

User's Guide

CompatiCard

The graphic features several stylized circuit traces. On the left side, there are three blue traces that extend horizontally and then turn diagonally upwards to the right. These blue traces transition into a series of green traces that continue the upward diagonal path. Finally, these green traces turn horizontally to the right, becoming yellow traces. The overall effect is a series of parallel lines that create a sense of flow and connectivity, reminiscent of a printed circuit board (PCB) layout.

MicroSolutions

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. **CompatiCard** will support any combination of 5 inch (48 TPI, 96 TPI, or high capacity 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.

Since **CompatiCard** is a direct replacement for the IBM PC floppy disk controller, software written to access standard 48 TPI drives will work without change. Software written specifically for **CompatiCard** must be used to access 8 inch or high capacity disk drives. *UniForm-PC*, a Micro Solutions product, can be purchased to access all of the available types of disk drives that use **CompatiCard**. For more information on *UniForm-PC*, see Appendix A.

1.1 Features

- **CompatiCard** is a half-size direct replacement for the IBM PC and XT floppy disk controller.
- 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 (48 TPI, 96 TPI, or high capacity AT), 8 inch, and 3.5 inch.
- Up to four **CompatiCards** can be installed in a computer to support up to sixteen floppy drives.
- **CompatiCard** can be used in computers that already have a built-in disk controller.

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- **CompatiCard** supports four internally mounted drives or two internal and two external drives.
 - **CompatiCard** 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.”

- PC DOS and MS DOS are functionally the same operating system. If the system comes with an IBM computer, it’s called PC DOS; if it comes with a compatible model, it’s called MS DOS. 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 **CompatiCard** in your computer. Three steps are involved: setting the jumpers, determining which connector to use, and inserting **CompatiCard** into your computer. If you are connecting **CompatiCard** 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 **CompatiCard** to allow it to be addressed at four different I/O port locations. If **CompatiCard** 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 **CompatiCard** from their factory setting before installation. If you change the jumpers to use **CompatiCard** as anything but the primary disk controller, you will need *UniForm-PC* or the **CompatiCard** software to support the drives attached to it.

CompatiCard has two jumper blocks (J1 and J2), which are located near the bottom left corner. Each jumper block has two possible positions (A and B), which are clearly labeled. The position of these jumpers will determine the I/O port locations that **CompatiCard** will occupy. Use Table 2-1 to set the **CompatiCard** jumpers.

Jumper Positions	Controller Number	I/O Ports
J1 ● ● <input type="checkbox"/> <input type="checkbox"/> J2	First (Primary)	3F0h-3F7h
J1 ● <input type="checkbox"/> ● ● <input type="checkbox"/> J2	Second	370h-377h
J1 <input type="checkbox"/> ● ● ● <input type="checkbox"/> J2	Third	360h-367h
J1 <input type="checkbox"/> ● ● <input type="checkbox"/> ● ● J2 A B A B	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

CompatiCard 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

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 **CompatiCard** internal disk drive connectors (P1/P3), pin 1 is toward the top of the board.

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 **CompatiCard** as your primary disk controller, your normal 5.25 inch drives would use connector P1 or P2. In any case, the address selector on the disk drive should be set to the second address. The address used to select the drive is determined by where the cable is attached to **CompatiCard** (P1/P2 or P3/P4) and which cable connector (twisted cable or not) is plugged into the drive.

2.3 Card Installation

Installing **CompatiCard** 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 **CompatiCard** is installed improperly your computer will erase your diskettes when you try to use them. To test the installation, you will be requested to use your **FORMAT** utility to initialize a diskette. Make a backup copy of your DOS system diskette with the **FORMAT** program on it 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 **CompatiCard**. If you are installing **CompatiCard** 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 **CompatiCard**. 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 **CompatiCard** in the same slot by lining the card up with the connector and gently pushing down. Seat **CompatiCard** 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.
 - 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 B (Troubleshooting) to try to isolate the cause of the problem. If you can't find the cause, remove **CompatiCard** 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 B (Troubleshooting) to try to isolate the cause of the problem. If you can't find the cause, remove **CompatiCard** and let someone else perform the installation.

- 9) Use your **FORMAT** utility to initialize a blank diskette in one of your floppy disk drives. If it formats properly, your **CompatiCard** 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 **CompatiCard** 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 **CompatiCard** with various DOS format diskettes and drives. This section of the manual explains the installation and use of the **CompatiCard** software.

UniForm-PC is a software product from Micro Solutions that allows the use of non-DOS diskettes on an IBM PC, XT, AT, or compatible. If you will be using **CompatiCard** with UniForm-PC instead of the **CompatiCard** software, you may skip this section.

3.1 Summary of Programs

The software programs included with **CompatiCard** 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 **CompatiCard** and indicates which drive letters to use to access the drives.

3.2 CCDRIVER

The software driver for **CompatiCard** is a file called CCDRIVER.SYS on the **CompatiCard** software diskette. Like any other device driver, CC-DRIVER.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 **CompatiCard** master diskette into an available disk drive.
- 3) Now copy the **CompatiCard** files to the DOS system disk. For our example, we will assume that you put the master **CompatiCard** 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 **CompatiCard** 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 **CompatiCard** 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 /x1,y1,z1 /x2,y2,z2 ... /xn,yn,zn
```

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 **CompatiCard**. The value for y , the step rate, is specified in milliseconds (ms). You may leave out the step rate for a default specification of 6 ms, which is proper for almost all disk drives. 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 **CompatiCard**, with a maximum of four **CompatiCards** 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 **CompatiCard** software driver. A message will be printed indicating what types of drives are connected to **CompatiCard** and what letters you are using to access them. To utilize a **CompatiCard** 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 **CompatiCard**, select the column that indicates which **CompatiCard** connector the cable attaches to and whether wires 10/16 are twisted or straight relative to the **CompatiCard** 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
1	5.25 inch 96 TPI
2	5.25 inch 96 TPI high capacity AT type
3	5.25 inch 96 TPI high capacity 300/360 dual speed
4	8 inch soft sector
5	3.5 inch 720K
6	3.5 inch 600 RPM 720K
7	3.5 inch high capacity 720K/1.4M

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 **CompatiCard** in your computer, that it's your primary controller (J1=B, J2=A), that your add-on drive is a 96 TPI high capacity AT style drive, that the drive can step at a 6 ms rate, that it's connected to P3 on **CompatiCard**, and that it's plugged into the cable socket that has pins 10/16 reversed. 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 2. Since the drive can use a step rate of 6 ms we don't have to specify z . Given all these assumptions, the line in CONFIG.SYS would read as follows:

```
device=ccdriver.sys /2,2
```

Let's look at another possibility. Let's assume that you have one **CompatiCard** in your computer, that it's your secondary controller (J1=B, J2=B), that your add-on drive is a 3.5 inch 720K formatted capacity drive, the drive can step at a 10 ms rate, that it's connected to P1 on **CompatiCard**, and that it's plugged into the cable socket that has pins 10/16 reversed. Using Table 3-1 we find the value of x is 4. Using Table 3-2 we

find the value of y is 5. The value of z is 10. Given the assumptions, the line in CONFIG.SYS would read as follows:

```
device=ccdriever.sys /4,5,10
```

As a final example, let's look at a situation where we are adding three drives. The **CompatiCard** 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 high capacity 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 96 TPI dual speed (300/360 RPM) drive capable of reading IBM AT 1.2 Mb 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=ccdriever.sys /10,4,12 /8,7,3 /9,3
```

3.3 CCDRIVES

Displays the active **CompatiCard** drives

Syntax

CCDRIVES

Purpose

CCDRIVES is used to display the types of drives currently in use with **CompatiCard** 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 **CompatiCard** 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:

```
CCDRIVES 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 300/360 RPM
```

```
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 option*

Purpose

CCFORMAT is a diskette initialization utility for use only with disk drives connected to **CompatiCard**. 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.

Description

The drive letter, followed by a colon (:), determines which **CompatiCard** 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 (720K/1.4M) drive.

```
A>ccformat g:/1.4↵
```

would initialize the diskette in drive G to the 1.4M high capacity format used by the IBM PS/2 computers.

```
A>ccformat g:↵
```

would also 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.

3.4.1 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	Format Capacity	Sides	CCFORMAT Option	DOS Version
5.25 inch 48 TPI	0	360 KB	2	/360	2.00
		320 KB	2	/320	1.10
		180 KB	1	/180	2.00
		160 KB	1	/160	1.00
5.25 inch 96 TPI	1	800 KB	2	/800	
		360 KB	2	/360	2.00
		320 KB	2	/320	1.10
		180 KB	1	/180	2.00
		160 KB	1	/160	1.00
5.25 inch 96 TPI high capacity AT type	2	1.2 MB	2	/1.2	3.00
		800 KB	2	/800	
		360 KB	2	/360	2.00
		320 KB	2	/320	1.10
		180 KB	1	/180	2.00
160 KB	1	/160	1.00		
5.25 inch 96 TPI high capacity 300/360 RPM dual speed	3	1.2 MB	2	/1.2	3.00
		800 KB	2	/800	
		360 KB	2	/360	2.00
		320 KB	2	/320	1.10
		180 KB	1	/180	2.00
160 KB	1	/160	1.00		
8 inch soft sector	4	1.2 MB	2	/1.2	
		250 KB	1	/250	1.00
3.5 inch	5	720 KB	2	/720	3.20
3.5 inch 600 RPM	6	720 KB	2	/720	3.20
3.5 inch high capacity	7	1.4 MB	2	/1.4	3.30
		720 KB	2	/720	3.20

Table 3-3 Types of Drives and Formats Supported



4.0 Drive Cabling

Since **CompatiCard** can be used with a wide variety of disk drives, special cabling arrangements are sometimes needed. **CompatiCard** 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 **CompatiCard** 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 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 **CompatiCard** 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 **CompatiCard** 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 **CompatiCard** drive connectors.

4.1 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.

CompatiCard also supports dual speed (300/360 RPM) high capacity drives. When a dual speed drive is attached, **CompatiCard** will use the slower speed (300 RPM) for standard density diskettes and the higher speed (360 RPM) for high capacity diskettes.

4.2 8 Inch Drives

Eight inch drives can be attached to **CompatiCard** if a wiring adapter is used to convert the 34 wire cable that **CompatiCard** 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			Signal Direction	8 Inch Drive	
Signal Name	34 Pin	37 Pin		50 Pin	Signal Name
Programmable	2	3	→	2	Low Current
Index	8	6	←	20	Index
Drive Select 1/3	12	8	→	28	Head Load
Motor Enable 1/3	16	10	→	18	Drive Select 2
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 **CompatiCard** 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 **CompatiCard** 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.

4.3 3.5 Inch Drives

Most 3.5 inch drives can be attached to **CompatiCard** using a 34 wire cable without any adapters but may require a different type of connector to be installed on the cable. Check your disk drive and make sure that you have the proper connector on the drive cable.

The 3.5 inch drives are available with two different rotational speeds: 300 RPM and 600 RPM. **CompatiCard** can be used with either type of drive, but you need to know the rotational speed to install the software.

4.3.1 Sony 3.5 Inch Drives

Sony 3.5 inch drives can be attached to **CompatiCard** if a wiring adapter is used to convert the 34 wire cable to the 26 wire cable on the Sony drive. An adapter can be assembled from the information in Table 4-2 or can be purchased from Micro Solutions.

CompatiCard		Signal	3.5 Inch Drive	
Signal Name	Pin	Direction	Pin	Signal Name
Index	8	←	18	Index
Drive Select 1/3	12	→	2	Drive Select 0
Motor Enable 1/3	16	→	1	Motor On
Motor Enable 1/3	16	→	14	Head Load
Step Direction	18	→	6	Direction
Step Pulse	20	→	8	Step
Write Data	22	→	10	Write Data
Write Enable	24	→	12	Write Gate
Track 0	26	←	20	Track 0
Write Protect	28	←	22	Write Protect
Read Data	30	←	24	Read Data
Select Head 1	32	→	16	Side Select

Note: Connect all odd numbered (ground) pins.

Table 4-2 Sony 3.5 Inch Adapter Wiring

5.0 Technical Details

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

CompatiCard is designed to handle both single density (FM) and double density (MFM) data using three different data transfer rates: 250 kHz, 300 kHz, and 500 kHz. This flexibility allows **CompatiCard** 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, **CompatiCard** 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 **CompatiCard** 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 **CompatiCard** connectors.

P1-P2 Pin	Signal Name	P3 Pin	P4 Pin	Signal Name
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 **CompatiCard** 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 **CompatiCard** 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 **CompatiCard**. This register is used to select the transfer rate and to control the Programmable output pin. Table 5-2 lists the **CompatiCard** 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
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 **CompatiCard** 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 kHz 0001 — 300 kHz 1111 — 500 kHz

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).

Appendix A UniForm-PC

Software written for **CompatiCard** is necessary for full utilization of **CompatiCard**'s capabilities. If you have the *UniForm-PC* program (Version 2.10 or higher) by Micro Solutions, you have the capability of accessing hundreds of different diskette formats. *UniForm-PC* will allow you to use both CP/M and foreign MSDOS format diskettes on your PC as though they were standard DOS diskettes. Your computer won't know the difference because *UniForm-PC* tricks it into thinking that the foreign format diskette is a standard DOS diskette.

UniForm-PC supports up to four floppy disk controllers in one computer. The first disk controller in your system must be either a standard disk controller or a **CompatiCard**. *UniForm-PC* will then allow up to three more **CompatiCard** controllers, enabling your system to support up to sixteen floppy drives.

The multiple controller feature is useful if your computer has a disk controller that can't be removed (such as the AT controller) and you want to add an 8 inch drive. Using **CompatiCard**, you can simply set the address jumpers for either the second, third, or fourth controller. Your original disk controller can remain installed because **CompatiCard** will not interfere with it. When *UniForm-PC* needs to access the 8 inch drive, it will use **CompatiCard** instead of your original disk controller.

The combination of **CompatiCard** and *UniForm-PC* gives you flexibility and capabilities that can't be matched—and at a price that can't be beat! Contact your dealer or Micro Solutions for more information on *UniForm-PC*.

Appendix B Troubleshooting

If you experience trouble with your computer after installing **CompatiCard**, 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 **CompatiCard** technical assistance. (See Appendix C.)

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 **CompatiCard** and is usually caused by improper orientation of the flat wire cable with respect to the connector on **CompatiCard** 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 **CompatiCard**. 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 **CompatiCard** 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 **CompatiCard**. If **CompatiCard** 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 **CompatiCard** 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 **CompatiCard**. If you are installing **CompatiCard** 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.

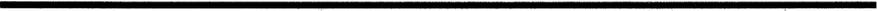
Appendix C Technical Support

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

- The serial number of your **CompatiCard** 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.





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