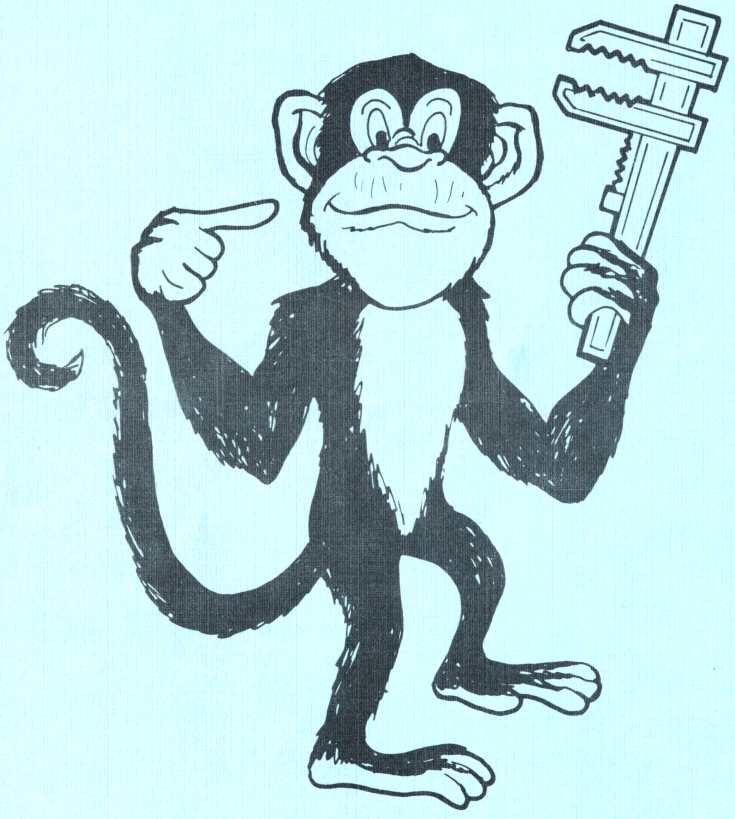
THE
MONKEY WRENCH

USERS GUIDE



A PROGRAMMERS AID FOR ATARI 800 COMPUTERS

THE MONKEY WRENCH (tm)

USERS GUIDE

WHAT IS THE MONKEY WRENCH ?

The Monkey Wrench is a machine language ROM program which extends the operating capability of the ATARI 800 computer. When installed into the ATARI, the Monkey Wrench provides 9 new BASIC commands. The commands are:

Auto Line Numbering - Provides new line numbers when entering BASIC program lines.

Delete Line Numbers - Removes a range BASIC line numbers.

Change Margins - Provides the capability to easily change the screen margins.

Memory Test - Provides the capability to test RAM memory.

Renumber - Renumbers BASIC's line numbers including internal references.

Cursor Exchange - Allows usage of the cursor keys without holding down the CTRL key.

Hex Conversion - Converts a hexidecimal number to a decimal number.

Decimal Conversion - Converts a decimal number to a hexdecimal number.

Monitor - Enter the machine language monitor.

In addition to the BASIC commands, the Monkey Wrench also contains a machine language monitor with 15 commands used to interact with the powerful features of the 6502 microprocessor.

GETTING STARTED

Normally, the Monkey Wrench is installed at the same time as the ATARI BASIC cartridge. However, it may be installed even though the BASIC cartridge is not installed. The Monkey cartridge is inserted into the RIGHT CARTRIDGE slot. Once the Monkey Wrench is inserted into the RIGHT slot, simply turn on the power switch (see NOTE). The Monkey Wrench will automatically initialize itself and display:

```
READY

  THE MONKEY WRENCH
  COPYRIGHT 1981 BY
EASTERN HOUSE SOFTWARE
```

Now you're ready to MONKEY around with the commands !!!

NOTE: Since the right slot is not normally used, the contacts in the slot may become dirty and cause the MONKEY WRENCH to malfunction when first installed. To help clean the contacts, wipe some alcohol on the fingers of the MONKEY WRENCH board and plug it in and then out of the right slot several times. During normal usage, the fingers on the board can be cleaned using a pencil eraser. In addition, always turn off the ATARI 850 interface unit before turning on the computer when MONKEY WRENCH is installed.

BASIC COMMAND DETAILS

The 9 new BASIC commands are designed to give you those extra features that are not provided by the ATARI BASIC. These commands must be executed in the direct mode. That is, they cannot be entered into a BASIC program. They must typed on the screen without a line number.

All of the Monkey Wrench commands must be entered with the greater than symbol (>) preceding the command syntax. In addition, all of the commands must be entered with the greater than symbol (>) in the first character position on the line. Finally, all commands with parameters must contain at least one space between all of the parameters.

Automatic Line Numbering

>A (line number) (increment value)

The >A command provides automatic line numbering for entering your BASIC program. The first parameter entered is the starting line number. The second parameter is the increment value used to determine the value of the next line number. If the increment value is not entered, the increment value defaults to 10. Now whenever you enter your BASIC line statements and depress RETURN, the next line number will automatically be displayed on the next line of the screen.

To exit the automatic line numbering mode, depress the BREAK key.

EXAMPLES:

```
>A  10  10                          * Start automatic
10 REM The old dog has flees!!      * line numbering
20 REM But he doesn't care!!        * at line 10 and
30                                  * increment by 10
```

```
>A  5000  1                         * Start automatic
5000 GOTO 1000                      * line numbering
5001 IF A=123 THEN B=321            * at line 5000 and
5002 LET C=0                        * increment by 1
5003
```

Note: While in the automatic line numbering mode, do not change the line number printed on the screen or move the cursor off the current logical line. Doing this may cause a wrong line number to be stored in the BASIC program. It is okay to use the INSERT and DELETE keys.

Delete Range of Line Numbers

>D (starting line number) (ending line number)

The >D command deletes a range of BASIC line numbers. The first parameter specifies the starting line number to be deleted. The second parameter specifies the last line number to be deleted.

EXAMPLES:

```
>D  0  50                    * Delete lines 0 to 50

>D  100 200                  * Delete lines 100 200

>D 32000 32500               * Delete lines 32000 to 32500
```

When the RETURN key is depressed, the lines will be deleted. The ATARI buzzer will sound when the lines have been deleted.

Set Margins

>M (left margin) (right margin)

The >M command makes it possible to easily change the screen margins. The first number in the parameter specifies the left margin; the second number in the parameter specifies the right margin. If the second parameter is not given, only the left margin will be changed.

EXAMPLES:

```
>M  5  35                    * Set margins to 5 and 35

>M  0 39                     * Set margins to 0 and 39

>M  2                        * Set left margin to 2
```

The lowest left margin number is 0 and the highest right margin number is 39. Don't specify a left margin number greater than the right margin. If you do, use the SYSTEM RESET key to reset the margins.

Exchange Cursor Keys

>E

When the Monkey Wrench is initialized at power-up, the cursor keys (up, down, left and right) are setup to allow their usage without holding down the CTRL key. This feature makes it much more easier to use the screen editing capabilities of the ATARI. To use the +, -, = and * characters, hold down the CTRL key. If you don't wish to use this feature, type in the >E command to exchange the characters to the normal mode. If at a later time you wish this feature restored, type >E again to exchange the keys.

Decimal To Hexidecimal Conversion

># (decimal number)

Convert a decimal number to hexidecimal number. When the RETURN key is depressed, the hexidecimal number will be displayed on the next line. The maximum decimal number is 65535.

EXAMPLES:

```
>#  255
00FF

>#  10
000A

>#  65535
FFFF
```

Hexidecimal To Decimal Conversion

>$ (hexidecimal number)

Convert a hexidecimal number to a decimal number. When the RETURN key is depressed, the decimal number will be displayed on the next line. The maximum hexidecimal number is FFFF.

EXAMPLES:

```
>$ FF
255

>$ A
10

>$ FFFF
65535
```

Monitor

>*

Enter the machine language monitor. The >* command exits the ATARI BASIC program and turns control of the 6502 microprocessor over to the monitor. See machine language monitor commands.

Memory Test

>T (start hex address) (end hex address)

One of the most handiest programs you can have for your computer is a MEMORY TEST program. It allows you to be sure that your RAM memory is functioning properly. This is particularly useful when you purchase additional memory modules. You only have a limited time period on your guarantee. How do you know that it is okay ? You really don't unless you test it. Also when one of your programs isn't working properly, is it because the problem is in the program or in RAM memory ? With the memory test, you can find out.

The test checks the memory for storage retention, an open, shorted or non-functioning data and address lines 0 through 7. This is done by writing 00 01 ... FF 00 01 ... FF continually throughout the memory range for the first pass. When this has been written, it is checked to validate the data. On the next pass 01 02 ... FF 00 01 ... FF is written and checked. This continues for 256 passes until all possible combinations of bit patterns have been checked.

The >T command parameters (start & end addreses) are hexidecimal addresses. The following are examples of the minimum and maximum practical ranges of memory that should be tested.

EXAMPLES:

```
>T  0700  7C20        * Test memory from hex 700 to hex 7C20.
                      * For 32K, 40K, or 48K of memory.

>T  0700  5C20        * Test memory from hex 700 to hex 5C20.
                      * For 24K of memory.

>T  0700  3C20        * Test memory from hex 700 to hex 3C20
                      * For 16K of memory.

>T  0700  1C20        * Test memory from hex 700 to hex 1C20
                      * For 8K of memory.
```

When the RETURN key is depressed, the screen will display TESTING. If any errors are found, they will be outputted as shown on the next page. At the end of the memory test, the screen will display TEST FINISHED and sound the buzzer. The memory test performs a lengthy but exhaustive test of RAM memory. Therefore, if you're testing alot of memory, be prepared to wait!!! If you wish to terminate the test early, depress the SYSTEM RESET key.

When memory errors occur during the test, they will be outputted in the following format:

ADDRESS OF ERROR	DATA PATTERN STORED BY TEST	DATA READ BY TEST
xxxx	yy	zz

Example Printout of Memory Errors

3D90	F1	F0
3D90	F3	F2
3D90	F5	F4
3D90	F7	F6

To the beginning computerist, the printout of memory errors won't mean much. But it does indicate a problem in one of the memory modules. Remove one of the memory modules and test the RAM that is left. If the errors occur again, continue to swap memory modules until the errors no longer occur. At that time, the memory module not installed will be the bad one.

Since BASIC and the Monkey Wrench take up the upper 16K of memory, it is not possible to test this RAM if you have 40K or 48K of memory. In order to test this RAM you must move or exchange the third memory module with the second module and repeat the memory test. Likewise, in order to do a complete test on the lower part of memory, exchange the first memory module with the second module and repeat the test. Finally, before starting a test, ensure the DOS or a program is not loaded. These programs will be destroyed by the test.

If you would like to see the memory test at work, try testing part of the screen memory. For example, clear the screen and type:

```
>T  7E00  8000     * For 32K, 40K, or 48K of memory
>T  5E00  6000     * For 24K of memory
>T  3E00  4000     * For 16K of memory
>T  1E00  2000     * For 8K of memory
```

Renumber BASIC Program

>R (start line number) (increment value)

The >R command will renumber all BASIC lines in a BASIC program. It will renumber not only the line numbers but also all references to the line number by the following BASIC commands: GOTO, GOSUB, IF THEN, ON GOTO, ON GOSUB, RESTORE, and TRAP.

If the renumber routine finds that a reference is made to a nonexistent BASIC line number, it will change the reference to line number 32767. Therefore, it will be easy to locate when scanning a listing of the program. In addition, when the BASIC program is RUN, an error message will be given.

The first parameter of the >R command specifies the starting line number. That is, the first line number you want the program to have. The second parameter specifies the increment value (or the number of line numbers) between lines. The increment value can be from 1 to 255. If the increment value is not entered, it will default to 10.

EXAMPLES:

```
>R  10          * Renumber program with the first new
                * line number being 10. An increment
                * value of 10 will be assumed. The new
                * line numbers will look like 10, 20,
                * 30, 40, 50, etc.

>R  1  1        * Renumber program with the first new
                * line number being 1 and an increment
                * value of 1. The new line numbers will
                * look like 1, 2, 3, 4, 5, 6, 7, etc.

>R  32000  50   * Renumber program with the first new
                * line number being 32000 and an increment
                * value of 50. The new line numbers will
                * look like 32000, 32050, 32100, etc.
```

Additional Facts About Using Renumber !!!

1. The renumber command uses the screen RAM memory as a buffer. Therfore in graphics mode 0, the longest BASIC program that can be renumbered is 478 lines. An error message PROGRAM TO LONG FOR SCREEN MEMORY will be given if the program is to long. If necessary, the graphics mode may be changed to GRAPHICS 6 before renumbering the program. This will double the number of lines that can be renumbered.

2. The maximum line number used by the >R command is 32766. Thus use the increment value carefully at high starting line numbers. An error message OUT OF NUMBERS will be given if this occurs. In this case, the BASIC program will be only partially renumbered and therefore is useless. Reload the BASIC program and renumber again.

3. There are many ways of constructing BASIC programs. Therefore it is impossible for the renumber routine to know exactly what the programmer had in mind. The following is a list of examples of BASIC commands which the renumber routine may or may not act upon.

* The renumber routine will not renumber BASIC statements which use symbolic labels as line numbers. For example,

```
10 LET CAT=50
20 GOTO CAT
```

* Be carefull of the following BASIC format:

```
10 IF A=1 THEN 100 + A
```

The above format is OK. The 100 will be renumbered.

```
10 IF A=1 THEN A + 100
```

In this format, the 100 will not be renumbered.

Note: This applies not only to the IF THEN command but also to the other commands.

MACHINE LANGUAGE MONITOR (MLM) COMMANDS

The MLM provides 15 commands which are most useful to the machine language programmer. It provides the user with the capability to easily interact with the 6502 microprocessor and system memory. The MLM uses the ATARI screen editing capability. This feature makes the MLM powerful and easy to use.

Normally the Monkey Wrench is used with BASIC. However, it can be used without BASIC. In this case, the ATARI will automatic enter the MLM when the power is turned on.

The following is a list of the MLM commands. Carefully read over the commands and examples. Then practice with the MLM to gain a better insight into their use.

. -- COMMAND PROMPT

A period is used to indicate the MLM is ready for a command.

M XXXX YYYY -- DISPLAY MEMORY

Display memory starting at hex address XXXX and ending at YYYY.

Example -

```
M 6531 653F
 :6531 01 02 03 04 05 06 07 08
 :6539 09 0A 0B 0C 0D 0E 0F 10
```

Note -- If only start address is entered, 24 memory locations will be displayed.

Note -- For long memory displays, the control-1 key can be use to stop and start the listing.

Note -- To abort a long listing, press the space bar.

I XXXX YYYY -- INTERROGATE MEMORY

Interrogate memory starting at hex address XXXX and ending at YYYY. The interrogate command works just like the .M command except it also displays the ATASCII equivalent of the memory contents. All cursor control codes are displayed with a question mark (?).

R -- DISPLAY REGISTERS

Display 6502 registers.

Example Printout -

```
 *  PC  AR XR YR PR SP
 ; 7013 41 11 FA 03 FA
```

PC = program counter; AR = accumulator; XR = X register
YR = Y register; PR = status register; SP = stack pointer

: -- ALTER MEMORY

Indicates that the following hex address and line of hex data will be used to alter memory. Cursur up and over to location and change bytes -- press RETURN.

; -- ALTER 6502 REGISTERS

Used to modify 6502 registers. Cursor up and over to register and change bytes (S) -- press RETURN.

G XXXX -- GOTO

GOTO address specified by XXXX and execute program. Program must contain a BRK instruction to return to MLM. If XXXX is not given, the GOTO address defaults to the program counter.

X -- EXIT

Exit the monitor and return to DOS menu.

S XXXX YYYY -- SAVE MEMORY TO CASSETTE

Save memory starting at hex address XXXX to ending address YYYY.

Note -- The end address must be the actual address+1.

L XXXX -- LOAD MEMORY FROM CASSETTE

Load memory from cassette and store starting at hex address XXXX. Binary data saved using the S XXXX YYYY command can be loaded into memory at any location (as defined by L XXXX).

? -- ERROR

A question mark will be printed if a bad command or bad hex data is entered. It will also be given if any command tries to alter a ROM or non-existent memory location.

H XXXX YYYY 'ZZZZZ -- HUNT FOR ASCII STRING

Hunt memory from XXXX to YYYY for the ASCII string ZZZZZ

Example - H 1700 2A80 'ATARI COMPUTER -- Hunt memory from $1700 to $2A80 for the ASCII string ATARI COMPUTER .

Note - The ASCII string can be up to 20 characters long.

Note - If a match of the ASCII string is found, the hex address will be listed to the screen. If no match is found, only the command prompt (.) will be displayed.

H XXXX YYYY ZZ ZZ ZZ ZZ -- HUNT FOR HEX CHARACTERS

Hunt memory from XXXX to YYYY for the hex characters ZZ ZZ ZZ ZZ.

Example - H 1700 2A80 20 00 07 A9 FF -- Hunt memory from $1700 to $2A80 for the hex characters 20 00 07 A9 FF .

Note - The hex characters can be up to 20 hex bytes long.

Note - If a match of the hex characters is found, the hex address will be listed to the screen. If no match is found, only the command prompt (.) will be displayed.

D XXXX - DISASSEMBLE MEMORY

Disassemble memory starting at hex address XXXX.

Example - D A000 - Disassemble memory starting at $A000. The screen will clear and display the hex code as well as the disassembled mnemonics. The control-1 key is used to stop and start the listing. To terminate the listing, press the space bar.

```
,A000  A5  CA    -LDA $CA
,A002  D0  04    -BNE $A008
,A004  A5  08    -LDA $08
,A006  D0  45    -BNE $A04D
 etc
```

Note - When an unimplimented opcode is encountered, the mnemonic field will display ???.

, - ALTER DISASSEMBLE LISTING

A comma command is used to alter the hex code printed out by the disassemble command. After the listing has been stopped with space bar, simply cursor up and over and change hex code (up to 3 memory locations can be modified). When the RETURN key is pressed, the disassembly process will begin again.

B XXXX YYYY - CALCULATE BRANCH

Calculate the branch value from address XXXX to YYYY.

Example - B 4000 4013 - Calculate the value of a branch instruction when the program counter is at $4000 and branch to instruction is at $4013. In this case, the hex value 13 will be displayed.

A - ATARI DOS

Exit the monitor and go directly to the DOS menu. If DOS isn't loaded, it will enter the MEMO PAD mode.

ADDITIONAL NOTES

(1) Spaces have been shown in the examples of the MLM commands. Spaces are optional and are not required by the monitor.

(2) In addition to the MLM commands, three of the normal Monkey Wrench commands can be used. They are: >E, >#, and >$.

ABOUT THE CARTRIDGE

As stated previousily, the Monkey Wrench ROM is contained on a special printed circuit cartridge. This cartridge is configured such that it uses memory from hex 8000 to hex 9fff when inserted into the right slot. Therefore, on an ATARI with 48k memory, only 32k of memory is usable. This is ,of course, a constraint of the ATARI computer. In addition, the Monkey Wrench uses hex memory from 600 to 700 for variable memory storage.

If you have any questions, comments about this software (good or bad), or any suggestions about future commands; please write describing in detail the information. Eastern House Software has always felt it is important not to abandon the user once the sale has been made. Please feel you can contact us if necessary.

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