5025A
User's Manual

Doc. #03999 Rev 1098

OCTAGON SYSTEMS CORPORATION®

6510 W. 91st Ave. Westminster, CO 80030
Tech. Support: 303–426–4521

IMPORTANT!

Please read before installing your product.

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

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

Using CMOS Circuitry in Industrial Control

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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WARRANTY

PREFACE

This manual provides all the information required to install, configure, and operate the 5025A Micro PC 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 5025A Control Card to your PC and the Micro PC expansion cards.

- Set up communications between the 5025A card and a PC.

- Gain an understanding of the operation and various options allowed in the 5025A 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 5025A-486-25MHz-2MB BIOS Vers x.xx
   Copyright (c) 1992-1994 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.

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 memory   Electrically erasable EPROM which allows
                    approximately 10,000 writes.

Memory device   The type of static RAM, DRAM, flash memory
                    or EPROM specified for either volatile or
                    nonvolatile memory.

PC SmartLINK   A serial communications software package
                    designed by Octagon for use with the 5025A
                    Control Card. Refers to all versions of PC
                    SmartLINK.

ROM	Read Only Memory devices. ROMs provide nonvolatile memory, have a limited number of write cycles, and include EPROMs, EEPROMs, and flash memory.
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 memory, 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 back–up 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.

TECHNICAL SUPPORT

If you have a question about the 5025A 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 *5025A Control Card User's Manual*

A description of your problem.

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

CHAPTER 1   OVERVIEW

DESCRIPTION

The 5025A PC Control Card is designed for use with Octagon's Micro PC system. This system uses small computer cards – 4.5 in. x 4.9 in. Its small size, wide temperature range (–40° C to +85° C) and rugged CMOS construction, make it ideal for high performance, embedded control applications. It has COM1 and COM2 serial ports, LPT1 parallel port, a keyboard and speaker port, calendar/clock, watchdog timer, up to 8 MB of DRAM, DOS in ROM, coprocessor socket, and three solid–state disks. The 5V operation simplifies installation. You program the card either through the serial port from your PC, or by adding a keyboard, monitor and floppy drive.

Three versions are available: the 5025A-386-25MHz, which has a 80386SX CPU; the high performance 5025A-486-25MHz, which has twice the performance of the 5025A-386-25MHz (it uses the code efficient 80486SLC CPU from Cyrix or Texas Instruments); and the 5025A-486-50MHz, which has a 50 MHz 80486SLC2 (internal clock doubler) with internal cache memory. The 5025A-486-50MHz internal CPU processing occurs at 50 MHz while local bus process-ing occurs at 25 MHz. This allows the 5025A-486-50MHz to run about 80 percent faster than the 5025A-486-25MHz. Bus master-ing is not supported on the 5025A.

MAJOR FEATURES

ROM–DOS Operating System

The 5025A is an "instant DOS" system. The card includes 6.22 compatible DOS in a solid–state disk. If you wish to use your own operating system, you may install it in SSD1 with your application. The system boots and operates the same way as your desktop PC. During run time it requires only about 64K of RAM space if ROM DOS is loaded low, or 20K if ROM DOS is loaded high.

Watchdog Timer

The watchdog timer is used to reset the system if the program stops unexpectedly. The watchdog is enabled under software control. The timeout is jumper selectable for 150 mS, 600 mS or 1.2 seconds.

Battery Backup and Calendar/Clock Option

The 5025A 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.

Solid–State Disk Options

SSD0 contains the BIOS and DOS 6.22 in the BIOS drive ROM. SSD1 is used for storage of the applications program. SSD1 accepts either 12V flash memory, 5V flash memory, or standard EPROMs. (See the list of SSD1 options immediately below.) The flash memory programmer is built–in allowing reprogramming through a serial port. SSD1 is described in further detail in the *RAMs and EPROMs* chapter.

SSD1 options include:
     128K 12V flash
     256K 12V flash
     128K 5V flash
     512K 5V flash
     512K EPROM
     1 MB EPROM

SSD2 is used primarily for logging process data. SSD2 accepts static RAMs, 5V flash memory, or standard EPROMs. (See the list of SSD2 options immediately below.) The static RAM can be battery–backed with a DS–1213DM battery backup module or the external 3.6V AT clock battery. SSD2 is described in further detail in the *RAMs and EPROMs* chapter.

SSD2 options include:
     128K SRAM
     512K SRAM
     128K 5V flash
     512K 5V flash
     512K EPROM
     1 MB EPROM

Speaker and Keyboard Port

The speaker and keyboard lines are brought out to a 10–pin connector via a CMA–10 cable. The Octagon PSKI–1 interface provides a PC compatible connector for the keyboard and provides screw terminals for the speaker. Any AT compatible keyboard may be used. A keyboard and monitor are not required for operation. The keyboard and monitor can be substituted for a terminal or PC.

Mounting

There are three ways to mount the 5025A:
1. Plug it directly into a Micro PC card cage;
2. Use the optional PC mounting bracket and plug it into any passive backplane;
3. Panel mount it using the four mounting holes. A screw terminal connector is used to supply the 5V power.

COM1 and COM2 Serial Ports

The serial ports use a high performance 16C550 communications controller, which is Intel 8250 compatible. The baud rates are programmable from 150 to 115K baud. Both ports have a RS–232 interface. RS–232 voltages are generated on–card. COM2 is also jumperable as RS–422 and RS–485 for multidrop operation.

LPT1 Parallel Port

The parallel printer port can be used to support a number of devices:
1. PC compatible printer
2. 17 digital I/O lines
3. Matrix keypad
4. Multiline displays
5. Octagon's MPC-16PC Opto I/O Rack

This port has a 20–pin connector. When used only for digital I/O, a CMA–20 cable connects the port to the STB–20 terminal board for connection to field wiring. This port will also interface with Octagon displays and keypads. For LCD displays, use the LCD–IFB interface board and the DP–IFB interface board for the DP series (vacuum fluorescent) displays. Both interface boards have keypad connectors. A CMA–20 cable is required.

Setup stored in EEPROM

The 5025A stores its setup information in nonvolatile EEPROM; as a result it is immune to battery or power failure. The user can also store additional information in the EEPROM: Up to 1792 bytes (that is, 896 words) are available.

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.

Hardware Reset

You can reset the system without turning off the power using the hardware reset button or the RESET command. It also provides a more complete reset than the <CTL> <ALT> <DEL> method.

Expansion Cards Available

The 5025A takes one card slot in a Micro PC card cage. Micro PC expansion cards (e.g., the 5805 Solid–State Disk Card, 5800A Floppy/Hard Disk Card, etc.) can be used by simply plugging the expansion card into the backplane of the card cage. Up to seven expansion cards can be used with the 5025A Control Card.

Differences between the 5025 and the 5025A

The 5025A is an enhanced version of the 5025. Various features of the 5025 were improved upon to create the 5025A. See the table below for a list of differences between these products.

Differences Between the 5025 and the 5025A		
Features	**5025**	**5025A**
Max. DRAM	4 MB	8 MB
SSD0 ROM size	128K	512K
SSD1 - max EPROM	1 MB	1 MB
SSD2 - max flash	256K	512K
SSD2 - max SRAM	1.5 MB	512K
SSD2 - max flash	0K	512K
SSD2 - max EPROM	0K	1 MB
SETUP EEPROM	128 bytes	2048 bytes
DOS version	5.0	6.22

Where to go from here:

Before you can begin developing your application program for the 5025A, 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 5025A system. This chapter describes how to install the 5025A into the card cage, how to establish a serial communications link with your PC and how to download files to the 5025A.

Chapter 3
RAMs & EPROMs

Configuring and installing static RAMs and EPROMs. Installing the battery backup and calendar/clock module.

Chapter 4
SETUP

Running the SETUP configuration program.

Chapter 5
Save & Run Programs

How to save your program files and autoexecute them from the 5025A.

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

Enabling the watchdog timer and configuring the timeouts.

Chapter 8
LPT1 Printer Port

Using the LPT1 parallel port for a printer, digital I/O, display or keypad.

Chapter 9
Serial EEPROM

How to read and write to the serial EEPROM.

CHAPTER 2   QUICK START

This chapter covers the basics of setting up a 5025A system and tells you:

1. How to panel mount or install the 5025A into the card cage;

2. How to set up a serial communications link between the 5025A and your PC; and

3. How to download files to the 5025A and run a program from the virtual drive.

WARNING: The 5025A may not be installed in a PC. These cards are designed to be independent CPU cards only, not accelerators or coprocessors.

HARDWARE INSTALLATION

Your 5025A Control Card can be installed in one of three ways:

1. Plug it directly into a Micro PC card cage;
2. Use the optional PC mounting bracket and plug it into any passive backplane;
3. Panel mount it using the four mounting holes.

Panel Mounting the 5025A

To panel mount the 5025A, you will need the following equipment (or equivalent):

5025A Control Card
5V Power Supply
VTC–9F Cable
Null modem adapter
5025A ROM–DOS & Utility Software Disk
PC SmartLINK w/manual
Your PC

If you are panel mounting the 5025A, a screw terminal connector (P2) is provided to supply the 5V power. Refer to Figure 2–2 for the location of various connectors.

1. Use #4–40 standoffs and screws to bolt down the 5025A. The following diagram shows the center to center mounting hole dimensions.

A = 4.90 in. (124,46 mm)
B = 0.20 in. (5,08 mm)
C = 3.50 in. (88,90 mm)
D = 0.10 in. at 45°, 2 PLCS
       (2,54 mm at 45°)
E = 0.475 in. (4,44 mm)
F = 0.85 in. (21,59 mm)
G = 3.20 in. (81,28 mm)
H = 0.30 in. (7,62 mm)
J = 4.20 in. (106,68 mm)
K = 0.20 in. (5,08 mm)

0.125 in. HOLE
(3,17 mm)
4 PLCS

0.015 in. at 45• CHAMFER, 2 PLCS
(0,038 mm)

A31   A1

BEVEL CARD EDGE, 2 PLCS
.015 in. x 45• (0,038 mm x 45•)
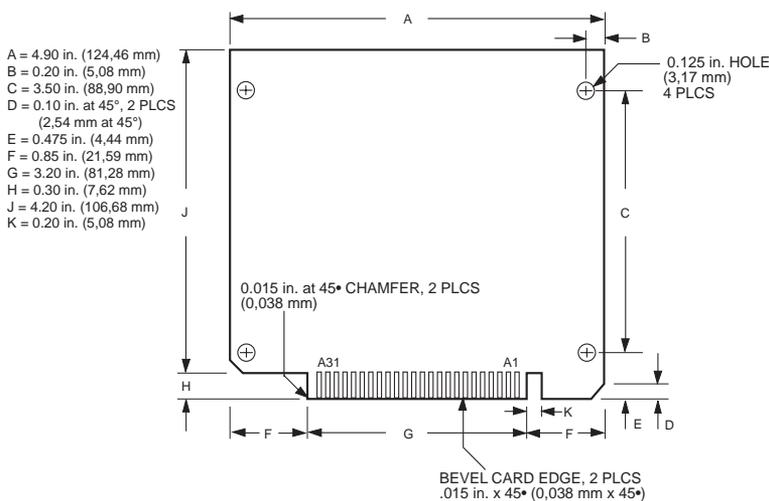
Figure 2–1—5025A Center to Center Hole Dimensions

2. 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 (J2) on the 5025A.

    NOTE: You must use COM1 on the 5025A 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.

You are now ready to transfer files between your PC and the 5025A. Please continue with the section, *Establishing Communications with the 5025A* in this chapter.

Using a Micro PC Card Cage

To install the 5025A in a Micro PC card cage, you will need the following equipment (or equivalent):

5025A Control Card
Micro PC Card Cage
Power Module
VTC–9F Cable
Null modem adapter
5025A ROM–DOS & Utility Software Disk
PC SmartLINK w/manual
Your PC

Please refer to Appendix B if you are making your own serial cable or using other non–Octagon components.

To install the 5025A:

1. Please refer to Figure 2–2 for the location of various connectors before installing the 5025A Control Card.
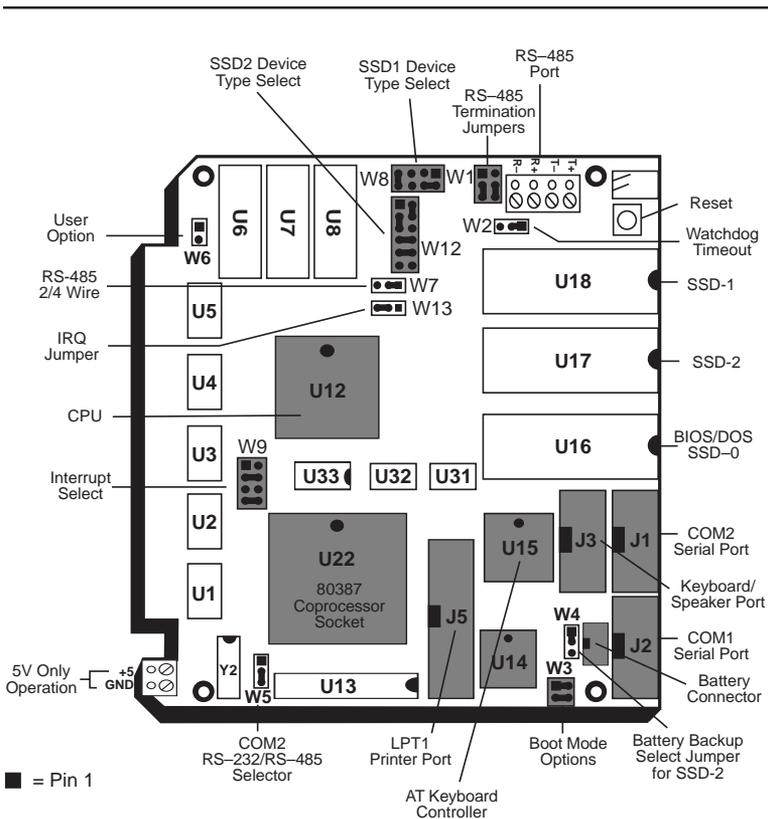
Figure 2–2 – 5025A Component Diagram

WARNING: The 5025A Control Card contains static–sensitive CMOS components. The greatest danger occurs when the card is plugged into a card cage. The 5025A card becomes charged by the user, and the static discharges to the backplane from the pin closest to the card connector. If that pin happens to be an input pin, even TTL inputs may be damaged. To avoid damaging your card and its components:

• Ground yourself before handling the 5025A card.

- Disconnect power before removing or inserting the card.
- When programming a memory device, place the device in the socket before applying power.

WARNING: Take care to correctly position the 5025A card in the card cage. The VCC and ground signals must match those on the backplane. Figure 2–3 shows the relative positions of the 5025A card as it is installed in the card cage.
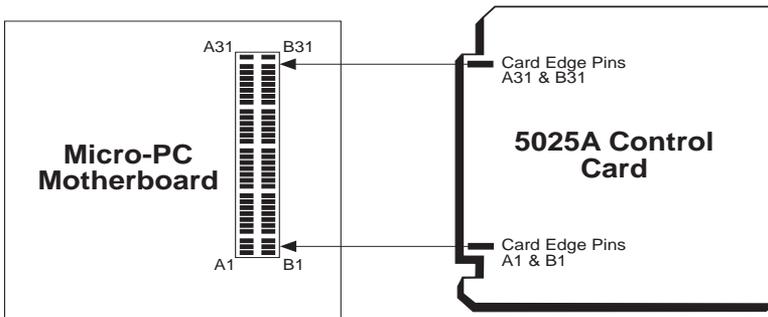
Figure 2–3 – Edge Connector Orientation

2. Attach the power module to the card cage following the instructions supplied with the power module.

3. Make sure power to the card cage is OFF.

4. Slide the 5025A into the card cage. The ROM–BIOS label on the card should face to the left or up depending on the type of card cage.

WARNING: Plugging the card in incorrectly will destroy the card!

5. Connect one end of a VTC–9F cable to the null modem adapter. Connect the other end to COM1 (J2) on the 5025A.

   NOTE: You must use COM1 on the 5025A in order to establish a serial communications link with your PC.

6. 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.

ESTABLISHING COMMUNICATIONS WITH THE 5025A

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 5025A files from the 5025A utility disk to a subdirectory on your PC hard drive.

   ```
   C:
   MD \MPC
   XCOPY A:\*.* \MPC /S
   ```

3. Start PC SmartLINK. You are now ready to establish communications between your PC and the 5025A Control Card.

4. Power on the 5025A.

5. A logon message similar to the one below will appear on your PC monitor:

   ```
   Octagon 5025A-486-25MHz-2MB BIOS Vers. x.xx
   Copyright (c) 1992-1994 Octagon Systems Corp. (TM)
   All Rights Reserved
   640K BASE RAM
   384K SHADOW RAM
   1024K EXTENDED RAM
   ```

```
Starting ROM-DOS
5025A MEMDRIVE.SYS V2.01, extended memory present
5025A MEMDRIVE.SYS V2.01, formatting extended memory
(1024KB) as drive D:
5025A MEMDRIVE.SYS V2.01, memory device not found in SSD1
5025A MEMDRIVE.SYS V2.01, memory device not found in SSD2

C:\>path . . .
C:\>prompt . . .
5025A C:\>showtime . .
5025A C:\>
```

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 a video card is not installed in the card cage.**

- **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. Enter:**

   ```
   DIR
   ```

   A directory listing of ROM–DOS files stored in the BIOS socket should appear:

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

COMMAND     COM   27,095   05-20-96    6:00a
FAST        COM      366   10-06-94   11:18a
RESET       COM      378   10-06-94   11:32p
SETUP       COM    2,918   10-06-94   11:18a
SHOWTIME    COM      619   10-06-94   11:18a
SLOW        COM      366   10-06-94   11:18a
DISKSAVE    EXE   21,478   10-06-94   11:04a
TRANSFER    EXE    9,969   01-05-93    2:36p
CONFIG      SYS      118   05-17-94   10:42a
MEMDRIVE    SYS    4,682   10-06-94   11:18a
AUTOEXEC    BAT       50   10-06-94    4:20p

           11 file(s)     68,039 bytes
                               0 bytes free
```

7. You are now ready to transfer files between your PC and the
    5025A.

TRANSFERRING FILES BETWEEN 5025A & YOUR PC

Once you have established communications between your PC and
the 5025A, you can download files to the virtual drive on the
5025A. The virtual drive provides temporary storage for your files
until you save them to a flash memory 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 5025A 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 on the memory configuration of the 5025A:

5025A Virtual Drives	
DRAM Installed	**Virtual Drive Size**
1 MB	384K uses MEMDRIVE.SYS EMS
2 MB	1024K uses MEMDRIVE.SYS EMS
4 MB	3072K uses MEMDRIVE.SYS EMS
8 MB	7168K uses MEMDRIVE.SYS EMS

A utility program called TRANSFER.EXE resides on the BIOS
drive and is used to send or receive files via COM1 of the 5025A.
TRANSFER.EXE uses the XMODEM protocol, as does PC
SmartLINK. The following information on downloading files
between the 5025A and your PC uses an example program,
DEMO.EXE and DEMO.BAS. These files are on your 5025A
utility disk in the DEMO subdirectory.

Downloading Files to the 5025A

The following procedures assume you are using PC SmartLINK
and is included in your directory path. For other communication
programs, refer to information on sending a file from your PC to
the target system.

1. Log into the directory on your PC which contains the file(s) you will download to the 5025A. For example:

```
C:\MPC\5025A\DEMO
```

2. Start PC SmartLINK and power on the 5025A.

3. Execute the TRANSFER.EXE program from the 5025A by entering:

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

The following message displays:

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

4. Execute the following steps in PC SmartLINK:
   a. Press <ALT> + <D> to download a file.
   b. Type in the name of the file to transfer, e.g., DEMO.EXE.
   c. Press ENTER to start (default). 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. It displays the following message:

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

5. 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 5025A:

```
DIR D:
```

The system will display the contents of drive D:

```
Volume in drive D has no label
Directory of D:\

DEMO      EXE    27,264 01-01-80      2:57p
             1 file(s) 27,264 bytes
```

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

```
D:DEMO
```

7. The system displays a message on your PC.

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CHAPTER 3   RAMs AND EPROMs

Before you can save and boot your application from the 5025A, you must first configure the system for your particular application requirements. The 5025A card includes two sockets for solid–state disks: SSD1 and SSD2.

SSD1

SSD1 generally contains the program to be executed on power–up. The program is automatically loaded into DOS memory and executed. SSD1 accepts either 128K/256K 12V flash memory, 128K/512K 5V flash memory, or 512K/1 MB standard EPROMs. With flash memory, your application program can be saved using the on–card programmer. These devices are erased automatically during the programming process. You can write to the flash memory a limited number of times (about 10,000), if your application program requires changes. With standard EPROMs, you must use an offcard programmer. Refer to Appendix B for information on programming standard EPROMs.

To Install an EPROM

1. Set the jumpers at W8 for the correct memory device:

W8: SSD1 Memory Device Select	
Pins Jumpered	**Description**
[1-3][2-4]	12V Flash memory
[3-5][4-6]	EPROM
[2-4][7-8]*	5V Flash memory

* = default

> **NOTE:** You must use SETUP.COM to set the SSD1 device before it can be properly accessed.

2. Install the flash memory 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!

WARNING:	Installing a 5V flash with 12V jumpers will destroy the flash when DISKSAVE attempts to program it!

NOTE: If installing a new flash memory, 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 accepts 128K or 512K static RAMs, 128K/512K 5V flash memory, or 512K/1MB standard EPROMs. A 3.6V AT clock battery can be used to battery back a static RAM device in SSD2 via jumper block W4 or a DS–1213DM battery backup module may be used.

NOTE: The DS–1213DM backs up only the RAM and not the DATE and TIME functions.

To Install an EPROM

1. Set the jumpers at W12 for the correct memory device:

W12: SSD2 Device Select	
Pins Jumpered	**Description**
[2-4][3-5][7-8][9-10]*	RAM
[1-2][4-6][8-10][9-11]	EPROM
[2-4][5-7][8-10][9-11]	5V Flash memory

* = default

NOTE: You must use SETUP.COM to set the SSD2 device before it can be properly accessed.

NOTE: Jumper W4[2-3] should be set if using an EPROM or a flash memory in SSD2.

2. Install the flash memory into socket 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!

NOTE: If installing a new flash memory, 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.

To Install 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

• The 3.6V clock battery can be used to battery back SSD2. Jumper block W4[2-3] battery backs both the calendar/clock and SSD2:

W4: RTC/SSD2 Battery Jumper	
Pins Jumpered	**Description**
[1-2]*	Battery backup for calendar/clock. No battery backup for SSD2.
[2-3]	Battery backup for calendar/clock and SSD2.

* = default

or

• Install a DS–1213DM into socket SSD2. Insert the static RAM on top of the DS–1213DM.

   NOTE: The DS-1213DM module will only battery back the SSD2 in the module. The calendar/clock will not be backed up.

   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!

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DESCRIPTION

The SETUP program defines the 5025A 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 5025A utility disk.

5025A SETUP Parameters	Description	Default
COM1 Console Baud Rate	Specifies communications rate between your PC and the 5025A 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.	512K 5V Flash memory
SSD2 Device	Specifies the type of memory device installed in SSD2.	128K/512K SRAM
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 first floppy drive.	1.44 MB
Shadow 0C000H-0C7FFH	The system will shadow (write protect) this segment of RAM.	Yes
Shadow 0C800H-0CFFFH	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
Number of hard drives	Specifies the number of hard drives attached.	0
Drive 0 parameters	Specifies the cylinders, heads and sectors of hard drives.	Varies with each drive

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 5025A continues 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 5025A and your PC.

2. Type:

    ```
    C:SETUP
    ```

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

3. The system will display the 5025A 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 12V FLASH (28F010)
    256K 12V FLASH (28F020)
    128K 5V FLASH (29F010/29C010/29EE010)
    512K 5V FLASH (29F040/29C040/28SF040)
    EPROM (27C0X0)

WARNING: Using a 5V flash in SSD1 and setting SSD1 to 12V flash DISKSAVE can destroy the flash!

- SSD2 device:
    none
    128K/512K SRAM
    128K 5V FLASH (29F010/29C010/29EE010)
    512K 5V FLASH (29F040/29C040/28SF040)
    512K EPROM (27C040)
    1 MB EPROM (27C080)

NOTE: After setting the SSD1/SSD2 device, use DISKSAVE/ DISKSEND to program the flash EPROMs. The message "Device not found from MEMDRIVE.SYS" displays until the device is programmed.

NOTE: MEMDRIVE.SYS will also display "Device not found" if the SSD2 device has not been set correctly.

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

NOTE: If NONE was selected for the SSD1 device type, the SSD1 boot options are not available.

We recommend that you do not change this option until you have saved and verified your program files in SSD1. If booting from the BIOS drive, the No Video jumper, W3[1–2], is ignored. 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 appears:

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

- Number of floppy drives:
     0, 1, 2

A maximum of 1 floppy drive is possible if booting from SSD1 and using your own DOS. See Chapter 12, *Using Your Own DOS/OS* for details. The following message will appear if you select one floppy disk and you boot from SSD1 with your own DOS:

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

- 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 two options only display if you have specified that a floppy drive(s) is attached to the 5025A.

- 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.

NOTE: The shadow RAM options will not display on 512K or 1 MB DRAM systems.

- Move BIOS DRIVE high:
   Yes
   No

You may enable the system to copy the BIOS drive (normally at E000–F000) into extended memory on systems with 1 MB or more DRAM. This "frees" up the address space for other applications such as PCMCIA, SCSI and network cards.

NOTE: This option does not display on 512K systems.

- 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.

```
Number of hard drives
    0
    1
    2
Drive 0 parameters
    Cylinders (xxx):
    Heads (x):
    Sectors (xx):
Press ENTER to SAVE the changes or
Press ESC to EXIT without saving the changes.

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 12V flash
EPROM in SSD1, nothing in SSD2, no memory test, 9600 baud, no
hard drives, and booting from SSD1 with ROM–DOS:

```
OCTAGON SYSTEMS CORPORATION
5025A SETUP UTILITY V3.2
(Press SPACE to CHANGE, ENTER to ACCEPT, ESC to
EXIT)

COM1 Console Baud Rate:  9600
Power on memory test:  Disabled
SSD1 device: 256K 12V FLASH (28F020)
SSD2 device: 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
Number of hard drives:  0

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.
C:\
```

CHAPTER 5   SAVE & RUN PROGRAMS

SAVE AND RUN YOUR PROGRAMS ON THE 5025A

Once you have written, tested and debugged your application, you can then save it to either battery–backed static RAM or flash memory in SSD2 or save it to flash memory in SSD1. When you reboot the 5025A, your program will automatically load into DOS memory and execute. (You can only boot from SSD1.)

This chapter tells you:
1.   How to save an application program to SSD1;

2.   How to autoexecute the program from the 5025A; 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 12, *Using Your Own DOS/OS*, for more information on saving and autoexecuting programs.

This chapter also assumes you will be using the 5025A without a video card/monitor. If you are using these devices, refer to Chapter 10, *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 5025A to ensure proper operation. These files include the ROM–DOS COMMAND.COM, CONFIG.SYS, AUTOEXEC.BAT and other files and device drivers specific to your application. ROM–DOS COMMAND.COM is required to boot the 5025A with ROM–DOS from SSD1. AUTOEXEC.BAT defines the routine for autoexecution of your program.

CONFIG.SYS defines the various device drivers of your 5025A system. The following is an example listing of CONFIG.SYS entries for the device drivers included with the 5025A. Each of

these device drivers is discussed in greater detail in Appendix A, *Software Utilities*. Refer to Appendix B for more information on how the 5025A assigns drive designators:

```
DEVICE=MEMDRIVE.SYS  SSD1          Accesses the SSD1 drive
DEVICE=MEMDRIVE.SYS  SSD2          Accesses the SSD2 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 5025A SSD1
The following information steps you through transferring, saving and autoexecuting a program using the DEMO application and a flash memory in SSD1. All the files for this application are located on the 5025A utility disk in the DEMO directory. These procedures assume you are using PC SmartLINK. The two programs, DISKSAVE and DISKSEND, transfer and save the files on the floppy disk to SSD1. The DISKSAVE program resides on the BIOS drive of the 5025A and the DISKSEND program resides on the 5025A utility disk.

1. Do an XCOPY of the utility disk to your hard drive. This will copy all subdirectories on the utility disk.

    ```
    MD C:\MPC
    XCOPY A:\*.* C:\MPC /S
    ```

2. Change to the 5025A directory to allow access to DISKSEND:

    ```
    CD \MPC\5025A
    ```

3. Connect a serial cable between COM1 on the 5025A to a COM port on your PC.

4. Start PC SmartLINK and power on the 5025A.

   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 /Bxxx switch on both DISKSAVE and DISKSEND.

5. On the 5025A, execute the DISKSAVE program by typing:

   ```
   A>DISKSAVE /X /DSSD1
   ```

   The systems displays the following message:

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

6. Exit to DOS and type the following:

   ```
   C>DISKSEND \MPC\DEMO
   ```

   The system then erases and programs the flash memory. This takes several minutes.

7. Restart PC SmartLINK.

8. If you are saving your program to SSD1 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
   ```

9. Display and verify the contents of SSD1:

   ```
   DIR E:
   ```

10. Test run the DEMO program:

    ```
    E:DEMO
    ```

11. If you want to boot from SSD1, run SETUP to specify this option.

AUTOEXECUTING YOUR PROGRAM

Once you have saved your program and other files to SSD1 you may boot from SSD1 and 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 5025A.

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: SSD1 using ROM–DOS".

    `SETUP`

5. Type:

    `RESET`

    The 5025A will reset and boot from SSD1. SSD1 now becomes drive A.

OVERRIDING PROGRAM AUTOEXECUTION FROM SSD1

If you want to make changes to your program and need to override autoexecution of your program, you must reboot the 5025A 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 5025A 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 5025A.

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 5025A.

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 SSD1. Verify and test your program.

7. Rerun SETUP to change the default boot drive to "SSD1 using ROM-DOS".

8. Reset the 5025A.

Removing Jumper W3[3–4]

If the SETUP program is not accessible from SSD1, you must remove jumper W3[3–4].

If you do not have a video card installed, the video display is through a COM1 serial link to your PC. The 5025A boots from the BIOS drive using ROM–DOS. COM1 is configured for 9600, N, 8, 1.

If you have a video card installed in your 5025A systems, removing W3[3–4] will boot the 5025A from the BIOS drive and you will continue to use the video installed in your system.

The following message appears when you reboot the 5025A:

```
BIOS boot jumper (W3[3-4]) not installed, boot-
ing from the BIOS drive and ignoring the video
jumper setting.
.
.
5025A A:\>
```

After booting from the BIOS drive, use the DISKSAVE and DISKSEND programs to download new files to SSD1. Before rebooting the 5025A, be sure to reinstall jumper W3[3–4] if you want the 5025A to boot a device other than the BIOS drive.

CHAPTER 6   SERIAL PORTS

DESCRIPTION

The 5025A has two serial ports that use a high performance 16C550 communications controller, which is 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.

J2: COM1 and J1: COM2 Serial Ports	
Pin #	**Function**
1	DCD
2	DSR
3	RxD*
4	RTS
5	TxD*
6	CTS
7	DTR
8	RI
9	Gnd
10	+5V

* = 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 5025A to your PC, you will need to use a null modem adapter.

COM1 AS CONSOLE I/O

The default settings for the 5025A are as follows:

- W3[1–2] — COM1 used for console (no video card)
- W3[3–4] — Boot using parameters defined by SETUP

W3: COM1, Video and BIOS Boot Options		
Pins Jumpered	Video System	Description
[1-2][3-4]*	No video card installed in system.	Video over COM1. System will boot SETUP boot device.
[1-2]		Video over COM1. System will boot BIOS drive.
[3-4]		No COM1 video available. COM1 available for use in application. System will boot SETUP boot device.‡
[3-4]†	Video card installed in system.	Video on CRT. System will boot SETUP boot device.
[3-4] not jumpered†		Video on CRT. System will boot BIOS drive.

* = default

† = W3[1-2] is ignored

‡ = If SETUP boot device is BIOS drive, system will use video over COM1.

NOTE: When W3[3–4] is removed, the baud rate defaults to 9600 and the TRANSFER program defaults to COM1 as the main console port.

Some programs which access the video memory directly will not work properly on the 5025A 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 10, *Video and Keyboard*, for more information on using a video as the console.

COM1 AS RS-232 I/O

When you have completed developing your application and pro-grammed the 5025A, you can use COM1 as an RS–232 serial port for connection to a printer, modem or other serial device. To access COM1 you have two options:

1. Configure the 5025A for no console port by removing jumper W3[1–2] and boot the system from SSD1 or floppy/hard drive (not the BIOS drive). If you do not remove W3[1–2], the BIOS sign on messages will be sent to your printer, modem or other device connected to COM1.

2. Add a video card and monitor to your 5025A system.

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.

COM2 AS RS-422/485 I/O

COM2 is jumper selectable for either RS–232 or RS–485 communi-cations at W5. Make sure W5[1-2] is jumpered for RS-485 prior to using the port.

W5: RS-232 or RS-485 Select	
Pins Jumpered	Description
[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-422/485 compatible port is accessed through COM2 via terminal block P3. This port will support two–wire or four–wire transmissions. The following diagrams show how a typical two–wire or four–wire mode network is implemented:

RS-422/485
2 Wire (Half Duplex) Transmission
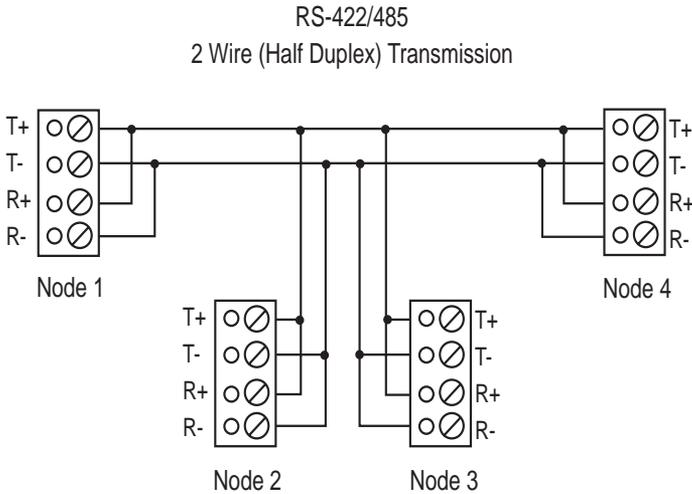
Figure 6–1—Two–Wire Network

RS-422/485
4 Wire (Full Duplex)
Transmission

Host
Node 1

Slave
Node 2

Slave
Node 3

Slave
Node 4
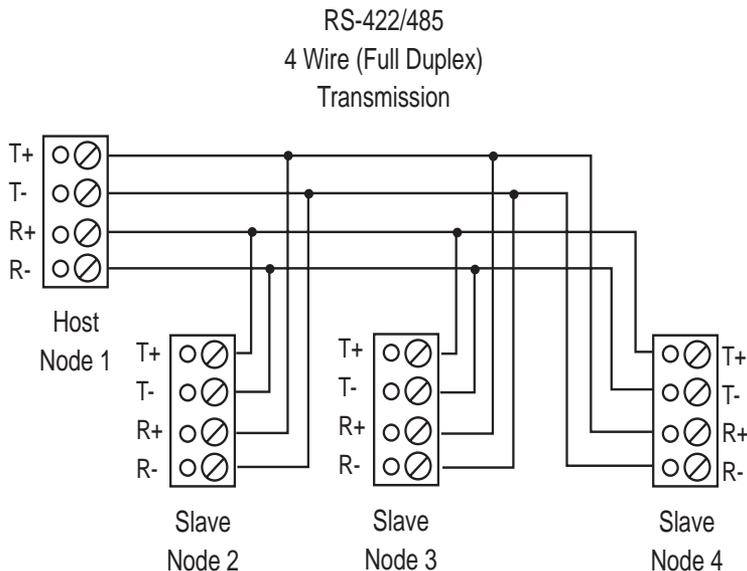
Figure 6–2—Four–Wire Network

Jumper block W7 selects either two or four wire transmission. This jumper automatically disables the transmitter output when operating in the two-wire mode.

W7: Two or Four Wire Select	
Pins Jumpered	**Description**
[1-2]	Four wire transmission
[2-3]*	Two wire transmission

* = default

Operating Precautions

The transmitter and receiver are not optically isolated so you must avoid ground loops. You should send only signals through the RS-485 lines, not power or power grounds. Power grounds cannot be used as a reference ground for RS–485 signals. 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.

Transmitter Control

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

5025A Transmitter Control	
Program Statement	**Description**
Write a "1" to I/O location 20CH	Enables transmitter output I/O location 20CH, 1
Write a "0" to I/O location 20CH	Disables transmitter output I/O location 20CH, 0

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.

W1: RS-485 Receiver Termination	
Pins Jumpered	**Description**
[1-3][2-4]	Termination active
[3-5][4-6]*	No termination

* = default

P3: RS-485 Connector	
Pin #	**Function**
1	Transmit +
2	Transmit -
3	Receive +
4	Receive -

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.

However, the 5025A now supports three additional interrupts: IRQ9, IRQ10 and IRQ11. Please refer to Appendix B for more information.

USING QUICKBASIC TO COMMUNICATE VIA COM1

Several programming languages including QuickBASIC V4.5 assume a video card is present, and for system speed reasons write directly to the video hardware. This can be a problem since many control applications require video output. The following discussion is directed at QuickBASIC, but the principles (not accessing the print routines which access the video memory directly) apply to many languages. There are several ways to use COM1 from QuickBASIC V4.5.

Systems with a Video Card

Add a video card to the system and open/close COM1 using the QuickBASIC OPEN/CLOSE commands.

Systems without a Video Card

WARNING: The system will lock if you use commands such as PRINT or PRINT USING. Because QuickBASIC writes directly to video memory, these commands are usually displayed on a monitor.

METHOD 1
The system display will not appear over COM1 while the BIOS boots.

1.   Remove the video jumper W3[1–2].

2. Boot from a drive other than the BIOS drive, e.g., SSD1 with ROM–DOS.

3. Use QuickBASIC's OPEN/CLOSE/PRINT/INPUT commands to access COM1. The following is an example program using these commands:

```
OPEN "COM1:9600,N,8,1,BIN" FOR RANDOM AS #1
CRLF$=CHR$(13)+CHR$(10)
PRINT #1, "INPUT A STRING" + CRLF$
INPUT #1, A$
PRINT #1, CRLF$ + A$
CLOSE #1
```

NOTE: All PRINT/PRINT USING/INPUT . . . commands MUST use the COM1 device number.

Method 2

1. Leave the video jumper W3[1–2] on.

2. Use QuickBASIC's OPEN/CLOSE/PRINT/INPUT commands to access COM1. After closing the device, manually restore the serial parameters. The following example assumes 9600, N, **8**, 1 parameters:

```
OPEN"COM1:9600,N,8,1,BIN" FOR RANDOM AS #1
CRLF$ = CHR$(13) + CHR$(10)
PRINT #1, "INPUT A STRING" + CRLF$
INPUT #1, A$
PRINT #1, CRLF$ + A$
CLOSE #1
```

NOTE: All PRINT/PRINT USING/INPUT . . . commands MUST use the COM1 device number.

3. Restore the serial parameters by using a batch file specifying your program's name as the first line of the file and 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.

METHOD 3
1. Leave the video jumper W3[1–2] on.

2. Use the PRINTS, PRINTSL, KEYHIT$, INKEY2$ commands
    as found in the DEMO.BAS and DSQBTEST.BAS programs
    (included on the utility diskette). Unformatted string output
    and string input must be done manually.

NOTE: Programs written in this manner will also work with a
video card present and therefore systems can be "debugged" on
your PC.

METHOD 4
1. Use an off–the–shelf communications library.

2. This may require restoring the COM1 parameters similar to
    method 2, if the console video is expected after the
    QuickBASIC program terminates.

METHOD 5
1. Use COM2 instead of COM1. This is similar to Method 1, but
    you will still get the system displays over COM1.

Using Turbo C

If you need to restore the serial parameters after executing a C
program, refer to the file COMTEST.CPP. This file can be
downloaded from the Octagon bulletin board at (303) 427–5368
using 2400 baud, 8 data bits, no parity, 1 stop bit.

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CHAPTER 7   WATCHDOG TIMER

DESCRIPTION

The watchdog timer is a failsafe against program crashes or processor lockups. It times out every 1.2 seconds unless reset by the software. There are three timeout periods for the watchdog timer. Each is selected by configuring jumperblock W2. As shipped, the timeout is 1.2 seconds.

W2: Watchdog Timer	
Pins Jumpered	**Timeout**
[1-2]*	1.2 seconds
[2-3]	0.15 seconds
Not jumpered	0.6 seconds

 * = default

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:

Watchdog Timer Software & Strobe Addresses	
Enable Base Address 380H	**Strobe Base Address 201H**
Timer disables = 0* Timer enabled = 1	Write any data to this address to reset timer

 * = default

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CHAPTER 8   LPT1 PRINTER PORT

DESCRIPTION

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

J5: Printer/Digital I/O Port		
Pin #	**Function**	
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

PRINTER

To install a printer:

1. Connect a CMA–20 cable from the LPT1 port (J5) to the PSKI–1 interface card.

2   Connect your printer to the DB–25 connector on the PSKI–1.

DISPLAY

The LPT1 port supports either vacuum fluorescent (DP series) or liquid crystal displays (LCD). To interface the displays to the 5025A, use the LCD–IFB interface board for LCD displays and the DP–IFB interface board for the DP series displays. A CMA–20 cable is required to connect the interface board to the 5025A. The program DISPLAY.EXE (found on the 5025A utility disk in the \DISPLAY subdirectory) 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.

To install a display:

1. Connect a CMA–20 cable from the LPT1 port to the DP–IFB or LCD–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.

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).

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.

KEYPAD

LPT1 also supports 4x4 matrix keypads. To interface the keypad to the 5025A, use either the LCD–IFB or DP–IFB interface board. A CMA–20 cable is required to connect the interface board to the 5025A. The program DISPLAY.EXE (found on the 5025A 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.

To install a keypad:

1. Connect a CMA–20 cable from the LPT1 port to the DP–IFB or LCD–IFB.

2. Connect the keypad cable to the interface board.

3. Refer to the file DISPLAY.DOC for more information on reading the keypad.

DIGITAL I/O LINES

When used only for digital I/O, a CMA–20 cable connects the port to a STB–20 terminal board for connection of field wiring. These boards may be used for any low voltage digital signal. 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.

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CHAPTER 9   SERIAL EEPROM

DESCRIPTION

Up to 1792 bytes (that is, 896 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 (0-895)*/
_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 (0-895)*/
_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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CHAPTER 10   VIDEO AND KEYBOARD

DESCRIPTION

You can use a video card with a monitor and a keyboard with the 5025A instead of using your PC keyboard and monitor over a serial communications link. The speaker and keyboard lines are brought out to a 10–pin connector via a CMA–10 cable. The Octagon PSKI–1 interface provides a PC compatible connector for the keyboard and provides screw terminals for the speaker. Any AT compatible keyboard may be used.

This chapter tells you:

1. How to use a video monitor and keyboard with a 5025A; and

2. How to transfer files between your PC and a 5025A with a video and keyboard only.

USING A VIDEO MONITOR AND KEYBOARD

You will need the following equipment (or equivalent) to use your 5025A with a video and keyboard:

5025A PC Control Card
Micro PC Card Cage
Power Module
54xx Video Card
AT Compatible Keyboard
PSKI–1 Interface Board
VTC–9F Cable
Monitor
CMA–10 Cable

1. Configure the 5025A for a video card by installing jumper W3[1–2].   Also configure the system to boot from the BIOS drive.

2. Connect the video card to the video monitor.

3. Connect the PSKI–1 to J3 on the 5025A using a CMA–10 cable and then connect the keyboard to the PSKI–1.

---

4. Install the 5025A and video card into the card cage.

5. Power on the 5025A. The BIOS messages should appear on your video monitor:

```
Octagon 5025A-486-25MHz-2MB BIOS Vers x.xx
Copyright (c) 1992-1994 Octagon Systems Corp. (TM)
All Rights Reserved
```

Saving a Program to the 5025A

The following steps detail the procedures for transferring files to the 5025A and programming the flash memory in SSD1 using the DISKSEND and DISKSAVE programs. The DISKSAVE program resides on the BIOS drive of the 5025A and the DISKSEND program resides on the 5025A utility disk.

1. Do an XCOPY of the utility disk to your hard drive:

```
MD C:\MPC
XCOPY A:\*.* C:\MPC /S
```

2. Change to the 5025A directory to allow access to DISKSEND:

```
CD \MPC\5025A
```

3. Connect a VTC–9F cable with a null modem adapter between COM1 of your PC to COM1 of the 5025A.

4. On the 5025A, execute the DISKSAVE program by typing:

```
C>DISKSAVE /DSSD1 /X
```

5. From your PC, execute the DISKSEND program by typing:

```
C>DISKSEND \MPC\DEMO
```

The system will then erase and program the flash memory. This will take several minutes.

Transferring Files to the 5025A

The following steps detail the procedures for transferring files from your PC to the virtual drive on the 5025A. In order to transfer files from your PC to the 5025A, you must execute the TRANSFER program from both the 5025A and your PC.

1. Connect a VTC–9F cable with a null modem adapter between COM1 of your PC to COM1 of the 5025A.

2. Execute the TRANSFER program from the 5025A to receive a file from your PC.

    ```
    TRANSFER /COM1 /R /V <drive>filename.ext
    ```

    <drive> is the virtual drive on the 5025A where the file will be transferred.

    filename.ext is the name of the file on the 5025A which you are receiving from your PC.

    /V enables "R" characters upon receiving a block and "T" upon transferring a block.

3. Execute the TRANSFER program from your PC to send a file to the 5025A.

    ```
    TRANSFER /COM1 /S /V <drive><path>filename.ext
    ```

    filename.ext is the name of the file on the PC which you are sending to the 5025A.

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

```
Failed to receive <drive>filename.ext
Deleting <drive>filename.ext
```

Also, you may speed up the transfer using the /Bnnnn switch to increase the baud rate. Example: /B57600.

Transferring Files from the 5025A

In order to transfer files from your PC to the 5025A, you must execute the TRANSFER program from both the 5025A and your PC.

1. Connect a VTC–9F cable with a null modem adapter between COM1 of your PC to COM1 of the 5025A.

2. Execute the TRANSFER program from the 5025A to send a file to your PC.

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

   filename.ext is the name of the file on the 5025A which you are sending to your PC.

3. Execute the TRANSFER program from your PC to receive a file from the 5025A.

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

   filename.ext is the name of the file on the PC which you are receiving from the 5025A.

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

```
Failed to receive <drive>filename.ext
Deleting  <drive>filename.ext
```

Also, you may speed up the transfer using the /Bnnnn switch to increase the baud rate. Example: /B57600.

DESCRIPTION

You can use your 5025A Control Card with one or two floppy disk drives and a hard disk drive. This chapter includes installation and operation instructions for each device. Also, refer to the instruction manuals included with each device.

For each of the devices below, the first step is to install the 5025A Control Card into the Micro PC backplane. Refer to the instructions in Chapters 4 – 5 if you will be booting from the BIOS drive or from SSD1 using ROM–DOS. If you are booting up using your own DOS, refer to the instructions in Chapter 12.

You can boot your 5025A 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 and the BIOS drive.

FLOPPY DISK DRIVES

You can add two floppy disk drives by using the 5800A Floppy/ Hard Disk Card with your 5025A card.

1. Install the 5025A Control Card.

2. Install the 5800A Floppy/Hard Disk Card and the 5814 Floppy Disk Drive, following the instructions included with these products.

3. Plug the card cage power cable into an AC outlet. Turn on the power supply. This supplies power to the floppy disk drive (via the ribbon cable) as well as to the cards in the card cage.

4. 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.

5. When you boot from either the BIOS or SSD1 drives using ROM–DOS, the floppy drive designations will be A: and B:.

NOTE: When you boot from SSD1 using your own DOS, only one floppy drive will be available, since DOS thinks that SSD1 is drive A:. Connect your floppy disk drive to connector J3 on the 5800A (FDC drive B) and access it with B:.

6. If, in SETUP, you entered 0 drives, access to either A: or B: 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 A. Requests to access drive B: 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 B:. When another request for drive A occurs, a prompt gives you the opportunity to replace the original A: 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 A: or drive B: work just as they would in a PC.

If you want to boot from the floppy disk using your own DOS refer to Chapter 12, *Using Your Own DOS/OS*.

HARD DISK DRIVE

The 5800A Micro PC Floppy/Hard Disk Drive Cards support IDE type hard drives. The disk drive designation for the first hard drive will be C:. If you boot from ROM–DOS in SSD1 or the BIOS drive, the ROM-DOS drive will be D.

Hard Drive SETUP			
No. of Drives in HDSETUP (5025A)	IRQ Setting in HDSETUP	No. of Drives in CPU SETUP	W13 setting
0	NA	1-2	1-2 (IRQ14)
1-2	IRQ5	0	2-3 (IRQ5)
1-2	IRQ14	0	1-2 (IRQ14)
1-2	IRQx	1-2	See note 1

NOTE 1: The system will not operate correctly if both HDSETUP.COM and SETUP have hard drives defined.

NOTE 2: If the 5815 BIOS is disabled via jumper, set W13 to 1-2 (IRQ14). See the 5815 manual for more information.

If the HD BIOS is enabled on the 5025A, be sure to disable the HD BIOS on the 5800A or the 5815. For example,

To disable the 5800A HD BIOS, type the following:
```
5800A:   HDSETUP drives = 0
```

To disable the 5815 HD BIOS, type the following:
```
HDSETUP drives = 0
```
or
Disable the BIOS via jumper

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CHAPTER 12   USING YOUR OWN DOS/OS

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 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 where you want to boot from.

GETTING STARTED

1. Verify that power to the card cage is OFF and install your 5025A Control Card and peripheral equipment, except for the video card.

    WARNING: Plugging the card in backwards will destroy the card!

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 5025A-486-25MHz-2MB BIOS Vers x.xx
    Copyright (c) 1992-1994 Octagon Systems Corp. (TM)
    All Rights Reserved
    ```

    If you do not get the proper logon message:

    *   Remove W3[3–4]. If 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.

    *   Make sure a video card is not installed.

    *   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. Enter:

    DIR

    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 5025A 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 5025A from a 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. Reboot the system by typing:

```
RESET
```

Booting from SSD1 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 5025A utility disk to your PC. Make sure the file is in your DOS PATH or current directory.

   The two programs, DISKSAVE and DISKSEND, transfer and save the files on the floppy disk to SSD1. The DISKSAVE program resides on the BIOS drive of the 5025A and the DISKSEND program resides on the 5025A utility disk.

3. Establish a serial communications link between your PC and the 5025A.

   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. Also, if you cannot communicate at 38400 baud, use the /Bxxx switch on both DISKSAVE and DISKSEND.

4. On the 5025A, execute the DISKSAVE program by typing:

```
A>DISKSAVE /DSSD1 /X
```

   The systems displays the following message:

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

5. If you are using PC SmartLINK IV, press F9 or <ALT> + <X>.
    For other communication programs, skip to step 6.

6. From the DOS command line, type the following:

    ```
    C>DISKSEND /FA
    ```

7. The system then erases and programs the flash memory. This
    takes several minutes.

    Restart PC SmartLINK.

8. Type:

    ```
    RESET
    ```

9. Display and verify the contents of SSD1:

    ```
    DIR E:
    ```

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

    ```
    SSD1 using User supplied DOS
    ```

11. Install jumper W2[3–4], if needed, and reboot your system by
    typing:

    ```
    RESET
    ```

CHAPTER 13   USER-DEFINED JUMPER

W6 is a user-defined jumper, however, this jumper has restrictions. If installed, W6 pulls IRQ11 low, and when removed, IRQ11 is pulled high. The 5025A has jumpers at W9 that allow IRQ3 and IRQ4 from the PC bus to be jumpered to IRQ10 and IRQ11 on the 5025A card. If W6 is installed, IRQ11 is pulled low and IRQ4 from the PC becomes ineffective. W6 can be accessed by using the following .CPP listing.

W6: User Options	
Pin#	**Description**
[1-2]*	User-defined jumper

 * = default

```
//READJUMP.CPP - This example shows how to read the user-defined
jumper, W6, on the 5025A.

#include <dos.h>
#include <stdio.h>
#define INT2 0xA0               //INT2 is the 2nd interrupt controller
                               //which controls IRQ8-IRQ15
int main(void)
{
unsigned char IntSaved;
 unsigned char UserJumper;
 disable();                    //disable interrupts while reading
 IntSaved = inportb(INT2+1);   //Read currently enabled interrupts
 outportb (INT2,0x19);         //Change interrupt controller to
 outportb (INT2+1,0x70);       //level sensitive to read
 outportb (INT2+1,0x02);       //jumper at IRQ11
 outportb (INT2+1,0x01);
 outportb (INT2+1,0xFF);
 UserJumper = inportb(INT2) & 0x08;//Read which interrupts are high
                               //User jumper is bit 3 (8) IRQ11
 outportb (INT2,0x11);         //Change interrupt controller back
 outportb (INT2+1,0x70);       //to edge sensitive (the default)
 outportb (INT2+1,0x02);
 outportb (INT2+1,0x01);
 outportb (INT2+1,IntSaved);   //restore previously enabled ints
 enable();                     //reenable interrupts
 printf("The user jumper is ")
 if (UserJumper)
 printf("off.\n");
 else
 printf("on.\n");
 return (UserJumper>>3);       //return errorlevel 1 (off) or 0 (on)
}
```

The following .BAT file will read the user-defined jumper, W6, on the 5025A using the above program.

```
RJ.BAT

@echo off
echo Test the user jumper
READJUMP.EXE
if ERRORLEVEL 1 goto off
echo Errorlevel says jumper is on
goto done
:off
echo Errorlevel says jumper is off
:done
```

CHAPTER 14 CPU POWER MANAGEMENT

DESCRIPTION

The power demands of a system can severely limit an application due to thermal constraints or the raw power usage in a battery-operated application. In order to maintain speed and efficiency, a software-controlled, power management system must be tailored to the application. Even if your application is operating within specified limits, a power management system may improve the life and reliability of your system by reducing thermal stress to the CPU.

Octagon provides two power management software utilities, **SLEEP.COM** and **SLOW.COM**, with all CPU cards. Octagon has also developed an Advanced Power Management Terminate and Stay Resident (TSR) program with source code examples that can be modified for use within your application software. These files are available on the Octagon BBS (Tel. No.: 303-427-5368). The file is called *powermgt.zip* and is located in the Downloads area (3).

SLEEP.COM

The **SLEEP.COM** power management utility executes a halt (sleep mode) in the microprocessor. Also, in some of the later AT MicroPC's, the charge pumps, that generate the +12V and -12V required for COM port transmission, are disabled. Execution of the **SLEEP.COM** utility reduces the MicroPC power consumption by approximately 65% to 73% in AT PC's and 30% to 34% in XT PC's (results will vary depending on the MicroPC model and memory configuration). Any hardware interrupt, except IRQ0 (the 54.9 mS Tick Timer is disabled during **SLEEP.COM**) wakes the microprocessor, returning it to its normal function and speed. Any external hardware used to generate the interrupts will add to the total power usage. A keyboard, for example, adds approximately 100 mA to your sleep mode current.

> **NOTE:** Some software applications will not work correctly when IRQ0 is disabled. See the *Advanced Power Management TSR* section below for an alternative to **SLEEP.COM**.

In AT CPU's, the CMOS Real Time Clock can be programmed to generate an interrupt (IRQ8) that will wake itself up after a preprogrammed period of time. The file *sleepat.asm* is included in the *powermgt.zip* download file. This file contains the code for building your own **SLEEP.COM**. The code includes everything **SLEEP.COM** performs (for AT CPU's only), and an example for programming the CMOS Real Time Clock to generate an IRQ8, as a self wake-up feature.

SLOW.COM

The **SLOW.COM** power management utility reduces the microprocessor clock speed by 50% in AT CPU's and 60% in XT CPU's. The execution of this utility also reduces the MicroPC power consumption by approximately 20% to 27%. Again results will vary depending on the MicroPC model and memory configuration. The microprocessor is returned to normal speed by executing **FAST.COM**.

IMPLEMENTATION

Software implementation of these utilities can be performed by two methods: in the application executable file, or in a batch file.

You can execute any power management utility from within your executable file by using the **SHELL** command in Microsoft QuickBASIC, or the **SYSTEM** command in Borland C++. The power management utilities can also be setup in a batch file for implementation after an application file has completed execution (see the example below).

```
"AUTOEXEC.BAT" :DOAGAIN        ! Start of Application loop
              MYPROG1.EXE      ! First Application segment
              SLEEP.COM        ! Waiting for interrupt to continue
              MYPROG2.EXE      ! Second Application segment
              SLOW.COM         ! Reduce processor speed for next segment
              MYPROG3.EXE      ! Third Application segment
              FAST.COM         ! Full processor speed for next segment
          GOTO DOAGAIN         ! Restart total application loop
```

ADVANCED POWER MANAGEMENT TSR

The Advanced Power Management TSR program, after successful installation, provides power management control via interrupt 15 calls from within the application software. This utility is similar to **SLEEP.COM**, except that all hardware interrupts including IRQ0 (Tick Timer) will wake the microprocessor, and return it to its normal function and speed. However, if IRQ0 is the interrupt detected, the microprocessor will only update the clock and return to sleep mode until the next interrupt (another 54.9 mS for IRQ0). The source code that is supplied with the TSR has examples in Assembly, C, and QuickBASIC. The source code demonstrates examples for: checking TSR status, TSR connection, CPU halt (sleep mode), TSR disconnect, and charge pump control for the COM port transmitters.

CHAPTER 15   TROUBLESHOOTING

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 all cards except the 5025A card are removed from the card cage. This ensures that other cards are not interacting with the 5025A and that a video card is not installed.

2. Install W3[1–2] or remove W3[3–4].

3. The VTC–9F serial cable turns the 5025A 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 J2 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 J2 (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.

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 5025A Control Card: 9600 baud, 8 bits, 1 stop bit, no parity.

System generates a BIOS message but locks up when booting from SSD1:

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 SSD1.

3. Display the directory of SSD1 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 SSD1 to overwrite any files which may have become corrupted.

System boots from BIOS drive even though I specified boot from SSD1 using ROM–DOS:

1. Make sure SSD1 is programmed.

Booting from SSD1 with user-supplied DOS doesn't work:

1. If you made SSD1 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 SSD1 correctly and that there are no bent pins.

2. Make sure a DS–1213D module is not in the SSD2 socket. (DM versions will work.)

MEMDRIVE.SYS reports device not present for SSD2 when device installed.

1. Make sure the flash EPROMs are programmed first.

2. Make sure SETUP.COM has the correct "SSD2 Device" set.

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.

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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CHAPTER 16   TECHNICAL DATA

TECHNICAL SPECIFICATIONS

CPU
80C386CX (5025A-386-25MHz)
80486SLC (5025A-486-25MHz)
80486SLC2 (5025A-486-50MHz)

Clock
5025A-386-25MHz and 5025A-486-25MHz:
12.5 or 25 MHz, 25 MHz is default; software selectable

5025A-486-50MHz:
25 or 50 MHz, 50 MHz (internal) is default; software selectable

BIOS
AT compatible with industrial extensions with the following
exceptions:
  • Uses 8–bit XT bus; Bus interrupts 10–15H not available on bus.
  • DMA 16–bit channels not available.
  • Expects hard drive card BIOS (like 5800A) if using a hard drive.

Interrupts
Standard XT bus interrupts with the following exceptions:
  • IRQ2 on bus is connected to IRQ9 on CPU.
  • IRQ3 on bus is jumperable to IRQ3 or IRQ10 on CPU.
  • IRQ4 on bus is jumperable to IRQ4 or IRQ11 on CPU.
  • IRQ5 on bus is jumperable to IRQ5 or IRQ14 on CPU.
  • IRQ8 and IRQ13 are standard AT.
  • IRQ12 and IRQ15 are reserved/not available.

DRAM
1 MB, 2 MB, 4 MB and 8 MB options.

Solid–State Disk 1
Supports 128K/256K 12V flash memory, 128K/512K 5V flash
memory or 512K/1MB standard EPROMs for application program.
Flash 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. Supports 128K/512K 5V flash
memory or 512K/1MB standard EPROMs.

ROM–DOS
Combined with BIOS ROM; DOS 6.22 compatible.

Serial I/O
COM1 and COM2 use a high performance 16C550 communications controller, which is Intel 8250 compatible. COM2 can be RS-485.

Printer Interface
LPT1 is PC compatible, PSKI interface read.

Power Requirements
5025A-386-25MHz:
+5V at 318 mA typical (1 MB); 5V at 321 mA typical (2 MB)

5025A-486-25MHz:
5V at 870 mA typical (4 MB); 5V at 880 mA typical (8 MB)

5025A-486-50MHz:
5V at 910 mA typical (8 MB)

Environmental Specifications
–40° to 85° C operating
–55° to 90° C nonoperating
RH 5% to 95%, noncondensing

Size
4.5 in. x 4.9 in.

Watchdog Timer
Default timeout is 1.2 seconds (jumper selectable for 150 mS, 600 mS and 1.2 seconds), software enabled and strobed. Disabled on power–up and reset. Address of the enable timer is 380H; address of strobe is 201H.

Serial EEPROM
1792 bytes of user space.
Software interrupt access via INT 17.

Bus Mastering
Bus mastering is not supported.

Memory Map

5025A Memory Map	
DRAM	**Extended Memory**
DRAM, 1 MB	0-A000 (base) A000-FFFF (used as extended)
DRAM, 2 MB	0-A000 (base) A000-FFFF (parts shadowed) 10000-1FFFF (extended)
DRAM, 4 MB	0-A000 (base) A000-FFFF (parts shadowed) 10000-3FFFF (extended)
DRAM, 8 MB	10000-7FFFF (extended)
SSD1	D000-DFFF*
SSD2	D000-DFFF*
EMS Window	D000-DFFF*
ROM-DOS drive	E000-EFFF
ROM-DOS kernel	F000-F7FF
BIOS	F800-FFFF

*This segment is bank switched via software control.

I/O Map

5025A I/O Map		
Hex Range		**Function**
000-00F	8237	DMA #1
020-021	8259	PIC #1
060-064	8255	PPI (XT)
070-071	MC146818	CMOS/RTC
080-08F	8237	DMA page registers
0A0-0AF	8259	PIC #2 & jumpers
0C0-0C7	8237	DMA #2
100-1FF		Off card
201-207		Watchdog strobe
208-20A		EEPROM
218-21A		EMS I/O register
20B		SSD select #2
20C		RS-485 xmit control
20D		LPT1 enable
20E		RS-232 xmit shutdown
20F		SSD A19
2F8-2FF		COM2
378-37F		Parallel printer
380		Watchdog enable/disable port
381		12V flash pgm voltage enable
382-384		SSD A16-A18
385		SSD select #1
386		Power LED & serial EEPROM pgm enable
387		SSD enable
3F8-3FF		COM1
218, 219, 21A		EMS registers

INTERRUPTS

5025A Interrupts	
Interrupt	**Description**
0	Timer
1	Keyboard
2	Cascade to second interrupt controller
3	COM2/COM4
4	COM1/COM3
5*	Hard Drive (XT)
6	Floppy Drive
7	LPT1 (Not used by ROM-DOS)
8	CMOS Clock
9	Free; Connected to IRQ2 on μPC Bus
10	Free; Jumperable to IRQ3 on μPC Bus
11**	Free; Jumperable to IRQ4 on μPC Bus
12	Not available
13	Coprocessor
14*	Hard Drive (AT)
15	Serial EEPROM

* IRQ5 and IRQ14 are connected together.
** W6 must be removed when using IRQ11.

JUMPER SETTINGS

W1: RS-485 Receiver Termination	
Pins Jumpered	**Description**
[1-3][2-4]	Termination active
[3-5][4-6]*	No termination

* = default

W2: Watchdog Timer	
Pins Jumpered	**Timeout**
[1-2]*	1.2 seconds
[2-3]	0.15 seconds
Not jumpered	0.6 seconds

* = default

W3: COM1, Video and BIOS Boot Options		
Pins Jumpered	**Video System**	**Description**
[1-2][3-4]*	No video card installed in system.	Video over COM1. System will boot SETUP boot device.
[1-2]		Video over COM1. System will boot BIOS drive.
[3-4]		No COM1 video available. COM1 available for use in application. System will boot SETUP boot device.‡
[3-4]†	Video card installed in system.	Video on CRT. System will boot SETUP boot device.
[3-4] not jumpered†		Video on CRT. System will boot BIOS drive.

* = default

† = W3[1-2] is ignored

‡ = If SETUP boot device is BIOS drive, system will use video over COM1.

W4: RTC/SSD2 Battery Jumper	
Pins Jumpered	**Description**
[1-2]*	Battery backup for calendar/clock. No battery backup for SSD2.
[2-3]	Battery backup for calendar/clock and SSD2.

* = default

W5: RS-232 or RS-485 Select	
Pins Jumpered	**Description**
[1-2]	RS-485 Receiver selected
[2-3]*	RS-232 Receiver selected

* = default

W6: User Options	
Pin#	**Description**
[1-2]*	User defined jumper

* = default

W7: Two or Four Wire Select	
Pins Jumpered	**Description**
[1-2]	Four wire transmission
[2-3]*	Two wire transmission

* = default

W8: SSD1 Memory Device Select	
Pins Jumpered	**Description**
[1-3][2-4]	12V Flash memory
[3-5][4-6]	EPROM
[2-4][7-8]*	5V Flash memory

* = default

W9: Interrupt Select		
Pins Jumpered	**Bus IRQ**	**CPU IRQ**
[1-2]	IRQ4	IRQ11
[3-4]*	IRQ4	IRQ4
[5-6]	IRQ3	IRQ10
[7-8]*	IRQ3	IRQ3

* = default
NOTE: Jumper W6 must be removed to use IRQ 11.

W12: SSD2 Device Select	
Pins Jumpered	**Description**
[2-4][3-5][7-8][9-10]*	RAM
[1-2][4-6][8-10][9-11]	EPROM
[2-4][5-7][8-10][9-11]	5V Flash memory

* = default

W13: IRQ Jumper	
Pins Jumpered	**Description**
[1-2]	Bus IRQ5 connected to CPU IRQ14
[2-3]*	Bus IRQ5 connected to CPU IRQ5

* = default

P3: RS-485 Connector	
Pin #	**Function**
1	Transmit +
2	Transmit -
3	Receive +
4	Receive -

CONNECTOR PINOUTS
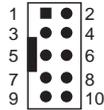
Figure 16–1—Typical 10–pin IDC Connector

J2: COM1 and J1: COM2 Serial Ports	
Pin #	**Function**
1	DCD
2	DSR
3	RxD*
4	RTS
5	TxD*
6	CTS
7	DTR
8	RI
9	Gnd
10	+5V

* = active low

J3: Keyboard/Speaker Port	
Pin #	**Function**
1	Keyboard clock
2	Keyboard data
3	PBR*
4	Gnd
5	5V
6	XRST*
7	5V
8	+5V
9	Speaker
10	Gnd

Battery: RTC/SSD2 Backup	
Pin #	Description
1	+3.6V
2	Key
3	Gnd
4	Gnd

J5: Printer/Digital I/O Port		
Pin #	Function	
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

PC BUS PINOUTS

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

* = active low

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

* = active low

APPENDIX A   SOFTWARE UTILITIES

INTRODUCTION

The 5025A ROM–DOS and Software Utility Disk comes with the
utilities listed below. Some of these utilities are also available on
the 5025A BIOS drive. This appendix describes the utilities and
their use.

Support commands:
COM1CON.COM
DISKSAVE.EXE
DISKSEND.EXE
FAST.COM
LPT1CON.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.

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 program a disk into SSD1 or SSD2 (5V-FLASH MEMORY or 12V-FLASH MEMORY); or to create disk image files for SSD1 or SSD2 (EPROM).

SYNTAX: **DISKSAVE** [/**D**y] [/**S**s] [/**I**]
[/**F**d | *path* | *filespec* | /**X** [/**C**c] [/**B**b]]

PARAMETERS: /**D**y specifies the destination device to be programmed. y can be SSD1 or SSD2. The default is SSD1.

/**S**s specifies the output is an image file and specifies the size of the EPROM to be programmed. s can be either 512K or 1M. The default is 512K.

/**I** specifies the source for programming to be an image file.

/**F**d specifies the source for programming to be a local drive. The disk image of the specified drive is used. d can be any DOS drive letter.

path specifies the source for programming to be a local tree of files.

filespec specifies the full path name of the image file to be used with the /**I** option.

/**X** specifies the source for programming is done through communication over a serial link connecting the 5025A to a remote host system running DISKSEND.EXE.

/Cc specifies the COM port *c* to be used. Use /**C** only when /**X** is used. *c* can be 1, 2, 3 or 4. The default is 1.

/Bb specifies the baud rate *b* to be used. Use /**B** only when /**X** is used. *b* can be 300, 1200, 2400, 4800, 9600, 19200, 38400, 57600 or 115200. The default is 38400.

EXAMPLE 1: To program SSD1 from local drive A, enter:

```
DISKSAVE   /FA  /DSSD1
```

EXAMPLE 2: To program SSD2 from local subdirectory C:\DEMO\TEST, enter:

```
DISKSAVE   C:\DEMO\TEST   /DSSD2
```

EXAMPLE 3: To program SSD1 from remote drive A, first enter the following command on the 5025A:

```
DISKSAVE   /X   /DSSD1
```

Then enter the following command on the remote host system:

```
DISKSEND   /FA
```

EXAMPLE 4: To program SSD2 from a remote subdirectory C:\DEMO through COM2 at baud rate 9600, first enter the following command on the 5025A:

```
DISKSAVE   /X   /DSSD2   /C2   /B9600
```

Then enter the following command on the remote host system:

```
DISKSEND   C:\DEMO   /B9600
```

EXAMPLE 5:   To create a 1 MB image file for the SSD1
                 EPROM from local drive A, enter:

```
DISKSAVE   /FA   /DSSD1   /S1M
```

EXAMPLE 6:   To create a 512K image file for SSD2 from a
                 local subdirectory named C:\TEST, enter:

```
DISKSAVE   C:\TEST   /DSSD2   /S512K
```

EXAMPLE 7:   To program SSD2 from an image file
                 C:\TEST\SSD2.IMG, enter:

```
DISKSAVE /I /DSSD2   C:\TEST\SSD2.IMG
```

REMARKS: When the /**F***d* option is used, the drive
                 specified must have a sector size of 512 bytes.
                 Both 1.44M and 720K floppies have a sector
                 size of 512 bytes.

                 To program an SSD which boots from a user-
                 supplied DOS or full ROM–DOS, the source
                 must be a bootable drive (use the /**F***d* option)
                 from either a remote or local system.

                 When a subdirectory path is used as input to
                 DISKSAVE.EXE, DISKSAVE creates a
                 temporary file in the currect directory.
                 Consequently, the current directory cannot be
                 included in the specified path and must not
                 be write-protected.

                 The filename of the image file created for the
                 SSD1 EPROM or SSD2 EPROM is SSD1.IMG
                 or SSD2.IMG, respectively.

                 The size of the solid state disk generated with
                 DISKSAVE.EXE is made only as large as
                 required to minimize programming time.

SEE ALSO: DISKSEND.EXE, TRANSFER.EXE

DISKSEND.EXE

DISKSEND.EXE: Support Command

PURPOSE: To send a disk image through a serial link to the DISKSAVE.EXE program running on the 5025A.

SYNTAX: **DISKSEND** [/**F***d* | *path*] [/**C***c*] [/**B***b*]

PARAMETERS: /**F***d* specifies the source for programming to be the local drive. The disk image of the specified drive is used. *d* can be any DOS drive letter. Use /**F***d* when not using path.

path specifies the source for programming to be a local tree of files. Use *path* when not using /**F***d*.

/**C***c* specifies the COM port *c* to be used. Use /**C** only when /**X** is used. *c* can be 1, 2, 3 or 4. The default is 1.

/**B***b* specifies the baud rate *b* to be used. Use /**B** only when /**X** is used. *b* can be 300, 1200, 2400, 4800, 9600, 19200, 38400, 57600 or 115200. The default is 38400.

EXAMPLE 1:   To send a local disk image (that is to be programmed into SSD1) through the serial link to the 5025A running DISKSAVE.EXE, first enter the following command on the 5025A:

```
DISKSAVE  /X  /DSSD1
```

Then enter the following command at the host system:

```
DISKSEND  /FA
```

EXAMPLE 2:   To send the image of floppy drive A via COM2 at the host system, that is to be programmed into SSD2 via COM1 at the 5025A, first enter the following command on the 5025A:

```
DISKSAVE  /X  /DSSD2  /C1
```

Then enter the following command at the host system:

```
DISKSEND  /C2  /FA
```

REMARKS: When DISKSAVE.EXE is used in conjunction with DISKSEND.EXE, the /**X** option must be used.

When the /**F**d option is used, the drive specified must have a sector size of 512 bytes. Both 1.44M and 720K floppies have a sector size of 512 bytes.

To program an SSD which boots from a user-supplied DOS or full ROM–DOS, the source must be a floppy drive (use the /**F**d option).

The size of the disk image generated with DISKSEND.EXE that was sent over the serial link is made only as large as required to minimize transfer and programming time.

SEE ALSO: DISKSAVE.EXE, TRANSFER.EXE

FAST.COM

FAST.COM   Support Command

PURPOSE: To change the CPU clock speed from
                      12.5 MHz to 25 MHz for the 5025A-386-
                      25MHz and the 5025A-486-25MHz. This
                      command also changes the CPU clock speed
                      from 25 MHz (internal) to 50 MHz (internal)
                      for the 5025A-486-50MHz.

SYNTAX: **FAST**

REMARKS: Enter the following command to change to the
                      25 MHz clock speed during system bootup for
                      the 5025A-386-25MHz and 5025A-486-
                      25MHz. Likewise, enter the following
                      command to change to the 50 MHz internal
                      clock speed for the 5025A-486-50MHz.

                      ```
                      FAST
                      ```

                      You can also enter <CTL><ALT><+> to
                      switch to 25 MHz or 50 MHz if you are using
                      a keyboard and monitor with the 5025A-386-
                      25MHz and 5025A-486-25MHz or 5025A-486-
                      50MHz, respectively.

                      The default speed is **fast** after a reset.

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

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
```

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

```
5025A 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:

```
5025A 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:

```
5025A MEMDRIVE.SYS V1.2, memory
device not found in SSD2
```

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

```
5025A 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.

NOTE: The SSD2 device type must be set to the proper device before MEMDRIVE.SYS will access it.

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 8 MB systems, the virtual drive will **not** be available. For 512K systems, 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:

```
5025A 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

NOTE: Use ROM-DOS VDISK.SYS /e instead of MEMDRIVE.SYS EMS when using ROM-DOS HIMEM.SYS and/or DOS=HIGH. For example:

```
device=HIMEM.SYS
device=VDISK.SYS 512 /e
dos=high
```

See the ROM-DOS manual for more information.

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

EMS Virtual Drives	
DRAM Installed	**Virtual Drive Size***
1 MB	384K
2 MB	1024K
4 MB	3072K
8 MB	7168K

*Size assumes the BIOS drive is loaded low. Subtract 128K to obtain the virtual drive size if the BIOS drive is high.

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 5025A 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
                    5025A SETUP UTILITY V3.2

                    (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 12V FLASH (28F010)
                                256K 12V FLASH (28F020)
                                128K 5V FLASH (29F010/
                                29C010/29EE010)
                                512K 5V FLASH (29F040/
                                20C040/28SF040)
                                EPROM (27C0X0)

```
SSD2 device:    None
                128K/512K SRAM
                128K 5V FLASH (29F010/
                29C010/29EE010)
                512K 5V FLASH (29F040/
                20C040/28SF040)
                512K EPROM (27C040)
                1 MB EPROM (27C080)

Boot from:      BIOS drive using ROM-DOS
                SSD1 using ROM-DOS
                Floppy or Hard drive
                SSD1 using user supplied
                DOS

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

Number of hard drives:      0
                            1
                            2

Drive 0 parameters
                Cylinders (xxx):
                Heads (x):
                Sectors (XX):

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

SLEEP.COM   Support Command

PURPOSE: To conserve CPU power consumption.

SYNTAX: **SLEEP**

REMARKS: 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 from 25 MHz to 12.5 MHz for the 5025A-386-25MHz and 5025A-486-25MHz. This command also changes the CPU clock speed from 50 MHz (internal) to 25 MHz (internal) for the 5025A-486-50MHz.

SYNTAX: **SLOW**

REMARKS: Enter the following command from the DOS prompt or in a batch file to change to the 12.5 MHz clock speed for the 5025A-386-25MHz and 5025A-486-25MHz. Likewise, enter the following command to change to the 25 MHz internal clock speed for the 5025A-486-50MHz:

```
SLOW
```

You can also press <CTL><ALT><–> to change to 12.5 MHz or 25 MHz if you are using a keyboard and monitor with the 5025A-386-25MHz and 5025A-486-25MHz or 5025A-486-50MHz, respectively.

SEE ALSO: FAST.COM

TRANSFER.EXE

TRANSFER.EXE   Support Command

PURPOSE: To transfer files to or from the 5025A over a serial port.

SYNTAX: **TRANSFER** *filepath* [/**S** | /**R**] [/**B***b*] [/**V**] [/**COM***c*]

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.

/**B***b* 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 /**COM***c* 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.

/**COM***c* 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 5025A 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 5025A:

```
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 5025A at 57600 baud with a serial cable from COM2 on the remote PC and COM1 on the 5025A, enter the following command on the 5025A:

```
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 5025A 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 5025A:

```
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 5025A 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 5025A.

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

SEE ALSO:　　　　DISKSAVE.EXE, DISKSEND.EXE

APPENDIX B

PROGRAMMING STANDARD EPROMS

The 5025A SSD1 and SSD2 sockets accept EPROMs as well as flash EPROMs. You must program the EPROM before installing it on the 5025A card, since there is no on–card programmer.

To program an EPROM

1. Depending upon the type of image file you want to create, do one of the following:

    A. To create a 1 MB image file for the SSD1 EPROM from local drive A, enter:

        ```
        DISKSAVE   /FA   /DSSD1   /S1M
        ```

    B. To create a 512K image file for SSD2 from a local subdirectory named C:\TEST, enter:

        ```
        DISKSAVE   C:\TEST   /DSSD2   /S512K
        ```

2. Install the EPROM into the programmer and program the chip using the file SSD1.IMG or SSD2.IMG.

CUSTOM COMMUNICATION CABLE

The 5025A 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 5025A:

Custom RS-232 Cable			
COM1/COM2	Signal Direction	DB-25	DB-9
1	DCD Input	8	1
2	DSR Input	6	6
3	RxD Input	3	2
4	RTS Output	4	7
5	TxD Output	2	3
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 the minimum load requirement for the power supply.

UPLOADING FILES FROM THE 5025A

The TRANSFER program is also used to upload files from the 5025A 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 5025A.

2. Start PC SmartLINK on your PC.

3. From the 5025A type:

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

4. To receive the files from the 5025A, execute the TRANSFER program from your PC using PC SmartLINK, for example:

```
<ALT> <U>
filename.ext
<ENTER>
```

filename.ext is the name of the file on the PC which you are receiving from the 5025A.

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 6.22 compatible operating system. Since it is stored in ROM, it is always present on power–up. When you boot from ROM–DOS in the BIOS socket, the system automatically assigns drive designators to the extended memory virtual drive, SSD1 and SSD2. 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 5025A. 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  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 5025A device drivers will be listed with their drive designations. When you boot from ROM–DOS in the BIOS drive, drives D–F are defined in the CONFIG.SYS file. The drives are designated as:

A: floppy disk
B: floppy disk
C: BIOS drive
D: virtual disk
E: SSD1
F: SSD2

If your system has a hard drive, drives C through F (in the example above) become drives D through G.

When you boot from SSD1 with ROM–DOS, the drives are designated as:
A: floppy disk
B: floppy disk
C: SSD1
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 1MB DRAM, 128K flash EPROM in SSD1 and nothing installed in SSD2. The system assigns the following drive designations:

```
5025A MEMDRIVE.SYS v2.0, formatting (384KB) in extended memory as
drive D:
5025A MEMDRIVE.SYS v2.0, assigning SSD1 (128 KB) as drive E:
5025A MEMDRIVE.SYS v2.0, memory device not found in SSD2.
```

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.

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.)

```
MOV AL,1
OUT DX,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
```

INTERRUPTS

The 5025A supports three additional interrupts: IRQ9, IRQ10 and
IRQ11. This allows applications using expansion cards such as the
Micro PC 5540 Multifunction Card or the Micro PC 5300 Counter
Timer Card to use interrupts which have previously conflicted
with the CPU. For example, using the 5540 with the 5025A allows
you to support four COM port interrupts at one time: COM1
(IRQ4) and COM2 (IRQ3) on the 5025A and COM3 (IRQ10) and
COM4 (IRQ11) on the 5540 card.

NOTE: The 5540 will still address COM3 as IRQ4 and COM4 as
IRQ3 on the bus.

Two of the new interrupts, IRQ10 and IRQ11 are jumper select-
able at W9 on the 5025A. IRQ10 on the 5025A is jumper selectable
to IRQ3 on the bus and IRQ11 on the 5025A is jumper selectable to
IRQ4 on the bus. The third interrupt, IRQ9, does not require any
jumper settings.

W9: Interrupt Select		
Pins Jumpered	**Bus IRQ**	**CPU IRQ**
[1-2]	IRQ4	IRQ11
[3-4]*	IRQ4	IRQ4
[5-6]	IRQ3	IRQ10
[7-8]*	IRQ3	IRQ3

* = default

NOTE: Jumper W6 must be removed to use IRQ 11.

The 5025A also supports any operating system which requires the standard AT IDE disk device interrupt (IRQ14). This includes QNX, Novell, Windows and others.

NOTE: Bus IRQ5 is jumperable to CPU IRQ5 and IRQ14 by configuring W13 as follows:

W13: IRQ Jumper	
Pins Jumpered	**Description**
[1-2]	Bus IRQ5 connected to CPU IRQ14
[2-3]*	Bus IRQ5 connected to CPU IRQ5

* = default

USING MICROSOFT WINDOWS 3.1

If you are using Microsoft DOS on the 5025A, Microsoft Windows 3.1 is fully compatible and operates in both Standard and Enhanced Modes. However, if you are using ROM–DOS 6.22 and Microsoft Windows on the 5025A, there is a limitation:

• The Windows installation program may modify the AUTOEXEC.BAT and CONFIG.SYS files to include the SMARTDRV.EXE file:

AUTOEXEC.BAT

```
C:\WINDOWS\SMARTDRV.EXE
```

CONFIG.SYS

```
DEVICE=C:\WINDOWS\SMARTDRV.EXE  /DOUBLE_BUFFER
```

ROM–DOS 6.22 is not compatible with SMARTDRV.EXE and you must remove these entries.

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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 the 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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