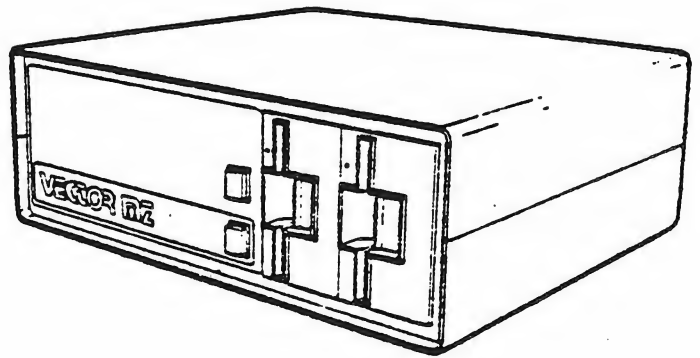
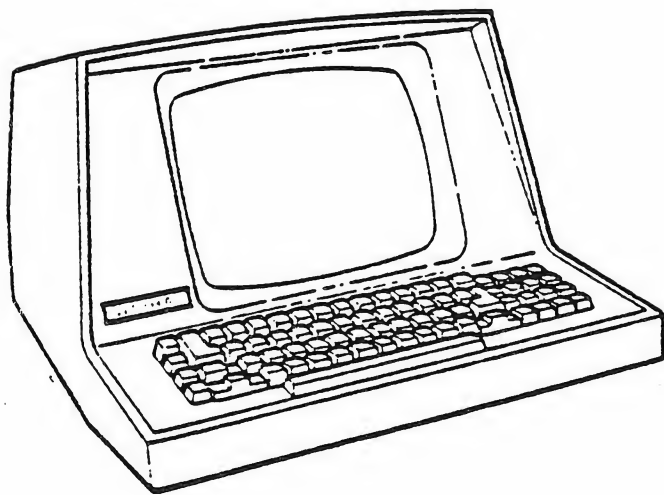
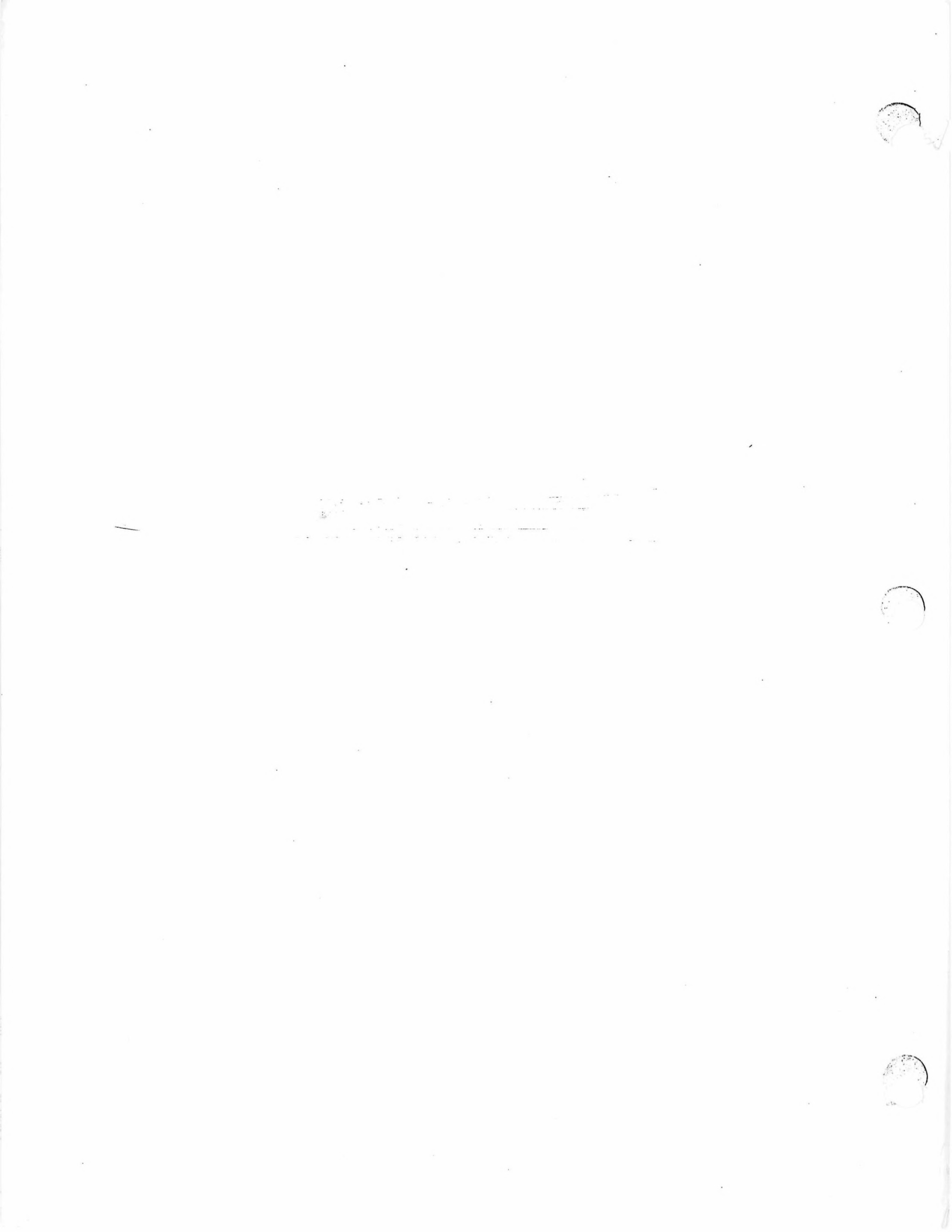


CP/M 2

INTRODUCTORY MANUAL



VECTOR
VECTOR GRAPHIC, INC.



VECTOR GRAPHIC
CP/M 2.2 SYSTEM DISKETTE
Release 5

INTRODUCTORY MANUAL
Revision C
JULY 10, 1980

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FOREWORD

Audience	This manual is intended for computer suppliers, or others with at least a moderate technical knowledge of small computers, and familiarity with the basic operation of the Vector Graphic system. It is NOT a training manual for end users.
Scope	This manual will describe the features unique to the Vector Graphic version of CP/M 2.2. It also tells you how to get this CP/M up and running on the Vector Graphic System B, System 2800 and Vector 3030.
Organization	Except for the above material, you must rely upon the CP/M manuals written by Digital Research to learn CP/M itself. However, this manual can serve as a useful introduction to CP/M on Vector Graphic systems.

A:

Control C - Charge Disks

Config

ZCB

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TABLE OF CONTENTS

<u>Section</u>	<u>Page</u>
Table of Contents	
I. Perspective	
1.1 Compatibility.....	1-1
1.2 How to use this manual and other CP/M manuals.....	1-1
1.3 Relationship of CP/M to MDOS and other operating systems.....	1-2
II. Diskettes and Disk Drives Used with CP/M	
2.1 Drive types.....	2-1
2.2 Kinds of diskettes.....	2-1
2.3 If you have problems with "bad sector" disk errors.....	2-2
2.4 Handling diskettes.....	2-2
2.5 Loading and unloading diskettes.....	2-3
2.6 Setting up new diskettes for use with CP/M.....	2-4
2.7 Hardware write-protecting diskettes.....	2-4
2.8 Replacement and backup of diskettes.....	2-4
2.9 Recovery techniques after disk errors.....	2-5
2.10 Floppy disk drive names.....	2-5
2.11 Winchester technology 8" hard disk.....	2-6
III. Getting CP/M Started (5-1/4" and 8" Floppy Diskettes)	
3.1 Cold boot.....	3-1
3.2 Warm boot.....	3-1
3.3 Return to Extended Systems Monitor executive.....	3-2
3.4 Warm start.....	3-2
3.5 Backing up the system diskette.....	3-2
3.6 If you have a 56K system.....	3-4
3.7 Configuring the Personalized System Diskette.....	3-5
3.8 Custom printer drivers.....	3-9
3.9 Interrupts.....	3-10
3.10 Formatting a diskette.....	3-10
3.11 CP/M 2.2 memory map.....	3-12
IV. Getting CP/M Started (Hard Disks)	
4.1 Cold Boot.....	4-1
4.2 Warm Boot.....	4-1
4.3 Return to Extended Systems Monitor executive.....	4-2
4.4 Warm start.....	4-2
4.5 Formatting the hard disk surfaces.....	4-2
4.6 System generation on the hard disk surfaces.....	4-4
4.7 Hard disk error messages.....	4-7

Vector Graphic CP/M 2.2 Introductory Manual

I PERSPECTIVE

1.1 Compatibility

Vector Graphic CP/M 2.2 is an industry standard operating system adapted for use on Vector Graphic computer systems. It represents a considerable advancement over the earlier CP/M 1.4. Further, because Vector Graphic adapted and owns Vector Graphic CP/M 2.2, you benefit from complete manufacturer support.

Vector Graphic CP/M 2.2 can be used in any Vector Graphic System B, Vector 3, 3030, 2800, MZ, Memorite 2, or equivalent system, so long as the system has at least 48K of contiguous RAM memory. The CP/M which you will use is specially configured for the disk drives you will be using. However, all software written on any of the three drive types supported by Vector Graphic is fully compatible with the other. This includes systems shipped with either 48K or 56K of memory. This multiple compatibility is possible because Vector Graphic CP/M 2.2 contains procedures for fitting the CP/M to the amount of memory in the system, and it is able to detect what kind of console and what kind of Extended Systems Monitor is used.

CP/M 2.2 is designed for use in a system having multi-megabyte hard disk storage, as well as floppy diskette storage. Hence, users can be confident that software written under CP/M 2.2 is fully compatible between hard disk and floppy diskettes.

The precise CP/M 2.2 version that this manual refers to is given on the title page.

1.2 How to use this manual and other CP/M manuals

This manual deals mainly with those features added to CP/M 2.2 by Vector Graphic. As part of this, it will give you the information necessary to set up CP/M on your particular system, with its particular printer. It also explains how to boot up CP/M and proper use of the hard disk and floppy diskette drives. Some industry standard CP/M features are also covered, but generally you will have to refer to the accompanying manuals originally written by Digital Research (edited slightly by Vector Graphic) for full information on CP/M at this time.

This and the other CP/M manuals are NOT intended for those NON-programmer end-users who are only interested in operating a turn-key applications program. These manuals ARE intended for suppliers, and for end-users who plan to program the system themselves. The supplier of the system to a non-programmer end-user is expected to provide the user with special instruction, either verbal or written, in how to use the ENTIRE computer system for the end-user's SPECIFIC application. This would include only those aspects of CP/M which the end-user comes into contact with.

Nevertheless, the supplier can use certain parts of this manual when

writing the end-user instruction material, particularly the sections on booting up CP/M and on proper maintenance of the disk drives.

If you are already familiar with CP/M 1.4, read the rest of this manual, and try out the procedures. Then read the "CP/M 2 User's Guide for CP/M 1.4 Owners," which assumes you are familiar with "An Introduction to CP/M Features and Facilities" and with the main CP/M utilities themselves - Editor, Dynamic Debugging Tool (DDT), and Assembler - whose manuals are also included for your reference. You may also want to reference the "CP/M 2 Interface Guide" and the "CP/M 2 Alteration Guide" for more advanced applications.

If you have little or no background in CP/M, you have a larger task. We suggest that if possible you arrange for an individual already familiar with CP/M 1.4 or 2.0 to introduce CP/M and its utilities to you. Then read the rest of this manual, and read the first CP/M 1.4 manual, entitled "An Introduction to CP/M Features and Facilities." Follow this by reading the "CP/M User's Guide for CP/M 1.4 Owners." Next, you should reread the rest of the present manual. After this, you can make use of the other CP/M manuals mentioned in the preceding paragraph.

The following typographical conventions are used in this manual. When explaining what the operator must do, underlined material is material that the operator is supposed to type on the keyboard. For example, CONFIG (return) means type "CONFIG" and then press the (return) key, after seeing A> on the screen. Any underlined spaces must also be typed. Operator entries in CP/M or its utilities can be typed in either upper or lower case. (return) means press the (return) key. Control-C means press the C key while holding down the CTRL key. Any key can appear in the place of the C. The letter does not have to be shifted (i.e. upper case.)

1.3 Relationship of CP/M to MDOS and other operating systems

Your Vector Graphic system may have come with the MDOS operating system and possibly other large systems such as Vector Graphic's word processing software. CP/M is completely INDEPENDENT of any other such "systems" software, so that it is not necessary to learn anything about them in order to operate any of CP/M.

Even if you are not using MDOS for any purpose, PLEASE RETAIN YOUR MDOS SYSTEM DISKETTES. They contain certain diagnostic programs which may be useful if the system should malfunction.

Further, the MDOS manual, most recently entitled "User's Guide to Vector Graphic Systems Using MDOS," contains in the first two chapters technical information about the computer generally and about attaching certain peripheral devices. At the time of this writing, most of this information is not published anywhere else. THEREFORE, PLEASE RETAIN THE MDOS MANUAL. Review these chapters if you are interested in adding new peripherals or modifying the system hardware. Note that in chapter 2, certain software procedure are given for interfacing printers to the system. These procedures

are relevant to MDOS, not CP/M. To make CP/M interface to these printers, you will find instructions in Part 3 of the manual you are reading now.

If you have a Memorex 2 system, your Memorex 2 manual has a chapter that describes the correct use of the Qume letter-quality printer that came with your system.

You may have a manual and disk for the MZOS operating system. You should retain these, but UNLESS YOU ARE DOING WORD PROCESSING, you will probably never have use for them if you did not intend to use them originally. Word processing software from Vector Graphic does tie into them, as explained in the word processing manual. However, this has NOTHING at all to do with CP/M.

The computer also comes with a number of technical manuals. One, describing the Systems Monitor is useful to advanced programmer only. The others discuss the computer hardware, and are only used by some advanced programmers or those interested in modifying the system or studying it at the deepest levels.

Naturally, you may also have manuals for optional software packages running on the system. These would relate to CP/M if the software runs in conjunction with CP/M.

Vector Graphic CP/M 2.2 Introductory Manual

II DISKETTES AND DISK DRIVES USED WITH CP/M 2.2

2.1 Drive Types

There are three kinds of disk drives that are supported by Vector Graphic CP/M 2.2: 5-1/4" floppy, 8" floppy and 8" Winchester (hard disk).

The 5-1/4" quad density floppy is found in the Vector MZ, the System B and the Vector 3. It is also found as part of the System 3030.

The 8" dual density, double sided floppy is found in the System 2800. A single sided, single density version is also available.

The 8" Winchester hard disk is found in the Vector 3030.

2.2 Kinds of diskettes

There are two different sizes of floppy diskettes used in Vector Graphic Systems. The diskettes you will have to buy depend upon the type of disk drive you have.

The System 3030 with 5 hard disk surfaces and approximately 30 million bytes of storage is factory sealed, the disks are not removable. However, two 5-1/4" floppy diskette drives allow portability of both programs and data.

Note that the main CP/M manuals state that CP/M uses 8-inch diskettes using the "IBM" format. This statement is only true for the Vector 2800. Vector has modified CP/M to run under any of the disk drive systems sold by Vector.

5-1/4" Floppy Disk Drives: Use an industry standard 5 1/4-inch diskette with 16 "hard" sectors. There will be 16 sector holes and 1 additional index hole around the edge of the center hole. They are usually marked with the number 16 on the label. Get them from computer stores or from other computer supply sources. **DO NOT USE 5-1/4" DISKETTES WITH OTHER THAN 16 HARD SECTORS, OR THOSE WHICH ARE SOFT-SECTORED (NO SECTOR HOLES). THEY WILL NOT WORK.**

Without relation to price, some brands of diskettes do not work well in the Micropolis high-density drives. We have generally found the following brands work reliably: Scotch, Dysan, or Maxell. Other brands may not be as reliable.

Individual diskettes may sometimes not work. Besides manufacturing defects, we have occasionally found batches of diskettes with the wrong number or sectors, and sometimes diskettes are manufactured with 2 diskettes inside the jacket. Diskettes which do not work or do not work reliably should be replaced immediately.

8" Floppy Disk Drives: You have a choice of using industry standard 8" double sided, double density or single sided, single density soft sectored (IBM format) disks. There will be no sector holes in the disk and 1 index hole around the edge of the center hole. Record length should be 256 bytes for the double density versions and 128 bytes for the single density version. Get them from computer stores or from other computer supply sources. DO NOT USE 8" DISKS THAT HAVE BEEN HARD SECTORED. THEY WILL NOT WORK. The same cautions that apply to 5-1/4" drives apply equally to the 8" drives.

2.3 If you have problems with "bad sector" disk errors

By a bad sector disk error, we are referring to errors reported on the screen (when CP/M is running) as "BDOS ERROR ON x: BAD SECTOR" indicating something wrong with the diskette, or the drive or disk controller board.

If you get such an error, first make sure the cover to the mainframe is on. It is a shield. Repeat the procedure that resulted in the error. If the error occurs again, refer to the section below on recovery techniques. If you consistently get such disk errors, switch to another of the suggested brands of diskettes. Try this before obtaining hardware service. If the errors persist, contact your service representative.

2.4 Handling diskettes

Diskettes are easily damaged and contaminated. Please obey the following rules without exception:

- a) Do not touch or attempt to clean the inner surface.
- b) Do not smoke, eat, or drink while handling the diskette.
- c) Do not place heavy objects on the diskette.
- d) Do not expose the diskette to excessive heat or sunlight.
- e) Do not use rubber bands or paper clips on the diskette.
- f) Do not bend or fold the diskette.
- g) Do not write on a diskette with a pencil or ball-point pen. A fiber-tipped pen is recommended. Return the diskette to its envelope before writing on it.
- h) Do not expose the diskette to magnetic fields.
- i) After use, always return a diskette to its protective envelope or other protective system such as plastic notebook pages designed for diskettes.
- j) Store diskettes in a vertical position, thus reducing rubbing.

- k) If a diskette is damaged or contaminated, replace it. If a contaminated diskette is placed in the drive, the receiver and read/write head may become contaminated and ruin other diskettes.
- l) Unmount the diskette if it will not be accessed for a half hour or more. If the interval is very long, remove it from the drive and return it to its storage envelope.

2.5 Loading and unloading diskettes

There are two stages of loading a diskette. First, insert the diskette with label side leftward for 5-1/4" drives and label side upward for 8" drives with the edge nearest the exposed area pointing inward. Insert the diskette until it clicks into place. You should not have to push so hard that the diskette bends. The diskette is now "inserted" but not yet "mounted". Although not good practice for long periods, you may leave the diskette like this any length of time, and even turn power on or off.

Second, to "mount" the diskette, push the door of the drive until you feel increased resistance about half-way closed, then STOP. Then, push SLOWLY but surely until it stays in the mounted position. The drive will begin to turn and rotate the diskette inside its jacket. If you cannot fully close the door, the diskette is not inserted properly. The above method of mounting has been found to reduce the chances of damage to the center hole of the diskette caused by poor mounting.

Do NOT turn power on or off while a diskette is in the mounted position. This will sometimes damage the diskette. However, if you accidentally do this, go ahead and use the diskette because it is probably undamaged.

Once the diskette is mounted, it is accessible by software for writing or reading. When the computer accesses the diskette, you will hear a click from the drive and its red light will glow. After the operation is complete, the drive will remain on for 5 seconds. You can be entering new material at the keyboard during this time. At the end of 5 seconds, the red light will go out, and there will be another click as the head load pad is raised off the surface of the diskette. This automatic deselect feature is important in lengthening the life-span of diskettes.

To unmount a 5-1/4" diskette, press the door further closed as far as it will go, then let it open. To unmount an 8" disk, press the button below the disk door. It will then release to the unmounted position. This stops the rotation of the diskette. UNMOUNT THE DISKETTE DURING PERIODS IN WHICH IT IS NOT IN USE. This reduces wear of the diskette against its jacket. You may leave it inserted without shortening lifespan.

To remove a 5-1/4" diskette, press the door leftward. The diskette will pop out.

2.6 Setting up new diskettes for use with CP/M

If you want a diskette to have CP/M on it, enabling you to boot the system from that diskette, then simply copy the Personalized CP/M 2.2 System Diskette, as explained in Section 3.5 of this manual. You can then selectively erase or add files as desired; see "An Introduction to CP/M Features and Facilities."

Normally, when using CP/M, the diskette in drive A is a Personalized System Diskette or a copy, because normally you will want the diskette in drive A to have CP/M on it so that you can reboot the system when desired. However, in the other drive(s) you can have diskettes which only contain certain programs or data files as needed, but not CP/M itself. You would get the desired files onto such a diskette by using the SAVE command, the PIP utility, or a higher level language, for example. But since you are not copying an entire diskette to this new diskette, you must "initialize" the new diskette before saving any files on it. This operation is called "formatting" the diskette. It is described in Section 3.10.

DO NOT FORMAT THE CP/M SYSTEM DISKETTES OR ANY OTHER DISKETTE CONTAINING DESIRED INFORMATION. FORMATTING COMPLETELY ERASES A DISKETTE.

2.7 Hardware write-protecting diskettes

Write protect tabs come in boxes of new diskettes. They work differently on 5-1/4" diskettes and 8" disks. If you attach a tab over the write protect cutout on a 5-1/4" diskette, the disk drive will not allow you to erase or change any information on the diskette. But if you place a tab over the write enable cutout on an 8" diskette, the drive will allow you to erase or change any information on the diskette. The tab may be removed later.

2.8 ~~Replacement and Backup of Diskettes~~

As with any magnetic storage medium, the recording gradually deteriorates over time. Even if a diskette is not damaged, it will begin producing errors after a very long period of use.

Backup

The BEST defense against loss of diskette-based data is maintaining a backup diskette for each diskette you use. In the business world, this is considered dogma. Copy a diskette on to its backup whenever you cannot afford to lose the information stored since you last backed it up. This goes for programs as well as data. If you are operating business programs such as inventory or accounts receivable, maintain a regular backup schedule, once a week or once bi-weekly. In addition, a transaction journal - that is a ~~copy~~ copy of entries made each day into the system - is an excellent idea to build into business software as a last resort backup.

Replacement

~~In addition to being backed up, replace frequently used diskettes by copying to a fresh diskette every 6 months. A good suggestion is to use the backup diskette, which is fairly fresh, as the new front-line diskette, and to create a fresh backup.~~ Do not wait until a frequently used diskette fails, before you replace it with the backup.

To create backup diskettes (i.e. to copy diskettes) use the BACKUP utility explained in ~~Section 2.5 of this manual~~.

2.9 Recovery techniques after disk errors

If you repeatedly get bad sector disk errors using one particular diskette, then it is probably defective. This will sometimes happen with a new diskette when you are formatting it or using it to back up another diskette. After several attempts, discard it or return it if possible. Whenever you repeat a disk operation after an error, always unload and reload the diskette, because it may be seated incorrectly.

If an old diskette repeatedly gives bad sector errors, first repeat the operation several times, unloading and reloading the diskette each time. If there is still a problem, check the center hole. If it is wrinkled, straighten it out with your fingers and then try again. If you still get bad sector errors, try copying the diskette to another diskette using the BACKUP utility in CP/M (described later in this manual.) If the error still occurs, try switching source and destination drives. Some combination of drives and repositioning of diskettes within drives will often result in a successful copy. If you cannot copy a diskette at all, then copy it file by file to another initialized diskette using the PIP utility. There will probably be one file which does not copy, but if you are lucky, they will all be good.

When you get a bad sector error message, CP/M allows you to skip over the bad sector and continue the operation. This is not usually desirable because the bad data will cause other problems. However, if there is no other way to get the file off the diskette intact, then to bypass the error message simply depress the (return) key immediately after the bad sector error message occurs. The disk operation will continue, ignoring the fact that a bad sector was transferred.

2.10 Floppy disk drive names

With the Vector Graphic System B, MZ or Vector 3 floppy disk drives are named A, B, C, and D when the CP/M operating system is used. A is the right hand drive. B is the left hand drive. If there are two additional drives (the Microstor add-on module) then C is its right hand drive and D is its left hand drive. The Vector Graphic System 2800 may have drives named A through L. The Vector 3030 may have drives names A through I.

2.11 Winchester technology 8" hard disk

The Vector 3030 system is based around a 5 surface 8" hard disk using Winchester technology. It gives the user up to 30 million bytes of on-line storage. The disks are permanently sealed at the factory.

III GETTING CP/M STARTED (FLOPPY DISK)

The following section deals with running CP/M on systems whose off line memory storage is based on floppy disk drives. For hard disk based systems see Section IV.

3.1 Cold boot

Use the following procedure every time you want to begin using CP/M. It is called the "cold" boot procedure.

1. Connect all hardware.
2. Make sure no disks are mounted.
3. On the computer chassis, turn the power key or depress the power button, whichever applies. The button(s) on the front of the chassis will light up. If using the 8" floppy disk based 2800 system, also turn on the AC power on the drive chassis.

In 56K systems, a banner will appear on the operator's console saying "Vector Graphic Monitor, Version 4.X", and "MON>" will appear on the left edge of the screen. In 48K systems, only a "*" will appear on the left edge of the screen, with no banner at all. The "MON>" or "*" is the "prompt" telling you the computer's Monitor's executive is waiting for a command.

If the Monitor executive prompt does not appear (as in some Memorete 2 systems) depress the RESET button on the computer chassis.

4. Insert and mount a Vector Graphic CP/M 2.2 System Diskette in drive A.
5. If you are using the 5-1/4" drives, depress B on the keyboard. If you are using 8" drives with the Vector 4.1 Monitor depress V on the keyboard. Drive A should activate as indicated by its small red lamp. In a moment, you will see a banner reading "Vector Graphic xxK CP/M - VERSION 2.2x." Then a "A>" will appear on the left edge of the screen. This prompt indicates that the CP/M executive is waiting for a command. The CP/M executive is normally called CCP, which stands for Console Command Processor.

3.2 Warm boot

If you have CCP running, and then remove the system diskette from drive A and replace it with a different Vector Graphic CP/M 2.2 System Diskette, you MUST perform a "warm boot" operation. This tells CP/M that a different system diskette is in the drive. If you do not do the warm boot, CCP will work, but CP/M will not allow you to do anything that will alter the system diskette now in the drive.

To do a warm boot, depress control-C after the A> prompt.

A Note on the System Error Message:

A SYSTEM ERROR message will appear under certain conditions. They generally fall under the category of attempting a warm boot of a system that is of a different size than the original system. This is particularly apparent during SYSGEN or MOVCPM procedures. When this condition occurs, the phrase "SYSTEM ERROR" will appear and any subsequent depressions of any key will cause the phrase to be repeated. To clear this condition, depress the reset key on the mainframe and reboot the disk.

Previous versions of CP/M would either return you to the Monitor program without explanation or freeze the keyboard thereby forcing you to hit the Reset button.

3.3 Return to Extended Systems Monitor executive

If you want to boot up from a different disk, or make use of any other Extended Systems Monitor command (see Extended Systems Monitor manual), you have to get back to the Monitor's executive. The RESET button on the computer chassis will accomplish this in single user systems, but in a Time-share Multi-user system from Vector Graphic, it will return ALL users to the Monitor executive, which is generally not desired. Further, the RESET button is not always convenient. Therefore, Vector Graphic CP/M 2.2 contains a special command which returns control to the Extended Systems Monitor executive.

The procedure is: after the CCP A> prompt, type MONITOR (return). You will immediately see the Monitor prompt appropriate to the type of system you have.

3.4 Warm start

If you were using CP/M and you returned to the Extended Systems Monitor executive, you can generally return to the CCP without rebooting your system diskette. This is assuming you did nothing to destroy CP/M in memory. Following any Monitor prompt, simply type G 0000. In some Monitor executives, there are also single letter commands that accomplish this. In the 4.x Monitor, depress L after the MON> prompt. In the 3.1 Monitor (except in Memortite 2 systems) depress K after the * prompt. If such a command does not work, then try the G 0000 command.

3.5 Backing up the system diskette

The serialized Vector Graphic CP/M 2.2 5-1/4" System Diskette is shipped with a write-protect tab. Do not remove this tab. The 8" disk is shipped without a write enable tab. Do not place a tab over the write enable cutout. Do not ever modify or configure this disk. You are allowed, within the CP/M licensing agreement, to copy this diskette as many times as needed

MAKING COPY OF
CP/M DISK
OF 193-4

for your own system, so long as the copies are not sold. Thus, any procedures which you do to personalize CP/M for your particular system, as described later in this part, can be done to a COPY of the master. Such a copy is called "Personalized" Vector Graphic CP/M 2.2 System Diskette.

Immediately after cold booting your serialized Vector Graphic CP/M 2.2 System Diskette the first time, create a Personalized Vector Graphic CP/M 2.2 System Diskette. Use it from then on.

The following is the procedure for copying a Vector Graphic CP/M 2.2 System Diskette or any CP/M 2.2 data diskette. Use it to create your first Personalized diskette from the original. Then, use it later to create subsequent copies of the Personalized diskette, after it has been modified as explained later in this manual.

1. Make sure you have nothing you want to save in memory, because it will be erased.
2. Mount the CP/M system diskette you want to backup in drive A. Mount a fresh unused diskette in drive B. The unused diskette does NOT have to be formatted before hand.
3. If necessary, either warm boot or cold boot the CP/M on the diskette in drive A (unless already running and its CCP is in control). [See next page]
4. When the A> appears, type BACKUP (return) if using 5-1/4" drives, BACKUP/8 if using 8" drives.
5. In response to the question "Source drive", type A. In response to the question "Destination drive", type B. In response to the command "Press RETURN to begin", press the (return) key. The backup process will take from 3 to 9 minutes at this point.
6. At the end of the process, or earlier if an error occurs, you will see a message on the screen following the last line. This message tells you whether or not the copying process succeeded. Always look for it. If successful, you will see "Copy complete" or "Function completed correctly". If unsuccessful, you will see either "Bad source diskette" or "Bad destination diskette". If unsuccessful, you should usually remount the diskettes, then go to step 7 and try the process at least one more time.
7. In response to the statement "(R) to return to system (B) execute backup again", type an R to return to the CCP, and type a B if you want to make another copy of the same diskette. If the latter, mount the next fresh diskette in drive B and return to step 5. If you are using a System 2800, you will also have the option (A) Again. This will permit you to repeat the backup process without having to respecify drives, etc.

3.6 If you have a 56K system...

If you have a 56K system, the CP/M that comes into effect following booting up will work, but it only makes use of 48K rather than the full 56K. Therefore, the first action you should take after creating your first Personalized CP/M System Diskette is to alter it so that it is optimal for a 56K system. The procedure involves two steps: relocating CP/M to run higher in memory ("moving" CP/M) and then saving the new CP/M on the diskette. Details are as follows:

1. If not already in place, mount your original serialized Vector Graphic CP/M 2.2 System Diskette in drive A. Mount your first Personalized CP/M System Diskette in drive B.
2. If the CCP is still in control, having just created the first Personalized CP/M System Diskette as described in Section 3.5, go to step 3. If you do not know what is in control, return control to the Extended Systems Monitor executive, and then reboot CP/M from the serialized System Diskette as explained in Section 3.1.
3. Following the CP/M executive prompt A>, type MOVCPM (return) if you are using 5-1/4" drives only. If you are using the System 2800, you have three options at this point. If you have a system which has 5-1/4" drives in addition to the 8" drives, type MOVCPM/M (return). If you have double density 8" drives only, type MOVCPM/D (return). If you have single density 8" drives only, type MOVCPM/S (return). This causes a relocated version of CP/M to be loaded into memory, but it cannot be used yet. MOVCPM always generates a version of CP/M appropriate for the memory available in your system.
4. When A> appears again, type SYSGEN (return). The purpose of this is to save the relocated CP/M on diskette.
5. After the question "Source drive name (or return to skip)", depress the (return) key. If you accidentally depress an A, B, C, or D instead, then you can get back to step 4 by depressing (return) in response to the next two questions that appear on the screen.
6. Assuming you did step 5 correctly, then after the question "Destination drive name (or return to reboot)" type B.
7. After the statement "Destination on B, then type return", press the (return) key. The disk will be activated for a few seconds.
8. When A> appears again, you know that your Personalized CP/M System Diskette (the one in drive B) has a version of CP/M suitable for 56K systems. This version is customarily called "56K CPM".
9. If you want to begin using your new 56K CP/M, type MONITOR (return). Then remove the serialized diskette and mount the 56K Personalized

diskette in drive A. Then type B for 5-1/4" systems and V for 8" systems, following the Monitor executive prompt.

3.7 Configuring the Personalized System Diskette

Perform the procedure in this section sometime after creating your Personalized System Diskette and setting it up for a 56K system (if relevant).

The procedure in this section has four purposes:

1. To set up CP/M for the printer you are using.
2. To enable automatic page feeding of printer output produced by PIP or applications programs.
3. To create an "auto" command and selecting when it is used.
4. To save the above selections on your Personalized CP/M System Diskette.

The following explains each of these issues.

(1) Printers

Printer drivers are present on the system diskette for Qume/Diablo protocol printers, Centronics protocol printers, and standard serial (Teletype or Decwriter) type printers. You can choose any one of these drivers during the configuration procedure.

Alternately, you can set CP/M up to make use of one of Vector Graphics own printers, called "system printers." The software driver for a Vector Graphic system printer is contained on a PROM installed within the computer at the time the printer is attached. If you are using such a printer, you must select the "system printer" option during the configuration procedure. This will make use of whatever Vector Graphic printer happens to be attached.

If you have no printer, then you should select the "no printer" option.

(2) Automatic paging

The CP/M logical lister is the software pathway used by PIP printed output, assembler printed output, and applications program printed output. The logical lister routine does NOT normally insert any page breaks in the output stream, so that IF the software which originated the output ALSO does not insert any page breaks, then the output will print on top of the perforations of continuous form paper. The ZSM assembler does insert page breaks, so that you do not have to worry about it. The same is true for some applications programs. However, if the program generating the printed output does NOT insert page breaks, then there is a way for you to request that the logical lister do this. This is part of the configuration

procedure. Remember, you only want to enable this "auto paging" if the program generating the printed output does NOT in itself take care of page breaks.

This is particularly useful when writing applications programs that have printed output. If you use the automatic paging option in the CP/M configuration procedure, you do not have to build a line-counter and paging capability into your application program.

You must be careful however if you do this. As mentioned above, the ZSM assembler which comes on the Vector Graphic CP/M System Diskette DOES do automatic paging itself. If you choose automatic paging in the configuration procedure, then the printer will skip an EXTRA page each time it goes to a new page when printing ZSM assembler output. Therefore, before printing assembler output, you must rerun the configuration procedure and disable the automatic paging option.

(3) Form length commands

Some printers can recognize form length commands such as the Sprint 3 and the Vector MP. If your printer is able to do this and you want to use this feature, you can respond by typing Y to this question. The program will then ask you to input the form length in inches (usually 11", the default value.) Maximum permissible length is 21-1/2", program will ignore any input longer than this.

(4) Auto commands

An auto command is a CCP command that is executed automatically when CP/M is booted up. You have the choice of making the command take place either upon a cold boot, a warm boot, or both. As an example of an auto command, normally you have to type MBASIC (return) after the CCP prompt A> in order to get Microsoft BASIC running (assuming there is an MBASIC on the system diskette.) With the auto command "MBASIC (return)" you can cause the system to boot directly into Microsoft BASIC, bypassing the CP/M executive. Further, Microsoft BASIC will automatically load and execute an application program if the name of the program appears after the "MBASIC." Thus, you can create a very impressive turn-key applications system, which goes directly to a user menu, by creating the auto command "MBASIC XXXXX (return)", where XXXXX is the name of the applications program. In this way, the user never interacts with either the CP/M or the BASIC executives.

The auto command is stored on a Vector Graphic CP/M 2.2 System Diskette. You can only have one auto command per diskette. This one auto command is the auto command which is executed automatically when you boot up CP/M 2.2 from THAT diskette. Of course, a system diskette does not have to have any auto command. It is optional. The Vector Graphic CP/M 2.2 System Diskette has none when it is shipped.

(5) Save configuration selections

You have the choice of making your configuration selections temporary -

resident only in memory but not on diskette - or saving them permanently on a Personalized CP/M System Diskette. Clearly, in order to have an auto command which takes effect in response to a COLD boot, the auto command must be stored on a diskette. Thus, if you are creating a cold boot auto command in the configuration procedure, you MUST take the option of saving the configuration selections on disk.

The following is the configuration procedure:

1. Mount the Personalized Vector Graphic CP/M 2.2 System Diskette, the one you want to configure, in drive A, if not already there.
2. Make sure CCP is in control. If not, return control to the Extended Systems Monitor executive and cold boot from the diskette in drive A. If CCP is in control, then do a warm boot by depressing control-C.
3. Following the CP/M executive prompt A>, type CONFIG (return).
4. You will then see the following on the screen:

USER CONFIGURATION - VERSION X.X

Printers - (A) Qume/Diablo (B) Standard serial
(C) Centronics (D) System printer
(E) No printer

Select one of the above :

Depress one of the 5 letter keys according to the type of printer, or no printer. Remember that D, the system printer option, is used only if one of Vector Graphic's system printer PROM's is installed in the computer. Depress the (return) key if you want to leave the printer selection unchanged from its current state.

5. Unless you selected no printer (E), (or depressed (return) and there had been no printer selected), you will then see the following on the screen:

Enable auto-page on non-console list output ? (Y/N)

Depress Y if you want automatic paging when the logical lister is printing, as explained earlier. Depress N if you want to disable this function. Depress the (return) key if you want to leave the automatic paging specification in its current state (either on or off).

6. The CONFIG program will then ask:

Does printer recognize form length commands ? (Y/N)

If your printer is capable of recognizing form length commands and you wish to exercise this option, depress the Y key. The Sprint 3 and the Vector MP are two printers that do recognize form length commands. If

you have another type of printer (a Sprint 5, for instance) type N to this question. If you do not wish to change your previous response, depress the (return) key.

If you depressed Y, the program will then ask:

Enter physical form length in inches:

Type in the length of the form you are using, generally 11.

7. You will then see the following on the screen:

Auto command specification - (A) Execute on cold boot
(B) Execute on warm boot
 (C) Execute on both
(D) Clear auto command

Select one of the above :

Depress one of the four letter keys. Make sure you do NOT press (return) after pressing the letter key. If you choose A, this means that the auto command will be executed only when you do a cold boot, as described earlier. B means that the auto command will be executed only when you do a warm boot, as described earlier. C means that the auto command will be executed when you do either a warm or cold boot. D clears any auto command that was previously created. Depress the (return) key if you want to leave the auto command, or lack thereof, as it is.

If you selected A, B, or C then you will see the following on the screen:

Enter auto command:

Type the exact text of the auto command. Use the same text you would use following the CCP prompt when entering the command normally. For example, type BASIC (return). Before hitting the (return) key, you can edit the command with BACK SPACE.

If you want to experiment with the auto command feature, use the B option that specifies execution of the auto command on warm boot only, then enter the auto command CONFIG (return). Then complete the configuration procedure. When the CCP prompt A> comes up, do a warm boot by depressing control-C. You will see that the system boots directly back into the CONFIG program. You can then experiment some more.

8. Finally, you will see on the screen:

Do you want selections made permanent ? (Y/N)

(Note: depressing the (return) key is the same as depressing N in this case.)

Depress Y to store your configuration selections on disk. You must depress Y if you want to use or cancel the auto command FROM A COLD BOOT, accomplished in step 5. If you did not specify an auto command from a cold boot, then you may answer either Y or N. N leaves your configuration choices in memory, but does not put them on disk. Such temporary selections will remain in effect until the next time you do a warm or cold boot.

Y puts your selections on disk. Y is the usual choice, because if you have to change selections, you can always change them by re-executing the CONFIG program (i.e. carrying out the configuration procedure in this section).

After depressing Y, the disk will access, and then return control to the CCP. If you get an error message "Error in disk access - abnormal exit," this means that either there is problem with the diskette (mounted improperly, damaged, etc.) or the diskette has a write protect tab on it. Check for the write protect tab before assuming the former.

9. After you have created your Personalized Vector Graphic CP/M 2.2 System Diskette, set it up for 56K (if necessary), and run the CONFIG program at least once, you have a fully personalized system diskette. You may at this time back it up using the BACKUP utility explained earlier.

3.8 Custom printer drivers

The "user area" is the part of CP/M which contains the printer drivers. The CONFIG program described above makes changes to the "user area" by activating and deactivating printer drivers as you request. If you type DIR (return) after the A> prompt, you will get a list of the files on the CP/M diskette in drive A. If you do this with your Vector Graphic CP/M 2.2 System Diskette, you will see a file called USERAREA.ASM. The former is an assembly language text file which when you assemble it and load it, replaces the code in the "user area" part of CP/M. The latter is a copy of the printed output produced when you assemble USERAREA.ASM. You can print the latter using the PIP utility. (Type PIP LST:=USERAREA.PRN (return) following the A> prompt.)

You will also see a file called USERCUST.ASM. This is a copy of the "framework" of USERAREA.ASM. It contains the labels of the various routines, the EQU statements, and explanations of what each routine should have in it, but does not contain the actual printer driver routines present in USERAREA.ASM. If you want to create your own printer driver, you do it by writing it within the USERCUST.ASM assembly language text, using the CP/M editor on your system diskette. Do not neglect to include in the COLDBOOT routine instructions to initialize the serial ports used by your serial printer and other serial peripherals, if any.

Use ZSM to assemble your modified USERCUST.ASM (i.e. with the Personalized CP/M System Diskette in drive A and with CCP in control, type

ZSM USERCUST (return).) During the assembly, you will be asked what size the system is. Enter 48 (return) for a 48K computer and enter 56 (return) for a 56K computer. ZSM will put the assembled code on the disk in drive A, calling the file USERCUST.HEX. Then load USERCUST.HEX into memory using the DDT (Dynamic Debugger) (type DDT USERCUST.HEX (return).) This causes USERCUST.HEX to overlay the user area, as desired. DDT is finished when a "-" appears. Depress control-C to return to CCP.

With a serial printer, the computer's serial ports must be reset before printing. A cold boot always does this, but the CONFIG program also does it by calling the COLDBOOT routine in the user area if a printer is selected. Hence, before testing a new serial printer driver, run the CONFIG utility and select ANY of the three standard printers (this will not damage your custom driver.) Just press (return) in response to the other questions. You can now test your printer.

When you are satisfied with it, to save this new user area onto your Personalized CP/M 2.2 System Diskette, execute the CONFIG program (again). When it asks you which printer you are using, and whether you want auto paging, just press the (return) key. If you do not want to change the auto command, also depress the (return) key in response to that request. Finish by responding Y to the question "Do you want your selections made permanent". (Note to programmers: when CONFIG saves the user area, it resets to zero the page position of the logical lister.)

3.9 Interrupts

For the benefit of systems programs, we have changed the way that CP/M deals with interrupts. In Vector Graphic CP/M 2.2, if a user program enables interrupts, then CP/M will leave them enabled, except for very short periods during disk access.

3.10 Formatting new diskettes

As explained in Section 2, you may want a diskette that does not have CP/M on it, but only has desired program or data files. Before saving such files on such a diskette, you have to "format" the diskette. Remember, however: you do NOT have to format a diskette before backing up an ENTIRE diskette onto it using the BACKUP utility.

To format a diskette, make sure you have a Vector Graphic CP/M 2.2 System Diskette in the drive that is logged in, usually drive A. Put the disk you want to format in one of the other drives. Then, following the CCP A> prompt, type FORMAT (return) for 5-1/4" systems and FORMAT/8 (return) for 8" systems. You will see on the screen:

FLOPPY FORMAT - VERSION X.X

DRIVE TO FORMAT (A,B,C,D) :

B

F

Enter the letter for the drive containing the disk you want formatted. Make sure you do not enter the letter of the drive containing the CP/M System Diskette. You will see on the screen:

INSERT BLANK DISK AND PRESS RETURN -

Make sure the blank diskette is in the desired drive, then press the (return) key. Several minutes will go by. When completed, the system will either report, "FORMAT COMPLETE" or "PERMANENT DISK ERROR." Then you will see on the screen:

(R) RETURN TO SYSTEM (F) FORMAT ANOTHER DISK

SELECT ONE OF THE ABOVE :

Depress either R or F. The latter gives you the opportunity of quickly formatting additional diskettes, or to try again in case of a disk error. Otherwise depress R. The system will return to CCP, showing the A> prompt.

3.11 CP/M 2.2 memory map

<u>MODULE</u>	<u>SYSGEN IMAGE</u>	<u>48K SYSTEM</u>	<u>56K SYSTEM</u>
5-1/4" Drives			
BOOT	0900H	016BH	016BH
CCP	0A00H	A000H	C000H
BDOS	1200H	A800H	C800H
BIOS	2000H	B600H	D600H
USERAREA	2700H	BD00H	DD00H
TOP USER ADDRESS		A800H	C800H

Mixed 5-1/4" and 8" Drives

BOOT	0900H		0300H
CCP	0100H		B800H
BDOS	1200H		C000H
BIOS	2000H		CE00H
USERAREA	2C00H		DC00H

Double Density 8" Drives

BOOT	0900H		0300H
CCP	0A00H		BD00H
BDOS	1200H		C500H
BIOS	2000H		D300H
USERAREA	2A00H		DD00H

Single Density 8" Drives

BOOT	0900H		0300H
CCP	0A00H		BE00H
BDOS	1200H		C600H
BIOS	2000H		D400H
USERAREA	2A00H		DE00H

IV GETTING CP/M STARTED (HARD DISK)

NOTE: There is no software at all on the hard disk as it is shipped from the factory. To initialize the disk and get it up and running the first time jump to section 4.5 in this chapter.

4.1 Cold boot

Use the following procedure every time you want to begin using CP/M. It is called the "cold" boot procedure.

1. Make sure all hardware is connected.
2. Make sure no disks are mounted in the floppy disk drives.
3. On the computer chassis, turn the power key or depress the power button, whichever applies. Also turn the key on the Microstor module to on.

A banner will appear on the operator's console saying "Vector Graphic Monitor, Version 4.X", and "MON>" will appear on the left edge of the screen. The "MON>" is the "prompt" telling you the computer's Monitor's executive is waiting for a command.

4. If you want to work with one of the Floppy Disks, see the preceding chapter. If you have the Vector 4.0 Monitor and you want to boot up CP/M on one of the hard disk surfaces, type G followed by the appropriate address as expressed in the table below.

Surface	Address
0	EC02H
1	EC04H
2	EC06H
3	EC08H
4	EC0AH

If you have the Vector 4.1 Monitor, depressing the W key will boot you onto Winchester Drive A (surface 0.)

5. In a moment, you will see a banner reading "Vector Graphic xxK CP/M - VERSION 2.2x." Then a "A>" will appear on the left edge of the screen. This prompt indicates that the CP/M executive is waiting for a command. The CP/M executive is normally called CCP, which stands for Console Command Processor.

4.2 Warm boot

If you have CCP running, and then decide that you want to change to a different drive surface simply type the letter of the drive you wish to access after the A: prompt, followed by a colon. For example, to change

from drive B to drive C, you would input C: in response to the B> prompt:

B>C:

Since you cannot change the disks in the Megastor, you do not have to worry about performing a warm boot unless you are using the floppy disks and change them. For more information on that see Section 3.3 of this manual.

4.3 Return to Extended Systems Monitor executive

If you want to boot up from a different disk, or make use of any other Extended Systems Monitor command (see Extended Systems Monitor manual), you have to get back to the Monitor's executive. The RESET button on the computer chassis will accomplish this in single user systems, but in a Time-share Multi-user system from Vector Graphic, it will return ALL users to the Monitor executive, which is generally not desired. Further, the RESET button is not always convenient. Therefore, Vector Graphic CP/M 2.2 contains a special command which returns control to the Extended Systems Monitor executive.

The procedure is: after the CCP A> prompt, type MONITOR (return). You will immediately see the Monitor prompt appropriate to the type of system you have.

4.4 Warm start

If you were using CP/M and you returned to the Extended Systems Monitor executive, you can generally return to the CCP without rebooting your system disk. This is assuming you did nothing to destroy CP/M in memory. Following any Monitor prompt, simply type G 0000. In some Monitor executives, there are also single letter commands that accomplish this. In the 4.0 Monitor, depress L after the MON> prompt. If such a command does not work, then try the G 0000 command.

4.5 Formatting the hard disk surfaces

NOTE:

Since the format procedure destroys all data which may be on a particular hard disk surface, make certain that that is what you want to do before you begin the format procedure. Once you have begun the FORMATHD program and you want to abort the procedure before the actual disk formatting has started, simply type (control) C which will return you to the console command processor (CCP).

We will assume the Megastor unit you received has no software present on the disk surfaces. It is possible that in the process of quality control and product checkout that software was left on one or more of the surfaces

of your Megastore system, you can decide whether to keep it or to reformat the disk(s) from the beginning.

Assuming there is no software on the hard disk, we have to begin with the floppy system disk that was included with your Megastor. Turn on your Vector 3 console by flipping the on/off switch on the rear and also turn on your Megastor unit by turning the key on. Wait for the Winchester drive to get up to speed (when the sound from it stops changing pitch.) You should have the Vector 4.0 Monitor banner on your screen by now. Two diskettes were shipped with your Megastor: one contains the CP/M operating system and other various programs and one contains programs needed for initializing the hard disk. Insert the CP/M system diskette in the right 5-1/4" floppy drive of your Megastor unit with the label side to the left and close the door by moving the tab gently to the right until it will move no more and then release. Depress the B key in response to the Mon> prompt. You will hear a click as the CP/M system boots into the system from off the diskette. On the screen you should now see:

```
Mon> BOOT DISK  
VECTOR GRAPHIC xxK CP/M - VERSION 2.2
```

```
A>
```

Don't let the A> prompt confuse you. After you've configured the hard disks as suggested, the right hand floppy drive will be drive F and not drive A as it is now.

Insert the diskette with the Hard Disk programs in Drive B (the left hand drive.) Close the door by moving the diskette door gently to the right until it will move no more then release. You may view the directory of the second diskette by keying in DIR B: (return). There should be three COM files on this diskette labelled: "FORMATHD", "MOVCPMHD" and "USERAHD". You can turn control over to the B disk by typing B: in response to the A> prompt. The screen should then display:

```
B>
```

Run the hard disk format program by typing FORMATHD (return).

The diskette will be accessed (again the clicking sound will be heard and the red light on the drive door will light.) In a few moments the following banner should appear:

```
WINCHESTER DRIVE FORMATTER - VERSION 1.x
```

```
ENTER SURFACE(S) TO BE FORMATTED (0-4) :
```

You may now format any of the five Winchester drive surfaces. We recommend that you format all five surfaces at this time. To do this, type 01234 in response to this question. If you should enter a number greater than 4 the phrase "ILLEGAL SURFACE" will appear. While the program is

running the following banner should appear:

NOW FORMATTING TRACK

It will be followed by the number of the track being formatted (0-579.)

This procedure may take up to 1-1/2 hours to do all 5 surfaces. Do not interrupt the system in the midst of formatting the surfaces.

What happens during this program is that the disk surface(s) are being initialized and formatted at the same time. The program checks the disk out for bad sectors, if there are any, and maps them into a reallocation table. Each track is formatted to work with CP/M but the system is not placed on the surfaces until the MOVCPMHD program is run.

When the procedure is complete, the NOW FORMATTING TRACK nnn banner will disappear and FORMAT COMPLETE will appear in its place.

Once the disks have been formatted (initialized) they are ready to have a CP/M system placed on them.

There are four numbered error messages which may occur during operation of the FORMATHD program only. (These are not to be confused with the system error messages, some of which are similar, which are listed in Section 4.7.)

FORMATHD ERROR MESSAGES

ERROR: 10 - COMMUNICATIONS
ERROR: 11 - TIMEOUT
ERROR: 12 - BAD MAP SECTOR
ERROR: 13 - ALLOCATION TABLE FULL

4.6 System generation on the hard disks

A system cannot be generated on a hard disk surface that has not first been initialized. So be sure that the surface you wish to generate a system on has been formatted.

Once the particular surface has been formatted, you can use the MOVCPMHD program which is on the hard disk program floppy diskette to generate CP/M on each of the Winchester surfaces.

To generate CP/M on each of the surfaces, type MOVCPMHD in response to the B> prompt. The following banner will appear:

WINCHESTER SYSTEM GENERATOR - VERSION 1.x

Enter system size to be generated (in K bytes) :

The program will accept values from 20 to 56 here. If you simply hit (return) the program will generate the maximum size CP/M possible. Type a 56 in response to this question unless you wish to generate a smaller CP/M.

The next question the program will ask you is:

Enter directory size (256,512,768,1024) :

This requires some explanation. If you simply hit (return) the default value of 256 will be used. The response to this question will determine how much space on the disk will be dedicated to the DIRECTORY file. Since each directory entry takes up 32 bytes of disk memory, you are allocating from 8K to 32K of disk space. This factor is, in and of itself, insignificant when the surface has in excess of 5 megabyte capacity. However, the longer the specified directory, the longer it takes to access and/or display the directory. Now the directory size can be changed after data has been written to the disk provided that the new directory size is smaller than the original. If you wish to make the directory size larger, you must start by reformatting the disk and essentially starting over, thereby destroying any data extant on that disk. So make a good guess as to the directory size you will require. If you do get stuck and have to change directory size on a surface that has a lot of data on it, you might want to PIP or BACKUP the files onto another surface before changing directory size.

The program will then display:

Drive selection - (1) Winchester surfaces (quan 5)
(2) Small floppies (quan 2)
(3) Large floppies - single density (quan 2)
(4) Large floppies - double density (quan 2)

Logical drive "A" assignment :

The user now chooses which of the disk devices on his system will be the logical "A" drive. With the Vector 4.0 Monitor, the user must input G EC02 in order to boot up on Surface 0. In the Vector 4.1 Monitor the user will input a W in order to boot up the "A" drive. We suggest that the user input a 1 to the Logical drive "A" question. The program will then calculate the letter of the next possible assignable drive and prompt the user with:

Logical drive "x" assignment :

where x is the next possible assignable drive. When you have chosen all the logical drive letter assignments for your system hit the (return) key to generate the system.

For example, if you want the Winchester surface 0 to be the logical drive "A" assignment, you would key in 1 to the question:

Logical drive "A" assignment :

The program would next ask:

Logical drive "F" assignment :

The user could then answer 2 to assign the drive letters "F" and "G" to his two 5-1/4" drives. If the user had 8" floppy drives, he could answer 3 if he had the single density version and 4 if he had the double density version.

Let us say, for the sake of further example, that the user wishes to assign drive "A" and "B" to his 5-1/4" floppy drives. In response to the:

Logical drive "A" assignment :

question, the user would have to respond 2. And to:

Logical drive "C" assignment :

the answer 1 would have to be input.

When the user has finally assigned all drives that are going to be used in his system, he responds (return) to the last question in the series which, in the above two examples would be:

Logical drive "F" assignment : (return)

After this happens, the following will appear on the screen:

GENERATED VECTOR GRAPHIC xxK CP/M VERSION 2.20

Enter winchester destination surface (0-4) :

For most applications key in 0 for this question. The default value is 0 which will be processed if you just hit (return) to this question. If you wish to abort the procedure at this point, depress the CTRL and C keys simultaneously to bring you back to the console command processor. If you wish to have an alternate surface on which to backup the system you can repeat this procedure for at least one other surface at this time.

When you see the A> prompt, you will know that the system generation was successful.

If, for some reason, the system generation failed, the following banner will appear:

System generation unsuccessful - abnormal exit

If that should happen, try reformatting the disks and do the system generation procedure again. If this does not work, call your Vector Graphic Service Representative.

Once the system has been placed on Winchester drive 0 (logical drive A), you can boot up the system by depressing a W if the 4.1 Monitor is in use or a G EC02 if the 4.0 Monitor is being used.

The first thing you may wish to do is to transfer all the files from the CP/M system diskette and the hard disk format diskette to the first initialized hard disk surface. You can do that by first booting up the newly generated CP/M on the first surface (logical drive "A") and performing the following:

A>F:

F>PIP A:=F:*.*

The PIP (Peripheral Interchange Program) will then display:

Copying file:

and a list of the files will follow. You may repeat the procedure for the programs on the logical "G" drive by substituting G for F in the above example. See the manual on CP/M Utility programs for further information on this.

You may wish to assemble a custom printer driver using the program USERAHD. The only difference between this program and USERAREA described in Section 3.8 of this manual is that the User Area is located at a different location in memory than the floppy version. Functionally, they are identical. Use the instructions found in Section 3.8 for running this program using the program name USERAHD rather than USERAREA.

All other programs explained in the Chapter III of this manual may be run on the hard disk system with no additional modifications.

4.7 Hard Disk System Error Messages

Should you experience a hardware or software fault that is detectable by the hard disk system, it will display a numbered error message. The following system error messages are found in the CP/M 2.2 version for the hard disk. Not all possible message numbers have been assigned.

40-49 - REALLOCATION ERRORS

41 - NO SPACE LEFT FOR REALLOCATION

This is the message which is presented when all possible sectors in the reallocation map have been assigned. To continue using the disk after this point will mean the risk of permanently losing some data. This message will follow the countdown message 51 when all reallocatable sectors have been assigned.

42 - UNABLE TO READ REALLOCATION SECTOR

The chance that you will ever see this message is infinitesimal. It means that the sector that has the reallocation map is unreadable. Contact your Vector Graphic Service Representative.

50-59 - WARNINGS (RETN'S)

51 - LITTLE SPACE LEFT (<5 REMAINING REALLOCATION POSITIONS AVAILABLE)

The disk operating system is set up in such a way that the system program automatically tests sectors before they are written on and, if the program detects a fault, will automatically skip over that sector and try a new sector. In order to remember which sectors are not usable, the program compiles a map which is essentially a sector containing the addresses of the bad sectors and the address of the sectors which replaced them. The program is organized to provide space for 120 of such reallocations. As long as the system has performed less than 115 reallocations, the operation of this checking device and automatic reallocation is completely transparent to the user. He may be totally unaware that it is happening. When less than 5 reallocation positions are available, however, the program will alert the user whenever it must perform such a reallocation. It will count down to 0 and display message 41 when no space is available for reallocation. When the user first sees message 51, he should contact his Vector Graphic Service Representative.

60-69 - SYSTEM ERRORS (SYSTEM TRACK)

61 - SYSTEM CANNOT BE LOADED AT WARM START

A procedure was done that prevents the system from being booted up without going through the cold start routine. To alleviate this condition, reset the mainframe and go through the cold start routine appropriate to your system. If this does not work try the MOVCPMHD routine again on the affected surface.

70-79 - OVERLAY ERRORS (REQUEST)

71 - ILLEGAL OVERLAY REQUESTED

The program has called for an overlay that is incompatible with the system.

72 - OVERLAY NOT AVAILABLE IN THIS SYSTEM CONFIG.

An overlay routine has been called for and is not available in this particular system's software.

8X - OVERLAY LOAD ERROR

The user has attempted to load an overlay file that was not completed. The second digit of the code tells why the operation was halted. See code chart below.

9X - READ + WRITE NON-DATA ERRORS

The user has attempted to read or write from or to the hard disk and a

non-data error has occurred. The second digit of the code tells why the operation was halted. See the code chart below.

8X and 9X Code Chart

<u>Second Digit</u>	<u>Error Condition</u>
1	Invalid Command
2	Invalid Parameter
3	Drive Not Ready
4	Drive Fault
5	Illegal Head or Cylinder Address
6	Sector Not Found
7	Data Error
8	Verify Error
9	Drive Timeout Error
A	Communications Error
B	Interface Timeout Error

