	2	3
4	RTS Output	4	7
5	RxD Input	3	2
6	CTS Input	5	8
7	DTR Output	20	4
8	RI Input	22	9
9	Gnd	7	5
10	+5	NC	NC

## **POWER SUPPLY**

If using a switching power supply, make sure you meet minimum load requirement for the power supply.

## **UPLOADING FILES FROM THE PC-425**

The TRANSFER program is also used to upload files from the PC-425 card to your PC for editing or debugging. To upload a file:

1. Make sure a serial link is established between your PC and the PC-425.
2. Start PC SmartLINK on your PC.
3. From the PC-425 type:

```
A:TRANSFER /s D:DEMO.EXE
```

---

Refer to the *PC SmartLINK User's Manual* for information on transferring files using the XMODEM protocol.

## ASSIGNING DRIVE DESIGNATORS

ROM-DOS is a MS-DOS version 5.0 compatible operating system. Since it is stored in ROM, it is always present on power-up. During run time it requires only about 16K of RAM space. When you boot from ROM-DOS in the BIOS socket, the system automatically assigns drive designators to the extended memory virtual drive, SSD1, SSD2 and SSD3. However, if you boot from SSD1 or floppy/hard drive you must add the appropriate device drivers to your CONFIG.SYS file and copy the files to your boot drive in order to access SSD2, the BIOS drive, and the extended memory virtual drive.

**NOTE:** Even though you provide information about memory devices during setup, you must still define drivers for these devices in your CONFIG.SYS file. You may also need to format the device. The following is an example listing of CONFIG.SYS entries for the device drivers included with the PC-425. Each of these device drivers is discussed in greater detail in Appendix A, "Software Utilities".

DEVICE=MEMDRIVE.SYS BIOS	Accesses the BIOS drive
DEVICE=MEMDRIVE.SYS SSD1	Accesses the SSD1 drive
DEVICE=MEMDRIVE.SYS SSD2	Accesses the SSD2 drive
DEVICE=MEMDRIVE.SYS SSD3A	Accesses the SSD3A drive
DEVICE=MEMDRIVE.SYS SSD3B	Accesses the SSD3B drive
DEVICE=MEMDRIVE.SYS EMS	Accesses the virtual drive in extended memory
DEVICE=MEMDRIVE.SYS BASE 136	Accesses a virtual drive in DOS base memory

When your system boots up, the PC-425 device drivers will be listed with their drive designations. When you boot from ROM-DOS in the BIOS drive, drives D-G are defined in the CONFIG.SYS file. The drives are designated as:

- 
- A: BIOS socket
  - B: floppy disk
  - C: floppy disk
  - D: virtual disk
  - E: SSD1
  - F: SSD2
  - G: SSD3

If your system has a hard drive, drive D: (in the example above) becomes the hard drive and drives D–H are now designated as E–I.

When you boot from SSD1 with ROM–DOS, the drives are designated as:

- A: SSD1
- B: floppy disk
- C: floppy disk
- D: first driver in CONFIG.SYS
- E: second driver in CONFIG.SYS

### **Example:**

In the following example of bootup messages, the system boots from the BIOS drive with 1 MB DRAM, 128K flash EPROM in SSD1 and nothing installed in SSD2 and SSD3 not programmed (or not installed). The system assigns the following drive designations:

```
PC-425 MEMDRIVE.SYS v2.0, formatting (3072KB) in extended
memory as drive D:
PC-425 MEMDRIVE.SYS v2.0, formatting SSD1 (128 KB) as drive
E:
PC-425 MEMDRIVE.SYS v2.0, memory device not found in SSD2.
PC-425 MEMDRIVE.SYS v2.0, memory device not found in SSD3.
```

**NOTE:** If a 512K battery–backed static RAM was installed in SSD2, the message would read MEMDRIVE.SYS v2.0, assigning SSD2 (512K) as drive F.



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## EXTENDED MEMORY

Once you have installed 1 MB or more of DRAM in your system, you can bypass the memory driver and extend the available memory past 640K by using the following instructions. This assumes you are not using the extended memory for a virtual drive.

**NOTE:** These instructions are written in 8086 assembly code.

Perform the following before your program accesses extended memory:

```
MOV DX, 387H
```

(To prevent contention, disable access to the SSD, by writing a "1" to 387H.)

```
MOVAL, 1
OUTDX, AL
```

```
MOV DX, 21AH
MOV AL, 80H      ;set auto increment
OUT DX, AL
```

```
MOV DX, 218H
```

Bit 15 is enable for current page. Bit 14–0 are A23–A14.  
40H=A20=100000. 41H=A20+A14=104000.

```
MOV AX, 8040      ;first 16K starting at D000
OUT DX, AX
INC AX
OUT DX, AX       ;second 16K starting at D400

INC AX
OUT DX, AX       ;third 16K starting at D800

INC AX
OUT DX, AX       ;fourth 16K starting at DC00
```

---

Access the page by writing/reading through the EMS window:

```
MOV AX, 0D000H
MOV ES, AX
```

(Sets ES to the window segment.)

```
XOR DI, DI
MOV ES: [DI], AH
```

(To store something in the window.)

```
MOV AH, ES: [DI]
```

(To retrieve something from the window.)

When your program has finished with the EMS memory:

```
MOV DX, 20AH
MOV AL, 80H           ;set auto increment for 218H/219H
OUT DX, AL

MOV DX, 218H
MOV AX, 0             ;make bit 15=0 to disable EMS page
OUT DX, AX           ;disable first 16K page
OUT DX, AX           ;disable second 16K page
OUT DX, AX           ;disable third 16K page
OUT DX, AX           ;disable fourth 16K page

MOV DX, 387H
OUT DX, AL           ;enable user sockets
```

Reenable the SSD:

```
MOV AL, 0
```

(Enables the SSD.)

```
MOV DX, 387H
OUT DX, AL
```

# WARRANTY

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Octagon Systems Corporation (Octagon), warrants that its standard hardware products will be free from defects in materials and workmanship under normal use and service for the current established warranty period. Octagon's obligation under this warranty shall not arise until Buyer returns the defective product, freight prepaid to Octagon's facility or another specified location. Octagon's only responsibility under this warranty is, at its option, to replace or repair, free of charge, any defective component part of such products.

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  3. Customers that return products for repairs, within the warranty period, and the product is found to be free of defect, may be liable for the minimum current repair charge.
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## **RETURNING A PRODUCT FOR REPAIR**

Upon determining that repair services are required, the customer must:

1. Obtain an RMA (Return Material Authorization) number from the Customer Service Department, 303-430-1500.
2. If the request is for an out of warranty repair, a purchase order number or other acceptable information must be supplied by the customer.
3. Include a list of problems encountered along with your name, address, telephone, and RMA number.
4. Carefully package the product in an antistatic bag. (Failure to package in antistatic material will VOID all warranties.) Then package in a safe container for shipping.
5. Write RMA number on the outside of the box.
6. For products under warranty, the customer pays for shipping to Octagon. Octagon pays for shipping back to customer.
7. Other conditions and limitations may apply to international shipments.

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