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SUPER SPREADSHEET ISSUE -- INCOME TAX 1984, PAGE 7

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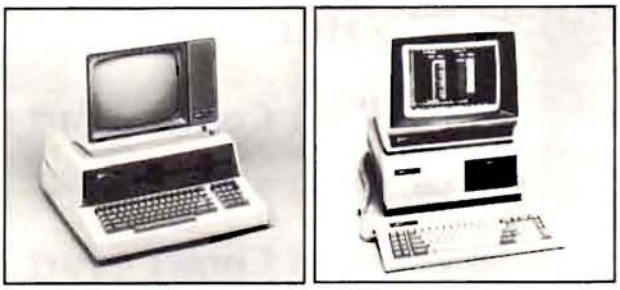

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On The Cover: *ALOHA! from Hawaii in February . . . Don't we wish!? But, an H89 on the beach . . . come on!!*

BUGGIN' HUG

Speed-Up And Slow-Down

Dear Mr. Gillespie:

Ever since I purchased my Magnolia Microsystems Controller card and 8 inch drives to add to my H-89 system, I've both cursed and blessed them. I'd previously purchased the Najay Speed Module which allows the computer to run at both 2 and 4 MHz, but there is no way to patch Magnolia (that I know of) to allow for this. For a long time I believed that this would turn out to be money that I'd thrown out, until I started playing with my Turbo Pascal.

Turbo Pascal allows you to manipulate data bytes in virtually any situation via the INLINE command. This lets you write a "machine language subroutine" and include it almost anywhere in the program. I'd like to share two routines here that:

1. Switches to 4 MHz and

```
PROCEDURE Speed_up;
BEGIN
  INLINE ($3A/$0D/$00/$F6/$10/$32/$0D/$00/$D3/$F2);
END;
```

2. Switches to 2 MHz.

```
PROCEDURE Slow_down;
BEGIN
INLINE ($3A/$0D/$00/$E6/$EF/$32/$0D/$00/$D3/$F2);
END;
```

I've tested the procedure in a short program that just calls each one singly and then runs a 1 to 30000 timing loop. The difference, as one would expect, is rather dramatic.

If anyone has the Najay Speed Module, they'll have to preface ANY disk access to either the H-17 or 8 inch drives with the Slow-down procedure. (The H-37 drives run at 4 MHz). This includes, of course, any data files and program reads or overlay reads. It's the nature of these drives to crash the program if they are "read" or "written to" at the wrong "speed."

Yes, your disk access is still slower, but your computational speed can be back up to "double time" when you call Speed-up. I hope that this helps other members of the group.

Sincerely,

Paul L. Eustace
Vice President - Editor
North Houston HUG
8110 Tattershall Circle
Humble, TX 77338

Modification To LPH44.ASM To Pause At End Of Page

Dear HUG,

It is really a simple matter to adapt the Heath drivers to sheet-fed printers. All that is needed is a routine to make the driver look for a character from the terminal whenever it is time for a new page.

The LPH44 driver maintains a line-count, and the lines/page can be set, so we don't have any trouble there--when the line-count goes over the allowed lines/page, the driver sends a form-feed (FF) character to the printer. This is done in the output routine DBOUT (actually at label DBO10).

Now, the output routine also watches for FF characters and when it gets one it resets the line and column counters before it sends the FF to the printer. All we have to do is add code here to make the system wait for a character to be typed on the terminal before proceeding. Probably it would be good if it also beeped or said something. This approach means we can also deal with programs (like ASM) which do their own line count and put in FF's as needed.

The routine DBOUT in the LPH44 driver is pretty hard to follow, mostly because it calls itself often, but a little patience will get results. The major change I made is at label DBO4 (actually 5 lines after) where after the line "MVI A,FF" I replaced "JMP DBO." with the following:

```
CALL    DBO.        send the FF
SCALL   .CLRCO      clear console of anything there already
CALL    GETCHR      wait for a character
RET
```

GETCHR is just a loop which looks for a character using the .SCIN SCALL and which only returns if a character is hit (or with CY set if Control-C or something like that).

```
GETCHR  SCALL    .SCIN      look for a char. from terminal
        RNC                 got one
        CALL     CFA        check for Ctrl-C or whatever
        STC                 assume Ctrl-C hit
        RNZ                 return if it was
        JMP      CETCHR     try again for a character
```

There is nothing very complicated about this, and it is out of the area of the driver where size is critical, so all that is necessary is to make the modifications with an editor and reassemble.

Michael Porter
Boatbuilder
Chebeague Island, ME 04017

Experience With 8087 Numeric Data Processor

Dear HUG,

I wanted to report on my experience with using an 8087 Numeric Data Processor with my Z100 computer. I purchased an 8087 board made specifically for the Z100 by Hudson & Associates, PO Box 2957, Santa Clara, CA 95055. The version of the board that I got contained 256K of memory besides the 8087 chip.

I am planning to do some complex graphics programming using the excellent video facilities of the Z100 computer. The graphics work that I am doing involves many floating point operations and the 8087 coprocessor is ideal for that. The extra memory on the board, when added to the 192K that my Z100 already had, gave me a total capacity of 448K, an unbelievable amount. I really never expect to run programs that require that much, but the main advantage of such a large amount of memory for me is that I can now use one of the inexpensive ramdisk programs that are available. Anyone who has ever used a ramdisk never wants to give it up because of its incredible speed and ease of operation. (Just don't forget to save your work!)

So far, I am very happy with the performance of the 8087. I am using

Vectored to 65 ☞

SPREADSHEET Corner

Part 6

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

Introduction

I stated in the last "SPREADSHEET Corner" that I would do a third assignment before starting the first Spreadsheet Project -- Federal Income Tax Return. I felt that some details and experience with the IF and the LOOKUP functions and a practice template would make this Project easier to understand. However, Congress has made a large number of changes in the tax laws that will take effect with the 1984 Tax Return Forms. This means that the 1984 Forms will not be available for months. Therefore, I decided that I would change my scheduled plan for SPREADSHEET Corner! I will start the Income Tax Return Project this month using the 1983 tax forms. Using the 1983 forms will provide the lead time required to write and publish this article. I will do a follow-up set of articles to cover the 1984 Tax Law changes. This will be beneficial, because it will provide a learning experience of how to update your templates for 1984 and future years. It seems that Congress makes enough changes every year in the laws and/or rates to require the Forms to be different!

Discussion

A spreadsheet model is an ideal tool to analyze and calculate the Federal Income Tax Forms. A template is prepared for each form to make future changes easier. Some readers will need more and different forms to complete their tax return than others. If it were not for the memory limitation problem, we could include all of the various forms and there are a lot of them! I will do a few of the ones most used and hopefully this will show you how to create any other that you might need for your tax return. The use of spreadsheet templates offers many useful features for studying various tax situations throughout your tax year. For example, if you had an investment opportunity that would change your total income and/or deductions, the templates could be used as a "WHAT-IF" and immediately calculate your tax before and after the proposed investment so that you could see the complete effect! This could help you make the right decision.

NOTE: SPREADSHEET Corner Warning --

These Income Tax templates are to help you understand the tax forms and the tax laws, BUT they are not to be used to replace TAX CONSULTATION!! Neither the author or HUG accepts any responsibility for the correctness or accuracy of the results produced by the tax templates in this article or the following articles concerning Income Tax Returns!! YOUR TAX PREPARER SHOULD be your only advisor!!

This is a fairly complex project; but to keep it from getting too complicated, I will break it down into separate individual problems. This breakdown falls into natural modules -- the 1040 forms. Of course, I will use our old standby -- SPREADSHEET Preparation Forms! It will be necessary to prepare a separate SPREADSHEET Preparation Form for each of the 1040 forms that will be included in this article. This project should really convince you readers that they are the major design tool for the model creation!

There are several ways to design the tax templates. I am going to choose the method that will require a minimum of new spreadsheet commands and functions. We will need to study Logical Operators, the IF and the LOOKUP functions. Do not let these scare you! I will use them in the project so that you will hardly notice them and will learn them by using them over-and-over! I will use these functions to automatically calculate taxes, deductions, exclusions and other related items. If Uncle Sam thinks that you should be able to do your own tax return, I should be able to show you and have you understand what you are doing.

Again, as I have stated in previous articles, spreadsheet models use a LOT OF RAM (working memory)! The number of 1040 Tax Forms that you will be able to include in your project will be determined by the amount of working memory that you have to work with. Also, not every reader has tax returns that are complicated enough to require many of the various forms. I hope that when you are working with this project that you will learn how easy it is to add or eliminate the forms and data that you need for your particular return. In future articles, I will show you methods that can be used to "spread" the work into separate files (templates) that will work together. For example, the use of a Database Program to store your tax return data from year to year!

Before I start the SPREADSHEET Preparation Forms, I want to spend some time on the "new" items we will be using for this project!

Logical Operators and Logical Formulas

The formulas I have used in previous SPREADSHEET Corner articles have been simple arithmetic type. They combined numbers using arithmetic operators, and produced numerical answers. Now, I will use another type of formula in which num-

bers will be combined into a statement that is either TRUE or FALSE. These formulas are called "logical formulas" or "conditions." (You will find that I will use conditions the most.) The operators that combine these numbers are called "logical operators." Here are some examples:

1) GROSS=5000 -- The value in cell named "GROSS" is 5000?
2) PROFIT<=12 -- The value in cell named "PROFIT" is less than or equal to 12?
3) 1STQ<>2NDQ -- The "1STQ" value does not equal "2NDQ" value?

Each of the above "conditions" has a TRUE/FALSE value. I hope that you can see what I mean by TRUE and FALSE. You MUST know what they mean to the spreadsheet program:

1) If statement is TRUE, it has a value of 1. Conversely any non-zero number is equivalent to TRUE.
2) If statement is FALSE, it has a value of 0.

I know that this sounds complicated to some of you readers and you do not really need to know this -- it will be sufficient to think in terms of TRUE/FALSE! Do not forget that these logical values are really numbers to your spreadsheet program and computer!

There are some other logical operators that we will not use in this article, but I will tell you what they are and what they do. They allow us to build up "compound conditions" using the following logical operators:

1) NOT -- logical NOT.
2) AND -- logical AND.
3) OR -- logical OR.

For example, we may have several conditions that apply at once:

1) Select records whose Zip Code is either 91307 OR 91308.
2) Select records whose Phone Prefix is either 213 OR 819.
3) Select records whose Balance is greater than 500 AND are more than 90 days overdue.

When using operators, YOU MUST know their PRECEDENCE NUMBER! Does that worry you? It means which operation will the computer do first in the formula. Refer to Table 1 and then I will give you some examples:

Operator	Meaning	Precedence
^	Exponentiation	6
*	Multiplication	5
/	Division	5
+	Addition	4
-	Subtraction	4
=	Equal	3
<	Less Than	3
<=	Less Than or Equal	3
>	Greater Than	3
>=	Greater Than or Equal	3
<>	Not Equal	3
NOT	Logical NOT	2
AND	Logical AND	2
OR	Logical OR	1

TABLE 1
Operator Precedence Number

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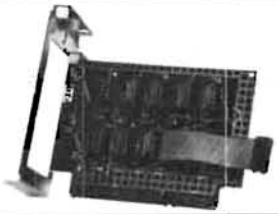

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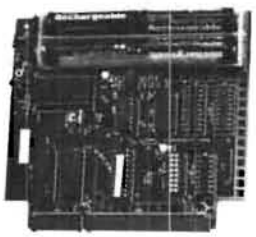

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The highest precedence operator is always handled first by the computer (one exception that I will explain in a moment) and if the precedence numbers are the same, they are used from left to right. Here are a few examples:

1) +1*2+4/2+2=?
Step #1--1*2=2
Step #2--4/2=2
Step #3--2+2=4
Step #4--4+2=6 (result)----Did you get this?

2) +2*(2+4)/(2+2)=?
Step #1--(2+4)=6
Step #2--(2+2)=4
Step #3--2*6=12
Step #4--12/4=3 (result)----How did you do?
[THE EXCEPTION:--"(▲)" have the highest precedence!!]

3) @IF(2+3>6,TRUE,FALSE)
Step #1--2+3=5
Step #2--5 is not greater than 6
Step #3--Result is FALSE (I will explain IF function soon)

4) @IF(2+3>2+2,TRUE,FALSE)
Step #1--2+3=5
Step #2--2+2=4
Step #3--5 is greater than 4
Step #4--Result is TRUE

You WILL find that you must WATCH the Operator Precedence Number when you are working with "logical formulas" or "conditions" in this project. I will point out some of the places as we proceed.

Functions

Nearly all spreadsheet programs make use of "functions!" Think of "functions" as built-in formulas. Like formulas, a function has a numeric or logical value. This value usually depends on its "arguments":

1) Numbers.
2) Cell or Range References.
3) Other functions.

You use functions by typing the function name, followed by its arguments, if any. Some spreadsheet programs require a "prefix" -- LOTUS 1-2-3 always begins a function with an "@" sign. The arguments follow the name in parentheses, separated by commas:

```
@function(arg1,arg2,...,argN)
```

Depending on the function, the argument can be either a single value or a range:

If Function Requires:
Single Value

Allowable Arguments:
Number
Cell-addr
Function
One-cell Range Name
Formula

If Function Requires:
Range

Allowable Arguments:
Cell addr..Cell addr
Range Name

For a function to work, there MUST be the correct number of arguments, in the correct ORDER, and of the correct TYPE, either a single value or a range! You can specify a number in a formula/function directly, by typing its digits (16.82) or you can specify a number indirectly using a cell address (AA62) or range name (SALES). When you use a cell address or a range name, you are telling the spreadsheet program to go to this cell (AA62), get the number stored there, and put it in the formula/function. Range name is treated in a similar way.

What do functions look like? In a way, a function is a formula within a formula. Functions are very powerful tools. Their greater sophistication means greater possibility for confusion. So, be careful when using them! Here are a couple examples of LOTUS 1-2-3 functions (other programs have similar ones):

1) @SUM(A1..A10)
2) @AVG(A1,A2,A3,A4,A5)

Note the following facts about functions:

1) Each function has a name. (1-2-3 requires the "@").
2) The arguments follow the function name enclosed in parentheses and the individual arguments are separated by commas.
3) Some functions have the arguments expressed as a "range" and some as a "list," as shown above.

A function can be used anywhere that you could use a formula or a number. Also, functions can be used within a function. DO NOT combine functions to the point that the resulting function is so complex that you cannot remember what you were trying to do if you come back to your work in a month or so. Break them down!

IF and LOOKUP Functions

First, let's examine the LOTUS 1-2-3 versions of these functions:

1) `@IF(a,vtrue,vfalse)`

This function tests the first argument "a" for non-zero (TRUE) or zero (FALSE). The value of the function will be "vtrue" if "a" is TRUE, "vfalse" if "a" is FALSE.

2) `@VLOOKUP(x,range,offset)`

The "@VLOOKUP" function performs a Vertical Table Lookup where the comparison values are in the first column of the "range." These comparison values MUST be in increasing order, with no duplicates. The result of the function is determined by locating the first cell in the range which exceeds the test value "x." If this is the first cell in the range, the result is ERR. Otherwise, the result is the value of a cell to the right of the comparison value in the range. The third argument, "offset," determines how many columns to the right of the comparison column to look. If the value of offset is negative, or is greater than or equal to the number of columns in the range, the result is ERR. Here is an example:

	A	B	C	D
1	1	3	2	4
2	1000	102	72	61
3	2000	211	103	84
4	3000	342	222	187
5	4000	487	361	248

EX #1 --@VLOOKUP(3000,A2..D5,2) = 222 (DID YOU SEE IT?)
EX #2 -- @VLOOKUP(4000,A2..D5,B1) = 248 (HOW ABOUT THIS?)
EX #3 -- @VLOOKUP(2000,A2..D5,A1) = 211 (A1=1)

This will be the format that we will be using in this article except that "x" will usually refer to a cell. Again, the way to learn the use of LOOKUP functions is by using them over-and-over and then they will become clear to you.

3) `@HLOOKUP(x,range,offset)`

The "@HLOOKUP" function performs a Horizontal Table Lookup where the comparison values are in the first row of the range. These comparison values MUST be in increasing order, with no duplicates. The result of the function is determined by locating the first comparison value in the range which exceeds the test value "x." If this is the first value in the range, the result is ERR. Otherwise the result is the value of the cell below the previous comparison value in the range. The third argument, "offset," determines how many rows below the comparison value to look. If the value of offset is negative, or greater than or equal to the number of rows in the range, the result is ERR.

We will not use this format in this article so I will not discuss it further until some future article where we will need it.

Second, let's look at SuperCalc/PeachCalc functions:

1) `IF(expression1,expression2,expression3)`

This function says, if expression1 is TRUE, then use expression2; otherwise use expression3 (FALSE).

2) `LOOKUP(value,column/row range)`

This function says, search the range for the last value LESS THAN or EQUAL to search value specified and return the adjacent value from the column to the right of the search column or the row below the search row. The search range must be in ascending order of values. (We will only be using columns in this article.)

Third, let's look at MYCALC that I am reviewing in the next article:

1) `IF(b,x,y)`

This function computes "x," if the expression "b" is TRUE; and "y," if "b" is FALSE.

2) `LOOKUP(x,range)`

This function gives the value arrived at by looking up the number "x" in the table described by the range.

Fourth, now we will look at MULTIPLAN:

1) `IF(Logical,Then Value,Else Value)`

This function says, if "Logical" is TRUE, the function returns the "Then Value"; otherwise the function returns the "Else Value." These values can be numeric, text or logical values. Here is an example:

`IF(x>y,z=10,z=0)`.

2) `LOOKUP(N,Table)`

This function will search for "N" in the first row or column of "Table" and return the contents of a cell from the last row or column of Table. Table is a group of cells on the worksheet. The dimensions of the Table determine the direction of the search.

If Table is square, or higher than it is wide, the LOOKUP function searches the first column of Table until it finds the cell that has the largest value that is less than or equal to "N." The value in the last cell in that row of Table is the result. If the values in all cells in the first column are greater than "N," a "#N/A" message is the result.

If Table width is greater than its height (meaning it has more columns than rows), then the LOOKUP function searches for "N" in the first row of Table. The value in the last cell in that column of Table is returned as the result. If the values in all cells in the first row are less than "N," the last column is used. If the values in all cells in the first row are greater than "N," a "#N/A" message is the result.

Note: Table should be a cell reference to a rectangular area of the active worksheet and MUST have its values in ascending order. Numeric or text values can be used.

The above descriptions show that each spreadsheet program has some differences. This means that you must use your manual or the HELP screens for more information of the way you must prepare your SPREADSHEET Preparation Forms. I showed an example for the LOTUS 1-2-3 above, and now I will give an example which will be helpful for the rest of the spreadsheet program formats:

Remember a Table or Range is a section of a row or column containing increasing (ascending) values with no duplicates specified in the LOOKUP function, together with the adjacent cells in the row directly below, or column directly to the right. The LOOKUP function goes down the search range of values until it finds the value being looked up, and returns the value in the adjacent cell. If the exact value being searched for is not in the table, the LOOKUP function finds the next smaller value in the table and returns the adjacent value. If the value being looked up is smaller than the first entry in the table, LOOKUP cannot return a useful value. (I usually start my tables with a zero "0" to overcome this!) If the value is larger than the last entry, LOOKUP will return the value adjacent to the last entry.

I know that I have repeated myself several times using different words to say the same thing, but this is a complex and difficult function to explain. I hope that I have made it clear, so that when you use it you will find that it clears up further. Also note that there is one big difference between LOTUS 1-2-3 and the others. The LOTUS 1-2-3 @VLOOKUP function has an "offset" argument! This is one of the many features that I like about 1-2-3!

Now for the example, here is a worksheet table:

	A	B
1	-5	3
2	0	1.5
3	1	-4
4	4	2
5	7	8

These LOOKUP functions will compute the following results:

1) LOOKUP(0,A1..A5) RESULT=1.5
2) LOOKUP(7,A1..A5) RESULT=8
3) LOOKUP(-8,A1..A5) RESULT=NOT DEFINED
4) LOOKUP(3,A1..A5) RESULT=-4

How did you do on these? I hope that you can see how they work!

Do not be afraid to refer to your manual and be sure to use your tutorial that comes with most spreadsheet programs for further information. You will find that most programs also provide a lot of information in their Help screens. Be sure to check them out. If you are still confused, try using these functions and they will usually clear up any problems that you have. If all else fails, write to me with your questions stated in detail along with the SASE, business size, for my answer. I want you to understand and I want to help!

"SPREADSHEET Preparation Forms"

I am including the following FORMS/SCHEDULES and DATAFORM in this article:

1) DATA1983.
2) FORM 1040-PAGE 1.
3) FORM 1040-PAGE 2.
4) SCHEDULE A.
5) SCHEDULE B.
6) SCHEDULES X, Y, & Z.

I will not discuss them in the above order because our SPREADSHEET Preparation Forms will show that we need certain information from one to complete the other. I will start with the DATA1983 Form. This Form will contain the majority of our 1983 tax information and as stated before this could be a Database Program file.

I AM GOING TO STATE IT AGAIN; you MUST prepare a SPREADSHEET Preparation Form for each module before you can enter ANYTHING onto your worksheet! I am going to do this article using LOTUS 1-2-3 on a H/Z-100 computer. Using the previous SPREADSHEET Corner articles you should be able to "adapt" the templates to your SuperCalc, PeachCalc, MYCALC, Multiplan, etc. Also, depending on which software package you are using, this project CAN BE DONE on an H-8, H/Z-89/90, H/Z-150, etc. computer. Thus, all readers can participate.

Note: I have used modified 1-2-3 worksheets that I have SAVED as ASCII Printer Files (.PRN) for a method of publishing the SPREADSHEET Preparation Forms for REMark. This allowed me to include them into a text file on a disk that I provide REMark. This saves the problem of working with drawings and I believe that they will be easier to read. Of course, YOU WILL NOT do yours this way!

DATA1983 Form

Figure 1 shows the "SPREADSHEET Preparation Form" for the 1983 Federal Income Tax Database. Please note that the A, B, C, etc. across the top and 1, 2, 3, etc. down the left side define the worksheet borders. The USER would enter their 1983 Tax Data between the arrows in column "D." If the USER has no data for any row, the column could be left blank if non-numeric data is called for, or put a zero "0" in the column if numeric data is required. Rows 18 & 19 (Lines 8 & 9) will have an entry only if the data is zero or less than $400. If the data is over $400, the user would put the data on the Schedule B as instructed. Other Lines that refer to a Schedule or Form that is not part of this article will require the user to complete those Schedules or Forms manually, and then enter the necessary data in column "D"!

Note: The second column "B" has a number that matches the Line Number corresponding to the 1040 Form for easy reference. Row 15 (Line #6e) requires a formula (function) -- @SUM(D11..D14). This function should be familiar to you from previous articles. It is used to ADD rows 11, 13, & 14.

The rest of this Form should be clear to you and after you have adapted it to your spreadsheet program format and completed "YOUR" preparation form, you can enter it on your worksheet and SAVE it as part of your project's files!

Schedule B Form

Figure 2 shows you my "SPREADSHEET Preparation Form" for the 1983 Schedule B. Again note, the G, H, I, etc. across the top and the 1, 2, 3, etc. down the left side represent the worksheet borders. The second column "H" has the numbers that correspond to the Line Numbers on the Schedule B Tax Form. The user will enter the non-numeric Name of Payer in column "J" to the right of the first arrow and the numeric data in column "L" to the right of the second arrow.

Row 17, Line #3, requires the function -- @SUM(L6..L16) and row 24, Line #5, uses the function -- @SUM(L20..L23). I should not need to tell you what these do. I will this last time. They ADD the rows in the range of the function. You should note what rows are included!

Row 25, Line #6, requires a decision! Thus, we use the @IF function that will refer to our DATA1983 template. Watch how this works! The reader should look at the 1983 Instruction Book that came with the Tax Forms to see how the exclusion is calculated. The instructions state that if the Taxpayer is single his exclusion is $1000, otherwise it is $2000. Our function will make this decision by checking back to row 9 of DATA1983 Form. Here is the required function:

```
@IF(+D9=1,1000,2000)
```

Do you see the "condition?" It is 'D9=1'! If it is TRUE, the result is $1000 and if it is FALSE the result is $2000. I hope that you can see this. If not, refer back to our discussion about the IF function.

Row 26, Line #7, requires a subtraction calculation, however we do not want a negative (less than zero result), so once again we need a decision! Again, this is best solved with an IF function. This time I will combine the

```
A  B              C                                    D                  E      F
1-**************1983 FED INCOME TAX DATABASE*************************************|
2-0--Your First Name,Init & Last----->                                            |
3-0--Spouse First Name,Initial------->                                <-----------|
4-00-Home Street Address------------->                                <-----------|
5-00-City,State,Zip Code------------->                                <-----------|
6-000Your Soc.Sec.Nbr & Occupation-->                                             |
7-000Spouse Soc.Sec.Nbr & Occupation>                                             |
8-5--Type 1=Single,2=Married Joint,3=Married Sep,4=Head House,5=Widow              |
9-5a-Filing Status Digit------------>                                 <-----------|
106--Exemption Instruction--Type 1=Yourself<65+1=Yourself>65+1=Blind              |
116a-Enter Nbr Exemptions Yourself--->                                <-----------|
126b-Exemption Instruction--Type 1=Spouse<65+1=Spouse>65+1=Blind                  |
136c-Enter Nbr Exemptions Spouse----->                                <-----------|
146d-Enter Nbr of Dependents--------->                                <-----------|
156e-Add Lines 6a, 6c and 6d--------->@SUM(D11..D14)                  <-----------|
167a-Your Wages, Salaries, etc------->                                <-----------|
177b-Spouse Wages, Salaries, etc----->                                <-----------|
188--Interest(use Sched B if >$400)-->                                <-----------|
199--Dividends(use Sched B if >$400)>                                 <-----------|
2010-Refunds(State & Local Inc Tax)-->                                <-----------|
2111-Alimony Received---------------->                                <-----------|
2212-Business Inc Gain/Loss(Sched C)>                                 <-----------|
2313-Capital Gain(from Sched D)------>                                <-----------|
2414-40% Cap Gain Distr not Above---->                                <-----------|
2515-Supplemental Gain(Form 4797)---->                                <-----------|
2616-Taxable Pensions/Annuities------>                                <-----------|
2717-Other Pensions/Annuties-Taxable>                                 <-----------|
2818-Rents, Royalties, etc.(Sched E)>                                 <-----------|
2919-Farm Income(Sched F)------------>                                <-----------|
3020-Taxable Unemployment Comp------->                                <-----------|
3121-Other Income-------------------->                                <-----------|
3223-Moving Expense(from 3903/3903F)>                                 <-----------|
3324-Empl Bus Expense(from 2106)----->                                <-----------|
3425-IRA Deductions------------------>                                <-----------|
3526-Keogh Deductions---------------->                                <-----------|
3627-Interest Penalty---------------->                                <-----------|
3728-Alimony Paid-------------------->                                <-----------|
3829-Married Couple(Sched W)--------->                                <-----------|
3930-Disability Income(from 2440)---->                                <-----------|
4041-Credit for Elderly(Sched R&RP)->                                 <-----------|
4142-Foreign Tax Credit(from 1116)--->                                <-----------|
4243-Investment Credit(from 3468)---->                                <-----------|
4344-Polical Contributions----------->                                <-----------|
4445-Child Care(from 2441)----------->                                <-----------|
4546-Jobs Credit(from 5884)---------->                                <-----------|
4647-Home Energy(from 5695)---------->                                <-----------|
4750-Self-Employment(Sched SE)------->                                <-----------|
4851-Alternative Min Tax(from 6251)->                                 <-----------|
4952-Recap Inv Credit(from 4255)----->                                <-----------|
5053-S/S Tax on Tip Inc(from 4137)--->                                <-----------|
5154-Uncollected S/S Tips(from W-2)->                                 <-----------|
5255-Tax on IRA(from 5329)----------->                                <-----------|
5357aYour Fed Income Tax Withheld---->                                <-----------|
5457bSpouse Fed Income Tax Withheld->                                 <-----------|
5558-Est Tax Payments-1983----------->                                <-----------|
5659-Earned Income Credit------------>                                <-----------|
5760-Amt Paid with Form 4868--------->                                <-----------|
5861-Excess S/S Tax Withheld--------->                                <-----------|
5962-Credit Tax Fuels(from 4136)----->                                <-----------|
6063-Reg Inv Co Credit(from 2439)---->                                <-----------|
61-------------------------------------------------------------------------------|
62                                Figure 1
```

calculation into the function. See if you can find it! Here is the IF function:

```
@IF(+L24>+L25,+L24-L25,0)
```

First, we use a logical formula asking if the value in cell "L24" is greater than the value in cell "L25." Second, if this condition is TRUE, we compute the subtraction formula "+L24-L25" to obtain the result of the function. If the condition is FALSE, the result is zero "0!" I hope that you know the IF function by now so that you can see where the result comes from. Can you? Did you find the calculation? Of course you did. It is the subtraction!

Row 27, Line #8, requires a simple addition formula -- +L17+L26. We have used this type of formula before so I will not discuss it. **Note:** The value in the cell defined by column "L" and row 27 will be referenced when you get to the 1040 Form Page 1.

Let's move along a little faster. Row 39, Line #10, requires another SUM function. You know this function by now. Row 43, Line #14, requires another SUM function; and row 44, Line #15, uses a simple subtraction formula.

Rows 48 and 49, Lines #16 & #17, require the user to enter a "Y'" or "N," for yes or no. That completes Schedule B. Now you can complete your SPREADSHEET Preparation Form (Are you getting tired of my saying this? I MUST, so that you will surely do them! I hope that you are convinced of their importance.)

```
G  H            I                    J              K          L        M
1*************************1983-SCHEDULE B*****************************|
2-----------------------------------------------------------------------|
3    PART I---Interest Income                                          |
4-----------------------------------------------------------------------|
5-1--From Seller-Financed Mtg-------------------------------------------|
6      Name of Payer------>                      Amt.Rec.>              |
7-2--Other (Not ASC)----------------------------------------------------|
8      Name of Payer------>                      Amt.Rec.>              |
9      Name of Payer------>                      Amt.Rec.>              |
10     Name of Payer------>                      Amt.Rec.>              |
11     Name of Payer------>                      Amt.Rec.>              |
12     Name of Payer------>                      Amt.Rec.>              |
13     Name of Payer------>                      Amt.Rec.>              |
14     Name of Payer------>                      Amt.Rec.>              |
15     Name of Payer------>                      Amt.Rec.>              |
16     Name of Payer------>                      Amt.Rec.>              |
173--Total-Lines 1 and 2-------------------------------->@SUM(L6..L16)  |
18-----------------------------------------------------------------------|
194--All-Saver Certificate----------------------------------------------|
20     Name of Payer------>                      Amt.Rec.>              |
21     Name of Payer------>                      Amt.Rec.>              |
22     Name of Payer------>                      Amt.Rec.>              |
23     Name of Payer------>                      Amt.Rec.>              |
245--Total ASC------------------------------------------->@SUM(L20..L23 |
256--Amt of ASC Exclusion(Worksheet)--------------------->@IF(+D9=1,100 |
267--Line 5 - Line 6------------------------------------->@IF(+L24>+L25 |
278--Line 3 + Line 7(1040-1 Line 8)---------------------->+L17+L26      |
28-----------------------------------------------------------------------|
29   PART II-Divident Income                                            |
30-----------------------------------------------------------------------|
319----Name of Payer------>                      Amt.Rec.>              |
32     Name of Payer------>                      Amt.Rec.>              |
33     Name of Payer------>                      Amt.Rec.>              |
34     Name of Payer------>                      Amt.Rec.>              |
35     Name of Payer------>                      Amt.Rec.>              |
36     Name of Payer------>                      Amt.Rec.>              |
37     Name of Payer------>                      Amt.Rec.>              |
38     Name of Payer------>                      Amt.Rec.>              |
3910-Total Line 9---------------------------------------->@SUM(L31..L38 |
4011-Cap Gain Dtr(#15 Sch D)                     <----------------------|
4112-Nontax Distr.(Utility)>                     <----------------------|
4213-Excl Reinv Dividend Uty                     <----------------------|
4314-Line 11 + 12 + 13----------------------------------->@SUM(J40..J42 |
4415-Line 10-Line 14(1040-1 Line #9a)-------------------->+L39-L43      |
45-----------------------------------------------------------------------|
46   PART III-Foreign Accts                                             |
47-----------------------------------------------------------------------|
4816-Bank/Security Acct.(Y or N)------------------------>               |
4917-Trust(If Y File3520/A or 926)----------------------->               |
50-----------------------------------------------------------------------|
                          Figure 2                                       |
```

Schedule A Form

Figure 3 presents my SPREADSHEET Preparation Form for the 1983 Schedule A Tax Form. It has the letters N, O, P, etc. across the top and the numbers 1, 2, 3, etc. down the left side to represent the worksheet borders. This form has a change. I have provided for Data and Formula in column Q, as well as in column R. The user will enter non-numeric data into column P between arrows at some points. Can you find them?

Rows 15, 25, 35, 43, and 53 all require SUM functions. I am not going to discuss them. You should be ready to handle these by yourself. Row 5, Line #2, and Row 16, Line #6, require formulas using multiplication and they require a reference to a cell that we have not come to as yet! It is part of the Form 1040 Page 2 template. We could have done this template first, but I wanted to keep this a tutorial article with the new items presented in the best order.

Row 55, Line #26, uses a simple addition formula. I did not use the SUM function because the rows that we are adding up are not adjacent!

```
+R17+R25+R35+R43+R53
```

Row 6, Line #3, and Row 17, Line #7, both require a decision, so I have used the IF function. Again, I must test for a negative result from the computation and if it is negative the result should be zero "0," like we did for the IF function we used for Schedule B. Look back and reread. Here is the function:

```
@IF((+Q4-Q5)>0,+Q4-Q5,0)
```

Take a look at the "(+Q4-Q5)" portion! Do you see why I had to do the function this way? If I did not use parentheses, the function would not be very readable. At first look, you would think that the -Q5>0 would be the condition tested. Of course, we know that the precedence number would keep it right, but the first look might give the wrong idea. I believe in making the functions readable. The next IF function works the same way. Here it is:

```
@IF((+R15-R16>0,+R15-R16,0)
```

You should be able to see this.

Row 57, Line #28, has another IF function. It has one new item. Here is the function:

```
@IF(+R55>+R56,+R55-R56,@ERR)
```

This time we are testing for a positive number and if we do not find one we want to "flag" the result. If you refer back to the Income Tax Manual, you would determine that you would not need to file a Schedule A because your deductions are not high enough if the result is an ERR message ("flag")!

Row 56, Line 27, gives us the first chance to use the @VLOOKUP function. Again, we are out of order for the same reason I stated earlier, but if you will read ahead about the 1983 Tax Rate Schedule Form, you will find that I discuss a little TABLE in the upper right corner that is used for Filing Status Amount. This is the table that we are going to use. Let's show the function first:

```
@VLOOKUP(+D9,AJ2..AK6,1)
```

Now, let's look at the various parts of the function. The first argument is "+D9" which looks back at row 9 on the DATABASE form and finds the Filing Status Digit. This is our search value. The function will look at the table's first column "AJ," scanning down for the value in the cell, +D9. When it finds this value, it will look at the value adjacent in the column determined by the argument called "offset" in 1-2-3, which in this case is "1." Thus, it will look at column "AK." Note, that these arguments must be in the specified range -- AJ2..AK6. For example, if +D9 is equal to 2, we find that the value in the column offset over by one column and adjacent, to be 3400! Did you follow this? We will be doing some more.

Form 1040 - Page 1

Figure 4 shows my SPREADSHEET Preparation Form for Page 1 -- 1040 -- Federal Individual Income Tax Return -- 1983. I will not go into the detail on this form that I have covered on the previous forms. You find that most of the information will automatically be put into their cells from the DATABASE, by cell reference.

Row 12, Line #7, has a simple addition formula to add the spouses salaries, if any. Row 31, Line #22, and Row 43, Line #31, require SUM functions like we have used and discussed. Row 44, Line #32, has a simple subtraction formula. I will show the two SUM functions below because they do not show up on the Figure:

Row 31 -- `@SUM(AA12..AA29)`
Row 43 -- `@SUM(AA34..AA42)`

Row 14, Line 9b, uses an IF function to make a decision. This time we must determine the exclusion depending on whether this is a Married, Joint Return. The exclusion is $200 if it is a joint return, otherwise the exclusion is $100. Here is the IF function that will choose:

```
@IF(+D9=2,200,100)
```

Can you see how this works? Remember that the cell "+D9" has the Filing Status Digit and if it is "2" the return is for Married, Joint Return. Thus, if the condition "+D9=2" is TRUE, the result is 200, otherwise the result is 100. We did the job!

Row 15, Line #16, requires another IF function to test for negative number, and if negative, the result is zero "0." We have used an IF function like the following before:

```
@IF(+X15>+Z15,+X15-Z16,0)
```

The rest of this form should be clear to you.

Form 1040 - Page 2

Figure 5 shows you my SPREADSHEET Preparation Form for the 1040 Page 2. Be sure you carefully read the cell references

```
MN          O              P                    Q                R          S  T
1**************************1983-SCHEDULE A*****************************
2-------------------------------------------------------------------------
3    Medical/Dental Paid
4-1--Medicine & Drugs------>                 <-------------------------------
5-2--1% 1040-1 Ln #33------>+AA50*0.01  <-------------------------------
6-3--Line 1 - Line 2-(NOT < 0)---------->@IF((+Q4-Q5)>0, <-------------------
7-4--Other Medical & Dental ------------------------------------------------
8-4a-Drs.,Hosp.,Etc.-------------------->                  <-----------------
9-4b-Med. Trans.------------------------>                  <-----------------
104c-Other-Glasses----------------------->                 <-----------------
114d-Hearing Aid------------------------>                  <-----------------
124e-Dentures---------------------------->                 <-----------------
134f>                        <---------->                  <-----------------
144g>                        <---------->                  <-----------------
155--Add Lines 3 thru 4g---------------->@SUM(R6..R14)     <-----------------
166--5% 1040-1 Ln #33------------------->+AA50*0.05        <-----------------
177--Line 5 - Line 6-(NOT < 0)---------->@IF((R15-R16)>0 <-------------------
18   Taxes Paid-----------------------------------------------------------
198--State & Local Income--------------->                  <-----------------
209--Real Estate------------------------>                  <-----------------
2110aGeneral Sales(Table)--------------->                  <-----------------
2210bGeneral Sales Motor Veh------------>                  <-----------------
2311-Other-Personal Property------------>                  <-----------------
24--->                       <---------->                  <-----------------
2512-Add Lines 8 Thru 11---------------->@SUM(R19..R24)    <-----------------
26   Interest Paid--------------------------------------------------------
2713aHome Mort. to Institution---------->                  <-----------------
2813bHome Mort. to Individual----------->                  <-----------------
29--->                       <---------->                  <-----------------
30--->                       <---------->                  <-----------------
3114-Credit & Charge-------------------->                  <-----------------
3215-Other------------------------------>                  <-----------------
33--->                       <---------->                  <-----------------
34--->                       <---------->                  <-----------------
3516-Add Lines 13 Thru 15--------------->@SUM(R27..R34)    <-----------------
36   Contributions--------------------------------------------------------
3717aCash-<$3000------------------------>                  <-----------------
3817bCash->$3000------------------------>                  <-----------------
39--->                       <---------->                  <-----------------
40--->                       <---------->                  <-----------------
4118-Not Cash---------------------------->                 <-----------------
4219-Carryover--------------------------->                 <-----------------
4320-Add Lines 17 Thru------------------->@SUM(R37..R42)    <-----------------
44   Casualty & Theft-----------------------------------------------------
4521-From Form 4684---------------------->                 <-----------------
46   Misc Deductions------------------------------------------------------
4722-Union & Prof Fees------------------>                  <-----------------
4823-Tax Prep. Fees---------------------->                 <-----------------
4924-Other------------------------------>                  <-----------------
50a->                        <---------->                  <-----------------
51b->                        <---------->                  <-----------------
52c->                        <---------->                  <-----------------
5325-Add Lines 22 Thru 24--------------->@SUM(R47..R52)    <-----------------
54   Summary--------------------------------------------------------------
5526-Add Ln 7,12,16,20,25--------------->+R17+R25+R35+R4 <-----------------
5627-Filing Status Amt.------------------>@VLOOKUP(+D9,AJ <-----------------
5728-Ln 26 - 27(1040 34a)--------------->@IF(+R55>+R56,+ <-----------------
58-------------------------------------------------------------------------
59                                Figure 3
```

check where they come from. You should be able to find them by the cell call-out! I will not go through this again.

Row 53, Line #35, has a simple subtraction formula that I will show below because it does not completely show up on the Figure:

```
+AA50-AA51-AA52
```

Note, that this calculates the cell value if the deductions are itemized or not. Do you see this? The three (3) SUM functions given for Rows 69, 80, and 91 do not show up completely, so I will give them below for your review:

```
@SUM(Y62..Y68)
@SUM(AA71..AA79)
@SUM(Y83..Y89)
```

Three (3) IF functions used for Rows 71, 93, and 96 are similar to functions that we have used to determine whether the result is positive or should be zero "0." I have discussed this format before, so I will just list them for you to examine:

```
@IF(+AA59>+AA69,+AA59-AA69,0)
@IF(+AA80>+AA91,+AA91-AA80,0)
@IF(+AA80>+AA91,+AA80-AA91,0)
```

By now, I hope that you can figure out how to do these. You will not learn to do them if I always do it all. Therefore, I am showing you how I would write them and you can see if you agree or see a better way. Remember, there is usually more than one way to solve most of these problems, because of the flexibility of spreadsheet programs. I think that you can work out the rest of this form for yourself.

1983 Tax Rate Schedules

Figure 6 shows my SPREADSHEET Preparation Form for the tables that we need for this project. I have put the two (2) tables that we need on the same page. They are:

1) As stated before, I have put the Filing Status Deduction Amount table in the upper right corner. It consists of two (2) columns (AJ & AK). The AJ column has the list of filing status digits (search values) and the AK column has the base deduction amount.

2) The main table consists of a calculation area at the top of the table, with the Schedules X, Y, and Z shown below. These are nearly the same as shown in your Income Tax Instruction Book. I have made two big changes!

I -- I have added a number determined by multiplying the filing status digit times $1,000,000 to the first column (search value) so that I could use one large table and search for the Schedule that we need. This is a "trick" that I devised! It will become clearer as we use it.

II - I have added a fifth column that is a repeat of the first column before I added the large number to it. (When typing this form you can use the COPY or MOVE command to advantage. HINT!)

Now, let's look at the calculation block at the top. Row 2 makes the decision of which Schedule we will use, determined by the filing status digit. Again, to make a decision I have used the IF function. Here is the function that I used:

```
@IF(+D9=5,2000000,1000000*D9)
```

The condition "+D9=5" tests for Widow/Widower filing status because they use the same Schedule Y(J) as Married filing a joint return. Therefore, if the condition is TRUE we want the 2 times 1000000 or 2000000 that we would use for filing status "2," which is married filing a joint return. If the condition is FALSE, we multiply the filing status digit times 1000000 -- 1000000*D9. This provides us with the search value that we will look for in the first column of the table when we add it to the taxable income from Line #37 of the 1040 Page 2. Therefore, Row 3 has a cell that refers to cell AA55 of that form.

Row 4 searches for the Tax Base that is given in the second column of the table. I have used the 1-2-3 @VLOOKUP function to do this and have shown it below:

```
@VLOOKUP(+AF2+AA55,AD110..AH56,1)
```

Let me explain this function. The condition "+AF2+AA55" calculates the search value using the value that is stored in cell "AF2" and adds that value to the Taxable Income value that is stored in cell "AF3," or in cell "AA55" of the 1040 Form Page 2. Next, I

```
 U  V          W                  X           Y          Z      AA     A
1*****1040---FEDERAL INDIVIDUAL INCOME TAX RETURN---1983**************|
2-------------------------------------------------------------------------|
3     Your Name,Initial & Last                          S/S#-+D6          |
4     Spouse Name & Initial---                          S/S#-+D7          |
5     Home Address-----------                           Occup             |
6     City, State & ZIP-------                          Occup             |
7=========================================================================|
8--5--Filing Status---------->+D9       <-------------------------------|
9--6e-Total Number Exemptions>+D15      <-------------------------------|
10=======================================================================|
11    INCOME RECEIVED-------------------------------------------------------|
12-7--Wages,salaries,tips,etc.-------------------------------->+D16+D17   |
13-8--Interest(Sch B if >400)--------------------------------->+L27       |
14-9--Dividend(Sch B if >400)>+L44      <-9b-Exclusion->@IF( <----------|
15-9c-Line 9a - 9b-------------------------------------------->@IF(X15>+  |
16-10-Refund State & Local Inc Tax---------------------------->+D20       |
17-11-Alimony Received---------------------------------------->+D21       |
18-12-Business Inc or (Loss) from Sched ----------------------->+D22       |
19-13-Capital Gain or (Loss) from Sched D--------------------->+D23       |
20-14-40% Capital Gain Distr Not on Line 13------------------->+D24       |
21-15-Supplemental Gain or (Loss) Form 4797------------------->+D25       |
22-16-Fully Taxable Pensions, IRA, Annuties Not on Line 17--->+D26       |
23-17aOther Pension & Annuties-Total Rcd                  <-------------|
24-17bTaxable Amt If Any-------------------------------------->+D27       |
25-18-Rents, Royalties, Partnerships, etc(Sched E)------------>+D28       |
26-19-Farm Inc (Sched F)-------------------------------------->+D29       |
27-20aUnemployment-Total Rec---------->                   <-------------|
28-20bTaxable Amt If Any-------------------------------------->+D30       |
29-21-Other Income-------------------------------------------->+D31       |
30--->                                                    <-------------|
31-22-Total Income-Add Lines 7 thru 21------------------------>@SUM(AA12  |
32-------------------------------------------------------------------------|
33    ADJUSTMENTS TO INCOME-------------------------------------------------|
34-23-Moving Expense from 3903/3903F-------------------------->+D32       |
35-24-Employee Bus Exp Form 2106------------------------------>+D33       |
36-25aIRA Deduction------------------------------------------->+D34       |
37-25bIRA Pmts Made in 1984 in Line 25a>                  <-------------|
38-26-Pmts to Keogh Plan-------------------------------------->+D35       |
39-27-Penalty on Withdrawal of Savings------------------------>+D36       |
40-28-Alimony Paid-------------------------------------------->+D37       |
41-29-Married Couple Deduction(Sched W)----------------------->+D38       |
42-30-Disability Inc Exclusion-Form 2440---------------------->+D39       |
43-31-Total Adjustments-Add Lines 23 thru 30------------------>@SUM(AA34  |
44-32-Adjusted Gross Income-Subtract Line 31 from 22---------->+AA31-AA4  |
45-------------------------------------------------------------------------|
46                          Figure 4                                       |
```

have specified the range of the table I will use "AD10..AH56." Finally, I give the offset as "1" which means one column to the right of the search column.

If our filing status was "3," the Row 2 function multiplies this times 1000000 to get "AF2" which would be 3000000. Then, the function adds that result to the Taxable Income from the cell "AA55" (I will assume $36,000 for our example.) getting 3036000 for a result. This 3036000 is the search value that the function goes down the first column looking for. After finding the nearest value in the specified range, it looks over the number of offset columns, "1" in this example, and finds the Tax Base value of 8007, which is the result of the function.

Row 5 calculates the excess income which is the amount of Taxable Income over the value that was used in the step above, or 30000 in the example. This time I will combine a formula with a function to calculate the result. I will show the formula below:

```
+AA55-@VLOOKUP(+AF2+AA55,AD10..AH56,4)
```

You will note that I have used the Taxable Income stored in cell "AA55" and subtracted the result of the function, which is the same as above except that the offset is "4" (four columns to the right) which gives us the 30000. Thus, our excess income will be 36000 - 30000 = 6000!

Now I will calculate the excess tax, which is the tax on the excess income. I will use another combined formula and function to get the result. Here is that formula:

```
+AF5*@VLOOKUP(+AF2+AA55,AD10..AH56,3)
```

Note: The cell "AF5" stores the excess income that we want to multiply by the tax rate that we will look for in the fourth column because offset is "3," or three columns to the right of the search column. You will note that the offset is the only change in the function from the previous ones.

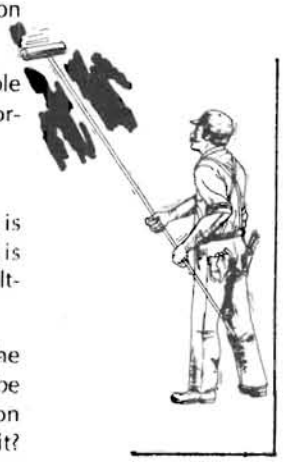
Finally, to calculate our tax on the Taxable Income I have used a simple addition formula shown below:

```
+AF4+AF6
```

This means that we add the Tax Base that is stored in cell "AF4" to the Excess Tax that is stored in cell "AF6" to obtain the final resulting TAX!

This may have looked complicated at the start, but I believe you have found it to be pretty easy after we broke the calculation down into steps! Did you understand it? There are other ways to do it, of course!

```
 U  V            W                  X              Y            Z       AA
47*****************************1040 PAGE 2*******************************
48-----------------------------------------------------------------------
49    TAX COMPUTATION-------------------------------------------------
50-33-Amount From Line 32------------------------------------->+AA44
51-34aAmount from Sched A Line 28 if Used--------------------->+R57
52-34bAmt of Deductions if not Itemized---------------------->
53-35-Subtract line 34a or 34b from 33------------------------>+AA50-AA5
54-36-Multiply $1000 by Total Number of Exemptions-Line 6--->1000*X9
55-37-Taxable Income-Subtract Line 36 from 35---------------->+AA53-AA5
56-38-Tax----------------------------------------------------->+AF7
57-39-Additional Taxes---------------------------------------->
58    NOTE:-Use Form and Check 1040 Box-------------------------------
59-40-Total-Add Lines 38 and 39------------------------------->+AA56+AA5
60-----------------------------------------------------------------------
61    CREDITS---------------------------------------------------------
62-41-For Elderly(Sched R&RP)---------->+D40              <--------------
63-42-Foreign Tax(Form 1116)----------->+D41              <--------------
64-43-Investment(Form 3468)------------>+D42              <--------------
65-44-Political Contributions---------->+D43              <--------------
66-45-Child & Dependent Care Exp------->+D44              <--------------
67-46-Jobs(Form 5884)------------------>+D45              <--------------
68-47-Residential Energy(Form 5695)---->+D46              <--------------
69-48-Total Credits-Add Lines 41 thru 47--------------------->@SUM(Y62
70-----------------------------------------------------------------------
71-49-Balance-Subtract Line 48 From 40--Not < Zero---------->@IF(+AA59
72-----------------------------------------------------------------------
73    OTHER TAXES-----------------------------------------------------
74-50-Self-Employment(Sched SE)------------------------------->+D47
75-51-Alternative Minimum(Form 6251)-------------------------->+D48
76-52-Recapture Investment Credit(Form 4255)------------------>+D49
77-53-S/S on Tip Inc not Reported(Form 4137)------------------>+D50
78-54-Uncollected S/S & RRTA on Tips-------------------------->+D51
79-55-On an IRA(Form 5329)------------------------------------>+D52
80-56-Total Tax-Add Lines 49 thru 55------------------------->@SUM(AA71
81-----------------------------------------------------------------------
82    PAYMENTS--------------------------------------------------------
83-57-Federal Inc Tax Withheld--------->+D53+D54          <--------------
84-58-1983 Est Pmts & From 1982 Return->+D55              <--------------
85-59-Earned Inc Credit(line 33<$10000)>+D56              <--------------
86-60-Amount Paid with Form 4868------->+D57              <--------------
87-61-Excess S/S & RRTA Withheld------->+D58              <--------------
88-62-Credit Fed Tax Spec. Fuels(4136)->+D59              <--------------
89-63-Regd Inv Comp. Credit(Form 2439)->+D60              <--------------
90-----------------------------------------------------------------------
91-64-Total Payments-Add Line 57 thru 63--------------------->@SUM(Y83.
92-----------------------------------------------------------------------
93-65-If Line 64 > 56, enter Amt OVERPAID-------------------->@IF(+AA91
94-66-Amt of Line 65 to be REFUNDED TO YOU------------------->
95-67-Amt Line 65 Applied 1984 Est Tax->+AA93-AA94        <--------------
96-68-If Line 56 > 64, enter AMOUNT YOU OWE(attach check)--->@IF(+AA80
97-69-NOTE:-If Form 2210/2210F Used---->                  <--------------
98-----------------------------------------------------------------------
99                          Figure 5
```



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Closing

This article has become very long and it has an awful lot of work for you readers to do. I will keep the articles a little shorter in the future, but I did want you to have a model that you could start doing tax analysis with! In the following article, I expand and refine this model.

```
AAC   AD      AE      AF       AG      AH      AIAJ     AK
|1**********1983 TAX RATE SCHEDULES*******|***********|
|2-FILING STATUS---->@IF(+D9= <----------| 1      2300 |
|3-1040-Ln37-------->+AA55     <----------| 2      3400 |
|4-TAX BASE--------->@VLOOKUP <----------| 3      1700 |
|5-EXCESS INC------->+AA55-----------------| 4      2300 |
|6-EXCESS TAX------->+AF5*@VL <----------| 5      3400 |
|7-TAX-------------->+AF4+AF6 <----------| ----------
|8-------------------------------------------|
|9                  SCHED X                 |
|10 1000000       0       0       0       0 |
|11 1002300       0    2300    0.11    2300 |
|12 1003400     121    3400    0.13    3400 |
|13 1004400     251    4400    0.15    4400 |
|14 1008500     866    8500    0.19    8500 |
|15 1012900    1656   12900    0.21   12900 |
|16 1015000    2097   15000    0.24   15000 |
|17 1018200    2865   18200    0.28   18200 |
|18 1023500    4349   23500    0.32   23500 |
|19 1034100    7953   34100     0.4   34100 |
|20 1055300   17123   55300     0.5   55300 |
|21                SCHED Y(J)               |
|22 2000000       0       0       0       0 |
|23 2003400       0    3400    0.11    3400 |
|24 2005500     231    5500    0.13    5500 |
|25 2007600     504    7600    0.15    7600 |
|26 2011900    1149   11900    0.17   11900 |
|27 2016000    1846   16000    0.19   16000 |
|28 2024600    3656   24600    0.26   24600 |
|29 2035200    6624   35200    0.35   35200 |
|30 2045800   10334   45800     0.4   45800 |
|31 2060000   16014   60000    0.44   60000 |
|32 2085600   27278   85600    0.48   85600 |
|33 2109400   38702  109400     0.5  109400 |
|34                SCHED  Y(S)              |
|35 3000000       0       0       0       0 |
|36 3002750   115.5    2750    0.13    2750 |
|37 3003800     252    3800    0.15    3800 |
|38 3005950   574.5    5950    0.17    5950 |
|39 3010100    1322   10100    0.23   10100 |
|40 3012300    1828   12300    0.26   12300 |
|41 3014950    2517   14950     0.3   14950 |
|42 3017600    3312   17600    0.35   17600 |
|43 3030000    8007   30000    0.44   30000 |
|44 3054700   19351   54700     0.5   54700 |
|45                SCHED  Z                 |
|46 4000000       0       0       0       0 |
|47 4004400     231    4400       3    4400 |
|48 4008700     834    8700    0.18    8700 |
|49 4011800    1392   11800    0.19   11800 |
|50 4015000    2000   15000    0.21   15000 |
|51 4018200    2672   18200    0.25   18200 |
|52 4023500    3997   23500    0.29   23500 |
|53 4028800    5534   28800    0.34   28800 |
|54 4034100    7336   34100    0.37   34100 |
|55 4060600   18254   60600    0.48   60600 |
|56 4081800   28430   81800     0.5   81800 |
|57-------------------------------------------|
|58                Figure 6                 |
```

*

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Part 7

SPREADSHEET Corner

H. W. Bauman
493 Calle Amigo
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In this article I am going to add some refinements and some additional Tax Schedules to the Federal Income Tax Return Project that I started in the last article. I hope that you have completed the project. Not all readers will have a need for all of the schedules and/or your set-up may not have the required amount of working memory. However, you can see how easy it is to add or eliminate schedules.

New Functions

I will be using two other functions in this article that you readers should learn. I will explain them in terms of LOTUS 1-2-3, and you can adapt over to your spreadsheet software by referring to your manual or the "HELP" screens. The syntax might be different, but similar. They are:

1) -- `@MIN(list)`
2) -- `@MAX(list)`

The result of the function [@MAX(list)] is the MAXIMUM of the values of all the entries in the list. If there are no values in the list, the function will return the result ERR. If the list includes any blank cells in the range, the blank cells would be ignored. Here is an example of this function:

```
@MAX(4.2,8.7,2.4,10.9) = 10.9 (result)
```

The result of the function [@MIN(list)] is the MINIMUM of the values of all the entries in the list. If there are no values in the list, the function will return the result ERR. If the list includes any blank cells in the range, the blank cells will be ignored. Here is an example of the function:

```
@MIN(4.2,8.7,2.4,10.9) = 2.4 (result)
```

These functions can be combined with other functions to form compound functions. They are often combined with logical operators to form compound functions also. I will be doing this in the article. For now, here is an example:

```
@IF(@MIN(C9,C10,C12)<1600,
@MIN(C9,C10,C12),1600)
```

In this example, if C9, C10, or C12 cell values are less than 1600, the result would be that cell value; otherwise, the result would be 1600. As I use these functions, I hope that you will see how they work and how powerful they are!

SPREADSHEET Preparation Form

As always, I use and I want you to use the "SPREADSHEET Preparation Form" as the basis of all of the project's worksheets! I am including the following revised (labeled with an "A") and new SCHEDULES/WORKSHEETS and DATAFORM in this article:

```
 1) DATABASE----------------Figure 1A
 2) FORM1040-PAGE1----------Figure 4A
 3) FORM1040-PAGE2----------Figure 5A
 4) IRA WORKSHEET-----------Figure 7
 5) SCHEDULE C--------------Figure 8
 6) SCHEDULE W--------------Figure 9
 7) SCHEDULE SE-------------Figure 10
 8) SCHEDULE D--------------Figure 11
 9) SCHEDULE E--------------Figure 12
10) NON-ITEMIZED DEDUCTION---Figure 13
```

Again, these have all been prepared with LOTUS 1-2-3 on an H/Z-100 computer. If you readers will refer back to our earlier articles, you will find the various differences as compared to other spreadsheet programs. YOU MUST PREPARE your own SPREADSHEET Preparation Forms adapted to your set-up using mine for reference even if you are using 1-2-3! I would like all readers to do all of them even if you are not going to include them into your project. This will be a good learning experience and you do not know when you might need them in the future. Please, let's have all readers participate. It is not hard to do.

DATA1983 Form

Figure 1A shows my revised SPREADSHEET Preparation Form for this 1983 Federal Income Tax Database. Notice that I eliminated the Name, Address, Social Security Number, and Occupation information to make more room for the refinements!

For Line 5a, I used an IF function combined with a logical operator to build up a "compound condition" to check for an Input Entry Error. If the entry is not 1, 2, 3, 4 or 5; we want to show ERR. Here is the function that I used:

```
@IF(D3<1#OR#D3>5,@ERR,D3)
```

Note that 1-2-3 requires the logical operator to be "#OR#" and the error message to be "@ERR"!

For Line 6e, I used another type of IF function combined with the SUM function to check if our entry is greater than "0." If it is not, we have an error. Here is the function that I used:

```
@IF(@SUM(D5..D8)<0,@ERR,@SUM(D5..D8))
```

Again, at Lines 8 and 9, we should check to see if the entry was over $400 in place of using Schedule B. If a value over 400 was tried as an entry, ERR should be the entry! The two compound functions follow (Note the logical operators):

Line 8 -- @IF(D12<400,+D12,@ERR)
Line 9 -- @IF(D13<400,+D13,@ERR)

If you will examine the revised form, you will find that I have provided for two entries for Wages, Schedule C, IRA, etc. This provides for a spouse, if any, so that we will have the information for use with the Married Couple Schedule W and the IRA Worksheet -- Figures 9 and 7!

Also, note the following added entries:

Line 12a -- YOUR SCH C -- +L91 (from Sch C)
Line 12b -- SPOUSE SCH C -- +L91 (from Sch C)
Line 13 -- Cap. Gain SCH D -- +AU35 (from Sch D)
Line 18 -- Rent, Etc Sch E -- +BE25 (from Sch E)
Line 25a -- YOUR IRA(wrksht) -- +D80 (from Fig 7)
Line 25b -- SPOUSE IRA(wrksht) -- +E72 (from Fig 7)
Line 29 -- Married Sch W -- +R73 (from Sch W)
Line 50 -- Self-Empl Sch SE -- +R97 (from Sch SE)

```
A  B                C                                   D                  E      F
1**************1983 FED INCOME TAX DATABASE*****************************|
2-5--Type 1=Single,2=Married Joint,3=Married Sep,4=Head House,5=Widow---|
3-5a-Filing Status Digit------------>@IF(D3<1#OR#D3>5,@ERR <------------|
4-6--Exemption Instruction---Type 1=Yourself<65+1=Yourself>65+1=Blind---|
5-6a-Enter Nbr Exemptions Yourself--->                    <------------|
6-6b-Exemption Instruction---Type 1=Spouse<65+1=Spouse>65+1=Blind-------|
7-6c-Enter Nbr Exemptions Spouse----->                    <------------|
8-6d-Enter Nbr of Dependents--------->                    <------------|
9-6e-Add Lines 6a, 6c and 6d--------->@IF(@SUM(D5..D8)<=0,@ <------------|
107a-Your Wages, Salaries, etc------->                    <------------|
117b-Spouse Wages, Salaries, etc----->                    <------------|
128--Interest(use Sched B if >$400)->@IF(D12<400,+D12,@ERR <------------|
139--Dividends(use Sched B if >$400)>@IF(D13<400,+D13,@ERR <------------|
1410-Refunds(State & Local Inc Tax)->                     <------------|
1511-Alimony Received---------------->                    <------------|
1612aYour Bus  Inc Gain/Loss(Sch C)->+L91                 <------------|
1712bSpouse Bus  Inc Gain/Loss(Sch C)+L91                 <------------|
1813-Capital Gain(from Sched D)------>+AU35                <------------|
1914-40% Cap Gain Distr not Above---->                    <------------|
2015-Supplemental Gain(Form 4797)---->                    <------------|
2116-Taxable Pensions/Annuities------>                    <------------|
2217-Other Pensions/Annuties-Taxable>                     <------------|
2318-Rents, Royalties, etc.(Sched E)>+BE25                <------------|
2419aYour Farm Income(Sched F)------->                    <------------|
2519bSpouse Farm Income(Sched F)----->                    <------------|
2620-Taxable Unemployment Comp------->                    <------------|
2721-Other Income-------------------->                    <------------|
2823-Moving Expense(from 3903/3903F)>                     <------------|
2924aYour Empl Bus Exp(from 2106)---->                    <------------|
3024bSpouse Empl Bus Exp(from 2106)->                     <------------|
3125aYour IRA Deductions(See Wksht)->+D80                 <------------|
3225bSpouse IRA Deductions(See Wksht)+E72                 <------------|
3326aYour Keogh Deductions----------->                    <------------|
3426bSpouse Keogh Deductions--------->                    <------------|
3527-Interest Penalty---------------->                    <------------|
3628-Alimony Paid-------------------->                    <------------|
3729-Married Couple(Sched W)--------->+R73                 <------------|
3830aYour Disability Inc(from 2440)->                     <------------|
3930bSpouse Disability Inc(from 2440)                     <------------|
4041-Credit for Elderly(Sched R&RP)->                     <------------|
4142-Foreign Tax Credit(from 1116)-->                     <------------|
4243-Investment Credit(from 3468)---->                    <------------|
4344-Polical Contributions----------->                    <------------|
4445-Child Care(from 2441)----------->                    <------------|
4546-Jobs Credit(from 5884)---------->                    <------------|
4647-Home Energy(from 5695)---------->                    <------------|
4750-Self-Employment(Sched SE)------->+R97                <------------|
4851-Alternative Min Tax(from 6251)->                     <------------|
4952-Recap Inv Credit(from 4255)----->                    <------------|
5053-S/S Tax on Tip Inc(from 4137)--->                    <------------|
5154-Uncollected S/S Tips(from W-2)->                     <------------|
5255-Tax on IRA(from 5329)----------->                    <------------|
5357aYour Fed Income Tax Withheld---->                    <------------|
5457bSpouse Fed Income Tax Withheld->                     <------------|
5558-Est Tax Payments-1983----------->                    <------------|
5659-Earned Income Credit------------>                    <------------|
5760-Amt Paid with Form 4868--------->                    <------------|
5861-Excess S/S Tax Withheld--------->                    <------------|
5962-Credit Tax Fuels(from 4136)----->                    <------------|
6063-Reg Inv Co Credit(from 2439)---->                    <------------|
61-------------------------------------------------------------------------|
62                                FIGURE 1A                              |
```

To make the suggested changes, retrieve your spreadsheet file from the last article and delete, edit, add, move, etc. When you SAVE your new work, BE SURE to rename your file so that you will not destroy your previous file!!!

Schedule W

Figure 9 shows the SPREADSHEET Preparation Form that I used for this schedule. Note that it has two entry columns -- YOURS is column "Q" and SPOUSE is column "R." Line 1 automatically calls for the wages from the database form -- +D10 and +D11. Line 2 calls for the other earned income values. Line 3 adds Lines 1 and 2 with a simple formula. At Line 4, we pick up the income adjustments for YOUR and SPOUSE with the following formulas:

YOUR -- +D29+D31+D33+D38
SPOUSE -- +D30+D32+D34+D39

Refer back to Figure 1A to see what these values mean.

Now Line 5, uses a simple subtraction formula to calculate the Qualified Earned Income. At Line 6, we start calculating the Married Couple Deduction, where both work, which is based on the smaller of the two incomes or $30,000 (maximum allowed). So, I will use the @MIN(list) function to find the smallest of Lines 5a or 5b or 30000 with the following function:

```
@MIN(Q69,R69,30000)
```

At Line 8, a simple multiplication formula completes the Deduction calculation which cannot exceed $3000 because the @MIN function limits the value to $30,000 times 10%!

IRA Worksheet

Next, I have shown the SPREADSHEET Preparation Form as Figure 7 used to calculate YOURS and SPOUSE, if any, IRA Deduction. Here again, two entry columns are needed -- YOUR IRA uses column "D" and SPOUSE IRA uses column "E." The user will enter the amount paid in 1983 and 1984 (paid until return is filed) for each on Lines 1a and 1b. At Line 2a we add the earned income for each and subtract the Keogh Payment, if any. The formulas are as follows:

YOURS -- +D10+D16+D24-D33
SPOUSE -- +D11+D17+D24-D34

If either you or your spouse had Foreign

Earned Income, it would be entered at Line 2b and subtracted from Line 2a for the Line 2c total with a simple subtraction formula. Line 3 shows the maximum amount allowed for each as $2000. Now, at Line 4 the smallest value of Lines 1c, 2c or 3 for each is required. Again, I used the following @MIN(list) function as shown below:

YOU -- `@MIN(D67,D70,D71)`
SPOUSE -- `@MIN(E67,E70,E71)`

The rest of the worksheet is for use when the spouse is non-working. At Lines 5a and 5b, the amount paid in for 1983 and 1984 is entered. Next at Line 5c, Lines 5a and 5b are totaled with a simple addition formula. Line 6 has the same value as Line 2c and Line 7 has the same $2000 maximum. Again at Line 8, the smallest value of Lines 5c, 6 or 7 is determined by using the MIN function as follows:

`@MIN(D75,D76,D77)`

Line 9 uses an addition formula combined with a MAX function to limit the value to $2,250 or less as shown below:

`@MAX(D72+D78,2250)`

Now at Line 10, the IRA is calculated if only one spouse works by finding the smallest value of Line 6 or 9 using the following MIN function:

`@MIN(D76,D79)`

This limits the IRA for a couple with a non-working spouse to $2,250 or less depending on the earned income by the working member.

Schedule C

This schedule is used to report the Profit/(Loss) from a Business or Profession. I have shown the SPREADSHEET Preparation Form that I used as Figure 8. It is a fairly simple schedule to prepare. In Part I, the Income is calculated. Line 5 adds Lines 3, 4a, 4b using the following SUM function:

`@SUM(L58..L60)`

Part II, calculates the Deductions using another SUM function on Line 31 as follows:

`@SUM(L63..L89)`

The total for the business is calculated at Line 32 with a subtraction formula as shown below:

`+L61-L90`

Part III is required for some types of businesses and should be clear to the readers.

Schedule SE

This schedule is usually required if you use Schedule C. This Schedule is used to calculate your Social Security Tax if you or your spouse are self-employed. Refer to Figure 10 for my SPREADSHEET Preparation Form. The procedure is about the same as I have been describing for the previous schedules until you get to Part III -- Computation of Social Security Tax. I will explain the few compound functions used in this section.

At Line 9, Lines 7 and 8 are added and tested to determine if the amount is less than $400. If the value is less than $400, self-employment tax is not required. Thus, the following compound function is used:

`@IF((R86+R87)>400,+R86+R87,0)`

Also, if the income is over $37,500, the tax is calculated on $37,500 regardless of the amount over the $37,500. Therefore, we add the incomes on Lines 11a and 11b. If this total is less than 37500, we calculate the tax on the lesser value; otherwise, we calculate the tax on 37500. So, the wages and tips subject to social security tax are entered on Lines 11a and 11b and added together for Line 11c. Then at Line 12, the 11c total is subtracted from 37500. Next at Line 13, the MIN function is used to determine the smaller of Lines 9 and 12:

`@MIN(R88,R93)`

If Line 13 is 37500 or more, Line 14 is 3337.95; otherwise, Line 13 is multiplied by .0935 to calculate the tax. The function to do this is as follows:

`@IF(R94>37500,3337.95,+R94*.0935)`

Schedule D

This schedule is used to calculate the taxpayer's Capital Gains and (Losses). Figure 11 shows the SPREADSHEET Preparation Form used.

Part I and Part II should be clear to the read-

```
U  V          W                  X          Y          Z      AA     A
1*****1040---FEDERAL INDIVIDUAL INCOME TAX RETURN---1983**************|
2-------------------------------------------------------------------------|
3-----Name,Initial & Last-----                          S/S#-           |
4-----Spouse Name & Initial---                          S/S#-           |
5-----Home Address------------                          Occup           |
6-----City, State & ZIP-------                          Occup           |
7=========================================================================|
8---5--Filing Status---------->+D3      <-------------------------------|
9---6e-Total Number Exemptions>+D9      <-------------------------------|
10========================================================================|
11++++INCOME RECEIVED++++++++++++++++++++++++++++++++++++++++++++++++++++|
12-7---Wages,salaries,tips,etc.-------------------------->+D10+D11       |
13-8---Interest(Sch B if >400)--------------------------->+D12+L27       |
14-9---Dividend(Sch B if >400)>+D13+L44  <-9b-Exclusion->@IF( <---------|
15-9c-Line 9a - 9b--------------------------------------->@IF(X15>+      |
16-10-Refund State & Local Inc Tax----------------------->+D14          |
17-11-Alimony Received----------------------------------->+D15          |
18-12-Business Inc or (Loss) from Sched C---------------->+D16+D17       |
19-13-Capital Gain or (Loss) from Sched D---------------->+D18          |
20-14-40% Capital Gain Distr Not on Line 13-------------->+D19          |
21-15-Supplemental Gain or (Loss) Form 4797-------------->+D20          |
22-16-Fully Taxable Pensions, IRA, Annuties Not on Line 17--->+D21      |
23-17aOther Pension & Annuties-Total Rcd                <---------------|
24-17bTaxable Amt If Any--------------------------------->+D22          |
25-18-Rents, Royalties, Partnerships, etc(Sched E)------->+D23          |
26-19-Farm Inc (Sched F)--------------------------------->+D24+D25      |
27-20aUnemployment-Total Rec---------->                 <---------------|
28-20bTaxable Amt If Any--------------------------------->+D26          |
29-21-Other Income--------------------------------------->+D27          |
30--->                                                  <---------------|
31-22-Total Income-Add Lines 7 thru 21------------------->@SUM(AA12     |
32-------------------------------------------------------------------------|
33++++ADJUSTMENTS TO INCOME++++++++++++++++++++++++++++++++++++++++++++++|
34-23-Moving Expense from 3903/3903F--------------------->+D28          |
35-24-Employee Bus Exp Form 2106------------------------->+D29+D30      |
36-25aIRA Deduction-------------------------------------->+D31+D32      |
37-25bIRA Pmts Made in 1984 in Line 25a>+D66+E66         <---------------|
38-26-Pmts to Keogh Plan--------------------------------->+D33+D34      |
39-27-Penalty on Withdrawal of Savings------------------->+D35          |
40-28-Alimony Paid--------------------------------------->+D36          |
41-29-Married Couple Deduction(Sched W)------------------>+D37          |
42-30-Disability Inc Exclusion-Form 2440----------------->+D38+D39      |
43-31-Total Adjustments-Add Lines 23 thru 30------------->@SUM(AA34     |
44-32-Adjusted Gross Income-Subtract Line 31 from 22----->+AA31-AA4     |
45-------------------------------------------------------------------------|
46                              FIGURE 4A                                |
```

```
U  V          W              X          Y          Z      AA
47**************************1040 PAGE 2*****************************
48-------------------------------------------------------------------
49++++TAX COMPUTATION+++++++++++++++++++++++++++++++++++++++++++++++++
50-33-Amount From Line 32-------------------------------->+AA44
51-34aAmount from Sched A Line 28 if Used---------------->+R57
52-34bAmt of Deductions if not Itemized-(FIGURE 13)------>+E88
53-35-Subtract line 34a or 34b from 33------------------->+AA50-AA5
54-36-Multiply $1000 by Total Number of Exemptions-Line 6--->1000*X9
55-37-Taxable Income-Subtract Line 36 from 35------------->+AA53-AA5
56-38-Tax----------------------------------------------->+AF7
57-39-Additional Taxes---------------------------------->
58    NOTE:-Use Form and Check 1040 Box-------------------------------
59-40-Total-Add Lines 38 and 39------------------------->+AA56+AA5
60-------------------------------------------------------------------
61    CREDITS----------------------------------------------------------
62-41-For Elderly(Sched R&RP)---------->+D40          <----------------
63-42-Foreign Tax(Form 1116)---------->+D41          <----------------
64-43-Investment(Form 3468)----------->+D42          <----------------
65-44-Political Contributions--------->+D43          <----------------
66-45-Child & Dependent Care Exp------>+D44          <----------------
67-46-Jobs(Form 5884)----------------->+D45          <----------------
68-47-Residential Energy(Form 5695)--->+D46          <----------------
69-48-Total Credits-Add Lines 41 thru 47---------------->@SUM(Y62
70-------------------------------------------------------------------
71-49-Balance-Subtract Line 48 From 40--Not < Zero------->@IF(+AA59
72-------------------------------------------------------------------
73++++OTHER TAXES++++++++++++++++++++++++++++++++++++++++++++++++++++++
74-50-Self-Employment(Sched SE)------------------------->+D47
75-51-Alternative Minimum(Form 6251)-------------------->+D48
76-52-Recapture Investment Credit(Form 4255)------------>+D49
77-53-S/S on Tip Inc not Reported(Form 4137)------------>+D50
78-54-Uncollected S/S & RRTA on Tips-------------------->+D51
79-55-On an IRA(Form 5329)------------------------------>+D52
80-56-Total Tax-Add Lines 49 thru 55-------------------->@SUM(AA71
81-------------------------------------------------------------------
82++++PAYMENTS++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
83-57-Federal Inc Tax Withheld-------->+D53+D54     <----------------
84-58-1983 Est Pmts & From 1982 Return->+D55         <----------------
85-59-Earned Inc Credit(line 33<$10000)>+D56         <----------------
86-60-Amount Paid with Form 4868------->+D57         <----------------
87-61-Excess S/S & RRTA Withheld------->+D58         <----------------
88-62-Credit Fed Tax Spec. Fuels(4136)->+D59         <----------------
89-63-Regd Inv Comp  Credit(Form 2439)->+D60         <----------------
90-------------------------------------------------------------------
91-64-Total Payments-Add Line 57 thru 63---------------->@SUM(Y83.
92-------------------------------------------------------------------
93-65-If Line 64 > 56, enter Amt OVERPAID--------------->@IF(+AA91
94-66-Amt of Line 65 to be REFUNDED TO YOU-------------->
95-67-Amt Line 65 Applied 1984 Est Tax->+AA93-AA94    <----------------
96-68-If Line 56 > 64, enter AMOUNT YOU OWE(attach check)--->@IF(+AA80
97-69-NOTE:-If Form 2210/2210F Used---->              <----------------
98-------------------------------------------------------------------
99                          FIGURE 5A
```

```
A  B              C                              D              E
63*********************IRA WORKSHEET*********************************
64++++++++++++++++++++++++++++++++++++++++YOUR IRA+++++++*SPOUSE IRA*
651a-Amt Paid in 1983--Form 5498---->
661b-Amt Paid in 1984 for 1983------>
671c-Add LNS #1a & 1b--------------->+D66+D67              +E66+E67
682a-Earned Income - Keogh Pmts----->+D10+D16+D24-D33      +D11+D17+D2
692b-Foreign Earned Inc(Form 2555)-->
702c-Subtract Ln #2b from 2a-------->+D69-D70              +E69-E70
713--Maximum Amount for Each-------->                2000        2000
724--Enter Smallest of Ln #1c,2c,3-->@MIN(D67,D70,D71)     @MIN(E67,E7
735a-Amt Paid Non-Working Spouse(83)-                      <----------
745b-Amt Paid Non-Working Spouse(84)>                      <----------
755c-Add Lines #5a and 5b----------->+D73+D74              <----------
766--Enter Amount from Ln #2c Above->+D70                  <----------
777--Maximum Amount---------------->                 2000 <----------
788--Enter Smallest of Ln #5c,6,7--->@MIN(D75,D76,D77)     <----------
799--Add Lns #4 and 8 (Not > 2250)-->@MAX(D72+D78,2250)    <----------
8010-Enter Smallest #6 or 9(1040-25a)@MIN(D76,D79)         <----------
81-------------------------------------------------------------------
82                          FIGURE 7
```

ers. The functions and formulas do not show completely, so I will list them below for you to transfer/adapt to your form:

Line 5, Column AT -- `@SUM(AT4..AT10)`
Line 5, Column AU -- `@SUM(AU4..AU10)`
Line 6 -- `+AU11-AT11`
Line 8 -- `+AU12-AU13`
Line 13, Column AT -- `@SUM(AT16..AU23)`
Line 13, Column AU -- `@SUM(AU16..AU23)`
Line 14 -- `+AU24-AT24`
Line 17 -- `@SUM(AU25..AU27)`
Line 19 -- `+AU28-AU29`

Now, let's do Part III together. Line 20 is a simple addition formula:

```
+AU14+AU30
```

Line 21 requires a compound function with another function and logical operator (don't forget that 1-2-3 requires logical operators like this "#OR#"). To determine the smaller value of Lines 19 or 20 and if the value is a loss, the result should be zero, and if Line 19 is blank, the result should be zero. Thus, the function will look as follows:

```
@IF(@MIN(AU30,AU32)<0#OR#AU30=0,0,
@MIN(AU30,AU32))
```

Line 22 requires a multiplication formula like this one:

```
+AT33*.6
```

Line 23 is a subtraction formula -- `+AU32-AU34`.

Lines 24a, 24b, 24c all require compound functions. I believe that you should now understand these so I will just list them for you below:

Line 24a --

```
  @IF(AU32<0#AND#AU14>=0,+AU32*.5,0)
```

Line 24b --

```
  @IF(AU32<0#AND#AU30>=0,AU32,0)
```

Line 24c --

```
  @IF(AU32<0#AND#AU14#AND#AU30<0,
AU14+AU30*.5,0)
```

Now Line 25 determines the smallest value of Lines 25a, 25b, 25c using this function:

```
@MIN(AU41,AU42,AU43)
```

Line 25a adds the values of Lines 24a, 24b, 24c using the SUM function as follows:

```
@SUM(AU37 .AU39)
```

Line 25b determines whether to use $1500 or $3000 using the following (D3=3 means married, filing separate return):

```
@IF(D3=3,1500,3000)
```

The value for Line 25c comes from Form 1040.

Part V handles carry overs and I believe that you are ready to handle these functions and formulas, so I will just list them by line

number below:

Line 26 -- @IF(AU14<=0,AU14,0)
Line 27 -- @IF(AU30>0,AU30,0)
Line 28 -- +AU48-AU49
Line 29 -- @MIN(AU40,AU50)
Line 30 -- +AU50-AU51
Line 31 -- +AU40-AU51
Line 32 -- @IF(AU30<0,AU30,0)
Line 33 -- @IF(AU14>0,AU14,0)
Line 34 -- +AU55-AU56
Line 35 -- +AU54*2
Line 36 -- +AU57-AU58

Schedule E

Schedule E is used for reporting Supplemental Income, such as, Rentals, Royalties, Partnerships, etc. Figure 12 shows the SPREADSHEET Preparation Form that I used. Part I is used for calculating Rent and Royalty Income/(Loss). Three entry columns are provided. They are columns "BB," "BC" and "BD." Column "BE" is used for the calculated values.

Lines 3a and 3b require the SUM function to add the values across the columns with functions as follows:

Line 3a -- @SUM(BB10..BD10)
Line 3b -- @SUM(BB11..BD11)

Line 17 has the totals for the three columns and a total for the values added across the columns. The functions used are as follows:

Column A -- @SUM(BB13..BB25)
Column B -- @SUM(BC13..BC25)
Column C -- @SUM(BD13 BD25)
Columns A+B+C -- @SUM(BB26..BD26)

Again Line 18 requires a SUM total across the columns like this function:

@SUM(BB27 .BD27)

Next at Line 19, the A, B, C columns are added as follows:

Column A -- +BB26+BB27
Column B -- +BC26+BC27
Column C -- +BD26+BD27

And Line 20 uses a subtraction formula like these:

Column A -- +BB10+BB11-BB28
Column B -- +BC10+BC11-BC28
Column C -- +BD10+BD11-BD28

Now for Line 21, just the profits are added and for Line 22 just the losses are added. This requires a couple of compound functions as follows:

Line 21 -- @SUM(@IF(BB29>0,BB29,0)
+@IF(BC29>0,BC29,0)+@IF(BD29>0,BD29,0)
Line 22 -- @SUM(@IF(BB29<0,BB29,0)
+@IF(BC29<0,BC29,0)+@IF(BD29<0,BD29,0)

Line 23 uses this formula -- +BE30-BE31. Line 24 uses this formula -- +BE32+BE33.

```
G  H          I                    J              K          L
52***SCH C--PROFIT/(LOSS) FROM BUSINESS OR PROFESSION**********
53+++PART I--INCOME++++++++++++++++++++++++++++++++++++++++++++
541a-Gross Receipts or Sales----------------------------------
551b-Less:Return & Allowance----------------------------------
561c-Subtract Ln #1b from 1a----------------------------+L54-L55
572--Cost of Goods Sold(Part III Ln #8)-----------------+L101
583--Subtract Ln #2 from 1c (Gross Profit)--------------+L56-L57
594a-Windfall Profit 1983-------------------------------------
604b-Other Income---------------------------------------------
615--Add Lns #3,4a,4b-----------------------------------@SUM(L58..L60
62+++PART II--DEDUCTIONS++++++++++++++++++++++++++++++++++++++
636--Advertising----------------------------------------------
647--Bad Debts from Sales-------------------------------------
658--Bank Service Charges-------------------------------------
669--Car/Truck Expenses---------------------------------------
6710-Commissions----------------------------------------------
6811-Depletion------------------------------------------------
6912-Depreciation(Form 4562)----------------------------------
7013-Dues & Publications--------------------------------------
7114-Employee Benefit Progs-----------------------------------
7215-Freight(not Part III)------------------------------------
7316-Insurance------------------------------------------------
7417-Interest on Business Indebtedness------------------------
7518-Laundry and Cleaning-------------------------------------
7619-Legal & Prof Services------------------------------------
7720-Office Expense-------------------------------------------
7821-Pension and Profit-Sharing-------------------------------
7922-Rent on Bus Property-------------------------------------
8023-Repairs--------------------------------------------------
8124-Supplies(not Part III)-----------------------------------
8225-Taxes----------------------------------------------------
8326-Travel & Entertainment-----------------------------------
8427-Utilities & Telephone------------------------------------
8528aWages-----------------------------------------------------
8628bJobs Credit-----------------------------------------------
8728cSubtract 28b from 28a------------------------------+K85-K86
8829-Windfall Profit Paid 83----------------------------------
8930-Other Expenses-------------------------------------------
9031-Add Lines 6 thru 30-------------------------------@SUM(L63..L89
9132-Subtract Ln #31 from 5 (1040-12 & Sch SE Part II-2)-+L61-L90
9233-If Ln #32 Loss Check---(Form 6189 Risk?)----------   Yes    No
93+++PART III COST OF GOOD SOLD and/or OPERATION++++++++++++++++++
941--Inventory Begin Year-------------------------------------
952--Purchases less Personal----------------------------------
963--Cost of Labor (not you)----------------------------------
974--Materials & Supplies-------------------------------------
985--Other Costs----------------------------------------------
996--Add Lines 1 thru 5-------------------------------@SUM(L94  L98
007--Less:Inv at End of Year----------------------------------
018--COST of GOODS SOLD-----(Enter Part I Ln #2)----------+L99-L100
02-------------------------------------------------------------
03                              FIGURE 8
```

```
N      O           P                Q              R          S
60*******SCH W--DEDUCTION FOR MARRIED COUPLE--BOTH WORK-1983*********
61-------------------------------------------------------------
62+++STEP 1--EARNED INCOME++++++++++++++++++++++++++++++++++++++
63------------------------ (a) YOU      (b) SPOUSE   ------------
641--WAGES, ETC-1040-LN #7->+D10        +D11          <----------
652--NET PROFIT/(LOSS)-C/F/K+D16+D24    +D17+D25      <----------
663--ADD LINES 1 & 2-------->+Q64+Q65    +R64+R65      <----------
67+++STEP 2--ADJUSTMENTS++++++++++++++++++++++++++++++++++++++++
684--1040 LN #24,25a,26,30->+D29+D31+D3 +D30+D32+D34+D3 <----------
695--SUBTRACT LN #4 FROM 3->+Q66-Q68    +R66-R68       <----------
70+++STEP 3--DEDUCTION++++++++++++++++++++++++++++++++++++++++++
716--SMALLER #5a-OR-5b-(30,000 MAXIMUM)>@MIN(Q69,R69,30 <----------
727--PERCENTAGE TO FIGURE DEDUCTION---->          X .10  <----------
738--MULTIPLY LN #6 BY 7 AND 1040-LN 29>+R71*0.1        <----------
74-------------------------------------------------------------
75                              FIGURE 9
```

Part II covers Partnerships, Trusts and S Corporations Income and (Losses). This part requires simple formulas that the reader will understand, so I will list them below by line number:

Line 26, Column BD -- +BD37+BD38
Line 26, Column BE -- +BE37+BE38
Line 27 -- +BE39-BD39
Line 29 -- +BE40-BE41
Line 30, Column BD -- +BD47+BD48
Line 30, Column BE -- +BE47+BE48
Line 33 -- +BE49-BD49
Line 35 -- +BE50-BE51

Part III -- Windfall Profit Tax Line 38 uses this formula -- +BE54+BE55.

Part IV -- Summary Line 39 uses +BE34+BE42+BE46+BE52+BE56.

```
N  O            P                  Q              R          S          |
76***SCH SE—COMPUTE S/S SELF-EMPLOYMENT TAX*************************|
77+++PART I  REGULAR COMPUTATION++++++++++++++++++++++++++++++++++++++|
781--Net Profit/Loss Sch F/K-------------+D24+D25          <------------|
792--Net Profit/Loss Sch C/K-------------+L91              <------------|
80+++PART II OPTIONAL COMPUTATION++++++++++++++++++++++++++++++++++++++|
813—Maximum Inc This Part--------------            1600 <------------|
824--Farm Method(F-31/87 or K-18a)<1600-@MIN(R82,1600)   <------------|
835—Subtract Ln #4 from 3--------------1600-R82          <------------|
846--Non-Farm Method < 1600-------------@MIN(R84,1600)   <------------|
85+++PART III COMPUTATION OF S/S TAX++++++++++++++++++++++++++++++++++|
867—Enter Amt Part I-1/II-4-------------+R78+R85          <------------|
878--Enter Amt Part I-2/II-6-------------+R79+R84          <------------|
889—Add 7 & 8 if < 400 = 0 ------------@IF((R86+R87)>4 <------------|
8910-Max Earnings for Tax---------------           35700 <------------|
9011aTotal S/S Wages--------             ------------------------------|
9111bUnreported Tips(4137)--             ------------------------------|
9211cAdd Lns #11a and 11b---------------+Q90+Q91          <------------|
9312-Subtract Ln 11c from 10-------------35700-R92         <------------|
9413-Enter Smaller 9 or 12--------------@MIN(R88,R93)     <------------|
9514-Self-Employment Tax(1040-50)-------@IF(R94>35700,3 <------------|
96-----------------------------------------------------------------------|
97                                FIGURE 10                            |
```

Charitable Contribution Worksheet

This worksheet is used only when there are Non-Itemized Deductions. (Schedule A is not used.) My SPREADSHEET Preparation Form is shown as Figure 13. The only special function required is for Line 5 that limits the deduction to $12.50 for Married, Filing Separate Return or $25. I have shown my function below:

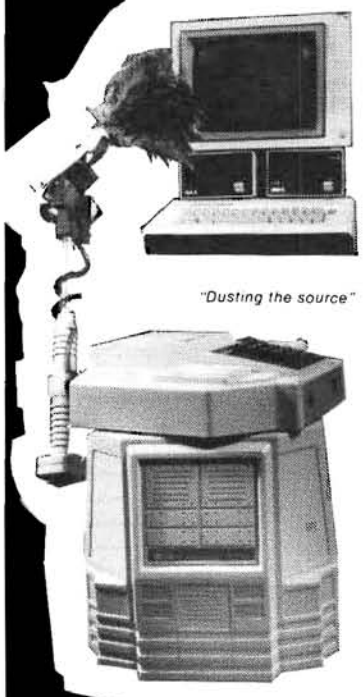
```
@IF(D3=3,@MIN(E87,12.5),@MIN(E87,25))
```

Form 1040 -- Page 1

Figure 4A shows the revised SPREADSHEET Preparation Form. There are very few changes that you will find by comparing this with your previous worksheet. The changes were required to handle the added entries for SPOUSES! Can you find them? I think so!

Form 1040 -- Page 2

Figure 5A shows the revised SPREADSHEET Preparation Form I used. Again there are only a few changes. On Line 34b, the value from the worksheet shown as Figure 13 is entered. Did you find any others?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Software Review

From time-to-time I would like to include a brief software review about a spreadsheet or database program that I feel would be of interest to the readers of "SPREADSHEET Corner." I hope that you will like this feature and that it might help you choose the right items to add to or change your set-up. It will not appear in every article, but only when I feel that I have something worth your time.

I think that this article's review of MYCALC from The Software Toolworks, 15233 Ventura Blvd., Sherman Oaks, CA 91403, (818) 986-4885 is a worthy one to start with. MYCALC can be purchased directly from them, from Heathkit catalog or from your local Heathkit Electronics Center for $59.95! It is available in versions to use with the H/Z-150/160 and H/Z-100 as Heath Part No. PA-250-1. For H/Z-89/90 computers using CP/M and soft-sector as PA-250-2 and for hard-sector as PA-250-3.

MYCALC is a full-featured, easy-to-use spreadsheet program at a budget price. It does not come with fancy documentation, but it is adequate. Of course, it is not an integrated LOTUS 1-2-3, but not everyone needs the 1-2-3 features. The Program disk has some helpful "templates" including an IRS Income Tax 1040 Form with Schedule A. It also has a step-by-step tutorial to get you off to a good start and 23 on-line "HELP" screens.

The PA-250-1 requires 128K RAM, while the CP/M version requires 64K and the HDOS version requires 56K. The H/Z-150/160 version can be configured to use any RAM you might have over the 128K to advantage. The H/Z-100 has a usable 128K limit. Both the H/Z-150/160 and H/Z-100 versions can be used with color if you have it. The maximum worksheet is 255 lines by 52 columns. Approximately 1000 entries can be used with 64K RAM and CP/M, and 4000 entries with the 128K RAM H/Z-150. References across multiple spreadsheets permit larger "models" to be handled.

The package includes a simple bar graph and a simple database. All versions can be configured to use the Heath Function Keys easily. A few commands and functions are a little different than what I have encounter before but are easily learned. For example, GET and PUT for COPY operations and lsr(x,y) means lesser of x and y, while gtr(x,y) means greater of x and y.

I have used MYCALC with both my 100 and my Z-150 with floppy disk and hard disk and I was pleasantly surprised with the program. Don't get me wrong, it is not a LOTUS 1-2-3 (my favorite), but it certainly performed near the level of PeachCalc/SuperCalc. I recommend it to the readers that do not need all the features furnished with LOTUS 1-2-3!!!

Closing

I would like to ask the "SPREADSHEET Corner" readers for some help. I have prepared two types of articles. At first, I supplied you with detailed, step-by-step instructions for several spreadsheet software programs. Next, I supplied the "SPREADSHEET Preparation Forms" that I used for creating the templates using LOTUS 1-2-3. I know that this was quite a change! Now, I would like

```
AMAN      AO          AP       AQ       AR        AS        AT        AU     AV
1****SCHEDULE D---CAPITAL GAINS & LOSSES---1983**********************
2++++PART I SHORT-TERM GAINS & LOSSES--HELD 1 YEAR OR LESS++++++++++++
3-----Describe PropDate AcqDate SldGross PrcCost+Exp-  LOSS      GAIN
4 1a
5 1b
6 1c
7 1d
8 2--Frm 2119-7/11-------------------------------------------------
9 3--Frm6252-21/29-------------------------------------------------
104--Ptnshp,S Corp-------------------------------------
115--Add 1,2,3,4---------------------------------------@SUM(AT4 @SUM(AU4
126--Combine 5 Loss & Gain-----------------------------------+AU11-AT
137--Loss Carryover------------------------------------------------
148--Combine 6 & 7-------------------------------------------------+AU12-AU
15+++PART II LONG-TERM GAINS & LOSSES--HELD > 1 YEAR++++++++++++++++++
169a
179b
189c
199d
209e
2110-2119-7,11,16,18-----------------------------------------------
2211-Frm6252-21/29-------------------------------------------------
2312-Ptnshp,S Corp-------------------------------------
2413-Add9,10,11,12-------------------------------------@SUM(AT1 @SUM(AU1
2514-Combine 13 Loss&Gain------------------------------------+AU24-AT
2615-Cap Gain Dist-------------------------------------------------
2716-Gain4797-6a-1--------------------------------------------------
2817-Combine 14-16-------------------------------------------@SUM(AU2
2918-LossCarryover-------------------------------------------------
3019-Combine 17-18-------------------------------------------+AU28-AU
31+++PART III SUMMARY I-II+++++++++++++++++++++++++++++++++++++++++++
3220-Combine8 & 19-------------------------------------------+AU14+AU
3321-Smaller19-20,0 if loss or 19 Blank-----------@IF(@MIN ----------
3422-Enter 60% #21-------------------------------------------+AT33*0.
3523-Subtract22 from 20(1040-13)-----------------------------+AU32-AU
3624-If 20 < 0 do:-------------------------------------------------------
3724aIf8 => 0,Enter 50% 20-----------------------------------@IF(AU32
3824bIf19 => 0,Enter Ln 20-----------------------------------@IF(AU32
3924cIf8 & 19 < 0,Enter 50% 19 + 8---------------------------@IF(AU32
4025-EnterHere & as a Loss 1040-13 smallest of:--------------@MIN(AU4
4125aAmt on Ln #24-------------------------------------------@SUM(AU3
4225b$3000($1500if Married Separate Return)------------------@IF(D3=3
4325cAdjTaxable Income---------------------------------------+AA37
44+++PART IV INSTALLMENTS++++++++++++++++++++++++++++++++++++++++++++
45   Check Instructions-------------------------------------------------
46+++PART V CARRYOVERS++++++++++++++++++++++++++++++++++++++++++++++++
47---SECTION A-SHORT-TERM LOSS CARRYOVER----------------------------
4826-Enter8 Loss or 0,Skip 27-30, Go To 31-------------------@IF(AU14
4927-Enter19 Gain or 0---------------------------------------@IF(AU30
5028-Reduce26 Loss by 27 Gain--------------------------------+AU48-AU
5129-EnterSmallest 25/28-------------------------------------@MIN(AU4
5230-Subtract29 from 28--------------------------------------+AU50-AU
53---SECTION B-LONG-TERM LOSS CARRYOVER-----------------------------
5431-Subtract29 From 25--------------------------------------+AU40-AU
5532-Enter19 Loss or 0,Skip 33-36----------------------------@IF(AU30
5633-Enter8 Gain or 0----------------------------------------@IF(AU14
5734-Reduce32 Loss by 33 Gain--------------------------------+AU55-AU
5835-Multiply Ln #31 * 2-------------------------------------+AU54*2
5936-Subtract35 From 34--------------------------------------+AU57-AU
60-----------------------------------------------------------------------
61                          FIGURE 11
```

```
AWAX      AY          AZ       BA        BB        BC        BD        BE     B
1***SCHEDULE E----SUPPLEMENTAL INCOME----1983**************************|
2+++PART I  RENT & ROYALTY INCOME OR LOSS++++++++++++++++++++++++++++++|
3-1-Expenses for Vacation Home, etc------------------------------ Y or N  |
4-2-If Y,Used > 14 Days or 10% Rented Days---------------------- Y or N  |
5   Property A:                                                          |
6   Property B:                                                          |
7   Property C:                                                          |
8---RENT & ROYALTY INCOME-------------------PROPERTIES-------------------|
9-----------------------------------    A         B         C     TOTALS  |
103aRents Received-----------------                                @SUM(BB1 |
113bRoyalties Rec------------------                                @SUM(BB1 |
12--RENT & ROYALTY EXPENSE-----------------------------------------------|
134-Advertising--------------------                                ---------|
145-Auto & Travel------------------                                ---------|
156-Cleaning & Maintence-----------                                ---------|
167-Commissions--------------------                                ---------|
178-Insurance----------------------                                ---------|
189-Interest-----------------------                                ---------|
1910Legal & Prof Fees--------------                                ---------|
2011Repairs------------------------                                ---------|
2112Supplies-----------------------                                ---------|
2213Taxes--------------------------                                ---------|
2314Utilities----------------------                                ---------|
2415Wages & Salaries---------------                                ---------|
25160ther--------------------------                                ---------|
2617Add Lns 4-16-------------------@SUM(BB1 @SUM(BC1 @SUM(BD1 @SUM(BB2 |
2718Depreciation or Depletion------                                @SUM(BB2 |
2819Add Ln 17 & 18-----------------+BB26+BB +BC26+BC +BD26+BD ---------|
2920Subtract 19 from 3a or 3b------+BB10+BB +BC10+BC +BD10+BD ---------|
3021Add Profits-------------------------------------------------@SUM(@IF |
3122Add Losses--------------------------------------------------@SUM(@IF |
3223Combine21 & 22-----------------------------------------------+BE30-BE |
3324Form 4835-49 Profit or Loss----------------------------------        |
3425Combine23 & 24, If Parts II,III,IV Not Used,(1040-18)------+BE32+BE |
35++PART II INCOME/LOSSES PARTNERSHIP,TRUSTS,S CORPS++++++++++++++++++|
36-----------------NAME-----------FOREIGN--ID NBR--NET LOSS--NET INC-|
37                                                                     |
38                                                                     |
3926Add Amounts-------------------------------------+BD37+BD +BE37+BE |
4027Combine Ln 26-----------------------------------------------+BE39-BD |
4128Deduct Sch K-1-----------------------------------------------        |
4229Combine27 & 28-----------------------------------------------+BE40-BE |
43                                  ---------                          |
44                                  ---------                          |
4530Add Amounts-------------------------------------+BD43+BD +BE43+BE |
4631Combine Ln 30-----------------------------------------------+BE45-BD |
47                                  ---------                          |
48                                  ---------                          |
4932Add Amounts-------------------------------------+BD47+BD +BE47+BE |
5033Combine Ln 32-----------------------------------------------+BE49-BD |
5134Deduct Sch K-1-----------------------------------------------        |
5235Combine33 & 34-----------------------------------------------+BE50-BE |
53++PART III WINDFALL PROFIT TAX++++++++++++++++++++++++++++++++++++++|
5436CREDIT/REFUND 1983-------------------------------------------        |
5537WITHHELD IN 83-----------------------------------------------        |
5638Combine36 & 37-----------------------------------------------+BE54+BE |
57++PART IV SUMMARY++++++++++++++++++++++++++++++++++++++++++++++++++|
5839Combine 25,29,31,35,38(1040-18)------------------------------+BE34+BE |
5940Gross Farming-------------------------------------          ---------|
60-----------------------------------------------------------------------|
61                          FIGURE 12                                  |
```

```
A  B              C                              D                E      F
83***CHARITABLE CONTRIBUTION WORKSHEET-NON-ITEMIZED DEDUCTIONS*********|
841--Cash Contributions-------------------------------------------      |
852--Other Contributions------------------------------------------      |
863--Add Lns #1 and #2--------------------------------------+E84+E85      |
874--Multiply Ln #3 by 25%----------------------------------+E86*0.25    |
885--Form 1040-34b($25 Max Or $12.50 Married File Separate)@IF(D3=3,@M |
89-----------------------------------------------------------------------|
90                          FIGURE 13                                  |
```

you readers to send me a postal card or letter to the author's address at the top of this article with answers to the following questions:

1) Which type of article do you like best?

2) Do you like short software reviews in the articles like the one on MYCALC in this article?

3) I have worked with LOTUS 1-2-3. Would you rather have the articles prepared with a different program? If so, which?

4) Tell me what computer set-up you are using. Do you have an H-8, H/Z-89/90, H/Z-100, H/Z-150/160, or what? How much working memory (RAM) do you have? How many disk drives and what are their capacities? What Printer will you use? Are you planning any changes soon?

5) What spreadsheet software are you using? Are you planning any changes soon?

6) Do you have a database management program? If not, do you plan on adding one? Which one? Would you like me to include short software reviews on some? Which?

7) What Projects would you like to see covered in future articles?

8) Would you like to submit a project for "SPREADSHEET Corner" to publish in a future article? When would you have it?

9) Do you have any comments, suggestions, corrections, etc. about "SPREADSHEET Corner?"

You do not need to sign your name if you do not want to. This is your "SPREADSHEET Corner" and I am going to try to make it useful for the greatest number of REMark readers and these cards will help me. If you like, I will condense the answers down and publish them in a future article.

I cannot cover all types of software and computers, but I do want to meet the needs of the MOST readers. You will get more from these articles if you will participate! It will not take you long. If you want any question answered, be SURE to include a stamped, self-addressed, business size envelope!

I want to thank all the readers that have sent me letters. It is your letters that make writing articles for REMark worthwhile! Happy spreadsheeting. Get your card to me promptly! Thank you.

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High Resolution Graphics With CP/M-85

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This is my first article for REMark, and I hope that it can be of use to some of you software hackers out there. I know that many of the programs I have seen in REMark over the years have helped me tremendously. Programs from Pat Swayne and others have nursed me from computer infancy with my Z90 to my recently acquired Z100. My Z90 gave me countless hours of enjoyment and I thought long and hard on whether or not to upgrade it or to replace it with a Z100. One day I found myself in a good position to buy a Z100, so I did. What a machine!!! I definitely made the right choice. This machine has everything that one could want; high speed, 8- or 16-bit, beautiful graphics, large support group, military approval, unbelievably clear documentation and a keyboard that can't be found on any other machine in its bracket. Although there is a possibility that my wife is going to throw me out of the house. Every now and then she slips me some food under the basement door, so it can't be too bad yet. How many HUGGIES out there are in this position? For you Heath readers, I have also built an H89 (for a friend) and split the task of wiring together a HERO robot. And on and on and on!! All endeavors to date have been successful, thanks in part to HUG and its articles in REMark. Keep up the good work.

Now excuse me for that rambling and let's get back to HIGH RESOLUTION GRAPHICS on the Z100 with CP/M-85. In the wisdom and foresight of some person or persons at either St. Joseph, at Digital Research or at Zenith, or whoever, the latest version of CP/M-85, version 2.2.103, has a couple of new functions included. They were thinking of me when they included these new functions. Incidentally, CP/M-85 2.2.103 is being shipped as a free update to users with registered versions of CP/M-85. This is how I received mine. Yet another reason why I'm glad I bought a HEATH/ZENITH product.

It seems that the 8085 upc. in the Z100 can now access all of the 8088 upc. ram area for purposes of PEEKING and POKING a byte of information. It can do so by a direct BIOS call to these new functions in CP/M-85.

Articles in earlier REMark issues have shown how to do direct system calls to CP/M, but I will attempt to give a summary of what is involved.

Normally, programs written for the CP/M operating system do their business with CP/M by calling address 5 in memory with a function number in the C register; then CP/M jumps up to high memory and vectors off to the desired subroutine. This is great, but unfortunately you can not access the subroutines in CP/M directly, by a call to address 5. The only way to access all the functions directly is to do your calls to the CP/M bios at the top of memory. You do this by finding these vectors up at BBASE and choosing the one you need for the job. This may sound difficult, but it is not.

The CP/M-85 documentation has to be the finest I have ever seen on the CP/M operating system and explains it finally, in an orderly and understandable fashion. Likewise, the source listings of CP/M-85 have been rewritten in a most organized and clean fashion. Once again HEATH/ZENITH has put it all together.

In the listing of BIOS85.ASM, the bios calls and their offsets from BBASE have been clearly defined and layed out so that anyone, even I, can understand how to use them. The two functions which interest us at the moment are the BPEEK and the BPOKE functions. In the BIOS85.ASM listing, BPEEK is shown as offset 3FH from the warm boot vector. Likewise, BPOKE is offset 42H from warm boot. With this information and a small amount of code, you can calculate the exact addresses of BPEEK and BPOKE, as I will show you later.

The BPEEK function is used (as the name suggests) to PEEK at memory, but not just any memory. It can peek at the 8088 upc. memory area. This includes the video ram memory of the Z100. To do a BPEEK function, just load HL registers with the desired memory segment, load DE with the offset in that segment and call BPEEK. CP/M-85 will return to your program with the byte you desire in the A register.

Likewise, The BPOKE function can POKE at memory. As a matter of fact, it can POKE a byte anywhere into the 8088 upc. memory area, including video ram. To do a BPOKE function, once again load HL with the segment, DE with the offset and put the byte you want to poke into C. Call BPOKE and it's there.

Well, now that we are over that, let us see how to utilize these new functions. Particularly, I will show you how to do high resolution graphics (simple for now), using MBASIC and by calling an assembler subroutine from BASIC.

The source listings have been provided for the assembler interface to BPEEK and BPOKE functions, and a BASIC example to show you how to access this interface.

Hold on! It isn't as bad as you think.

A summary of the assembler program is as follows.

First, I get the BBASE address and calculate the entry points for the BPEEK and BPOKE functions. The BBASE address is found at location 1 & 2 in memory, which CP/M programmers know as the warm boot location. The BPEEK function is a letter higher in memory. How much higher?? Well, it's exactly 3FH higher, so all I have to do is add 3FH to BBASE and I have it. BPOKE is 3 bytes higher yet. Now that I have these addresses, I save them at the appropriate places in my subroutines.

Next, I get the desired Y (vertical) location from the BC register pair pointer. I calculate the row address on the screen by using a technique similar to the one used in the May 84 REMark issue program 'Computer Graphics on the H/Z100' by Randy Meyers. Incidentally, I have utilized Randy's program with my TURBO Pascal and it works great. This program also goes a long way in explaining the Z100 graphics, and it would do you good to read it with this article for a full understanding of the situation at hand.

Now I calculate the X (horizontal) location from the DE register pair pointer. I now have the proper offset in the video segment for plotting my dot.

The next job at hand is to go get the byte of pixels already at this location in video ram and 'OR' in the desired pixel. Finally, I go poke this new byte of pixels into video ram.

A note of interest should be made here. In the AUGUST 84 issue of REMark, James T. Malone, in the BUGGIN HUG column, listed 10 extra 8085 upc. op codes. I was intrigued by them and decided to implement 2 of them in my divide routine. They work fine and have eliminated 10 instructions. If you feel uneasy about this, then you can substitute the normal move and rotate instructions. On the other hand, why not give them a try and if they don't work, then let us know.

As I stated earlier, there have been other excellent articles on the Z100 graphics organization and access, so I will not try to re-invent the wheel.

I do not wish to elaborate any further on the assembler process involved, except that this program works well, is quite well documented, and can be easily modified to do colors and complex graphics. The idea of this article is to show the hobbyist programmer, like myself, that these graphics are possible from 8-bit, and also to show him or her how to use this assembler program with a high level language, like MBASIC.

My first use of the 8-bit graphics driver was with my 8-bit Pascal programming package, but I chose to show how to call it from MBASIC for the many possibly interested BASIC programmers out there. As you may have guessed, my favorite language is Pascal. I have written a couple of large BASIC programs and they work well, but I have to admit that maintaining them can be hair raising. This is not so with Pascal. Although I believe that if you force yourself to break your BASIC program up into lots of subroutines and you label every subroutine, label every gosub statement, and use one program statement per line, then you will have a fighting chance at understanding this program at a later date. Many BASIC programmers expend too much effort into condensing their programs into a totally unreadable and almost mystical fashion. I don't think there is any good reason for this. If it's speed your looking for, then try assembler programs that you can call from BASIC. If it's room that you are short on, then use overlays. I wrote one of these mystical programs and ended up scrapping the program and starting over again. Imagine someone else trying to figure out a program I wrote that even I could not do. Nuff said on that subject.

To call this driver from BASIC, you must first clear an area in high memory for use with the assembler program. Next, you must load and initialize this program. Then finally, you can call this program at any time from your BASIC program by using a syntax such as:

```
100 CALL PLOT(X%,Y%) :' GO PLOT A DOT AT X Y COORDINATE
```

X% must be an integer from 0 to 639 and Y% must be an integer from 0 to 224. You must assign values to variables and call with variables as arguments. You can not use a statement such as CALL PLOT(300,100). It doesn't work.

Clearing a space in high memory is the easiest part of this setup procedure. To do so just type at the CP/M prompt; A>MBASIC /M:50000 when you are loading MBASIC, or if you want to run a program from the command line, type A>MBASIC PROGRAM/M:50000. MBASIC will now load and will leave all memory above 50000 alone. This is where we will stick our assembler program to access the BPEEK and BPOKE CP/M-85 functions.

The most difficult part is to get our program there. You can do this in many ways. One is to load all the program instructions into DATA statements and poke them there. This is a good way to do it. I have included the data statements in the BASIC program, along with an alternate method of loading the program into high memory.

If you don't have a copy of C80 from The Software Toolworks, too bad. With C80 there is a high speed 8085 assembler which happens to make a command file which is easy to read from BASIC. Specifically, it loads the program at 100H even if I have ORG'ed my program at 50000. Thus, I have a 256 byte COM program on my disk which has been ORG'ed at 50000. You assembler programmers know what happens with other assemblers; namely, if you make a COM file which is ORG'ed at 50000, then you will have a file on your disk of at least 50000 bytes plus your program: not very easy to load from BASIC and not very easy on disk space. So, if you have the C80 assembler handy, then lucky for you. The BASIC program here loads the program from disk or from DATA statements, but I prefer the disk method (I hate typing DATA statements). I have thoroughly tested both methods with no problems from either. If any of you hackers can think of other ways to get a COM file that has been ORG'ed in high memory onto disk, then please tell us.

Now, anywhere in the program just type CALL PLOT(x,y) and you will plot a point on the screen and return to your BASIC program. HuMMM!, has some interesting possibilities, don't it.

In closing, try the program and experiment the heck out of it. The program as it is here, can be used as a beginning to some really far out graphics, thanks entirely to the design of the Z100. As I said earlier, WHAT A MACHINE !!!

Good luck!

```
; A BASIC 8 BIT GRAPHICS DRIVER FOR THE Z100 USING
  CP/M 85 2.2.103

; CALL PLOT(X%,Y%)
;
; TO PLOT A POINT ON THE SCREEN AT X(HOR), Y(VER) AXIS
; NOTE: X RANGE : 0 - 639
;       Y RANGE : 0 - 224

; ON ENTRY: (HL) = X% ADDRESS
;           (DE) = Y% ADDRESS

;       CP/M 85 2.2.103
;       NEW FUNCTIONS: BPEEK AND BPOKE (PEEK & POKE TO
        8088 MEMORY)

BBASE   EQU     1           ;LOCATION OF JUMP ADDRESS TO
                             BBASE (WARM BOOT)
POKE88  EQU     42H         ;BPOKE OFFSET FROM BBASE
PEEK88  EQU     3FH         ;BPEEK OFFSET FROM BBASE

;       Z100 VIDEO RAM EQUATES

GRAM    EQU     0E000H      ;GREEN VIDEO RAM SEGMENT
VRPORT  EQU     0D8H        ;VIDEO RAM CONTROL PORT
```

```
; BEGIN
        ORG     50000       ;PLACE IN HIGH MEMORY
                            ;MBASIC /M:50000 REQUIRED

        PUSH    H           ;SAVE X% ADDRESS
        PUSH    D           ;SAVE Y% ADDRESS

;       CALCULATE ADDRESS OF BPEEK AND BPOKE FUNCTIONS

        LHLD    BBASE       ;GET ADDRESS OF CP/M 85 BBASE
        LXI     B,PEEK88    ;PLACE BPEEK OFFSET IN BC
        DAD     B           ;HL = CP/M 85 BPEEK FUNCTION
        SHLD    PEEKAD      ;STORE IT IN OUR BPEEK
                             SUBROUTINE
        INX     H           ;BPOKE IS 3 BYTES HIGHER
        INX     H
        INX     H
        SHLD    POKEAD      ;STORE ADDRESS IN OUR BPOKE
                             FUNCTION

;       GET Y VALUE AND ADJUST OFFSET

; Y OFFSET = ((( Y / 9 ) * 16 ) + ( Y MOD 9 )) * 128

        POP     H           ;GET Y% ADDRESS
        MOV     E,M         ;PLACE Y% IN DE
        INX     H
        MOV     D,M
        LXI     B,9         ;DIVISOR 9 IN BC
        CALL    DIV1616
        PUSH    H           ;SAVE REMAINDER ON STACK
                             ( SCAN LINE 0 - 8 )
                            ;MULTIPLICAND (QUOTIENT) IN BC
        MVI     A,16        ;MULTIPLIER 16 IN A
       CALL     MUL168
        POP     D           ;GET DIVISION REMAINDER BACK
        DAD     D           ;ADD SCAN LINE TO CHAR ROW
        PUSH    H           ;MULTIPLICAND (RESULT) IN DE
        POP     D
        MVI     A,128       ;MULTIPLIER 128 IN A
        CALL    MUL168

;       GET X VALUE AND ADJUST OFFSET

        POP     D           ;GET X% ADDRESS
        PUSH    H           ;SAVE Y% OFFSET
        XCHG
        MOV     E,M         ;PLACE X% IN DE
        INX     H
        MOV     D,M
        LXI     B,8         ;BC = DIVISOR
        CALL    DIV1616
        PUSH    H           ;PUT REMAINDER IN BC
        POP     B
        POP     H           ;GET BACK Y OFFSET
        DAD     D           ;ADD X OFFSET
        PUSH    H           ;HL =  TOTAL OFFSET, SAVE ON
                             STACK

;       PROCESS THE BIT WE NEED TO USE FOR PLOT

        MOV     A,C         ;DID OUR FINAL OFFSET DIVIDE
                             EVENLY?
        ANA     A           ;TEST FOR NO REMAINDER
        MVI     A,10000000B ;SET BIT
        JZ      BITOK       ;NO REMAINDER THEN LEAVE BIT
                             ALONE ELSE
SETBIT: RAR                 ;SHIFT BIT RIGHT ONE
        DCR     C           ;C HAS REMAINDER < 8
        JNZ     SETBIT      ;DONE WHEN ZERO
BITOK:  MOV     C,A         ;PUT POKE BYTE IN C
        PUSH    B           ;SAVE ON STACK FOR NOW
;       ALL OFFSETS AND BYTES CALCULATED , NOW PEEK AT
        BYTE , OR IN NEW BYTE

        XCHG                ;PLACE OFFSET IN DE FOR BPEEK
                             + BPOKE
        LXI     H,GRAM      ;USE GREEN RAM FOR NOW
        PUSH    H           ;SAVE ON STACK FOR NOW

;       PEEK88 AT 3FH OFFSET FROM BBASE
;       ON ENTRY: (HL) = SEGMENT
;                 (DE) = OFFSET IN SEGMENT
;       ON EXIT:  ( A) = BYTE PEEKED AT

        DB      0CDH        ;8085 CALL INSTRUCTION
PEEKAD: DW      0           ;BPEEK ADDRESS

        POP     H           ;GET BACK SEGMENT
        POP     B           ;GET BACK BYTE TO POKE
        POP     D           ;GET BACK OFFSET
        ORA     C           ;OR POKE BYTE WITH BYTE
                             THERE NOW
        MOV     C,A         ;PUT IN C FOR BPOKE FUNCTION
       IN       VRPORT      ;GET VRPORT BYTE
        ANI     0FH         ;REMOVE CONTROL BITS
        OUT     VRPORT      ;ENABLE ALL VIDEO RAM (R.G.B)

;       POKE88 AT 42H OFFSET FROM BBASE
;       ON ENTRY: (HL) = SEGMENT
;                 (DE) = OFFSET IN SEGMENT
;                 ( C) = BYTE TO POKE

        DB      0C3H        ;8085 JUMP INSTR.
POKEAD: DW      0           ;ADDRESS OF BPOKE FUNCTION
                            ;CALL WITH IMPLICIT RETURN TO
                             MAIN PROGRAM

;       16 * 8 BIT UNSIGNED MULTIPLY

;       ENTRY: (A)  = MULTIPLIER
;              (DE) = MULTIPLICAND
;       EXIT:  (HL) = RESULT

MUL168:
        LXI     H,0         ;CLEAR RESULT
MU0:    ORA     A           ;CLEAR CARRY
MU1:    RAR
        JNC     MU2         ;IF NO ADD
        DAD     D
MU2:    ORA     A
        RZ                  ;ALL BITS TESTED THEN DONE
        XCG
        DAD     H
        XCHG
        JNC     MU1         ;LOOP IF NOT OVERFLOW
        JMP     MU0

;       16/16 BIT UNSIGNED DIVISION

;       ON ENTRY: (DE) = DIVIDEND
;                 (BC) = DIVISOR
;       ON EXIT:  (DE) = QUOTIENT
;                 (HL) = REMAINDER

DIV1616:
        MOV     A,B         ;NEGATE DIVISOR
        CMA
        MOV     B,A
        MOV     A,C
        CMA
        MOV     C,A
        INX     B
        LXI     H,0         ;CLEAR REMAINDER
        MVI     A,17        ;SETUP COUNTER
DIV0:   PUSH    H           ;SAVE REMAINDER
        DAD     B           ;SUBTRACT DIVISOR
        JNC     DIV1        ;IF UNDER FLOW THEN RESTORE
        XTHL
DIV1:   POP     H
        PUSH    PSW         ;SAVE COUNTER
        DB      18H         ;UNASSIGNED 8085 INSTRUCTION
                             (RDELC)
                            ;ROTATE DE LEFT THROUGH CARRY
```

```
        MOV     A,L
        RAL
        MOV     L,A
        MOV     A,H
        RAL
        MOV     H,A
        POP     PSW
        DCR     A       ;DONE YET?
        JNZ     DIVO    ;NO - KEEP LOOPING
        ORA     A       ;CLEAN UP REMAINDER
        DB      10H     ;UNASSIGNED 8085 INSTRUCTION
                         (RHLRC)
                        ;ARITHMETIC RIGHT SHIFT OF HL
        RET

        END
```

```
10 ' A BASIC DEMO PROGRAM TO SHOW HOW TO LOAD AND USE
20 ' THE ASSEMBLER GRAPHICS PLOT SUBROUTINE
30 '
40 ' REMEMBER TO LOAD MBASIC WITH THE M: SWITCH EX.
   A>MBASIC /M:50000
50 '
60 GOSUB 630:
   ' GO LOAD THE ASSEMBLER ROUTINE FROM DATA STATEMENTS
70 PRINT CHR$(27);"E";CHR$(27);"x1";CHR$(27);"x5";
80 '
90 ' PRINT RECTANGLES
100 '
110 FOR Z%=0 TO 90 STEP 10
120     Y%=0+Z%
130     FOR X%=0+Z% TO 639-Z%
140         CALL PLOT(X%,Y%)
150     NEXT
160     X%=639-Z%
170     FOR Y%=0+Z% TO 224-Z%
180         CALL PLOT(X%,Y%)
190     NEXT
200     Y%=224-Z%
210     FOR X%=639-Z% TO 0+Z% STEP -1
220         CALL PLOT(X%,Y%)
230     NEXT
240     X%=0+Z%
250     FOR Y%=224-Z% TO 0+Z% STEP -1
260         CALL PLOT(X%,Y%)
270     NEXT
280 NEXT
290 '
300 ' PRINT CENTER AXIS AND A COUPLE OF SINE WAVES
310 '
320 Y%=112
330 FOR X%=639 TO 0 STEP -1
340     CALL PLOT(X%,Y%)
350 NEXT
360 FOR Z%=1 TO 3 STEP 2
370     FOR X%=0 TO 639
380         Y%=112+INT(100*SIN(X%/(101/Z%)))
390         CALL PLOT(X%,Y%)
400     NEXT
410 NEXT
420 '
430 ' FINISHED DEMO FOR NOW ,
    WAIT FOR ANY KEY PRESS THEN RESET TERMINAL
440 '
450 X$=INKEY$:IF X$=""THEN 450
460 PRINT CHR$(27);"z"
470 END
480 '
490 ' SUBROUTINE TO GET PLOT COMMAND FROM DISK AND LOAD
500 '
510 PLOT=50000!
520 OPEN"R",1,"PLOT.COM"
530 B%=-1
540 FIELD#1,128 AS X$
550 GET#1
560 FOR A%=1 TO 128
570     POKE PLOT+B%+A%,ASC(MID$(X$,A%,1))
580 NEXT
590 B%=B%+128
600 IF NOT EOF(1)THEN 550
610 RETURN
620 '
630 ' SUBROUTINE TO LOAD PLOT COMMAND WITH DATA STATEMENTS
640 '
650 PLOT=50000!
660 FOR A%=0 TO 150
670     READ B%
680     POKE PLOT+A%,B%
690 NEXT
700 RETURN
710 DATA 229,213,42,1,0,1,63,0,9,34,160,195,35,35,35,
    34,174,195,225,94,35,86
720 DATA 1,9,0,205,196,195,229,62,16,205,176,195,209,
    25,229,209,62,128,205,176
730 DATA 195,209,229,235,94,35,86,1,8,0,205,196,195,
    229,193,225,25,229,121
740 DATA 167,62,128,202,152,195,31,13,194,147,195,79,
    197,235,33,0,224,229,205
750 DATA 0,0,225,193,209,177,79,219,216,230,15,211,
    216,195,0,0,33,0,0,183,31,210
760 DATA 185,195,25,183,200,235,41,235,210,180,195,
    195,179,195,120,47,71,121,47
770 DATA 79,3,33,0,0,62,17,229,9,210,214,195,227,
    225,245,24,125,23,111,124
780 DATA 23,103,241,61,194,208,195,183,16,201
```


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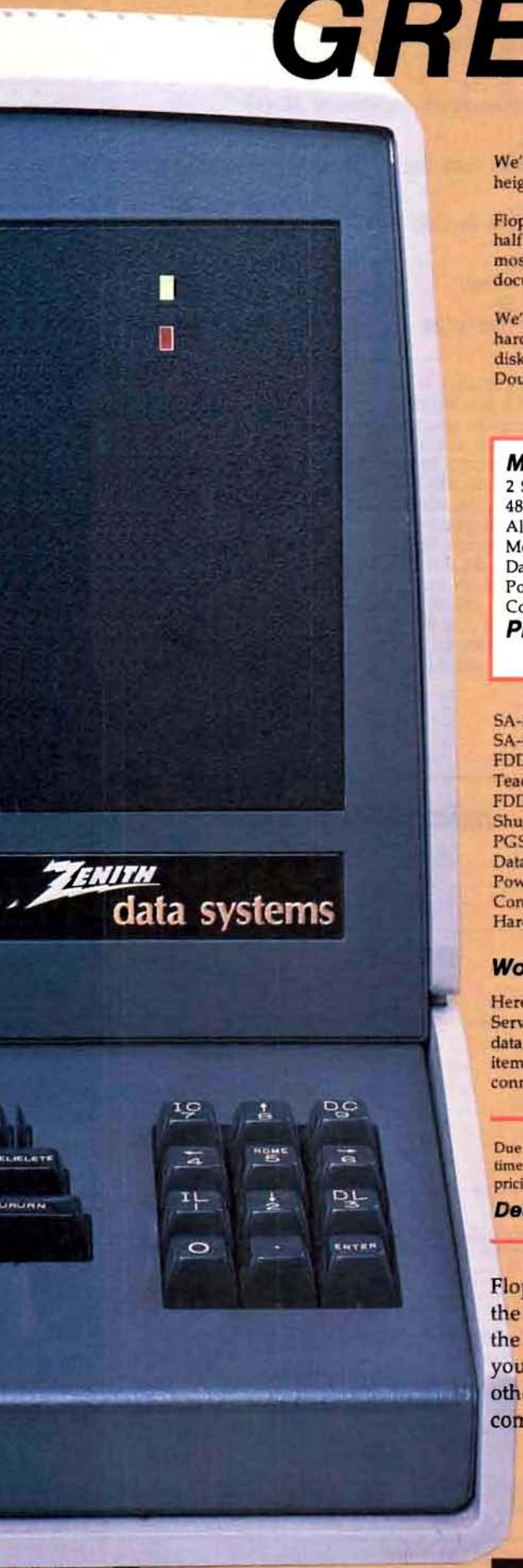

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Making Z-100 WordStar Faster

(And Other Fast Hints)

Pat Swayne
HUG Software Developer

This article is primarily concerned with modifications to make the WordStar program, as implemented on H/Z-100 computers, work faster. It also contains a technique that can be used to increase the screen output speed of many other H/Z-100 programs. In addition, some of the WordStar patches are valid for CP/M WordStar.

As many of you know, I am a fan of WordStar (that is, when it has been "fixed" by my KEYMAP program, 885-3010-37), but I was disappointed with the speed at which it handled text on the screen on an H/Z-100 computer, especially under MS-DOS 2.13. When I tried the H/Z-150/160 version on an H-160, I was amazed at how much faster it ran, and decided to try to fix the H/Z-100 version. This article is the result of my efforts.

The ROM Output Routine

(You may skip this section if assembly language techniques do not concern you.) In Appendix I of the Z-DOS manual is a listing of the entry points for some of the routines in the H/Z-100 monitor ROM. One of those routines is MTR_SCRT, which handles output to the screen. I found through experimentation that if you use that routine instead of an MS-DOS output routine, screen output will be much faster. You can use the ROM routine in an assembly language program by adding an INCLUDE DEFMTR.ASM statement at the beginning of your program (BEFORE any segment declarations), putting DEFMTR.ASM on your system disk (from your Z-DOS distribution disk), and using the following code where an MS-DOS output function would normally be used.

```
PUSHF
CLD
CALL    MTR_SCRT
POPF
```

Note that the direction flag must be cleared (CLD) before the ROM routine is called. The flags are saved on the stack to protect the original state of the direction flag. The MTR_SCRT routine destroys the AX, BX, CX, DX, SI, DI, and ES registers, so you may have to save them on the stack, as well.

The ROM Routine and WordStar

Two versions of WordStar have been released for the H/Z-100 by Heath/Zenith, and I have worked out patches for both of them. The newer version, 3.3, is unusual in the way it outputs to the screen and inputs from the keyboard. If it detects that there is enough memory in your computer, it moves its input/output (I/O) routines to another segment of memory outside of the 64k block used by WordStar, and patches WordStar so that it uses those routines. By placing the routines in another segment, the extra code for handling the function and keypad keys does not use up WordStar's text space. However, if WordStar detects that you do not have enough memory in your computer to use another segment, it will use the standard I/O routines, with the result that the function and keypad keys will not work!

Patching WordStar 3.3 I/O

After some research into the matter, I decided that the most efficient way to patch the I/O routines of WordStar 3.3 for faster operation would be to disable the part that moves code to another segment and just patch the standard I/O sections. This means that if you do these patches, you will have to use KEYMAP if you want to use function and keypad keys with WordStar (sorry about that). These patches not only install a call to the ROM for output, but calls to the BIOS for input. Since WordStar polls the keyboard constantly during its operation, patching in faster input routines means faster output. You can use DEBUG to install the patches by entering the commands as shown.

```
-NWS.COM
-L
-E55C7
xxxx:55C7 50.C3     (disables extra segment I/O)
-E2BA
xxxx:02BA 00.EB  90.24  C3.C3  00.EB  90.2E  C3.C3
xxxx:02C0 00.EB  90.31
-E2E0
xxxx:02E0 00.9A  00.03  00.00  00.40  00.00  00.75  00.03  00.B0
xxxx:02E8 00.00  00.C3  00.B0  00.FF  00.C3  00.9A  00.06  00.00
xxxx:02F0 00.40  00.00  00.C3  00.9C  00.FC  00.9A  00.19  00.00
xxxx:02F8 00.01  00.FE  00.9D  00.C3
-W
```

In these examples, the prompt characters for the MS-DOS 2.13 DEBUG program is shown ("-"). For Z-DOS, the prompt is a ">." The characters xxxx represent a segment address that is unimportant for this discussion. The comments in parentheses should not be typed in. If the old data is not what is shown above (the numbers

before the periods), do not make the patch. If you have never used DEBUG to make a patch before, see the section at the end of this article on how to use it.

Patching WordStar 3.21 I/O

WordStar version 3.21 uses standard I/O only, with patches that cause the arrow keys to work. The speed up patches for this version do not affect those patches.

```
-NWS.COM
-L
-E2C0
xxxx:02C0  00.EB  90.77
-E2E0
xxxx:02E0  2E.9A  F6.06  06.00  2C.40  03.00  FF.EB  74.14
-E312
xxxx:0312  2E.9A  F6.03  06.00  2C.40  03.00  FF.75
xxxx:0318  75.0F  11.B0  B2.00  FF.C3
-E339
xxxx:0339  00.9C  00.FC  00.9A  00.19  00.00  00.01  00.FE
xxxx:0340  00.9D  00.C3
-W
```

Other WordStar Patches

The following patches are good for any version of WordStar, except where noted. You can patch CP/M WordStar with DDT using the same addresses shown here if you have version 2.2x, or by using the label for the patch using the Winstall program if you have version 3.3. To patch using Winstall, type a + when the main menu appears, and follow the directions printed.

The first patch allows easier use with KEYMAP, by patching WordStar so that it does not clear the bottom line and does not affect the keyboard mode of operation. The Winstall label for this patch is :TRMINI.

```
-E292
xxxx:0292  05.02  1B.1B  7A.45
```

This patch is also for easier KEYMAP use. It causes WordStar to leave the bottom line alone when it exits. You should make this patch and the one above to Z-DOS WordStar version 3.3 if you made the speedup patch. The patch label is :TRMUNI.

```
-E29B
xxxx:029B  02.02  1B.1B  7A.45
```

The next patch reduces the time that the initial message remains on the screen when you call up WordStar. It also reduces the time that the "abandon file" message appears when you exit a session using ↑KQ. The patch label is :DEL4.

```
-E2D2
xxxx:02D2  10.01
```

In CP/M WordStar, the old value for the above delay is 40, and a good value to patch there is 3. The final patch removes some delays that WordStar inserts after cursor positioning and other screen activities. These delays are not required on Heath/Zenith equipment, and removing them will speed WordStar up a bit. This patch is not required for the Z-DOS/MS-DOS implementation of WordStar version 3.3. The patch label is :DELCUS.

```
-E2AE
xxxx:02AE  0A.00  05.00
```

Patching With DEBUG

The DEBUG program that was used to make the patches that were made to WordStar in this article is supplied on one of your Z-DOS or MS-DOS distribution disks. You should place both the DEBUG program and the program you want to patch on a disk in your default drive (usually A:). Then run the DEBUG by typing its name. It will prompt for your input with a ">" or "-" character, depending on the version. The first thing you must do then is to load in the file to be patched, using the N (Name) and L (Load) commands. You enter N and the name of the file to be patched

```
NWS.COM
```

and then you hit RETURN. Then you type L and RETURN again. The file is now loaded and can be patched with the E (Examine) command. You enter E followed by the patch address. For example, if you were making the last patch in this article, you would enter

```
E2AE
```

and hit RETURN. The screen will now show

```
-NWS.COM
-L
-E2AE
xxxx:02AE  0A.
```

with the cursor beside the period. There will be a four digit hex number where we have shown xxxx, but the value of that number is not the same for every system, and is not important for our purposes. You can now type the number that is to be installed at address 2AE instead of the 0A that is shown. In this case, it is 00, and after typing it, the screen shows

```
-NWS.COM
-L
-E2AE
xxxx:02AE  0A.00
```

You should NOT hit RETURN at this point unless you are finished with the patch. In this case, the patch is not finished, so you type a SPACE after typing the number. The screen now shows

```
-NWS.COM
-L
-E2AE
xxxx:02AE  0A.00  05.
```

and the cursor is beside the period after 05. Type in 00, and this time type RETURN after the number, because the patch at the current location is finished. When you are using the E command, you type RETURN only when you want to exit the E command and get back to the DEBUG prompt ("-" or ">"). After you have finished all patches, enter W and RETURN to Write the patched file back to the disk, and then enter Q and RETURN to exit DEBUG. You can now try out the patched program, and copy it to every disk where you had the old version if it works.

NOTE: The Z-100 version of KEYMAP (885-3010-37) has been upgraded to work with MS-DOS 2.13. If you have the old version that does not work with MS-DOS 2.13, send your original HUG distribution disk containing KEYMAP to Heath Users' Group, Hilltop Road, St. Joseph, MI 49085 with the envelope marked "Attn: Nancy Strunk" with $5.00, and Nancy will send you the new version.

HUG NEW PRODUCTS

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.

885-1133-[37] HDOS Games Collection I (Addendum)

In the December 1984 Issue of REMark, a game called GUNFIGHT was accidentally left out of the description of this collection of games. GUNFIGHT is a two player action game written in "C." Each player controls a gunfighter located on each side of the screen. The gunfighters are able to hide behind objects and move out and shoot at the other fighter. The gunfighter that hits the other fighter three times, wins the game. The three files included with this game are: GUNFIGHT.C, GUNFIGHT.ABS, and GUNFIGHT.DOC. These files are located on Disk "A" and a few of these disks were shipped without this game. If you purchased this games collection without the GUNFIGHT program, return your Disk "A" to Nancy Strunk here at the Heath Users' Group. In turn, your disk will be updated and returned to you.

P/N 885-5005-37 16-Bit MicroNET Connection (CP/M-86) $16.00

Introduction: This package provides the user with a User IDentification number to access the CompuServe timeshare system. The package includes a modem utility package, a CompuServe User ID and secret password to get on the system, plus some limited documentation to help the user get started using the system.

Requirements: This package contains a double-sided, soft-sectored diskette which requires the CP/M-86 Operating System on an H/Z-100 computer. Only one drive is required.

To use this package, the user will need a modem capable of ORIGINATE mode, FULL duplex operation. The modem should be capable of at least 300 baud, however 1200 baud is possible. The user is responsible for choosing a modem which fits his particular system.

The following files are contained on the HUG P/N 885-5005-37 16-Bit MicroNET Connection (CP/M-86) Disk:

README .DOC
HZTERM86 .CMD
TMTERM86 .CMD
TERM86 .DOC
FIRSTIME .NET

Refer to P/N 885-5004-37 in the January 1985 issue of REMark for a description of TERM86.

Package Description: This package has been put together to allow any member of HUG to get on the CompuServe timeshare system as soon as he/she receives the package, provided he/she has a modem as explained above.

The CompuServe User ID and secret password are sealed in an enclosed envelope in the package. The user is responsible for filling out and mailing the "Service Continuation/Request and Agreement" form to CompuServe.

CompuServe is a large timeshare data base system that has many areas of service, information, interest and fun. The HUG Special Interest Group (SIG) or Bulletin Board (BB) is a part of the CompuServe system. The member can leave, retrieve, search, scan, and reply to messages on the BB. In addition, the HUGBB has a large data base of programs on CompuServe, of which the HUGBB member can download from the host. The HUGBB also has the facility for the member to upload files to the system for others to download.

To access CompuServe, the user must have a telephone number that links to CompuServe. There are direct numbers, TYMNET and TELENET numbers that access CompuServe. TYMNET and TELENET are two telephone services that link to remote systems. For their services, they have a surcharge per hour over the cost of CompuServe.

Note: To find out if you have a telephone link in your area, call the CompuServe Customer Service Toll Free number (800) 848-8990 or (614) 457-8650. For general information about CompuServe call (800) 848-8199.

There is documentation included with the package that shows step-by-step what the user will see the first time on CompuServe (the host computer). This file could be studied before going on CompuServe to help in understanding what the host timeshare system is doing. The sample link will show how to get to the HUGBB, as well as some other options, which are significant to HUG members.

Documentation about the system is available from CompuServe for an additional charge:

1) CIS (CompuServe) User Guide
2) Personal Computing Guide
3) Special Interest Group (SIG) Manual

Refer to FIRSTIME.NET for help in ordering documentation and prices while on the system or contact CompuServe directly.

Special Note: CompuServe charges are around $6.00 an hour for regular hours and open areas. (The rates are subject to change.) Parts of CompuServe have additional charges. Any member of the HUG Bulletin Board (or SIG) receives a $.50 an hour discount for the time spent while on the HUG Bulletin Board.

The user may already have a modem package. TERM86 is supplied for the new users' convenience. The source code is not included, but is available on the part number 885-5004-37 disk.

Comments: This package will introduce a user to the timeshare system of CompuServe and access to the features of the HUG Bulletin Board.

TABLE C Rating: (0), (1), (5), (10)

P/N 885-3019-37 16-Bit MicroNET Connection (ZDOS) $16.00

Introduction: This package provides the user with a User IDentification number to access the CompuServe timeshare system. The package includes a modem utility package, a CompuServe User ID and secret password to get on the system, plus some limited documentation to help the user get started using the system.

Requirements: This package contains a double-sided, soft-sectored diskette which requires the ZDOS Operating System on an H/Z-100 computer. Only one drive is required.

To use this package, the user will need a modem capable of ORIGINATE mode, FULL duplex operation. The modem should be capable of at least 300 baud, however 1200 baud is possible. The user is responsible for choosing a modem which fits his particular system.

The following files are contained on the HUG P/N 885-3019-37 16-Bit MicroNET Connection (ZDOS) Disk:

README .DOC
TERMZ100 .COM
TERMZ100 .DOC
DTERM .ASM
DTERM .COM
FIRSTIME .NET

Refer to P/N 885-3008-37 in the January 1985 issue of REMark for a description of TERMZ100 and DTERM.

Package Description: This package has been put together to allow any member of HUG to get on the CompuServe timeshare system as soon as he/she receives the package, provided he/she has a modem as explained above.

The CompuServe User ID and secret password are sealed in an enclosed envelope in the package. The user is responsible for filling out and mailing the "Service Continuation/Request and Agreement" form to CompuServe.

CompuServe is a large timeshare data base system that has many areas of service, information, interest and fun. The HUG Special Interest Group (SIG) or Bulletin Board (BB) is a part of the CompuServe system. The member can leave, retrieve, search, scan, and reply to messages on the BB. In addition, the HUGBB has a large data base of programs on CompuServe, of which the HUGBB member can download from the host. The HUGBB also has the facility for the member to upload files to the system for others to download.

To access CompuServe the user must have a telephone number that links to CompuServe. There are direct numbers, TYMNET and TELENET numbers that access CompuServe. TYMNET and TELENET are two telephone services that link to remote systems. For their services, they have a surcharge per hour over the cost of CompuServe.

Note: To find out if you have a telephone link in your area, call the CompuServe Customer Service Toll Free number (800) 848-8990 or (614) 457-8650. For general information about CompuServe call (800) 848-8199.

There is documentation included with the package that shows step-by-step what the user will see the first time on CompuServe (the host computer). This file could be studied before going on CompuServe to help in understanding what the host timeshare system is doing. The sample link will show how to get to the HUGBB, as well as some other options, which are significant to HUG members.

Documentation about the system is available from CompuServe for an addition charge:

1) CIS (CompuServe) User Guide
2) Personal Computing Guide
3) Special Interest Group (SIG) Manual

Refer to FIRSTIME.NET for help in ordering documentation and prices while on the system or contact CompuServe directly.

Special Note: CompuServe charges are around $6.00 an hour for regular hours and open areas. (The rates are subject to change.) Parts of CompuServe have additional charges. Any member of the HUG Bulletin Board (or SIG) receives a $.50 an hour discount for the time spent while on the HUG Bulletin Board.

The user may already have a modem package. TERMZ100 and DTERM are supplied for the new user's convenience. The source code is not included, but is available on the part number 885-3008-37 disk.

Comments: This package will introduce a user to the timeshare system of CompuServe and access to the features of the HUG Bulletin Board.

TABLE C Rating: (0), (1), (5), (10)

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) 982-3462. REMEMBER - Heath Company Parts Department is NOT capable of answering questions regarding software or REMark.

HUG Price List

The following HUG Price List contains a list of all products not included in the HUG Software Catalog. For a detailed abstract of these products, refer to the issue of REMark specified.

Part Number	Decription 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 H8/89	18.00	8
885-1044-[37]	Disk VI H8/89	18.00	
885-1064-[37]	Disk IX H8/89 Disk	18.00	
885-1066-[37]	Disk X H8/89	18.00	10
885-1069	Disk XIII Misc H8/89	18.00	

GAMES

HDOS

885-1010	Adventure Disk H8/89	10.00	4
885-1029-[37]	Disk II Games 1 H8/89	18.00	8
885-1030-[37]	Disk III Games 2 H8/89	18.00	8
885-1031	Disk IV MUSIC H8 Only	20.00	25
885-1067-[37]	Disk XI H8/19/89 Games	18.00	12
885-1068	Disk XII MBASIC Graphic Games	18.00	10
885-1088-[37]	Disk XVII MBASIC Graphic Games	20.00	14
885-1093-[37]	D$D H8/89 Disk	20.00	16
885-1096-[37]	MBASIC Action Games H8/89	20.00	18
885-1103	Sea Battle HDOS H19/8/89	20.00	20
885-1111-[37]	HDOS MBASIC Games H8/89	20.00	23
885-1112-[37]	HDOS Graphic Games H8/89	20.00	23
885-1113-[37]	HDOS Action Games H8/89	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	47
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 Seabattle	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 Cassino Gamess	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

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885-1077	TXTCON/BASCDN H8/89	18.00	
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885-8001	SE (Screen Editor)	25.00	28
885-8003	BHTOMB	25.00	28
885-8004	UDUMP	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 H8/89	20.00	21
885-1213-[37]	CP/M Disk Utilities H8/89	20.00	22
885-1217-[37]	HUG Disk Duplication Utilities	20.00	26
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885-1070	Disk XIV Home Fin H8/89	18.00	
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CP/M

885-1218-[37]	CP/M MBASIC Payroll	60.00	31
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885-1244-[37]	Spread Sht. Contest Disk VI	20.00	
885-8011-[37]	CP/M CHECKOFF	25.00	32

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Vectored to 67 ☞

A Tour Through The Debugger, Video Modes, And The Keyboard

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Last month, we presented a general introduction to the Z-100 PC, along with a quick overview of the ROM based debugger in the machine (MFM-150). This month, we'll take a closer look at how to enter the debugger, and the different video and scroll modes which are available. This month's column will also provide a summary of the special keys defined by the ROM - some of which can make the machine much more pleasant to use!

To start off, let's look at the different ways of entering the debugger. The ROM allows many different ways of achieving this, but the most straightforward are the two special key sequences Ctrl-Alt-Ins and Ctrl-Alt-Return. Many people are confused as to exactly what each of these key sequences does. Ctrl-Alt-Ins is defined as "reinitialize the computer, but do not boot from disk," and Ctrl-Alt-Return is defined as "Stop the currently running program and enter the debugger." While these commands may appear to be similar, they are intended to be used under quite different circumstances.

The first sequence, Ctrl-Alt-Ins, is used when you want to boot from a drive which is different than your default drive. For example, if your computer has a Winchester disk drive, it is probably set up to automatically boot from the hard disk when the system is powered-up or reset. If you want to boot from floppy, you might use Ctrl-Alt-Ins to enter the monitor, and then use the boot-to-floppy command "BF." The point here is that Ctrl-Alt-Ins acts as though the system were reset (in earlier versions of the MFM-150 ROM, Ctrl-Alt-Ins did not actually reset the hardware - this capability was added starting with Version 1.7 - see the text box "MFM-150 Upgrades" for more details).

The other key sequence used to enter the MFM-150 monitor is Ctrl-Alt-Return. This sequence is used for a completely different purpose - stopping a program on the fly, with the ability to continue program execution. This means that Ctrl-Alt-Return should not be used to boot from disk, etc, since the program which was running may have left the hardware in an unusual state (it may already be in the middle of a disk transfer, for instance). Therefore, Ctrl-Alt-Ins is used to start from scratch, and Ctrl-Alt-Return is used for program debugging purposes. Next month, we'll look at ways to use Ctrl-Alt-Return to debug your programs.

Now that you know how to enter the monitor correctly, you can experiment with the MFM-150 commands. Initially, enter the monitor via Ctrl-Alt-Ins (press and hold the Ctrl and Alt keys, press the Ins key, and then release all three keys). At this point, you will see the MFM-150 sign-on message. This message tells you what version of the firmware you are running, and how much memory is installed in your machine. It also provides a reminder that help on monitor usage is available by pressing the "?" key, and then pressing the Return key (note that all of the monitor commands require that you press the Return key after you have entered the command). So, enter a question mark to get a quick summary of the commands which MFM-150 supports.

One of the more interesting features of the MFM-150 ROM is that it allows you to experiment with the different video modes which are available. The command which allows you to manipulate the video display is the "V" (for Video) command. This command accepts several different options - we'll examine the "M" (Video Mode) and "S" (Scroll Mode) options. The video mode describes whether or not text or graphics is displayed on the screen, and the number of columns (40 or 80) which will be displayed. Each of the video modes has a number, as follows:

0 or 1	- Display 40x25 characters in text mode
2 or 3	- Display 80x25 characters in text mode
4 or 5	- Display 40x25 characters in graphics mode
6	- Display 80x25 characters in graphics mode
7	- Display 80x25 characters on the IBM Monochrome display adapter (if installed, this requires MFM-150 Version 1.7 or later).

The best way to understand what each of these options does is to try them out. The help command shows you how to enter this information. If you have had some problems deciphering the help message, items in brackets [like this], mean that the information inside the brackets is optional, and when you see an entry like <mode>, you must replace the <mode> with the number of the mode you are actually interested in. To enter the 40 column text mode, you could type either:

VM0 or VM1

The pairing of video modes (ie, 0 and 1 are the same) exists for IBM compatibility. Try out each of the different display modes (don't select VM7, however, if you don't have an IBM Monochrome Display Adapter installed in your machine, since the monitor ROM will display information where you can't see it). After you've selected each mode, request the help message a couple of times, so you can see how MFM-150 writes characters to the screen in each of the

different video modes.

Once you've tried out the video display modes, it's time to experiment with some of the features which make the Z-100 PCs unique. As mentioned above, MFM-150 has a "VS" (Video Scroll mode) command. Last month's article on the Z-150/160 described the three different scroll modes which were available: software, hardware, and smooth scrolling. Like the Video Modes, the Scroll Modes have numbers associated with them, as follows:

0 - Software scroll (this is the default mode, which is compatible with the IBM-PC).
1 - Hardware scroll (high-speed display)
2 - Smooth scroll (for improved readability - works only in the graphics modes - 4, 5, and 6).

To experiment with the scroll modes, the command to enter is VS<mode>, ie, VS0, VS1, or VS2. You can also combine both the Video Mode and Scroll Mode commands together, by separating the Mode and Scroll options by a space. The most interesting combinations of Video Mode and Scroll Mode include:

VM3 S0 - The default power-up display.
VM3 S1 - A super-fast 80x25 text display
VM6 S1 - High speed 80x25 graphics mode display
VM6 S2 - Smooth 80x25 graphics display.

By playing around with these combinations, you can see some of the special abilities which the Z-150 and Z-160 provide. Next month, we'll show you how you can invoke the different video and scroll modes from within your programs, along with a technique that your programs can use to determine if they are running on a Z-100 PC (as opposed to another machine).

Keyboard Features

In the above section, we mentioned a couple of key sequences you may not have been familiar with. In this section, we'll mention a few more keyboard commands that can make life a little easier.

When you first got your Z-150 or Z-160, you probably noticed that the keyboard is very quiet - rather than the usual mechanical key click, the Z-100 PCs use an electronic key click. Some people, however, don't even want the electronic key click, so Zenith provides the option of turning the key click on or off. The key sequence which controls this feature is "Alt-Esc." Each time you press these keys, the key click is "toggled" on or off. To make this feature more usable, the keyboard will automatically remember whether or not you wanted the key click each time you re-boot (until you turn the power off). If you never want to use key click, then, just enter the Alt-Esc sequence each time you turn the machine on, after it has booted up.

The reason you don't want to enter "Alt-Esc" before the machine boots up is that the "Esc" key is used to abort the boot process. If you want to prevent your computer from booting to disk when you first turn it on, press and hold the "Esc" key. This gives you yet another way of entering the MFM-150 monitor/debugger!

Another nice feature provided by the MFM-150 firmware is the ability to type-ahead while the computer is processing prior commands. Other computers also allow this capability, but some don't allow you to correct mistakes. The Z-100 PCs have a special key sequence "Alt-Scroll Lck," or Alt-Break. This sequence will empty the type-ahead buffer. If the program which is running has already "seen" your keys, this will not have any effect, but when you are

FOR H-150 USERS THE RIGHT MEMORY AND THE RIGHT PRICE.

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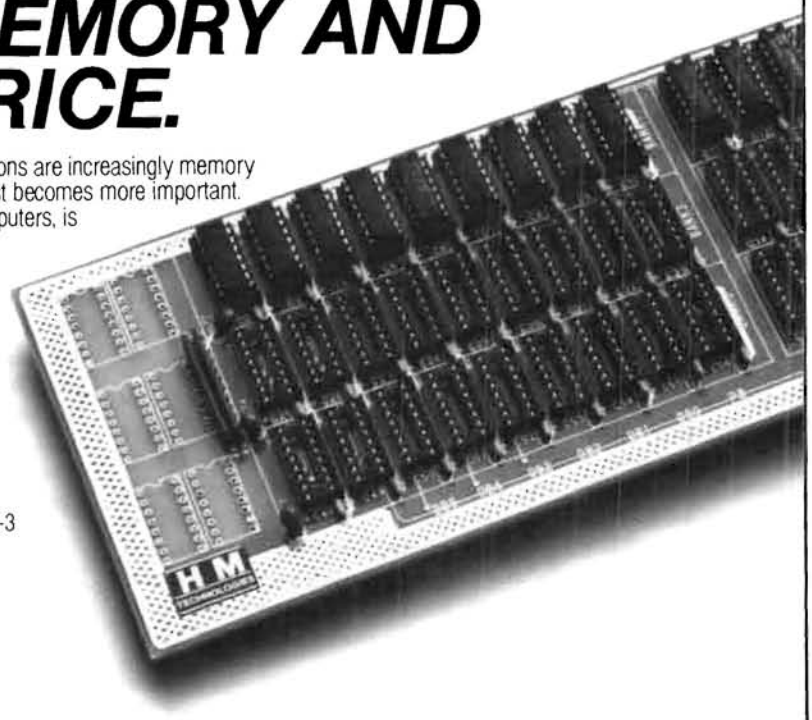

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typing ahead (while running multiple commands, for instance), it can come in quite handy.

Another use for the Alt-Break key sequence occurs when you are typing a file, and accidentally press a key. When this happens, the normal "Ctrl-S" (pause) feature will not work. If you type Alt-Break first, the computer will "throw-away" the key you accidentally typed, and Ctrl-S will work just fine.

The last feature we'll present this month is the Ctrl-NumLck key sequence. This is a special "Halt-right-now!" command which stops the program which is currently running. If you have a program where Ctrl-S doesn't work, the Ctrl-NumLck sequence will nearly always work. The interesting thing here is that this key sequence doesn't just stop characters from being displayed (as does Ctrl-S), it stops everything! So if you are trying to catch the screen display while a program is "bombing," or you just want to catch your breath in the middle of a game, keep Ctrl-NumLck in mind.

For The Future

This month's column is the first in a series. Down the road, we'll cover more programming information, details on the Z-150 and Z-160 hardware, and other features as they are added to the newest Heath/Zenith machines.

*

MFM-150 Upgrades

Heath and Zenith are continually improving upon the Z-150 and Z-160. As new features and improved compatibility are added to the firmware, a new "release" of the ROM is made available to end users. Because of this ongoing commitment on Zenith's part, you have the opportunity to keep improving your machine for a reasonable cost! Throughout this series, we'll continue to mention some of the latest bells and whistles which are being added to the machine, along with the Version numbers associated with each feature. If you see a feature that you would really like in your machine, you can order the latest version of the firmware from:

Heath Company
Parts Replacement
Benton Harbor, MI 49022
(616) 982-3571

As of this date, the most recent version of the MFM-150 firmware which is available is Version 2.0 (order part numbers 444-229-8 and 444-260-8), which contains all of the enhancements mentioned in this column, along with many other features and compatibility improvements.

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Binary Searches -- The Secret For Speed

Paul L. Eustace
8110 Tattershall Circle
Humble, Texas 77338

I'd originally intended to submit the following as a candidate for the Most Favorite Subroutine column, but in placing my thoughts in order I realized how useful the program concept is to all programmers . . .

The Big Race . . .

Today is Friday and before they go home Jim and Mark have to put up the inventory they just received. This is crucial because they're both planning to go out with saucy Janice and the first to arrive gets the date.

Each of the computers they use has their custom written program loaded and ready. Jim opens his box and finds 15 items while Mark finds 50 in his box.

Mark not only finishes first, but also "borrows" Jim's new shirt!! What was Mark's advantage?

The Answer . . .

Sherlock Holmes might have seen the advantage, but I'll tell you about it. Jim had his inventory program written to search through the records in the file in ascending order. (If not first, then let's try second . . . until last.) If he happened to have a part number that was stored as the last number in his file, the program would have to automatically take the maximum number of Reads to find the record.

On the other, hand Mark wrote his routine as a true "binary search." This is faster because when checking a sorted file you can check the middle record and find if your target record is "higher" or "lower" in the file. This "yes or no" action continues throughout the search procedure. The following illustration may aid here:

(Note: SP = SEARCHPOINT)

```
                    NAME
LO                   V      SP                          HI
|-------------------------------↑-------------------------------| SP=HI
LO           SP              HI
|-------------------------------|-------------------------------\ SP=LO
             LO      SP      HI
\-------------|-------------|-------------------------------\ MATCH
```

The values held by LO, SP and HI serve as pointers to records in the file. Please note how the position of SP moves to the center of the eligible records. Nothing in the file is changed by reassigning the variables, but it does enable you to "narrow down" the possible area where a qualifying record might be. The tilde (~) shows the "positions" of the disqualified records while the hyphens (-) show those of the records still in contention. Our third line shows coincidence of the SearchPoint and the target variable.

As you run the program, you'll find that in our 100 record example there will never be an occasion where the search will have to take more than seven (7) samples to qualify the search key. This should speed up the process for most of our uses. A 10,000 item file would require less than 15 "peeks" to find the data at virtually any position!!

The following listing is an example of a Binary Search routine. For each of the 100 records it will load a 70 character record with one number. You can access each of the records by searching for the record number. The display will inform you of the actual search sequence. I hope that the comments that I've included will be helpful. When you type the program in just leave them out.

The program was compiled with Borland International's TURBO Pascal, version 2.0. I hope that this will be of some assistance in your future programming.

```
(* ============================================ *)
(*                                              *)
(*   TESTFILE.PAS Designed to demonstrate the   *)
(*                use of a Binary Search on the *)
(*                records of a file.            *)
(*                                              *)
(* ============================================ *)
(*                                              *)
(*   Written by:  Paul L. Eustace               *)
(*                8110 Tattershall Circle       *)
(*                Humble, Texas  77338          *)
(*                                              *)
(* ============================================ *)

{ Written as instructional material only.                }
{ Released for non-commercial use only.  October 4, 1984 }

PROGRAM TESTFILE;

TYPE
   SURNAME          = STRING [15];
   FIRSTNA          = STRING [15];
   COMMENT          = STRING [40];
   STRINGSET        = STRING [40];

TUG_REC = RECORD                {the structure of the file   }
   NAME1            : SURNAME; {that will be on disk is def-}
   NAME2            : FIRSTNA; {ined here.  Length is 70    }
   REMARK           : COMMENT; {characters.                 }
   END;

CONST
   FNAME = 'TEST.FIL'; { STANDARD FILE NAME LOCATED HERE }
```

```
LABEL LOOP1;                { contrary to some ideas loops can}
                            { facilitate matters sometimes.    }
VAR
  FILE1        : FILE OF TUG_REC;
  F1_REC       : TUG_REC; {all of the variables are defined }
  ITEM         : SURNAME; {in this block.                    }
  SEARCHPOINT,
  MEMBERNO, I,
  LINECOUNT,
  LO, HI       : INTEGER;

BEGIN
  WRITELN ('INITIALIZING A DATA FILE - VALUES FROM 1 TO 100');
  WRITELN ('THIS WILL TAKE ABOUT FIVE SECONDS');
  ASSIGN (FILE1, FNAME);
  REWRITE (FILE1);          {set file pointer to first record}
  WITH F1_REC DO
  BEGIN
  FILLCHAR (NAME1, 15, ↑@);  { clear junk from memory where }
  FILLCHAR (NAME2, 15, ↑@);  { variables will be stored     }
  FILLCHAR (REMARK, 40, ↑@); { this is a must for operation }
  FOR I := 0 TO 100 DO       {Turbo Pascal starts at record 0}
    BEGIN
    SEEK (FILE1, I);
    STR(I:4,ITEM);
    NAME1 := COPY (ITEM, 1, LENGTH (ITEM));
    WRITE (FILE1, F1_REC);   {write it to disk from 0 to 100}
    END;
    CLOSE (FILE1);
    END;
REPEAT                          {second section - search}
  CLRSCR;
  ASSIGN (FILE1, FNAME);        {reopen the file        }
  RESET (FILE1);
  MEMBERNO := FILESIZE (FILE1);
  WITH F1_REC DO
  LOOP1:
    LINECOUNT := 0;
    WRITELN ('ENTER THE VALUE TO LOOK FOR . . .');
    WRITELN ('   ENTER A NEGATIVE VALUE TO QUIT');
    WRITE   ('   >> YOUR NUMBER -=> ');
    READLN (I);                 {enter search variable}
    IF I < 0 THEN HALT;
    STR (I:4, ITEM);            {set up as a 4 char string}
    LO := 0;  HI := MEMBERNO;   {reset the lo & hi pointers}
  REPEAT
    SEARCHPOINT := (( HI - LO ) DIV 2) + LO; {calculate SP}
    LINECOUNT := LINECOUNT +1; {accumulate number of tries}
    WRITELN
    ('PEEK NO:',linecount:2,' LO=',LO:3,' SP=', SEARCHPOINT:3,'
      HI', HI:3);
    SEEK (FILE1, SEARCHPOINT);
    READ (FILE1, F1_REC);
    WITH F1_REC DO
    BEGIN
      IF ITEM = NAME1 THEN     {check for match}
      BEGIN
        WRITELN ('MATCH');
        GOTO LOOP1;            {go to next search}
      END
      ELSE
        IF NAME1 < ITEM THEN LO := SEARCHPOINT ELSE HI :
        = SEARCHPOINT;
          {reset lo or hi as needed}
      END;
  UNTIL (HI-LO) <= 1;    {keep doing until none left}
  WRITELN ('NO MATCH HERE');{if no match write no match}
  GOTO LOOP1;
UNTIL I < 0;
END.
```

*

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- IBM PC/Zenith 100 (CP/M) D.S. D.D.*
- Kaypro II S.S. D.D.
- Morrow Micro Decisions S.S. D.D.
- NEC PC-8001A S.S. D.D.
- Osborne S.S. S.D.
- Osborne S.S. D.D.
- Otrona D.S. D.D.*
- Superbrain Jr. S.S. D.D.
- TI Professional S.S. D.D.
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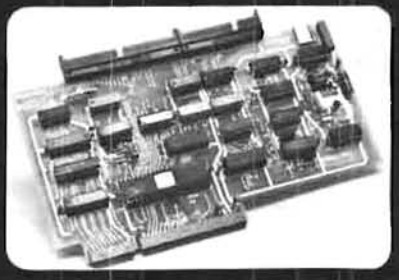

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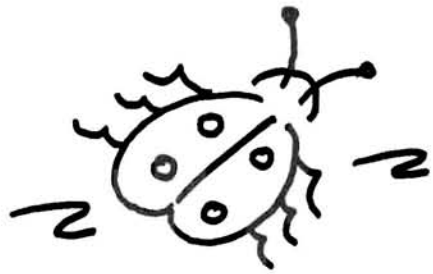

Due to typesetting problems, a section of the program of Z-ARTIST on Page 13 of the December 1984 issue is missing. We are sorry for any inconvenience this may have caused.

```
800 LOCATE TY%,TX% : PRINT A$ :
    IF A$<>"" THEN TX%=TX%+1
810 IF A$=CHR$(8) OR A$=CHR$(29) OR A$=CHR$(127)
    THEN TX%=TX%-2
820 IF A$= CHR$(31) THEN TX%=TX%-1 : TY%=TY%+1
830 IF A$= CHR$(30) THEN TX%=TX%-1 : TY%=TY%-1
840 IF A$=CHR$(13) THEN COLOR 7,0 : GOSUB 2440 :
    GOSUB 3490 : RETURN ELSE 750
850 GOSUB 2440 : PRINT
    "(CIRCLE) ENTER CENTER POINT OF CIRCLE"
860 GOSUB 2040 : X1=X : Y1=Y
870 GOSUB 2440 : PRINT
    "SPACE CURSOR TO THE RIGHT TO INDICATE RADIUS"
880 GOSUB 2040 : R=X-X1 : IF R=0 THEN 980
890 IF X1-R<2 THEN 930
900 IF INT(Y1-R/2.28261)>9 AND INT(Y1+R/2.28261)<215
    AND R>0 THEN 910 ELSE 930
910 GOSUB 2440 : PRINT "ENTER COLOR" : K$="{" :
    GOSUB 2040 : IF C1=C2 THEN 950
920 GOSUB 2440 : PRINT
    "CIRCLE COMMAND REQUIRES A PRIMARY COLOR" : GOTO 940
930 GOSUB 2440 : PRINT
    "IMPROPER COORDINATES OR CIRCLE TOO BIG"
940 GOSUB 510 : GOSUB 3490 : X=X1 : Y=Y1 : GOSUB 3490 :
    K$="(" : GOTO 850
950 GOSUB 3490
960 CIRCLE (X1,Y1),R,C1,,,.44 :
    IF T%=2 THEN CIRCLE (X1,Y1),R+1,C1,,,.44
970 GOSUB 3490
980 GOSUB 2440 : RETURN
990 GOSUB 2440 : PRINT
    "(CLS) DO YOU REALLY WANT TO CLEAR THE SCREEN?
    (Y OR N)"
1000 Q$=INKEY$ : IF Q$="Y" OR Q$="y" THEN GOSUB 3490 :
     GOTO 1020
1010 IF Q$="N" OR Q$="n" THEN GOSUB 2440 :
     RETURN ELSE 1000
1020 LINE (1,10)-(638,214),0,BF : GOSUB 2440 :
     GOSUB 3490 : RETURN
1030 GOSUB 2440 : PRINT "(FILL) ENTER UPPER LEFT CORNER"
```


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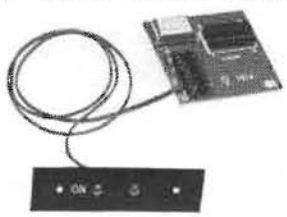

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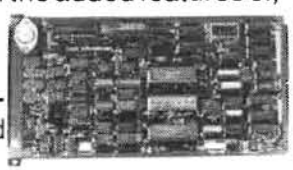

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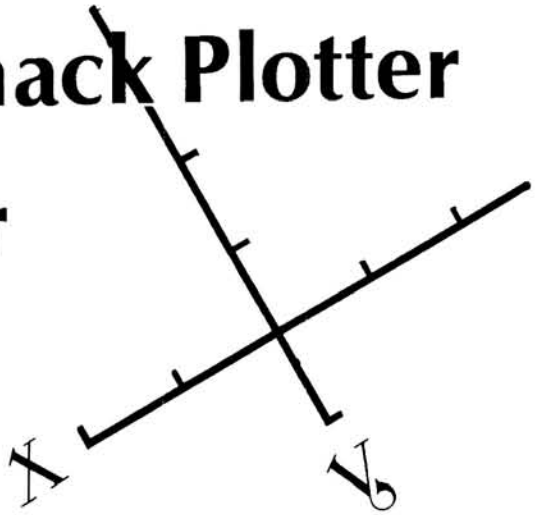
Interfacing A Radio Shack Plotter To An H/Z Computer



Walter M. Scott III
7608 Luscombe Drive
Knoxville, TN 37919

The Radio Shack model 26-1191 Multi Pen Plotter is a microprocessor controlled high resolution color graphics device. It has built-in commands to produce a variety of points, lines, circles, arcs and character strings in any of several different colors, on paper or transparencies. The plotter was not designed to be compatible with non Radio Shack computers. However, this article describes an interfacing technique that allows the plotter and an H/Z/8/89/90 computer running HDOS to work together.

The plotter expects data to be sent to it in 255 (or less) byte blocks, terminated by a carriage return (CR). After a successful data block transmission, the plotter sends a CR back to the computer when it is ready for another data block. The plotter has a buffer of about 700 characters. When the buffer is full, no CR is sent until there is room in the buffer for another data block. If additional data is sent without waiting for the CR, it will be ignored by the plotter.

Unfortunately, HDOS device drivers do not use this type of handshaking. A typical device driver will transmit a character then check the handshaking lines. If a busy signal is not present, the driver will transmit another character, then check the handshaking again. When a busy signal is received, the driver will stop transmitting characters until the busy signal is gone, which indicates that the peripheral device is ready for more data.

The peripheral ready or busy information is communicated to the computer by changing the signal level of the CTS/RTS line or the DSR/DTR line, which is called hardware handshaking. Another method is for the peripheral to send a CNTRL-S or CNTRL-Q via the serial data input line. This is called software, or X-ON/X-OFF, handshaking.

Another type of handshaking is called ETX-ACK. This is similar to the handshaking used by the plotter. In this case, the computer sends a data block terminated by an ETX (end of text, 03H), then the computer waits for the peripheral to transmit an ACK (acknowledge, 06H) before it resumes sending data. (For a thorough discussion of the serial interfacing methods used by Heath/Zenith, see the Technical Forum in issues 53-55 of HSCOOP.)

Unfortunately, none of these techniques are employed by the plotter. The best way to solve this problem of incompatibility would be to write (or rewrite) a device driver to have the following characteristics:

1) Transmit an entire block of data to the plotter, terminated by a CR.
2) After the entire block has been transmitted, wait for receipt of a CR from the plotter via the serial data input line.
3) After the CR has been received, transmit another block of data.
4) Continue with 1-3 until all data has been transmitted to the plotter.

The most expedient solution may be to modify the HDOS device driver LPH44.DVD, which uses ETX-ACK. If the ETX and ACK characters were changed to CRs, this driver should work.

Some minor modifications to device drivers are not too difficult to implement. However, to write or rewrite a driver to perform these tasks could be a formidable undertaking, even for a thoroughly experienced assembly language programmer. Fortunately, the interfacing chores can be performed directly from the applications program that is using the plotter. To accomplish this, all data transfer and handshaking is done directly from the program, and no device driver is used. Since the plotter is a relatively slow device, there is no sacrifice in speed from using this method, and there are only a few extra program lines.

To operate the plotter, a serial interface card that employs an 8250 ACE must be used, such as the HA-88-3 or H8-4. The H8-5 card will not work. The plotter, which has a female serial connector, is wired to the computer's serial port as follows:

Plotter	Computer (DTE Connector)	Function
Pin 2	Pin 3	Data from computer to plotter
Pin 3	Pin 20	Data from plotter to computer (used for DTR/DSR handshaking)
Pin 7	Pin 7	Signal ground

The signal functions, plotter pin numbers, and data directions shown are correct, regardless of how the computer's serial port is wired. The computer's serial port pin numbers are shown for a DTE connector, such as the "standard" cable supplied with an H8-4 card for use in the H8, or the "Line Printer" or "Data Terminal Equipment" connector of the HA-88-3 for use in the H/Z/89/90. If a different arrange-

ment is used, the serial port schematic should be consulted. The correct pin numbers can be identified by coordinating the function and direction of each signal. For example, the data from the computer comes from the output of an LM1488, while the handshaking goes to the input of an LM1489. In any case, a custom cable must be made as only pins 2, 3, and 7 from the plotter should be connected to the computer. (The other pins contain signals that are not compatible with RS232 signal levels.)

The interrupt jumper for the serial port being used for the plotter should be set to "off." The software routine listed in this article assumes that the serial port is configured for address 310Q, but this can be changed to any desired address. (See the manual for the computer being used for any restrictions on assigning port addresses If the address is changed, the software will also have to be changed, as discussed below. DSR/DTR handshaking is used by connecting the plotter data output line (pin 3) to the DSR/DTR input (pin 20) of the serial port. This is purely arbitrary; CTS/RTS can also be used, but the software must be changed accordingly.

The application software will configure the serial ACE for the correct protocol for the plotter. Next, it will output a line of data to the plotter, then check for a signal on the DSR/DTR line by accessing the data set ready bit (bit 5) of the modem status register (MSR) of the 8250 chip. This bit is set to one whenever the DSR/DTR line is high. (i.e. whenever the plotter sends a CR.) The software will loop until this bit is set to one, then it will transmit another line of data to the plotter.

The general characteristics of this software routine should be incorporated into any plotter software that is developed. Although the software shown is written in Microsoft BASIC, the plotter can be driven by any language that allows direct access of I/O ports.

Software Listing

```
10 GOSUB 200
20.........
30.........
"  "      "
90....P$= "........."
100 P$=";: "+ P$ + CHR$(13)
105 IF LEN(P$) > 255 THEN PRINT "DATA BLOCK TOO LONG!":
    CLOSE: END
110 GOSUB 300
120 END
200 OUT &0313, 128
201 OUT &0310, &060
202 OUT &0311, 0
203 OUT &0313, &07
204 RETURN
300 FOR X=1TO LEN(P$)
301 OUT &0310, ASC(MID$(P$,X,1))
302 NEXT
303 IF (INP(&0316) AND 32) = 32 THEN RETURN ELSE 303
```

Line 10 calls a subroutine that configures the serial port to properly communicate with the plotter. Lines 200-202 set the baud rate to 2400 and line 203 sets the data word to eight bits with no parity and two stop bits. These lines can be combined into a single line with multiple statements; they are shown on separate lines only for clarity. Lines 20-90 are that part of the program that generates data for the plotter, and places it in a variable called P$. Line 100 adds the plotter select code (see the plotter manual) and a terminating CR to P$. Line 105 verifies that P$ is not longer than 255 characters, which is the maximum that the plotter can accept at one time. Line 110 calls the subroutine that writes to the plotter. Lines 300-302 send the characters in P$ to the plotter. Line 303 checks the MSR of the computer's serial port and waits for the DSR/DTR input (pin 20) to go high. (This

```
10 ' PLOTTER DEMONSTRATION PROGRAM FOR HDOS AND MBASIC
20 ' This program for use with Radio Shack model 26-1191
    multien plotter
30 ' and H/Z/8/89/90 computer. The plotter should be
    connected as
40 ' described in the article. This program is set up for
    port address 310Q.
50 ' To change this address, revise lines 70, 440 and 450
    as required.
60 CLEAR2000
70 OUT&0313,128:OUT&0310,&060:OUT&0311,0:OUT&0313,&07
80 P$="H P1":GOSUB420
90 P$="A 200,350":GOSUB420
100 P$="S45 FOURIER ANALYSIS"+CHR$(95):GOSUB420
110 P$="P2 A 400,200 D":GOSUB420
120 'FUNDAMENTAL
130 FORZ=0TO1100STEP10
140 X=INT(100*SIN(5*6.28*Z))+400
150 Y=Z+200
160 P$="A "+RIGHT$(STR$(X),LEN(STR$(X))-1)+STR$(Y):
    GOSUB420:NEXT
170 P$="U A 550,350 S43 Fundamental Waveform"+CHR$(95):
    GOSUB420
180 '3rd harmonic
190 P$="P3 A 700,200 D":GOSUB420
200 FORZ=0TO1100STEP10
210 X=INT(100*SIN(5*6.28*Z)+(100/3)*SIN(6.28*5*3*Z))+700
220 Y=Z+200
230 P$="A "+RIGHT$(STR$(X),LEN(STR$(X))-1)+STR$(Y):
    GOSUB420:NEXT
240 P$="U A 850,350 S43 Fundamental + 3rd harmonic"
    +CHR$(95):GOSUB420
250 '5th harmonic
260 P$="P4 A 1000,200 D":GOSUB420
270 FORZ=0TO1100STEP10
280 X=INT(100*SIN(5*6.28*Z)+(100/3)*SIN(6.28*5*3*Z)+(100/5)
    *SIN(6.28*5*5*Z))+10
290 Y=Z+200
300 P$="A "+RIGHT$(STR$(X),LEN(STR$(X))-1)+STR$(Y):
    GOSUB420:NEXT
310 P$="U A 1150,350 S43 Fundamental + 3rd + 5th harmonic"
    +CHR$(95):GOSUB420
320 '7th harmonic
330 P$="P5 A 1300,200 D":GOSUB420
340 FORZ=0TO1100STEP10
350 X=INT(100*SIN(5*6.28*Z)+(100/3)*SIN(6.28*5*3*Z)+(100/5)
    *SIN(6.28*5*5*Z)+(100/7)*SIN(6.28*5*7*Z))+1300
360 Y=Z+200
370 P$="A "+RIGHT$(STR$(X),LEN(STR$(X))-1)+STR$(Y):
    GOSUB420:NEXT
380 P$="U A 1450,350 S43 Fundamental + 3rd + 5th
    + 7th harmonic"+CHR$(95):GOSUB420
390 P$="P6 A 1650,350 S44 F(X)=1/N*SIN(2*PI*N*F*X)"
    +CHR$(95):GOSUB420
400 P$="A 1750,350 S44 N=1,3,5,7 F=5Hz PI=3.14"
    +CHR$(95):GOSUB420
410 P$="H P0 Z":GOSUB420:PRINTCHR$(27);CHR$(69):END
420 'PLOTTER OUTPUT
430 P$=";: "+P$+CHR$(13)
440 FORXX=1TOLEN(P$):OUT&0310,ASC(MID$(P$,XX,1)):
    NEXTXX
450 IF(INP(&0316)AND32)=32THENRETURNELSE450
```

will occur when the plotter sends a CR back to the computer.) The routine will continuously loop at line 303 until the CR is received, then return to the main program. Line 120 ends the program. Lines 300-302 can also be combined into a single line with multiple statements.

If the address for the serial port is changed from 310Q, the octal (&O) addresses in the OUT and INP( ) commands in the software must also be changed. The table shows the port I/O address and the octal number for each appropriate line in the software:

PORT I/O	LINE #: 200 201 202 203 301 303	
300	303 300 301 303 300 306	
310	313 310 311 313 310 316	(currently used)
320	323 320 321 323 320 326	
330	333 330 331 333 330 336	(modem port)
340	343 340 341 343 340 346	(printer port)

Any of these port addresses could be used, depending on the computer model, and what other peripherals are already connected.

As plotter commands are separated by spaces, be careful in MBASIC. For example, to select pen #3, ';: P3' must be sent to the plotter. The following will not work:

```
10 P=3: P$= ";: P" + STR$(P)
```

MBASIC will send: ':; P 3' and the extra space in front of the 3 will confuse the plotter. Instead, use RIGHT$ to remove the unwanted space:

```
10 P=3: P$=";: P" + RIGHT$ (STR$(P), LEN (STR$(P) )-1)
```

If a properly configured device driver is used, commands can be sent directly to the plotter from a text file, or from the keyboard. For example:

```
COPY UD: = SY1:PLOT.DOC
```
or
```
COPY UD: = TT:
```

However, the amount of data sent should be kept fairly small so as not to overwrite the plotter's buffer.

At the beginning of each plotter program, ";: H" should be sent to the plotter or it will assume that the current pen position is the origin, which could cause problems. Also, the plotter will work with the pens capped, and stored upside down in the stalls. This is convenient for testing out programs, without wasting paper or ink.

The author has only used the plotter with HDOS. However, as long as the operating system and applications software used allows direct access of I/O ports, this interfacing technique should work. For those who wish to experiment, the plotter protocol is 2400 baud (fixed), 8 bit data word, no parity, 2 stop bits.

The interfacing technique described in this article may not be ideal, but it does work and is easy to use. The article also lays the foundation for an interface using a custom written device driver.

Happy Plotting!

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Looking At CP/M-80, CP/M-85, And CP/M-86

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By now, you're probably wondering why this column hasn't appeared for a few months. It seems that the disk for this column got lost in the mail, and since we just moved to our new house in Grand Prairie, I hadn't had time to check on it. If some of these comments seem a little untimely (particularly on the HUG Convention in Chicago), that's because they are; however, I thought that it would be better late than never. I've also taken this opportunity to update and add to the column, so there is some new information which is more up-to-date.

As I mentioned last time, we'll be looking at the differences between CP/M-80, CP/M-85, and CP/M-86. But before I get too far into that, I'd like to spend a few minutes on some comments and observations on the 1984 HUG Convention. Although I recognize that the convention has been covered by the HUG staff, I thought I also would add a few comments of my own.

As usual, Margaret Bacon did an excellent job of organizing the convention, and that was no small task. With the exception of some room problems, I thought the convention went extremely well, and I learned about a lot of interesting things. And little did I know that I was going to get a surprise!

And Was I Ever!

The awards breakfast took place on Saturday morning. Bob Ellerton was describing the various awards and during that process, I suddenly realized that he was describing some of the contributions, specifically this column and the FlipFast book series, that I had made to the Heath/Zenith community over the last year. It really hadn't had time to register when he announced that I was being given the award for the Outstanding Heath/Zenith User. I guess that I had vaguely realized that such an award was given, but I never expected to win something like that. My thanks and appreciation to Bob and the HUG staff for the recognition and award.

Tom Dornback's Talk

One of the high points of the conference for me was Tom Dornback's talk on the current status and future plans for the Heath/Zenith family of computers. For those of you who haven't seen the Winter Heathkit catalog, it contains a number of new products including new printers, software, and accessory boards. A number of new products specifically for the H/Z-150 series is also listed in the catalog.

Tom has a unique ability to answer tough questions which was apparent during the question and answer period, and I thought he handled the entire session with remarkable aplomb. Although there were a number of good questions asked, I was particularly interested in the one about the confusing similarity between the names of the Z-100 and the Z-100 PC. That particular question has bothered me, since it caused some difficulty in the writing of the MS-DOS FlipFast book because it includes both computers. Tom noted that a lot of thought had been devoted to that particular question, and that was simply the name of the series. The problem is that the H/Z-151 desktop computer and the H/Z-161 portable are also known as the H/Z-100 PC Series computers. The standard H/Z-100 nomenclature (without the PC) indicates the standard 100, 110, and 120 models. This is a fine and rather important distinction, and you may well be wondering why I spent so much time on it. The real point is that you should be extremely careful about ordering software, particularly from vendors who do not specialize in the Heath/Zenith line. Because of the total IBM compatibility of the PC series, many programs for that computer will not run on the standard H/Z-100 series as we have discussed in previous columns. I would expect that most people would order the IBM version of a program for the PC series, and specify the Heath/Zenith (or MS-DOS) version of a program for the standard H/Z-100 series. With any luck, that should avoid most problems with software.

Another question of interest to current Z-DOS owners was the cost of the update to MS-DOS 2.0. The retail price is $150.00, however, all registered Z-DOS licensees will receive a certificate for $50.00 good toward the purchase of MS-DOS 2.0. Note that the keyword here is registered. If you have not sent in the license form for Z-DOS, don't expect to receive the certificate. According to Tom, HUG members will get the usual 20% discount from that which means that the total cost is $80.00 plus any sales tax and shipping charges. While that may seem too high for a system update, I think you'll find that the

advanced features and over 30 new commands in 2.0 to be worth it.

MS-DOS Version 2 for the H/Z-100

My complements to ZDS on a nice job on this operating system. But there are a couple of things that you should know. The macro assembler, MASM, is not included in the standard operating system. Source libraries and code for the Basic Input/Output System (BIOS) are also not part of the standard release. Both are available as part of an optional "Programmers Utility Package" (CB-5063-16) which has been released for $199.00. It also includes some exciting extras, such as a screen editor. A number of additional filter commands are included with some very nice programs which will be the subject of a future column. I'll also let you know about the new MS-DOS Windows when that's released too.

Speaking of MS-DOS

My thanks to the Fort Worth HUG for inviting me to speak at their September meeting on MS-DOS version 2. I always enjoy the idea of helping introduce a new subject to a group of interested people. Since there was some concern about the price of version 2 and the fact that it does not include an assembler, we had an interesting discussion about that. Don Brown, manager of the Fort Worth Heathkit store came up with a great idea...assemble the program using the Z-DOS assembler and boot up MS-DOS to run the program. Although I feel certain that there are some "hooks" in MS-DOS that will cause a problem, I have tested it. So far, I haven't found any problems, but I've been in data processing too long. I have a feeling that the problems are there...I just haven't found them yet. My recommendation is that, if you're going to do any significant amount of programming in assembler, you should get the Programmer's Package. I think that the price is a little high, but there is some neat software that makes it worthwhile in my mind. As previously mentioned, I'll talk about the details of what's included in the Programmer's Package in a future column. As one additional note, it isn't very clear in the catalog, but the same package works for both the H/Z-100, as well as the H/Z-150 PC series. That's why the catalog mentions that three versions of the source BIOS are included.

Any discussion of MS-DOS would be incomplete without a mention of Windows. You probably are wondering why they haven't been released yet...at least I was until about a week ago. Some checking of independent sources (not connected with Heath or Zenith) revealed that, at the time of this writing, MicroSoft still hasn't provided any OEM's (Original Equipment Manufacturers) with the final release yet - MicroSoft is apparently still trying to work out some of the bugs. I'm also hearing some concerns about performance problems, memory requirements, and the need for a hard disk for Windows. I recently read in one publication that Windows may be out by the middle of the year, but...

For those of you interested in Windows or Concurrent DOS (Concurrent CP/M-86 was the old name), I would recommend that you plan to buy additional memory for your system. Some recent research has lead me to believe that this kind of capability will have memory requirements on the order of 300-350K. That's not too surprising, but obviously these new features won't be cheap.

An Introduction to CP/M

It's not too easy to compare all of the versions of CP/M that have been available for Heath/Zenith hardware, but I selected some functional categories that seem to be recognized by most CP/M users. These categories include: built-in commands, system function commands, system utilities, Winchester commands, and programming commands. As part of this review, we'll also look at the updates to CP/M-80 that have been included in version 2.2.04.

Built-in Commands

The built-in commands are shown in Table 1. There is no difference in the command or syntax between CP/M-80 and CP/M-85, but the CP/M-86 version has a couple of new twists. First, the DIR command has been enhanced with the DIRS command. DIR, as always, displays the disk directory without the system files which were set with the STAT command ($SYS option). DIRS displays the system files so you don't have to use the STAT command to see what additional files are on the disk.

The second change is that there is no SAVE command in CP/M-86. I suspect that it was sacrificed because of space in order to add the DIRS command. The absence of the SAVE command does, in some ways, make it a little more difficult to make program patches, since DDT86 must be used for this purpose.

TABLE 1

CP/M Built-in Commands

CP/M-80	CP/M-85	CP/M-86
DIR	DIR	DIR/DIRS (1)
ERA	ERA	ERA
REN	REN	REN
SAVE	SAVE	n/a
TYPE	TYPE	TYPE
USER	USER	USER

(1) Displays system files

System Function Commands

The system function commands (Table 2) provide control over the formatting and setup of the operating system. The BSYSGEN (batch sysgen) command has been added to CP/M-80 (version 2.2.04), and I think its best feature is the capability to add it to a submit file. Another new command for 2.2.04 is SETUP. This spectacular new command allows you to completely implement the BIOS for your system with a very simple menu. When the process has completed, a nice graphics display of the H-89 system (with peripheral drives if specified) is shown on the CRT so there is no doubt as to the BIOS implementation. Someone spent a lot of time to develop this, and it's really a nice implementation. I only wish I had had something like this when I was setting up my H-89. For those of you still struggling with MAKEBIOS, I recommend that you seriously consider updating to version 2.2.04. If you need some more help on MAKEBIOS, a 9 page supplemental procedure (called Makebios Procedures) is available from the ZDS Software Consultation Group.

CP/M-85 does not need anything like MAKEBIOS since BIOS is specific to the H/Z-100. A modest change has been made to the MOVCPMnn command to allow for the Z-207 (Floppy Disk) and the Z-217 (Winchester) controllers so that the actual command has been changed to MVCPMnnn. The CONFIGUR command is also slightly different, but is as easy to use as the CP/M-80 version.

CP/M-86 does not have the BSYSGEN command or the MAKEBIOS command. A new command (COPYDISK), provided by Digital Research, replaces the DUP command, and it is also menu driven for ease of use. The MOVCPM command is not needed for CP/M-86 since the memory sizing is done during cold boot. The LDCOPY (loader copy) replaces the SYSGEN command, but does not create a bootable disk. You have to use PIP to copy CPM.SYS to create a

bootable disk, and I use a submit file (SYSGEN.SUB) to also copy ALTCHAR.SYS, as well.

TABLE 2

CP/M System Function Commands

CP/M-80	CP/M-85	CP/M-86
BSYSGEN(1)	BSYSGEN	n/a
CONFIGUR	CONFIGUR	CONFIGUR
DUP	DUP	COPYDISK
FORMAT	FORMAT	FORMAT
MAKEBIOS	n/a	n/a
SETUP(1)		
MOVCPMnn	MVCPMnnn	(2)
SYSGEN	SYSGEN	LDCOPY(3)

(1) Version 2.2.04 only
(2) Memory sized at cold boot
(3) Kernel only, PIP CPM.SYS/ALTCHAR.SYS

Miscellaneous System Utilities

Table 3 shows a listing of what I call the Miscellaneous System Utilities. This includes commands that didn't seem to fit in any other category.

One of the biggest changes is that CP/M-86 has on-line help screens for the commands. Although it's very useful for the command syntax, it takes up over 30K on the disk. Another major change is that CP/M-86 does not have the XSUB utility which means that you can't run buffered commands, like ED and DDT86, in a submit file. The end result of that is that you can't run automated program patches using DDT since they have to be done on a manual basis. I believe that is a major loss since I used that capability for a lot of experimenting under CP/M-80 and CP/M-85.

The SETLP command, which dynamically changes the baud rate for the line printer port under CP/M-80, was not implemented in CP/M-85 or CP/M-86 since the CONFIGUR command can be used for that purpose.

TABLE 3

CP/M Miscellaneous System Utilities

CP/M-80	CP/M-85	CP/M-86
n/a	n/a	HELP
LIST	LIST	LIST
PIP	PIP	PIP
n/a	n/a	RDDOS (1)
SETLP	n/a	n/a
STAT	STAT	STAT
SUBMIT	SUBMIT	SUBMIT
XSUB	XSUB	(2)

(1) Copies MS-DOS/Z-DOS files to CP/M
(2) No similar function available

Winchester Commands

As you can see in Table 4, there were no significant changes in the Winchester commands between CP/M-85 and CP/M-86. The BRS (Backup/Restore) command from CP/M-80 became two commands in the later versions with essentially the same features. Other equivalent Winchester commands provided under CP/M-85 and CP/M-86 were supplied as part of the menu driven Winchester utilities for CP/M-80. An interesting side note is that the Winchester utilities PREP, PART, SHIP, and DETECT(VERIFY) are provided with a limited MS-DOS operating system. The point is that these utilities do not actually run under CP/M, but they were included in the CP/M FlipFast book for easy reference.

TABLE 4

Winchester Commands

CP/M-80	CP/M-85	CP/M-86
ASSIGN	ASSIGN	ASSIGN
BRS	BACKUP	BACKUP
	RESTORE	RESTORE
(1)	PART	PART
(1)	PREP	PREP
(1)	SHIP	SHIP
(1)	VERIFY	VERIFY

(1) Included in Z-67 Winchester Utilities

Programming Related Commands

Although there were no real changes in the programming commands between CP/M-80 and CP/M-85, there have been some interesting changes for CP/M-86, as you can see in Table 5. In particular, two versions of ASM86, DDT86, and GENDEF provide the capability for cross development between 8-bit and 16-bit systems. The reason for this is that the 8-bit systems use the COM file type for command files and the 16-bit systems use the CMD file type. Both versions of these commands have been included with CP/M-86.

Aside from that, ASM86 is essentially the same as its 8-bit cousin. DDT86 has some new commands that are different, as shown in the table. Of particular interest is the new Write command which allows you to write the contents of a block of memory to disk. The addition of this command may also be another reason why the SAVE command was not included.

The DUMP command, which allows you to list the contents of a file in both hex and ASCII formats is not available under CP/M-86. A new command, GENDEF, allows you to easily change the disk parameter tables, and takes the place of the old DISKDEF macro in the 8-bit versions of CP/M.

The LOAD command, which translates object modules (HEX) into load modules (COM), in the 8-bit versions, has been replaced by GENCMD (Generate CMD file). The new LMCMD performs a similar function for Intel L-modules. PREL, a customized H/Z command for 8-bit CP/M, is not available under CP/M-86.

TABLE 5

CP/M Programming Related Commands (Disk Resident)

CP/M-80	CP/M-85	CP/M-86
ASM	ASM	ASM86 (1)
DDT	DDT	DDT86 (1)
		Block Compare (B)
		Execution (E)
		Fill Word (FW)
		Hex (H)
		Verify (V)
		Write (W)
DUMP	DUMP	n/a
ED	ED	ED
n/a	n/a	GENDEF (1)(2)
LOAD	LOAD	
GENCMD/		LMCMD (3)
PREL	PREL	n/a

(1) CMD and COM files
(2) Generates disk definitions
(3) For Intel-L modules

The Documentation

The user documentation for 2.2.04 is completely revised and is much easier to use. In many ways, it's like the documentation for CP/M-85 and MS-DOS (Z-DOS). Because of that, you might want to send in the update card for this new version, since it looks like it's worth the $35.00 for the new documentation. Speaking of that, I've heard that a number of people expected to get new binders for this update which came as quite a surprise to people at ZDS and Heath. The intent was to replace the existing documentation in the existing binder rather than provide a completely new binder package. The new documentation was a rather complete update for the new version, and since it was really intended as a replacement, rather than a supplement, binders were not supplied since that would have also raised the cost of the update. Oh well, I guess you can't please everyone.

The CP/M-85 documentation is in a new format and is much easier to read and use than the old CP/M-80 version. Technical information is provided in the appendices, and there is an index for both volumes.

The documentation supplied with CP/M-86 is essentially the Digital Research (DR) version with a supplement on the Z-100 utilities provided by ZDS. The new DR manuals have been typeset so that they're much easier to read.

Buying Software

If you need some software that is not available through the normal Heath/Zenith channels, I can recommend 800-Software as the place to buy it. Aside from the fact that their prices are very competitive, they offer excellent technical support. As a result of using MicroPro's Star Index for the MS-DOS book, I found that the 8-bit version of Star Index had a bug that would not allow the use of command files (using the .FI command). After a call to 800-Software, their technical support representative called MicroPro to resolve the problem. Unfortunately, that's a little known bug in Star Index which still hasn't been fixed by MicroPro, but the fact that 800-Software provides that support is worth mentioning. Their prices are also extremely competitive. Although they aren't the absolute lowest that you can find, a comparison of their ads shows that you might pay an additional $5-10.00 on a $400.00 software package, but I think their technical support is definitely worth it. Their technical support is also available on Saturday, which I have found to be a big help.

More importantly, I've found that they make a genuine effort to please the customer, and that includes the ordering and technical support departments up to the president of the company. I've dealt with them for a couple of years now, and I did have a problem with some software that I bought long before I started writing this column. They resolved that problem to my complete satisfaction, and while I'm sure that they aren't able to please everyone all of the time, it's reassuring to know that they try. Although I can't discount the idea that I may be getting better service now because of this column, that entire episode was resolved before I began writing, so I don't have any reservations in recommending them to my friends.

I've also bought a lot of software from the people who advertise in REMark, and have had similar good luck with that. Although I've never had any problem with anything that I bought from an advertiser in REMark, I did have a chance to meet a number of people at the HUG convention, and I'm quite sure that they stand behind their products too.

Although I've managed to work around the real point of this discussion, the bottom line recommendation is to buy hardware and software from reputable vendors who will stand behind their products.

My New Winchester Disk

Speaking of buying things from reputable vendors, I finally could not resist the temptation to buy a hard disk at the Heathkit store at the HUG Convention. I decided to buy the 26 megabyte upgrade for my H-100. Although I managed to install it without any problems, it appears that I got a bad drive, since a rather incredible number of bad sectors have been consistently appearing. As usual, Heath is correcting the problem, and I'm glad to report that everything should be back to normal in a couple of days. And that's one of the key reasons that I believe in the Heath and Zenith products. They DO provide service and support.

While I'm not real pleased about the bum drive, I think it's important to keep the perspective that you can also get a car that's a lemon. As long as the dealer resolves the problem to your satisfaction, you'll be favorably inclined to deal with them again. And, in my opinion, both Heath and Zenith do an excellent job in that respect. They aren't perfect, and they can't satisfy everyone, but they have a well deserved reputation for excellent equipment, service, and support.

Before I bought the Winchester, I always wondered what was involved in the installation and system start up from the user perspective. Now that I know, I thought I would share my "experience" with you next month.

CP/M-86 Keymap (885-5001-37)

In the May '84 issue, I noted that the 8-bit version of Keymap would not run under the CP/M-80 emulation mode provided by CP/M-86. HUG has released the CP/M-86 version which runs with no problem. The CP/M-86 version also allows you to alter the codes produced by the Function and keypad keys. The CP/M-86 version, like the Z-DOS version, allows up to twenty characters on each key. All versions allow you to create labels for the function keys on the 25th line. Like the Z-DOS version, the CP/M-86 Keymap allows you to configure all of the H/Z-100 function keys. As mentioned in my

previous review, the CP/M-80 Keymap was created for the H-89, so it can not define all of the function keys for the H-100. I sure wish we could get an updated keymap for CP/M-85 which would allow the configuration of ALL of the function keys on the H-100.

All versions include some configured keymaps that can be used straight from the disk. KEYBAS can be used to generate commands and program lines for BASIC (CP/M) and Z-BASIC (Z-DOS). A KEYSYS version is also included with the disks which allows you to press a function key to display a directory, format a disk and other commonly used commands. And of course, neither disk would be complete without a pre-configured keymap for WordStar.

Hints and Kinks Update

I mentioned the use of WD-40 to renew fabric ribbons for your printer in the May 1984 issue. As a result of that information, I found another way to renew ribbons...Ebonize Printer Ribbon Ink Spray. It's available from Bob Small at Data Phase for $11.95. Although the price seems a little high, it does a great job of renewing my H-25 ribbons. The advertising sheet says that one can (3 ounces) will re-ink up to 20 ribbons. That's optimistic for the H-25 ribbons because they are so big, but I would guess that you should be able to reasonably get at least 15 normal size robbons from each can. Even if I only get 5 for the H-25, one new ribbon costs $10.00...about a $40.00 savings. If you're looking to save a little money on ribbons, Ebonize is recommended.

The MS-DOS (Z-DOS) FlipFast Book

By the time you read this column, the MS-DOS (Z-DOS) FlipFast Guide should be in your local Heathkit store. As you can probably tell from the title, it is another book written specifically for Heath-/Zenith users. Since this book is larger, 256 pages to be exact (compared to 192 for the CP/M book), the price has also increased to $14.95.

An interesting note on the price...at the time I wrote the September column, the price for the MS-DOS (Z-DOS) had not been determined. One of the facts of writing is that there must be sufficient lead time to write the article and then wait for it to appear in a magazine. REMark is very good in that respect, which is a compliment to Walt Gillespie and his staff, but I usually plan on a 3 month lead time for these columns. The reason for that explanation is a few people who called my publisher to order the book were very upset that the price had been "raised" to $14.95. If you look carefully at the list, you will see that I PURPOSELY omitted the price of the MS-DOS (Z-DOS) book from the list at the end of that column. Since that was obviously not clear, I will, in the future, indicate that a price for a product is "unknown" by the words "Not Available" or something similar.

Next Month

As I mentioned before, implementation of the Winchester disk was an interesting experience which I'll talk about next month. Although I have the H-100 low profile, the manual indicates that the installation is similar for the All-in-One, except for the obvious physical differences in the computers.

*

Products Reviewed	FlipFast Command Guides CP/M-80/85 MS-DOS (Z-DOS)
Ebonize Ink Spray Data Phase P.O. Box 941 Satsuma, AL 36572 (205) 675-9742 $11.95	S-A Design Books 515 W. Lambert, Bldg. E Brea, CA 92621-3991 (714) 529-7999 $12.95 $19.95
MS-DOS 2.0 (OS-61-8)	$150.00 (H/Z-100, 110, 120 only)
CP/M-80 (HOS-8917-2)	$150.00 (hard-sector)
CP/M-80 (HOS-8937-2)	$150.00 (soft-sector)
CP/M-85 (OS-53-2)	$150.00
CP/M-86 (OS-63-2)	$250.00
CP/M-86 Keymap (885-3010-37)	$ 20.00
Z-DOS Keymap (885-3010-37)	$ 20.00
CP/M Keymap (885-1230-37)	$ 20.00
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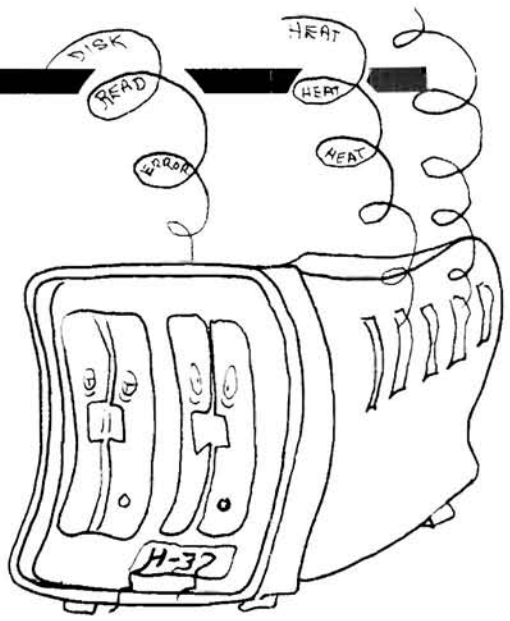
A Fan For The H/Z-37/77



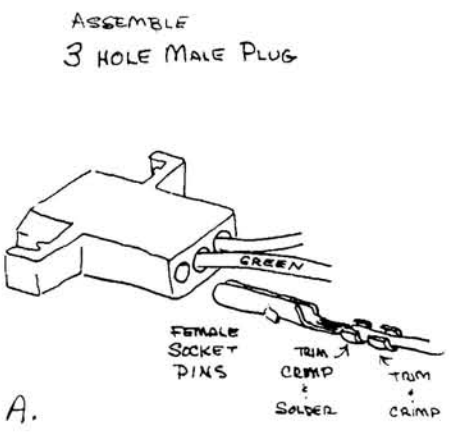
Heberto Galicia
Jennifer McGraw

Do the cooling fins on your external disk drive burn your fingers? Do you get a lot of disk errors after your computer has been on a while? Try adding a fan.

ONE: Obtain the following parts or equivalents. (All but wire are from the H-89A kit.)

Qty	Part #	Description
1	204-2452	Fan Bracket
1	420-630	Fan
1	432-148	Male plug, 3 hole
3	432-855	Female connector pin
2	250-1315	6-32 X 1-7/8 Hex-head screw
2	254-1	#6 Lockwasher
2	252-3	6-32 Nut
2	250-1316	6-32 X 1-7/8 Self tapping screw
2		8" black standard hookup wire
1		8" green standard hookup wire

TWO: Follow the Figures.



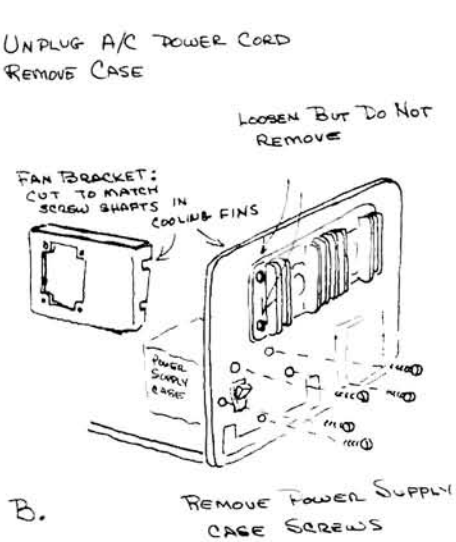


Figure B: Cut the notches in the fan bracket big enough for the screw shafts, but small enough so the nuts will hold.

WARNING: Although Galicia and I are employed in a Heathkit Electronics Center, this modification is in no way warranteed, guaranteed or acknowledged by Veritechnology Electronics Corporation, Heath Company or Zenith Data Systems. However, a Z-37 which is on 24 hours a day has had error conditions cut drastically by this addition and my H-77 has run much cooler.

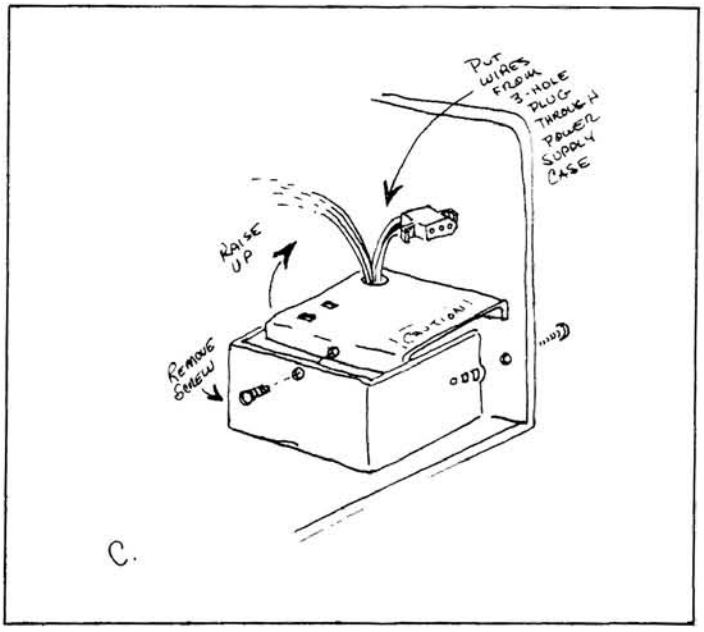
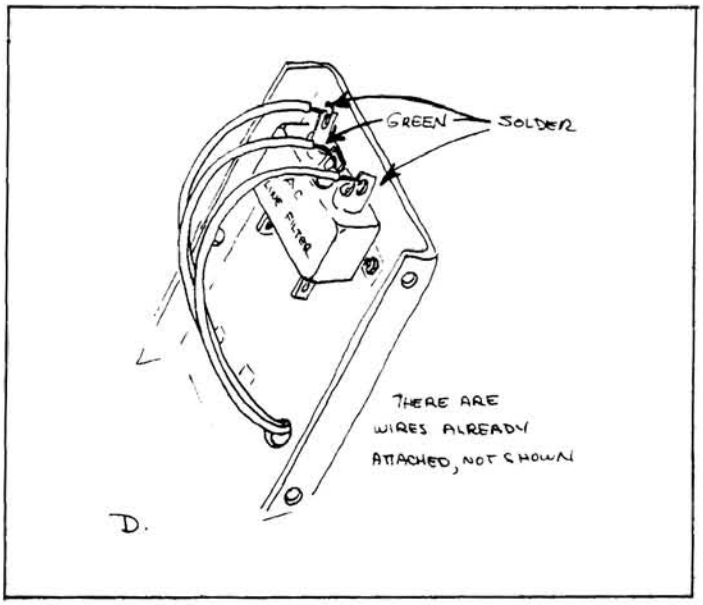


Figure C: On some models the circuit board gets in the way of raising the power supply lid. However, removing the case will give just enough room to work.

Figure D: As long as the green wire is attached to the middle solder tab, it doesn't matter which of the other two wires is soldered to the other tabs.



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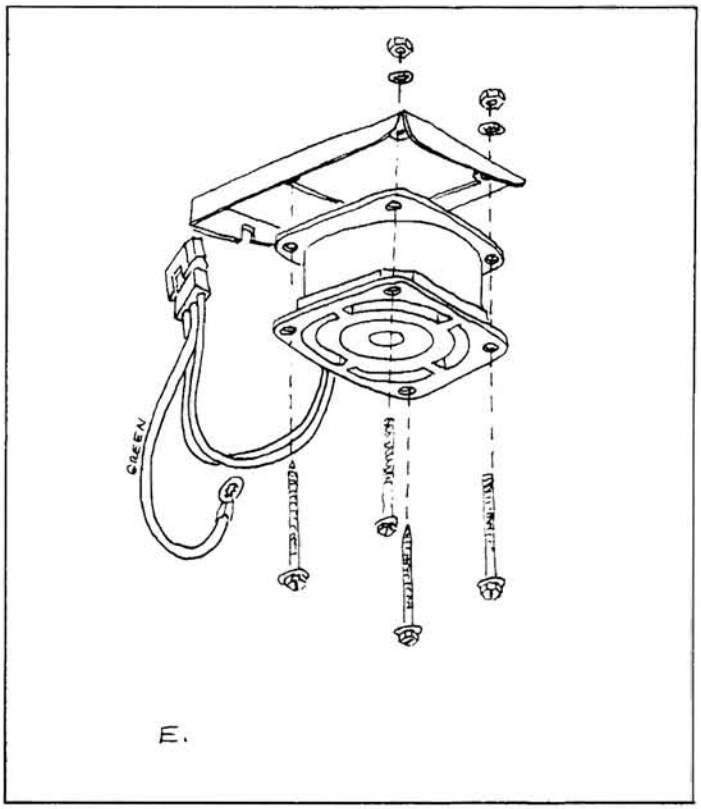
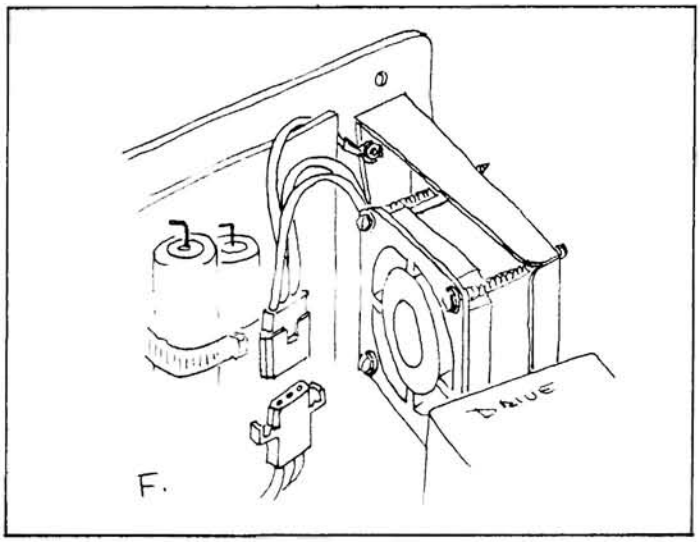


E.

Figure E: Air flow direction can be either way.

Figure F: Remove the top nut and lockwasher. Slide the fan bracket on to the screws and put on the grounding lug from the fan. Put on the lockwasher and nut and tighten, using all three of your hands. This is what I like about kit building: Instructions frequently say do thus and so with an airy wave of the hand without mentioning that you have to stand on your head and twist like a pretzel to do thus and so.



F.

My thanks to Heath Company for their great figures, which I used as a basis for mine. However, do not blame them for my mistakes.

*

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Attention Z-100* Owners!

If you are using 8-bit software on your Z-100, there are at least 17 reasons why you should be using CP/M Plus instead of CP/M-85. Here is reason number 11:

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For more information on CP/M Plus (and the other 16 reasons) please contact:

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*Z-100/110/120; not for Z-150/160 series.
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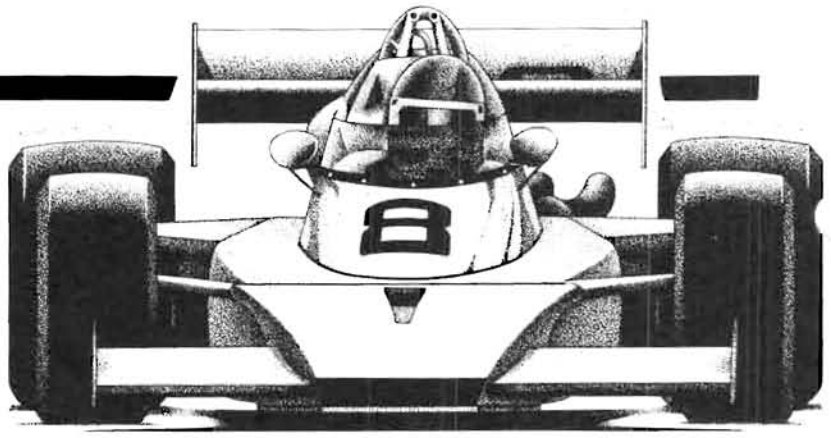
Speeding Up The Z-100



Tom Huber and John Rogers

A direct comparison of the H/Z-100 (and other computers that use the 8088) against 4 MHz Z-80 and 8080 computers often reveal slower operation than one might expect. For instance, the IBM PC is a very slow computer, particularly when compared to a machine, such as the H/Z-89, running at 4 MHz.

One of the reasons behind this is the fact that the IBM, along with the Heath and Zenith counterparts and the H/Z-100 manage a greater amount of memory than the H/Z-89. What does that have to do with the cost of tea in China, you ask? Simply this, the 8088 is still an 8-bit device, as far as the outside world is concerned. It still talks with the rest of the system over 8-bit data channels and when it wants to execute a 16-bit command, it has to go out to memory twice as often as a true 16-bit processor, such as the LSI-11 in the older H-11 and DEC PDP-11 series. Furthermore, it is designed to work with 64-kilobyte blocks of memory, called segments, and not the entire 1 megabyte that it is capable of addressing. Again, the reason is the same: its 8-bit data lines. To obtain the bits necessary to directly address a 1 megabyte memory block, it would have to have at least 12 bits of information available to it at one time.

So why did Heath/Zenith Data Systems choose the 8088 over the 8086 for the H/Z-100? I am going to offer some conjecture here, because I wasn't around when that decision was made. However, I suspect that the major factor was the choice of making the H/Z-100 compatible with the CP/M-80 world. And, the only two processors that really work efficiently together are the 8085 and the 8088. In fact, from all outward appearances, they look as though they were made for each other.

So what does this preliminary garbage have to do with a speed-up kit for the H/Z-100? A lot -- because the 8085 and 8088 share many common functions and the "faster" 8088 performs many functions for the 8085 under CP/M-85. The 8085 has its own clock that runs at 5 MHz; it won't handle faster speeds. Any speed-up conversion will only affect the 8088's operation. Fortunately, the 8088 handles I/O for the system and anything that has to be sent to the screen (in the upper 1/4 megabyte of the system) must be addressed through the 8088. Even though the 8085 executes 8080 code for CP/M-85, it is the 8088 that handles the video I/O.

Now, what about the IEEE 969 Std-1983 standard to which this computer is built? One of standard's specifications is that no signal on the bus be running faster than 6 MHz. Any modification that increases the 8088's clock to faster than 6 MHz will mean that your computer no longer meets that standard. And that means that some S-100 boards may not run at the faster speed. To put it another way, the standard for S-100 systems is being violated, and so if you do run a faster clock, you run the chance of not having accessories operate properly. Speed-sensitive devices, such as additional memory, are the most likely to have problems at higher speeds.

John Rogers and I tried the CDR Systems, Inc., ZS100 speed-up modification in several different computers; here are our findings.

First, installation is a snap, or almost so. You don't have to touch a soldering iron to any part of your computer. So if anything goes wrong after you have installed the kit, it can be easily removed, and the unit returned for service to an authorized dealer. However, don't expect the dealer (or Heathkit store) to work on the unit with the speed-up kit installed. Nor, for that matter, expect warranty service to take care of any slow parts. That is your responsibility.

Installation involves removing the IC at U236 on the main board. That location is under the video board, so disassembly will have to include the video board (you have to remove the drives before you can access it). Once the video board is out of the way, it is easy to remove the IC -- just insert a small, flat-bladed screwdriver under one end of the IC and work it up (carefully) and out of the socket. The speed-up board plugs in the empty socket and the IC into the board. The next thing to do is mount a switch to the back panel in one of many empty RS-232 slots. I picked J10, although J5 is equally as good a choice. The switch can be easily reached from the front of the computer around the right side. There was enough wire provided in one of the kits to reach any of the empty DB-25 holes, but not the other. If the longer wire is standard, the choice of mounting locations is yours (though I doubt that you would select any hole other than J5 or J10). After that is done, you are ready to reassemble your computer and try out the modification.

First things first. The switch is provided so you may select the normal operating speed of the H/Z-100 or the faster 7.5 MHz. Therefore, the first test we tried was the normal speed to make sure we didn't create any problems when we installed the board. Everything worked fine. The computer ran without any problems.

Ok, so next we turned off the computer and moved the switch to the "F" position for "fast," and without further todo, turned on the computer. One beep -- nothing else. Hummm... What could be wrong? The instruction booklet, which I haven't mentioned so far, is unusually thorough in that it provides a logical sequence of parts to check for being slow. The first part? The 8088, naturally. Oh well. The current going price for the 8088 isn't too bad, but you don't know if that will get you a fast part. Even then, checking magazines such as Radio Electronics reveals that the price for the faster part isn't too much more than the standard speed version. Yeah, I know,

double the price is a lot more, but when you are talking less than $25.00 as compared against the cost of a complete H/Z-100 even as a kit, the cost is still reasonable.

A note here, though. If you have ready access to one or more 8088s, try several. The 7.5 MHz speed was chosen over the slightly faster 8 MHz because many 5 MHz 8088s will run very well at 7.5 MHz, but not at 8 MHz. I am told by CDR that the majority of 8088s will operate at 7.5 MHz. My unit was one of the very first kits, which means that it is close to two years old. Unfortunately, all the computers we tried with the modification fell into this same category. All of them exhibited the same problem, a slow 8088. Substituting a more recent 8088 resolved the problem. No, we did not try the faster-rated 8088s for the simple reason that we wanted to see if what the vendors were telling us was true -- at this point, we believe that their claim is as they state it: the majority of the 8088s will run at 7.5 MHz. However, be prepared to replace yours if you buy this kit.

On one other computer, we ran into several disk problems. The FDC exhibited problems while trying to format disks. It would not do a successful disk format and verify (FORMAT B:/V). We checked the drive and it was fine. The problem was in a slightly slow Floppy Disk Controller. Again, my home unit exhibited no problems beyond the 8088.

Next, we ran into an unusual problem with a Winchester system. This appears to be uniquely isolated to a flakey part that only shows up after the computer has been on and running for a half-hour. At the slower clock speed, everything was fine, but at 7.5 MHz, the problem appeared. Talk about one that will be very difficult to fix! It turned out to be the "scratch" RAM on the controller.

I mentioned problems associated with the IEEE Std 969-1983 for the S-100 interface. The problem really showed up in the Z-205 card. At first, no matter what we did, we could not use the Z-205 card in the fast mode. In his research of this problem, John found that the engineers tested the Z-205 card during development to 10 MHz, well beyond the 7.5 MHz under which we were trying to get it to run. So, armed with that information, we tried faster RAM chips (120 ns) and a faster delay line (125 ns). Unfortunately, we were unable to test this theory out immediately as our only Z-205 card went up to the illustrating department in a CAD application. After several months, we "borrowed" another Z-205 card from another department (they are extremely hard to obtain through normal channels), and tested the card once again. It still didn't work, even with the appropriate memory parts and delay lines (very difficult to obtain). Going back to the engineer of the original project revealed several other important factors. It seems that with some of the product Z-205s, some of the TTL chips may be at the "slow" end of their specified speed. If this is the case, that Z-205 card may or may not work at the faster speed. Placement in the card cage will affect the card, so before you start wholesale replacement of parts, move the card to the first slot (as viewed from the front of the computer) in the card cage.

These "slow" TTL chips slow down the access timing of the memory chips themselves, resulting in the wrong "window" for read/write operations. In order to resolve this problem without resorting to replacement of ICs, you would normally implement one or more wait states on the Z-205. But here again, the TTL ICs in the wait-state circuit may be too slow in asserting the RDY signal on the S-100 bus.

To properly resolve the problem, you need to replace the slower ICs with faster ones so that the access times are no longer too long and then, if needed, replace the appropriate parts in the wait-state circuit. Here are the parts to replace:

U2, U3, U44, and U45: replace the 74LS244 with 74ALS244 (443-1096); U11: replace the 74LS04 with 74F04 (443-1137); and U14: replace the 74LS74 with 74ALS74 (443-1153).

For the wait-state circuit, replace U24, the 74LS175 with 74S175 (443-983).

John tells me that this should correct the problem with the Z-205. In some cases, you may be able to correct a problem by replacing only some of the chips, but he does not recommend this since the computer would then be operating in a marginal state and a low-voltage condition could easily cause the system to fail.

I tried out the modification with Software Wizardry's P-SST card and had no problems other than those one would expect with a faster clock -- mostly associated with software operating faster than originally intended. For instance, music played as a foreground task (and controlled by the system clock) ran much too quickly (tempo) though the notes were correct.

Therefore, we suspect that any problems will be limited to only those systems with slightly slow parts and expansion memory cards that rely heavily on exact system timing and are sensitive to propagation delays. (Does anyone remember the problems with the original Radio Shack Model I Expansion Interface?)

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Osborne 1	SSDD	Morrow MD3	DSDD	Cromemco	DSDD
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Xerox 820	SSDD	Televideo 802	DSDD	CDR 80TK	DSXD
DEC VT180	SSDD	Actrix	SSDD	NEC 8001	SSDD
Ampro	SSDD	TRS80/Omikron	SSSD	Eagle II	SSDD
DEC Rainbow	SSDD	TRS80-4 CP/M	SSDD	Z100 40TK	DSDD

A universal format program will be supplied as a free update. The H37 version requires 64K of RAM and the use of a modified version of CP/M 2.2.03 or .04 BIOS which is included with the program. Allows the use of virtual drives and reading of 40 track disks in an 80 track drive.

Must include your CP/M s/n when ordering

For H37 with Heath CP/M $59

Limited Version For CDR controller $39

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Simple plug-in installation of the REP2 gives your H89/H19 keyboard the same auto-repeat function you get with a Z100. Provision for a defeat switch.

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Another accessory that we know won't work (currently) with the faster speed is the 8087 coprocessor (Z-216). A faster version of the 8087 will probably become available by the time you read this, but my guess is that pricing will be prohibitive and it will probably not be readily available.

Ok, so what is the result of this kit. What kind of improvement in speed can I expect, you ask? Well, we ran a series of tests to see what the differences would be. The following chart will give you an idea of what we found:

	Interpreter		Compiled	
	5 MHz	7.5 MHz	5 MHz	7.5 MHz
FOR...NEXT loop, one line	12.7	8.3	6.1	4.0
FOR...NEXT loop, condensed	12.4	8.1	6.1	4.0
FOR...NEXT loop, two lines	15.7	10.3	6.1	4.0
REM	23.0	15.0	6.1	4.0
Addition	42.1	27.7	10.3	6.8
Multiplication	43.5	28.5	10.9	7.2
Division	43.5	28.6	10.9	7.0
GOSUB/RETURN	34.2	22.3	6.2	4.1
GOSUB/addition/RETURN	60.7	39.8	10.4	6.8
LINE command	48.1	31.8	45.1	29.9
PSET command (fill screen)	612.7	401.2	204.4	134.1
PRINT one character	9.4	6.0	5.4	3.5
PRINT one line	273.7	166.2	221.5	145.5
Time for total test:	3:25:35	2:12:35	1:32:52	1:01:16

Each test was run in a FOR...NEXT loop that repeated 10,000 times. Each series was run 10 times and then averaged to come up with the composite time given. The findings could be still off as much as 1 second, though I expect a tolerance of plus or minus 1/2 second to be more accurate.

The first FOR...NEXT loop had normal spacing around the colon: FOR I=1 TO 10000 : NEXT I. The next FOR...NEXT loop had the spacing removed: FOR I=1 TO 10000:NEXT I. The third FOR...NEXT loop was placed on two separate lines. All subsequent mathematical tests were placed between the two lines. Addition used A=A+B, setting A=0 and B=1 at the beginning of the test. Multiplication started with A=1 and B=1.001. Division started with A=2000 and B=1.001. The first gosub went to the RETURN statement. The second branched to an add statement, followed by the RETURN statement on the next line. The line command used 700 lines (rather than 10,000) and was an average of 200 pixels long. Then PSET command filled the entire screen, one pixel at a time (using nested FOR...NEXT loops). The PRINT one character test printed a character at a time to the screen for 2000 characters; the semicolon terminated the end of each print statement. The PRINT one line printed 78 characters with no semicolon at the end of the statement; it ran 10,000 times. Each test called the following test from disk and the times were recorded on a line printer.

I found the results interesting, if not peculiar, particularly when I looked at the compiler results. Note that the compiler does indeed ignore lines and remark statements in FOR...NEXT loops. That is why the four speeds were identical for the compiler; remark statements slow down the interpreter. Math calculations are handled fairly effectively, but one anomaly showed up in the division and multiplication results. The compiler actually handles division with a bit more efficiency than multiplication; the results are reversed with the interpreter. The slight increase in speed for the compiler running under the faster clock is within a given tolerance variation of half a second.

Under certain circumstances the interpreter handles screen output about as efficiently as the compiler, because the interpreter, running at 7.5 MHz, out-performs the compiled programs, running at 5 MHz. Note this was true for the line command (200 pixels average) and the print a row of characters.

Overall, the clock provided 1/3 increase in performance. That is, an operation that normally takes 30 seconds will take 20 seconds under the faster clock. This was to be expected from a system with the clock running at the same faster ratio. Note that disk operations were not improved (as noted by the overall time). This will be true of any I/O operation that is not dependent upon the system clock. Such operations would include anything transmitted out any of the serial or parallel ports. The same holds true of 5.25-inch disk operation. However, I noticed a significant improvement while formatting 8-inch disks. Part of this has to do with the internal timing required by the system. Under normal conditions, 8-inch disk formatting is very slow. In my tests, the improvement of speed was significant:

It took me 4 minutes and 35 seconds to format and verify a double-sided 8-inch disk with the clock running at 5 MHz. It took me 1 minute and 35 seconds to format and verify the same disk with the clock running at 7.5 MHz.

Is the speed-up kit for you? That depends upon your particular requirements. I highly recommend running the faster clock, particularly in systems with 8-inch disk drives. However, I must warn you that you may have to replace one or more ICs above and beyond the modest $49.95 cost. In all of our tests, we never once experienced any trouble with standard software, including word processors, spreadsheets, and the like.

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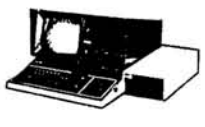

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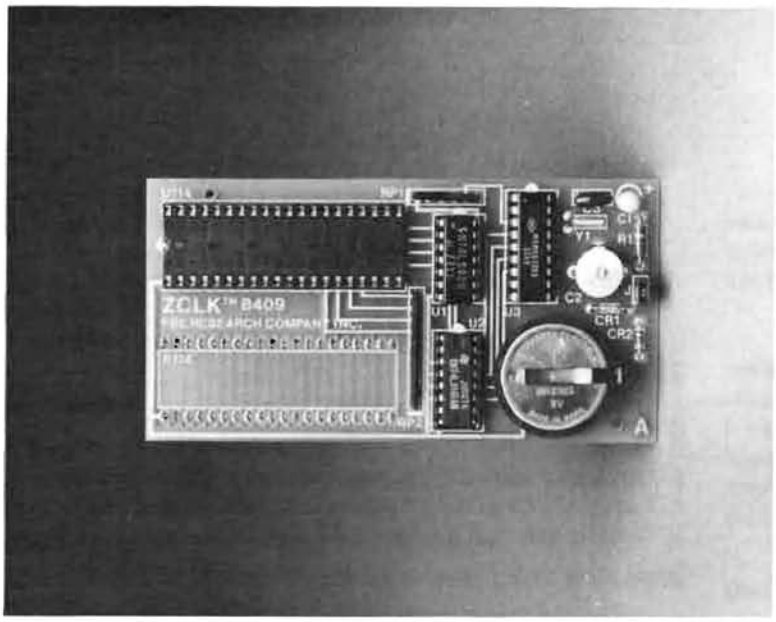
ZCLK

A Calendar/Clock Module For The Z-100



Larry T. Wier
1068 149th Pl. S.E.
Bellevue, WA 98007

Like most Heath/Zenith computer users, I welcomed the new MS-DOS machine with much enthusiasm. Also like most MS-DOS users, I was somewhat unhappy with the constant requirement to enter date and time after turning on the computer. Even though several programs have been written to partially resolve this problem, it still causes difficulty.

The only complete solution to the problem of entering a date and time upon booting Z-DOS/MS-DOS is a real time clock. To this end FBE Research Company, Inc. of Seattle, Wa. has developed ZCLK.

ZCLK is a clock/calendar built around the popular OKI Micro-MSM5832. It maintains the time of day, month, day, and year utilizing a battery back-up system during computer power-off conditions. Better yet, it does not need an S-100 bus slot in the Z-100.

Features

ZCLK is a small module measuring about 2" x 4". It is packaged with complete software and several pages of installation and operation instructions. ZCLK is very easy to install and the software includes everything required to set the date and time.

Installation, for the most part, is straight forward. It does require some computer disassembly to gain access to the main printed circuit board (PCB). For those of you who are a little apprehensive about tearing into your machine, the instructions give complete step-by-step information on how to add ZCLK to your system.

ZCLK uses a Peripheral Interface Adaptor (PIA) as a shared interface with the parallel printer port. The ZCLK module itself is installed in place of the PIA at location U114 on the main PCB. The 68A21 PIA is installed in a like socket on the ZCLK module. The ZCLK module is then installed at location U114. I was able to remove the IC at U114 and install the ZCLK module without removing anything but the top cover of my all-in-one. I do not know if this procedure can be followed in the low profile version. If an IC removal tool is used, U114 can be lifted from its socket without much difficulty.

Even though ZCLK uses the parallel PIA, printer operation is still functional. ZCLK uses the printer /ERROR line for its control. This particular line is not normally used by today's printer software and as far as the computer can tell, there is never a parallel printer error condition. This is a small price to pay for the convenience of automatic (AUTOEXEC.BAT) date/time entry, especially since most printers have other methods to signal error conditions.

If you are a stickler for exact time, FBE Research, Inc. has provided ZCLK with an adjustment to trim the crystal frequency to track the exact time. Drift tests with my Z-100 showed less than one second change over a 72 hour period.

Software

Software included with ZCLK contains everything required to set or reset dates and times. Error messages which are caused by incorrect entry are caught by ZDOS. (ZDOS is protected from allowing non-valid date/time entry). ZCLK will accept an incorrect entry (as long as it consists of 10 digits) and input the error into the hardware. The software then calls ZCLK and prints the results on the screen. Since ZDOS will not allow an incorrect input, an error message is generated and an opportunity to re-enter the correct date/time is available. Since the incorrect entry has been printed on the screen, the error is easily corrected.

Also included with ZCLK is the complete source program file along with a sample (AUTOEXEC.BAT) file. Instructions for copying software from the distribution disk is included with the documentation.

Observations

ZCLK was installed and operated according to manufacturers in-

Vectored to 66 ☞

Keep It Simple Stupid

KISS Dating

R. J. Winkler
2140 Culpeper Drive
Woodbridge, VA 22191

Keep it simple stupid (KISS) has been my philosophy in programming for over 28 years. I have programmed on numerous computers using numerous languages and found KISS to be most valuable. I have found that those programmers which like to use trick code and complex algorithms are those that continually have problems with their programs. Maintenance for programs not using KISS is very difficult or next to impossible.

I have found that date conversion routines appear to have the most complex and inaccurate algorithms I have come across. Two examples are:

1. The "dBASEII command file DATER" on Ashton-Tate's sample command file distribution disk. This is the calendar-to-julian date conversion algorithm

```
STORE INT(30.57*MONTH)+INT(365.25*YEAR-395.25)+DAY TO JD
```

The julian-to-calendar conversion routine is too complex to exhibit here, but take my word for it you wouldn't comprehend it anyway.

2. The "compute the day of the week program" CALENDAR on the HUG Volume II, 885-1013

```
100 REM COMPUTER DAY OF THE WEEK FOR YEARS AFTER 1752
110 REM Y=YEAR: M=MONTH (1-12): D=DAY: DEFINT Z
120 REM Z7 IS A NUMBER FROM 0 TO 6, 0=SUNDAY, 6=SATURDAY
130 Z0=Y: Z1=M+1
140 IF M<3 THEN Z0=Y-1: Z1=M+13
150 Z2=INT(Z0/100)
160 Z7=(INT(Z0*1.25)+INT(Z1*2.6)+INT(Z2/4)-Z2+D-1) MOD 7
170 Z7=Z7-(7*INT(Z7/7)
```

If anyone can comprehend the CALENDAR algorithm please write an article for REMark so the rest of the world can understand it.

I think I have made my point with the above two examples I have presented.

The article, "What's an Algorithm" by Ms. McGraw on page 28 of REMark, Issue 46, November 1983, inspired me to write the date conversion program, which I have been putting off for a long time, which I will discuss here.

The program DATER (Figure 1) contains simple and accurate calendar-to-julian and julian-to-calendar date conversion routines. The julian date is the day within the 20th century. The program prompts for the month, day and year the user wishes to convert. The prompted calendar date is converted to julian date, the julian date is converted to calendar date and the prompted date and the two converted dates are displayed.

DATER Synopsis

LINES 140 thru 260 - Main program

1. Prompts for the calendar input date
2. Executes both the julian and calendar subroutines
3. Displays the input date and both converted dates

LINES 1000 THRU 1060

1. Loads the month data table to an array

LINE 1999 - DATA statement for the month data table

1. The table is constructed to contain the number of days of the year prior to the month thus, data element-1 (January) is equal to 0 and data element-12 (December) is equal to 334.

LINES 2000 thru 2090 - Calendar-to-julian date conversion

1. LINE 2050 - Checks the year for a leap year.
2. LINE 2060 - Computes the julian date. The algorithm multiplies the input year by 365.25, adds the month table value utilizing the input month and adds the input day to arrive at the julian date.
3. LINE 2070 - This is the leap year adjustment. Since the year 1900 is not a leap year the months prior to March for leap years must be adjusted.

LINES 3000 thru 3200 - Julian-to-calendar date conversion

1. LINE 3070 - The year is computed by dividing the julian date by 365.25.
2. LINE 3080 - Checks the year for a leap year.
3. LINE 3090 - Subtracts the days of the computed year from the julian date.
4. LINE 3100 - This is the leap year adjustment.
5. LINE 3110 - The adjustment for non-leap years. This adjustment is required since the calculations for December 31st can calculate to zero. In these cases, the julian date is set to 365.
6. LINES 3120 thru 3170 - Determines the calendar month by recursively step through the month table.

    a. LINE 3150 - Adjusts the month table value for leap years.

Well, there it is, my KISS version of the date conversion routines. I hope you HUGgies comprehend the synopsis or I have failed in my attempt to promote KISS. Time permitting, I will submit future articles which I think will be beneficial to HUGgies.

```
10 '**  **** 11/28/83
20 '** THIS PROGRAM CONTAINS SIMPLE AND ACCURATE
     CALENDAR TO
30 '** JULIAN AND JULIAN TO CALENDAR DATE ROUTINES.
     THE JULIAN
40 '** DATE IS THE DAY WITHIN THE 19TH CENTURY.  I
     WROTE THESE
50 '** SUBROUTINES BECAUSE MOST OF THE DATE ROUTINES
     I CAME
60 '** ACROSS WERE EITHER SO COMPLEX OR NOT ACCURATE.
70 '**
80 '**  I HOPE THESE ARE MUCH EASIER TO UNDERSTAND
90 '**  IF YOU FIND WAYS TO IMPROVE THESE ROUTINES
     PLEASE CALL
100 '**
110 '**  R. J. WINKLER  703-491-1990
120 '************************
130 '************************
140 DEFINT I: DEFSTR X
150 RESTORE 1999
160 DIM ITBL(12)
170 GOSUB 1000  '** LOAD CONVERSION TABLE
180 LINE INPUT "DATE: ";XIDATE
190 IMONTH = VAL(MID$(XIDATE,1,2))
200 IDAY = VAL(MID$(XIDATE,3,2))
210 IYEAR = VAL(MID$(XIDATE,5,2))
220 GOSUB 2000  '** CONVERT TO JULIAN
230 GOSUB 3000  '** CONVERT TO CALENDAR
240 PRINT XIDATE; DJULIAN, IMONTH; IDAY; IYEAR
250 GOTO 180
260 END
1000 '**  ****
1010 '** LOAD MONTH TABLE
1020 '**
1030 FOR I = 1 TO 12
1040    READ ITBL(I)
1050    NEXT I
1060 RETURN
1999 DATA 0,31,59,90,120,151,181,212,243,273,304,334
2000 '**  ****
2010 '** CONVERT CALENDAR TO JULIAN
2020 '**
2030 '**   INPUT:  IMONTH, IDAY, IYEAR
2040 '**   OUTPUT:  DJULIAN
2050 IF INT(IYEAR/4) = IYEAR/4 AND IYEAR > 0
     THEN ILEAP = 1 ELSE ILEAP = 0
2060 DCJDAY = INT(IYEAR * 365.25) + ITBL(IMONTH) + IDAY
2070 IF IMONTH < 3 THEN DCJDAY = DCJDAY - ILEAP
2080 DJULIAN = DCJDAY
2090 RETURN
3000 '**  ****
3010 '** CONVERT JULIAN TO CALENDAR
3020 '**
3030 '**  INPUT:  DJULIAN
3040 '**  OUTPUT: IMONTH, IDAY, IYEAR
3050 '**
3060 DJCDAY = DJULIAN
3070 IYEAR = INT(DJCDAY / 365.25)
3080 IF IYEAR/4 = INT(IYEAR/4) AND IYEAR > 0
     THEN ILEAP = 1 ELSE ILEAP = 0
3090 DJCDAY = DJCDAY - INT(IYEAR * 365.25)
3100 IF ILEAP > 0 THEN DJCDAY = DJCDAY + 1
3110 IF DJCDAY = 0 AND ILEAP = 0 THEN DJCDAY = 365
3120 ISW = -1: I = 13
3130 WHILE ISW
3140    I = I - 1
3150    IF I > 2 THEN IX = ITBL(I) + ILEAP
        ELSE IX = ITBL(I)
3160    IF IX < DJCDAY OR I = 1 THEN ISW = 0
3170    WEND
3180 IMONTH = I
3190 IDAY = DJCDAY - IX
3200 RETURN
```

About the Author

R.J. Winkler *has been working with computers for the last 28 years. For the last 15 years, he has been working for the Naval Medical Data Services Center, Bethesda, Maryland as a computer specialist. His work with the Navy has included various types of computer applications utilizing mainframe, minicomputers, as well as microcomputers. He has built numerous microcomputers and conducted computer classes for both the Navy and his friends. R.J. holds an AAS degree in Computer Science from NVCC.*

RED ℰ PRODUCTS

DOS UTILITIES available in utility package for Z-100, Z-150, and big name, with "prime" utility, "INDEX," a continuing file of all your disk directories with ability to: add, change, delete, store, save and append.

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Only $19.95 with shipping, documentation, instructions, and demo program listing.

NORCOM
9630 Hayes
Overland Park, KS 66212

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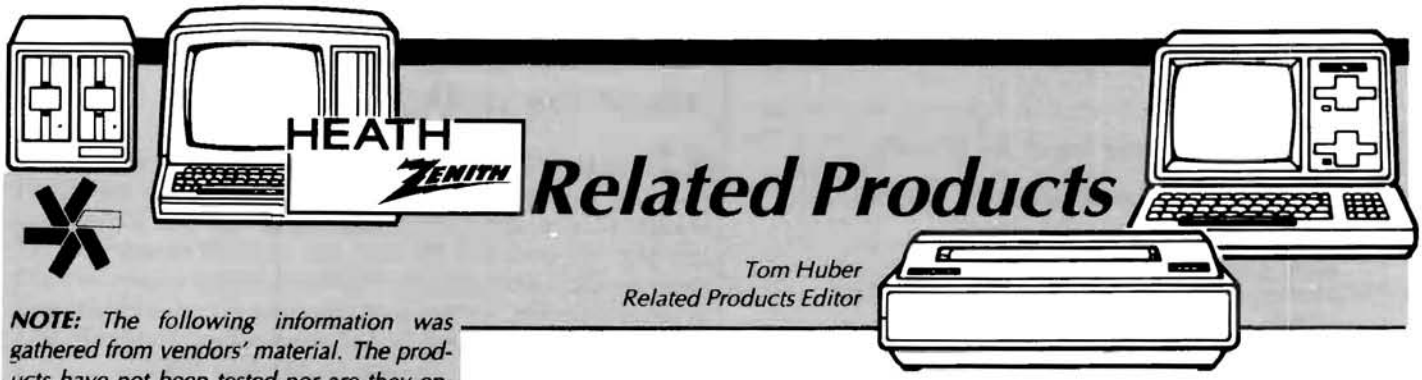
LJP
4685 South 2025 West
Roy, Utah 84067
(801) 773-5608



Related Products

Tom Huber
Related Products Editor

***NOTE:** The following information was gathered from vendors' material. The products have not been tested nor are they endorsed by HUG. We are not responsible for errors in descriptions or prices.*

Phosphor Essence™ Interlaces for 640 x 480-pixel Displays

Friendliware is now shipping COLORGEN, an 8088 programmer's color synthesis tool for the H/Z-100. Using interlaced mode to produce a usable 640 x 480-pixel display, COLORGEN enables the programmer/artist to produce patterns of different colors and complexity, as well as compare a current pattern with up to 9 previous generations. It has a core of 10 base patterns which may be user-defined for personalized use. Included with the program is CRTMOD.ASM/.OBJ, a library routine that can be integrated into the user's own application program, allowing interlaced displays as desired. An H/Z-100 (not PC) with 192K color video memory and MS-DOS or Z-DOS is required to run the program. LACE is a public domain program that demonstrates the utility and elegance of the interlaced mode. A version for CP/M is planned.

Vendor: Friendliware
P.O. Box 21206
Lansing, MI 48909
(517) 882-1675

Prices: COLORGEN: $40.00
LACE: $ 5.00
(add $2.00 shipping & handling)
(Michigan residents
add 4% state sales tax)

ZRT Provides Async Communications

Sigma Technology Co. has introduced ZRT, a collection of programs and files for asynchronous line communication between the H/Z-100 (under Z-DOS) and other computers. It allows data transfer and terminal emulation (standard CRT and VT-52 terminals), including host full screen editing and windowed screen displays from computers, such as the VAX. Encryption allows privacy over public mailboxes and permits binary to ASCII and vice versa conversion for easy transmission over telecommunication links that do not permit certain binary characters or combinations.

Vendor: Sigma Technology Co.
ZRT Telecommunications Div.
491 Breezewood Drive
St. College, PA 16801

Price: $29.95
(Pennsylvania residents
add state sales tax)

Two From Applied Operations Research

Routemaster™ is a program for vehicle scheduling and routing that computes the most efficient routes between a number of different locations to minimize costs and time. Requirements: CP/M or MS-DOS, 64K RAM and one disk drive; two drives or Winchester are recommended for large data base operations.

LPmaster(R) is a program for automatic linear programming, to produce optimal allocation of resources, product-specification/least-cost blending, production, and manufacturing. Requirements: MS-DOS, 192K RAM (512K recommended); supports 8087 coprocessor.

Vendor: Applied Operations Research, Inc.
22056 Saticoy St.
Canoga Park, CA 91303
(818) 888-3336

Prices: Routemaster: $195.00
LPmaster: $795.00

ARCHIVE Allows Related-File Archiving

Generic Software has announced the availability of the ARCHIVE utility, which allows groups of files to be saved in one file, resulting in a significant savings in disk space. In addition, ARCHIVE allows the user to create an archive file, the contents of which may be listed, updated, appended, extracted, or deleted. Files can be time- and date-stamped when placed in the archive. Binary, as well as text files may be archived and appropriately commented. Wild cards are supported and header/trailer records in the file can be made to look like comment lines for any high-level language, allowing the archive file to be compiled. CP/M versions (ARCHIVE-80) require 32K RAM, while the MS-DOS/Z-DOS versions (ARCHIVE-86) require 64k RAM. Specify disk format when ordering.

Vendor: Generic Computer Products, Inc.
P.O. Box 790
Marquette, MI 49855
(906) 249-9801

Prices: ARCHIVE-80: $24.95
ARCHIVE-86: $34.95
(add $3.00 for shipping and handling)
(Michigan residents
add 4% state sales tax)

Software Directories for CP/M, Personal Computer Users

R.R. Bowker Company has obtained the PC Telemart Software Directories Series and combined it with their own to produce the new PC Telemart/VANLOVES IBM Software Directory, which is a directory that contains over 3,000 entries of software packages, organized into 80 categories and subcategories. Also available is the PC Telemart/VANLOVES Software Directory (over 34,000 software pack-

ages for over 200 microcomputers), and the PC Telemart/VANLOVES CP/M Software Directory. Contact the vendor for prices and availability.

Vendor: R.R. Bowker Company
P.O. Box 1807
Ann Arbor, MI 48106
(800) 521-8110

Prices: Contact vendor

Computer and Monitor Covers for H/Z-89/90s, 100s, 150s

Professional Services Computer Corp. is now shipping anti-static cloth-lined vinyl covers for Heath/Zenith Computers. They are fully machine washable and are individually tailored to fit. The vendor also offers covers for other computers and peripherals, such as the Diablo 630. Colors available are brown, almond, or gray. Specify color. Custom application covers are also available.

Vendor: Professional Services Computer Corp.
7300 N.W. 23rd Street, Suite 501
Bethany, OK 73008
(405) 495-6826

Prices:

H/Z-100 All-in-One:	$26.95
H/Z-100 Low-Profile:	$18.95
H/Z-150 CPU & Keyboard:	$16.95
H/Z-89/90:	$26.95
12" Monitors:	$11.95
13" Monitors:	$12.95
Diablo 630:	$16.95
(Oklahoma residents add 5% state sales tax)	

BASIC Programmer's Tools for BASICA and GW-BASIC

Datasmith has announced a set of BASIC programmer's tools. NUMBER is a program preprocessor that generates line numbers from BASIC source code written using labels instead of line numbers. LABEL reverses the process of NUMBER. It takes a regular numbered BASIC program and removes all unreferenced line numbers and converts referenced line numbers to labels. BASLIST will make page numbered listings of several BASIC programs without operator intervention. MERGE duplicates the BASIC MERGE command, but at the operating system level. It works with binary files, recognizes up to 16 delete commands, and may be included in batch files to allow use with several programs in a single procedure. BASCOMP reads two BASIC programs simultaneously and checks for differences between the two on a line number by line number basis. SMASH removes remarks and unnecessary spaces from a BASIC program stored in binary format. XREF prints a comprehensive cross reference of variable names, keywords, and entry points in a BASIC program saved in binary format. WSUTIL converts WordStar document files to non-document files to be used by such programs as NUMBER. Requires 128K of memory.

Vendor: Datasmith, Inc.
Box 8036
4200 Somerset, Suite 129
Shawnee Mission, KS 66208
(913) 381-9118

Price: $100.00

Mastercom--Telecommunications Utility for CP/M, MS-DOS

Mastercom is a full featured, smart terminal/file transfer utility for CP/M-80 and MS-DOS. It provides terminal support to a host time-sharing system, capture support for data to disk and/or printer, transmit support of disk files, and error correction support when used with a Mastercom or Christensen Xmodem. For more information, contact the vendor.

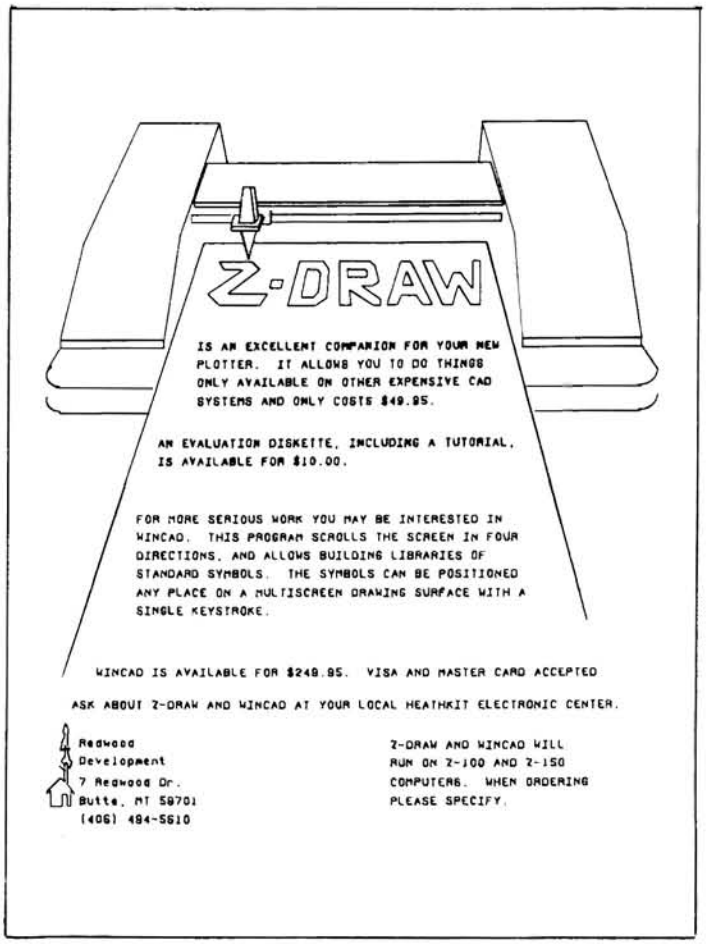
Vendor: The Software Store
706 Chippewa Square
Marquette, MI 49855
(906) 228-7622

Price: $49.00

Free Catalog from Electronic Specialists, Inc.

Catalog 841, Hi-Tech Equipment Protection & Interference Control Catalog, from Electronic Specialists, Inc., presents its line of protective devices, including AC line voltage regulators and conditioners, modem and phone line surge suppressors, equipment isolators, and filter/suppressors. The catalog also describes numerous applications for high technology equipment protection and interference control.

Vendor: Electronic Specialists, Inc.
171 South Main Street
P.O. Box 389
Natick, MA 01760
(800) 225-4876/(617) 655-1532



"Close Is Good Enough" With SeekEasy

SEEKEASY is a self-prompting information storage and retrieval program for CP/M and MS-DOS. It accepts misspelled, imprecise, or incomplete requests, and yet still locates and displays the requested information in "most likely item first" order. The user can file any information wanted, up to two screen lines per entry, and completely form-free. Filed items are automatically cross-referenced by their entire contents (phrases, words, word fragments, etc.) so the user doesn't have to decide which words to make "keywords."

Vendor: Correlation Systems
81 Rockinghorse Road
Rancho Palos Verdes, CA 90274
(213) 833-3462

Price: $87.00

MTERM Version 1.5 for Z-DOS

MTERM Version 1.5 for the Z-100 under Z-DOS will work with dial-up modems to 2400 baud and includes file transfer programs. Direct connection (hard-wired) will allow higher speeds yet. Features include auto-dial, auto-answer, directory tables, macro keys (up to ten), automatic transmission at a preselected time, full- or half-duplex, print spooling, and screen print. Version 1.4x is available for PC machines.

Vendor: Micro-Systems Software, Inc.
4301-18 Oak Circle
Boca Raton, FL 33431
(800) 327-8724 (outside Florida)
(305) 391-5077 (inside Florida)

Price: $79.95

ZS100 Speed Module for H/Z-100s

The Z-100 Speed Module (Model ZS100), developed by Controlled Data Recording Systems, Inc., plugs into the Z-100 mother board easily with no soldering. The ZS100 comes with a switch that occupies one of the vacant DB-25 slots on the back of the computer, which allows you to switch between fast and normal operation. The resulting clock speed is 7.5 MHz (from 5 MHz) for the 8088 processor (the 8085 is separately controlled) and does not require software modification to work.

Vendor: C.D.R. Systems, Inc.
7210 Clairemont Mesa Blvd
San Diego, CA 92111
(714) 560-1272

Price: $49.95

MS-DOS Dental Billing Package

CMA Micro Computer has announced the release of an MS-DOS-based dental billing package for GW-BASIC and hard disk drives. It is a private billing package, appointment scheduling system, full-function screen-mapped word processor, patient diagnostics data base, financial history management system, and insurance form preparation system. The software will operate on both Z-100 and Z-100-PC systems. Requirements include 256K RAM, 1 floppy disk drive, 1 Winchester (5 Mbyte minimum), 130-column printer, and GW-BASIC.

Vendor: CMA Micro Computer
55722 Santa Fe Trail
Yucca Valley, CA 92284
(619) 365-9718

Doodler Graphics Package for H/Z-100s

Doodler allows you to use the Heath/Zenith H/Z-100 as an electronic sketchpad, the results of which may be saved on disk. The designs may be printed on a Gemini, Epson, MPI, C.Itoh, Okidata, or similar graphics printer, with control of left margin placement, print density, and line spacing. It is ideal for artwork of all kinds, including design drawings, advertising layout, or other graphic arts projects. It can also be used for designing pictures for other programs.

Vendor: Paul F. Herman
Data Systems Consultant
P.O. Box 535
St. James City, FL 33956

Price: $79.95

Power-line Surge Protectors

The Tiger™ Surge Guard is a compact, bidirectional surge protector for electronic equipment. It protects against overvoltage, undervoltage, and noise (EMI, RFI, and EMP). Prices range from $39.95 to $325.00. Contact the vendor for a complete list of protectors, pricing and their features.

Vendor: EEE Electronics, Inc.
Sound Division
P.O. Box 331
Linthicum, MD 21090
(301) 761-9433

Financial Forecaster and Planner from Hoyle & Hoyle

Financial planning has become an important economic ability. Financial Forecaster, a dynamic cash flow predictor, is a menu driven worksheet for use with LOTUS 1-2-3 on the H/Z-100 and H/Z-100 PC computers. It manipulates information on monthly and annual cash reserves, six categories of income, six categories of expenses, percentages and distribution of income & expenses. Nine graphs are possible illustrating actual figures and predicting results for a twelve month period. The program interfaces with Jay Gold's Home Finance System. Specify Z-DOS or MS-DOS operating system.

Vendor: Hoyle & Hoyle Software
604 S. Elam Avenue
Greensboro, NC 27403
(919) 378-1050

Price: $49.95
(North Carolina residents add 4.5% state sales tax)

H/Z – 19/89

New from Apex Systems Technology, a conversion kit which will enable the owners of the H/Z – 19/89 computers to separate the keyboard from the main screen. This conversion kit is designed for comfort and flexibility when operating the computer. When completed you will have an attractive, versatile computer.

Vendor: APEX SYSTEMS TECHNOLOGY
P.O. Box 2231
Canoga Park, Calif. 91306
Price: $50.95 + $2.00 S & H
(Calif. residents add sales tax)

Zilog Z80 Utilities for CP/M

ZDM and ZDMZ are powerful Z-80 debuggers and monitors designed to operate on Z80 based CP/M systems. They feature the same command structure and the CP/M DDT module, and are intended to replace it for Z80 and 8080 program development. ZDM displays extended 8080 mnemonics in its disassembly command while ZDMZ displays 100% Zilog Z80 mnemonics. The two files are otherwise identical. ITOZ and ZTOI are a pair of independent source program preprocessors or translators that run on Z80 based CP/M systems. ITOZ accepts as input, a CP/M source program file written in extended Intel 8080 mnemonics. It creates as output, the equivalent source program file in Zilog Z80 mnemonics. ZTOI provides the reverse translation from Zilog to Intel. The translated files are fully formatted, contain all the original comments, and are ready for assembly. Specify system and disk format (5-1/4" soft-sectored or 8").

Vendor: RD Software
1290 Monument St.
Pacific Palisades, CA 90272
(213) 454-8270

Prices: ZDM/ZDMZ: $50.00
ITOZ/ZTOI: $40.00

CBASIC Tools

CBC Tools is a large set of functions that can be used with the CBASIC compiler and is available for both CP/M-80 and CP/M-86 systems. The functions support operating system and machine interface, radix conversion and number validation, bit and byte manipulation, string operations, array operations, data compression, a number of functions (including CBASIC source code), a program tracer, and a program profiler. The program tracer prints out line numbers as they are being executed. The program profiler allows the user to create histograms of how often sections of the program are being executed. Line numbers (within a user-specified range) are counted (the current count may be displayed at any time). Both the tracer and profiler may be called "on-the-fly" eliminating the need to modify the source code. For more information, contact the vendor. Specify system (CP/M-80 or CP/M-86) and disk format (5-1/4" soft-sectored or 8").

Vendor: Minnow Bear Computers
P.O. Box 2233 Sta. A
Champaign, IL 61820-8233
(217) 398-6883

Price: $100.00 + $5.00 S&H

PRIVACODE Provides Individualized Data Security

PRIVACODE is a computer program that translates readable "cleartext" files into unreadable "private" files. It is designed for the PC family and compatible MS-DOS systems and is fully compatible with Lotus 1-2-3, Multiplan, SuperCalc, dBASE II, and WordStar, and computer programs. It uses a proprietary set of algorithms to create a program highly resistant to analytical attack. The security module "erases" (writes over) the cleartext file when the private file is created and vice versa. Each PRIVACODE disk is totally incompatible with any other, but is available on special order in multiple copies of the same version to provide multiple sites with the same program in a private communications network. The resulting files are in plain letter format, allowing transmission without garbles over communications channels. For more information, contact the vendor.

Vendor: Eden Press, Inc.
P.O. Box 8410
Fountain Valley, CA 92728
(714) 556-2023

Price: $395.00 first copy
$295.00, additional copies
$25.00 special order processing

Custom Payroll for the Microsoft BASIC

Datasmith has announced its custom payroll package for Microsoft BASIC version 5 (BASICA, Z-BASIC). As a custom system, the features provided to a particular user depend on the user's needs. Full support includes employee data, up to 24 department types, eight pay types, full tax support (federal, state, local, social security, state disability), recurring deductions, up to 9 one-time amounts (earning or deductions) per pay period, reports, and maintenance and support. Capacity is approximately 75 employees per 100K of disk space. A standard, preconfigured system including state and local tax calculations is available as priced below. Contact the vendor for specific custom needs and more information.

Vendor: Datasmith, Inc.
Box 8036
4200 Somerset, Suite 129
Shawnee Mission, KS 66208
(913) 381-9118

Price: $695.00 (standard, preconfigured system)

Reinkers From SAS Industries

SAS has a line of ribbon reinkers for over 200 makes and models of printers. The time required to ink a ribbon and the amount of ink used is dependent upon the length, width, and condition of the ribbon. Generally, a two-ounce bottle of ink will supply twenty ribbons. The time required is about twenty minutes (average). The ink is formulated to lubricate the pins of dot matrix printers and is available in red, blue, green, and brown. The company also offers the Tipper, a table designed for Epson printers to tilt the printer at an angle so that the active printing line is more easily seen by the operator.

Vendor: SAS Industries
3019 North Bay Drive
North Bend, OR 97459
(503) 756-7155

Prices: Inker (M/II): $54.95 + $3.00 Shipping
Ink: 2 ounces: $3.00
4 ounces: $5.00
pint: $15.00
quart: $25.00
Tipper: $22.50 + $2.50 Shipping

H/Z-100 Diagnostics and Utilities for CP/M-85

The Z-100 Disk Support System provides a comprehensive set of diagnostic, data recovery, and file operation utilities for the 5-1/4" 48 tpi disk drives of the H/Z-100 computers. This software package contains capabilities that start where the Heath/Zenith diagnostics end (CB-463-13), thereby complementing rather than duplicating what Heath already offers. Z100DSS offers sixteen disk support utilities integrated into a single, menu-driven program. The diagnostic functions include display/reset hard and soft error counters;

verify disks with errors mapped to track, sector, and error type; disk workout by write/read/compare operations to random sector addresses; produce an error map of all errors on a disk; display disk parameter table information; measure and report disk rotation speed; display disk directory, including erased files and the allocation unit numbers assigned to each file; report disk useage showing the physical location of both valid and erased files; "unerase" a previously erased file; lockout bad sectors; format; editing/view any disk sector; compress/expand files; and send/receive files. Requires CP/M-85 and at least one 5-1/4" disk drive.

Vendor: The Soft Firm
P.O. Box 1125
Picayune, MS 39466
(601) 798-0740

Price: $65.00

ACT Marketing Corporation Introduces IBM-Compatible Expansion Boxes

December 3, 1984 -- ACT Marketing Corporation of Hunt Valley, MD, is introducing a new line of expansion boxes designed to enhance the graphics, memory, and communications capabilities of IBM PC's and compatibles. The ACT 1000 will accept standard IBM and IBM-compatible cards. The ACT 2000 adds the storage capacity of a Winchester Disk, available in sizes from 10MB to 112.5MB, all in one convenient unit. Located just north of Baltimore, ACT is one of Hunt Valley's fastest growing high-tech companies. Other products include the DISCovery line of 35 different 5-1/4" hard disk subsystems, with 5MB to 225MB fixed disks, and 5MB and 10MB removable hard disks. For more information, call Gerry O'Brien at (301) 628-0260.

ESP Allows Remote Access to CP/M Heath/Zenith Computers

Software Wizardry, Inc., is now shipping ESP, The Easy System Paralleler, an advanced software product allowing remote access to Heath/Zenith computers running the CP/M operating system. A CP/M system, running ESP will allow dial-in access by remote callers. The operator has full control to designate which system functions are available to the remote caller. The functions range from handing over complete console control to allowing only designated programs to be run. Multilevel password protection can be provided. Applications include setting up a bulletin board or timesharing system, receiving messages from other callers as an electronic mail device, or allowing dedicated users to remotely use their business computer from home. Available for CP/M-80 or CP/M-85 H-8 or H/Z-89/90/100 installations, soft-sector disk only.

Vendor: Software Wizardry, Inc.
1106 First Capitol Drive
St. Charles, MO 63301
(314) 946-1968

Price: $49.95

Interlaced Graphics on H/Z-100

Budget Software has announced an interlaced graphics support package for the H/Z-100 computer series. Full-time interlaced graphics provides 30 rows of 80 characters in an 8 dot x 16 line matrix for very detailed characters. All operating system functions are supported in a 640 x 480 pixel display. Other packages include support for Z-BASIC interpreter, Z-BASIC compiler, FORTRAN-86, COBOL-86, Pascal-86, and C. There is also an interlaced character editor. Budget software provides software at the lowest possible cost. For more information and a free copy of the catalog, send a self addressed, stamped envelope to the vendor.

Vendor: Budget Software
P.O. Box 221
Berrien Springs, MI 49103

SX Series of Printers Uses 23 x 18 Dot Matrix

MPI announced the availability of the "SX"printer, a new, letter quality, 300 cps, dot matrix printer that employs a 23 x 18 dot matrix to produce fonts with dot elements that overlap horizontally, vertically, and diagonally within the matrix. The increased density results in rounded characters without the jagged appearance of typical dot matrix printers. The printer produces draft, correspondence, near-letter quality, and letter quality print at speeds up to 300 cps. Multipass operation provides the highest quality (letter quality at 52 cps) and is supported by a new heavy-duty motor. The printer is compatible with PC command sequences and will print the full Z-100 PC IBM-compatible character set. The SideWinder mode allows wide-column printouts from spreadsheet programs to be rotated and printed lengthwise on the paper, using a special 12 cpi font designed for sideways printing.

Vendor: Micro Peripherals, Inc.
4426 South Century Drive
Salt Lake City, UT 84123
(800) 821-8848 or (801) 263-3081

Price: $795.00

ScenicWriter Supports the HP LaserJet Printer

Scenic Computer Systems Corporation has announced ScenicWriter/HP, a text composition system that supports the Hewlett Packard LaserJet Printer. ScenicWriter provides the power to compose and produce 100% camera-ready copy for publication. The program includes support for the LaserJet font cartridges, and graphics such as frames, screens, and simulated cursors, placed anywhere on the page. It also creates indexes, tables of contents, and lists of illustrations as documents are being prepared. It numbers chapter headings, sections, subsections, footnotes, and illustrations and handles renumbering necessitated by revisions. ScenicWriter supports single and multi-column formats; margin, header and footer, paragraph break, and chapter heading placement; and provides crop marks for page preparation and design. The program includes a 40,000-word spelling checker that accepts unlimited additions. The full-screen editor features nested editing, global search and replace, block copying, and a macro system which will accept any sequence of formatting commands. ScenicWriter is available for a wide range of printers, including other laser printers, phototypesetters, and over 30 different daisywheel and thimble printers. It currently runs on PC- and XT-compatible computers, including the H/Z-100 PC.

Vendor: Scenic Computer Systems Corporation
14852 N.E. 31st Circle
Redmond, WA 98052
(206) 885-5500

Price: $995.00

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a version of Turbo Pascal that supports the 8087 and the accuracy and speed of floating point operations are hard to believe.

One caution to any Z100 owner who wants to use an 8087 with his equipment. After I installed the board, not too difficult a procedure, the board didn't work. Since I lived reasonably near the manufacturer, I brought the board and computer to him. He quickly found that my three month old Z100 used an NEC 8088 microprocessor. Apparently, this chip is not 100% compatible with the original Intel 8088 design. When the chip was replaced with one by a different manufacturer, the board worked with no trouble.

It is hard to describe the computing power and graphics capability I now have available. I am very satisfied.

Yours,

Frank Davidoff
7002 Carol Court
El Cerrito, CA 94530

Evolution Of Heath Computers

Dear Walt:

I've just been reading the December issue of REMark and a letter from Ken Goto caught my attention. I thought I'd like to respond, in part because I think he raises a good question, and in part because the evolution of Heath computers has been much on my mind of late.

Mr. Goto's comment that he would like to see more hardware articles relating to the H-100 computers is worth discussing. First, a personal bias. I don't especially appreciate the Zenith decision to roll the H-110 and H-120 series and the H-150 and H-160 series into what's become the H/Z-100 series of computers. This blurrs a very important distinction. No one should consider them in the same family. The true H-100 series, the H-110 and H-120, are considerably more efficient and effective than the IBM PC, that forms the basis of the H-150 and H-160, that there's no comparison. There's also, as yet, little comparison between the software run by each series. The former simply won't run the IBM-compatible software at all, unless it be something not graphics-intense like dBASE II. I would prefer that Zenith not simply tack a "PC" to the end of the family name. But, as I say, that's personal bias.

Another thing that needs to be said. What follows is personal observation. I wasn't present at the creation of any of this, I was just a customer. Albeit one of the first for Heath's computer.

The main reason that you don't, and won't, see much in the way of hardware modification articles for the H-100 series is that there isn't really very much left to modify. I realize that sounds a little flippant, but stop to consider the path we've come along since 1977. When the H8 was introduced, there was next to nothing available. Heath did their best, but it took quite some time to even get the basics out. For instance, the only software we had was BASIC and a line-oriented text editor intended mostly for use with the assembler. If you wanted anything beyond that, you wrote it yourself. There was little commercial software available until a better terminal than the H9 came along. That was the H19, and it opened the way for Auto-Scribe, PIE and a host of other programs that equalled or exceeded the quality of software available for other 8-bit computers.

As for hardware, there was nothing until Dr. Godbout made his 12k memory board available. This was a significant improvement over Heath's 8K board, but was followed so closely by Heath's 16K board and the Trionyx and DG 64K boards that it lost out. Gradually, the experimenters delved into the H8, and found ways to improve on what Heath's engineers had wrought. The same thing happened in spades when the H89 came out. In both cases, though, there was an overriding reason why there was so much scope for improvement. Heath's engineering was notoriously conservative. In many cases, specifications were understated by 50 to 100 percent. The reason for this was that both computers were intended from the outset to be built from kits. And since there's great scope for fouling up a kit, the engineers were understandably cautious. They wanted to be certain that no matter what, the user would get the performance the specifications promised. Hence, the 2 MHz clock and the 30 msec disk drive step rate, both of which could be dramatically improved upon.

Then came the H-100 series. These were the first computers designed under Zenith control, and Zenith's goals were different from Heath's. First, the H-100 series wasn't designed for ease of kit-building. It was designed for ease of production. Production of finished computers for the business market. I don't believe Zenith had any idea of the potential popularity of the '100 series, and in fact, I think it took the Air Force-Navy contract to convince them that they could sell the '100 in the ten-thousands, not just the thousands.

Being designed for professional use and not for hobby use, Heath built in features that hobbyists might not care too much about. They were still conservative, but since almost everything would be factory-built and tested, the design could be more nearly state-of-the-art. Clock rates were raised to the point that performance would be more than acceptable, but completely reliable. The display was greatly improved upon, and higher capacity disk drives were used. None of this may seem like state-of-the-art now, but remember that the '100 was designed in 1980 and 1981. The promised IBM compatibility never really appeared because Heath found they could do a better job, and no one at that time realized how many uncritical people would be drawn to their machine by those three letters.

When you get down to cases, there's not a whole lot you can do to the '100 hardware to improve it. You can increase the clock rates for the processors. I've changed the 8088 crystal to make the 16-bit side run at 8 MHz. This doesn't always work on all H-100's, though, because some of the other chips aren't up to the speed. I tried the same thing on the 8-bit side, intending to increase the clock to 6 MHz, but that was too fast and the computer failed. More memory? Just plug it in. Other accessories? Remember that the H-100 is an S-100 machine. There are more S-100 boards out there than there are IBM and IBM-compatible boards. These boards will do anything you want, from speech and music synthesis to laboratory process control and analog data collection. Hardware modification to the H-100 consists mostly of plugging in the board providing the feature you want. Need a hard disk? There are literally a dozen to choose from. Almost any S-100 hard disk controller will work (but test it first for software compatibility). More floppy disks? The H-100 controller board will take eight, four of each size. A tape back-up is available from several folks. I could go on, but I think the point is evident.

The H-100 is an extremely complex machine, but all of it's complexity is software-controlled. The only thing I can't control from software is the 110-220 volt switch and the 50-60 Hz switch. And I expect if I diligently searched the manuals, I might very well find out how to do that. So it seems inevitable that the bulk of the articles that

we'll be reading for the next several years will be dealing with the software part of the system, since it's there that the real advances will be made. Enjoy!

Sincerely,

D. C. Shoemaker
HQ US European Command
Box 897
APO NY 09128

Customizing Magic Wand

Dear HUG,

There have been a number of comments recently on "Magic Wand" (buggin' HUG July, Sept. '84). Having recently customized my Magic o 5FF IS LOKUPTABLE FR PROPOTIONAL PACIg, so oly 256 YTES IS AVAILABLE FOR THE CUSTOMIZING.

WAND assumes that the line is built up of horizontal increments. Typically, an increment is 1/120th of an inch. Likewise, vertical spacing is done in vertical increments. The customizing module contains the following information:

The number of horiz increments per inch.
The number of horiz increments per character.
The number of horiz increments per line (i.e. max line size)
The number of vert increments per inch.
The printer name (16 chars)
Proportional spacing info for printer.
A subroutine called at the beginning and end of processing.
A subroutine called to set the horizontal motion index (HMI).
A subroutine to set the VMI.
A subroutine to linefeed n-increments.
A subroutine to reverse linefeed n-increments (needed for superscript)
A subroutine called to do a carriage return.
A subroutine called to do a formfeed.

WAND does all of its printer interfacing by frequently changing the VMI and HMI. It controls its own proportional spacing, taking the HMI for each char from the proportional spacing table. To print superscripts, it does a reverse linefeed by half the number of increments in a line, and at the end does a forward linefeed of the same amount.

All output of chars to the printer goes through a single subroutine, so it is not hard to modify this to call your subroutine (assuming there is still space in the 256 bytes available).

Incidentally, address 680h in PRINT and 400h in EDIT contain the maximum disk drive number. If you are having trouble reading from the C: drive, you may wish to patch these two addresses.

Yours sincerely,

Neil W. Rickert
828 S. Ada Street
Chicago, IL 60607

Inside Microsoft For The H100

Dear HUG,

I just received the August 1984 issue of REMark and quickly reviewed each article. I became interested in Mr. Dodgen's article - Inside Microsoft (TM) BASIC (MBASIC). I found it to be well written and to contain a detailed explanation of the subject matter. The functions provided by his CROSSREF program were just what I needed for my current program work. Unfortunately, the program was written for the H89 and I have an H100.

Using the explanation provided in Mr. Dodgen's article, I revised the program to operate on the H100. In addition, I corrected what appeared to be some typographical errors, and added a few enhancements.

1. Line 65000 - Set MP=25079 vs 28761
2. line 65460 - Add the string designator ($) to each variable V.
3. Line 65500 - Change line segment to: IF VAL(LEFT$(V$(I),X1)) < VAL(LEFT$(V$(I+1),X2)) 4. Add the following lines to strip quoted strings from the variable list:
   a. Change Line 65210 to end after the expression - ELSE IF MM=14 THEN GOSUB 65400
   b. Add Line - 65212 IF MM=34 THEN GOSUB 65225
   c. Add Line - 65215 IF MM>64 AND MM<123 THEN GOSUB 65300
   d. Add Line - 65225 MP=MP+1:MM=PEEK(MP):IF MM<>34 GOTO 65225 ELSE RETURN
5. Modify line printer program steps as follows . . .
   a. Change line segment in 65030 - . . . INPUT "Do you want the output to go to a disk file (LPRINT) & to the printer";LP$ . . .
   b. Change file name in 65030 from "LP:" to "LPRINT"
   c. Change Line 65525 to - 65525 NEXT:IF LP$="Y" THEN PRINT:INPUT "Printer READY (Y/N) . .";A$:IF LEFT$(A$,1) <> "Y" GOTO 65530 ELSE POKE 3, 158:WIDTH LPRINT 80:FOR I=1 TO LV:PRINT V$(I):NEXT:POKE 3,149
   d. Add line - 65530 CLOSE:END

I hope this information is helpful to other H/Z100 owners that may want to use Mr. Dodgen's program. Enjoy . . .

Yours very truly,

M.D. Zapolski, Sr.
226 N. West Ave.
Bridgeton, N.J. 08302

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structions. It functioned as advertised and I was not able to find any software or hardware combination which ZCLK failed to function. My Z-100 has a CDR SPEED MODULE (ZS100 tm) installed and ZCLK worked perfectly.

There are only two disadvantages I can find with ZCLK. The main one is, if you have a parallel printer that requires the ERROR line, you lose any functions associated with printer errors. The second, is if you do not care to disassemble your computer you may not wish to purchase ZCLK.

Battery life should be about a year or more under normal operation. When the battery requires changing, the entire module may require removal. By utilizing a slightly modified IC removal tool, module removal for battery replacement will cause little difficulty.

Conclusions

Judging by the tests run on a ZCLK module supplied by FBE Research, Inc., it is well worth the $89.95. It is easily installed and provides up-to-the-minute date/time information for all of your files without the constant re-entry required by ZDOS.

ZCLK is manufactured by FBE Research Company, Inc., PO Box 68234, Seattle, WA., 98168. It can be purchased directly from FBE or from most Heathkit Electronic Centers (HEC's).

Coming Soon . . .

HUG Personal Bulletin Board

HUGPBBS For CP/M-86

Coming, very soon, HUGPBBS. HUGPBBS is an acronym for Heath Users' Group Personal Bulletin Board System. This software will turn your H/Z-100 into a single user bulletin board service. A caller can leave or retrieve messages, upload and download programs or data files, and with the proper command and password sequence access your computer from a system level (this feature is enabled at your option). Uploading and downloading is accomplished using either simple XON/XOFF and capture buffer or XMODEM protocol with checksum testing. If the Sysop is available, the caller can attempt to communicate with him via keyboard and CRT. This board can be completely open to anyone that calls, requiring only his name, or it can be closed and require the user to give his name and a predetermined password. Passwords are entered and changed by the sysop only. Hardware requirements are an H/Z-100 computer with at least two 5" drives (the bulletin board operates from one drive, the program database from the other). Presently, this system runs under CP/M-86 only. A Hayes Smartmodem is highly desirable, however not necessary. Pin 20 on the RS-232 connector is used as a hook control (DTR) and pin 8 is used to detect the caller's carrier (DCD). No Hayes modem commands are used in the operation of this software. Proper operation with other brands of modems will be the responsibility of the user. Message capacity is limited to 128 messages. Each message can contain 16 lines with 77 characters in each line. This software was written with the individual user, as well as local users' groups kept in mind. Bulletins can be created using any text editor or word processor. First time user information can be created in the same manner. These files can be read by any caller. If the board is operated as a closed system (passwords required), unauthorized users will be allowed access, however they will not be able to leave or kill messages, or upload and download files. This mode of operation protects the sysop from the so-called "twits." Actual operation of this system can be observed anytime between 4:30 pm and 8:00 am EST by calling (616) 982-3956. The system presently is using a Hayes Smartmodem, and recognizes 110, 300, and 1200 baud, 8 data bits with 1 stop bit, no parity. Feel free to call and browse and also leave messages with your comments.

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COMMUNICATION

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CP/M

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885-5004-37	CPM86 TERM86 and DSKED	20.00	56
885-8005	MAPLE (Modem Appl. Effector)	35.00	29
885-8012-[37]	CP/M MAPLE (Modem Program)	35.00	34
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885-4003	REMark Volume III issues 24-35	20.00	
885-4004	REMark Volume 4 Issues 36-47	20.00	
885-4005	REMark Volume 5 Issues 48-59	25.00	
885-4500	HUG Software Catalog	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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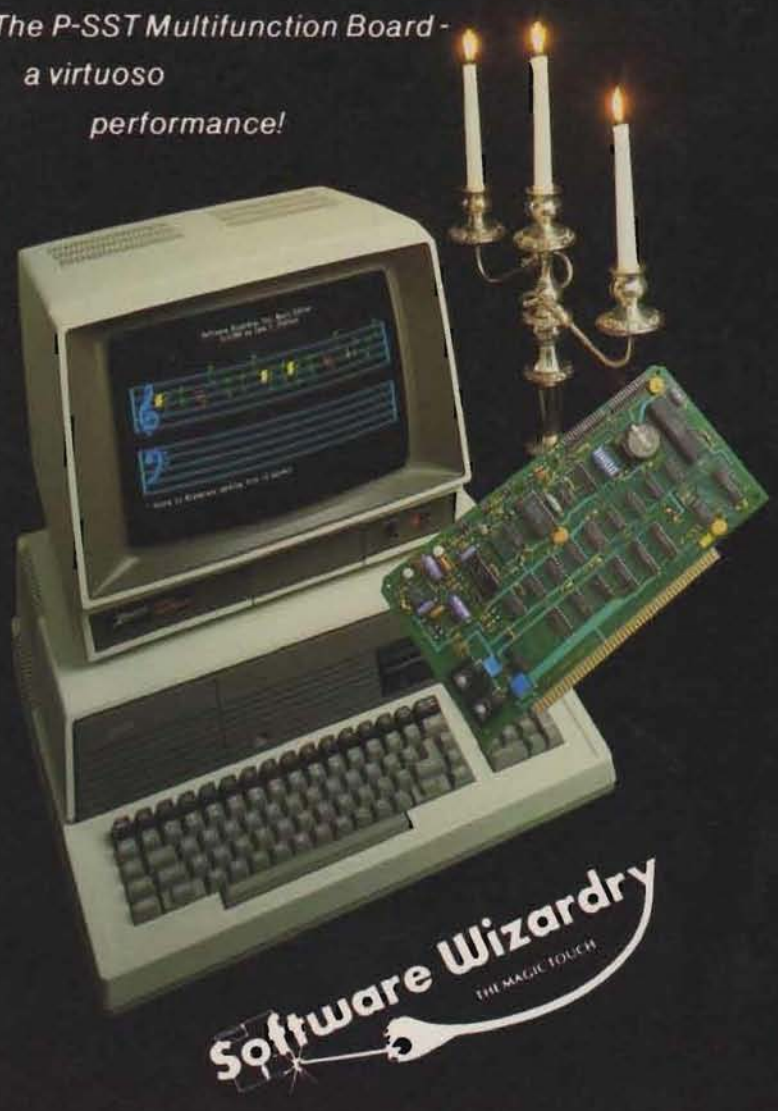

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The P-SST is available from authorized Software Wizardry dealers, and Heathkit Electronic Centers everywhere.

P-SST and Standard Software	$395.00
P-SST Development Libraries	$ 49.95

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