

MICRO-80

P.O. BOX 213, GOODWOOD, S.A. 5034 AUSTRALIA
TELEPHONE (08) 381 8542

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All enquiries should be sent to MICRO-80,

P.O. BOX 213, GOODWOOD, SA 5034. Phone : (08) 381 8542

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EDITORIAL

Welcome to the first issue of MICRO-80.

MICRO-80 is the first and only Australian monthly magazine devoted entirely to the TRS-80 microcomputer. It is available by subscription - \$24.00 for 12 months or by mail order at \$2.50 per copy. Special bulk purchase rates are also available to computer shops etc., - please use the form in this issue to order your copy or subscription.

The purpose of MICRO-80 is to publish software and other information to help you get the most from your TRS-80 computer and its peripherals. MICRO-80 is in no way connected with the TANDY organisation.

WE WILL BUY YOUR PROGRAMS!

Most of the information we publish is provided by our readers, to whom we pay royalties. An application form containing full details of how you can use your TRS-80 to earn some extra income is included in every issue.

CONTENT

Each month we publish at least one applications program in Level 1 BASIC; one in Level 2 BASIC and one in Disk BASIC (or Disk compatible Level 2). We also publish Utility programs in Level 2 BASIC and Machine Language. At least every second issue we will have an article on hardware modifications or constructional articles for useful peripherals. Starting next month, we will also be running a series of informative articles on Assembly Language Programming, new product reviews etc., In addition to all this, we are prepared to print news from TRS-80 Users clubs, letters to the Editor, display advertisements and classified ads.

ADVERTISING

We accept camera ready copy for display advertising at the following rates:

- FULL PAGE (19 cm wide x 28 cm high)	\$120
- 1/2 PAGE (19 " " x 14 " ")	\$ 60
- 1/4 PAGE (19 " " x 7 " ")	\$ 30

Classified Ads are \$8.00 for up to 50 words.

These prices are valid for issues 2 & 3 only. Ads must be submitted by the 15th of each month in order to appear in the following month's issue. An official Company Order or payment must be included with the advert.

SPECIAL OFFER - ISSUE 2 ONLY

FOR ISSUE 2 ONLY, THE COST OF A FULL PAGE ADVERT. WILL BE REDUCED BY 1/3rd TO ONLY \$80!!!!!!!!

TRS-80 USERS CLUB NEWS

We are prepared to print news of the activities of TRS-80 Users Clubs, up to a maximum of 200 words per club per month, space permitting. Copy must be TYPED with DOUBLE LINE SPACING and reach us NO LATER than the 15th of each month in order to appear in the following month's issue.

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CASSETTE SOFTWARE

For those who don't get as much time at the keyboard as they would like, the programs in each month's issue are available on a cassette for an additional \$3.50. If you can order a 12 month subscription to the magazine PLUS cassette for \$60.00, that's only \$5.00 per month!!!!

COPYRIGHT

All the material published in this magazine is under copyright. That means that you must not copy it except for your own use. This applies to photocopying the magazine itself or making copies of programs on tape or disk. Being practical, if you copied a program onto cassette and gave it to a friend who is not a subscriber to MICRO-80, we would be unlikely to sue you, even if we found out. However, that's a pretty good way to put us out of business, then there would be no more programs to copy and no more money to be earned when we publish your programs! Think about it.

If a friend asks you for a copy of a MICRO-80 program, why not get him to take out a subscription himself, that way everyone will benefit and we'll do our part by publishing better and better programs far cheaper than anyone else.

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***** NEXT MONTH'S ISSUE *****

The January edition of MICRO-80 will be ready for posting about 14th January. It will contain at least the following programs:

- | | |
|-------------------------------------|---|
| HANGMAN (L1) | - The traditional, educational word-game brought up to date, complete with a picture of the hangman's victim, on the screen. |
| FRUSTRATION (L2) | - Test your reactions as you try to beat the computer's "clock". |
| GAME OF LIFE
(L2+m/c language) | - This is the well-known and fascinating illustration of growth and decay of populations (civilizations?), now written to run on your TRS-80. Machine language sub-routines have been used to speed up execution. You can observe up to one generation per second. |
| STOCK RECORDING SYSTEM
(Disk/L2) | - This program, which will run in both Level 2 and Disk BASIC, enables the businessman to keep track of his stock, item by item. It can also be used as a simple data base management system. |
| MONITOR IN BASIC (L2) | - Written in Level 2 BASIC, this monitor program allows you to examine and modify memory also to dump the contents of a block of memory to the screen or printer. It is absolutely essential if you want to enter our machine language programs but don't have a monitor such as T BUG. |

In addition to all these programs, January's issue will also contain the first in a series of articles on Assembly language programming. If you are interested in this fascinating and powerful method of programming but have not known where to start, this series of articles is for you.

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SOFTWARE SECTION

The listings for these programs are published in a separate section at the back of the magazine. This section explains what each program is all about and how to use it.

SUPER MASTERMIND - L1/4K

If you are a Mastermind addict then this is the version you have been waiting for. Whereas Mastermind only has pegs of six different colours, Super Mastermind has up to nine (not colours on the TRS 80 of course, but numbers 1-9). With Mastermind you have four colours to find at any one time. With Super Mastermind you have up to 10! But the best part of all is that the Computer does all the tedious work for you. It chooses the numbers and it works out how many you have placed in the right position and how many are correct but in the wrong position. It also works out your score and gives you a progressive average score. All you have to do is use your powers of logic. If the unthinkable happens and you can't work out the answer, simply enter 999 and the computer tells you. But that ends the session and wipes out your score.

The listing at the back includes full instructions and takes 3822 bytes. That's about 240 more than a 4K system can handle. So, if you are entering this program into a 4K system we suggest you leave out some or all of the instructions. We have printed them separately so that you can read them without using the computer.

To reduce the program size to 2368 bytes:

Delete lines 40, 50, 810 and all higher lines.

Change line 30 to F. C=1 TO 1500: N. C

LEVEL 2 - If you want to use this program in a Level 2 machine, enter it without abbreviations and with the following changes:

Add line 10 DIM A(30)

Add line 120 RANDOM

Delete lines 95 and 97

Don't forget to use PRINT @ instead of PRINT AT.

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DIGITAL CLOCK - L1/4K

This is an extension of the clock program published in the Level 1 Manual. However, it prints the time in 4cm. high digits and indicates whether it is AM or PM. It is also more accurate because the timing loop runs for a full minute, rather than one second.

The timing variable is N in line 130. To adjust the accuracy of the clock, note the starting time, let it run for about 12 hours then note the time on the clock and the correct time. Work out the number of minutes elapsed since the start:

A = elapsed minutes on computer

B = actual elapsed minutes

Then calculate a more accurate value of N:

new N = old N x A/B

Enter the new value of N into line 130

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As an exercise, why don't you write a small routine to do this calculation. Another useful addition would be an alarm which could print a message on the screen, turn on the cassette recorder or do both. When you have done this, write in and we'll publish the best modification and send the winner a free copy of MICRO-80

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SNAKE - L2/4K

This program is a lot of fun for kids of all ages. It tests your reflexes and generates a lot of excitement. It starts off by drawing a large box on the screen inside which there is a short snake of ***'s moving across the screen. You use the arrow keys to make it change direction but, if you turn it back on itself or crash into the box, that's the end of you. At random intervals "mice" in the form of graphics blocks suddenly appear. If you make the snake eat one before it disappears then you score (you don't know how many points until after you've eaten it). If it gets away (disappears) then its value is subtracted from your score.

As the game goes on, the snake gets longer and longer and moves faster and faster.

HAPPY HUNTING!

-00000-

MERGE - L2/4K or 16K

Have you ever wanted to add together two BASIC programs which you have stored on tape. Normally, you would CLOAD the longer one then have to type in the shorter one. Never again, the simple, 7 line program listed below, allows you to merge together two BASIC programs in your TRS 80.

```
1 CLS
2 PRINT "16549="; PEEK(16549)
3 PRINT "16548=";PEEK(16548)
4 A= 17129
5 B=A: A=PEEK(B+1)*256+PEEK(B)
6 IF A > Ø THEN 5
7 POKE 16549,INT(B/256):POKE 16548, B-INT(B/256)*256: END
```

It works because Level 2 BASIC stores a "start of program" pointer at 40A4H and 40A5H (Decimal 16548 and 16549). This pointer is initialised to 42E9H (Decimal 17129) during power-up. The start of program pointer is stored in RAM rather than ROM so that it can be relocated to a higher address when DISC BASIC is loaded into RAM. The above program uses PEEK and POKE statements to do the same thing when a Level 2 BASIC program is resident in memory. First, it prints out the existing value of the start of program pointer, so that you can restore it later. Then it searches for the first vacant position in RAM after the resident program and resets the start of program pointer to that address. Now, when you CLOAD a program, it will commence loading from this new address. Once it is loaded, you restore the pointer to its original address and, low and behold, the two programs are merged. You can do this as often as you wish but make sure that the second program has higher line numbers than the first, the third higher than the second, and so on.

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To merge two programs, use the following procedure:

1. Key in or CLOAD the seven line program above.
2. Run it.
3. Write down the two addresses and their values which are printed on the screen (they should be 16549=66 and 16548=233)
4. CLOAD the BASIC program to be added to the existing program.
5. Using the keyboard, type in:
POKE 16549,66
POKE 16548,233
(or whatever values were printed on the screen if you are not starting from the first program in memory)
6. LIST the combined program.

At this stage, you will have merged the seven line utility program with your BASIC program. To merge another BASIC program, repeat the above steps. When you have finished merging all your programs, kill lines 1-7.

If some of the programs you wish to merge have similar line numbers, you can still use MERGE with the assistance of Tandy's RENUM program. Load this into protected memory before loading MERGE, then use the following procedure:-

Steps 1-4 as before.

- ```
5 Use RENUM to renumber the new BASIC program so that all line numbers are
 above those in the resident BASIC program.

6 POKE 16549,66
 POKE 16548,233

7 LIST the combined program
```

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LOADER L2/16K (4K)

Have you ever sat through a complete CLOAD of a long program, only to find that it hadn't loaded properly and you have to start all over again? This only has to happen once or twice and you never really trust that blinking asterisk again! Well, LOADER overcomes all that by printing out each byte of the BASIC program as it is loaded. You can see when the machine is loading rubbish, abort the LOAD and start again.

In order to give you a chance to read them, program lines are displayed one after the other, separated by a graphics block. Line numbers are not shown.

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The program is at the back of the magazine. There are two listings in HEX. One is for a 4K machine, the other is for a 16K machine. To enter either listing you will need a monitor such as T BUG (or the monitor in BASIC we will publish next month). Follow the procedure below for the 16K version (4K shown in brackets).

1. Answer MEMORY SIZE? with 31880 (19600). This enables you to use the program more than once
2. Enter T BUG
3. Type M 7C90 xx 4C (4C90 xx )
4. Continue entering the values in the listing until you get to 7EE6 (4EE6) then enter "X": 7EE6 xx X (4EE6 xx X)
5. Enter J 7D33 (4D33)

If all is well, a copyright message will print out at the top of the screen and control will be automatically transferred to BASIC.

Whenever you wish to use LOADER, set your cassette recorder to PLAY and then press the shift key and the down arrow at the same time. The cassette recorder will start running and the program will be displayed on the screen as it loads. To abort loading, just hit the BREAK key or use the RESET button (the BREAK key will only work while loading is in progress). If there is nothing on the tape, the RESET button will have to be used.

When loading has finished, LOADER will tell you the locations of the first and last bytes of the BASIC program just loaded, in HEX. Some BASIC commands or errors could cause the entry pointer for LOADER to be changed or overwritten. In this case, type X=USR (0) or, if this fails type "SYSTEM" and answer the \*? with /32051 (/19763) This will reinitialise LOADER.

Once you have tested LOADER and proved that you have entered it correctly, you should make a tape of it. Load T BUG again then:

1. Set up cassette recorder to RECORD
2. Type P 7C90 7EE5 7D33 LOADER (ENTER) (P 4C90 4EE5 4D33 LOADER (ENTER))

T BUG will punch a tape which can be loaded under the SYSTEM command using the file name "LOADER"

LOADER can also be stored on disk using TAPEDISK. TAPEDISK parameters are F(LOADER):0 7C90 7EE5 7D33". To use it under DOS type LOAD "LOADER" then type BASIC or BASIC 2 and use the SYSTEM command as described above, to initialise it.

LOADER will occasionally generate error messages. If this happens during a LOAD, it means that you have run out of memory. At other times, ignore them. Finally, don't be tempted to use the space between the top of LOADER (7EE5 or 4EE5) and the end of RAM, for another program. LOADER uses this area to set up a table and it would destroy any other program resident there.

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## WORDPROC: A WORD PROCESSOR IN BASIC

By: Hubert S. Howe Jr. Ph.D.  
Reprinted from TRS-80 Monthly Newsletter  
Published by H & E Computronics Inc.  
Box 149 New City, New York 10956 USA.

### INTRODUCTION

WORDPROC is a Level 2 BASIC word processing program that enables you to create files that represent documents to be printed on your TRS-80. It's main features are:

1. It is line-oriented. This means that every line of text has a line number associated with it, whether or not the line number is printed. Line numbers are convenient references to the text. Lines can be moved, replaced, rearranged, etc.
2. It allows entry of upper or lower case letters from your keyboard without modification to the TRS-80.
3. Lower case letters can be printed properly if you have a line printer with the lower-case character set. Otherwise, everything is printed as upper-case.
4. Text files can be saved and loaded either on cassette tape or disk.
5. Lines can be edited in a manner very similar to Level 2 BASIC.
6. Text lines can automatically be right justified.
7. There are provisions for adjustable page lengths, page numbering, line lengths and a special title to be printed at the top of each page.
8. The program itself is in Level 2 BASIC so that you can study it to learn how it works and possibly modify it if desired.

### MODIFYING THE PROGRAM

The standard version of WORDPROC is written to fit into a 16K Level 2 TRS-80. It has provision for 120 lines of text, which is sufficient for much business correspondence or short documents. If you have 32K or 48K, you will probably want to expand it into your larger memory. This is accomplished by changing line 110, near the beginning of the program. It currently reads:

```
110 CLEAR 7200: NL=120
```

With 32K, you can expand to at least 200 lines, and with 48K to at least 400 lines. The amount of string space that you must clear is 60 (or the number of characters per line) times the number of lines. Thus, for 32K you could change line 110 to:

```
110 CLEAR 12000: NL=200
```

and for 48K it could be:

```
110 CLEAR 24000: NL=400
```



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## RUNNING THE PROGRAM

There are basically two modes of operation in WORDPROC: the FILL mode and the COMMAND mode. FILL is used when you are entering text into the computer, and COMMAND at other times. When in FILL, you can return to COMMAND only by typing "shift-@" twice in succession.

When in the COMMAND mode, the computer prints the word "COMMAND" and awaits your reply. The replies, all discussed in detail below, are either a single letter or an entire word. The computer executes the command, which may require additional input from you, and returns for another one.

## HELP

"HELP" or "H" is a command provided in case you forget any of the commands. It prints the complete list of commands and their associated words in order to remind you. These are shown below:

|   |         |                                              |
|---|---------|----------------------------------------------|
| F | FILL    | Add text to the buffer.                      |
| P | PRINT   | Print text on video display or line printer. |
| C | CLEAR   | Clear buffer (erase all text).               |
| R | REPLACE | Replace text starting at existing line.      |
| I | INSERT  | Insert text starting at empty line.          |
| D | DELETE  | Delete lines.                                |
| M | MOVE    | Move lines.                                  |
| N | NUMBER  | Number line, eliminating blanks.             |
| E | EDIT    | Edit line.                                   |
| L | LOAD    | Load text file from cassette or disk.        |
| S | SAVE    | Save text file on cassette or disk.          |
| J | JUSTIFY | Right-justify text lines.                    |
| H | HELP    | HELP! Print commands.                        |
|   | SET     | Set variables governing program options.     |

## FILL

"FILL" or "F" enters the FILL mode, which you use to enter text into the computer. The line number is displayed at the left, and then the cursor flashes on and off over the current position in the line where you are entering text. If you are starting at the beginning, FILL begins at the first space in line 0 (zero). If there is already text in the buffer, it starts after the last filled space, and any preceding lines are printed on the video display. The "cursor" used throughout the program is not the same cursor used in BASIC but a graphics block that covers the entire space filled in by the letter.

If you are typing in a word that goes off the end of a line (by exceeding the line length, which is set by default to 60 or by the SET command), WORDPROC automatically removes the word from the preceding line and places it at the beginning of the next line so that the word will not be split. Later, the line can be right justified by the JUSTIFY command.

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During the FILL mode, the following keys have special functions:

|                   |                                              |
|-------------------|----------------------------------------------|
| LEFT ARROW        | backspace                                    |
| RIGHT ARROW       | TAB five spaces to the right                 |
| DOWN ARROW        | form feed (page eject) on line printer       |
| ENTER             | move to the next line (inserts no character) |
| SHIFT LEFT ARROW  | backspace entire line                        |
| SHIFT RIGHT ARROW | fill to end of line with spaces              |
| SHIFT-@ (TWICE)   | return to COMMAND mode                       |

The following points should be noted about the use of these special keys:

The RIGHT ARROW (TAB) key actually inserts five spaces into the line.

The DOWN ARROW key will cause a page eject on the line printer (if your line printer responds this way to a form feed), but does not affect the printing of the page number and title.

When ENTER is typed, it does not insert any character into the line. If ENTER is typed at the beginning of a line, the line remains empty, but FILL proceeds to the next line.

If you type SHIFT LEFT ARROW when the cursor is at the bottom of the screen, it appears to scroll to the next line but actually continues to fill the same line.

The FILL mode is entered by both REPLACE and INSERT as well as FILL. The difference is that REPLACE and INSERT can insert lines of text anywhere a line number can exist, and they will stop as soon as existing text is reached. FILL always adds text to the end of the file.

## PRINT

PRINT or P is used to print the text in the buffer, optionally on the line printer or video display. When the PRINT command is issued, the computer asks two questions:

PRINT LINE NUMBERS (Y/N)?  
LINE PRINTER OR VIDEO DISPLAY (P/V)?

You must reply "Y" in order for line numbers to be printed. Similarly, you must reply "P" for the line printer to be selected. When you select the line printer, the program automatically checks to see if the line printer is ready. If it is not, it prints the message:

LINE PRINTER NOT READY. ABORT (Y/N)?

If you reply "Y" a new command is requested. Otherwise, it asks you to press ENTER when ready, and repeats the printer test. You can never use the printer without first readying it; the program will never inadvertently "freeze up" as it will if you do a LLIST or LPRINT in BASIC (without a ready printer).

The printing on the video display is identical to that on the line printer, with the exception that only upper case letters are printed. In particular, the number of lines on the page is the same' the default number is 50 lines per page.

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Not all these lines can be displayed on the screen at the same time, although they fit comfortably onto a page. Therefore, it is useful to PAUSE during the printing process by typing "shift-@". (This is a normal feature of Level 2 BASIC).

The program pauses and asks you to press ENTER before continuing at the end of each line of a multi-page printing.

The TITLE and PAGE NUMBER are optionally printed at the top of each page. These options are controlled by the SET command.

If your TRS-80 is unmodified, holding down the SHIFT key while typing a letter produces a lower case letter: otherwise the letter is upper case. This is the reverse of a typewriter. Some printers (such as the SELECTRAPRINT) have been modified so that they convert upper case into lower case and vice versa. Whichever way your TRS-80 works, WORDPROC considers upper and lower case letters to be distinct. This means that "A" is different from "shift-A" even though both are displayed as "A" on the screen.

## CLEAR

CLEAR or "C" erases everything in the buffer. In addition, it restores all SET variables to their default values.

It is not necessary to perform a CLEAR at the beginning of a run. It is only necessary if you want to clear everything out and start again.

LOADING a text file from cassette tape or disk also clears out **anything in the** buffer and fills it with the material read in.

## INSERT

INSERT or "I" is used to FILL in new lines starting from any legal line number, provided that no text currently occupies the starting line. INSERT will operate just like FILL until you come to a line that is occupied with text, at which point it will automatically return to the COMMAND mode.

## REPLACE

REPLACE or "R" is used to FILL in new lines starting from any legal line number, provided that text DOES exist at the starting line. The text at the starting line is replaced entirely. Following that line, REPLACE operates exactly like INSERT and continues to FILL new lines until you come to a line occupied with text, at which point it will automatically return to the COMMAND mode.

## DELETE

DELETE or "D" is used to delete a range of lines from the text. Deleted lines are empty, but the line marker used to FILL continues to point to where it did before the DELETE. Therefore, to insert new text into the deleted lines, INSERT should be used rather than FILL.

## MOVE

MOVE or "M" is used to move a block of lines from one position in the buffer to another. The only limitation is that the position where the text is moved must

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consist of empty lines. If a new line is ever found that contains text, the MOVE is terminated, and only the lines that were moved prior to the error are moved. The lines from which the text is moved are replaced with empty spaces.

When a MOVE begins, the computer asks:

FIRST LINE TO BE MOVED?  
LAST LINE TO MOVE  
FIRST NEW LINE?

If you were to reply to these questions, in succession, 1, 4, and 6, line 1 would be moved to line 6, line 2 to line 7, line 3 to line 8, and line 4 to line 9. Lines 1, 2, 3, and 4 would become empty lines. If, in performing the move, the computer found that line 7 already had text in it, it would print:

LINE 7 ALREADY OCCUPIED

and stop the move. However, line 1 would have been moved to line 6.

If you want to insert one or more blank lines into existing text, first MOVE the lines following the line where you want the blank line inserted down to a free area in the buffer, and then MOVE them back to one or more lines following their original position.

MOVE can also be used to rearrange the text lines, in order to change the order of paragraphs or for other reasons.

## NUMBER

NUMBER or "N" is used to delete all blank lines in a text and close up the text. In addition, the lines are renumbered from zero and the line marker indicating the first empty line is moved to the first line after any text lines.

BLANK lines (lines containing only spaces) are different from EMPTY lines (lines containing nothing at all). Only EMPTY lines are eliminated by NUMBER. Therefore, blank lines can still be kept in a text.

## SAVE

SAVE or "S" saves the text file, including the TITLE, all SET variables, and the complete text, on cassette tape or disk. When you type SAVE, the computer first asks:

TAPE OR DISK )T/D)?

If you are using cassette tape, the computer prints PRESS ENTER WHEN READY TO CONTINUE? and waits for you to ready the tape before continuing. (If you want to abort the SAVE command, type BREAK and GOTO 2000.)

If you are using a disk, the computer asks FILESPEC? Here you must give the complete file specification. If you specify a drive number (such as ":0") the file specification must be enclosed in double quotation marks.

Because of the way that Level 2 BASIC handles string variables, commas, colons, and blank spaces must be translated into special graphics characters so that the

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text can be restored to its precise previous structure. Unfortunately, this translation process takes a significant amount of computer time to execute - possibly several minutes. When you save or load a text file, the computer may appear to be doing nothing, but if you interrupt execution and turn on the trace function you will see it going through a long loop.

After the file has been saved on tape or disk, WORDPROC then retranslates the file back to its original condition so that execution may continue and you may add new text to the file. The retranslation, of course, also takes a significant amount of computer time.

Text files are stored in the same way whether on tape or disk. A file can be loaded from cassette and saved on disk or vice versa.

## LOAD

LOAD or "L" loads a previously-saved text file from cassette tape or disk. Loading the file restores everything to the condition it was in when the file was saved: all SET variables, the TITLE, and all text lines are retrieved. Any text presently in the buffer is lost.

In other respects the operation of LOAD is the same as SAVE.

## SET

SET (there is no single letter abbreviation) is used to set internal variables that control the line length, page length, spacing of text, page numbering, starting page number, and TITLE. When you type SET, the computer asks you a series of questions about setting each of these variables. If you do not want to change the present value, simply hit ENTER without typing a new value. Only the new values are inserted.

The variables are as follows:

LINE LENGTH? This indicates the number of characters in a line. The default is 60. LINE LENGTH can be any value up to 255. LINE LENGTH controls the manner in which words are separated on lines during FILL, and is used to set the right margin by JUSTIFY.

PAGE LENGTH? This indicates the number of lines on a page. The default value is 50. During printing, the computer waits for you to press ENTER following the completion of each page.

SPACING (1-SINGLE, 2-DOUBLE)? This controls the spacing between lines during the printing. 1 is for single spacing, 2 for double, and any number that you input here would be used as the number of spaces between lines.

PAGE NUMBERING (1=YES, 0=NO)? This variable controls the printing of both the TITLE and the page numbering. If you respond with zero, nothing is printed at the top of the page. But, if you reply with one, then both the TITLE (if present) and the page number are printed at the head of each page. This line is not counted as a line of text.

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**STARTING PAGE NUMBER?** This indicates the number of the first page of text. If you have long documents prepared as several text files, then they can still be combined into one final document by setting the starting page number to the right value. Page numbers are printed so that they are right justified over the right margin of the text.

**TITLE?** The TITLE is a character string that is printed left-justified on the top line of each page of text, followed by the page number. It is printed only if the PAGE NUMBERING is on. The TITLE can appear to be centered if it begins with blank spaces. The same TITLE is printed on each page. If the TITLE contains any punctuation, it must be enclosed within double quotation marks when it is SET.

## EDIT

EDIT or "E" is one of the most powerful commands in the word processor. It is used to edit a single line at a time in a manner very similar to Level 2 BASIC. When you type "E", the computer asks you the line number of the line you want to edit. If the line contains text, it is printed on the second line of the video screen with the cursor flashing over the first character. (If there is no text, an error message is produced.) What you then type at the keyboard determines how the line is edited. The following EDIT commands are recognized:

**SPACE** - Advances the cursor to the next character in the line, unless you are at the last character in the line.

**ENTER** - Terminates editing. ENTER MUST be typed at the conclusion of the editing process.

**LEFT ARROW** - Backspace, unless you are at the first character.

**I** - Insert characters. Following the I, any characters that you type are inserted BEFORE the current cursor position. You can exit from I by typing either ENTER, which terminates editing, or SHIFT UP ARROW, which allows you to continue editing the line. If the line length equals or exceeds the maximum, you cannot start an Insert, but you can continue it past the end of a line.

**D** - Delete character. Only ONE character is deleted, and all characters following that character are moved left one space.

**H** - Hack and Insert. All text following the current cursor position is deleted, and whatever you type is added to the line. Note that the cursor does not flash in this mode, indicating that there is no text in the line at the position where you are adding text.

**X** - End of line and insert. The cursor is moved to the first position following the last character in the line, and then the operation of X is identical to H.

**C** - Change character. Only ONE character is changed, to whatever character is typed following the "C".

**S** - Search character. The character following the "S" is searched for in the line and, if it is found, the cursor is moved to that position; otherwise, it is not moved.

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During the EDIT process, upper and lower case letters are kept distinct, although everything is printed as upper-case on the screen.

When text is being entered in the FILL mode, it is impossible to enter characters into a line past the line length, but in EDIT, only during the operation of "H" or "X". it is possible to go past the end of a line. This is legal, although the program prints a reminder after exiting from EDIT. If you want to delete the characters, you can re-edit the line.

Once you enter "H" or "X" in EDIT, it is impossible to return to EDIT by SHIFT UP ARROW as during "I". If you want to Insert, you must use "i". It is impossible to Insert characters past the end of the line.

## JUSTIFY

JUSTIFY or :J: is used to right justify all lines of text. Nothing is printed during the operation of JUSTIFY, although it can take a long time to execute if the program contains a long text. For this reason, it is suggested that you JUSTIFY each section as you enter it into the text, and check it as you go along.

JUSTIFY inserts additional spaces into the middle of a line, only where there are already empty spaces, to make the right margin vertically aligned. If a line contains no spaces at all, it will not be justified. It will also not be justified if it ends in a period, question mark, exclamation point or right parenthesis.

When a line contains only a few words, requiring many spaces to be inserted, it may be necessary to execute JUSTIFY more than once to complete the process.

If a line ends with a blank space, it may appear not to be justified even though the program would consider it to be. To avoid this problem end the line with ENTER as you type it in, unless the word is split from one line and moved to the next.

When you end a line with a SHIFT RIGHT ARROW, spaces are automatically inserted out to the end of the line. This is used when you want text such as titles, etc. to be centered on the page, or not to be justified for any reason.

JUSTIFY physically changes the text in the buffer, so that it is then stored with the internal spaces.

## PROBLEMS

There are several problems that must be taken into account when using WORDPROC. Most of these are a direct consequence of the fact that the program is in BASIC, and thus could be eliminated by translating the program into assembly language.

First, you will probably notice immediately that the speed at which you can type characters into the file is not always fast enough, and some letters that you do type are not inserted into the text. This is because of the time that it takes BASIC to process each letter, which is very short, but sometimes not short enough.

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More annoying than this, however, is that sometimes the entire computer will appear to "freeze up" for a moment. As the buffer gets fuller and fuller, the likeliness that this will happen and the length of time it will take both get longer and longer. The reason for this is that BASIC must sometimes reallocate the string space while a job is running, even though many of the locations set aside for string space are still free. Nothing is really wrong when this happens, but it can disturb your use of the program.

Another BASIC problem, which we mentioned above, was the necessity of translating special characters before executing a SAVE or after a LOAD. One reason why this was necessary was that, in designing WORDPROC, we wanted to use only Level 2 BASIC so that anyone with a Level 2 computer could use the program, whether or not they have a disk. Some features of the program could be implemented more efficiently in DISK BASIC.

Finally, another problem for which there is presently no solution is that WORDPROC does not allow you to underline or overprint characters. Such a feature would require a line printer that could execute a carriage return without a line feed (such as the DIABLO or SPINTERM). Such a feature could easily be implemented in WORDPROC in the future if line printers with these capabilities become available to the average user.

## NOTES ON USING WORDPROC

When using WORDPROC, it is convenient, and recommended, that you type ENTER when nearly at the end of a line. This will prevent ending the line with a space, which may appear to be misaligned after a JUSTIFY.

In order to center titles or other materials, use the SHIFT RIGHT ARROW following the last character in the line. This will prevent the line from being justified, by filling it with spaces.

To enter information at the beginning of a new page, use the INSERT command at a multiple of the page length (default is 50). That is, INSERT at 50. 100. 150. etc. If you use the form feed character to eject pages, turn off the page numbering (by using SET).

Finally, if the program ever aborts with any BASIC error, you can retrieve anything presently in the buffer and return to the COMMAND mode by a GOTO 200 statement. If you get an error in data transmission from a cassette tape or disk, you will find that the text may contain graphics in place of certain characters, after a GOTO 200. To untranslate the text and retrieve the proper characters, BREAK the program, type GOSUB 2400, and then CONT.

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## HARDWARE SECTION

### IMPROVE YOUR CTR-41 CASSETTE RECORDER

If you have a Level 2 machine and a CTR-41 cassette recorder, chances are that you have trouble loading programs. There are several modifications you can make to your cassette recorder to improve this situation.

1. Enable the speaker on both CLOAD and CSAVE so that you can hear what is going on and set the level by ear.
2. Convert the TONE switch to control the motor so that you can position the tape without removing plugs.
3. Correct a ground-loop which introduces hum into the system and degrades recorder performance.

You can do all this in just a few minutes with a soldering iron, a Stanley knife, a Phillips head screwdriver, some wire and a resistor. But, if you have never done this sort of thing before, find someone to help you who has. **WARNING: CARRYING OUT THESE MODIFICATIONS WILL VOID THE TANDY WARRANTY ON YOUR CASSETTE RECORDER.** If the warranty has already run out, then you really have very little to lose and a lot to gain. Follow the instructions below:

1. Remove all plugs from the recorder, including the black plastic Mic-jack dummy plug. Take off the battery cover and remove the batteries.
2. Turn the recorder upside down on a soft surface, such as a newspaper, with the battery compartment facing away from you.
3. Remove the three Phillips head screws from the bottom of the case and the two in the battery compartment.
4. Lift up the rear of the case bottom a little then slide it forward about 1cm to clear the volume and tone controls. Put it aside.
5. Remove the chrome carrying handle at the front of the recorder.
6. Speaker Mod - Solder a 100 Ohm resistor from point A to point B on the printed circuit board (PCB). Stick a small piece of plastic insulating tape to the PCB under the resistor. Keep its leads short and make sure it lies flat on the insulating tape.
- 7/ Motor Mod. - Cut the two tracks on the PCB which are connected to terminals 2 and 3 of the TONE switch. Solder a 14cm piece of insulated wire to point C on the PCB. Run the other end forward, feeding it underneath the wires crossing the circuit board near its centre. Solder the other end to terminal 2 (the Centre) of the switch.

Solder a 15cm long piece of insulated wire to point D on the PCB. There is a yellow wire here which should be left in place. Run the new wire alongside the one you have just installed and solder to terminal 1 of the switch (that's the one on the left which was previously unused).

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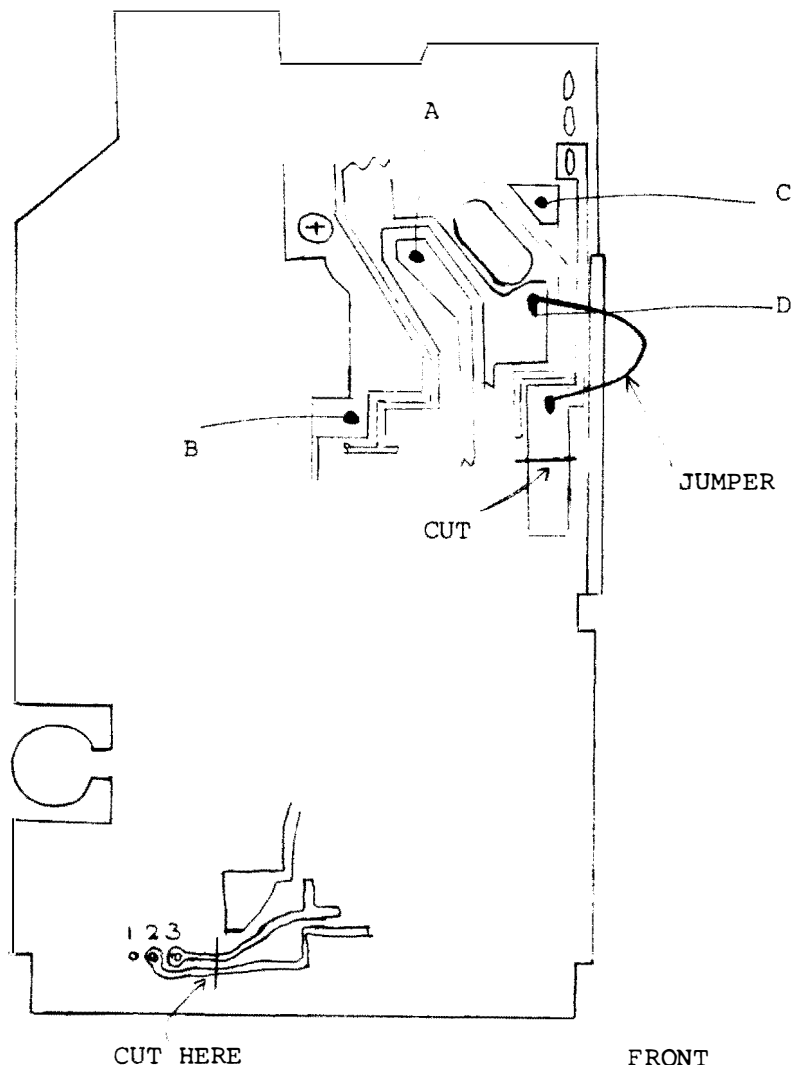
Now the recorder is permanently in the HIGH TONE mode and when the TONE switch is set to LOW, the recorder will act as normal, under computer control. However, when the switch is moved to the HIGH position, you can rewind, play and use fast-forward without removing any plugs.

8. Ground-loop Mod - Cut the wide track on the PCB between the MIC and AUX jacks.

Connect a 2.5cm long piece of insulated wire from the ground lug on the AUX jack to the ground lug on the EAR jack as shown in the diagram.

9. Replace the chrome carrying handle, bevelled edge to the top of the recorder
10. Reassemble the bottom case, remembering to slide it over the volume and tone controls before lowering it into position. Make sure that it fits correctly.
11. Replace the five screws. The two pointed ones go in the battery compartment holes.

## CTR-41 CASSETTE MODIFICATION



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## LETTERS TO THE EDITOR

This space will be used in future issues to publish your letters. We'd like to know how you feel about the magazine, the sort of articles and programs you want us to publish, any useful tips you would like to pass on to other TRS-80 users and requests for help from other readers to solve your problems. The space is here, please make use of it.

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## DO YOU HAVE SOFTWARE TO SELL?

MICRO-80 is interested in buying original programs for publication. We pay from \$15-\$50 for a program, depending on our assessment of its appeal. As a guide, we would pay the lower figure for games and simple utility programs. We would pay more for business, educational, scientific and more comprehensive utility programs.

MICRO-80 also intends to become one of the leading suppliers of TRS-80 software, both imported and produced locally. If you have written a program which you believe is worth a lot more than \$50 because of its wide appeal or because it would offer very considerable financial benefits to users, then we could be interested in distributing it for you, on tape or disk. We would take responsibility for all production, advertising and distribution costs and would sign a royalty agreement with you. If it really is good, then you could make thousands of dollars from it. Some suggestions for programs which should sell:

- a machine language word processor which outperforms the Electric Pencil and sells for less
- a machine language monitor which outperforms T BUG and sells for less
- a set of programs which would teach the user to touch-type on the TRS-80 keyboard. It needs to analyse mistakes and check typing speed
- a chess program which can beat Sargon and Micro Chess
- properly constructed educational programs to teach kids to read, do arithmetic etc.

Programs must be original, or have such a major component of originality that they do not infringe any existing copyrights. You alone know that, so before we publish a program, we will send you a form to sign in which you declare that the program is your own original work and in which you give us permission to publish for the agreed figure. This means that, should a third party claim a prior copyright to the program, then it will be up to you to defend your copyright.

## HOW TO SUBMIT A PROGRAM FOR CONSIDERATION

Send your program to us on CASSETTE or DISK, together with an application form from your copy of MICRO-80. Make sure you include the following:

- YOUR NAME AND ADDRESS CLEARLY MARKED ON THE CASSETTE OR DISK
- The name of the program plus any special loading information, such as memory size, how to start a machine language program etc., clearly marked on the cassette or disk

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- Whether it is Level 1, Level 2, Disk BASIC, System, T BUG (1 or 2) or editor/assembler format, clearly marked on the cassette or disk.
- A separate note giving useful information such as start, end and entry-point for machine language programs
- A clear expalantion of what the program does and how to use it. This will be published in MICRO-80 or used as the basis of the manual for a program to be published on tape or disk.
- A description of any changes that have to be made for different memory sizes etc.
- The size of memory and type of system needed to run it (eg. Level 1 4K, 32K with 2 disk drives, etc.)
- Any simple changes which can be made to make it more flexible or useful.

If your program is for publication in MICRO-80, then please avoid too many multi-statement lines unless they are essential to squeeze it into 4K. Remember, our readers have to key it into their machines! Please avoid using Level 1 abbreviations too, if you can. That way Level 2 owners can also use the program easily. Level 1 programs should be designed to run in 4K and Level 2 programs in 16K.

IMPORTANT: IF YOU WANT YOUR CASSETTE OR DISK RETURNED, ENCLOSE A STAMPED, SELF-ADDRESSED ENVELOPE.

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COMING SOON

Articles planned for the future include:

- Build your own light-pen for only a few dollars.
- Build an RS232 printer interface which works from your cassette port

Plus, of course, all those great programs you, our readers, are going to write for us.

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## APPLICATION FORM

To: MICRO-80, PO BOX 213, GOODWOOD, SA 5034. Phone: (08) 381 8542

Please send me:

- CURRENT ISSUE ..... \$ 2.50
  - CURRENT ISSUE PLUS CASSETTE ..... \$ 6.00
  - 12 MONTH SUBSCRIPTION, MAGAZINE ONLY ..... \$24.00
  - 12 MONTH SUBSCRIPTION, MAGAZINE PLUS CASSETTE \$60.00
  - START SUBSCRIPTION FROM ..... (Dec.79 is issue 1)
- (Make cheques payable to MICRO-80)

NAME: .....

ADDRESS: .....

.....POST CODE .....

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```
20 CLS:PRINT@ 470,"SUPER MASTERMIND"
30 PRINT@ 842,"DO YOU NEED INSTRUCTIONS (1=YES, 2=NO)";:INPUT C
40 IF (C<>1)*(C<>2) THEN 20
50 IF C=1 GOSUB 810
60 CLS:F=0:G=0:H=0
70 INPUT"HIGHEST NUMBER (2 TO 9)";A
75 IF (A<2)+(A>9) THEN 70
80 INPUT"NUMBER OF COLUMNS (2 TO 10)";B
85 IF (B<2)+(B>10) THEN 80
90 REM * GENERATE RANDOM NUMBERS *
95 INPUT "ENTER A NUMBER BETWEEN 1 AND 100";N
97 FOR C=1 TO N:J=RND(32767): NEXT C
100 CLS
110 FOR C=1 TO B
130 A(C-1)=RND(A):PRINT@ 4+2*C," ";:NEXT C
140 PRINT TAB(27);"CORRECT POSITN CORRECT VALUE"
150 REM * INPUT A SET OF NUMBERS *
160 J=0
165 FOR E=1 TO 13
170 PRINT@ 64*E," ";:FOR C=1 TO 4:PRINT@ " ",:NEXT C
180 PRINT@ 1+64*E,E+J;
190 FOR C=1 TO B
200 PRINT@ 4+64*E+2*C,". ";:A(9+C)=A(C-1)
210 NEXT C
220 FOR C=1 TO B
230 PRINT@ 940," ";
240 INPUT A(19+C)
245 REM PRINT 43 SPACES
250 PRINT@ 905," ";
260 IF A(19+C)=999 THEN 340
270 IF (A(19+C)<1)+(A(19+C)>A) THEN 290
280 GOTO 300
290 PRINT@ 907,"REDO, VALUE MUST BE FROM 1 TO";A;" ";:GOTO 240
300 IF C=B THEN 315
310 PRINT@ 3+64*E+2*C, A(19+C);". ";: NEXT C
315 PRINT@ 3+64*E+2*C, A(19+C);
320 NEXT C
330 GOTO 440
340 REM * PRINT HIDDEN NUMBERS *
350 C=B: PRINT@ 5+64*E,"THE CORRECT ANSWER IS:-"
360 FOR C=1 TO B
370 PRINT@ 67+64*E+2*C,A(C-1);:NEXT C
380 PRINT:PRINT TAB(5);"THAT IS THE END OF THIS SESSION."
390 PRINT TAB(5);:INPUT"DO YOU WANT TO PLAY AGAIN (1=YES, 2=NO)";C
400 IF (C=1)+(C=2) THEN 430
410 PRINT TAB(5);:INPUT"PLEASE ENTER 1 FOR YES, 2 FOR NO";C
420 GOTO 400
430 ON C GOTO 60,700
440 REM * CHECK FOR CORRECT POSITION *
450 PRINT TAB(27);: FOR C=1 TO B
460 IF A(19+C)<>A(9+C) THEN 480
470 PRINT"* ";: A(9+C)=0: A(19+C)=0
480 NEXT C
490 REM * CHECK FOR CORRECT SOLUTION *
500 FOR C=1 TO B
510 IF A(9+C)<>0 THEN 720
520 NEXT C
530 REM * SCORING ROUTINE *
```

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```
540 F=F+E+J:G=G+1
550 H=F/G
560 PRINT:PRINT"CONGRATULATIONS MASTERMIND! YOU WORKED IT OUT IN ONLY";
570 PRINT+J;:IF E+J=1 THEN590
580 PRINT"TRIES.":GOTO600
590 PRINT"TRY."
600 E=1:C=0
610 PRINT:PRINT TAB(7);"YOU HAVE PLAYED";G;: IF G=1 THEN 630
620 PRINT"GAMES THIS SESSION": GOTO640
630 PRINT"GAME THIS SESSION"
640 PRINT TAB(7);"YOUR AVERAGE SCORE IS";INT(10*H)/10;:IFH=1THEN660
650 PRINT"TRIES PER GAME.": GOTO 670
660 PRINT"TRY PER GAME."
670 PRINT:PRINTTAB(7);"DO YOU WANT TO TRY AGAIN (1=YES, 2=NO)";:INPUTC
680 IF (C=1)+(C=2) THEN 690
685 INPUT"PLEASE ANSWER WITH 1 OR 2.";C
687 GOTO680
690 ON C GOTO 100,700
700 CLS:PRINT@ 465,"BYE FROM SUPER MASTERMIND."
710 FOR C=1 TO 1500: NEXTC: CLS: END
720 REM * CHECK FOR CORRECT VALUE *
730 PRINT TAB(43);
740 FOR C=1 TO B: FOR D=1 TO B
750 IF A(19+C)=0 THEN 790
760 IF A(19+C)<>A(9+D) THEN780
770 PRINT"O ";A(9+D)=0: D=B
780 NEXT D
790 NEXT C
800 NEXTE
805 J=J+13:GOTO165
810 REM * INSTRUCTIONS *
820 CLS
830 PRINT"SUPER MASTERMIND ALLOWS YOU TO PIT YOUR WITS AGAINST THE"
840 PRINT"COMPUTER.":PRINT:PRINT"THE COMPUTER SELECTS A SERIES OF";
850 PRINT" NUMBERS AT RANDOM AND 'PRINTS' THEM INVISIBLY AT";
860 PRINT" THE TOP OF THE SCREEN. YOUR TASK IS TO FIND"
870 PRINT"THE VALUE OF EACH NUMBER AND ITS CORRECT POSITION."
880 PRINT:PRINT"TO DO THIS, YOU ENTER NUMBERS ONE AT A TIME AND";
890 PRINT" THE COMPUTER":PRINT"PLACES THEM IN A ROW ON THE SCREEN";
900 PRINT", UNDER THE INVISIBLE ONES."
910 PRINT"IT THEN COMPARES THE TWO SETS OF NUMBERS. FOR EACH";
920 PRINT" CORRECT":PRINT"NUMBER IN ITS CORRECT POSITION, THE";
930 PRINT" COMPUTER WILL PRINT AN *,":PRINT"FOR EACH OTHER CORRECT";
940 PRINT" NUMBER IN THE WRONG POSITION, THE"
950 PRINT"COMPUTER WILL PRINT AN O. THE GAME ENDS WHEN YOU";
960 PRINT" EXACTLY":PRINT"DUPLICATE THE INVISIBLE NUMBERS."
970 PRINT:PRINT TAB(18);"ENTER ANY NUMBER TO CONTINUE";:INPUTC
980 CLS:PRINT:PRINT
990 PRINT"YOU MAY CHOOSE ANY NUMBER OF COLUMNS, UP TO 10 AND";
1000 PRINT" THE MAXIMUM":PRINT"VALUE FOR THE NUMBERS, UP TO 9.";
1010 PRINT" (0 IS NOT A VALID NUMBER).":PRINT"THE MORE";
1020 PRINT" COLUMNS YOU HAVE AND THE HIGHER THE MAXIMUM VALUE,";
1030 PRINT" THE":PRINT"HARDER THE GAME.":PRINT
1040 PRINT"AT ANY TIME, YOU MAY ENTER 999 , WHEN THE COMPUTER";
1050 PRINT" WILL":PRINT"DISPLAY THE INVISIBLE NUMBERS AND THE GAME";
1060 PRINT" WILL END.":PRINT:PRINT TAB(26);"GOOD LUCK":PRINT
1060 PRINT:PRINT TAB(18);"ENTER ANY NUMBER TO CONTINUE";:INPUTC
1090 CLS:RETURN
```

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## \* DIGITAL CLOCK \*

```
5 DIM A(15)
10 CLS
20 INPUT "ENTER 1 FOR AM, 2 FOR PM";A
30 IF (A<>1)*(A<>2) THEN 10
40 A$="AM":B$="PM"
50 INPUT "THE HOUR IS ";E
60 F=INT(E/10):E=E-(F*10)
70 INPUT "THE MINUTES ARE ";C
75 CLS
80 D=INT(C/10):C=C-(D*10)
90 A(1)=C:A(2)=D:A(3)=E:A(4)=F
100 A(11)=C+1:A(12)=D+1:A(13)=E+1:A(14)=F+1
110 GOTO 330
120 A(11)=C:A(12)=D:A(13)=E:A(14)=F
130 N=14736
150 FOR M=1 TO N:NEXT M
160 C=C+1
170 IF C>9 GOTO 190
180 GOTO 400
190 C=0
200 D=D+1
210 IF D>5 GOTO 230
220 GOTO 400
230 D=0
240 E=E+1
250 IF E>9 GOTO 270
260 GOTO 290
270 E=0
280 F=F+1
285 IF (F=1)*(E=3) THEN 290
287 GOTO 400
290 C=0:D=0:E=1:F=0
300 IF A=1 THEN 320
310 A=1:GOTO 330
320 A=2
330 ON A GOTO 340,350
340 PRINT @ 502,A$:GOTO 400
350 PRINT @ 502,B$
400 G=92:H=12:IF C<>0 THEN 420
410 GOSUB 950
420 ON C GOSUB 500,540,600,650,700,750,800,850,900
425 IF D=A(12) THEN 130
430 G=74:IF D<>0 THEN 440
435 GOSUB 950
440 ON D GOSUB 500,540,600,650,700,750,800,850,900
445 IF E=A(13) THEN 120
450 G=42:IF E<>0 THEN 470
460 GOSUB 950
470 ON E GOSUB 500,540,600,650,700,750,800,850,900
475 IF F=A(14) THEN 120
477 G=24
480 ON F+1 GOSUB 950,500,540,600,650,700,750,800,850,900
489 GOTO 120
500 REM * PRINT 1 *
505 GOSUB 10000
510 GOSUB 6000
515 RETURN
```

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```
540 REM * PRINT 2 *
545 GOSUB 10000
550 GOSUB9000
560 GOSUB5000
570 GOSUB7000
575 RETURN
600 REM * PRINT 3 *
605 GOSUB 10000
610 GOSUB9000
620 GOSUB7000
630 GOSUB8000
635 RETURN
650 REM * PRINT 4 *
655 GOSUB 10000
660 GOSUB4000
670 GOSUB2000
680 GOSUB6000
685 RETURN
700 REM * PRINT 5 *
705 GOSUB 10000
710 GOSUB9000
720 GOSUB4000
730 GOSUB8000
740 RETURN
750 REM * PRINT 6 *
755 GOSUB 10000
760 GOSUB9000
770 GOSUB4000
780 GOSUB5000
790 GOSUB8000
795 RETURN
800 REM * PRINT 7 *
805 GOSUB 10000
810 GOSUB1000
820 GOSUB7000
830 GOSUB8000
840 RETURN
850 REM * PRINT 8 *
855 GOSUB 10000
860 GOSUB9000
870 GOSUB4000
875 GOSUB5000
880 GOSUB7000
885 GOSUB8000
890 RETURN
900 REM * PRINT 9 *
905 GOSUB 10000
910 GOSUB9000
920 GOSUB4000
930 GOSUB7000
940 GOSUB8000
945 RETURN
950 REM * PRINT 0 *
955 GOSUB 10000
960 GOSUB1000
965 GOSUB3000
970 GOSUB4000
975 GOSUB5000
```



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```
980 GOSUB7000
985 GOSUB8000:RETURN
1000 REM * TOP HOR. LINE *
1010 Y=H:FORX=G TO G+12:SET(X,Y):NEXTX
1020 RETURN
2000 REM * MIDDLE HOR. LINE *
2010 Y=H+5:FORX=G TO G+12:SET(X,Y):NEXTX
2020 RETURN
3000 REM * BOTTOM HOR. LINE *
3010 Y=H+10:FORX=G TO G+12:SET(X,Y):NEXTX
3020 RETURN
4000 REM * TOP LEFT VERT. LINE *
4010 X=G:FORY=H TO H+5:SET(X,Y):NEXTY
4020 RETURN
5000 REM * BOTTOM LEFT VERT. LINE *
5010 X=G:FORY=H+5 TO H+10:SET(X,Y):NEXTY
5020 RETURN
6000 REM * CENTER VERT. LINE *
6010 X=G+6:FORY=H TO H+10:SET(X,Y):NEXTY
6020 RETURN
7000 REM * TOP RIGHT VERT. LINE *
7010 X=G+12:FORY=H TO H+5:SET(X,Y):NEXTY
7020 RETURN
8000 REM * BOTTOM RIGHT VERT. LINE *
8010 X=G+12:FORY=H+5 TO H+10:SET(X,Y):NEXTY
8020 RETURN
9000 REM * ALL HOR. LINES *
9010 FORY=H TO H+10 STEP5:FORX=G TO G+12:SET(X,Y):NEXTX:NEXTY
9020 RETURN
10000 REM * CLEAR OLD NUMBER *
10010 FOR Y=H TO H+10 STEP 5:FOR X=G TO G+12:RESET(X,Y)
10020 NEXT X:NEXT Y
10030 FOR X=G TO G+12 STEP 6:FOR Y=H TO H+10:RESET(X,Y)
10040 NEXT Y:NEXT X:RETURN
```

DUE TO A LAST MINUTE SYSTEM FAILURE, WE HAVE HAD TO CONVERT SUPER MASTERMIND AND DIGITAL CLOCK INTO LEVEL 2 FORMAT IN ORDER TO PRINT THEM. THE ONLY CHANGES LEVEL 1 USERS NEED TO MAKE, ARE TO USE ABBREVIATIONS (ESSENTIAL TO FIT SUPER MASTERMIND INTO A 4K MACHINE) AND TO TYPE "P. AT" INSTEAD OF "PRINT AT".

LEVEL 2 USERS MUST STILL MAKE THE CHANGES EXPLAINED ON PAGE 3.

WE APOLOGISE FOR ANY INCONVENIENCE THIS MIGHT CAUSE OUR READERS. THE CASSETTE IS, OF COURSE, UNAFFECTED AS IT CONTAINS BOTH LEVEL 1 AND LEVEL 2 VERSIONS.

# MICRO-80

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TELEPHONE (08) 381 8542

```
~ COPYRIGHT 1979:PETER GRAHAM HARTLEY, 57 MAIN AVE.,FREWVILLE, SOUTH AUSTRALIA.
1 GOT032
2 FORK=0TOKK:D$=INKEY$:IFD$=""GOTO4
3 S=ASC(D$):IFS<>91ANDS<>10ANDS<>9ANDS<>8GOTO4:ELSEZ=S
4 NEXT
5 IFZ=10Y=Y+1
6 IFZ=9X=X+2
7 IFZ=8X=X-2
8 IFZ=91Y=Y-1
9 M=15359+(Y)*64+X:C=PEEK(M):IFC=191GOSUB27
10 IFC=420RC=35GOTO16
11 POKEM,42:KK=KK-.25
12 K1=K1+.125:IFK1>330THENK1=330
13 A1=A1+1:IFA1>K1THENA1=0
14 POKEA(A1),32:A(A1)=M:A2=RND(100):IF A2>94GOSUB29
15 IFA2<85GOSUB30:GOTO2:ELSEGOTO2
16 P=(Y*64+X):Z=RND(5):ONZGOSUB17,18,19,19,20,21:GOTO22
17 D$="CRUMP!":RETURN
18 D$="YAROOH!":RETURN
19 D$="BANG!":RETURN
20 D$="SMASH!":RETURN
21 D$="THUD!":RETURN
22 IFX>57THENX=X-9:GOTO16:ELSEPRINT0P,D$;:D$="":FORT=0T05000:NEXT:CLS:PRINTCHR$(
23):PRINT"YOUR SCORE WAS";H:PRINT:PRINT"PLAY AGAIN?";
23 D$="":D$=INKEY$:IFD$=""23
24 IFD$="Y"THENRUN41
25 IFD$<>"N"23
26 CLS:PRINTCHR$(23):PRINT"BYE FROM SNAKE...":FORT=0T05000:NEXT:CLS:END
27 A3=RND(20)*5:H=H+A3:PRINT0984," SCORE";H;"*****":RETURN
28 X1=RND(30)*2+1:Y1=RND(11)+1:M=15359+X1*2+Y1*64+1:RETURN
29 GOSUB28:IFPEEK(M)=32THENPOKEM,191:RETURN
30 GOSUB28:IFPEEK(M)=191THENPOKEM,32:A2=RND(40)*5:H=H-A2:GOTO27
31 RETURN
32 CLS:PRINT0532,CHR$(23);"SNAKE":FORT=0T02000:NEXT
33 PRINT:PRINT:D$="":PRINT"DO YOU REQUIRE INSTRUCTIONS?":PRINT
34 D$=INKEY$:IFD$<>"Y"ANDD$<>"N"34
35 IFD$="N"41
36 CLS:PRINT:PRINT"THIS IS A GAME OF SKILL - WITH JUST A LITTLE BIT OF CHANCE":P
RINT"THROWN IN FOR INTEREST...":PRINT:PRINT"THE GAME IS PLAYED WITHIN THE BOUNDA
RIES (DRAWN ON THE SCREEN)":PRINT"AND THE PLAYER IS REQUIRED TO CONTROL A SNAKE
OF ***** BY"
37 PRINT"SKILFULL USE OF THE FOUR KEYS MARKED WITH ARROWS...":PRINT:PRINT"IF THE
HEAD OF THE SNAKE SHOULD COLLIDE WITH THE BOUNDARY,":PRINT"OR WITH ANY PART OF
THE SNAKE ITSELF... THE GAME ENDS.":PRINT
38 FORT=0T08000:NEXT:INPUT"PRESS <<ENTER>> TO CONTINUE...":D$:CLS
39 PRINT:PRINT:PRINT"FROM TIME TO TIME TARGETS WILL APPEAR ON THE SCREEN...":PRI
NT"YOU ARE REQUIRED TO HIT THESE IN ORDER TO INCREASE YOUR SCORE.":PRINT"EACH TA
RGET HAS A LIMITED LIFE... IF IT ISN'T HIT BEFORE ITS":PRINT"LIFE EXPIRES... YOU
R SCORE IS DEBITED
40 PRINT"IT W I C E ITS VALUE.":PRINT"AS THE GAME PROGRESSES THE SNAKE WILL GRAD
UALLY INCREASE IN":PRINT"LENGTH, AND THE SPEED OF THE GAME WILL INCREASE...":PRI
NT:FORT=0T07000:NEXT:PRINT"G O O D L U C K !":FORT=0T04000:NEXT:GOTO41
41 CLEAR200:RANDOM:CLS:POKE16553,255
42 B$=STRING$(63,"*")+ " ":FORK=1T015:PRINTB$;:NEXT:B$=STRING$(63,"*"):PRINTB$;:B
$="*"+STRING$(61," ")+"* ":PRINT064,"":FORK=1T013:PRINTB$;:NEXT
43 CLEAR10:DEFINTM,A,S,X,Y:DEFDBLH:SV=64:SH=2:DIMA(330):KK=S0:X=RND(15)*2+15:Y=R
ND(3)+4:Z=RND(4):ONZGOSUB44,45,46,47:FORM=15423T016383STEP64:POKEM,128:NEXT:GOTO
9
```

# MICRO-80

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26

```
44 Z=91:RETURN
45 Z=10:RETURN
46 Z=9:RETURN
47 Z=8:RETURN
48 D$=INKEY$:IFD$=""48
49 Z=ASC(D$):PRINTD$:Z;" ";GOTO48
```

---

LOADER - 16K.

```
7C90: 4C 4F 41 44 45 52 20 32 2E 33 20 42 59 20 45 44
7CA0: 57 49 4E 20 50 41 41 59 20 28 43 29 20 20 31 39
7CB0: 37 39 20 2E 28 48 49 54 20 3C 53 48 49 46 54 3E
7CC0: 20 5C 20 54 4F 20 53 54 41 52 54 2E 29 42 41 53
7CD0: 49 43 20 50 52 4F 47 52 41 4D 20 4C 4F 43 41 54
7CE0: 49 4F 4E 53 20 3A 20 53 54 41 52 54 20 3D 20 58
7CF0: 58 58 58 48 20 2C 20 45 4E 44 20 3D 20 58 58 58
7D00: 58 48 20 20 4C 4F 41 44 45 52 20 32 2E 33 20 54
7D10: 59 50 45 20 3C 42 52 45 41 4B 3E 20 54 4F 20 53
7D20: 54 4F 50 20 57 48 49 4C 45 20 52 45 41 44 49 4E
7D30: 47 2E 20 CD 39 7D C3 19 1A CD C9 01 21 40 3C 22
7D40: 20 40 11 00 3C 21 90 7C 01 3D 00 ED B0 21 63 7D
7D50: 3E C3 32 33 40 22 34 40 AF 32 15 40 21 33 7D 22
7D60: 8E 40 C9 CD E3 03 FE 1A C2 DD 7E ED 73 8A 7C 31
7D70: 88 7C E5 D5 C5 F5 DD E5 FD E5 CD C9 01 21 04 7D
7D80: 11 00 3C 01 2E 00 ED B0 21 FA 3F 22 20 40 2A A4
7D90: 40 E5 DD E1 22 8C 7C CD 2E 7E F3 3E 00 CD 12 02
7DA0: CD 96 02 CD 35 02 FE D3 28 F9 21 40 3C 06 04 CD
7DB0: 35 02 DD 77 00 DD 23 10 F6 3A 40 38 E6 04 20 44
7DC0: CD 35 02 DD 77 00 DD 23 B7 28 15 FE 80 30 46 77
7DD0: 23 7C FE 3F 38 E3 7D FE F0 38 DE 21 40 3C 18 D9
7DE0: 3E BF 77 23 CD 35 02 DD 77 00 DD 23 DD E5 D1 CD
7DF0: D0 7E 06 03 B7 20 B8 CD 35 02 DD 77 00 DD 23 06
7E00: 02 B7 20 AB DD 22 F9 40 DD 22 FB 40 DD 22 FD 40
7E10: CD F8 01 18 36 E5 D6 80 87 26 7F 6F 5E 23 56 E1
7E20: 1A E6 7F 77 23 13 1A FE 5E 30 8E 77 18 F6 01 D0
7E30: 01 21 50 16 11 00 7F 7E E6 80 C4 44 7E 23 0B 78
7E40: 81 C8 18 F3 EB 73 23 72 23 EB C9 DD 2B DD 22 8E
7E50: 7C 21 CD 7C 11 C0 3F 01 37 00 ED B0 2A A4 40 11
7E60: E2 3F CD 8D 7E 2A 8E 7C 11 F0 3F CD 8D 7E 2A A4
7E70: 40 E5 23 23 23 23 7E B7 20 FB 23 D1 EB 73 23 72
7E80: EB 7E B7 20 EC 23 7E B7 28 37 2B 18 E4 7C CB 3F
7E90: C5 3F CB 3F C5 3F CD B2 7E 7C E6 0F CD B2 7E 7D
7EA0: CB 3F CB 3F CB 3F CB 3F CD B2 7E 7D E6 0F CD B2
7EB0: 7E C9 FE 0A 38 06 D6 09 F6 40 18 02 F6 30 12 13
7EC0: C9 FD E1 DD E1 F1 C1 D1 E1 ED 7B 8A 7C C3 CC 06
7ED0: E5 21 54 7C ED 52 E1 D0 3E 07 C3 F4 1F E5 F5 CD
7EE0: 4D 7D F1 E1 C9 FE
```

# MICRO-80

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LOADER - 4K.

```
4C90: 4C 4F 41 44 45 52 20 32 2E 33 20 42 59 20 45 44
4CA0: 57 49 4E 20 50 41 41 59 20 28 43 29 20 20 31 39
4CB0: 37 39 20 2E 28 48 49 54 20 3C 53 48 49 46 54 3E
4CC0: 20 5C 20 54 4F 20 53 54 41 52 54 2E 29 42 41 53
4CD0: 49 43 20 50 52 4F 47 52 41 4D 20 4C 4F 43 41 54
4CE0: 49 4F 4E 53 20 3A 20 53 54 41 52 54 20 3D 20 58
4CF0: 58 58 58 48 20 2C 20 45 4E 44 20 3D 20 58 58 58
4D00: 58 48 20 20 4C 4F 41 44 45 52 20 32 2E 33 20 54
4D10: 59 50 45 20 3C 42 52 45 41 4B 3E 20 54 4F 20 53
4D20: 54 4F 50 20 57 48 49 4C 45 20 52 45 41 44 49 4E
4D30: 47 2E 20 CD 39 4D C3 19 1A CD C9 01 21 40 3C 22
4D40: 20 40 11 00 3C 21 90 4C 01 3D 00 ED B0 21 63 4D
4D50: 3E C3 32 33 40 22 34 40 AF 32 15 40 21 33 4D 22
4D60: 8E 40 C9 CD E3 03 FE 1A C2 DD 4E ED 73 8A 7C 31
4D70: 88 7C E5 D5 C5 F5 DD E5 FD E5 CD C9 01 21 04 4D
4D80: 11 00 3C 01 2E 00 ED B0 21 FA 3F 22 20 40 2A A4
4D90: 40 E5 DD E1 22 8C 7C CD 2E 4E F3 3E 00 CD 12 02
4DA0: CD 96 02 CD 35 02 FE D3 28 F9 21 40 3C 06 04 CD
4DB0: 35 02 DD 77 00 DD 23 10 F6 3A 40 38 E6 04 20 44
4DC0: CD 35 02 DD 77 00 DD 23 B7 28 15 FE 80 30 46 77
4DD0: 23 7C FE 3F 38 E3 7D FE F0 38 1E 21 40 3C 18 D9
4DE0: 3E BF 77 23 CD 35 02 DD 77 00 DD 23 DD E5 D1 CD
4DF0: D0 4E 06 03 B7 20 B8 CD 35 02 DD 77 00 DD 23 06
4E00: 02 B7 20 AB DD 22 F9 40 DD 22 FB 40 DD 22 FD 40
4E10: CD F8 01 18 36 E5 D6 80 87 26 7F 6F 5E 23 56 E1
4E20: 1A E6 7F 77 23 13 1A FE 5E 30 8E 77 18 F6 01 D0
4E30: 01 21 50 16 11 00 7F 7E E6 80 C4 44 4E 23 0B 78
4E40: 81 C8 18 F3 EB 73 23 72 23 EB C9 DD 2B DD 22 8E
4E50: 7C 21 CD 4C 11 C0 3F 01 37 00 ED B0 2A A4 40 11
4E60: E2 3F CD 8D 4E 2A 8E 7C 11 F0 3F CD 8D 4E 2A A4
4E70: 40 E5 23 23 23 23 7E B7 20 FB 23 D1 EB 73 23 72
4E80: EB 7E B7 20 EC 23 7E B7 28 37 2B 18 E4 7C CB 3F
4E90: CB 3F CB 3F CB 3F CD B2 4E 7C E6 0F CD B2 4E 7D
4EA0: CB 3F CB 3F CB 3F CB 3F CD B2 4E 7D EB 0F CD B2
4EB0: 4E C9 FE 0A 38 06 D6 09 FE 40 18 02 F6 30 12 13
4EC0: C9 FD E1 DD E1 F1 C1 D1 E1 ED 7B 8A 7C C3 CC 06
4ED0: E5 21 54 7C ED 52 E1 D0 3E 07 C3 F4 1F E5 F5 CD
4EE0: 4D 4D F1 E1 C9 00
```

CONTINUATION OF 'WORDPROC'.

```
3090 IFL>=LATHEN200ELSE3010
3100 L$=LEFT$(A$(L),I):R$=RIGHT$(A$(L),LEN(A$(L))-I)
3110 I=I-1:GOTO3130
3120 L$=LEFT$(A$(L),J):R$=RIGHT$(A$(L),LEN(A$(L))-J):J=J+1
3130 A$(L)=L$+B$+R$:RETURN
3200 GOSUB3250
3210 M$=CHR$(M-128):GOTO3230
3220 GOSUB3250:M$=CHR$(ASC(M$)+128)
3230 A$(L)=L$+M$+R$:RETURN
3250 L$="":IFI>1THENL$=LEFT$(A$(L),I-1)
3260 R$="":IFIKLEN(A$(L))THENR$=RIGHT$(A$(L),LEN(A$(L))-I)
3270 RETURN
```

# MICRO-80

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```
10 CLS:PRINT@340,"BASIC WORD PROCESSOR"
20 REM COPYRIGHT <C> 1979 BY HUBERT S. HOWE, JR.
100 DEFINT A-Z
110 CLEAR7200:NL=120
120 DIM A$(NL)
130 C=0:S=1:L=0:LA=0:SP=1:PN=1:PG=1:PL=50:LL=60:T$=""
140 B$=" ":BB$=" ":CC$=CHR$(143):BR$=CHR$(96):LF$=CHR$(11)
190 CLS
200 INPUT"COMMAND";C$
210 IFC$="F"OR C$="FILL" THEN NL=LA:GOTO450
220 IFC$="C"OR C$="CLEAR" THEN 110
230 IFC$="D"OR C$="DELETE" THEN 1200
240 IFC$="R"OR C$="REPLACE" THEN 1300
250 IFC$="I"OR C$="INSERT" THEN 1400
260 IFC$="P"OR C$="PRINT" THEN 1000
270 IFC$="N"OR C$="NUM" THEN 1500
280 IFC$="M"OR C$="MOVE" THEN 1600
290 IFC$="H"OR C$="HELP" THEN 1700
300 IFC$="S"OR C$="SET" THEN 1800
310 IFC$="E"OR C$="EDIT" THEN 1900
330 IFC$="L"OR C$="LOAD" THEN 2100
340 IFC$="S"OR C$="SAVE" THEN 2200
350 IFC$="J"OR C$="JUSTIFY" THEN 3000
390 GOTO200
450 CLS:IF L<1 THEN 500:REM FILL
460 FOR J=0 TO L-1:C=J*64:IF C>958 THEN PRINT@960,B$:C=896
470 PRINT@C,J;:IF LEN(A$(J))<1 THEN 490
480 PRINT TAB(4);A$(J);
490 PRINT:NEXT J
500 GOSUB700:PRINT@C,L;TAB(4);:C=C+4
505 IF LEN(A$(L))>0 THEN S=LEN(A$(L)):PRINT@C,A$(L):C=C+S
510 PRINT@C,CC$;:A$=INKEY$:IF A$="" THEN PRINT@C,B$;:GOTO510
520 A=ASC(A$)
530 IF A=13 THEN A$=B$:GOTO750
540 IF A=8 THEN 800
550 IF A=9 THEN 900
560 IF A=24 THEN 850
570 IF A=10 THEN 740
580 IF A$=BR$ THEN PRINT:GOTO200
590 IF A=25 THEN 950
600 PRINT@C,A$;:A$(L)=A$(L)+A$:S=S+1:C=C+1:IF S<=LL THEN 510
610 S=1:L=L+1
620 IF L>NL THEN NL=NL:PRINT"BUFFER FULL":GOTO200
625 IF LEN(A$(L))>0 THEN PRINT:GOTO200
630 IF L>LA THEN LA=L
635 IF A$=B$ THEN 500
640 FOR I=LL TO 0 STEP -1:IF MID$(A$(L-1),I,1)=B$ THEN 660
650 C=C-1:NEXT I:GOTO500
660 IF I=LL THEN 500 ELSE FOR J=I+1 TO L:PRINT@C,B$;
665 A$(L)=A$(L)+MID$(A$(L-1),J,1)
670 S=S+1:C=C+1:NEXT J:A$(L-1)=LEFT$(A$(L-1),I-1):GOTO500
700 C=L*64:IF C<959 THEN RETURN ELSE PRINT@960,B$:C=896:RETURN
740 A$(L)=A$(L)+LF$:A$=B$:REM DOWN ARROW
750 PRINT@C,A$;:GOTO610:REM ENTER
800 IF S<2 THEN 510:REM BACKSPACE
810 C=C-1:PRINT@C,BB$;:S=S-1:A$(L)=LEFT$(A$(L),S-1):GOTO510
850 IF S<2 THEN 510:REM SHIFT LEFT ARROW
860 A$(L)="" :S=1:GOSUB700:C=C+4
```

# MICRO-80

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```
870 PRINT@C,CHR$(30):GOTO510
900 IFS>LL-6THEN510:REM RIGHT ARROW
910 FORI=STOS+4:AS(L)=AS(L)+B$:PRINT@C,B$;:C=C+1:NEXTI
920 S=S+5:GOTO510
950 IFS>=LLTHEN610:REM SHIFT-RIGHT ARROW
960 PRINT@C,B$:FORI=STOLL:AS(L)=AS(L)+B$:NEXTI:GOTO610
990 INPUT"PRESS ENTER WHEN READY TO CONTINUE";EN$:RETURN
1000 CLS:INPUT"PRINT LINE NUMBERS (Y/N)";N$:REM PRINT
1010 INPUT"LINE PRINTER OR VIDEO DISPLAY (P/U)";P$
1020 IFP$="P"THEN1100
1030 CLS:PP=PG-1:FORK=0TOLASTEPPL:PP=PP+1
1040 IFPN<1THEN1050ELSEPRINTT$;
1045 PRINTTAB(LL-7);"PAGE";:PRINTUSING"###";PP
1050 FORJ=KTOK+PL-1:IFJ>LATHEN1090
1055 IFSP>0THENFORM=1TOSP:PRINT:NEXTM
1060 IFN$="Y"THENPRINTJ;
1070 PRINTA$(J);
1080 NEXTJ:GOSUB990
1090 PRINTCHR$(30):NEXTK:GOTO200
1100 IFPEEK(14312)<128THEN1130
1110 INPUT"LINE PRINTER NOT READY. ABORT? (Y/N)";A$
1120 IFA$="Y"THEN200ELSEGOSUB990:GOTO1100
1130 PP=PG-1:FORK=0TOLASTEPPL:PP=PP+1
1140 IFPN<1THEN1150ELSEPRINTT$
1145 LPRINTTAB(LL-7);"PAGE";:LPRINTUSING"###";PP
1150 FORJ=KTOK+PL-1:IFJ>LATHEN1190
1155 IFSP>0THENFORM=1TOSP:LPRINT:NEXTM
1160 IFN$="Y"THENLPRINTJ;
1170 LPRINTA$(J);
1180 NEXTJ:GOSUB990
1190 LPRINTLF$:NEXTK:GOTO200
1200 INPUT"FIRST LINE TO DELETE";N1:REM DELETE
1210 INPUT"LAST LINE TO DELETE";N2:IFN1>NLTHENN1=NL
1220 IFN1<0THENN1=0
1230 IFN2>NLTHENN2=NL
1240 FORI=N1TON2:AS(I)="":NEXTI:GOTO200
1300 INPUT"LINE NUMBER";L:REM REPLACE
1310 IFA$(L)="":THENPRINT"CAN'T REPLACE LINE";L:GOTO200
1320 AS(L)="":GOTO450
1400 INPUT"STARTING LINE";L:REM INSERT
1410 IFLEN(AS(L))=0THEN450
1420 PRINT"CAN'T INSERT AT LINE";L:GOTO200
1500 K=0:REM NUMBER
1510 IFK>=LATHEN200
1520 IFLEN(AS(K))<>0THENK=K+1:GOTO1510
1530 FORJ=KTOLA-1:AS(J)=AS(J+1):NEXTJ
1540 AS(LA)="":LA=LA-1:GOTO1510
1600 INPUT"FIRST LINE TO MOVE";N1:REM MOVE
1610 INPUT"LAST LINE TO MOVE";N2
1620 INPUT"FIRST NEW LINE";N3
1630 FORJ=N1TON2
1640 IFLEN(AS(N3))>0THEN1650
1645 PRINT"LINE";N3:"ALREADY OCCUPIED." :+200
1650 AS(N3)=AS(J):AS(J)="
1660 N3=N3+1:IFN3>LATHENLA=N3
1670 NEXTJ:GOTO200
1700 CLS:PRINT"LEGAL commands ARE AS FOLLOWS:"
1710 PRINT" F FILL","P PRINT","C CLEAR"
```

# MICRO-80

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30

```
1720 PRINT "R REPLACE", "I INSERT", "D DELETE"
1730 PRINT "N NUMBER", "M MOVE", "E EDIT"
1740 PRINT "L LOAD", "S SAVE", "H HELP"
1750 PRINT "J JUSTIFY", "SET"
1760 PRINT "TYPE SHIFT-@ TWICE TO RETURN TO COMMAND MODE."
1770 GOTO 200
1800 CLS: INPUT "LINE LENGTH"; LL
1810 INPUT "PAGE LENGTH"; PL
1820 INPUT "SPACING (1=SINGLE, 2=DOUBLE)"; SP
1830 INPUT "PAGE NUMBERING (1=YES, 0=NO)"; PN
1840 IF PN > 0 THEN INPUT "STARTING PAGE NUMBER"; PG
1850 INPUT "TITLE"; TS
1890 GOTO 200
1900 CLS: INPUT "LINE NUMBER"; L: REM EDIT
1910 IF LEN(AS(L)) < 1 THEN PRINT "CAN'T EDIT LINE"; L: GOTO 200
1920 PRINT L; TAB(4); AS(L);
1930 C=68: S=1: IF L > 99 THEN C=69
1940 GOSUB 2520
1950 IF AS=" " THEN 2500
1960 IF ASC(AS)=8 THEN GOSUB 2510: GOTO 1940
1970 IF ASC(AS)=13 THEN 2900
1980 IF AS="I" THEN 2600
1990 IF AS="D" THEN 2650
2000 IF AS="H" THEN 2750
2010 IF AS="X" THEN 2800
2020 IF AS="C" THEN 2850
2040 IF AS="S" THEN 2950
2050 GOTO 1940
2100 GOSUB 2300: IF AS="D" THEN 2150: REM LOAD
2110 INPUT #1, LA, SP, PN, PG, PL, LL, T
2115 IF T > 0 THEN INPUT #1, TS
2120 FOR L=0 TO LA: INPUT #1, AS(L)
2130 NEXT L: GOSUB 2400: GOTO 200
2150 OPEN "I", 1, F$
2160 INPUT #1, LA, SP, PN, PG, PL, LL, T
2165 IF T > 0 THEN INPUT #1, TS
2170 FOR L=0 TO LA: INPUT #1, AS(L)
2180 NEXT L: CLOSE: GOSUB 2400: GOTO 200
2200 GOSUB 2300: GOSUB 2450: IF AS="D" THEN 2250: REM SAVE
2210 PRINT #1, LA, SP, PN, PG, PL, LL, LEN(TS)
2215 IF LEN(TS) > 0 THEN PRINT #1, TS
2220 FOR L=0 TO LA: PRINT #1, AS(L)
2230 NEXT L: GOSUB 2400: GOTO 200
2250 OPEN "O", 1, F$
2260 PRINT #1, LA, SP, PN, PG, PL, LL, LEN(TS)
2265 IF LEN(TS) > 0 THEN PRINT #1, TS
2270 FOR L=0 TO LA: PRINT #1, AS(L)
2280 NEXT L: CLOSE: GOSUB 2400: GOTO 200
2300 CLS: INPUT "TAPE OR DISK (T/D)"; AS
2310 IF AS < "D" THEN 2330
2320 INPUT "FILESPEC"; F$: RETURN
2330 PRINT "READY CASSETTE": GOSUB 990: RETURN
2400 FOR L=0 TO LA: IF LEN(AS(L)) < 1 THEN 2440: UNTRANSLATE
2410 FOR I=1 TO LEN(AS(L)): M=ASC(MID$(AS(L), I, 1))
2420 IF M > 128 THEN GOSUB 3200
2430 NEXT I
2440 NEXT L: RETURN
2450 FOR L=0 TO LA: IF LEN(AS(L)) < 1 THEN 2490: TRANSLATE
```

## 31

CONTINUED BENEATH 'LOADER - 4K'