

# MICROSOFT Z-80 SOFTCARD



# THE Z-80 SOFTCARD: A LITTLE STROKE OF GENIUS FOR YOUR APPLE II

As the Apple II™ computer, with its spectacular graphics and wide range of peripherals, has become more and more popular over the last couple of years, we at Microsoft found ourselves faced with an interesting dilemma—

**“How to make our wide range of systems software packages (which we modestly describe as ‘superb’) available to the ever-growing ranks of Apple owners?”**

That question increasingly occupied us as we began to get more and more requests from Apple owners, hungry for different kinds of software to run on their computers.

**“Give us a really good BASIC interpreter, BASIC Compiler, FORTRAN and COBOL!” they cried. “And more choice in word processors and business applications!”**

After all, we already had FORTRAN, COBOL and BASIC Compiler, in addition to our industry standard BASIC interpreter, all for Z-80/8080 based machines. And enthusiastic Apple owners seemed an excellent market for them.

**But we had one little problem.**

The Apple is a 6502 machine. A majority of our software is written for Z-80/8080. The difference would make transferring our software impossible, yet rewriting it would be

a huge, time-consuming new project. Not only would new software be a long time in coming, but it would of necessity be much more expensive than the cost at which we could sell our existing base of proven software. Things didn't look good.

**That's when we had a little Microsoft stroke of genius.** (The same kind of genius that inspired Microsoft to write the first micro-computer BASIC.)

## WHY NOT PUT A Z-80 PROCESSOR IN THE APPLE?

The Apple would use the Z-80 for running Z-80 software and switch to the 6502 for running Apple software. It sounded good to us right off. And as we thought more about the whole range of Z-80 software that would run in the same environment required by our software, it became obvious that a Z-80 SoftCard would not only be **good** for us but **great** for Apple owners. Suddenly all of the Microsoft languages plus a plethora of excellent word processors and business applications would be within their grasp.

To make a long story short, we did it! And by the time the package was complete, it included the plug-in SoftCard, the CP/M® operating system and Microsoft BASIC, plus various software utilities and complete documentation.

## WHY CP/M?

Next to the SoftCard itself, CP/M is the most important key to allowing a wide variety of Z-80 software to run on the Apple and we include version 2.2 of the CP/M operating system in the SoftCard package. Introduced in 1975 by Digital Research, Inc., CP/M was the first microcomputer operating system; today, it is still the most widely supported one available.

Wide support means more software choices for the user. You have your choice of many sophisticated system, word processing, accounting, business and professional software packages when you have CP/M.

Unlike standard Apple DOS, CP/M supports many languages in addition to BASIC. These include FORTRAN, COBOL, BASIC Compiler.

And CP/M has many conveniences not found in Apple DOS. Such as easy interface to machine language programs; faster disk I/O; simple file transfer; and wild card file-naming conventions that allow you to refer to multiple files with one name.

Included as standard with CP/M 2.2 is a complete set of system utilities that give you complete control of the CP/M operating environment. These include PIP, a general purpose file transfer utility and STAT, a program that lets you keep track of important system information such as disk space and file size. SUBMIT and XSUB allow you to execute batch processing jobs. And a powerful text editor, assembler, and sophisticated assembly language debugger, are also included.



## THE ADVANTAGES OF MICROSOFT BASIC 5.0

When you buy a Z-80 SoftCard, you get a copy of CP/M and a copy of Microsoft BASIC on disk, plus all the necessary utility programs.

Once you've installed the SoftCard, you can bring up Microsoft BASIC anytime, simply by loading CP/M and BASIC from disk. Then you're ready to start taking advantage of these added features:

**ANSI Compatibility.** Microsoft 5.0 BASIC meets the ANSI qualifications for BASIC, as set forth in document BSRX3.60-1978.

**Compilability.** Microsoft has developed a BASIC Compiler that compiles BASIC 5.0 programs into directly executable true machine code. The compiler is available separately to SoftCard owners.

**CALL.** Used to call a 6502 or Z-80 assembly language subroutine or FORTRAN subroutine.

**PRINT USING.** Greatly enhances programming convenience by making it easy to format output. It includes asterisk fill, floating dollar sign, scientific notation, trailing sign, and comma insertion.

**Built-in Disk I/O Statements.** Since standard Applesoft BASIC and Integer BASIC were not designed for a disk environment, Disk I/O commands have to be included in PRINT statements. With Microsoft BASIC 5.0's built-in Disk I/O statements, this process is eliminated (no More PRINT "<ctrl D>").

**WHILE/WEND.** Gives BASIC a more structured flavor. By putting a WHILE statement in front of a loop and the WEND statement at the end, BASIC 5.0 will continuously execute the loop as long as a given condition is true.

**16-Digit Precision.** In fact, BASIC 5.0 has three variable types—fast two-byte true integer variables, single precision variables and double precision variables—for 16-digit precision. As opposed to 9-digit precision in Applesoft. Also, hex and octal constants may be used.

**EDIT Commands.** Let you edit individual program lines easily and efficiently without re-entering the whole line.

**AUTO and RENUM.** RENUM makes it easier to edit and debug programs by letting you automatically renumber lines in user specified increments. AUTO is a convenience feature that generates line numbers automatically after every carriage return.

**CHAIN and COMMON.** Used to call in another BASIC program from disk and pass variables to it.

**Added String Functions.** INSTR, HEX\$, OCT\$ and left hand side MIDS are included.

**IF . . . THEN . . . ELSE.** Extends the IF statement in Applesoft to provide for handling the negative case of IF.

**Added Operators.** AND, OR, XOR, EQV, IMP, and MOD are provided.

**Expanded User-Defined Functions.** In 5.0 BASIC, user-defined functions can have multiple parameters.

## WHAT ABOUT APPLE GRAPHICS?

We supply not one, but two, versions of Microsoft BASIC with the SoftCard. Both include Apple low-resolution graphics and other Apple-soft features; and one version also includes Apple high-resolution graphics. Here's how it works:

Your Z-80 SoftCard comes with two disks. One is a 13-sector disk, to be used if you don't have a Language Card or Apple DOS 3.3. The 13-sector disk includes the version of BASIC with low-resolution graphics (in addition to all the other SoftCard software).

The second disk is 16-sectored, to be used if you have a Language Card or DOS 3.3. Since a 16-sector disk has substantially more space on it than a 13-sector disk, we were able to include **both** versions of Microsoft BASIC—one with low-resolution graphics and one with low and high-resolution graphics—(again, in addition to the other software), on the disk.

The graphics statements and functions we've included are:

### Low Resolution Graphics

• GR • COLOR • PLOT • VLIN • HLIN • SCRN

### High Resolution Graphics

• HGR • HCOLOR • HPLT

Other statements and functions we've added from Applesoft are:

• TEXT • HTAB • VTAB • INVERSE • NORMAL • PDL

Statements we've added to BASIC 5.0

especially for the Apple II are:

• BUTTON • BEEP • HSCRN • VPOS

**WHAT IS  
THE Z-80  
SOFTCARD  
AND  
HOW DOES  
IT WORK?**

The Z-80 SoftCard is not an emulator. It is an actual Z-80 chip plus interfacing circuitry on a circuit board that plugs directly into any of the slots on your Apple (except slot 0).

The Z-80 does not replace your 6502; it adds to it. You use Z-80 mode when you want to run Z-80 software and 6502 mode to run 6502 software. Switching back and forth is as simple as a single machine instruction and is taken care of for you automatically when you boot up CP/M (for Z-80 mode) or Apple DOS (for 6502 mode).

When you are in Z-80 mode, the Z-80 assumes all the processing tasks, but the 6502 continues to handle I/O. Thus, you can still use most Apple peripherals when you are in Z-80 mode.

If you are familiar with both CP/M and the Apple, you may be wondering just how you are going to load standard CP/M programs on an Apple system. True, the Apple has its screen in low memory and CP/M starts at 0 in memory, so there is a memory conflict. But we solved that problem through memory mapping.

The memory map circuitry adds 1000 hex to the Z-80 address bus, so that location 0 to the Z-80 is location 1000 hex to the 6502. Thus, in effect, CP/M programs are loaded at the usual 0 hex location and need not be changed for the Apple. Yet there are no memory conflicts between CP/M and the 6502. I/O mapping does not affect normal operation of the Apple.

## **USING PERIPHERALS WITH THE Z-80 SOFTCARD**

A Z-80 SoftCard system will run with all standard Apple peripheral I/O cards and most independent peripherals including any printer that is supported by Apple printer interface cards. Since CP/M provides the same I/O environment as Apple Pascal, a good rule of thumb is that the SoftCard will interface with any peripheral that currently works with Apple Pascal.

The Z-80 SoftCard will support up to six disk drives. 24x80 column video cards such as the Videx and Sup-R-Term are supported as are most popular 80-column terminals such as those from Hazeltine and Soroc.

In addition, user I/O drivers can be easily added to CP/M.

## **TRANSFERRING STANDARD CP/M APPLICATION PACKAGES TO APPLE CP/M**

Literally thousands of CP/M-based applications can be easily transferred to run on the Apple. It is simply a matter of converting programs from standard 5" and 8" CP/M disk format into Apple CP/M disk format. This is done by transferring CP/M files from a CP/M machine to the Apple via a serial I/O port. You'll need an Apple High Speed Serial Interface or an Apple Communications Interface; a connecting cable; and, of course, a CP/M machine from which to transfer. Utilities that make this process easy are supplied with the Z-80 SoftCard.

An Upload utility is typed into the CP/M "source" machine and a Download utility is loaded from disk into the Apple. These utilities read the file on the standard CP/M

format disk and transfer it to the Apple. Then they read the Apple RAM and write to the Apple disk. Since this occurs 128 bytes at a time, you needn't be concerned about running out of Apple memory.

One more thing. Since some CP/M applications, most notably many of the word processors, are written for 80-column display, you may wish to buy an 80-column plug-in video card or use an external terminal. 80-column format programs can also be converted to 40-column format, if desired.

## MEMORY REQUIREMENTS

To run the Z-80 SoftCard requires a disk-based Apple II or disk-based Apple II Plus computer with at least 48K RAM memory. If used with a Language Card, 12K additional RAM can be utilized.

Whether you have a 48K system or a 60K system with Language Card, 4K of RAM is required to handle the Apple screen and CP/M sector read and write routines.

CP/M occupies 7K of RAM, 2K of which can be used by other programs, such as BASIC. The standard version of Microsoft BASIC, which supports all Applesoft extensions except high-resolution graphics, requires slightly more than 24K RAM. So BASIC and CP/M together occupy just over 29K RAM.

The version of BASIC that supports high-resolution graphics is somewhat larger because 8K of screen memory is necessary for high-resolution graphics. It occupies just over 33K, making a total of slightly more than 38K for both CP/M and the high-resolution version of BASIC.

## BEYOND MICROSOFT BASIC

Microsoft 5.0 BASIC is provided with the Z-80 SoftCard. Microsoft FORTRAN, COBOL, BASIC Compiler, and Assembly Language Development System will be available and sold separately to Z-80 SoftCard users.

Just imagine the power of your Apple Computer when it has one of the following:

**Microsoft FORTRAN-80.** Comparable to the FORTRAN compilers used on large mainframes and mini-computers, Microsoft's FORTRAN-80 brings the world's most popular science and engineering programming language to the Apple. Compilation is very fast (up to several hundred statements per minute) and less than 25K bytes of memory are needed to compile most programs. All of ANSI FORTRAN X3.9-1966 is included except the COMPLEX data type. Therefore, you may take advantage of the many application programs already written in FORTRAN.

**Microsoft COBOL-80.** The most widely used language for business applications, COBOL is excellent for inventory, personnel, payroll, order entry, accounting, and forecasting applications. Powerful use of disk files, CRT screen handling, easy-to-use syntax and readable programs give programmers the tools they need to meet the rising challenge of data processing. Microsoft's COBOL-80 is an ANSI standard COBOL with many enhancements.

**Microsoft BASIC Compiler.** This single-pass compiler produces extremely efficient, highly optimized Z-80 machine code that is in Microsoft standard relocatable binary format. Microsoft BASIC Compiler will compile BASIC 5.0 programs, including graphics features, and typically increases execution speed 3-10 times over the interpreter.

**Assembly Language Development System.** An excellent package to help you get started with Z-80 assembly language programming. It includes the MACRO-80 macro assembler, LINK-80 linking loader, and CREF-80 Cross Reference Facility. Code is assembled in relocatable modules, which offers the advantage of easier coding and faster testing, debugging and modifying.

## **EACH SOFTCARD PACKAGE CONTAINS**

- Z-80 SoftCard
- 13-sector disk with CP/M operating system, Version 2.2; Microsoft BASIC, Version 5.0; Software utilities
- 16-sector disk with CP/M operating system, Version 2.2; Microsoft BASIC, Version 5.0; Microsoft BASIC with high-resolution graphics, software utilities
- Two loose-leaf documentation binders, Installation and Operations Guide, CP/M Operating System Reference Guide, Microsoft BASIC Reference Guide, Utilities Operations Guide.

## **SYSTEM REQUIREMENTS**

The Z80 SoftCard requires an Apple II or Apple II Plus microcomputer with a minimum of 48K and one disk drive.

## **PRICE**

\$349 for the SoftCard, CP/M, Microsoft BASIC, software utilities and complete documentation.

## **WHERE TO BUY**

The Z-80 SoftCard requires an Apple the other Microsoft Consumer Products packages are sold by computer retailers across the country. If your local dealer doesn't carry our products, you can call us, (206) 454-1315, or write:

**MICROSOFT**  
CONSUMER PRODUCTS

10800 Northeast Eighth, Suite 507  
Bellevue, WA 98004





# Z-80 SOFTCARD PRODUCT SPECIFICATIONS

The Z-80 SoftCard is a plug-in processor card for the Apple II. The SoftCard package includes the CP/M operating system and Microsoft 5.0 BASIC.

## The Hardware:

**Processor:** Z-80A, 4MHz.

**Clock Rate:** Operates at an effective clock rate of 2.04 MHz.

**Addressing Options:** True/offset addressing; Z-80 DMA enable/disable; Z-80 non-maskable interrupt enable/disable; and Z-80 interrupt enable/disable.

**Memory Mapping:** Offsets Z-80 addresses by 1000 hex, so that location 0 to the Z-80 is location 1000 hex to the 6502. Thus, in effect CP/M programs are loaded at the usual hex location, but they don't interfere with the Apple screen memory.

**Power Consumption:** Averages 249 MA; Peak is 490 MA.

**Size:** 2 3/4" X 7 1/4" X 1/8".

**Selecting Z-80 Mode:** You can alternate between Z-80 mode and 6502 mode to run software for either. To make the switch, simply boot the appropriate operating system disk (CP/M for Z-80; Apple DOS for 6502).

**Installation:** The SoftCard plugs into any of the slots in the Apple except slot 0. No hardware or software modifications are required to install the SoftCard.

**Compatibility:** When not in Z-80 mode, the Z-80 processor is off and the Apple runs as usual. In Z-80 mode, most Apple peripherals and many independent peripherals are supported.

## CP/M Operating System:

**Version:** The CP/M included in the SoftCard package is standard CP/M from Digital Research, in its latest version.

**Memory:** Occupies 7K of RAM.

**CP/M Programs:** The SoftCard system will run all standard CP/M programs (subject to memory limitations) that are converted to Apple disk format. See Memory Mapping above.

## Microsoft BASIC

**ANSI Standard:** 5.0, the version of Microsoft in the SoftCard package meets the requirements set forth in document BSRX3.60-1978.

**Memory:** Occupies 24K with low-resolution graphics supported; 33K with both low-resolution and high-resolution graphics.

### Exclusive 5.0 Features:

- CHAIN and COMMON • WHILE/WEND • AUTO
- IF . . . THEN . . . ELSE • Built-in Disk I/O statements
- CALL • 16-Digit Precision • RENUM • Added Operators • PRINT USING • EDIT Commands
- Added Variable Types • Expanded User-Defined Functions • Hex and Octal Constants

### Applesoft Features:

- GR • HLIN • TEXT • PDL • HPLOT • PLOT • COLOR
- INVERSE • HGR • VTAB • VLIN • SCRN • NORMAL
- HCOLOR • HTAB

### Features added to BASIC 5.0 for SoftCard Version:

- BUTTON • BEEP • HSCRN • VPOS

**Compiler Compatibility:** 5.0 BASIC is compatible with Microsoft's BASIC Compiler which may be purchased separately.

## Utilities:

**Upload/Download:** Allows programs to be transferred from standard CP/M disk to Apple CP/M disk.

**Format:** Formats CP/M disks on Apple disk drives.

**13-16 Sector Disk Conversion:** Converts 13-sector Apple CP/M disks to 16-sector.

**Apple DOS to CP/M:** Converts Applesoft text files to CP/M text files.

**Copy:** Copies Apple CP/M disks.

## Z-80 SOFTCARD AT A GLANCE

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The Z-80 SoftCard is a circuit board with a Z-80 microprocessor and I/O circuitry. It plugs directly into any slot (except slot 0) of an Apple II or Apple II Plus computer.

The Z-80 SoftCard allows you to run CP/M, CP/M based languages and CP/M application programs on the Apple Computer. CP/M is the most widely supported operating system available for personal computers. It is provided on disk in the SoftCard package.

Another immediate advantage of the Z-80 SoftCard is Microsoft BASIC 5.0. BASIC 5.0 is also included with the SoftCard and can be used instead of Applesoft BASIC or Integer BASIC. Microsoft BASIC is upwardly compatible with Applesoft.

In addition to CP/M and Microsoft BASIC 5.0, utility programs are provided so that you can download CP/M based application programs from a CP/M based microcomputer to your Apple computer; convert 13-sector CP/M disks to 16-sector; format Apple CP/M disks; convert Apple DOS files to CP/M; and copy Apple CP/M disks.

Once the Z-80 SoftCard is plugged into your Apple, you can switch back and forth from 6502 processing to Z-80 processing by executing a single instruction.

All standard Apple I/O peripherals and most independent peripherals will run on a Z-80 SoftCard-based Apple, because the 6502 chip handles the peripheral I/O routines.

The Z-80 SoftCard requires a disk-based Apple II or a disk-based Apple II Plus computer with minimum 48K RAM. Using a Language Card gives you an additional 12K.

The Z-80 SoftCard with CP/M, Microsoft BASIC 5.0, and all necessary utilities and documentation retails for just \$349.00.

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