MicroSolutions
Computer Products

*Compati*Card

User's Guide

CompatiCard

User's Guide

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1.0 Introduction

CompatiCard is a versatile floppy disk controller card for the IBM PC, XT, AT, and compatibles. It can accommodate up to four drives and includes a connector for two externally mounted drives. **Compati**Card will support any combination of 5.25 inch (360KB, 800KB, or high capacity 1.2MB AT), 8 inch, and 3.5 inch drives. It will also support both single and double density on all drives for maximum flexibility.

CompatiCard can be used as a direct replacement for the standard IBM floppy disk controller card used in the PC and XT. It can also be jumpered as a secondary controller for use with the IBM AT and computers that have built-in floppy disk controllers. **Compati**Card is not a replacement for the primary floppy disk controller in an AT type machine. While **Compati**Card supports any combination of 360KB, 720KB, 1.2MB, and 1.4MB drives, your choice for drives A: and B: in your computer may be limited by the DOS version and BIOS of your computer.

1.1 Features

- **Compati**Card is a half-size direct replacement for the IBM PC and XT floppy disk controller. **Compati**Card is not a replacement for the primary diskette controller in an AT type machine.

- It supports 8 inch drives (but requires *UniForm-PC* for CP/M diskettes).

- It supports both single and double density on all types of drives.

- It supports up to four drives. Drives can be any combination of 5.25 inch (360KB, 800KB, or high capacity 1.2MB AT), 8 inch, and 3.5 inch.

- Up to four **Compati**Cards can be installed in a computer to support up to sixteen floppy drives.

- **Compati**Card can be used in computers that already have a built-in disk controller.

- **Compati**Card supports four internally mounted drives or two internal and two external drives.

- **Compati**Card offers high quality construction backed by a one year warranty.

1.2 Conventions Used in This Manual

To make reading this guide a little easier, we have clarified certain conventions and phrases:

- "↵" means that you should press the RETURN or ENTER key.

- When a command to the computer is shown, your inputs will appear in boldface.

- The word "format" is used several ways in the computer world, and the multiple uses can lead to some confusion.

  In this guide, the word "format" is used to describe the layout of the data on a diskette. Different computers lay out the data differently and therefore use different diskette formats.

  In some manuals, the word "format" refers to the process of initializing a diskette to a particular format. Often this process is referred to as "formatting a diskette." To eliminate confusion, we will refer to this process as "initializing a diskette to a particular format."

- PCDOS and MSDOS are functionally the same operating system. If the system comes with an IBM computer, it's called PCDOS; if it comes with a compatible model, it's called MSDOS. We will refer to them both as DOS.

- Your computer needs to have a special type of diskette placed in drive A after the power is turned on. Putting the diskette in causes DOS to be loaded and the "A>" prompt to appear on the screen. We will refer to this type of diskette as a "DOS system diskette." It must contain at least the DOS operating system, and it probably has one or two more utility programs on it. If your computer loads DOS from a hard disk, the hard disk drive is considered your "DOS system disk"; in this case, substitute your drive letter for the "A>" or "a:" in the examples that follow.

2.0 Installation

This section will describe how to install **Compati**Card in your computer. Three steps are involved: setting the jumpers, determining which connector to use, and inserting **Compati**Card into your computer. If you are connecting **Compati**Card to 8 inch, 3.5 inch, or high capacity AT type drives, you should also examine Section 4.0 (Drive Cabling) before installation.

2.1 Jumper Settings

Jumpers are provided on **Compati**Card to allow it to be addressed at four different I/O port locations. If **Compati**Card is the only floppy disk controller in your computer, jumper it as the primary disk controller. This is the factory setting, but you should check the jumpers to make sure they are in the proper positions before proceeding. If your computer already has a floppy disk controller and it can't be removed, you will need to change the jumpers on **Compati**Card from their factory setting before installation. If you change the jumpers to use **Compati**Card as anything but the primary disk controller, you will need *UniForm-PC* or the **Compati**Card software to support the drives attached to it. If you are not using **Compati**Card as the primary controller, you may choose any of the three remaining address jumper settings. Pick one which works in your computer. The third (A, B) has been found to work in most cases. If you have more than one **Compati**Card in your computer, you must select a different address for each.

CompatiCard has two jumper blocks (J1 and J2), which are located near the bottom left corner. Use Table 2–1 to set the **Compati**Card jumpers.

Jumper Positions		Controller Number	I/O Ports
J1	J2		
B	A	First (Primary)	3F0h-3F7h
B	B	Second	370h-377h
A	B	Third	360h-367h
A	A	Fourth	3E0h-3E7h

Table 2–1 Address Jumper Settings

When you have set the jumpers to their proper position, proceed to the next section to determine which disk drive connector to use.

2.2 Drive Connectors

When you are installing cables for internally mounted drives, make sure the pin 1 side of the cable (usually marked with a colored stripe) is connected to the side of the connector that is marked 1. On all **Compati**Card internal disk drive connectors (P1/P3), pin 1 is toward the top of the board. The address selector on the disk drive should be set to the second address (usually DS1).

2.2.1 CompatiCard I

CompatiCard I has several disk drive connectors for maximum flexibility. Three of the connectors are for internally mounted drives. The fourth is for externally mounted drives. Each connector has a name associated with it (P1/P4); the name is printed near its associated connector. Table 2–2 describes each connector.

Connector Designation	Drive Addresses	Drive Location	Connector Type
P1	0 & 1	Internal	Edge Card
P2	0 & 1	Internal	34 Pin Header
P3	2 & 3	Internal	34 Pin Header
P4	2 & 3	External	DB-37 (female)

Table 2–2 Connector Designations

Connectors P1 and P2 may be used interchangeably for drives that will be software selected as drives 0 or 1. Connectors P3 and P4 may be used interchangeably for drives that will be software selected as drives 2 or 3. If you are installing **Compati**Card I as your primary disk controller, your normal 5.25 inch drives would use connector P1 or P2. The address used to select the drive is determined by where the cable is attached to **Compati**Card I (P1/P2 or P3/P4) and which cable connector (twisted cable or not) is plugged into the drive.

> **WARNING**: Do not plug any non-Micro Solutions drive unit that requires power from the controller into P4. Power wiring differences may damage your equipment. Refer to Table 5–1 for the pinout of P4.

2.2.2 CompatiCard II

CompatiCard II only supports 2 internally mounted drives. It has a 34 pin connector marked P1 in the upper left corner of the card. When installing a **Compati**Card II using this manual, ignore any references to connectors other than P1.

2.3 Card Installation

Installing **Compati**Card is a straightforward process. It consists of plugging the card into one of the computer's existing expansion slots and making the proper cable connections from the card to your disk drives. The instructions in this section will guide you step by step through the installation procedure. If you don't feel comfortable doing the installation yourself, have your local computer dealer or service shop do it for you

It's possible that if the **Compati**Card is installed improperly your computer will erase your diskettes when you try to use them. Do not connect **Compati**Card to your hard disk because loss of hard disk data may occur. Make a backup copy of your DOS system diskette now. Use the copy to test the installation.

The installation procedure described here is used to replace an existing floppy disk controller in an IBM PC or compatible with a **Compati**Card. If you are installing **Compati**Card in addition to an existing disk controller, skip the step concerning the removal of the existing controller and repeat the step concerning connection of the disk drive cables for each of your additional drives.

1) With the power off and the computer unplugged, remove any screws necessary to allow you to get access to the expansion slots in your computer.

2) Locate the flat wire cable that connects your floppy disk drive(s) to the disk controller. Study the orientation between the socket on the end of the cable and the connector on the disk controller to determine the pin 1 side of the socket.

The pin 1 side can usually be located by one of the following indicators: a color stripe on one side of the flat cable, an index mark molded into the cable socket toward one side, a number (1 or 2) molded into the cable socket toward one side, or a number (1 or 2) printed on the existing disk controller connector where the cable is attached.

Once you have determined which ends of the connectors orient toward pin 1, you can proceed. If you can't make the determination, let someone

else perform the installation. If you proceed and do things improperly, your computer will erase your diskettes when you try to use them.

3) Remove the cable from the existing disk controller and connect it to either P1 or P2 on **Compati**Card. Make sure you orient the pin 1 side of the cable to the pin 1 side of the connector.

4) Remove the retaining screw holding the existing disk controller to the back of the cabinet. Save the screw. Remove the existing controller by gently rocking the card lengthwise while pulling it upward.

5) Install **Compati**Card in the same slot by lining the card up with the connector and gently pushing down. Seat **Compati**Card squarely and firmly in the slot in such a way that its mounting bracket lines up with the mounting hole in the cabinet. Using the screw removed previously, mount the bracket securely to the cabinet. If you are installing **Compati**Card in an IBM XT, be sure it is not plugged into the slot closest to the power supply (slot 8).

6) Put the cabinet back together and replace any screws that were removed. Connect the power cable and anything else you might have disconnected.

7) With no diskettes in the floppy disk drives, power up the computer. If the activity light on your floppy drive comes on as soon as you turn on the power and stays on continuously, do not proceed any further. Your diskettes will be erased if you try to use them. Carefully go through the installation steps again. Refer to Appendix A (Troubleshooting) to try to isolate the cause of the problem. If you can't find the cause, remove **Compati**Card and let someone else perform the installation.

8) Put in the DOS system diskette which you created at the start of this installation process and load DOS (or load it from the hard disk if your computer has one). If your computer will not load DOS from the floppy diskette, carefully go through the installation steps again. Don't try your other DOS diskettes until you locate and correct the problem or the computer may erase them when it tries to load DOS.

Refer to Appendix A (Troubleshooting) to try to isolate the cause of the problem. If you can't find the cause, remove **Compati**Card and let someone else perform the installation.

9) Install the **Compati**Card software according to Chapter 3 and use the CCFORMAT utility to initialize a blank diskette in each drive attached to **Compati**Card. If it formats properly, your **Compati**Card is installed correctly.

If you have completed the installation successfully, your computer should work exactly as it did before.

3.0 CompatiCard Software

Included with **Compati**Card is a software diskette. The software consists of a diskette initialization utility, a drive status utility, and a device driver. The device driver software is for using **Compati**Card with various DOS format diskettes and drives. This section of the manual explains the installation and use of the **Compati**Card software.

3.1 Summary of Programs

The software programs included with **Compati**Card are as follows:

CCDRIVER.SYS	A device driver for inclusion in DOS at the time of machine startup. This is accomplished by inserting a statement about the driver into your CONFIG.SYS file on your DOS system disk.
CCFORMAT.COM	A diskette initializer program, similar in function and appearance to your DOS FORMAT command.
CCDRIVES.COM	A status utility that displays the types of drives attached to **Compati**Card and indicates which drive letters to use to access the drives.
BACKFMT.COM	A pop-up diskette initializer that allows you to initialize diskettes while in other programs.

3.2 CCDRIVER

The software driver for **Compati**Card is a file called CCDRIVER.SYS on the **Compati**Card software diskette. Like any other device driver, CCDRIVER.SYS is made an active part of DOS by being referenced in the CONFIG.SYS file on your DOS system disk (the floppy diskette or hard disk that you use to start up the computer). (If you have a hard disk, substitute the letter for your system drive in place of the "A" or "a:" in these instructions.) The following instructions will step you through the installation process:

1) Turn on your computer and insert your DOS system disk. Make sure that you have the DOS system prompt "A" before you proceed to the next step.

2) Place your **Compati**Card master diskette into an available disk drive.

3) Now copy the **Compati**Card files to the DOS system disk. For our example, we will assume that you put the master **Compati**Card diskette into drive B. If you inserted it into a drive other than B, substitute the correct drive letter in place of the B in the following command:

```
A>copy b:*.* a:↵
```

If you receive an "insufficient disk space" error message while you are copying the **Compati**Card files, it means that the disk you are copying to is full. In this case you must either erase some files from your DOS system disk, using the DEL command, or try using another disk and repeating the steps until you are successful.

4) You are done with the **Compati**Card master diskette and can remove it now. Using a suitable text editor or word processor, bring up the CONFIG.SYS file from your DOS system disk for editing. If the file doesn't exist, create it using a text editor.

5) Add the following line to the end of the CONFIG.SYS file:

device=ccdriver.sys $/x_1,y_1,z_1 /x_2,y_2,z_2 \ldots /x_n,y_n,z_n$

where

x = physical drive address (0-15)
y = drive type (0-7)
z = step rate (1-32)

Use Tables 3–1 and 3–2 to determine the values of x and y for each drive connected to a **Compati**Card. The value for z, the step rate, is specified in milliseconds (ms). You may leave out the step rate for a default value which is determined according to the type of disk drive (see Table 3–3). Specify x, y, and z, preceded by a forward slash (/) and separated by commas, for each drive. The order in which the drives are specified will determine the disk drive letter assigned to them. Up to sixteen drives may be specified (four per **Compati**Card, with a maximum of four **Compati**Cards per computer).

6) Save the modified CONFIG.SYS file on your DOS system disk. Make sure the CONFIG.SYS and CCDRIVER.SYS files are both in the root directory so that DOS can find them when the computer starts up.

7) Restart the computer by pressing CTL-ALT-DEL. The computer should now start up and include the **Compati**Card software driver. A message will be printed indicating what types of drives are connected to **Compati**Card and what letters you are using to access them. To utilize a **Compati**Card drive, use the corresponding drive letter and access the drive as you would any other DOS drive, using your normal DOS commands and software.

3.2.1   Drive Installation Tables

Table 3–1 shows the physical drive addresses. To use it, select the row that matches your J1 and J2 settings for the **Compati**Card, select the column that indicates which **Compati**Card connector the cable attaches to and whether wires 10/16 are twisted or straight relative to the **Compati**Card connector for the drive in question. Read the value of x (the drive address) corresponding to your selections.

J1	J2	P1 or P2		P3 or P4	
		Twisted	Straight	Twisted	Straight
B	A	0	1	2	3
B	B	4	5	6	7
A	B	8	9	10	11
A	A	12	13	14	15

Table 3–1 Physical Drive Addresses

To use Table 3–2, locate the description that matches your disk drive. Read the value of y (the drive type) from the first column.

Drive Type	Drive Description
0	5.25 inch 48 TPI (360KB)
1	5.25 inch 96 TPI (800KB)
2	5.25 inch 96 TPI high capacity (1.2MB) Not supported by **Compati**Card II
3	5.25 inch 96 TPI high capacity (1.2MB) dual speed
4	8 inch double sided
5	3.5 inch (720KB)
6	3.5 inch 600 RPM (720KB)
7	3.5 inch high capacity (1.4MB)

Table 3–2 Types of Disk Drives

3.2.2 Installation Examples

Following are some examples of the line in CONFIG.SYS for various types of drives:

Let's assume that you have one **Compati**Card in your computer, that it's your secondary controller (J1=B, J2=B), that your add-on drive is a 3.5 inch 1.4MB formatted capacity drive, the drive can step at a 3 ms rate, that it's connected to P1 on **Compati**Card, and that it's plugged into the cable socket that has pins 10/16 twisted. Using Table 3–1 we find the value of x is 4. Using Table 3–2 we find the value of y is 7. The value of z is 3. Given the assumptions, the line in CONFIG.SYS would read as follows:

```
device=ccdriver.sys /4,7,3⏎
```

Let's look at another possibility. Let's assume that you have one **Compati**Card in your computer, that it's your primary controller (J1=B, J2=A), that your add-on drive is a 1.2MB dual speed drive, that the drive can step at a 3 ms rate, that it's connected to P3 on **Compati**Card, and that it's plugged into the cable socket that has pins 10/16 twisted. Now let's look at the tables and see what they say. Using Table 3–1 we find that the value of x is 2. Using Table 3–2 we find that the value of y is 3. Since the drive can use a step rate of 3 ms we don't have to specify z. The line in CONFIG.SYS would read as follows:

```
device=ccdriver.sys /2,3⏎
```

As a final example, let's look at a situation where we are adding three drives. The **Compati**Card is the third controller in the system J1=A, J2=B. The characteristics of the drives are listed below:

The first drive is an 8 inch drive that steps at a 12 ms rate. It is connected to P4, with the cable wiring specified in Table 4–1 of this manual. The specified wiring is equivalent to that of a 34 pin cable with wires 10/16 twisted.

The second drive is a 3.5 inch 1.4MB drive. The drive is connected to P1 through a cable with wires 10/16 twisted. The drive can step at a 3 ms rate.

The third drive is a 5.25 inch 1.2MB dual speed (300/360 RPM) drive capable of reading IBM AT 1.2MB diskettes. It is also connected to P1 but through a connector that doesn't have wires 10/16 twisted. The drive steps at a 6 ms rate.

Using Tables 3–1 and 3–2 for these drives, we would assemble the following line for CONFIG.SYS:

```
device=ccdriver.sys /10,4,12 /8,7,3 /9,3,6⏎
```

3.3 CCDRIVES

Displays the active CompatiCard drives

Syntax

CCDRIVES

Purpose

CCDRIVES is used to display the types of drives currently in use with **Compati**Card and the drive letters you use to access them.

Description

When you issue the CCDRIVES command, status information about the disk drives currently attached to **Compati**Card will be displayed on the screen. The types of drives listed and the order of assignment of drive letters are determined by the values and the order of the information you included in the CCDRIVER.SYS statement of the CONFIG.SYS file.

```
A>ccdrives↵
```

would produce a display similar to the following, depending on what types of drives you are using:

```
CDRIVES Version X.XX

The following drives are available:
  Drive E: - 8 inch
  Drive F: - 3.5 inch High Capacity
  Drive G: - 5.25 inch 96 TPI High Capacity

A>
```

If you don't like the order of the drive letter assignment, edit the CONFIG.SYS file and rearrange the order in which you specify the disk drive parameters.

3.4 CCFORMAT

Initializes diskettes

Syntax

CCFORMAT drive letter *options*

Purpose

CCFORMAT is a diskette initialization utility for use only with disk drives connected to **Compati**Card. Similar in use to the DOS FORMAT utility, CCFORMAT allows you to initialize blank diskettes into all DOS formats supported by the particular style of drive.

Options

/N   disables verification of diskette while formatting

/V   prompts for a volume label after the diskette is initialized

/S   copies the operating system files to the diskette after initialization

Description

The drive letter, followed by a colon (:), determines which **Compati**Card drive to use. The option determines which format will be used. The option consists of a forward slash (/) followed by three characters to indicate which format you want. Table 3–3 lists the supported formats and options for each type of drive. If you enter the CCFORMAT command without specifying a capacity option, the highest capacity format supported for that drive will be used. Make sure you have high capacity diskettes if you are trying to use a high capacity format, or else initialization errors and data loss will probably occur. You may initialize a blank diskette or reinitialize an existing diskette, but remember that initialization will erase any existing data on the diskette.

For this example, assume that drive G is a 3.5 inch high capacity (720KB/1.4MB) drive.

```
A>ccformat g:/720↵
```

would initialize the diskette in drive G to 720KB format.

```
A>ccformat g:↵
```

would initialize the diskette in drive G to the 1.4MB high capacity format used by the IBM PS/2 computers. Since no capacity is specified, the highest capacity supported for the type of drive is used.

3.5 BACKFMT

Initializes diskettes while other programs are running.

Syntax

BACKFMT *options*

Purpose

BACKFMT is a background diskette formatting program that allows you to initialize diskettes while you continue running other programs.

Options

/C   reconfigures some BACKFMT options after the initial installation

/D   disables BACKFMT and removes it from memory

Description

Background formatting is initiated when you press a user-definable "access key," which displays a menu from which you can select the drive and capacity of the diskette to initialize. After you select the drive and capacity, BACKFMT will start initializing the diskette while returning you to your original program. You can continue working while BACKFMT performs the initialization.

To make the background formatter available, you have to run the BACKFMT program. Enter the following command at the DOS prompt:

```
A>backfmt↵
```

Configuration

The first time the BACKFMT program is run, it will display a message indicating that it has not been configured yet. Configuration consists of answering a few simple questions. Each question has a default answer (in square brackets) that can be used for the first-time installation. Listed here are some points you will be asked about:

- Would you like to change the background formatter access key? This allows you to change the access key to a different combination of keys. The access key is initially set to Ctrl-Alt-F.

- What would you like BACKFMT to do when it completes the initialization of a diskette? You can select how to be informed when BACKFMT finishes initializing a diskette.

- Would you like the diskette to be verified after formatting? You should always have the diskette verified for normal operation. If you tell BACKFMT not to verify, it will always verify the first cylinder, where the directory is placed. If that area is good, it will continue without verifying the rest of the diskette. Turning verification off allows diskettes to be initialized about 20-30% faster.

- Are you using a color monitor? You should answer Yes to this question only if you are really using a color monitor. If you have a monochrome (white, green, or amber) monitor, answer No. Menu readability will be improved by a correct response.

Once you answer the configuration questions, the BACKFMT.COM file will be updated with the new information. From that point on, when BACKFMT is run, it will not ask for configuration information. If you want to change the configuration, you should specify the /C option when you are running the BACKFMT program, as follows:

   A>**backfmt /c**↵

If BACKFMT is reconfigured with the /C option, all the changes will be made to the BACKFMT.COM file. The changes will take effect immediately.

The currently defined access key will be displayed near the end of the BACKFMT signon message. It will look similar to this:

   While holding **Ctrl** & **Alt**, press **F**

When the DOS prompt returns, BACKFMT is ready for use. If you need to remove BACKFMT from memory, use the following command from the DOS prompt:

   A>**backfmt /d**↵

Using BACKFMT

To initialize a diskette with BACKFMT, use the following procedure:

1) Press the BACKFMT key sequence. The default is Ctrl-Alt-F unless you changed it during configuration. A window displaying the available drives and formats should appear near the top of your screen.

2) Using the cursor keys, select the drive and format capacity that you would like to use.

3) When you have selected the desired drive and format capacity, press ENTER to get the program to accept your choices.

4) Another window will appear, displaying your selection and giving you one last chance before the initialization starts. Pressing ENTER will start the diskette initialization, and you will be returned to the program you were originally running.

If you press the BACKFMT access key while a diskette is being initialized, a status window will appear. The current cylinder and head being initialized will be displayed in this window. Press any key to remove the status window.

Depending on how you configured BACKFMT, a window may appear when the initialization is finished or if an error exists. This display will be self-explanatory. If you configured BACKFMT so it won't display a window, the result will be displayed when you press the access key again.

Notes

BACKFMT will work only with disk drives controlled by CCDRIVER.

If you attempt to access a diskette that is currently being background formatted, you will get a "Drive not ready" error message. The drive will be accessible as soon as the initialization is complete.

You may notice the drive light going off on a drive being background formatted when you access another diskette drive. This is normal because only one diskette drive can be used at a time. BACKFMT will give priority to another program if it is accessing a diskette drive. When the program seems to be done with the diskette drive, BACKFMT will continue.

The BACKFMT menu is not available while your screen is displaying graphic images. If you try to access the BACKFMT menu while your display is in a graphic mode, you will hear a beep.

BACKFMT will not work if your computer is using the NODMA parameter specified on the CCDRIVER line of the CONFIG.SYS file. The NODMA parameter instructs CCDRIVER not to use the direct memory access (DMA) chip in your computer. This parameter is needed only when CCDRIVER is being run on a computer that does not have an existing floppy controller which is 100% IBM compatible. Since BACKFMT needs this chip to work properly, the use of this parameter will cause an error message when you run BACKFMT.

Don't remove BACKFMT from memory with any memory management program. While in memory, BACKFMT is closely linked to CCDRIVER; and if it is improperly removed, it will cause system failure. Remove BACKFMT from memory only with the /D option.

3.5.1 Disk Formats Supported

Table 3–3 lists the DOS formats supported for each type of disk drive you may use. It also lists the option you would enter with the CCFORMAT command to initialize a diskette to that format. The last column indicates which version of DOS introduced the format. If no DOS version number appears next to a format, it means the format is unique to CCDRIVER and will not be readable with other software packages. These formats were included for people who wish to use the full capacity of their drive.

Drive Description	Drive Type	Default Step Rate	Format Capacity	Sides	CCFORMAT Option	DOS Version
5.25 inch 48 TPI (360KB)	0	6 ms.	360KB	2	/360	2.00
			320KB	2	/320	1.10
			180KB	1	/180	2.00
			160KB	1	/160	1.00
5.25 inch 96 TPI (800KB)	1	6 ms.	800KB	2	/800	
			360KB	2	/360	2.00
			320KB	2	/320	1.10
			180KB	1	/180	2.00
			160KB	1	/160	1.00
5.25 inch 96 TPI high capacity (1.2MB)	2	3 ms.	1.2MB	2	/1.2	3.00
			800KB	2	/800	
			360KB	2	/360	2.00
			320KB	2	/320	1.10
			180KB	1	/180	2.00
			160KB	1	/160	1.00
5.25 inch 96 TPI high capacity dual speed (1.2MB)	3	3 ms.	1.2MB	2	/1.2	3.00
			800KB	2	/800	
			360KB	2	/360	2.00
			320KB	2	/320	1.10
			180KB	1	/180	2.00
			160KB	1	/160	1.00
8 inch double sided	4	10 ms.	1.2MB	2	/1.2	
			250KB	1	/250	1.00
3.5 inch (720KB)	5	3 ms.	720KB	2	/720	3.20
3.5 inch 600 RPM (720KB)	6	12 ms.	720KB	2	/720	3.20
3.5 inch high capacity (1.4MB)	7	3 ms.	1.4MB	2	/1.4	3.30
			720KB	2	/720	3.20

Table 3–3 Types of Drives and Formats Supported

NOTE: Drive type 2 is not supported by **Compati**Card II.

4.0 Drive Cabling

Since **Compati**Card can be used with a wide variety of disk drives, special cabling arrangements are sometimes needed. **Compati**Card uses a 34 wire cable for connection to disk drives. Drives that do not use a 34 wire connector will require an adapter. This section will describe the different wiring arrangements that will have to be made for a variety of disk drives.

The 34 wire cable for use with **Compati**Card should be identical to the cable used by IBM and most compatible manufacturers. One cable is capable of supporting two drives. Pins 10/16 should be twisted (reversed in order) before they enter one of the two connectors. The drive address that the software uses to access a drive will depend on which connector the drive is attached to and which **Compati**Card connector the cable is plugged into. If the drive is attached to the connector with the twisted wires, the software drive address will be either 0 or 2, depending on which **Compati**Card connector the cable is plugged into. Similarly, the connector without the twisted wires will represent drive address 1 or 3. Refer to Section 2.2 for information on the **Compati**Card drive connectors.

4.1 1.2MB High Capacity Drives

CompatiCard can be attached to a high capacity (AT type) disk drive with a standard 34 wire cable. High capacity drives have a track density of 96 tracks per inch (TPI), and most operate at a single rotational speed of 360 RPM. This is 20 percent faster than a standard drive, which rotates at 300 RPM. In order to use the single speed 1.2MB drive, you must be using a **Compati**Card I.

Both **Compati**Card I and **Compati**Card II support dual speed (300/360 RPM) high capacity drives. When a dual speed drive is attached, **Compati**Card will use the slower speed (300 RPM) for standard density diskettes and the higher speed (360 RPM) for high capacity diskettes. Following is a list of drives which are known to support both single and dual speed operation. Also listed are the jumper changes needed to operate the drive in dual speed mode.

Fujitsu M2554	Jumper 1SP open, 2SP shorted
Mitsubishi MF-504	Jumper SB open, SS shorted
NEC 1157C	Jumper HDE to position 2
Panasonic JU-475-2	Jumper CX open, BX shorted
Panasonic JU-475-3	Jumper open, BX shorted
TEAC FD-55GFR	Jumper I shorted, II (if present) open
Toshiba 08DEG	Jumper DE/X shorted
Chinon FZ-506	Jumper J1 positions 1, 3, 6, 8, 10, 13 shorted

4.2 8 Inch Drives

Eight inch drives can be attached to **Compati**Card if a wiring adapter is used to convert the 34 wire cable that **Compati**Card uses to the 50 wire connector on the 8 inch drive. An adapter specifically designed for this conversion can be purchased from Micro Solutions or can be assembled from the information in Table 4–1.

CompatiCard				8 Inch Drive	
Signal Name	34 Pin	37 Pin	Signal Direction	50 Pin	Signal Name
Programmable	2	3	→	2	Low Current
Index	8	6	←	20	Index
Drive Select 1/3	12	8	→	28	Drive Select 2
Motor Enable 1/3	16	10	→	18	Head Load
Step Direction	18	11	→	34	Direction Select
Step Pulse	20	12	→	36	Step
Write Data	22	13	→	38	Write Data
Write Enable	24	14	→	40	Write Gate
Track 0	26	15	←	42	Track 0
Write Protect	28	16	←	44	Write Protect
Read Data	30	17	←	46	Read Data
Select Head 1	32	18	→	14	Side Select

Table 4–1 8 Inch Drive Wiring

If you are connecting the 8 inch drive to **Compati**Card through one of the 34 pin connectors (P1/P3), use the 34 pin column of Table 4–1. Connect the odd numbered pins (1/33) from **Compati**Card to all the odd pins on the 50 pin connector for the 8 inch drive.

If you are connecting the 8 inch drive to the DB–37 connector P4, use the 37 pin column of Table 4–1. Connect pins 21/37 of the DB–37 to all the odd pins on the 50 pin connector for the 8 inch drive.

When an 8 inch drive is being installed, the physical drive address on its electronics board must be jumpered to the second drive out of the four possible drives.

5.0 Technical Details

This section will describe the technical aspects of **Compati**Card. It is meant for the advanced programmer who wants to write software to access **Compati**Card directly.

CompatiCard is designed to handle both single density (FM) and double density (MFM) data using three different data transfer rates: 250 kbps, 300 kbps, and 500 kbps. This flexibility allows **Compati**Card to support a wide variety of disk drives. The transfer rate must be set by the software driver program to the frequency needed by the selected disk drive.

CompatiCard uses the 765 or 8272 diskette controller chip to achieve compatibility with the IBM diskette controller. For general programming information on the controller chip, refer to the appropriate data sheets or the *IBM Technical Reference* manual.

Disk data transfer can be accomplished by using direct memory access (DMA) or by directly accessing the disk controller data port. If DMA transfers are desired, **Compati**Card will use DMA channel 2 for data transfers and interrupt request 6 to signal the processor at the termination of a command. If more than one diskette controller is in the system, the DMA request line must be disabled (by clearing bit 3 of Control Register 1) on all the unused controllers.

5.1 Cable Connections

All cable connections to **Compati**Card are made with 34 conductor cable. In the event that the disk drive to be attached does not have a 34 conductor connector, an adapter cable will have to be fabricated for the proper connections to be made. The two parts of Table 5–1 describe the signals that are available from the **Compati**Card connectors.

P1–P2 Pin	Signal Name	P3 Pin	P4 Pin	Signal Name
			1	+12 volts
			2	+5 volts
2	Programmable	2	3	Programmable
8	Index	8	6	Index
10	Motor Enable 0	10	7	Motor Enable 2
12	Drive Select 1	12	8	Drive Select 3
14	Drive Select 0	14	9	Drive Select 2
16	Motor Enable 1	16	10	Motor Enable 3
18	Step Direction	18	11	Step Direction
20	Step Pulse	20	12	Step Pulse
22	Write Data	22	13	Write Data
24	Write Enable	24	14	Write Enable
26	Track 0	26	15	Track 0
28	Write Protect	28	16	Write Protect
30	Read Data	30	17	Read Data
32	Select Head 1	32	18	Select Head 1
Odd Pins	Ground	Odd Pins	20-37	Ground

Table 5–1 Connector Pin Assignments

All the signals listed in Table 5–1, except the Programmable signal, are standard disk drive control signals. For a more complete description of each signal, refer to your disk drive manual.

The Programmable signal is an output from **Compati**Card that is controlled by bit 5 of Control Register 2. Refer to Section 5.2.2 for more information.

5.2 I/O Ports

When **Compati**Card is jumpered to be the primary diskette controller, the port addresses correspond to those of the IBM diskette controller, with one addition. Control Register 2 is unique to **Compati**Card. This register is used to select the transfer rate and to control the Programmable output pin. Table 5–2 lists the **Compati**Card I/O ports used. The port to choose depends on which controller number jumpers J1 and J2 are set for. Refer to Section 2.1 for a description of the jumper settings.

| Controller Number | | | | I/O Port Description |
First	Second	Third	Fourth	
3F2h	372h	362h	3E2h	Control Register 1
7F2h	772h	762h	7E2h	Control Register 2
3F4h	374h	364h	3E4h	765 Status Register
3F5h	375h	365h	3E5h	765 Data Register

Table 5–2 I/O Port Assignments

5.2.1 Control Register 1

Control Register 1 is a write only register used to control drive motors, drive selection, interrupt enable, DMA enable, and diskette controller chip reset. All Control Register 1 bits are cleared to zero by the I/O channel reset line. Table 5–3 describes the Control Register 1 bits.

Bit Position	Description
7	Drive 3 Motor Enable
6	Drive 2 Motor Enable
5	Drive 1 Motor Enable
4	Drive 0 Motor Enable
3	Interrupt and DMA Enable 1 enables IRQ 6 and DACK/DRQ 2
2	Diskette Controller Chip Reset Logic 0 resets chip
1–0	Drive Select 00—Drive 0 01—Drive 1 10—Drive 2 11—Drive 3

Table 5–3 Control Register 1

5.2.2 Control Register 2

Control Register 2 is used to select the data transfer rate and to control the Programmable output pin. This register is unique to **Compati**Card and is not available on a standard PC diskette controller. All Control Register 2 bits are cleared to zero by the I/O channel reset line or bit 2 of Control Register 1. Table 5–4 describes the Control Register 2 bits.

Bit Position	Description
7	Reserved—Set to 0
6	Reserved—Set to 0
5	Programmable Pin 2 Logic 1 sets Pin 2 low
4	Reserved—Set to 0
3–0	Data Transfer Rate Select 0000—250 Kbps 0001—300 Kbps 1111—500 Kbps

Table 5–4 Control Register 2

By setting bit 5 of Control Register 2 to 1, the Programmable line (pin 2) on the diskette interface will go active (low). This output is used for several purposes, depending on the type of disk drive attached. On 8 inch or high capacity drives, the output controls the write current line. On dual-speed high capacity drives, the output controls the write current line and selects the spindle speed (300 or 360 RPM).

5.3 CompatiCard II Jumpers

CompatiCard II boards (Rev D and above) contain additional jumpers to select alternate DMA and interrupt settings. The following sections do not apply to **Compati**Card I.

5.3.1 Interrupt Request Number

The interrupt jumper selects which interrupt number will be used. **Compati**Card uses interrupts to communicate with the computer. Interrupt 6 has been designated as the floppy controller interrupt and is made to be shareable by more than one controller. Interrupt 6 is the proper choice for almost all installations.

In some brands and models of computers interrupt 6 can't be used. The symptoms of such a problem might be a "Drive not ready" error when you try to access the drive or the locking up of the computer when you try to access a **Compati**Card controlled drive. If you suspect an interrupt conflict, try setting the interrupt jumper to one of the other five positions. Use Table 5–5 to decide which options are available for your computer.

Interrupt Level	Notes
2	Do not use in an AT
3	Available
4	Available
5	Do not use in a PC, XT, or PS/2 Model 25 if it has a hard drive
6	Available—Factory Setting
7	Available

Table 5–5 Interrupt Level Jumper Settings

Note that when you move the interrupt request jumper to something other than 6, you must modify the CONFIG.SYS file on your DOS system disk. First, perform the **Compati**Card software installation. Then add "**IRQ n**" (n is the interrupt number) to the line in your CONFIG.SYS file, on your DOS system disk, that refers to CCDRIVER.SYS. You must reboot the computer after you modify CONFIG.SYS in order for the changes to take effect. For example, if you choose to use interrupt 2, your CONFIG.SYS file should contain a line similar to the following:

```
device=ccdriver.sys /8,3 irq 2
```

5.3.2 DMA Channel

The DMA jumpers (**Compati**Card II only) select which DMA channel is to be used. **Compati**Card uses DMA to transfer information to and from the computer. DMA channel 2 has been designated for use by floppy controllers and is made to be shareable by more than one controller. DMA 2 is the proper choice for almost all installations.

In some brands and models of computers DMA 2 can't be used by **Compati**Card. The symptoms of such a problem might be a "Seek error," "Sector not found," "Non DOS disk," "Read fault error," or plain old garbage data on readback. If you suspect a DMA conflict, try setting the DMA jumpers to one of the other two positions. You must put both DMA jumpers on the selected channel.

If you are installing **Compati**Card II in a PS/2 model 25, 30, or 30-286, put both DMA jumpers in the channel 1 position.

Use Table 5–6 to decide which options are available for your computer.

DMA Channel	Notes
1	Available
2	Factory setting
3	Do not use in a PC, XT, or PS/2 Models 25, 30, or 30-286 if it has a hard drive

Table 5–6 DMA Channel Jumper Settings

You must modify the CONFIG.SYS file on your DOS system disk when you move the DMA jumpers to something other than 2. First, perform the **Compati**Card software installation. Then add "**DMA n**" (n is the DMA channel number) to the line in your CONFIG.SYS file that refers to CCDRIVER.SYS. You must reboot the computer after you modify CONFIG.SYS in order for the changes to take effect. For example, if you choose to use DMA 1, your CONFIG.SYS file should contain a line similar to the following:

```
device=ccdriver.sys /8,3 dma 1
```

Appendix A Troubleshooting

If you experience trouble with your computer after installing **Compati**Card, it could be for one of several reasons. Read the following problem descriptions to see if any match those you are experiencing. If you can't resolve the problem, call Micro Solutions and ask for **Compati**Card technical assistance. (See Appendix B.)

The activity lights on the floppy disk drives are always on and the floppy drives won't access diskettes placed in them.

This problem will most likely occur immediately after installation of **Compati**Card and is usually caused by improper orientation of the flat wire cable with respect to the connector on **Compati**Card where it attaches. Check to make sure that the pin 1 side of the flat cable connects to the pin 1 side of the connector as it is marked on **Compati**Card. Refer to installation Section 2.3 for information on how to determine the pin 1 side of the flat cable. Any diskettes you try to read from while this condition exists may be erased, so try a different diskette once you have located the problem and corrected it.

The activity lights on the floppy disk drives never go on and the drives won't read diskettes.

This problem may occur for several reasons. Check for any of the following conditions:

The jumper blocks J1 and J2 may not be in the proper positions. Refer to Table 2–1 for the correct settings for your application. If **Compati**Card is the only disk controller in your computer, position the jumpers as indicated for the "First" or "Primary" controller.

The flat cable from your disk drive may be attached to the wrong connector on **Compati**Card. If **Compati**Card is the only disk controller in your computer, your cable should be connected to either P1 or P2. Refer to Table 2–2 for a description of the function of each connector.

The flat cable from your disk drive may not be attached. Check to make sure it is properly connected to both **Compati**Card and your disk drive.

A "boot disk failure" occurs when I try to boot from a floppy diskette. The drive will not read diskettes.

Another disk controller may be interfering with **Compati**Card. If you are installing **Compati**Card as the primary disk controller, be sure you have removed or disabled any other disk controller. If you are installing

CompatiCard as something other than the primary controller, be sure you have set jumper blocks J1 and J2 to the appropriate settings, as indicated by Table 2–1.

When you are trying to access a CompatiCard supported drive, an "Invalid drive specification" message appears on the screen.

This can occur if you are not using the correct drive letter to access **Compati**Card. Be sure the letter you use is the one indicated on the screen when the computer loads DOS or run the CCDRIVES program to list the **Compati**Card supported drives.

This can also occur if you have not installed the **Compati**Card software or if you have not restarted the computer after installation. Review Section 3.2 for information on software installation.

The CCFORMAT and CCDRIVES commands don't work. Invoking them results in a "Bad command or file name" message.

The CCFORMAT.COM and CCDRIVES.COM files are not located on the disk you are trying to access them from. For either command to be used, the files must be located on the disk you are invoking them from. You must copy them from the master **Compati**Card diskette to another floppy diskette or to the utilities subdirectory of your hard disk by using the DOS COPY command. You may wish to experiment with the DOS PATH command to make your computer find them automatically.

The CCFORMAT and CCDRIVES commands don't work. Invoking them results in the following message: "The CompatiCard device driver 'CCDRIVER.SYS' is not installed."

The **Compati**Card software was not installed on your DOS system disk. The CONFIG.SYS file on your DOS system disk may have been modified or deleted, eliminating the reference to **Compati**Card. The CCDRIVER.SYS file on your DOS system disk may have been deleted. If either of the above is true, you must perform the software installation procedure again. Refer to Section 3.2 of this manual for instructions.

The message will also appear if you loaded DOS from a DOS system disk other than the one **Compati**Card was installed on. (For example, you might have loaded DOS from a floppy diskette after installing **Compati**Card on your hard disk, or you might have used a DOS floppy diskette other than the one **Compati**Card was installed on.) In this case, restart your computer using the proper DOS system disk.

The drive activity light illuminates. However, when you are trying to access a drive, nothing happens. Eventually a "drive not ready" or other failure message appears.

This can occur if another card in your computer uses the same I/O addresses that **Compati**Card is trying to use. Normally, setting J1 to position A and J2 to position B will prevent the problem. However, you may need to try jumpering J1 and J2 for a different address range.

The drive activity light illuminates at the same time as the activity light on one of the other floppy disk drives. When you try to access the drive, nothing happens. Eventually a "drive not ready" or other failure message appears.

This indicates that another card in your computer is using the same I/O addresses that **Compati**Card is trying to use. It will be necessary to jumper J1 and J2 for a different address range.

When accessing a drive, the activity light illuminates and the disk rotates. Eventually a failure message appears.

This can occur if another card in your computer is using the same I/O addresses that **Compati**Card is trying to use. It may be necessary to jumper J1 and J2 for a different address range.

This can also occur if you have a disk drive alignment problem. Either the drive that created the diskette or the **Compati**Card controlled drive may be out of alignment. Try initializing a new diskette on the **Compati**Card controlled drive using CCFORMAT and accessing it. If it works, one of the drives is probably misaligned. Try reading your diskettes on a different PC to pinpoint the problem. Your local service center should be able to align the drive for you.

After CompatiCard is installed, one of your existing cards, devices, or programs doesn't work properly.

This can occur if another card in your computer uses the I/O addresses that **Compati**Card is using. Remove the **Compati**Card and the CCDRIVER.SYS software to see if the problem goes away. If it does, there appears to be an I/O address conflict. If it doesn't, **Compati**Card is not the source of the problem. Try another jumper option if necessary.

A "drive not ready" error occurs when trying to access the drive or the computer "locks up" when trying to access the drive.

CompatiCard II only—This can occur if there is an interrupt conflict between the **Compati**Card and something else in your computer. If you suspect an interrupt conflict, try setting the interrupt jumper to one of the other five positions. Read Section 5.3.1 for complete instructions on selecting an interrupt request number.

A "seek error," "sector not found," "non-DOS disk," "read fault error," or garbage data occurs when trying to access a floppy drive attached to CompatiCard.

This can occur if there is a DMA conflict between the **Compati**Card and something else in your computer.

CompatiCard I only—Use the NODMA option. After you have completed the hardware and software installation of **Compati**Card, use your text editor or word processor to edit the CONFIG.SYS file on the disk drive that CCDRIVER.SYS was installed to. Locate the line that contains the statement DEVICE=CCDRIVER.SYS. Add a blank space to the end of the line and then add NODMA. Your edited line in CONFIG.SYS should look something like:

device=ccdriver.sys /8,7,3 NODMA

CompatiCard II only—If you suspect a DMA conflict, try setting the DMA jumpers to one of the other two positions. Read Section 5.3.2 for complete instructions on selecting a DMA channel.

Appendix B Technical Support

Most questions about **Compati**Card and its operation are answered in this guide.
If you still need help, contact Micro Solutions and ask for **Compati**Card technical
assistance. Please have the following information handy before calling:

- The serial number of your **Compati**Card board.

- The make and model of the computer you are using.

Our technical assistance staff will be happy to answer your questions Monday
through Friday during normal business hours at (815) 756–3411.

Appendix C Hardware Warranty

1 Year Limited Warranty

Micro Solutions, Inc. (MSI) warrants **Compati**Card to be free from defects in workmanship or material under normal use for a period of (1) year from the date of purchase by the original consumer purchaser. During this warranty period, MSI at its option, will repair or replace any component parts which in its opinion prove to be defective. This warranty does not extend and shall not apply to products which have been subject to misuse, neglect, accident, or improper installation.

Products to be repaired under the term of this limited warranty must be returned, shipping and insurance prepaid, by the original purchaser to the address noted below. A Return Material Authorization (RMA) number must be obtained from MSI prior to return of defective material. Telephone 815-756-3411, Technical Support Department for an RMA number. MSI is not responsible for material returned without the RMA number clearly printed on the outside of the shipping container.

Micro Solutions Computer Products
132 West Lincoln Hwy.
DeKalb, IL 60115
Attn: RMA#_____

THIS LIMITED WARRANTY AND REMEDY ARE EXCLUSIVE AND EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT SHALL MICRO SOLUTIONS, INC. BE LIABLE FOR LOST PROFITS, LOSS OF GOOD WILL, OR ANY OTHER SPECIAL OR CONSEQUENTIAL DAMAGES. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

Appendix D Software License Agreement

Terms and Conditions

Micro Solutions, Inc. licenses the **Compati**Card software for your personal use. You assume all responsibility for the operation and results. Micro Solutions, Inc. may from time to time, revise the performance of this program and in doing shall incur no obligation to furnish such revisions to you. Further, Micro Solutions, Inc. may elect to charge an update fee for such revisions.

Software Warranty Information

Micro Solutions, Inc. warrants that the diskette containing the **Compati**Card software is free from defects and will replace a defective diskette within thirty (30) days from the date of purchase by the original consumer.

Micro Solutions, Inc. makes no warranties, either express or implied, with respect to this software, its quality, performance, merchantability, or fitness for any particular purpose. The entire risk as to the performance of this program is with you.

IN NO EVENT WILL MICRO SOLUTIONS, INC. BE LIABLE TO YOU FOR ANY DAMAGES, INCLUDING ANY LOST PROFITS, LOST SAVINGS, OR OTHER INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OR INABILITY TO USE THIS PROGRAM.

This agreement shall be interpreted in accordance with the laws of the State of Illinois.