

### INFESTATION

by Phillip B. Liescheski III

INFESTATION is a computer modeling algorithm similar to LIFE. This program was inspired by an article written by Frank C. Hoppensteadt. From this article, the basic information and rules of INFESTATION were obtained. Unlike LIFE, it does not model growth. It demonstrates the propagation of disease in a forest or some other form of vegetation. Each tree can exist in one of three states. These states are green, infested, and defoliated. The term tree is used loosely as a unit of vegetation or an area containing some form of vegetation.

There are four basic rules under which INFESTATION operates. These four rules are:

- 1) A green tree remains green as long as it is not infested.
- 2) An infested tree becomes defoliated in the next generation.
- 3) A defoliated tree becomes green in the next generation.
- 4) An infested tree will infect its four non diagonal, green neighbors in the next generation.

These rules determine the manner in which the disease propagates and thus dictates the type of patterns for each generation.

Since each tree can exist in any of three states, the SUPER COLOR OR GREMILIN video board with its color graphics ability is used to display the forest. A green or healthy tree is represented by a green square on the video grid. An infested tree is represented by a red square, while a defoliated tree is displayed as a yellow square. These colors are chosen since they subjectively represent these states. Also, with this color combination, the three states can be differentiated on a black and white television receiver.

In order to use INFESTATION, one must bootup the Super Elf with the Super BASIC interpreter. The Gremlin video board must be set for the Alphanumeric/Semigraphics-4 mode (The SUPER COLOR board can be set by adding a line of code to the beginning of the program to POKE the mode into the mode latch on the board). Next the BASIC program is typed in and it is executed. The program will first print its identification and a symbol key. afterwards, it will request the ini tial state for each tree in the forest. Each tree is assigned unique row and column numbers. Each position is displayed and the state is then requested. One must enter G for green, I for in fested or D for defoliated. If another character is accidentally entered, an error message is displayed. The row and column numbers for this tree are reprinted and the request is made again until the proper character has been entered. After the initial pattern has been entered, the screen is cleared, and the initial pattern of the forest is displayed. The state of the forest for the next generation is determined according to the four rules. Afterwards, the forest of the next generation is displayed. For a ten by ten (10\*10) forest, the time period for each gener ation is about a half minute.

The operation of the program is simple. Since the program is written in BASIC with several remark statements, a detailed discussion of its operation will not be made here. Basially, the information of state for each tree is contained in matrix P. As the initial pattern is entered, the Gremlin color code is assigned to each matrix element which represents a tree. A color code represents a specific state. In other words, an infested tree in the second row and third column of the forest grid is represented by the red color code #BF in the matrix element P(3,2). During the determination of the next generation, the pattern is temporarily stored in matrix G. Afterwards, the contents of the matrix G is transferred to matrix P. The contents of the matrix P is displayed by poking the code value of each element in the appropriate location of the video memory. The video screen is initially cleared by loading the black color code #80 into each location of the video memory between the addresses E000 and E200. Finally, this program will operate until the operator pushes the escape key or pulls the plug.

One thing which will be mentioned in detail is the dimension declaration statement. In almost all BASIC interpreters ranging from DEC to IBM. the size of each declared array must be expressed by a number, that is: DIM P(6,6). But, in Super BASIC, the size can be expressed by an arithmetic expression, that is: DIM P(N,N). This feature allows for greater flexibility. Finally, if the size of the forest grid is to be changed, one merely assigns the variable N a new value which is indicative of the new size. This change will not disrupt the operation of the program; however, the calculation of the video memory coordinates, X and Y, in lines 260 and 270 should be taken into consideration, if severe problems should result.

INFESTATION has been written in Quest Super BASIC V3.0. The algorithm is simple. The task of writing it in machine code or Tiny Basic should pose no problems. INFESTATION demonstrates the principles behind computer population simulation and also produces very interesting and colorful patterns.

REFERENCE——— Hoppensteadt, Frank C. "Mathematical Aspects of Population Biology." In MATHEMATICS TODAY: TWELVE INFORMAL ESSAYS, pp. 297–320.

Edited by Lynn Arthur Steen. New York: Springer-Verlag, 1978.

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1 REM **
```

2 REM \*\*INFESTATION

3 REM \*\*

4 REM \*\* PHILLIP 3. LIESCHESKI III \*\*

5 REM \*\*

6 DEFINT Z

7 REM \*FOREST GRID SIZE

8 N=10

9 DIM P(N,N),G(N,N)

10 REM \*\*

11 REM \*\*REQUEST INITIAL FOREST PATTERN

20 PR "INFESTATION MODELING FOR A FOREST":PR

25 PR "SYMBOL TABLE:"

30 PR "G-GREEN=LIVING TREE"

40 PR "I-RED=INFESTED TREE"

50 PR "D-YELLOW=DEFOLIATED TREE":PR

60 PR "ENTER FOREST STATE PATTERN:"

70 PR "ROW", "COLUMN", "STATE"

80 FOR R=1 TO N

90 FOR C=1 TO N

100 PR. R.C.

109 REM \*REQUEST EACH TREE STATE

110 INPUT A\$

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120 IF A$="I" P(C,R)=#BF:GOTO 160
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130 IF A\$="D" P(C,R)=#9F:GOTO 160

140 IF A\$="G" P(C,R)=#8F:GOTO 160

150 PR "WRONG CHOICE" GOTO 100

160 NEXT C

170 NEXT R

180 REM \*\*

181 REM \*\*CLEAR SCREEN

190 FOR I-0E000 TO 0E200

199 REM \*LOAD VIDEO MEMORY W/ BLACK COLOR CODE

200 POKE(I,#80)

210 NEXT I

221 REM \*\*DISPLAY FOREST PATTERN

230 FOR R=1 TO N

240 FOR C=1 TO N

249 REM \*REFRESH TEMPORARY FOREST MATRIX

250 G(C,R)=#8F

259 REM \*CALCULATE VIDEO MEMORY ADDRESS

260 X=C+11

270 Y=@E080+(R-1)\*32

279 REM \*PUSH COLOR CODE INTO VIDEO MEMORY

280 POKE(X+Y,P(C,R))

290 NEXT C

300 NEXT R

310 REM \*\*

311 REM \*\*DETERMINE PATTERN FOR NEXT GENERATION

320 POR R=1 TO N

330 FOR C=1 TO N

339 REM \*IF DEFOLIATED, MAKE GREEN

340 IF P(C,R)=#9F G(C,R)=#8F:GOTO 460

349 REM \*IF NOT INFESTED, LEAVE ALONE

350 IF P(C,R)<>#BF GOTO 460

359 REM \*IF INFESTED, DEFOLIATE

360 G(C,R)=#9F

370 REM \*INFECT FOUR GREEN NEIGHBORS

380 IF C<2 GOTO 420

390 IF C>N-1 GOTO 420

400 IF P(C+1,R)=#8F G(C+1,R)=#BF

410 IF P(C-1.R)=#8F G(C-1.R)=#BF

420 IF R<2 GOTO 460

430 IF R>N-1 GOTO 460

440 IF P(C,R+1)=#8F G(C,R+1)=#BF

450 IF P(C,R-1)=#8F G(C,R-1)=#8F

460 NEXT C

470 NEXT R

480 REM \*\*

481 REM \*\*TRANSFER NEW GENERATION PATTERN

490 FOR R=1 TO N

500 FOR C=1 TO N

510 P(C,R)=G(C,R)

520 NEXT C

530 NEXT R

540 GOTO 220

999 END

# Q\*BUG

In a future column, we will be adding some two character "Shorthand" commands to the Super command table. Until we learn and memorize all of the new commands, it might be helpful to have a "HELP" routine which will list all of the commands in the command table. What follows is a machine language routine to do just that.

To use this routine, we will make a change in the command table on page 0500 and the execution table on page 0700. At this point, the changes will be temporary and we will make them permanent when the "Shorthand" commands are inserted into the command table.

A look at the command table at location 0500 thru 06D2 reveals several interesting pieces of information: Each command in the table consists of a leading control byte, the ASCII representation of the command word with bit 7 of the last byte changed to a 1, and a trailing byte which is the command token. When Super writes a program to memory, only the token byte is actually put in memory. Thus, only one byte of memory is used for each command.

As an example, the command "CLS" appears in the command table at location 0505 as:

### 24 43 4C D3 81

The 24 is the control character, 43 = "C", 4C = "L", and D3, which is really 53 with bit 7 set to 1, = "S". The 81 is the token byte for the command.

Incidentally, tokens A9, AC, AF and B0 are not presently used for statements in the command table. Also, the FUNCTION execution table, at location 07A0 thru 07D7, contains several unused tokens as well as six unidentified tokens.

The STATEMENT execution table starts at 0700 and runs thru 0763. Each statement command token "points" to a two byte address in the execution table that Super will vector to when running your program. Our job will be to set up a token for the "HELP" routine and install the address of the Machine Language routine in the STATEMENT execution table.

Super now includes two rather redundant commands - SFMON and FDMON. I feel it is very unlikely that anyone would have both a Floppy Disk drive AND a Stringy Floppy drive. Consequently, we will use one of these for our HELP command. Actually, we will change the command word to HELPP so that it has the same number of

characters as SFMON (or FDMON) and will save us the job of realigning the command table.

At location 0573, change 53(S), 46(F), 4D(M), 4F(O) and CE(N) to 48(H), 45(E), 4C(L), 50(P), and D0(P), if you wish to drop SFMON; or, at location 057A, change 46 44 4D 4F CE to 48 45 4C 50 D0. Either way, the command "HELPP" is now in the command table.

Now, if you changed SFMON to HELPP, you must change the address for token 93 in the execution table. If FDMON was changed, the address for token 94 must be changed.

As mentioned previously, each token "points" to a two byte address in the execution table. Token 80 "points" to location 0700 and 0701 which show an address of 02F9. This is the actual routine Super will perform when a REM is encountered in a program. (Did you know that you can type a "!" for REM and Super will automatically convert it to REM ?)

Token 81 "points" to location 0702 and 0703, token 82 "points" to 0704 and 0705, etc...

Token 93 "points" to location 0726 and 0727 which contain address OCA6 and token 94 "points" to location 0728 and 0729 which contains the address OCA9.

Depending on which command you changed, change its address in the execution table to 0010. Thus, if you changed SFMON to HELPP, you would change location 0726 and 0727 to 0010. If you changed FDMON, change location 0728 and 0729 to 0010.

We will put the HELPP machine language routine on work page 0000. It will run from location 0010 thru 004F. The program follows:

#### ADDR.

0010	F8 05 B1	Set R.1 to point to location 0501
13	F8 01 A1	(First ASCII character in REM)
16	88 73	Save R&O on stack
18	F8 00 A8	Set line length counter (R8.0) to "00"
1B	01	Get byte at location pointed to by R1
1C	FF 80	Subtract 80 - Convert to probab- le ASCII character
1E	38 25	If DF = 0 (Probable ASCII) branch to 0025
20	41	Get byte at location pointed to

		by R1 - R1 + 1
21	FF 80	Subtracr 80 - convert to probab-
		le ASCII character
	30 2B	Branch to location 002B  Get byte at location pointed to
25	41	Get byte at location pointed to
		by R1 - R1 + 1
26	D4 35 8E	Call print routine - prints only
		valid ASCII
29		Branch to location 003C
28	D4 35 8E	Call print routine
<b>2</b> E	F8 20	Load "20" (space) to D register
30	D4 35 8E	Print the space
33	11	Increment R1 past the next token
	•	character
34	01	Get the byte at location pointed
		to by R1
35	FB FF	Test (XRI) for "FF" (end of
		command table)
37	32 4C	If test is true, branch to 004C
39	11	Increment R1 past first control
		character
<b>3</b> A	18	Increment line length counter
		for byte printed
<b>3B</b>	18	Increment line length counter
		for space printed
<b>3</b> C	18	(Housekeeping)
<b>3</b> D	88	Get R&O (line length counter)
3E	FF 3D	Test for "3D" (61 characters
		printed)
40	318 1B	If test not true, (less than 61)
		branch to 001B
42	01	Get next byte at location poin-
		ted to by R1
	FF 80	Subtract 80
45	33 20	If DF = 1, branch back to print
		byte(continue word)
	D4 2F F9	Print CR/LF
<b>4</b> A	30 18	Branch back to reset line length
		counter
<b>4</b> C	12 02 88	Restore R&0
4F	D5	Return

You may have to adjust the value of the byte at location 003F, up or down, to keep Super from splitting too many command words.

First, make a new master Super program tape (record at least twice). Now, you can use your HELPP command by typing "HELPP" at any time.

The next article will go into the creation of a simply "Shorthand" basic, moving the printer driver routine to a new location and opening up the command table thru location O6FF, and the final HELP routine.

### **DF DEMO**

by

### Randy Rinker

DF Demo is a program for those who would like to learn more about the 1802 processor that is the heart of your Super Elf. As the title suggests, this program shows how the DF register works.

purposely kept this program easy to understand. What good would it do to show you how one thing works if you don't understand the rest of the program? Addresses 0000 H to 0008 H are for initialization. 0009 H to 0018 H are used to input two numbers. Push input after each number. Addresses 0019 H to 001B H subtract the first number from the second. At address 001C H is a 32 instruction that branches to a buzzer if both numbers are equal. At the heart of this program is the 3B (branch if DF=0). DF will equal 0 if a borrow occurs on subtract. This means the first number was larger. Addresses 0020 H to 0029 H display either 01 or 02 to show which number was larger and then branches back to the start. The buzzer starts at address 002A H. It is a typical routine and others like it can be found in "What the Machine is Thinking" in Questdata #2 or the Super Elf manual. You must reset and start over if the buzzer sounds.

I hope this program has given you some insight into the great Cosmac microprocessor. I am always willing to help fellow Cosmacians!

### Program Listing:

Addr.	Data		
0000	90 B2 B3	0020	E0
0003	F8 1B A2	0021	64 02
0006	F8 FF A3	0023	30 00
0009	E2	0025	E0
000A	3F 0A	0026	64 01
000C	37 OC	0028	30 00
000E	6C 64 22	002A	7B
0011	E3	002B	F8 FF
0012	3F 12	002D	FF 01
0014	6C 64 23	002F	3A 2D
0017	37 14	0031	7A
0019	F0	0032	F8 FF
001A	FF 'any' (stack)	0034	FF 01
001C	32 2A	0036	3A 34
001E	3B 25	0038	30 2A

#### NOTE:

If you change address 38 to 3F 2A and add 30 00 at address 3A, then the program will reset itself to address 00 00 if the input is held while the "buzzer" is sounding.

## TEXT EDITOR

by

#### Fred Hannan

When I first agreed to write the "QBUG" column, I did not possess an easily useable Text Editor. I had dabbled with the program "Simple Line Editor" in the manual for Super Basic Version 1.4 but found it lacked several features that I wanted in an Editor. Also, at this time, I did not have a printer so any output I generated went to the CRT.

The first article I prepared was created as a very long string of "PRINT" statements in a Basic program. Although this worked after a fashion, it gave our editor, Paul Messenger, fits when he had to convert the Basic program to a form compatible with his word processing machine.

Paul asked our resident programming Guru, Ron Cenker, to prepare a simple line editor program that I could use to prepare future columns. Although this program also worked, it was even more rudimentary than the Super Basic "Simple Line Editor" program (sorry, -Ron). At this point, I decided to use the "Simple Line Editor" in spite of its faults. I made a few changes to the program to make it more adaptable to my needs but refrained from a complete rewrite due to the pressure of getting several columns written up and off to QUESTDATA.

Shortly thereafter, I made the decision to purchase a printer and started to look for a means of interfacing a printer to my ELF II. I also needed a program to print out a hard copy of the column, both for proofreading purposes and to accompany the tape when I sent it to QUESTDATA. Happily, John Ware in Fort Worth, Texas, was kind enough to provide the hardware interface details and a much modified version of the "Simple Line Editor" program which included a printer driver section.

After a bit of a struggle with the printer interface, due to a lack of electronic knowledge on my part, I had the printer up and running and merrily spewing out page after page of the column.

At this point, I decided to really dig in and make the Line Editor program useful for the preparation of the column and letter or memo writing. The accompanying program is the result of my labor — it is a greatly modified version of the original program and includes some of John Ware's modifications.

The program is menu driven and will perform the following operations:

1 - Enter new data from the keyboard

2 - Enter data from a tape

3 - List the data already entered (to the CRT) 4 - Present a proof type listing on the CRT with line #1s and prompt for the line # to be edited 5 - Prompt for the line # to be edited and perform edit

6 - Save data to tape

- 7 A) Print a proof type listing with line #1s
  - B) Print a draft (final) copy of:
  - 1) A letter
  - 2) A memo form
  - 3) A plain form (no heading)
- 8 Add data to data already entered will display last line previously entered

9 - Exit from editor

10 - Display the menu at any time

Although the program is liberally sprinkled with REM like statements explaining most of the functions, I will run thru the program with you, section by section.

Line 30, the first non-REM line, will clear the screen and initialize the variables A and A1. Line 40 establishes strings H and H1 which are used for the headings on the memo form when this is the desired output. Lines 60 thru 80 are used to set up the letterhead strings which the program will print at the top of the form. I have placed "x"s in the program but you should put your name, etc. in these lines.

The main program starts at line 90 with a sign on message. Line 100 requests the entry of a date. This date is printed at the appropriate place on the letter, memo, or plain form. If you do not want the date to appear on a form, merely press the RETURN (or ENTER) key. The program will assign a space to the date string Y. This is to avoid the abort of the program later on when it looks for the Y string.

Line 110 thru 150 give you the option of going immediately to the entry of new data or performing some other task. If either an uppercase or lowercase "N" is entered, the program will ask you if you wish to have the menu displayed. (All prompt reply scan be either upper or lower case letters when a letter is the required input). A C/R will default to a "Y" and the program goes into the data entry mode. Line 150 is an error trap typeline and will display an error mesage if an invalid input is attempted.

Lines 160 thru 200 give the user the option of displaying the menu or not. In the beginning, you may want to display the menu rather often until you memorize the option selection codes. A C/R will default to an "N" and the menu will not be displayed. A "Y" will display the menu, of course. The errortrap is at line 200.

Lines 210 thru 330 request the input of the option selection code and will go to the proper function upon receipt of the code. A C/R will default to option #1 - Enter New Data. The error trap for this routine is line 330.

Lines 340 thru 370 perform the data load from a tape routine. A prompt is issued requesting the page # on the tape which is to be loaded. Instructions for setting the tape deck are issued and when RETURN is pressed, loading of the data begins. There is no error trap for this routine so be careful in entering the prompt replies.

Lines 380 thru 490 represent the keyboard data entry function. The program issues two simple instructions concerning line length and the exit symbol, both of which can be changed to suit your needs. If you change the number of characters on a line, be sure to change line 440 which is the actual line length delimiter.

Lines 430 thru 450 prepare the line # counter for the first or next line of data, issues the prompt "Enter Data", sets the line length delimiter, and awaits the entry of data.

Line 460 tests for the entry of the exit symbol """. If the symbol is received, the program goes to the exit routine atline 490.

Line 470 tests the length of the data line entered and, if more that 64 characters were entered, the line is ignored and a new line input requested.

Line 480 increments the line # counter if a proper line of data was entered and goes back to line 450 for the entry of more data.

Line 490 is the exit routine. The value of variable A is placed in variable A1 and the program goes back for entry of the next option selection code.

Lines 500 thru 540 are the list routine. A prompt is issued requesting the starting line #. You may start with line # 1 and get a full list of all the data or any line # and get a list of the data from that line to the end. If the line # entered does not exist in the data, an error message is issued and a new starting line # is requested. The entry of an "0" will exit the routine. Again, no error trap is included so be careful in entering the responses.

Lines 550 thru 650 cover the edit routine. A prompt is issued requesting the # of the line to be edited. If an improper line# is entered, an error message is issued and a request for a line # repeated. If a "0" is entered, the procedure will exit and go back to the option code entry line. If a valid line # is entered, this line will be displayed and a prompt option for changing the line is issued. A C/R will default to a "Y" and an "N" will cause the line # request prompt to be redisplayed.

If a C/R was entered, the line to be edited will be redisplayed and the input of the new line requested. The new input will appear directly below the old line so you can copy the old data and see the change in the data when you enter the change. You exit the procedure with the entry of a "O".

Lines 660 and 670 are a subroutine to print to the CRT the numbered list for the edit list routine. This is the response to option code #4 and will go to the edit routine after the list is displayed.

Lines 680 thru 710 are the data save to tape routine and are virtually the same as the data load from tape routine. I do not think any specific explanation of this function is necessary.

Lines 720 thru 1320 cover the various printer functions. Four different types of printer outputs are generated within this section and many of the lines contain EPSON printer control commands. These, of course, will have to be changed or eliminated for other brands of printers. Incidentally, the program assumes that the printer is set to print the first line at the fourth physical line on the form. Also, each form is printed in the "Block" style (no indentations).

Lines 740 thru 780 request an input to designate the type of printer output desired – a proof copy or a draft (final)copy. A C/R defaults to a "D" while a "P" will generate a proof copy, The error trap is line 780.

If a proof copy was requested, the program goes to line 790 which sets the output to go to the printer by the P/O (short-hand for POUT). The date is printed (Y string) and the line number and line are printed. Line 830 increments the line counter and, if 56 lines have been printed, calls the form feed subroutine at line 1500. The line counter is reset to 0 and the next line is printed on the following page.

When all the data has been printed, the program falls through to line 850 where the EPSON printer control commands are turned off. Line 860 turns the program printer output off, clears the screen and goes back to get the next option selection code.

If a draft copy was requested at line 740, the program goes to line 870 where a prompt requests an entry for the type of final copy to print. If a letter form is requested, the program goes to line 1270. If a plain form was selected, the program goes to line 1320. If a memo form was chosen, the program falls through to line 940.

At line 940, the names of the "TO" addressees are requested. Up to 10 names may be entered and a plain C/R will exit the "TO" addressee section. One note of interest – the word "TO" will be printed to the left of the first "TO" name only although all names will be printed as a list.

Line 990 similarily requests the names of the carbon copy (CC) addressees with the same rules and results as the "TO" addressees.

Line 1040 requests the name of the sender and line 1050 asks for the subject of the memo.

Lines 1080 and 1090 put the "TO", "CC", "FROM", and "SUBJECT" in front of the appropriate strings to form the proper line headings for each section of the memo.

Lines 1100 and 1110 print the heading in double width (chr\$(14))

### MENU

Line 1120 prints the date. Lines 1130 thru 1160 print the "TO" names. If only one "TO" name was entered, the program will exit this section after that one name was printed or after all "TO" names have been printed.

Lines 1170 thru 1210 do the same for the "CC" names. Line 1220 prints the sender name and line 1230 prints the subject. Line 1240 prints down three blank lines, sets the line counter for the lines already printed and goes to line 1330 to print the body of the memo.

Line 1270 starts the letter printing function. At line 1275, the users name is printed in double width, emphasized format. Line 1280 prints the street address and line 1290 prints the city, state, and Zip code.

Line 1300 prints the date, sets the line counter and goes to line 1330.

Line 1320 is the entry point for the plain form routine and merely prints the date, sets the line counter and goes to line 1330.

Line 1330 prints the body of any of the forms, counts the number of lines printed and, if 56 lines have been printed, calls the form feed subroutine, resets the line counter, and resumes

printing the next line. When all data has been printed, the program goes to line 850 to exit the printer section.

The menu display subroutine is contained in lines 1380 thru 1490, the form feed subroutine in line 1400, and the error message subroutine in lines 1610 and line 1620.

A word about option selection code #8 is in order. This is the code to add data to the already existing data. The routine for this is included in lines 290 thru 295. Here, the last-line entered in the existing data will be displayed and the program then goes to line 430 for the entry of the new data.

The program is very long with all of the REM type statements included. You should eliminate as many of these as you see fit so that you program space is not wasted. Also, if you have entered and printed one set of data and wish to start another data entry session, you must exit the program completely and restart it in order to clear all of the strings. If, for some reason, you had to exit the program prematurely (to check remaining memory for a very long set of data for instance), you can reenter the program and not lose any existing data by using the command "RUN 100". This entry point bypasses the variable setting line and picks up where you left off as far as the existing data is concerned. You must reenter the date, however.

All in all, the program pretty much does all that I want it to do. However, I am sure each user will have their own likes and needs to add to the program. Some other features that you might want to add could be variable number of spaces between lines, the addition of the addressee's name for a more formal letter, automatic indentation of the first line of each paragraph, etc. These are all easily done with just a little bit of imagination. In fact, if you do come up with some interesting variations, send them to QUESTDATA and we will fit them into a future column so others have a chance to include them in their program.

```
RE-ENTER": GOTO 450
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       If more than 64 characters entered, re-enter line
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   REM valid line entered. Increment line number counter
A=A+1: GOTO 450
                                                                                                                                         IF S$="8" PRINT : PRINT " LAST LINE ENTERED:":A=A1 IF S$="8" PRINT : PRINT A$(A) IF S$="8" PRINT : GOTO 430
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                use the symbol " " to exit the enter mode
                                                                                                                                                                                                                                                                                                                                               REM Which page of data to load?
PRINT : INPUT "WHAT PAGE # DO YOU WANT TO LOAD "P
IF P=0 THENP=1
                                                                 Option #8 = add data to data already entered
                                                                                                                              2) Go to add data to old data
                                                                                               1) Display last line entered
                                                                                                                                                                                                                                                                                                                                                                                              DATA.";
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  REM Only 64 characters allowed per line
PRINT : PRINT "64 CHARACTERS PER LINE MAXIMUM"
                                                                                                                                                                                                                                                                    REM Invalid entry will cause an error mesage
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               PRINT "TYPE THE SYMBOL " TO EXIT"
REM Allow some time to read the instructions
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   A1=A: PRINT : PRINT "PAGE COMPLETE": GOTO 210
                                                                                                                                                                                       REM Option "M" or "m" = display the menu
                                                                                                                                                                                                                                                                                                                                                                                                                                                          (D/L) is my shorthand for DLOAD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      IF LEN(A$(A))>C PRINT "LINE TOO LONG -
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      REM If """ typed, end of enter session
IF A$(A)="""1A=A-1: GOTO 490
                                                                                                                                                                                                                                                                                                                                                                                             PRINT : PRINT "REWIND TAPE TO START OF PRINT " SET RECORDER FOR PLAY."
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Enter new data from your keyboard
PRINT "KEYBOARD ENTRY MODE:"
                                Option #7 = printing operations
                                                                                                                                                                                                     IF S$="M" CLS: GOSUB 1380: GOTO 210
IF S$="M" CLS: GOSUB 1380: GOTO 210
     REM Option #6 = save data to tape IF S$="6" GOTO 680
                                                                                                                                                                                                                                    REM Option #9 = exit from program
                                                                                                                                                                                                                                                                                                                                                                                                                          INPUT "PRESS RETURN WHEN READY ." Z$
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Establish line length limiter
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            REM Set up line number counter
A=A+1: PRINT "ENTER DATA": PRINT
                                                                                                                                                                                                                                                                                                                                CLS: PRINT "DATA LOAD MODE:"
                                                                                                                                                                                                                                                                                                                   Load data from tape
                                                                                                                                                                                                                                                                                    GOSUB 1610: GOTO 210
                                                                                                                                                                                                                                                     IF S$="9" CLS: END
                                               IF S$="7" GOTO 720
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Enter line
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 REM All done
                                                                                                                                                                                                                                                                                                                                                                                                                                                                       CLS: GOTO 210
REM
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       INPUT AS(A)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     PRINT
                                                                                                                                                                                                                                                                                                                                                                                                                                         DLOAD ,P
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              WAIT(70)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CLS:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 REM
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          REM
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          C=64
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          REM
                                                                                                                                                                                                                                                                                                                  REM
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       REM
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                                                                                                            REM
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                                                                                                                              REM
                                                                                 REM
                                                                                               REM
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CLS
     101 IF Y$="" THENY$=" "
102 REM
105 REM Do you want to start entering data or do something else
110 PRINT : INPUT "GO RIGHT TO ENTER NEW DATA ( [CR] or N )"D$
                                                                                                                                                                                                                                                                                                                                                                          REM An "N" or "n" will get you to the next prompt question
                                                                                                                                                                             or [CR] )"M$
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           REM Time to pick the task - RETURN will default to ENTER PRINT : INPUT "ENTER YOUR SELECTION ( [CR] = ENTER )"S$
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  REM Option #4 = dispaly an edit listing by line number
   Line Editor Program
Adapted from Quest's "Simple Line Editor" Program
                                                                                                                                                                            insert your name
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  REM Menu display option
PRINT: INPUT "DO YOU WISH TO SEE THE MENU ( Y
REM A "Y" or "y" will display the menu
                                                                                                                                                                                                                                                                                                                                                                                                                                                          REM Invalid entry will cause an error message GOSUB 1610: GOTO 110
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Invalid entry will cause an error message
                                                                                                                                                                                                                                                                                              100 PRINT : INPUT "ENTER DATE (MMM. DD, YYYY) "Y$
                                                                                                                                                                                                                                                                                                                                                                                                                          REM Enter or Return key will default to "Y"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 REM Enter or Return key will default to "N" IF M$="" CLS: GOTO 210
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    REM Option #3 = list data already entered
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               REM Option #5 = edit a designated line
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Option #2 = load data from tape
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 IF M$="Y" CLS: GOSUB 1380: GOTO 210 IF M$="Y" CLS: GOSUB 1380: GOTO 210
                                Super Basic Version 1.4 manual
                                                                                                            Set up headings for MEMO form
                                                                                                                                                                           REM
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          REM Option #1 = enter NEW data
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    IF S$="4" GOSUB 660: GOTO 550
5 REM Line Editor Program
10 REM Adapted from Quest's "Si
15 REM Super Basic Version 1.4
20 REM
25 REM Initialize variables
30 CLS:A=0:A1=0
32 REM Set up headings for MEMC
40 H5="MEMO":H$(1)="===""
42 REM
50 REM Set up letterhead
60 N$(1)="xxxxxxxxxxxxxxxxxxxxx":
70 N$(2)="xxxxxxxxxxxxxxxxxxxxxx":
82 REM Main program
90 PRINT "*** LINE EDITOR ***"
95 REM Enter today's date
                                                                                                                                                                       N$(1)="xxxxxxxxxxxxxxxx";
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        REM C/R defaults to "1"
IF S$="1" GOTO 380
IF S$="" GOTO 380
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               GOSUB 1610: GOTO 160
                                                                                                                                                                                                                                                                                                                                                                                             IF D$="N" GOTO 160
IF D$="n" GOTO 160
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     IF S$="2" GOTO 340
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     IF S$="3" GOTO 500
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  S$="5" GOTO 550
                                                                                                                                                                                                                                                                                                                                                                                                                                         IF D$="" GOTO 420
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        REM
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                REM
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        REM
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       REM
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              REM
```

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812 RRW Print Proof line
820 RRINT A;TAB(4);A$(A)
822 RRW Increment line counter - if EOF reached, do Form Feed
823 RBW Increment line counter
830 B=B+1: IF B=56 GOSUB 1500:B=0
840 NEXT
842 RRW The following is an EPSON printer command which turns
843 REW off the Emphasized print mode and performs a Form Feed
850 RRWINT CHR$(27,70);CHR$(12)
852 RRW Print job done
860 TOUT: CLS: GOTO 210
862 REW (T/O) is my shorthand for TOUT
865 REW (T/O) is my shorthand for TOUT
872 INFUT "PRINT A LETTER, MEMO, OR PLAIN FORM (L/M/P) mp$
874 REW (I* "L" or "P" is not selected, program falls thru to
880 IF P$=""" GOTO 1320
930 IF P$="" GOTO 1320
930 IF P$="" GOTO 1320
931 REW MEMO print operation
933 REW MEMO print operation
935 REW MEMO print exprises to receive the memo - the "TO" will
935 REW Up to 10 addressees may be entered
940 RRM T Extra or Return key will exit "TO" entry section
950 RRW The Enter or Return key will exit "TO" entry section
951 REW The "C" will appear to the left of the first name
950 RRM The Enter or Return key will exit "TO" entry section
951 REW The "C" will appear to the left of the first name
950 RRM THE "C" will appear to the left of the first name
950 RRM THE "C" will appear to the left of the first name
950 RRM THE "C" will appear to the left of the first name
950 RRM THE "C" will appear to the left of the first name
950 RRM THE "C" will appear to the left of the first name
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1000 FOR Y=1 TO 10
1000 FOR Y=1 TO 10
1010 INPUT C$(Y)
1012 REM The Enter or Return key will exit "CC" entry section
1020 IF C$(Y)=""Y=Y-1; EXIT 1040
1030 NEXT Y
1032 REM Enter name of memo sender
1040 PRINT: INPUT "ENTER ADDRESSOR"F$
1042 REM Enter subject matter of memo
1050 REM T: INPUT "ENTER SUBJECT"M$
1052 REM Set up headings ":O$="SUBJECT;"
1070 B$="CC:"
1072 REM Assign headings to first name of each section
                                                                                                                                                                                                                                                                                                         REM off the Emphasized print mode and performs a Form Feed
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               REM Assign headings to first name of each section
V$(1)=U$+T$(1):J$=G$+F$:P$=O$+M$
E$(1)=B$+C$(1)
  Set line number counter
                              A=1 TO A1
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1080
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              or [CR] )"Z$
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         PROOF printing operation: REM (P/O) is my shorthand for POUT
Print date (Y$) - B is line counter for End Of Form
PRINT TAB(8);Y$: PRINT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          REM Subroutine to print numbered line listing to screen PRINT : FOR A=1 TO A1: PRINT A;" ";A$(A): NEXT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        CLS: PRINT "DATA SAVE MODE:"
PRINT: PRINT "SET TAPE TO END OF LAST DATA RECORDED.";
PRINT " SET RECORDER TO RECORD."
INPUT "PRESS RETURN WHEN READY"Z$
DSAVE: CLS: GOTO 210
                                                                                                                                                                                                                                                                                                                                                                        INPUT "WHAT LINE # IS TO BE EDITED (ENTER 0 TO EXIT)"L
IF L=0 GOTO 210
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    PRINT: INPUT "DO YOU WANT A PROOF OR DRAFT COPY (PIF Z$="P" GOTO 790
IF Z$="p" GOTO 790
                                                                                                                                                                IF S>A1 PRINT "THAT LINE # DOES NOT EXIST": GOTO 510 PRINT : FOR A=S TO A1: PRINT A$(A): NEXT PRINT : PRINT " END OF LIST": GOTO 210
                                                                                                                                                                                                                                                                                                                                                                                                                                      IF L>A1 PRINT "THAT LINE # DOES NOT EXIST": GOTO 550
                        CLS: PRINT "LIST MODE:"
REM Enter starting line # - entry of "O" will exit
PRINT : INPUT "START WITH WHICH LINE # "S
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     REM A proof copy will be a numbered hard copy list
REM Enter or Return will default to "D"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           PRINT : INPUT "WANT TO CHANGE IT ( [CR] or N )"Z$
REM Enter or Return will default to "Y"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            REM Invalid entry will cause an error message GOSUB 1610: GOTO 740
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Invalid entry will cause an error mesage
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              (D/S) is my shorthand for DSAVE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    PRINT : PRINT "POSITION PAPER IN PRINTER"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                             REM Display selected line
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       REM Enter corrected line
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                REM Printing operations CLS: PRINT "PRINT MODE:"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Save data on tape
  List data entered
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     INPUT A$(L): GOTO 550
                                                                                                                                IF S=0 CLS: GOTO 210
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        GOSUB 1610: GOTO 550
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      REM Redisplay line
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              IF Z$="n" GOTO 550
IF Z$="" GOTO 640
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          IF Z$="N" GOTO 550
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1F Z$="" GOTO 870
                                                                                                                                                                                                                                                                                                      REM Editing mode
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 PRINT " ": A$(L)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     PRINT " "; A$(L)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           RETURN
                                                                                                                                                                                                                                                                                                                                          PRINT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  REM
B=2:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    REW
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REM CHR\$(12) is an Epson printer command for a Form Feed PRINT CHR\$(12): RETURN = 1 OR PRESS 'RETURN'" REM Error message subroutine PRINT : PRINT "THAT DOES NOT COMPUTE, TRY AGAIN!" RETURN REM Job done - exit to turn off printer option : PRINT "ENTER - NEW DATA REM Display menu subroutine PRINT : PRINT " \*\*\* MENU \*\*\*" 61 7 8 8 ¥ Н REM FORM FEED subroutine Reset line counter NO LIST T nemenantes 1 1S17 # -PRINT "DISPLAY MENU - TAPE 1 PRINT "EDIT - PRINT "EDIT - PRINT "SAVE - PRINT "SAVE - PRINT "PRINT "PRINT " 100" PRINT "ADD GOTO 850 PR INT RETURN PR INT PR INT REM REM 353 360 370 372 380 380 400 410 420 440 1450 480 1485 1510 1550 1610 1700 470 495 500 492 1497

### QUESTDATA P.O. Box 4430 Santa Clara, CA 95054

Publisher......Quest Electronics Editor......Paul Messinger QBUG Editor.....Fred Hannan Proof Reading.....Judy Pitkin Production.....John Larimer

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```
REM Print the date
PRINT: PRINT TAB(4); Y$: PRINT
REM Print "TO" addressees
PRINT: PRINT TAB(4); V$(1)
REM If only one "TO" addressee, exit to print "CC" section
FOR W=2 TO X: IF T$(W)="" EXIT 1170
PRINT TAB(8); T$(W)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     go to print line section
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           REM Set output to printer. CHR$(14) is Epson Double Width
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 REM Increment line counter - if EOF reached, do Form Feed
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             print command. CHR$(27,69) is Epson Emphasized print
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           REM Space down to first line of memo - set line counter
REM Set output to printer - P/O is shorthand for POUT REM The CHR$(14) is an Epson printer command to print REM the word "MEMO" and underscore in DOUBLE WIDTH POUT : PRINT : PRINT TAB(36);CHR$(14);H$

PRINT TAB(36);CHR$(14);H$(1): PRINT
                                                                                                                                                                                                                                            REM Print "OC" section
REM if no "CC" addressees, (Y=0), go to next section
IF Y=0 GOTO 1220
REM Print "CC" addressees
                                                                                                                                                                                                                                                                                                                     PRINT: PRINT TAB(4):E$(1)
REM If only one "CC" addressee, exit to next section
FOR V=2 TO Y: IF C$(V)="" EXIT 1220
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           REM Print city, state, zip
PRINT TAB(30);CHR$(27,69);N$(3)
REM Print date, set line counter, go to print line :
PRINT : PRINT : PRINT TAB(4);Y$: PRINT : PRINT :B=B
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 PRINT : PRINT : PRINT : B=14+(X-1)+(Y-1): GOTO 1330
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  POUT : PRINT : PRINT TAB(4);Y$: PRINT : B=2
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      PRINT TAB(29); CHR$(27,69); CHR$(14); N$(1) REM Print address portion of letterhead PRINT TAB(34); CHR$(27,69); N$(2)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                POUT : REM (P/O) is shorthand for POUT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     REM Print Name portion of letterhead
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              REM Go to line printing operation
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   REM LETTER printing operation
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              PRINT TAB(4); A$(A)
B=B+1: IF B=56 GOSUB 1500:B=0
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1310 GOTO 1330
1311 REM
1312 REM Plain form entry point
1315 REM
1317 REM Print date
1320 POUT : PRINT : PRINT TAB(4);
                                                                                                                                                                                                                                                                                                                                                                                                                                    PRINT : PRINT TAB(4); J$
                                                                                                                                                                                                                                                                                                                                                                                                                                                       REM Print subject
PRINT : PRINT TAB(4);P$
                                                                                                                                                                                                                                                                                                                                                                                 PRINT TAB(8);C$(V)
                                                                                                                                                                                                                                                                                                                                                                                                                    REM Print sender
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         REM Print lines
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             FOR A=1 TO A1
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 REM command.
                                                                                                                                                                                                                              NEXT &
                                                                                                                                                                                                                                                                                                                                                                                                   NEXT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                REM
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     REM
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          REM
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    272
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232
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## SUPER SOUND

by

Don Stevens

The music program given here is like McCormack's program (Quest vol. 1, nu. 7) in that tones are generated by the process of reading a number from a table of input data and then using this number in a counting routine to determine how long Q is on and off. In McCormack's program the number of machine cycles in a complete on-off cycle of Q is equal to 68+8\*N, where N is the number read from the table. For the program presented here the number of machine cycles in a complete on-off cycle of Q is equal to N, and so the frequency of the note is C/8N, where C =clock frequency. The program can play notes three octaves higher than the McCormack program can with the same resolution. In fact, the program provides about twice the frequency resolution that the General Instruments AY-8910 chip provides (this chip is used in the Alf board) and also twice the frequency resolution that the RCA 1863 chip provides (this chip is used in the RCA VP-550 Super Sound Board). This Super Sound Program includes even harmonics in its audio signal and has a more pleasing timbre.

The data in the data table can use either one byte or two bytes to specify the frequency of the note. If the 3 highest order bits of the first byte are all equal to 1, then the remaining 13 bits of the first two bytes specify N as a 13 bit binary number. If the above condition is not met, then from this byte are extracted the tone number (from 1 to 12, 1 gives C, 2 gives C#, 3 gives D, 4 gives D#, 5 gives E, etc. to 12 gives B) from the first nibble and the octave (from 0 to 8) from the second nibble. First byte = 14 hex gives middle C or C4 (261.6 hz), first byte = 10 hex gives C0 (16.3 hz), first byte = 58 hex gives E8 (5327 hz). All the notes from C0 to E8 can be produced, a greater range than a piano produces.

The duration is determined by the value of the byte following the byte(s) which gives the tone. The duration is approximately equal to .0183 \* byte value / (1-00015\*F), where F is the frequency (in hz) of the note being played. For ordinary music the duration is approximately .02 \* byte value. The duration should be greater than the duration of 16 cycles of the note being played. If the first data byte = 01, a silent note is produced with duration determined by the second data byte (actually a 14khz tone is produced). If the first data byte = 00, the program

jumps to the address contained in bytes B2 (high address byte) and B3 (low address byte) in the program.

The program is given in the listing and it fits in one page. The address of the data table in this listing is 00 F5 hex, with the high byte specified at 06 and the low byte specified at 09. Of course, the address of the data table may be changed as the user chooses. If the PC is R0 and not R3, change byte 00 from 93 (GHI3) to 90 (GHI0). If the program is loaded as listed at 00 00, it will play a certain tone repeatedly until the input key is held down. This causes the program to read new data (entered on the hex keypad) and play the corresponding tone.

The equal tempered musical scale is in general use today because it works equally in every key. With our Super Sound Program we can use a better scale for any given key. The program has a list of divisors (starting at byte DD) which specify the equal tempered scale by giving the approximate divisors for tones 1 through 12 in octave 0. To use a different divisor list, put the high byte of the address of the list in byte 03 and put the low byte of the address of the list in byte C4 of the program. The divisor list should not straddle a page boundary.

The program may be run on any page. For easy reference, here are the locations in the program where various addresses should be put:

high	byte	low byte
data table	06	09
exit address	B2	B3
divisor table	03	C4

```
93 BE F8 00 BC F8 00 B6
                              F8 F5 A6 E6 7B 06 64 7A
AC FF E0 3B B0 8C 7B FA
                              1F B7 7A 46 A7 46 B8 7B
97 F6 7A B9 87 76 A9 7B
                              29 29 7A 29 29 29 99 7B
F6 B9 7A 89 76 A9 76 7B
A9 8D 7A 76 AD 99 F6 7B
F6 F6 7A F6 F6 F6 AD 7B
                              29 99 7A FC 01 B9 29 F8
99 7B AE 87 7A F6 7A 33
1E 7B 8D 32 7B 7A 2D F8
                              6D F8 99 30 6F F8 C4 5E
                              99 30 6F 7A F8 30 5E 1E
F8 83 5E 99 7B BA BB 89 7A 32 0C 2B 28 9B 9B 3A
                              AA AB 2A 9A 3A 8A 98 7A
                              93 89 FF 01 A9 99 7F 00
B9 30 83 7A 46 B8 28 98
                              7B 98 98 7A 32 0C 30 A6
8C C2 00 F8 7B FA OF A8
                              7A 8C F6 F6 F6 7B FA 1E
32 A3 7A FC DD FF 02 AC
1D 97 7B F6 B7 7A 87 76
                              4C B7 7B OC A7 7A 88 32
                              A7 7B 28 30 CD 35 72 32
72 2F 9D 2C F1 2A 6B 28
C7 1D FF 1C 50 55 10 00
                              OA 25 CB 23 AC 21 AB 1F
                               3F 00 26 26 26 6C 30 00
```

00		93	GHI3	PUT HIGH BYTE OF	54		F6	SHR		A3	LA	7A	REQ	
01		- BE	PHIE	PC IN RE.1	55		F6	SHR		A4		46	LDA6	DO SILENT NOTE
02		F8	LDI		56		AD	PLOD		Α5		88	PHI8	FIRST
03		00 BC	00	HIGH BYTE OF DIVISOR			7B	SEQ		A6	LB	28	DEC 8	GET
04 05		F8	PHIC LDI	LIST	58		29	DEC9		A7		98	GHI8	THE
06		00	00	DATA TABLE ADDRESS	59		99	GHI9		A8		7B	SEQ	DURATION
07		B6	PHI6	HIGH BYTE	5A 5B		7A FC	REQ ADI		A9		98 98	GHI8	THEN
08		F8	LDI	arda bire	5C		01	01		AA			GHI8	LOOP
09		LF	LF	DATA TABLE ADDRESS	5D		B9	PHI9		AB		7A 32	REQ BZ	FOR THE
0A		A6	PLO6	LOW BYTE	5E		29	DEC9		AC AD		Ll	Ll	
0В		E6	SEX6	Bow Bills	5F		F8	LDI		AE		30	BR	DURATION
0C	Ll	7B	SEQ		60		L9	L9		AF		LB	LB	
OD.		06	LDN6	GET NEXT NOTE	61		78	SEQ		B0	LC	8C	GLOC	TABLE LOOK UP
0E		64	OUT 4	DISPLAY NOTE	62		AE	PLOE		Bl		C2	LBZ	FOR TONE
OF		7 <b>A</b>	REQ		63		87	GLO7		B2		00	00	USERS CHOICE
10		AC	PLOC		64		7A	REQ		В3		LG	LG	WHERE TO GO
11		FF.	SMI	TEST WHETHER	65		F6	SHR		84		7B	SEQ	
12		E0	E0	TO USE	66		7A	REQ		B5		FA	ANI	
13		3B	BNF	TONE TABLE	67		33	BDF	•	B6		OF	OF	
14		LC	LC	OR NOT	68		L3	L3		<b>B</b> 7		<b>A8</b>	PLO8	R8 HAS OCTAVE
15		8C	GLOC		69		F8	LDI		В8		7A	REO	
16 17		7B FA	SEQ ANI	ELIMINATE HIGH	6A		99	99		В9		8C	GLOC	
18		18	1F	ORDER 3 BITS	6B 6C		30 L4	BR		BA		F6	SHR	
19		B7	PHI7	ONDER 3 BIIS	6D	L3	F8	L4 LDI		BB BC		F6 F6	SHR SHR	
1A		7A	REO		6E	63	C4	C4		BD		7B	SEQ	
18		46	LDA6		6F	L4	5E	STRE		BE		FA	ANI	
1C		A7	PLO7		70		íε	INCE		BF		1E	1E	
10	L2	46	LDA6	GET DURATION	71		7B	SEQ		CO		32	BZ	IF TONE=0,
1E		B8	PHI8		72		8D	GLOD		Ç1		LA	LA	TO SILENT NOTE
1F		7B	SEQ		73		32	BZ		C2		7A	REQ	10 DIBLET HOLD
20		97	GHI7	COMPUTE R9	74		L5	L5		C3		FC	ADI	
21		F6	SHR	AND	75		7A	REQ		C4		LE	LE	LOW BYTE OF
22		7A	REQ	ADJUST	76		2D	DECD		C5		FF	SMI	DIVISOR LIST
23		B9	PHI9	LOOP	77		F8	LDI		C6		02	02	
24		87	GLO7	TIMING	78		99	99		C7		AC	PLOC	
25		76	SHRC		79		30	BR		C8		4C	LDAC	
26		A9	PLO9		7 <b>A</b>		L4	L4		C9		B7	PHI7	
27		7B	SEQ		7 <b>B</b>	L5	7A	REΩ		CA		7 <b>B</b>	SEQ	
28		29	DEC 9		7C	-		LDI		CB		0C	LDNC	
29 2A		- 29 7 <b>A</b>			7D		30	30		CC		A7	PLO7	
2B		29	REQ DEC9		7E		5E	STRE		D3		F6	SHR	
2C		29	DEC 9		7F		1E	INCE		D4		B7	PHI7	
2D		29	DEC 9		80		F8	LDI		D5		7 <b>A</b>	REQ	
2E		99	GHI9		81		L6	L6		D6		87 7 <b>6</b>	GLO7 SHRC	
2F		7B	SEQ		82	7.6	5E 99	STRE	מנאע משפי	D7 D8		A7	PLO7	
30		F6	SHR		83 84	L6	7B	GHI9 SEQ	PLAY THE NOTE	D9		7B	SEQ	
31		В9	PHI9		85		BA	PHIA	WIE	DA		28	DEC8	
32		7 <b>A</b>	REQ		86		BB	PHIB		DB		30	BR	
33		89	GLO9		87		89	GLO9		DC		ĽD	LD	
34		76	SHRC		88		AA	PLOA		DD	LE	35	35	THIS
35		A9	PLO9		89		AB	PLOB		DE		72	72	•
36		76	SHRC		8A	L7	2A	DECA		DF		32	32	IS
37		7B	SEQ		8B		9A	GHIA		E0		72	72	•
38		AD	PLOD		8C		3 <b>A</b>	BNZ		El		2F	2F	THE
39		99	GHI9		8D		L7	L7		E2		9D	9D	•
3A		7A	REQ		8E		98	GHI8		E3		2C	2C	DIVISOR
3B		F6	SHR		8F		7A	REQ		E4		Fl	Fl	•
3C 3D		B9 89	PHI9 GLO9		90		7A	REQ		E5		2A	2A	TABLE
3E		76	SHRC		91		32	BZ	GO FOR	E6		6B	6B	, DOD
3F		7B	SEQ		92		Ll	Ll	NEW NOTE	E7		28	28	FOR
40		A9	PLO9		93	L8	2B	DECB		E8		0A 25	0A 25	THE
41		8D	GLOD		94		28 9B	DEC8		E9		CB	CB	THE
42		7A	REO		95 96		9B	GHIB GHIB		ea eb		23	23	EQUAL
43		76	SHRC		97		3A	BNZ		EC		AC	AC	a quant
44		AD	PLOD		98		L8	L8		ED		21	21	TEMPERED
45		99	GHI9		99	L9	89	GLO9	ADJUST	EE		AB	AB	•
46		F6	SHR		9A		FF	SMI	LOOP	EF		1F	1F	SCALE
47		7 <b>B</b>	SEQ	•	9B		01	01	TIMING	FO		C7	C7	•
48		В9	PHI9		9C		A9	PLO9	-	F1		1D	1D	•
49		89	GLO9		9D		99	GHI9		F2		FF	FF	•
4A		7A	REQ		9E		7 <b>F</b>	SMBI		F3		1C	1C	•
4B		76	SHRC		9F		00	00		F4		50	50	•
4C		A9	PLO9		A0		В9	PHI9		P5	LF	55	55	INTERACTIVE
4D		8D 76	GLOD		A1		30	BR	CONTINUE	F6		10	10	DATA TABLE
4E 4F		7B	SHRC SEQ		A2		L6	L6	THE NOTE	F7		00	00	MBCM WINNE
50		76 F6	SHR		CD	LD	7A	REQ	1000	F8	LG	3P	3F	TEST INPUT
50 51		F6	SHR		CE		88	GLO8	LOOP SHIFTS	F9		00 26	00 26	READ NEW TONE AND
52		7A	REQ.		CF D0		32 L2	BZ L2	R7	FA FB		26	26	OCTAVE
53		F6	SHR		D1		97	GHI7	BY OCTAVE	FC		26	26	DATA
					D2	-	7B	SEQ		FD		6C	6C	
					J2		, 5	200		FE		30	30	
										PF		00	00	

## DAY OF THE WEEK

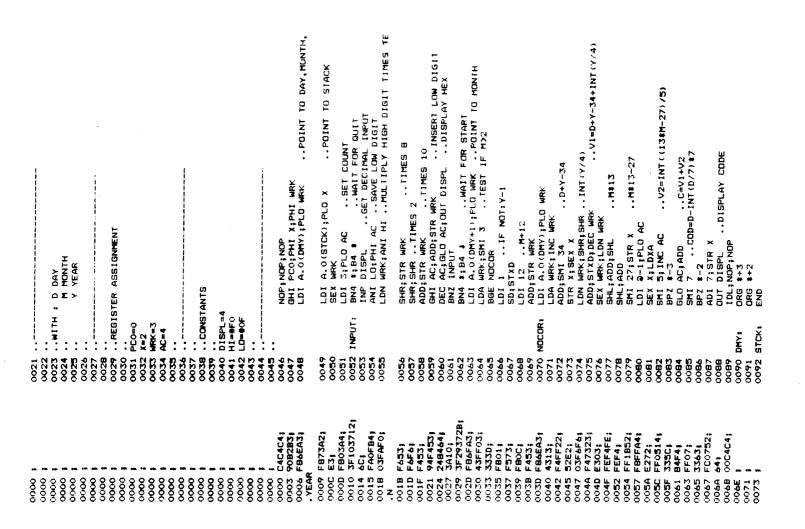
by

### Werner Cirsovius

Want to know the week day of 2,16,1978?

ELF stops

CITY	STATE ZIP	
7001100		
NAME		
	· <b>√</b> · · · · · · · · · · · · · · · · · · ·	
Your comments are	ilways welcome and appreciated. We want	to
ercen	t Canada and Mexico add \$2.00)	
entire	ely to the COSMAC 1802 is \$12.	
A 12 issue subscrit	otion to QUESTDATA, the publication devo	<b></b> t <b>e</b> d
0020		
0019COD=C-INT(C/7)		
0017 IF M<=2 THEN M		
0015ALBORITHM FROM	FOLLOWING BASIC PART	
0011 0012	6 SATURDAY	
0010	11 11	
0008GENERATED CODE		
0005 WRITTEN BY W.C		
	OF H WEEK PROM 1,1,1901 TO 12,31,1999	
0001		
04	correct. Can anyone find the bug?	
<b>4</b> E	begins correctly with X,X,1905 but 12,31,1	
<b>-</b>	Although I tested the program and it runs	w
m	of day, month or year.	
10	Note that the ELF doesn't check for legal	inp
10	06 : Saturday	
	04 : Thursday 05 : Friday	
	03 : Wednesday	
neans "Thursday".	00 : Sunday	
	0002*********************************	O4: Thursday O5: Friday O6: Saturday  Note that the ELF doesn't check for legal of day, month or year.  O2  Although I tested the program and it runs the range from X,X,1901 is not correct begins correctly with X,X,1905 but 12,31,1 correct. Can anyone find the bug?  O001 O002 O003CDMPUTE A DAY OF A WEEF FROM 1,1,1901 TO 12,31,1979  O004 O005WRITTEN BY W.CIRSOVIUS; O006GENERATED CODE:0 SUNDAY O009 O009SENERATED CODE:0 SUNDAY O010 O011ALBORITHM FROM FOLLOWING BASIC PART O014OUSALBORITHM FROM FOLLOWING BASIC PART O015ALBORITHM FROM FOLLOWING BASIC PART O016ODM-C-INT(C13H-27)/5)+D+Y+INT(Y/4)-34 O019CDD-C-INT(C7):87 O020  A 12 issue subscription to QUESTDATA, the publication devo entirely to the COSMAC 1802 is \$12. (Add \$6.00 for airmail postage to all foreign countrexected canada and Mexico add \$2.00)  Your comments are always welcome and appreciated. We want be your 1802's best friend.  NAME  ADDRESS



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