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Z–System To Boot!

Analytical Products Offers
Z–System On Bootable Disk . . .
Ready To Run

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If this is the first time you have ever heard of Z–System and you own a Z–80 based computer, you just don't know how to live! Z–System is an enhanced CP/M 2.2 compatible operating system. BE VERY CAREFUL. Once you use Z–System, you may loose the desire to upgrade (?) your H–89 to an MS–DOS compatible machine. Z–System features are typical of those found in MS–DOS and UNIX. Enhancements like shells, paths, multiple commands on a single line, named directories, flow commands, I/O redirection, error handling and memory–resident commands have elevated the 8–bit computer to heights never before considered attainable. If the terminology gets confusing, please refer to my two previous REMark articles on ZCPR3 and Z–System found in the November 1985 and January 1986 issues, respectively.

In this article I will describe a bootable Z–System for the H–89 offered by Analytical Products. If you have been following my articles on ZCPR3 and Z–System, you may be having a tough time deciding which way to implement Z–System. Until now, Heath users had only two ways to implement Z–System: Manual–Install and Auto–Install. The manual installation procedure required the user to be proficient in the use of assembly language and be able to make changes to the Basic Input/Output System (BIOS). It also required skill in the use of a debugger (DDT or equivalent) and the MOVCPM/SYSGEN functions. The Auto–Install version overlays the user's version of CP/M currently residing in memory. The end–result is the same. However, under the Auto–Install version, the system is booted from standard CP/M. Then Z–System is brought into memory via a COM file. The Manual–Install version results in a Z–System bootable disk.

Now there is a third way to obtain Z–System: Analytical Product's bootable Z–System. This is just like having the manual install version except that someone else did all the work for you and then some. This takes all the guesswork out of installation and allows the novice to get down to the "nuts–and–bolts" of Z–System right out of the box.

Just a quick note: Throughout this article I will refer to ZCPR3, the Replacement Console Command Processor which replaces CP/M's standard CCP, and ZRDOS, the Replacement Disk Operating System which replaces CP/M's standard BDOS. Together they form Z–System. ZCPR3 is the part of Z–System which processes commands and ZRDOS is the part of Z–System which coordinates disk activity. They are two separate programs which were designed to work together. The Basic Input/Output System (BIOS) is the final part of Z–System (or CP/M). The BIOS is written specifically for the computer hardware by the manufacturer.

What You Get

The disk set includes a bootable system disk and a number of disks containing the support files. The exact number of disks depends on the type of media desired. The source code to the essential files like the BIOS and ZCPR3 are present. Due to the massive size of the source code to the utilities, it is not provided on the disk set but is available for a copying charge. The supplied documentation includes "ZCPR3 – The Manual" by Richard Conn, the ZRDOS Programmers Manual and an instruction booklet by Analytical Products. "ZCPR3 – The Manual" is a 351 page book covering every aspect of ZCPR3, the Console Command Processor.

Implemented Features

When performing a manual install of ZCPR3 you will find it hard to select from the many options available. Analytical Products selected those options for its Z–System which it felt made the most sense while keeping memory space for user programs (TPA) as large as possible.

A large TPA memory was maintained by optimizing code in the BIOS. The BIOS is a version of Heath's 2.2.04 implementation re-

written in Z80 code and shortened as much as possible. All of the H–8 code was removed from the BIOS in the shortening process so even if your H–8 has a Z–80 CPU board, you cannot boot this Z–System disk. More about this later. The BIOS source code was broken down into modules for ease of modification. The modules consist of the separate disk device drivers for H17, H37, H47 and H67, the CRT and printer device drivers, the Cold Boot routine, and finally the system equates and other definitions. At this time, Analytical Products supplies a bootable disk for the combined support of H17 and H37. If you currently own and use Livingston Logic Labs BIOS–80 which supports double–sided 48 or 96 TPI hard–sectored disks, you can obtain a version of Z–System from Analytical Products which includes BIOS–80 code. You must provide proof of ownership of BIOS–80. The BIOS modules for H47 and H67 are included for those brave souls who want to try their hand at bringing up the Z–System on those disk types. Contact Analytical Products if you need to operate on H47 or H67 disks. All of the standard features of Heath CP/M 2.2.04 have been retained. If you do wish to customize any of the BIOS modules, you will need a Z–80 compatible assembler such as Microsoft's M80.

Analytical Products also provides a bootable Z–System for the CDR soft–sectored controller board and a version for the Heath H–8 is planned for release soon.

The ZCPR3 command processor was also optimized. This was done so that Analytical Products could pack as many features as possible into the 2K maximum size permitted for the command processor. The original version of ZCPR3 was able to be assembled for operation (with reduced features) on an 8080 CPU. In order for the ZCPR3.ASM file to assemble for both the Z80 and 8080, macros were used to translate the Z80 opcodes into 8080 equivalents. Since there were no 8080 equivalents to the Z80 block move instructions like LDIR, they were not used in the original version. Analytical Products optimized ZCPR3 wherever possible by using Z80 instructions. They also added clear screen and printer form–feed commands. All possible internal commands in ZCPR3 have been implemented. All of these improvements result in improved speed and efficiency while ensuring the largest TPA size for user programs.

In order to configure the special options of Analytical Products' Z–System, they have provided several reworked versions of familiar Heath programs: CONFIGZ.COM, MOVZR17.COM and MOVZR37.COM.

The CONFIGZ.COM program is similar to Heath's CONFIGUR.COM. It allows you to tailor the software to meet the needs of your hardware. In addition, it allows you to automatically run a program called STARTUP.COM on cold or warm boots. The inner details of auto running a program on cold or warm boot under CP/M are dramatically different under Z–System. With CONFIGZ.COM, the difference is transparent to the user. CONFIGZ correctly sets–up Z–System to automatically run the STARTUP .COM file on cold or warm boot if desired.

The MOVZ17 and MOVZ37 programs are similar to MOVCPM17 and MOVCPM37 except that in the MOVZnn programs, the standard CCP was replaced with ZCPR3 and the standard BDOS was replaced with ZRDOS. Integrating ZCPR3 and ZRDOS into the MOVZnn programs means that Z–System is fully relocatable and that you can create a new Z–System of any size you require. This may need to be done when installing other hardware accessories such as RAM boards.

In the CDR version of the bootable Z–System, the names of the modified system utilities are consistent with the familiar CDR utilities (i.e. I/OMOD instead of CONFIGUR).

Standard Features

Analytical Products implementation of Z–System includes the following standard features:

- Named Directories — 5 available
- Flow Control Package (memory resident or disk–based)
- External File Control Block — 36 bytes
- Shell Stack — two 32 byte stacks
- External Stack — 48 bytes
- External Environment Descriptor
- External Path — 5 pairs of bytes
- Wheel Byte
- External Command Line Buffer — 200 characters

I will now explain the standard features provided with the Analytical Products' Z–System disk in more detail.

Named Directories

These are physical names assigned to drive/user areas. An example of this would be a pair of disks which have programs in different user areas. Text files are in user area 3 of drive A, your checkbook program is on drive A in user area 12 and your BASIC programs are in user 5 of drive B. Using Named Directories, you could then have the following:

```
A3:TEXT       A12:CHECKS      B5:BASIC
```

Under Z–System, the A> prompt also shows the current user area. If you were logged into the first directory, the system prompt would be:

```
A3:TEXT>
```

If you wanted to move to your checkbook program directory, you could do this either by typing "A12:" or by using the CD.COM utility (Change Directory) and type "CD CHECKS". Once you set up your Named Directories, you don't have to remember what the drive/user areas were. You can log into them using the name of the directory. As part of the memory conservation effort, logging directly into a named directory, such as by typing "CHECKS:" is not permitted under this version of Z–System. The CD utility must be used to change directories my name. Of course, you can still change the directory using the DU (Drive/User) form, such as "A12:".

Flow Control Package

Two types of Flow Control Packages (FCP) are provided. Both are memory resident. One version (called the "Resident" version) processes flow commands solely from its own memory–resident command set. The other version (called "IF.COM version) also attempts to process Flow Commands from its own memory–resident command set. However, with this version, if the desired Flow Command can not be found in the memory–resident command set, the FCP will invoke the more powerful IF.COM file to resolve the command. With this version, IF.COM must be located on the disk in the "ROOT" directory and it will take a bit more time to resolve the command since the FCP must be checked and then the IF.COM file loaded and executed. (The Root directory is the last drive/user area specified in the search path. See "External Path".) Under the first FCP version, you cannot take advantage of the extended power of IF.COM processing. If the desired flow command is not memory–resident, the command processing

stops quickly. This is nice if you only use a few Flow Commands and you know which ones are memory resident.

The following flow commands are available from the memory-resident FCP:

IF EMPTY — if a file is empty
IF EXIST — if a file exists
IF INPUT — ask the user for a yes or no
IF EQ — if afn1 = afn2 (filenames are the same)
IF ~ — a leading tilda (~) negates any of the above, such as IF ~EMPTY means "if the file is NOT empty"

All of the standard ZCPR3 flow commands are available with IF.COM processing.

Future releases of Z-System will probably have only the resident IF commands. The IF.COM commands will still be available, but to again increase available user memory, the automatic scanning of resident IF commands will be disabled and if the commands are not found, the attempt to process it will halt. The more powerful IF.COM will be renamed so as not to conflict with the resident IF processing and the invocation of IF.COM will be my manual user selection.

External File Control Block And External Stack

These are features which are transparent to the user and were implemented under ZCPR3 to remove code from the CCP which really did not have to be inside the CCP and place it elsewhere in memory. Having both of these external freed-up valuable space to add more commands and features to the CCP. In addition, the External FCB and External Stack are now available to Z-System utilities which need to access them. One example of the use of the External FCB is in shell processing. The ZCPR3 command processor stores the name of the command it just processed into the external FCB buffer. A shell would use this feature to determine the name it was invoked under so it can become ready to re-execute itself.

Shell Stack

Two 32 byte Shell Stacks are provided. The Shell Stack allows ZCPR3 to process shells. A shell is a "front-end" which provides a user-interface instead of the system prompt. Among the standard shell programs provided are MENU/VMENU and VFILER. MENU/VMENU are menu-oriented command preprocessors where the user can create custom menus for inexperienced persons to operate the computer. Their interface to the system is a menu instead of the A0> system prompt. VFILER is a very powerful full-screen video oriented file handler. It performs disk operations like copying, renaming, erasing, etc. It performs the same basic functions like NSWEEP, DISK7, WASH and others, but it takes into account the ZCPR3 environment to address the video attributes of the user's CRT terminal.

Z3 Message Buffer

The Z3 Message Buffer is another transparent feature. Without it, ZCPR3 could not process flow commands, shells, error handling, or ZEX, the memory-resident batch processor similar in function to CP/M's SUBMIT.

External Environment Descriptor

This area in memory is where the pointers to the Z-System segments and buffers are maintained. Each Z-System utility has a pointer to this Environment Descriptor. Since the utilities know where the Environment Descriptor is located, they can also easily know everything about the configuration of the Z-System without having all that information present within each utility. If you alter the size of the Z-System and relocate the address of the Environment Descriptor, you must also change the pointer to the Environment Descriptor in each of the Z-System utility files. This is what is known as "installing" a Z-System file. You merely change the pointer to the Environment Descriptor. A special utility is provided to a "mass" installation of the files. This would only be necessary if you alter the size of Z-System. All of the files on the distribution disk are pre-installed.

External Path

A five level Path is provided to specify the order of drives and user areas (directories) to search for COM files to be executed. The Path could be specified in the drive/user format, such as A3 A12 B5 or in the named directory format, such as TEXT CHECKS BASIC where, in this example, the order of searching for a requested COM file would be first to look on A3:TEXT, then on A12:CHECKS and finally on B5:BASIC. The Path, as well as the assignments of the named directories, are easily changed by the user.

Wheel Byte

The Wheel Byte is nothing more than a software switch that can enable or disable certain Z-System commands. This provides the user with a means of system security. The Wheel Byte could be reset to disable the use of COM files which check that byte before running.

External Command Line

A Multiple Command Line Buffer is provided which will allow you to enter more than one command at the system prompt. For example, you could type "DIR;TYPE MYFILE.DOC;B2:;ERA LETTER.TXT <return>". Each command is separated with a semicolon. This command would display the directory of the current drive, type the file MYFILE.DOC on the screen, log into drive B: user 2, and finally erase the file LETTER.TXT. Up to 200 characters can be entered on a single command line.

Z-System Utilities

The distribution disk set contains the standard ZCPR3 and ZRDOS utility files, as well as some of the newer video-oriented utilities written by members of the Z-System user community. In addition, a full complement of on-line help files are provided.

I used to think that help files were a waste of disk space and that the hard copy was all I needed. But using the computer's power to electronically "flip" through the pages of the on-line "book" while I was learning Z-System was much easier.

If you desire the source code to the Z-System utilities, it is available for a copying charge ($5 per disk). There is about 912K of files which will require 5 SSDD soft-sectored disks or 11 hard-sectored disks to contain the files.

For The Future

Analytical Products has plans to make Z-System bootable disks available for Magnolia and the H47/H67 controllers for the H-89, as well as the Heath controllers for the H-8. The current version only supports H17/H37 (and BIOS-80) or CDR operation on the H-89. Call them for information on availability of these products.

Conclusion

Analytical Products has done a fine job in producing a bootable Z-System disk for the H-89. They have implemented as many

features as possible while conserving available memory. No installation is required. Personal customization and relocatability (for add-on accessory boards) was simplified. If you have an H-89, you should not be without Z-System. If you were wondering about your skills to attempt a manual installation, consider Analytical Products bootable disk as the fastest way to get you into the heart of the power of Z-System!

Ordering Information

Z-System Bootable Disk Set for Heath/Zenith 89/90 computers with H17/H37 disk controllers or the CDR soft-sectored disk controller $98.00, specify disk format. Add $3.00 for shipping and handling. California residents add 6% sales tax. Pay by check, money order, Visa/Master Card or COD.

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