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# Z-100 Series User's Manual

Winchester  
Supplement

695-3023-04

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 **ZENITH** | data  
systems

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**Zenith Data Systems Corporation**  
**St. Joseph, Michigan 49085**

## Introduction

With the addition of the internal Winchester drive, your Z-1 00 Desktop Computer from Zenith Data Systems achieves a level of performance rarely encountered in desktop computers.

The Winchester drive is an option that will allow you to store the equivalent of several dozen floppy diskettes inside your Computer, ready for immediate access in your daily business needs. Besides additional on-line capacity of stored records, the speed at which that information may be accessed is increased by a factor of ten to twenty.

This manual has been prepared as a supplement to the "Operation" and "Disk Operating System" sections of your Z-100 Series Desktop Computer User's Manual.

## Hardware Features

After you read pages 1.13 and 1.14 of the Operation section of the User's manual, you will notice an important difference between your Desktop Computer and the two-drive unit described in the manual.

One of the two disk drives has been replaced by a Winchester drive. In place of the Diskette Load Slot, Disk Drive Door, and LED Disk Access Indicator, you will see only an LED Disk Access Indicator.

You need to know and understand a couple of important facts about the care of your Winchester drive.

- Never drop your Winchester drive system or subject it to any other physical shock. If the Computer is accidentally dropped, even from only two to three inches, the Winchester drive may fail to operate. If this occurs you should contact your local ZDS representative for service.
- The built-in disk of your Winchester drive cannot be physically removed from the drive. However, information can be removed, stored, and replaced with other data. You will learn how to do this later in this supplement and in the Winchester section of your operating system manuals.

## WINCHESTER DISK DRIVES

A Winchester Disk Drive System, such as the one in your Z-100 Desktop Computer, is only one of a family of disk systems generally called "hard disks."

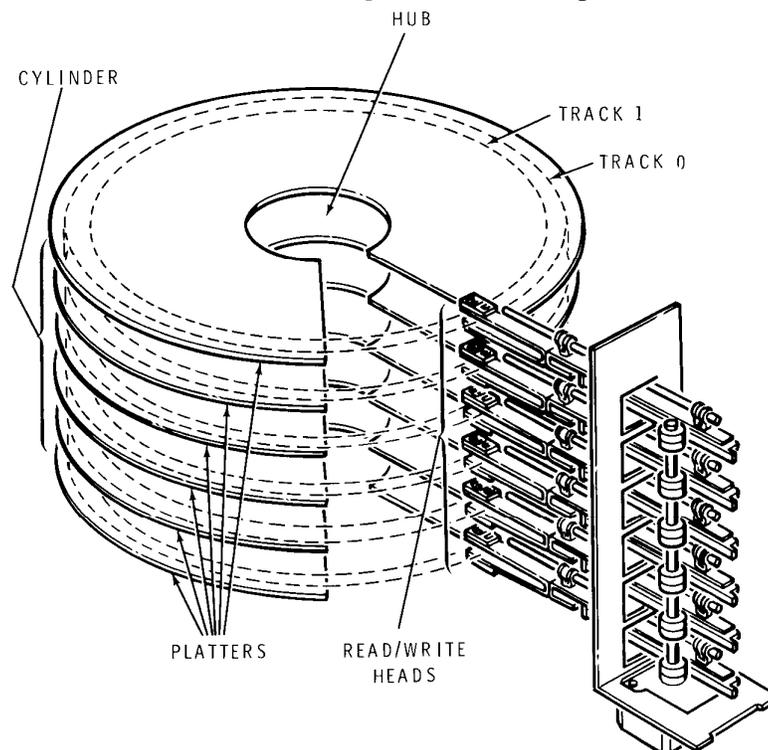
The disk itself is a carefully machined and polished nonmagnetic metal platter that is coated with a magnetic material, similar to that used by floppy disks and audio and video tape. Hard disks come in a variety of sizes, capacities, and configurations. Many have multiple disks and some are even removable, being enclosed in "disk packs," or "cartridges."

The "read/write" head (which records and "reads" information to and from the surface of the disk) "floats" on a cushion of air above the disk as it turns. The distance between the head and the surface is so small that even a tiny smoke particle could cause irreparable damage to the disk. For this reason, most disks, including your Winchester disk system, are sealed against contamination.

In contrast to the floating head of a hard disk, the head of a floppy disk drive actually rides on the surface of the disk. The read/write heads of both systems have the same function and are described on page 1.16 of your User's Manual.

The organization of the individual hard disk is similar to a floppy disk and is also described on page 1.16 of your User's Manual. However, a hard disk system may have more than one platter, and the system may use each side of each platter. Therefore, each side will have its own read/write head. Each head is in alignment with the heads for the other platters or sides, and all are moved together. Refer to Figure 1.

**Figure 1**  
The Elements of a Hard Disk



A track is that portion of the disk that passes under a read/ write head. If you have four read/write heads on four different platter sides, you will have four tracks that are passing under the heads at one time. These four tracks make up a "cylinder." A cylinder has as many tracks as there are heads in any particular hard disk system.

In addition to being divided into cylinders, tracks and sectors, a hard disk may be "partitioned." A partition is a group of tracks or cylinders that you use as a "logical" drive for a particular application or operating system.

A logical drive acts like a floppy disk. Because a partition is considered to be a logical drive, it will be treated the same as any individual floppy disk drive. It will be uniquely identified with a drive name, such as A or B. It may contain an operating system, such as CP/M®-85 or Z-DOSS, or may be used strictly for data storage.

The Winchester design in your Desktop Computer uses a single head per platter side and is totally sealed. But before you can use it, the disk surfaces must be prepared (formatted - like a floppy disk) and partitioned. You will find a diskette packed with your system that contains four utility programs: PART, PREP, SHIP, and VERIFY. You will use these programs to prepare and partition your system a little later in this documentation.

## **POWER UP**

A Desktop Computer shipped from the factory is set up to "boot" from the Winchester disk. However, the first time you use your system, the Winchester will not be ready to use because it will not yet contain an operating system. It is also possible that it may not have been prepared or partitioned, although this will normally be done before the Winchester

*®CP/M-85 is a registered trademark of Digital Research, Inc.*

*®Z-DOS is a trademark of Zenith Data Systems Corporation.*

drive is shipped from the factory. Use the following procedure to start your system for the first time or whenever you do not want to "boot" from your Winchester drive.

If your Computer is set for auto boot and you do not see the hand prompt when you reset or turn on the system, disable the normal power-up sequence by pressing the **DELETE** key immediately. Once the screen warms up, it will display the message:

*Boot Abort*

and you will see the "hand prompt." You will also see the power-on indicator (in the RESET key) light.

You may now boot from the floppy disk drive and run the programs on either the Customer Demonstration Disk or the Utilities disk.

To use either diskette, follow these general instructions:

- Make sure your Computer is turned on and the hand prompt is showing. If your system is set for auto boot, remember to press the **DELETE** key to disable the powerup sequence from trying to access the Winchester disk. If your system does not display the hand prompt, refer to the "In Case of Difficulty" section on page 1.25 of the User's Manual.
- Refer to page 1.13 of the User's Manual and insert either the Customer Demonstration diskette or the Winchester Utilities diskette (with the label closest to you and facing up) into the floppy disk drive in your system. NOTE: Remove the tab that is covering the write protect notch if one is present on the Customer Demonstration diskette.

- Close the disk drive door and press the **B** key and then the **F1** key. You will see the following on the screen:

*Boot f1*

Press the RETURN key. The disk access indicator for the floppy disk drive will glow. After a moment, the first messages will appear on the screen.

- If you are using the Customer Demonstration diskette, turn to page 1.20 in your User's Manual for the messages and instructions.
- If you are going to use the Winchester Utilities diskette, read the next section, a discussion of how to use these four utilities.

## The Utilities

Four utility programs - PART, PREP, SHIP, and VERIFY - are supplied on a minimum system Z-DOS diskette. Two copies of the diskette are supplied, so you need not worry about "backing up" your diskette before you use it. Note, however, that the system on this diskette *is not* designed for normal Z-DOS use, and should be used only for these utilities.

Each of these utilities is designed to allow you to use up to four Winchester disk drives in your system.

The **PREP** utility is supplied so that you may initialize the surface of your Winchester disk should the need ever arise. It will also allow you to check for bad sectors and "lock out" any that are found. In addition, PREP will pre-allocate two "standard" partitions (described later) for immediate use.

The **VERIFY** utility is supplied so that you may check the surface of your Winchester disk for bad sectors and "lock out" any that are found. Where PREP destroys the data you have stored on your disk, VERIFY does not.

The **PART** utility is supplied so that you can redefine the partitions of your Winchester disk if those that are preset do not meet your needs.

The **SHIP** utility is supplied so you can place the heads in your system over an unused portion of the Winchester disk. This utility should be used whenever you move your Desktop Computer, even a short distance.

You should read pages 2.5 to 2.7 of the Z-100 Series User's Manual and then boot your Winchester Utilities disk as described in the "Power Up" section of this supplement. When you see the Z-DOS prompt on your screen, you are ready to run **PREP**, **PART**, **SHIP** or **VERIFY**.

## The PREP Utility

### DISK INITIALIZATION

The surface of the Winchester disk must be initialized before you can use it in a system. This is similar to the **FORMAT** command and procedure discussed in the Z-100 Series User's Manual, except that typical operating system information (headers, labels, boot code and directories) for a specific system is not written onto the disk. In addition, **PREP** will test the surface and set up standard partitions. Two are set up - approximately equal in size - so it is not necessary to run the **PART** utility unless you want to use some other partitioning arrangement. Also, the disk will normally have been prepared at the factory as part of the final testing procedure, so you should not need to use **PREP**.

You need to be aware that while **PREP** does test the surface of the disk for retention of data, it will also destroy any data that you have recorded on the Winchester disk system. If you do not want to destroy the data on your disk, but still want to test the disk for data retention capabilities, you may run the **VERIFY** utility. This utility does not destroy the current data and partitions that are set up on your Winchester disk, but it does test for and flag those sectors that are bad so that they can be "locked out" later. See "The VERIFY Utility" for a discussion of this process.

Before you can run the **PREP** utility, you must install a jumper on the Winchester disk controller card in your Desktop Computer. If the jumper is not installed, your Winchester disk cannot be accidentally initialized. Therefore, the jumper (not installed) acts as a safety feature for any files that may be on the disk. If you wish to run PREP, refer to Appendix B (at the back of this Supplement) to install or remove the jumper.

## The PREP Utility

### FEATURES OF PREP

The PREP utility enables you to:

- Initialize the surface of your Winchester disk.
- Test the data retention capabilities of your Winchester disk.
- Isolate questionable disk sectors.
- Divide the surface of the Winchester disk into two equal partitions (normally with one used for Z-DOS and one for CP/M).

### PREP OPERATION

If your Winchester disk does not contain initialization information (for instance, the disk may not have been initialized or the information may be incorrect or damaged), **PREP** will prompt you to enter characteristics in order to identify the type of Winchester disk you have in your Desktop Computer. Then PREP will display messages that tell you what is happening as it "prepares" and tests your disk. A chart of typical Winchester disk parameters is supplied in Appendix A along with the specific answers that you should enter for each of the six prompts.

**CAUTION:** Using PREP will destroy all the files that may exist on your Winchester disk. Winchester disks supplied by Zenith Data Systems or Heath Company will normally have been prepared with PREP at the factory. If your disk has been prepared, you will need to use PREP only if you consistently encounter an unreasonable number of disk access errors. Do not use PREP until you have backed up the information on your Winchester disk to floppy disks.

## The PREP Utility

PREP has two optional switches: /K and /Q. You may use either, both, or none when you start PREP. To start the PREP utility, type:

*PREP*

and enter the optional switches that you desire. Then press the RETURN key. Do not space between the switch and the line. If you want to use the /Q switch, you would enter:

*PREP/Q*

and press the RETURN key.

The /K switch will cause PREP to prepare the disk using 1024byte sectors rather than 512-byte sectors. Do **not** use this switch unless your operating system specifically supports 1024-byte sectors. Z-DOS does **not** support the 1024-byte format.

The /Q switch will cause **PREP** to prompt for the drive characteristics regardless of whether the drive had been previously prepared or not. Normally, **PREP** will prompt for drive characteristics only if the disk had not been previously prepared or an error has been found in the superbiock (described later in this section).

**NOTE:** Installed Winchester disk drives are normally prepared at the factory. Upgrade kits are usually prepared at the factory. Upgrade kits are usually prepared at the service center performing the upgrade.

- Enter the command line and press the **RETURN** key to start PREP. You will see a display similar to the one illustrated in Figure 2.

## The PREP Utility

*PREP version 1.00  
Copyright(C) 1982, Zenith Data Systems*

*The PREP utility helps*

- *initialize surface of Winchester disk*
- *test data retention capabilities of Winchester disk me*
- *isolate questionable disk sectors*
- *divide the surface of Winchester disk into two partitions  
of equal size (one Z-DOS partition and one CP/M partition).*

*PREP may prompt you to specify five Winchester disk characteristics in order to identify the type of Winchester drive you have installed. Then PREP displays messages as it operates on the disk.*

**CAUTION:** *Using PREP will destroy all files on your Winchester disk. Winchester disks supplied by Zenith or Heath are normally prepared by PREP before they are shipped. Users of these disks will need to use **PREP only if they are consistently encountering an unreasonable number of disk access errors.** Do not use PREP until you have transferred your Winchester disk files to floppy disks.*

*Do you wish to proceed with PREP (Y/N)? \_*

**Figure 2**  
**The Introductory Display for PREP**

**At the bottom of the display, you will see:**

*Do you wish to proceed with PREP (Y/N)? \_*

## The PREP Utility

If you press the **N** key, the program will be halted and control of the Computer will be returned to Z-DOS. If you press the **Y** key, PREP will continue operation.

- To exit PREP, press the **N** key. The Z-DOS system prompt will be displayed.
- To continue with PREP, press the **Y** key. You will see:

*Please type P to proceed*

This display gives you one last chance to change your mind. The reason for this second prompt is the nature of PREP. **PREP will destroy any and all information that has previously been recorded on the Winchester disk.**

- To continue with PREP, press the **P** key. If you press *any other* key, PREP will be stopped and you will see the Z-DOS system prompt.

The screen will display:

*Winchester Drive Unit number (0-3)?*

Normally, an internal Winchester disk drive will be numbered unit 0. External drives will be numbered 1, 2, or 3.

- Enter the number that represents the disk drive that you wish to prepare and then press the RETURN key.

If the disk has been previously prepared and PREP detects no errors in the boot code or "superblock" (explained later), then the following five disk parameter questions will be skipped and the tests will be run. However, If the disk has not been previously prepared or if an error is detected in the boot code or superblock, then you will be asked to enter five disk parameters. Your answers will depend upon the type of Winchester drive installed in your

## The PREP Utility

Desktop Computer. You will find a list of possible drives and the appropriate responses for each question listed in a table in Appendix A of this supplement.

In the examples that follow, the responses supplied are for the Miniscribe 2012 (the standard 10 megabyte drive supplied in Winchester versions of the Desktop Computer).

The screen will display:

*Enter number of heads in hex:*

- Enter 4 (the hexadecimal equivalent of the number of read/write heads) and press the **RETURN** key. Next, the screen will display:

*Enter number of cylinders in hex:*

- This number is equal to the total number of tracks divided by the total number of read/write heads. Enter 132 (the hexadecimal equivalent of the number of cylinders) and press the RETURN key. The screen will now display:

*Enter reduced write current cylinder in hex:*

- Toward the hub of a hard disk, where the circumference of each track is smaller, some Winchester systems require that less electrical current be applied to the write head to avoid having magnetic pulses overlap adjacent tracks. The Miniscribe Mod II 2012 does not require reduced write current. Therefore, a value greater than the largest cylinder number will be entered. Enter 200 (the number in hexadecimal of the cylinder where the current applied to the write head is reduced to avoid overwriting

## The PREP Utility

track bounds) and press the **RETURN** key. Next, the screen will display:

*Enter pre-comp cylinder in hex:*

- Disk storage devices operate by creating magnetically polarized areas on the disk surface that correspond to the presence or absence of "bits" (the smallest unit of measure in computer data and memory) in the information being stored. Since "like" charges repel and "unlike" charges attract, it is possible for the charged areas on the disk surface, which represent the data, to "shift" slightly if they are closely spaced after being recorded. If such a shift occurs, reduced reliability will result.

Precompensation refers to the intentional shifting of data during the recording process so the combined result of precompensation and the natural shift (which cannot be prevented) places the data in the desired position. On the outer tracks of the disk, the spacing between bits is great enough so no significant shifting occurs and precompensation is not required. However, since the inner tracks have a smaller circumference, the bits are closer together and precompensation is required to maintain acceptable reliability. Enter 80 (the cylinder number where precompensation must start) and press the RETURN key. Next, the screen will display:

- Enter 1 (the rate code in hexadecimal at which the read/ write heads "step" between tracks) and press the RETURN key. The screen will display:

*Enter parking cylinder number in hex:*

## The PREP Utility

- Enter 14F (the cylinder number in hexadecimal where the SHIP utility will move the read/write head - see the SHIP utility discussion). If you are preparing a drive other than the Miniscribe 2012, use the table in Appendix A to determine the parking cylinder number or use the same number that you entered for the "number of cylinders" prompt. Press the **RETURN** key.

Now that you have supplied the necessary information for your hard disk, the program will initialize the surface of the disk for the tests that follow. The initialization process is similar to that used by the Z-DOS and CP/M-85 FORMAT utility in that the surface of each disk is organized into tracks and sectors. In addition, a "map" is also prepared for keeping track of any sectors that are found to be bad.

During the initialization process, you will see the following display on the screen:

*Initializing the disk ...*

If you have not installed the jumper on the controller board, the system will immediately display:

*Error during formatting of the drive.*

and return to the Z-DOS prompt; the disk will not be affected. Remember, to run the PREP utility, you must install the jumper on the controller board as explained in Appendix B.

When the disk has been fully initialized, you will see:

*... completed*

## The PREP Utility

Now the disk will be tested seven times. Each test is known as a "pass." The seven passes of the test that are now performed are conducted to check the integrity of the disk's storage capacity. During each pass, PREP will "write" a predetermined code in each sector (the LED drive access light will flicker) and then will "read" back that code to verify that it remained correct (the LED drive access light will appear to be constantly on). PREP will keep you informed of its progress by displaying the message:

*Media test in progress. Pass n*

where n represents the current pass number. This phase of PREP takes about an hour and a half because of the large number of sectors on the Winchester disk system.

PREP uses a different code on each pass it makes through the test. If PREP finds questionable areas on the disk, it stores the address where the error occurred, and later places these addresses into a bad sector table.

When PREP has finished the seven passes, two "superblocks" and two bad sector tables are recorded on the disk. While it is doing this, you will see:

*Initializing the disk...completed*

A "superblock" is a portion of the disk surface (on cylinder 0) that is used to keep track of the disk "partition" names, the operating system name assigned to each partition, a flag that is used to show whether the partition has been formatted or not, and a pointer (or number) for the first sector of that partition. The superblock is recorded twice on the Winchester disk. Each copy is written with a different disk head so that the copies are physically isolated from each other. If something occurs to damage one copy of the superblock, the other may remain usable.

## The PREP Utility

During the test passes, PREP kept a record of any bad sectors. After the tests are finished and the superblocks have been written, PREP will write the bad sector table. As with the superblock, the table is recorded twice, each with a separate read/write head. The bad sector tables are used to "flag" all known bad sectors and "lock them out," or prevent them from being used by the system for data storage. It is normal to have a small number of bad sectors out of the five to twenty *thousand* located on the typical Winchester disk.

**Note:** If there are an excessive number of bad sectors (greater than 10%), an error message will be displayed indicating that the disk is not usable. The disk drive must be replaced. The cause of a bad disk unit can be one of three things: (1) excessive heat causing the disk to warp or the electronics to fail (i.e., fire); (2) damaged read/write head from dropping the computer; or (3) damaged disk surface caused by moving the computer when it is not in the SHIP position (see the discussion on the SHIP utility).

When the tests are completed, PREP will return control to the minimum Z-DOS system and you will see the Z-DOS prompt. Remember, since this is a minimum operating system, do not use it for normal operation.

- Remove the Format Enable jumper as explained in Appendix B of this Supplement. *Do not* proceed with any other operations until you have removed the jumper and replaced it in its proper place on the board.

## The VERIFY Utility

The VERIFY utility enables you to verify the integrity of your Winchester disk. However, the tests performed by the system are not "destructive." That is, they will not destroy the data that is recorded on your disk.

Several things could cause a sector to "go bad" during normal operation of your system. They include subjecting the Computer system to a physical shock (most common cause of sector failure), power failure during the middle of a disk operation (unlikely), or electronic component failure (very rare). When a power failure causes a sector to go bad, you may be able to recover the use of that sector by reformatting the partition, just as you would reformat a floppy disk. However, you will want to use the BACKUP utility before you do this. See the discussion on BACKUP and RESTORE found later in this supplement.

When a bad sector is located by the VERIFY utility, its location will be stored in memory. At the end of the test, those sectors that are found to be bad are added to the bad sector table that was established by the PREP utility. However, the bad sector(s) located by VERIFY will *not be* "locked out" until you run your Z-DOS or CP/M-85 FORMAT program and reformat the partition.

One advantage of VERIFY is that you can use the utility to check your disk if you *suspect* that you have one or more bad sectors. If none are found, the system will let you know, and you can continue to use your programs without having to go through the BACKUP and RESTORE processes described later in this supplement.

## The VERIFY Utility

### VERIFY OPERATION

- To use the VERIFY utility, boot the Utilities disk and type:

VERIFY

and press the RETURN key. You will see a display similar to that shown in Figure 3.

*VERIFY version 1.00  
Copyright © 1982, Zenith Data Systems  
The VERIFY utility helps you to:  
Locate sectors that have failed since you last ran PREP  
Do you wish to proceed with VERIFY (Y/N)?*

**Figure 3**  
The VERIFY Initial display

At the bottom of the display, you will see:

*Do you wish to proceed with VERIFY (Y/N)?*

If you press the **N** key, the program will be halted and control of the Computer will be returned to Z-DOS. If you press the **Y** key, VERIFY will continue operation.

- To exit VERIFY, press the © key. The Z-DOS system prompt will be displayed.
- To continue with VERIFY, press the 0 key. You will see:

*Winchester Drive Unit number (0-3)?*

## The VERIFY Utility

Normally, an internal Winchester disk drive will be numbered unit 0. External drives will be numbered 1, 2, or 3.

- Enter the number that represents the disk drive that you wish to verify and then press the RETURN key. The screen will display:

*Enter bad sector address, or zero to end:*

Some operating systems will display bad sectors that are detected during normal operation. This prompt will allow you to enter the sector addresses that your system has detected and add those to the bad sector table. Note, however, that particular sectors may be identified by the operating system with a logical address within a partition and may not represent the same real sector as identified by VERIFY. *Both CP/M-85 and Z-DOS report the same address as identified by VERIFY and not a logical address within the partition.*

To enter a bad sector address, type the address number and press the RETURN key. The prompt will reappear, allowing you to continue to enter additional bad sector addresses.

- To end entering bad sector addresses, press the 0 key and then the RETURN key. The system will start testing the disk and will display:

When the test is finished, the display will add:

*Beginning verification...*

to the end of the verification message. If no bad sectors were located, the system will display:

*No bad sectors located.*

## The VERIFY Utility

and then return to Z-DOS and display its prompt.

If bad sectors were found, then the system will display:

*Bad sectors located. Tables modified.*

This message tells you that there were bad sectors located on your Winchester disk. However, they have only been flagged at this time and you may continue to access them, though you will probably experience difficulties when your programs attempt to use those sectors.

You should now back up your Winchester disk with the BACKUP utility and then reformat your disk partitions using the appropriate operating system(s). This operation will "lock out" the bad sectors so that you may be assured of continued high performance from your Winchester system.

While this discussion has stressed what to do with bad sectors, the actual need for this utility (as well as the other utilities on this disk) will be minimal once your system has been in use for a month or two. Failures due to contamination from smoke and dust particles found in the air around your Computer are rare because the Winchester disk is sealed. However, a small number of sector failures is normal when a disk is new. Manufacturers consider a Winchester disk to be acceptable if it has less than 20 errors. It is not unusual for a drive to develop several additional bad sectors during the first month or two of regular operation.

## The PART Utility

The PART utility enables you to change the names, number, and sizes of Winchester disk partitions. It also allows you to specify which partition you want accessed when your Computer boots up.

### PARTITIONS

Winchester disks distributed by Zenith Data Systems and Heath Company have a very large storage capacity when compared to floppy disks. To make practical use of all this storage space, partitions divide the disk space into more manageable sizes. You can establish up to 16 partitions on your Winchester disk. Each partition will be treated like an individual disk. Therefore, you may have different operating systems (for example, Z-DOS and CP/M) on different partitions. However, you may not have two different operating systems on the same partition.

Each of the two standard partitions that exists on your Winchester disk when it is shipped from the factory occupies approximately one half of the total available Winchester disk space. Each has been assigned a distinct name: CPM and Z-DOS. Both represent popular operating systems that are sold by ZDS for the Z-100. Therefore, you do not need to run PART before you can use your Winchester disk. If two equal partitions meet your needs, then proceed to the "Installing Operating Systems" section. Note that there is no requirement that requires you to use Z-DOS and CP/M on these partitions, in spite of the names given to them.

**CAUTION:** If you make any changes to the number or size of the partitions on your Winchester disk with either PART or PREP, you may destroy existing data on the disk. Therefore, if you have previously used the drive for data storage, you should back up all necessary files from each partition before using the PART program.

## The PART Utility

NOTE: The capacity of your Winchester disk is affected by a number of factors that were discussed in the hardware section of this supplement. Also affecting the total usable capacity is the number of sectors that were locked out during the operation of the PREP utility.

### FEATURES OF PART

The PART utility enables you to establish and/or change the following:

- The name of each partition.
- The name of the operating system to be used with each partition.
- The percent of disk space allocated to each partition.
- The name of the partition that is selected when you boot your computer system.

### PART OPERATION

In this part of the Winchester supplement, you will learn how to use the PART utility. If you are going to establish several new partitions or rearrange existing partitions, then you will enter partition and operating system names and establish the amount of disk space for each partition. If you are setting up a new default boot drive, then you will only have to specify the desired partition.

When you see the Z-DOS prompt on your screen as described previously, you may start PART.

## The PART Utility

- To start the PART utility, type:

PART

and press the RETURN key. The screen illustrated in Figure 4 will be displayed.

*PART version 1.00  
Copyright© 1982, Zenith Data Systems*

*The PART utility helps you to:*

- *change the arrangement of your Winchester disk partitions and / or*
- *select a partition (default boot partition) to which you can*
- *boot up without specifying the partition name*

*Part displays a table showing the names of each partition (a Partition name and a system name) and the amount of the disk space Allocated to each partition (in percentages and in kilobytes). PART Also dynamically calculates and totals the size of all partitions As you specify each partitions allocation percentage.*

*CAUTION: Using PART can destroy all files on your Winchester disk. Do not use PART until you have transferred copies of you Winchester Disk files to floppy disks.*

*Proceed (Y/N)?*

### Figure 4

**The Introductory Display for PART**

At the bottom of the display, you will see:

*Proceed (Y/N)?*

If you press the **N** key, the program will be halted and control of the Computer will be returned to Z-DOS. If you press the **Y** key, PART will continue operation.

## The PART Utility

**CAUTION:** The PART utility may destroy some of the information that you have stored on your Winchester disk. Do not use PART until you have transferred your existing Winchester disk files to floppy disks.

If you have existing files on your Winchester disk that need to be transferred to floppy disks, you should press the © key to stop PART. Then use the appropriate utility (supplied with your operating system) to back up the files on your Winchester disk.

**NOTE:** You can use PART to select a different "default boot partition" without destroying software or data. However, you should not attempt to do this if you are unsure about the procedure. To be safe, back up your important disk files first.

You may now use the following procedure if you are setting up your Winchester disk for the first time, if you have backed up all important files, or if the existing files on the Winchester disk are unimportant.

- To exit PART, press the © key. The Z-DOS system prompt will be displayed.
- To continue with PART, press the 0 key. The screen will display:

*Winchester Drive Unit number (0 – 3)?*

Normally, an internal Winchester disk drive will be numbered unit 0. External drives will be numbered 1, 2, or 3.

- Enter the number that represents the disk drive that you wish to verify and then press the RETURN key. The screen will clear and you will see a display similar to that illustrated in Figure 5.

## The PART Utility

	Partition Name	Operating System Name	Percentage	Kilobytes
1.	Z-DOS	Z-DOS	50	5000
2.	CPM	CPM	50	5000
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				
13.				
14.				
15.				
16.				
	Total Utilization (Allocated/unallocated)		100/0	10000/0
	Default boot partition number: 1		<Z-DOS;Z-DOS	>

B – Modify default boot partition  
P – Partition maintenance  
E – Exit

Choose desired option. <B, P, E> \_

Figure 5  
Sample Initial Display

## The PART Utility

The display illustrated in Figure 5 shows the partition name, operating system name, percentage of disk space, and size in kilobytes for each partition. The total percentage, and the number of kilobytes currently allocated and not allocated on the disk, are shown at the bottom of the table.

You will also see the number of the partition that is assigned to be the default boot partition (if one is assigned), its name and operating system. Below that there is a short "menu" that will allow you to select a different default boot partition, change the arrangement of your Winchester disk partitions, or exit from the PART utility. Your choice is entered by pressing the **B**, **P**, or **E** key.

The display is similar to the one that will appear the first time you run PART on a new Heath/Zenith Data Systems Z-217 Winchester disk, or immediately after you have run the PREP utility. If you have already used PART, then portions of your display may vary from the one illustrated in Figure 5.

### Modifying the Default Boot Partition

The "default boot partition" is the one that will be selected when you boot your system without specifying a partition name (as with an auto boot operation). (In order to select any other partition during the boot process, you must specify the partition name, and sometimes the system name, in the boot command.)

- Press the B key to modify the default boot partition. The menu that was displayed at the bottom of the screen as shown in Figure 5 will disappear. The cursor will move to the current default boot partition number as shown in Figure 6.

## The PART Utility

```
Total Utilization (Allocated/unallocated)      100/0      10000/0
Default boot partition number: 1 <Z-DOS;Z-DOS      >
```

B – Modify default boot partition

P – Partition maintenance

E – Exit

Choose desired option. <B, P, E> B

Enter the number fo the default boot partition.

Figure 6  
Entering a Default Boot Partition

When the cursor moves to the default boot partition number, you will see the current partition number and name disappear. You may now enter the number of the partition that you want to be selected by the boot process. You will also see a prompt to, "Enter the number of the default boot partition," at the bottom of the screen.

- Enter the number of the partition that you want to establish as the default boot partition, and press the RETURN key. The number must be in the range 1 to 16 and have a partition name established in the table. Once you enter the number and press RETURN, the partition and system names will be displayed between the angle brackets.

A disk that has just been prepared with the PREP utility will be set up with two partitions. The default boot partition will be set to 1 (Z-DOS). To change the default boot partition to partition 2 (CPM), enter:

## The PART Utility

and press the RETURN key. Your screen will be similar to that illustrated in Figure 7.

```
Default boot partition number: 1 <CPM,CPM                >
B – Modify default boot partition
P – Partition maintenance
R – Restore to original partition
E – Exit
Choose desired option. <B, P, R, E> _
```

Figure 7

Display After Selecting a default Boot Partition

If you try to enter a number for which there is no established partition on the table, the Computer will simply not accept your entry and the cursor will remain at the number position until you enter a valid number and press **RETURN**.

To retain the current default boot partition number press the **RETURN** key. The number and names of the current default boot partition will be redisplayed, and the cursor will move to the "Choose desired option" prompt at the bottom of the display as shown in Figure 7.

## The PART Utility

If you do not want to have a default boot partition, press the SPACE BAR. Your screen will be similar to that illustrated in Figure 8.

Default boot partition number: is undefined

B – Modify default boot partition

P – Partition maintenance

R – Restore to original partition

E – Exit

Choose desired option. <B, P, R, E> \_

Figure 8

Display After Selecting no Default Boot Partition

Instead of a partition number and name, the message, "is undefined," will be displayed. Now when you boot the system, you will have to enter bootup commands that specify partition names (and possibly also operating system names) in order to boot up with any partition.

### Partition Maintenance

This description of the "Partition Maintenance" section will show you how to add partitions, remove partitions, change the names of partitions, and change the percentage of space allocated to each partition. After you have finished with partition maintenance, you will then be prompted to select a default boot partition just as if you had selected that option from the initial menu.

## The PART Utility

To select the partition Maintenance option, press the **P** key whenever your display is similar to Figure 5, 7, or 8. Your screen will be similar to the one illustrated in Figure 9.

	Partition Name	Operating System Name		Percentage	Kilobytes
	-----	-----	-----	-----	-----
1.		Z-DOS	Z-DOS	50	5000
2.		CPM	CPM	50	5000
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					
16.					
Total Utilization (Allocated/unallocated)100/0 10000/0					
Default boot partition number: 1 <Z-DOS;Z-DOS >					
Minimum allocation = 2%					

**Figure 9**  
Initial Partition Maintenance Display

## The PART Utility

The cursor will be positioned over the first character of the first partition's partition name in the table. The partition name may be up to 16 characters in length and may contain any printing character except the semicolon (;). The following are all valid partition names:

CP/M\_4000UNTING  
DATABASE  
WORD/PROCESSING  
George  
Spread-sheet  
Z-DOS ACCOUNTING  
Thelma  
BASIC

At this time, you may choose to change the partition name, delete the partition, or leave it alone.

To change the partition's name, type the new name. If you use lower case letters, they will be converted to upper case. While entering the new name, you will see several things happen.

- The old partition name will be erased when you press the first letter of the new name.
- The BACK SPACE key will operate normally, moving one character to the left and erasing the character under the cursor. When you use the BACK SPACE key to erase the first letter of the new name that you have typed, the letter will be removed and the old partition name will reappear.

## The PART Utility

- If you press only the RETURN key, the partition name will remain unchanged while the cursor moves to the next column, the operating system name.
- If you press the semicolon key or the TAB key and then press the RETURN key, the partition name will disappear while the other features of that partition remain the same. However, after you have finished making all the entries for this partition, the old partition name will reappear.

**NOTE:** Avoid giving two partitions the same partition names unless you plan to give them different operating system names. Even though PART will not flag the error immediately, you will see the "duplicate name error" message after you make the default boot partition entry.

- If you want to delete all the entries for this partition, press the **SPACE BAR**. The remaining information in the table will move up one row. If you remove a partition that was assigned as the default boot partition, then the "is undefined" message will be displayed for the default boot partition until a new default boot partition is selected. If you then attempt to bypass setting the default boot partition, the "boot partition error" message will be displayed until you properly specify a default boot partition.
- If you do not want to make a change to the partition name, do not make any entries; press the **RETURN** key.
- If you wish to alter the partition name, type the new name and press the **RETURN** key.

Once you press the **RETURN** key, the cursor will move to the next column, the operating system name.

## The PART Utility

An operating system name may be up to 10 characters in length and may contain any printing character except the semicolon (;). NOTE: Z-DOS requires that you use "Z-DOS" (as it is spelled here) as the operating system name for those partition(s) that you plan to use with Z-DOS. At the present time, you may use any name you choose for the CP/M operating system, or you may optionally choose to use no name. Operating system names are not mandatory except in the case of Z-DOS. However, if you use the same partition name for more than one partition, each partition must then have a different operating system name. The following are typical examples of operating system names:

CPM  
Z-DOS  
USER-DOS  
OTHER-DOS

At this time, you may choose to change the operating system name or leave it alone.

To change the operating system name, type the new name. If you use lower case letters, they will be converted to upper case. While entering the new name, you will see several things happen.

- The old operating system name will be erased when you press the first letter of the new name.
- The **BACK SPACE** key will operate normally, moving one character to the left and erasing the character under the cursor. When you use the **BACK SPACE** key to erase the first letter of the new operating system name that you have typed, the letter will be removed and the old operating system name will reappear.
- If you press only the RETURN key, the operating system name will remain unchanged while the cursor moves to the percentage column.

## The PART Utility

- If you press the semicolon key or the TAB key and then press the RETURN key, the operating system name will disappear while the other features of that partition remain the same. However, after you have finished making all the entries for this partition, the old operating system name will reappear.

**NOTE:** Avoid giving two partitions the same operating system names unless you give them different partition names. Even though PART will not flag the error immediately, you will see the "duplicate name error" message after you make the default boot partition entry.

- If you do not want to make a change to the partition name, do not make any entries; press the **RETURN** key.
- If you wish to alter the operating system name, type the new name and press the **RETURN** key.

Once you press the **RETURN** key, the cursor will move to the percentage column.

The amount in the percentage column indicates the percent of the total available disk space that has been allocated for that partition. It is expressed as a whole number in the range from the minimum allocation figure displayed at the bottom of the screen (see Figure 9) to 100. With the cursor in the percentage column, you may enter a new figure or leave it alone.

PART will automatically calculate the number of kilobytes that are represented by the figure that you enter, and record that quantity in the next column. The total disk space that is allocated (to be used) and not allocated (not to be used) in percent and kilobytes will also be calculated and displayed at the bottom of the table.

## The PART Utility

If you enter a figure for one of the first 15 partitions that will bring the total disk space used to 100 percent, then the cursor will move to the next partition's row in the table (whether this partition has been established or not). But if you are entering a figure for the 16th partition, then the cursor will move to the default boot partition selection position as illustrated in Figure 6.

If you enter a figure for one of the first 15 partitions that will bring the total disk space used to less than 100 percent, then the cursor will move to the next partition's row in the table (whether this partition has been established or not) *and* the total allocation figures will display the amount of "unallocated" space in reverse video (dark characters on a light background).

If you establish 16 partitions on your disk, and have not allocated all of the available disk space by the time you enter the percent figure for the 16th partition, PART will automatically allocate the remaining disk space to the 16th partition. If you have established fewer than 16 partitions, it is possible to exit PART with a portion of your disk not allocated to any partition. The only way that you can then access that portion of the Winchester disk is to allocate that percentage to a partition through subsequent use of PART.

If you attempt to enter a figure that will bring the total disk allocation to more than 100 percent, PART will lower your entries (starting with the bottom of the table) so that the total never exceeds 100 percent. In some cases, you may find that some partitions (at the bottom of the table) end up with zero percent of the disk allocated to them.

The minimum allocation figure, which will vary depending on the disk capacity, will always be displayed at the bottom of the screen whenever you can enter a percent figure. If you enter a figure lower than the minimum allocation figure for

## The PART Utility

your disk, you will not be able to complete the operation until you have entered a value that is equal to or greater than the minimum figure. While entering the new figure, you will see several things happen.

- The old percent figure will be erased when you press the first number of the new figure.
  - The BACK SPACE key will operate normally, moving one character to the left and erasing the character under the cursor. But, when you use the BACK SPACE to erase the first number entered, the amount will remain blank (unlike the partition and operating system names which reappear). If you press the RETURN key at that point, the old value will be restored when the screen is redrawn.
  - If you press only the RETURN key, the value will remain unchanged while the cursor moves to the next row's partition name (if you are currently working on one of the first 15 partitions) or the default boot partition area (if you are currently working on the 16th partition).
- If you do not want to make a change to the current figure, do not make any entries; press the RETURN key.
- If you wish to alter the value, type the new value and press the RETURN key.

Once you press RETURN, the cursor will move to the partition name position for the next partition, unless you have just finished with the last (16th) partition in the table, in which case the cursor will move down to the default boot partition entry position.

**NOTE:** If you have two partitions with identical names, and one is the default boot partition, PART will always select the partition with the lowest partition number in the table as the default boot partition (even if the highest partition number was

## The PART Utility

previously selected). For example, if you have two Z-DOS partitions, one in partition number 2 and one in partition number 5, PART will always select partition number 2 as the default boot partition even you attempt to select partition number 5.

You may continue to modify, delete or leave unchanged the remaining partitions, and when you have finished with all the previously allocated partitions, you may enter new partitions. When all partitions have been selected, then enter your choice of the default boot partition (or leave it undefined).

If you find the cursor in the partition name column of an unused partition (one for which there is no information) and you do not want to establish any more partitions, press the **RETURN** key. The cursor will advance directly to the default boot partition area where you can establish the default boot partition of your choosing.

### Finishing PART

After you complete any PART operation (such as "Modify default boot partition" or "Partition maintenance"), the menu at the bottom of the screen will display four options as illustrated in Figure 8. The first two options, B and P, have already been discussed.

**NOTE:** If you have created an error condition, the E option may not be displayed. Therefore, you must select an operation and correct the error.

Now is a good time to review your choices. If you do not like what you see on your display, you may restore the partition table to its original condition upon starting PART or, if everything meets your satisfaction, you may exit PART and record your choices permanently.

## The PART Utility

- ❑ To restore the partition table to its original condition, press the **R** key. The screen will redisplay the original table. You may now reenter your choices. NOTE: The menu will no longer display the "R - Restore original partitions" option.
- ❑ To begin the exit process, press the **E** key. The screen will show you two choices:

*M – Make changes and exit*

*A – Make no changes and exit*

*Choose desired option. (M or A)*

If you press the **M** key to make the changes (you have selected) to the Winchester disk, you need to be aware that any data you have on the disk could be lost. Make sure that you have backups of your files before you select this option.

- ❑ Press the **Ⓢ** key to complete the changes and record them on the Winchester disk.
- ❑ Press the **A** key to exit PART without making any changes to the current partitioning arrangement on the Winchester disk.

After either operation, the Z-DOS prompt will be displayed. Remember this is not a complete version of Z-DOS; do not use it for normal operation.

## Installing Operating Systems

The operating systems currently available for the Z-100 from Zenith Data Systems are Z-DOS (Zenith Disk Operating System) and CP/M-85 (Control Program for Microcomputers). This section of the Winchester Supplement will let you initially install either operating system on your Winchester and prepare it so that you may boot directly from the Winchester disk.

For the moment, assume that you are going to use the Winchester disk as it is shipped from the factory. There are two partitions: one called Z-DOS and one called CPM. First you will use PART to establish the default boot partition for one of the two operating systems. Then you will install Z-DOS and CP/M.

### ESTABLISHING THE DEFAULT BOOT PARTITION

- Use your Utilities disk and run PART as previously described.
- Press the **B** key to select option B of the menu to establish the default boot partition.

You may press the **1** key to select the Z-DOS operating system or the **2** key to select the CP/M operating system as the default system to be used when booting from the Winchester disk.

- Press the **E** key to quit PART and press the **M** key to make the changes and exit to the operating system.

**NOTE:** Before you attempt to install *any* operating system on your Winchester disk system, you must remove the Winchester Utilities disk and reboot your system using the operating system that you wish to install. For instance, if you wish to install CP/M, you will have to boot your system with CP/M Distribution Disk I. If you wish to install Z-DOS, you will have to boot your system with Z-DOS Distribution Disk I.

## Installing Operating Systems

### Z-DOS

**NOTE:** Unless you have previously duplicated your Z-DOS Distribution Disks with the MAKE utility, your Desktop Computer will start a duplication process when you boot from your Z-DOS Distribution Disk I. Use the following instructions to install Z-DOS on your Winchester system.

- Turn on your Computer (if it is not already on), place your Z-DOS Distribution Disk I (you must have Z-DOS *B/IO*S version 1.10 or later) in the floppy disk drive, and close the door.
- If your Computer is not set up to boot from the floppy disk, press the DELETE key to stop any auto boot process. Then press the **B** key and then the F1 key, followed by the **RETURN** key.

In a moment, the Z-DOS initial messages will appear and you will be asked to enter the date. If your disks have not been previously duplicated using the automatic MAKE utility installed on your distribution disks, you must press the **CTRL** and **C** key simultaneously. You will be asked if you want to discontinue the batch process. Press the **Y** key and then the **RETURN** key. The Z-DOS prompt will appear.

- Type

FORMAT E:/S/V

and press the **RETURN** key. The E represents the first Z-DOS Winchester partition (under Z-DOS, drives A and B are assigned to the built-in floppy disk, drives C and D are assigned to the external 8" drives if present, and drives E and F are assigned to the two Winchester partitions). The /V switch will locate any bad sectors and lock them out of the system. The /S switch will establish the operating system on the disk. You will see:

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*Format version 1.0*

*Will Format partition assigned drive E:  
Strike any key when ready*

- Press any key. You will see the Winchester disk access light come on while the disk is being formatted. When it has completed the operation, you will have created a minimum operating system on the Winchester disk. A message will be displayed informing you of the total number of bytes on the partition, the number of bytes used by the system, and the number of free bytes for your files. If any sectors were locked out, that information will also be displayed.

- Type the following:

```
COPY A:*. * E:
```

The E: in the command represents the first Winchester drive partition.

- Press the **RETURN** key. You will see each file displayed as it is transferred and the total number of files copied. Repeat the COPY command for each Z-DOS distribution diskette.

NOTE: If you copied the Z-DOS Distribution Disks directly to your Winchester disk system, you need to delete one file to prevent the automatic duplication process from taking place every time you boot your Winchester disk.

- Type:

```
ERASE E:AUTOEXEC.BAT
```

and press the **RETURN** key.

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### Booting from the Winchester

**NOTE:** This boot procedure assumes that you have assigned a Z-DOS partition as the default boot partition. If you have not assigned any partition as the default boot partition, read the section entitled, "Booting from the Winchester - No Default Boot Partition."

At this point, you may boot your Computer from the Winchester disk. Use the same procedure to boot your Computer as you would if you were using a floppy disk. The only difference is that the Winchester cannot be removed from the system, and so it is ready to go when you turn on or reset your Computer.

If your Computer is not set up to boot from the Winchester disk, you will have to press the DELETE key to stop any auto boot process and then press the **B** key and then the **F3** key, followed by the **RETURN** key. The Winchester LED disk access indicator will light and in a moment, the Z-DOS initial messages will appear, along with the Z-DOS prompt. You have booted your system from the Winchester. You may now use any Z-DOS program or utility you want.

### CP/M-85

You should become somewhat familiar with various CP/M utilities and options by reading about them in your CP/M-85 documentation. To prepare the Winchester CP/M partition and use it to boot up CP/M, proceed with the following instructions.

- Turn on your Computer (if it is not already on), place your CP/M-85 Distribution Disk I (you must have CP/M version 2.2.101 or later) in the floppy disk drive, and close the door.

## Installing Operating Systems

- ❑ Reset your Computer by pressing the **CTRL** and **RESET** keys at the same time and then releasing them. If your Computer is set up for auto boot, press the **DELETE** key to disable this feature. You should see the hand prompt in the upper right-hand corner of the screen.

- ❑ Press the B and F2 keys. Your screen will display:

*Boot.fl*

Press the **RETURN** key. The floppy disk drive LED access indicator will come on and in a moment your screen will display a message similar to:

*CP/M-85 VERSION 2.2.101 01/28/83*

*A>*

The A> is the CP/M system prompt. You must now "assign" your system to work with the CP/M partition.

- ❑ If you **do not** have 8" diskettes connected or turned on, type the following:

ASSIGN C: =CPM

- ❑ If you do have 8" disk drives connected to your system and turned on, type:

ASSIGN E: =CPM

**ASSIGN** is a **CP/M** command that will let you access a partition by name. In this case, you want to be able to set up the partition that has been named CPM by the PREP utility. If you are going to work with a different CP/M' partition at this time, you would use that partition's name in place of CPM as illustrated. The reason two different disk names (C: or E:) are shown is that CP/M is a dynamic operating system and

## Installing Operating Systems

assigns disk designators at the time of bootup. Two names are assigned by CP/M to each of the floppy disk systems that are connected to the system. The names A: and B: are always assigned to the built in drive (even if only one is present as is the case with the Winchester system). If external 8" drives are present, then C: and D: are assigned to those drives and E: and F: are assigned to the Winchester disk. If no 8" system is present, then C: and D: are assigned to the Winchester disk.

- Press the **RETURN** key. The CP/M prompt will reappear. You are now ready to format the partition.

- Type:

FORMAT

and press the **RETURN** key. The following will be displayed:

*CP/M-85 Format Version 2.2.101  
This program is used to initialize a disk.  
All information currently on the disk will be destroyed.  
Is that what you want? (y/n)*

- Press the **Y** key. The display will show:

*Which drive do you wish to use for this operation?*

- You will enter either C or E as you did in when you select-ed the CP/M partition with the ASSIGN command. Your display will show:

*Will format partition assigned to drive C:*

*Press RETURN to begin, anything else to abort.*

The C will be replaced by an E if you entered an E instead of a C for the previous prompt.

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- Press the RETURN key. The Winchester disk access indicator will light while the partition is being formatted. When the process is finished, you will see:

*Do you have any more disks to format? (y/n)*

- Press the © key. The CP/M prompt will reappear. Now you will place the CP/M BIOS on the disk.

- Type the following:

MVCPM217

and press the **RETURN** key. You will see the following:

*MVCPM217 VERSION 2.2.101*

*CONSTRUCTING 64k CP/M vers 2.2  
READY FOR "SYSGEN" OR  
"SAVE 38 CPM64.COM"  
A>*

You must now perform the **SYSGEN** operation before you attempt *any* other command. Type the following:

SYSGEN

and press the **RETURN** key. You will see displayed:

*CP/M-85 SYSGEN VER 2.2.101  
SOURCE DRIVE NAME (OR RETURN TO SKIP):*

- Press the **RETURN** key. The information is stored in memory as a result of the MVCPM217 operation. The display will now show:

*DESTINATION DRIVE NAME (OR RETURN TO REBOOT):*

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- Press the 0 or © key as you have done for the FORMAT command. You will see a display similar to:

*DESTINATION ON C, THEN TYPE RETURN*

The C will be replaced with an E if you had pressed the E key. Since the disk is permanently mounted, press the **RETURN** key.

CP/M will place the operating system on your Winchester disk. You will see:

*FUNCTION COMPLETE*

*DESTINATION DRIVE NAME (OR RETURN TO REBOOT):*

- Press the RETURN key. The CP/M-85 prompt will appear on your screen.
- Type the following for non-8" systems:

PIP C: =A: \*. \* [RV]

or the following for 8" systems:

PIP E: =A: \*.\* [RV]

and press the **RETURN** key. The PIP utility is similar to the COPY utility in Z-DOS. With CP/M you will see the name of each CP/M file as it is copied. When it is finished, you will see the CP/M prompt appear once again. You have completed the preparation of the CP/M partition for booting.

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### Booting from the Winchester

**NOTE:** This boot procedure assumes that you have assigned a CP/M partition as the default boot partition. If you have not assigned any partition as the default boot partition, read the section entitled, "Booting from the Winchester - No Default Boot Partition."

At this point, you may boot your Computer from the Winchester disk. Use the same procedure to boot your Computer as you would if you were using a floppy disk. The only difference is that the Winchester cannot be removed from the system and so it is ready to go when you turn on or reset your Computer.

If your Computer is not set up to boot from the Winchester disk, you will have to press the **DELETE** key to stop any auto boot process and then press the **B** key and then the **F3** key, followed by the **RETURN** key. The Winchester LED disk access indicator will light and in a moment, the CP/M-85 initial messages will appear, along with the CP/M prompt. You have booted your system from the Winchester and may now use any CP/M-85 compatible program or utility of your choosing.

### Booting from the Winchester – No Default Boot Partition

If you have not established a default boot partition, you may boot from any partition by following this sequence of operations:

- Press the **B** key and the **F3** key in sequence.
- Type a colon (:) and the name of the partition that you wish to boot the computer from, and then press the **RETURN** key.

## Installing Operating Systems

If you typed the correct name of the partition and there is an operating system on that partition, your Computer will boot from that partition.

If you did not type the correct name of the partition, or if you did not type the name of any partition, an error condition will be created and you will see on your screen:

*Error – Partition not found. Type RETURN to continue.*

- Press the RETURN key. Now the system will display all of the valid partition names and operating system labels that were assigned by PREP or when you used the PART utility.

You may boot your system from any partition that contains an operating system by typing the partition name (for instance, Z-DOS) and pressing the **RETURN** key.

If you have selected a partition that has not been formatted, the hand prompt will reappear on your screen. The system may be booted as previously described.

If you have selected a partition that has been formatted, but did not contain an operating system, the operation of your Desktop Computer will be the same as if you had attempted to boot your system from a formatted disk that had no operating system on it. Consult your respective operating system manual for more information.

### **OTHER OPERATING SYSTEMS**

From time to time, Zenith Data Systems will release additional operating systems that you may want to use with your Winchester drive. Documentation will be included with those systems that will tell you how to install them on your Winchester drive.

## Installing Operating Systems

### INSTALLING APPLICATION PACKAGES

*Do not* attempt to follow the software installation procedure described in your software documentation. In most cases, the documentation was written for a one or two-drive floppy disk system.

You may establish one or more Winchester partitions with the PART utility for use with Z-DOS, CP/M-85, and/or other operating systems. In the following discussion, references will be made to partition numbers which correspond to those used by the PART utility.

### Disk Drive Name Assignment

Under **Z-DOS**, drive name E is assigned to the first Winchester Z-DOS partition and drive name F will be assigned to a second Winchester Z-DOS partition if it is available.

When Z-DOS is booted from a floppy disk, the first two available Z-DOS partitions (having the lowest partition numbers) can be accessed by the system. If you choose to boot from a Winchester partition, then it, and if available, the next higher numbered Z-DOS partition can be accessed by the system. Note that in both cases, partitions with other operating systems may reside between the Z-DOS partitions; selected ZDOS partitions do not need to share a common border.

Most Z-DOS-based application software is set up to operate in the dual floppy disk environment where drive A represents the first 5.25-inch floppy disk drive and drive B represents the second. Therefore, once your software is installed (placed) on a Winchester partition, you will need to remap (with the Z-DOS MAP command) drive names A and B to the respective partition(s). Note that you may remap both drive names to the same partition. You can use a BATCH file for this purpose automatically upon power-up if you name it AUTOEXEC.BAT. Or, you may assign some other easily-remembered name to a BATCH file for that purpose. Refer to your Z-DOS documentation for details.

## Installing Operating Systems

Under **CP/M**, drive names are assigned *dynamically* upon bootup. The names assigned to the first partition is dependent on the powered-up state of any 8-inch floppy disk system that may be attached to your computer. The following discussion assumes that you are booting your CP/M system from the 5.25-inch floppy disk drive.

If there is no 8-inch system, or if you have an 8-inch system attached but not powered-up, your computer will boot CP/M and assign drive name C to the lowest numbered CP/M partition and drive name D to the next higher numbered CP/M partition if one is present. If you have an 8-inch floppy disk system attached to your computer *and* it is on, then your computer will boot CP/M and assign drive name E to the first CP/M partition and drive name F to the second.

Since CP/M is dynamic, you do not need to be concerned with "mapping" the various Winchester partitions, as with ZDOS. Instead, when you boot CP/M from the Winchester CP/M partition of your choice, that partition is automatically assigned drive name A. The CP/M command, ASSIGN, can then be used to assign drive name B to a *second* partition (you can not assign more than one drive name to the same partition). The entire process can be automated by using a SUBMIT file and setting the partition (with the CONFIGUR program) to execute the SUBMIT file from a "cold" boot. Refer to your CP/M documentation for details.

**NOTE:** If your CP/M application software requires the use of two logical disk drives, then two Winchester CP/M partitions will also be required to use the software.

### Select Your Target Partition(s) and Space Needed

Now, you must select the appropriate Z-DOS or CP/M partition(s) that you will use for your working copy of the software application package. The software package may include program files, data files, operating system files, and/or computer language files. You will need to make sure that the amount of space required to store and maintain these files is less than the amount of space available on the

## Installing Operating Systems

target Winchester disk partition. Use the Z-DOS DIR command or the CP/M STAT command to determine the amount of space required for your files and the Z-DOS CHKDSK command (or CP/M STAT command) to determine the amount of space available on your selected partition(s).

Generally, one partition may be used to hold all of your files, or you may choose to store selected data files in a second partition. Drive name considerations need to be considered as outlined under Drive Name Assignment.

### Prepare to Copy Your Files

After you have selected the target partition(s), determine the names of the files that are to be transferred from the distribution disk(s) to the partition(s). Use the Z-DOS or CP/M DIR command to list the names of the files. *Exclude* any Z-DOS files named COPYFILE.DAT, as they are batch files used by the Z-DOS MAKE utility for installing the software on floppy disk systems.

### Copy the Files

If you are using Z-DOS, boot from the Winchester disk partition of your choice and use the Z-DOS COPY command to transfer your selected files from the distribution disk(s) to your Winchester partition(s). With a distribution disk in drive A (the 5.25-inch floppy disk drive), the form of the command is:

*COPY A:filename.ext x:*

where x is the drive name of the target partition (E or F) and *filename.ext* is the name of the file to be copied. Use the COPY command for all the files that are to be transferred from the distribution disk(s) to the Winchester partition(s). Note that you may use wild cards in the filename and extension to copy multiple files.

## Installing Operating Systems

If you are using CP/M, boot from the 5.25-inch floppy disk system and assign a drive name to your target partition with the CP/M ASSIGN command. Use the PIP command (place it on your Winchester partition if it is not there) and transfer your selected files from the distribution disk(s) to the partition. With a distribution disk in drive A (the 5.25-inch floppy disk drive), the form of the command is:

*x: PIP x: =A: filename.ext*

where x is the drive name of the target partition and *filename.ext* is the name of the file on the distribution disk in drive A to be copied. Use the PIP command for all the files that are to be transferred from the distribution disk(s) to the Winchester partition(s). Note that you may use wild cards in the filename and extension to copy multiple files.

### Complete the Process

When you have finished copying all of the selected files to your Winchester partition(s), store the distribution disk(s) in a safe place.

Consult the documentation that comes with your software to determine if you need additional software files (such as Z-DOS or CP/M utilities or perhaps a computer language like Z-BASIC or BASIC-80) to operate your program(s). If you need additional files, such as those mentioned, then transfer them from the appropriate distribution disk(s).

When you are finished, you have completed the installation procedure for a working copy of your software. You may now proceed with the normal operation of your software as described in its documentation.

**NOTE:** If the software is dependent upon specific drive names, you may have to remap (under Z-DOS) your partition names, or (under CP/M) boot from the selected partition and assign a drive name to a second partition. See the discussion under Disk Drive Name Assignment.

## Backing up the Winchester Disk

Because it is possible to store the equivalent of several dozen floppy disks on the Winchester disk, two commands, BACKUP and RESTORE have been added to the Z-DOS and CP/M-85 operating systems to aid you in backing up your Winchester Z-DOS partitions. You may elect to copy only certain files, files updated recently, or the entire partition. The basic operation of BACKUP is to create a directory of the specified files and then copy them to a "single" file. The "single" file may actually be several files that each contain a sequentially numbered extension such as BACKFILE.000, BACKFILE.001, and so on. The system backs up your files "end to end" to save floppy disk space.

The operation is further enhanced by providing an automatic FORMAT procedure for the floppy disks, protection against unwanted "overwriting" of existing files on the Winchester, verification, and so on. For complete details of the features and operation of BACKUP and RESTORE, refer to your Z-DOS or CP/M-85 software documentation for the Winchester disk.

### Z-DOS

In this supplement, you will learn just one of several methods of backup for your Z-DOS partition. To backup the entire Z-DOS partition use the following instructions.

- Have a good supply of 5-1/4" or 8" disks on hand that may be used for backups.
- Boot the Winchester system and at the Z-DOS prompt, type:

```
BACKUP E:*.* A:BACK1 /F/V
```

## Backing up the Winchester Disk

for 5-1/4" disks, or

```
BACKUP E:*. * C:BACK1 /F/V
```

for 8" disks.

The E designates the first Winchester disk Z-DOS partition. If you want to back up the second Z-DOS partition, replace the E with F. The wild card symbols \*.\* indicates "copy all files," and the A:BACK1 is the "single" file name mentioned earlier. If you are using 8" disks, substitute the A with C. The /F switch is used to automatically format the floppy disks. The N switch is used to verify that the copy is valid and is identical to the original.

The system will prompt you to put the floppy disks into the disk drives as needed. When the process is finished, the Z-DOS prompt will reappear.

To obtain additional information on the BACKUP command, type:

```
BACKUP ?
```

and press the **RETURN** key. Your display will show you the exact syntax and an explanation of the switches that may be used.

Restoration of the original files to the Winchester disk is also somewhat selective or automatic. Again, you will find full details in your Z-DOS Winchester documentation.

- To restore the "single" file to the Winchester drive from your master backup floppy disks, type:

```
RESTORE A:BACK1 E:*. * /O/V
```

## Backing up the Winchester Disk

Use the drive names as described in the BACKUP operation. The /O switch will automatically overwrite existing Winchester disk files with floppy disk files of the same name. The system will prompt you to place the floppy disks into the drives as needed. When the operation is complete, the Z-DOS prompt will reappear.

To obtain additional information on the RESTORE command, type:

```
RESTORE ?
```

and press the **RETURN** key. Your display will show you the exact syntax and an explanation of the switches that may be used.

### CP/M-85

In this supplement, you will learn just one of several methods of backup for your CP/M-85 partition. To backup the entire CP/M-85 partition use the following instructions.

- Have a good supply of 5-1/4" or 8" disks on hand that may be used for backups.
- Boot the Winchester system and at the CP/M-85 prompt, type:

```
BACKUP C: BACK1=A: *.* [V]
```

The A: represents the Winchester disk CP/M-85 partition. If you want to back up the second CP/M-85 partition, replace the A: with B: (it must be assigned to logical drive B). The wild card symbols \*.\* indicates "copy all files," and the A:BACK1 is the "single" file name mentioned earlier. The floppy drive name C represents the floppy disk drive that you are using as a destination (for most sys-

## Backing up the Winchester Disk

tems, the 5-1/4" drive. However, you may also use the external 8" drive system). The V switch is used to verify that the copy is valid and is identical to the original.

**NOTE:** Do *not* use an extension on the "single" file name. It will be ignored and the screen will display a warning message.

The system will prompt you to put the floppy disks into the disk drives as needed. When the process is finished, the CP/M-85 prompt will reappear.

To obtain additional information on the BACKUP command, type:

```
BACKUP ?
```

and press the **RETURN** key. Your display will show you the exact syntax and an explanation of the switches that may be used.

Restoration of the original files to the Winchester disk is also somewhat selective or automatic. Again, you will find full details in your CP/M-85 Winchester documentation.

- To restore the "single" file to the Winchester drive from your master backup floppy disks, type:

```
RESTORE A:*.*=C:BACK1 [0; V]
```

Use the drive names as described in the BACKUP operation. The 0 switch will automatically overwrite existing Winchester disk files with floppy disk files of the same name. The system will prompt you to place the floppy disks into the drives as needed. When the operation is complete, the Z-DOS prompt will reappear.

## Backing up the Winchester Disk

To obtain additional information on the RESTORE command, type:

```
RESTORE ?
```

and press the **RETURN** key. Your display will show you the exact syntax and an explanation of the switches that may be used.

## The SHIP Utility

The SHIP Utility is provided so that you may place the heads of your Winchester system over a non-vital area of the disks. Then if the system is accidentally jarred during movement, damage will be limited to an area that is not used by your Computer. The floating head design of Winchester drives makes them very sensitive to physical shocks, which can damage the surface of the disks. Therefore, you should use this utility whenever you move your Winchester disk system, even from one table to another.

To operate the SHIP utility, boot your Winchester Utilities disk and type:

SHIP

and press the **RETURN** key. You will see a display similar to the one illustrated in Figure 10.

*SHIP version 1.00  
Copyright © 1983, Zenith Data Systems*

*The SHIP utility helps you to:*

- *Position the read/write heads of the Winchester disk  
At a safe location for subsequent transportation  
Of the Winchester disk unit.*

*SHIP will prompt you to specify a cylinder address to  
identify where the read/write heads should be moved.*

*Winchester Drive Unit number (0 – 3)?*

Figure 10  
The Display for SHIP

## The SHIP Utility

At the bottom of the display, you will see:

*Winchester Drive Unit number (0 – 3)?*

Normally, an internal Winchester disk drive will be numbered unit 0. External drives will be numbered 1, 2, or 3.

- Enter the number that represents the disk drive that you wish to move and then press the RETURN key. **NOTE:** If you have to move more than one disk drive, you will have to run this utility for each drive.

The system will correctly position the heads of the designated drive over unused disk space.

- Remove any floppy disk in the system and turn off your Computer. You may now unplug the power cord and move your system.

When you start your system after running this utility, the Desktop Computer will automatically move the heads back to the correct position over the disks.

**NOTE:** Do *not* copy this utility to a regular Z-DOS disk. It will modify the operating system in your Computer's memory; you will have to reboot your system if you want to perform *any* other functions with the Z-DOS operating system.

## The SHIP Utility

This completes the abbreviated instructions in this supplement to the Z-1 00 Series Desktop Computer User's Manual. If you have any questions concerning any of the operations described herein, refer to your respective operating system manual for complete details or contact Software Consultation by writing to:

Zenith Data Systems Corporation  
Software Consultation  
Hilltop Road  
St. Joseph, MI 49085

or calling (616) 982-3860 for operating systems, languages, and utilities (like PART, PREP, SHIP, and VERIFY); or (616) 982-3884 for application packages and SoftStuff products. Consultation is available from 8:00 AM to 7:30 PM (Eastern Time) on regular business days. Sorry, but we are not able to evaluate or assist in the debugging of any programs you may develop.

## Appendix A

This appendix lists some of the models of Winchester disk systems that can be used with the Winchester controller installed in your Computer system. If you have any question concerning which system is installed in your Computer, consult your dealer. All values are listed in hexadecimal.

Manufacturer and Model	No. of Cylinders	No. of Heads	Write Current Cylinder	Precomp Cylinder	Step code	SHIP Cylinder Address
<b>Seagate</b>						
ST-412	132	4	200	80	1	131
<b>Miniscribe</b>						
2012	132	4	200	80	1	14F
5619	132	6	200	80	1	131
<b>CMI</b>						
5412	132	4	200	80	1	131

This information is provided from Manufacturer's specifications and is subject to change without notice.

## Appendix B

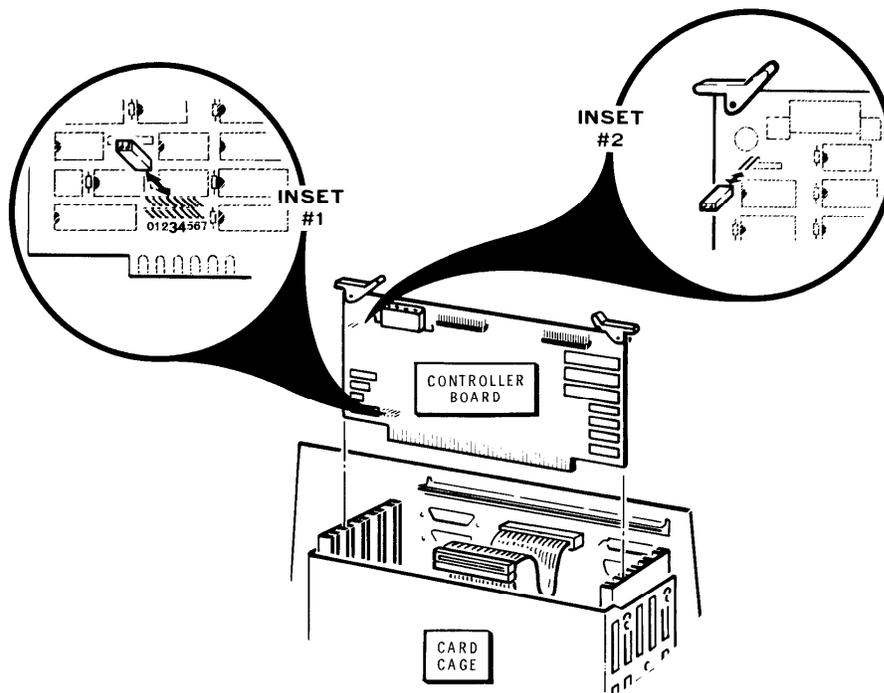
The information in this appendix will provide you with the necessary information to enable your system for proper PREP operation. Please note that you normally will never have to perform this operation; VERIFY and PART should be sufficient in most instances. However, if you must run PREP, proceed with the following instructions.

- Remove any disk that may be in the floppy disk drive and turn off the power.
- Using instructions provided in Appendix I of the Z-100 Series User's Manual, remove the cabinet top.
- Carefully remove any cable(s) that may prevent you from removing the Z-217 Winchester Controller card from the card cage. One such cable may be the external 8-inch floppy disk cable leading from the Z-207 Controller card to the back panel of your Computer. Note any cables you remove and how they are positioned on their respective boards so that you can replace them later.

**NOTE:** In the next step, you may have to carefully remove the two flat ribbon cables that go from the Z-217 Winchester Controller card to the Winchester drive. You will have to do this if the cables are not long enough to prevent strain on them when you remove the controller card from the card cage. If you do remove the cables, note the position of each cable and the position of the colored edge of the cable with respect to the connector and card. You will need to reconnect these cables when you re-install the card.

## Appendix B

- ❑ Refer to Figure 11 and gently lift the Z-217 controller board free of the S-100 bus and straight up until it almost clears the card cage.
- ❑ Remove the jumper from the interrupt plugs (see inset 1 of the Figure).
- ❑ Place the jumper over the Format Enable plugs on the upper left corner of the board (see inset 2 of the Figure).
- ❑ Replace the board by gently pushing it straight down into the card cage. Make sure that it slides down the guides provided and is completely pushed down into its socket.



**Figure 11**  
The Winchester disk controller board

## Appendix B

- Replace any cables that you have disconnected and make sure that all cards are fully seated into their connectors on the main board of the Computer.
- Replace the top cover of your Computer and make sure that it is completely latched into position.
- Replace the power cord. Your system is now ready to use with the PREP utility.

**CAUTION:** Do *not* leave the jumper in place for normal operation. If you do, it is possible that the Winchester disk can automatically initialize itself if it receives a "glitch" from some obscure source. To remove the jumper reverse the above procedure.

## Index

The information in this index supplements the information in the table of contents and is by subject matter only. For definitions of some of the terms used in this manual, consult the Glossary in the *Z-100 User's Manual* (Appendix A).

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