# 6024 User's Manual

**Doc. #03714 Rev. 0796**

**OCTAGON SYSTEMS CORPORATION®**

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

## COPYRIGHT



## TRADEMARKS

Micro PC™, PC SmartLink™, Octagon Systems Corporation®, the Octagon logo and the Micro PC logo are trademarks of Octagon Systems Corporation. QuickBASIC® is a registered trademark of Microsoft Corporation. ROM-DOS™ is a trademark of Datalight. SmartSocket™ and SmartWatch™ are trademarks of Dallas Semiconductor. IBM PC® is a registered trademark of IBM Corporation.

## NOTICE TO USER

The information contained in this manual is believed to be correct. However, Octagon assumes no responsibility for any of the circuits described herein, conveys no license under any patent or other right, and makes no representations that the circuits are free from patent infringement. Octagon makes no representation or warranty that such applications will be suitable for the use specified without further testing or modification.

Octagon Systems Corporation general policy does not recommend the use of its products in life support applications where the failure or malfunction of a component may directly threaten life or injury. It is a Condition of Sale that the user of Octagon products in life support applications assumes all the risk of such use and indemnifies Octagon against all damage.

# 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 6024 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 6024 Control Card to your PC and the Micro PC expansion cards.
- Set up communications between the 6024 card and a PC.
- Gain an understanding of the operation and various options allowed in the 6024 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 6024 BIOS Vers x.xx
   Copyright (c) 1994-1996 Octagon Systems, Corp. (TM)
   All Rights Reserved.
   ```

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

   Enter *filename*

   means enter the name of your file.

3. Warnings always appear in this format:

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

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

5. All addresses are given in hexadecimal.

## SYMBOLS AND TERMINOLOGY

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

| | |
|---|---|
| W[ – ] | Denotes a jumper block and the pins to connect. |
| Autoexecution | Automatic execution of a program on power–up or reset. |
| BIOS drive | The solid–state disk which contains the system BIOS and ROM–DOS. |
| Console Port | Video card or COM1 where BIOS and DOS messages appear and keyboard input is available. |
| Control Card | Contains the CPU, memory, and operating system and controls the operation of all the extension cards. |
| DRAM | Dynamic Random Access Memory devices. DRAMs provide volatile memory with unlimited read and write cycles. |
| Expansion Card | The expansion cards add I/O functions to the Micro PC system, such as analog input/ output, digital input/output, motion control, display, and so on. |
| Flash EPROM | Electrically erasable PROM which allows a minimum of 100,000 write/erase cycles. |
| Memory device | The type of static RAM, DRAM, flash EPROM or EPROM specified for either volatile or nonvolatile memory. |
| PC SmartLINK | A serial communications software package designed by Octagon for use with the 6024 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 EPROMs. |
| ROM–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, 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 6024 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 *6024 Control Card User's Manual*

A description of your problem.

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

## DESCRIPTION

The Micro PC 6024 Control Card combines a PC with communications and control capabilities on a single card. It can be plugged into a Micro PC card cage for I/O expansion or operated stand–alone. Mounting holes are provided in each corner and 5V power can be supplied to screw terminals.

The 6024 integrates PC architecture with three serial ports; printer, keyboard and speaker ports; a 24–line digital I/O port for logic I/O or for interfacing directly to an opto module rack; calendar/clock option; 1 MB DRAM and DOS in ROM.

## MAJOR FEATURES

### High Current Interface

Eight of the 24 digital I/O lines can drive external devices that require up to 100 mA per device, and up to a 50V power supply. Relays, small motors, displays and other devices can be driven directly by the 6024. The outputs act as switches to ground. The eight lines can be converted to 0–5V logic levels with a supplied jumper block.

### Matrix Keypad and LCD Display Support

The LPT1 parallel port can interface with a matrix keypad with 12 or 16 keys, and with 2– or 4–line LCD displays. If this port is used for a printer, then, the digital I/O port can also be used for the keypad and display interface.

### Solid–State Disk Options

SSD0 contains the BIOS and DOS 6.22 in ROM. SSD1 is used for storage of the applications program. The flash programmer is built–in allowing reprogramming through a serial port. SSD1 supports one or two 256K flash EPROMs.

SSD2 is used primarily for logging process data. This disk supports 128K/512K static RAMs that may be battery–backed.

### Printer Port

Standard Centronics/IBM parallel port. Data lines are bi-directional. The printer port has a 24 mA drive capability.

### Serial Ports

The three serial ports are 16C450 with 115K baud. COM1 and COM2 have RS–232 interfaces while COM3 has both 4–wire RS–422 and 2–wire RS–485 interfaces.

### EPROM Programmer

256K flash EPROMs programmable under software control Programming voltage generated on–card.

### SETUP Stored in Serial EEPROM

The 6024 stores setup information in nonvolatile EEPROM; as a result, it is immune to battery or power failure. The BIOS uses 60 bytes of the EEPROM. Additional user-definable information can also be stored in the EEPROM: Up to 452 bytes are optionally available; 68 bytes are standard.

### Remote Reset

The 6024 has an opto–isolated remote reset line that will provide a hardwire reset up to 50 ft. from the unit.

# CHAPTER 2 QUICK START

This chapter covers the basics of setting up a 6024 system and tells you:

1. How to panel mount or install the 6024 into a card cage;

2. How to set up a serial communications link between the 6024 and your PC; and

3. How to download files to the 6024 and run a program from the virtual drive.

**WARNING:** The 6024 may not be installed in a PC. These cards are designed to be independent CPU cards only, not accelerators or coprocessors.

## HARDWARE INSTALLATION

Your 6024 Control Card can be installed in one of three ways:

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

### Panel Mounting the 6024

To panel mount the 6024, you will need the following equipment (or equivalent):

6024 PC Control Card
5V Power Supply
VTC–9F Cable
Null modem adapter
6024 ROM–DOS & Utility Software Disk
PC SmartLINK
Your PC

Before mounting the 6024, refer to Figure 2–1 for the location of various connectors.

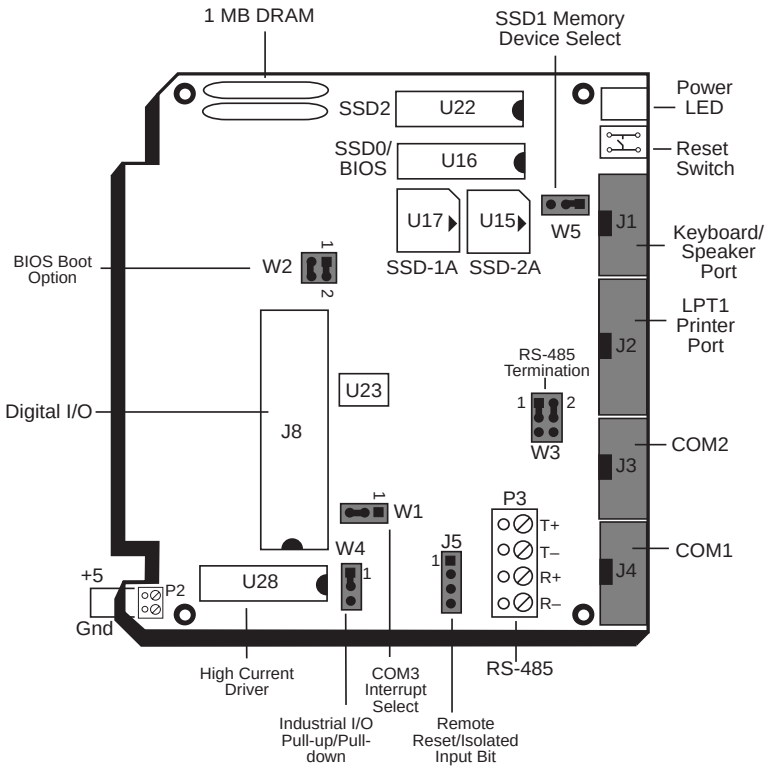


Figure 2–1—6024 Component Diagram

**WARNING:** The 6024 Control Card contains static–sensitive CMOS components.

- Ground yourself before handling the 6024.
- Disconnect power before handling the card.
- When programming a memory device, place the device in the socket before applying power.

To mount the 6024:

1. A screw terminal connector at P2 is provided to supply the 5V power. Connect the proper ground and 5V wires to the terminal block at P2.

2. Connect one end of the VTC–9F cable to the null modem adapter. Connect the other end to COM1 (J4) on the 6024.

   **NOTE:** You must use COM1 on the 6024 in order to establish a serial communications link with your PC.

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

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

4. Use standoffs and 4–40 screws to bolt down the 6024. The following diagram shows the center to center hole dimensions.

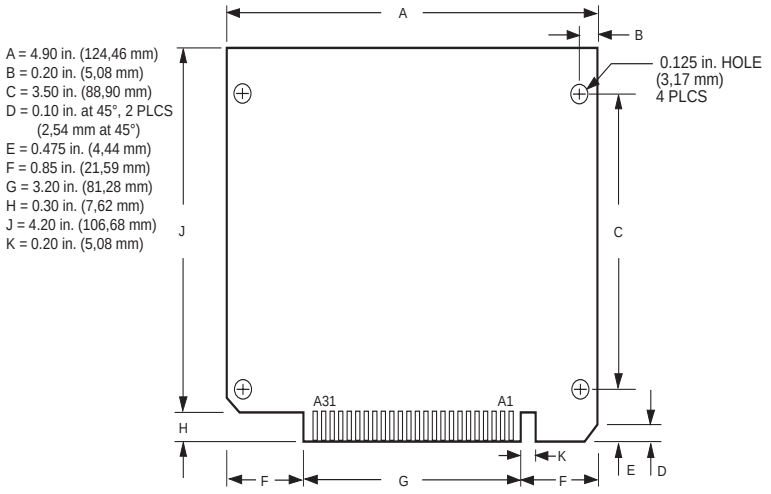


Figure 2–2—6024 Center to Center Hole Dimensions

You are now ready to transfer files between your PC and the 6024. Please continue with the section, “Establishing Communications with the 6024” in this chapter.

### Using a Micro PC Card Cage

To install the 6024 in a Micro PC card cage, you will need the following equipment (or equivalent):

6024 PC Control Card
Micro PC Card Cage
Power Module
VTC–9F Cable
Null modem adapter
6024 ROM–DOS & Utility Software Disk
PC SmartLINK
Your PC

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

To install the 6024:

1. Please refer to Figure 2–1 for the location of various connectors before installing the 6024 PC Control Card.

**WARNING:** The 6024 Control Card contains static–sensitive CMOS components. The greatest danger occurs when the card is plugged into a card cage. The 6024 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 6024.
- Disconnect power before removing or inserting the card.
- When programming a memory device, place the device in the socket before applying power.

2. Install the power module following the instructions supplied with the power module.

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

4. Slide the 6024 card 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:** Take care to correctly position the 6024 card in the card cage. The VCC and ground signals must match those on the backplane. Figure 2–2 shows the relative positions of the 6024 card as it is installed in the card cage.

Plugging the card in backwards will destroy the card!

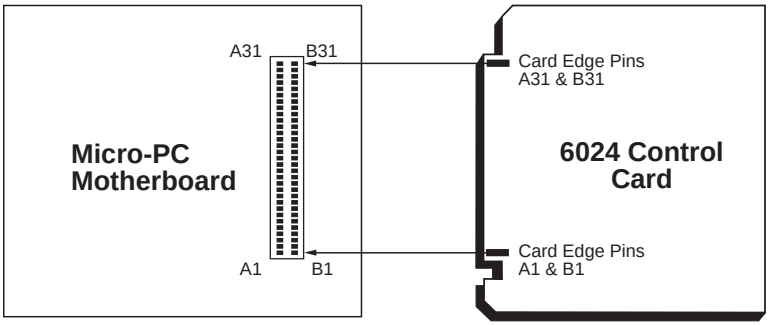


Figure 2–2 – Edge Connector Orientation

5. Connect one end of a VTC–9F cable to the null modem adapter. Connect the other end to COM1 (J4) on the 6024.

**NOTE:** You must use COM1 on the 6024 in order to establish a serial communications link with your PC.

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

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

## ESTABLISHING COMMUNICATIONS WITH THE 6024

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 6024 files from the 6024 utility disk to a subdirectory on your PC hard drive.

3. Start PC SmartLINK.

4. Power on your 6024 system.

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

```
Octagon 6024 BIOS Vers x.xx
Copyright (c) 1994-1996 Octagon Systems, Corp. (TM)
All Rights Reserved

6024 MEMDRIVE.SYS v2.06, expanded memory present
6024 MEMDRIVE.SYS v2.06, formatting expanded memory
(xxxKB) as drive D:
6024 MEMDRIVE.SYS v2.06, memory device not found in SSD1A
6024 MEMDRIVE.SYS v2.06, memory device not found in SSD1B
6024 MEMDRIVE.SYS v2.06, memory device not found in SSD2

C:\>prompt 6024 $p$g
C:\>path D:\;C:\;

6024 C:\>showtime
Current date/time is TUE 1/1/1980  1:00:00
6024 C:>
```

If you do not get the proper logon message:

- Check the serial parameters of your PC to make sure they are set correctly. Parameters should be 9600 baud, 8 data bits, no parity, and 1 stop bit.
- Make sure a video card is not installed in the card cage.
- Remove jumper W2[3–4] from the 6024 card. Be sure to turn off the power before removing the 6024 card from the card cage.
- 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. Enter:

   ```
   DIR
   ```

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

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

   COMMAND   COM   27095   05-20-94    6:00a
   FAST      COM     384   06-23-95    9:47a
   RESET     COM     375   06-23-95    9:47a
   SETUP     COM    2893   06-23-95    9:47a
   SHOWTIME  COM     619   06-23-95    9:47a
   SLOW      COM     384   06-23-95    9:47a
   DISKSAVE  EXE   12598   06-23-95    9:47a
   TRANSFER  EXE    9969   01-05-93    2:36p
   CONFIG    SYS     146   05-17-94   10:42a
   MEMDRIVE  SYS    4124   06-23-93    9:47a
   AUTOEXEC  BAT      46   12-16-93    9:43a
      11 File(s)          0 bytes
   ```

7. You are now ready to transfer files between your PC and the 6024.

## TRANSFERRING FILES BETWEEN 6024 & YOUR PC

Once you have established communications between your PC and the 6024, you can download files to the virtual drive on the 6024. The virtual drive provides temporary storage for your files and allows you to test and debug your application files before permanently saving them.

You can also upload files from your 6024 to your PC for editing and debugging. When you boot the 6024, a 1 MB system has a 384K virtual drive generally configured as drive D.

Files are downloaded using the transfer program, TRANSFER.EXE, which resides on the 6024. The following information on downloading files between the 6024 and your PC uses an example program, DEMO.EXE. This file is on your 6024 utility disk in the DEMO subdirectory.

### Downloading Files to the 6024

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 has the file(s) you will download to the 6024.

2. Start PC SmartLINK and power on the 6024.

3. Execute the TRANSFER.EXE program from the 6024 by entering:

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

4. Execute the following using PC SmartLINK:

   a. Press <ALT>+<D> to download a file.
   b. Type in the name of the file to transfer.
   c. Select START. The progress of the transfer displays in the dialog

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

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

5. When the transfer is complete, type the following DOS command to view the virtual drive directory and confirm that your file has transferred to the 6024:

   ```
   DIR D:
   ```

   The system will display the contents of drive D:

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

   DEMO      EXE    1725   11-05-91     2:37p
             1 file(s) 27264 bytes free
   ```

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

   ```
   D:DEMO
   ```

7. The system displays a message on your PC.

8. Transfer the file DEMO.BAS to the 6024:

   ```
   TRANSFER D:DEMO.BAS
   ```

9. DEMO.BAS is the QuickBASIC program for the DEMO program. You can display the file by typing:

   ```
   TYPE DEMO.BAS
   ```

This page intentionally left blank.

## INSTALLING RAMS AND EPROMS

The 6024 card includes three sockets for solid–state disks: SSD1A, SSD1B and SSD2. SSD1A/B generally contains the program to be executed on power–up. The program is automatically loaded into DOS memory and executed. SSD1A/B supports up to two 256K flash (N28F020). Your application program can be saved to flash using the on–card programmer. These devices are erased automatically during the programming process. You can write to flash a limited number of times (100,000), if your application program requires changes.

The 6024 also supports standard 256K and 512K EPROMs. However, these EPROMs must be programmed on an external programmer. Refer to Appendix B for more information on programming standard EPROMs.

**NOTE**: When using both SSD1A and SSD1B, you should not mix standard and flash EPROMs. Also, the size of the EPROMs should be the same.

### To Install EPROMs

1. Install the first EPROM directly into SSD1A and the second EPROM (if applicable) into SSD1B making sure to align the notched corner of the EPROM with the notched corner of the socket.

**WARNING:** If you need to remove the EPROMs from the sockets, be sure to use a PLCC chip puller. Failure to use the correct tool could result in damage to the EPROM and socket.

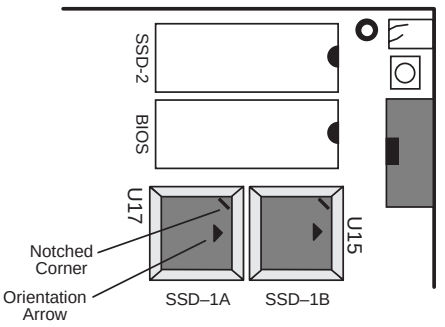


Figure 3-1 6024 PLCC Orientation

After installing an EPROM in SSD1, you should run the SETUP program to specify the size of device. If you change the size of the device in SSD1, you **must** run SETUP again.

### To Install Static RAMs

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

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

### To Install Battery Backup & Calendar/Clock Module

1. Install the DS–1216DM into socket SSD2.

2. Insert the static RAM on top of the DS–1216DM.

**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!

3. After installing the calendar/clock module, confirm that the SETUP option, "DS clock?", is enabled. Otherwise, the time and date will be incorrect.

## DESCRIPTION

The SETUP program defines the 6024 system parameters for CPU clock speed, COM1, memory test, boot options, number and size of floppy drive(s), SSD1 flash EPROM size, clock option and number of line printers. The 6024 is shipped with default configuration parameters stored in the EEPROM, U23. You make changes to these parameters by running the SETUP program which is stored on the BIOS drive. Each time you make a change to your system's configuration, you must rerun SETUP.

| 6024 SETUP Parameters | Description | Default |
|---|---|---|
| COM1 Console Baud Rate | Specifies communications rate between your PC and the 6024 when no video card is in use. | 9600 |
| Power-on Memory Test | Extensive memory testing performed on bootup. | Enabled |
| SSD1 Device | Specifies the size/type of devices installed in SSD1. | 512K Flash (2-256Ks) as 1 disk |
| 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 |
| DS Clock Installed | Specifies whether you have a DS-1216DM installed in SSD2. | No |
| Number of line printers | System will automatically check to verify if a device is attached. | Auto check |

If you are running SETUP for the first time and have not previously saved and autoexecuted your program, we recommend you keep the default setting, “Boot from: BIOS drive using ROM–DOS”. The 6024 will continue to boot from the default BIOS drive until you have verified that your program files are successfully saved to SSD1. You can also test your program before making changes for autoexecution. Once your program is tested and verified, you can run SETUP and make changes so that your program will autoexecute and “Boot from SSD1 using ROM–DOS”.

## RUNNING SETUP

1. Make sure you have established a serial communications link between the 6024 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 6024 setup parameters and available options. Select the option by pressing the space bar until the correct information appears, then press <ENTER>. Press <ESC> if you want to exit setup without saving your responses.

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

The following messages may appear:

```
NOTE:  To use COM1 as the console at a speed
other than 9600 baud, you must install the
BIOS boot jumper. (W2[3–4])
```

- **Power on memory test:**
  Enabled
  Disabled

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

- **SSD1 device:**
  256K FLASH (N28F020) in SSD1A
  512K FLASH (2–256Ks) as one disk
  512K FLASH (2–256Ks) as two disks
  512K EPROM (27C040) in SSD1A
  1024K EPROM (2–512Ks) as one disk
  1024K EPROM (2–256Ks) as two disks
  None

- **Boot from:**
  BIOS drive using ROM–DOS
  SSD1 using ROM–DOS
  SSD1A using ROM–DOS
  SSD1B using ROM–DOS
  Floppy or Hard drive
  SSD1 using User supplied DOS/OS
  SSD1A using User supplied DOS/OS
  SSD1B using User supplied DOS/OS

**NOTE**: These options may not be available depending on the SSD1 device selected.

If jumper W2[3–4] is not installed and you selected an option other than BOOT FROM BIOS DRIVE USING ROM–DOS, the following message will also appear:

```
NOTE:  To boot from the specified device you
must install the BIOS boot jumper.
```

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, W2[1–2], is ignored.

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

The following message will appear if you select one floppy disk and you boot from SSD1 with your own DOS:

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

A maximum of 1 floppy drive is possible if booting from SSD1 and using your own DOS. See Chapter 13, *Using Your Own DOS/OS* for details.

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

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

These options only display if you have specified that a floppy drive(s) is attached to the 6024.

- **DS clock installed:**
  Yes
  No

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

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

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

Saving options.
Options saved.
```

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

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

## SETUP EXAMPLE

The following example configures a system with 256K flash in SSD1A, a DS–1216DM calendar/clock in SSD2, and booting from SSD1A with ROM–DOS:

```
OCTAGON SYSTEMS CORPORATION
6024 SETUP UTILITY V4.30
(Press SPACE to CHANGE, ENTER to ACCEPT, ESC to
EXIT)

COM1 Console Baud Rate:  9600
Power on memory test:  Disabled
SSD1 device: 256K FLASH (N28F020) in SSD-1A
Boot from:  SSD1 using ROM–DOS
Number of floppy drives: 0
DS clock installed:  Yes
Number of line printers:  Auto check
Press ENTER to SAVE the changes or
Press ESC to EXIT without saving the changes.

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

C:\
```

This page intentionally left blank.

# CHAPTER 5 SAVE & RUN PROGRAMS

## SAVE AND RUN YOUR PROGRAMS ON THE 6024

Once you have written, tested and debugged your application, you can then save it to flash in SSD1A/B. When you reboot the 6024, 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 6024; 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 unpredictably. We recommend booting from SSD1, using your own DOS, when using programs with undocumented DOS calls. Refer to Chapter 13, *Using Your Own DOS/OS*, for more information on saving and autoexecuting programs.

This chapter also assumes you will be using the 6024 without a video card/monitor. If you are using these devices, refer to Chapter 11, *Video and Keyboard*, for more information on transferring and saving programs.

## SAVING YOUR PROGRAM

Saving your program to SSD1 is accomplished in two steps:

1. Run SETUP to define the size of the flash in SSD1 and default boot option. Refer to Chapter 4, *SETUP* for more information.

2. Save your program and supporting files from your PC to the 6024.

## Saving Program and Support Files

In addition to your application program, you must also transfer and save support files to the 6024 to ensure proper operation. These files include the ROM–DOS COMMAND.COM, CONFIG.SYS, AUTOEXEC.BAT and other files specific to your application. ROM–DOS COMMAND.COM is required to boot the 6024 with ROM–DOS from SSD1. AUTOEXEC.BAT defines the routine for autoexecution of your program.

CONFIG.SYS defines the various device drivers of your 6024 system. The following is an example listing of CONFIG.SYS entries for the device drivers included with the 6024. 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 6024 assigns drive designators.

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

**NOTE**: We recommend you include in your CONFIG.SYS file the entry DEVICE=MEMDRIVE.SYS BIOS. This allows you to easily access utility programs that are located on the BIOS drive. For example, if you make changes to your program, you will need to rerun the SETUP program.

### To Save Files to the 6024 SSD1

The following information steps you through transferring, saving and autoexecuting a program using the DEMO application. All the files for this application are located on the 6024 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 6024 and the DISKSEND program resides on the 6024 utility disk.

1. Create the directory MPC:

   ```
   MD C:\MPC
   ```

2. Insert the utility diskette into drive A: and enter the following:

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

3. Format a floppy disk on your PC and copy the following files from the C:\MPC\DEMO directory onto the floppy disk:

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

4. Copy the file DISKSEND.EXE from the 6024 utility disk to your PC.

5. Connect a serial cable between COM1 on the 6024 to a COM port on your PC.

6. Start PC SmartLINK and power on the 6024.

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

7. On the 6024, execute the DISKSAVE program by typing:

   ```
   A>DISKSAVE SSD1A  (or SSD1B)
   ```

   **NOTE:** You may designate either SSD1A or SSD1B depending on how the drive was defined in SETUP.

8. If you are using PC SmartLINK IV, use the following steps. For other communications programs, skip to step 9.

   PC SmartLINK IV:

   - Press <ALT> + <D> to download a file.
   - Press <ALT> + <P> to program SSD1
   - Press <ENTER>

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

Continue with step 10.

9. If using another communication program, exit to DOS and type the following:

   ```
   C>DISKSEND
   ```

   When prompted for the “Input drive to send”, enter the drive designator for the newly created floppy disk. The system then erases and programs the flash EPROM. This will take several minutes. Using a RAM disk or virtual drive on your PC in place of the floppy disk will considerably shorten the time it takes to program the flash EPROM.

10. Restart PC SmartLINK or your communications program.

    If you are saving your program to SSD1 for the first time or you are running the DEMO program, the system should boot from the BIOS drive since you did not change the default “Boot from” option in SETUP. Type:

    ```
    RESET
    ```

11. Display and verify the contents of SSD1:

    ```
    DIR E:
    ```

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

12. Test run the DEMO program:

    ```
    DEMO
    ```

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

## AUTOEXECUTING YOUR PROGRAM

Once you've saved your program and other files to SSD1 you may boot from SSD1 and autoexecute your program. You cannot boot from SSD2.

1. Make sure jumper W2[3–4] is installed. (This is the default setting.)

2. Establish a serial communications link between your PC and the 6024.

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
   ```

   **NOTE:** The drive designators will change depending on your system configuration.

5. Type:

   ```
   RESET
   ```

   The 6024 will reset and boot from SSD1. SSD1 now becomes drive A.

## OVERRIDING PROGRAM AUTOEXECUTION FROM SSD1

If you want to make changes to your program and need to override autoexecution of your program, you must reboot the 6024 from the BIOS drive. There are two options available:

1. You can rerun SETUP to change the "Boot from" option to "BIOS drive with ROM–DOS". If you included the line DEVICE=MEMDRIVE.SYS BIOS in your CONFIG.SYS file, you can access the SETUP program on the 6024 BIOS drive.

2. You can remove jumper W2[3–4]. However, this may be inconvenient and/or impossible if you are making program changes from an off site location.

The following information discusses each of these options in detail.

### To Rerun SETUP:

1. Make sure you have established a serial link between your PC and the 6024.

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

   ```
   E:SETUP
   ```

   **NOTE:** The drive designator will vary depending on the hardware configuration of the 6024.

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 6024.

**Removing Jumper W2[3–4]**

If the SETUP program is not accessible from SSD1, you must remove jumper W2[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 6024:

```
BIOS boot jumper (W2[3–4]) not installed, boot-
ing from the BIOS drive and ignoring the video
jumper setting.
.
.
6024 C:\>
```

After booting from the BIOS drive, use the DISKSAVE and DISKSEND programs to download new files to SSD1. Before rebooting the 6024, be sure to reinstall jumper W2[3–4] if you want the 6024 to boot from SSD1, (or the drive specified in SETUP).

This page intentionally left blank.

## DESCRIPTION

The 6024 has two RS–232 serial ports, COM1 and COM2, that are Intel 8250 compatible. COM3 is RS–422/485 compatible.

COM1 and COM2 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.

| **J4: COM1 and J3: COM2 Serial Ports** | | |
|---|---|---|
| **Pin #** | **Function** | |
| 1 | In | DCD |
| 2 | In | DSR |
| 3 | In | RxD* |
| 4 | Out | RTS |
| 5 | Out | TxD* |
| 6 | In | CTS |
| 7 | Out | DTR |
| 8 | In | RI |
| 9 | Out | Gnd |
| 10 | Out | +5V |

* = active low

Use a VTC–9F cable to connect the ports to the external serial equipment. The pinout of the connector allows you to plug the cable directly into a 9–pin PC serial connector. When interfacing the 6024 to your PC, you will need to use a null modem adapter.

## COM1 AS CONSOLE I/O

The default settings for the 6024 are as follows:

- W2[1–2] — COM1 is the console
- W2[3–4] — Boot from the BIOS drive (default SETUP)

| W2: 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

† = W2[1-2] is ignored

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

With this configuration, the 6024 communicates via COM1 to your PC, accepting keyboard input and displaying responses over the serial link. In this case, the serial parameters of COM1 are:

Baud rate – specified by SETUP
Data bits – 8
Stop bits – 1
Parity – none
Interface – RS–232

When W2[3–4] is removed, the baud rate defaults to 9600.

The TRANSFER program defaults to COM1 as the main console port. Some programs which access the video memory directly will not work properly when using COM1 as the main console. You may need to install a video card for the program to function properly. If you are using a video card, you can use the /COM# switch as described in Chapter 11, *Video and Keyboard*. For other programs, you may need to make modifications. Refer to the DEMO.BAS program on the utility disk for an example of QuickBASIC modifications.

## COM1 AS RS–232 I/O

When you have completed developing your application and programmed the 6024, you can used 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 6024 for no console port by removing jumper W2[1–2] and boot the system from SSD1 or floppy/hard drive (not the BIOS drive).

2. Add a video card and monitor to your 6024 system.

## COM3 RS–422/485 COMPATIBILITY

The RS–422/485 compatible port is accessed through COM3 via terminal block P3. You can connect up to 32 units on a multidrop RS–485 network. However, only one transmitter can be active at a time. Although no wire type or maximum wire length is specified in the EIA 485 specification, the EIA 422 specification (which is very similar) lists a maximum length of 4000 ft. COM3 is jumper configurable to use either IRQ2 or IRQ4 at jumper block W1. If your application requires IRQ4 on COM3, you cannot use COM1 as the console port because it also requires IRQ4.

| **W1: COM3 Interrupt Select** | |
|---|---|
| **Pins Jumpered** | **IRQ** |
| [1-2] | IRQ2 |
| [2-3] | IRQ4 |

* = default

## FOUR WIRE TRANSMISSION

COM3 supports four–wire transmissions. The following diagram shows how a typical four–wire mode network is implemented:

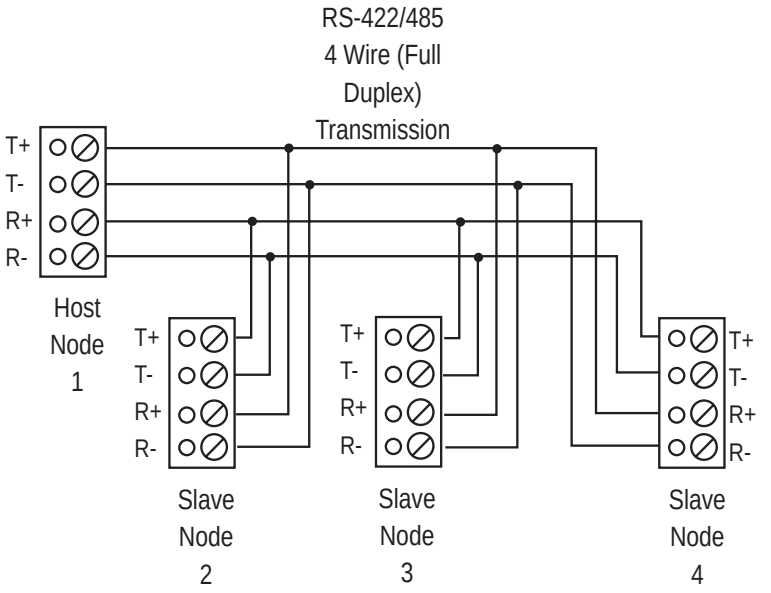


Figure 6–1—Four Wire Network

### Operating Precautions

At COM3 the transmitter and receiver are not optically isolated, therefore you must avoid ground loops. You should only send signals through the RS–485 lines, not power or power grounds. Power grounds cannot be used as a reference ground for RS–485 signals. You will need to establish a common ground reference before implementing your 485 network. The maximum common mode voltage output is +/–7V. Refer to the EIA 485 specification for further details on grounding and safety procedures.

### Transmitter Control

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

| 6024 Transmitter Control | |
|---|---|
| **Program Statement** | **Description** |
| Write a "1" to I/O location 0C3H | Enables transmitter output I/O location 0C3H, 1 |
| Write a "0" to I/O location 0C3H | Disables transmitter output I/O location 0C3H, 0 |

### Termination Network

Jumper block W3 installs or removes the termination network. A termination network must be installed at the last receiver of the network. Failure to do so may cause spurious oscillation on the receive line and corrupt incoming data.

| W3: RS-485 Receiver Termination | |
|---|---|
| **Pins Jumpered** | **Description** |
| [1-3][2-4] | Termination active |
| [3-5][4-6]* | No termination |

* = default

## DISABLING INTERRUPTS

The PC Bus does not allow shared interrupts on the bus. You can, however, disable the COM1 and COM2 interrupts (IRQ3 and IRQ4) 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 9 to 2FC bit 3.

## COM1CON.COM

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

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

```
USECOM1
COM1CON
```

Then execute TEST.BAT.

## QUICKBASIC NOTES

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

# CHAPTER 7 WATCHDOG TIMER & RESET

## DESCRIPTION

The watchdog timer is a failsafe against program crashes or processor lockups. It times out every 1.2 seconds. The address for the watchdog timer enable port is 380H. The timer is software disabled when you write a "0" to 380H. This is the default setting on power–up or reset.

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

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

* = default

## HARDWARE RESET

The 6024 has a button which allows you to reset the system without turning off the power. This provides a more complete reset than the <CTL><ALT><DEL> method. The RESET command also accomplishes the same thing as the reset button.

### Remote Reset

In addition to the push-button reset, there is a separate opto–isolated input so that the 6024 can be remotely reset. The opto–isolation allows the reset line to extend up to 50 feet from the card. The 5V signal resets the system. Noise filtering is built–in. The isolation from the system ground is 100V. The remote reset is accessed at J5.

| J5: Remote Reset & Isolated Input Bit | |
|---|---|
| **Pin #** | **Signal** |
| 1 | Reset - |
| 2 | Reset + |
| 3 | Input + |
| 4 | Input - |

# CHAPTER 8 LPT1 PARALLEL PORT

## DESCRIPTION

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

| J2: LPT1 Printer/Parallel Port | | | | | |
|---|---|---|---|---|---|
| **Pin #** | **Function** | | **Pin #** | **Function** | |
| 1 | Out | STB* | 11 | I/O | Data 5 |
| 2 | Out | AFD* | 12 | I/O | Data 6 |
| 3 | I/O | Data 0 | 13 | I/O | Data 7 |
| 4 | In | ERR* | 14 | In | ACK* |
| 5 | I/O | Data 1 | 15 | In | BUSY |
| 6 | Out | INIT* | 16 | In | PE |
| 7 | I/O | Data 2 | 17 | In | SLCT |
| 8 | Out | SLIN* | 18 | Out | +5 |
| 9 | I/O | Data 3 | 19 | Out | Gnd |
| 10 | I/O | Data 4 | 20 | Out | Gnd |

* = active low

## PRINTER

To install a printer:

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

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

## DISPLAY

The LPT1 port supports either vacuum fluorescent (DP series) or liquid crystal (LCD) displays. To interface the displays to the 6024, use the LCD–IFB interface board for LCD displays and the DP–IFB interface board for the DP series displays. A CMA–20 cable is required to connect the interface board to the 6024. The program DISPLAY.EXE (found on the 6024 utility disk) provides an easy method to use the display. Please refer to the file DISPLAY.DOC on the utility disk for information on how to initialize and use the display.

To install a display:

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

2. Connect the display cable to the interface board.

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

LPT1CON allows the display to be used as the console device. To do this, add the DISPLAY and LPT1CON commands to your AUTOEXEC.BAT file. Keyboard input can be from a local keyboard or from COM1 (if no video card is installed and if W2[1-2], no video jumper, is installed).

## KEYPAD

LPT1 also supports 4x4 matrix keypads. To interface the keypad to the 6024, use either the LCD–IFB or DP–IFB interface board. A CMA–20 cable is required to connect the interface board to the 6024. The program DISPLAY.EXE (found on the 6024 utility disk) provides an easy method to use the keypad. Please refer to the file DISPLAY.DOC on the utility disk for information on how to initialize and use the keypad.

To install a keypad:

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

2. Connect the keypad cable to the interface board.

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

**NOTE:** If your application requires the use of a printer at LPT1 and keypad concurrently, you may connect a keypad, 4x4 or larger, to the digital I/O lines at J8 via a DP–IFB or LCD–IFB terminal board. Use the program DISPLAY.EXE on the 6024 utility disk to read the keypad.

## DIGITAL I/O LINES

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

This page intentionally left blank.

## DESCRIPTION

The 6024 has 24 digital I/O lines at connector J8. These lines can be used to interface with opto–module racks, operate switches, turn on low–current LEDs, and interface with other devices that have TTL input or output (for example, printers and scales). The STB–26 terminal board provides a convenient way of interfacing switches or other digital I/O devices to the 82C55 digital port on the 6024. I/O lines at connector J8 can be connected to the STB–26 with a CMA–26 cable. Digital I/O devices are then connected to the screw terminals on the STB–26. Figure 9–1 shows a typical opto rack and/or terminal board configuration.

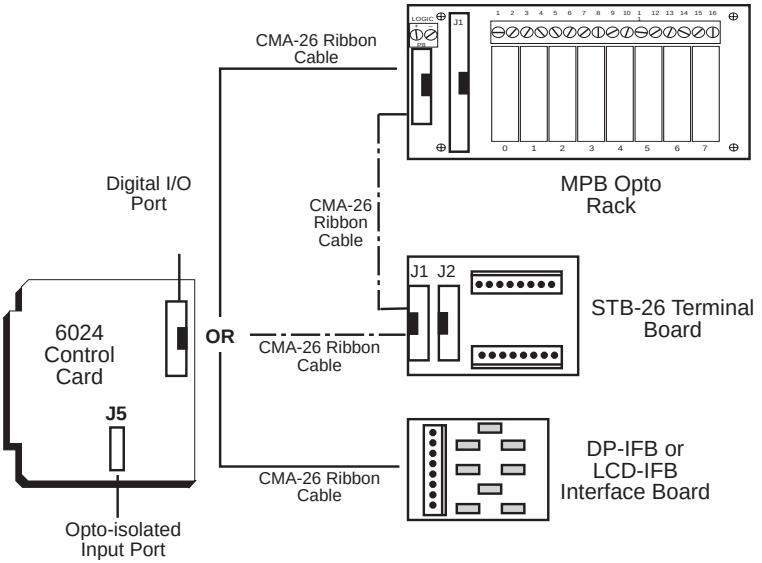


Figure 9-1—Typical Opto Rack and Terminal Board Configuration

**WARNING:** Apply power to the 6024 Control Card before applying an input voltage to the digital I/O lines. This prevents excessive currents from flowing and damaging input devices.

## ORGANIZATION OF THE PORTS

The 24 digital I/O lines on the 6024 are supplied by a 82C55 chip. The 82C55 is located in U26, which is connected to J8. On power–up and software or hardware reset, all the 82C55 digital I/O lines in J8 are configured as inputs. All lines are TTL logic level compatible (0–5V) and have 10K pull–up resistors to the 5V supply. These lines can be pulled–up or down via jumper block W4:

| W4: Digital I/O Pull-up/Pull-down Resistors | |
|---|---|
| **Pins Jumpered** | **Description** |
| [1-2]* | I/O lines pulled high |
| [2-3] | I/O lines pulled low |

* = default

The 82C55 has three ports with eight parallel I/O lines (bits) per port. Each port has a unique I/O address. Port A and Port B can be programmed as all inputs or all outputs. Port C can be programmed in one group of eight lines (all inputs or all outputs) or as two groups of four lines (upper and lower C). The four lines in upper or lower C can each be programmed as all inputs or all outputs. When a line is configured as an output, it can sink a maximum of 2.5 mA at 0.4V and can source over 2.5 mA at 2.4V. When driving opto-modules, the output can sink 15 mA at 1.0V.

**NOTE:** Port B uses a ULN2804 high current Darlington array in IC socket U28. The array outputs are open collector and can drive loads as high as 100 mA at 50V. With the ULN2804 installed, port B can only be used as an output port. Port B can be converted to standard 0-5V I/O with the supplied jumper block installed in socket U28. Install the jumper block leaving pins 9 and 10 open. If the jumper is incorrectly installed, VCC - pin 10, will be shorted to GND - pin 9.

| 6024 Digital I/O Port: J8 | | |
|---|---|---|
| **Port** | **I/O Address** | **Description** |
| A | 208H | 8 lines which can be programmed as all inputs or all outputs |
| B | 209H | 8 lines which can be programmed as all inputs or all outputs. 8 lines interface to a high current driver. |
| C | 20AH | 8 lines which can be programmed as one group of 8 lines or two groups of 4 lines as all inputs or all outputs. |
| Control Register | 20BH | |

## CONFIGURING THE 82C55 DIGITAL I/O LINES

On power–up or reset, all ports are inputs. You can alter which ports are inputs or outputs by writing a control command to the control register in the 82C55.

| 6024 Digital I/O Control Commands | | | | | |
|---|---|---|---|---|---|
| **HEX** | **DEC** | **Port A*** | **Port B*** | **Upper Port C*** | **Lower Port C*** |
| 80H | 128 | OUT | OUT | OUT | OUT |
| 81H | 129 | OUT | OUT | OUT | IN |
| 82H | 130 | OUT | IN | OUT | OUT |
| 83H | 131 | OUT | IN | OUT | IN |
| 88H | 136 | OUT | OUT | IN | OUT |
| 89H | 137 | OUT | OUT | IN | IN |
| 8AH | 138 | OUT | IN | IN | OUT |
| 8BH | 139 | OUT | IN | IN | IN |
| 90H | 144 | IN | OUT | OUT | OUT |
| 91H | 145 | IN | OUT | OUT | IN |
| 92H | 146 | IN | IN | OUT | OUT |
| 93H | 147 | IN | IN | OUT | IN |
| 98H | 152 | IN | OUT | IN | OUT |
| 99H | 153 | IN | OUT | IN | IN |
| 9AH | 154 | IN | IN | IN | OUT |
| 9BH | 155 | IN | IN | IN | IN |

*Ports A and B must be either all inputs or all outputs. Each half of Port C is controllable. Upper C includes bits 4 through 7 and lower C includes bits 0 to 3.

## Examples

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

```
OUT &H20B, &H80
```

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

```
OUT &H20B, &H99
```

## OPTO–MODULE RACK INTERFACE

You can interface digital I/O lines from J8 to an MPB–8, MPB–16, or MPB–24 series opto–module rack via a CMA–26 cable. One end of the CMA–26 cable plugs into J8 and the other plugs into an MPB–8, MPB–16, or MPB–24 mounting rack. Use isolator modules when driving or receiving signals from high voltage and/or high current devices. Opto–isolation also eliminates ground loops and significantly reduces the chance that noise will invade the system.

You can also use a CMA–26 cable to connect J8 on the 6024 to a STB–26 terminal board and then to the opto rack. The STB–26 has two 26–pin connectors, one of which plugs into J8; the other plugs into the opto rack.

For either configuration, run a separate line to 5V and ground on the opto–module rack. Use the following table to determine the corresponding opto channel for a particular port.

**6024 Opto Rack Interface**

| Opto Channels | 82C55 Port | I/O Address |
|---|---|---|
| 0-3 | Lower C | 20AH |
| 4-7 | Upper C | 20AH |
| 8-15 | A | 208H |
| 16-23 | B | 209H |

## OPTO–ISOLATED PORT: J5

In addition to the digital I/O lines at J8 on the 6024, a single opto–isolated input port is available at connector J5. This input port shares the same connector with the isolated reset input. A voltage of 3V to 12V may be applied to pins 2 and 4 of J5. They are read via software at I/O location C0H on data bit 1. For example, if 5V is applied between pins 3 and 4 of J5, bit 1 of address C0H will be at a logic 1. If no input voltage is applied, bit 1 will be read as a logic 0:

| J5: Remote Reset & Isolated Input Bit | |
|---|---|
| **Pin #** | **Signal** |
| 1 | Reset - |
| 2 | Reset + |
| 3 | Input + |
| 4 | Input - |

## DESCRIPTION

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

## READING THE SERIAL EEPROM

The following Borland C example reads word 2:

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

## WRITING TO THE SERIAL EEPROM

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

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

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

This page intentionally left blank.

# CHAPTER 11 VIDEO AND KEYBOARD

## DESCRIPTION

You can use a video card with monitor and a keyboard with the 6024 instead of using your PC keyboard and monitor over a serial communications link. The speaker and keyboard lines are brought out to a 10–pin connector via a CMA–10 cable. The Octagon PSKI–1 interface provides a PC compatible connector for the keyboard and provides screw terminals for the speaker. Any XT compatible keyboard may be used.

This chapter tells you:

1. How to use a video monitor and keyboard with a 6024;
2. How to save a program from your PC to the 6024; and
3. How to transfer files between your PC and a 6024 with a video and keyboard only.

## USING A VIDEO MONITOR AND KEYBOARD

You will need the following equipment (or equivalent) to use your 6024 with a video and keyboard:

6024 PC Control Card
Micro PC Card Cage
Power Module
5400, 5410 or 5420 Video Card
XT Compatible Keyboard
PSKI–1 Interface Board
VTC–9F Cable
Monitor
CMA–10 Cable
Null modem adapter

1. Configure the 6024 to use COM1 as the console by setting W1[1–2]. Make sure the 6024 will boot from the BIOS drive.

2. Connect the video monitor to the video card.

3. Connect the PSKI–1 to J1 (keyboard/speaker port) on the 6024 using a CMA–10 cable and then connect the keyboard to the PSKI–1.

4. Install the 6024 and video card into the card cage.

5. Boot the 6024 from the BIOS drive. The following message should appear on your video monitor:

```
Octagon 6024 BIOS Vers x.xx
Copyright (c) 1991-1996, Octagon Systems, Corp. (TM)
All Rights Reserved
```

### Saving a Program to the 6024

1. Create a bootable floppy disk with COMMAND.COM, CONFIG.SYS, AUTOEXEC.BAT, your applications and other supporting files. (Refer to Chapter 5, *Save and Run Programs*, if you are using ROM–DOS. Refer to Chapter 13, *Using Your Own DOS/OS*, if using other versions of DOS.)

2. Copy the program DISKSEND from the 6024 utility disk to your PC.

3. Connect a VTC–9F cable with a null modem adapter between COM1 of your PC to COM1 of the 6024.

4. On the 6024, execute the DISKSAVE program.

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

   `C>DISKSEND SSD1A` (or SSD1B)

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

   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 6024 and the DISKSEND program resides on the 6024 utility disk.

### Transferring Files to the 6024

1. Connect a VTC–9F cable with a null modem adapter between COM1 of your PC to COM1 of the 6024.

2. Execute the TRANSFER program from the 6024 to receive a file from your PC.

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

   *filename.ext* is the name of the file on the 6024 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 the 6024 to send a file from your PC.

   `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 6024.

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

### Transferring Files from the 6024

1. Connect a VTC–9F cable with a null modem adapter between COM1 of your PC to COM1 of the 6024.

2. Execute the TRANSFER program from the 6024 to send a file to your PC.

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

   *filename.ext* is the name of the file on the 6024 which you are sending to your PC.

3. Execute the TRANSFER program for the 6024 to receive a file on your PC.

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

*filename.ext* is the name of the file on the PC which you are receiving from the 6024.

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

# CHAPTER 12 EXTERNAL DRIVES

## DESCRIPTION

You can use your 6024 Control Card with one or two floppy disk drives and/or a hard disk drive. This chapter includes installation and operation instructions for each device. Also, refer to the instruction manuals included with each device.

For each of the devices below, the first step is to install the 6024 Control Card into the Micro PC backplane. Refer to the instructions in Chapters 4–5 if you will be booting from the BIOS drive or from SSD1 using ROM–DOS. If you are booting up using your own DOS, refer to the instructions in Chapter 13.

You can also boot your 6024 from a floppy or hard disk. However, MEMDRIVE.SYS must be placed in your CONFIG.SYS file in order for the system to access SSD1, SSD2 or the BIOS drive.

## FLOPPY DISK DRIVES

You can add two floppy disk drives (3.5 in. or 5.25 in.) by using the 5800A Floppy/Hard Disk Card with your 6024 card.

1. Install the 6024 Control Card.

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

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

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

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

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

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

6. If, in SETUP, you entered 0 drives, access to either A: or B: will generate an error message:

   ```
   ABORT RETRY FAIL?
   ```

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

   If, in SETUP, you entered 1 drive, then you can access drive A: and requests to access drive B: result in the following prompt:

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

   Insert another floppy disk and press a key. The program then accesses your one drive as drive B:. When the request is complete, 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: works just as it 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/OS*.

## HARD DISK DRIVE

The 5800A Series of Micro PC Floppy/Hard Disk Drive Cards support 16–bit, IDE type hard drives. The disk drive designation for a hard drive will be D: if you boot from ROM–DOS and C: if you boot using your own DOS.

# CHAPTER 13 USING YOUR OWN DOS/OS

## DESCRIPTION

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

## GETTING STARTED

1. Make sure jumper W2[1–2] and W2[3–4] are installed.

2. Verify that power to the card is OFF and install your 6024 Control Card and peripheral equipment, except for the video card, into the card cage

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

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

   ```
   Octagon 6024 BIOS Vers x.xx
   Copyright (c) 1991-1996 Octagon Systems, Corp. (TM)
   All Rights Reserved
   ```

   If you do not get the proper logon message:

   - Remove W2[3–4]. Also 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.
   - 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. Enter:

   ```
   DIR
   ```

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

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 6024 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.

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 6024 and the DISKSEND program resides on the 6024 Utility Disk.

### Booting the 6024 from a Floppy/Hard Disk Drive

1. Type:

   ```
   SETUP
   ```

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

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

3. After completing the information for SETUP, insert your bootable disk (which contains your DOS) into the floppy disk drive.

4. Reboot the system by typing:

   ```
   RESET
   ```

### Booting from SSD1 with/without a Floppy Drive

1. Create a bootable floppy disk on your PC and copy your DOS version of COMMAND.COM, all device drivers and necessary application files onto the floppy.

2. Copy the file DISKSEND.EXE from the 6024 utility disk to your PC.

3. Establish a serial communications link between your PC and the 6024. Configure your PC as the main console for the 6024, i.e., no video card or keyboard is available.

4. On the 6024, execute the DISKSAVE program by typing:

   ```
   C:>DISKSAVE SSD1A
   ```
   (or SSD1B)

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

   PC SmartLINK IV:

   - Press <ALT> + <D> to download a file.
   - Press <ALT> + <P> to program SSD1.
   - Press <ENTER>

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

**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.

Continue with step 7.

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

   ```
   C>DISKSEND SSD1A  (or SSD1B)
   ```

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

   **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.

   Restart PC SmartLINK.

7. Type:

   ```
   RESET
   ```

8. Display and verify the contents of SSD1:

   ```
   DIR E:
   ```

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

   ```
   SSD1 using user supplied DOS
   ```

10. Install jumper W2[3–4], if needed, 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 6024 card are removed from the card cage. This ensures that other cards are not interacting with the 6024 and that no video card is installed.

2. Install W2[1–2] or remove W2[3–4].

3. The VTC–9F serial cable turns the 6024 Control Card serial port into a 9–pin AT serial port. Make sure a null modem adapter is installed on the other end, and that the assembly is inserted into the proper serial port on the PC. Make sure the VTC–9F serial cable is connected to J4 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 J4 (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 W2[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 6024 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 W2[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. If some files are missing, you will need to copy any missing files to your floppy disk and re–execute the DISKSEND and DISKSAVE programs.

4. If no files are missing, reprogram 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 ROM–DOS COMMAND.COM resides on SSD1.

**Booting from SSD1 with DOS doesn't work:**

1. If you made SSD1 using a floppy drive, test the boot files on the floppy drive of your PC. Also, make sure all the necessary boot files are present.

### Cannot save programs to flash

1. Make sure the flash device(s) are installed in SSD1 correctly and that there are no bent pins. If using only one 256K flash, make sure it is installed in socket SSD1A.

2. Confirm that the Dallas clock, DS1216DM, is installed. A DS1216D from Dallas SemiConductor will not work properly. It requires minor modifications. Call Technical Support for more information.

### Clock doesn't work

1. Verify SETUP indicates a clock is installed.

2. Make sure the DS–1216DM is installed in SSD2 correctly.

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

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

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

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

## 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.

This page intentionally left blank.

## TECHNICAL SPECIFICATIONS

**CPU**
V20 (CMOS 80C88)

**Clock**
4.77 or 12 MHz, 12 MHz is default; software selectable.

**BIOS**
PC compatible with industrial extensions.

**DRAM**
1 MB; 80 nS; 0 wait state; supports the LIM 4.0 standard above 640K.

**Solid–State Disks**
SSD0 contains the BIOS and ROM–DOS 6.22.

SSD1 supports one or two 256K flash EPROMs for application programs. Programmer built–in. Also supports 256K or 512K standard EPROMs. (External programmer required.) EPROMs not included. The types of EPROMs cannot be mixed. Supports 2–256K flash EPROMs, 2–256K EPROMs or 2–512K EPROMs.

SSD2 supports 128K/512K static RAMs that may be battery–backed. RAM and Dallas module not included.

**Serial EEPROM**
68 bytes available to user in standard model. Options to 452 bytes are available.

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

**Serial Ports**
8250 compatible UARTs; interface is standard RS–232. Serial voltages generated on card. COM1 and COM2 are RS–232. COM3 is RS–422/485 only.

**LPT1 Printer Port**
Standard Centronics/IBM parallel port. Data lines are bidirectional. 24 mA drive capability.

**Digital Port**
24 lines programmable as inputs or outputs in groups of 4 or 8. 0–5V voltage levels. Source and sink current 2.5 mA for logic interface. Drive current is 12 mA when driving opto module racks. All lines may be pulled down to ground or up to 5V through 22K resistors.

8 of the 24 lines above will also drive loads as high as 100 mA and 50V. This is the default. These 8 lines can be converted to standard 0–5V I/O with a supplied jumper block.

This port is terminated with a 26–pin IDC connector.

**Hardware Reset**
Reset button allows system reset without turning off the power.

**Remote Reset**
Opto–isolated, 5V operation. 100V of isolation. Reset line can extend up to 50 feet from the card. Four pin locking connector. One each (housing) Amp #102241–2. Four each (receptable contact) Amp #1–102316–4.

**Software Supplied**
BIOS is PC–compatible. ROM–DOS 6.22, combined with BIOS ROM. Programs should not make undocumented DOS calls or jump directly into the middle of DOS.

**Power Requirements**
+5V +/-5% at 254 mA typical. 350 mA during flash memory programming. Does not include any digital output or serial port current.

**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**
Timeout is fixed at 1.2 seconds. Address of the enable timer is 380H; address of strobe is 201H.

**Battery Backed Calendar/Clock**
Supports optional Dallas SmartWatch DS–1216DM modules to battery back 128K or 512K static RAMs.

## Memory Map

| 6024 Memory Map | |
|---|---|
| **Address** | **Description** |
| 00000-9FFFFH | System Memory |
| A0000-CFFFFH | Off-card memory |
| D0000-DFFFFH | Solid-state disks |
| E0000-FFFFFH | BIOS/DOS SSD0 |

## I/O Map

| 6024 I/O Map | |
|---|---|
| **Hex Range** | **Function** |
| 000-00F | 8237 DMA #1 |
| 020-021 | 8259 PIC #1 |
| 040-043 | 8253 Timer |
| 060-063 | 8255 PPI (XT) |
| 080-08F | DMA Page Registers |
| 0A0-0AF | NMI Mask Register (XT) |
| 0C0-0C7 | Bit port (write) |
| 0C0 | Serial EEPROM CS & opto-isloated input bit |
| 0C1 | Serial EEPROM data in |
| 0C2 | Serial EEPROM clock |
| 0C3 | RS-485 driver enable |
| 0C4 | Not used |
| 0C5 | LPT1 I/O direction enable |
| 0C6 | Not used |
| 0C7 | Not used |
| 0C0-0C7 | Bit port (read) |
| 0C0 | W2 jumpers, EEPROM |
| 100-1FF | Off card |
| 200-207 | Watchdog strobe port |
| 208-20F | Industrial I/O (8255 - J8) |
| 208 | Port A |
| 209 | Port B |
| 20A | Port C |
| 20B | Control register |
| 210-2F7 | Off card |
| 2F8-2FF | COM2 serial port |
| 300-377 | Off card |
| 378-37F | LPT1 printer port |
| 380-387 | Bit port |
| 380 | Watchdog enable |
| 381 | Flash program voltage on |
| 382 | SSD bank switch A16 |
| 383 | SSD bank switch A17 |
| 384 | SSD bank switch A18 |
| 385 | SSD socket select |
| 386 | Power LED |
| 387 | SSD socket enable |
| 388-3E7 | Off card |
| 3E8-3EF | COM3 serial port |
| 3F0-3F7 | Off card |
| 3F8-3FF | COM1 serial port |

## INTERRUPTS

| 6024 Interrupts | |
|---|---|
| **Interrupt** | **Description** |
| 0 | Timer |
| 1 | Keyboard |
| 2 | Cascade to second interrupt controller |
| 3 | COM2/COM4 |
| 4 | COM1/COM3 |
| 5 | Hard Drive (XT) |
| 6 | Floppy Drive |
| 7 | LPT1 (Not used by ROM-DOS) |

## JUMPER CONFIGURATIONS

| W1: COM3 Interrupt Select | |
|---|---|
| **Pins Jumpered** | **IRQ** |
| [1-2]* | IRQ2 |
| [2-3] | IRQ4 |

* = default

| W2: 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

† = W2[1-2] is ignored

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

| W3: RS-485 Receiver Termination | |
|---|---|
| **Pins Jumpered** | **Description** |
| [1-3][2-4]* | Termination active |
| [3-5][4-6] | No termination |

* = default

| W4: Digital I/O Pull-up/Pull-down Resistors | |
|---|---|
| **Pins Jumpered** | **Description** |
| [1-2]* | I/O lines pulled high |
| [2-3] | I/O lines pulled low |

* = default

| W5: SSD1 Memory Device Select | |
|---|---|
| **Pins Jumpered** | **Description** |
| [1-2]* | 256K Flash EPROM |
| [2-3] | 512K EPROM |

* = default

## CONNECTOR PINOUTS

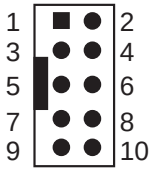


Figure 15–1—Typical IDC Header/Pin Orientation

| J1: Keyboard/Speaker Port | |
|---|---|
| **Pin #** | **Function** |
| 1 | Keyboard clock |
| 2 | Keyboard data |
| 3 | N.C. |
| 4 | Gnd |
| 5 | +5 |
| 6 | N.C. |
| 7 | N.C. |
| 8 | +5 |
| 9 | Speaker |
| 10 | Gnd |

| J2: LPT1 Printer/Parallel Port | | | | | |
|---|---|---|---|---|---|
| **Pin #** | **Function** | | **Pin #** | **Function** | |
| 1 | Out | STB* | 11 | I/O | Data 5 |
| 2 | Out | AFD* | 12 | I/O | Data 6 |
| 3 | I/O | Data 0 | 13 | I/O | Data 7 |
| 4 | In | ERR* | 14 | In | ACK* |
| 5 | I/O | Data 1 | 15 | In | BUSY |
| 6 | Out | INIT* | 16 | In | PE |
| 7 | I/O | Data 2 | 17 | In | SLCT |
| 8 | Out | SLIN* | 18 | Out | +5 |
| 9 | I/O | Data 3 | 19 | Out | Gnd |
| 10 | I/O | Data 4 | 20 | Out | Gnd |

* = active low

| J4: COM1 and J3: COM2 Serial Ports | | |
|---|---|---|
| **Pin #** | **Function** | |
| 1 | In | DCD |
| 2 | In | DSR |
| 3 | In | RxD* |
| 4 | Out | RTS |
| 5 | Out | TxD* |
| 6 | In | CTS |
| 7 | Out | DTR |
| 8 | In | RI |
| 9 | Out | Gnd |
| 10 | Out | +5 |

* = active low

| J5: Remote Reset & Isolated Input Bit | |
|---|---|
| **Pin #** | **Signal** |
| 1 | Reset - |
| 2 | Reset + |
| 3 | Input + |
| 4 | Input - |

| J8: Digital I/O Port | | | |
|---|---|---|---|
| **I/O Line** | **Port A** | **Port B** | **Port C** |
| Line 0 | 19 | 10* | 13 |
| Line 1 | 21 | 8* | 16 |
| Line 2 | 23 | 4* | 15 |
| Line 3 | 25 | 6* | 17 |
| Line 4 | 24 | 1* | 14 |
| Line 5 | 22 | 3* | 11 |
| Line 6 | 20 | 5* | 12 |
| Line 7 | 18 | 7* | 9 |
| +5V - Pin 2 | | | |
| Gnd - Pin 26 | | | |

* These lines are also high current.

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

* = active low

This page intentionally left blank.

# APPENDIX A SOFTWARE UTILITIES

## INTRODUCTION

The 6024 ROM–DOS and Software Utility Disk comes with the utilities listed below. Some of these utilities are also available on the 6024 BIOS drive. This appendix describes the utilities and their use.

**Support commands:**

COM1CON.COM
DISKSAVE.EXE
DISKSEND.EXE
DSKTOBIN.COM
FAST.COM
LPT1CON.COM
MAKESSD1.COM
REMDISK.EXE
REMQUIT.EXE
REMSERV.EXE
RESET.COM
SETUP.COM
SHOWTIME.COM
SLEEP.COM
SLOW.COM

**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 transfer a disk into SSD1.

**SYNTAX:** **DISKSAVE**

**REMARKS:** This program saves data to SSD1. This program is used in conjunction with DISKSEND. Start DISKSAVE on the 6024 and then start DISKSEND on your PC. The following message displays:

```
6024 DISKSAVE v2.03 Octagon Systems, Corp.
Ready to save disk in SSDxx.
Attempting connection with DISKSEND on
remote host.
```

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

If SSD1 has been configured as two drives, you must specify either SSD1A or SSD1B when using DISKSAVE.

| Switch | Options | Default |
|---|---|---|
| /B[baud rate] | 1200,2400,9600... | 57600 |
| /C[com port] | 1,2,3,4 | 1 |
| /D[data bits] | 7,8 | 8 |
| /S[stop bits] | 1,2 | 1 |
| /P[parity] | NONE,EVEN,ODD | NONE |
| /H[handshake] | ECHO,CTS,XON | CTS |

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

```
DISKSAVE /B2400 /C2
```

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

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

**SEE ALSO:** DISKSEND

# DISKSEND.EXE

**DISKSEND.EXE** Support Command

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

**SYNTAX:** **DISKSEND**

**REMARKS:** This program reads a diskette from your PC and transfers it to the 6024. It is used in conjunction with DISKSAVE, which programs the flash EPROM in SSD1 with the diskette image. Start DISKSAVE on the 6024 and then start DISKSEND on your PC. The following message displays:

```
6024 DISKSEND v1.01 Octagon Systems, Corp.
Attempting connection with DISKSAVE on
remote host.
```

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

```
Connection established.
```

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

```
Connection failed!
```

Next, DISKSEND verifies the SETUP parameters on the 6024. If the SSD1 device is NONE, the response is:

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

Otherwise the following message appears:

```
Input drive to send:
```

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

If you entered drive A and the 6024 has 256K flash, the next message is:

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

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

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

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

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

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

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

Either:

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

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

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

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

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

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

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

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

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

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

```
DISKSAVE /B2400 /C2
```

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

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

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

```
B: /C2
```

# DSKTOBIN.COM

**DSKTOBIN.COM** Support Command

**SYNTAX:** **DSKTOBIN**

**PURPOSE:** Converts a disk to a binary image file to program EPROMs for a 5805 card.

**REMARKS:** This program converts a disk to a binary image file, which can be input for an EPROM programmer on your PC. The output binary files can be programmed via an external EPROM programmer. This program is run either on the PC or on the 6024 with floppy support and external programmer.

**EXAMPLE 1:** The following example illustrates how to create a binary image file for programming into one 512K EPROM. This can be used when there is "1 512K EPROM" or "1024 (2 - 512Ks) AS TWO DISKS."

After the copyright message displays, the following menu appears:

```
DESTINATION DEVICE SELECTION MENU
---------------------------------
1-128K EPROM (27C010) for SSD1.
2-256K EPROM (27C020) for SSD1.
3-512K EPROM (27C040) for SSD1.
4-1MB EPROM (27C080) for SSD1.
5-128K FLASH EPROM (28F010) for SSD1.
6-256K FLASH EPROM (28F020) for SSD1.
7-128K FLASH EPROMs (28F010) for 5805
SSD.
ESC - Exit
Please select the destination device: 3
```

After you select a destination device, for example 3, the following appears:

```
FLOPPY IMAGE DRIVE
  Enter the floppy drive which is the
  image you wish to transfer to the
  6024 control card SSD1.

  Image floppy drive (default A) : A
```

Respond by entering the drive letter of the floppy drive, for example A, which is to be source for the binary image file.

```
TEMPORARY FILE STORAGE DRIVE

  Enter the drive to store the temporary
  file(s) created by DSKTOBIN. An external
  EPROM programmer uses this file when
  programming the EPROM for SSD1.
  NOTE: You may NOT use the same drive the
  image is created from.

  Temporary file storage drive (default C): C
```

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

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

```
FLOPPY IMAGE CONVERSION
  Creating temporary file C:FLPYIMG.001

  Finished creating the floppy image file.
```

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

```
WHAT TO DO NEXT
  Program the binary file FLPYIMG.OO1 into
  an EPROM using an external EPROM pro-
  grammer.

C:\MICROPC\6024\UTL> dir flpyimg.001

  Volume in drive C has no label
  Volume Serial Number is 4339-0CF3
  Directory of C:\MICROPC\6024\UTL
  FLPYIMG 001    524,288 07-21-95  10:53a
```

```
    1 file(s)      524,288 bytes
           79,069,184 bytes free

C:\MICROPC\6024\UTL>
```

Use the FLPYIMG.001 file to program the EPROM on the external EPROM programmer. (Insert the EPROM into SSD1A or SSD1B when programmed.)

**EXAMPLE 2:** The following example illustrates how to create binary image files for programming two 512K EPROMs as one disk.

After the copyright message displays, the following menu appears:

```
DESTINATION DEVICE SELECTION MENU
-----------------------------------
1-128K EPROM (27C010) for SSD1.
2-256K EPROM (27C020) for SSD1.
3-512K EPROM (27C040) for SSD1.
4-1MB EPROM (27C080) for SSD1.
5-128K FLASH EPROM (28F010) for SSD1.
6-256K FLASH EPROM (28F020) for SSD1.
7-128K FLASH EPROMs (28F010) for 5805
SSD.
ESC - Exit
Please select the destination device: 7
```

After you select a destination device, for example 7, the following appears:

```
  5805 SSD SIZE MENU
-------------------------
Eight sizes are available:
   0 - 128K (1 EPROM)
   1 - 256K (2 EPROMs)
   2 - 384K (3 EPROMs)
   3 - 512K (4 EPROMs)
   4 - 640K (5 EPROMs)
   5 - 768K (6 EPROMs)
   6 - 896K (7 EPROMs)
   7 - 1024K (8 EPROMs)
   ESC - Exit
Select size: 7
```

After you select a size, for example 7, the next prompt appears:

```
FLOPPY IMAGE DRIVE
  Enter the floppy drive which is the
  image you wish to transfer to the
  6024 control card SSD1.

  Image floppy drive (default A) : A
```

Respond by entering the drive letter of the floppy drive, for example A, which is to be source for the binary image file.

```
TEMPORARY FILE STORAGE DRIVE

  Enter the drive to store the temporary
  file(s) created by DSKTOBIN. The
  BINTOUSR program uses these files when
  programming SSD1.

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

  Temporary file storage drive (default C): C
```

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

The program then creates the binary image files and displays:

```
FLOPPY IMAGE CONVERSION
  Creating temporary file C:FLPYIMG.001.
  Creating temporary file C:FLPYIMG.002.
  Creating temporary file C:FLPYIMG.003.
  Creating temporary file C:FLPYIMG.004.
  Creating temporary file C:FLPYIMG.005.
  Creating temporary file C:FLPYIMG.006.
  Creating temporary file C:FLPYIMG.007.
  Creating temporary file C:FLPYIMG.008.

  Finished creating the floppy image
  files.
```

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

A message similar to the following appears with instructions on what to do next. (Ignore the following instructions when using EPROMs.)

```
WHAT TO DO NEXT
  If you have a floppy and 5800/A card
  with your 6024 control card, copy the
  temporary files to a floppy starting
  with FLPYIMG.001.
                    or
  Boot the 6024 using the BIOS drive card
  and using COM1 to talk to your PC. Then
  transfer FLPYIMG.001 to the local
  virtual drive on the 6024 using the
  TRANSFER program and an XMODEM transfer
  system (such as SmartLINK).

  Then execute the BINTOUSR program on the
  6024 to program SSD1.

  See the 6024 User Manual for further
  details.
```

```
C:\MICROPC\6024\UTL> copy /b flpyimg.001+flpyimg.002+
flpyimg.003+flpyimg.004 flpyimg.b1
FLPYIMG.001
FLPYIMG.002
FLPYIMG.003
FLPYIMG.004
      1 file(s) copied

C:\MICROPC\6024\UTL> copy /b flpyimg.005+flpyimg.006+
flpyimg.007+flpyimg.008 flpyimg.b2
FLPYIMG.005
FLPYIMG.006
FLPYIMG.007
FLPYIMG.008
      1 file(s) copied

C:\MICROPC\6024\UTL> dir flpyimg.b*

Volume in drive C has no label
Volume Serial Number is 4339-0CF3
Directory of C:\MICROPC\6024\UTL
FLPYIMG B1    524,288 07-21-95  11:15a
FLPYIMG B2    524,288 07-21-95  11:17a
```

```
      2 file(s)      1,048,576 bytes
             77,496,320 bytes free

C:\MICROPC\6024\UTL>
```

Burn a 512K EPROM using the FLPYIMG.B1 file and insert this into SSD1A. Burn another 512K EPROM using the FLPYIMG.B2 file and insert this into SSD1B.

# FAST.COM

**FAST.COM** Support Command

**PURPOSE:** To change CPU clock speed to 12 MHz.

**SYNTAX:** **FAST**

**REMARKS:** The 6024 boots with the default 12 MHz clock speed. If you changed to the slower 4.77 MHz clock speed by using the SLOW command and now need to return to 12 MHz, enter the following from the DOS prompt:

```
FAST
```

You can also enter <CTL><ALT><+> to switch to 4.77 MHz if you are using a keyboard and monitor with the 6024.

**SEE ALSO:** SLOW

# LPT1CON.COM

**LPT1CON.COM** Support Command

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

**SYNTAX:** **LPT1CON**

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

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

# MAKESSD1.COM

**MAKESSD1.COM** Support Command

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

**SYNTAX:** **MAKESSD1**

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

```
MAKESSD1 SSD1A (or SSD1B)
```

After the copyright message displays, the following message displays:

```
Which disk do you want to copy to
the XXXK memory device in SSD1A/
SSD1B (default D:)
```

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

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

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

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

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

SSD1 using user supplied DOS — To boot with your DOS on SSD1. SSD1 must contain all required DOS boot files. See your DOS manual for more information.

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

# 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 SSD1A  Accesses SSD1A
DEVICE=MEMDRIVE.SYS SSD1B  Accesses SSD1B
DEVICE=MEMDRIVE.SYS SSD2   Accesses SSD2
```

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

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

```
6024 MEMDRIVE.SYS V2.06, memory device
not found in SSD2.
```

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

```
6024 MEMDRIVE.SYS V2.06, formatting SSD2
(128KB) as drive F:
```

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

```
6024 MEMDRIVE.SYS V2.06, memory device
not found in SSD2
```

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

```
6024 MEMDRIVE.SYS V2.06, assigning SSD2
(128KB) as drive F:
```

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

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

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

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

The /NOIFEMS switch is optional. If it is included on a 1 MB system, 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:

```
6024 MEMDRIVE.SYS V2.06 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 expanded memory as a drive

`DEVICE=MEMDRIVE.SYS EMS mmm sss`
Expanded memory as a drive of size mmm. Starting address at 16K page # sss.

- sss: 0 = start addr. 1MB
- sss: 1 = start addr. 1MB+16K
- sss: 2 = start addr. 1MB+32K

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

| **EMS Virtual Drives** | |
|---|---|
| **DRAM Installed** | **Virtual Drive Size** |
| 512K | 136K |
| 1 MB | 384K |

# REMDISK.EXE

**REMDISK.EXE** Support Command

**PURPOSE:** Allows access to a disk drive on a remote system via a serial cable and standard PC style (8250 UART) serial port.

**SYNTAX:** **REMDISK** [**/U**] [**/?**] [**/B*nnnn***] [**+**] [**/COM*n***]

**REMARKS**: In a Remote Disk setup, one system, the one that will share its drives, is termed the Server. The other system, the one that will access and use the remote drives, is called the Client. The serial ports on both systems must be connected via null modem cable. A cabling diagram for a standard cable is shown below:

| DB9 TO DB9 | DB25 TO DB25 | DB9 TO DB25 |
|---|---|---|
| 2----------3 | 2----------3 | 2----------3 |
| 3----------2 | 3----------2 | 3----------2 |
| 7----------8 | 4----------5 | 7----------4 |
| 8----------7 | 5----------4 | 8----------5 |
| 5----------5 | 7----------7 | 5----------7 |
| 6----------4 | 6---------20 | 6----------6 |
| 4----------6 | 20----------6 | 4----------20 |

Run REMDISK.EXE on the Client system. This program creates a new drive letter for the Client. REMDISK will use the next available system drive letter. For example, if the last assigned drive was D:, REMDISK will create a drive E:. This drive acts in all ways just like any other drive, except for the fact that it requires the serial port to do its job.

REMDISK.EXE can be installed using a **DEVICE=** command in CONFIG.SYS or from the DOS prompt.

**/U** tells REMDISK to unload itself from memory, thereby disabling the new drive

letter and freeing the memory occupied by REMDISK. The option can only be used when REMDISK is installed from the DOS command line. A Remote Disk installed via CONFIG.SYS cannot be unloaded.

**/?** displays a short help screen for the REMDISK program. No other arguments are to be included on the command line when the **/?** is used.

**/B*nnnn*** selects the baud rate for transmission. Available baud rates are 300, 1200, 2400, 4800, 9600, 19200, 38400, 57600, and 115k. The default baud rate is 115k.

**+** is an optional argument which specifies packet style transmission. This is recommended for any baud rates over 19200. The default for this option is to include the **+** for packet transmission.

**COM*n*** is an optional argument which selects the communication port. Available ports are 1 and 2. COM1 is the default port.

**NOTE:** To use the Remote Disk, both the REMDISK and the REMSERV programs must be running on their respective systems. Both programs must use the same baud rate and packet or non-packet style transmission. It does not matter which program is installed first.

**EXAMPLE 1:** To install the REMDISK program from CONFIG.SYS at 19200, on COM1, using packet style transmission, enter the following in CONFIG.SYS and then reboot the system (remember to include the full path to find REMDISK.EXE if not located in the root directory):

```
DEVICE=REMDISK.EXE /B19200 +
```

**EXAMPLE 2:** To display a help screen for REMDISK, enter the following at the DOS prompt:

```
REMDISK /?
```

**EXAMPLE 3:** To install REMDISK from the DOS prompt or from a Batch file (like AUTOEXEC.BAT) at 9600 baud, without packet style transmission, on COM2, enter the following;

```
REMDISK /B9600 /COM2
```

**EXAMPLE 4:** To unload the REMDISK installed from the batch file or the DOS prompt, type:

```
REMDISK /U
```

**SEE ALSO:** REMSERV.EXE, REMQUIT.EXE

# REMQUIT.EXE

**REMQUIT.EXE** Support Command

**PURPOSE:** To cancel a REMSERV session on a remote system.

**SYNTAX:** **REMQUIT**

**REMARKS**: Once a REMDISK/REMSERV connection is no longer needed, the REMQUIT command is used (on the same CPU running REMDISK) to cancel the REMSERV command. You may also press the ESC key if you have access to a local keyboard to the CPU running REMSERV.

**SEE ALSO:** REMSERV.EXE, REMDISK.EXE

# REMSERV.EXE

**REMSERV.EXE** Support Command

**PURPOSE:** To make a single drive at a time on the server system available to the Client. The available drive can be changed at any time by quitting the REMSERV program and then running the program again with a new drive letter.

**SYNTAX:** **REMSERV.EXE** *d:* [**/B***nnnn*] [**+**] [**/COM***n*] [**/S**]

**REMARKS**: *d:* represents the letter of the drive that the Server will make available to the Client.

**/B***nnnn* selects the baud rate for transmission. Available baud rates are 300, 1200, 2400, 4800, 9600, 19200, 38400, 57600, and 115k. The default baud rate is 115k.

**+** is an optional argument which specifies packet style transmission. This is recommended for any baud rates over 19200. The default for this option is to include the **+** for packet transmission.

**COM***n* is an optional argument which selects the communication port. Available ports are 1 and 2. COM1 is the default port.

**/S** instructs REMSERV to run silently, that is without any screen output.

**/?** is an unlisted option which is used to print a short help screen for the REMSERV program. If the **/?** is used, the drive letter argument is omitted, for example:

```
REMSERV /?
```

**EXAMPLE 1:** To select drive B: as the available Server drive at 115K baud, pack style transmission, using COM1, you would enter the following:

```
REMSERV B:
```

**EXAMPLE 2:** To set drive C: as the Server disk at 9600 baud, without packet style transmission, on COM2, you would enter the following:

```
REMSERV C: /B9600 /COM2
```

**NOTE:** The Server program can be terminated at any time by pressing the <ESC> key. The Client can then no longer access the Server's drive until the REMSERV program is run again.

**SEE ALSO:** REMDISK.EXE, REMQUIT.EXE

# 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 6024 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, enter:

```
SETUP
```

After the copyright message displays, the main menu appears:

```
OCTAGON SYSTEMS CORPORATION
6024 SETUP UTILITY V4.30
---------------------------
(Press SPACE to CHANGE, ENTER to
ACCEPT, ESC to EXIT)

COM1 Console baud rate:   1200
                          2400
                          4800
                          9600
                          19200
                          38400
                          57600
                          115200

Power on memory test:Enabled
                     Disabled

SSD1 Device:
NONE
256K FLASH (N28F020) in SSD1A
512K FLASH (2–256Ks) AS ONE DISK
512K FLASH (2–256Ks) AS TWO DISKS
512K EPROM (27C040) in SSD-1A
1024K EPROM (2–512Ks) AS ONE DISK
1024K EPROM (2–512Ks) AS TWO DISKS
```

```
Boot from:
   BIOS drive using ROM–DOS
   SSD1 using ROM–DOS
   SSD1A using ROM–DOS
   SSD1B using ROM–DOS
   Floppy or Hard drive
   SSD1 using User supplied DOS/OS
   SSD1A using User supplied DOS/OS
   SSD1B using User supplied DOS/OS

Number of floppy drives: 0
                         1
                         2

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


Number of line printers: Auto Check
                         0
                         1
                         2
                         3

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

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

# SHOWTIME.COM

**SHOWTIME.COM** Support Command

**PURPOSE:** To display the current time and date.

**SYNTAX:** **SHOWTIME**

**REMARKS:** This command displays the following, for example:

```
Current date/time is: THU 12/1/1994
10:06:47
```

# 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) and if a DS–1216DM clock module has been installed in SSD2 of the 6024 and has been enabled in SETUP, the time will be accurate when the processor is awakened from sleep mode. Otherwise, the time will not be accurate.

# SLOW.COM

**SLOW.COM** Support Command

**PURPOSE:** To change the CPU clock speed to 4.77 MHz.

**REMARKS:** The 6024 boots with the default 12 MHz clock speed. If you need to change to 4.77 MHz, enter the following from the DOS prompt or in a batch file:

```
SLOW
```

You can also press <CTL><ALT><–> to change to 4.77 MHz if you are using a keyboard and monitor with the 6024.

**SEE ALSO:** SETUP

This page intentionally left blank.

# APPENDIX B

## CUSTOM COMMUNICATION CABLE

The 6024 card requires an RS–232 serial communications cable to interface to the PC. If you are not using a VTC series cable, you can make your own communications cable.

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

2. Refer to the following table for cable connections for the 6024:

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

## POWER SUPPLY

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

## UPLOADING FILES FROM THE 6024

The TRANSFER program is also used to upload files from the 6024 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 6024.

2. Start PC SmartLINK on your PC.

3. Execute the TRANSFER program from the 6024 to send a file to your PC.

   `6024:\> TRANSFER /COM1 /S <drive><path> filename.ext`

   *filename.ex*t is the name of the file on the 6024 which you are sending to your PC.

4. Execute the TRANSFER program on your PC to receive a file from the 6024.

   `C:\> TRANSFER /COM1 /R <drive><path> filename.ext`

   *filename.ext* is the name of the file on the PC which you are receiving from the 6024.

## ASSIGNING DRIVE DESIGNATORS

ROM–DOS is a MS–DOS version 6.22 compatible operating system. Since it is stored in ROM, it is always present on power–up. During run time it requires only about 20K of RAM space. When you boot from ROM–DOS in the BIOS socket, the system automatically assigns drive designators to the extended memory virtual drive, SSD1 and SSD2. However, if you boot from SSD1 or floppy/hard drive you must add the appropriate device drivers to your CONFIG.SYS file and copy the files to your boot drive in order to access SSD2, the BIOS drive, and the extended memory virtual drive.

**NOTE:** Even though you provide information about memory devices during setup, you must still define drivers for these devices in your CONFIG.SYS file. You may also need to format the device. The following is an example listing of CONFIG.SYS entries for the device drivers included with the 6024. 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 SSD1A | Accesses the SSD1A drive |
| DEVICE=MEMDRIVE.SYS SSD1B | Accesses the SSD1B drive |
| DEVICE=MEMDRIVE.SYS SSD2 | Accesses the SSD2 drive |
| DEVICE=MEMDRIVE.SYS EMS | Accesses the virtual drive in extended memory |
| DEVICE=MEMDRIVE.SYS BASE 136 | Accesses a virtual drive in DOS base memory |

When your system boots up, the 6024 device drivers will be listed with their drive designations. When you boot from ROM–DOS in the BIOS drive, drives D–G are defined in the CONFIG.SYS file. The drives are designated as:

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

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

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

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

**Example:**

In the following example of bootup messages, the system boots from the BIOS drive with 1MB DRAM, 128K flash EPROM in SSD1 and nothing installed in SSD2. The system assigns the following drive designations:

```
6024 MEMDRIVE.SYS v2.06, formatting (384KB) in extended
memory as drive D:
6024 MEMDRIVE.SYS v2.06, formatting SSD1 (128 KB) as drive E:
6024 MEMDRIVE.SYS v2.06, memory device not found in SSD2.
```

**NOTE:** If a 512K battery–backed static RAM was installed in SSD2, the message would read MEMDRIVE.SYS v2.04, assigning SSD2 (512K) as drive F.

## EXPANDED 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
```

Enable the EMS for the page from which you want to modify or read:

For systems with 1 MB, there will be 384K available over the 640K limit. Dividing this amount into 16K amounts gives page numbers from 0–17H.

Bit 7 is the enable/disable flag. The window 0 I/O address is 258H at D000H.

```
MOV  AL,81H
```

(Enables the second 16K page to be accessed through window 0, located at 0D000H.)

```
MOV  DX,258H
OUT  DX,AL
```

Enable the other three 16K windows:

Window 1 I/O address is 4258H at D800H.
Window 2 I/O address is 8258H at D400H.
Window 3 I/O address is C258H at DC00H.

```
MOV AL,97H
```

(Enables the last 16K page to be accessed through window 1, located at 0D800H.)

```
MOV DX,4258H
OUT DX,AL
```

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 AL,0
```

(Bit 7 = 0 disables the EMS.)

```
MOV DX,258H
```

(The EMS window 0 I/O port = 258H.)

```
OUT DX,AL
```

Disable the other enabled windows:

```
MOV DX,4258H
```

(Disables page 1.)

```
OUT DX,AL
```

Reenable the SSD:

```
MOV  AL,0
```

(Enables the SSD.)

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

# 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 5 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 15% 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.

The information in this manual is provided for reference only. Octagon does not assume any liability arising out of the application or use of the information or products described in this manual. This manual may contain or reference information and products protected by copyrights or patents. No license is conveyed under the rights of Octagon or others.