Model 102

Mirage™

Technical Manual

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NOTICE

MIRAGE is a product of:

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Table of Contents

Chapter 4: AOS and AOS/VS Software Guide

Chapter 5: Harware Installation

How To Use This Manual

This Reference Manual is divided into five chapters:

Chapter 1 is the User's Guide and also serves as an introduction to the entire MIRAGE system. We suggest that you read pages 1-1 through 1-10 before attempting to install the MIRAGE hardware or software.

Chapter 2 covers more advanced CP/M and MIRAGE topics. You do not need to read this chapter until after the MIRAGE system is fully installed.

Chapter 3 describes the installation of MIRAGE on an RDOS or DOS system. After reading the first ten pages of Chapter 1, refer to Chapter 3 to begin the installation.

Chapter 4 describes the installation of MIRAGE on an AOS or AOS/VS system. After reading the first ten pages of Chapter 1, refer to Chapter 4 to begin the installation.

Chapter 5 is the hardware installation manual. Do not start the hardware installation until instructed to do so by the text of Chapter 3 or Chapter 4.

BEFORE PROCEEDING:

- CHECK THE MATERIALS YOU HAVE RECEIVED AGAINST THE MIRAGE PARTS LIST ON THE FOLLOWING PAGE, AND

- INSPECT ALL PARTS FOR VISUAL DAMAGE. IF ANY DAMAGE IS APPARENT, DO NOT ATTEMPT TO INSTALL ANY OF THE MIRAGE HARDWARE OR SOFTWARE, BUT NOTIFY YOUR MIRAGE DEALER IMMEDIATELY.

NOTE: READ THE DIGITAL RESEARCH, INC. SOFTWARE LICENSE AGREEMENT BEFORE PROCEEDING FURTHER. IF YOU DO NOT AGREE TO THE LICENSING CONTRACT, RETURN THE ENTIRE MIRAGE SYSTEM TO YOUR MIRAGE DEALER.

"What Are All These Pieces?"

Why is it that instructions for opening a box are always inside the box?

Since you are reading this manual (which was inside the box) we will assume that you managed to get it open. Before going further, however, let's identify all of the pieces in the box. Here is what you should have:

(1) MIRAGE Processor: This is the 15x15-inch circuit board.

(1) MIRAGE Distribution Panel: This is a metal panel about 19" long and 1-3/4" high with six connectors on the front.

(1) Ribbon Cable: This multicolored flat cable has a connector at one end which mates with the back of the distribution panel.

(1) Loop-Back Test Cable: This is a 6-inch cable with a 25-pin "female" connector on each end.

(2) Pass-Through Cables: These cables are each 12 feet long. One end has a 25-pin "male" plug, the connector on the other end will vary.

(1) A bag of miscellaneous parts, specifically:
- (4) panel mounting screws,
- (4) panel mouning nuts,
- (1) plastic clip for the ribbon cable, and
- (4) jumper wires for your minicomputer backplane

(1) A Software and Documentation Package containing:
- (1) "MIRAGE Reference Manual" (this is it!),
- (1) reel of magnetic tape or a diskette containing the CP/M operating system, and support software for your computer,
- (1) Registration Card for CP/M
- (1) "CP/M Operating System Manual",
- (1) "CP/M Operating System Command Summary", and
- (1) "Digital Research Operating System End User License Agreement".

If anything from the parts list is missing, STOP!

Do not attempt to install the MIRAGE system if you don't have everything listed in the parts list or if something appears to be damaged. Instead, contact your MIRAGE dealer immediately.

Chapter 1:

MIRAGE User's Guide

Chapter 1 Contents

Introduction

This chapter of the "MIRAGE Reference Manual" is intended for the ultimate users of MIRAGE personal computers. There are four other chapters of which you should be aware:

Chapter 2 deals with advanced issues of CP/M and MIRAGE.

Chapter 3 describes the installation of the MIRAGE software under RDOS and DOS.

Chapter 4 describes the installation of the MIRAGE software under AOS and AOS/VS.

Chapter 5 describes the installation of the MIRAGE hardware.

PLEASE READ THE FIRST TEN PAGES OF THIS CHAPTER BEFORE STARTING THE INSTALLATION OF THE MIRAGE SYSTEM ACCORDING TO CHAPTER 3 OR CHAPTER 4 (AS APPROPRIATE).

Most of this chapter deals with the CP/M® operating system and the specifics of using CP/M on the MIRAGE processor. The authors assume you are already familiar with CP/M, and that you have a copy of the Digital Research's "CP/M Operating System Manual" on hand as you follow this guide.

CP/M Commands and Utilities

CP/M commands are executed by simply typing the name of the command followed by a <return> or <newline>. Some commands are built into the Console Command Processor (CCP) while others are "transient" commands which are actually programs. Transient commands and programs are also executed by typing their names.

The following are added transient commands and are described in this chapter:

HOST	MOUNT
DISMOUNT	WHAT
RPRINT	RSTOP
IMPORT	EXPORT
SEND	RECEIVE
BYE	BOOTCPM
DGCRT	

What is MIRAGE?

MIRAGE is a personal computer developed specifically for users of Data General computers. The MIRAGE computer runs Digital Research's popular CP/M operating system and makes use of the terminals, disks and other peripherals already attached to your DG system.

Each MIRAGE user has a private Z80A central processor and 64kb of memory which is mounted on a circuit board. This circuit board, the MIRAGE Processor, is installed inside the Data General "host" computer. Some MIRAGE processors contain the circuitry for more than one user, thereby reducing the number of circuit boards which are required for multiple users.

A program is supplied which runs on the host computer to support the MIRAGE users. This program is called a "server". Only one server program is required to support multiple MIRAGE users.

Whereas most personal computers use floppy disks for storage, the MIRAGE processor makes use of the hard disks already attached to your Data General system. Your MIRAGE personal computer uses disks that are both faster and larger than those found on any desktop machine.

CP/M on the MIRAGE Processor

MIRAGE is not exactly the same as most other personal computers. For one thing, the computer itself is not near your CRT terminal but is located inside a larger machine. Since MIRAGE is so different from other personal computers, how can it possibly run the thousands of application programs written for other computers? The answer lies in the portability of the CP/M operating system.

As you start to work with CP/M on your MIRAGE system, you will notice other differences between the typical system described in the CP/M manuals and your MIRAGE. Most obvious will be references to the use of floppy disks -- the MIRAGE system doesn't need any.

This guide is a supplement to the "CP/M Operating System Manual"; we won't be explaining CP/M here, just how to use CP/M on the MIRAGE system in particular.

Bootstrapping MIRAGE: Loading CP/M

When you sit down at a CRT terminal, you cannot tell by looking around whether there is a MIRAGE processor attached to it or not. There's nothing on or under the desk and there are no extra wires. If there really is a MIRAGE connected to the terminal, it's installed inside a host Data General computer at the other end of the cable which comes out of the terminal.

When your DG system is first turned on, the MIRAGE is effectively invisible. It has switched itself out of the circuit between the terminal and the DG computer. You can use your host DG computer as you could before the installation of MIRAGE. This is known as MIRAGE's "pass-through" mode of operation.

If there is a MIRAGE processor connected to your terminal, it is monitoring your data line, waiting for you to send a special signal from the keyboard, known as a BREAK.

You do this by pressing the BREAK key. If you have a Data General terminal, you may have to press the CMD and SHIFT keys along with the key marked BREAK in order to actually transmit a BREAK. Check with your terminal's manual or your system manager to find out.

Without MIRAGE, sending a BREAK would have little or no effect. But when a MIRAGE processor detects a BREAK from your terminal, it treats it as a signal to disconnect you from the DG host and connect you to your own personal computer.

The first time CP/M is loaded (or "bootstrapped") it responds by displaying:

```
Loading...
```

Then, after a brief delay:

```
RDS MIRAGE:  CP/M 2.2

A>
```

The "2.2" is the CP/M version number, the "A" means that you are currently addressing disk "A:", and the ">" means that CP/M is waiting for your first command.

MIRAGE is now in the "local" mode as opposed to the "pass-through" mode. In the local mode your terminal is effectively disconnected from the DG host computer. If you were running a program on the DG system just before you pressed the BREAK key, that program is still running. But for now, you are running on your own personal computer which is independent of the rest of the system.

Leaving CP/M: Returning to the Host System

Whenever you are in the pass-through mode, a BREAK will switch you to the local mode and to CP/M. There are two ways to get back to the pass-through mode and to the program on your host.

If CP/M is alive and well, you can type the HOST command. This will switch MIRAGE out of the circuit and will re-connect your terminal to the host processor. MIRAGE will go back to watching for the next BREAK.

But suppose you are running CP/M in the local mode and you press the BREAK key. What will happen?

The answer depends upon the setting of a switch on your MIRAGE processor. Ask your system manager whether your MIRAGE line is set for "production" or "development".

If your MIRAGE is set for production, then a BREAK in the local mode has the opposite effect of a BREAK in the pass-through mode: the MIRAGE will switch your terminal back to the host computer.

This is similar to typing the HOST command, but has some advantages. First of all, it's easy. You can press the BREAK key as often as you like and each time you will switch back and forth between CP/M and the host computer. Just as the program on your host computer kept running when you switched to the local mode, your CP/M programs will keep running while you switch back to pass-through mode by using the BREAK key.

If your MIRAGE is set for development, however, a BREAK will not switch you back to the pass-through mode. Instead, it will perform a so-called "cold bootstrap" and re-load CP/M from scratch.

The development setting is intended for users who are running programs which are likely to "crash" CP/M. Having a BREAK perform a cold bootstrap means that no matter how much your program runs amuck, you can always restart the system.

If your MIRAGE is set for development, the only way to return to the pass-through mode is via the HOST command.

If you are running well-tested programs and, therefore, do not experience CP/M "crashes", we recommend the production setting. Being able to switch back and forth between one computer and another by simply pressing the BREAK key is a great convenience.

If you are using the production mode and you do experience a crash, your system manager can restart your MIRAGE processor from the system console. (See Chapter 3 or Chapter 4).

Where are the Disk Drives?

Most CP/M systems use "floppy disks". These are small disks which rotate like phonograph records and can store data on magnetically coated surfaces. Floppy disks are usually 8" or 5-1/4" in diameter and can store from 100,000 to 1,000,000 characters per disk.

The disks must be inserted into "drives" which are similar to phonograph turntables. Each drive has a "head" assembly which moves in and out to access different "tracks" on the disk like the tonearm on a turntable.

The MIRAGE processor does not normally use floppy disks. Instead, it accesses the large disks already attached to your host minicomputer. These disks are typically 100 times larger than floppies, ranging from 10 to 500 million characters per disk. They are much faster than floppy disks, so that a program which uses the disks will run faster on the MIRAGE processor than on a system with floppy disks.

Your "hard disks", as they are called, are also more reliable than floppy disks. Greater reliability and capacity means that you won't have to make frequent backup copies of your data. (This is a common practice when using floppy disks.) Instead, your data can be backed up at the same time as the other data on your minicomputer.

Floppy disk drives on a CP/M system have names which consist of a letter ("A" through "P") followed by a colon. For example, if a system had two floppy disk drives, the first would be called "A:" and the second "B:".

The names refer to the disk drives, not to the floppy disks themselves. A user can put a paper label on a floppy disk before inserting it into a drive, but the name on the label has no significance to CP/M.

Instead of real floppy disk drives, the MIRAGE system uses four "virtual drives" named A:, B:, C: and D:. The MIRAGE system has been designed so that CP/M cannot distinguish your virtual drives from normal floppy disk drives.

As described above, there are many advantages to not using real floppy disk drives. But if there are no drives, what about the floppy disks that are supposed to go into them?

To go along with your virtual disk drives, the MIRAGE system uses "virtual floppies". Each virtual floppy is a special disk file created on your host Data General system by a utility program called MGEN which is discussed in Chapters 3 and 4.

Virtual floppies have many advantages. Obviously you can't touch them, which makes them harder to damage or lose than real floppies.

Also, virtual floppies can be of different sizes and still run in the same virtual drive. The MIRAGE software updates tables inside CP/M whenever you change the virtual floppy in a drive. The maximum size for a virtual floppy is 8 megabytes. Since each MIRAGE user has four virtual drives, each user can have up to 32 megabytes of on-line disk storage.

Virtual floppies also have names. The MGEN utility asks you to provide a name of up to ten characters for each virtual floppy you create. The files on your host system which simulate virtual floppies are given the extension ".VF" so that you will be able to distinguish them from other files. For example, if you want to create a virtual floppy called "MYDISK", MGEN will allocate a disk file of the size you specify and name that file "MYDISK.VF".

Aside from these differences, MIRAGE will be easy for you to use if you pretend that you have real drives and real floppy disks just like every other user of CP/M.

The MOUNT and DISMOUNT Commands

If you can't touch a virtual floppy, how are you supposed to insert it into the drive (which is also "virtual")?

If you had real floppy disks, you would select the proper disk according to its label. You would then open the door on the disk drive, insert the floppy, close the door, and type control-C to restart CP/M.

On MIRAGE this is all done with the MOUNT command.

Type MOUNT followed by <return> and MOUNT will respond with:

```
Name of virtual floppy: _
```

Type in the name of the virtual floppy that you want to mount. The virtual floppy must have been created by the MGEN utility on the host system. Don't type the ".VF" extension, just the same name used when the virtual floppy was created.

MOUNT now asks you:

```
Mount in which virtual drive: _
```

Type the ID for the virtual drive in which you want to mount the virtual floppy disk you have named. Since there are four virtual disk drives, A:, B:, C: and D:, your response must be one of these letters (without the colon).

If there is already a virtual floppy mounted in the drive you have specified, MOUNT will ask you something like:

```
YOURDISK is aready mounted in drive B:

Do you want to DISMOUNT it [Y]? _
```

If you press "Y" or <return>, the currently mounted disk will be dismounted. Otherwise (if you type "N", for example) the MOUNT procedure will terminate.

If the virtual floppy is not in use by someone else, and if you have the necessary access privileges, MOUNT will ask you:

```
R/W [Y] ? _
```

If you require Read/Write access to this floppy, press the "Y" key or <return>. If you do not need to write to the floppy, press "N" and it will be mounted R/O (Read Only). If you have ever used real floppy disks, you will recognize that this is just like covering or exposing the small slot on a floppy disk which enables or disables writing to the disk.

Sharing Virtual Floppies

If you MOUNT a virtual floppy R/O (for Reading Only) by answering "N" to the last question, then other MIRAGE users will also be able to MOUNT the same virtual floppy R/O.

On the other hand, if you answer "Y", MIRAGE will attempt to give you R/W (Read/Write) access to the virtual floppy.

There are two conditions under which you could be denied R/W access. First, the file access control mechanism of the host operating system on your Data General system may deny your request. If that is the case, check with your system manager to have the write access changed. Second, if the virtual floppy is already in use, either R/W or R/O, you cannot be given R/W access to it.

To put it another way: any number of users can share a virtual floppy disk so long as all of them use it for Reading Only (R/O). If the first user MOUNTs it R/W, that user will have exclusive access to the virtual floppy until it is DISMOUNTed.

DISMOUNT

When you are finished with a virtual floppy disk, it should be removed from the virtual drive so that others may use it.

Type DISMOUNT followed by <return>. DISMOUNT will respond with:

```
Dismount floppy from which drive ? _
```

Type in the letter for the ID of the drive (A, B, C or D) followed by <return>. DISMOUNT will respond with something like:

```
YOURDISK has been dismounted from B:.
```

The WHAT Command

Since you don't have a real floppy disk drive you can't just open the door to see the label on the disk inside. Instead, type the WHAT command to get:

```
A: MUTIL        R/O      512 Kb
B: YOURDISK     R/W     1024 Kb
C:
D: TEMP         R/W      256 Kb

LPT: $LPT
```

From this you can see, for example, that the C: drive is not in use, and that you cannot write to the "MUTIL" floppy in drive A: which, by the way, has a maximum size of 512K bytes.

The reference to "LPT:" indicates that data sent to the CP/M device known as LPT: will, in fact, be sent to the device known as $LPT on the host DG operating system (RDOS or DOS in this example). See the sections of this chapter which describe CP/M devices and the RPRINT utility for more details about LPT:.

You may notice delays of a few seconds or more as WHAT displays the details of each virtual floppy. This is because WHAT actually logs-in each MOUNTed disk if you have not alread done so. The larger the virtual floppy, the longer it takes to log it in.

You should also be familiar with CP/M's standard STAT command. STAT is a powerful utility and is explained in detail in the "CP/M Operating System Manual". Simply typing "STAT" will display data similar to that shown by WHAT. For example, STAT may display the previous situation as:

```
A: R/W, Space: 506k
D: R/O, Space: 253k
```

Notice three differences between the outputs of STAT and WHAT:

1. Disk B: is not displayed at all by STAT. This is because STAT only provides information about "logged-in" virtual floppy disks. Disks can become logged-out when you end a program or perform a warm or cold start. WHAT logs in and displays all mounted disks.

2. The file sizes displayed by WHAT are always larger than those displayed by STAT. WHAT shows the total size of the allocated virtual floppy disk file. STAT, on the other hand, shows the amount of space currently available on each disk.

3. According to STAT, disk A: is "R/W" (Read/Write) whereas WHAT says that it is "R/O" (Read/Write). Similarly disk D: is shown as R/O by STAT but R/W by WHAT. Since a virtual floppy is really a disk file on your host computer, the server program must get access to it on your behalf. You specify whether you want R/O or R/W access with the MOUNT command, and MOUNT "opens" the host file in that mode. That is also the value displayed by the WHAT command.

If you specify R/O to MOUNT, the disk is actually protected against writing, but CP/M does not discover that fact until it tries to perform the write. (CP/M operates on the assumption that all disks are R/W until proven otherwise. This assumption is made at every warmstart of CP/M).

If you specify R/W to MOUNT, STAT will initially display R/W as well. However, you can use the STAT command to temporarily "write protect" the disk. If you do this, STAT will display R/O while WHAT displays R/W. Although the host operating system would permit you to write to the disk, CP/M will not let you do so.

If a disk was MOUNTed R/W, but is currently shown as R/O by STAT, a warmstart (control-C) will reset CP/M to permit writing to the disk.

Use of CP/M Physical Devices

The following CP/M devices are supported by the MIRAGE processors:

CRT: This is your console, connected to the RS-232C port labelled "CRT". It can be used for both input and output.

LPT: This output-only device is usually associated with a printer on your host minicomputer system through the MIRAGE server program.

When you send data to LPT: it is first transmitted to the host system and from there to an actual device, queue or file on that system.

You can change the current device, queue or file associated with LPT: by using the RPRINT command.

You can find out what device, queue or file is currently associated with LPT: with the WHAT command.

TTY: Like CRT:, this device can be used for both input and output. Data is transmitted and received through the connector marked "AUX" (auxilliary) on the MIRAGE distribution panel.

When output goes to TTY: the use of the XON/XOFF protocol (CTRL-Q/CTRL-S) on the TTY: input data line controls the flow of output data. For this reason, CTRL-S and CTRL-Q characters are "filtered" out of the input data from TTY:.

Use TTY: for most printers or plotters connected to the AUX port.

PTP: In early CP/M systems, these devices were named for the
PTR: "Paper Tape Punch" and the "Paper Tape Reader". As you might expect, the "punch" (PTP:) is an output device and the "reader" (PTR:) is an input device. In fact, both of these devices are associated with the same AUX connector as TTY:.

Although PTP: and PTR: refer to the same AUX port as TTY:, they work differently. PTP: and PTR: are totally independent devices. An XOFF character (CTRL-S) received by PTR: will not stop PTP:, for example, and can be read by a program just like any other character. The same is true for XON (CTRL-Q).

Use PTP: and PTR: when you want to communicate with a device from which you must input data or from which CTRL-Q and CTRL-S should not be interpreted as flow control signals.

Local vs. Remote Printing

There are three CP/M devices to which you can send data for printing. The devices are LPT:, TTY: and PTP:.

If you send data to TTY: or PTP: , the data will be transmitted to the plug marked "AUX" on the MIRAGE distribution panel, and from there to whatever printer is connected. This is called "local" printing.

Alternatively, you can send data to LPT:, in which case the MIRAGE processor will forward the data to a printer attached to your host minicomputer. This is referred to as "remote" printing.

There are advantages to both techniques. If you want to share a printer with other MIRAGE users, or if you want to use a printer which is already in use on your Data General system, then LPT: makes the most sense.

If, however, you have a private printer which will only be used by you, plug it into the AUX connector, and refer to your printer as TTY: or PTP:. When you use the MIRAGE AUX port, all of the processing associated with printing is handled by the MIRAGE system with no overhead to the host minicomputer.

In both cases, unless you are using "spooling" you will have to wait until printing has stopped before CP/M lets you perform other tasks. If you are printing remotely, spooling depends on your host operating system. Under RDOS or DOS, certain devices such as the line printer ($LPT) can be spooled. This means data bound for CP/M's LPT: gets sent to a temporary disk file on the Data General computer, and the DG operating system will eventually send it to the line printer.

Under AOS or AOS/VS, you can achieve spooling by having CP/M's LPT: associated with a host operating system queue, such as @LPT.

If you are printing locally (to TTY: or PTP:) you will not have spooling unless you are running an application program which includes its own spooler (as do some word processing packages) or you have a separate spooling utility.

"Binary" Printing

Some times you will want to print data which contain "control characters". MIRAGE will pass all your data to the host system unmodified, but you may need to take special steps to ensure that the host operating system does not misinterpret these special codes. In particular, when using a spooler under AOS or AOS/VS you may have to run the spooler in "binary" mode. Refer to the Data General "Operator's Manual" for full details.

CP/M's Logical Devices

MIRAGE supports five "physical" CP/M devices, CRT:, TTY:, LST:, PTP: and PTR:. They are called physical devices because they are permanently associated with certain hardware capabilities of the MIRAGE system.

CRT: refers to the connector marked "CRT" on the MIRAGE distribution panel. TTY:, PTP: and PTR: refer to the connector marked "AUX". LST: refers to the mechanism which transfers data for printing to the host system.

Every computer which runs CP/M has a slightly different hardware environment. For example, some systems may not have devices called PTP: and PTR:.

In order to make programs portable, the authors of CP/M made up four "logical" device names. Since there are no real (physical) devices permanently associated with logical devices, they can be assumed to exist on every CP/M system.

Logical devices are "assigned" to physical devices through a small table, called the IOBYTE, which acts like a telephone switchboard. When a program sends data to a logical device, CP/M examines the IOBYTE to determine which physical device should be used. The same thing happens when a program reads data.

Here is a table of the four logical devices and the physical devices which may be associated with each of them on the MIRAGE processor:

Logical Device	Function	May be connected to these Physical Devices	
CON:	The main interactive device. Used by most programs to communicate with the user.	CRT: TTY:	(default)
RDR:	The "reader" device.	PTR: TTY:	(default)
PUN:	The "punch" device.	PTP: TTY:	(default)
LST:	The standard output list device.	TTY: LPT: CRT:	(default)

For example, suppose printed output of a program goes to LST:, which is normally associated with TTY:, so that printed output is sent to a printer. But if you want to get printed output displayed on your terminal, you can change the IOBYTE so that LST: is associated with CRT:.

The RPRINT Command

RPRINT is used to set or change the destination for remote printing of data sent to CP/M's LPT: device.

If you have not used the RPRINT command since you started the current session of CP/M on the MIRAGE (i.e., since a cold boot), the remote printing destination will be undefined.

Type RPRINT and you will see something like:

```
Remote printing via LPT: is currently going to $LPT.

Enter the new remote printing destination device, file or
queue, or press <return> for no change: _
```

If you want to start sending remote printing to a new destination, enter the name of the destination device or file followed by <return>. If your host system is AOS or AOS/VS, it may be more appropriate to enter the name of a print queue.

Note: Remote printing performs an "append" operation if the remote printing destination already exists.

The RSTOP Command

RSTOP tells the server program that you are done with the remote printer. Type:

```
RSTOP
```

The server will then close the file, queue or device which was in use as the destination of LPT:.

On RDOS or DOS it is important to issue the RSTOP command when you are done using the remote printer; other users will be denied access to it until you do so.

On AOS and AOS/VS the same is true except when the remote destination is a print queue. You can print to an AOS or AOS/VS queue for as long as you like, but everything you send for printing will be held in a temporary disk file on the host system until you issue the RSTOP command. At that time, the temporary disk file will be closed and enqueued for printing by an AOS or AOS/VS spooler. In other words, your printed data will not actually appear until you issue the RSTOP command.

NOTE: Performing a cold boot load of CP/M will perform an implicit RSTOP.

The IMPORT and EXPORT Commands

Your first impulse, after seeing that CP/M is running, might be to TYPE a file which you know exists on your Data General system. If you try it, you will find that CP/M claims there is no such file. Remember, CP/M thinks it is using floppy disks which are, in fact, disk files on your host system. CP/M files are actually "inside" of the files on your DG disks.

There is another reason you cannot TYPE a DG file from CP/M: text files are stored differently under CP/M than under any of the DG systems.

For these reasons the MIRAGE software includes the IMPORT and EXPORT commands to convert files from DG to CP/M and from CP/M to DG, respectively.

To convert a DG file to a CP/M file, type IMPORT, followed by the name you wish to give the imported file under CP/M. You will see:

```
Import what file?: _
```

Enter the name of the file on your DG system. IMPORT then asks:

```
Is this a text file? [Y]: _
```

If the file is "displayable" (meaning it consists of printable characters) then press "Y" or <return>. IMPORT will then convert the file from DG text format to CP/M format. If you press "N", IMPORT will copy the file in "binary" mode (i.e., without changes).

To convert a CP/M file to a DG file, type EXPORT followed by the name of the CP/M file you wish to export. You will see:

```
Save under what host system filename?: _
```

Enter the name you wish to give this file when stored on your host Data General system. Finally EXPORT will ask:

```
Is this a text file? [Y]: _
```

If the file is "displayable" (meaning it consists of printable characters) then press "Y" or <return>. IMPORT will then convert the file from CP/M text format to DG format. If you press "N", IMPORT will copy the file in "binary" mode (i.e., without changes).

If the host file already exists, EXPORT will "append" to it.

Note: IMPORT and EXPORT share a common data transfer facility with remote printing (see the RPRINT command). If remote printing is currently enabled, you will have to disable it by using the RSTOP command before running either the IMPORT or EXPORT utilities.

The SEND and RECEIVE Commands

SEND and RECEIVE permit you to exchange files between MIRAGE and another CP/M system by connecting the other computer to the AUX connector on the MIRAGE distribution panel.

Depending upon the direction of the file exchange, the program for either SEND or RECEIVE will have to first be made to work properly on the other system. For example, if you want to transfer files from a Brand X computer to the MIRAGE, you must first get the SEND program working on X. For this reason, both SEND and RECEIVE are supplied in source form. You will have to study the source code and customize it appropriately for your non-MIRAGE system. (You can send from one MIRAGE line to another without customizing the code).

Note: When running SEND or RECEIVE the character format for both the sender and receiver must be set for 8 data bits. The number of stop bits, the parity and the baud rate are not important to the operation of these utilities, but must be the same for both the sender and receiver.

These parameters for MIRAGE are controlled by switches on the edge of the MIRAGE Processor board. Refer to Chapter 5 for details.

Again, assuming that you want to transfer a file from system X to MIRAGE, type the following CP/M command on system X:

SEND <source>

where "<source>" is the actual filename of the file you wish to send.

On MIRAGE type:

RECEIVE <dest>

where "<dest>" is replaced by the name you wish to give to the file once it is on the MIRAGE system. (Normally the source and destination names would be the same, but this is not required).

The sending machine should now display the message:

SENDING BEGINNING

and the receiving machine should display:

RECEIVING BEGINNING

In addition, a period (".") will be displayed at the receiving end for every block of data successfully received. If a block is received incorrectly a "B" will be displayed and the block will be retransmitted.

When the file exchange is complete, the sending machine will display:

SENDING COMPLETED

and will return to CP/M.

When the above message is displayed, type control-C at the receiving machine. The receiving machine should display:

RECEIVING COMPLETED

Note to users of Apple® II computers: SEND and RECEIVE are compatible with the UPLOAD and DOWNLOAD programs (respectively) supplied with the Microsoft SoftCard™. If you have a SoftCard and an appropriate serial interface, you can use UPLOAD to transmit files to the MIRAGE system and DOWNLOAD to receive files from MIRAGE.

The BOOTCPM Command

The BOOTCPM command will cause a "cold-boot" of CP/M.

In the development mode, pressing the BREAK key performs a cold-boot of CP/M and the BOOTCPM command is unnecessary.

In the production mode, however, BREAK is used to switch back and forth between MIRAGE and your host system. BOOTCPM must be used to perform a cold-boot of CP/M. In the unusual case where CP/M has apparently "died", your system manager can perform a cold-boot of your MIRAGE processor via the host system console.

CP/M's Console Command Processor (CCP) will accept either a <newline> or a <return> at the end of a command line, but other programs are not so forgiving. For example, if you use the ED editor to enter text which you then assemble using ASM, lines entered using <newline> will be rejected by ASM.

The "N" option to the DGCRT command will cause all <newline> characters received from your keyboard to be changed into <carriage-return> characters and vice versa. If you select this option, you should just pretend that the "big key" is labeled RETURN and that the CR key is labelled LINE FEED.

The B (Backspace) Option

Many programs including CP/M's Console Command Processor (CCP) permit you to type a BACKSPACE character (CTRL-H) to perform a "destructive backspace". That is, if you press CTRL-H the cursor should back-up one column and erase the previously typed character.

The CCP accomplishes this by first sending out one CTRL-H which positions the cursor over the character which is to be erased. Next, CCP sends a SPACE, which erases the character, but also advances the cursor. Finally, CCP sends a second CTRL-H which backs-up the cursor once again so that it now rests where the erased character used to be.

The assumption made by the CCP and other programs is that if a CTRL-H is sent to the terminal, the cursor will move one column to the left. This is a reasonable assumption, as the vast majority of terminals in the world will do so. Except DG's.

When a Data General terminal receives a control-H it homes the cursor. To move the cursor left, a Data General CRT requires a control-Y instead.

The "B" option to DGCRT command will cause all control-H characters sent to your terminal to be converted to control-Y characters unless they are part of a cursor addressing sequence. By selecting this option, you should be able to use control-H as the standard BACKSPACE character from the keyboard.

The H (Home) Option

If you use the B option to the DGCRT command, control-H can be used as a standard BACKSPACE. However, Data General terminals have another related peculiarity.

The HOME key on a DG CRT transmits a control-H (BACKSPACE) character.

When installing application programs, there is often an INSTALL or "GEN" program for terminal customization. In many cases this utility wil ask someting like, "What sequence of characters will come from the HOME key on the keyboard?" Some of these INSTALL programs just won't believe you if you tell them that your HOME key sends a BACKSPACE.

For such disbelievers, the "H" option to the DGCRT command will cause all control-H characters from the keyboad to be converted to control-underscore (octal 37; hexadecimal 1F).

Note that if you use the H option, the control-H key will also be converted and you may lose your BACKSPACE capabilities. We suggest that you use either the B or the H option, but not both.

The R (Reset) Option

There are a variety of control charcters which can "mess up" a Data General display and from which it can be difficult to recover. For example, if a DG CRT receives a control-S, scrolling will be disabled. A control-R will re-enable scrolling, but it is very difficult to convince CP/M's Console Command Processor (CCP) to echo a control-R to the screen. Similarly, such attributes as blinking, reverse video and dim can be accidently enabled.

The "R" option of the DGCRT command will cause a control-R and control-L to be sent to the terminal. The effects will be to enable scrolling, clear the screen, and turn off the blink, underscore, reverse video and dim attributes.

Note: Unlike the other options to the DGCRT command, the R (Reset) option makes no change to CP/M; the effect is one-time only. Therefore, you should issue "DGCRT R" any time the screen needs resetting.

The "P" (Parity) Option

Normally, parity errors from the keyboard are ignored. If you use the "P" option in the DGCRT command line, CP/M will check data input to the "CRT" line for parity errors according to the CRT port character format switch settings. (See Chapter 5). Any character which arrives with a parity error will be converted to a control-G. When echoed to most terminals, this will cause the terminal's bell to ring. This option of the DGCRT command may be used with all terminals, not just those manufactured by Data General.

Customizing DGCRT

If you use the DGCRT command every time you boot CP/M you may find that it is more convenient to "patch" DGCRT so that one or more of the options is always assumed by default. The instructions for paching DGCRT can be found in Chapter 2.

Nothing Mounted In Drive Accessed

The server has detected a request for a drive in which no virtual floppy is currently mounted.

Remote Printing Not Currently Enabled
Discarding Data Bound For LPT:

You have attempted to write to LPT: without a remote printing destination currently defined. The RPRINT command establishes a remote printing destination. RSTOP and Cold-Starts both terminate remote printing. Data to LPT: is being accepted by MIRAGE but is not being transmitted to the host computer.

Terminating CP/M

This message is displayed after all fatal errors. An attempt has been made to close all host files in use by you, and your MIRAGE line has been switched to the pass-through mode.

Wrong Revision Bootstrap EPROM

The "firmware" on your MIRAGE Processor Board is not compatible with the MIRAGE server which is running on your host computer. Contact your MIRAGE dealer for advice.

Chapter 2:

MIRAGE System Management

This chapter of the "MIRAGE Reference Manual" is intended for system managers or advanced CP/M users. The material presented goes beyond what is normally required in order to install or use the MIRAGE system.

Also note that most of the material presented here refers to CP/M and the MIRAGE system. If a topic is RDOS- or DOS-specific, you will most likely find it discussed in Chapter 3. AOS- and AOS/VS-specific topics are covered in Chapter 4.

Chapter 2 Contents

Enhancements to CP/M

CP/M for MIRAGE has been enhanced in two areas: (1) new BIOS entry points have been added which should help with the programming of peripheral devices, and (2) some optional enhancements provided by Digital Research have been incorporated.

Extended BIOS Entry Points

The following BIOS entry points follow the standard CP/M 2.2 BIOS entries. In other words, "JMP COTST" immediately follows the standard entry "JMP SECTRAN". Refer to the "CP/M Operating System Manual" for complete details on the BIOS jump table.

The status returned from these routines is compatible with the status returned by the standard CP/M BIOS routine "CONST". All values are returned in the A register.

JMP COTST — Console Output Status: Returns FF (hex) if the current logical console output device is ready to accept a character. Returns 00 if not ready.

JMP RDRST — Reader Input Status: Returns FF (hex) if a character is available from the current logical reader device. Returns 00 if no character is available.

JMP PUNST — Punch Output Status: Returns FF (hex) if the current logical punch device is ready to accept a character. Returns 00 if not ready.

CP/M Modifications

The following modifications to CP/M have been installed according to materials supplied by Digital Resarch. Square brackets surround references to the relevant DRI documents.

SUBMIT.COM

Normally, if drive A: is not the default drive when you run the SUBMIT program, the $$$.SUB file is created on the currently logged-in disk. Therefore, you cannot run a SUBMIT job from any drive other than A:. A modification has been incorporated which always creates the $$$.SUB on the A: drive. The disk mounted in A: must be mounted R/W (read/write). [P03,SUBMIT]

Normally, SUBMIT accepts only certain control characters in SUB files. A modification has been incorporated which causes SUBMIT to recognize the two characters "CTRL-z" as control-Z. [A12,SUBMIT]

PIP.COM

Normally, when using the SUBMIT and XSUB utilities to execute multiple PIP commands from a SUBMIT file, it is not possible to exit from PIP automatically. The SUBMIT utility does not accept lines with only a carriage return. PIP has been modified so that a period (".") can be used to exit from PIP instead of a carriage return. In the SUBMIT file, place a single period on a line by itself after the last PIP command to be executed. [A13,PIP]

BDOS

The control-S function controls screen scrolling during CRT ouput. Normally, however, the system does not recognize control-S if you type another character before it. A change has been made to rectify this situation. [A05,BDOS]

DDT.COM

DDT normally uses the machine instruction "RST 7" to set breakpoints. The MIRAGE Processor uses "RST 7" for Z80A interrupts. DDT has been modified to use "RST 6" instead of "RST 7". This should not affect the user in any way. [A07,DDT]

Advanced CP/M Compatibility Issues

(Refer to the "CP/M Operating System Manual" for additional information.)

SYSGEN

The SYSGEN utility is intended to place a copy of CP/M onto a floppy disk. Since MIRAGE does not use floppy disks, and only one copy of CP/M is required (even for multiple users), SYSGEN is not supplied with MIRAGE. The file MBOOT.BT contains the MIRAGE copy of CP/M.

MOVCPM

MOVCPM is a utility program designed to "reconfigure" CP/M for systems with different amounts of memory. Since all MIRAGE users have 64kb of memory and the system is shipped to work in that environment, MOVCPM is not supplied with MIRAGE.

CP/M 2 SYSTEM INTERFACE

All of the standard facilities are provided. There are additional interfaces which are documented in the "MIRAGE User's Guide".

CP/M ALTERATION

This section of the "CP/M Operating System Manual" can be ignored. The MIRAGE version of CP/M comes fully implemented and system alteration is not required.

Additional Enhancements

See Chapter 1 for details regarding further enhancements made to CP/M on the MIRAGE system.

Production and Development Modes

Chapter 1 contains a complete user's perspective on the differences between these two modes. Please read that section before continuing here.

We recommend that you install your system for the production mode. The mode is selected by one of the DIP switches on the edge of the MIRAGE circuit board. (See Chapter 5).

In the production mode, software is used to detect BREAKs coming from the user's terminal and to switch the user back and forth between local processing on the MIRAGE board and the "pass-through" mode in which the data from the connector labelled "CRT" is passed through to the "HOST" connector and from there to the host minicomputer system.

The advantages of the production mode are (a) switching back and forth is simple, and (b) programs can continue on one system while the user is connected to the other.

The development mode is intended for situations when this software-based scheme is not adequate. For example, if a CP/M-based program contains a bug, the program could overwrite the software that processes BREAKs. In such a case, a user running CP/M may not be able to return to the pass-through mode of operation unless a "BOOT" command is issued from the system console.

To support the development mode, the MIRAGE processors contain hardware which can detect a BREAK from the user's CRT terminal independent of the software on the MIRAGE or host system. When this development mode break-detect hardware is enabled, a BREAK will ALWAYS attempt a cold-start bootstrap of CP/M and, if successful, will leave the user in the MIRAGE mode. If CP/M cannot be loaded (e.g., the server is not running) the user will be switched to pass-through.

The advantage of the development mode is a guaranteed way to re-boot the system from the terminal. The disadvantages are (a) the user must use the slightly less-convenient HOST command to return to the pass-through mode, and (b) returning to MIRAGE always causes a cold-start, halting all CP/M processing and closing any virtual floppies which were open.

Experiment with both modes of operation to determine which best meets the needs of each individual MIRAGE user.

Advanced Virtual Floppy Issues

Contiguous Virtual Floppy Disks

You may convert virtual floppies to contiguous files to obtain a slight improvement in performance so long as you have enough contiguous space on your disk.

On RDOS and DOS, virtual floppies are created as random files. They can be copied to contiguous files via the XFER CLI command and the /C switch.

On AOS and AOS/VS you can make these files contiguous by copying them to a file created with an element size equal to the entire size of the virtual floppy disk file.

Direct Manipulation of Virtual Floppies

The files within a virtual floppy are not directly accessible from your host operating system. Use the EXPORT and IMPORT commands under CP/M to convert files to and from your host operating system, respectively.

You can, however, peform certain operations upon entire virtual floppies. For example, they can be DUMPed and LOADed as can any other files on your Data General system. They can also be copied using XFER (under RDOS or DOS), COPY (under AOS ad AOS/VS) or MOVE (on all systems).

Altering the Size of a Virtual Floppy

Don't do it! CP/M floppies (and therefore virtual floppies, too) reserve a percentage of total disk space for directory information. If you change the size of a virtual floppy, CP/M will become confused as to where the directory area ends and the data area begins.

If you need to change the size of a virtual floppy, you should create a new one of the desired size with the MGEN utility, transfer the files to the new virtual floppy using CP/M's PIP utility, and finally delete the old virtual floppy.

If the file containing a virtual floppy is not an exact multiple of 64kb, the MIRAGE server will refuse to MOUNT it.

Customization of the DGCRT Utility

The purpose and operation of the DGCRT utility are described in Chapter 1. As mentioned there, you may desire to modify the DGCRT utility so that one or more of its arguments are assumed by default.

DGCRT.COM can be patched using DDT. Each of the five options may be individually enabled. Run DDT using the command:

```
A>A:DDT DGCRT.COM
```

DDT will display:

```
DDT VERS 2.2
NEXT  PC
0280  0100
-
```

Use the "S" (Set memory) command to modify the desired locations according to the list below:

N (Newline) Option	location 0105 (hex)
P (Parity) Option	0106
B (Backspace) Option	0107
H (Home) Option	0108
R (Reset) Option	0109

By default, each of the above locations contains a 00H. To enable a selected option, change the contents to 01H. For example, to modify DGCRT so that the B option is always taken, type:

```
S107<return>
```

DDT will respond with:

```
0107 00          ( current contents )
```

Type:

```
01<return>       ( change contents )
.<return>        ( leave 'S' mode  )
```

After making all of your changes, type:

```
G0<return>       ( stop DDT but leave program )

SAVE 2 MYDGCRT.COM<return>
```

Now the program MYDGCRT is a customized version of DGCRT and can be run without arguments or with additional arguments. (You can use any name in place of MYDGCRT).

There are three other locations which you can change in DGCRT.COM to suit your personal needs:

location 010A: The character which will replace a control-H from the keyboard ("H" option).

location 010B: The first of two characters sent to the terminal when the "R" option is selected.

location 010C: The second of two characters sent to the terminal when the "R" option is selected.

A Note About Multiple Users

Chances are you are using a MIRAGE system which supports more than one CP/M user at a time. Does this mean that you have a "multi-user" version of CP/M? The answer is emphatically NO!

CP/M is a "single-user" operating system. Each MIRAGE user has his or her own private personal computer. Users of MIRAGE Processors can share certain devices connected to the host system (such as printers, etc.), but for the most part each user's disk files cannot be used by others simultaneously.

This is not a restriction of the MIRAGE processors, it is inherent in CP/M as a personal, single-user system. Although MIRAGE Processors are physically installed inside a "host" minicomputer, think of your MIRAGE Processor as being your private computer.

There may be some confusion regarding the CP/M "USER" command as described in the "CP/M Operating System Manual". This command is handy if different users share virtual floppy disks AT DIFFERENT TIMES. For example, if you issue the command "USER 3" every time you start running CP/M, you will only be aware of the files created by you (or someone else) while the USER value was "3". If other people use the same virtual floppy, they can use different USER numbers, thereby keeping separate "directories" of files within the same virtual floppy.

There is also room for confusion regarding the operating system known as MP/M™, also a product of Digital Research. This operating system is very much like CP/M except that it is a true multi-user system.

However, MP/M requires that all of the users share a single central processor. The designers of MIRAGE chose to provide each user with a private Z80A central processor to achieve better performance. For this reason, the MP/M operating system cannot be run on the MIRAGE processor.

MIRAGE Server Errors

The MIRAGE server is capable of correcting (or at least coping with) most error conditions. Should a more serious error occur, the server will display a message in the following form before terminating:

Fatal MIRAGE Error: 000000

All of these conditions indicate a serious problem with the MIRAGE system. If you cannot remedy the situation, please report these conditions to Custom Systems Inc.

The number displayed is in octal. The following values are currently defined as fatal errors:

000002: Server stack overflow.

000003: Parameter File Revision Mismatch. The file MPARAM.DA is not compatible with the current server.

000005: Unable to exit from interrupt service routine.

000021: A MIRAGE Processor found during MGEN and recorded in MPARAM.DA was not found during initalization.

000022: The "ECO" (hardware update) level of a MIRAGE Processor is one not compatible with the current server.

Other codes are non-fatal and should never be displayed.

Reporting Errors

Some errors will be serious enough to abort the MIRAGE server program. When the server aborts, a "break" file will be created on the host system. This file is invaluable to Custom Systems in diagnosing problems.

On RDOS and DOS the break file is always called "BREAK.SV" and will be created in the directory in which the MIRAGE server was running when it aborted.

On AOS and AOS/VS the break file will have a name something like

?.006.14_10_51.BRK

where the actual filename is based on the time and process id number.

When reporting errors to Custom Systems DUMP the following files to tape or XFER them to a floppy disk:

1. The "break" file, if any.
2. "MPARAM.DA"
3. "MBOOT.BT"

Also enclose a detailed description of the error, including:

1. The error code displayed, if any.
2. Any "trap" information displayed, such as the value of the program counter or the contents of the accumulators at the time the error occured.
3. A desription of host system and CP/M activity at the time the error occured.
4. A list of the CP/M programs being run at the time of the error
5. A description of any specific action which was the apparent cause of the error.
6. Whether the error can or cannot be duplicated.

Please report all problems using the Software Trouble Report (STR) form which can be found towards the back of this manual. You may copy this form as necessary.

Chapter 3:

MIRAGE Software Installation Guide for RDOS and DOS

This chapter describes the installation and management of the MIRAGE software under the RDOS and DOS operating systems. The majority of this chapter consists of step-by-step instructions for the installation process. The remainder of the chapter describes RDOS/DOS system management issues.

Chapter 3 Contents

Introduction

Here is an outline of the installation procedures which follow for the MIRAGE system software on RDOS or DOS:

1. SYSGEN a new RDOS or DOS system (if necessary).
2. Load the MIRAGE files from tape or diskette.
3. Run the MGEN utility to help you select a device code for the MIRAGE processor.
4. Shut down your system and install the MIRAGE hardware. Refer to Chapter 5 for step-by-step instructions.
6. Bring your system up and run the MGEN utility once again, this time completing the process. This utility will create a customized MIRAGE "server" program.
7. Use MGEN to create a virtual floppy to play with.
8. Create links to support CP/M bootstrapping.
9. Execute the MIRAGE server.
10. Press the BREAK key on a terminal connected to a MIRAGE processor to run CP/M.

NOTE:

The MIRAGE Server requires an entire ground, but a single server can support multiple MIRAGE Processors so long as they all use the same device code. It is not practical to run the MIRAGE Server in the foreground of an unmapped system.

RDOS or DOS SYSGEN for MIRAGE

The RDOS/DOS environment you specify via the Data General SYSGEN utility has a great effect upon the performance of your MIRAGE system. Below are some details of resources utilized by MIRAGE. Read this section to determine whether you must perform a new RDOS or DOS SYSGEN. Print a listing of the "dialogue" file from your current system to see if you have allocated enough resources to properly support MIRAGE. If so, you can skip this section and continue with the loading of the MIRAGE files.

Here are things you should consider when performing an RDOS or DOS SYSGEN for a system to support MIRAGE. We don't know what resources are needed to support the other ground (if you have one) nor do we know whether such options as spooling are enabled, so the following is only a guide of the resources which MIRAGE will utilize.

Refer to DG's "How to Load and Generate Your RDOS (or DOS) System" for more details.

Channels

DOS and Unmapped RDOS users may ignore this section.

For a mapped system, SYSGEN will ask for the maximum number of channels each ground will use. MIRAGE will use five channels per user plus one channel overhead:

```
channels = (5 * mirage_users) + 1
```

For example, if you have one MIRAGE 102 (2-user) Processor, you should allocate 11 (decimal) channels for the ground in which the MIRAGE server will run.

Stacks

Stacks are shared by both grounds on a mapped system. We can, therefore, only estimate the number of total stacks required.

The MIRAGE server itself should have one stack per user plus one stack overhead. Add to that one stack for each spooled device other than the console attached to the MIRAGE server's ground. Finally, add the number of stacks required by the other ground, if any.

```
stacks = mirage_users + 1 + spooled_devices + (other_ground)
```

For example, on an unmapped RDOS or DOS system with one MIRAGE 102 (2-user) Processor and one line printer, you should allocate at least four stacks.

Extra Cells

SYSGEN automatically allocates three cells for each stack, so you only need to enter the number of additional cells required. We suggest you allocate one extra cell per MIRAGE user.

Tuning

There is enough uncertainty about these variables that RDOS tuning can be helpful. If you run a system with tuning enabled while you are using MIRAGE (and the rest of your system) under a "typical" load, the tuning report will help you to re-SYSGEN a more efficient system. Once this settles down, you can create a final system which does not include tuning.

Extra Buffers

SYSGEN automatically allocates two buffers per system stack. The number to be specified is the number of "extra" buffers. This number will vary with the actual processing being peformed. We recommend at least 8 extra buffers. These will be used to minimize the number of times the system has to read a system overlay from disk.

MIRAGE Under Mapped RDOS Rev 7

The MIRAGE Processor is a "user defined device". Beginning with revision 7.00 of Mapped RDOS, user defined devices must be specified during RDOS "SYSGEN". If you are using Mapped rev 7.00 or later you may have to re-run SYSGEN. When SYSGEN asks

ANY USER DEVICES?

Answer "1" (yes).

All MIRAGE Processors running under control of a single server program have the same device code and, therefore, count as only a single device. When SYSGEN asks

ENTER NUMBER OF USER DEFINED DEVICES (1-64)

enter "1" (or more, if you have non-MIRAGE devices).

Both the MIRAGE Server and the MGEN Utility treat the MIRAGE Processor as a user device.

Loading RDOS/DOS Files

If you received the MIRAGE software on magnetic tape:

Mount the release tape on your tape drive and execute CLI commands similar to the following but modified as appropriate for your system:

```
DIR %MDIR%              ; go to the master directory
CDIR MIRAGE             ; create a direcory named MIRAGE
DIR MIRAGE              ; go into the new directory
INIT MT0                ; initialize the tape drive
LOAD/V MT0:0            ; load the MIRAGE files
RELEASE MT0             ; rewind the tape
```

If you received the MIRAGE software on floppy disk:

Mount the release diskette in your floppy disk drive and execute CLI commands similar to the following but modified as appropriate for your system:

```
DIR %MDIR%              ; go to the master directory
CDIR MIRAGE             ; create a direcory named MIRAGE
INIT MIRAGE             ; initialize the new directory
DIR DP1                 ; go into the release diskette
MOVE/V MIRAGE           ; copy the release files
DIR MIRAGE              ; go to the MIRAGE directory
RELEASE DP1             ; release the diskette
```

Access to RDOS/DOS Utilities

If you are running under RDOS or DOS, MGEN will chain to the CLI and to RLDR.SV to build the server. In the MIRAGE directory you must have copies of (or links to) the following files.

CLI.SV	RLDR.SV
CLI.ER	RLDR.OL
CLI.OL	SYS.LB

For example, if all of the above files reside in your primary partition, use the following CLI command:

```
LINK (CLI.SV,CLI.ER,CLI.OL,RLDR.SV,RLDR.OL,SYS.LB)/2
```

As another example, if the CLI resides in the primary partition but RLDR and SYS.LB reside in a directory named UTIL, use:

```
LINK (CLI.SV,CLI.ER,CLI.OL)/2
LINK (RLDR.SV,RLDR.OL,SYS.LB) UTIL:(RLDR.SV,RLDR.OL,SYS.LB)
```

SYS.LB: A Special Warning

SYS.LB contains the "task scheduler" required to support MIRAGE under RDOS or DOS on your specific hardware. If you use multiple revisions of RDOS or DOS (e.g., rev 6.xx and 7.xx) or if you use RDOS or DOS on different computers (e.g., mapped vs. unmapped or NOVA vs. ECLIPSE) double check that you have the correct SYS.LB for you revision/computer combination.

THE ONLY WAY TO BE SURE YOU HAVE THE CORRECT SYS.LB IS TO RE-LOAD IT FROM YOUR RDOS OR DOS RELEASE TAPE OR DISKETTES.

> Do not assume that you have the correct SYS.LB just because you have been using it and it has been working. Single-task programs will work even with the wrong SYS.LB and can mislead you!

The MIRAGE Files

These are the files which are included with your MIRAGE software:

- MUTIL.VF — A "virtual floppy" disk file containing various CP/M-based utilities.
- MGEN.SV — The MIRAGE installation utility with which you install your MIRAGE processor, modify the MIRAGE's operating environment, or create "virtual floppies".
- MGEN.OL — An "overlay" file associated with MGEN.
- MBOOT.BT — A file containing the CP/M operating system.
- MIRAGE.LB — Library containing MIRAGE server binary modules.

The MGEN Utility

The MGEN program should be run by a system manager when initially installing one or more MIRAGE processors, when adding additional MIRAGE processors, or when making changes to the operating environment of the MIRAGE processor(s).

MGEN is an interactive program. It should be run from your main console. MGEN will take you step-by-step through the installation of MIRAGE software on your system.

From within the MIRAGE directory (!) run the program from the CLI by typing:

MGEN <return>

MGEN will respond with a menu similar to:

```
MGEN:  MIRAGE Processor Installation/Support Utility
       Revision 1.10

Select one of the following functions from the menu below:

       I    Install MIRAGE Hardware and Software

       F    Create a "Virtual Floppy" Disk File

       Q    Quit

Please enter the letter opposite your choice: _
```

Press "I". MGEN will pause for a moment while it checks the devices already in use on your system.

MGEN will now display something like:

```
The following device codes (listed in octal) are IN USE:

        02              33
        10              34
        11              43
        14              73
        22

What device code have you selected for MIRAGE (in octal): _
```

The next step in installing any MIRAGE system is the physical installation of the circuit board(s) and cables. The MIRAGE boards must have a "device code" which is unique from all other devices attached to your computer. Therefore, the first thing that MGEN does is to find out which device codes are already in use by other devices. MGEN has checked each of the 64 possible device codes and has reported its findings to your console.

NOTE:

The "standard" device code for the MIRAGE Processor is 40 (octal). Although any value may be used, the examples which follow assume device code 40. If you use a device code other than 40, keep that in mind as you execute the following stages of the installation of the MIRAGE software.

IF THE MIRAGE HARDWARE HAS NOT YET BEEN INSTALLED, abort MGEN by typing control-A at the console. Shut down your operating system and CPU and install the MIRAGE board(s) according to Chapter 5. After installing the hardware, return to this point in the manual.

Assuming you have already set the device code and installed the MIRAGE board(s), enter the device code followed by <return>.

MGEN will now try to find all of the MIRAGE lines on your system. It will first double check this with you:

```
Shall I check for MIRAGE boards on device code 40? (y/n):
```

If the device code is correct, press "Y". If the device code is not correct (or if you do not wish to proceed) press "N" and MGEN will return to its initial menu.

If you answered "Y" to the previous question, MGEN will use the device code you specified and will try to communicate with all of the MIRAGE boards installed on that device code. MGEN will then report something like:

```
I have found 4 MIRAGE lines on device code 40:

        00              02
        01              03
```

If no board was found with line 0, or if any gaps were found in the line numbering, MGEN will report the error. If the total number of lines found does not appear correct, but MGEN did not issue an error message, you may have accidentally set the line numbers in such a way that they overlap.

MGEN will now display something like:

```
You can run 4 MIRAGE lines with between 4 and 8 tasks.

Do you want to restrict the number of tasks (y/n)? _
```

For now, enter "N". You can fine-tune the MIRAGE Server later using this feature. It is described in detail under the section on "Mapped RDOS Tuning".

MGEN now says:

I am saving this configuration in "MPARAM.DA".

MPARAM.DA contains of the details of the MIRAGE system. This file is read by the MIRAGE server every time the server begins execution.

MGEN now asks:

Do you want to build a new MIRAGE server? (y/n): _

Answer "Y".

MGEN will chain to the CLI and will execute RLDR to build the server. You must have copies of (or links to) the following files in the current directory:

CLI.SV	RLDR.SV
CLI.ER	RLDR.OL
CLI.OL	SYS.LB

SEE THE NOTE EARLIER IN THIS CHAPTER REGARDING THE PROCEDURES FOR CREATING LINKS TO THESE FILES AND FOR ENSURING THAT YOU HAVE THE CORRECT VERSION OF SYS.LB FOR YOUR SYSTEM.

Creating Virtual Floppies

If you have not yet read the first ten pages of Chapter 1 we suggest you do so now. It contains an introduction to the concept of a MIRAGE "virtual floppy". An understanding of this concept is helpful in continuing the installation of the MIRAGE software.

The instructions that follow should be used any time you want to create a new virtual floppy. During initial installation, however, you will just create one small (64kb) virtual floppy (or "vf") per MIRAGE line.

Make sure you are in the MIRAGE directory when you create these vf's. Later on you can keep them in other directories and use links to them from the MIRAGE directory.

After building your server, MGEN will now redisplay its main menu:

```
MGEN:  MIRAGE Processor Installation/Support Utility
       Revision 1.10

Select one of the following functions from the menu below:

       I    Install MIRAGE Hardware and Software

       F    Create a "Virtual Floppy" Disk File

       Q    Quit

Please enter the letter opposite your choice: _
```

Type "F" and MGEN will display:

```
To create a new virtual floppy disk for use with MIRAGE.

Name of new virtual floppy: _
```

Virtual floppies have names of up to ten characters. The characters must be legal filename characters for RDOS or DOS.

For purposes of installation only, let's now create one virtual floppy per MIRAGE user. Respond to MGEN with the filename:

MIRAGE00B

followed by <return>. This is the default name for the "B:" disk for MIRAGE line #0.

MGEN next asks:

Size in K bytes: _

"1K" bytes is equal to 1024 bytes or characters. Legal values are in the range of 64 through 8192 (8 Megabytes). Since virtual floppies are always allocated in multiples of 64K bytes, MGEN will round your answer upwards to the next multiple of 64KB.

During installation, create small virtual floppies. Respond to MGEN with:

64

followed by <return>.

MGEN will create the virtual floppy and will return to its main menu.

During installtion, repeat the above process for each MIRAGE line installed. If you have a single 2-user MIRAGE 102 Processor, you have just created one "vf" for user #0. To create one for user #1, provide MGEN with the name

MIRAGE01B

and again specify a size of 64kb.

If you have a total of four users, for example, use MGEN to create

MIRAGE02B (for line #2)
and
MIRAGE03B (for line #3)

After you have created the last virtual floppy, respond with a "Q" to MGEN's menu to return to the CLI.

Default Virtual Floppies

Whenever you perfom a cold-start boot of CP/M, any virtual floppies currently in use are automatically DISMOUNTed. After that, the server will automatically attempt to MOUNT "default" virtual floppies. If you take advantage of this feature, you will have the disks you use most often "pre-mounted".

Upon receipt of your request for a cold-start boot of CP/M, the server will look for virtual floppy files in its current directory with filenames or links having the form:

MIRAGEnna.VF

where "nn" are the two digits corresponding to the MIRAGE line number, and "a" is the letter of the virtual drive. For example, if your MIRAGE Processor is line #9, your default C: disk should have the name "MIRAGE09C.VF".

You have just created default "B:" virtual floppies for each MIRAGE line. But each MIRAGE line MUST have a default disk for its A: drive. If there is no default A: disk, CP/M will not boot.

You received a virtual floppy called "MUTIL" as part of the MIRAGE software. This "vf" contains CP/M utilities which you will want all MIRAGE users to share. It would be wasteful if each user needed private copies of this disk.

It would be convenient to have MUTIL automatically MOUNTed on each user's A: drive, but because its filename (MUTIL.VF) does not fit the format of

MIRAGEdda.VF

it will not be mounted as a default disk. If we renamed it to:

MIRAGE00A.VF

it would be automatically mounted on user #0's A: drive, but not for users #1, #2, etc. We will get around this problem by creating "links" to MUTIL.

Using Links for Default Virtual Floppies

For each MIRAGE line installed, create a link from the default filename for the line's A: disk to MUTIL.VF using a command similar to:

```
LINK  MIRAGE00A.VF  MIRAGE:MUTIL.VF
```

Repeat the above command for each MIRAGE line. For example, if you have a two-line system, use:

```
LINK  MIRAGE01A.VF  MIRAGE:MUTIL.VF
```

Controlling Access to Virtual Floppies

When the server finds a default disk, it will attempt to MOUNT it R/W (Read/Write). If the default disk cannot be mounted R/W, the server will attempt to MOUNT it R/O (read-only). If that also fails, the default disk will be left unmounted. VF's cannot be shared unless they are mounted R/O by all users.

Since we want to keep shared utilities on a common default A: disk, we must make sure that it is mounted R/O for all users. To make sure that the first line booted doesn't get R/W access to this virtual floppy (and therefore exclude all others from accessing it) you must use the facilities of your host operating system to prohibit write access to the file.

Two file attributes are checked at the time virtual floppies are opened. If a virtual floppy is write protected (the "W" attribute) the file will not be mounted R/W. If the file is read protected (the "R" attribute) it will not be mounted at all.

You can use the RDOS/DOS "LIST/E" command to determine a file's current attributes and the "CHATR" command to change the attributes.

In order to make sure that MUTIL is opened R/O by all users, make it Write Protected using the following CLI command:

```
CHATR MUTIL.VF W
```

Invoking the MIRAGE Server

It is now time to get the server program up and running so that you can use your MIRAGE system.

Simply type:

```
MIRAGE      ( to run server in the background ), or

EXFG MIRAGE ( to run server in the foreground )
```

If you are running MIRAGE in the RDOS Foreground without a console, you will get no response. Just go to one of the installed terminals and bootstrap CP/M according to the "MIRAGE User's Guide".

If the MIRAGE server has access to an RDOS or DOS console, the server will display the message:

MIRAGE Server Ready

This means that the server is up and running and that the terminals connected can now be used to run CP/M.

THIS CONCLUDES THE INSTALLATION OF THE MIRAGE SYSTEM UNDER RDOS OR DOS.

Stopping the MIRAGE Server on RDOS or DOS

You can terminate the MIRAGE server program by typing control-A or control-F as appropriate for the ground in which you are running. MIRAGE will return control to the CLI.

Server Console Commands

If there is a console associated with the MIRAGE server you can force a cold bootstrap of a MIRAGE line by typing the line number followed by "B". For example, to cold boot MIRAGE line #2, type:

```
2B
```

The server will respond with: "MIRAGE Server Ready".

Similarly, you can terminate CP/M on a MIRAGE line by typing the line number followed by "K". The following will "kill" line #0:

```
0K
```

The effect of this command is identical to the user issuing the BYE command from CP/M.

Mapped RDOS Tuning

Since the MIRAGE server only runs when a user reads or writes a virtual floppy, accesses a shared peripheral or runs the IMPORT or EXPORT utilities, the server uses relatively few system resources. However, if you have many currently active MIRAGE users, they may get more than their fair share of system resources relative to the other ground. RDOS provides two ways to "throttle" the activities of the server program.

If you plan to run the MIRAGE server in the background, you can give the foreground program higher priority when you start it via the EXFG CLI command. This is the default for EXFG. If you want the foreground and background to run at the same priority, use EXFG/E to start the foreground program. (MIRAGE may be run in either ground on a mapped system.)

There is a second option available to you at MGEN time. MGEN will create a MIRAGE server with a specific number of tasks and Task Control Blocks (TCBs). To restrict the RDOS resources which can be used simultaneously by the MIRAGE server, you may reduce the number of tasks. You should never reduce this number below four; this would be adeqate for console communications, interrupt handling, the main server task, and support for one user's i/o at a time.

During installation, MGEN will display something like:

```
You can run 4 MIRAGE lines with between 4 and 8 tasks.
The more tasks, the more resources MIRAGE can use
concurrrently.

Do you want to restrict the number of tasks (y/n)? _
```

Answer "Y" and MGEN will ask:

```
How many tasks (4-8): _
```

Enter the number of tasks you want to use, followed by <return>.

There will be no performance improvement if you increase the value beyond the maximum (default) number.

Chapter 4:

MIRAGE Software Installation Guide for AOS and AOS/VS

This chapter describes the installation and management of the MIRAGE software under the AOS and AOS/VS operating systems. The majority of this chapter consists of step-by-step instructions for the installation process. The remainder of this chapter describes AOS and AOS/VS system management issues.

Chapter 4 Contents

Introduction

Here is an outline of the installation procedures which follow for the MIRAGE system software under AOS and AOS/VS:

1. Load the MIRAGE files from tape or diskette.

2. Run the MGEN utility to help you select a device code for the MIRAGE processor.

3. Shut down your system and install the MIRAGE hardware. Refer to Chapter 5 for step-by-step instructions.

4. Bring your system up and run the MGEN utility once again, this time completing the process. This utility will create a customized MIRAGE "server" program.

5. Use MGEN to create a virtual floppy to play with.

6. Create links to support CP/M bootstrapping.

7. Execute the MIRAGE server.

8. Press the BREAK key on a terminal connected to a MIRAGE processor to run CP/M.

MIRAGE Software Under AOS and AOS/VS

The interactive MGEN utility program identifies the installed MIRAGE Processors and creates a parameter file (MPARAM.DA) which describes the MIRAGE "environment". MGEN also creates a CLI macro (MUP.CLI) which should be used to start the MIRAGE Server process.

With the help of the MGEN.CLI macro and LINK, MGEN also creates the server itself, MIRAGE.PR.

The MIRAGE Server runs as a small resident process. It must be resident because is uses the ?IDEF system call to "define an interrupting device" to the system.

The MGEN utility is normally swappable, but because it, too, communicates with the MIRAGE Processor(s) it makes itself resident for short periods of time.

Under AOS/VS, both of these programs run as 16-bit processes.

The server performs i/o on behalf of the MIRAGE users. It is a multi-task program and may be performing i/o for more than one user at a time. Because AOS and AOS/VS do not permit each "task" to have a username (there is only one for the entire process) the server must run with the Superuser privilege turned "on" and perform its own enforcement of ACL processing.

Channel Restrictions

The MIRAGE server process is limited to 64 files (channels) just like other AOS or AOS/VS processes. Each MIRAGE line requires five channels: four for virtual floppies plus one for remote printing, IMPORTing and EXPORTing. Therefore, a server can only support twelve users.

To support more than twelve MIRAGE users on one AOS or AOS/VS system, run additional server processes.

Loading AOS or AOS/VS Files

If you received the MIRAGE software on magnetic tape:

Mount the release tape on your tape drive and execute CLI commands similar to the following (but modified as appropriate for your system) from your system console (PID 2):

```
DIR :                       ; go to the root
SUPERUSER ON                ; override file access control
CREATE/DIRECTORY MIRAGE     ; create a directory named MIRAGE
ACL MIRAGE + RE             ; set its access control list
DIR MIRAGE                  ; go into the new directory
LOAD/V @MTB0:0              ; load the release files
REWIND @MTB0                ; rewind the tape
```

If you received the MIRAGE software on diskette:

Mount the release diskette in your diskette drive and execute CLI commands similar to the following (but modified as appropriate for your system) from your system console (PID 2):

```
DIR :                       ; go to the root
SUPERUSER ON                ; bypass file access control
CREATE/DIRECTORY MIRAGE     ; create a directory named MIRAGE
ACL MIRAGE + RE             ; set its access control list
DIR MIRAGE                  ; go into the new directory
LOAD/V @DPI10               ; load the release files
```

The MIRAGE Files

These are the files which are included with your MIRAGE software:

- MUTIL.VF — A "virtual floppy" disk file containing various CP/M-based utilities.

- MGEN.PR — The MIRAGE installation utility with which you install your MIRAGE processor, modify the MIRAGE's operating environment, or create "virtual floppies".

- MGEN.OL — An "overlay" file associated with MGEN.

- MGEN.CLI — A CLI macro file to be used with MGEN.

- MBOOT.BT — A file containing the CP/M operating system.

- MIRAGE.LB — Library containing MIRAGE server binary modules.

The MGEN Utility

The MGEN program should be run by a system manager when initially installing one or more MIRAGE processors, when adding additional MIRAGE processors, or when making changes to the operating environment of the MIRAGE processor(s).

MGEN is an interactive program. It can be run from any console on your system. You must, however, have the ACCESS DEVICES privilege and the ability to change your process type to RESIDENT. These privileges are under the control of your user profile which can be changed with the Data General PREDITOR utility.

MGEN will take you step-by-step through the installation of MIRAGE software on your system.

From within the :MIRAGE directory (!) run the program from the CLI by typing:

MGEN <newline>

MGEN will respond with a menu similar to:

```
MGEN:  MIRAGE Processor Installation/Support Utility
       Revision 1.10

Select one of the following functions from the menu below:

       I    Install MIRAGE Hardware and Software

       F    Create a "Virtual Floppy" Disk File

       Q    Quit

Please enter the letter opposite your choice: _
```

Press "I". MGEN will pause for a moment while it checks the devices already in use on your system.

MGEN will now display something like:

```
The following device codes (listed in octal) are IN USE:

        02              33
        10              34
        11              43
        14              73
        22

What device code have you selected for MIRAGE (in octal): _
```

The next step in installing any MIRAGE system is the physical installation of the circuit board(s) and cables. The MIRAGE boards must have a "device code" which is unique from all other devices attached to your computer. Therefore, the first thing that MGEN does is to find out which device codes are already in use by other devices. MGEN has checked each of the 64 possible device codes and has reported its findings to your console.

NOTE:

The "standard" device code for the MIRAGE Processor is 40 (octal). Although any value may be used, the examples which follow assume device code 40. If you use a device code other than 40, keep that in mind as you execute the following stages of the installation of the MIRAGE software.

IF THE MIRAGE HARDWARE HAS NOT YET BEEN INSTALLED, abort MGEN by typing control-C, control-B at the console. Shut down your operating system and CPU and install the MIRAGE board(s) according to Chapter 5. After installing the hardware, return to this point in the manual.

Assuming you have already set the device code and installed the MIRAGE board(s), enter the device code followed by <newline>.

MGEN will now try to find all of the MIRAGE lines on your system. It will first double check this with you:

Shall I check for MIRAGE boards on device code 40? (y/n):

If the device code is correct, press "Y". If the device code is not correct (or if you do not wish to proceed) press "N" and MGEN will return to its initial menu.

If you answered "Y" to the previous question, MGEN will use the device code you specified and will try to communicate with all of the MIRAGE boards installed on that device code. MGEN will then report something like:

I have found 4 MIRAGE lines on device code 40:

00	02
01	03

If no board was found with line 0, or if any gaps were found in the line numbering, MGEN will report the error. If the total number of lines found does not appear correct, but MGEN did not issue an error message, you may have accidentally set the line numbers in such a way that they overlap.

AOS and AOS/VS File Access Control

At this point, MGEN knows how many MIRAGE users you will have, and the device code via which the MIRAGE software can communicate with them.

The MIRAGE server must know who will be using each MIRAGE line if you want the server to enforce the security provisions of your host operating system.

All AOS and AOS/VS files have restrictions relating to "who can do what" with them. This is called the Access Control List (or ACL) mechanism. ACLs basically indicate which users, identified by their "usernames", have certain privileges with respect to each file, such as permission to read or to modify the file.

The single MIRAGE server program actually performs the reading and writing of disk files for all users of MIRAGE processors. The server is a "superuser" and bypasses the normal ACL mechanism.

If security is not important in your system environment, you can run the MIRAGE server without ACL enforcement. If you need the security, however, the server program must know the username of each person using a MIRAGE processor. The server then performs its own checking of the ACLs for the files being accessed to ensure that the operations requested are legitimate for each user.

A small table stored within the server keeps track of which user is connected to each MIRAGE line. There is one entry in the table for each MIRAGE line. If the entry contained only the username, then the security mechanism would not work properly. If you logged onto the system from someone else's terminal, the system would think that you were, in fact, someone else.

Instead, each entry for a MIRAGE line usually contains the name of the console to which that processor is connected. For example, MIRAGE line 00 may be connected to "@CON4", while line 01 is connected to "@CON12". Since these connections are made via cables, they do not often change.

Knowing what console is associated with each MIRAGE line permits the server to ask AOS or AOS/VS, "What is the username of the person logged onto that console?" Once the server knows the username of the person at the console, it can use his username instead of its own when requesting access to files and devices.

It should be pointed out that there can be terminals which are connected to MIRAGE boards but are not connected to the host system. For these terminals, MGEN will let you specify a username rather than a console. The server will then use that username for access control.

MGEN now asks:

Do you want to enforce ACL restrictions? (y/n):

Type "Y". (If you respond with "N", the server will always use its Superuser privilege and you will have no control over file access via MIRAGE.)

MGEN now displays:

Console or Username for line 00: _

If MIRAGE line 00 is also connected to a normal system console, type the name of that console, such as "@CON7", followed by <newline>. If you do this, file access will be controlled by the username of the person currently logged on at that console.

If line 00 is not connected to a console, you should enter the username which you want the server to use when accessing files on behalf of this MIRAGE line.

MGEN will repeat this question for each MIRAGE line it has found.

After providing an answer for the last line, MGEN will ask you:

Do you want to make any changes? (y/n): _

If you type "Y" you will be able to make changes or corrections to each MIRAGE line. If you type "N", MGEN will save this table in the file "MPARAM.DA" and proceed to the next step.

Note: The actual username of the server is usually "MIRAGE". The server will make the appropriate system calls to perform the appropriate access control checks. However, it is still the server, under its own name and using the SUPERUSER privilege, which is performing the actual i/o. This is important to bear in mind should any system software be logging or checking the history of such accesses.

MGEN now says:

```
I am saving this configuration in "MPARAM.DA".
```

MPARAM.DA contains of the details of the MIRAGE system. This file is read by the MIRAGE server every time the server begins execution.

MGEN now asks:

```
Do you want to build a new MIRAGE server? (y/n): _
```

If you answer "N", MGEN returns to its main menu.

If you answer "Y", MGEN will display:

```
I have created a new "MUP.CLI" macro which should be used
to bring up the new server process.  You may want to invoke
it from your standard "UP.CLI" macro.
```

MUP.CLI is tailored to the specific server. We recommend that you always use it to start the MIRAGE system.

MGEN will now terminate. The MGEN.CLI macro (which you used to execute MGEN) will now invoke another macro (which MGEN created) and will run LINK.PR to create the new server.

The macro is "LINK_MIRAGE_SEVER.CLI" and will not be deleted after use. You may want to "tune" the server at some later time by editing LINK_MIRAGE_SERVER.CLI with the help of "Managing the System" (later in this chapter).

Creating Virtual Floppies

If you have not yet read the first ten pages of Chapter 1 we suggest you do so now. It contains an introduction to the concept of a MIRAGE "virtual floppy". An understanding of this concept is helpful in continuing the installation of the MIRAGE software.

The instructions that follow should be used any time you want to create a new virtual floppy. During initial installation, however, you will just create one small (64kb) virtual floppy (or "vf") per MIRAGE line.

Make sure you are in the :MIRAGE directory when you create these vf's. Later on you can keep them in other directories and use links to them from the :MIRAGE directory.

After building your server, re-run MGEN from the CLI. MGEN will again display its main menu:

```
MGEN:  MIRAGE Processor Installation/Support Utility
       Revision 1.10

Select one of the following functions from the menu below:

       I    Install MIRAGE Hardware and Software

       F    Create a "Virtual Floppy" Disk File

       Q    Quit

Please enter the letter opposite your choice: _
```

Type "F" and MGEN will display:

```
To create a new virtual floppy disk for use with MIRAGE.

Name of new virtual floppy: _
```

Virtual floppies have names of up to ten characters. The characters must be legal filename characters for AOS or AOS/VS.

For purposes of installation only, let's now create one virtual floppy per MIRAGE user. Respond to MGEN with the filename:

MIRAGE00B

followed by <newline>. This is the default name for the "B:" disk for MIRAGE line #0.

MGEN next asks:

Size in K bytes: _

"1K" bytes is equal to 1024 bytes or characters. Legal values are in the range of 64 through 8192 (8 Megabytes). Since virtual floppies are always allocated in multiples of 64K bytes, MGEN will round your answer upwards to the next multiple of 64KB.

During installation, create small virtual floppies. Respond to MGEN with:

64

followed by <newline>.

MGEN will create the virtual floppy and will return to its main menu.

During installation, repeat the above process for each MIRAGE line installed. If you have a single 2-user MIRAGE 102 Processor, you have just created one "vf" for user #0. To create one for user #1, provide MGEN with the name

MIRAGE01B

and again specify a size of 64kb.

If you have a total of four users, for example, use MGEN to create

MIRAGE02B (for line #2)
and
MIRAGE03B (for line #3)

After you have created the last virtual floppy, respond with a "Q" to MGEN's menu to return to the CLI.

Default Virtual Floppies

Whenever you perfom a cold-start boot of CP/M, any virtual floppies currently in use are automatically DISMOUNTed. After that, the server will automatically attempt to MOUNT "default" virtual floppies. If you take advantage of this feature, you will have the disks you use most often "pre-mounted".

Upon receipt of your request for a cold-start boot of CP/M, the server will look for virtual floppy files in its current directory with filenames or links having the form:

MIRAGEnna.VF

where "nn" are the two digits corresponding to the MIRAGE line number, and "a" is the letter of the virtual drive. For example, if your MIRAGE processor is line #9, your default C: disk should have the name "MIRAGE09C.VF".

You have just created default "B:" virtual floppies for each MIRAGE line. But each MIRAGE line MUST have a default disk for its A: drive. If there is no default A: disk, CP/M will not boot.

You may have noticed that you received a virtual floppy called "MUTIL" as part of the MIRAGE software. This "vf" contains CP/M utilities which you will want all MIRAGE users to share. It would be wasteful if each user needed private copies of this disk.

It would be convenient to have MUTIL automatically MOUNTed on each user's A: drive, but because its filename (MUTIL.VF) does not fit the format of

MIRAGEdda.VF

it will not be mounted as a default disk. If we renamed it to:

MIRAGE00A.VF

it would be automatically mounted on user #0's A: drive, but not for users #1, #2, etc. We will get around this problem by creating "links" to MUTIL.

Using Links for Default Virtual Floppies

For each MIRAGE line installed, create a link from the default filename for the line's A: disk to MUTIL.VF using a command similar to:

```
CREATE/LINK MIRAGE00A.VF MUTIL.VF
```

Repeat the above command for each MIRAGE line. For example, if you have a two-line system, use:

```
CREATE/LINK MIRAGE01A.VF MUTIL.VF
```

Controlling Access to Virtual Floppies

The MIRAGE server uses the Access Control List (ACL) facility of AOS and AOS/VS to restrict and control access to virtual floppies. The important privileges are "W" (for Writing) and "R" (for Reading). These privileges are checked any time a virtual floppy is opened. In order to MOUNT a virtual floppy R/O (Read-Only), the user must have the "R" privilege. In order to MOUNT a VF R/W (Read/Write), the "W" privilege is required.

During a cold boot, the server will attempt to MOUNT each default virtual floppy R/W. If the default disk cannot be mounted R/W, the server will attempt to MOUNT it R/O. If that also fails, the default disk will be left unmounted. VF's cannot be shared unless they are mounted R/O by all users.

Since we want to keep shared utilities on a common default A: disk, we must make sure that it is mounted R/O for all users. To make sure that the first line booted doesn't get R/W access to this virtual floppy (and therefore exclude all others from accessing it) you must use the ACL facilities of your host operating system to prohibit write access to the file.

Use the following CLI command:

```
ACL MUTIL.VF + R
```

This guarantees that no MIRAGE user can get R/W access to this shared utility disk.

Also set the ACL for the links using commands similar to:

```
ACL MIRAGE(00,01)A.VF + R
ACL MIRAGE(00,01)B.VF + RW
```

Remember, the user must have access to the link in order to have access the resolution file. Also be aware that if you elect not to enforce ACL restrictions during MGEN, all default VFs will be mounted R/W.

Invoking the MIRAGE Server

MIRAGE may be initiated from any console, but we recommend using PID 2 (the operator's console).

The MGEN utility will have created a file named "MUP.CLI". If you are bringing MIRAGE up for the first time, simply type:

```
MUP
```

(Eventually you should edit your "UP.CLI" macro to include an invocation of MUP.CLI.)

The MIRAGE server process will send the following message to the console of its father process:

```
FROM PID 6: MIRAGE Server Ready
```

where instead of "6" you will see the actual PID of the MIRAGE server process. This means that the server is up and running and that the terminals connected can now be used to run CP/M.

==========

THIS CONCLUDES THE INSTALLATION OF THE MIRAGE SYSTEM UNDER AOS OR AOS/VS.

==========

Stopping the MIRAGE Server on AOS and AOS/VS

You can terminate the MIRAGE server program by issuing the CLI TERMINATE command specifiying the PID of the MIRAGE server.

AOS and AOS/VS MIRAGE Server Console Commands

There are two IPC commands which you can send to the MIRAGE process. The first forces a cold bootstrap of a MIRAGE line:

```
CONTROL @MIRAGE BOOT n
```

Where "n" is the line you wish to bootstrap. The server will respond with: "MIRAGE Server Ready" via an IPC.

Similarly, you can terminate CP/M on MIRAGE line "n" using:

```
CONTROL @MIRAGE KILL n
```

The effect of this command is identical to the user issuing the BYE command from CP/M.

IPC Access

The MIRAGE process creates an IPC entry in the directory in which it is run (usually :MIRAGE). The MUP.CLI macro (generated by the MGEN utility) creates a link in the peripheral directory (:PER) to this IPC entry. This IPC entry is used to communicate with the MIRAGE process. For example, the CLI command:

```
CONTROL @MIRAGE BOOT 0
```

will instruct the MIRAGE server to perform a cold bootstrap of MIRAGE line #0.

Since the user of MIRAGE line #0 may not appreciate this while he is running an important program, we suggest you restrict access to both the IPC entry (:MIRAGE:MIRAGE) and to the link (@MIRAGE). In particular, we suggest limiting access to the operator via the following CLI command which can be added to MUP.CLI:

```
ACL (@MIRAGE,:MIRAGE:MIRAGE) OP OWARE
```

The MGEN ACL Option

The MIRAGE server process runs with the SUPERUSER privilege ON. If you elected not to enable ACL enforcement during MGEN, every MIRAGE user will have effectively unlimited access to the AOS or AOS/VS file system via the MIRAGE IMPORT and EXPORT utilities.

We recommend that you select the ACL enforcement option during MGEN. Even if security is not important to your installation, the enforcement of ACLs helps catch inadvertent user errors.

Virtual Floppy ACLs

All virtual floppies receive their initial ACLs from the default ACL of the MGEN process used to create them.

If you selected ACL enforcement during MGEN, you should also explicitly set the ACLs of all of the virtual floppies and links which are used to access them. When a virtual floppy is mounted R/O, the user must have Read access the the file. For R/W access, the user must have the Write privilege.

You can also control access to virtual floppies via the ACL on the directory in which they reside. AOS and AOS/VS require that a user have Execute access to a directory in order to use that directory in a pathname.

Backup Procedures

Virtual floppies are standard disk files, like any other on your system. They can be backed up via any standard methods including DUMP, MOVE, COPY and PCOPY.

When a virtual floppy is backed up, the entire file must be copied (or dumped). It is not possible to backup or restore only a portion of a virtual floppy.

NOTE: Utilities which perform backup via the standard file system (DUMP, MOVE and COPY) will not be able to backup a virtual floppy while that virtual floppy is mounted R/W (Read/Write). This is because the MIRAGE server has opened them with the Exclusive option. Virtual floppies mounted R/O (Read Only) can be DUMPed, MOVEd or COPY'd.

To backup all virtual floppies, users must temporarily close the files which are exclusively opened by using either the DISMOUNT command or the BYE command. Alternatively, you can forcibly close all virtual floppies open on a MIRAGE line via the CLI command:

CONTROL @MIRAGE KILL n

where "n" is the line number. The effect is identical to that of the user issuing the BYE command from his or her terminal.

MIRAGE Process Searchlist

The MUP.CLI macro generated by MGEN will PROC' the MIRAGE server with no searchlist. We recommend that you modify this only with the understanding that the server process is peforming i/o operations on behalf of the MIRAGE users. The searchlist given to the MIRAGE process will be that used by ALL MIRAGE users.

MIRAGE Username for Spoolers

The MUP.CLI macro generated by MGEN will PROC' the MIRAGE server with the username "MIRAGE". This is done for only one reason: so that header and trailer pages printed by EXEC's spoolers such as XLPT will have "MIRAGE" printed on them instead of "OP".

To support this, you should use the PREDITOR utility under AOS or AOS/VS to create a user profile with the username "MIRAGE". Although PREDITOR will insist that MIRAGE have a password, we suggest that you respond "NO" to all privileges such as "Use Console" and "Use Batch". This will prevent someone from actually logging onto the system under the username "MIRAGE".

You can edit MUP.CLI to PROC' the MIRAGE server with any username you want, but there should be a user profile for that username if you intend to use EXEC's spooling facilities.

ACLs for Queues

If you want to send data to a queue (such as @LPT) via the EXPORT or RPRINT facilities, you should explicitly set the queue's ACL to permit you to do this. Normally, access to queues goes through the EXEC process which has the ability to override a queue's ACL. However MIRAGE bypasses EXEC and sends data directly to the queue. For this reason, you should set the ACL of your queues in your UP.CLI macro.

Tuning MIRAGE on AOS and AOS/VS

The MIRAGE server is a sophisticated multi-task program running as a resident process. CP/M users therefore can get higher apparent priority than "normal" system users who typically run as swappable processes.

Since the MIRAGE server only executes when a user reads or writes a virtual floppy, accesses a shared peripheral or runs the IMPORT or EXPORT utilities, the server uses relatively few system resources. However, if you have many currently active MIRAGE users, they may get more than their fair share of system resources.

If you want to "throttle" the activities of the server process, edit the MUP.CLI macro created by the MGEN utility. Typically, there is a line in the macro which looks something like:

```
PROC/DEF/DIR=:MIRAGE/NAME=MIRAGE/CALLS=6 :MIRAGE:MIRAGE.PR
```

The global switch "/CALLS=6" tells the operating system that the MIRAGE server process should be permitted to have as many as 6 system calls pending at any given time. The actual number generated by MGEN will not always be "6"; typically it will be two, plus the number of MIRAGE lines installed.

To restrict the AOS or AOS/VS resources which can be used simultaneously by the MIRAGE server, reduce the number of concurrent system calls permitted. You should never reduce this number below "2". This would support the IPC mechanism which receives messages from other processes, and support for one user's i/o at a time.

There will be no performance improvement if you increase the value beyond that output by the MGEN utility.

Chapter 5

MIRAGE Hardware Installation Guide

In this chapter we describe the step-by-step procedure for installing the MIRAGE processor and associated hardware.

BEFORE INSTALLING THE MIRAGE HARDWARE, PLEASE READ THE FIRST TEN PAGES OF CHAPTER 1 AND FOLLOW THE INSTRUCTIONS OF CHAPTER 3 (RDOS OR DOS) OR CHAPTER 4 (AOS OR AOS/VS).

Chapter 5 Contents

List of Figures

Introduction

The hardware installation consists of the following steps which are detailed in the pages that follow:

1. setting the device code and line number switches;
2. selecting communications options such as baud rate, parity, etc.;
3. installing the MIRAGE processor board in your computer;
4. installing the MIRAGE distribution panel; and
5. installing the cables between MIRAGE and your terminals and computer.

WARNING: INSTALLATION OF THE MIRAGE HARDWARE MUST BE PERFORMED ONLY BY SOMEONE ALREADY FAMILIAR WITH SUCH PROCEDURES. THE INSTRUCTIONS PRESENTED HERE ARE NOT INTENDED AS A TUTORIAL FOR INEXPERIENCED PERSONNEL, BUT AS A GUIDE FOR TRAINED TECHNICIANS.

DO NOT INSTALL THE MIRAGE HARDWARE UNLESS YOU KNOW WHAT YOU'RE DOING! IF YOU ARE UNSURE OF YOURSELF, CONTACT YOUR MIRAGE DEALER TO HAVE QUALIFIED PERSONNEL PERFORM THE INSTALLATION.

NEITHER RATIONAL DATA SYSTEMS, CUSTOM SYSTEMS, INC., NOR YOUR MIRAGE DEALER WILL ASSUME ANY LIABILITY FOR DAMAGE WHICH OCCURS DURING INSTALLATION OF THE MIRAGE HARDWARE EVEN IF SUCH DAMAGE IS DUE TO AN ERROR IN THESE INSTRUCTIONS.

THESE INSTRUCTIONS ASSUME THAT YOU KNOW MORE ABOUT YOUR OWN SYSTEM THAN WE DO. YOU SHOULD DOUBLE CHECK EVERY STEP AGAINST WHAT YOU KNOW TO BE PROPER FOR YOUR PARTICULAR COMPUTER.

Selecting a Device Code for the MIRAGE Processor

Before we can install the MIRAGE Processor circuit board, we must set the switches labelled "DEVICE" and "LINE" which you can see through cut-outs in the circuit board cover.

The "DEVICE" switch selects the MIRAGE Processor's "device code".

What's a device code?

A device code is just a number which your Data General computer uses to distinguish one circuit board from another. If you have a tape drive, for example, the circuit board which controls it probably has the code "22". That code is used by your computer to talk to the tape drive and vice versa.

The MIRAGE Processor will also need a device code so that the server software will be able to communicate with it.

Before you can select a device code for MIRAGE, you must determine which device codes are already in use on your system. This can be determined by running a special program called "MGEN" which, among other things, will tell you which codes are already in use.

If you are installing MIRAGE on an RDOS or DOS system, turn now to Chapter 3.

If you are installing MIRAGE on an AOS or AOS/VS system, turn to Chapter 4.

As usual, start at the beginning and follow the instructions step by step until you have determined which device codes are already in use on your system. At that point return to this part of the manual.

Selecting a Device Code

All MIRAGE Processor boards in your computer should have the same device code. Select some code which is NOT already "IN USE" according to the MGEN utility. Legal device codes are in the range of 01 to 76. Note that these numbers are in "octal" (base 8), so only the digits "0", "1", "2", "3", "4", "5", "6" and "7" may be used in selecting a device code.

Place the MIRAGE Processor circuit board on a flat surface. (Don't put it on a fancy desk, you might scratch the desk.) Turn the circuit board so that the writing on the cover reads in the correct direction and that the cover is up. The board should look as it does in figure 5.1.

Notice the cut-out in the cover which reveals a small set of switches labelled "DEVICE". The switches are labelled "1" through "6", just like the columns of the device code chart. Also notice that "ON" is "UP", unless you still have the board upside-down or sideways. Figure 5.2 is a closeup view of the swithes used for "DEVICE" and "LINE".

Using the table in figure 5.3, find the device code you have selected in the column labelled "DEVICE or LINE". Run your finger along to the right and you will find a combination of "ON"s and "OFF"s under the six right-most columns.

Set each of the six "DEVICE" switches for the code you have selected according to the device code table. Use a pencil or other pointed instrument to slide the switches.

Note: If any devices are installed but are not currently "defined" to the operating system, MGEN will not be able to report them as being "IN USE". You may want to survey the boards installed in your system and compare them to the list reported by MGEN. You may also want to refer to the Data General documentation for your specific computer to see which device codes are reserved for use by the processor or special peripherals.

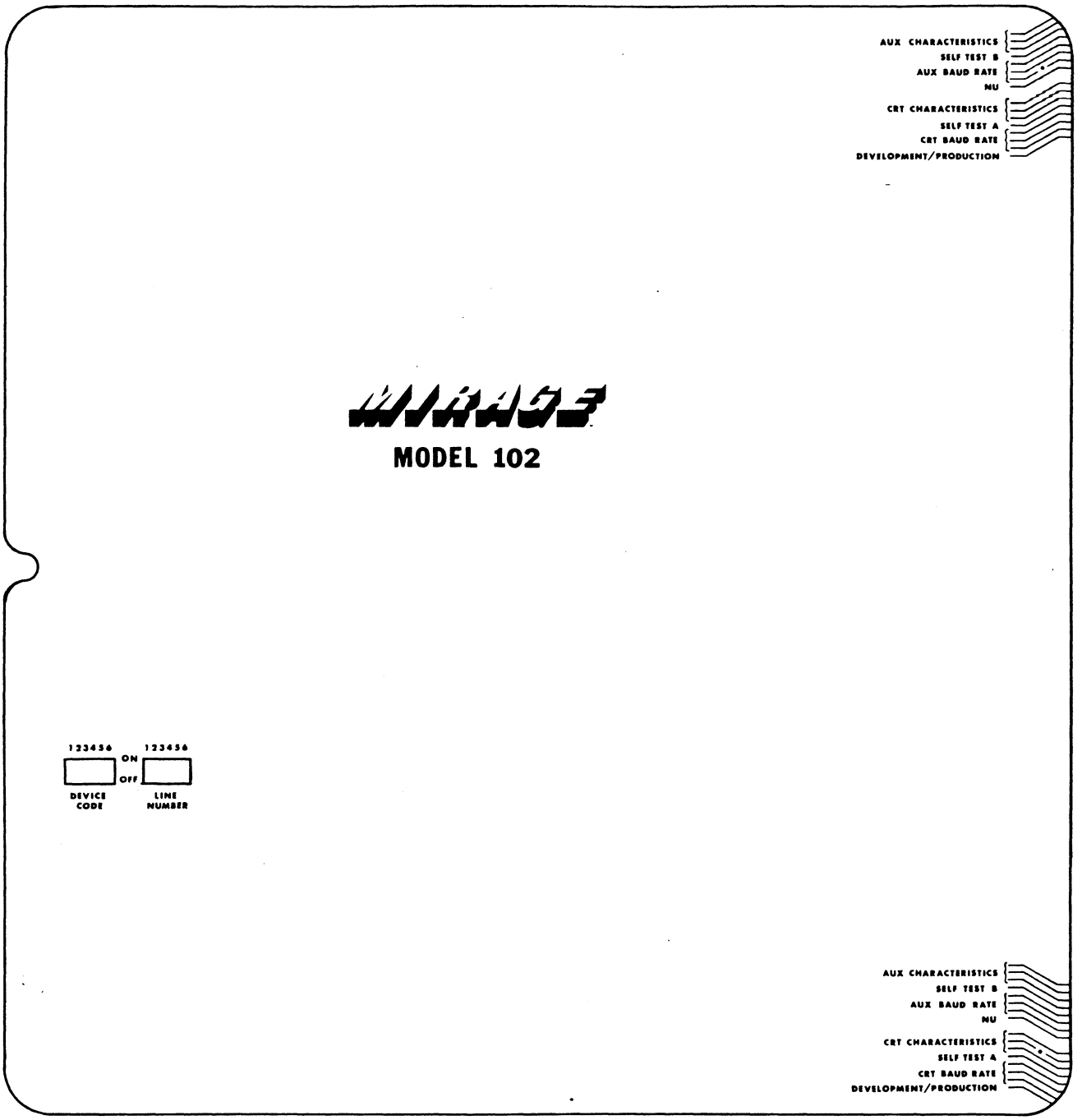


Figure 5.1: MIRAGE Processor Cover and Switches

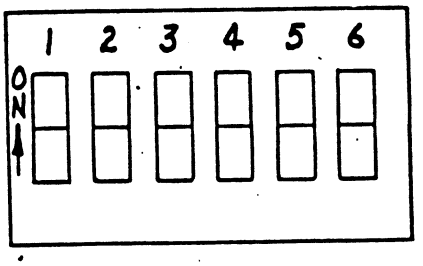


Figure 5.2: DIP Switch for DEVICE or LINE

DEVICE or LINE	Switch 1	Switch 2	Switch 3	Switch 4	Switch 5	Switch 6
00	OFF	OFF	OFF	OFF	OFF	OFF
01	OFF	OFF	OFF	OFF	OFF	ON
02	OFF	OFF	OFF	OFF	ON	OFF
03	OFF	OFF	OFF	OFF	ON	ON
04	OFF	OFF	OFF	ON	OFF	OFF
05	OFF	OFF	OFF	ON	OFF	ON
06	OFF	OFF	OFF	ON	ON	OFF
07	OFF	OFF	OFF	ON	ON	ON
10	OFF	OFF	ON	OFF	OFF	OFF
11	OFF	OFF	ON	OFF	OFF	ON
12	OFF	OFF	ON	OFF	ON	OFF
13	OFF	OFF	ON	OFF	ON	ON
14	OFF	OFF	ON	ON	OFF	OFF
15	OFF	OFF	ON	ON	OFF	ON
16	OFF	OFF	ON	ON	ON	OFF
17	OFF	OFF	ON	ON	ON	ON
20	OFF	ON	OFF	OFF	OFF	OFF
21	OFF	ON	OFF	OFF	OFF	ON
22	OFF	ON	OFF	OFF	ON	OFF
23	OFF	ON	OFF	OFF	ON	ON
24	OFF	ON	OFF	ON	OFF	OFF
25	OFF	ON	OFF	ON	OFF	ON
26	OFF	ON	OFF	ON	ON	OFF
27	OFF	ON	OFF	ON	ON	ON
30	OFF	ON	ON	OFF	OFF	OFF
31	OFF	ON	ON	OFF	OFF	ON
32	OFF	ON	ON	OFF	ON	OFF
33	OFF	ON	ON	OFF	ON	ON
34	OFF	ON	ON	ON	OFF	OFF
35	OFF	ON	ON	ON	OFF	ON
36	OFF	ON	ON	ON	ON	OFF
37	OFF	ON	ON	ON	ON	ON
40	ON	OFF	OFF	OFF	OFF	OFF
41	ON	OFF	OFF	OFF	OFF	ON
42	ON	OFF	OFF	OFF	ON	OFF
43	ON	OFF	OFF	OFF	ON	ON
44	ON	OFF	OFF	ON	OFF	OFF
45	ON	OFF	OFF	ON	OFF	ON
46	ON	OFF	OFF	ON	ON	OFF
47	ON	OFF	OFF	ON	ON	ON
50	ON	OFF	ON	OFF	OFF	OFF
51	ON	OFF	ON	OFF	OFF	ON
52	ON	OFF	ON	OFF	ON	OFF
53	ON	OFF	ON	OFF	ON	ON
54	ON	OFF	ON	ON	OFF	OFF
55	ON	OFF	ON	ON	OFF	ON
56	ON	OFF	ON	ON	ON	OFF
57	ON	OFF	ON	ON	ON	ON
60	ON	ON	OFF	OFF	OFF	OFF
61	ON	ON	OFF	OFF	OFF	ON
62	ON	ON	OFF	OFF	ON	OFF
63	ON	ON	OFF	OFF	ON	ON
64	ON	ON	OFF	ON	OFF	OFF
65	ON	ON	OFF	ON	OFF	ON
66	ON	ON	OFF	ON	ON	OFF
67	ON	ON	OFF	ON	ON	ON
70	ON	ON	ON	OFF	OFF	OFF
71	ON	ON	ON	OFF	OFF	ON
72	ON	ON	ON	OFF	ON	OFF
73	ON	ON	ON	OFF	ON	ON
74	ON	ON	ON	ON	OFF	OFF
75	ON	ON	ON	ON	OFF	ON
76	ON	ON	ON	ON	ON	OFF
77	ON	ON	ON	ON	ON	ON

Figure 5.3: Device Code and Line Number Selection Table

MIRAGE Line Numbers

If you have only one MIRAGE Processor, set all six of the "LINE" number switches to "OFF" (down) and skip to the next section.

Since you may have more than one user (also called a "line") on each MIRAGE board and may have more than one board installed, you must help the MIRAGE software distinguish lines from one another. That is the purpose of the second set of 6 switches labelled "LINE".

Line numbers range in value from 00 through 77. That's octal (base 8) again, so no "8"s or "9"s can be used as digits.

Instead of setting each board's line number to the same value (as you did with the DEVICE switches) you must set each board's LINE switches to different values.

The LINE switch selects the number of the lowest line on each board. For example, a two-user board with its switches set to 00 actually contains two lines: 00 and 01. Similarly, a two-user board with its switches set to 01 actually contains lines 01 and 02.

When setting line numbers there are two rules to remember:

1. The first (or only) board must have its LINE switches set to "00" (all "down" or "off"),

2. All other boards must be set so that
   a) no line numbers are duplicated, and
   b) no line numbers are skipped.

For example, let's assume that you have two 2-user boards. The line number for one board must be set for 00. This board now has lines 00 and 01. The other board should be set to 02; its lines are 02 and 03.

If the second board's switches were set to 01, then line 01 would ambiguously refer to (a) the 2nd line on the 1st board, and (b) the 1st line on the 2nd board.

Similarly, if the second board's switches were set to 03, then there would be lines 00 and 01 (on the first board), and 03 and 04 (on the second board). There would be no line 02 and the server software would waste time and memory supporting a non-existant line.

Taking into consideration the number of lines on each board, select line numbers starting at 00. Using the chart in figure 5.3, set the LINE number switches on each MIRAGE processor board.

Note that the physical location of each board within the computer has no relationship to its line number.

Communications Options

Each line on a MIRAGE Processor has three communications "ports". One goes to the user's CRT terminal (its connector is labelled "CRT" on the distribution panel), another (optionally) goes to your Data General computer (it's marked "HOST"), and the third is for general purpose and is marked "AUX" on the panel.

The HOST port is not adjustable; the options for this line are determined by the Data General computer.

The CRT port must be configured to match the MIRAGE user's terminal, and the AUX port must also be configured if you want to use it.

Use the board cover or figure 5.1 to help you to identify each of the switch positions described in the following sections.

Repeat the following procedure for each line (#0 and #1) on each MIRAGE board you are installing on your system.

Refer to figure 5.4 and look at the right-hand edge of the MIRAGE Processor. This is the edge with the stiffener or "handle" and which will be visible after you have inserted the board into your computer. Note that for each line per board (#0 or #1) there are two sets of small "piano-style" 8-position switches. We call the left group of 8 switches "CRT" and the right group "AUX". Since each block of switches is labelled "1" through "8", we will refer to the individual switches using a notation like "CRT-3" or "AUX-6".

Set all switches for each line according to the following guidelines.

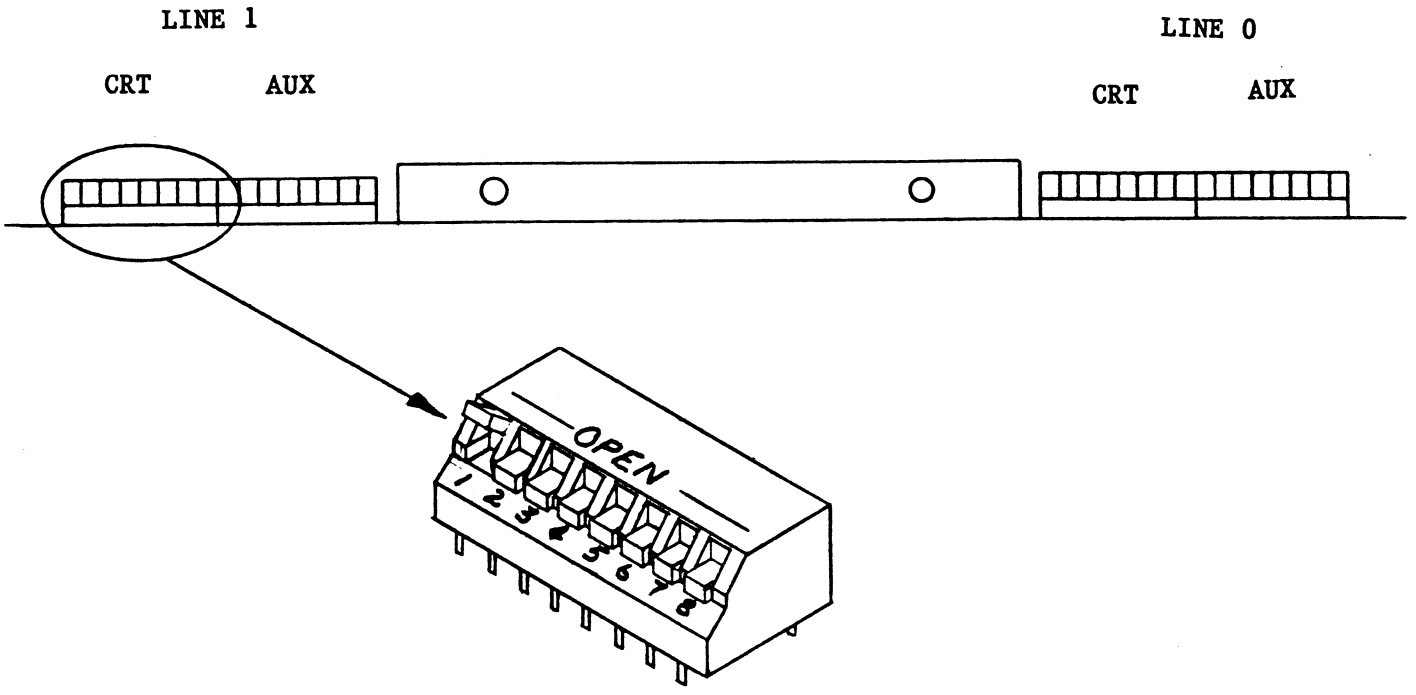


Figure 5.4: CRT and AUX "Piano-Style" Switches

CRT-1: Production/Development Mode

UP = Production Mode (recommended)
DOWN = Development Mode

Refer to Chapters 1 and 2 for more information about this option.

CRT-2,3,4: CRT Baud Rate

Use the table in figure 5.5 to determine the proper position for each of these switches so that they match the baud rate of the CRT terminal or modem to be connected to this MIRAGE line.

CRT-5: Self-Test A

UP = Special Self-Test Enabled
DOWN = Normal Operation

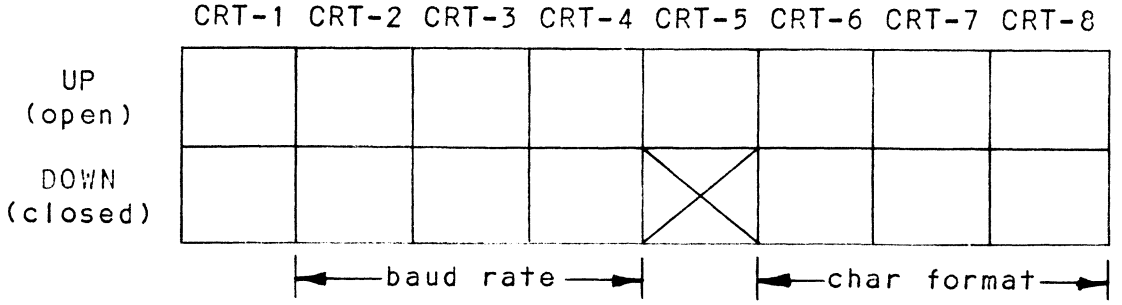
Set this switch DOWN.

See the "HELP!" section in this guide for more information regarding the self-test facilities of the MIRAGE processor.

CRT-6,7,8: CRT Data Format

Use the table in figure 5.6 to determine the proper position for each of these switches so that they match the character format of the CRT terminal or modem to be connected to this MIRAGE line.

In the space below, place an "X" in each column to indicate the switch settings for future reference:



AUX-1: (currently unused)

The position of this switch has no effect.

AUX-2,3,4: AUX Port Baud Rate

Use the table in figure 5.5 to determine the proper position for each of these switches so that they match the baud rate of the device connected to the "AUX" port for this MIRAGE line. If no device is to be connected to this port, these switches can be left in any position.

AUX-5: Self-Test B

UP = Special Self-Test Enabled
DOWN = Normal Operation

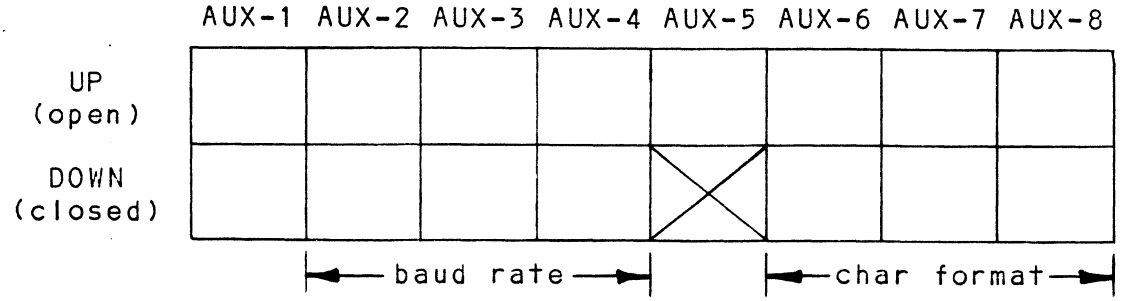
Set this switch DOWN.

See the "HELP!" section in this guide for more information regarding the self-test facilities of the MIRAGE processor.

AUX-6,7,8: AUX Port Data Format

Use the table in figure 5.6 to determine the proper position for each of these switches so that they match the character format of the device connected to the "AUX" port for this MIRAGE line. If no device is to be connected to this port, these switches can be left in any position.

In the space below, place an "X" in each column to indicate the switch settings for future reference.



Baud Rate Selection

Baud Rate	Switch 2	Switch 3	Switch 4
110	UP	UP	UP
300	UP	UP	DOWN
600	UP	DOWN	UP
1200	UP	DOWN	DOWN
2400	DOWN	UP	UP
4800	DOWN	UP	DOWN
9600	DOWN	DOWN	UP
19200	DOWN	DOWN	DOWN

Figure 5.5: Baud Rate Selection

Character Format Selection

Data Bits	Stop Bits	Parity	Switch 6	Switch 7	Switch 8	
8	1	ODD	DOWN	DOWN	DOWN	
8	1	EVEN	DOWN	DOWN	UP	
8	1	MARK	DOWN	UP	DOWN	
8	2	MARK	DOWN	UP	UP	
7	1	ODD	UP	DOWN	DOWN	
7	1	EVEN	UP	DOWN	UP	*
7	2	ODD	UP	UP	DOWN	
7	2	EVEN	UP	UP	UP	

* Note: This configuration is common for many Data General systems.

Figure 5.6: Character Format Selection

Installing the Board

Selecting a Slot

Each MIRAGE Processor board occupies one "slot" in your Data General computer. In this step, we will help you select the proper slot for your MIRAGE Processor(s).

First, let's figure out how to identify the slots in your computer.

Older Data General computers have chassis which slide out like a drawer. If you look at the front of this type of chassis, the boards are inserted from the right-hand side and connections are made to the "backplane" which is on the left. We call this a "sidemount" or "sideplane" machine. On these machines the slots are numbered from bottom to top, starting with slot "1" at the bottom.

Recent small Data General computers have a plastic front panel which, when removed, reveals the circuit boards. The chassis of these computers are not designed to slide out. Instead the boards are inserted from the front, and connections are made to the true "backplane" at the rear of the machine. As in the sidemount machines, the boards are stacked one on top of another and the slots are numbered from bottom to top, starting with "1".

Data General's larger systems also have their boards installed from the front, but the boards are arranged vertically and are side-by-side. Typically, you have to open a metal door at the front of the machine to access the boads. On most of these machines the slots are numbered from right to left (!) where slot number "1" is at the far right when viewed from the front of the computer.

Now using the table in figure 5.7, find the entry for your computer by its model number. The table will tell you which slots can be used to hold MIRAGE Processor(s).

Select an available slot which is valid according to the table in figure 5.7. If more than one slot is available, we suggest using the highest available slot. If you have a large system with side-by-side boards, we recommend using the right-most available slot.

Computer Model	Total Slots	Slots OK for MIRAGE
Nova 2/4	4	4
Nova 2/10	10	4-10
Nova 3/4	4	3,4
Nova 3/12	12	3-12
Nova 4/C (5-slot)	5	2-5
Nova 4/C (16-slot)	16	3-16
Nova 4/S (5-slot)	5	3-5
Nova 4/S (16-slot)	16	3-16
Nova 4/X (5-slot)	5	3-5
Nova 4/X (16-slot)	16	3-16
Nova 800	7	4-7
Nova 820	10	4-10
Nova 1200	7	4-7
Nova 1220	10	4-10
Eclipse S/100	7	4,6,7
Eclipse S/120-5	5	2-5
Eclipse S/120-16	16	3-16
Eclipse S/130	12	4-12
Eclipse S/140	16	4-16
Eclipse S/200	16	7-16
Eclipse S/230	16	7-16
Eclipse S/250	34	17-26 (1)
Eclipse C/150	12	4-6, 8-11
Eclipse C/300	16	7-16
Eclipse C/330	16	7-16
Eclipse C/350	34	9-26
Eclipse M/600	56	26-37
Eclipse MV/6000	16	2-7 (2)
Eclipse MV/8000 (93xx)	56	30-43
Eclipse MV/8000 (96xx)	56	30-42

(1) Slots 1-16 may be used if driven by a bus repeater, NOT a DCU.

(2) Slots 10-14,16 may be used if the E2 bus is driven by a bus repeater, NOT a DCU.

Figure 5.7: MIRAGE Slot Selection Guide

To double-check that the slot you have selected really is available, let's look at the backplane side of your machine.

But first, a few suggestions about working inside your computer:

1. Be careful when working on or around the backplane of your computer. In particular avoid bending backplane pins. Also, handle all connectors gently and never force anything.

2. The average backplane has over 2,000 pins and a single bad connection can keep the entire system from functioning.

3. Even in a well-lighted room we suggest you use a flashlight or other worklight to illuminate the backplane. This makes it much easier to count the pins and slots.

4. If your computer has a "slide-out" chassis, be extra careful. Open the back and, if possible, the side of your cabinet while you carefully slide the chassis forward. Watch all the cables as you pull the chassis out to make sure they don't get caught on the cabinet. If possible, get some help for this seemingly simple chore -- have one person watch the front of the machine and the other watch the back.

5. Make sure the power is off to both your computer and your cabinet whenever you work around the backplane.

Now study your backplane. There should be nothing connected to the slot you have selected except perhaps two jumper wires similar to those shown in figure 5.8.

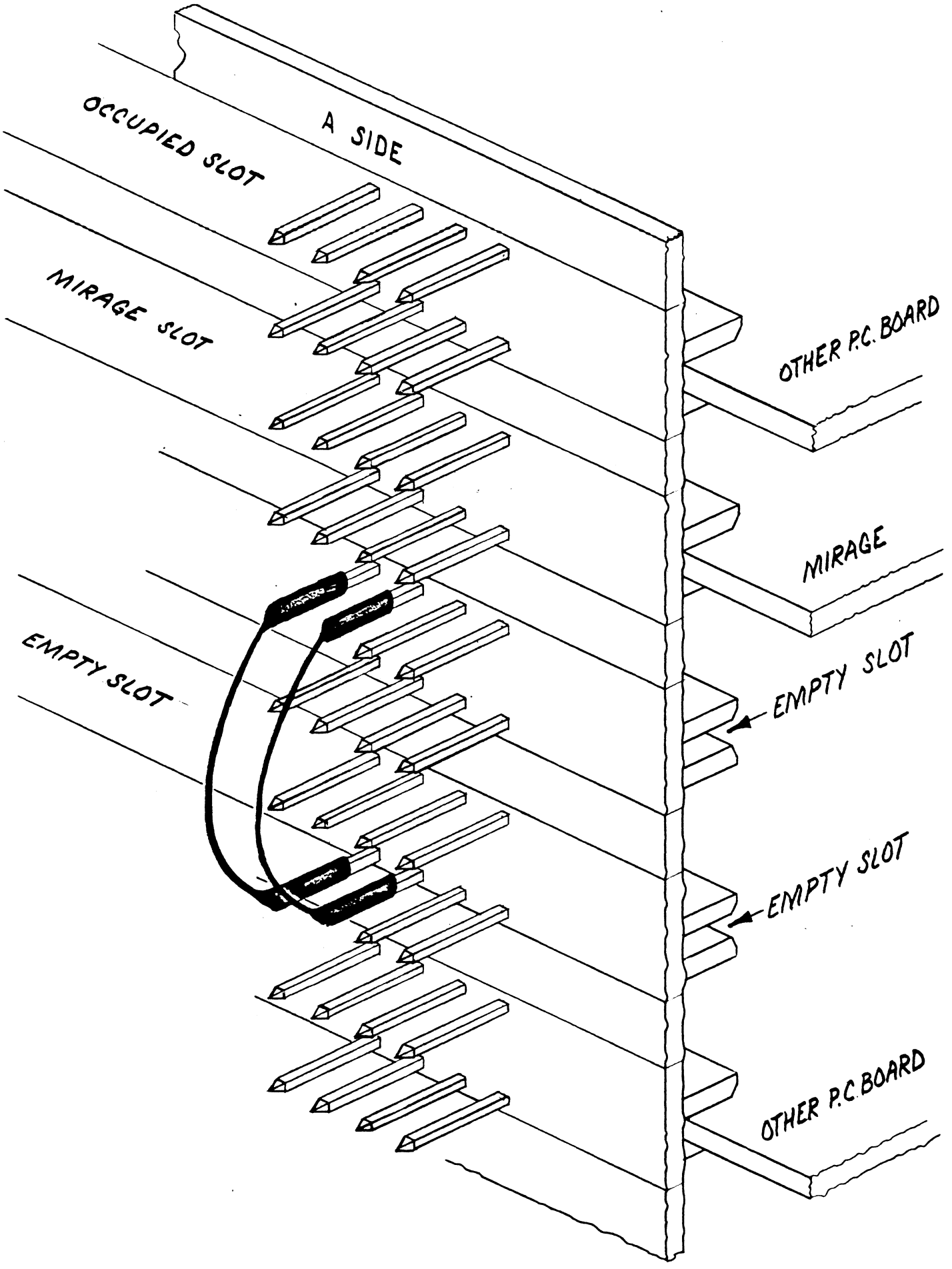


Figure 5.8: Backplane Showing Jumpers Over 2 Empty Slots

Backplane Jumpers

This part of installing a circuit board is really very simple,once you understand it. The problem is that people have had trouble explaining it for so long. (If you know all about priority jumpers, feel free to skip this discussion -- just make sure you install them correctly.)

Let's take a moment to understand why we must install jumpers in the first place.

Your computer is made up of many circuit boards. The "backplane" is also a circuit board. Its job is to carry the signals which let the circuit boards communicate with one another. For the most part, all of these signals are connected to all of the slots. This means that all of the circuit boards are connected together in a "party line" fashion. Imagine what would happen if all of the boards decided to "talk" on the backplane at the same time!

To avoid such chaos, Data General computers use two "priority chains", one for interrupts and the other for the data channel facility. Each chain is simply a connection of a signal from one board (or slot) to the next.

Here's how it works. When everything is quiet, each board acts like a link in the chain. The priority signal comes in one side of the board and is sent out the other side. The chain extends all the way from the main CPU board to the top (or other end) of the chassis.

Pretend we are on a circuit board that wants to "talk" on the backplane. We can play a little trick on the other boards. Instead of passing on the priority signal, let's break the chain, or circuit. Boards which are farther from the CPU than our board are disconnected from the priority chain and can't talk. Our board, which has disconnected them, may now "talk", right?

Maybe not; for each board can play this trick. Suppose a board closer to the CPU board than we are also wants to talk and has broken the chain at its position. Then the priority signal won't even reach us! That's why this scheme is called a "priority chain"; boards closest to the CPU have the highest priority.

We have all heard that "a chain is only as strong as its weakest link", and Data General has taken advantage of this. If more than one board wants to "talk" at the same time, the one closest to the CPU board will disconnect all of the others from the chain.

Take a look at figures 5.9 and 5.10. Notice that, when viewed from the backlplane, there are two "banks" of pins. One bank is called the "A" side (it's on the left or bottom) and the other is called the "B" side.

All of our discussions will concentrate on the right-hand end of the "A" side of the backplane as viewed from the backplane side of the machine. We won't be using the "B" side at all, nor will we use the left-most portion of the "A" side. (If you have one of those big computers where the "A" side is really the "bottom", you'll have to either tip your head to the left when looking at the backplane or turn this book ninety degrees to the right and read sideways).

For every slot in the chassis, there are two rows of pins going all the way across the backplane. There are fifty pins in each row on the "A" side and another fifty on the "B" side. There are, therefore, a total of two hundred backplane pins per slot.

Figure 5.8 shows the relationship between the circuit boards on one side of the backplane, and the pins on the other side. Take a look at your MIRAGE Processor and imagine it installed in the backplane. The pins on the top row of each slot will connect to the gold "fingers" on the top of the board. The fingers on the bottom of the MIRAGE Processor will connect to the bottom row of pins for the slot chosen.

Pay special attention to one detail that causes trouble for even the most experienced engineers. Notice that the spacing of the pins does not help you determine whether a row is the top of one slot or the bottom of another. It all looks like one mass of pins. You will have to count the pairs of rows carefully to make sure which pins are associated with each slot.

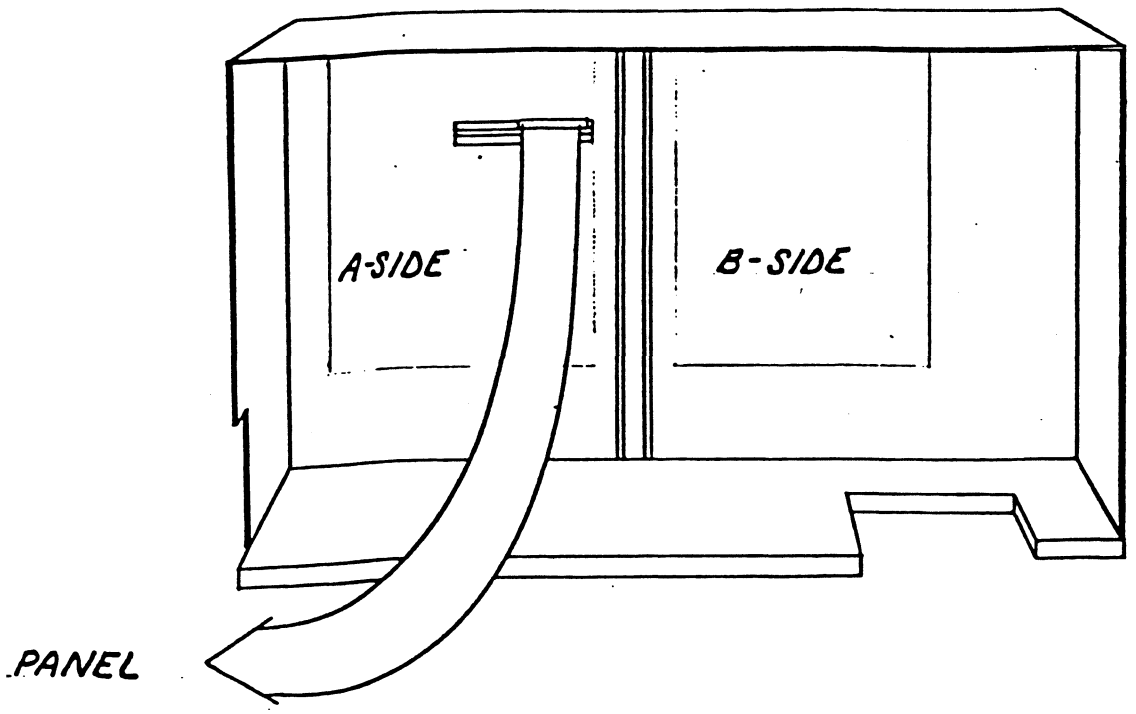


Figure 5.9: Rear View of a Horizontal Backplane

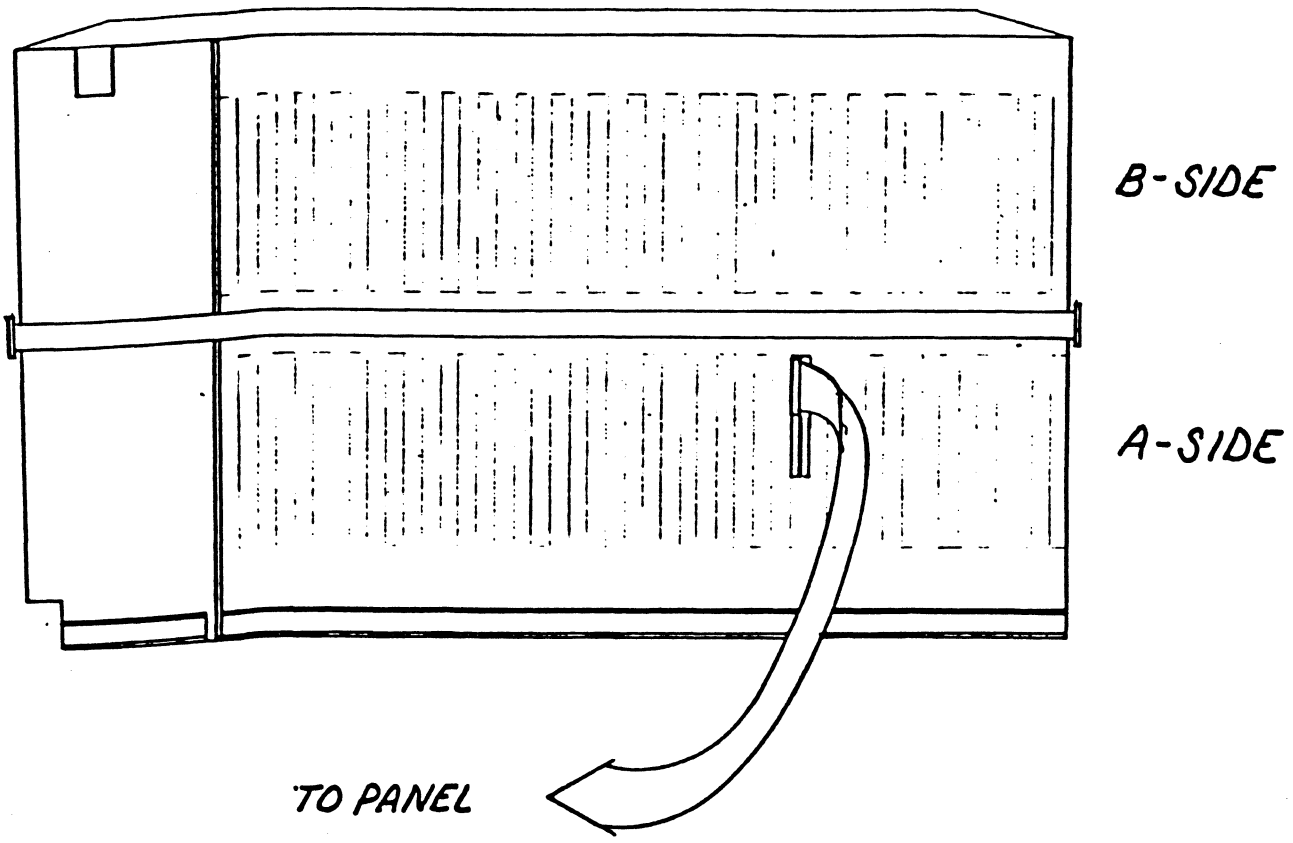


Figure 5.10: Rear View of a Vertical Backplane

As we said earlier, there are two different priority chains, one for interrupts and the other for the data channel. Physically, these chains are columns of connections which run up and down side-by-side near the right-hand end of the "A" side of the back plane. Look at figure 5.11 and you will see how the pins are numbered for each slot. Note that the odd numbered pins are along the top of the slot and the even numbered pins are along the bottom.

Although you can't see it, the backplane itself connects pin A93 of one slot to pin A94 of the next slot. This is the data-channel priority chain. Note that this column of pins is four pins in from the right-hand end of the "A" side of the backplane.

Similarly, the backplane connects A95 of one slot to A96 of the next slot for the interrupt priority chain. This column is three pins in from the right-hand end of the "A" side.

So the backplane takes care of the links from slot to slot, but something is needed to pass the signal from the bottom of each slot to the top of that slot. There are two ways this can happen: If a circuit board is installed in a slot, then that board will provide the link since all boards are required to connect A94 to A93 and A96 to A95. (These are the connections which the board "breaks" when it wishes to "talk" on the backplane).

If there is no board in a slot then "jumper" wires must be installed to complete the chains across the empty slot. These jumpers may span just one slot. However, if there is more than one empty slot in a row it is common to skip over all of the empty slots with one pair of jumpers rather than use a pair of jumpers for each individual slot.

Let's assume that your computer was working fine before the installation of the MIRAGE Processor. (If it wasn't, adding the MIRAGE Processor won't help much). For things to be working properly, both priority chains must be wired correctly. This means that each slot must either (a) contain a board, or (b) be "jumpered". After installation of a MIRAGE Procesor, this still must be true.

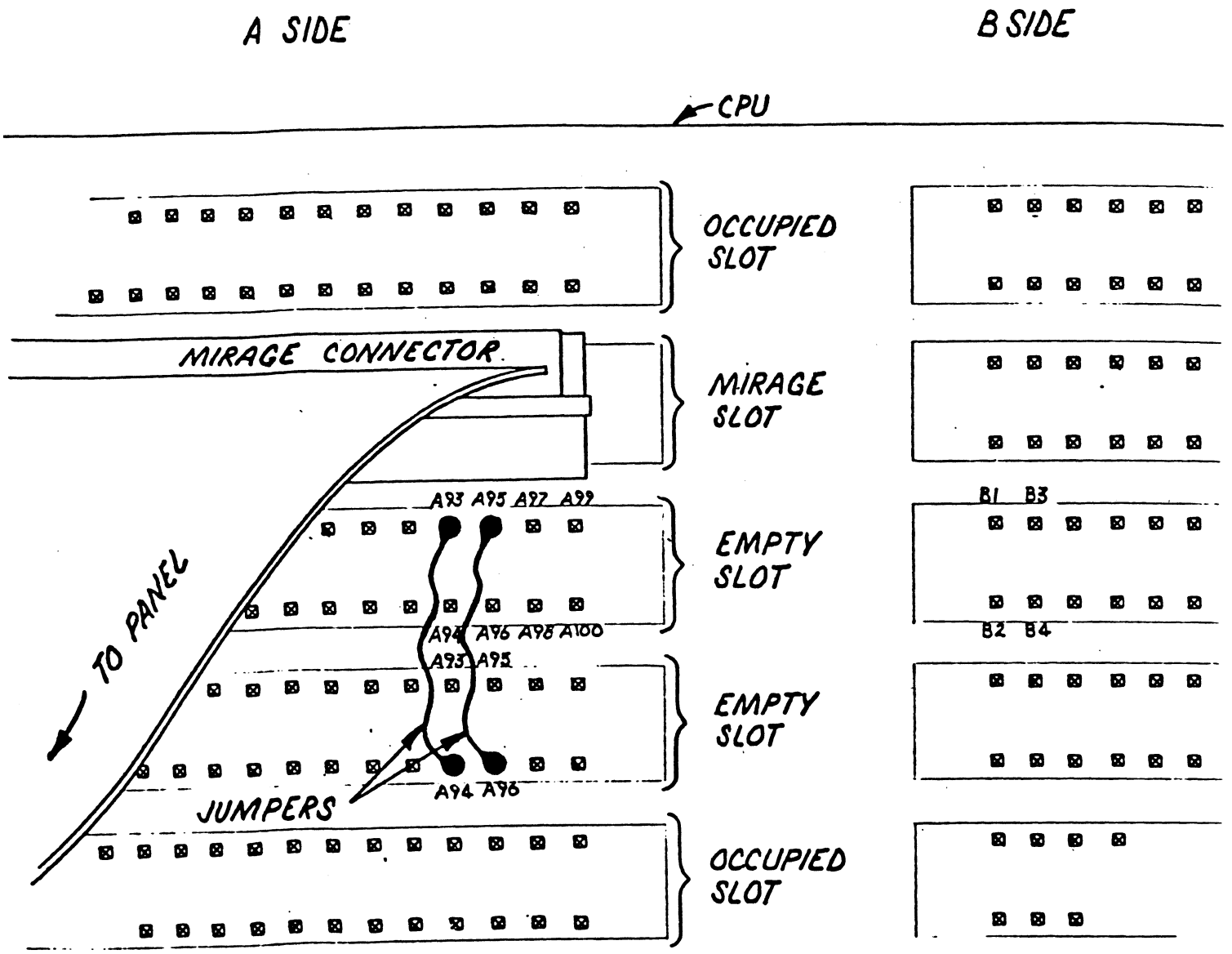


Figure 5.11: Backplane Closeup Showing Cable and Jumpers

You have selected an empty slot for each MIRAGE Processor. There are two possibile situations, so let's handle them separately.

If the slot you have selected is farther from the CPU than any of the existing boards, that's "Case 1".

If the slot is one between the CPU and another board in the chassis, that's "Case 2".

Note: If you remove any jumpers in the steps that follow, make sure to note their EXACT position in case you must return your MIRAGE Processor for repairs and, therefore, need to replace your original jumpers.

Case 1

This is the easiest case. You can be pretty sure that the priority signals are already reaching the last board that is currently in the computer. If you install the MIRAGE Processor in the very next slot the priority signals will reach it through the backplane and no jumpers need to be added. Skip to the next section, "Installing the Circuit Board".

If there are one or more empty slots beetween the last existing board and the slot for the MIRAGE Processor, you must install jumpers over the "gap". Skip to "Installing Jumpers".

Case 2

If you have selected a slot in a gap between existing boards, there should already be jumpers across the empty slot(s). If the gap is exactly big enough to hold the number of MIRAGE Processors you are installing then just remove the existing jumpers from these slot(s) and proceed to "Installing the Circuit Board".

If there is more than one empty slot at this point, then either all the empty slots have been bypassed with a single pair of jumpers, or each empty slot has been individually jumpered, or some combination of these techniques has been used.

Examine the wires which exist in this area on your backplane. You should be able to decipher the scheme used to ensure that the two priority signals get across the gap of empty slots. In most cases it will be easiest to remove all priority jumper wires in the gap.

Since the gap contains more slots than you plan to use for MIRAGE Processors you will have to re-jumper the unused slots. If, for example, you are installing one MIRAGE Processor in a gap of three empty slots, don't use the slot in the middle -- then you would have to re-jumper both of the other two slots. Instead, use a slot at one end of the gap and jumper over the other two with a single pair of jumpers.

Installing Jumpers

NOTE: On some computers one or both of the priority chains may begin farther from the CPU than A94 or A96 of the first empty slot. Before removing any jumpers study the ends closest to the CPU. If the pins are not A94 or A96, and if you will be starting your jumpering at the same slot, then re-use these same non-standard pins rather than A94 and A96 in the instructions that follow FOR THIS SLOT ONLY.

Refer to figure 5.11 as a guide for installing jumpers over a gap of unused slots in the backplane. Remember that the "gap" we are describing may be one or more slots.

Use the push-on jumpers provided with the MIRAGE Processor and make sure the power to your computer is off.

Connect one jumper from A94 of the slot at the beginning of the gap to A93 of the slot at the other end of the gap. (The "beginning" of a gap is the slot closest to the CPU board). If the gap is only one slot, you will be connecting A94 to A93 of the same slot.

Similarly, connect another jumper from A96 of the slot at the beginning of the gap to A95 of the slot at the end of tha gap.

Installing the Circuit Board

Once again make sure the power is off!

Now insert the MIRAGE Processor circuit board(s) into the slot(s) selected. Make sure that the board is positioned like the others in your computer; that is, each one has a "top" (with components and a cover) and a "bottom".

NOTE: If you have never done this before, we suggest that you try to remove and re-insert one of the boards already in your computer. In this way, you will get to know how it should feel and how much resistance you should expect at each point of inserting a board.

Push the circuit board in until it is sticking out about one-half inch beyond the other boards. It should be very easy to slide the board in up to this point, so don't force it.

Open the two "insertion levers" at the exposed edge of the board.

At this point you will feel resistance as the backplane connector makes contact with all two hundred fingers at once. Make sure that the short, round-shaped ends of the insertion levers engage the curved channels at the sides of the slot, just like the other boards.

Finally, use the insertion levers to push the MIRAGE Processor into its slot.

Push firmly on the edge of the board to make sure that the board is fully seated and is making good contact.

How well did you do?

This step will tell you how well you did in installing the data channel and interrupt priority jumpers.

If you did everything right, the priority chains should have no "weak links". Every slot which was previously jumpered is now either still jumpered, or it contains a MIRAGE Processor board. Therefore, your computer should still do everything it did before you installed the MIRAGE Processor, right?

Double check your jumpering. You should not have connected to any pins other than A93, A94, A95 and A96 on any slot. Check that you have not bent any pins on the backplane. (If one pin touches another it could damage your computer).

Now turn on the power to your computer. As you do so, keep an eye on the two red "light emitting diodes" (LEDs) on the edge of the MIRAGE processor. If they don't go off after a few seconds, or if they start to blink, turn to the "HELP!" section of this guide.

If the LEDs go out and stay out, your MIRAGE processor has passed its on-board self test. This test does not check your backplane jumpering, but it does perform an initial checkout of the board. This short self-test is peformed automatically every time the power to your computer is turned on.

Now bring up your operating system like you have always done. Play around for a few minutes, taking the time to exercise each of your non-MIRAGE circuit boards to make sure that they are receiving the data channel and interrupt priority signals.

If you are unsuccessful, first double-check your work. If you cannot spot an error, contact your MIRAGE dealer for advice.

If everything seems to work, shut down your operating system, turn off all power, and continue the installation procedure.

The MIRAGE Ribbon Cable

Now that your MIRAGE Processor board is installed, the majority of connections to it have also been made via the backplane. However the connections to your terminals have not yet been made.

Study figure 5.12 and the appropriate end of the MIRAGE ribbon cable. Notice which side of the ribbon cable is the "top". (On a larger machine with vertically-organized boards the "top" goes to the "left" when viewed from the back of the machine.)

With the ribbon cable connector in the proper position, carefully press it onto the backplane pins for the slot containing the MIRAGE Processor board. Because many pins are contacted, some force is required, so be careful not to bend any pins.

If you have done this before, you probably know how many ways there are to get this wrong. Here are some things to check:

1. Make sure that the right-hand end of the connector goes onto pins A99 and A100. It's easy to be off by one pin left or right.

2. Check that you have the correct vertical positioning. Because the spacing of pins between slots is the same as the spacing of the two rows within a slot, it is possible to accidentally install the connector straddling two slots.

3. Be sure the ribbon cable isn't upside-down.

4. Hopefully by now you know the "A" side from the "B" side. Everything you've done so far should have been done on the "A" side.

5. Make sure you haven't bent any pins!

If you have a slide-out chassis perform the following additional steps, referring to figure 5.13.

1. As the cable comes off of the backplane, fold it sharply downwards, making it parallel to the backplane.

2. Make a 90-degree fold in the ribbon cable so that it heads toward the rear of the chassis.

3. Place the plastic clip over the fold to keep it creased.

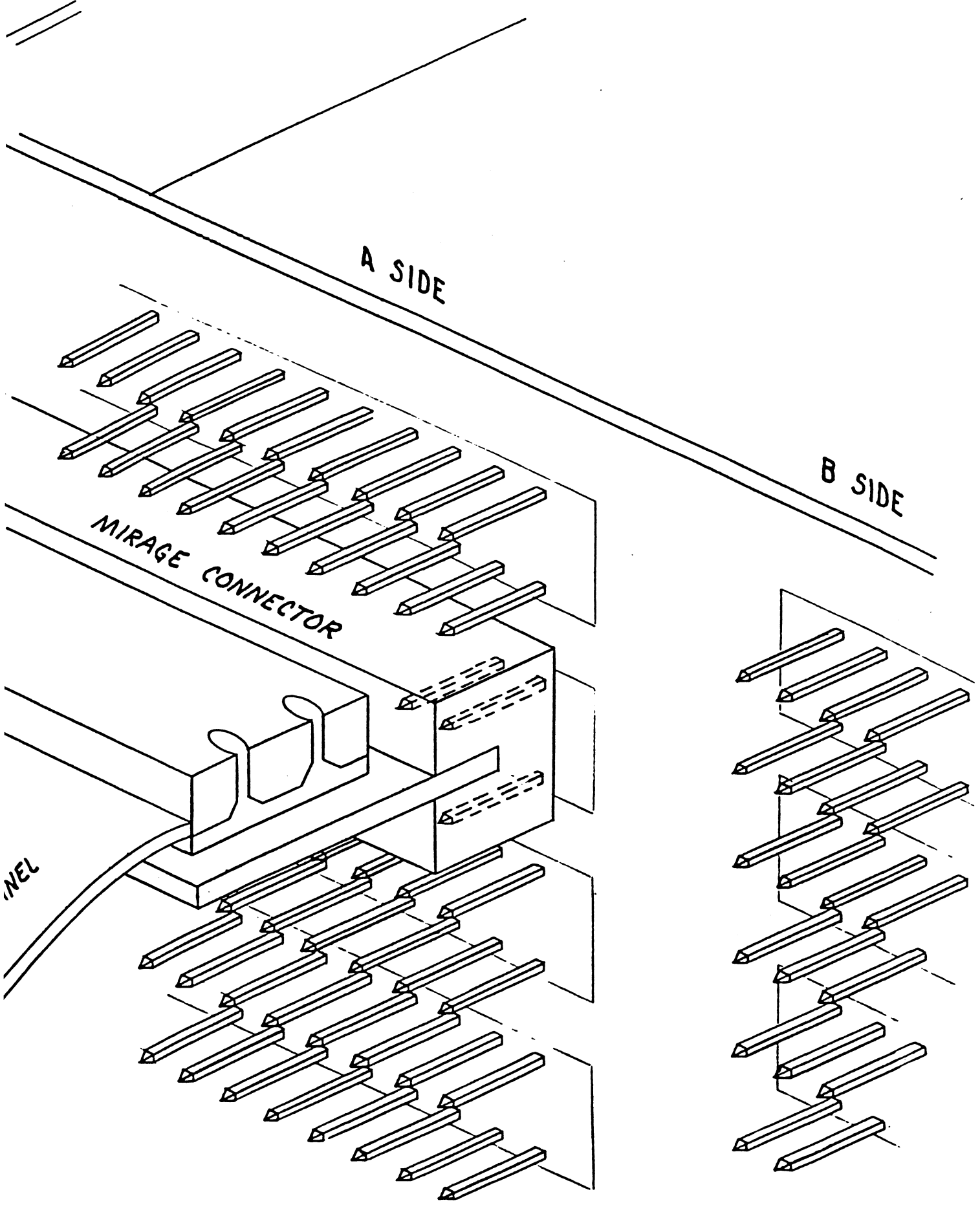


Figure 5.12: Closeup of Ribbon Cable Connector on Backplane

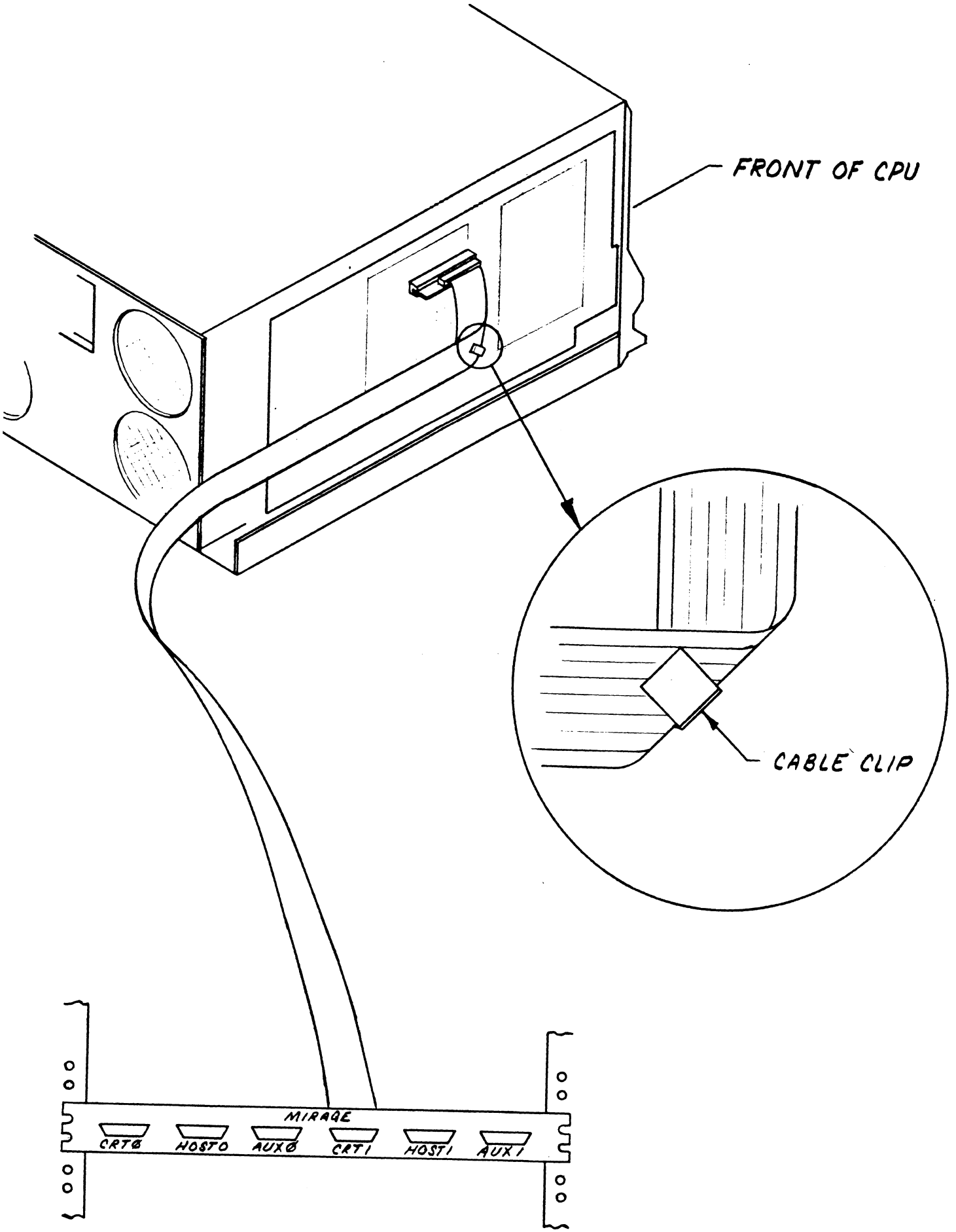


Figure 5.13: Ribbon Cable Installation on Side-Mount Chassis

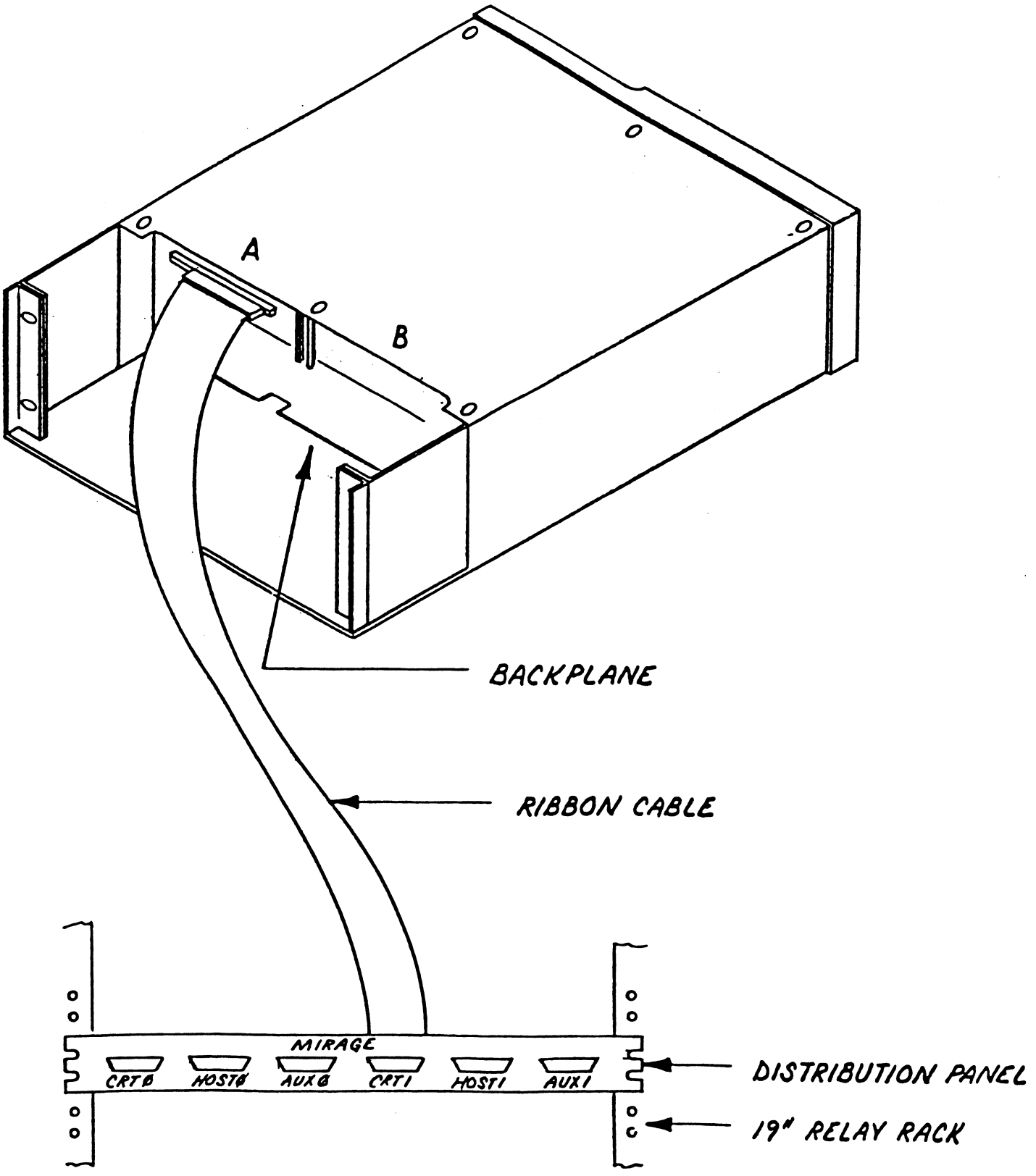


Figure 5.14: Ribbon Cable Installation on Rear-Mount Chassis

The MIRAGE Distribution Panel

The MIRAGE distribution panel is intended to be mounted on the vertical rails which are three-quarters of the way back in your cabinet. Actually, you can mount it anywhere you like so long as the ribbon cable reaches it.

Refer to figures 5.13 and 5.14. Hold the panel in the position in which you want to mount it. Make sure that the holes at the end of the panel line up with holes in your cabinet.

Before attaching the distribution panel to your cabinet, connect the ribbon cable to the panel. Lock the plug into the connetor mounted on the panel by closing the "flaps" on each side.

Attach the four self-holding "captive" nuts to the vertical rails of your cabinet at the position you have selected for the MIRAGE distribution panel.

Now mount the distribution panel to the cabinet using the four screws supplied. The screws should first pass through the panel, then the cabinet and finally into the captive nuts.

Arrange the ribbon cable so that it will not interfere with the physical movement of any equipment within the cabinet.

In the steps that follow, you will be connecting cables to the six plugs on the distribution panel. Let's take a moment to understand the purpose of each one.

First of all, the plugs are divided into two sets of three; one set for each line on the MIRAGE Processor.

For each line there are three connetctions:

CRT

You will connect the MIRAGE user's CRT terminal to this plug. Earlier in the installation procedure you set the characteristics used by the MIRAGE processor to communicate with the terminal connected to this port.

HOST

If the terminal you connect to the CRT plug was previously connected to your Data General "host" computer, you will connect a "pass-through" cable from the HOST plug to the point of original connection on the DG system. When the MIRAGE Processor is not running CP/M, it passes all signals from the CRT plug to the HOST plug, therefore giving the user the appearance that nothing has changed. This is called the "pass-through" mode. When in the pass-through mode, the CRT and HOST plugs are connected together in a manner which is independent of baud rate and character format so there is neither the need nor the ability to set such characteristics on the HOST port.

AUX

If you want to connect a "private" perpheral device (such as a printer) to this user's MIRAGE Processor, do so through this connector. The selection of baud rate and character format were performed earlier in the installation procedure.

Connecting Your Terminals to MIRAGE

Each MIRAGE user's terminal should be connected to the appropriate plug marked "CRT" on the MIRAGE distribution panel. If the cable coming from your terminal currently terminates in a 25-pin female connector on your Data general system, you can simply move that cable to the CRT connector. This is the type of connector in use on most Data General multiplexors manufactured in recent years.

If the cable coming from a terminal does not have a 25-pin female connector on the end, it cannot be connected to the MIRAGE distribution panel. You must either cut off the connector and replace it with one of the appropriate type, provide a "conversion" cable, or replace the entire cable between the terminal and the MIRAGE distribution panel.

If you must make or modify a cable, be sure to study the wiring diagrams in figures 3.15 and 3.17. It only takes minutes to make a cable, but tracking down one which was made incorrectly can take hours.

Turn to the section of this guide which describes the MIRAGE Self-Test facilities and perform tests #1 and #2 at this time.

After running the self-tests, reset all switches to the positions determined earlier in the installation process.

Note: The MIRAGE Processor only works with the EIA RS-232C interface. If your terminal is set up for "current loop", you must either (a) change the terminal to operate with RS-232C, or (b) use a current-loop-to-RS-232C converter.

Installing the Pass-Through Cables

In the "pass-through" mode, signals from the terminal connected to the "CRT" port are passed to the connector marked "HOST". The MIRAGE processor switches the terminal back and forth between this pass-through connection and local processing (the MIRAGE mode) upon detection of a BREAK from the keyboard.

If you only intend to use a terminal for CP/M processing, you can leave the HOST port unconnected.

We usually assume that before you connected a terminal to the MIRAGE Processor the terminal was already in use on your host system. In this case the goal of the pass-through mode is to re-connect the terminal to the point of original connection. In fact, however, the pass-through connection may be made to any asynchronous RS-232C port using the same baud rate and character format as the terminal.

To set-up a MIRAGE line for pass-through operation, install a pass-through cable from that line's HOST connector to the point of original connection (typically a multiplexor). The twelve-foot pass-through cables should be long enough to reach from the MIRAGE Distribution Panel to any reasonable point in your cabinet.

One end of each pass-through cable is terminated in a 25-pin male plug which mates with the HOST connector. The type of connector on the other end of the cable was specified when your MIRAGE system was ordered.

If you ordered the right cable (and if we shipped the right one, too!) then completing the pass-through connection is simply a matter of plugging in the other end of the cable.

Once again turn on the power to your system. After a few seconds the LEDs on the MIRAGE Processor should go out. After a few more seconds, when the MIRAGE Processor has determined that its support software is not running on the host computer, it will display the message "MIRAGE Server Not Running" followed by "Host". This means that MIRAGE has returned to the pass-through mode.

Now bring up your operating system. All terminals connected to MIRAGE lines which have pass-through connections should operate as they did prior to the installation of the MIRAGE Processor.

If Pass-Through Does Not Work

Your MIRAGE Processor was thoroughly tested at the factory. We have found that nearly all problems with pass-through operation are caused by cabling errors.

Remove the plugs from the CRT and HOST ports and connect them to each other. Now you are bypassing the MIRAGE system entirely. If this bypass still does not work, you should suspect your cabling or your selection of baud rate or character format at the terminal or host interface.

If the bypass works but you do not get the same results when the cables are re-connected to the CRT and HOST ports, turn to the "HELP!" section of this guide.

If for any reason you must remove your MIRAGE Processor, you can always bypass the entire MIRAGE system by performing the above procedure.

You have now completed the installation of the MIRAGE hardware. Make sure to dress all cables so that they will not snag other equipment or be damaged themselves. Where there are 25-pin connectors, secure them gently with the screws on the sides.

If your computer has a slide-out chassis, slide it back carefully.

Continue with the installation of the MIRAGE software as described in Chapter 3 (RDOS or DOS) or Chapter 4 (AOS or AOS/VS).

HELP! Using the MIRAGE Self-Test Procedures

The MIRAGE Processor can perform four Self-Tests. Each one has a particular purpose and operating instructions. If a Self-Test discovers an error, the Light-Emitting Diode (LED) for than line will blink. (The LED is located on the edge of the board and can be seen when the MIRAGE Processor is installed).

If the LED never comes on, then either (a) the MIRAGE Processor is not receiving proper power, or (b) the MIRAGE Processor should be returned for service.

The LED will display a code by flashing some number of times. This pattern will repeat over and over. The following explains the significance of each code.

1: RAM Test Failure.

An error in this line's memory has been detected. The MIRAGE Processor requires maintenaince.

2: EPROM Test Failure.

An error in this line's EPROM has been detected. The MIRAGE Processor requires maintenance.

3: CRT Port Error.

The Clear-to-Send (CTS) line on the CRT port is "false" which prohibits MIRAGE from transmitting to the terminal. The device conneced is off-line or is wired incorrectly. This is NOT a problem with the MIRAGE Processor.

4: CRT Port Failure.

The UART associated with the CRT port is not functional. If this error occurs when a device is connected to the CRT port, the Clear-to-Send (CTS) signal on pin 5 may be "false" which will prevent the flow of data from MIRAGE to the device connected. If this error occurs when there is nothing connected to the CRT port, the MIRAGE Processor requires maintenance.

5: Loopback Test Failure.

If the loopback cable is connected between the CRT and AUX ports of this line, then either (a) there is a cabling error between the distribution panel and the backplane or (b) the MIRAGE Processor requires service.

Self-Test #1: Short test of RAM, followed by output to CRT

Set CRT-5 DOWN and AUX-5 DOWN.

Set all other switches according to installation instructions.

Purpose

Basic checkout of MIRAGE Processor and user cabling. This is the "normal" self-test which will be run every time power is applied to the MIRAGE Processor. No operator intervention is required.

1. Connect a terminal to the "CRT" connector.

2. Turn power off then on.

3. If the LED blinks, refer to the error code list.

4. If LED does not go out within five seconds the self-test itself is failing. Contact your MIRAGE dealer.

5. If the message "RDS MIRAGE OK" appears on the CRT, proceed to Self-Test #2.

6. If the message "RDS MIRAGE OK" does not appear on the CRT, check the following:

   a. Is your CRT turned on?

   b. Is the ribbon cable properly connected to the MIRAGE Processor's I/O slot? (See figures 5.11 and 5.12).

   c. Is the ribbon cable properly connected to the MIRAGE Distribution Panel?

   d. Does the CRT's baud rate match that of the MIRAGE Processor?

   e. Does the CRT's character format (data bits, stop bits, parity) match that of the MIRAGE Processor?

   f. Double check the cable between your CRT and the MIRAGE distribution panel. The MIRAGE Processor is transmitting data on pin #2 of the "CRT" connector.

7. If the problem cannot be found, proceed to test #4.

Self-Test #2: Short test of RAM, followed by CRT Input/Output

Set CRT-5 UP and AUX-5 UP.

Set all other switches according to installation instructions.

Purpose

Extensive checkout of user cabling and bi-directional asynchronous communications with the CRT port. Operator intervention is required.

1. Connect a terminal to the "CRT" connector.

2. Turn power off then on.

3. If the LED blinks, refer to the error code list.

4. The following message should appear on your terminal:

   TYPE "HELLO" TO COMPLETE MIRAGE SELFTEST:

   If this message does not appear, but test #1 was passed, something is weird. Check the switches and try again.

5. Using only upper case (capitals), type HELLO then press the <return> or <cr> key.

6. If the LED is now off, this test has been passed.

7. If the characters you type do not appear on the screen, you should suspect your cabling.

8. If you receive the message

   PLEASE ENTER THE CORRECT CHARACTER!

   when, in fact, you have typed the correct character, or if the characters are echoed incorrectly (e.g., you type a "H" but a "q" is displayed) then make sure that your terminal has the same characteristics for sending and receiving (baud rate, data bits, stop bits and parity).

8. If there is no response to the keys you press, data is not being received by the MIRAGE Processor. Double check the cable between your CRT and the MIRAGE distribution panel. The MIRAGE Processor is receiving data on pin #3 of the "CRT" connector.

9. If the problem cannot be found, proceed to test #4.

Self-Test #3: Long test of RAM, followed CRT Input/Output

Set CRT-5 UP and AUX-5 DOWN.

Set all other switches according to installation instructions.

Purpose

This test is identical to Self-Test #2 except that a more extensive (five-minute) test of the MIRAGE Processor's on-board memory is performed before the interactive dialogue with the user's CRT begins.

Self-Test #3 should only be run if you have established that the MIRAGE Processor can successfully communicate with your terminal (self-tests #1 and #2) but appears to have other problems which may be related to memory.

The operating procedures for Self-Test #3 are the same as for Self-Test #2. However, during the five-minute long test of memory, an asterisk ("*") should appear to flash on-and-off on the terminal to indicate that the test is running.

After running Self-Test #3, make sure to return switch CRT-5 to the DOWN position. If you leave CRT-5 UP and AUX-5 DOWN, this lengthy test will be performed every time power is turned on to the MIRAGE Processor.

Self-Test #4: Short test of RAM, followed by Loopback Test

Set ALL Switches DOWN (CRT-1 through AUX-8) except AUX-5 (UP).

Purpose

This is a problem-determination test for bi-directional asynchronous communications with the CRT and AUX ports. If Self-Tests #1 or #2 fail and this test passes, it is reasonable to assume that there is a problem in the cabling between the user's CRT and the MIRAGE Distribuion panel or that there is a mismatch between the baud rate and/or character format of the terminal and the CRT port.

1. Disconnect all cables from the MIRAGE Distribution Panel.

2. Connect the short (one foot or less) "loopback" cable from the plug marked "CRT" to the plug marked "AUX" on the MIRAGE Distribution Panel.

3. Turn the power off then on.

4. If the LED blinks, refer to the error code list.

5. If LED does not go out within five seconds check the following:

    a. Is the ribbon cable properly connected to the MIRAGE Processor's I/O slot? (See figures 5.11 and 5.12).

    b. Is the ribbon cable properly connected to the MIRAGE Distribution Panel?

    c. Are fifteen out of the sixteen switches for this line all in the DOWN position? Only AUX-5 should be up.

    d. Is the MIRAGE Processor firmly seated in its slot?

If this self-test still does not pass, there is a problem with your MIRAGE Processor. Contact your MIRAGE dealer.

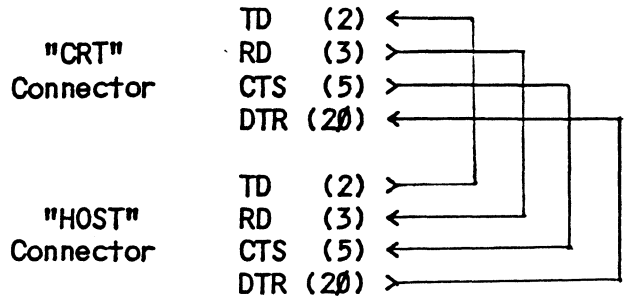
Note: Since there is only one loopback test cable, you can only run this test on one MIRAGE line at a time. If you run this test on both lines simultaneously, the line without the loopback test cable will, therefore, appear to fail the test.

6. If the LED goes out and stays out, this test has passed. This means that the MIRAGE Processor can successfully transmit data out the CRT plug, can receive it correcIty at the AUX plug, and vice versa. If the data portions of self-tests #1, #2, or #3 still do not work, the chances are that there is a problem in the cabling between the MIRAGE Distribution panel and your terminal. Refer to figures 3-16 and 3-17 for details of cable configurations.

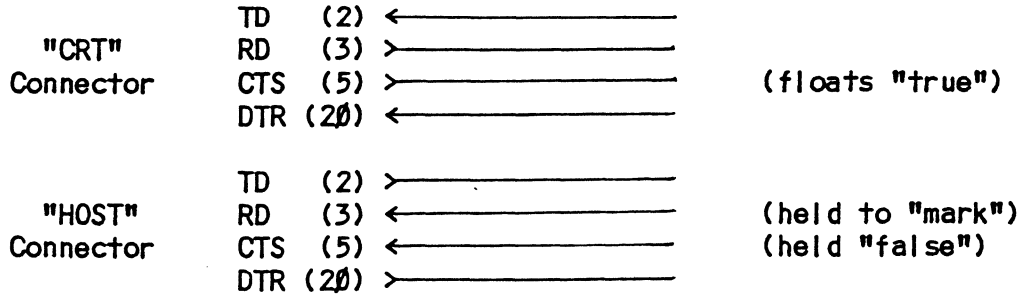
90% OF THE PROBLEMS ENCOUNTERED DURING INSTALLATION OF THE MIRAGE PROCESSOR TURN OUT TO BE CAUSED BY THE REVERSAL OF PINS #2 (TRANSMIT DATA) AND #3 (RECEIVE DATA) ON THE "CRT" OR "HOST" CONNECTORS.

Make sure to return all sixteen switches for this line to the positions established during the installation procedure.

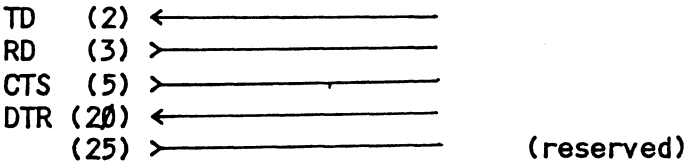
"Pass-Through" Mode



Local Processing Mode



"AUX" Connector



Arrowheads only serve to indicate logical flow:

"<" indicates MIRAGE is the source (active).
">" indicates MIRAGE is the destination (passive).

"HOST" connector is 25-pin EIA RS-232C female, panel mounted, wired as Data Communications Equipment (DCE).

"CRT" and "AUX" connectors are 25-pin EIA RS-232C male, panel mounted, wired as Data Terminal Equipment (DTE).

With the exception of pin 7 (Signal Ground), pins not shown are not connected.

Figure 3.15: MIRAGE 102 Interconnections and Cabling

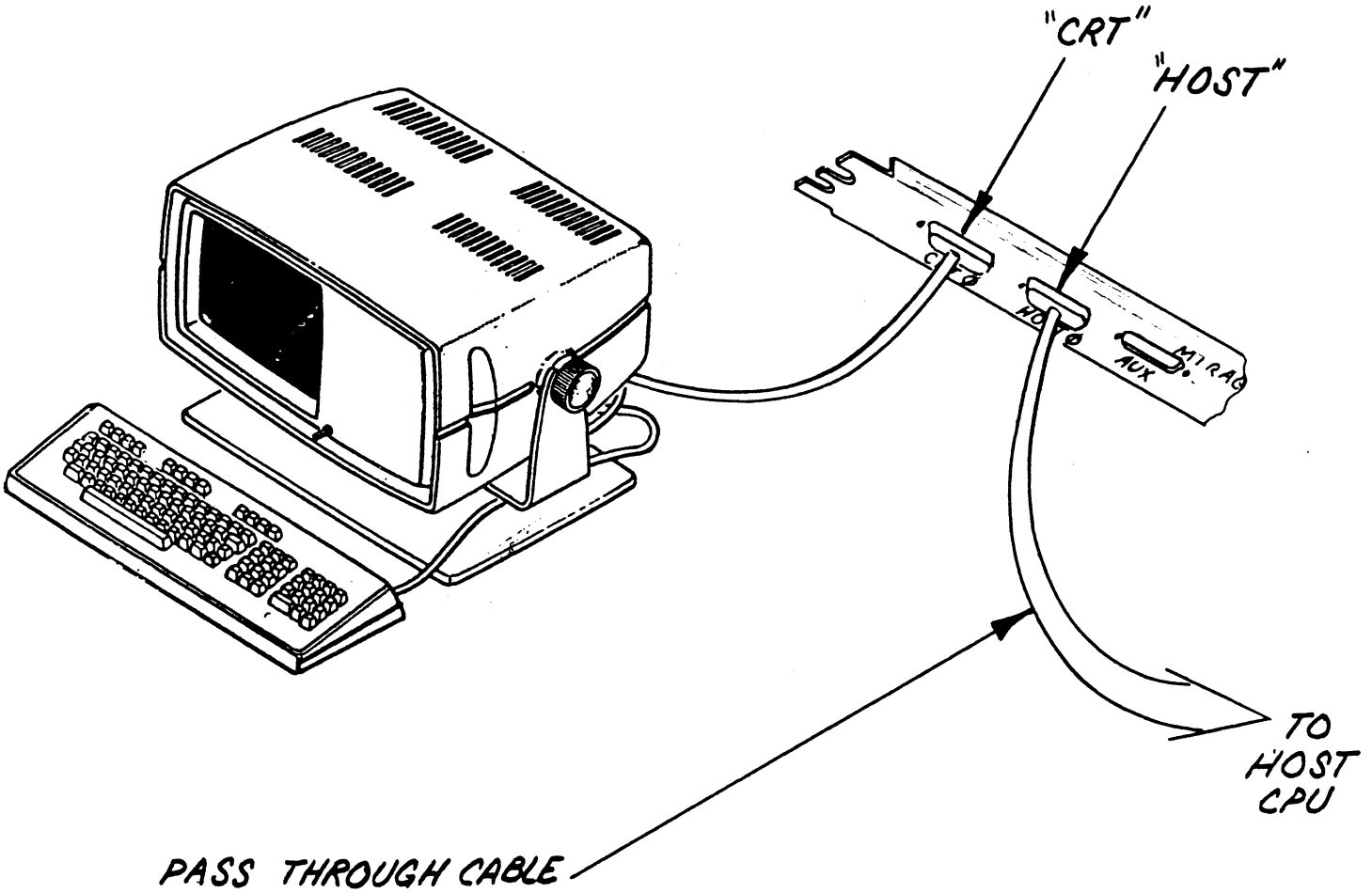
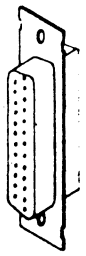


Figure 3.16: Pass-Through Connections at Distribution Panel

e #1

'Ins
ıle



4	4	RTS
6	6	DSR
8	8	CD
2	2	TX DATA
3	3	RX DATA
5	5	CTS
7	7	GND
20	20	DSR
22	22	RI

Recent DG Multiplexors with 25-pin Internal Cables; AMI-8, ATI-16 and IAC's.

---

le #2

Ins
Key

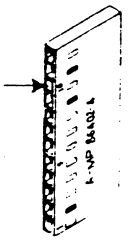
1	2	TX DATA
2	3	RX DATA
4	7	GND
	5	
	20	

Direct Connection to Communications Chassis for 4258 ALM-16.

---

e #3

'Ins
In #10



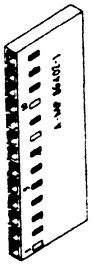
2	2	TX DATA
9	7	GND
11	3	RX DATA
10 — KEY	5	
	20	

Main Console except on S/250, C/350, M/600.
"TTY" Interfaces: 4010, 4023, 4075, 4060.
Also ULM Multiplexors.

---

le #4

Pins
Key



3	22	RI
4	8	CD
12	4	RTS
2	2	TX DATA
5	20	DTR
6	5	CTS
9	7	GND
11	3	RX DATA
7	6	DSR

Direct Connection to Communications Chassis for 4155 & 4256 ALM-8.
Also CS-40's.

---

le #5

Pins
e

6	6	DSR
8	8	CD
22	22	RI
3	2	TX DATA
2	3	RX DATA
20	5	CTS
7	7	GND
5	20	DTR
4	4	RTS

Most Non-DG Multiplexors and Modems.

Note: All cables are for EIA RS-232C interface only.
The Mirage 102 does not support current loop.

Figure 3.17: Pass-Through Cable Wiring Diagrams

Mirage™ Software Trouble Report

Use this form (or a copy) to submit reports of problems with Mirage™ or CP/M® software. Mail completed forms to:

CUSTOM SYSTEMS, INC.
6850 Shady Oak Road
Eden Prairie, MN 55344

Your Name _____

Company Name _____

Address _____

_____

City _____ State _____ Zip _____

Telephone _____ Telex _____

Mirage Serial# (black ink on bottom of board) _____

CP/M Serial# (on tape or diskette) _____

Mirage Server Revision# (on tape or diskette) _____

DG CPU Type and Model _____

DG Operating System _____ Revision _____

Does this problem cause the Mirage server to terminate? _____

If "yes", what are the "Trap" codes and messages?

_____

_____

(Submit the BREAK file for all server terminations.)

Does this problem crash your operating system? _____

If "yes", what are the "Fatal Error" codes and messages?

_____

_____

Is this problem easily reproducible? _____

Please describe the problem in detail. Include:

- a description of system and CP/M activity at the time the error occured,
- a list of the CP/M programs being run at the time of the error, and
- a summary of non-Mirage activity on the host system.

Note

For all serious errors, please submit the following files on floppy disk or magnetic tape:

- The BREAK file, if any
- "MPARAM.DA"
- "MBOOT.BT"
- Other files associate with the problem.
  (Submit CP/M files in virtual floppy format.)

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