4010 User's Manual

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OCTAGON SYSTEMS CORPORATION®

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IMPORTANT!

Please read before installing your product.

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

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

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

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

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

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

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

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

- **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.

TABLE OF CONTENTS

PREFACE

This manual provides all the information required to install, configure, and operate the 4010 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 4010 Control Card to your PC and the Micro PC expansion cards.
- Set up communications between the 4010 card and a PC.
- Gain an understanding of the operation and various options allowed in the 4010 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 4010 BIOS Vers x.xx
   Copyright (c) 1994 Octagon Systems, Corp.
   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 4010 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 4010 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 *4010 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 4010 is a low cost, single board PC for use in a wide variety of embedded applications. The 25 MHz 386SX and 486SLC processors have enough processing power for most control and data acquisition applications.

Despite its small size, the features include: DOS 5.0 in ROM; two serial ports; a parallel port; a dual floppy drive port; a hard drive port that supports 2.5 in. hard drives; a watchdog timer; 2 MB of DRAM; 512K of flash memory with integral programmer or 1 MB of standard EPROM; keyboard and speaker ports; two solid–state disks; and ISA and 8/16–bit, PC/104 connectors.

The card can be used in a stand–alone mode or installed in a passive ISA bus backplane. For very small systems one or two PC/104 expansion cards may be stacked on the 4010. The 4010 can also be installed in three or four slot card cages.

MAJOR FEATURES

Instant DOS

The 4010 is an "instant DOS" system. The card includes 5.0 compatible DOS in a solid–state disk. The system boots and operates the same way as your desktop PC.

Watchdog Timer

The watchdog timer resets the system if the program stops unexpectedly. The watchdog is enabled under software control. The timeout is 1.2 seconds.

Calendar/Clock

The 4010 has a built–in, AT style calendar/clock. An external AT clock battery plugs into the card and powers the clock during power–down.

Solid–State Disk Options

SSD0 contains the BIOS and DOS 5.0 in ROM. SSD1 is used for storage of the applications program. 128K or 512K flash memory (5V) may be used. The flash memory programmer is built–in allowing reprogramming locally or through a serial port. Standard EPROMs up to 1 MB may also be used. The solid–state disks look like disks to the user. All the necessary software is provided.

Speaker and Keyboard Port

The 4010 accepts any AT keyboard and has the small PS–2 style keyboard connector. The speaker port is a 3–pin connector for use with any external speaker from 8–50 ohms.

Mounting

There are several ways to mount the 4010:

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.
4. Stack it with other Micro PC cards.

COM1 and COM2 Serial Ports

COM1 and COM2 serial ports are 16C450 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.

LPT1 Parallel Port

The LPT1 parallel port can be used for a printer port or for general purpose I/O. For embedded applications an interface board and software are available to interface with a 4–line LCD display and a 16–position keypad. The port can also be connected to the MPB–16PC, a 16–position opto module rack for driving high current AC and DC loads.

Floppy and hard disk support
The dual floppy port supports all 3.5 in. and 5.25 in. drives up to 1.44 MB. The hard drive interface is a 16–bit IDE controller with a 2 mm. connector for 2.5 in. drives.

Setup stored in serial EEPROM
The 4010 stores the 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 1,892 bytes are available.

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.

Boot sequence
A system can execute from the on–card, solid–state disk, floppy or hard disk.

Where to go from here:

Before you can begin developing your application program for the 4010, 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 4010 system. This chapter describes how to install the 4010 into the card cage, how to establish a serial communications link with your PC and how to download files to the 4010.
Chapter 3 EPROMs	Configuring and installing EPROMs.

Chapter 4 SETUP	Running the SETUP configuration program.
Chapter 5 Save & Run Programs	How to save your program files and autoexecute them from the 4010.
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 Parallel Port	Using the LPT1 parallel port for a printer, display or keypad.
Chapter 9 Serial EEPROM	How to read and write to the serial EEPROM.
Chapter 10 Video/Keyboard/Speaker	Configuring the 4010 with a video, keyboard and speaker.
Chapter 11 External Drives	Configuring the 4010 with a floppy drive or hard drive.
Chapter 12 PC/104	Using a PC/104 module.
Chapter 13 Using Your Own DOS	Configuring the 4010 with a version of DOS other than ROM–DOS.

Chapter 14 Troubleshooting	Problems encountered when using the 4010.
Chapter 15 Technical Data	Technical specifications, jumper configurations and connector pinouts.
Appendix A Software Utilities	Description and operation of software utility programs and device drivers.
Appendix B	Using non–Octagon cables, programming EPROMs, uploading files from the 4010, assigning drive designators and using interrupts.

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CHAPTER 2 QUICK START

This chapter covers the basics of setting up a 4010 system and tells you:

1. How to panel mount or install the 4010 into the card cage;

2. How to set up a serial communications link between the 4010 and your PC; and

3. How to download files to the 4010 and run a program from the virtual drive.

WARNING: The 4010 may not be installed in a PC. These cards are designed to be independent CPU cards only, not accelerators or coprocessors.

HARDWARE INSTALLATION

Your 4010 Control Card can be installed in one of three ways:

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

Panel Mounting the 4010

To panel mount the 4010, you will need the following equipment (or equivalent):

4010 Control Card
5V Power Supply
VTC–9F Cable
Null modem adapter
4010 ROM–DOS & Utility Software Disk
PC SmartLINK w/manual
Your PC

If you are panel mounting the 4010, 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 4010. The following diagram shows the center to center mounting hole dimensions.

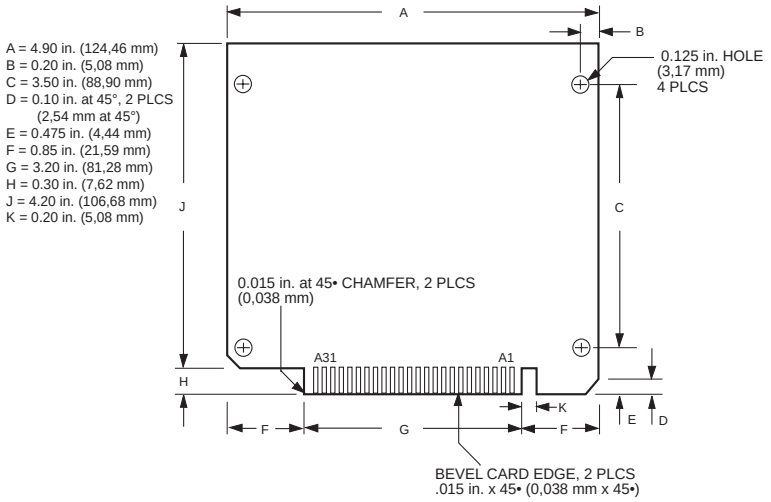

Figure 2–1—4010 Center to Center Hole Dimensions

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 (J1) on the 4010.

   NOTE: You must use COM1 on the 4010 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 any serial port (COM1 – COM4) 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 the serial port.

   NOTE: Please refer to the PC SmartLINK manual for more information on using a COM port other than COM1.

You are now ready to transfer files between your PC and the 4010, please continue with the section, “Establishing Communications with the 4010” in this chapter.

Using a Micro PC Card Cage

To install the 4010 in a Micro PC card cage, you will need the following equipment (or equivalent):

4010 Control Card
Micro PC Card Cage
Power Module
VTC–9F Cable
Null modem adapter
4010 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 4010:

1. Please refer to Figure 2–2 for the location of various connectors before installing the 4010 Control Card.

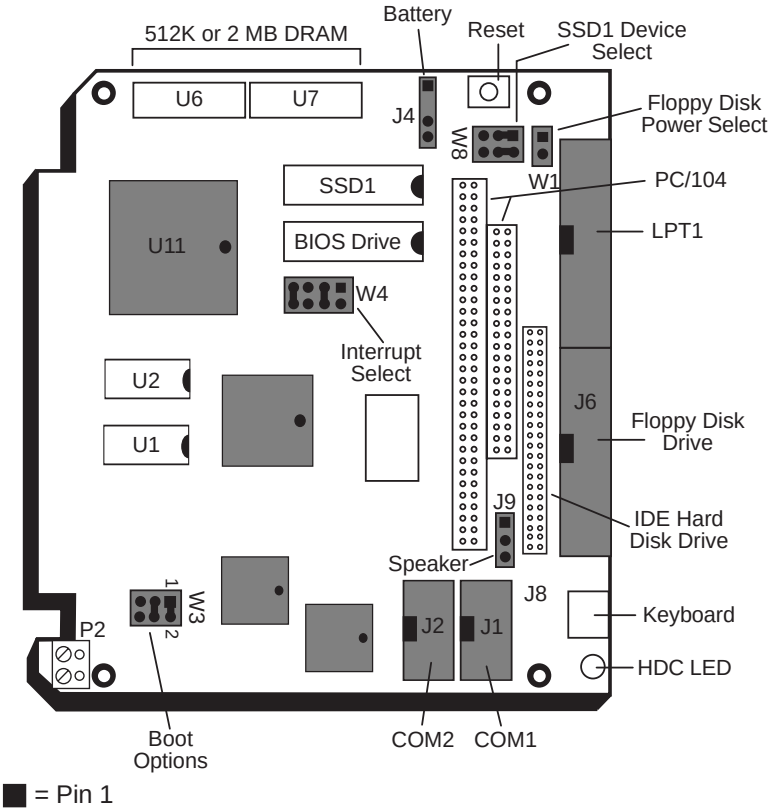

Figure 2–2 – 4010 Component Diagram

WARNING: The 4010 Control Card contains static–sensitive CMOS components. The greatest danger occurs when the card is plugged into a card cage. The 4010 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 4010 card.

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

Take care to correctly position the 4010 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 4010 card as it is installed in the card cage.

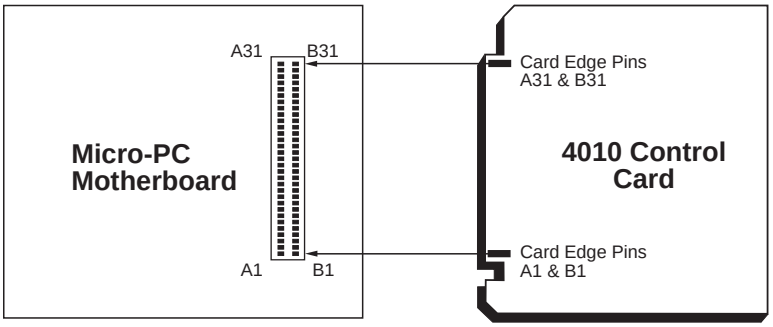

Figure 2–3 – Edge Connector Orientation

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 4010 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 (J1) on the 4010.

   NOTE: You must use COM1 on the 4010 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 any serial port (COM1 – COM4) 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 the serial port.

   NOTE: Please refer to the PC SmartLINK manual for more information on using a COM port other than COM1.

ESTABLISHING COMMUNICATIONS WITH THE 4010

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 4010 files from the 4010 utility disk to a subdirectory on your PC hard drive.

3. Start PC SmartLINK. You are now ready to establish communications between your PC and the 4010 Control Card.

4. Power on the 4010.

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

```
Octagon 4010 BIOS vers x.xx
Copyright (c)1994 Octagon Systems, Corp.
All Rights Reserved
640K Base RAM
384K Shadow RAM
1024K Extended RAM
```

```
4010 MEMDRIVE.SYS V1.6, extended memory present
4010 MEMDRIVE.SYS V1.6, formatting extended memory (960KB) as
drive D:
4010 MEMDRIVE.SYS V1.6, memory device not found in SSD1
4010 DISK.SYS v3.5, 5805 SSD not found.

A:\>path D:\;A:\;
A:\>prompt 4010 $p$g
4010A:\>showtime
Current date/time is TUE 1/1/1980 1:00:00
```

If you don't 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 14, Troubleshooting.

6. Use the directory command to make sure your equipment and software are working properly. Type:

```
DIR <return>
```

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

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

COMMAND    COM  27145   03-17-94  10:04a
FAST       COM    301   04-05-94   7:34a
RESET      COM    313   03-31-94   2:43p
SETUP      COM   3919   04-05-94   7:33a
SHOWTIME   COM    619   03-31-94   2:43p
SLOW       COM    301   04-05-94   7:34a
DISKSAVE   EXE  14297   04-05-94   7:34a
TRANSFER   EXE   9969   01-05-93   2:36p
CONFIG     SYS    113   04-05-94   2:48p
MEMDRIVE   SYS   4499   04-05-94   7:33a
AUTOEXEC   BAT     46   03-08-94   2:50p
   11 Files(s)         63255 bytes
                       0 bytes free
```

7. You are now ready to transfer files between your PC and the 4010.

TRANSFERRING FILES BETWEEN 4010 & YOUR PC

Once you have established communications between your PC and the 4010, you can download files to the virtual drive on the 4010. The virtual drive provides temporary storage for your files until you save them to a flash EPROM 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 4010 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 4010:

4010 Virtual Drives	
DRAM Installed	**Virtual Drive Size**
512K	136K uses MEMDRIVE.SYS BASE*
2 MB	1024K uses MEMDRIVE.SYS EMS

*This memory is taken out of DOS base memory.

NOTE: The drivers are optional when booting from SSD1. For example, if you do not need a virtual drive with a 512K system, do not use MEMDRIVE.SYS.

A utility program called TRANSFER.EXE resides on the BIOS drive and is used to send or receive files via the serial port (e.g., COM1) on the 4010. TRANSFER.EXE uses the XMODEM protocol, as does PC SmartLINK. The following information on downloading files between the 4010 and your PC uses the example programs, DEMO.EXE and DEMO.BAS. These files are on your 4010 utility disk in the DEMO subdirectory.

Downloading Files to the 4010

The following procedures assume you are using PC SmartLINK. 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 4010.

2. Start PC SmartLINK and power on the 4010.

3. Execute the TRANSFER.EXE program from the 4010 by typing:

   ```
   TRANSFER D:DEMO.EXE <RETURN>
   ```

   The following message displays:

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

4. Press <ALT> + <D> to download a file.

5. Type in the name of the file to transfer, for example:

   ```
   DEMO.EXE
   ```

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

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

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

7. When the transfer is complete, type the following DOS command to view the virtual drive directory and confirm that your file has transferred to the 4010:

   ```
   DIR D:
   ```

The system will display the contents of drive D:

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

DEMO      EXE    27264  01-01-80     2:57p
             1 file(s) 27264 bytes
```

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

```
D:DEMO
```

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

DESCRIPTION

Before you can save and boot your application from the 4010, you must first configure the system for your particular application requirements.

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/512K, 5V only, flash memory. Your application program can be saved to the flash memory 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 100,000), if your application program requires changes. You can also use a 512K/1 MB standard EPROM. These EPROMs must be programmed with an off–card programmer. Please refer to Appendix B for more information.

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]	Flash memory*
[3-5][4-6]	EPROM

* = default

2. Install the EPROM into socket SSD1.

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

NOTE: If 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 the section in Chapter 5, “Saving Program and Support Files” and MEMDRIVE.SYS in Appendix A.

DRAM

The 4010 is shipped with either 512K or 2 MB of DRAM soldered onto the card.

DESCRIPTION

The SETUP program defines the 4010 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 4010 utility disk.

4010 SETUP Parameters	Description	Default
COM1 Console Baud Rate	Specifies communications rate between your PC and the 5025 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 Flash EPROM
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-0C7FF	The system will shadow (write protect) this segment of RAM.	Yes
Shadow 0C800H-0CFFF	The system will shadow (write protect) this segment of RAM.	Yes
Move BIOS DRIVE high	Copies the contents of the BIOS drive into high memory freeing memory address EXXX	Yes
Number of line printers	System will automatically check to verify if line printer port(s) exist.	Auto check
Number of hard drives	Specifies the number of hard drives attached.	0
Drive 0 parameters	Specifies the cylinders, heads and sectors of drive 1.	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 4010 continues to boot from the BIOS drive allowing you to verify 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 4010 and your PC.

2. Type:

   ```
   A:SETUP
   ```

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

3. The system will display the 4010 setup parameters and available options. Select the option by pressing the space bar until the correct information appears, then press <enter>. Press <ESC> twice 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. You may also press any key to cancel the memory test while in progress.

- SSD1 device:
  128K FLASH (29F010)
  512K FLASH (29F040)
  EPROM (27C0x0)
  None

NOTE: After setting the SSD1 device, use DISKSAVE/ DISKSEND to program the flash memory.

NOTE: If SSD1 is not programmed, MEMDRIVE.SYS displays the message "Device not found" when the system comes up.

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

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 the BIOS boot 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 13, Using Your Own DOS 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 cable 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 4010.

- 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 network cards, 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 is not available on 512K 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 is not available on 512K systems.

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

If you select Auto Check, the system automatically checks the available parallel printer interfaces to verify their existence 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.
Saving options.
Options saved.
```

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

```
You must reset for these options to take effect.
```

SETUP EXAMPLE

The following example configures a system with 512K flash memory in SSD1, no memory test, 9600 baud, and booting from SSD1 with ROM–DOS:

```
OCTAGON SYSTEMS CORPORATION
4010 SETUP UTILITY V2.7
(Press SPACE to CHANGE, ENTER to ACCEPT, ESC to
EXIT)

COM1 Console Baud Rate:  9600
Power on memory test:  Disabled
SSD1 device: 512K FLASH (29F040)
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.
Saving options.
Options Saved.
You must reset for these options to take effect.
A:\
```

CHAPTER 5 SAVE & RUN PROGRAMS

SAVE AND RUN YOUR PROGRAMS ON THE 4010

Once you have written, tested and debugged your application, you can then save it to either battery–backed static RAM or flash memory in SSD1. When you reboot the 4010, your program will automatically load into DOS memory and execute.

This chapter tells you:

1. How to save an application program to SSD1;
2. How to autoexecute the program from the 4010; 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 13, Using Your Own DOS for more information on saving and autoexecuting programs.

This chapter also assumes you will be using the 4010 without a video card/monitor. If you are using these devices, refer to Chapter 10, Video and Keyboard for more information on transferring an saving programs.

SAVING PROGRAM AND SUPPORT FILES

In addition to your application program, you must also transfer support files to the 4010 to ensure proper operation. These files include the ROM–DOS COMMAND.COM, AUTOEXEC.BAT, CONFIG.SYS, and other files specific to your application. ROM–DOS COMMAND.COM is required to boot the 4010 with ROM–DOS from SSD1. AUTOEXEC.BAT defines the routine for autoexecution of your program.

CONFIG.SYS defines the various device drivers of your 4010 system. The following is an example listing of CONFIG.SYS entries for the device drivers included with the 4010. 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 4010 assigns drive designators.

`DEVICE=MEMDRIVE.SYS SSD1`	Accesses the SSD1 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 4010 SSD1

The following information leads 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 4010 utility disk in the DEMO 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 4010 and the DISKSEND program resides on the 4010 utility disk. The following procedures assume you are using PC SmartLINK.

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 4010 directory to allow access to DISKSEND:

   ```
   CD \MPC\4010
   ```

3. Connect a serial cable between COM1 on the 4010 to a COM port on your PC.

4. Start PC SmartLINK and power on the 4010.

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 4010, 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 may take several minutes.

7. Restart PC SmartLINK.

8. Confirm that the “Boot from” option in SETUP shows "BIOS drive with ROMDOS". Then 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.

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 4010.

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 4010 will reset and boot from SSD1. SSD1 now becomes drive C.

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 4010 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 include the line DEVICE=MEMDRIVE.SYS BIOS in your CONFIG.SYS file, you can access the SETUP program on the 4010 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 4010.

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

   ```
   E:SETUP
   ```

   NOTE: The drive designator may vary depending on the hardware configuration of the 4010.

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 4010.

Removing Jumper W3[3–4]

If the SETUP program is not accessible from SSD1, you must remove jumper W3[3–4]. This configuration uses video and boots from the BIOS drive using ROM–DOS. COM1 is configured for 9600, N, 8, 1. The following message appears when you reboot the 4010:

```
BIOS boot jumper (W3[3–4]) not installed, boot-
ing from the BIOS drive and ignoring the video
jumper setting.
.
.
4010 C:\>
```

After booting from the BIOS drive, use the DISKSAVE and DISKSEND programs to download new files to SSD1. Before rebooting the 4010, be sure to reinstall jumper W3[3–4] if you want the 4010 to boot a device other than the BIOS drive.

DESCRIPTION

The 4010 has two serial ports that are Intel 8250 compatible. They can be used for interfacing to a printer, terminal or other serial device. These ports support 5–, 6– 7–, or 8–bit word lengths, 1, 1.5, or 2 stop bits, and baud rates up to 115.2K.

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

* = active low

Use a VTC–9F cable to connect the ports to the external serial equipment. The pinout of the connector allows you to plug the cable directly into a 9–pin PC serial connector. When interfacing the 4010 to your PC, you will need to use a null modem adapter.

COM1 AS CONSOLE I/O

The default settings for the 4010 are as follows:

- W3[1–2] — Video enabled
- 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. If a video card is present, jumper W3[1–2] is ignored.

Some programs which access the video memory directly will not work properly on the 4010 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/ Keyboard/Speaker” for more information on using a video as the console.

COM1 AS RS–232 I/O

When you have completed developing your application and programmed the 4010, 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 4010 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 4010 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.

DISABLING INTERRUPTS

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

NOTE: You can also use different interrupts for COM3 (IRQ11) and COM4 (IRQ10). IRQ9 and IRQ12 are also available. Refer to Appendix B for more information on interrupts.

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.

DESCRIPTION

The watchdog timer is a fail-safe against program crashes or processor lockups. It times out every 1.2 seconds unless reset by the software.

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 disabled = 0* Timer enabled = 1	Write any data to this address to reset timer

* = default

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DESCRIPTION

The LPT1 parallel port has a 26–pin connector. It can be used to support a number of devices including PC compatible printer, multiline display or matrix keypad.

J5: LPT1 Printer Port		
Pin #	**Function**	
1	Out	STB*
2	Out	AFD*
3	I/O	D0
4	In	ERR*
5	I/O	D1
6	Out	INIT*
7	I/O	D2
8	Out	SLIN*
9	I/O	D3
10	Gnd	Gnd
11	I/O	D4
12	Gnd	Gnd
13	I/O	D5
14	Gnd	Gnd
15	I/O	D6
16	Gnd	Gnd
17	I/O	D7
18	Gnd	Gnd
19	Out	ACK*
20	Gnd	Gnd
21	In	BUSY
22	Gnd	Gnd
23	In	PE
24	Gnd	Gnd
25	In	SLCT
26	+5	+5

* = active low

PRINTER

To install a printer:

1. Connect an Octagon VTC–5/IBM cable from the LPT1 port (J5) to the 25–pin connector on your printer cable.

2. Connect the cable to your printer.

DISPLAY

The LPT1 port supports either 4x20 or 4x40 liquid crystal displays (LCD). To interface the displays to the 4010, use the Octagon 2010 interface board. A CMA–26 cable is required to connect the interface board to the 4010. The program DISPLAY.EXE (found on the 4010 utility disk) provides an easy method to use the display. Please refer to the file DISPLAY.DOC on the utility disk for information on initializing and using the display. Also, refer to the 2010 Product Sheet for information on the interface board. To install a display:

1. Connect a CMA–26 cable from the LPT1 port to J1 on the 2010.

2. Connect the display cable to either the 14–pin or 16–pin header on the 2010. The size of the display will determine which header to use.

3. Refer to the file DISPLAY.DOC for more information on initializing and using the display.

KEYPAD

LPT1 also supports 4x4 matrix keypads. To interface the keypad to the 4010, use the Octagon 2010 interface board. A CMA–26 cable is required to connect the interface board to the 4010. The program DISPLAY.EXE (found on the 4010 utility disk) provides an easy method to use the keypad. Refer to the file DISPLAY.DOC on the utility disk for information on initializing and using the keypad. Also, refer to the 2010 Product Sheet for information on the interface board. To install a keypad:

1. Connect a CMA–26 cable from the LPT1 port to J1 on the 2010.

2. Connect the keypad cable to the 10–pin header on the 2010.

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

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/KEYBOARD/SPEAKER

DESCRIPTION

You can use a video card with a monitor and a keyboard with the 4010 instead of using your PC keyboard and monitor over a serial communications link. The keyboard lines are brought out to a PS–2 type connector. Any PS–2 compatible keyboard may be used.

J3: Keyboard/ Port	
Pin #	**Function**
1	Keyboard data
2	NC
3	Gnd
4	+5V
5	Keyboard clock
6	NC

The speaker is interfaced via a 3–pin connector at J9. You may use any external speaker from 8–50 ohms.

J9: Speaker Connector	
Pin #	**Function**
1	Gnd
2	Speaker data
3	+5V

USING A VIDEO MONITOR AND KEYBOARD

You will need the following equipment (or equivalent) to use your 4010 with a video and keyboard:

4010 PC Control Card
Micro PC Card Cage
Power Module
PC/104 Video Display Module or 54xx Video Card and monitor
AT Compatible Keyboard with PS–2 type connector
VTC–9F Cable
CMA–10 Cable

1. Configure the 4010 for a video card by installing jumper W3[1–2]. Also configure the system to boot from the BIOS drive.

2. Install the PC/104 video display module or 54xx video card and monitor.

3. Connect the keyboard to J3.

4. Install the 4010 and video card into the card cage.

5. Power on the 4010. The BIOS messages should appear on your video monitor:

```
Octagon 4010 BIOS vers x.xx
Copyright (c) 1994 Octagon Systems, Corp.
All Rights Reserved
```

Saving a Program to the 4010

The following steps detail the procedures for transferring files to the 4010 and programming the flash memory in SSD1 using the DISKSEND and DISKSAVE programs. The DISKSAVE program resides on the BIOS drive of the 4010 and the DISKSEND program resides on the 4010 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 4010 directory to allow access to DISKSEND:

   ```
   CD \MPC\4010
   ```

3. Connect a VTC–9F cable with a null modem adapter between COM1 of your PC to COM1 of the 4010.

4. On the 4010, 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 4010

The following steps detail the procedures for transferring files from your PC to the virtual drive on the 4010. In order to transfer files from your PC to the 4010, you must execute the TRANSFER program from both the 4010 and your PC.

1. Connect a VTC–9F cable with a null modem adapter between COM1 of your PC to COM1 of the 4010.

2. Execute the TRANSFER program from the 4010 to receive a file from your PC.

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

   <drive> is the virtual drive on the 4010 where the file will be transferred.

   filename.ext is the name of the file on the 4010 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 4010.

   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 4010.

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 4010

In order to transfer files from your PC to the 4010, you must execute the TRANSFER program from both the 4010 and your PC.

1. Connect a VTC–9F cable with a null modem adapter between COM1 of your PC to COM1 of the 4010.

2. Execute the TRANSFER program from the 4010 to send a file to your PC.

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

   filename.ext is the name of the file on the 4010 which you are sending to your PC.

   /V enables “R” characters on receiving a block and “T” on transferring a block.

3. Execute the TRANSFER program from your PC to receive a file from the 4010.

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

   filename.ext is the name of the file on the PC which you are receiving from the 4010.

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.

CHAPTER 11 EXTERNAL DRIVES

DESCRIPTION

You can use your 4010 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.

You can boot your 4010 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 extended memory and the BIOS drive.

FLOPPY DISK DRIVES

The 4010 supports one or two 3.5 in. or 5.25 in. floppy drives via a 34–position IDC connector at J6. Both floppy drives use DMA channel 2.

Power Requirements

The 4010 requires +5V for operation. If you are using an Octagon 5814 Floppy Disk Drive, power is supplied directly from the floppy port. No external supply is required. If your floppy drive does not support power through the cable, you must supply power through an external source. Additionally, if you are interfacing to 5.25 in. floppy drives, external +12V is required. Refer to your floppy drive manual for specific instructions. Set the jumpers at W1 to specify the floppy drive power source:

WARNING: Jumpering W1 incorrectly will cause a power to ground short when connecting the drive.

W1: Floppy Drive Power Source	
Pins Jumpered	**Description**
Jumpered	Power supplied directly from floppy port. (+5V)
Not Jumpered*	Power supplied to drive through external power cable.

* = default

To install a floppy disk drive:

1. Install the 4010 Control Card.

2. Connect the floppy disk drive cable to J6 on the 4010. If you are using an Octagon 5814 Floppy Disk Drive, power is supplied directly from the floppy port. No external supply is required. If you are using a floppy disk drive other than the Octagon 5814, make sure the drive cable pinouts meet the following requirements:

J6: Floppy Drives			
Pin #	**Function**	**Pin #**	**Function**
1	NC	2	DSEL
3	NC	4	NC
5	NC	6	DRATE
7	+5V or Gnd	8	INDEX*
9	+5V or Gnd	10	MTR2 ON*
11	+5V or Gnd	12	DS1*
13	Gnd	14	DS2*
15	Gnd	16	MTR1 ON*
17	Gnd	18	DIR IN*
19	Gnd	20	STEP*
21	Gnd	22	WR DATA*
23	Gnd	24	WR GATE*
25	Gnd	26	TRK 00*
27	Gnd	28	WRITE PROTECT*
29	Gnd	30	RD DATA*
31	Gnd	32	SIDE 1*
33	Gnd	34	DISK CHANGE

* = active low

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

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

4. When booting from all modes except "SSD1 using your own DOS", the floppy drives are A: and B:.

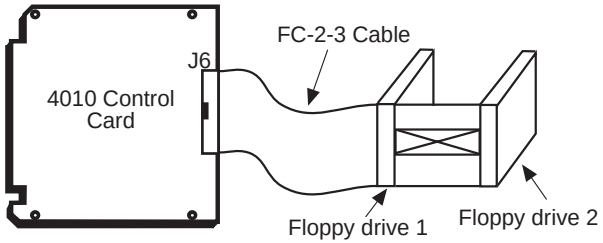

Figure 11–1—Two Floppy System

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

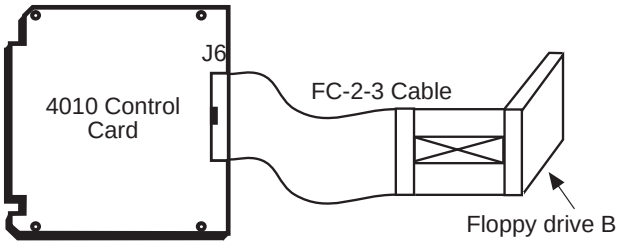

Figure 11–2—One Floppy System With User Supplied DOS

5. 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. Run SETUP and change the number of floppy drives to the correct setting.

If, in SETUP, you entered 1 drive, you can access drive A. Request to access drive B results 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 13, Using Your Own DOS.

HARD DISK DRIVE

The 4010 supports one standard 16–bit AT IDE hard drive. Connector J8 is a 44–pin connector which supports 2.5 in. hard drives. The hard drive BIOS is included in the 4010 BIOS.

To install a hard drive:

1. Connect the hard drive cable to J8 on the 4010 using a 44–pin connector. Make sure the drive cable pinouts meet the following requirements:

J8: Hard Drive			
Pin #	**Function**	**Pin #**	**Function**
1	RESET*	2	Gnd
3	DATA 7	4	DATA 8
5	DATA 6	6	DATA 9
7	DATA 5	8	DATA 10
9	DATA 4	10	DATA 11
11	DATA 3	12	DATA 12
13	DATA 2	14	DATA 13
15	DATA 1	16	DATA 14
17	DATA 0	18	DATA 15
19	Gnd	20	KEY
21	Reserved	22	Gnd
23	IOWR*	24	Gnd
25	IORD*	26	Gnd
27	NC	28	BALE
29	NC	30	Gnd
31	IRQ 14	32	IO16*
33	ADDR1	34	NC
35	ADDR0	36	ADDR2
37	HCSO*	38	HCSI*
39	LED	40	Gnd
41	+5 LOGIC	42	+5 MOTOR
43	Gnd	44	NC

* = active low

Power Requirements

5V is supplied from the 4010 to the hard drive through the disk drive cable.

You can use a video monitor and a keyboard with the 4010 via the PC/104 connector. This connector allows you to interface to a variety of PC/104 form factor modules including video, analog I/O, floppy/hard disks, etc. These modules can be stacked on top of the 4010 to form a highly integrated control system.

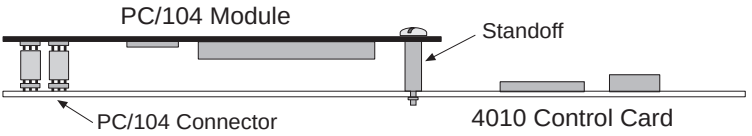

Figure 12–1—Typical PC/104 Module Stack

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CHAPTER 13 USING YOUR OWN DOS

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 4010 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 if it isn't already in place. To install memory devices refer to Chapter 3, "EPROMs".

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

   ```
   Octagon 4010 BIOS vers x.xx
   Copyright (c) 1994 Octagon Systems, Corp.
   All Rights Reserved
   ```

   If you don't 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 14, Troubleshooting.

4. Use the directory command to make sure your equipment and software are working properly. Type:

   ```
   DIR <return>
   ```

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

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 4010 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 4010 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. Make sure the floppy number and size and/or hard drive parameters are correct.

3. After completing the information for SETUP, insert your bootable disk (which contains your DOS) into the floppy disk drive or add a bootable IDE hard 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 4010 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 4010 and the DISKSEND program resides on the 4010 utility disk.

3. Establish a serial communications link between your PC and the 4010.

   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 4010, 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, use the following steps. For other communication programs, skip to step 6.

   PC SmartLINK IV:

   - Press F9 or <ALT> + <X>

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

   ```
   C>DISKSEND /FA
   ```

7. The system then erases and programs the flash memory. This may take 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] and reboot your system by typing:

    ```
    RESET
    ```

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

No Screen Activity – Checking Serial Communications for Console

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

1. Make sure all cards except the 4010 card are removed from the card cage. This ensures that other cards are not interacting with the 4010 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 4010 Control Card serial port into a 9–pin AT serial port. Make sure a null modem adaptor is installed on the other end, and that the assembly is inserted into the proper serial port on the PC. Make sure the VTC–9F serial cable is connected to J1 on the Control Card.

4. Make sure your power module provides +5V (+/–0.25V).

5. After verifying the above conditions, you can monitor voltage levels by connecting an oscilloscope between the TxD* line on J1 (pin 5) and ground. After power–up, you should see a burst of activity on the oscilloscope screen. The voltage level should switch between +/–8V.

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 4010 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 that you can boot using that disk on the floppy drive of your PC. Also, make sure all the necessary boot files are present.

Cannot save programs to flash memory

1. Make sure the EPROM is installed in SSD1 correctly and that there are no bent pins. Also, make sure that jumper W8 is set up correctly.

MEMDRIVE.SYS reports device not present with new flash memory installed.

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

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

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

TECHNICAL ASSISTANCE

Carefully recheck your system before calling Technical Support. Run as many tests as possible; the more information you can provide, the easier it will be for the Technical Support staff to help you solve the problem.

For technical assistance, please call 303–426–4521.

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TECHNICAL SPECIFICATIONS

CPU
80C386SX
80486SLC

Clock
12.5 or 25 MHz, 25 MHz is default; software selectable

BIOS
AT compatible with industrial extensions with the following exceptions:

- Uses 8–bit bus
- DMA 16–bit channels not available except via PC/104

Interrupts
IRQ3 & IRQ4 on bus are jumperable between 3 & 4 or 10 & 11 on–card.

DRAM
512K or 2 MB options. DRAM is soldered onto the card.

Solid–State Disk 1
Supports 128K or 512K, 5V only, flash memory for application program. Programmer built–in. Supports 512K or 1 MB EPROMs.

ROM–DOS
Combined with BIOS ROM; DOS 5.0 compatible.

Serial I/O
COM1 and COM2 are 8250 compatible

Printer Interface
LPT1 is PC compatible.

Power Requirements
4010-386-25MHz:
5V at 275 mA typical (512K); 5V at 285 mA typical (2 MB)

4010-486-25MHz:
5V at 885 mA typical (2 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, software enabled and strobed. Disabled on power–up and reset. Address of the enable timer is 380H; address of strobe is 201H.

Memory Map

4010 Memory Map	
Address	**Description**
00000-9FFFFH	System Memory
A0000-CFFFFH	Off-card memory
D0000-DFFFFH	SSD1/Switchable to off-card
E0000-EFFFFH	BIOS drive (optionally off-card with BIOS loaded high)
F0000-FFFFFH	DOS kernal & BIOS

I/O Map

4010 I/O Map	
Hex Range	**Function**
0000-00FFH	Core logic I/O functions
0100-01EFH	Off card
01F0-01F7H	Hard disk interface
01F8-0200H	Off card
0201-0207H	Watchdog strobe
0208-020FH	Bit port
0208H	Serial EEPROM CS
0209H	Serial EEPROM Data input
020AH	Serial EEPROM Clock
020BH	Serial EEPROM program enable
020CH	Not used
020DH	Not used
020EH	RS-232 charge pump powerdown
020FH	SSD bank switch A19
0210-02F7H	Off card
02F8-02FFH	COM2 serial port
0300-0377H	Off card
0378-037FH	LPT1 printer port
0380-0387H	Bit port
0380H	Watchdog enable
0381H	Not used
0382H	SSD bank switch A16
0383H	SSD bank switch A17
0384H	SSD bank switch A18
0385H	Not used
0386H	Power LED switch
0387H	SSD socket enable
0388-03EFH	Off card
03F0-03F7H	Floppy disk interface
03F8-03FFH	COM1 serial port

JUMPER SETTINGS

W1: Floppy Drive Power Source	
Pins Jumpered	**Description**
Jumpered	Power supplied to drive through Octagon FC-2-3 cable. (+5V)
Not Jumpered*	Power supplied to drive through external power cable.

* = 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: 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: IRQ6 on bus is tied to IRQ12 on the CPU.

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

* = default

CONNECTOR PINOUTS

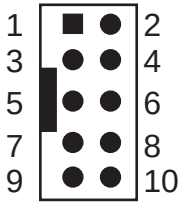

Figure 15–1—Typical 10–pin IDC Connector

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

* = active low

J3: Keyboard/ Port	
Pin #	**Function**
1	Keyboard data
2	NC
3	Gnd
4	+5V
5	Keyboard clock
6	NC

J4: Battery Connector	
Pin #	**Function**
1	+Battery
2	NC
3	Gnd
4	Gnd

J5: LPT1 Printer Port		
Pin #	**Function**	
1	Out	STB*
2	Out	AFD*
3	I/O	D0
4	In	ERR*
5	I/O	D1
6	Out	INIT*
7	I/O	D2
8	Out	SLIN*
9	I/O	D3
10	Gnd	Gnd
11	I/O	D4
12	Gnd	Gnd
13	I/O	D5
14	Gnd	Gnd
15	I/O	D6
16	Gnd	Gnd
17	I/O	D7
18	Gnd	Gnd
19	In	ACK*
20	Gnd	Gnd
21	In	BUSY
22	Gnd	Gnd
23	In	PE
24	Gnd	Gnd
25	In	SLCT
26	+5	+5

* = active low

J6: Floppy Drives			
Pin #	**Function**	**Pin #**	**Function**
1	NC	2	DSEL
3	NC	4	NC
5	NC	6	DRATE
7	+5V or Gnd	8	INDEX*
9	+5V or Gnd	10	MTR2 ON*
11	+5V or Gnd	12	DS1*
13	Gnd	14	DS2*
15	Gnd	16	MTR1 ON*
17	Gnd	18	DIR IN*
19	Gnd	20	STEP*
21	Gnd	22	WR DATA*
23	Gnd	24	WR GATE*
25	Gnd	26	TRK 00*
27	Gnd	28	WRITE PROTECT*
29	Gnd	30	RD DATA*
31	Gnd	32	SIDE 1*
33	Gnd	34	DISK CHANGE

* = active low

J7: PC/104 Bus Signal Assignments				
Pin #	**Row A**	**Row B**	**Row C**	**Row D**
0	--	--	OV	0V
1	IOCHCK*	0V	SBHE*	MEMCS16*
2	SD7	RESETDRV	LA23	IOCS16*
3	SD6	+5V	LA22	IRQ10
4	SD5	IRQ9	LA21	IRQ11
5	SD4	-5V	LA20	IRQ12
6	SD3	DRQ2	LA19	IRQ15
7	SD2	-12V	LA18	IRQ14
8	SD1	0WS*	LA17	DACK0*
9	SD0	+12V	MEMR*	DRQ0
10	IOCHRDY	(KEY)	MEMW*	DACK5*
11	AEN	SMEMW*	SD8	DRQ5
12	SA19	SMEMR*	SD9	DACK6*
13	SA18	IOW*	SD10	DRQ6
14	SA17	IOR*	SD11	DACK7*
15	SA16	DACK3*	SD12	DRQ7
16	SA15	DRQ3	SD13	+5V
17	SA14	DACK1*	SD14	MASTER*
18	SA13	DRQ1	SD15	0V
19	SA12	REFRESH*	(KEY)	0V
20	SA11	SYSCLK	--	
21	SA10	IRQ7	--	
22	SA9	IRQ6	--	
23	SA8	IRQ5	--	
24	SA7	IRQ4	--	
25	SA6	IRQ3	--	
26	SA5	DACK2*	--	
27	SA4	TC	--	
28	SA3	BALE	--	
29	SA2	+5V	--	
30	SA1	OSC	--	
31	SA0	0V	--	
32	0V	OV	--	

* = active low

J8: Hard Drive			
Pin #	**Function**	**Pin #**	**Function**
1	RESET*	2	Gnd
3	DATA 7	4	DATA 8
5	DATA 6	6	DATA 9
7	DATA 5	8	DATA 10
9	DATA 4	10	DATA 11
11	DATA 3	12	DATA 12
13	DATA 2	14	DATA 13
15	DATA 1	16	DATA 14
17	DATA 0	18	DATA 15
19	Gnd	20	KEY
21	Reserved	22	Gnd
23	IOWR*	24	Gnd
25	IORD*	26	Gnd
27	NC	28	BALE
29	NC	30	Gnd
31	IRQ 14	32	IO16*
33	ADDR1	34	NC
35	ADDR0	36	ADDR2
37	HCSO*	38	HCSI*
39	LED	40	Gnd
41	+5 LOGIC	42	+5 MOTOR
43	Gnd	44	NC

* = active low

J9: Speaker Connector	
Pin #	**Function**
1	Gnd
2	Speaker data
3	+5V

MICRO 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	IRQ9	I	B20	CLOCK	O
B5	-5V	Not used	B21	IRQ7	I
B6	DRQ2	I	B22	IRQ6	I
B7	-12V	Not used	B23	IRQ5	I
B8	Reserved	Not used	B24	IRQ4	I
B9	+12V	Not used	B25	IRQ3	I
B10	Analog Gnd	Not used	B26	DACK2*	I
B11	MEMW*	O	B27	T/C	I
B12	MEMR*	O	B28	ALE	O
B13	IOW*	O	B29	Aux +5V	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 4010 ROM–DOS and Software Utility Disk comes with the utilities listed below. Some of these utilities are also available on the 4010 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 (5V-FLASH MEMORY) or to create disk image files for SSD1 (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. Currently, *y* can be SSD1. 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 4010 to a remote host system running DISKSEND.EXE.

/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 program SSD1 from local drive A, enter:

```
DISKSAVE  /FA  /DSSD1
```

EXAMPLE 2: To program SSD1 from local subdirectory C:\DEMO\TEST, enter:

```
DISKSAVE  C:\DEMO\TEST  /DSSD1
```

EXAMPLE 3: To program SSD1 from remote drive A, first enter the following command on the 4010:

```
DISKSAVE  /X  /DSSD1
```

Then enter the following command on the remote host system:

```
DISKSEND  /FA
```

EXAMPLE 4: To program SSD1 from a remote subdirectory C:\DEMO through COM2 at baud rate 9600, first enter the following command on the 4010:

```
DISKSAVE  /X  /DSSD1  /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 SSD1 from a local subdirectory named C:\TEST, enter:

```
DISKSAVE  C:\TEST  /DSSD1  /S512K
```

EXAMPLE 7: To program SSD1 from an image file C: \TEST\SSD1.IMG, enter:

```
DISKSAVE /I /DSSD1  C:\TEST\SSD1.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 is SSD1.IMG.

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 4010.

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 4010 running DISKSAVE.EXE, first enter the following command on the 4010:

```
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 SSD1 via COM1 at the 4010, first enter the following command on the 4010:

```
DISKSAVE  /X  /DSSD1  /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 CPU clock speed from 12.5 MHz to 25 MHz for the 4010.

SYNTAX: **FAST**

REMARKS: Enter the following command to change to the 25 MHz clock speed during system bootup for the 4010:

```
FAST
```

You can also enter <CTL><ALT><+> to switch to 25 MHz if you are using a keyboard and monitor with the 4010.

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
```

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:

```
4010 MEMDRIVE.SYS V1.2, memory
device not found in SSD1.
```

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 2 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:

```
4010 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***
512K	0
2 MB	1024K

*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 4010 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
4010 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 5V FLASH
                     (29F010)
                     512K 5V FLASH
                     (29F040)
                     EPROM (27C0X0)
```

```
Boot from:   BIOS drive using ROM-
             DOS
             SSD1 using ROM-DOS
             Floppy or Hard drive
             SSD1 using user sup-
             plied 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 CPU clock speed from 25 MHz to 12.5 MHz for the 4010.

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 4010:

```
SLOW
```

You can also press <CTL><ALT><–> to change to 12.5 MHz if you are using a keyboard and monitor with the 4010.

SEE ALSO: FAST.COM

TRANSFER.EXE

TRANSFER.EXE Support Command

PURPOSE: To transfer files to or from the 4010 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 4010 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 4010:

```
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 4010 at 57600 baud with a serial cable from COM2 on the remote PC and COM1 on the 4010, enter the following command on the 4010:

```
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 4010 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 4010:

```
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 4010 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 4010.

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 4010 SSD1 socket accepts EPROMs as well as flash memory. You must program the EPROM before installing it on the 4010 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 SSD1 from a local subdirectory named C:\TEST, enter:

   ```
   DISKSAVE  C:\TEST  /DSSD1  /S512K
   ```

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

CUSTOM COMMUNICATION CABLE

The 4010 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.

NOTE: This is a null modem cable. RxD and TxD are crossed.

1. Determine if your PC requires a male or female connector.

2. Refer to the following table for cable connections for the 4010:

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

POWER SUPPLY

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

UPLOADING FILES FROM THE 4010

The TRANSFER program is also used to upload files from the 4010 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 4010.

2. Start PC SmartLINK on your PC.

3. From the 4010 type:

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

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

ASSIGNING DRIVE DESIGNATORS

ROM–DOS is a MS–DOS version 5.0 compatible operating system. Since it is stored in ROM, it is always present on power–up. During run time it requires only about 20K of RAM space if DOS is loaded high; 64K of RAM space if DOS is loaded low. When you boot from ROM–DOS in the BIOS socket, the system automatically assigns drive designators to the extended memory virtual drive and SSD1. 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 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. The following is an example listing of CONFIG.SYS entries for the device drivers included with the 4010. 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 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 4010 device drivers will be listed with their drive designations. When you boot from ROM–DOS in the BIOS drive, drives D–E are defined in the CONFIG.SYS file.

The drives are designated as:

A: floppy disk
B: floppy disk
C: BIOS socket
D: virtual disk
E: SSD1

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

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 and 128K flash memory in SSD1. The system assigns the following drive designations:

```
4010 MEMDRIVESYS v2.0, formatting (384KB) in extended memory as
drive D:
4010 MEMDRIVE.SYS v2.0, assigning  SSD1(128 KB) as drive E:
```

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 4010 supports two additional interrupts: 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 4010 allows you to support four COM port interrupts at one time: COM1 (IRQ4) and COM2 (IRQ3) on the 4010 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.

IRQ10 and IRQ11 are jumper selectable at W4 on the 4010. IRQ10 on the 4010 is jumper selectable to IRQ3 on the bus and IRQ11 on the 4010 is jumper selectable to IRQ4 on the bus.

W4: 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

The 4010 also supports any operating system which requires the standard AT IDE disk device interrupt (IRQ14). This includes QNX, Novell, Windows and others.

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.

USING MICROSOFT WINDOWS 3.1

If you are using Microsoft DOS on the 4010, Microsoft Windows 3.1 is fully compatible and operates in Standard Mode only. Enhanced Mode is not supported due to the limitations of the processor chip. However, if you are using ROM–DOS 5.0 and Microsoft Windows on the 4010, there are some limitations:

- 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 5.0 is not compatible with SMARTDRV.EXE and you must remove these entries.

- The ROM–DOS memory manager, HMA.SYS, will not work with Windows. You must use the HIMEM.SYS memory manager that comes with Windows 3.1.

- Windows only runs in Standard mode on the 4010. From the DOS prompt type:

  ```
  WIN /S
  ```

WARRANTY

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

LIMITATIONS ON WARRANTY

The warranty set forth above does not extend to and shall not apply to:

1. Products, including software, which have been repaired or altered by other than Octagon personnel, unless Buyer has properly altered or repaired the products in accordance with procedures previously approved in writing by Octagon.
2. Products which have been subject to power supply reversal, misuse, neglect, accident, or improper installation.
3. The design, capability, capacity, or suitability for use of the Software. Software is licensed on an "AS IS" basis without warranty.

The warranty and remedies set forth above are in lieu of all other warranties expressed or implied, oral or written, either in fact or by operation of law, statutory or otherwise, including warranties of merchantability and fitness for a particular purpose, which Octagon specifically disclaims. Octagon neither assumes nor authorizes any other liability in connection with the sale, installation or use of its products. Octagon shall have no liability for incidental or consequential damages of any kind arising out of the sale, delay in delivery, installation, or use of its products.

SERVICE POLICY

1. Octagon's goal is to ship your product within 10 working days of receipt.
2. If a product should fail during the warranty period, it will be repaired free of charge. For out of warranty repairs, the customer will be invoiced for repair charges at current standard labor and materials rates.
3. Customers that return products for repairs, within the warranty period, and the product is found to be free of defect, may be liable for the minimum current repair charge.

RETURNING A PRODUCT FOR REPAIR

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

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

NOTE: PRODUCTS RETURNED TO OCTAGON FREIGHT COLLECT OR WITHOUT AN RMA NUMBER CANNOT BE ACCEPTED AND WILL BE RETURNED FREIGHT COLLECT.

RETURNS

There will be a 20% restocking charge on returned product that is unopened and unused, if Octagon accepts such a return. Returns will not be accepted 30 days after purchase. Opened and/or used products, non-standard products, software and printed materials are not returnable without prior written agreement.

GOVERNING LAW

This agreement is made in, governed by and shall be construed in accordance with the laws of the State of Colorado.

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