REMark®

Volume 7, Issue 6 • June 1986
P/N 885-2077 Issue 77

Official magazine for users of HEATH ZENITH computer equipment.

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Page 35

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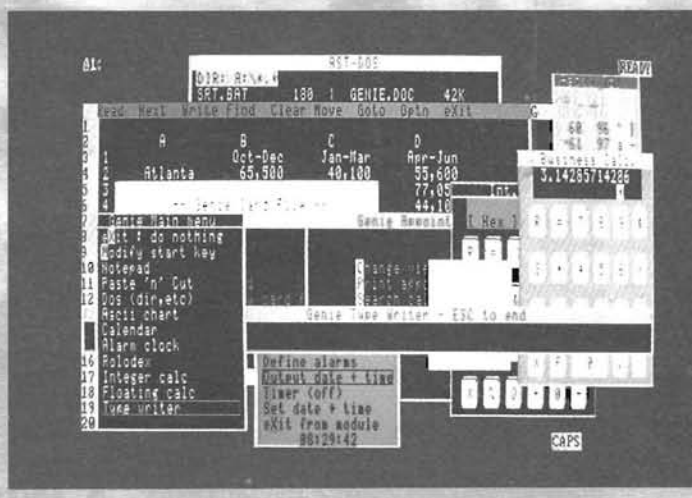

Shown here is Genie "popped up" on a Z-110 running Lotus 123. From the left are: The Genie main menu, the Genie rolodex style card file, the Genie notepad containing data cut from Lotus, the Genie DOS performing a directory command, the Genie alarm clock (at the bottom,) the Genie typewriter, Genie calendar, Genie Cut and paste, Genie Calculators, and the Genie Ascii table.

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REMark®

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On The Cover: *Need an Oscilloscope that runs off of your computer? The article on Page 35 will tell you all about it.*

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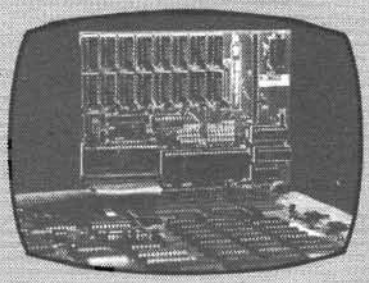

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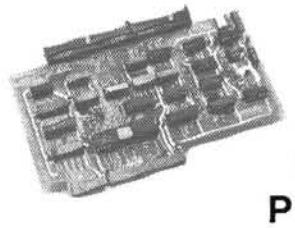

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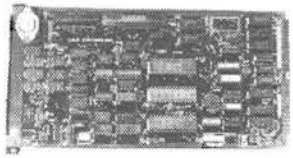

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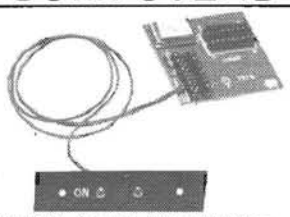

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BUGGIN' HUG

Remote Keyboard Adapter, July And August 1985

Dear HUG:

I'm sending this letter to inform you of minor changes to my H/Z-100 Remote Keyboard Adapter, described in REMark, July and August 1985.

I have lived with my invention for quite a while and found that my diagnostic jumper scheme needed some refinement. The place I live in has very poor AC power and from time to time a power surge would put a glitch on the Z-80's interrupt line (tied to +5 volts), causing my program to jump into the diagnostic routine at the most unfortunate times. I modified the Encoder as follows.

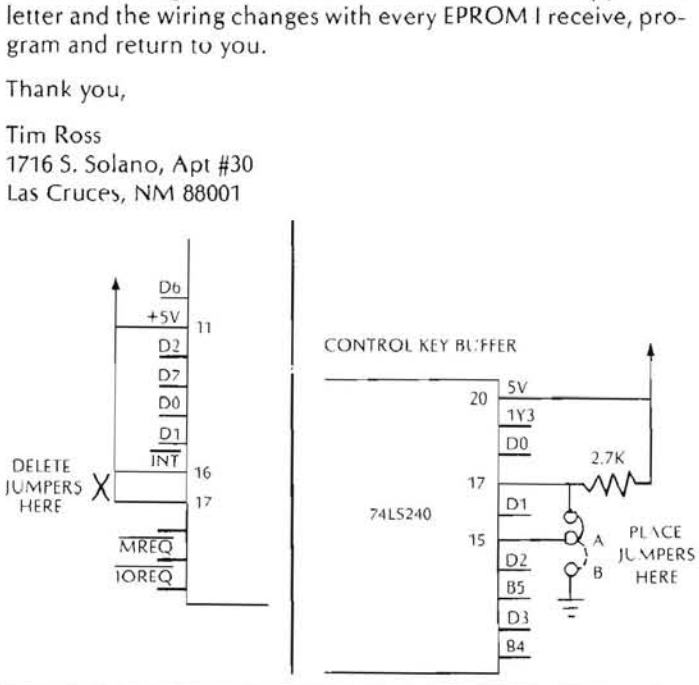
I removed the jumper from the interrupt line and tied the interrupt line to +5 volts and disabled interrupts in the software. I placed the diagnostic jumper on bit 6 of the control key buffer, a 74LS240. I then modified my program to reflect this change. If bit 6 of the control key matrix is active, tied low (in the 'B' position), the program will jump into the diagnostic routine.

So, there is a minor change to the schematic and a minor change to the software, but the diagnostic still runs properly when the jumper is placed in the 'B' position and power fluctuations do not cause problems. These wiring changes (below) affect Z-80 pins 11, 16, 17, and control key buffer, 74LS240 pins 15, 17, and 20 only. All other wiring is identical to the schematics in REMark. There has been no change to the Decoder. I hope this will not inconvenience you.

I will send free updates to everyone who has constructed the adapter and all EPROMs sent to me in the future will incorporate the minor changes I have mentioned. I will include a copy of this letter and the wiring changes with every EPROM I receive, program and return to you.

Thank you,

Tim Ross
1716 S. Solano, Apt #30
Las Cruces, NM 88001



Jed's Cockroach Killer

Dear HUG:

My copy of the April REMark arrived early. Good thing, too. I quickly was drawn to Jed Borlowinski's article on "THE PLIGHT OF THE COCKROACH". Really a great and useful program. And I was ready for the only first day of the fourth month for this year.

As is my quirk, I sought to debug that great debugger and I made some changes to it. The program now uses the input of the estimated number of bugs to select a search pattern. The search returns the number of bugs within detection range. It then proceeds to utilize the technique Jed developed, but now returns a body count. Seems to work a little faster too, and it is no longer limited to the first day of the fourth month in a year. It is most effective on the first tuesday following a Julian date divisible by thirteen, if the Julian date is taken from the first day of the third month in year 1313.

Thanks Jed, once I got the magazine right side up, copying the program was much easier.

Here are my changes:

Change:

```
110 RANDOMIZE TIMER:REM  AREN'T BUGS ALWAYS RANDOM?
                         (Yes, but more so if on the clock.)
```

Add:

```
115 BUGS=INT(BUGS*(3*RND(BUGS)))
122 FOR I=1 TO 5:SOUND SN(I)+INT(RND*500),DU(I)+INT(RND*3)
    NEXT I
124 PRINT BUGS;" bugs detected ";PRINT
126 FOR I=1 TO 2000:NEXT I
128 IF BUGS=0 THEN 400:PRINT "Working          ";PRINT
    DEAD=0
162   BUGS=BUGS-INT(RND*1.05)
164   IF BUGS<>BUGS THEN DEAD=DEAD+1:PRINT "Dead Bug No. ";
      DEAD:BUGS=BUGS
166   IF BUGS=0 THEN 380
380 PLAY "t140mbo2c8f8a8o3c8c16c16c8o2a8a16a16a8r8a8f8c
    mbo2c8f8a8o3c4o2a8o3c "
390 LOCATE 10,25:PRINT"ALL THE BUGS ARE DEAD":LOCATE 24,1:
    END
400 CLS:LOCATE 10,25:PRINT"CONGRATULATIONS
                          THERE ARE NO BUGS!"
410 LOCATE 23,1:END
```

Note: Line 150 is no longer needed and can be deleted.

James M. Kruthers
608 Calle del Cerrito
San Clemente, CA 92672

Volume 6, Issue 12: Setting Up Your System - Part 2

Dear HUG:

First of all, I really like Mr. Adney's articles about software, and the hidden attributes many of us miss when reading some obscure note in some of the manufacturers documentation. He really hit the nail on the head, and to regress to my first sentence, PeachText editor has many hidden facilities no one has ever used. Without a doubt it is one of the best text editors I have used to write source language programs. It is also great to access practically any database. This text editor is worth the price even if you throw away the rest of the modules.

Two parts of his last article did concern me about the power protection and uninterruptible power supplies. First, 308VA (Volt-Amps) do not equal voltage times current. This is a common mistake many make and cannot be computed.

There are several ways to find (VA or KVA) by using other instruments, but not using volt and current readings. Because of the Cosine angle of non-inductive devices also known as transformers and AC motors there is a loss. Remember your computer, printer and other devices use a step down transformer. Cosine Phi is used in AC Ohms Law, and AC Ohms Law is different than DC Ohms Law.

In general, most AC devices are only 80 percent efficient, thus to make his calculations approximately correct, you would need to multiply 308 watts times 1.20 which equals 397 VA. In my experience, I have seen transformers and AC motors having only 60 percent efficiency. If this is true, then the rating for a (UPS) would need to be 431 VA to satisfy a 308 watt system.

In most cases, the Heathkit GD-1295 is adequate for surge protection, but does nothing for power interrupts caused by low voltage. The only adequate protection is an auto transformer which can adjust to line variation of 80 to 150 volts giving you a constant output of about 118 volts if you do not lose all AC power. By the use of an auto transformer, or in fact any transformer, they will contain or choke out voltage spikes of short duration to protect most electronic devices, unless the transformer shorts to cause the spike on the secondary side. The best system would be a line filter with transformers and move devices feeding a (UPS) which are available at some very high prices. Both my auto transformers came from surplus electronic houses at bargain prices, and a nice new (UPS) from the local Heathkit Store.

I hope this information will help some of our members from making a mistake and buying an under rated power system. Please do not confuse watts with VA ratings.

Yours very truly,

Bert Rathkamp
5950 Park Road
Cincinnati, OH 45243

Annoyed By The Block Cursor?

Dear HUG:

Constantly annoyed by the block cursor that appears when you normally invoke MagicWand finally convinced you to take out DDT and make a patch? For those of you that like the underscore cursor like me, here is the patch to make:

From the system prompt type: DDT EDIT.COM
Now type: s027e
The computer will respond with: 78
Then a space followed by a cursor
Now type: 79 return
Next type a Control-C
At the system prompt type: SAVE 129 EDIT.COM

Now, whenever you invoke MagicWand, you will have an underlined cursor. Hope this helps other people that were wondering how to do it!

Note: Print.com can be patched at the same address as Edit.com to turn off the block cursor in that program. The only difference is that you must SAVE 160 PRINT.COM to save the patched print.com.

Sincerely,

David Fisher
3083 Highway 13
Eagan, MN 55121

Correction: MUVIT.BAS

Dear HUG:

A puzzled Huggie, Ray Hanna of Baltimore, writes to tell me he's run into a problem with my program, MUVIT.BAS, published in the November '85 issue and points to where things go awry.

Part of line 4610 in FOUR.BAS is missing. The correct line is:

```
IF INSTR(1,FFOR$(T),"\") > 0 THEN 4660
```

I apologize to you and my fellow enthusiasts; the error was mine, not that of your printer or copy editor.

Sincerely,

Louis M. St. Martin
860 Hillcrest Drive
Pomona, CA 91768

Correction: Inside MBASIC Program Files

Dear HUG:

I am, finally, writing to correct some errors that occurred in the program listings in my article "Inside MBASIC Program Files" (REMark, June 85). I should have written sooner, but eye surgery and convalescence have kept me out of circulation for several months.

CALYPSO.BAS

Line 10300 should end with a semicolon for proper PRINT formatting.

CRG.BAS

Line 10130 reads...+CHR$(11)+CHR$(28)+...
should read...+CHR$(11)+CHR$(12)+CHR$(28)+...

Line 10300 reads LD-FNUA!(...
should read LD=FNUA!(...

Line 10540 reads...:LF$(HB)-LI$+LE$
should read...:LF$(HB)=LI$+LE$

Line 10640 reads...V$=V$+,MID$(...
should read...V$=V$+MID$(...

Line 10830 reads...FNAB$(11,20);'LINE REFE...
should read...FNAB$(11,20);"LINE REFE...

PC.BAS

Line 10080 reads...CHR$(NE!-INT(NE!/256)+CHR$(...
should read...CHR$(NE!-INT(NE!/256)*256)+CHR$(

Line 10140 reads...:CE$=:.1234...
should read...:CE$=".2134...

Line 10570 reads...;FJUA!(LC$)
should read...;FNUA!(LC$)

Line 10610 reads...MID$(BE#,LB+1)
should read...MID$(BE$,LB+1)

Line 10970 reads...PA-1,1)=":<LINE FEED><TAB>"THEN...
should read...PA-1,1)=":"THEN...

Line 11080 reads...:BF$"":RETURN
should read...:BF$="":RETURN

A note on the operation of my programs: I have discovered that the location of MBASIC's program space is changed if you call MBASIC with the /F switch to change the number of file buffers available. The /S switch may also confuse. A program SAVEd while these switches are active will have a disk image that CALYPSO.BAS and CRG.BAS will not understand.

There are two ways to get around this:

1. LOAD MBASIC with the desired switches set
   LOAD and SAVE CAL.BAS
   RUN CAL.BAS
   Tell CALYPSO or CRG the new location

2. LOAD MBASIC without the switches
   LOAD and SAVE the object program
   LOAD and RUN CALYPSO or CRG

I appreciate the interest shown, and help offered from Belgium, Canada and Sarasota.

Sincerely,

John C. Harper
NASA - Ascension
Patrick AFB, FL 32925

Echoes From CheapCalc

Dear HUG:

This concerns the spreadsheet program called CheapCalc as set forth by Bob McFarland in issue 44 of REMark. I copied this program to use with my H-8/H-19/H-17, 64k, CP/M system and have found some bugs and made some changes which may be of interest to some of the readers.

BUG 1

Upon entering a number with sufficient digits to exceed the column-width of the active cell, the program would respond with a BASIC error and exit. This was corrected as follows (note that it clears the cell and provides a double bell warning.):

Line 1780 Change the 1800 to 1795
New Line 1795 IF CW(A)-LEN(B$(SY+Y1,A)) < 0 THEN PRINT BP$;NV$;:A$(Y,X)=" ":GOTO 2650

BUG 2

Upon entering a column-width less than 4, the program would respond with a BASIC error and exit. The fix, with warning, was as follows:

Line 2890 Drop off the :IF A>30 THEN 2890 at the end
New Line 2894 IF A > 30 OR A < 4 THEN PRINT BP$;: GOTO 2890

BUG 3

When using the &SUM function not all of the second cell number was erased if the row number had two digits. This was corrected by adding a clear line order (CL$) as follows:

Line 2730 PRINT FN PC$(2,1);CL$;"SUM(";A$;" THRU ";B$;")"

BUG 4

The clear order in the command line not only cleared the worksheet, but left the active cell at A1. If you happened to be viewing an area not containing cell A1, the active cell showed up on line 2 OUTSIDE the worksheet. The following preserves the active cell position:

Line 2820 Change the fourth statement number from 270 to 4000.
New Line 4000 ZA=X:ZB=Y
New Line 4005 FOR X=1 TO XM:FOR Y=1 TO YX(X): A$(Y,X)=" ": B$(Y,X)=" ": NEXT : NEXT
New Line 4007 X=ZA:Y=ZB
New Line 4010 GOSUB 1860:GOTO 2130

BUG 5

Upon 'pushing' the active cell against the bottom row to obtain the next screen of rows, the active cell will not end up in the correct position, but will be advanced one row. This was cured as follows:

Line 2400 Change the last statement from Y=SY+10 to Y=SY+9

BUG 6

Upon 'pushing' the active cell against the top row to obtain the previous screen of rows, the active cell always ends up in the upper left corner cell instead of the next lower row cell. While correcting this, a better stopping procedure at row 1 was added.

Line 2550 Change Y=SY to Y=SY+9 and add :GOTO 2380 at the end
New Line 2555 IF SY<=0 THEN SY=1

CHANGE 1

The CTRL/@ did not erase the active cell. This was fixed as follows:

Line 2280 Change A=35 to A=64

CHANGE 2

Once you have typed the / key, you are in the command line with no way to handle an "Oops! I didn't mean to do that!' An eighth choice was added, as well as a test for improper input as follows:

Line 2810 PRINT "1-WIDTH 2-SAVE 3-LOAD 4-CLEAR 5-GOTO 6-PRINT 7-HELP 8-EXIT"
New Line 2812 A$=INPUT$(1)
New Line 2814 IF VAL(A$)>0 AND VAL(A$)<9 THEN 2820 ELSE PRINT BP$;: GOTO 2812
Line 2820 ON VAL(A$) GOTO 2890,3000,3210,4000, 3460,3630,2830,3970
New Line 3970 PRINT E$+"j";FN PC$(2,1);CL$;A$(Y,X)
New Line 3980 PRINT E$+"k";BP$;
New Line 3990 GOTO 2190

Note that in line 2820: old statement number 3220 is now 3210 (CHANGE 5); old statement number 270 is now 4000 (BUG 4); new statement number 3970 is present (CHANGE 2).

CHANGE 3

If the HELP screen is chosen from the command line in the middle of some work, a lot of confusing 'garbage' remains. This was cleared as follows:

New Line 2835 PRINT CS$;
Line 2870 Change the last statement number from 2090 to 4010.
New Line 4010 GOSUB 1860:GOTO 2130

CHANGE 4

To gain accuracy with cents on monetary worksheets but at the price of more memory usage and a bit of speed add:

New Line 135 DEFDBL A

CHANGE 5

If you have trouble remembering the names of worksheet files on the disk, you can have the disk directory printed out to look at while you make your choice and check spelling as follows:

(Note that line 2820 has had statement number 3220 changed to 3210.)

New Line 3210 PRINT CS$;FN PC$(3,1)
New Line 3211 WIDTH 80
New Line 3213 FILES
New Line 3215 WIDTH 255
Line 3220 PRINT FN PC$(16,1)
New Line 3225 ON ERROR GOTO 4050
Line 3230 leave it as it is
Line 3240 Change GOSUB 3390 to GOSUB 1860
New Line 4010 GOSUB 1860:GOTO 2130
New Line 4050 RESUME 4010

One of the nasty things about modifying an old program while preserving its statement numbers is that things get out of hand and the program 'grows like Topsy' to become gangly and GOTOed to death! This is no exception, but you can incorporate any or all the changes discussed since each is complete by itself, which accounts for the repetition of some line numbers. Just be careful of the line numbers in line 2820 if not all changes are made.

I hope this has helped some users of the CheapCalc program.

Arthur H. Pedley
19 Abeling Street
Canajoharie, NY 13317

Attention Bicyclers

Dear HUG:

Bicycling Log (2.0) is designed to help cyclers keep track of their cycling activities with a minimum of effort. If you are a cycler and are tired of keeping your records on scraps of paper all over the house, then Bicycling Log is just the program you need.

Bicycling Log was written to be very user friendly. The program option by only one or two keystrokes. The options selectable within the program include: (1) Provide Directions, (2) Display Bicycling Data on Screen, (3) Add Bicycling Data to Master Data File, (4) Print Bicycling Data, and (5) Exit to Operating System.

Bicycling Log will display the following information, in log book format, on the screen or send it to the printer for a hard copy: (1) DATES, (2) MILES, (3) TIME, (4) TERRAIN, (5) LOCATION, and (6) COMMENTS. Error checking is provided to assist the user during initial data entry. Additionally, prior to sending the data to disk, the user is provided another chance to correct/update an entry. The program also includes an option to allow use of CONTINUOUS or SINGLE sheet paper.

Bicycling Log is a compiled program designed to run on Heath/Zenith computers capable of running the CP/M-80, CP/M-85, MS-DOS, or ZDOS operating systems. This includes the H-8, H/Z-89, Z-90, and H/Z-100.

Bicycling Log (2.0) is available from: ADC Computer Products, 10784 Magnolia Avenue, Nr. 2H, Santee, CA 92071, (619) 449-7298, for $25.00 plus $2.00 for shipping and handling. Formats include: 5-1/4" SSSD, 10 sector, hard-sector (for CP/M-80) and 5-1/4" SSDD, Soft-sector (for CP/M-80, CP/M-85, MS-DOS, and ZDOS) diskettes. Indicate disk format and operating system. Registered owners of version 1.0 can get an update for $11.00 by sending in their original distribution disk.

Knottenbelt Letter

Dear HUG:

In reference to the letter in the November REMark submitted by F.H. Knottenbelt concerning compatibility between Microsoft WORD and the C.ITOH Prowriter printer, I have written to Mr. Knottenbelt and would like to offer the same information to the HUG membership. My husband and I also have the Z-150 computer and the C.ITOH 1550 printer which is the same as the 8510, except with the 15 inch carriage. Out printer has the serial interface since we used it first with the H-89A computer.

We had much frustration when we first got the new computer because of the lack of support for this printer and we live in a very low populated area with no dealer readily available for support. We found that the printer driver for the Epson MS-80 was a good compromise for the time being, but wanted full compatibility with out printer.

Eventually, I discovered an advertisement by C.ITOH in Byte magazine that mentioned a special utility program for Prowriter printers to make them compatible with the IBM computer. I sent for this program from a mail order business. It looked like it would really do the job. It was designed to reside in memory so that it could be called up anytime while running other programs and had several different programs incorporated within it. One of the programs is an Epson emulator; it translates all Epson MS-80 printer codes into C.ITOH codes which worked well with Microsoft WORD. Still, there were things the C.ITOH printer could do that the EPSON couldn't and we were still interested in getting a printer driver for our printer.

I contacted Microsoft and Heath Company and did receive some programming information from Microsoft that had been left out of the Zenith manual for WORD. Not being programmers, this info didn't do us much good. But, Good News, we just received the new WORD Version 2.0 from Microsoft. (This is available by sending your original program disk along with $50 to Microsoft). It comes with a whole new manual, a spelling correction program and other enhancements. One of the utilities included is used to make a text file out of any of the printer drivers that are included, and then after you make alterations to fit your printer it will convert it back into a printer driver for you. Even though the new version covers many many printers it still does not directly

Continued on Page 81

Programming In BATCH

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You could say that the original motivation was the IRS. The law (which has been changed) required that a microcomputer deducted as a business expense must have a detailed, contemporaneous use log. The law, as changed, simply eliminates the word "contemporaneous." Records will still be required — the same detail couldn't hurt. But that only explains what is required, not how I would keep the records. The best explanation is, I am lazy. I could keep a paper and pen log. But imagine the drudgery. Any programmer may trudge blindly through a problem once. The second time they write a program.

Originally I planned to use my favorite programming environment, Turbo Pascal, to create a program to track my Z-100's usage. But after trying some of the resident commands available for batch files, I changed my mind. The entire program could consist of a short batch file.

In the course of designing a batch file, based on the new resident commands available in MSDOS2, several other applications found their way onto my disks. This article will discuss the implementation of some of these "batch programs." Among these are an autoexec.bat that establishes some initial conditions for the operating system. There are utilities to erase a list of files and to compare the current directories on two disks. Also included is a file called LOG.BAT which maintains a working log of activities. Finally, there is a pseudo-Menu batch file which helps the casual user migrate through the complexities of the hierarchical file structure.

In order to understand how batch files fit into the operating system, a few features of the MSDOS2 operating system need review. The purpose of the operating system includes the following:

1. Manage the physical resources of the system;
2. Disguise hardware differences from the software;
3. Provide user interface with the system.

Two important activities that a user can influence occur during the boot up sequence. Asterisks mark these activities in the following abbreviated account of booting up:

```
Monitor reads BootLoader off disk;
BootLoader draws in IO.SYS ;
IO.SYS initializes hardware  and loads MSDOS.SYS;
MSDOS passes control to SYSINIT;
SYSINIT relocates itself in memory;
SYSINIT relocates MSDOS.SYS in memory and initializes tables;
MSDOS displays ID message (MS-DOS version 2.03,   etc );
*** SYSINIT then looks for file   CONFIG.SYS
        If CONFIG.SYS is NOT in root directory
                then SYSINIT loads COMMAND.COM
        Else
           CONFIG.SYS is consulted for location of shell
*** If  COMMAND.COM locates AUTOEXEC.BAT on the root  directory
             then  AUTOEXEC.BAT is executed
        ELSE
             DATE & TIME resident commands are triggered
    COMMAND.COM  displays  the  system prompt and  waits
      for  a command line to process (127 char buffer)
```

Note particularly that SYSINIT looks for a file called CONFIG.SYS. What is the CONFIG.SYS file?

Definition: A CONFIG.SYS file is A TEXT (ASCII) file (should be located in the root directory of the boot-up disk) that contains sub-commands for the COMPLETION of BOOT-UP and the configuration of the system.

List Of Legal Commands For CONFIG.SYS:

BUFFERS = (number) number: 1-99, default 2, Sets # of (512 for Z-100 PC, 1024 for Z-100) disk sector buffers: Least Recently Used algorithm. Use of more than 20 buffers may degrade system performance: The system does have to maintain the buffers whether they are in use or not.

FILES = (number) number 5-99, default 8, Sets # of open files allowed; each additional file expands DOS approximately 39 bytes.

DEVICE = dirpath\filename.ext {Custom device drivers: e.g. MDISK.DVD & ANSI.SYS (PC)}

SHELL = filename.ext {replaces COMMAND.COM}

Example Of CONFIG.SYS

To create a CONFIG.SYS file, type the following at the A> prompt:

```
A>    copy con config.sys
      BUFFERS = 15
      FILES   = 20
      DEVICE = DEV\MDISK.DVD  {creates two memory disks}
      DEVICE = DEV\MDISK.DVD
^Z
```

The second notable occurrence in the bootup sequence is the search for a batch file named AUTOEXEC.BAT. What is a batch file? Definition: A batch file is a TEXT (ASCII) file containing a sequence of commands for the operating system to execute.

COMMAND.COM automatically executes AUTOEXEC.BAT at bootup, if the batch file is present on the root directory. Knowledge of the manner in which the operating system is loaded enables us to write our first batch file: the shortest possible program that can be written. Create this first batch file by typing at the A> prompt:

```
A>    copy con AUTOEXEC BAT
      ^Z
```

The AUTOEXEC.BAT file thus created is an empty file — there are NO commands in it. However, its mere presence on the root directory of the boot-up disk will suppress the system's request for TIME and DATE.

Upon being successfully loaded, COMMAND.COM assumes the job of monitoring the entry of commands from the keyboard. If a legitimate entry made on the command line is the first name of filename that has an extension of .COM, .EXE, .BAT or is a resident command, then COMMAND.COM loads this program for execution. In the event that more than one file or command shares the first name of the file, then COMMAND.COM searches for the file to load according to the following priority:

Priority Of File Names As Received By COMMAND.COM

Resident command
Search Current Directory
  .COM extension
  .EXE extension
  .BAT extension
Search Path

Upon termination of a line of information entered at the keyboard with a RETURN, COMMAND.COM saves the entered line for processing in a 127 byte "command buffer." From this command line buffer, COMMAND.COM checks the legitimacy of the entered names (tokens) and the manner in which they were entered (syntax). This process is "parsing" of the command line.

Suppose that a command line has FILENAME of FILENAME.BAT as the first token in the following command line:

```
A>FILENAME A Bt C D,E F;G H  I J K L M N O PQRS  T UV1
```

Since FILENAME has the extension .BAT, COMMAND.COM will load the sequence of commands contained in FILENAME.BAT for processing. Also, items distinguished in the command line by legitimate separators (space, ",", ";", etc.) will be assigned as parameters as follows: %0 will be FILENAME. %1..%9 are assigned as A,Bt,C,D,E,F,G,H,I, respectively. COMMAND.COM retains the remainder of the buffer (J, K, L, etc.) to the full 127 bytes, but does not assign these to other parameters.

Now that we have established the syntax to execute a batch file, the next question concerns the contents of the file. What is the form of a batch file? In essence, a batch file is a sequence of commands (one to a line) which the operating system executes one at time. You may imagine that the operating system, having identified a batch file, will carefully note the location of the file and then extract lines from the batch file one at a time to insert into the command line buffer. Once the line appears in the command line buffer, COMMAND.COM acts upon it just as if the user had typed the line. In fact, you will see the lines "ECHOED" to the screen after the system prompt as they are copied to the command line buffer (unless we turn the ECHO OFF). Clearly then, the lines of a batch file must each be able to "stand alone."

How well does the operating system track the location of the batch file? Quite well. Even if your batch file changes the default drive, or changes directories, the operating system will locate the batch file to obtain the next line. Should you remove the disk containing the batch file from its drive, the operating system will know, and will prompt you to replace it, when the time comes to load the next line into the command line buffer.

Should you ever need to terminate a batch file before its completion, simply type ^C (CTRL–C). As a safe guard, you will be asked to confirm that you wish to terminate the batch file.

We see that we may populate a batch file with any of the legitimate resident commands, .COM or .EXE, and they will be executed as if the user directly typed the command into the command line buffer. Batch files themselves form an exception. You may use a .BAT file command in a batch file. The system will transfer control to the new batch file. But the operating system tracks only one batch file at a time. Control will not automatically return to the calling batch file when the new batch file completes its activities. In other words, batch files cannot be nested.

Some special batch commands, that are useful only in batch files, supplement the usual operating system commands. The following summarizes these commands:

ECHO — Repeats a message (also can turn OFF or ON echo)
FOR ... IN ... DO — Loop control facility
GOTO Identifier — Transfers control to a label (:Identifier)
IF (NOT) — Condition execution (selective execution)
PAUSE (message) — suspends execution
REM (or . or [or]) — Displays remark
EXIST — (Checks directory for file listing) (Boolean)
ERRORLEVEL — (Checks system for exit level number: 0 means no system errors)
== — (Equality) (Boolean)

Now consider a few examples of batch files.

Listing 1 — AUTOEXEC.BAT

```
echo off
path = c:\bin
prompt $em63$s $d$s  $em52$s  $t$s $em70$_$em07$s $p $g $em70
cd \bin
date
time
log ON
```

Listing 1 is an AUTOEXEC.BAT file. Recall that COMMAND.COM executes autoexecs automatically at bootup. This particular AUTOEXEC.BAT begins by suppressing the echo of commands to the screen as the system copies them to the command line buffer: ECHO OFF. PATH = C:\BIN establishes a path to search when a referenced .COM, .EXE or BAT file is not on the current directory. I bootup and maintain my utility files on drive C:. If I am on drive A: and want to use ZDIR, I simply type ZDIR. MSDOS first checks the currently logged drive for ZDIR.COM, when ZDIR.COM (or ZDIR.EXE or ZDIR.BAT) is not found, MSDOS checks C:\bin.

Remember that the presence of AUTOEXEC.BAT suppresses the normal request for Time and Date. Thus, we must explicitly request these resident functions if we are to use them. Date and Time offer the opportunity to enter the correct date and time. If the work log for the computer accurately maintains records of activities, access to the correct Date and Time is essential.

The string following the PROMPT command customizes the system prompt. I prefer to be reminded of the date, time and the current directory as part of the prompt. Note that including the current directory in the prompt will cause the operating system to access the default disk each time the prompt is displayed. Many might regard this added disk access as a disadvantage. CD

\BIN changes the current directory on the default drive to \bin.

Listing 2 — ERA.BAT

```
[DELetes a sequence of files entered on the command line]
     for %%A in (%1 %2 %3 %4 %5 %6 %7 %8 %9) do DEL %%A

|   NOTE:  usage                                          |
|             A>  ERA  myfile B:oldfile that.exe          |

[deletes the files "myfile", "B:oldfile" & "that.exe" |

[NOTE  Unfortunately, the structure "for %%A in ( ..) do]
[      is unable to handle directory specifications      ]
```

The last command is LOG ON.

LOG is a batch file resident on the boot up drive in the \bin directory. ON is a parameter for LOG. No commands should follow the LOG ON line, since we may not return to AUTOEXEC.BAT when another batch file is called. As its name indicates, LOG.BAT is the batch file which maintains a working activities log for the Z–100. See Listing 4.

Listing 3 CHECK.BAT

```
[Compares the current directories of disks on two disks]
[USAGE.  enter  CHECK   DRIVE1  DRIVE2  ]
[Example:  CHECK A C  will compare the current directories]
[on the disks in drives A  and C ]
     echo off
     %1
     echo FILES on %1: and on %2:
     for %%1 in (*.*) do if exist %2:%%1 echo %%1
     echo FILES on %1: and NOT on %2:
     for %%1 in (*.*) do if not exist %2:%%1 echo %%1
     %2.
     echo FILES on %2: and NOT on %1:
     for %%1 in (*.*) do if not exist %1:%%1 echo %%1
     %1
```

As promised, the length of LOG.BAT is short. Turbo Pascal is concise, but still includes a library that produces .COM files in excess of 10k.

As in the AUTOEXEC, the first activity of LOG.BAT eliminates the echo of commands to the screen: ECHO OFF. The remainder of LOG.BAT selects information to attach to a file named USE.LOG, using the redirection facility of MSDOS2. For example, the DATE command displays the date on the console quite readily. Redirecting this information to a specified disk file is an easy matter. In order that the information be appended to the file, rather than overwriting the file, we use >> to redirect the output. Unfortunately, DATE invariably offers the opportunity to alter the current date. While a user can ignore this request for a new date by striking a RETURN, allowing the request in the batch file would slow down automation for the LOG procedure. One solution is to alter the input for DATE (normally expected from the console) to come from the same disk file as the output. Suppose that we create an activity file USE.LOG with 2 empty lines as a header. If the first parameter passed to LOG.BAT is ON (or on, or On, for %1), the line

```
if "%1"=="ON" then goto ON
```

transfers control to the line label :ON. From there, the command

```
DATE<USE.LOG >>USE.LOG
```

will append "Current date is Day MM-DD-YY" to USE.LOG because of the ">>" redirection. "<USE.LOG" will cause DATE to seek the response to the prompt for a new date from USE.LOG. Since a couple of carriage returns begin the file, the date defaults to the current setting. The USE.LOG file returns no new date. Fortunately, the redirection for DATE is not complete: MSDOS displays the request for a new date on the screen and does not write it to USE.LOG. In a similar manner, TIME gets the current time and appends it to USE.LOG. Once again, the request for a new time goes to USE.LOG where an empty line is read.

In the case that the first parameter entered on the command line of LOG is OFF (to replace %1), then control in the batch file passes to the label :OFF. Notice that the lines following :OFF are also executed in the event that ON (or its variations) is the first parameter of the command line. :OFF is also the default when neither ON nor OFF occupy the %1 position. As a result, the current time and the parameters on the command line are appended to the file USE.LOG each time that LOG is executed. The command

```
LOG MSDOS Housekeeping Activities
```

will use "MSDOS" as %1, "Housekeeping" as %2 and "Activities." as %3. From this, the lines Current time is HH:MM:SS "MSDOS Housekeeping Activities ..." will be appended to USE .LOC. The last ECHO statement appends "... _____ _____" to USE.LOG to separate log activities for easier reading. See Listing 5 for a sample of USE.LOG after several activities are logged.

By renaming use.log to MONTH.LOG at the end of the month, we may break activities into convenient file sizes. To create a file FORM.LOG without an editor, enter the following at the A> prompt:

```
>    copy CON to FORM.LOG
^M
^M
                    USER ACTIVITY LOG
==================================
^Z
```

At the CTRL-Z <return>, (^M is also <return>) MSDOS copies the file FORM.LOG from the console to the default disk. In this copy mode, editing of the current line is possible, but you can not return to a previous line. However, I have found this a safer method than editors for creating templates for USE.LOG. Some editors apparently record end of files in a manner that upsets the >> redirection facility of MSDOS2. (I have seen claims that this is a legitimate bug in the redirection facility where the ^Z that terminates a text file does not coincide with the physical end of file.) Once this file is in reserve, we may create a NEW USE.LOG (after archiving the current USE.LOG as MONTH.LOG) with

```
A>   copy FORM.LOG USE.LOG
```

Again, be cautioned, the use of an editor on a USE.LOG file may render USE.LOG useless for appending further log information.

A major flaw of LOG.BAT is the number of disk accesses it makes during its run.

Listing 2 (ERA.BAT) and Listing 3 (CHECK.BAT) offer additional examples of the construction of batch files. Each is documented with comments.

The hierarchical directory structure of MSDOS2 is excellent for use with large capacity mass storage devices. I was happy with ZDOS until I finagled a couple of 8" disk drives. Then, the num-

"Have Your Computer Talk To Ours!"

"HUGPBBS is on line, 24 hours a day, with over 10 megabytes of free software available for downloading. There's software for every Heath/Zenith operating system, with the majority being for MSDOS, and specifically the Heath/Zenith PC compatible computer systems. Also included is software for HDOS, CP/M, and MSDOS for the H/Z-100 computer system. In addition to this software is a message base through which you can exchange information with other HUG members. Have your computer call (616) 982-3956, 'The Heath Users' Group Personal Bulletin Board System', and make connection at 300, 1200, or 2400 baud. Type a carriage return several times to get my attention. Registration requires that you supply your human's first name, last name, HUG ID number, and some sort of secret password (up to 16 characters). Alternatively, your human can call Jim Buszkiewicz at HUG, and register via voice connection at (616) 982-3837. Call today! All it takes is a computer, modem, and a phone call for your computer to talk to ours!"

ber of files began to tangle the display when DIR was used. MSDOS2 provides facilities for pigeonholing files in tree structured directories. By carefully choosing meaningful directory names and stocking these directories with homogeneous file types, handling a large number of files becomes feasible. Clearly, MSDOS2 was the correct tool for the job of straightening out my cluttered directories.

Listing 4 — LOG.BAT

```
|Appends DATE, TIME and activity information to USE.LOG|
    echo off
    if "%1"=="ON" goto ON
    if "%1"=="On" goto ON
    if "%1"=="on" goto ON
|Anyone typing "oN" deserves what they get |
    goto OFF
    :ON
    echo ==================================== >>USE.LOG
    date <USE.LOG >>USE.LOG
    :OFF
    time <USE.LOG >>USE.LOG
    echo "%1 %2 %3 %4 %5 %6 %7 %8 %9.. " >>USE.LOG
    echo .            ___________________  >>USE.LOG
```

On the other hand, when you are in a hurry to run an application program, searching and changing directories can dampen your enthusiasm. Why not a menu to select an activity without worrying about which directory to access? Better yet, why not a menu that was easy to ignore when it got in the way? Why not use a batch file to simulate a menu to control application programs?

Rather than program the menu into a batch file, I choose to create a text file which listed the options. Changing or extending the menu structure would not require rewriting and debugging a batch file. Also, it allowed me to easily adjust the menu to allow for my non-standard prompt so that the menu would fill the screen. Listing 6 is a typical menu.

Listing 5 — USE.LOG

```
{Note  first two lines are blank}

          COMPUTER USAGE LOG  ..  1985
=========================================
=========================================
Current date is Wed  2-27-1985

Current time is  8:13:28.96

"ON        ..."
           ___________________
Current time is  8:13:57.30

"Work on batch files for BATCH Article    . "
           ___________________
Current time is  9:04:25.75

"Rework Batch article          "
           ___________________
Current time is 10:23:22.21

"Make out test for computer science class      "
           ___________________
Current time is 10:23:48.09

"Off           "
           ___________________
=========================================
Current date is Thu  2-28-1985

Current time is  6:32:19.53

"on        . ."
.          ___________________
Current time is  6:32:51.52

"Write Pascal program for Archive      ."
           ___________________
Current time is  9:59:23.57

"Work on Pascal graphics package       "
           ___________________
Current time is 11:58:43.35

"OFF           "
           ___________________
```

MENU:BAT (Listing 7) clears the screen (CLS) and types the menu to the screen. After displaying the menu on the screen, MENU .BAT is no longer in control. A user is free to type any command they wish: The menu does not actually limit choice to the displayed choices. However, the selection of a 1,2,3,4,5,6 or 7 (or for that matter, whatever selection device you please) will pass control to batch files titled in a corresponding manner, 1.BAT, 2.BAT, 3.BAT, 4.BAT, 5.BAT, 6.BAT and 7.BAT (Listing 8). Each of these batch files will meander to the proper directory and run the selected program.

Listing 6 — MENU.DSP

```
==================================
            MENU for DISK C:
==================================

1. Word Processing
2. Electronic Spread Sheet
3. Data Base Management
4. General Ledger and Accounts
5. Graphics
6. Programming in BASIC
7. Programming in PASCAL
8. Format a Document disk
==================================
```

Some planning is, of course, required. Directories must be named. Appropriate files must be copied into these directories. A suitable path selection should be made (see AUTOEXEC.BAT). For example, create a directory called EDITOR.

```
C:\bin>    MD EDITOR
```

Note the customized prompt from autoexec.bat. Change directories, so that you are in EDITOR.

```
C:\bin>    CD EDITOR
C:\bin\editor>
```

Copy your favorite editor, say WatchWord and all of its associated files into the directory.

```
C:\bin\editor> copy WW* * /v
```

Finally, return to the previous directory \bin.

```
C:\bin\editor> CD
C:\bin >
```

Now create a batch file, such as 1.BAT (Listing 8) to control the selection of editor use. Note that the last two lines of 1.BAT change the directory back to \bin and then execute MENU.BAT. Why did we change directories to execute MENU.BAT? After all, there was a path defined which would track down MENU.BAT. While MENU.BAT will be found, MENU.DSP will not. Thus, the

command to TYPE MENU.DSP will fail when the display file cannot be located in the current directory.

In preparing a similar set of batch files for a local lawyer who just got a computer, I created a parallel set of batch files. For a selection made by 1.BAT, there would be a corresponding H1.DSP. H1.DSP a is text file describing the usage and options available with batch file 1.BAT. To unite these was a file HELP.BAT. For example, HELP 2, would replace %1 with 2 and the help file H2.DSP is typed to the screen.

Try modifying this batch file so that if no parameter is entered, a description of the use of HELP.BAT is typed (from HELP.DSP). I think you will enjoy the results. Better yet, before you decide to use a high level language to create an applications program, consider whether programming in batch might not do the job.

Listing 7 — MENU.BAT

```
CLS
TYPE menu.dsp
```

Listing 8 — Batch File For Menu Support

1.BAT

```
CLS
CD editor
PAUSE       Be sure that the DOCUMENT disk is in Drive D:
ws
CD
Menu
```

2.BAT

```
CLS
CD spcheet
PAUSE      Be sure that DOCUMENT disk is on Drive D:
sc
CD
Menu
```

3.BAT

```
CLS
CD database
PAUSE      Be sure that correct data disk is on Drive D:
db
CD
Menu
```

4.BAT

```
CLS
CD ledger
PAUSE ...  Be sure correct data disk is on Drive D.
ZBASIC Ledger
CD
Menu
```

5.BAT

```
CLS
CD graph
PAUSE .  Be sure correct data disk is on Drive D
ZBASIC graphics
CD
Menu
```

6.BAT

```
CLS
CD graph
PAUSE ... Be sure correct data disk is in Drive D:
ZBASIC
CD .
Menu
```

7.BAT

```
CLS
CD pascal
PAUSE      Be sure correct data disk is in Drive D:
turbo
CD
Menu
```

8.BAT

```
CLS
Echo  .. Insert Disk to be formatted into drive A:
Echo
Echo   CAUTION: All data on this disk will be destroyed.
Echo           If this is not what you want, press ^C
Echo           to stop
echo
PAUSE     otherwise, to FORMAT
format A:/v/9
```

HELP.BAT

```
     echo off
     cls
     type h%1.dsp
     pause
     cls
     menu
```

H8.DSP

```
*****************************************************
*                                                   *
*     8.  Format a NEW disk as a DOCUMENT disk.     *
*                                                   *
*     This procedure formats a new disk or ERASES   *
*     and reformats an old disk for new usage.  If  *
*     an old disk is reused ALL old information on  *
*     that disk WILL BE DESTROYED   Be sure there   *
*     are no useful files on an old disk to be      *
*     formatted.                                    *
*     Document disks are for the storage of files   *
*     only.  You may not "boot up" on such a disk   *
*                                                   *
*****************************************************
*     SHORT CUT: You may format a disk on drive B:  *
*     without using the menu by typing              *
*                                                   *
*               FORMAT B:/V      <return>           *
*                                                   *
*****************************************************
```

A Winchester For The '89

Part Five

Peter Ruber
P.O. Box 502
Oakdale, NY 11769

C.D.R.'s Super RAM 89 (I)

Just when you think that everything ever destined to be designed for the old H/Z-89 has already been done (in some cases, once too often) a product appears and creates a whole new set of standards. I was well under way in researching this series when C.D.R.'s Super RAM 89 slid into view. There was none of the hoopla that accompanied the impending arrival of the D.E.L. "Gemini" or UCI PC-Emulator Boards for the Z-100; nor reams of media hype of will-it-won't-it-where-is-it-send-check-now-and-hold-your-breath nonsense that kept anxious users waiting for for nearly a year before the products were ready for release.

C.D.R. (better known as Controlled Data Recording Systems, Inc., of San Diego, CA) is not a firm noted for multitude H/Z-89 enhancements. When they feel they've created a worthwhile product, they try to perfect it as much as possible and then release it. Since they're also a Zenith Data Systems dealer, they are in a position to provide good support for their customers.

The firm was launched in 1978 when Marc Brooks graduated from the University of Hawaii with a B.S. in Computer Sciences and started the company with his father Herm Brooks and Bill Martin, who had worked with Herm at his previous corporate assignment. A year later, it was just Marc and Herm Brooks as the principles of Controlled Data Recording Systems.

The newly-founded venture had its main interest in developing data retrieval and harsh environment instrumentation, remote data acquisition systems, test instrumentation and industrial controllers. They used Heath computer systems almost from the beginning and adapted the H-89 to some of their industrial data acquisition systems. The main thrust behind C.D.R. is Herm Brooks, who has been in electronics research and development divisions of major corporations for over 30 years. He holds seven patents. As with most C.D.R. products, Herm Brooks does the engineering and design work, with the assistance of their resident technician, Steve Devlin. Marc Brooks develops the in-house software.

Since C.D.R. has used Heath/Zenith computers exclusively for all software development, they branched out and became a Zenith Data Distributor and also began to design product enhancements for the H/Z-89 and H/Z-100 — including disk controllers, speed modules, power supply modifications, and special software packages.

Super RAM 89 created more than a minor flurry when it was released. Only CP/M was provided, and C.D.R. received an unexpected deluge of requests for HDOS software, which was completed about five months after the release of SR-89. The initial SASISOFT hard disk software drivers were configured around the Adaptec ACB-4000 hard disk controller, a unit they feel is more sophisticated than the popular Xebec S1410. However, a large percentage of '89 owners who had Winchester subsystems on line, used the Xebec controller, and this meant they had to develop an alternate software package.

To ease the technical correspondence load and to minimize the expense to both C.D.R. and the User in obtaining software updates, C.D.R. has created a Bulletin Board in cooperation with the San Diego Heath Users' Group. C.D.R. has provided all the equipment and telephone lines; San Diego HUG, the software and board maintenance. When a C.D.R. product is purchased, the new user receives a password to get on the BBS. From there he can download new technical data, ask for help, and receive free software updates (saving himself the nominal update charge). San Diego HUG members have access to other portions of the BBS designed to benefit their group and associated members.

Super RAM 89 is a complex product that incorporates the latest innovations in chip technology. Eighteen-months ago this product would not have been financially possible for a computer system slated for extinction in the marketplace. Now it's not only

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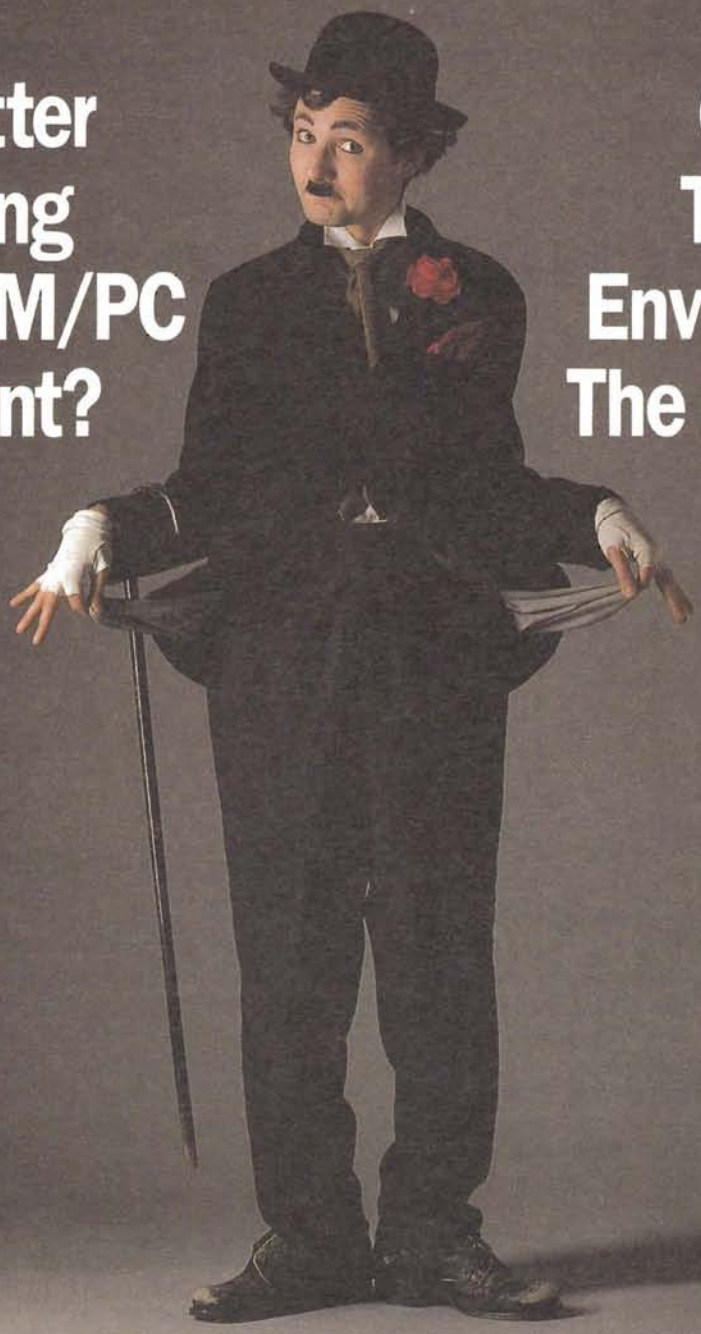

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affordable, but will turn the H/Z-89 into an entirely new system capable of holding its own in the high-speed world of 16-bit computers.

Because there is a lot of territory to cover, we are going to present the Super RAM 89 story in two parts. This segment will cover the hardware and the H/Z-89's entry into the new SCSI standard for hard disk interfacing and multi-user applications. The second part will delve into all the software for RAMdisk, Clock Board and Winchester drive usage.

What Is Super RAM 89?

There are many features to Super RAM 89. First and foremost, it is a RAMdisk, containing a full Megabyte of RAM in the form of 32-256k Dynamic RAM ICs. Load your favorite Database or Spreadsheet program and then dump the contents of a 96-tpi disk (640k), and you'll be stunned by the manipulative speed when you assemble, sort or calculate directly in RAM.

Had C.D.R. created Super RAM 89 with just the RAMdisk, it would have been a welcome add-on for the H/Z-89. But they weren't content. They included a programmable clock with a back-up battery to automatically keep track of the date and time and an 8237 Direct Memory Access Controller. (A DMA controller is a dedicated high-logic circuit that can operate faster than the microprocessors.) For direct memory access, the DMA controller takes over the CPU's memory. It contains a set of programmable registers that specify a starting memory address, the number of bytes to be transferred, and the direction of transfer (to or from memory). In a sense, it is a slave CPU, sitting idly by until an associated peripheral device has some data to be transferred. Registers inside the DMA controller are downloaded by the CPU, and when the controller has finished the job, it signals the CPU via an interrupt or control flag. As a result, data is transferred at a higher throughput, because the device communicates directly with RAM instead of disturbing the CPU.

As a coup de grace, C.D.R. added an SCSI hard disk interface via an NCR 5380 SCSI controller chip. This has several advantages for the '89. It doesn't steal a valuable expansion slot from the right-hand bus, and it enables the '89 to access high storage media — primarily hard disk drives capable of 50-144 Megabytes of storage. The older SASI interface from Magnolia Microsystems and the MMS implementation of CP/M (this includes the Quikstor Winchester software from Quikdata Computer Services) limit the user to hard disk drives with 40-Megabytes.

The SCSI interface will also allow the '89 to use the new Bernoulli Box — a removable cartridge device that is immune from head crashing, but outrageously priced; and the hard disk drives incorporating the new voice-coil technology and capable of 30ms data transfer rates. But we're getting ahead of ourselves.

The affordability aspect of Super RAM 89 is a boon for those of us who would like to add on without the painful side effects. Each component, the basic Interface Card, the Piggy-Back Expansion Board, the RAM, the Clock circuitry, the SCSI interface, the HDOS software (CP/M comes with SR-89), hard disk software for either the Adaptec or Xebec Winchester controllers, can be purchased one step at a time, like a building block.

The Hardware

A fully configured Super RAM 89 is contained on 2 piggy-back boards approximately 4" X 6". The primary interface board plugs into P501 — the first expansion slot on the left-side. It can be stuffed with 16-256k chips for a total of 512k RAM — or an equal number of 64k chips for 128k of RAM. The expansion piggy-back board contains another 512k RAM plus all the good stuff — the Clock circuitry, battery, DMA controller and SCSI interface. The two boards are mated at three points. It is a tight fit and they butt against each other without so much as an air space between them. The piggy-back board is .05" longer on top to allow for the 50-pin right angle header for the SCSI cable.

The installation is simple. Remove the CPU board and lay it down on a clear space on your desk. If you have the 16k RAM expansion board installed at P503, remove it and pack it away. You can also remove the 48k of 4116 ICs. Super RAM 89 does not recognize the RAM on the CPU board in a 1-Megabyte configuration. While leaving these chips installed causes no side-effects, they do draw unnecessary voltage from the power supply.

The next step is to remove the Z-80 CPU and plug it into the SR-89 interface card. Check the pin position marker on the board, because the Z-80 plugs upside-down on the interface card. Take the triangular folded shielded cable and plug it into the 40-pin connector on the piggy-back card. Now plug the unit into P501. C.D.R. has installed a plug between the upper and lower bus connectors so that you can't possibly plug in the board without having the pins properly aligned.

Attach the 40-pin plug at the other end of the shielded cable to the Z-80 socket on the CPU board. There is a green ground wire with a spade-lug soldered into the shielded cable that you have to connect to the heatsink panel on the top of the CPU board. If possible, use a 6 X 32 hex-head screw and secure the ground cable to one of the holes for the mounting bracket.

When you reinsert the CPU board and slide it down the support brackets, use your left hand to push the shielded cable against the CPU board so that it doesn't hang up on the heatsink panel for the Video Board and Flyback Transformer. You may also find that the mounting screw for the right side of the Flyback Transformer may interfere with the cable. If it applies too much pressure to the cable, it may ultimately tear through the vinyl if you remove the CPU board with any regularity. You might find it advisable to take a pair of wire-cutting pliars and cut off the extended part of the Flyback Transformer mounting bolt to ease the installation and removal of the CPU board. If you have any sharp corners after cutting off the extended part, file it carefully and blow out all particles with a can of compressed air, or place several layers of electrical tape over the end.

The SR-89 Manual covers the installation adequately by providing illustrations and some cautionary notes. But there are some things you should look out for.

The shielded cable is quite stiff. This is due to the fact that it is directly in back of the flyback transformer and requires a rigid shield to insure that the high-speed data transmissions aren't volatile to magnetic interference. The way the cable positions itself against the CPU board interfers with the installation of any plug-in boards at P503 (such as the Universal Parallel Interface for the INTERACTIVE GRAPHICS CONTROLLER from SigmaSoft & Systems). You can squeeze such an expansion board into place, but you will have to lift up the triangular corner of the cable in order to do so. This may have a tendency to lift the 40-pin connector in the Z-80 CPU socket out at one end — so do it carefully.

Another aspect to watch out for after you have your system up and running is a potential power supply problem. C.D.R. claims that the fully-stuffed Super RAM 89 board set draws a maximum

of .55 Amps. This conservative rating may or may not be true to your system's configuration. Since my system has been re-oriented to handle a great many enhancements (see Figure 1), I began having some additional power supply problems.

Figure 1

This may well be the ugliest H/Z-89 in captivity. I grew tired of tearing apart my computer in order to write this series, so I turned the H/Z-89 inside out. The CPU board has been repositioned over the CRT. The top of the CPU board is secured to the upright support brackets. The front rests over the CRT on several layers of insulated foam tape in order to prevent the shielding plate from coming in contact with the CRT's metal band. This makes board switching a snap, and you never have to worry about forgetting a cable connection. Of course, RFI emissions are horrendous to in-house TV reception, but you are compensated by having a cool-running unit.

The way things are installed: I have the HSC CO-16 Interface card plugged into the Z-80 socket on the CPU board. A connecting cable goes to the HSC MSDOS emulator unit. The SR-89 interface cable is plugged into the CO-16 Interface card. SR-89 is installed at P501. The hard disk interface cable from SR-89 runs to a Xebec S1410a controller and a Shugart SA712 10 MB Winchester drive. The Z-89-37 jumper wire goes to Pin 14 of P508 — the lower bus of P502. The SigmaSoft Universal Parallel Interface is located at P503, with a cable leading to an Epson MX-80. In the background, the SigmaSoft IGC graphics card is mounted vertically and connected to the Terminal Logic Board.

Moving to the right side: At P504, we have the Z-89-37 soft-sector controller serving 2 Teac 55F 96 tpi DS/DD drives. Spooldisk 89 is located at P505 with a parallel cable running to an Epson LX-80 printer. The H-88-1 hard-sector controller is at P506 to serve two Panasonic JA-551-2 48-tpi DS/DD drives. At alternate times, the H-88-1 is removed, Spooldisk 89 slides over to P506, and the Magnolia 77320 SASI card goes to P505 for use with a second Winchester drive.

On the extreme right, in the cavity where my internal drive used to be, are two boards that will be scrutinized in forthcoming articles in the WINCHESTER/'89 series. They are the new Ampro CP/M and 80186 PCDOS single-board computers with SCSI hard disk interfaces. Both mate easily with the '89's Terminal Logic Board, providing inexpensive upgrades. The CP/M version permits the conversion of all Heath/Zenith disk formats, plus the transfer of CP/M-85, CP/M-86 and MSDOS data files from the Z-100 and the Z-150 PC series computers. The total RAM installed between the various enhancements is 3.5 Megabytes.

My screen suddenly had several text lines with diminished intensity, which crawled up the screen like a shadow. At times, these lines would be stationary and flicker, or go beserk when the heating system kicked on. As I didn't have an oscilloscope to test out the voltage consistency from the +5 and +12 volt regulators, I clipped on the leads from a voltmeter and kept an eye on the dial. I also played with the G1 variable resistor on the Video Board and noticed that when I brought up the raster display, the lines were not horizontal but had a pronounced sawtooth pattern. This information, along with seeing rapid voltage drops from the +5-volt regulator led me to believe that the 10-Amp bridge rectifier and the +5-Volt regulator were on the verge of a thermal shutdown.

I decided at long last to do something about it and purchased a heavy-duty 25 Amp 50 PIV Full Wave Bridge (Radio Shack #276-1185) in place of Heath's modest 10 Amp 25 PIV part. The diminished lines disappeared; the raster screen returned to normal, and the voltage regulators started running much cooler.

I don't mean to imply that this problem is universal. But it will affect some systems more so than others. When I wrote to C.D.R. and mentioned that I was having this difficulty (as were some members of a mid-west HUG), I received a quick call from them to let me know that they had contacted those HUG members and helped to provide them with solutions. In some unusual circumstances, a small metal plate mounted over the flyback transformer will provide additional shielding from magnetic interference. In other cases, the 25 Amp 50 PIV bridge mentioned above will suffice. By the same token, I know of some H/Z-89s who exhibit none of these problems. These are primarily units that were built after 1983.

Super RAM 89's I/O Port assignments do not conflict with any existing H/Z-89 add-on hardware. The only possible mechanical interference is if you have any special graphics boards (such as the SigmaSoft IGC) mounted over the CRT. The .05" extension of the piggy-back board where the SCSI hard disk cable is mounted brings it flush with the top of the CPU board. This means it will come in contact with the ground plane of the IGC and one of the bolt/nuts that secure the IGC's mounting frame to the board. This is easily remedied by removing the bolt and placing a piece of insulated foam tape over the IGC's ground plane. Chances are that you may not be able to latch the computer's top cover, which really isn't a major catastrophe. Leaving it unlatched helps air circulation.

Theory Of Operation

The basic operation of Super RAM 89 is a result of a design decision to move the Z-80 CPU to the SR-89 board. This allows the SR-89 circuitry to access all Z-80 addresses, data and control signals, making it a kind of computer within a computer.

The contiguous use of RAM is based upon a bank switching technique which requires the use of an I/O Port. This was selected as 3A Hex. The signals required to produce the decoded I/O signal 3A Hex are fed to U19 (a 6301 PROM), which also provides decoding for the expansion board's Real Time Clock and SCSI hard disk controller interface. The Z-80 output signals are fed to the CPU board via the 6" shielded cable connected to J1 on the SR-89.

The I/O 3A HEX signal is used in conjunction with data bus bits D0, D1, D2 and D3 to select one of sixteen banks. This selection is performed by the interconnection of U20 and U22 (PAL chips). They also determine the amount of RAM reserved for global use

via Pin 8 at U20 (in conjunction with the jumper settings at JJ1 and JJ2). Pin 11 at U20 informs SR-89 if the CPU board RAM is to be used via JJ3. If you install less than One-Megabyte of RAM on SR-89, you can use the CPU board RAM. If you install the maximum configuration of RAM, it will not be recognized.

U21 is an 8409-2 Dynamic RAM Controller and when provided Refresh (Pin 28 of the Z-80), and MRQ (Pin 19 of the Z-80) will provide *CAS (Column Address Select), *RAS (Row Address Select), *WRITE and Multiplexed RAM addressed MA0 through MA8, for the RAM banks. U17 is used to prevent *CAS to the RAM banks when a program wishes to use the H/Z-89 ROMs for booting drives or running in the monitor. My system currently has the Magnolia Microsystem ROMs installed and I haven't noticed any conflict. Undershoot damping resistor networks are used in series with all signals for U21 and U17 to the RAM banks.

The *RAS signal for banks 2 and 3, together with all other output signals from the RAM controller, are fed to connector J3, which is used to provide drive to the SR-89 expander RAM. The RAM data pins are fed to the Z-80 data pins and to connector J2. This connector also carries the data developed by the circuitry on the expander board.

The SR-89 expansion board contains two RAM blocks. As mentioned earlier, they can either contain 256k or 64k chips. With 256k chips currently selling around $2.50 from many sources in COMPUTER SHOPPER, it would be a criminal waste to use the 64k chips. Control signals and power to these RAM banks are fed through P3. Data lines through P2.

The Clock I/O address is A0 HEX through B7 HEX via Pin 9 of P2. Timing for the clock is provided by a 32 KHZ NOM crystal located at X1, and the associated resistor capacitor networks of R1, R2, C18 and C19. The Clock runs off of 5-volts connected to Pin 24 through diode D2. When the computer is powered down, the clock receives its power from a 3-volt lithium battery. C.D.R. claims that you can also use a 9-volt transistor battery in place of the lithium battery, for an anticipated 3-year lifespan.

The PAL at U20 provides decoding and selection of the SCSI interface which is comprised of U17, U19, U20, U21, U22, U23 and resistors R2 through R18. The SCSI I/O decode is arrived from P2 pin 10 and is set at 90 HEX through 97 HEX. The DMA controller is addressed at C0 HEX through CF HEX. The SCSI ID generator, U19, is addressed at 88 HEX through 8B HEX.

Now — if you read the last few paragraphs closely, you may have noticed that there is some chip duplication. Unfortunately, both boards use the same numerical starting sequence, instead of having different numerical designations. That requires the user to be very specific when consulting the schematics and the parts list for the SR-89 boards. These are included in the revised CP/M software and installation manual. If you received one of the early manuals, two copies of the expansion board schematics were included due to an oversight by the printer. C.D.R. will provide copies of the interface board schematics if you want them as part of your documentation package.

A manufacturer is not obligated to provide schematics for his products. Heath/Zenith is one of the few computer manufacturers to provide complete technical data on its computers. This policy has been adopted by most of the major supporting vendors, except for Magnolia who regard their boards as proprietary secrets. C.D.R. seems to support this policy by allowing us to acquire additional knowledge by seeing how the SR-89 circuits work together.

The SCSI Interface/BUS

As you learned in the INTRODUCTION to this series, the drive manufacturer Schugart developed the original SASI (Shugart Associates System Interface) hard disk interface. They are also responsible for the development of the SCSI (Small Computer Systems Interface) bus in cooperation with NCR.

This is an evolved standard of the SASI interface which allows owners of SASI standard hard disk drives and controller boards to upgrade without having to scrap their original equipment. It is also the first step in the development of a common bus system among all computers and peripheral equipment.

Unlike the RS-232C and the Centronics Parallel interfaces which require a separate I/O Port connector to bridge it to a single peripheral (a printer, modem, plotter or floppy drive) the SCSI bus can connect several Host Processors with several peripherals. Specifically, 8 and 16-bit computers can hook up to each other through the simple SCSI Host Adaptors and share the same peripherals.

If you have acquisition mania and own an H/Z-89, Z-100 and Z-150 PC series computers in different rooms, a SCSI bus network will allow all computers to share a single (or multiple) hard disk drive and one printer — through an interesting bus arbitration scheme. In business situations, it avoids having to replace an entire series of computers. Additional systems can be acquired and hooked up to the existing network without the major expense of LAN or Network units that can cost between $800-1000 for each computer.

Computers equipped with a SCSI Host Adaptor/Interface are able to reside on the same bus because a Control Unit (an NCR 5380 SCSI Controller Chip) relieves the CPU of the chore of communicating and transferring of data to and from the peripheral. It also handles the complex and time consuming task of converting Serial Data to Parallel Data and back again, so that each CPU on the system is free to respond to continued user input.

Figure 2 illustrates how various single and multi-processors are interfaced with a variety of devices ranging from hard disk drives, magnetic back-up tape equipment, Bernoulli boxes, flexible disk media, and the developing optical disk storage technology.

Under the present proposed SCSI standard, a system can have a combined total of 8 Host Adaptors and Control Units. Each Control Unit can service 8 external devices. Thus, 64 devices can be connected on a single 50-pin cable. With the proper software development and the implementation of all signal lines on the bus, it is projected that the SCSI bus will ultimately be able to link 2,048 devices.

The 50-pin mechanical interface includes 9 Control and 9 Data lines. Differentially driven signals (those on a multi-user system) can use a maximum cable length of 25-meters between each shared device. Single-user systems are limited to 6-meters. Under an asynchronous protocol arrangement, the SCSI bus will transfer data at 1.5M bytes/sec. Synchronous protocol allows for a 4M bytes/sec. transfer rate. The older SASI interface transferred data 5M bytes/sec. But something has to give somewhere.

John Lohmeyer, of the Peripheral Product Development Department of NCR Corp. (Wichita, KS), described in the January 24, 1985 issue of EDN how linked devices on an SCSI bus asserted use of peripherals:

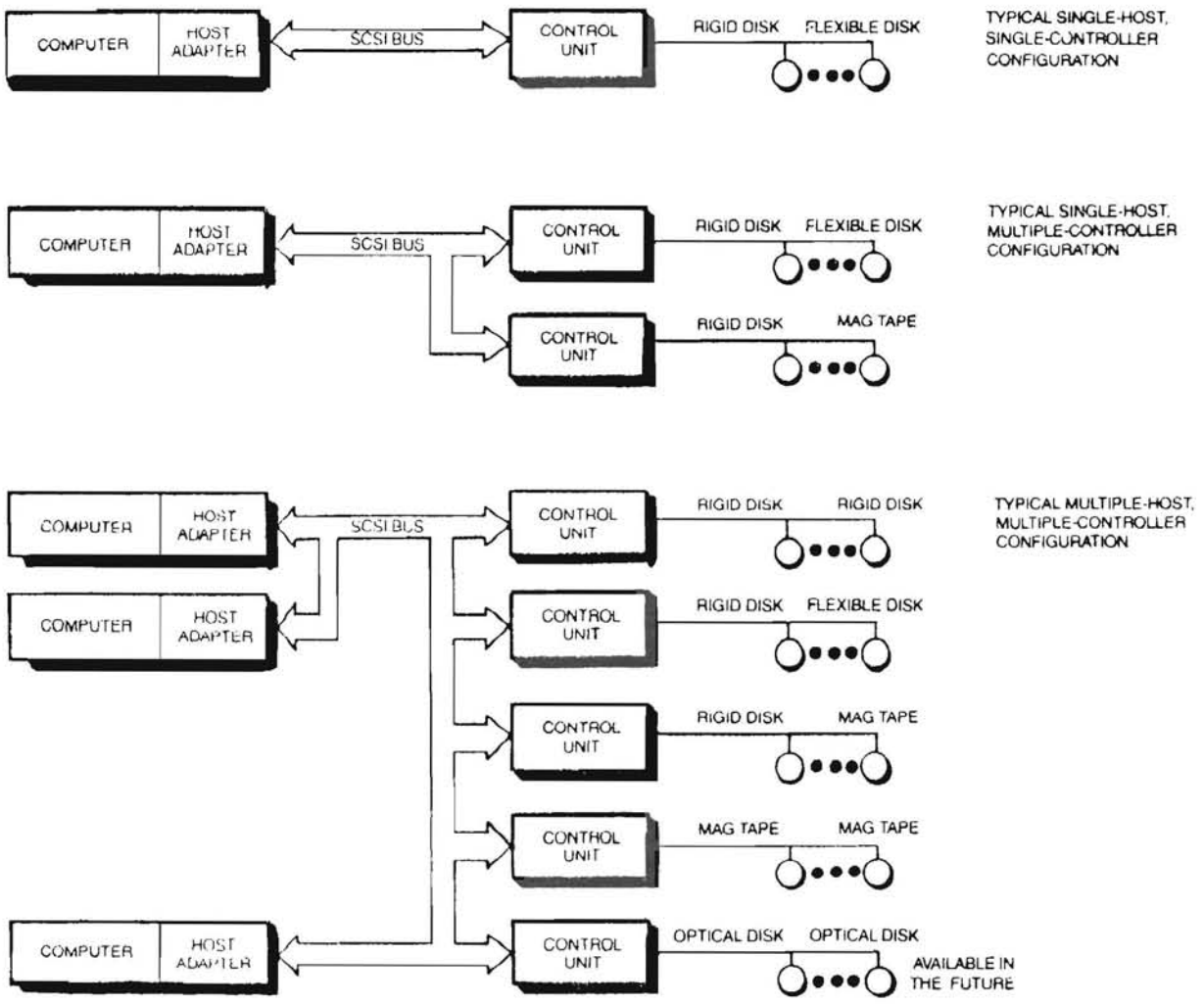

Figure 2

Here are examples of single and multi-user SCSI setups as taken from the ANSC X3T9.2 draft standard manual. It is available for $20 from The X3 Secretariat, Computer & Business Equipment Manufacturers Assoc., 311 First Street, N.W., Suite 500, Washington, DC 20001. Include a self-addressed mailing label.

"The SCSI's scheme for arbitrating bus contention specifies eight lines on the SCSI connector as device ID lines, numbered 0 to 7. To initiate a transaction, a device (the initiator) first checks the control lines to determine if the bus is busy. The initiator does so by detecting the presence or absence of Bsy (busy) and Sel (select) signals. If these signals are not detected, the device asserts Bsy and its own specified device-ID line. If more than one device contends for the bus, the device with the highest priority ID gains access to the bus.

"A general strategy for assigning bus IDs is to give the highest priorities to devices that are not fully buffered; this ensures that each device in the system has sufficient bandwidth to complete transactions. Printers and other fully buffered devices should generally be assigned a lower priority.

"A device that wins an arbitration asserts the Sel signal to end the arbitration. It continues asserting its own ID line and it asserts the ID line corresponding to the device it is selecting. It then stops asserting Bsy, and the selected device (called the target) responds by reasserting Bsy.

"This arbitration scheme is simple but effective. It requires no data transmission before establishing the connection between the initiator and the target, thus reducing system overhead. As a result, bus utilization improves."

NCR claims that peripherals attached to an SCSI bus have an activity limit factor of about 30% before things bog down. The bulk of this time is consumed by buffered devices (printers) while high-density storage media has a much lower activity factor due to the rapid transfer of data to and from the host com-

puters. A semblance of order is maintained through the use of sub-channels on the SCSI bus which can thread data from several computers to different target devices at the same time.

The Microprocessor Products Division of Motorola has gone one step further. In developing the MC68HC99 IC, it has incorporated both a microprocessor and an SCSI port structure into one chip. This chip also contains a serial data processor (serializer-deserializer, which we discussed in the Introductory part of this series), DMA-driven sector buffers, and Reed-Solomon error checking and correction circuitry.

Chips like the MC68HC99 are also capable of maintaining integrity of data. Some disk drives are able to isolate tracks that may have trouble-spots which are caused by defects in a disk's surface that may have occurred during the manufacturing process or during prolonged use. They can help the drive controller isolate these areas and automatically map them out. This is accomplished by the alternate-sector, alternate-track method. Each track is assigned several spare sectors. Thus, if a drive encounters a bad sector, it automatically attempts to use one of the spares. If there are no spare sectors available, the entire track is deemed defective and all data is routed to an alternate track. With the DMA taking control of the data transfers, the CPU can assist by monitoring the spindle rotation of the motor, the consistency of the drive's power supply and the accuracy of the drive controller — creating a check and balance within the system that is able to isolate malfunctions before they result in a breakdown.

A major application for this type of data integrity is in systems where breakdowns cannot be tolerated — such as in banks, airline scheduling, database banks and communications transmissions.

The SCSI standard has been several years in development and is only now being adopted by drive, controller and computer manufacturers as older equipment heads for the second-hand junk heap. It is probably the only standard that will prevent the ultimate industry take-over by the IBM hardware standard for computers, because it allows special applications hardware and different Microprocessors to co-reside on the same bus and share common peripherals, even if they have proprietary interfaces based on the SCSI standard. It may also trigger more independent development of unique hardware, as well as give it a better chance of capturing enough market share to insure even modest success without it having to buy its way to fame, whether deserving or not.

The effect these chips have achieved is the reduction of the old SASI interface to just a couple of parts rather than whole boards. I should also mention that the development of the SCSI bus standard has resulted in manufacturers working together to establish a common interchange of hard disk controllers and hard disk drives without the need of system integrators and software houses having to develop specific software for a specific group of drive/controller combinations.

The established ST506 hard disk interface has been incorporated into the new SCSI ST412 interface. Some manufacturers will list them as ST506/412 compatible. And since the SCSI firmware contains a super-set of the SASI firmware, equipment originally designed for the SASI standard will run perfectly well on an SCSI system. The only exception to this rule is that an SCSI system using SASI controllers will require specific software drivers for specific controller boards.

The foregoing may be regarded as a general overview of the SCSI standard. There are some new products coming available for the H/Z-89, Z-100 and Z-150 series of computers that will exploit the SCSI bus potential in interesting ways. The hardware isn't quite ready for release, but I expect to obtain evaluation units very shortly for a future article in this series.

* * *

I have a strong feeling C.D.R. plans to be in the forefront of the SCSI development for all Heath/Zenith computer systems. By the time this article appears, they will have released a hard disk controller board for the Z-100 series computers that will not only look like a Zenith Z-217 hard disk controller to the computer, but it will also enable the Z-100 to communicate externally with other SCSI devices — including the H/Z-89 with Super RAM 89 and the SCSI option.

The hard disk software presently available (December 1985) for SR-89 follows the SASI conventions in communicating with the Adaptec ACB-4000 controller. A modified version for use with the Xebec S1410/a controllers is also available.

Full implementation of the SCSI bus is currently in Beta site testing at a San Diego school district where three SCSI/SR-89 equipped H/Z-89s are linked to two 54 MB hard disk drives and a 90 MB MAG tape system to handle employee payroll and scheduling information. The SCSI software is being developed and tested by Eugene Skopal, Systems Administrator for Copley Computer Services (7701 Herschel Drive, La Jolla, CA — 619-457-3880). C.D.R. expects that the general release of this software will coincide with their own release of the SCSI controller for the Z-100.

As a closing note, Figure 3 shows a comparative chart that I have compiled to illustrate the SASI interface in comparison to the single and multi-user SCSI bus.

Figure 3

This is a compilation/comparison of the SASI and SCSI Connector Pin Assignments. Applicable notes have been included at the end of the chart.

SASI INTERFACE		SCSI SINGLE ENDED OPTION	SCSI DIFFERENTIAL OPTION			
Signal	Pin	Signal	Signal	Pin		Signal
DATA0	2	-DB(0)	SHIELD GROUND	1	2	GROUND
DATA1	4	-DB(1)	+DB(0)	3	4	-DB(0)
DATA2	6	-DB(2)	+DB(1)	5	6	-DB(1)
DATA3	8	-DB(3)	+DB(2)	7	8	-DB(2)
DATA4	10	-DB(4)	+DB(3)	9	10	-DB(3)
DATA5	12	-DB(5)	+DB(4)	11	12	-DB(4)
DATA6	4	-DB(6)	+DB(5)	13	14	-DB(5)
DATA7	16	-DB(7)	+DB(6)	15	16	-DB(6)
SPARE	18	-DB(PARITY)	+DB(7)	17	18	-DB(7)
SPARE	20	GROUND	+DB(PARITY)	19	20	-DB(PARITY)
SPARE	22	GROUND	DIFFSENS	21	22	GROUND
SPARE	24	GROUND	GROUND	23	24	GROUND
SPARE	26	TERMPWR	TERMPWR	25	26	TERMPWR
SPARE	28	GROUND	GROUND	27	28	GROUND
SPARE	30	GROUND	+ATN	29	30	-ATN
SPARE	32	-ATN	GROUND	31	32	GROUND
SPARE	34	GROUND	+BSY	33	34	-BSY
BUSY-	36	-BSY	+ACK	35	36	-ACK
ACK-	38	-ACK	+RST	37	38	-RST
RST-	40	-RST	+MSG	39	40	-MSG
MSG-	42	-MSG	+SEL	41	42	-SEL
SEL-	44	-SEL	+C/D	43	44	-C/D
C-/D	46	-C/D	+REQ	45	46	-REQ
REQ-	48	-REQ	+I/O	47	48	-I/O
I-/O	50	-I/O	GROUND	49	50	GROUND

1 - In the SASI option, all odd numbered pins are GROUND.

2 - In the single-ended SCSI option, all odd pins except 25 are connected to GROUND IN Pin 25 may be OPEN or GROUNDED.

3 - Shield ground is optional

4 - TERMPWR pins may be used to provide 5V for terminator power

5 - Pin 21 in the Differential Option may be used to provide active high sensing for enabling differential drivers

In the next installment, we will discuss the creation of Super RAM 89 — the people who contributed to its hardware and software development — and evaluate all the software packages. My opinion after working with Super RAM 89 for the past two months is that it is an exciting product whose best applications are yet to come.

* * *

Super RAM 89 Board 1 (w/o RAM) is $190. Board 2 is $90. Real Time Clock option is $45. SCSI/DMA option is $95. HDOS software is $35. CP/M is free with Board 1. Hard disk software — either for their Adaptec or Xebec controllers — is $75. For current pricing 256k RAM, hard disk drives and controllers, please contact:

CONTROLLED DATA RECORDING SYSTEMS, INC.
7210 Clairemont Mesa Blvd.
San Diego, CA 92111
(619) 560-1272

BASIC Computing

Serial Ports
Part 2

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In my last article, we took a pretty thorough look at the microchip which controls the serial ports of our computers. We called it an Asynchronous Communications Element (ACE) and said that it was a model number 8250. Those of you with the H-89 or Z-90 will find that your manuals call it an INS8250. The HS-151 manual includes information on the WD8250. The different prefixes indicate that different manufacturers are involved. For our purposes, they're all the same.

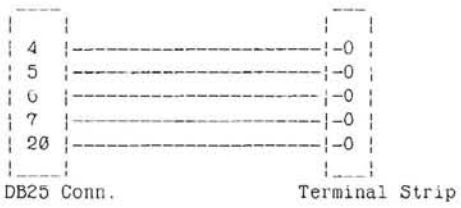


Figure 1

We discovered that we can change the way the ACE works by inserting data into certain of its seven registers, and that we can find the status of the serial ports and the equipment connected to them by reading data from these registers. I promised that as this series progresses, we'll begin to develop programs which are very useful, programs which allow us to signal to the outside world, keep track of events occurring outside the computer, and talk with other digital devices. These programs will even allow you to do things like turn lights on and off and monitor home security. They may require some outside hardware, and will be rather rudimentary, but remember that the object of this series is to teach you to write your own useful programs and to provide you with good programming examples. That way, you can develop precisely what you need, not try to adapt your computing lifestyle to emulate mine.

In this article, we'll take a look at four of the lines provided in the serial connector. These leads are the Data Set Ready (DSR), Clear To Send (CTS), Request To Send (RTS), and Data Terminal Ready (DTR). At this point, it is very important to note that we are only talking about your serial connector which is called DTE, not the DCE connectors. This is the port at address 330 through 337 octal on the H-89, or the ports called COM1 or COM2 on the IBM PC clones.

Why only these ports? DTE means Data Terminal Equipment, and DCE means Data Communications Equipment. Each type of circuit is connected to the ACE differently. On the DTE, which we will be using, the DTR and RTS leads come from line drivers (transmitters). That is, they send their information from the DTE to the external equipment. These are the two leads we'll control to turn things outside the computer on and off. Also, on the DTE, the DSR and CTS connect to receivers. We can monitor the status of these leads, but cannot set them to turn anything on or off. We'll use these received leads to monitor what's going on in the outside world.

In a future article covering RS-232C, I'll cover in detail what DTE and DCE are all about. For now, you need to know that on the DCE connector, the DTR and RTS leads are connected to receivers. The CTS and DSR leads, conversely, are connected to line drivers. This is just the opposite of the connectors to the DTE we'll be using. This could cause some confusion later when we're selecting a register and bit we want to turn on. For now, let's just stick with the DTE connector.

Last month, we included a table which showed that each of the leads mentioned above is associated with a specific register (an address we know), and a bit in that register. Now we find that these leads are also each associated with a specific pin on the DB-25 connector on the rear of our computers. By knowing the register, we know its address. By knowing the bit within the register, we know its value. (Each bit in a binary word has a specific value.) We'll need to know these things to do our programming. Before we're done, we'll be able to monitor and control remote devices. All these steps make it seem slow, but hang in there. We're real close now. We'll soon be doing an experiment you're sure to enjoy.

Here's all the information you'll need about the four leads we'll be using. You'll want to refer to this table often.

LEAD	S/R	REG	ADDRESS	BIT	VALUE	DB-25 PIN
DTR	SEND	4	PORT+4	0	1	20
RTS	SEND	4	PORT+4	1	2	4
CTS	RCV	6	PORT+6	4	16	5
DSR	RCV	6	PORT+6	5	32	6
GRD	--- THIS IS GROUND FOR ALL ---					7

If we're going to turn these things on and off, we'll need a way to monitor our progress. If you have a breakout box, great. You can use that. For most of us, however, we'll need a female DB-25, a terminal strip, a voltmeter and some wire. Most of us have built our own computers and have these on hand. Make the cable assembly I show in Figure 1, and label the terminals as shown. The wires need to be only two or three feet long. The purpose of this cable is to permit us to monitor the condition of the leads we'll be turning on and off.

When you've completed the cable, plug it into the port we'll be using. That's the one labeled 330 - 337 on the H-89 or H-8 computer. (It's the only male connector on the computer.) If you have an IBM PC compatible machine, plug the cable into COM1. For the next set of experiments, we will be measuring the voltage between GRD and DTR, and between GRD and RTS. You can expect a voltage of approximately -11.5 volts when the lead is turned off, and +11.5 when it is turned on. Now prepare a chart with four columns. Label them:

COMMAND DTR RTS A

You'll fill these in as we complete the following steps. Then you'll be able to look back at your chart and learn more from it.

All the preparations have been made. We'll begin our experiments now. Turn on your computer, boot it up, and call up BASIC. We'll perform all of these experiments in the command mode. That is, we'll type each command as we want it to execute. You could type the same commands into a program and it would run, but when you're testing a new series of commands, it's often better to enter them from the keyboard, one at a time, so you can check each ones results before proceeding to another.

With BASIC running, we'll first set the value of the variable PORT to the address of the serial port we're using, just as we did last month. When you enter these commands, finish each with a carriage return. Begin with:

```
PORT=&O330Q
```

if you have an H-8 or an H-89. Or use

```
PORT=&H3F8
```

for the PC clones. Use the appropriate address for the H-100s. Now that we have set the variable, all the commands which follow will be the same, no matter which machine we have. Every time you enter a command, write it in the first column of your chart. Now, we'll force both the output lines to their off state to assure that we have a common starting point. Enter the command:

```
OUT PORT+4,0
```

This turns all bits off in Register 4. Both our DTR and RTS leads should be off. Using your voltmeter, measure from GRD to DTR and from GRD to RTS. Add the information you get to your chart. So far, your chart should look like this:

COMMAND	DTR	RTS	A
PORT=&O330	-	-	-
OUT PORT+4,0	-11.5(OFF)	-11.5(OFF)	-

We'll use "A" a little later. Now enter the command:

```
OUT PORT+4,1
```

and make the two voltage measurements again. The new line on your chart should read:

OUT PORT+4,1	+11.5(ON)	-11.5(OFF)	-

You just turned on the DTR lead. With the correct interface connected to that serial port, you could have caused an action to be taken. (Lights turned on, coffee pot started perking, etc.) I'll show you how to do those things later. Right now, there's more to learn. If you don't have a name for your computer, you've got to think of one soon. Then when something happens, you can say "OGLETHORPE DID IT!!!"

Next enter the command

```
OUT PORT+4,2
```

and measure the voltages again. The chart entry should be:

OUT PORT+4,2	-11.5(OFF)	+11.5(ON)	-

You can see that RTS turned on, but DTR turned off. Why? We'll explain that after the next command. Enter:

```
OUT PORT+4,3
```

Measure the voltages and add the information to your chart. This latest addition should read:

OUT PORT+4,3	+11.5(ON)	+11.5(ON)	-

Let your computer run while we look at our results. There are still some experiments to do. You'll want to refer to the table at the end of last month's article. Once again, DTR is associated with Register 4, bit 0, and RTS is controlled by Register 4, bit 1. The following chart should make the results of our tests clear.

BIT LEAD	7	6	5	4	3	2	1 RTS	0 DTR
0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	1
2	0	0	0	0	0	0	1	0
3	0	0	0	0	0	0	1	1

The first row of the chart shows the number of each bit within the byte you placed into the register with the OUT command. The second row shows that the DTR and RTS leads are turned on and off by bits zero and one, respectively. Rows three through six give us the binary byte placed into Register 4 when the OUT command was issued for the values 0, 1, 2, and 3.

Now, it should be clear to you. When we placed a zero into the register, each bit was set to zero, or off. Therefore, when you measured the voltages, you found both leads to be in the off state. Next, we placed a one into the register. Bit zero was set to the one or 'on' condition. All other bits were at zero or 'off'. We confirmed this with our meter reading. Sure enough, DTR was on and RTS was off.

When we sent the number 2 to Register 4, we set bit one to binary one or 'on' and all other bits were set to zero, or turned 'off'. That's why DTR was off and RTS was on. Finally, the number 3 was sent by the OUT command. As you can see, by the binary representation of the number, both bits zero and one are 'on' because each contains a binary one. All other bits are zero and,

therefore, off. And, sure enough, our meter readings confirmed this to be the case.

These are the only two leads we have control of. The other bits of the byte won't appear at the input/output (I/O) connector on the back of the computer. They're enough for many applications, and the required interfaces are both simple and inexpensive.

There is one problem with this type of control, however. If we want to turn bit one on (the RTS lead), how do we know whether to send a two or a three to the register? How do we know whether bit zero (the DTR lead) is on or off when we want to switch RTS? And what if other leads were 'on' when we sent our OUT command? We could inadvertently turn something else off.

Not to worry. We'll just use a little bit of Boolean Algebra. No, I'm not going to try to explain what Boole had on his mind when he came up with it. We'll just look at "OR". BASIC allows us to use this OR logic and now is the time to learn how it works. When we combine two bytes with the 'OR', the resulting byte will contain a logic one in each bit in which either input had a one. For example:

```
        1 0 1 0 1 0 1 0
   OR   1 1 0 1 0 0 1 1
EQUALS  1 1 1 1 1 0 1 1
```

Now all we have to do is find out what exists in Register 4 (remember the INP() command from last month?) and send that value 'OR', the value required to turn on the lead we want. In the following series of experiments, we'll first turn off both leads. Then, we'll set the variable 'A' to the existing register contents with the INP() command and use OR to show the following:

```
zero      0 0 0 0 0 0 0 0     BOTH OFF
OR one    0 0 0 0 0 0 0 1     DTR ON
equals    0 0 0 0 0 0 0 1     DTR ON

one       0 0 0 0 0 0 0 1     DTR ON
OR one    0 0 0 0 0 0 0 1     DTR ON
equals    0 0 0 0 0 0 0 1     DTR ON

one       0 0 0 0 0 0 0 1     DTR ON
OR two    0 0 0 0 0 0 1 0     RTS ON
equals    0 0 0 0 0 0 1 1     BOTH ON

three     0 0 0 0 0 0 1 1     BOTH ON
OR one    0 0 0 0 0 0 0 1     DTR ON
equals    0 0 0 0 0 0 1 1     BOTH ON

three     0 0 0 0 0 0 1 1     BOTH ON
OR two    0 0 0 0 0 0 1 0     RTS ON
equals    0 0 0 0 0 0 1 1     BOTH ON
```

In the following paragraph, I'll show a command or series of commands. Then, I'll use a slash (/) and an asterisk (*) to begin the entry you should make on your chart. I'll end that entry with asterisk-slash (*/). I'll also include remarks in the command lines. It's not necessary to type the remarks as they'll be ignored by BASIC anyway. When you see /* you should take voltage readings as we did before, and enter the information into the chart. Here goes:

```
OUT PORT+4,0   'THIS TURNS BOTH LINES OFF
/* OUT PORT+4,0      -11.5(OFF)      -11.5(OFF)      - */
A=INP(PORT+4)  'THIS SETS VARIABLE A TO THE REGISTER CONTENTS
PRINT A   'THIS PRINTS THE VALUE OF A ON THE SCREEN
/* A=INP(PORT+4)  */
/* PRINT A      -11.5(OFF)      -11.5(OFF)      0  */
OUT PORT+4,A OR 1   'TURN DTR ON
A=INP(PORT+4)
PRINT A
/*OUT PORT+4,A OR 1 */
/* A=INP(PORT+4) */
/* PRINT A      +11.5(ON)       -11.5(OFF)      1  */
OUT PORT+4,A OR 1   'TURN DTR ON AGAIN
A=INP(PORT+4)
PRINT A
/* OUT PORT+4,A OR 1  */
/* A=INP(PORT+4)  */
/* PRINT A      +11.5(ON)       -11.5(OFF)      1  */
OUT PORT+4,A OR 2   'TURN RTS ON
A=INP(PORT+4)
PRINT A
/* OUT PORT+4,A OR 2  */
/* A=INP(PORT+4)  */
/* PRINT A      +11.5(ON)       +11.5(ON)       3  */
OUT PORT+4,A OR 1   'TURN DTR ON
A=INP(PORT+4)
PRINT A
/* OUT PORT+4,A OR 1  */
/* A=INP(PORT+4)  */
/* PRINT A      +11.5(ON)       +11.5(ON)       3  */
OUT PORT+4,A OR 2   'TURN RTS ON
A=INP(PORT+4)
PRINT A
/* OUT PORT+4,A OR 2  */
/* A=INP(PORT+4)  */
/* PRINT A      +11.5(ON)       +11.5(ON)       3  */
```

Well, there you see it. We could turn on a port, and we were assured that any bit which was turned on when we entered our command remained on when we were finished. By using the INP() command to put the existing contents of the register into a variable, we maintained its integrity. This is what you should have learned. To turn on (set to binary one) any bit in a register, use the Boolean operator 'OR' to combine the existing contents of that register with a byte which has the desired bit on.

But what about OFF? Everything we did turned something on. Sooner or later, we've got to turn one of the lines off, and just like before, we can't change any other bits within the register. It's time for another trick from Boole. We'll now use the operator 'AND'. This operator provides that when combining two bytes, any bit which contains a logic one in 'both' bytes will contain a one in the result. If either bit is a zero in a given position within either byte, the resulting byte will contain a zero in that position. For example:

```
        1 0 1 0 1 0 1 0
   AND  1 1 0 1 0 0 1 1
EQUALS  1 0 0 0 0 0 1 0
```

Again, we'll find out what exists in the register and send that value 'AND' the required byte to the register. The required byte must have a zero in the bit we want to turn off. All other bits must be logic one. That way, any existing bit which was on (except the bit we want off) will combine with a one and remain on. Any bit which was off was at logic zero, and will produce a zero to remain off.

In this series of experiments, we'll show that:

```
three     0 0 0 0 0 0 1 1     BOTH  ON
AND 254   1 1 1 1 1 1 1 0     DTR OFF
equals    0 0 0 0 0 0 1 0     DTR OFF

two       0 0 0 0 0 0 1 0     RTS ON
AND 254   1 1 1 1 1 1 1 0     DTR OFF
equals    0 0 0 0 0 0 1 0     DTR OFF

two       0 0 0 0 0 0 1 0     RTS ON
AND 253   1 1 1 1 1 1 0 1     RTS OFF
equals    0 0 0 0 0 0 0 0     BOTH OFF

zero      0 0 0 0 0 0 0 0     BOTH OFF
AND 254   1 1 1 1 1 1 1 0     DTR OFF
equals    0 0 0 0 0 0 0 0     BOTH OFF
```

```
zero      0 0 0 0 0 0 0 0     BOTH OFF
AND 253   1 1 1 1 1 1 0 1     RTS OFF
equals    0 0 0 0 0 0 0 0     BOTH OFF
```

For this series of experiments, I'll use the same shorthand I used in the previous set. Do the following steps:

```
OUT PORT+4,3   'ASSURE BOTH ARE ON
A=INP(PORT+4)
PRINT A
/* OUT PORT+4,3  */
/* A=INP(PORT+4)  */
/* PRINT A      +11.5(ON)      +11.5(ON)      3  */
OUT PORT+4,A AND 254      'TURN DTR OFF
A=INP(PORT+4)
PRINT A
/* OUT PORT+4,A AND 254  */
/* A=INP(PORT+4)  */
/* PRINT A      -11.5(OFF)     +11.5(ON)      2  */
OUT PORT+4,A AND 254      'TURN DTR OFF AGAIN
A=INP(PORT+4)
PRINT A
/* OUT PORT+4,A AND 254  */
/* A=INP(PORT+4)  */
/* PRINT A      -11.5(OFF)     +11.5(ON)      2  */
OUT PORT+4,A AND 253      'TURN RTS OFF
A=INP(PORT+4)
PRINT A
/* OUT PORT+4,A AND 253  */
/* A=INP(PORT+4)  */
/* PRINT A      -11.5(OFF)     -11.5(OFF)     0  */
OUT PORT+4,A AND 254      'TURN DTR OFF
A=INP(PORT+4)
PRINT A
/* OUT PORT+4,A AND 254  */
/* A=INP(PORT+4)  */
/* PRINT A      -11.5(OFF)     -11.5(OFF)     0  */
OUT PORT+4,A AND 253      'TURN RTS OFF
A=INP(PORT+4)
PRINT A
/* OUT PORT+4,A AND 253  */
/* A=INP(PORT+4)  */
/*  PRINT A     -11.5(OFF)     -11.5(OFF)     0  */
```

So there you have it. When we used the OR operator to turn a bit on, only that bit was affected. If it was already on, it stayed on. When we used the AND operator to turn a bit off, only that bit was affected. If it was already off, it stayed off.

We've seen how to control the outgoing DTR and RTS leads. You can refer to the chart we made as we went through the experiments. Go through the steps as often as you like to verify your results, and experiment if you like. That's the way to learn.

Next month, we'll look at ways to monitor the incoming CTS and DSR leads. Then we'll look at ways to interface those signals to and from the outside world. See you next month. ✱

1.2 Megabyte Drives For The ET-100

Pat Swayne
HUG Software Engineer

Warning: Installation of this modification requires that you connect jumper wires directly to your ETA-100 accessory board. This work should only be done by persons experienced in making such changes to printed circuit boards. The possibility exists of permanently damaging your accessory board. Neither the Heath/Zenith technical consultants nor the Heath/Zenith Users' Group staff may be able to help you if you attempt the modification, and your computer does not work. To install this modification, you will need an accurate voltmeter, and either a frequency counter or a calibrated oscilloscope.

In the February issue of REMark, I showed you how to expand the memory of the ET-100 computer (with ETA-100 accessory) to 768k (see also the 768k Update in this issue). In the May issue, Jim Buszkiewicz described some new disk drives that are available from Controlled Data Recording Systems (CDR) that allow you to store 1.2 megabytes of data on a 5.25 inch disk. In this aritcle, I will describe how you can connect this type of drive to an ET-100 computer.

There are two reasons why it is possible to connect "hi tech" drives to an ET-100 computer. One is that even though the drives work like 8" disk drives, they have standard 5.25" drive connectors on them On The CDR unit, an adapter is provided that allows you to plug a Z-100 8" drive cable to the drives. My modification allows you to connect both standard and "hi tech" drives to your ET-100 on the existing 5.25" drive cable.

The other reason why it is possible to connect "hi tech" drives to your ET-100 is because the disk controller board in it was copied from the Z-100 controller board, and contains most of the circuitry required to support 8" drives. The most important 8" support that is missing from the ET-100 controller is the actual 8" connector and the buffers to drive it. Since my modification uses only the 5.25" cable, the 8" connector and buffers are not needed, and everything else that we need is already on the board, though most of it is not connected.

Required Materials

To make the modification described here, you will need two 14-pin IC sockets (Heath p/n 434-298), a 16-pin IC socket (434-299), a 36 pf ceramic capacitor (21-709), and 3 feet (1 meter) of 28 or 30 AWG "wire wrap" wire. Prepare one 14-pin socket by bending out pin 3 90 degrees and connecting a 4" (10 cm) length of wire to the bent out pin. Prepare the other 14-pin socket by bending out pin 8 and connecting a 2.5" (6.5 cm) length of wire to the bent out pin. Prepare the 16-pin socket by bending out pin 12 and connecting a 1" (2.5 cm) length of wire to the bent out pin.

You will also need one or more 1.2 megabyte disk drives. The drives are available from the Heath parts dept. as part no. 150-203. They are also available for $195 each from Controlled Data Recording Systems, Inc., 7210 Clairemont Mesa Boulevard, San Diego, CA 92111, (619) 560-1272. To connect the drives to the existing cable in your ED-100 drive unit, you will need some press-on connectors. A suitable connector is available as part number R502-ND for $3.51 each from Digi-Key Corporation, P.O. Box 677, Thief River Falls, MN 56701, (800) 344-4539. If you want to use a new cable altogether, you might consider part no. 443-811 from Heath. This cable was originally used for the 3 drive H-17 modification, so it has 3 drive connectors on one end, and a pin connector that would plug into your ET-100 at the other end. It is not RFI shielded, however.

To make power cables for your drives, you will need one connector shell (p/n 434-319), 3 connector pins (p/n 432-1002), and an 8" (20 cm) each of red, orange, and black pieces of 20 to 24 AWG stranded insulated wire for EACH drive.

Disassembly

Disassemble your ET-100 by following steps 1 through 4 on page 11 of your EA-100 Technical Manual. Do not perform step 5. Now, remove your accessory board by following steps 2 through 7 on pages 13 and 14. Do not perform step 1 on page 13. All work will be done on the accessory board, so set the rest of the computer's components aside until called for.

Step-By-Step Modification Procedure

( ) Replace the capacitor at C604 with a 36 pf capacitor. Remove the old capacitor by heating each pad where the capacitor is soldered on the solder side of the board with your soldering iron while pulling the capacitor with pliers, then clean the mounting holes with a solder removal tool or braid. Now, install the new capacitor. Note: If the old capacitor is not mounted flush to the board, you can cut it off and solder the new one to the remaining leads.

( ) Remove the IC at U614 and bend out pins 12 and 13. Replace the IC at U614 with pins 12 and 13 outside of the socket.

( ) Remove the IC at U603 and insert the prepared 16-pin socket in its place, and then insert the IC in the new socket.

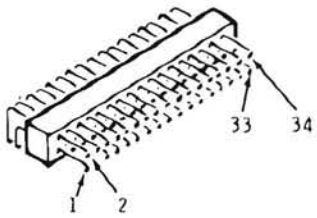
( ) Connect the wire coming from the prepared 16-pin socket to the leg of R617 that is nearest the edge of the circuit board.

( ) Remove the IC at U619 and replace it with the prepared 14-pin socket that has the 4" wire attached to it. Install the IC in the new socket. Pass the wire coming from pin 3 of the new socket through the feed-through hole by pin 7 of U614. The other end of the wire will be connected later.

Note: When you must pass a wire through a feed-through hole, make sure that it is clear first. Remove any solder in it first, if necessary.

( ) Remove the IC at U624 and replace it with the other prepared 14-pin socket. Install the IC in the new socket. Pass the wire coming from the new socket through the feed-through hole by pin 8 of U624. The other end of the wire will be connected later.

( ) Cut off pins 2 and 34 of P602. Pins 2 and 34 are the pins at each end of the top row of pins (see the drawing below). They are connected to the circuit board ground.



Note: The following steps will all be performed on the solder side of the board. When an instruction calls for a jumper wire from one IC pin to another, it means to solder the ends of the wire to the solder pads under the appropriate pins.

( ) Connect the wire coming from the socket in U619 through the feed-through hole to U614 pin 3.

( ) Jumper U614 pin 10 to U614 pin 12.

( ) Jumper U614 pin 11 to U614 pin 13.

( ) Jumper U614 pin 3 to U627 pin 1.

( ) Jumper U614 pin 3 to U623 pin 2. There will now be 3 jumper wires connected to U614 pin 3.

( ) Jumper U623 pin 18 to U627 pin 4.

( ) Connect the wire coming from the socket in U624 through the feed-through hole to U626 pin 3.

( ) Jumper U626 pin 3 to U627 pin 5. There will now be two wires at U626 pin 3.

( ) Jumper U627 pin 3 to U627 pin 6, and to U624 pin 8. This connection is to the pad at U624 pin 8, not to the bent out pin.

( ) Jumper U627 pin 2 to U626 pin 5.

( ) Jumper U626 pin 4 to U626 pin 1, and to U626 pin 14.

( ) Jumper U626 pin 2 to U626 pin 6.

( ) Carefully check all wiring for errors. Recheck each step above.

Disk Controller Calibration

Return the base of your computer to your work bench. Replace the accessory board by reversing steps 7 and 6 on page 14 of your EA-100 Technical Manual. Carefully rest the heat sink assembly on the power transformer, with a piece of cardboard between them, so that no metal parts on the heat sink touch the rest of the computer.

Perform the Data Separator Calibration procedure starting with step 5 on page 93. (This procedure can be performed with just the accessory board installed. You do not need the other boards for this procedure.) If you do not have a frequency counter as called for in the manual, you can use a calibrated oscilloscope instead. Set it for 500 ns/div and 2 volts (.2 for 10-to-1 probe). Connect the scope probe to test point X601 and adjust R611 for exactly 1 complete cycle (one square wave) per division on the scope. Note: the presence of a voltmeter lead at X602 alters the frequency of the oscillator that you are adjusting. Therefore, do not leave a lead attached to X602 during the procedure, but just touch it there when you want to check the voltage.

The precompensation adjustment procedure (see page 96 of your Technical Manual) is quite difficult to perform, since all components of the computer must be present, but the computer must still be propped open somehow, to allow access to the accessory board. I removed my precompensation control (R620) and mounted it on the solder side of the board, and drilled a hole in the bottom of my cabinet so that I could adjust the control with the computer assembled. I do not recommend that you try this unless you have a good solder removal tool. The precompensation adjustment does not seem to be very critical, and you will probably get good results if you set your control to this position:

assuming that your control is mounted normally on the component side of the board. If your standard 5.25 inch drives are the 48 TPI type, they do not use precompensation, so the adjustment will affect only your 1.2 megabyte drives. If your standard drives are 96 TPI drives, they use precompensation, and the correct adjustment for them may be different from the adjustment for

1.2 megabyte drives, so you may run into trouble. The Z-100 disk controller, from which the ET-100 controller was designed, has two precompensation controls.

If after performing the tests described later in this article you decide that you must adjust precompensation, follow the procedure in the Technical Manual, but format a 1.2 megabyte disk rather than a standard disk during the procedure.

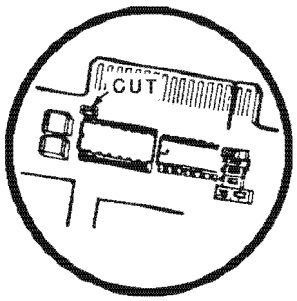
Reassembly

Reassemble your computer by reversing the steps that you originally followed on pages 13 and 11 in your manual.

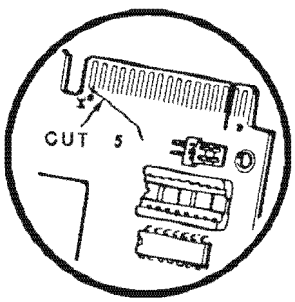
Drive Preparation

If you remove the existing full height drives from your ED-100 cabinet and replace them with half height drives, you can install up to 4 drives in the cabinet — two regular drives and two 1.2 megabyte drives. Because the half height drives use less current than the old drives, your power supply will not be overloaded with 4 drives. In any case, your system should have at least one standard type drive, for disk compatibility with other computers.

To prepare your drives, you must first open your drive cabinet as described on page 16 of your Technical Manual. If you plan to keep one of your full height drives, you can use it as is, but if you are going to use half height standard drives with the 1.2 megabyte drives, you will have to modify the standard drives. If they are of the Shugart type (a lever is rotated to lock and release disks), you must cut a small jumper shown in the drawing below.

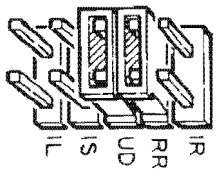


If your standard drives are of the Mitsubishi type (a rectangular plate is pressed to release disks), you should cut the trace going to pin 34 of the edge connector, as shown in the drawing below.



When you connect more than one drive to the same cable, one of the drives must have a terminating resistor installed, and the other drives must have their terminating resistors removed. Normally, the last drive on the cable is the one that has the resistor installed, but if you combine standard and 1.2 megabyte drives, one of the 1.2 megabyte drives must be the one with the resistor, regardless of where it is on the cable. The terminating resistors resemble ICs, and are plugged into sockets near the edge connector, where the drive cable is connected.

Before you install your 1.2 megabyte drives, you must install jumper plugs at various locations on the drives. The jumper plugs are little blue plastic plugs that are plugged onto small gold pins. The pins are labeled, usually with a two letter designation for each jumper location. Below is a drawing of some of the pins with two jumpers installed.

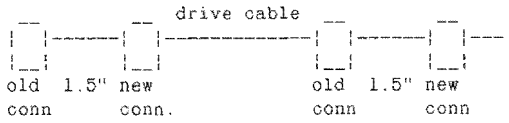


On Heath-supplied drives, you should install jumpers at these locations for each drive: HS, DC, MM, SB, IH-1, RR, UD, and DS2 for the first drive, or DS3 for the second drive. The jumpers should be removed at all other locations. Location IH has 3 pins. A jumper should be on the two closest to the edge of the drive which make up position IH-1. Note: Jumper locations for CDR drives are not known. Contact Controlled Data for that information.

Your standard 5.25" drives should have a jumper at DS0 on the first drive and DS1 on the second drive. Other jumpers will vary depending on the drive manufacturer, but there should always be one at position HS, in addition to the DS0 or DS1 jumper.

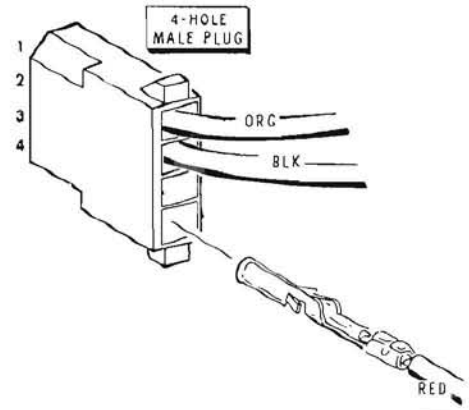
If you are going to mount two half height drives in one or both drive positions of your drive cabinet, you will have to drill new holes for the drive mounting screws. Unless you are planning to transport your system a lot, it will probably suffice to drill and mount them to the top plate only. Newer top plates are cut to allow ventilation, and you may only be able to drill one hole for each drive. If you mount two half height drives in the right position, the mounting holes in the right most drive will fall outside the mounting plate, but you can still secure the drive with a fairly large flat washer under the mounting screw, which will clamp the edge of the plate.

To prepare your drive cable to accept the new drives, clamp new connectors to the cable as shown below:



There should be 1.5 inches (3.8cm) of cable between the old (existing) connectors and the new ones you clamp on. The connectors are designed to be installed using a special tool, but you can easily install them with a large "C" clamp and two blocks of wood to place between the "C" clamp pads and the cable connector pieces. Be sure that the cable is positioned properly before you clamp the connector. The contacts in the connector are designed to pierce the cable through the insulation between each wire. ONCE YOU CLAMP A CONNECTOR ON, YOU MAY NOT BE ABLE TO GET IT OFF, SO BE CAREFUL!

The final things you need to connect your new drives are power cables for each drive. Crimp and solder a pin to each piece of 8" wire, and insert the pins with the wires connected into the connector shell as shown below.



Strip 1/2 inch from the unconnected end of each connector wire. If you are building two connectors, twist the ends of each red, orange, and black pair of wires from the two connectors together. Then solder the stripped ends of the wires to the back of the power supply circuit board in your drive cabinet, at the points where the existing red, orange, and black wires are connected. Be sure that you solder the new red wire(s) to where the existing red wire is, and so with the orange and black wires. Before you connect the power cables to the new drives, you may want to turn the drive unit on and measure the voltage at the red and orange pins, using the black pin(s) as ground reference. You should get +5 volts at the red pin(s), and +12 volts at the orange pin(s). Turn off the power after making the measurements.

Reassembly And Testing

After you have mounted your drives and connected all cables, reassemble your drive cabinet, plug it in (if not already done so), connect the drive cable to your computer, connect your monitor and keyboard, and turn on the power. You should get a hand prompt as usual. Do not insert a disk into any drive yet, but type B and the F2 key, and then press RETURN. The red LED on your first 1.2 megabyte drive should light up. If it does not, you have something wrong — probably a wiring error.

If you have two 1.2 megabyte drives, reset your computer and press B and F2 again, and then press 1 and RETURN. The LED on your second 1.2 megabyte drive should light up.

Reset your computer and boot up with your MS-DOS or Z-DOS system in drive A: as usual. Insert a "hi tech" or a good quality standard disk into your first 1.2 megabyte drive, and enter

```
FORMAT C:
```

at your system prompt, and hit RETURN. If FORMAT completes without issuing any error messages, enter

```
CHKDSK C:
```

and hit RETURN. CHKDSK should report 1250304 bytes of total disk space. Now run format again, but this time enter

```
FORMAT C:/V
```

and hit RETURN. Listen as the drive steps through each track on the disk. When it reaches the last track (track 77), it will step back to the first track and start over, stepping at a slower rate this time. Count the steps, and when it gets to step 43, notice whether the steps continue as before, or if the drive begins to make other sounds. If it does, and seems to get stuck, you may have a precompensation problem — either the adjustment is out, or the precompensation circuitry is not working. It is also possible that you have a bad disk, so you should reset, reboot, and try again with another disk.

If FORMAT continues to step normally past step 43 for a while, but seems to falter a bit later on, the problem may just be a bad disk, or a disk that cannot take the higher density, if you used a standard one for this test. However, it could also be a precompensation problem, so repeat the test with another disk.

If you have two 1.2 megabyte drives, try formatting a disk in drive D:, which is the designation of the second 1.2 megabyte drive.

Operation

Once you are satisfied with the performance of your 1.2 megabyte drives, you can begin using them as part of your system. Your drives will be designated as follows: The first standard drive will be A:, and the second one, if any, will be B:. The first 1.2 megabyte drive will be C:, and the second one, if any, will be D:. You can make bootable 1.2 megabyte system disks (FORMAT C:/S) and then boot from them by entering B, F2, RETURN for drive C:, or B, F2, 1, RETURN for drive D: at the hand prompt.

For best results, you should use special "hi tech" disks in your 1.2 megabyte disk drives. Ask for PC-AT high density disks in your computer store. However, I have had excellent results using high quality standard disks (such as Dysan). Always include the /V switch when you format standard disks in a 1.2 megabyte drive, and FORMAT will mark any unusable sectors so that they will not be used.

The recording format used on your 1.2 megabyte disks is not the same as the format used in an IBM PC-AT, but it is actually a better format for two reasons. The first is that the Heath/Zenith format gives you 32k more space per disk than the PC-AT format. The second is that the Heath/Zenith format is more reliable, because it only uses 77 tracks on each side of the disk surface, while the PC-AT format uses 80 tracks. The Heath/Zenith format avoids the three innermost tracks, which are the most error prone.

The reason why the Heath/Zenith format gives you more disk space while using fewer tracks is that the Heath/Zenith format uses 8 1024-byte sectors per track, while the PC-AT format uses 15 512-byte sectors per track. That gives you 512 bytes more per track. By using larger sectors, the Heath/Zenith format uses less of the disk's space for sector headers and inter-sector gaps. More usable data is placed on each track, with no loss of reliability.

Normally, you cannot read the PC-AT (H/Z-200) format in your 1.2 megabyte drives, but your system can be temporarily modified to allow you to do it. See the article "Read Z-200 Disks In Your Z-100" in this issue for more details. *

Condor

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Director, Product Support
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2051 South State Street
Ann Arbor, MI 48104

Condor Beefs Up Support

In addition to the enhancements recently added to CONDOR 3 DBMS software, (as reported in the November issue of REMark), Condor Computer Corporation has implemented several new Customer Support Programs, designed to help our users "get the most" out of their Condor 3 software.

Available to interested parties, users who wish to take advantage of any of the Customer Support Programs described below need only to complete and return the "Condor User Support Request" form included with this publication. All of these customer support services are available from Condor "at no charge" to you!

Customer Support Programs

"THE LINK", a Condor user newsletter. This 8 page publication is packed with information that will keep you up-to-date on the latest news from Condor headquarters. Published quarterly, "THE LINK" features articles such as:

- Featured Articles — Covering the internal structure of Condor 3, and how you can take advantage of Condor's unique design to simplify, yet expand, your data management applications.
- Featured Users — Highlighting interesting applications with Condor.
- Seminars — Condor Database Management seminars and schedules for the coming year.
- "Ask Condor" — Where user submitted questions are answered, and "technical tips" are given for resolving common application needs.
- Condor Corner — A no charge "Want Ad" service to Condor users describing the type of Condor application they need.
- Featured Products — Special promotions on new or selected Condor products.

Condor Connection

During the last several years, an enormous number of applications using Condor database software have been developed by end users, software houses, consultants, and businesses all over the world.

Condor Education

We offer a wide range of coursewares and hands-on seminars for teaching and learning Condor's Database Management software. Our seminars and educational products will walk you through all 35+ Condor 3 commands, and you'll come away with indepth knowledge of Condor's relational features.

Whether you're an instructor, responsible for training others, or an individual user interested in using advanced techniques for data management, our educational offerings will meet your needs. For more information on Condor education, send for our Education Brochure.

Condor Cares About You

We'd like to hear from you. Your needs . . . your problems . . . your use of our products. Use the "Comments" section in the enclosed User Support Request form, and let us know your thoughts.

In order to meet the increasing number of requests from users for information on these applications, Condor has invited users to submit outlines of their applications for publication in Condor's soon to be published applications catalog "The Condor Connection".

This publication will include summaries of the user-generated applications, and will provide pricing and hardware information submitted by the developer.

If you're interested in advertising your Condor 3-based application in "The Condor Connection", we'll send you simple guidelines to follow in describing your application. Once you return the description to us, we'll incorporate your application in our catalog.

Condor User Groups

Condor software user groups form an effective information network system that allows the exchange of invaluable ideas and techniques between users. Helping our more than 200,000 Condor users all over the country to create Condor User Groups is one of our most important objectives.

A special Condor committee was established late last year to assist Condor users in building and developing these groups. While our company does not wish to administer or control these groups, we do hope to support and nurture their success by serving as a central clearinghouse for user group information.

A listing of established Condor User Groups is available upon request, or if you're interested in becoming founder of a Condor User Group, call our Product Support Department at (313) 769-3988. We'll provide you with all the information you'll need to begin a Condor User Group in your home town.

Condor Consultant Referrals

Are you interested in helping other Condor users build their applications, or offering assistance to users in a "jam", or helping design and implement their microcomputer systems? If you are, we'll add your name to our "Condor Consultant Referral Listing". On the other hand, if you'd like us to forward the listing of Condor Consultants to you, we'd be happy to do so.

Although we don't certify the referrals we provide to our users, nor play an active role in the arrangements made, we'd like to help you identify local contacts who are interested in providing their Condor knowledge to you.

CONDOR USER SUPPORT REQUEST

YES, PLEASE SEND ME:

_____ Your users newsletter, "THE LINK"

_____ Your Application Catalog Submission Guidelines

_____ Your list of Condor User Groups

_____ Your list of Condor Consultants

_____ Your Education Brochure

YES, I WOULD LIKE TO BE ADDED:

_____ To your Condor Consultant Referral List

COMMENTS:

_____

_____

_____

Attn: Customer Support
Condor Computer Corporation
2051 South State Street
Ann Arbor, MI 48104
(313) 769-3988

*

From PC To Digital Storage Scope With One Easy Step

Jim Lytle
Heath Company

What has 84 keys, one eye and a whale of a lot of waveform measurement power? It could be your personal computer if you have one of the new computer scopes from Heath. The SC/IC-4802 Computer Scope and the SD/ID-4850 Digital Memory Scope are Heath's newest entries into a growing line of personal computer based instrumentation products.

Figure 1
The Computerscope

Just What Is A Personal Computer Based Instrument?

Well, as the name suggests, it's an instrument used for test and measurement which is somehow tied to the personal computer. Traditional instruments use knobs and buttons for the operator to set up and control the instrument and some form of display device to read data back to the operator. Personal computer based instruments may be either a card which plugs into an expansion slot or an external box which connects to the computer via an RS-232 port or some specialized interface. The computer's keyboard now performs the functions of set-up and control while the monitor becomes the readout device.

But look what else this does. The awesome power of the personal computer — its storage, programmability and computational capability — now become part of the instrument. A combination such as this results in a degree of flexibility and performance previously found only in instruments priced well up into the multi-thousand dollar range. Laboratory grade instruments have just become affordable to the personal computer owner. Let's take a closer look at Heath's computer scopes.

As shown in Figure 1, the SC-4802 Computer Scope is a rather plain looking box with an almost featureless front panel. This box connects to a computer via an RS-232 connector located at the back of the unit. Simply connect oscilloscope probes to the Y1 and Y2 input connectors on the front panel, boot up the disk furnished with the scope and presto! you've got a dual channel, 50 megahertz digital storage oscilloscope (DSO).

Figure 2 shows a typical display on the computer monitor with a triangle squarewave connected to the two vertical inputs on the computerscope. Notice that the graticule waveforms are displayed slightly to the left of the screen leaving room for all the familiar oscilloscope settings to be displayed to the right.

To change a setting (the vertical attenuation, for example) you use a function key to select vertical attenuation, then use an arrow key to either increment or decrement the setting. In the same manner, input mode, trigger mode, timebase and all the other traditional oscilloscope functions are selected and set to the desired value.

Any waveform which is displayed on the screen may be stored as a file on disk. The only limitation as to the number of waveforms that may be stored is the amount of disk space available.

Figure 3 shows how up to two stored and two "live" waveforms may be displayed simultaneously. The stored waveforms are displayed at the same timebase, vertical sensitivity and vertical position at which they were stored. This makes it easy to compare waveforms from different tests, check the effects of drift, or simply set a high and low limit on an adjustment. (No more grease pencil outlines on the oscilloscope screen.)

Cursors can be generated by the computer and superimposed on the waveform as shown in Figure 4. The cursors are positioned with the arrow keys, while the display at the bottom of the screen continuously reads out the amplitude difference between them, the time difference between them, and the frequency represented by this time difference. This permits small variations in the

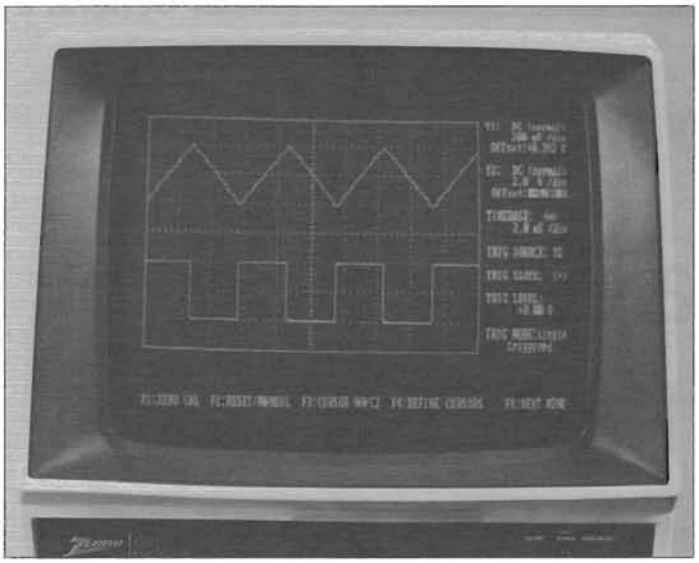


Figure 2
Typical Screen Display

waveform to be carefully scrutinized and measurements such as risetime to be easily made.

Sometimes a signal has a great deal of noise riding on it which obscures the details of interest. No problem for the DSO. You simply select the AVERAGE function and the computer averages successive samples of the waveform for up to 255 iterations. Since the noise is random, its average value is zero. This leaves the details of the signal completely unobscured.

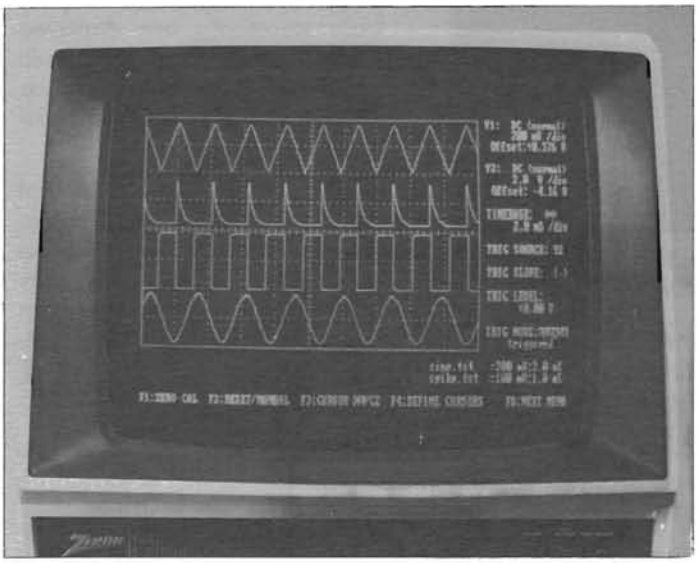
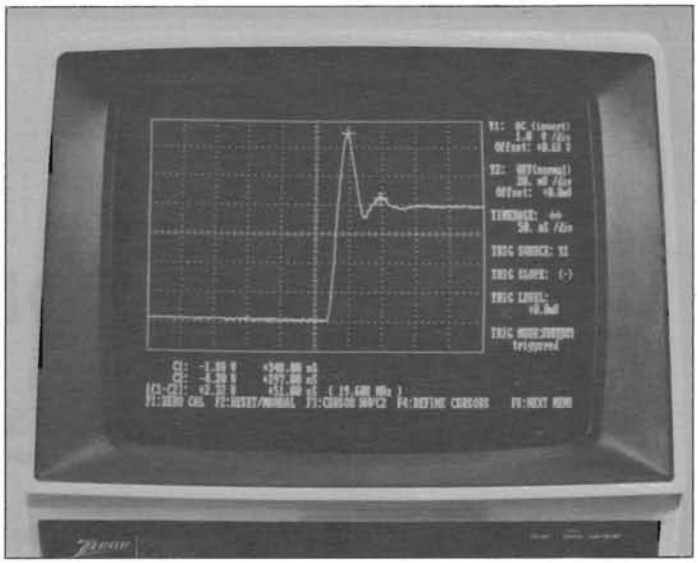


Figure 3
Displaying "live" and stored waveforms simultaneously.

Figure 5 shows an actual signal before and after the AVERAGE function has been used to eliminate the noise. Signals with noise level amplitudes in excess of the amplitude of the signal itself can be displayed completely noise free using this mode.

Hard copies are a snap, too. Using the print utilities in your operating system, anything displayed on the screen may be captured and printed as shown in Figure 6. This allows you to easily include copies of waveforms as part of a report, file them for later reference or as part of a preventive maintenance record.



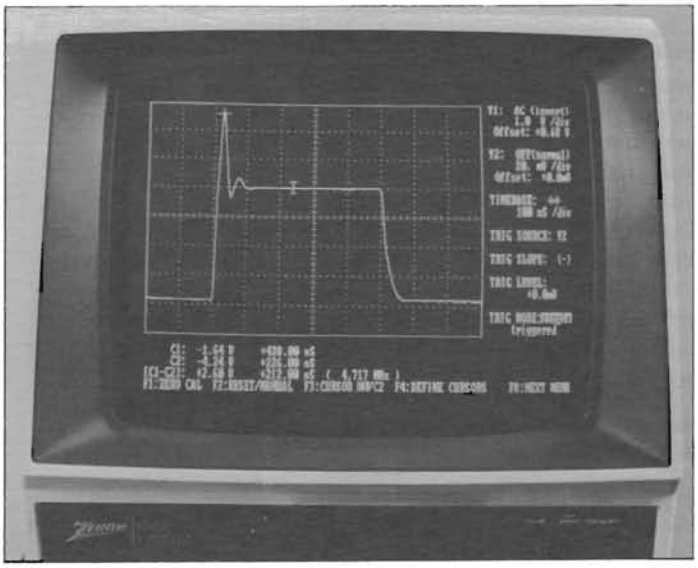


Figure 4
Using computer generated cursors to measure amplitude, time and frequency.

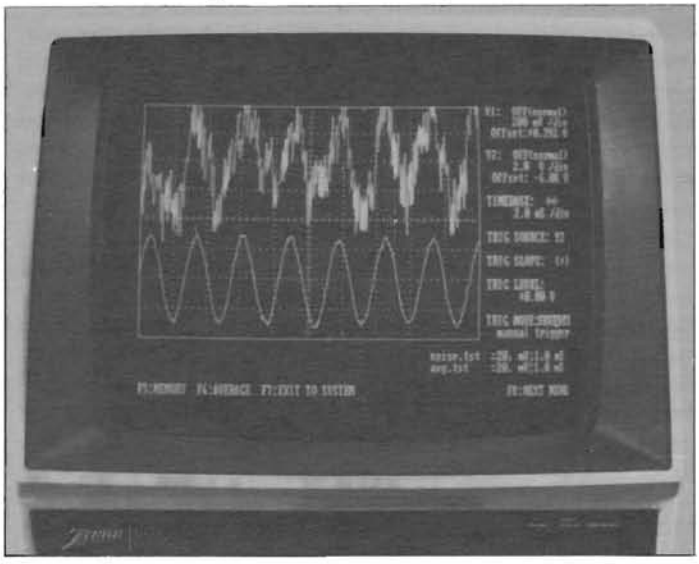


Figure 5
Using the computer to "average" a noisy waveform.

Since the computer is connected to the scope, via a data link, there is no reason why a modem can't become part of the link. Figure 7 shows such a set-up. With this arrangement, a computer can call up one or more scopes anywhere in the world and display what the scope is connected to, save waveforms from the remote scope or change settings on the remote scope.

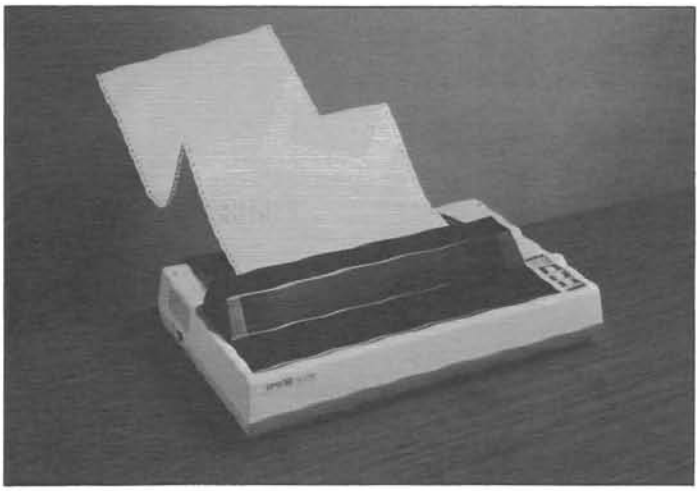


Figure 6
Generating a hardcopy.

Got a custom application? The disk furnished with the computerscope contains a compiled version of the BASIC program which controls the operation of the scope for normal use. Source code is also provided so that anyone with a knowledge of BASIC programming may make modifications for custom applications or waveform analysis.

The SC-4850 Digital Memory Scope is shown in Figure 7. As you can see, this unit has a full front panel unlike its cousin the SC-4802. The Digital Memory Scope can be interfaced to a computer via the RS-232 connector and can perform all of the functions just described for the SC-4802. In addition, it can be used

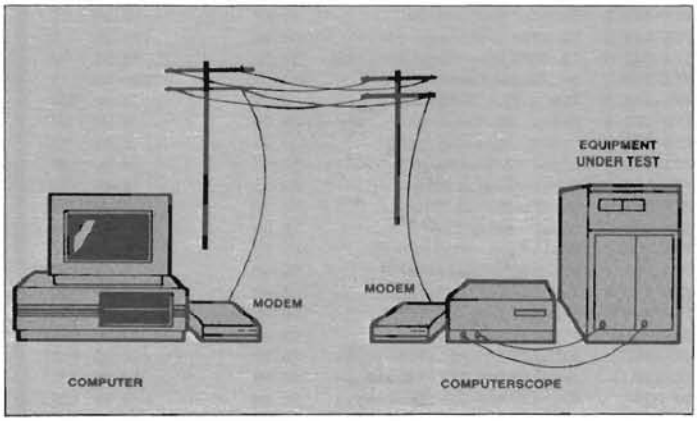


Figure 7
Linking the computer to the scope via modem.

without a computer to upgrade a single trace analog oscilloscope to a dual channel 50 megahertz digital storage scope. Simply connect the vertical output and trigger output from the digital memory scope to the vertical input and external trigger input on the analog oscilloscope and the conversion is complete. All set-up and adjustment is now done from the front panel of the SD-4850.

Programmable instrumentation has been around for more than five years. The price of such instrumentation started out high and has actually gone higher over those years. Watch for developments in personal computer based instrumentation over the next few years to completely revolutionize the instruments business. As the personal computer becomes as commonplace as the telephone in the engineering workplace, huge markets will develop for these innovative technological tools.

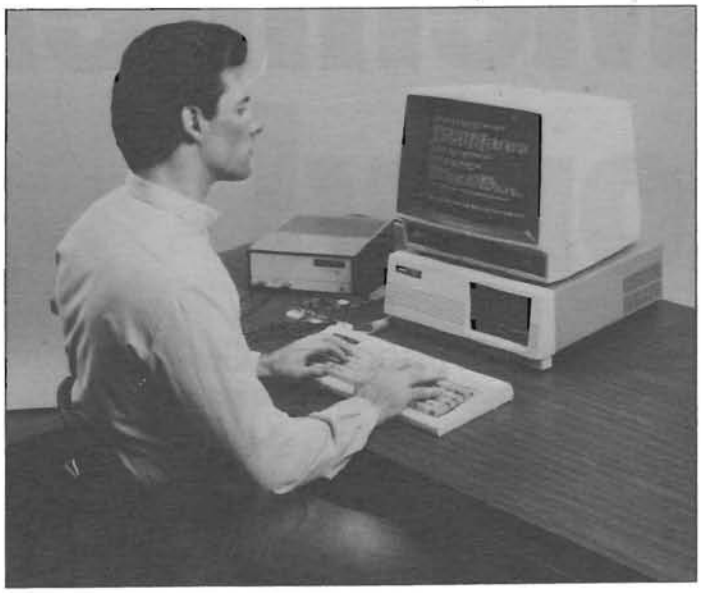


Figure 8
Customize the software for special testing or analysis.

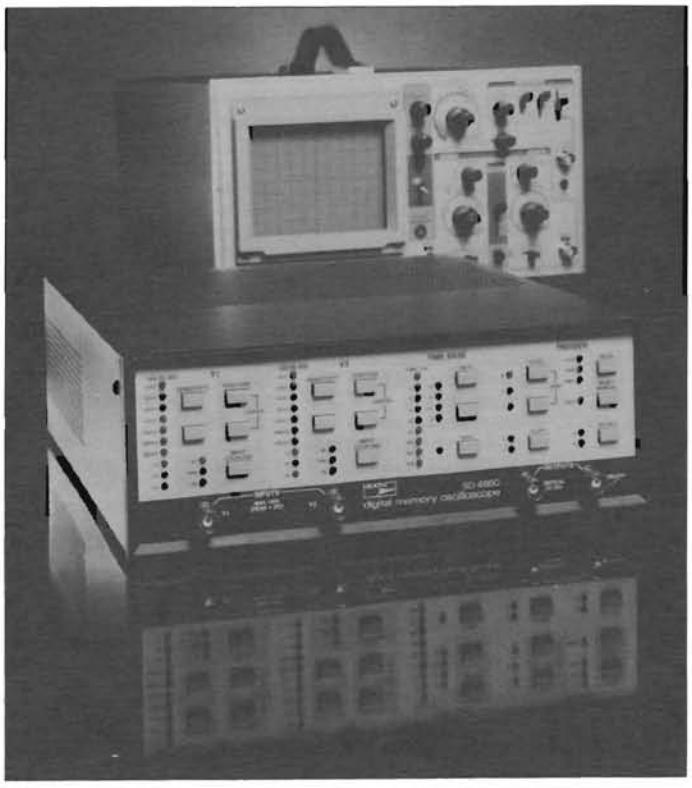


Figure 9
The Digital Memory Scope

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HUGE HUGGER DISCOUNTS now available on these selected products...exclusively for members only!

That's right. We're offering HUG members these close-out, last call and limited quantity specials from Heath Company.

The items listed are not necessarily representative of complete systems. Please call your nearest Heath/Zenith Computers & Electronics Center or Heath Company toll-free at 1-800-253-7057 for more information before ordering.

Watch for additional MEMBER ONLY discounts in upcoming issues of REMark®!

REMark Discount List

	Item	Last Adv'd Price	May Issue Price	HUG Member Price	Qty Left		Item	Last Adv'd Price	May Issue Price	HUG Member Price	Qty Left
H-19-3	H-19 to H-88 Mod Kit	220.00		199.95	16	PPA-210-3	Process Color Ribbon	24.95		8.99	59
H-88-1	Floppy Disk Accessory	150.00		99.95	50	PPA-215-1	Ribbon: Epson JX-80	15.95		12.95	17
H-88-5	Cassette I/O Card	25.00		14.95	75	PPA-240-3	LQ-1500 Interface. Serial	149.95		129.95	5
H-88-9	Drive Mounting & Inst.	25.00		14.95	27	PPA-240-4	LQ-1500 Interface: Parallel	94.95		79.95	40
H-89A	W/O CRT, Ser I/O, Disk Cont.	----		399.95	10	PPA-260-2	Cut-Sheet Feeder/380Z	574.95		299.95	1
HCA-9	Print Stand For H-125	99.00	69.95	59.95	19	PPA-260-3	Rib. (3Pk)/380Z/IBM Selec	9 95		3.99	220
PA-100-1	USR Telpak (PC&ZDOS)	99.00	79.95	69.95	8	PPA-260-4	Cable - RS-232/380Z	49.95		9.99	27
PC-131	USR PCM-5 Modem (PC)	349.95	269.95	249.95	41	PPA-260-5	Cable - Parallel/380Z	49.95		9.99	15
PC-140	DG Magic RAM Expn. 0K	129.00		19.95	8	PPA-260-6	Wheel - Brougham 10	26.95		4.99	37
PC-200	USR Modem Card (S100)	399.00		299.00	45	PPA-260-8	Wheel - Anelia Prop.	26.95		4.99	23
PC-310	DG Super "89 CPU	699.00	399.95	349.95	26	PPA-260-9	Wheel - Script 10/12	26.95		4.99	36
PCA-120-1	6-PAK Plus Game Acc'y	39.95		24.95	16	PPA-260-20	Wheel - Quadro 15	26.95		4.99	62
PM-111	Stat^Attack Anti^Static Kit	24.95		14 95	76	PPA-270-2	Sheet Feed - Stylewriter	249.95		99.95	42
PP-210	DP P132 Color Printer	1795.00		799.00	1	PPA-270-4	Black Ribbons (3Pk)	16.95		3 99	236
PP-215	EPSON JX-80	699.95		499.95	32	PPA-270-5	Red Ribbons (2PK)	6.95		2.99	31
PP-260	DTC 380Z Daisy Printer	1295.00	599.95	549.00	13	PPA-400-1	KOA Speedkey Software	59.95		29.95	162
PP-400	Koalapad Touch Tablet	99.95		69.95	145	ZA-100-4	S-100 Extender Board	59.00		19.95	283
PP-401	WICO 50-0110 Joystick	39.95		24.95	9	ZA-219	Amber CRT/H-121 (Tube only)	75.00		14.95	575
PPA-210-1	Black Ribbon	12.95		5.49	18	ZG-219	Green CRT/H-121 (Tube only)	75.00		14.95	136
PPA-210-2	Primary Color Ribbon	24.95		5.49	88	ZW-219	White CRT/H-121 (Tube only)	75.00		9.95	152

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CP-236

HUG Club Update

Nancy Strunk
HUG Software Coordinator

L. W. (Bud) Cooke, 343 Fletcher Street, Orange, CA 92665 would like to organize a **HUG-8 club** for H-8 owners and enthusiasts. If interested, please send a self-addressed, stamped envelope.

A collection of Zenith users from around the state of Kansas have organized the **Library Users' Group — Zenith.** Meetings are held semi-monthly at different sites around the state to allow all members to attend without a long drive. A newsletter is being organized and a body of public domain software is being established. Yearly membership is $10.00. Contact persons are as follows: Scott B. Mitchem, Head Librarian, Ellinwood School Community Library, 210 N. Schiller, Ellinwood, KS 67526, (316) 564-2306. Also: Elaine den Hoed, Saint Mary of the Plains College, Michael Hornung Library, Dodge City, KS 67801 (316) 225-4171.

The Bulletin Board phone number for the **Philadelphia HUG** is (215) 288-0262.

The correct zip code for the **HUG North Shore** club is Lynnfield, MA 01940. They also meet the 1st Wednesday in December to avoid the Christmas rush, shopping, etc.

THUG (Tidewater HUG) now meets the 1st and 3rd Thursdays at 7:30 pm at the Heath/Zenith Computers & Electronics Center in Virginia Beach.

The **Buffalo HUG** club has a 24-hour Bulletin Board (716) 835-0443.

The new address for **DENHUG** is: c/o Rob Chapman, P.O. Box 20023, Denver, CO 80220-0023.

The meeting time and place varies for the **Anderson, SC HUG.**

The **PNHUG (Pacific Northwest HUG)** new address is: 2120 S. 320th C-6, Federal Way, WA 98003. New phone (206) 941-6940. Nori Lamphere is temporary contact person.

BAHUG (Bay Area HUG-Redwood City, CA) now has 60+ members in their club and they meet the 2nd Tuesday at 7:00 pm at the Heath/Zenith Computers & Electronics Center. New zip code: 94063-2890.

Sun Cities HUG — Arizona now meet the 3rd Sunday at 2:00 at the Heath/Zenith Computers & Electronics Center.

New contact person for **THUG (Toledo HUG)** is Tim Tribble and new phone number is (419) 862-2417 after 6:00 pm. They also now meet the 2nd Wednesday at the Heath/Zenith Computers & Electronics Center.

We are sorry to announce that the **Memphis, TN** club and the **Kalamazoo, MI** club are no longer active. However, the Memphis club hopes to reorganize in the future. We hope they can rebuild.

New contact person for the **East Tennessee Central HUG** is G. R. Stradley. New address and phone: 1304 Witthollow Road, Sevierville, TN 37822, (615) 428-2057.

MIHUG (Michiana HUG) has a new address: 620 S. Logan Street, Mishawaka, IN 46544-4834. Meeting location varies, call first (219) 255-3923. Have 24-hour Bulletin Board (219) 255-4980 300/1200 baud. Now have six members in group.

New Clubs:

Zaragoza Air Base, Spain
Small Computers Users' Group
1986 ISS/DOA
APO New York 09286-6346
Contact Person: MSGT John E. Johnson, Jr.
Club formalized in March 1986.

Grand Forks HUG
19 Vail Circle
Grand Forks, ND 58201
(701) 772-3033
Contact Person: Charlie Robertson
First meeting in March 1986, will have BBS if enough interest. Plan to meet either the 2nd or 3rd Thursday of each month in the Grand Forks Public Library. *

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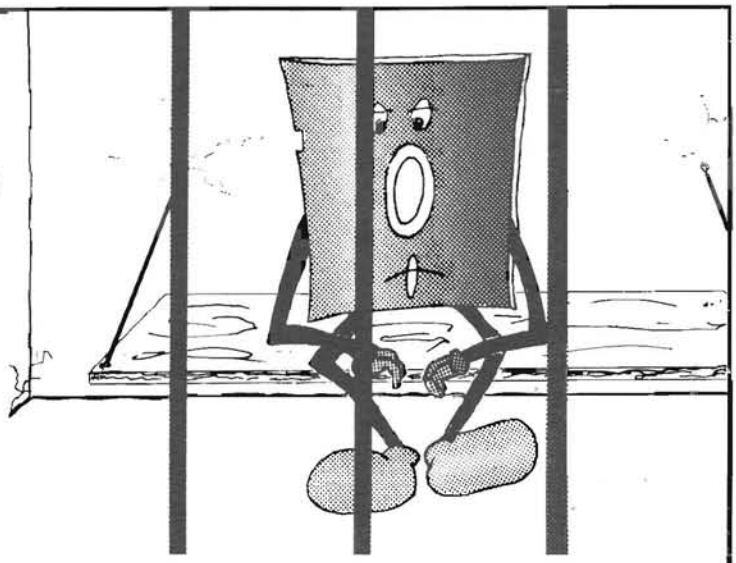

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- Datavue (SSDD)
- Datavue (DSDD)
- Epson QX-10 (SSDD)
- Epson QX-10 (DSDD)
- HDOS (SSSD)*†
- HDOS (SSDD)
- HDOS (DS00)†
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- Heath With Magnolia (DSDD)
- Heath With Magnolia (SSSD)*
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- Heath With Magnolia CP/M 2.24 (DSDD)
- Heath With Magnolia CP/M 2.24 (SSSD)*
- IBM-PC/CPM-86 (SSDD)
- IBM-PC/CPM-86 (DSDD)
- Kaypro II (SSDD)
- Osborne (SSSD)*
- Osborne (SSDD)
- Osborne (DSDD)
- Osborne (Ozmosis SSDD)
- Osborne (Ozmosis DSDD)
- Radio Shack TRS-80 CP/M (SSDD)
- Radio Shack TRS-80 CP/M (DSDD)
- Radio Shack TRS-80 CP/M (SSSD)*
- Radio Shack TRS-80 I DOS (SSDD)*†
- Radio Shack TRS-80 DOS 1.3 (SSDD)*†
- Radio Shack TRS-80 DOS 2 (SSDD)*†
- Radio Shack TRS-80 I DOS (SSSD)*†
- Radio Shack TRS-80 NEWDOS (SSSD)*†
- Lobo MAX-80 (SSDD)
- Lobo MAX-80 (DSDD)
- Morrow MD2 (SSDD)
- Morrow MD3 (DSDD)
- Morrow MD11 (DSDD)
- NEC PC (8001) (SSDD)
- NEC PC (8031) (SSDD)
- NEC PC (8031) (DSDD)
- Sanyo (SSDD)
- Sanyo (DSDD)
- Superbrain 2*
- Televideo (SSDD)
- TI Professional (SSDD)
- Xerox 820-I (SSSD)*
- Xerox 820 (SSDD)
- Xerox 820 (DSDD)
- Zenith Z-100/CPM-85 (SSDD)
- Zenith Z-100/CPM-85 (DSDD)
- Zenith Z-90 (SSDD)
- Zenith Z-90 (DSDD)
- Zenith Z-90 CP/M 2.24 (SSDD)
- Zenith Z-90 CP/M 2.24 (DSDD)
- Zenith Z-89 (SSSD)*

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HUG Price List

The following HUG Price List contains a list of all products in the HUG Software Catalog. For a detailed abstract of these products, refer to the issue of REMark specified.

Part Number	Description of Product	Selling Price	Vol. Issue

HDOS HARDCOPY SOFTWARE

885-1008	Volume I Documentation	9.00	
885-1013	Volume II Documentation	12.00	
885-1015	Volume III Documentation	9.00	
885-1037	Volume IV Documentation	12.00	8
885-1058	Volume V Documentation	12.00	

MISCELLANEOUS HDOS COLLECTIONS

885-1032	Disk V H8/H9	18.00	8
885-1044-[37]	Disk VI H8/H89	18.00	
885-1064-[37]	Disk IX H8/H89 Disk	18.00	
885-1066-[37]	Disk X H8/H89	18.00	10
885-1069	Disk XIII Misc H8/H89	18.00	
885-1135-[37]	HDOS Variety Pkg	20.00	76

GAMES

HDOS

885-1010	Adventure Disk H8/H89	10.00	4
885-1029-[37]	Disk II Games 1 H8/H89	18.00	8
885-1030-[37]	Disk III Games 2 H8/H89	18.00	8
885-1031	Disk IV MUSIC H8 Only	20.00	25
885-1067-[37]	Disk XI H8/H19/H89 Games	18.00	12
885-1068	Disk XII MBASIC Graphic Games	18.00	10
885-1088-[37]	Disk XVII MBASIC Graph. Games	20.00	14
885-1093-[37]	D&D H8/H89 Disk	20.00	16
885-1096-[37]	MBASIC Action Games H8/H89	20.00	18
885-1103	Sea Battle HDOS H19/H8/H89	20.00	20
885-1111-[37]	HDOS MBASIC Games H8/H89	20.00	23
885-1112-[37]	HDOS Graphic Games H8/H89	20.00	23
885-1113-[37]	HDOS Action Games H8/H89	20.00	23
885-1114	H8 Color Raiders & Goop	20.00	23
885-1124	HUGMAN & Movie Animation Pkg	20.00	41
885-1125	MAZEMADNESS	20.00	41
885-1130	Star Battle	20.00	45
885-1133-[37]	HDOS Games Collection I	20.00	59
885-8009-[37]	HDOS & CP/M Galactic Warrior	20.00	32
885-8022	HDOS SHAPES	16.00	45
885-8026	HDOS Space Drop	16.00	49
885-8032-[37]	HDOS Castle	20.00	59

CP/M

885-1206-[37]	CP/M Games Disk	20.00	11
885-1209-[37]	CP/M MBASIC D&D	20.00	19
885-1211-[37]	CP/M Sea Battle	20.00	20
885-1220-[37]	CP/M Action Games	20.00	32
885-1222-[37]	CP/M Adventure	10.00	35
885-1227-[37]	CP/M Casino Games	20.00	38
885-1228-[37]	CP/M Fast Action Games	20.00	39
885-1236-[37]	CP/M Fun Disk I	20.00	55
885-1248-[37]	CP/M Fun Disk II	35.00	69

ZDOS

885-3004-37	ZDOS ZBASIC Graphic Games	20.00	37
885-3009-37	ZDOS ZBASIC D&D	20.00	50
885-3011-37	ZDOS ZBASIC Games Disk	20.00	52
885-3017-37	ZDOS Contest Games Disk	25.00	58

UTILITIES

HDOS

885-1022-[37]	HUG Editor (ED) Disk H8/H89	20.00	20
885-1025	Runoff Disk H8/H89	35.00	
885-1060-[37]	Disk VII H8/H89	18.00	
885-1061	TTH Load H8 ONLY Disk	18.00	
885-1062-[37]	Disk VIII H8/H89 (2 Disks)	25.00	
885-1063	Floating Point Disk H8/H89	18.00	
885-1065	Fix Point Package H8/H89 Disk	18.00	10
885-1075	HDOS Support Package H8/H89	60.00	
885-1077	TXTCON/BASCON H8/H89	18.00	
885-1079-[37]	HDOS Page Editor	25.00	15
885-1080	EDITX H8/H19/H89 Disk	20.00	
885-1082	Programs for Printers H8/H89	20.00	
885-1083-[37]	Disk XVI Misc H8/H89	20.00	11
885-1089-[37]	Disk XVIII Misc H8/H89	20.00	20
885-1090-[37]	Disk XIX Utilities H8/H89	20.00	22
885-1092-[37]	Relocating Debug Tool H8/H89	30.00	14
885-1098	H8 Color Graphics ASM	20.00	19
885-1099	H8 Color Graphics Tiny PASCAL	20.00	19
885-1105	HDOS Device Drivers H8/H89	20.00	24
885-1116	HDOS Z80 Debugging Tool	20.00	27
885-1119-[37]	BHBASIC Support	20.00	29
885-1120-[37]	HDOS 'WHEW' Utilities	20.00	33
885-1121	HDOS Hard Sec Sup Pkg 2 Disks	30.00	37
885-1123	XMET Robot Cross Assembler	20.00	40
885-1126	HDOS Utilities by PS:	20.00	42
885-1127-[37]	HDOS Soft Sector Support Pkg	30.00	45
885-1128-[37]	HDOS DISKVIEW	16.00	46
885-1129-[37]	HDOS CVT Color Video Terminal	20.00	46
885-8001	SE (Screen Editor)	25.00	28
885-8003	BHTOMB	25.00	28
885-8004	UNUMP	35.00	28
885-8006	HDOS SUBMIT	20.00	31
885-8007	EZITRANS	30.00	30
885-8015	HDOS TEXTSET Formatter	30.00	42
885-8017	HDOS Programmers Helper	16.00	42
885-8024	HDOS BHBASIC Utilities Disk	16.00	46

CP/M

885-1210-[37]	CP/M ED (same as 885-1022)	20.00	20
885-1212-[37]	CP/M Utilities H8/H89	20.00	21
885-1213-[37]	CP/M Disk Utilities H8/H89	20.00	22
885-1217-[37]	HUG Disk Duplication Utilities	20.00	26
885-1223-[37]	HRUN HDOS Emulator 3 Disks	40.00	37
885-1225-[37]	CP/M Disk Dump & Edit Utility	30.00	40
885-1226-[37]	CP/M Utilities by PS:	20.00	40
885-1229-[37]	XMET Robot Cross Assembler	20.00	40
885-1230-[37]	CP/M Function Key Mapper	20.00	42
885-1231-[37]	Cross Ref Utilities for MBASIC	20.00	43
885-1232-[37]	CP/M Color Video Terminal	20.00	46
885-1235-37	CP/M COPYDOS	20.00	54
885-1237-[37]	CP/M Utilities	20.00	55
885-1245-37	CP/M-85 KEYMAP	20.00	63
885-1246-[37]	CP/M HUG File Manager & Utilities	20.00	64
885-1247-37	CP/M-85 HUG Bkgrd Print Spooler	20.00	67
885-5001-37	CP/M-86 KEYMAP	20.00	51
885-5002-37	CP/M-86 HUG Editor	20.00	52
885-5003-37	CP/M-86 Utilities by PS:	20.00	54
885-5008-37	CP/M 8080 To 8088 Trans. & Hex	20.00	64
885-5009-37	CP/M-86 HUG Bkgrd Print Spool	20.00	66
885-8018-[37]	CP/M Fast Eddy & Big Eddy	20.00	43
885-8019-[37]	DOCUMAT and DOCULIST	20.00	43
885-8025-37	CP/M-85/86 Fast Eddy	20.00	49

ZDOS/MSDOS

885-3005-37	ZDOS Etchdump	20.00	39
885-3007-37	ZDOS CP/Emulator	20.00	47
885-3008-37	ZDOS Utilities	20.00	47
885-3010-37	ZDOS Keymap	20.00	51
885-3022-37	ZDOS/MSDOS Useful Programs I	30.00	63
885-3023-37	ZDOS/MSDOS EZPLOT	20.00	63
885-3026-37	MSDOS SMALL C Compiler	25.00	65
885-3030-37	ZDOS/MSDOS Z-100 PC Emulator	40.00	68
885-3031-37	ZDOS/MSDOS Graphics	20.00	69
885-3034-37	ZDOS/MSDOS ZPC Support Pkg	10.00	72
885-3037-37	MSDOS ZPC II	60.00	76
885-8029-37	ZDOS Fast Eddy	20.00	53
885-8035-37	MSDOS DOCUMAT and DOCULIST	20.00	70
885-8041-37	ZDOS/MSDOS Orbits	25.00	75

H/Z100 ZDOS/MSDOS - H/Z150 PC MSDOS

885-3012-37§§	ZDOS HUG Editor	20.00	52
885-3014-37§§	ZDOS/MSDOS Utilities II	20.00	54
885-3016-37§	ZDOS/MSDOS Adventure	10.00	57
885-3020-37§	MSDOS HUG Menu System	20.00	62
885-3021-37§§	ZDOS/MSDOS Cardcat	20.00	63
885-3024-37§	ZDOS/MSDOS 8080 To 8088 Trans	20.00	64
885-3025-37§§	ZDOS/MSDOS Misc. Utilities	20.00	64
885-3029-37§§	ZDOS/MSDOS HUG Bg Print Spool	20.00	66
885-3032-37§	MSDOS Halley's Comet Locater	20.00	70
885-3035-37§§	MSDOS SPELL5 & SPELL5F	20.00	72
885-8039-37§§	MSDOS DPATH	20.00	74
885-8040-37§§	MSDOS HELP Programs	20.00	74

§ All program files run on both

§§ Program files run partially on both

PC/IBM COMPATIBLE

885-6001-37	MSDOS Keymapper	20.00	59
885-6002-37	CP/Emulator II & ZEmulator	20.00	59
885-6003-37	MSDOS EZPLOT	20.00	65
885-6004-37	MSDOS CheapCalc	20.00	67
885-6005-37	MSDOS Skyviews	20.00	67
885-6006-37	MSDOS Cardcat	20.00	69
885-6007-37	MSDOS DND (Dung. & Dragons)	20.00	70
885-6009-37	MSDOS Screen Saver Plus	20.00	76
885-8033-37	MSDOS Fast Edit	20.00	62
885-8037-37	MSDOS Grade	20.00	70

PROGRAMMING LANGUAGES

HDOS

885-1038-[37]	Wise on Disk H8/H89	18.00	
885-1042-[37]	PILOT on Disk H8/H89	19.00	
885-1059	FOCAL-8 H8/H89 Disk	25.00	13
885-1078-[37]	HDOS Z80 Assembler	25.00	21
885-1085	PILOT Documentation	9.00	
885-1086-[37]	Tiny HDOS PASCAL H8/H89	20.00	13
885-1094	HDOS Fig-Forth H8/H89	40.00	18
885-1132-[37]	HDOS Tiny BASIC Compiler	25.00	59
885-1134	HDOS SMALL-C Compiler	30.00	63

CP/M

885-1208-[37]	CP/M Fig-Forth H8/H89 2 Disks	40.00	18
885-1215-[37]	CP/M BASIC-E	20.00	26

BUSINESS, FINANCE AND EDUCATION

HDOS

885-1047	Stocks H8/H89 Disk	18.00	
885-1048	Personal Account H8/H89 Disk	18.00	
885-1049	Income Tax Records H8/H89 Disk	18.00	
885-1055-[37]	MBASIC Inventory Disk H8/H89	30.00	
885-1056	MBASIC Mail List	30.00	
885-1070	Disk XIV Home Fin H8/H89	18.00	
885-1071-[37]	MBASIC SmBusPk H8/H19/H89	75.00	17
885-1091-[37]	Grade/Score Keeping H8/H89	30.00	14
885-1097-[37]	MBASIC Quiz Disk H8/H89	20.00	18
885-1118-[37]	MBASIC Payroll	60.00	30
885-1131-[37]	HDOS CheapCalc	20.00	47
885-8010	HDOS Checkoff	25.00	32
885-8021	HDOS Student's Statistics Pkg	20.00	44
885-8027	HDOS SciCalc	20.00	50

CP/M

885-1218-[37]	CP/M MBASIC Payroll	60.00	31
885-1233-[37]	CP/M CheapCalc	20.00	47
885-1239-[37]	Spread Sht. Contest Disk I	20.00	
885-1240-[37]	Spread Sht. Contest Disk II	20.00	
885-1241-[37]	Spread Sht. Contest Disk III	20.00	
885-1242-[37]	Spread Sht. Contest Disk IV	20.00	
885-1243-[37]	Spread Sht. Contest Disk V	20.00	
885-1244-[37]	Spread Sht. Contest Disk VI	20.00	
885-8011-[37]	CP/M Checkoff	25.00	32
885-8036-[37]	CP/M Grade	20.00	70

ZDOS

885-3006-37	ZDOS CheapCalc	20.00	47
885-3013-37	ZDOS Checkbook Manager	20.00	54
885-3018-37	ZDOS Contest Spreadsheet Disk	25.00	58
885-8028-37	ZDOS SciCalc	20.00	50
885-8030-37	ZDOS Mathflash	20.00	55

Continued on Page 83

HUG NEW PRODUCTS

HUG P/N 885-3036-37 MS-DOS
TREE-ID $20.00

Introduction: This Z-BASIC program was written to demonstrate a "generic" menu program for Z-BASIC, and arouse interest in tree identification using both text and graphics.

Requirements: TREE-ID requires an H/Z-100 (not PC) computer system with two 5-1/4" disk drives, 192k of system memory, a printer, 3 banks of 32k or 64k color memory, a color monitor, and either Z-DOS or MS-DOS.

The following files are included on the HUG P/N 885-3037-37 TREE-ID disk set:

Disk A

RUN	.BAT	RUNAB	.BAT
RUNI	.BAT	README	.DOC
TREE-ID	.EXE	AMEELM	.PRN
BASSWO	.PRN	BEECH	.PRN
BITHIC	.PRN	BLACHE	.PRN
BLAGUM	.PRN	BLALOC	.PRN
BLAOAK	.PRN	BLAWAL	.PRN
BLAWIL	.PRN	BLUBEE	.PRN
BOXELD	.PRN	BUROAK	.PRN
CHEOAK	.PRN	CHIOAK	.PRN
COFTRE	.PRN	COMCOT	.PRN
FLODOG	.PRN	HACKBE	.PRN
HONLOC	.PRN	IRONWO	.PRN
LARASP	.PRN	OHIBUC	.PRN
OSAORG	.PRN	PERSIM	.PRN
PIGHIC	.PRN	PINOAK	.PRN
REDBUD	.PRN	REDMAP	.PRN
REDMUL	.PRN	REDOAK	.PRN
RIVBIR	.PRN	SASAF	.PRN
SHAHIC	.PRN	SHIOAK	.PRN
SILMAP	.PRN	SLIELM	.PRN
SUGMAP	.PRN	SWAOAK	.PRN
SWEGUM	.PRN	SYCAMO	.PRN
TULIPT	.PRN	WHIASH	.PRN
WHIHIC	.PRN	WHIOAK	.PRN
GLOSSARY	.TXT		

Disk B

TREE-ID	.BAS	AMEELM	.PIC
BASSWO	.PIC	BEECH	.PIC
BITHIC	.PIC	BLACHE	.PIC
BLAGUM	.PIC	BLALOC	.PIC
BLAOAK	.PIC	BLAWAL	.PIC
BLAWIL	.PIC	BLUBEE	.PIC
BOXELD	.PIC	BUROAK	.PIC
CHEOAK	.PIC	CHIOAK	.PIC
COFTRE	.PIC	COMCOT	.PIC
FLODOG	.PIC	HACKBE	.PIC
HONLOC	.PIC	IRONWO	.PIC

TABLE C
Product Rating

10 - Very Good
9 - Good
8 - Average

Rating values 8-10 are based on the ease of use, the programming technique used, and the efficiency of the product.

7 - Has hardware limitations (memory, disk storage, etc.)
6 - Requires special programming technique
5 - Requires additional or special hardware
4 - Requires a printer
3 - Uses the Special Function Keys (f1,f2,f3,etc.)
2 - Program runs in *Real Time
1 - Single-keystroke input
0 - Uses the H19 (H/Z89) escape codes (graphics, reverse video)

Real Time — a program that does not require interactivity with the user This term usually refers to games that continue to execute with or without the input of the player, e.g. p/n 885-1103 or 885-1211[-37] SEA BATTLE.

ORDERING INFORMATION

For Visa and MasterCard phone orders; telephone Heath Company Parts Department at (616) 982-3571. Have the part number(s), descriptions, and quantity ready for quick processing. By mail; send order, plus 10% postage and handling ($1.00 minimum charge, up to a maximum of $5.00. UPS is $1.75 minimum -- no maximum on UPS. UPS Blue Label is $4.00 minimum.), to Heath Company Parts Department, Hilltop Road, St. Joseph, MI 49085. Visa and MasterCard require minimum $10.00 order

Any questions or problems regarding HUG software or REMark magazine should be directed to HUG at (616) 982-3463. REMEMBER-Heath Company Parts Department is NOT capable of answering questions regarding software or REMark.

NOTE

The [-37] means the product is available in hard-sector or soft-sector. Remember, when ordering the soft-sectored format, you must include the "-37" after the part number; e.g. 885-1223-37.

Note: ZPC II contains only one disk. It is a combination of ZPC I and the ZPC Support disk plus extra data.

LARASP	.PIC	MENU12	.PIC
MENU15	.PIC	MENU16	.PIC
MENU18	.PIC	MENU20	.PIC
MENU3	.PIC	MENU4	.PIC
OHIBUC	.PIC	OSAORG	.PIC
PERSIM	.PIC	PIGHIC	.PIC
PINOAK	.PIC	REDBUD	.PIC
REDMAP	.PIC	REDMUL	.PIC
REDOAK	.PIC	RIVBIR	.PIC
SASSAF	.PIC	SHAHIC	.PIC
SHIOAK	.PIC	SILMAP	.PIC
SLIELM	.PIC	SUGMAP	.PIC
SWAOAK	.PIC	SWEGUM	.PIC
SYCAMO	.PIC	TULIPT	.PIC
WHIASH	.PIC	WHIHIC	.PIC
WHIOAK	.PIC		

Author: Ronald B. Berger

Program Content: TREE-ID, is a tree identification program based on a simplified method from T.E. Shaw's pamphlet, "Fifty Trees Of Indiana", 1981, published by the Indiana State Forestry Division and by the Forestry Department Of Purdue University. This database is entirely menu driven, and very easy to use. It presently contains forty-five trees, but more menus and tree descriptions could be readily added. This program uses the high resolution color graphics capabilities of the H/Z-100 (not PC) computer to display help figures, as well as the leaves of tree being identified.

Comments: Although this program was written for floppy disk drives A: and B:, the source code could be changed to allow the program to work on a hard disk, or memory disk.

TABLE C Rating: (10)

HUG P/N 885-3038-37 Z-DOS/MS-DOS
DEBUG Support Utilities $20.00

Introduction: This disk contains three utilities designed to help you with debugging programs. They are designed to be used with the standard MS-DOS DEBUG utility or other similar utilities. The three utilities are:

Processor Window — This utility allows you to "look inside" your microprocessor in your computer while it is running. It will display any two 16-bit registers, any two 16-bit memory locations, or one register and one memory location on the screen in the upper right corner, while any program is running. You can use this utility to see how a program alters an interrupt vector, where it gets "stuck" in an endless loop, and for many other purposes. This utility was developed and used to debug ZPC, and get PC programs running under it. It works with or without DEBUG.

Breakout — This utility allows you to run a program under DEBUG, and then break out of the program back into DEBUG even though you have not hit or even set a breakpoint. It allows you to get out of endless loops or "runaway" programs.

Anti-Paranoid — This utility allows you to debug "paranoid" commercial programs that otherwise cannot be debugged because they destroy the breakpoint interrupt. Two versions of this utility are included, which take two different approaches to solving the "paranoid program" problem.

Requirements: You will need an H/Z-100 or H/Z-100 PC series computer, any version of MS-DOS or Z-DOS, and the DEBUG utility that came with your DOS, or another debugging utility. The second version of ANTI-PARANOID requires 512k of RAM, but the other utilities will work in a minimum (128k) system.

Here is a list of the files on the DEBUG Support Utilities disk:

README	.DOC	APNOID2	.COM
PWINDOW	.POM	APSET2	.BAT
PWINDOW	.ZOM	PWINDOW	.PSM
PW	.COM	PWINDOW	.ZSM
BRKOUT	.POM	PW	.ASM
BRKOUT	.ZOM	BRKOUT	.PSM
BRK	.COM	BRKOUT	.ZSM
APNOID	.COM	BRK	.ASM
APSETP	.COM	APNOID	.ASM
APSET	.BAT	APSETP	.ASM
APSET	.DAT	APNOID2	.ASM

Author: Patrick Swayne, HUG Software Engineer

PWINDOW.POM, PWINDOW.ZOM — These are two versions of Processor Window, for PC or Z-100 type computers. You must rename the extension of the version you use to .COM before you can run it. PWINDOW remains resident in memory, and is controlled by the PW program, described below, once it has been installed.

PW.COM — This program is used to "open" or "close" the processor window, and to set what it will display on the screen. For example, to display the values of the CS and IP registers on the screen, you would enter

```
PW CS,IP
```

The actual display is in the form nnnn:nnnn, where nnnn represents a hexadecimal number.

BRKOUT.POM, BRKOUT.ZOM — These are two versions of Breakout, for PC or Z-100 type computers. You must rename the extension of the version you use to .COM before you can run it. BRKOUT is a memory resident program. While it is loaded and active, you can break out of the program you are debugging by pressing a special key sequence. It will not break out if it detects that a DOS function is being executed at the time you press the key sequence, to protect the operating system.

BRK.COM — This program is used to enable or disable BRKOUT, once it has been installed.

APNOID.COM — This is the first version of Anti-Paranoid. It works by capturing nearly every interrupt vector, and fixing the breakpoint and single step interrupt vectors during each interrupt. The captured interrupts are passed through unchanged. APNOID is a memory resident utility.

APSETP.COM, APSET.BAT, APSET.DAT — These files are used to set up APNOID before each debugging session. They make sure that it restores the breakpoint and single step interrupts correctly. The batch file, APSET.BAT, controls everything else.

APNOID2.COM — This is the second version of Anti-Paranoid. Some programs will not run if they detect that the breakpoint interrupt has been fixed. They usually clear the breakpoint vector to all zeros, so APNOID2 places a jump at 0:0 that eventually gets to the breakpoint routine. Some Microsoft programs clear the breakpoint vector to 4E4E:4E4E, so APNOID2 places a vector there, too, if it detects enough free memory. The single step vec-

tor is not protected by this version, and the divide-by-zero interrupt is destroyed by the jump placed at 0:0.

APSET2.BAT — This runs APNOID2.COM under the control of DEBUG, so that the vectors are set properly.

***.ASM, *.PSM, *.ZSM** — Assembly source code for the DEBUG Support Utilities programs.

HUG P/N 885-8035-37 MS-DOS Documat & Doculist UPDATE

This popular Word Processor/Text Formatter is being re-released under the same part number 885-8035-37, and will now work with either the H/Z-100 or H/Z-100/200 PC computer systems. This latest version, 2.1, now includes the following enhancements:

1. Macros can now be longer than 256 characters.
2. Full MS-DOS path names are now permitted.
3. Proper operation with RAM drives and windowing software.
4. Output from DOCULIST can now be sent to a file.

For a more complete description of this product, see page 60 of the HUG Software UPDATE catalog, or issue 70 (Nov. '85) of REMark.

HUG P/N 885-8042-37
Poker Party $20.00

Introduction: For lighthouse keepers, military personnel on solitary assignments, confirmed bachelors, and anyone else who hungers for a little human companionship during long hours spent alone; this disk is for you. The programs which make up Poker Party will bring to your computer terminal the faces and the voices of three rustic cow hands out of the old west who invite you to try your luck with them in a friendly game of old-fashioned draw poker, America's national game. You'll meet Shorty, Ole, and Cisco who play a conservative brand of poker that's hard to beat. Yet, with patience and shrewdness just as in a real poker game, you can come out the winner. But it ain't easy, pardner!

Requirements: Poker Party is designed to run on an H/Z-100 (not PC), with at least 128k of system memory. Z-DOS or MS-DOS is also needed along with ZBASIC. Although not required, fuller enjoyment can be obtained if the P-SST board from Software Wizardry is installed. A color monitor is highly recommended, however, the program will work properly on a monochrome monitor

The following files are included on the HUG 885-8042-37 Poker Party disk:

ADIOS	.DAT	ANTE	.DAT
DEAL	.DAT	IBET1	.DAT
IBET2	.DAT	IBET5	.DAT
ICALL	.DAT	ICHECK	.DAT
IDROP	.DAT	IRAISE1	.DAT
IRAISE5	.DAT	ISTAY	.DAT
IWIN	.DAT	PPRTY	.BAS
PPRTY2	.BAS	PPRTY3	.BAS
PPRTY4	.BAS	RULES	TXT
TALK3	.DAT	TRIO	.BLU
TRIO	.GRE	TRIO	.RED
README	.DOC		

Author: Robert E. Newlon

Program Content: While draw poker is played differently in various places, this program generally follows the rules and procedures described in the book ACCORDING TO HOYLE by Richard L. Frey. The game is limited to four players. Three of them are controlled by the computer. You are player number four, and must make your own decisions. The cards used in this game are the typical new pack which comes with two jokers. These jokers are completely wild and can be used as any card you choose.

Comments: Before I reviewed this program, I wondered, 'How much fun could a computerized version of 'draw poker' be? Boy, was I in for a surprise!' The graphics are outstanding, and I really felt as though I were playing with three other people (the author uses graphics to display the other three players on the screen).

TABLE C Rating: (10)

768k Update

Pat Swayne
HUG Software Engineer

ET-100 Upgrade Correction

In the modification to upgrade the ET-100 to 768k (February 1986 REMark), I was wrong in stating that pin 2 of P203, which the modification uses, was an unused pin. The worst thing is that I knew that before I wrote the article, and took care of the situation in my ET-100. The pin IS used, but by an unused signal. To remove the signal from the pin, and free it for use by the modification, remove the IC at U243 from its socket, bend out pin 14, and replace it. The signal from U243-14 was originally intended to activate some kind of sound generating circuitry that the designers had originally intended to include on the ET-100 (and Z-100). On the ET-100 schematic, it is labeled SNDSEL (for Sound Select).

Still Having Memory Problems?

If you upgraded your Z-100 or ET-100 to 768k, and have tried all of the hints published in various REMark issues and elsewhere to take care of random memory problems, and nothing worked, you may have a decoupling problem. I have been told that the manufacturers of 256k RAM chips specify .33 microfarad decoupling capacitors for each chip. The capacitors currently installed on your Z-100 or ET-100 board are .1 microfarad capacitors, which were fine for the old 64k chips, but may not be enough for the 256k chips. The decoupling capacitors are the little green or clear glass capacitors mounted near each memory IC. Since it would be difficult to remove and replace the capacitors at each memory IC (27 altogether), you might want to try connecting .22 microfarad (or higher) capacitors to the leads of each existing capacitor. Another method would be to connect the new capacitors on the underside of the board to the pads below the existing ones.

Heath doesn't stock a .22 microfarad capacitor, but they do have a .33 microfarad one that can be used either for replacing the old ones, or connecting across them. The part number is 21-811. If you are connecting new capacitors across the old ones, you might try doing it at every other memory IC at first.

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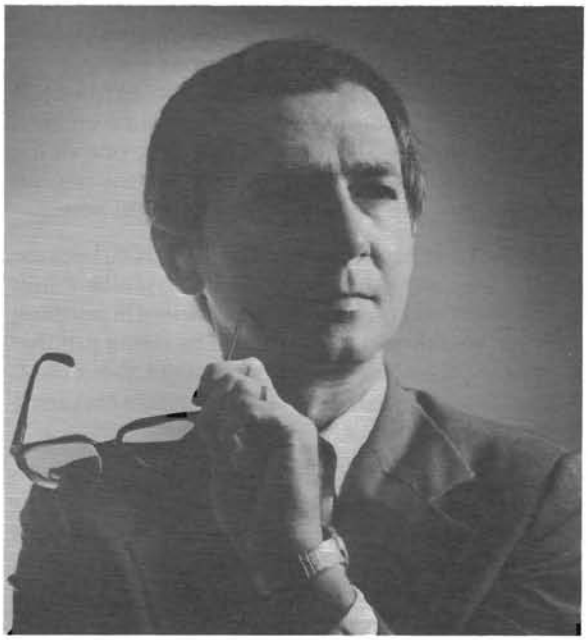


Mainstream Computing

Joseph Katz
103 South Edisto Avenue
Columbia, SC 29205

Bruce Steinberg, Marketing Communications Director for SCO (The Santa Cruz Operation) wasn't sure that either SCO Xenix 86 or SCO Xenix 286 would run on Heath/Zenith machines, but he sent both anyway. Xenix 86 is for the IBM XT, Xenix 286 is for the IBM AT. Multiplan, Lyrix (a word processing program), and Informix (a database management system) came along for each version of the operating system.

You probably bought your H/Z-100 PC or H/Z-200 as an XT or AT compatible, which customarily involves attention only to versions of MS-DOS for the IBM machines. If so, alternative operating systems may not interest you. That could be too shortsighted a view, possibly even a costly mistake. By no measure of such things has the evolutionary period of microcomputers ended, and for better or worse we've bought in to that period. Wisdom now requires keeping one's eyes, ears, and mind open. If you are indeed uninterested in things other than DOS, my best advice is to suspend your disinterest from time to time, long enough to get an idea of where things may be going.

Two sure directions are towards multitasking, multi-user microcomputers. A likely avenue in both directions, for historical reasons, is Unix and its derivatives. They are different from MS-DOS, although less different from MS-DOS 2 than from MS-DOS 1, and less different still from MS-DOS 3 than from MS-DOS 2. The latest indication — perhaps only gossip — is that Microsoft will skip MS-DOS 4 in the United States and jump directly to MS-DOS 5. (MS-DOS 4 is available now in England for the Apricot microcomputer, but not in the U.S.A.) If so, MS-DOS 5 almost certainly will be closer still to Unix. I have no crystal ball, axe to grind, nor hobby to ride: some reasons for my predictions will become clear as this discussion continues.

Right now, at least, Unix nevertheless is different from MS-DOS. It's really an entirely different league too, so you need at least a quick orientation to the players and their positions.

We're really talking about Xenix, a microcomputer implementation of Unix. Unix is the operating system developed by Bell Laboratories for minicomputers in the late 1960s. Xenix and Unix are multi-user, multi-tasking operating systems, unlike MS-DOS, which is a single-user, single-tasking operating system.

In plain English, MS-DOS is made so only one person at a time can use the computer, and only to do one thing at a time. Unix, however, allows a computer to support remote terminals so multiple users can share resources and do different things at the same time. (Those statements deserve qualification because what man creates tends to become darned complicated. Nevertheless, the overview is right and useful.)

But Unix was created for Bell Labs' internal use on minicomputers. Microsoft, progenitor of MS-DOS, secured a license from Bell Labs to implement Unix on microcomputers and called its implementaton "Xenix." SCO, in turn, secured a license from Microsoft to do implementations of Xenix for various specific minicomputers and microcomputers. We are interested in two.

SCO Xenix 86 is for the IBM XT; SCO Xenix 286 is for the IBM AT. Both versions are System V — which Bell Labs has declared the Unix standard — and both are the latest releases.

Getting back to where you came in on this discussion, I saw no reason why Xenix 86 wouldn't run on the H/Z-150 or -158, or other Heath/Zenith XT compatibles, or why Xenix 286 wouldn't run on the H/Z-241 or future AT compatibles. Bruce Steinberg wasn't sure, but was willing to experiment.

My H-241 hadn't arrived when SCO Xenix did, so I haven't yet been able to try Xenix 286. I did try Xenix 86 on my two Heath/Zenith XT compatibles, though, and I was right — mostly. It runs like a champ.

But I can see how Bruce may have heard about a problem. On the 158 I had to set the speed down to 4.77 MHz by pushing in the switch on the back. Otherwise, Xenix 86 would not install. I haven't tried installing at the slower speed and then running at the higher speed: the one internal hard drive on my 158 is small and always nearly filled — too full to spare the space required for

Xenix and software to run under it. So even at the slower speed I had to abort the installation process and move to another computer.

That other computer was the 150, in which I've put one of those new Syquest hard drives with removable 10Mb cartridges. A spare cartridge was handy and, unlike the newer 158, the stock 150 runs at 4.77 MHz. There were no installation problems at all; there were no problems of any kind getting Xenix 86 up and running on the 150.

What's interesting, though, is that my 150 is not a stock machine. About six months ago, I pulled the 8088 microprocessor from the 150 and replaced it with a NEC V-20. The V-20 retains the 8088's instruction set while allowing other things as well, a side effect being a faster effective speed for many standard MS-DOS operations. Although there is supposed to be full 8088 compatibility, I was more than a little concerned that Xenix 86 wouldn't think so and would abort installation. I hate pulling the top off the 150, even though it's not hard to do, so the thought of replacing the 8088 did not appeal to me.

On top of that care, I wondered if Xenix 86 would object to the Syquest in my 150. SCO's literature lists the hard drive/controlier combinations with which Xenix 86 is known to work. The implication, of course, is that the issue is sensitive.

In short, I wondered if MY XT compatibles were all that XT compatible as far as Xenix 86 was concerned.

Not to worry.

The Xenix 86 installation went without a hitch. It took some time because Xenix consists of many disk files, not all of which need be used in every installation, and because I wanted Xenix and MS-DOS both on the hard disk.

You'll recall my prediction a few paragraphs back that there would be continuing movement of MS-DOS towards Unix with each new version. MS-DOS is from Microsoft. Xenix is by way of Microsoft. The former is the best-selling single-user, single-tasking operating system for microcomputers. What if you ran Microsoft and wanted to dominate the microcomputer world? Wouldn't you try for compatibility among your operating systems? Don't you think Microsoft is trying?

I have about 80% of the 10Mb Syquest partitioned for Xenix 86, with the remainder partitioned for MS-DOS. (For the record, I've used Zenith's MS-DOS 2.1. When Zenith's MS-DOS 3.1 finds its way down here, I'll put it on instead.) SCO Xenix 86 comes with a full complement of utility programs to interface with MS-DOS. Once I got the lingo straight, I was transferring files back and forth between MS-DOS and Xenix with no trouble at all.

Why bother?

It's certainly not because I suffered any delusions about running MS-DOS software — WordStar, dBASE III, or Lotus 1-2-3, for example — on Xenix. Rarely is object code portable between one operating system and another. MS-DOS object code won't work on Xenix, or any other kind of Unix I know.

But there is a great deal of other compatibility between SCO Xenix and MS-DOS to make easy file transfers between the two systems most valuable.

For one thing, Microsoft evidently is well on its way to interfacing its programming languages on the two systems — especially, of course, the MS-DOS and Xenix versions of its C programming language. Most of Xenix, like most of Unix, is written in C so the operating system can be "ported" (i.e., "adapted") to different computers fairly easily. In fact, a major concern of good C programmers is to make their work portable. So if one writes a C program on SCO Xenix and takes care that it does nothing in a machine-specific way, all one has to do is put it on an MS-DOS disk and recompile it. The program will work the same on both systems. That's not just theory or wishful thinking: one of my earliest Xenix projects is to do just this to get some of my favorite utilities on both systems. No problem. It works. Right now.

It works most easily if one has Microsoft C for MS-DOS, because there are core libraries on both systems to handle similar things in compatible ways. It's very nice. If you're interested in pursuing the matter further, you should know that I'll be doing just that from time to time in "C Notes," the column I write about the C programming language for Sextant: The Independent Magazine for Heath/Zenith Owners.

Another reason for valuing the easy transfer of files between MS-DOS and Xenix 86 shows that the people at The Santa Cruz Operation also have their heads screwed on extremely well. If you were in their situation, you'd probably try to make Xenix applications programs as compatible as possible with the most popular MS-DOS programs in at least three major areas. Those three major areas are word processing, database management, and spreadsheets, and the most popular programs in those areas are, arguably, WordStar, dBASE II, Multiplan, and Lotus 1-2-3.

So your word processing program would handle WordStar files, have at least the same capabilities as WordStar, and might even work much the same way. Your database management software, following the same lines of thought, would handle dBASE II's database, index, and program files, and might even work much the same way. And, again, your spreadsheet program would handle Lotus 1-2-3's worksheet and macros, and might even work the same way.

Now you'd have something. A business could run Xenix on a network using your word processing, database management, and spreadsheet software for its multiple users. A tiny branch office, a salesman on the road, or an executive working at home or in the office on an isolated personal computer could use equivalents of the Xenix software. And everything could be transferred back and forth without a hitch.

The Multiplan equivalent is Multiplan itself, of course, licensed by Microsoft to SCO; the WordStar equivalent is SCO's own Lyrix; the 1-2-3 equivalent is SCO Professional; the dBASE II equivalent is SCO FoxBASE.

I haven't tried SCO's Multiplan or Informix yet: there's not enough room on the 10Mb Syquest for them and everything else. (Taking good advantage of Xenix — at least if one writes about microcomputers — requires lots of hard disk space.) SCO Professional and SCO FoxBASE were just announced, so I haven't even seen them yet. But I have been using Lyrix, the word processing program, pretty regularly for about a week.

The embarrassing part is that I haven't done more than crack the manual open long enough to do more than install Lyrix. Question: "Is it that easy to use?" Answer: "It surely seems to be." I'm under deadlines right now, so I decided to be daring — or foolhardy — and just jump in and start whacking away with Lyrix. Much of this column, in fact, has been written with it. Of course, I haven't had to do anything but write straight text so far, and move it around. For that kind of word processing — which is the

only kind done in many offices — one probably doesn't need to read the manual: opening menus for major operations and on-screen help when one needs it carry the burden well. Lyrix seems an intelligently-built program, the kind reviewers call "intuitive." Maybe I'll be disappointed when I can catch my breath long enough to try putting Lyrix through its paces. I think not.

Super Word Processing Packages

If you're outgrowing your current word processing program or have special word processing needs, you might want to look in a different direction entirely.

Chances are you have an all-in-one, WYSIWYG program right now: WordStar, Word Perfect, Multimate, or whatever. The face they present is of a single, complete program that attempts to show you on the screen exactly what you will get printed on the page — in other words, "What You See is What You Get." I like that kind of program for general-purpose work.

For special kinds of work, however, it might repay you to look at software like Emerging Technology's Edix, Wordix, Spellix, and Indix, and CompuView's Vedit Plus, V-Print, and V-Spell. As the names of each company's products suggest, these are related but separate programs. Each is dedicated to one of the major word-processing functions: Edix and Vedit Plus are editors that handle document creation and editing; Wordix and V-Print are print formatters that shape the document for printing as you want it to appear; Spellix and V-Spell are spelling checkers; and Indix is a separate index and table-of-contents preparer, functions which are handled by V-Print in the Compuview series.

Microcomputer oldtimers and Unix users will recognize the strategy behind these programs. In fact, the earliest word processing programs for microcomputers were descended from the editors and print formatters found on Unix and mainframe systems. WordStar itself came from an editor called "WordMaster," produced by MicroPro International, when Rob Barnaby got the idea to do an integration of editor and print formatter as an all-in-one program. But the separates still existed, and still do. Think of Magic Wand, with its EDIT and PRINT programs, or Vi and Nroff. In this approach, every function is given a tool of its own, which therefore can allow as complete control as possible over the function — much more complete control than can be gained from an all-in-one program, especially one that attempts WYSIWYG.

I have two parallel printers connected to my 158 with an A-B switch: turn the switch to "A" and the computer feeds an Epson FX-185; switch to "B" and the stream goes instead to an old Radio Shack Daisy Wheel Printer II. I, therefore, have two versions of WordStar's main file: WSE.COM configured for the Epson, and WSD.COM configured for the DWII. It seemed silly to patch both versions fully for the way I like to edit, so I only did WSE .COM that way. When I'm finished printing article drafts on the Epson and am ready for a beautiful final copy, I have to exit WSE.COM and run WSD.COM — which really is just serving as a print formatter. That's a nuisance.

An even bigger nuisance is that my ingenious little scheme really isn't satisfactory for anything much more than straight text. One reason I still like the DWII, for example, is that it has symbols for such as copyright, trademark, sections, and paragraphs. When I use them in a document, I can't use WSE.COM and the Epson for my drafts: because the codes are embedded in the document, the Epson does strange things.

There are no such problems with either Edix/Wordix or Vedit Plus/V-Print because they work differently from WordStar. Although codes can be embedded in the document, the way WordStar requires, I use their extended dot commands for formatting. The document files, therefore, are straight ASCII, and the dot commands can trigger different codes for the different printers. With Wordix, that is handled by separate printer personality files specified on the command line when printing. Instead of having to reedit the document to embed special codes required for each printer's special capabilities, all that's needed is to specify the appropriate personality file at print time. What one does with V-Edit is to code the personality characteristics into the print formatter itself, as different fonts. Either way is much more useful than WordStar's for using multiple printers.

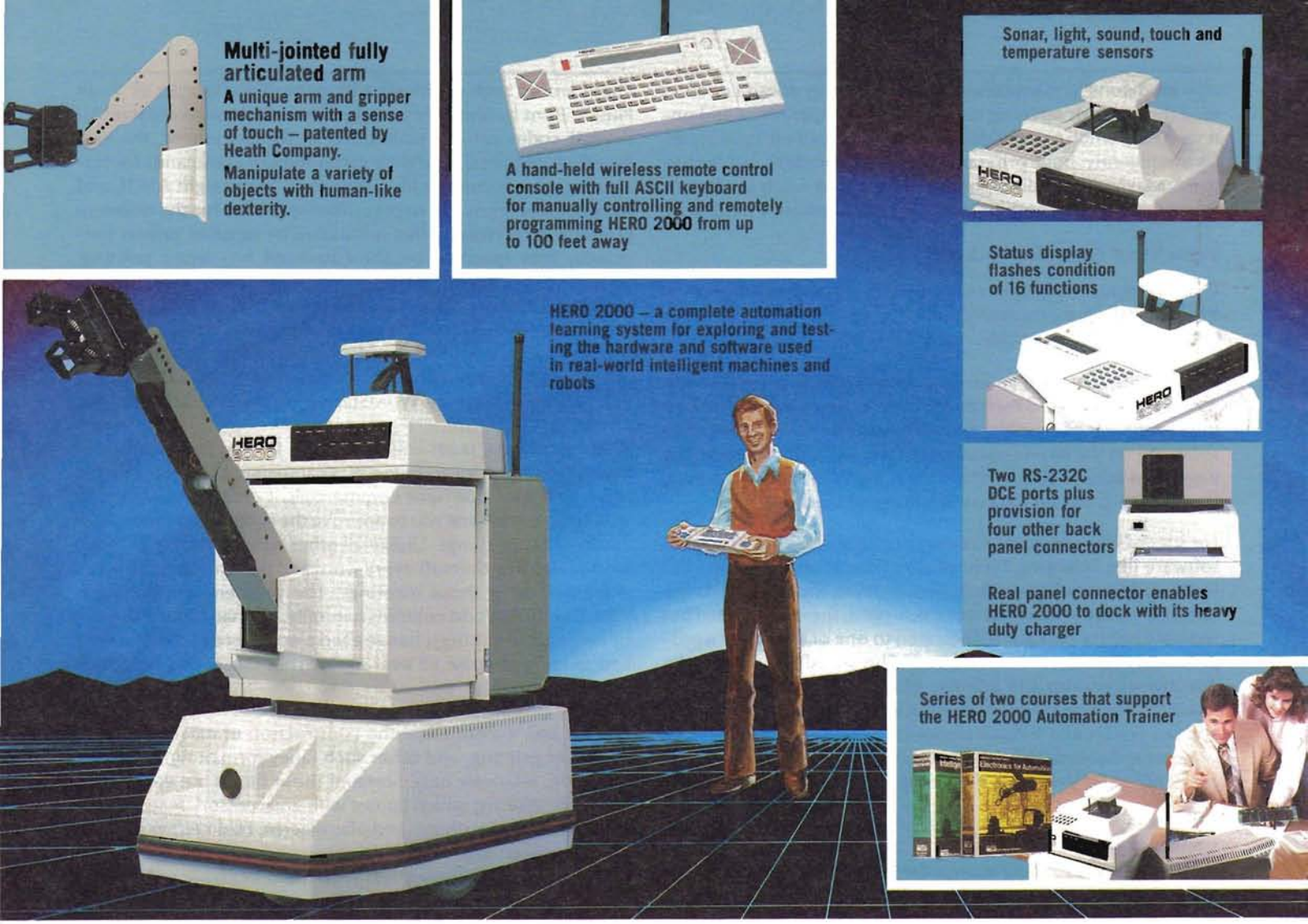
A few years ago, Janet volunteered us for the public relations committee in our local United Way campaign, and I got to do the radio and television spot commercials. I dreaded meetings at which the committee was to approve the scripts. Committees, of course, change things. Unlike all other writers, I don't have the kind of ego that defends every word and punctuation mark. But it seemed so at those meetings. The problem was columns: WordStar doesn't do columns naturally, so I had to format them by cutting and pasting; change even a word here and there, and I had to cut and paste all over again. That was what I defended against so fiercely.

Wordix and V-Print allow the construction of macros to make columnar printing, and other such fancy formatting, including play style, relatively easy. Some of those things are easier right now with Wordix, which comes with an accessory macro package that includes column and play macros. Had I either of these programs years ago, I would have seemed much less the egotist at those committee meetings. With them available right now, I don't even mind doing occasional radio and television spots. I make text changes in the document unconcerned about how the script will align when printed. The macros take care of that at print time.

README.NOW, WHATSUP.DOC, and other document files added to software packages really annoy me. I understand the need for such last-minute documentation, but they are a nuisance because I print each of them to go with the manual. The trouble is that all of these files are formatted for printing as 8-1/2" × 11" sheets, but most of the manuals are 5" × 8" — the so-called "IBM style." Those two formats are incompatible. What I've done to reduce the nuisance is to create IBM-style macros for Wordix and V-Print, and those reduce the nuisance at least a little.

I've concentrated on the superior print-formatting possibilities of these two programs over the WYSIWYGT standalones as represented by WordStar. Even so, I've done little but suggest these possibilities. I knew each of them first by their editors, Edix and Vedit Plus, and these too are superior in the control they offer. I'll do more in later columns. My message right now is that the approach taken by both companies can be truly worth examining if you have special word processing needs.

Compuview's products are available separately. So are Emerging Technology's, which are available also as a package called the "Professional Writer's Package." The latter includes a shell to integrate the modules so they seem together, something like an all-in-one word processing program.



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Get Started

K. Stuart Marvin's "Get Started" looks like a good way to head off the "magic box" syndrome from developing in novice computer users. The chief symptom is an attitude that a microcomputer somehow is like one of those boxes from which magicians make absurdly large objects appear. The reason why it should be nipped early is that those novice users tend to flap their hands and shriek "It don't work! It don't work!" whenever they hit the wrong key in a program. They can't make associations among their actions, the software, and the computer, with the result that they generate piercing sounds and great motion, but relatively little useful work. Moreover, their continual crises demand constant attention. It can be very tedious, I think.

Get Started is a self-paced, computer-assisted instruction course in the basics of using a microcomputer — not just the machine, but also the major kinds of software. The idea is that The Old Hand — anyone responsible for training new computer users — boots the computer, plugs in Disk 1 of the five-disk package, and lets the neophyte work at his own pace. What he gets is intended to give him concepts on which he can build his later experiences.

There is competition for Get Started — books and other software packages. But Get Started's approach seems unique: without losing sight of the need to impart information, it is entertaining — "light," not "heavy." It's a kind of interactive fiction, nicely illustrated with cartoons and sample program screens, full of things like "Hi! What's your name?" and such. That approach seems splendid for heading off computerphobia at the pass.

Understand that I'm prejudiced in favor of Get Started. For one thing, Davis Baird — who, with his wife Linda Weingarten, wrote parts of the text — is the only man I ever met whose business card reads, simply, "Philosopher." For another thing, K. Stuart Marvin is the only publisher I've heard of who literally is on Easy Street. Really: 321 Easy Street #2, Mountain View, CA 94043.

Get Started is effective on a monochrome display, but it really is a Wow! in color. The package is $100 for the five diskettes, a nice storage case, and a teeny weeny leetle instruction card. There's no manual, but this program really doesn't need a manual. K Stuart Marvin's slogan is, "entertaining, educational software for personal computers." I don't know what other products are on, or planned for, its list. This product, however, deserves high marks.

"I Thought I Was A Goner! HUGMCP To The Rescue . . ."

Remember those old flashlight-battery ads? The one that sticks in my mind featured a man who broke his leg in the wilderness with only his flashlight for company. Despite the batteries' age, they lasted long enough for him to signal his predicament. They saved his life. For years I bought only that brand of battery. One never knows.

A tornado hit Columbia a few days ago. I was in the middle of downloading a big file from a remote computer when all hell broke loose. Of course, I ran for cover, and of course I didn't bother disconnecting the modem or anything else, except myself from my office. I ran! When I got back to the H-158, what I saw was "Transfer Completed" — and it had been, successfully. Sonofagun!

The file transfer program was HUGMCP, the "HUG Modem Communications Program." Jim Buszkiewicz, justifiably proud author, sent it to me a couple of weeks ago when I was having trouble uploading the first "Mainstream Computing" column to a private part of CompuServe, from where he downloads these columns for further processing.

From Columbia, SC, to St. Joseph, MI, by way of the CompuServe computers in Cleveland, OH, is how things are done. It's a long road for the bytes to travel — unpredictably long because the actual route is determined by the telephone network when our calls are placed. I had tried every day for a solid week to get the first column transmitted with another program, one of the Big Names in commercial software, but each time the transfer aborted.

Jim finally sent me HUGMCP and urged me to give it a try. He wanted the column before its deadline, or at least before we both retired. I tried his program, which of course did the job. I started looking for another program with the kind of features my old one has, but I felt I owed it to Jim to explore his program a little. Then the tornado hit and I vowed to keep HUGMCP around even after I find something with lots of whistles and bells. This program works.

HUGMCP is tiny — one 19Kb file — where the communications program it replaced was two files totalling more than 104Kb. Of course, my former communications program had many more whistles and bells than HUGMCP, but most of the time all I used was the autodialing and autologon functions. HUGMCP has those.

So I'm still looking around for a good, reliable, communications program with whistles and bells that suit my taste. It's deja vu: I spent a long time on just this hunt for my CP/M computers a few years ago, so I don't look forward to doing the same thing again for DOS. But this time, the pressure is off because I have HUGMCP to keep me going during the hunt. My first requirement now is that my next Big Bertha must be at least as reliable as HUGMCP.

And my hunch is that, even after I find a more feature-packed program, I'll still be using HUGMCP from time to time. It's easy to use and, with the commands listed at the bottom of the screen and a good help system available at the press of a key, doesn't demand study to remember. I confess that I haven't yet read the manual. I'll do it when I get the chance. Probably there are things the program does that I don't know about yet. What I do know is that it's reliable.

I guess I'm plugging HUG now. But I'm not doing it just to keep on good terms with the landlord. HUG was part of what attracted me to the Heath/Zenith world in the first place. As a group, Heath/Zenith owners at least seem much more sophisticated than the crowds that congregate around other brands of microcomputers, and Heath is smart enough to realize the benefits of supporting HUG. That's one thing to give me confidence in the company and, by extension, its products.

Speaking of which, incidentally, thanks for proving me right — even before anyone knew there was a contest. The lag time in a column like this is a minimum of three months. That's how long it takes between the time I send my bytes to REMark and the time copies of that issue roll off the presses. So I'm writing this column while the first is being typeset, and we're all still trying to remember what title we had agreed upon. It can get very confusing sometimes, this need to live in the past, present, and future at the same time.

For example, right now I have to say, "You'll recall that last month I spoke about the inability of general computer magazines to

serve the special needs of the Heath/Zenith owner even when their hearts were pure." One of my illustrations was the fellow who recently asked PC Magazine how to plug more RAM on his Z-150's motherboard to get it up to 640KB. The "PC Advisor" for that magazine said it couldn't be done. Well, I pointed out what most of HUG knows anyway: that First Capital Computer sells RamPal, a set of replacement PALs (Programmable Array Logic chips) to allow just that. The $39 for RamPal saves the price of an expansion memory board — a big cost that owners of other XT computers have to bear.

I wrote the "PC Advisor" about the way he missed the target this time, and so — evidently — did many others. The 15 April 1986 issue of PC Magazine talked about the "Fervent Z-150 fans" who wrote to set the record straight. I just hope that the fellow who asked the question originally hadn't gone out in the interim to buy an expansion board. He would have thrown out a couple of hundred dollars. My point was that magazines with an IBM orientation — PC Magazine and others — are useful only about the areas in which mainstream computers are similar, not about areas in which they differ. Of course, I was communicating the rationale for this column. I just hadn't expected my logic would be verified with such astounding swiftness. You appreciate, I hope, the real difficulty of a man my age patting himself on the back so heartily. Ah well, it's exercise.

Products Discussed

SCO Xenix 86 (System V) for XTs
SCO Xenix 286 (System V) for ATs

Operating System	$ 495.00
Development System	$ 495.00
Text Processing System	$ 195.00
Complete (three packages)	$1,085.00

SCO Lyrix	$ 595.00
Informix	$ 995.00
Multiplan	$ 495.00

The Santa Cruz Operation
500 Chestnut Street
P.O. Box 1900
Santa Cruz, CA 95061
(408) 425-7222

Edix	$ 195.00
Wordix	$ 195.00
Spellix	$ 95.00
Indix	$ 95.00
Professional Writer's Package (Contains all four programs)	$ 490.00

Emerging Technology Consultants
4760 Walnut Street
Boulder, CO 80301

Vedit Plus	$ 225.00
V-Print	$ 120.00
V-Spell	$ 79.00

CompuView Products
1955 Pauline Boulevard, Suite 200
Ann Arbor, MI 48103
(313) 996-1299

HUGMCP — HUG Modem Communications Program	$ 40.00

(Part No. 885-3033-37)
Heath Company Parts Department
Hilltop Road
St. Joseph, MI 49085
(616) 982-3571

Read Z-200 Disks In Your Z-100

Pat Swayne
HUG Software Engineer

In last month's REMark, Jim Buszkiewicz described a disk drive assembly from Controlled Data Recording Systems that provides 5.25" drives capable of storing 1.2 megabytes each for an H/Z-100 series computer. In this issue, I described a way to connect the kind of drives used in the Controlled Data assembly to an expanded ET-100 computer. Although these drives are the same type as the "hi tech" drives available for the H/Z-200 series and the IBM PC-AT, the recording format used is not the same, and a 1.2 megabyte disk made in an H/Z-200 cannot be read by an H/Z-100 with a 1.2 megabyte drive.

Since the standard 360k disk format used in H/Z-100 and H/Z-200 series computers is interchangeable, incompatibility of the 1.2 megabyte formats presents no real problem. However, there may come a time when you want to access some information which is available only on an H/Z-200 format 1.2 megabyte disk. Fortunately, because of the way the H/Z-100 BIOS (Basic Input/Output System) was designed, reading the H/Z-200 disk is not an impossible task.

The H/Z-100 BIOS is table driven. There are tables in the BIOS that define the various disk formats that you can read, and if you change the appropriate table entries, you can change the disk format. When you use a 1.2 megabyte drive on an H/Z-100, it is treated as an 8" disk, and is formatted 77 tracks per side, and 8 1024-byte sectors per track. The H/Z-200 format is 80 tracks per side, and 15 512-byte sectors per track.

There are two tables in the H/Z-100 BIOS that you need to change in order to read the H/Z-200 disk. One is a hardware information table, that is used to program the disk controller. You need to change the tracks/side, sectors/track, and bytes/sector in this table. There is a table of this type for each drive unit. The address of these tables can be obtained with a command to the BIOS. Since a drive can usually take more than one disk density, each table is usually modified from the BIOS. In addition to patching the table, the code that modifies it must be found and patched.

The other table is a software information table, for the operating system. This table is called the BPB (BIOS Parameter Block) table, and is part of any MS-DOS implementation. This table contains the total number of sectors on the disk, the sector size, and also contains such information as the number of directory entries, the number of FAT's (File Allocation Tables), etc. There is a BPB table for each different disk format supported by the various disk drives. There is no command that gives you the location of the BPB tables, but if you know what is in the one you want, you can find it.

It would be possible to patch the tables and BIOS code using DEBUG and then read the H/Z-200 format disk, but that would be a lot of trouble. I have written a simple program, called RD200.COM that can locate and patch the tables for you. It patches the hardware tables and BIOS modifying code for drives C: and D:, and the 8" double density BPB to the H/Z-200 parameters. I have written another program, called RD100.COM, that patches the tables back to the normal H/Z-100 parameters. The source code for both programs is included at the end of this article.

If you do not have an assembler, you can obtain RD200.COM by typing in and running the following BASIC program.

```
10 REM THIS PROGRAM CREATES RD200.COM
20 DEFINT A-Z:OPEN "O",1,"RD200.COM
30 C!=0:CK! = 10590 :FOR I=1 TO 114
40 READ B:C!=C!+B:PRINT #1,CHR$(B),
50 NEXT I:IF C!<>CK! THEN PRINT "TYPING ERROR!":END
60 CLOSE #1.LOCATE 23,1:PRINT "DONE!":SYSTEM
70 DATA 176,8,154,72,0,64,0,51,255,185
80 DATA 0,16,176,199,252,242,174,117,71,38
90 DATA 129,61,69,18,117,245,38,129,125,2
100 DATA 0,4,117,237,87,190,92,1,50,192
110 DATA 242,174,117,46,86,87,81,185,11,0
120 DATA 243,166,89,95,94,117,239,190,103,1
130 DATA 185,11,0,243,164,6,31,95,198,69
140 DATA 3,2,198,69,20,15,139,127,4,198
150 DATA 69,15,80,139,127,6,198,69,15,80
160 DATA 205,32,4,1,1,0,2,192,0,208
170 DATA 4,254,2,2,1,1,0,2,224,0
180 DATA 96,9,249,7
```

To create RD100.COM, type in and run this BASIC program.

```
10 REM THIS PROGRAM CREATES RD100.COM
20 DEFINT A-Z:OPEN "O",1,"RD100.COM
30 C!=0:CK! = 10577  FOR I=1 TO 114
40 READ B:C!=C!+B:PRINT #1,CHR$(B);
50 NEXT I:IF C!<>CK! THEN PRINT "TYPING ERROR!":END
60 CLOSE #1:LOCATE 23,1:PRINT "DONE!":SYSTEM
70 DATA 176,8,154,72,0,64,0,51,255,185
80 DATA 0,16,176,199,252,242,174,117,71,38
90 DATA 129,61,69,18,117,245,38,129,125,2
100 DATA 0,2,117,237,87,190,103,1,50,192
110 DATA 242,174,117,46,86,87,81,185,11,0
120 DATA 243,166,89,95,94,117,239,190,92,1
130 DATA 185,11,0,243,164,6,31,95,198,69
```

```
140 DATA 3,4,198,69,20,8,139,127,4,198
150 DATA 69,15,77,139,127,6,198,69,15,77
160 DATA 205,32,4,1,1,0,2,192,0,208
170 DATA 4,254,2,2,1,1,0,2,224,0
180 DATA 96,9,249,7
```

These programs have been tested under MS-DOS versions 2 and 3, but not Z-DOS. It is not known if they will run under Z-DOS. To use the programs, boot up on a standard (not 1.2 megabyte) 5.25" drive, or a hard disk partition, containing RD200.COM and RD100.COM, and enter

```
RD200
```

at the system prompt, and hit RETURN. Then insert your H/Z-200 (or IBM PC-AT) format disk into drive C: or D: and copy the files you need from it to either a standard 5.25" disk or a hard disk partition. You can also copy files to the H/Z-200 disk, but you cannot format a disk in the H/Z-200 format, or make it bootable. When you have finished copying the files, enter

```
RD100
```

at the system prompt, and hit RETURN. You can now use your 1.2 megabyte drives normally. Note: After you have run RD200, you cannot read or write to an H/Z-100 format 1.2 megabyte disk until you run RD100.

For more information on this topic, see the article "1.2 Megabyte Drives For The ET-100" in this issue.

Note to ZPC users: You must not run RD200 or RD100 while you are in the PC mode. You can run RD200 in the Z-100 mode, and then switch to the PC mode if you wish before using Z-200 format disks. Then you must switch back to the Z-100 mode to run RD100.

Source code for RD200.COM and RD100.COM

```
        PAGE    ,132
;       UTILITY TO ALLOW A HI-TECH DRIVE EQUIPPED Z-100
;       TO READ Z-200 FORMAT HI-TECH DISKS.

;       BY P. SWAYNE, HUG SOFTWARE ENGINEER  4-14-86

BIOS    SEGMENT AT 40H
        ORG     48H
DSKFUNC LABEL   FAR             ;DEFINE DSKFUNC
        BIOS    ENDS

CODE    SEGMENT
        ASSUME  CS:CODE,DS:CODE,ES:CODE,SS:CODE
        ORG     100H

START:  MOV     AL,8
        CALL    DSKFUNC         ;GET BIOS DISK TABLE ADDRS
        XOR     DI,DI           ;POINT DI AT ZERO
        MOV     CX,1000H        ;SEARCH THIS MUCH
        MOV     AL,0C7H         ;LOOK FOR THIS
        CLD                     ;SEARCH FORWARD
SCHLP:  REPNZ   SCASB           ;LOOK FOR CODE
        JNZ     NFND            ;NOT FOUND
        CMP     ES:WORD PTR [DI],1245H  ;IS THIS IT?
        JNZ     SCHLP
        CMP     ES:WORD PTR 2[DI],1024
        JNZ     SCHLP
        PUSH    DI              ;FOUND, SAVE PLACE
        MOV     SI,OFFSET OLDBPB        ;POINT TO OLD BPB
        XOR     AL,AL           ;LOOK FOR ZERO
SCHLP1: REPNZ   SCASB           ;LOOK FOR ZERO
        JNZ     NFND            ;NOT FOUND
        PUSH    SI              ;SAVE POINTERS
        PUSH    DI
        PUSH    CX              ;SAVE COUNTER
        MOV     CX,11           ;CHECK 11 BYTES
        REP     CMPSB           ;IS THIS THE BPB?
        POP     CX
        POP     DI
        POP     SI
        JNZ     SCHLP1          ;NO, KEEP LOOKING
        MOV     SI,OFFSET NEWBPB    ;ELSE, POINT TO NEW BPB
        MOV     CX,11
        REP     MOVSB           ;MOVE IT IN
        PUSH    ES
        POP     DS              ;PUT DS IN BIOS SEGMENT
        POP     DI              ;GET FIRST MATCH ADDR
        MOV     BYTE PTR 3[DI],2    ;MODIFY BYTES/SECTOR
        MOV     BYTE PTR 20[DI],15  ;MODIFY SECTORS/TRACK
        MOV     DI,4[BX]        ;POINT TO DRIVE C: TABLE
        MOV     BYTE PTR 15[DI],80  ,INSERT NO  TRACKS
        MOV     DI,6[BX]        ;POINT TO DRIVE D. TABLE
        MOV     BYTE PTR 15[DI],80  ;INSERT NO  TRACKS
NFND:   INT     20H             ;EXIT TO DOS

OLDBPB  DB      4,1,1,0,2,0C0H,0,0D0H,4,0FEH,2
NEWBPB  DB      2,1,1,0,2,0E0H,0,060H,9,0F9H,7

CODE    ENDS
        END     START
```

```
        PAGE    ,132
;       UTILITY TO ALLOW A HI-TECH DRIVE EQUIPPED Z-100
;       TO RETURN TO NORMAL OPERATION AFTER READING
;       Z-200 DISKS

;       BY P  SWAYNE, HUG SOFTWARE ENGINEER  4-14-86

BIOS    SEGMENT AT 40H
        ORG     48H
DSKFUNC LABEL   FAR             ;DEFINE DSKFUNC
        BIOS    ENDS

CODE    SEGMENT
        ASSUME  CS:CODE,DS:CODE,ES:CODE,SS:CODE
        ORG     100H

START:  MOV     AL,8
        CALL    DSKFUNC         ;GET BIOS DISK TABLE ADDRS
        XOR     DI,DI           ;POINT DI AT ZERO
        MOV     CX,1000H        ;SEARCH THIS MUCH
        MOV     AL,0C7H         ;LOOK FOR THIS
        CLD                     ;SEARCH FORWARD
SCHLP:  REPNZ   SCASB           ;LOOK FOR CODE
        JNZ     NFND            ;NOT FOUND
        CMP     ES:WORD PTR [DI],1245H  ;IS THIS IT?
        JNZ     SCHLP
        CMP     ES:WORD PTR 2[DI].512
        JNZ     SCHLP
        PUSH    DI              ;FOUND, SAVE PLACE
        MOV     SI,OFFSET OLDBPB        ;POINT TO OLD BPB
        XOR     AL,AL           ;LOOK FOR ZERO
SCHLP1: REPNZ   SCASB           ;LOOK FOR ZERO
        JNZ     NFND            ;NOT FOUND
        PUSH    SI              ;SAVE POINTERS
        PUSH    DI
        PUSH    CX              ;SAVE COUNTER
        MOV     CX,11           ;CHECK 13 BYTES
        REP     CMPSB           ;IS THIS THE BPB?
        POP     CX
        POP     DI
        POP     SI
        JNZ     SCHLP1          ;NO, KEEP LOOKING
        MOV     SI,OFFSET NEWBPB    ;ELSE, POINT TO NEW BPB
        MOV     CX,11
        REP     MOVSB           ;MOVE IT IN
        PUSH    ES
        POP     DS              ;PUT DS IN BIOS SEGMENT
        POP     DI              ;GET FIRST MATCH ADDR
        MOV     BYTE PTR 3[DI],4    ;MODIFY BYTES/SECTOR
        MOV     BYTE PTR 20[DI],8   ;MODIFY SECTORS/TRACK
        MOV     DI,4[BX]        ;POINT TO DRIVE C: TABLE
        MOV     BYTE PTR 15[DI],77  ;INSERT NO  TRACKS
        MOV     DI,6[BX]        ;POINT TO DRIVE D: TABLE
        MOV     BYTE PTR 15[DI],77  ;INSERT NO  TRACKS
NFND:   INT     20H             ;EXIT TO DOS

NEWBPB  DB      4,1,1,0,2,0C0H,0,0D0H,4,0FEH,2
OLDBPB  DB      2,1,1,0,2,0E0H,0,060H,9,0F9H,7

CODE    ENDS
        END     START
```

H-150 Speed-up Modification

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P.O. Box 234
Wyandotte, MI 48192

Introduction

Ever since the first time I powered up my H-150 I have been pleased with its performance. It was reasonable in cost, improved upon the common "Big Blue" PC and was a kit. The last part was very important because I love to tinker. The H-150, however, seemed slow compared to my H-89. BASIC listings that would zip off the screen of my H-89 crawled along on the H-150. This was true of directory listings and application programs, as well.

I guess I wasn't the only one who thought so since Heath/Zenith introduced the H-158 with the capability to run at 8MHz, as well as the familiar 4.77 MHz clock frequency. Unfortunately, there was no upgrade for H-150s (at least not from the factory) and I was envious of the faster 158s. While advertisements for H-150 CPU speed-up kits have been around for some time, little was reported on them and what had been reported was not positive. Since it appeared possible to increase the clock speed of the H-150 I decided to design and build my own modification.

Some of the performance criteria used when designing the circuit included: 1) being able to change the CPU (central processing unit) speed without rebooting; 2) booting at either speed; 3) an indicator of the current CPU speed; 4) complete compatibility with my hardware and software; and 5) no modifications to the computer. A tall order? Not really. Actually the circuit presented is straight forward. Construction and installation is easy using relatively inexpensive components.

The modification described in this article is very basic in that it increases the proper CPU clock frequency but does not alter the bus timing. While this approach is simple and cost effective it is not without limitations. The major problem is that the modification is sensitive to some of the ICs (integrated circuits) used on the CPU board. This modification, as well as others commercially available, may not work initially with all 150s for this reason. The problem, however, can be circumvented by replacing the offending components.

The modification itself consists of a small PC board (which is piggy-backed onto the CPU card) and an external module containing the speed select switch, a CPU speed indicator and a hardware reset switch. The modification increases the CPU clock speed from the standard 4.77 MHz to either 6.67 or 7.38 MHz with a resultant 39-63% increase in CPU processing speed. A simple benchmark is presented in Table 1. The times were obtained by plotting from a hard disk file to the screen a rather complex drawing using a popular CAD package. Times were recorded for 4.77, 6.67 and 7.38 MHz with both an 8088 and NEC "V-20" CPU. The last column is the result of dividing the time obtained from the stock components by the time obtained for each enhancement.

Table 1

CPU	Clock Speed	Time (sec.)	
8088	4.77 MHz	121	1.00
V-20	4.77	114	1.06
8088	6.67	87	1.39
V-20	6.67	82	1.48
8088	7.38	78	1.55
V-20	7.38	74	1.63

The modified computer was an H-150 with 640K of 150 ns RAM using the Quikdata Z150MP memory PAL, a non-Heath hard disk system using the Western Digital WD1002S-WX controller, two floppies, and the Houston HUG clock board. The computer will boot at either 4.77 or 7.38 MHz from the hard disk or the floppy. No problems have yet to be found with any software excepting FORMAT and DISKCOPY which must be run at 4.77 MHz. This document was prepared using Spellbinder running within Microsoft Windows running under PC-DOS 3.1 (I know, but it was cheaper) at 7.38 MHz. All copy-protected software tried ran properly including various flight oriented games. If, however, there is a problem, the speed can be switched back to slow at any time without hanging the computer. Also note that the software time-of-day clock is kept correctly. The only inconvenience is that the key sequence CTRL-ALT-DEL will not reboot the computer at high speed, although the computer will reboot at either speed using the hardware reset no matter how badly it's hung up.

What Needs To Be Done

The H-150 like the other popular PC runs at a CPU clock frequency of 4.77 MHz and uses an 8284A clock generator chip. This IC is an example of one of the several 8088 support chips used in the H-150. Its job is to supply three different clock frequencies for various circuits, the system reset signal and to synchronize the CPU with other devices. For our purposes, the important signals are the Oscillator (OSC), the Peripheral Clock (PCLK), and the CPU clock (CLK88).

An external 14.318 MHz crystal is used by the 8284A to generate each of these signals in the standard 150. The buffered output of the crystal controlled oscillator is the OSC signal. When divided internally by three this becomes the familiar 4.77 MHz CLK88. Division again by two gives the 2.38 MHz PCLK signal.

Obviously, the 4.77 MHz signal is used as the system clock, but what of the other two? The PCLK is intended for use by peripheral devices that may be connected to the PC bus. In the 150, this signal is required by the 8253 programmable interval timer which contains three separate timers (one of which is used by the system time-of-day clock). The 14.318 MHz OSC signal is required by the video circuitry for various timing functions. If the crystal used by the 8284A were simply changed to a higher frequency, all these signals would be affected. Although the PCLK frequency is not critical (time just goes by faster) the 14.318 MHz OSC signal is absolutely necessary if you want to see what the computer is telling you.

The modification detailed in this article increases the CLK88 frequency without changing the frequency of the other signals thus allowing the computer to operate properly.

Circuit Description

A schematic of the modification is shown in Figure 1. The circuit consists of three ICs (one of which is taken from the 150's CPU board). Two 8284As are used to generate the necessary clock signals while a 74C02 CMOS series quad NOR gate is used for miscellaneous logic functions. Connector P0 is actually an 18 pin header which fits into the 8284A socket on the CPU board to connect the modification with the computer.

While not exploited in the design of the H-150, the 8284A allows the use of an externally applied clock frequency to be used instead of the crystal frequency. If the F/C{*} line is held low, all output frequencies are generated using the external crystal. However, when this line is high, the CLK88 signal will be one third the frequency of the signal applied to pin 14 (External Frequency Input, EFI) and the PCLK will be half the CLK88. The OSC output is not affected and will remain the same as the crystal frequency. This feature is used to obtain the signals needed for the modification.

U1 outputs both the 4.77 and 7.38 MHz CLK88 signal, but does not provide the OSC signal. While U1 uses a 22.12 MHz crystal to supply the CLK88 frequency of 7.38 MHz (or a 20.00 MHz crystal for a CLK88 of 6.67 MHz), the 4.77 MHz CLK88 is generated by U2 using the 14.318 MHz crystal on the CPU board and fed to U1 as the EFI signal. This allows the CLK88 frequency sent to the CPU to be changed by toggling the F/C{*} line of U1. When the line is low, CLK88 is generated from the 22.12 MHz crystal. When F/C{*} is high the 14.318 OSC output from U2 is used to generate the 4.77 MHz CLK88 signal. The PCLK and OSC signals are always generated by U2. Although the OSC signal is independent of the selected CLK88 speed, PCLK can be configured to either always be 2.38 MHz (normal) or one half the clock speed.

Ideally, the PCLK would be maintained at the normal 2.38 MHz so that the time-of-day is kept correctly. However, if the system is powered up at 7.38 MHz, while the PCLK is at the normal frequency of 2.38 MHz, the power-up fails and the message "+++ ERROR: Timer Interrupt failure! +++" is displayed. From this one could surmise that the 150 checks the 8253 timer chip with a routine that requires that the PCLK be half the CLK88 frequency.

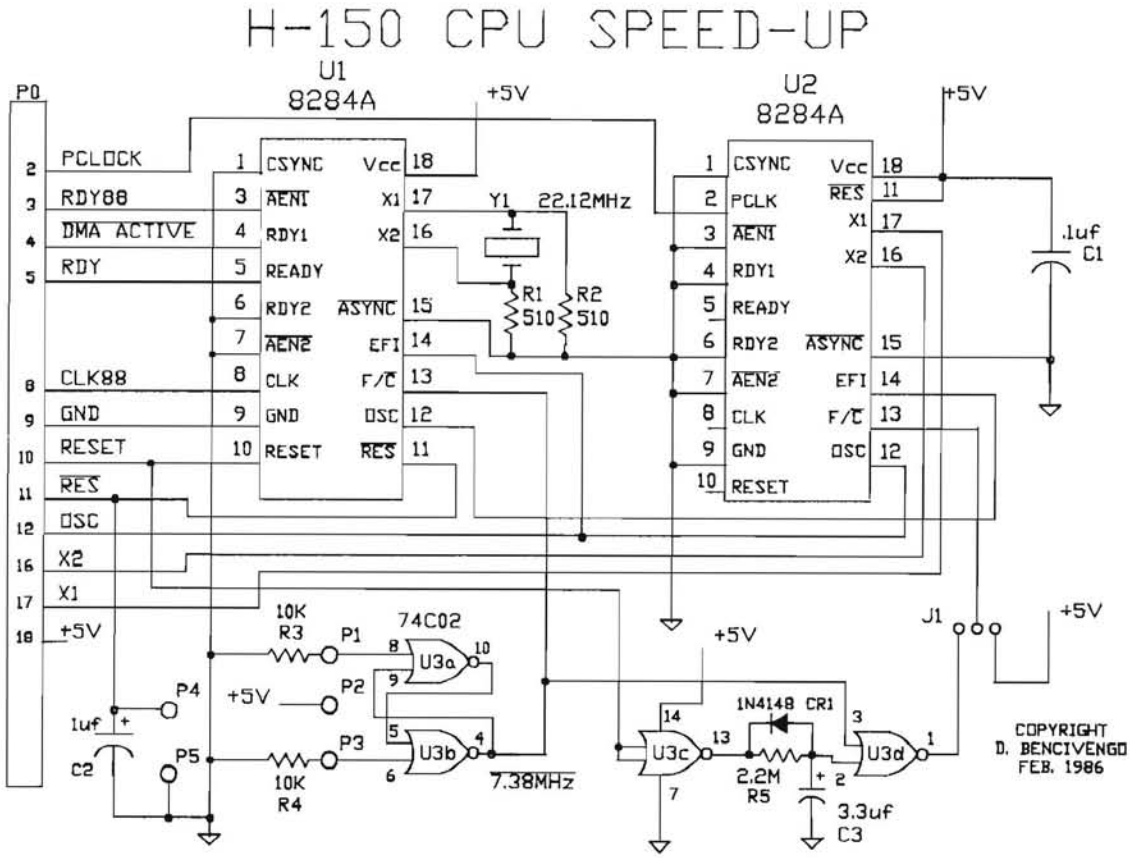

Figure 1
Schematic Diagram

So if we want to boot at 7.38 MHz but still keep the correct time the circuit must "shift gears". This is accomplished using the F/C{*} feature of U2 and an RC time delay circuit consisting of two NOR gates (U3c and U3d). On power-up, the PCLK is one half of CLK88, after about five seconds (depending on the values of C3 and R5) the PCLK changes to the normal 2.38 MHz. This delay is long enough for the H-150 to check the interrupt timer and decide that everything is OK. If the F/C{*} line is tied to +5V, then the PCLK will always be one half CLK88, regardless of frequency, just in case some other peripheral device wants this to be the case. Jumper J1 allows this to be configured as necessary for your computer system.

Notice the use of CMOS for U3. For this application TTL is not suitable because of their large input current requirements, and the RC timing network would not behave properly. The remaining two NOR gates (U3a and U3b) comprise a switch debouncer for the speed change switch providing a positive transition so that the CPU won't be tripped up when the speed is changed.

An additional feature of the circuit is the incorporation of a hardware reset switch. By shorting the RES{*} line to ground, the computer is reset as though the power was turned off, then on again. Capacitor C2 removes any extraneous noise picked up on the cable to the remote control. Located in the control module is the SPDT speed change switch, a momentary normally open switch, and an LED for speed indication (see Figure 2).

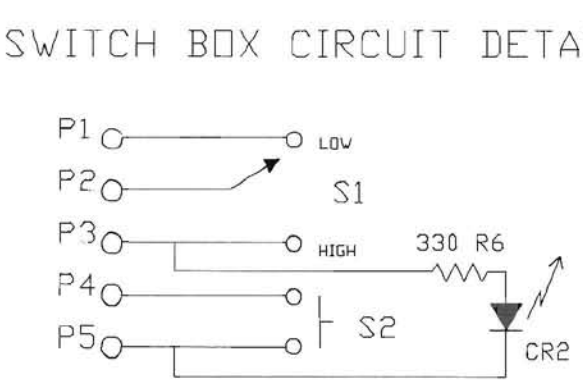

Figure 2
Remote Switch Box Schematic

Construction

Although not required, the use of a PC board is recommended. A full size PC board etching pattern is supplied as Figure 3. Since the board is piggy-backed, wire wrap construction technique will not work. The prototype was soldered using point-to-point wiring and extended from the CPU board with ribbon cable. If you decide to design your own board, be sure not to extend the board over the 8088 chip which runs rather hot. The rest of the chips in the area are LS series TTL and are not a problem in this regard. Also, the distance between pins 16 and 17 on U2 and the connection to the board should be kept short. To piggy-back the board single row headers were used, although an 18 pin wire wrap socket would work fine if the leads were trimmed some. In either case, it is important that an 18 pin DIP socket be used to protect the CPU board from the oversized header pins.

Construction of the PC board is straight forward. If you are using the suggested PC board layout watch for solder bridges, as the distance between traces is often very small, start by installing the IC sockets and the jumpers (refer to Figure 4 for the PC board component layout). A three pin, single-row angled header along with a shorting block should be used for J1 to facilitate configuration for your computer. Jumpers J2 and J3 are just short pieces of bare wire. Next install the resistors, the diode, the capacitors, and the crystal. Be extra careful of the polarity when orienting the diode and tantalum capacitors. When installing the crystal be sure that the leads are not shorting against the case and do not use any more heat than necessary when soldering. Next, install the headers using a minimum of solder so that the IC socket will fit properly. Trim the header pins on the component side flush and install an 18 pin socket over the header pins on the solder side. The length of the header pins on the solder side of the board should be trimmed to about 0.25 inches, if needed. Some force will be necessary to install the socket over the header pins and can be applied using the shaft of a screw driver parallel to the bottom of the socket.

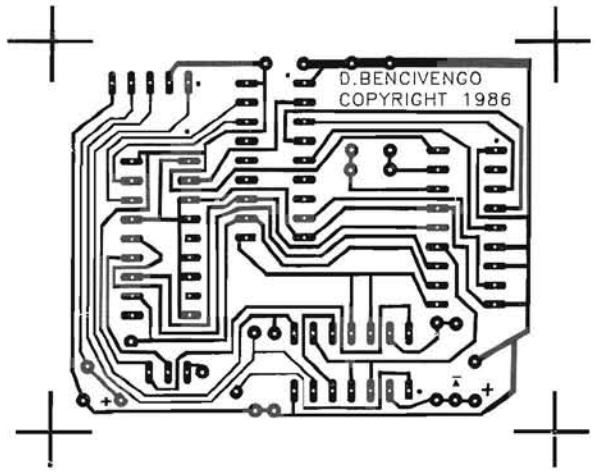

Figure 3
Full Size Etching Template

The cable to the remote module can be soldered to the board or connected using a Molex type connector if preferred. Ribbon cable is suitable to connect the modification with the remote box and allows the cable to exit through the back of the computer without using back panel I/O connector space. The actual length of the cable used was four feet, although it could be somewhat longer if necessary. A small project box with appropriately drilled holes was used for the remote control with the speed change switch and indicator LED on the front and the reset switch mounted on the back out of the way. The wiring for the remote control is shown in Figure 2 . After wiring the switches and such, put a knot in the cable to serve as a strain relief and notch the plastic case slightly so that it grabs the cable but does not destroy it when the cover is screwed down.

Just before you are ready to install the piggy-back board, insert ICs U1 and U3 into their respective sockets (taking care against static damage).

Installation

Turn off the power to your computer but do not unplug it from the electrical outlet. Remove the cover, discharge your body by touching the power supply case, disconnect the keyboard and speaker connectors and remove the CPU card. Lay the CPU card down on a piece of aluminum foil. Locate the 8088 (U212) in the

upper right hand corner of the card. Remove the 8284A (U211) to the left of the 8088 and install it in the empty socket (U2) on the speed-up PC board. Carefully install the speed-up board into the 8284A socket on the CPU board. Note: The ribbon cable will be closest to the top of the CPU board. Configure J1 in the "a" position (shorting the left-most two pins). Replace the CPU card and route the ribbon cable out the rear of the computer over the back panel. Put the switch box in a convenient location or attach it to the computer with double-sided foam tape. Finally, reconnect the keyboard and speaker connectors.

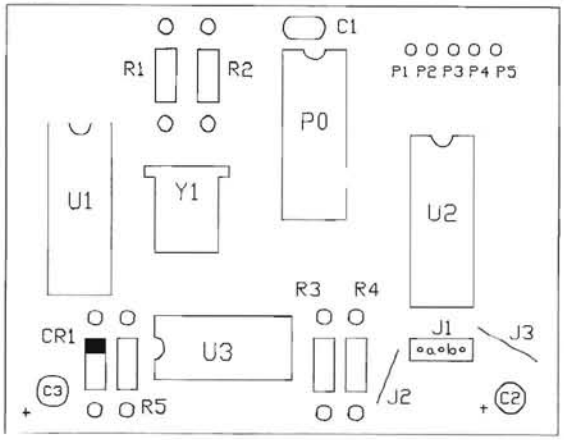

Figure 4
Suggested PC Board Parts Layout

Initial Tests

If you normally boot from a hard drive, it is recommended that floppies be used until you're sure the computer is operating properly. While I haven't lost any data throughout all of my experimentation, it is nevertheless wise to back-up your hard drive and experiment with floppies.

Power up the computer with the switch in the normal speed position (the LED speed indicator will not be lit). The diagnostic LEDs on the CPU board should go out and the computer should boot. If all the LEDs stay lit, then there is a problem with your board. Nothing strange has been done so the computer will still run properly with the switch in the normal position. At this point, suspect a solder bridge or a bad IC on the modification board, or improper contact of the speed-up board with the CPU board.

With the computer running at the normal speed ask for a directory, then flip the switch and ask for a directory again. The difference should be obvious. Next turn off the power and boot up at the faster speed. The message "+++ ERROR: Timer Interrupt failure! +++" indicates that U3 is changing the PCLK speed too soon. This can be verified by monitoring pin 14 of U2. If this line goes low before the diagnostic LED "INT" light goes out on the CPU board, then U3 is switching too soon and the value of C3 should be increased.

If all seems fine allow the computer to run at high speed for about 20 minutes then try to run a program from a floppy. If your computer just hangs or the screen fills with garbage, the next section is for you. If everything seems to work OK try out your hard disk if you have one and that's it.

Why Doesn't My Computer Work?

My computer runs reliably at 7.38 MHz, however, at first it did not. Speeding up the CPU clock puts an extra burden on some of the ICs in the form of more heat to dissipate and simply exceeds timing specifications of others. Unfortunately, some of the chips used in the H-150 are not able to handle the extra load. If you have built this modification or tried a commercial circuit and failed to get it to work, then some of the chips in your computer are not up to the task. I have installed this modification in several 150s and found the troublesome ICs to be the Advanced Micro Devices 9517A-5 (a direct memory access (DMA) controller which is functionally equivalent to the 8237A-5) and the NEC B8288 bus controller. They are U209 and U243 respectively on the CPU board.

There are several manufacturers of the 8088 and the 8200 series support chips including Intel, Advanced Micro Devices (AMD), and NEC. The prefix letter to the IC number (e.g. B8288) indicates the quality of the IC package. Usually, a "P" designates plastic while a "B" or "D" indicates a ceramic package (this is not strictly true since some NEC products in plastic packages bear the "D" designation"). The ceramic package is, in general, preferred for this application. To keep things interesting all of these manufacturer's parts were used in different places in different 150s. My 150, as supplied by Heath, used a P8088 from Advanced Micro Devices, a B8288 from NEC and an Intel D8237A-5 DMA controller.

The first speed-up modification board constructed used a clock speed of 6.67 MHz and after about 10 minutes of operation the hardware clock could not be read properly. Using component cooler, I found that the NEC B8288 was the culprit. Component cooler can be very useful in tracking down thermally related problems. The 8288 is specified by Intel to run at 8 MHz maximum and as such no faster chip is available. Replacing the NEC B8288 with an AMD D8288 cured the problem. In fact, this new D8288 allowed the CPU clock to be increased to 7.38 MHz. Two other NEC B8288s were tried but these were not reliable either. Several (rather expensive) Intel D8288s were tried, but to my surprise they would not work at 7.38 MHz but rather at 6.67 MHz only. Interestingly, the Intel D8288 generated far more heat than the AMD device and quickly became too hot to touch. Five of the AMD D8288s were tried and all worked satisfactorily. In my H-150 all that was needed was a higher quality bus controller.

With this conquered everything looked fine until I found another minor problem. After running for a few minutes I tried to load GW-BASIC and received the message "You cannot SHELL to BASIC". After switching back to 4.77 MHz GW-BASIC would load. Once loaded GW-BASIC would run fine at 7.38 MHz. Replacing the standard (5 MHz) AMD P8088 with an 8 MHz NEC D70108D-8 "V-20" cured the problem completely and my computer has been running perfectly, at 7.38 MHz, ever since. Curiously, when an Intel 8088-2 (8 MHz) was tried the same message was obtained(?).

Attempted installation of the modification into another Z-150 also failed initially. After about five minutes at high speed, any floppy disk activity would hang the computer. It turned out that this computer used an AMD 9517A-5 plastic package DMA controller (both floppy and hard disks use DMA to transfer data). Replacement of the AMD 9517A-5 with an Intel D8237A-5 chip cured the problem. At the same time, the NEC B8288 was replaced with an AMD D8288 and the computer ran perfectly at 7.38 MHz. This scenario was also encountered on another 150. As far as DMA controllers are concerned, the NEC D8237A-5 was also found to work properly at 7.38 MHz.

With regard to the CPU, I have no evidence that the 5 MHz version will not run satisfactorily at 7.38 MHz. The one problem observed was not cured by using the 8 MHz version and both the AMD P8088 and the NEC D8088 appear to perform satisfactorily at 7.38 MHz.

Please realize that what I found may not be true for all 150s. That is to say, a 5 MHz 8088 may not work in your computer while the plastic AMD 9517A-5 might work just fine. The hot setup appears to be the AMD D8288, the Intel D8237A-5 and the NEC "V-20". I am particularly fond of the "V-20" because it runs much cooler and slightly faster that the 8088. To improve your chances for success, as well as increase the reliability of the modification, the use of an IC heat sink is recommended on the D8288 and D8237A-5.

And finally, if 7.38 MHz does not work, try 6.67 MHz. The improvement over 4.77 is quite noticeable and the computer is much more likely to work properly especially if the above mentioned components are replaced.

Conclusion

My experience is that the 150 will run at 6.67 MHz or even 7.38 MHz if the proper components are used. For those of you frustrated with modifications purchased previously, the information contained in this article should get you on your way. Although some 150s will run at a higher speed with factory supplied parts, I believe that they are the exception rather than the rule.

The improvement in speed is, in my opinion, well worth the effort spent on the modification. Operation at 4.77 MHz is too slow to bear and the cost of other alternatives is too high.

The PC board is available from me for $6.00 postage paid. A complete kit of parts, as well as the "replace as necessary" parts are also available, please write with your needs.

Table 2
Component Parts List For H-150 Speedup Modification

U1	8284A clock generator
U3	74C02 CMOS Quad NOR gate
CR1	1N4148 diode
CR2	LED, T-1 3/4 with mounting hardware
R1,R2	510 ohm, 5%, 1/4 watt resistor
R3,R4	10K ohm, 1/4 watt resistor
R5	2.2M ohm, 1/4 watt resistor
R6	330 ohm 1/4 watt resistor
C1	.1 uf, 50V monolithic capacitor
C2	1.0 uf, 10V tantalum
C3	3.3 uf, 10V tantalum
Y1	20.00 or 22.18 MHz crystal
S1	Subminiature SPDT switch
S2	Miniature NO momentary switch

Miscellaneous: Three 18 pin DIP sockets, one 14 pin DIP socket, four feet of 5 conductor ribbon cable, project box (Radio Shack #270-230), 18 pin DIP heat sink (DIGI-KEY #HS-126 or equivalent), 40 pin DIP heat sink (DIGI-KEY #HS-129), two 9 pin sections straight single-row male headers, 3 pin section right-angle single-row male headers, shorting jumper.

Optional "Replace as Necessary" Components

Advanced Micro Devices D8288 bus controller
Intel D8237A-5 DMA controller
NEC D70108D-8 8 MHz CPU

References

iAPX88 Book, Intel 1983.

MCS-80/85 Family User's Manual, Intel 1979.

CMOS Databook, National Semiconductor Corp. 1981

H-151 Personal Desktop Computer Service Data Manual, Zenith Data Systems 1984

Addresses

Quickdata Computer Services, Inc.
2618 Penn Circle
Sheboygan, WI 53081

DIGI-KEY Corp.
701 Brooks Ave. South
P.O. Box 677
Thief River Falls, MN 56701

Advanced Micro Devices
901 Thompson Place
Sunnyvale, CA 94036

Intel
3065 Bowers Ave.
Santa Clara, CA 95051

NEC Electronics, Inc.
401 Ellis St.
Mountain View, CA 94039 *

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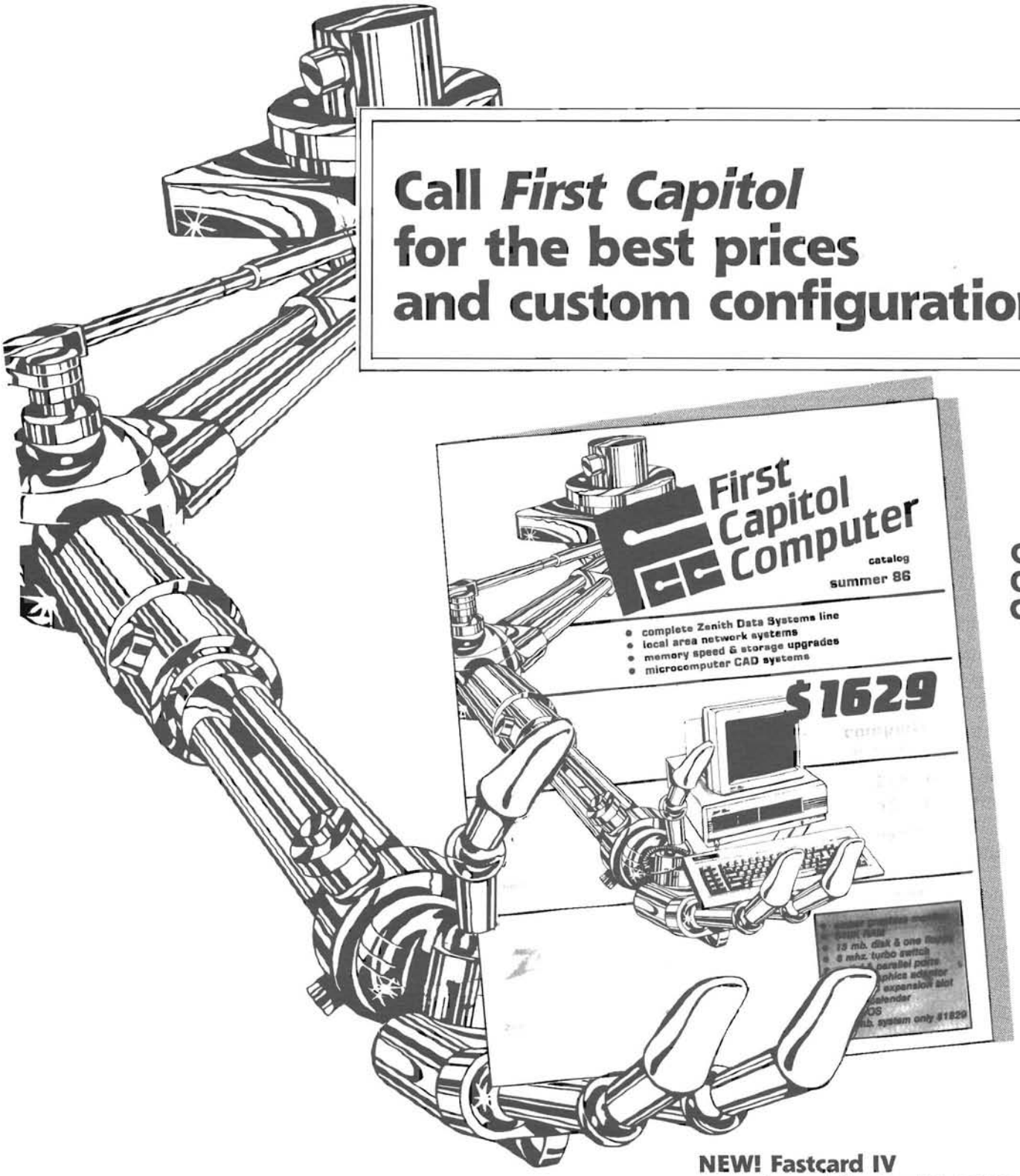

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SPREADSHEET Corner

Part 15

H. W. Bauman
493 Calle Amigo
San Clemente, CA 92672

We did a spreadsheet database project a few months back. I feel that many of the readers would like to start some advanced spreadsheet work. I am picking another database program that could be used with small variations by many users. The Data command is a very powerful tool, but the user must be aware of some other POWER commands of the LOTUS 1-2-3 (or some other software package that can handle advanced database projects). One of the main strong points of 1-2-3 is its database management commands and the structure of its spreadsheet. How many readers know how to Sort and Query a worksheet?

By the way, readers that do not have the advanced spreadsheet software will be able to work with this article to a limited extent! If these readers want to get into advanced spreadsheeting, they should save their nickels and dimes to buy an H/Z-100 type computer and the LOTUS 1-2-3 software. This 1-2-3 and a word-processer software are the MOST important requirements to obtain some really valuable usage from their computer and their computer know how! The results of my questionnaire showed that most of the readers that answered either already had a 100 type computer and had or were planning on obtaining the LOTUS 1-2-3 software. The LOTUS 1-2-3 software is available for all of the H/Z 100 types. The current price in the Xmas Catalog is $299 so save up for it if you do not already have this software. By the way, I am not trying to sell anything, my job is to show the readers how to use spreadsheet and database software and I will be using the dBASEII or dBASEIII software more and more in future articles. Spreadsheets and database software are used together like bread and butter. Spreadsheet database programs are very powerful, but they are a long ways from a dBASE program, but together YOU-HAVE-POWER!

Database programs are usually used often and most times by Users that DO NOT know anything about database programs in business. Therefore, we must create programs that are operator fool-proof. This makes it necessary to spend more time on designing projects that make the programs easier and quicker to use. That is the goal of this project!

The Macro is one way to make the program easier for the user to operate. BUT, we must go at least one step further by creating a user customized menu. The menu that we will create in this project will be very similar to the 1-2-3 menus from which you have issued 1-2-3 commands. A user created menu provides a means for the user to Select and Execute a macro from a menu of macros! Both, menus and macros reduce the complicated, tedious tasks to a few keystrokes that require no know-how about the software.

This project will be to develop a program that will Sort and Rank organization's divisions, offices or employees. Ranking is used to decide how bonuses or raises should be distributed or which office or division should be opened or closed. That is just a few ways ranking is important to the businessman! I have picked a Marketing Measurement Plan to rank various offices in the organization. I have created a fictitious sales organization for SPREADSHEET Corner Company with six separate locations where each is responsible for a specified area arranged so that each would have nearly the same sales potential. This area selection could also be arrived at using a similar program. I hope that many readers will find that they could adapt it to their needs or submit it to their boss and really impress him! HAHA!

I have kept the worksheet short and simple as possible because most of the readers that answered my questionnaire requested this. Of course, this greatly limits the applications that I could create for this article, but I believe that it will still teach the user this procedure. It will focus on menus and macros, the invaluable power that allows the user to get the MOST CAPABILITIES from 1-2-3!

```
17-Nov-85          (SALES IN THOUSANDS OF DOLLARS)

                   SPREADSHEET Corner COMPANY
                   *OFFICE SALES RANKING PLAN*

                                                    YTD
OFFICE      NAME      1STQTR 2NDQTR 3RDQTR 4THQTR YTD RANK
-------------------------------------------------------------
ATLANTA     ABBOTT,T     178    188              366    1
BOSTON      WILSON,E     188    173              361    2
LOS ANGELES RICE,L.      195    161              356    3
PORTLAND    NEWMAN,D.    169    178              347    4
OMAHA       JOHNSON,E    178    163              341    5
CHICAGO     MILNER,H     162    171              333    6
```

\A
/DSPG8~D~
SB8~A~G
/DF~1~~~

Figure 1

This Company desires to rank the Sales of each office on a quarterly basis to determine which office in each of the four quarters rates the Sales Incentive Awards! (I am sure that the reader can see that this project could perform the same function for determining which individuals should receive a raise or bonus.) I will not provide the step-by-step description for this project, but I will provide the NEW portions with these steps and explanations. I expect the readers to make use of the Figures furnished with the article to design their worksheet. Remember, that database programs are not "forgiving" — that is, you will have to follow my work exactly in many areas!

Examine Figure 1 and Figure 3 to create the first portion of the worksheet. Now would be a good time to review the Data Sort command in your manual and make use of the Help Screens provided by the 1-2-3 software. I stress these because many times the user needs only a little help to refresh the mind. They are always within a keystroke(F1). Having finished that review, set up the Figure 1 worksheet, except for the YTD RANK Column and the ALT-A macro that we will get to shortly. Figure 3 shows that the @SUM function is required for the calculations for the YTD column. Do you know how to use the CELL-FORMULA printout (Figure 4)? Watch the column widths so the worksheet will print on standard 8-1/2 × 11 inch paper.

```
17-Nov-85          (SALES IN THOUSANDS OF DOLLARS)

                   SPREADSHEET Corner COMPANY
                   *OFFICE SALES RANKING PLAN*

                                                    YTD
OFFICE      NAME      1STQTR 2NDQTR 3RDQTR 4THQTR YTD RANK
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ATLANTA     ABBOTT,T     178    188              366    1
BOSTON      WILSON,E     188    173              361    2
LOS ANGELES RICE,L.      195    161              356    3
PORTLAND    NEWMAN,D.    169    178              347    4
OMAHA       JOHNSON,E    178    163              341    5
CHICAGO     MILNER,H     162    171              333    6
```

\A
/DSPYTD~D~
SNAME~A~G
/DF~1~~~

\B
/DSP2NDQTR~D~
SNAME~A~G

Figure 2

The first cell, A1 in Figure 4, shows that the cell contains "(D1) @TODAY". This means that the cell will be updated to include the current date each time the program is used and the date will be formatted with the Date 1 form. Try the Date command to see how it works and be sure to review the manual and the help screen if you need information. This date is optional, some users may not want the current date, but will want a certain date on the report and not today's date. If I were sending you a report about last weeks sales, you would want the date for the period I am reporting on. When you enter the YTD formula (@SUM(F8..C8) you may notice that the Range is specified with the fourth quarter listed first and the first quarter last. LOTUS 1-2-3 uses the upper left and lower right corners to specify a range and it does not make any difference to 1-2-3 as to what order they are called out. Did you know this? Also, did you use the /Copy to enter the YTD formula in the other five cells after completing the entry of the first cell? (Type /Copy Return, Move the Cursor to cell G9, type a period, press the down arrow to paint the range G9.G13, press Return.)

With this worksheet, we can now manipulate the data. First, Sort the data in descending order of year-to-date (YTD) sales using the Sort command:

1. Move the cursor to cell A8 (first field of the first record) — Do you know the definition of a database? Also, DO NOT include the Field Labels!
2. Type /DS (Data Sort).
3. Choose Data-Range option to tell 1-2-3 where the records are for sorting and press Return.
4. Type a . (period), press END and HOME keys to include the bottom right corner of the database, cell G13. Be SURE to ALWAYS check the painted area (it only takes a moment) to be sure that it includes ONLY what you NEED! This is the advantage of the pointer mode!
5. Press Return. (Range of Records to be sorted will include A8.G13.) The Sort Menu will reappear.
6. Choose Primary-Key option by typing a P.
7. Indicate the column that you want to sort and in what order the sort should be arranged. Move the cursor to any cell in the YTD field (column G). Press Return.
8. The menu will request sort order, recommending A (ascending). We want the BEST sales office on TOP, so reject this A and type D to choose Descending order. Press Return. The Sort Menu will reappear with the rest of the options.
9. Select Secondary-Key. Move the cursor to any cell in the NAME field (column B). Press Return.
10. This time accept the A for Ascending (alphabetical) order and press Return.
11. Start the Sort by choosing the Go option.
12. Did you see it do the sort? It is fast!

If you remember, I stated that the primary reason for this project is to Rank the offices. It would be useful if we added a column to the worksheet that numbers the year-to-date (YTD) sales performance from 1 for the best to 6 for the poorest office. Later, when we resort this database, we will be able to use this column to compare the other types of ranking to the year-to-date ranking. This will clear itself up as we proceed. We will assign rankings to the offices by entering a sequence of numbers starting with 1, in a new column to the right of YTD. Figure 1 shows this column.

1. Move the cursor to cell H5, enter label ^YTD, move cursor to cell H6, and enter label ^RANK. Did you remember the ^ label-prefix to center the labels? Also, did you use the Down Arrow key between the labels and not the Return key? This is to save typing tasks!

2. Use \- and Return to put a line of hyphens in cell H7.
3. How many readers know about and how to use Data Fill to save typing tasks? Data Fill creates a sequential list of numbers in a range of consecutive cells using a specified step. We will use this sequence of numbers in column H, beginning with 1 in H8 and increase in steps of 1 through the rest of the range to H13 that should have a 6 in it. Move the cursor to cell H8, type /DF (Data Fill). 1-2-3 asks for the fill range and suggests the current cursor position, H8, as the beginning of the range. This is what we want, type a . (period) to anchor the range, and move the cursor down to the bottom cell H13. Press Return.
4. 1-2-3 will ask for the beginning number of the sequence. In response to the "Start" prompt, type 1, and press Return.
5. 1-2-3's next prompt asks for "Step", the increment value. We want the sequence to increase in steps of 1; so, accept the suggested value. Press Return.
6. The "Step" prompt allows the user to specify a maximum value for the sequence. The suggested 2047 is more than necessary and we will accept it by pressing Return. Instantly, the sequence of 1 thru 6 will fill the RANK column. Did you follow it? It was fast! Imagine if you were filling a column of say 500 cells how much typing this would save you!
7. Now, we do not want to forget to expand our revised database to include the NEW column — RANK! Type /DSD (Data Sort Data-Range). The control panel will still show the active area as A8..G13, the corners of the prior range. Press the Right Arrow key once to expand the range to include column H, and press Return.

```
17-Nov-85          (SALES IN THOUSANDS OF DOLLARS)                    ¦
                                                                      ¦
                   SPREADSHEET Corner COMPANY                         ¦
                   *OFFICE SALES RANKING PLAN*                        ¦
                                                                      ¦
                                                          YTD         ¦     \A          \B
OFFICE      NAME     1STQTR 2NDQTR 3RDQTR 4THQTR    YTD    RANK      ¦ /DSPYTD~D~ /DSP2NDQTR~D~
-------------------------------------------------------------------- ¦ SNAME~A~G  SNAME~A~G
ATLANTA     ABBOTT,T   178    188             @SUM(F8 .C8)     1     ¦ /DF~1~~~
BOSTON      WILSON,E   188    173             @SUM(F9..C9)     2     ¦
LOS ANGELES RICE,L     195    161             @SUM(F10..C10)   3     ¦
PORTLAND    NEWMAN,D   169    178             @SUM(F11..C11)   4     ¦
OMAHA       JOHNSON,E. 178    163             @SUM(F12..C12)   5     ¦
CHICAGO     MILNER,H   162    171             @SUM(F13..C13)   6     ¦
```

Figure 3

At this time, we have data in our Worksheet for the first and second quarters. Right? Our Company's quarterly incentives are based on this quarter's sales; so, it is necessary to Sort the offices by the sales of the most recent quarter, the second quarter in this case. This means, we must revise the above procedure simply by changing the Primary-Key and ReSort!

1. Select Primary-Key option. The cursor will move to the current Primary-Key in the YTD column. To use the second quarter as the basis of this new Sort, move the cursor to any cell in the 2NDQTR column (D), and press Return.
2. The suggested descending order is what we want; so, press Return again. The Secondary-Key will stay the same. Select the Go option! Did you see the rearrangement? You will find the old YTD rankings were rearranged!

I hope that all the readers have followed what we have done. It is important, because now that we have the Company Data Range established, it will not need repeating until we add to or change the data range. The Company will be doing a lot of Sorting with this Worksheet; so, it will be worth developing macros that will automate and simplify these Sorting tasks.

Do you remember that we defined a macro as a series of 1-2-3 keystrokes that can invoke commands or enter information? The keystrokes are stored as labels — that is — each must be preceded by the Label-Prefix, such as an apostrophe. As you will remember, macros are given a special range name consisting of a backward slash (\) followed by a single letter. To write a macro, the creator must make a list of commands and responses to prompts that were used to perform the task by the manual method. The summary of keystrokes that we used above to rearrange the Data File in order of YTD sales are:

```
/Data Sort Primary-Key G1 Return Descending Return
Secondary-Key B1 Return Ascending Return Go
/Data Fill Return 1 Return Return Return
```

Note! The third line was required because 1-2-3 will remember the Data Fill entries for the current session, BUT if you Save the Worksheet and Retrieve it later, 1-2-3 will know only the Fill Range — the Start, Step, and Stop will revert to their default values! Therefore, we must include the Data Fill commands in our macro.

To translate the above keystrokes into a macro, the user MUST convert the commands and prompts to labels! Also, the special keys must be converted into special macro keystroke indicators. The only special key in this project at this time is Return. If you remember from previous articles the Tilde (~) character replaces the Return key. Do not let these new commands worry you as we will learn them by repetition! Our keystrokes for this macro will be:

```
'/DSPG1~D~SB1~A~G/DF~1~~~
```

Please see how many of the characters you can recognize. It will be easier to type them out on the keyboard with 1-2-3 loaded. The macro does not have to reside in one cell. In fact, chaining keystrokes into long macro labels will make them more difficult to understand and troubleshoot. Macros are subject to errors and finding the errors in a long macro can be time consuming (I should point out that when the reader has more experience in writing macros, they will find that usually one-line-or-less lines will produce a faster executing macro.) For this project, we will divide the keystrokes into short segments. LOTUS 1-2-3 will read the next line until it reaches a BLANK! **Note!** Be SURE to leave blanks in your macro to END the macro, BUT NEVER have a blank in the macro otherwise. Here is the proposed segmented macro:

```
   \A
/DSPG1~D~
SB1~A~G
/DF~1~~~
```

Do you find that this segmented version is easier to understand? You might also want to include the SAVE macro we used in the previous project. I will let you decide. Before you can test a macro, ALWAYS protect your work against zapping by an error in the macro!! You know the /FS and Return command. After saving the worksheet, TEST the macro. Did you remember that we must name the macro before it can be used so that 1-2-3 will know it exists? Do you remember how we named the macro? Put

the cursor on the first cell of the macro (not the \A cell), type /RNC (Range Name Create). Assign a special name by typing \A and press Return. If you did NOT do this before you SAVED the worksheet, I would suggest that you SAVE the worksheet again. Now, retrieve it and we are ready to test the macro! Do you remember how? Press the ALT key, hold it down, press the A key. Did it work? How fast did 1-2-3 perform the macro? When the READY Mode indicator appears in the control panel, check the results on the worksheet. The results should be the same, the NAMES and RANKS should be rearranged as they were when we sorted them according to YTD sales manually above.

If you have an error in the macro, you will most likely hear a Beep! Depending on the type of problem, the macro may stop or it may continue to execute, but erroneously. If the result is in error or the beep sounds, you will most likely have a typing error. Visually examine your macro! If you do not find the error, "step" through the macro. You should remember how to do this from the prior articles! Do you?

Let's discuss other ways you might get into trouble with this macro. What would happen if you were to insert another column later to the left of the macro location? Remember the Primary-Key and the Secondary-Key (YTD and NAME) were defined as cells G8 and B8. If a column were added, these columns could be wrong! The macro would not know that you have added or deleted a column (it only knows about G8 and B8) because the macro is comprised of labels! Labels ARE NOT automatically changed when cells are rearranged on the worksheet. The inserted or deleted column would make our macro useless! What should we do?

This is where we should think of using Range Names because a named range of cells will be automatically adjusted when the worksheet is altered. No matter where a Named Range is relocated, its name will still be assigned to it. It is quite possible that we could make changes to the worksheet where these Named Ranges would be located in other columns, but our macro will still refer to the new location and the macro will still work! Therefore, we should assign Range Names to all locations covered by the macro! In fact, the readers should get into the habit of using Range Names. As we get into other projects this will be even more important.

When 1-2-3 prompts for the location of a Sort Key, it requests the address of a cell within the column that we want to Sort. To be able to Sort any column in the worksheet, we must assign a unique name to a cell in each of this project's eight column labels (names). The eight names would be assigned with the /RNC command! Look at Figure 1 on your worksheet and you will find that the eight column labels could be used as Range Names. Let's see what we would do:

Figure 4

```
A1  (D1) @TODAY
C1. '(SALES IN THOUSANDS OF DOLLARS)
I1: '¦
I2: '¦
C3: 'SPREADSHEET Corner COMPANY
I3: '¦
C4: '*OFFICE SALES RANKING PLAN*
I4: '¦
H5  ^YTD
I5  '¦
K5. ^\A
L5: ^\B
A6: ^OFFICE
B6. ^NAME
C6: ^1STQTR
D6: ^2NDQTR
E6  ^3RDQTR
F6  ^4THQTR
G6. ^YTD
H6: ^RANK
I6· '¦
K6· '/DSPYTD~D~
L6. '/DSP2NDQTR~D~
A7: \-
B7: \-
C7  \-
D7. \-
E7: \-
F7: \-
G7· \-
H7: \-
I7  '¦
K7: 'SNAME~A~G
L7: 'SNAME~A~G
A8. 'ATLANTA
B8: 'ABBOTT,T
C8: 178
D8: 188
G8: @SUM(F8..C8)
H8: 1
I8: '¦
K8: '/DF~1~~~
A9: 'BOSTON
B9: 'WILSON,E
C9: 188
D9  173
G9: @SUM(F9..C9)
H9· 2
I9· '¦
A10  'LOS ANGELES
B10: 'RICE,L.
C10: 195
D10· 161
G10. @SUM(F10..C10)
H10. 3
I10: '¦
A11: 'PORTLAND
B11· 'NEWMAN,D
C11. 169
D11: 178
G11: @SUM(F11..C11)
H11: 4
I11: '¦
A12: 'OMAHA
B12: 'JOHNSON,E
C12. 178
D12  163
G12  @SUM(F12 .C12)
H12. 5
I12· '¦
A13  'CHICAGO
B13  'MILNER,H
C13: 162
D13: 171
G13: @SUM(F13..C13)
H13  6
I13: '¦
```

1. Move the cursor to cell A6 (OFFICE), type /RNL (Range Name Label). Did you notice I used Label this time? The Control Panel Menu will read:

   Right Down Left Up

   If we choose Down, the cells below the range of labels (which we must specify) will be given the Range Name! Choose Down. Now, 1-2-3 wants to know the label range. This range will contain the labels we will use for Range Names! 1-2-3 will recommend the range A6..A6. Move the cursor to the right to H6 so our label range will be A6..H6. Press Return.
2. The READY Mode is back. To check the Named Cells press the F5 key (GoTo). If the GoTo works, we will go to the specified named cells. Press F5 again. We will be in the pointer mode so that we can tell it where to go. If we press the F3 (Name) key, 1-2-3 will show us a list of active range names. Press F3 and the names will be listed alphabetically. We want to find OFFICE, 1STQTR, 2NDQTR, 3RDQTR, REGION, YTD, \A (the name of this macro). There will not be enough space to show all of the named ranges, but we can move the menu display by pressing the Arrow keys. Move the pointer to where YTD will be highlighted and press Return. The cursor will jump to cell G7, the cell below YTD field. Did yours work this way? The Range Name label command is a very useful command, so be sure you understand how it works! The other Range Name label commands will all do the same. (If the labels were contained in a vertical range of cells, we would choose the Right or Left options to name the bordering cells to the right or left of the labels!) We are not going to do this now, but I was trying to help you readers to see how the command works. I hope that I have made this procedure clear. I also want the readers to know that the F3 (Name) key can be used to obtain a list of range names anytime you are in the pointer mode. Therefore, the user can use this key in the Move, Copy, Data, Print, File, and Graph commands and in a

formula entry. This is important because Range Name must be UNIQUE names so you will be able to see if the name you are choosing has been used earlier. We will not have this problem in this project, but it is important for you to know this for future work whenever you are naming a range!

With the Range Name Label commands used, return to the \A macro. In place of the Data Sort Primary-Key G1 to serve as the Sort Key to Sort the Records in order of YTD sales, we will use a Range Name. This change will make the macro more descriptive and it will add to the macro flexibility as we previously discussed. If the YTD column is moved for any reason, the Range Name YTD will be automatically reassigned to the new address and the macro will continue to function correctly. I hope that I have made this clear to you readers, because the use of Range Names will be important in our future work!

1. Press F5 (GoTo) key, type \A, and press Return. The cursor should move to the ALT-A macro.
2. Press the F2 (Edit) key to get into the Edit Mode. The current macro label will appear in the control panel as '/DSPG1~D~. Using the Left Arrow and DEL keys, replace G1 with YTD and press Return. Press Down Arrow key.
3. Next, as in step 2, replace the B8 label with NAME in cell K7, so the Secondary-Key will refer to the NAME cell, but it does not necessarily have to be in cell B8 as we have discussed. We have not made any changes at this time, so the B8 location will be correct. Press Return.

Always SAVE your worksheet before testing a new or revised macro, it's a MUST! Make certain that the macro label is entered correctly. Hold down the ALT key and press the A key. If the macro works correctly, the results should be the same as before. I know that some of you readers are saying that is a lot of work; BUT REMEMBER when you are experienced with creating macros, you will use the Range Name as you proceed with your work the first time. Also, we still have a ways to go in order to demonstrate the true value of macros! Hang in there! I think that you will like what the end results will be able to do?

Now, we will create a second macro, \B, to Sort the Second-quarter sales records in descending order. You will find that the macro to be nearly the same as \A, except 2NDQTR will be the Primary-Key. As a short-cut, copy the \A macro over to the \B macro (refer to Figure 2):

1. Use the F5 (GoTo) key to get to the \A macro first line by pressing F5, type \A, and press Return.
2. Type /Copy, type a . (period), press the Down Arrow key to move to the second cell of the macro, and press Return.
3. Put the cursor on the top line, press F2 (Edit), replace YTD in the label with 2NDQTR, and press Return.
4. DO NOT FORGET to NAME the MACRO!! Goto L5 and type \B and press Return. Press the Down Arrow and type /RNL (Range Name Label), select Down, and press Return.

By this time, you might have found that some columns should be increased or decreased in width. Use /WCS (Worksheet Column-Width Set), type the number of characters you want to set the column for OR use the Spacebar or Backspace to point the width, and press Return. Compare your ALT-B macro with the one in Figure 2. It should be directly next to the \A macro.

Watch the 2NDQTR column as you execute the \B macro. Hold down the ALT key and press the B key. The results should be the same as those when we used the manual Sort command without a macro. How do you like the idea of less typing? Did you remember to SAVE your worksheet before testing?

The \B macro is fine for Sorting the Second-quarter, but what about the other quarters? One way would be to create a macro for each of the quarters. That would be quite a task! A better way would be to make the \B macro more flexible by enabling it to work with all four quarters. A procedure that would do this, requires the user to tell 1-2-3 which quarter should be the Sort key. If 1-2-3 has this information, it can be instructed to set the Primary-Key to the chosen quarter column. That is what we are going to do in the next "SPREADSHEET Corner" article. We will have to find a way to provide the macro with some intelligence to distinguish between quarters and how to tell the macro to issue sequences of keystrokes conditionally, depending on which quarter the user chooses.

Up to now in this project, we have created macros that have been exact duplicates of the keystrokes that we typed manually to perform the task at the beginning of this article. These macros do not have any internal intelligence or logic. They consist of the standard 1-2-3 keystrokes. Next, we must get into an area where LOTUS 1-2-3 uses a class of commands unique to the macro environment. These commands cannot be used outside of a macro! By the way, this will be your introduction to the World of LOTUS 1-2-3 PROGRAMMING!! How many readers really knew that it was possible to program in 1-2-3? For homework, the reader might start searching for information on this. I am not going to say anything else, so have I WET your craving for more information?? Of course, I know that there are readers out there that already know all about this, but maybe we will refresh their minds or teach them a different twist to use.

As always I invite the reader to ask for help if needed, give me suggestions and criticisms. All I ask is that you give me all the facts and supply a stamped, self-addressed business size envelope if you want an answer from me. I just cannot answer all the letters that I get without this. I would be buying stamps all the time. I did get behind for a short time because of an accident, but I will be back on schedule where I aim to answer within a week! Happy SPREADSHEETING until the next article!

*

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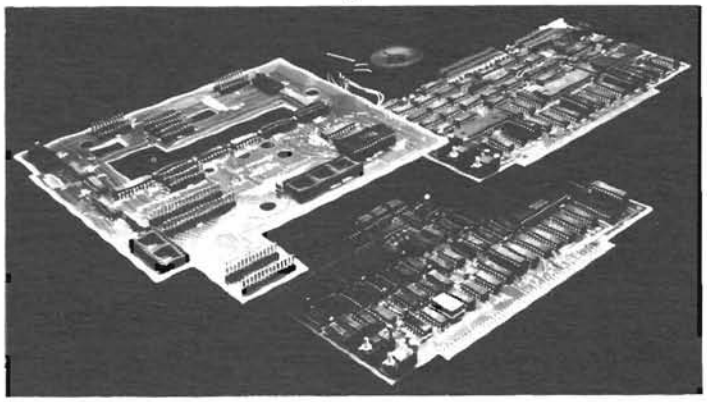

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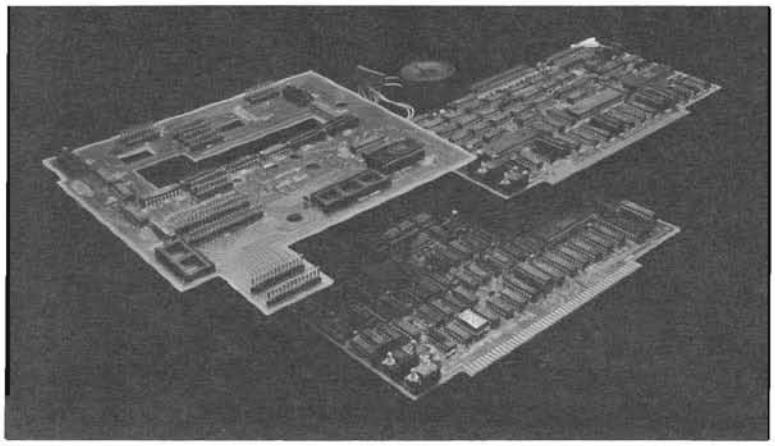
On The Leading Edge

The UCI Easy PC Emulator Board: A Review



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One of the hazards of writing a continuing series of articles which strive to be "On the Leading Edge" is that the edge is a very fine line. As I was writing this article, I actually fell off of that edge and was hanging by my fingernails.

For reasons that will become obvious later, this article required about five times the number of hours that I usually devote to most of these articles.

This article is the second of three on PC emulation on the H/Z-100 computers. It deals with the installation and use of UCI's Easy PC.

What Is Emulation?

As we discussed in the January article on the Gemini, Webster's New Collegiate Dictionary says that an EMULATOR is a "hardware device or a combination of hardware and software that permits programs written for one computer to be run on another" Similarly, EMULATE is defined as "to strive to equal or excel".

With that in mind, we will take a look at the Easy PC.

Buying The Easy PC

According to the Spring/Summer 1986 Heathkit catalog, the list price of the Easy PC is $699. Remember that, in addition to the Easy PC, you will need to buy a new DOS. As you may remember from the Gemini review, I recommend that you buy the Zenith Z-150 MS-DOS since it is available for $90.00 when you purchase one of the emulators. That is a bargain since I recently read that IBM has increased the list price of their PC-DOS 3.2 to $95.

When you unpack the Easy PC, you will find three boards: a system board that plugs into the H/Z-100 motherboard, an S-100 disk controller, and an S-100 video board. A video/sound wiring harness, speaker, and several packages of ICs complete the Easy PC hardware complement. The label package also contains a keyboard label set in addition to the regular blue and white Heathkit label. And, of course, the standard Heathkit assembly manual.

The Testing Configuration

In order to establish the parameters that I used for testing the Easy PC Emulator, I should note that my system configuration has changed significantly since the Gemini review. Although I originally intended to keep the same hardware configuration for the Easy PC, the later than scheduled release of the Easy PC completely eliminated that possibility.

I had an opportunity to exchange the old motherboard in my H-100 for one of the new ones. The new motherboard has been upgraded with the HA-108 upgrade kit which supports the 256K RAM chips and 8 mhz operation. The motherboard is fully populated with the 256K RAM chips for a total of 768K. The video memory has been upgraded to full color capability with 64K RAM chips. All S-100 memory cards have been removed, and I replaced the internal half height drive with a repaired full height drive. As usual, I still have an internal 26 megabyte half height Tulin hard disk.

I still have another separate 5-1/4" drive in a separate cabinet with its own power supply. Two 8" drives in a separate cabinet complete the disk configuration. Printer support is provided by an H-25 dot matrix printer plus a DTC Style Writer (similar to the Brother HR-15) for letter quality.

The Easy PC board tested is advertised to run at both 5 and 8 megahertz. It was one of the first boards available from Heath Company. Although I received the Easy PC with ROM version

1.5, all software was tested on ROM version 1.63 for reasons that will become obvious later.

I have used all available ports on my H-100. J1 is connected to my trusty H-25 printer. J2 is connected to my Prometheus Pro-Modem. And the parallel port is used for my DTC Style Writer printer.

Installing The Easy PC

Most of the basic installation tools are required any time you disassemble your H-100. I recommend a #2 phillips screwdriver, #3 phillips screwdriver, a 1/4" nutdriver preferably with a deep socket (low profile only), and an IC remover or a small flat blade screwdriver. I also found that a good light is extremely helpful, if not essential.

The first task is to remove enough of the Z-100 hardware so that you can get full access to the motherboard. The usual excellence of the Heathkit manual and pictorials makes that a much easier job than it would otherwise be. The video board also must be removed in order to get to the motherboard.

The installation process for the Easy PC system board requires that you remove a total of seven ICs (including the 8088 CPU) from the motherboard. Two of these ICs (including the 8088) are installed on the Easy PC system board. In addition, you must replace three of the ICs on the motherboard with ones provided with the Easy PC.

Installing the Easy PC on the motherboard is a real trick and a half. Their are seven sets of IC pins that you must align to install the Easy PC. And although I was very careful to check the pin alignment before I installed the system board, I managed to destroy a couple of the socket connectors on the 8080 motherboard socket. Fortunately, the Dallas Heathkit store came to my rescue and fixed that problem.

After the system board is installed, the remaining S-100 board installation is quite easy. The Easy PC floppy disk controller board replaces the standard Z-207 floppy disk controller for the Z-100. The Easy PC disk controller has two header connections like the Z-207: one for 5-1/4" drives and one for 8" drives. But it is really two disk controllers in one. In addition to the standard Z-207 controller, it also contains a PC-type floppy disk controller.

The Easy PC video board is also installed in an S-100 slot. Without going into all of the details, I will simply say that it is installed in series with the existing Z-100 video board. That is, the video cables from the back of the Z-100 are connected to the Easy PC video board. Then the wiring harness, provided with the Easy PC, is connected to the existing Z-100 video board and the speaker. The speaker is physically placed just in front of the power supply for the computer.

I found the installation to be somewhat tedious in that it took me almost 70 minutes. Since the computer did not work when I turned on the power, I had to go to the Dallas Heathkit store for assistance which took several more hours. The problem was that I had absolutely no video display which was due to the 8088 socket problem. And that pin alignment problem occurred even though I took extreme care to check the pin alignment on the Easy PC before I attempted the installation. The moral of the story is: I recommend that, if you are considering the Easy PC, you pay a little extra to have it installed at your local Heathkit store. If that is not possible due to distance or other reasons, be extremely careful in checking the pin alignment on the system board.

The Initial Tests

After my H-100 8088 socket was fixed, the UCI sign-on screen appeared. There are two options: press I for the IBM mode or Z for the regular Z-100 mode.

After the initial tests indicate that the Z-100 is working satisfactorily in both modes, you can reassemble the computer. The final part of the installation is to install some special key labels, provided with the Easy PC, to indicate an IBM compatible keyboard configuration.

The keyboard has been slightly changed to reflect the IBM requirements as shown in Listing 1. In addition, you can still use the standard Z-100 CTRL-RESET keys to reboot the system, as well as IBM's CTRL-ALT-DELETE sequence. By the way, Listing 1 only shows the keys that were changed in function on the Z-100.

Listing 1
Easy PC Z-100 Keyboard Configuration

Z-100 Key	Easy PC (IBM) Key
F0	ALT
F11	Num Lock
F12	Scroll Lock/Break
ICHR/DCHR	Not Used
INS/DEL LINE	Not Used
DELETE	* and PrtSc
HELP	Not used
BREAK	Caps Lock (toggle)
LINE FEED	Not Used
CAPS LOCK	Not Used
HOME	Home
Cursor Arrows	Perform same function as 2, 4, 6, 8
2, 4, 6, 8	Cursor for IBM
9	PgUp
3	PgDn
1	End
ENTER	+
0	Ins
Period (.)	Del

Although the "new" IBM keyboard is certainly functional, I thought it was a little strange to remap the PC CAPS LOCK key to the Z-100 BREAK key. I prefer that the CAPS LOCK key remain the same since it is already appropriately labeled.

External port configuration is identical to the normal Z-100 hardware configuration. That is, the Z-100 J1 becomes COM1 and J2 becomes COM2. More on that later.

The Serial Ports

The Easy PC uses a different approach to the mapping of the serial ports than the Gemini does. Although the J1 serial port becomes COM1, it is important to note that, unlike the PCs and compatibles, J1 is a DTE port. Remember that all PC ports (and cables) are specifically configured for the serial DCE configuration. If you intend to run any PC-type serial device, I recommend that you use J2 (COM2) unless you want to make up a special cable (for J1) which is shown in Listing 2. Because the hardware is obviously the same, the translation should be the same as for the Gemini.

Since all of this can be very confusing, I have shown a wiring translation table as listing 2 which should allow you to change the

J1 configuration to the IBM standard. This information was originally obtained from D.E.L., but I assume it should be the same for the Easy PC. Since I do not have any specific IBM compatible serial peripherals/cables, I did not test the configuration for the Easy PC either.

Listing 2
Serial Port Information for Easy PC Emulator

Z-100 J2 (DCE port) is basically the same as the IBM serial port (COM2) except that the Ring Detect (pin 22) is not implemented due to hardware in the Z-100. Most serial hardware, like the Microsoft Mouse (serial version) can be plugged in directly to J2 with appropriate software support.

Z-100 J1 (DTE port) can also be used for serial interface with IBM compatible peripherals as COM1 when the cable is set up as shown below. This information is believed to be accurate, but was not tested as part of this review.

Pin Conversion for Z-100 Serial Port J1

Z-100 J1 (DTE Port)	IBM PC Serial Port 1 (COM1 - DCE Port)
1	1
2	3
3	2
4	5
5	4
6	20
7	7
8	8
11	11
20	6

Note: Two jumpers (J109 and J111) on the Z-100 motherboard must be in their normal positions as specified in the Z-100 manual. These jumpers are factory set in their correct positions and should not be modified.

The Operating System

Like the Gemini, the addition of the Easy PC basically gives you a new computer. As such, you must have an operating system that is Z-150 compatible, such as the Z-150 MS-DOS or IBM PC-DOS. I highly recommend that you buy the Z-150 MS-DOS since you can get the latest version 3.1 at a modest price. As I mentioned earlier, IBM has announced a list price of $95 for their latest version of PC-DOS, so the Zenith MS-DOS is a bargain.

All of the PC-DOS commands that I tested seemed to work satisfactorily on the Easy PC. I continue to recommend the Z-150 MS-DOS simply because I find it contains fewer bugs and is easier to use than PC-DOS. As before, I recommend that you buy the Z-150 MS-DOS with the Easy PC.

Running PC Software

In the Heath supplied information with the Easy PC, they have provided a list of tested software as shown in Listing 3. I tested some software as shown in Listing 4. Similar to Heath, I did not test every command and every function of the software, but I did take the test far enough to determine that the software would run on the Easy PC. As with any hardware change, Heath recommends (and so do I) that you carefully check out the performance of the software before you entrust any valuable data to the system. There is more to that story as you will find out.

Listing 3
Heath/Zenith Tested PC Software on Easy PC

MS-DOS for Z-150; Versions 1.25, 2.11, and 3.1
GW-BASIC for Z-150; Versions 1.10 and 2.02
Microsoft FORTRAN
Microsoft PASCAL
C-86 Compiler
WordStar Professional
Multimate
dBase II and dBase III
Condor
RBase 4000, 5000
Microstat
Lotus 1-2-3
Symphony 1.0
SuperCalc 3
Microsoft Chart
Graphtalk
Digital Research GEM
4-point
MASM Macro Assembler
Microsoft Flight Simulator
Robotron
Donkey Kong
Microsoft Mouse
Cobol
Defender
Adventure
MS-Windows
Pro Key
Concurrent PC-DOS
Fansi Console
Enable
Sidekick
Night Mission
Styx
GW BASIC Compiler

Note: Heath has not tested every command or configuration for each of the above programs.

Aside from that caveat, the bottom line is that the Easy PC does run PC software on the Z-100 as advertised. All software that I tested was run under both the Zenith Z-150 MS-DOS version 3.1, as well as IBM PC-DOS version 3.0.

The Easy PC disk controller is essentially a duplication of the IBM floppy disk controller. As a result, I expected that COPYIIPC would probably run successfully on the Easy PC although it did not do so on the Gemini. Unfortunately, I could not get COPYIIPC to run reliably on the Easy PC either: sometimes it worked and sometimes it didn't, even when trying to copy the same program from a master disk. UCI is aware of the problem, but there is no fix for that as yet. Another strike against the general notion of copy protected software.

I should note that the Easy PC did run all copy protected software that was tested so long as I used the original distribution disk from the manufacturer.

Other than the COPYIIPC problem, I was able to successfully run the software shown in Listing 4. Those of you who compare the listing with the Gemini article will find that the software that I specifically tested was not the same. In particular, I was not able

to find an H-100 in either of the local Heathkit stores with a working Easy PC. The Dallas store did not have an Easy PC installed in a store computer for demonstration simply because they had sold all of the Easy PCs that were shipped. The Fort Worth store had a problem with what appeared to be a bad video board. As a result, I was only able to test the PC software that a friend brought over or that I personally own for one reason or another.

Easy PC Performance

Due to the hardware emulation approach of the Easy PC, it runs like a rocket. Video displays and disk I/O is more than acceptable, but remember that I am currently running my H-100 at 8 megahertz. All software testing was done on the floppy drives for reasons that will become obvious.

Listing 4
List of Z-150/IBM PC Tested Software For this Review

MS-DOS 11, 3.1 for Z-150
IBM PC-DOS; versions 1.10, 2.10, 3.0
Microsoft Flight Simulator
Microsoft Word version 2
Microsoft Project
Microsoft Chart
Microsoft Multiplan
WordStar Professional Package (Z-150 version)
CI C86 C Compiler
MS-DOS Version 3 Programmer's Utility Package
Multimate
AutoCad
Micro/SPF
COPYIIPC (not reliable)
HyperACCESS (Easy PC version)
WINCAD
jr-CAD

The Hard Disk And The Easy PC

I followed the instructions for setting up the Easy PC with my hard disk. The process is quite similar to that required for the Gemini. The basic process is to use the Z-100's PART utility to identify a "UCI" partition. In addition, the Operating System Name (specified as part of the PART command) must also be "UCI".

The Z-100 PART command told me that I have assigned a total of 4661 kilobytes to the UCI partition. So far, so good. Since I needed to know how many cylinders I had available for the UCI partition, I used the Z-100 disk diagnostics to determine the beginning cylinder of the UCI partition was 518. Since I have a total of 649 cylinders on my hard disk, a quick subtraction tells me that I have 131 cylinders in the UCI partition. Since those cylinder numbers do not reflect the fact that the partition does not start at exactly cylinder 518, head 1, I decided to pick the number of 120 cylinders for safety reasons. Then I started the Z-150 PART command as specified in the Heathkit instructions.

Following the Heathkit instructions, I tried to enter zero for the starting cylinder number and 120 for the ending cylinder. As I was doing this, I noticed that the Z-150 PART command was behaving strangely. It was obvious that PART did not like what I was doing since it would not accept any values. Oh well, I decided to exit, boot from the Z-100 MS-DOS partition, and see what happened. When I did that, the system displayed an error message "Error — Cannot read Superblock A". In addition, the system seemed to take forever to boot.

At that point I was nearly in a panic. The Superblock is critical to the proper functioning of a hard disk and contains partition information among other things. Although two Superblocks (A and B) are created by the PREP program on the Z-100, Superblock A is the primary one used. Superblock B is only used as a backup.

The point is that once Superblock A is bad, you should PREP the hard disk again and reload all of your software and data. Fortunately, I had taken a complete hard disk backup prior to the installation of the Easy PC. That is a personal policy that I have whenever I make a major hardware change. In this case, it really saved me.

I called UCI and talked to Dave Cheung about the problem. He informed me that UCI ROM versions prior to 1.60 would not work with a hard disk larger than 10 megabytes — the standard Heath/Zenith size. The result is that an attempt to partition the hard disk with the earlier versions of the UCI ROM and the Z-150 PART utility causes the Superblock A to be clobbered.

The only recovery from that is to completely PREP the hard disk again, and then reload all of the programs and data. That alone cost me an additional ten hours for the PREP and hard disk reload in the preparation for this article. Needless to say, I was not very convinced of the reliability of the Easy PC at this point.

Does The Easy PC Work As Expected?

My answer to that question is a conditional "sort of". In my opinion, the Easy PC that I received was simply not ready for the field. Aside from the fact that the early UCI ROM clobbered my hard disk, I had several other problems with the Easy PC. Apparently, there are various other problems that have since been corrected by adding a 68 pf capacitor across pins 20 and 25 of the 8088 on the system board. I won't go into detail about noise, slanted and unreadable letters, and strange keyboard responses (including a keyboard lockup that required a power off). When I called UCI about these problems, the answer for almost everything seemed to be that I should install that 68 pf capacitor.

I will frankly admit that all of these problems have not made a positive impression on me for this review. Although I received quick help on problems when I called UCI, and they were very responsive in getting me a new ROM, the Easy PC that I tested had two problems that I consider to be major: the ROM problem and the capacitor problem.

Aside from that, the Easy PC performance was very good with all of the software tested, but I believe that reliability is more important. While I expect that the Easy PC reliability will be improved, I was not favorably impressed with the one that I received. At this point, I do not feel that I can recommend it to my friends, although I do know a few local people that have installed the Easy PC with no problems. None of them have a hard disk, however.

Since Heath always has a few comments about these products, I have also listed Heath Company information which is included with the Easy PC. Listing 5 is the summary of what the Easy PC will do. Listing 6 is a summary of what the Easy PC will not do.

Other limitations on the Easy PC are basically those imposed by the IBM PC. The most significant is perhaps the lack of support for 8 inch disk drives in the PC mode, although 8" drives are still supported in the Z-100 mode. Since the IBM PC (and Heath/Zenith PC compatibles) do not support 8" or 96 TPI drives, neither does the Easy PC (or the Gemini) in the PC mode. The

Easy PC does support 8 colors as a standard, but it will also support the full 16 IBM colors if the intensity is connected. We will talk about how to do that in a minute.

Listing 5
Heath Notes On What the Easy PC Will Do

The Easy PC Emulator will:

- Run many IBM PC software programs.
- Run IBM PC programs that use ROM BIOS for I/O (input/output) functions.
- Allow full Z-100 operation.
- Run in Z-100s with the 5 MHz system clock or 8 MHz system clock (must be a Heath/Zenith 8 MHz upgrade).
- Support both Z-100 and IBM PC Winchester drive operations.
- Access the 8087 Numeric Co-Processor in both the Z-100 and IBM PC modes using the UCI 8087 Coprocessor Board.
- Support sixteen colors (although your monitor may not have a connection to the intensity pin).
- Give you the ability to run future releases of current PC software.
- Support sound through its own speaker.
- Support UCI's memory board (A modification to the memory board is required. Contact UCI for modification information).
- Support Heath RGB color monitors (A modification to the video master board is required to support IBM RGB monitors. Contact UCI for modification information).

16 Colors On The Easy PC

When I called UCI about the ROM problem, I found out that they have a cable that will implement the intensity feature on the Z-100 with a capable monitor. I ordered it without asking any more questions since it sells for $25. Unfortunately, the cable is set up for a Zenith monitor, and I have a C. Itoh color monitor with a rather strange connector. So I had to return the cable to UCI since it would not work with my monitor.

Fortunately, it is rather easy to make up one of these cables although I recommend that you order the set from UCI if you have a Zenith color monitor which has a DB-25 connector on the back.

The first task is to obtain about 24" of number 20 insulated wire. Install a female socket pin connector on one end, and insert the connector into position 6 of the J9 (RGB) socket on the rear panel of the Z-100. Install a "socket connector" on the other end of the wire which will plug into position 6 of plug P4 for the Easy PC video board. These "socket connectors" are provided with Heathkits that require you to make up wiring harnesses and plugs, so I would guess that they are available at any Heathkit store if you don't have a few left over from previous kits. Then you must make certain that the cable to your monitor is properly connected to support the intensity feature. UCI supplies a completely new cable for this.

My Opinion Of The Easy PC

Although I do know one man who has used an Easy PC with no problems (floppy disk system only), I am not personally convinced that it is currently ready for the field. To their credit, UCI has been extremely responsive to helping with these problems. But that is not sufficient in my mind. I was not sufficiently confident that I knew all of the problems and fixes so that I could install the hard disk with the Easy PC. As a result, I tested nothing using my hard disk with the Easy PC. I simply could not afford to spend any more time on the problems.

UCI has had a good reputation in the Heath/Zenith community, and I suspect that they will get all of these problems fixed in the near future. At this point, however, I do not believe that the Easy PC is reliable enough to support any critical work.

Listing 6
Heath Notes On What the Easy PC Will Not Do

The Easy PC Emulator will not:

- Support IBM PC hardware add-on products.
- Run software that requires the addition of special hardware (network I/O cards and analog joysticks, for example) unless custom drivers are supplied by UCI.
- Co-exist on the Z-100 main board with ZCLK (model PC-240).

Notes:

1. Operation in the IBM PC mode requires the OS-63-50 MS-DOS Operating System (or equivalent) which must be purchased separately. Please note that there are syntax differences between many Z-150 MS-DOS commands and their Z-100 counterparts. Refer to their respective manuals for specific information on these commands.
2. In the PC Mode, if you press the CTRL/ALT/DEL keys simultaneously, your system will auto-boot.
3. In the PC Mode, if you press the CTRL/ALT/INS keys simultaneously, your system will bypass the Main Menu and display the UCI PC prompt.
4. If you press the CTRL/RESET keys simultaneously, your system will reset to the Main Menu.

More On The V20

One of the interesting side effects of upgrading my '100 with the HA-108 upgrade kit was the fact that I began having all kinds of strange problems with CP/M-85. In my checking on that, I found out that there are some differences in the current V20 version which preclude it working satisfactorily under all conditions, namely with the CP/M-85 operating system in this case.

All versions of MS-DOS (Z-100 and Z-150) seem to work satisfactorily except that the Easy PC displays some "dots" (UCI told me that was noise) on the sign-on screen. This is another one of those problems that UCI told me could be corrected by the addition of the 68 pf capacitor on the 8088 socket. In any case, I decided to change back to the 8088 for further testing at 8 megahertz.

One of my technical friends told me that NEC has recognized this problem with the V20 and has corrected it with a new part number. Without getting into a lot of technical details, it appears that the current V20 has a different duty cycle than the 8088. Under some conditions, like running the swap between the 8085 and 8088 CPUs under CP/M-85, the difference in duty cycles can cause some strange problems to occur. I have also heard that similar problems have been found when the current V20 is used on the H/Z-158's when they are operating at 8 Mhz, but I have not verified this.

It was a coincidence that Richard Mueller's article on the NEC V20 appeared in the April issue along with my comments about the V20. The Dallas Heathkit store was swamped with calls which were apparently due to the combination of articles in REMark. In fact, I talked to a couple of HUG members who called in orders to Dallas, because I was in the store getting my H-100 fixed during one of my Easy PC "installation problems".

Upgrading Your H/Z-100

I continue to see published reports of complaints about various problems related to the Gemini and the Easy PC. Virtually all of these reports are the direct result of users not obtaining the HA-108 upgrade kits and performing the specified modifications. One user complained that he was not informed that the "wait state" jumper on the new motherboard had to be moved to the W2 position to run the Gemini satisfactorily at higher clock speeds. Although he called Gemini and found the answer, he still complained about the problem.

It is absolutely critical that, if you expect to run most of the Z-100 hardware add-ons and software, you must read and follow the directions. Both the Gemini and the Easy PC documentation clearly and specifically state that you must have the complete HA-108 modification installed before the emulators are certified to work properly. A rather large number of ICs and other modifications (like the wait state jumper and the new delay unit) are provided with the kit. No vendor, including Heath and Zenith, will guarantee proper operation of your '100 at 8 megahertz unless you have performed the HA-108 modification on the new motherboard. Furthermore, the memory and speed upgrade to the old motherboard in the July 1985 REMark is also not certified to work with either emulator.

Unfortunately, it is also true that the HA-108 upgrade kit is over priced by at least 100%. The current list price is $249.95 which is incredibly high. I suspect that price is at least one reason that some users simply can not justify doing the complete HA-108 upgrade. I wish that whoever establishes some of these prices would come down out of the stratosphere and make some of these things affordable to the user community. It would eliminate any number of problems.

And speaking of the upgrades, there continue to be a number of complaints that both the Gemini and the Easy PC will not run some PC software. From what I have seen, all of these complaints involve games that are copy protected. In addition, all of the complaints that I have seen originate with users who have upgraded the speed of the '100 in one way or another.

Remember that one of the hazards of any speed upgrade to a PC or compatible is that you will NOT be able to run copy protected software that uses the computer clock speed as part of the protection scheme. The standard PC clock speed is 4.77 megahertz which happens to be the same as the older '100's. Although a faster clock speed will give you the benefits of improved performance, you will sacrifice the capability to run some games as the price for that improvement. That applies to the H/Z-100s running at 8 megahertz, as well as the H/Z-158s running at the faster speed.

Oddly enough, it also applies to the Z-200 series since it is about 30% faster than the IBM PC AT even though the identical clock speeds of 6 megahertz are used in both. The reason for the Z-200 performance is that it has no wait states. I have heard that some AT software will not run on the Z-200 simply because the copy protection scheme is apparently affected by the no wait states. I do not know of any specific examples of this problem on the Z-200, but you should be aware of the general problem.

HyperAccess (Hilgraeve, Inc.)

Hilgraeve has developed a special version of HyperAccess that runs on the Easy PC. You may recall that they also have a Gemini version of HyperAccess, too. From what I understand, it is highly likely that any telecommunications software will require program modifications to work properly with the Easy PC or the Gemini. That is one of the hazards of emulation. It is almost impossible to get EVERYTHING to work properly. At the time of this writing, it appears that HyperAccess is the only telecommunications program that has Easy PC and Gemini versions. I also noticed that it just appeared in the Spring/Summer Heathkit catalog, too. Someone at Heath must have read my comments about HyperAccess and tried it. They must have been as impressed as I have been in order to have it in the catalog.

In testing the Easy PC version of HyperAccess, I found that everything seems to run satisfactorily. I had no problems with telecommunications in the Easy PC version. I will caution you that I have installed the 68 pf capacitor on the 8088 socket and am currently running the system with UCI ROM version 1.63.

For those of you who came in late, HyperAccess is absolute dynamite! Aside from having a rather incredible array of features that support local/remote micro/mainframe telecommunications, HyperAccess also has a spectacular disk-based tutorial which introduces you to the features and takes about two hours. If you need a telecommunications program, HyperAccess is the best I have seen.

As I have said before, the basic features of HyperAccess will probably provide all that is required by most people. The advanced features should satisfy even the most discriminating expert.

If you need a telecommunications program, HyperAccess has everything you will need whether you are a novice or an expert. If you order the Z-100 MS-DOS version, you will also receive a modem adapter for the serial port plus a special version which runs on the Gemini in addition to the normal Z-100 MS-DOS version. If you have the IBM PC version, you can obtain a special version for the UCI by sending $10 to Hilgraeve. The bottom line is that HyperAccess is highly recommended.

WINCAD And jr-CAD (Redwood Development)

Since I tested both WINCAD and jr-CAD on the Gemini, it is only fair to check them out on the Easy PC. Both programs worked much faster which is probably due in part to the fact that I am currently running at 8 megahertz, as well as to the performance of the Easy PC.

As I said in the Gemini review, my initial impressions of both programs are very favorable. Both are easy to use, and I ran the demo programs which worked fine. Although I have not used a CAD program on a microcomputer before, it only took about 10 minutes to become familiar enough with the command structure to use the programs. WINCAD is the advanced version of the program which obviously has more features. I became so engrossed in the capability to draw pictures that I had to force myself to stop.

Credits And Thanks To . . .

Special thanks to Heath Company, and particularly Bob Ellerton, for providing an Easy PC board for this review. I also found that

the people at UCI were particularly helpful in providing corrections, a new ROM, and technical information.

The Dallas Heathkit store provided a rather spectacular amount of support for this article owing to several hardware problems that I had. Special thanks to Don Murray (manager) and Chris (technician) for their help.

Hilgraeve, Inc. provided me with a special evaluation copy of HyperAccess for the Easy PC on very short notice so that I could test the telecommunications compatibility of the Easy PC. Special thanks to Matt Gray, President of Hilgraeve, for that support.

Redwood Development also furnished evaluation copies of WINCAD and jr-CAD for Easy PC testing. Special thanks to Phil Winninghoff, President of Redwood Development, for his assistance.

Good News For Zenith

For those of you who have not seen the announcements, Zenith has pulled off several spectacular coups in recent months. The first was that the IRS announced the purchase of 15,000-18,000 Z-171 portables for about 27 million dollars. A few days later, it was announced that Zenith won another military contract for Z-200 computers with an estimated value of 242 million dollars.

The IRS contract was announced despite initial reports that IBM's new portable had won. The initial reports were wrong. Zenith wrapped it up nicely which is probably due to the PC compatibility of the Z-171 as much as anything else. In case you have not had a chance to read some of the news, IBM's new portable is NOT completely PC compatible. I find that is rather incredible! I have had quite a few calls from friends in business who were waiting to see the IBM portable, but have decided to buy the Z-171 instead. IBM's new portable also uses the new 3-1/2" disk drives which also adds to the compatibility problems. Although IBM is big enough to set some standards, I find it difficult to believe that their new portable will be widely accepted. I suspect that this blunder will cause their new portable to have a similar fate as the PCjr.

While I am on the subject of IBM announcements, they have also announced an "enhanced" keyboard for their PC lines. They have changed the keyboard again, but reports indicate that it is even worse than before. It is difficult to understand how a company that developed the widely accepted and "standard" Selectric keyboard could mess it up in their personal computer lines.

The Multiplan 2.0 Controversy

I recently received a letter that one of my readers takes exception to my statement that "Heath and Zenith hardware and software is probably the best you find anywhere at any price period". He cited the problem of obtaining Multiplan version 2.0 from Zenith. In addition, he says that he is "stuck with version 1.2 with no hope of an update without repurchasing this program anew"

My original statement was meant to specifically address the quality of the software that is marketed. It is generally more bug free than original releases from the vendor. If I have a choice, I will always buy tested and proven software since I do not have the time to replace lost data as a result of software bugs. The Lotus 1-2-3 compatibility problem in version 2.0 is a good example of that. Version 2 has some changes that make it less than totally compatible with version 1. As a result, I would have to be convinced that version 2 has significant improvements to warrant my spending the time updating spreadsheets and spending the $150 upgrade fee. Aside from the copy protection problems with Lotus 1-2-3, that is yet another issue.

Of course, this particular individual is NOT "stuck" with version 1.2 with "no hope of an update". That is simply not true. I spoke to a Zenith representative about the problem, and he assures me that they are quite aware of it. And they are working on it, but he was careful to say that there is no decision on the upgrade as yet. Apparently, it is not a simple matter since there are contract implications with Microsoft that must be worked out among other things.

As a personal matter, I have a lot of problems with the Zenith policy of application software updates. Their updates, when they are made available for repackaged software like Multiplan, are significantly behind the vendor release dates. That has been true since some of the Heath/Zenith 8-bit CP/M software was introduced since we could not buy some application software from any other source.

If you think that you NEED a software update, I believe that there is one very important question that you must ask yourself: What new feature(s) are CRITICAL to your use of the software? For most people (including me), the real answer to that question is that they would LIKE to have the latest version, but there is usually no real critical need for any of the new features.

Zenith could do everyone a favor, including themselves, by improving the response time for making their application software updates available to users on a more timely basis. Still, compared to other hardware vendors, they do a very good job. Compared to IBM, Zenith does a spectacular job.

I think that Zenith hit the best answer to the application update problem when they sent out the update notices to Microsoft Word for version 2. The approach was for registered users to send the update fee ($50) direct to Microsoft for the "official" update. I believe that they should use the same idea for updates to ALL of their PC compatible software. That, in my opinion, is the real solution.

Next Month And In The Future

Last in the articles on PC emulation, but certainly not least, is the review of Pat Swayne's rather spectacular ZPC emulator program which will appear next month. I will also talk about my recommendations if you are considering adding some kind of emulation capability to your '100. That includes both the Gemini and the Easy PC. I suspect that my conclusions may be rather surprising in light of our discussions so far.

Questions relating to the Easy PC as discussed in this article will usually require a personal answer, so I will request that you include (as usual) a self-addressed, stamped envelope for a personal reply. If you have any general questions about the Easy PC, your best bet is probably to start with your local Heath/Zenith Computer Center. It is obvious that things will (hopefully) change due to the lead time required to publish this information.

Products Discussed

ACCESS	
H-8, H/Z-89 (CP/M-80)	$ 49.95
Z-100 (MS-DOS, CP/M-85, CP/M-86)	$ 59.95

Z-150/IBM PC (MS-DOS, CP/M-86)	$ 69.95
HyperAccess (all Operating Systems)	$149.95
IBM PC version w/Easy PC version	$159.95

Heath/Zenith Computer Centers
Hilgraeve, Inc.
P.O. Box 941
Monroe, MI 48161
(313) 243-0576

Easy PC Emulator (PC-250)	$699.00
Z-150 MS-DOS (OS-63-31)	$ 90.00

(when purchased with PC-250 only)

Gemini Emulator Board (PC-251)	$599.00
Z-150 MS-DOS (OS-63-31)	$ 90.00

(when purchased with PC-251 only)

MS-DOS Version 2	
Z-100 only (OS-61-8)	$150.00
Z-150 only (OS-63-50)	$150.00
MS-DOS Version 3.1	
Z-100 only (OS-63-30)	$150.00
Z-150 only (OS-63-31)	$150.00
Z-100 CP/M-85 (OS-53-2)	$150.00
Z-100 Concurrent CP/M (OS-61-12)	$150.00
Z-100 CP/M-86 (OS-63-2)	$ 99.00
Concurrent CP/M-86 (OS-61-12)	
Z-100 only	$299.00
HA-108 Upgrade Kit (Z-100 only)	$249.95

Heath/Zenith Computer Centers
Heath Company Parts Department
Hilltop Road
St. Joseph, MI 49085
(616) 982-3571 (HUG Software only)
(800) 253-7057 (Heath Catalog orders only)

Color Cable (Easy PC)	
H/Z Monitors only	$ 25.00

Heath/Zenith Computer Centers
UCI Corporation
948 Cherry Street
Kent, OH 44240
(800) 824-2667 (Outside Ohio)
(216) 673-5155 (In Ohio)

WINCAD (Z-100, Z-150/IBM PC)	$149.95
jr-CAD (Z-150/IBM PC/PC jr.)	$ 49.95

Heath/Zenith Computer Centers
Redwood Development
7 Redwood Drive
Butte, MT 59701
(406) 494-5610

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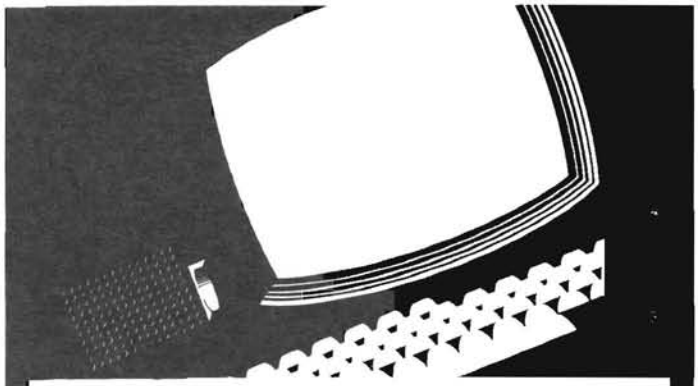


Heath/Zenith Data Systems Software Consultation Information Bulletin Board

(616) 982-3503

This computer bulletin board is normally available 24 hours a day, 7 days a week, all year long except for periodic maintenance and updating. At these times the phone will not be answered.

The bulletin board contains:

- up-to-date source of information
- helpful hints
- Z150 software compatibility list
- sample programs
- product announcements
- answers to common problems
- easy to use procedures
- no passwords
- updated weekly
- information only - no messages

The bulletin board uses:

- Hayes Smartmodem at 1200 and 300 baud
- automatic baud rate selection
- compatible with most modems
- standard 7 bit ASCII characters
- 8 data bits, 1 stop bit and no parity
- for any standard ASCII terminal or
- computer emulating an ASCII terminal

If you have any comments or questions about the bulletin board, please feel free to contact the Software Consultation group at (616) 982-3860 during normal business hours (8:00 am to 7:30 pm Eastern Time Zone). This number is also used to obtain answers for specific questions about operating systems and programming languages software. Questions about applications software should be directed to the consultation group at (616) 982-3884 also during normal business hours.

Heath/Zenith Related Products

Jim Buszkiewicz
HUG Software Developer

A new and updated catalog of Public Domain Software for CP/M personal computers has been published and is now available from Bill Roch, President of Elliam Associates, a personal computer consulting firm. Contents of the new catalog includes information about some 400 public domain disks. The 100 page catalog provides the names of over 8000 programs and files. Listed with each program or file is the volume number, its size, and type, and in most cases, a short description. Source code is provided with the majority of the programs. The catalog describes a number of disks containing dBASE programs, communication software, games, general utilities, and programs for use by CP/M-86 owners. Also, there are a number of languages in public domain such as Small C, Forth, Xlisp, Pistol, Pascal, etc. This public domain software is available from Elliam Associates on 5-1/4" disk in some 75 different formats for both 40 and 80 track disks, as well as on 3-1/2" and 8" disks. The catalog including ordering instructions is available for $7.50 (which includes shipping and handling costs). For further information, contact: Bill Roch, Elliam Associates, 24000 Bessemer Street, Woodland Hills, CA 91367, (818) 348-4278.

A new book is available from Bantam Computer Books, entitled "How To Get The Most Out Of CompuServe". Written by Charles Bowen and David Peyton, this softbound volume covers everything from logging on for the first time to creating your own personal menus. This newer second edition, was written to reflect the many changes and new features CompuServe has added over the past years. Topics covered include: CB, The National Bulletin Board, SIGs, shopping and banking at home, games you can play, and electronic mail. Retrieving computer programs into your own computer is also covered within the 300+ pages. This book lists for $16.95 U.S., and $18.95 in Canada.

The H-8 is not forgotten! H-8, WH8-37 Board available! As you know, Heath had discontinued their WH8-37 board some time ago, and the boards were no longer available. Quikdata has made a one-time limited production run of these boards to sell, mainly since we cannot sell our QUIKSTOR winchester subsystem for the H-8 without this interface board. This is the first major board production we have ever done, and I don't think it will happen again. This board was projected due out late 1985, but because of vendor delays of parts, it just got finished last month.

We now have in stock for delivery (first come, first served basis) the H-8, WH8-37 controller and accessories — and at a lower price than we had earlier projected ($349 for the assembled board). The WH8-37 handles both the 5" soft sector drives at double density (both 48 and 96 TPI, single and double track, up to three drives total), and the SASI winchester interface (can be used both for our Quikstor winchester system, see REMark issue 75, April '86 for review). Note that to use this board, as with any soft sector or winchester controller board, a Z80 CPU is required in the H-8.

We have several configurations available as indicated: If interested, call in your order charging to VISA or MC, or write for an order blank for this product, and order by mail.

WH8-37 BARE BOARD, $75.00
WH8-37 COMPLETE BOARD assembled/tested (note: this is the complete board only — does not include manuals, HDOS test disks, extender cables, or PAM37 ROM), $295.00
34 PIN EXTENDER CABLE to bring floppy cable out of H-8, $20.00
40 PIN EXTENDER to bring winnie cable out of H-8, $20.00
WH837 complete board, ROM, Manuals, HDOS disks, $329.00

Prices include UPS shipping to contiguous 48 states, add $10 additional for 2nd day Federal-X shipping.

Note: IF YOU ORDER THE QUIKSTOR SUBSYSTEM, you can take advantage of some additional savings. You pay the $295 for the board, and we'll throw in all the accessories: Extender cables, ROM, manuals and HDOS diagnostic disks.

Quikdata, Inc., 2618 Penn Circle, Sheboygan, WI 53081, (414) 452-4172.

Make Your LEDs Tell The Truth

Pat Swayne
HUG Software Engineer

The LEDs (Light Emitting Diodes) in the keycaps of the Num Lck and Caps Lock keys on H/Z-100 PC series computers are a good idea, but they do not always show the actual condition of the keypad number keys or the letter keys. That is because the condition of what the keys control can also be controlled by software. If you run a program that wants the keypad to produce numbers, it can set a bit in memory that will cause that to happen, regardless of the condition of the LED on the Num Lck key. The same thing can happen with Caps Lock.

I have written a little program that allows you to alter the condition of Num Lck or Caps Lock without pressing the key, so that the condition agrees with the LED on the key cap. If you type in and run the BASIC program listed below, it will generate the program, called FL.COM. At the end of this article is the assembly source code for FL.COM.

```
10 REM THIS PROGRAM CREATES FL.COM
20 DEFINT A-Z:OPEN "O",1,"FL.COM
30 C!=0:CK! = 9181 'FOR I=1 TO 93
40 READ B:C!=C!+B:PRINT #1,CHR$(B),
50 NEXT I:IF C!<>CK! THEN PRINT "TYPING ERROR!":END
60 CLOSE #1:LOCATE 23,1:PRINT "DONE!":SYSTEM
70 DATA 184,64,0,142,192,190,93,0,252,172
80 DATA 60,32,117,2,205,32,60,67,116,27
90 DATA 60,78,117,246,232,52,0,114,241,116
100 DATA 8,38,128,38,23,0,223,235,29,38
110 DATA 128,14,23,0,32,235,21,232,29,0
120 DATA 114,218,116,8,38,128,38,23,0,191
130 DATA 235,6,38,128,14,23,0,64,129,254
140 DATA 108,0,119,196,190,109,0,235,186,172
150 DATA 60,76,116,6,60,85,117,3,10,192
160 DATA 195,249,195
```

If you see the message "TYPING ERROR!" on the screen when you run this program, do not use the FL.COM produced by it, but find the error and run it again.

To use FL.COM, enter

```
FL <key><state>[,<key><state>]
```

at the system prompt, where <key> is either C for the Caps Lock key or N for the Num Lck key, and <state> is either L for Locked or U for Unlocked. For example, if your Caps Lock LED was lit, and your Num Lck LED was off, you could enter

```
FL CL,NU
```

at the system prompt, and hit Return. That would force capitals lock on and number lock off, so that the indication of the LEDS would be true. If you want to set only one key state, you can leave off the second key state and the separating comma in the FL command line. For example, to turn number lock on, you can enter

```
FL NL
```

If you wish, you can use FL to purposely make the Caps Lock or Num Lck key LEDs disagree with the number or capitals settings, because it always forces the condition you select regardless of whether the LED is lit or not.

Generating .COM Files With BASIC

In the past, whenever we wanted to distribute a machine language program (a .COM file, for example) in REMark, we would just put in the assembly source code for the program. However, you need an assembler to assemble such code, and the days when a free assembler came with every copy of the operating system are gone.

Since nearly everyone with a computer has a BASIC interpreter (GW-BASIC, etc.), we can distribute a machine language program by creating a BASIC program that generates the machine language program when it is run. The BASIC program could be generated by "hand", but errors could sneak in that way, so I wrote a special BASIC program which I call a .COM file generator generator. When you run it, it will input your .COM (or other machine language) file, and generate a BASIC program which, when run, will generate the original .COM file. Below is a listing of the .COM file generator generator.

```
10 ' PROGRAM TO MAKE A COM FILE GENERATOR FROM A COM FILE
20 DEFINT A-Z:DIM B$(1)
30 ON ERROR GOTO 340
40 PRINT:PRINT ".COM FILE GENERATOR GENERATOR"
```

```
50 PRINT:LINE INPUT "ENTER THE  COM FILE NAME: ";FA$
60 OPEN "I",1,FA$:CLOSE
70 PRINT:LINE INPUT "ENTER THE OUTPUT FILE NAME  ";FB$
80 PRINT:LINE INPUT "ENTER NO  OF BYTES PER LINE: ";NB$
90 NB=VAL(NB$):IF NB=0 THEN 80
100 IF NB>40 THEN 80
110 LN!=70:OPEN "R",1,FA$,1
120 OPEN "O",2 "PLINES.TMP"
130 FIELD 1,1 AS BB$
140 L=1:CNT=0:MCNT=0:CK!=0
150 ' CONVERSION LOOP STARTS HERE
160 GET 1,L
170 IF EOF(1) THEN 230
180 IF CNT=0 THEN NUM$=STR$(LN!):GOSUB 360:
    PRINT #2," DATA ";:LN!=LN!+10:
    ELSE PRINT #2,",";
190 A=ASC(BB$)
200 NUM$=STR$(A):GOSUB 360
210 MCNT=MCNT+1.CNT=CNT+1:IF CNT=NB THEN PRINT #2,:CNT=0
220 L=L+1:CK!=CK!+A:GOTO 160
230 IF CNT<>0 THEN PRINT #2
240 CLOSE #1:CLOSE #2:OPEN "I",1,"PLINES.TMP".
    OPEN "O",2,FB$
250 PRINT #2,"10 REM THIS PROGRAM CREATES ";FA$
260 PRINT #2,"20 DEFINT A-Z:OPEN ";CHR$(34);"O";CHR$(34).
    ",1,";CHR$(34);FA$
270 PRINT #2,"30 C!=0:CK! =";CK!,":FOR I=1 TO";MCNT
280 PRINT #2,"40 READ B:C!=C!+B:PRINT #1,CHR$(B);
290 PRINT #2,"50 NEXT I:IF C!<>CK! THEN PRINT ";CHR$(34);
    "TYPING ERROR!";CHR$(34),":END
300 PRINT #2,"60 CLOSE #1:LOCATE 23,1.PRINT ";CHR$(34),
    "DONE!";CHR$(34),":SYSTEM
310 LINE INPUT #1,DL$:PRINT #2,DL$
320 IF EOF(1) THEN 330 ELSE 310
330 CLOSE:KILL "PLINES.TMP":END
340 IF ERR=53 AND ERL=60 THEN PRINT CHR$(7):RESUME 50
350 PRINT "ERROR NO. ";ERR;" IN LINE ";ERL:END
360 LNM=LEN(NUM$):NUM$=RIGHT$(NUM$,LNM-1):
    PRINT #2,NUM$;:RETURN
```

Lines 260, 290, and 300 of the program should be typed all on one line, not broken as shown above. The other broken lines can be left broken if you type Control-Return (line feed) at the break point instead of just Return. When the program asks you to enter the number of bytes per line, it means the maximum number of numbers that will be placed in each DATA statement line in the generated program. While the program runs, it generates a temporary file called PLINES.TMP, which it erases when it is finished. Make sure you do not have a file called PLINES.TMP in your current directory when you run the .COM file generator generator, because it will be erased.

Source code for FL.COM

```
        PAGE    ,132
;       FL (FIXLOCK) -- NUM LCK AND CAPS LOCK FIXER
;
;       THIS PROGRAM ALLOWS YOU TO MAKE THE CONDITION OF
;       NUM LCK AND CAPS LOCK MATCH THE LEDS ON THE KEYCAPS
;
;       TO USE THIS PROGRAM, ENTER
;
;       FL (KEY)(STATE)[,(KEY)(STATE)]
;
;       WHERE (KEY) IS EITHER C FOR THE CAPS LOCK KEY, OR
;       N FOR THE NUM LCK KEY, AND (STATE) IS EITHER L FOR
;       LOCKED, OR U FOR UNLOCKED   EXAMPLE:
;
;       A>FL NL.CU
;
;       ENTER THE ABOVE IF THE NUM LCK LED IS LIGHTED, AND
;       THE CAPS LOCK LED IS OFF   THE PROGRAM WILL FORCE
;       THE NUM LCK STATE TO LOCKED, AND THE CAPS LOCK STATE
;       TO UNLOCKED, TO MATCH THE LEDS.
;
;       BY PATRICK SWAYNE, HUC SOFTWARE ENGINEER  27-MAR-86

CODE    SEGMENT
        ASSUME  CS:CODE,DS:CODE,ES:CODE,SS:CODE
        ORG     17H
KEYFLG  LABEL   BYTE                    ;DEFINE KEY FLAG
        ORG     5CH
FCB     LABEL   BYTE                    ;DEFINE DEFAULT FCB
        ORG     6CH
FCB2    LABEL   BYTE                    ;DEFINE SECOND FCB
        ORG     100H

START:  MOV     AX,40H
        MOV     ES,AX                   ;POINT TO BIOS SEG.
        MOV     SI,OFFSET FCB+1         ;POINT TO USER INPUT
        CLD
GETKLP: LODSB                           ;GET FIRST CHARACTER
        CMP     AL,' '                  ;SPACE?
        JNZ     NOTSP                   ;NO
EXIT:   INT     20H                     ;ELSE, EXIT
NOTSP:  CMP     AL,'C'                  ;CAPS LOCK?
        JZ      CAPS                    ;YES
        CMP     AL,'N'                  ;NUM LCK?
        JNZ     EXIT                    ;NO, BAD ENTRY
        CALL    CHKCHR                  ;CHECK FOR L OR U
        JC      EXIT                    ;BAD ENTRY, EXIT
        JZ      NUMON                   ;IT'S
        AND     ES:KEYFLG,-1-20H        ;TURN NUM LCK OFF
        JMP     SHORT NEXT              ;GET NEXT ENTRY
NUMON:  OR      ES:KEYFLG,20H           ;TURN NUM LCK ON
        JMP     SHORT NEXT
CAPS:   CALL    CHKCHR                  ;CHECK FOR L OR U
        JC      EXIT
        JZ      CAPON                   ;IT'S L
        AND     ES:KEYFLG,-1-40H        ;TURN CAPS LOCK OFF
        JMP     SHORT NEXT
CAPON.  OR      ES:KEYFLG,40H           ;TURN CAPS LOCK ON
NEXT:   CMP     SI,OFFSET FCB2          ;DONE BOTH FCB'S?
        JA      EXIT                    ;IF SO, EXIT
        MOV     SI,OFFSET FCB2+1        ;POINT TO NEXT FCB
        JMP     GETKLP                  ;CHECK IT

CHKCHR: LODSB                           ;GET NEXT KEY
        CMP     AL,'L'                  ;IS IT L?
        JZ      CHKX                    ;YES
        CMP     AL,'U'                  ;IS IT U?
        JNZ     BADKEY                  ;NO
        OR      AL,AL                   ;SET NZ
CHKX    RET
BADKEY  STC                             ;SET CARRY FLAG
        RET

CODE    ENDS
        END     START
```

STOP, LOOK, And Especially LISTEN

Jim Buszkiewicz
HUG Software Developer

With the fifth annual HUG Conference rapidly approaching, and with over 600 pre-registered huggies, I thought it might be interesting, as well as helpful to give you some idea of what types of talks will be given this year.

At some point in time, we all had our starting point with computers, and I'm sure a lot of our attendees this year will be beginners. For those users we have two different types of talks scheduled, "Introduction to Computers," and "Introduction to Computers for the Completely Intimidated". Both seminars will address the hardware and software, but will be given from two different points of view.

Since they were so well received last year, this year we plan to have three different workshops: Software, Hardware (H8/H89/H100), and Hardware (PC). In these workshops you are given the opportunity to submit ANY related questions or problems to the moderator. These questions should be written down on a supplied question form before the session. During the seminar, your questions will be addressed, and hopefully answered either by the moderator or by someone from the audience. These workshops usually turn out to be very informative 'bull' sessions!

Addressing Heath/Zenith's newest line of computers will be a talk on the H/Z-200 monitor ROM. Also, aimed at the 'AT' will be a seminar on the XENIX operating system.

For our more advanced programmers, we plan to have the following talks: 1) An Introduction to LISP, 2) Device Drivers, TSR Routines, and Device Configuration, 3) Advanced Programming Concepts In 'C', 4) MSDOS Version 3 for the Z-100 and Z-100 PC.

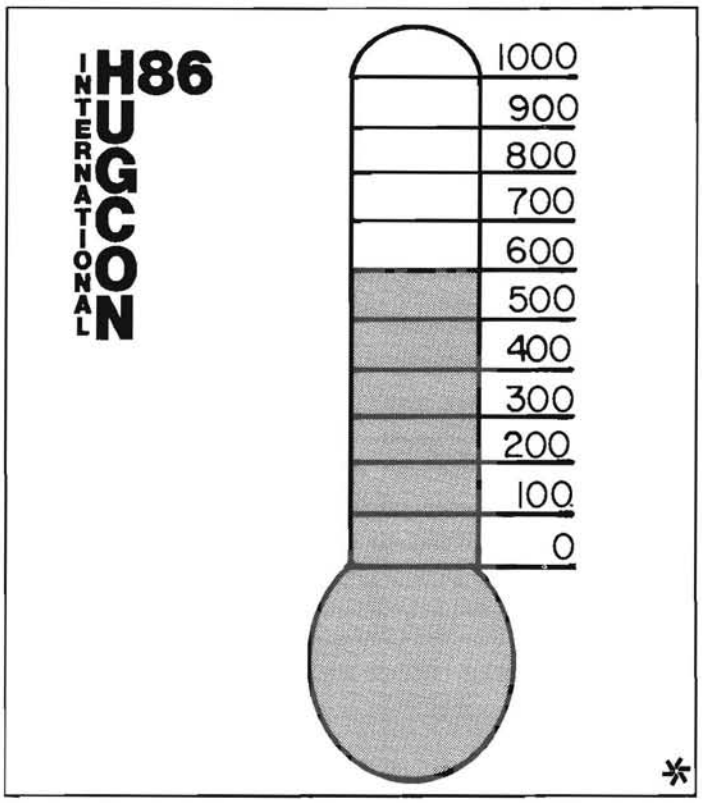
We also plan to have speakers from several software companies speaking about their particular products. The companies represented thus far are: Hilgraeve, Condor, and Zeducorp. Hilgraeve, as you know, markets a very popular communications package, called HYPERACCESS. The speaker from Condor will be discussing new concepts in database systems. The Zeducorp representative will be presenting an "Introduction to Local Area Networks".

Since business computing is very important to a large part of our user base, we have scheduled talks on Desktop Publishing, Using Computer Aided Design Software, and Business Graphics for the Z-100.

Just recently, Heath introduced the high technology HERO 2000 educational robot. To give all of us a first-hand look at how this new machine works, plays, and whatever else it can do, will be an engineering representative from Heath's Educational Department. Also, from the education department will be someone to talk about Heath's line of computer instrumentation, and upcoming products in the educational field.

Finally, we will have two different 'insight' talks. One will be on all the different undocumented 'secrets' of the Heath/Zenith PC computer systems. Realizing that it's difficult to buy software simply by reading a description of the product, the other talk will be an audio-visual look at the more popular pieces of HUG software.

So, as the title suggests, this August 15th, 16th, and 17th, STOP in at the Fifth Annual HUG Conference at the O'Hare Hyatt Regency Hotel in Chicago. LOOK at all of the old and new products being offered at the various vendors' booths. Finally, and most importantly, LISTEN to the variety of seminars and talks being given. If you come and walk away with one small piece of knowledge from these talks, it will have all been worth it!



INTERNATIONAL HUGCON H86

Heath/Zenith Users' Group • Hilltop Road • St. Joseph, Michigan 49085 • (616) 982-3463

INTERNATIONAL HEATH/ZENITH USERS' GROUP CONFERENCE

Official Conference Registration Form

O'Hare Hyatt Regency
Rosemont, Illinois
August 15, 16, 17, 1986

Name(s): _____

_____

_____

Company: _____

Address: _____

City: _____ **State:** _____ **Zip:** _____

Enclosed is $25.00 for each of the individuals listed above to attend the International HUG Conference being held the weekend of August 15, 16, and 17, 1986. Please send tickets along with information regarding hotel reservations and transportation.

Amt. Enclosed: _____ No. Attending: _____

For Our Information:

Which Heath/Zenith computer do you now operate? _____

Are you a Non-User-Attendee?	Yes	No
Are you a computer related manufacturer?	Yes	No
If yes, would you like exhibit information?	Yes	No
Are you, or anyone in your party, interested in activities in or around the Chicago area other than the Conference?	Yes	No

If yes, please indicate any suggestions you may have:

_____

Special Notice To Exhibitors:

Exhibitor Information Packages are available on request from the Heath/Zenith Users' Group. Those of you interested in exhibiting your products should contact us as early as possible to ensure a position at this year's event.

For Your Information:

The $25.00 you are paying for your reservation to the International HUG Conference entitles you to all functions of the Conference. Visitor tickets, for those of you simply attending the seminars and exhibits, are available for $10.00. Visitor tickets do not include eligibility for prizes or food while attending the Conference.

Please send your completed registration form or suitable copy to:

Heath/Zenith Users' Group
Attention: International HUG Conference Registration
Hilltop Road
St. Joseph, Michigan 49085

Registration(s) must be post marked no later than July 31, 1986. Cancellation will not be accepted after this date. Sorry, We cannot accept purchase orders

Continued from Page 10

support C.ITOH dot matrix printers. But now with this conversion program it is not hard to make your own, incorporating most if not all the features.

By converting one or more of the supporting printer drivers into text format, and using the documentation supplied with the utility it is not too hard to figure out how to modify one for your own printer. The only problem I have had is understanding how they are enabling the subscript and superscript features. It would help also to have a list of the Epson control codes for reference, but not absolutely necessary.

I suggest that any Z-150 owners still using WORD, version 1.10 get the new version 2.0 as it is well worth the money, and for Prowriter owners it's a must. There have been a number of reviews of it in the various computer magazines and all have been favorable. As an alternative, contact Microsoft and see about obtaining the utility program alone. It is named Convprd.exe. That will take care of using your printer with WORD, but if you want to use the special printer features with other programs (Lotus 123 and PC-PG especially), I suggest you order the C.ITOH PC Utilities. You will have to go through a dealer for it as C.ITOH doesn't sell it directly. One caution about this program, you will have to use the Mode.com (if your printer is serial interface instead of parallel) from IBM PC-DOS instead of the Mode.com from your MS-DOS. For some reason the MS-DOS Mode.com will not work with this program and it will not "see" your printer. The C.ITOH PC Utilities retails for about $55 and can probably be purchased for a little less at a discount mail order house, but it was not "in stock" at most when I ordered mine. C.ITOH also has a brochure describing the program and it's various utilities if you want to check it out before purchasing. We had to spend a lot of time talking to the programmerthat wrote the utilities to resolve the incompatibility we had with our Z-150. We discovered by accident that the Mode.com program was at fault.

There's times when we have wondered if this printer is worth the hassle we've had with interfacing it, but it is certainly built well mechanically and has many features for the price that are lacking in some of the others.

I hope this information will help any members who haven't already given up in frustration and if any have questions they are welcome to write. I would like to compare notes on modified printer drivers. By the way, my husband and I are both Ham Radio operators, my call sign being WA0CSL, and his is WA0CSK. There must be many other HUG members who decided to buy "Ham" gear. I think it would be informative if more "Ham" contributors to REMark would include their call signs.

Best Regards,

Mary Carlson
Rt. 2, Box 47
Hatton, ND 58240

All He Gets Is Garbage

Dear HUG:

Let me begin by praising ZDS for the Z-150 PC family and their support of 'compatibility' with the over-rated IBM PC. I also enjoy the REMark magazine and HUG benefits.

A letter in the November issue of REMark is prompting me to write concerning the support by ZDS of the C.ITOH Prowriter. I have no problem controlling text through my BASIC programs, but when I run a graphics program, all I can get to print is garbage.

I would appreciate any help from ZDS or fellow HUG members.

Sincerely,

Stephen Booth
P.O. Box 2916
Durham, NC 27705

Makes-Life-Easy Department

Recently saw a request for a source of anti-glare screens for H/Z computers in REMark. If you want to spend BIG BUCKS, buy from catalog houses, such as NEBS or Black Box. But if you're like me (limited funds), get a black fabric filter from Radio Shack for around $16! Heather, my H-89 has one, and we both like it very much. It has a reusable adhesive backing which permits sticking it onto your console front, completely covering the CRT opening. Any time the filter gets dusty, use its accompanying anti-static cleaning cloth. To clean the CRT face, carefully peel the filter off, clean CRT and re-stick filter. The adhesive is said to have a very long life, about 100 cycles, if you are careful and don't contaminate it during removal and reinstallation. It's as good as a polarizing filter, much less costly, makes your computer look "professional", and reduces eye strain greatly. Diagonally measures 13 inches, which is adequate for most H/Z 10 to 13 inch terminals, including my H/Z Color Monitor (a stretch fit!) . . .

Trivia Van

Trivia Van (2.0) is a game program that was written to be very user friendly. The program is almost entirely menu-driven. The user is able to select any option by only one or two keystrokes. The options selectable from the Main Menu include: (1) Provide Directions, (2) ONE Player Game, (3) TWO Player Game, and (4) Exit to Operating System. A special program is also on the disk to allow the user to create and read question files or the user can use his word processor to create the question files.

Trivia Van will display the following Trivia Categories from the Choice Menu: (1) TV/Movies/Radio, (2) Arts/Sciences/Crafts, (3) Foods/Farming/Cooking, (4) Military/History, (5) Sea/Sky/Space, (6) Geography/Nature, (7) Sports, (8) Miscellaneous, and (9) Quit. Question Group 1, consisting of 50 questions in each category (400 questions) is provided with the basic game. The Choice Menu will also allow question selection from Question Groups 2 and 3 (made or purchased separately). Error checking is provided to assist the user to prevent an improper response.

Trivia Van is a compiled program designed to run on Heath/Zenith computers capable of running the CP/M-80, CP/M-85, MS-DOS, or ZDOS operating systems. This includes the H-8, H/Z-89, Z-90, and H/Z-100. An HDOS version is available, but is not compiled and requires Microsoft BASIC.

Trivia Van (2.0) is available from: ADC Computer Products, 10784 Magnolia Avenue, Nr. 2H, Santee, CA 92071, (619) 449-7298, for $25.00 plus $2.00 for shipping and handling. Formats include: 5-1/4" SSSD, 10 Sector, Hard-Sector (for CP/M-80 and HDOS) and 5-1/4" SSDD, Soft-Sector (for CP/M-80, CP/M-85, MS-DOS, and ZDOS) diskettes. Indicate disk format and operating system. Registered owners of version 1.0 can get an update for $11.00 by sending in their original distribution disk.

I Love My H-8

Dear HUG:

I have noticed over the past many months that articles and advertisements pertaining to H-8 and H-89 computer systems have rapidly dwindled. I know that the "in" thing in 1985 and 1986 is to purchase a Z-dash (Z-100, Z-151, etc.) system. I know that an awful lot of old-time Heath users have traded their H-8, H-89 and H-11 systems for the new Z-dash systems; yet I can't believe that they all just tossed their H-8/H-89 systems into the trash can. There has to be plenty of users across the nation that either have the H-8/H-89 they purchased new or have bought H-8/H-89s second hand (from one of the new Z-dash users).

With Trionyx Electronics in Southern California, I have upgraded my H-8 system with a Z-80 CPU, 64k board (which is expandable to 256k), a side fan panel, and a universal driver that is currently driving my two 5.25 soft-sectored drives. This board can control practically any type of disk drive. I will eventually be getting a hard disk to add on to it. SigmaSoft and Systems in Texas have made a beautiful interactive graphics/pseudo-disk/spooler that can go into either an H-89 or an H-8 w/Z-19. By adding this board to my H-8/Z-19 system, I have expanded the H-8 to a level I had never dreamed of before. And these two companies, Trionyx Electronics and SigmaSoft and Systems, have only just begun. I might also add that they give their customers support well beyond the hardware and the software which supports it. I have called and talked to the people at both companies numerous times and received prompt and detailed answers to my questions and suggestions.

I love my H-8. I am running both soft-sectored drives and hard-sectored drives on it. I have a Z-19 terminal with the SigmaSoft and Systems IG/PD/SP board and an EPSON MX-80. I can run both HDOS and CP/M software on this fine machine. I prefer HDOS and have just heard that HDOS 3.0 has been developed. I can't describe to you how excited I am about that.

Please, HUG, don't write us H-8/H-89 users off. I am sure that there are a lot of us out there. If you print this in the Buggin' HUG column, make sure that you include my name and address so that other H-8 users can get in touch with me.

Sincerely yours,

Phillip Marlan McCrum
35 Rogers Court
Brea, CA 92621

April Issue Of REMark

Dear HUG.

Congratulations on the April issue of REMark. This was an outstandingly useful issue! I am a Z-100 owner and I have been following the ZPC series. ZHS is the greatest. I had it built and running in a few hours, and was running an unprotected copy of 1-2-3 within a week! The articles on V-20 were really helpful, too.

A few comments:

1. The 'street price' of 8 MHz V-20s in Silicon Valley is $18.00, quantity 1. I ran out and got one, and I find a 10% improvement on real 1-2-3 applications. Some things, like the memory test in the monitor, run as much as 25% faster.

2. The source listing of KEYINT.ASM given in the ZHS article will not run through EXE2BIN as written, the Stack declaration must be removed. Once this is done, everything works. The reason is that EXE2BIN only works within a single segment and the stack is assigned automatically. Also, the output BIN file must be renamed KEYINT.COM.

3. I found a few compatibility problems running 1-2-3:

   - The cursor stays in the upper left of the control panel when in EDIT and doesn't follow the cursor position, which works otherwise.
   - When loading very large WKS files, garbage appears on the screen, this goes away, except around the borders when loading is completed. Everything works until a CALC is done, at which point it blows up altogether.
   -Screen graphics don't work with the standard Lotus graphics adapter driver.

Let's hear more about ZHS and ZPC2, keep up the good work.

Sincerely,

Seth Neumann
2712 Katrina Way
Mountain View, CA 94040

The H/Z-110/120 Increased Memory

Dear HUG:

The increase in memory from 192K to 768K in the H/Z-110/120 computers provides an opportunity to increase the size of the virtual disk created by the MSDOS Version 2 MDISK.DVD file to something more practical than 64K.

This can be done by changing only a few bytes in this file, using DEBUG, starting at address 011A. Type DEBUG MDISK.DVD and return. At the - cursor, type E0118 and again return. This address location is used for convenience so you can look at a few of the bytes ahead of the actual addresses being changed. Use the spacebar to "print" out the hex values for each location until you print out the first hex value you want to change. In this case, it will be hex 011A which will show a value of 10. At that point, type 80 right after the period and then space to the next value which is "00". This one doesn't need changing. Space again and make changes as listed below.

```
1CB7:0118  00   01   10.80  00   80.00  00.02  FF.  0C.03
```

After the changes are made, (i.e., after the hex 03 entry is made) press return. At the - cursor, type a W and return. This will write the patch to file. Then, type a Q to return to the operating system.

A CONFIG.SYS file must be made using EDLIN or a non-document form of word processing incorporating a statement, DEVICE = MDISK.DVD SIZE = 256. Both the CONFIG.SYS and modified MDISK.DVD must be copied over to your "boot" disk. Reboot to load the two files into memory. Type an I: to assure that the virtual disk is there. CHKDSK will display its size. The 256K virtual disk made with this patch has been used without problems by many Austin/San Antonio HUG users for almost a

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Part Number	Description of Product	Selling Price	Vol. Issue
DATA BASE MANAGEMENT SYSTEMS			
HDOS			
885-1107-[37]	HDOS Data Base System H8/H89	30.00	23
885-1108-[37]	HDOS MBASIC Data Base Sys.	30.00	23
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885-6008-37	MSDOS NAVPROG	20.00	73
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885-8020-[37]	CP/M RF Comp. Aided Design	30.00	44
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HDOS			
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CP/M			
885-1207-[37]	CP/M TERM & HTOC	20.00	26
885-1224-[37]	CP/M MicroNET Connection	16.00	37
885-3003-[37]	CP/M ZTERM (Z100 Modem Pkg)	20.00	34
885-5004-37	CP/M-86 TERM86 and DSKED	20.00	56
885-5005-37	CP/M-86 16 Bit MicroNET Conn.	16.00	61
885-5006-37	CP/M-86 HUGPBBS	40.00	62
885-5007-37	CP/M-86 HUGPBBS Source List.	60.00	62
885-8012-[37]	CP/M MAPLE (Modem Program)	35.00	34
885-8023-37	CP/M-85 MAPLE	35.00	45
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885-3019-37	ZDOS 16 Bit MicroNET Connect.	16.00	61
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885-4500	HUG Software Catalog	9.75	
885-4501	HUG Software Catalog Update #1	9.75	
885-4600	Watzman/HUG ROM	45.00	41
885-4700	HUG Bulletin Board Handbook	5.00	50
885-3015-37	ZDOS Skyviews	20.00	55

NOTE: The [-37] means the product is available in hard sector or soft sector. Remember, when ordering the soft sectored format, you must include the "-37" after the part number; e.g. 885-1223-37. *

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year without difficulty and is considerably simpler to construct than the ones in John Stetson's article in the August 85 CHUG and other articles I have seen.

Best Regards,

Bill Millis
2502 Barkwood Drive
Austin, TX 78748

Upgrading H/Z-89 Problem

Dear HUG:

I recently ordered a new set of Canon FDD211 48 tpi half-height drives to replace the old single drive in my machine.

After studying the interface connector, I discovered that pin out 6 is drive select 4 rather than drive select 0 as found in the Siemens drives. I also found I needed to jumper the drive motor to run continuously in order for the H/Z soft-sector diagnostic disk to access the correct drive select. After doing the above, the new drives seemed to work well until I tried running Configur routine. What appears to happen is that the disk directory is destroyed and all I get when accessing the drive is a BDOS error.

If anyone has any ideas on how to get these Canon drives to work, I could use any suggestions they might have.

Jesse T. Lee
P.O. Box 851
Bangor, ME 04401-0851

*

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