AMPRO

COMPUTERS, INCORPORATED

Z80 SYSTEM SOFTWARE
USER'S MANUAL

P/N: A74006−A

PREFACE

This manual is for users and integrators of systems based on AMPRO Z80-based single board computers using the CP/M operating system. It describes the software contained on the AMPRO Z80 System Software diskette. The optional AMPRO Z80 Hard Disk Software is available separately, on the Z80 Hard Disk Software diskette, and is described in the Z80 Hard Disk Software User's Manual. This manual includes:

Chapter 1 – GENERAL INFORMATION – Descriptions of the types of software available from AMPRO for the Z80A-based single board computers and systems. Conventions used in program operation descriptions.

Chapter 2 – OPERATING SYSTEM DESCRIPTION – Description of the AMPRO enhanced CP/M operating system, and the features provided by ZCPR3. Brief descriptions of the utilities and programs.

Chapter 3 – SOFTWARE INSTALLATION – Information on customizing the standard system software diskette for unique system requirements.

Chapter 4 – AMPRO UTILITY PROGRAMS – Detailed descriptions and operating instructions for the AMPRO-specific system utility programs.

Chapter 5 – ZCPR3 PROGRAMS – Detailed descriptions and operating instructions for the ZCPR3 programs and utilities on the system diskette.

Chapter 6 – PUBLIC DOMAIN PROGRAMS – Detailed descriptions and operating instructions for the public domain software included.

Chapters 4, 5, and 6 provide a user reference with the programs in each group are arranged alphabetically. The program names appear on the bottom of each page so that you can find them easily.

Each AMPRO program has a version number, and revision level. For example "Version 2.3" represents program Version 2, Revision 3. The version number is changed when a new program description is required. Most programs display their version number when you run them so that you can tell which version you are using.

PLEASE NOTE

Specifications and descriptions are subject to change without notice. Updates are available from AMPRO at a nominal charge. The contents of this document are believed to be accurate. If errors are found, please notify AMPRO at the address shown on the title page of this document.

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TABLE OF CONTENTS

      AMPRODSK   Disk copy, format, verify
      CONFIG   System configuration
      DOS   PC floppy drive emulation
      DOSFMT   PC diskette formatter
      ESET   Format translation
      MOVCPM/ZMOVCPM   Relocates operating system
      MULTIDSK   Read/write of non-AMPRO formats
      MULTIFMT   Format of non-AMPRO formats
      SET   Modifies port configurations
      SWAP   Re-assign drive letters
      SYSGEN   Copies system between disks
      48TPI   96tpi-to-48tpi Translation

CHAPTER 5 - ZCPR3 PROGRAMS

ALIAS	Creates multi-command files
CRC	Generates file CRC values
DIFF	Compares files
DIR	Displays directories
DISK7	File copy/rename/delete/length
LDR	Loads ZCPR3 system segments
MCOPY	Copies files between directories (DU)
MENU	System menu shell program
PATH	Modifies command search path
TCMAKE	Creates custom termcap file
TCSELECT	Selects standard termcap file
UNERASE	Restores erased files (when possible)
Z3INS	Installs ZCPR3 utilities
ZEX	Memory-based batch

CHAPTER 6 - PUBLIC DOMAIN PROGRAMS

MDM740	Communications (AMPRO version)
SD	"Super Directory"
SWAPCOPY	Single drive copy (AMPRO version)

CHAPTER 1

GENERAL INFORMATION

1.1 INTRODUCTION

This chapter primarily describes the four types of software available for the AMPRO Z80-based single board computers and computer systems. Conventions to be used in program operating instructions are defined, and references for further information are listed.

1.2 SOFTWARE TYPES

There are four types of software available from AMPRO for its Z80-based products. Brief descriptions of each of the following appear in Chapter 2, while detailed descriptions and instructions for use are contained in Chapters 4, 5, and 6.

Operating System - CP/M 2.2 operating system and utilities, AMPRO custom Basic I/O System (BIOS), and the ZCPR3 CP/M enhancement.

AMPRO-Specific Utility Programs - Programs specifically developed to support the AMPRO single board computers and computer systems. Used for disk formatting and copying, disk format translation, system configuration, etc.

ZCPR3 Utility Programs - Programs useful in gaining the full value of the ZCPR3 CP/M enhancement. Included are utilities for: directory, file copy, file management, multi-command file generation, command search path, batch facility, and a powerful menu program.

Public Domain Programs - Several valuable programs, including communications, single drive copying, bad sector lockout, etc.

These programs are provided on the system software diskette. The optional hard disk software utilities are available separately on the Z80 Hard Disk Software diskette, and are covered in the Z80 Hard Disk Software User's Manual. One AMPRO program not described in this manual, the FRIENDLY Integrated Operating Environment, is also available separately.

1.3 CONVENTIONS

In the descriptions of the use of software utilities, terminal keyboard inputs which you will make to the system are shown underlined. This has been done to make it easy for you to distinguish between the computer's prompts and the operator's keystrokes. For example:

        A0>DIR <RETURN>

Also, certain keys on your terminal's keyboard have special uses. The control key, generally labeled CTRL, is meant to be pressed at the same time as one other key. The required control key combination will be represented as follows: <CTRL-C> = control key pressed along with C key.

Two other special keys are the "escape" key, indicated by <ESC> and the "return" key (also called the "carriage return" or "enter" key), indicated by <RETURN>. In general, all commands you enter from the CP/M (or ZCPR3) command prompt require you to press <RETURN> key to begin the operation, as in the example above.

1.4 REFERENCES

Whenever a software utility is mentioned, it will either be called an AMPRO utility, a CP/M utility, or a ZCPR3 utility. This way you will know where to obtain further information on the program's use.

CP/M References

CP/M Handbook, by Rodnay Zaks (Sybex Inc.)

CP/M Primer, by Stephen M. Murtha and Mitchell Waite (Howard W. Sams)

CP/M Revealed, by Jack D. Dennon (Haydon Publishing)

The Programmer's CP/M Handbook, Andy Johnson-Laird (Osborne/McGraw-Hill)

ZCPR3 Reference

The definitive ZCPR3 reference manual is:

ZCPR3: The Manual, by R. L. Conn (Echelon Inc. - Phone: 415/948-3820)

This manual is available from Echelon Inc. - Phone: 415/948-3820 or New York Zoetrope, Suite 516, 80 East 11th St., New York, N.Y., 10003.

User's Bulletin Boards

In addition, there are many CP/M and ZCPR3 user's groups and bulletin board systems, which can provide much useful information and software, including:

AMPRO1: AMPRO USER'S BULLETIN BOARD
(408) 258-8128
24 hrs/day, 7 days/week, 300/1200 baud

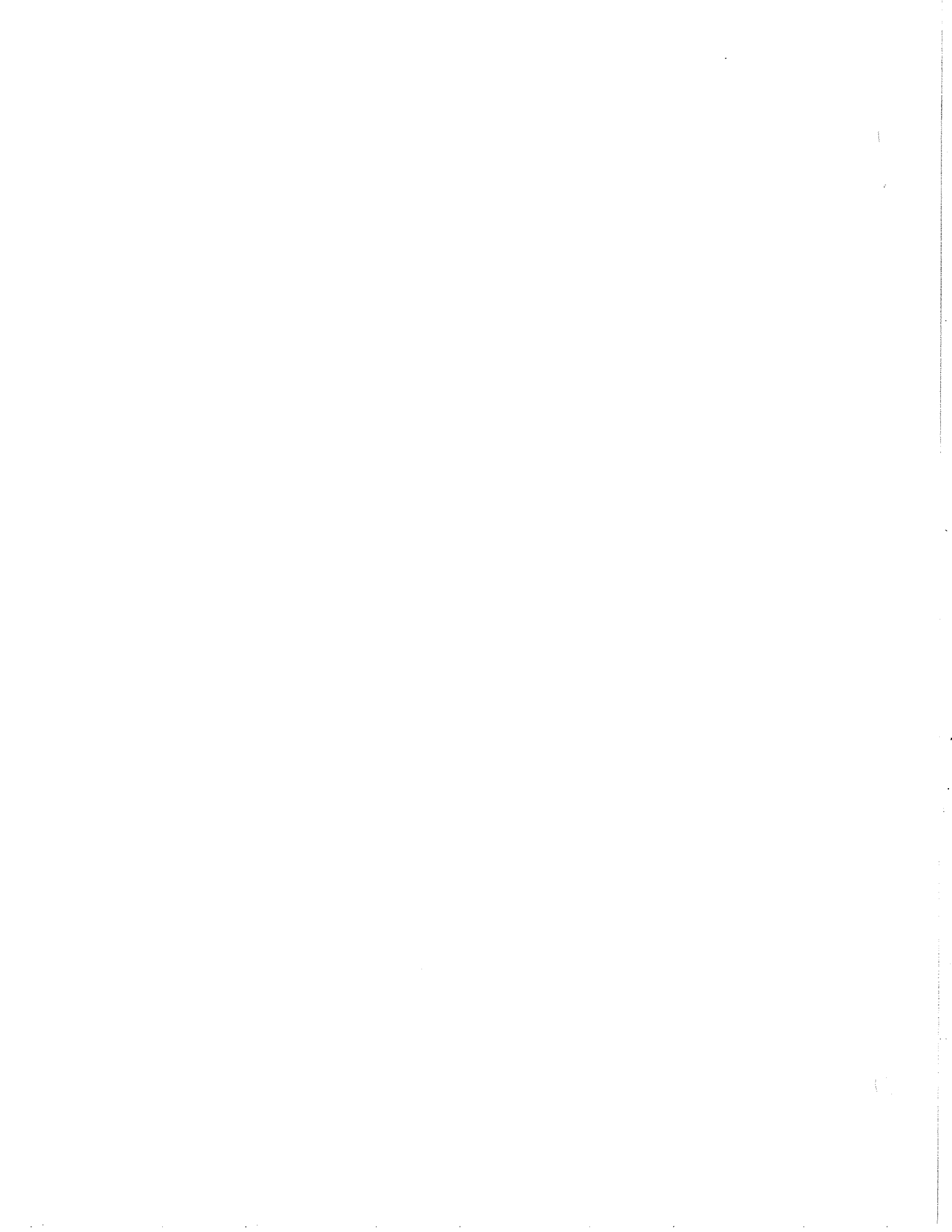**AMPRO2: AMPRO USER'S BULLETIN BOARD**
(415) 962-9023
24 hrs/day, 7 days/week, 300/1200 baud

Z-NODE CENTRAL
ZCPR3 User's Bulletin Board
(415) 489-9005
300/1200 baud

CHAPTER 2

OPERATING SYSTEM DESCRIPTION

2.1 INTRODUCTION

This chapter provides a description of the AMPRO enhanced CP/M operating system, along with brief descriptions of each of the utilities and programs available through AMPRO on the Z80 System Software diskette. The optional AMPRO Z80 Hard Disk Software and the unique and powerful FRIENDLY Integrated Operating Environment, available separately from AMPRO, are covered in other user's manuals.

Detailed descriptions and operating instructions for the utilities and programs are provided in Chapter 4 (AMPRO Utility Programs), Chapter 5 (ZCPR3 Programs), and Chapter 6 (Public Domain Programs). Further information on the CP/M 2.2 operating system and the ZCPR3 CP/M enhancement may be obtained from the references listed in the introduction to Chapter 1.

The hard disk software utilities necessary to format and install hard disk drives in your system are available on the optional Z80 Hard Disk Software diskette.

2.2 OPERATING SYSTEM FEATURES

The operating system included with the your system is an enhanced version of standard CP/M version 2.2. One major difference is that the user command line interface (Console Command Processor, CCP) is replaced by an enhanced Z80 Command Processor Replacement called ZCPR3. The AMPRO CP/M operating system consists of three portions:

> CP/M 2.2 BDOS: Standard CP/M file and device management facility
>
> AMPRO Custom BIOS: Enhanced Basic I/O System
>
> ZCPR3 CCP: Z80 Command Processor Replacement version 3

In addition, a powerful replacement for the CP/M 2.2 BDOS, called "ZRDOS", is available in the optional AMPRO ZRDOS Distribution Disk. ZRDOS provides a number of enhancements relative to the CP/M BDOS. Contact your dealer or distributor for additional information.

2.2.1 CP/M 2.2 BDOS

The heart of the AMPRO CP/M operating system is the Basic Disk Operating System (BDOS), which is the normal CP/M 2.2 BDOS. This is the part of the operating system that interacts with programs. Because this is completely standard CP/M 2.2, all software programs designed to work with CP/M 2.2 will run without modification, provided they do not contain hardware-dependant routines.

2.2.2 AMPRO Custom BIOS

The CP/M Basic I/O System (BIOS) takes care of all hardware-dependant operating system functions. Many features of the AMPRO CP/M operating system are the result of a highly flexible, sophisticated BIOS implementation. Here are a few:

Automatic Format Sensing - Single- and double-sided, 40- and 80- track disks and drives may be intermixed freely. The BIOS senses which format is present, and adjusts accordingly. 40-track (48 tpi) diskettes may even be read (but not written) in 80-track (96 tpi) drives. (NOTE: CP/M requires that you use a <CTRL-C> keystroke when you change diskettes.) You can also boot a double-sided 48 tpi system disk in a double-sided 96 tpi drive.

Alien Format Support - One disk drive can be assigned as an "emulating" drive, so that you can read from or write to your choice of non-AMPRO format.

Hard Disk Support - You can add one or more hard disk controllers and drives to your system. The BIOS contains generic SCSI (SASI) support, making it compatible with a wide variety of devices, and has been structured to maximize the flexibility of this function. The hard disk software utilities necessary to format and install hard disk drives in your system are available on the optional Z80 Hard Disk Software diskette.

Power-up Port Defaults - You can easily alter the system power-up I/O port defaults (console baud rate, printer port assignment and setup, etc.) using the AMPRO configuration utility.

Power-up Auto-Command - A single command can be specified to run automatically on system power-up or reset. This is one of the options available through the AMPRO configuration utility.

IOBYTE Implementation - The IOBYTE can be changed by the CP/M STAT utility, to reassign logical I/O devices to physical I/O devices. Table 2-1 shows the standard CP/M logical-to-physical device assignments and choices, as supported in the AMPRO BIOS.

As implemented, the IOBYTE allows two choices for console port (Serial Port A or Serial Port B), and three choices for printer port (Serial Port A, Serial Port B, or Parallel Printer Port).

In addition, the AMPRO CONFIG utility program allows you to set the IOBYTE either temporarily, or in the cold-boot defaults on the system tracks of a disk.

Table 2-1. Logical-to-Physical I/O Assignments

Logical Device	Physical Device Choices	Default
CON: RDR: PUN: LST:	CRT: or TTY: TTY: (input) TTY: (output) CRT: or TTY: or LPT:	CRT: TTY: TTY: LPT:
Where:	CRT: = Serial Port A TTY: = Serial Port B LPT: = Parallel Printer Port	

2.2.3 ZCPR3 Command Processor

The normal CP/M console command processor (CCP) has been replaced with the more powerful Z80 Command Processor Replacement, version 3 (ZCPR3). As indicated in Table 2-2, the ZCPR3 implementation differs slightly from standard CP/M, but can be used in much the same way you would use standard CP/M. If you wish to eliminate the ZCPR3 enhancement, you can do so through the use of the AMPRO MOVCPM utility. Refer to the Chapter 3 for information on how to do this.

Your system software includes only part of the full power of the ZCPR3 System; the full ZCPR3 System occupies several megabytes of disk! The following paragraphs cover the ZCPR3 features that are present in the standard AMPRO CP/M operating system software. Additional ZCPR3 options can be easily added, as discussed in Chapter 3. Contact Echelon Inc. (Phone: 415/948-3820) for additional ZCPR3 information and support. ZCPR3 utilities and information are also available at no charge through many CP/M and ZCPR3 user groups and bulletin board systems.

Sub-Directories

Each floppy disk has a directory of files; each directory can contain up to 16 sub-directories (also called user areas), numbered 0 through 15. Normal CP/M uses the USER command to change between the 16 possible sub-directories, with the default being 0. ZCPR3 uses a directory label formed from the combination of the drive letter (A, B, etc.) and user area (0,1, etc.). This is called a drive-user, or "DU" expression. For example, A0 represents drive A user area 0, while B15 corresponds to drive B user area 15.

Using ZCPR3, the current drive and user area are displayed in the command prompt. Instead of using CP/M's USER command to change user areas, you do it in the same way that you change drives. In addition, whenever you use the DU expression, you may omit either the letter or number portion, if that part of the expression is the same as the current one. For example:

```
A0>B15:<RETURN>
B15>0:<RETURN>
B0>A:<RETURN>
A0>
```

In addition, functions such as directory (DIR), erase (ERA), rename (REN), etc., allow the DU form as destination and source directory designations.

Another powerful feature of ZCPR3 is the option of "named" sub-directories. When the named directory option is present, a directory name can be substituted for the DU expression in all command line inputs. This feature is not present in the AMPRO system software as shipped, but can be easily added. Please refer to the above-mentioned software references for further information.

Table 2-2. ZCPR3/CCP Command Comparison

Function	ZCPR3 Command	CCP Command
Display all files	DIR	DIR
Display files in specific DU	DIR DU:	No equivalent
Erase specified file	ERA DU:afn	ERA D:afn
Erase with verify	ERA DU:afn V	No equivalent
Rename file	REN DU:ufn=ufn2	REN D:ufn=ufn2
Rename file over existing file	REN DU:ufn=ufn2	No equivalent
Print file on console Without paging	TYPE DU:ufn P	TYPE D:ufn
Print file on console With paging	TYPE DU:ufn	No equivalent
Save memory into file	SAVE n DU:ufn	SAVE n D:ufn
Save memory into file and specify size in hex	SAVE nH DU:ufn	No equivalent

Save memory into file
   and specify number of
   blocks
	SAVE n DU:ufn S
	or
	SAVE nH DU:ufn S
		No equivalent

Change disk	D:	D:
Change user	U:	USER n
Change disk and user at same time	DU:	No equivalent

DU: - Drive number,User number	(e.g., A0:, B15:, C:, 13:)
ufn - Unambiguous file name	(e.g., MYFILE.TXT, DIR.COM)
afn - Ambiguous file name	(e.g., *.COM, MYFILE.*, M??ILE.T?T)

Directory Utility

In AMPRO's ZCPR3 implementation, the DIR utility is not an "intrinsic" (internal) function, but requires the presence of the ZCPR3 DIR.COM utility on disk. As you will notice as soon as you use this command, the DIR utility has quite a few nice features, such as alphabetical file sorting and direct access to any directory. For example

    A0>DIR B5:<RETURN>

displays the directory of drive B, user area 5 (sorted alphabetically!).

Also, since the directory utility is disk-based rather than internal, you can select from a large assortment of public domain directory utilities -- simply rename your favorite one "DIR.COM".

Multiple Commands per Line

With ZCPR3, multiple commands may be given on a single command line, with semi-colons (;) used as separators. For example, the sequence

    A0>DIR;ERA *.BAK;DIR<RETURN>

runs the directory program, erases all files with the .BAK type, and then runs the directory program a second time.

Command Search Path

ZCPR3 also uses an automatic command search path. This means that programs referenced on the command line may be located anywhere along a pre-defined command search path. You can be logged onto drive B, and execute a program on drive A, without typing the drive prefix for the program drive. The default search path is:

    current drive, current user
    current drive, user 0
    drive A, current user
    drive A, user 0
    drive A, user 15
    current drive, user 15

Since the search path covers both different drive letters and different user area numbers, you can "hide" programs and utilities in different user areas. This results in cleaner looking directories. A common practice is to "hide" COM files (programs) in user 15. Such files will not be visible from user 0, but will execute from user 0.

NOTE

> Some application programs must be run from the same drive
> letter and user area as the files they will be used with,
> or require additional programs, overlays, or files to be
> present in the same directory (drive and user area) as the
> program itself.

The ZCPR3 DISK7 and MCOPY, and the AMPRO FRIENDLY utilities can be used to copy files directly between user areas. The ZCPR3 PATH utility allows you to easily change the search path as needed.

Intrinsic Commands

With the exception of the DIR and USER commands noted above, all standard CP/M version 2.2 intrinsic commands are implemented, as well as some additions. Table 2-2 lists the ZCPR3 commands versus those of the standard CP/M CCP.

Aliases

One of the most powerful features of ZCPR3 is the use of aliases. This feature is made possible by the multiple command line capability. An "alias" is a disk-resident multiple command line. The alias has a command file name, such as FUNCTION.COM, but represents a pre-programmed set of commands. Whenever you run the alias, you get the set of commands. It is like a fast, memory-based submit, or batch, facility. By using an alias (usually STARTUP.COM) as the CONFIG auto-command, you can have a complex sequence of functions automatically initialize your system on power-up or reset.

Shells

ZCPR3 also provides shell support. A "shell" is a substitute operating environment. Examples of ZCPR3-compatible shells are ZCPR3 MENU, VMENU, and VFILER, and AMPRO FRIENDLY. A shell is a program that always reloads following the execution of any program, rather than returning you to the command prompt. Once a shell is loaded, you might never see the A0> prompt again! ZCPR3 shells provide varying levels of isolation of the user from the operating system, and can even completely replace the CCP interface. The powerful MENU shell program is included on your system diskette.

Termcap Facility

ZCPR3 adds another powerful feature to CP/M which is lacking in most microcomputer operating systems: a termcap facility. The AMPRO CP/M implementation contains a special buffer area in memory which is used by ZCPR3 to standardize terminal display control codes. This allows application programs to be terminal-independent, providing the software is written to take advantage of the ZCPR3 termcap. The ZCPR3 utilities TCSELECT and TCMAKE are used to create a termcap file, usually called MYTERM.Z3T. The ZCPR3 utility LDR is used to load the appropriate termcap file into memory, for use by compatible programs.

Extended ZCPR3 Support

ZCPR3 is a highly configurable system. Additional ZCPR3 configurations and utilities are available in the optional AMPRO Extended ZCPR3 Support Package. This package includes several alternative ZCPR3 configurations which are easily installed using a utility provided.

2.3 STANDARD CP/M UTILITIES

Included on your system software diskette are all the standard CP/M utility programs. Consult the references listed in the introduction of Chapter 1 for further information on their use.

ASM.COM - Standard assembler for 8080 instructions. May be used to assemble AMPRO source code.

DDT.COM - Dynamic Debugging Tool: standard CP/M debugger.

DUMP.COM - Permits display of a file in hexadecimal values.

ED.COM - Standard CP/M line editor. May be used to edit AMPRO source code.

LOAD.COM - Converts .HEX file output of the ASM program to an executable .COM file.

PIP.COM - Permits single or multiple disk-to-disk file transfers. Also port-to-port and port-to/from-disk transfers.

STAT.COM - Status of disk and other I/O devices. Also may be used to set file attributes.

SUBMIT.COM - Permits execution of multiple commands and parameters stored in a disk file.

XSUB.COM - For use with SUBMIT.COM, to allow passing of parameters direct to programs.

2.4 AMPRO-SPECIFIC UTILITIES

The following programs are specific to AMPRO hardware, and used for system customization, disk formatting, disk format translation, etc. Source code is available from AMPRO at nominal cost. Detailed descriptions and instructions appear in Chapter 4.

The hard disk software utilities necessary to format and install hard disk drives in your system are available on the optional Z80 Hard Disk Software diskette.

AMPRODSK.COM - Used to copy, format, and verify AMPRO-format disks.

CONFIG.COM - Used to modify or set your system's current or powerup default peripheral port characteristics according to your particular requirements. Lets you set serial port A and B baud rates, data characteristics, and hand-shaking, floppy drive step rates, printer port choice (serial or parallel), and command for power-up or reset automatic execution.

DOS.COM - Used to read and write files on PC-DOS format disks. Also used to read the directory and erase files.

DOSFMT.COM - Used to format PC-DOS disks in all standard formats.

ESET.COM - Permits reading and writing of data to and from disk formats other than those available with the MULTIDSK.COM utility. (See MULTIDSK.COM)

MOVCPM.COM - Configures the operating system for a user-definable memory size. Same as ZMOVCPM.COM, except contains the standard CP/M CCP. Used as part of the procedure for generating a hard disk system, if ZCPR3 is not desired.

MULTIDSK.COM - Provides compatibility with other computers' disk formats. After MULTIDSK is run, you can read from or write to the selected alien format by using the drive letter "E" instead of the drive's normal designation (A, B, etc.).

MULTIFMT.COM - Permits formating (and verifying) disks using non-AMPRO formats.

SET.COM - Allows setting of current serial port characteristics (baud rate, data characteristics, hand shaking) and assignment of printer port (serial or parallel). Similar to CONFIG.COM, but all parameters are given from the command line, thus allowing use with ALIASes, MENU lines, etc.

SWAP.COM - Re-assigns CP/M disk drive letters, swapping them in pairs.

SYSGEN.COM - Used to write the AMPRO CP/M operating system tracks onto a disk. Allows source of the system tracks to be either another disk's system tracks, a disk file, or a memory image (generally placed in memory by MOVCPM or ZMOVCPM).

ZMOVCPM.COM - Configures the operating system for a user-definable memory size. Same as MOVCPM.COM, except contains the ZCPR3 CCP replacement. Used as part of the procedure for generating a hard disk system.

2.5 ZCPR3 UTILITIES

The following ZCPR3 utilities are included on the system software diskette. Source code is available from ECHELON Inc. (415/948-3820) at nominal cost. Detailed descriptions and instructions appear in Chapter 5. Consult the references listed in the introduction to Chapter 1 for additional information on these and other ZCPR3 utilities.

ALIAS.COM - Used to create or modify multiple command line files (aliases).

CRC.COM - Generates Cyclic Redundancy Check (CRC) values for files.

DIR.COM - Displays contents of disk directories. Allows direct drive/user area (DU) access.

DIFF.COM - File compare utility. Checks two files for differences.

DISK7.COM - Easy to use disk file management utility. Includes a menu of single-keystroke commands for Copy, Rename, Delete, Length, and drive Status.

LDR.COM - Used to load terminal definition files (e.g. MYTERM.Z3T), system environments, and other system-resident ZCPR3 files.

MCOPY.COM – General purpose file copying program. Allows direct file movement between directories (e.g. A0 to B15).

MENU.COM – Powerful system menu shell program.

PATH.COM – Used to temporarily alter command search path.

TCMAKE.COM – Used to create non-standard terminal definition files (e.g. MYTERM.Z3T).

TCSELECT.COM – Used to select a standard terminal definition file from a menu of standard terminals.

UNERASE.COM – Recovers deleted disk files. Inverse of the ERA (erase) command.

Z3INS.COM – ZCPR3 installation utility. Installs other ZCPR3 utilities for your operating system configuration. AMPRO-suplied ZCPR3 utilities do not require installation prior to use with the standard AMPRO-supplied operating system.

ZEX.COM – Memory-resident batch processor, similar to CP/M's SUBMIT utility, but more powerful.

2.6 PUBLIC DOMAIN PROGRAMS

Several valuable public domain programs have also been included. Source code for these programs is available through CP/M user groups and bulletin board systems. Brief descriptions and instructions for these programs are included in Chapter 6.

MDM740.COM – General purpose, powerful communication program. Modified for use with the AMPRO serial port B. (AMPRO-specific overlay is contained in the file, M7-LB.ASM.) Allows direct computer-to-computer file transfer over RS232, or may be used with a modem. Features include ASCII transfer or XMODEM protocol, auto dialing, stored phone library, and more.

SD.COM – Directory display utility alternative to DIR.COM. Options you may specify in the command line allow printing the directory, creating a file containing the directory, and inclusion of multiple user areas.

SWAPCOPY.COM – Single drive disk-to-disk copy utility. Modified for use with AMPRO foreign formats (allows copying from A to A, A to E, and E to A).

2.7 GENERATING DIFFERENT SYSTEMS

There are several reasons why you may wish to generate an alternate operating system:

(1) Use of hard disk drives

(2) Alternate ZCPR3 system configurations

(3) Memory requirements of a modified BIOS or custom software

(4) Substitution of standard CP/M CCP for ZCPR3 CCP

(5) Generation of a larger TPA system, using the Version 1 BIOS

In the first three cases, additional buffer areas are required in high memory, above the operating system. This requires moving the operating system **down** in memory, and leaving room for the required functions. In the fourth case, the use of CP/M results in less memory required for the operating system, allowing the operating system to be moved **up** in memory. In the fifth case, slightly more program area is made available by using a BIOS with a few less features.

The AMPRO utilities MOVCPM.COM or ZMOVCPM.COM are used to relocate or regenerate the operating system. Refer to the Chapter 3 for additional information on the generation of alternate CP/M configurations.

CHAPTER 3

SOFTWARE INSTALLATION

3.1 INTRODUCTION

This chapter provides information on generating a custom system software diskette. The modifications which you may wish to make to your system software fall into several categories. If you plan to add hard disk support, you will require the optional Z80 Hard Disk Software and Hard Disk Software User's Manual, available through AMPRO.

Here are some ways your system can be customized:

● Changing system initialization parameters

● Customizing the terminal characteristics file

● Adding hard disk support

● Installing alternate ZCPR3 environments

● Substitution of standard CP/M CCP for ZCPR3 CCP

● Generation of a larger TPA system, using BIOS Version 1

This chapter describes the procedures required to customize your system software in these ways, except for addition of hard disk support which is covered in the Z80 Hard Disk Software User's Manual. For further details on the operation of the utility programs referenced in this chapter, consult the program descriptions in Chapter 4 (AMPRO Utilities), Chapter 5 (ZCPR3 Programs), and Chapter 6 (Public Domain Programs).

There are two things it is recommended that you do immediately:

1. Make a backup copy of the disks included with your system.

2. Customize your system disk boot parameters.

NOTE

Any modifications to the system parameters should only be performed using your backup disks. **Do not** use the disks shipped with your system.

3.2 MAKING BACKUP DISKS

It is always a good idea to have at least one backup copy of all floppy disks. This is especially true of your master system disks. The exact procedure you use to make backup disks depends on your system configuration. Here are three methods:

Method 1: Two identical format types. - When making a backup in which the source and destination disks will be the same floppy format (i.e., 48 to 48 tpi, or 96 to 96 tpi), the backup can easily be made with the Copy function of the AMPRO AMPRODSK utility. The only catch is that AMPRODSK requires the source and destination to be the same floppy format and drive type. One exception is that double-sided drives can be used to copy from or to single-sided floppy formats. The AMPRODSK Copy funtion even formats the destination disk for you. Simply follow the instructions given by the program when you run it.

NOTE

AMPRODSK can not read 48 tpi disks in 96 tpi drives. Use Method 2.

Method 2: Two different drive types. - You can backup a source disk onto a different floppy format (e.g. 96 tpi backup of 48 tpi disk or visa versa), as follows:

1. Use the AMPRODSK utility's Format function to format a fresh disk having the desired destination format, in the destination drive.

2. Use a file copy utility (CP/M PIP, ZCPR3 DISK7, ZCPR3 MCOPY, AMPRO FRIENDLY, etc.) to copy all files from the source to the destination disk.

3. If the source disk is a system disk, use the AMPRO SYSGEN utility to copy the source system tracks to the destination system tracks.

Method 3: Single-drive Systems. - If you have a system with only one disk drive, you can do nearly anything that can be done with two or more drives. For example, a backup of your system software diskette can be made as follows:

1. Use the AMPRO AMPRODSK utility's Format function to format a blank disk. The program will indicate what you need to do.

2. Use the AMPRO SWAPCOPY utility to copy all files from the source system disk to the backup disk. The required command is:

A0>SWAPCOPY *.* <RETURN>

3. Use the AMPRO SYSGEN utility to copy the system tracks from the source disk to the backup disk. The program will indicate what to do.

3.3 SYSTEM INITIALIZATION PARAMETERS

When using your system for the first time, some of the system initial default values are probably not perfect for your system configuration. The AMPRO CONFIG utility allows you to easily modify the serial port setups (baud rates, handshaking, etc.), printer port assignment (serial or parallel), floppy drive step rates, and automatic powerup/reset command.

As shipped, the CP/M system diskette's default boot parameters are as shown in Table 3-1.

Table 3-1. System configuration defaults.

Parameter	Default Value	
Terminal Port:	Serial Port A	
Printer Port:	Parallel Port	
Max. Drives:	4	
Step Rate:	6 mS, 6 mS, 6 mS, 6 mS	
Autocommand:	startup	
Serial Port A		
configuration:	data bits	8
	stop bits	1
	parity	none
	baud rate	9600
	hand shake	no
Serial Port B		
configuration:	data bits	8
	stop bits	1
	parity	none
	baud rate	300
	hand shake	no

One important parameter to be sure to set correctly is the floppy disk drive step rate. Initially, the system disk is set up for, and boots with, a step rate of 6 mS. Check your drive's step rate specification, and set the default step rate to the one that is closest to the drive's specification. The CONFIG utility will guide you through its use.

3.4 TERMINAL CHARACTERISTICS FILE

As mentioned in Chapter 2, ZCPR3 provides a terminal characteristics facility, or "termcap," which allows programs and utilities to take advantage of your terminal's specific control codes. The termcap data is contained in a file having the "Z3T" extent (normally MYTERM.Z3T), and is loaded with the ZCPR3 system segment loader, LDR.COM (see Chapter 5).

As shipped, your system software diskette contains a generic MYTERM.Z3T file which is usable only with the ZCPR3 MENU program. You will probably wish to customize MYTERM.Z3T for your terminal. Once you do, you will find the MENU screen looks nicer, and writes to the screen faster.

Use either the ZCPR3 TCSELECT or TCMAKE utilities to create a version of MYTERM.Z3T appropriate for your system. The file on your system disk called STARTUP.COM contains the command line:

LDR MYTERM.Z3T; MENU

which invokes the ZCPR3 system segment loader utility (LDR.COM) to load your MYTERM.Z3T termcap into memory, and then runs the ZCPR3 MENU program. STARTUP is run automatically on powerup or system reset, as long as it is the "autocommand" set with the AMPRO CONFIG utility.

3.5 ALTERNATE ZCPR3 CONFIGURATIONS

As mentioned previously, the ZCPR3 CP/M enhancement provides a great many features and options. The normal AMPRO system diskette includes but one of many possible ZCPR3 configurations. For each possible ZCPR3 system configuration, there is a specific a ZCPR3 Environment Descriptor, along with a set of system segments which must be loaded into the proper memory locations.

Normally, changing ZCPR3 configurations requires reassembly of the system BIOS, and rebuilding of the system. The AMPRO operating system contains a default environment within the BIOS buffer area (located at FE00H), which is loaded and initialized by the BIOS on cold boot. This allows a subset of ZCPR3 features to be immediately available on powerup. More importantly, if the environment base address (FE00H) is kept invariant, it is possible to change ZCPR3 configurations without having to reassemble the BIOS, providing that the system segments required by each configuration are loaded immediately after cold boot, prior to any other system operation. (By having the default environment loaded with the BIOS at cold boot, the ZCPR3 multiple command line can be used to load alternative environments and system segments, etc.)

When available, alternative ZCPR3 configurations will be contained in files on your system diskette. The files associated with each configuration have a common file name (Z1, Z2, etc.), and an appropriate file type (extent). The number used to identify the configuration (1,2,...) will indicate how many extra K bytes of BIOS buffer space is required for use with that configuration. For example, the files associated with configuration 1 are called:

ZAMPRO1.DOC DOCumentation for installing and using configuration 1.
ZAMPRO1.ENV ENVironment descriptor file for configuration 1.
ZAMPRO1.FCP Flow Command Package for configuration 1.
ZAMPRO1.IOP Input/Output Package for configuration 1.
ZAMPRO1.RCP Resident Command Package for configuration 1.
ZAMPRO1.COM Alias to load configuration 1.

The DOC file describes the corresponding ZCPR3 Configuration's features, installation, and use. When making space (using ZMOVCPM) reduce the "CP/M size" by the number of K bytes indicated in the configuration's file name. For example ZAMPRO1 files correspond to a configuration which requires 1K additional space. In that case, since a 20 megabyte storage hard disk system requires a "59K CP/M" system, a ZCPR3 configuration based on the ZAMPRO1 files would require a 58K CP/M system. In this case "58" is the parameter you give ZMOVCPM.COM in preparation for system installation.

3.6 CP/M CCP OPTION

If, for some reason, you do not wish to use the ZCPR3 feature of the AMPRO CP/M operating system, you can create a system version which has the normal CP/M 2.2 Console Command Processor (CPM) instead. This is easily done by means of the AMPRO MOVCPM.COM utility, as follows:

NOTE

This must be performed from the CP/M command prompt, not from a shell as provided in the ZCPR3 environment.

A0>MOVCPM 60 *<RETURN>

MOVCPM will respond with:

CONSTRUCTING 60K CP/M vers 2.2
READY FOR "SYSGEN" OR
"SAVE 41 CPM60.COM"
A0>_

Then run the AMPRO SYSGEN utility. Give <RETURN>, and no drive letter, in response to SYSGEN's source drive prompt. Then specify the destination drive letter on which you wish the CP/M system (without ZCPR3) to be placed.

NOTE: Some useful functions are not available without the ZCPR3 option. One such lost feature is the autocommand set using the AMPRO CONFIG utility.

3.7 BIOS VERSION 1 OPTION

An alternative AMPRO BIOS is also available on your system software diskette. It is the floppy-only BIOS Version 1, and has a few less features than the current BIOS version, but provides an additional 1K bytes of TPA space. Limitations of the Version 1 BIOS are:

- All floppy drives step at the same rate

- No automatic reading or booting of 48 tpi formats in 96 tpi drive (reading can, however, be done with the AMPRO 48TPI.COM utility)

- No drive letter re-assignment

- No hard disk support

This is how to install the Version 1 BIOS on a system diskette:

NOTE

This must be performed from the CP/M command prompt, not from a shell as provided in the ZCPR3 environment.

(1) Run ZMOVCPM (or MOVCPM), to create a temporary 61K system image file:

```
A0>ZMOVCPM 61 *<RETURN>
CONSTRUCTING 61K CP/M vers 2.2
READY FOR "SYSGEN" OR
"SAVE 41 CPM61.COM"
A0>SAVE 41 ZCPM61.COM<RETURN>
```

You have now created a file containing the system image for a 61K CP/M system (with ZCPR3).

(2) Combine the Version 1 BIOS with the 61K system image:

```
A0>DDT ZCPM61.COM<RETURN>        ...loads 61K system
DDT VERS 2.2
NEXT  PC
2A00 0100
-IV1BIOS.HEX<RETURN>             ...file name to overlay
-R3180<RETURN>                   ...overlays Version 1 BIOS
NEXT  PC
4F80 0100
-G0<RETURN>                      ...exits to CP/M
A0>SAVE 41 V1SYS.COM<RETURN>     ...saves Version 1 system
```

(3) Finally, install the new system by writing it to a diskette:

```
A0>SYSGEN V1SYS.COM<RETURN>
Enter Destination Drive? (A thru P)              B
Place Destination on B, then type <RETURN>       <RETURN>
Enter Destination Drive? (A thru P)              <RETURN>
A0>_
```
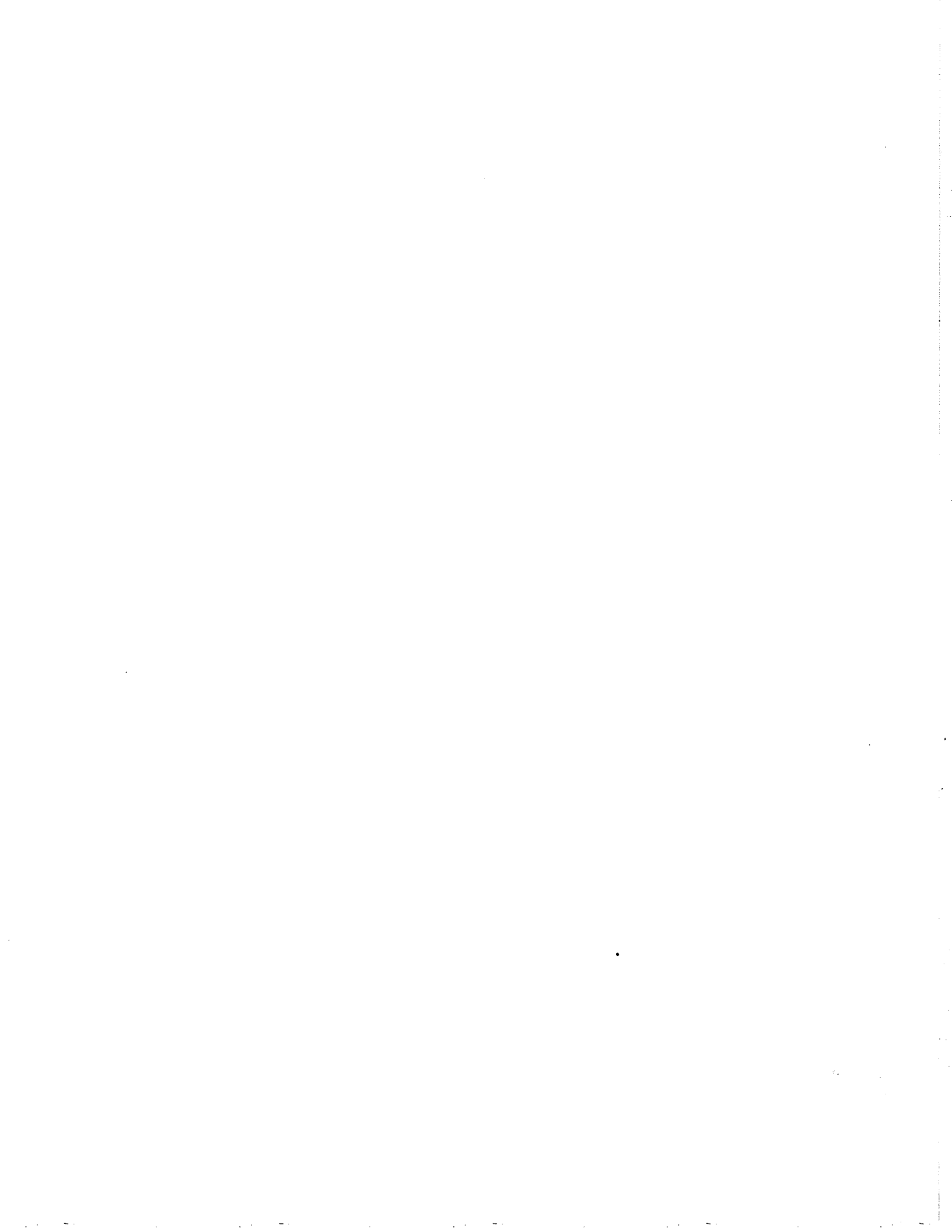
3.8 BIOS CUSTOMIZATION

Finally, you may wish to modify the standard AMPRO BIOS. BIOS source code is available from AMPRO for a nominal charge. The MSIZE constant in the BIOS determines the resulting system's "CP/M size" (60K CP/M, 59K CP/M, etc.) and should be set according to the memory requirements of your customized BIOS. This is what you need to do:

(1) Edit and assemble your modified BIOS.

NOTE

The following steps must be performed from the CP/M command prompt, not from a shell as provided in the ZCPR3 environment.

(2) Run ZMOVCPM (or MOVCPM), to create an unmodified system image corresponding to the required CP/M size. For example:

```
A0>ZMOVCPM 60 *<RETURN>
CONSTRUCTING 60K CP/M vers 2.2
READY FOR "SYSGEN" OR
"SAVE 41 CPM60.COM"
A0>SAVE 41 ZCPM60.COM<RETURN>
```

You have now created a file containing the system image for a 60K CP/M system, with the ZCPR3 CCP replacement. The number of pages to save is always 41.

(3) Combine your new BIOS with the moved (unmodified) system image:

```
A0>DDT ZCPM60.COM<RETURN>          ...loads unmodified system
DDT VERS 2.2
NEXT  PC
2A00 0100
-IBIOS.HEX<RETURN>                 ...identifies "BIOS.HEX"
-R3580<RETURN>                     ...overlays your BIOS.HEX
NEXT  PC
4F80 0100
-G0<RETURN>                        ...exits to CP/M
A0>SAVE 49 NEWSYS.COM<RETURN>      ...saves modified system
```

In this case, the overlay "offset" of 3580(hex). This is the right number for a 60K CP/M system. The other choices are:

CP/M SIZE	LOAD OFFSET	SAVE PAGES*
61K CP/M	3180	41
60K CP/M	3580	45
59K CP/M	3980	49
58K CP/M	3D80	49
57K CP/M	4180	49
56K CP/M	4580	49

(4) Finally, test the new system by writing it to a diskette:

```
A0>SYSGEN NEWSYS.COM<RETURN>
Enter Destination Drive? (A thru P)          B
Place Destination on B, then type <RETURN>   <RETURN>
Enter Destination Drive? (A thru P)          <RETURN>
A0>__
```

CHAPTER 4

AMPRO UTILITY PROGRAMS

4.1 INTRODUCTION

This chapter contains detailed information on each of the AMPRO-specific utility programs supplied on the standard AMPRO system software diskette, as well as those supplied on the optional hard disk software diskette. Each program's description explains what the program does and how it is used. The utilities are covered in alphabetical order, so this material can serve as a handy operator's reference.

Each program description is identified with a version number. When the utility program is run, its version number (and a revision level) appear in the program's sign-on message, for example:

AMPRO Copy/Format/Verify Utility
Copyright (C) 1984 AMPRO Computers, Inc.
Version 1.6

In this case the program is Version 1, Revision 6. Revisions of a utility program having the same version number operate in the same manner. If a future version of a particular utility program requires a new description, its version number will be changed, to indicate that the old description is no longer accurate. Program descriptions for the new program version will be available, so that you can update this manual.

4.2 PROGRAM DESCRIPTIONS

The following pages contain the program descriptions of the AMPRO Z80 system utilities, alphabetically arranged.

The utilities for formatting and installing hard disk drives, are available on the optional AMPRO Z80 Hard Disk Software diskette, are described in the Hard Disk Software User's Manual.