WEMON REVIEWED

by Dr. A.A.BERK

THE WEMON monitor, produced by *Watford Electronics,* is an overall system monitor for the UK101-Superboard family of computers. The Monitor in any machine of this kind is in constant use for such activities as interpreting keyboard data, keeping the screen formatted, allowing editing of programs, breakpoints, machine code writing etc. The revolutionary nature of WEMON is its realisation on a 2532 (4K Bytes) erasable programmable read-only memory (EPROM). These devices retail at £15-£18, normally, and WEMON costs less than £20. The reason for its requiring such a large amount of memory for all its functions lies in two or three of its advanced facilities. Firstly, full on-screen editing of BASIC programs is available—you simply move the cursor to any point on the screen containing a listing of the program, effect an insertion, change or deletion, and WEMON takes care of inserting the changes into the stored copy of your program. The second important feature is concerned with the sophisticated way in which the device controls loading and saving to tape. One of the most memory intensive parts of this function stems from the fact that WEMON's method of tape storage is fully compatible with the usual methods for 101/Superboard machines. Thus, although under WEMON it is vastly more sophisticated than normal, friends can still swop taped versions of programs with alacrity.

A third feature of some importance for the programmer, though less memory intensive than the above, is WEMON's BASIC keyword presentation facility. By this means, BASIC keywords such as FOR, POKE, etc may be called up by single keys on the keyboard. Two keystrokes are necessary, as SHIFT and CONTROL have to be pressed together first, released and followed by the key associated with the BASIC function required.

The chip containing WEMON has to be fitted into the memory space on the board, and to do this, a set of links and track cuttings must be performed on the p.c.b. before starting. These modifications are quite straightforward, and though I did not perform the modification myself, they seem to be well described in the manual.

The facilities available are described below, and have mostly been checked, during the review, on a Superboard. The chip comes in various versions, for the different machines it fits.

START UP

When the machine is switched on, the BREAK or RESET key is pressed, and a menu containing five letters appears:

M/C/W/D/U?

The machine is asking for a response from the user, and any of these letters can be typed, followed by a RETURN, to open one set of facilities available. **M** starts the machine code monitor, **C** is cold start for BASIC, **W** is warm start, **D** performs an indirect jump to a routine starting at 9800 (Hex), although this can be changed if required, and **U** jumps to a vector which can be defined by the user. The last two commands allow complete flexibility of use from the very beginning.

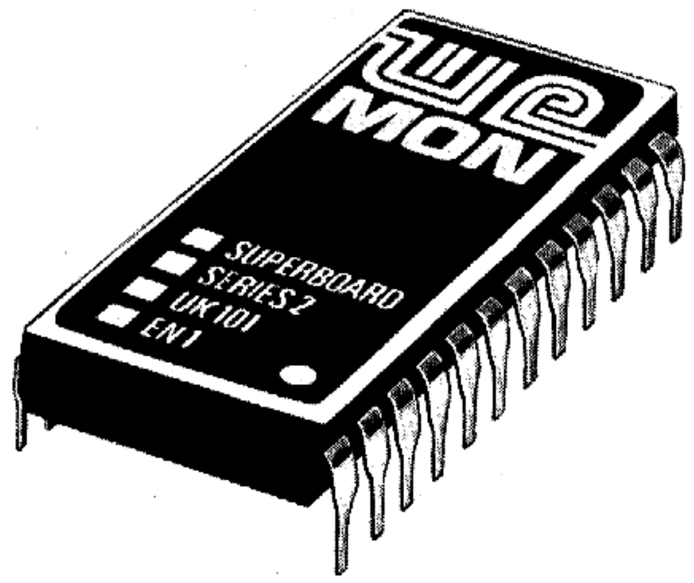
KEYBOARD

The keyboard is decoded as normal with alpha lock distinguishing between upper case teletype, and normal typewriter mode with lower case and use of SHIFT. In addition, several of the keys have special cursor control functions, and others, when used in conjunction with the CONTROL key, have command functions. See Table 1. CTRL(S) toggles between 24 and 48 characters per line with half the number of lines in the second case, CTRL (E) allows a jump to extensions to BASIC, CTRL(Q) changes to a mode whereby you can print characters on the screen corresponding to each of the cursor commands. By this means, using a PRINT statement, the cursor may be moved around the screen by your BASIC program—very useful for easy screen formatting under program control. The symbols used to signify these cursor commands are chosen to be logical—e.g., the cursor down symbol is a down arrow, etc. Table 1 also shows that cassette tape motor control is included from the keyboard to allow the tape to be rewound or forward wound without having to unplug the remote connection. CTRL(D) inserts a blank line between two BASIC lines of text to allow a new line to be written in. In addition, cursor movements are effected by LINE FEED and REPEAT, with their inverses occurring by the use of SHIFT with these keys. SHIFT RUBOUT, logically enough, produces the INSERT function in BASIC text, and SHIFT ESC (using the LEFT SHIFT) produces a screen clear.

These facilities are very useful indeed during program writing, and after a few minutes of use, it becomes very irritating to return to the old method of rewriting lines to effect changes. The only criticisms I can make are, firstly that the cursor is chosen, sensibly, to flash on and off, but the speed is rather low; and secondly, while stepping along a line, or moving up and down the screen using auto repeat, the cursor will stop flashing, and disappear. It is therefore impossible to watch the progress of the cursor on the screen to see when it has arrived at its destination.

BASIC

As mentioned above, WEMON has full screen editing, including insert both character and line. An exciting aspect of the editor is its ability to be used within a program. As explained above, characters corresponding to the editing commands may be included in PRINT statements to allow simple program formatting of the screen. By this means, a program is able to treat the screen as a "sheet of paper" around which the cursor may be moved at will to place printout easily at any position on the screen.



Another advanced feature of the monitor is its ability to extend the BASIC words which it can recognise. This is activated by CTRL(E). Before this has been performed, BASIC responds with the usual SN error if it finds a command which it does not

TABLE 1

REPEAT = Cursor Right
DELETE = Rubout
LINE FEED = Cursor Down
ESC = Home Cursor

Use of SHIFT reverses these functions, e.g. SHIFT LINEFEED = Cursor Up., and SHIFT ESC clears the screen.

CTRL(E) = Basic Extension
SHIFT RUBOUT (1E) = Insert
CTRL(X) = Cursor Left
CTRL(Z) = Cursor Up
CTRL(S) = Video Swop
CTRL(Q) = Toggle Quotes
CTRL(N) = Delete
CTRL(H) = Cursor Right
CTRL(J) = Cursor Down
CTRL(T) = Tape on/off
CTRL(D) = Open Screen
CTRL(P) = Toggle Print Flag

recognise. After CTRL(E), it performs further tests before rejecting the command. If the tests succeed, then a jump is performed to a location named EXTVEC. This is a three byte location which should contain a jump to another routine which can contain anything you wish. Some parameters are passed via the stack, and use of this function can, of course, crash the system if not set up correctly. Thus, the BASIC interpreter is no longer completely closed, any further facilities required can simply be strung on as desired.

A useful, though simple, addition to the system is use of the SPACE key to slow down a listing. Instead of flashing uncomfortably before the user's eye, a long list can be slowed down to reading speed by holding down the SPACE bar.

A printer routine is included in the monitor, but it expects a 6520 parallel 1/O chip to be present at base address 8800(Hex). The command CTRL(P) toggles the print facility in and out, and every call to the normal output routine tests this flag and prints accordingly. The protocol is Centronics. Naturally, any other parallel device may be attached here if it handshakes in the Centronics manner.

The cursor symbol and flash rate are supposed to be user selectable via certain memory locations, but neither of these facilities worked on my version of the chip. I am assured that this will be rectified on the full production version, and these additions appear to be easy enough to include.

TAPE HANDLING

This is one of the areas of WEMON where it really scores very high marks. The whole problem of tape handling seems to have been cleared up by this monitor. The tape is automatically turned on and off by the program via a very simple hardware modification to the p.c.b. which includes an i.c. driver and a p.c.b. mounted relay. The RTS line of the 6850 ACIA is used to drive this facility in a very neat and easy to use manner. Once the remote connection has been plugged into the tape recorder, it does not have to be removed to rewind etc.—CTRL(T) being used from the keyboard to allow normal tape use when not required to be under program control.

Both (optional) named-files and part-SAVEs are allowed. To save a file to tape, the command: SAVE"AAAAAA is typed being followed by RETURN, opening quotes being mandatory, closing quotes are not required. The name (up to six alphanumeric characters) can be omitted (along with quotes) if no name is required for the file. At this point, a five second delay is encountered during which any tape leader is cleared, and then the message "SAVING AAAAAA" will appear followed by the command "LIST". At this point, the user may type a line-number followed by RETURN, to tell the computer where to start the listing from. Just RETURN starts the listing from the first line. The file then lists out on the screen as usual until the process is complete, when SPACE RETURN switches off the tape and clears the SAVEFLAG—which signals the computer whether or not to output to tape when a LIST is performed.

Loading from the tape is similar, with one or two extra tricks. If the opening quotes are omitted, the first character of the name is ignored in the name comparison. If a "*" is included in the name, the name comparison stops at that point. Thus:

LOAD"HELLO

will load the same file as:

LOAD"HE*

In addition, all named files encountered during a search of the tape are listed on the screen during the process, to allow the user to keep track of what is happening.

Machine code tape files are also handled with great efficiency by WEMON. It is claimed that they transfer some three times faster than normal! These files may only be handled from the machine code monitor, which is described later. S and L are used instead of SAVE and LOAD, and no quotes are necessary for file names. The form of the SAVE operation is as follows:

S AAAAAA(RETURN) XXXX-YYYY

After the RETURN, the cursor waits for the mandatory address parameters for the SAVE routine—all code from address XXXX to the location immediately preceding YYYY is thus saved to tape under the file name of AAAAAA.

LOADING of the block of data may be made to the same locations, or a different set entirely. Leading zeros are not required in the address parameters, and once again, the file name is optional.

MACHINE CODE MONITOR

The machine code monitor has one or two useful features not found on other monitors, though WEMON is much more a BASIC handler, and the features should not be expected to be wide ranging.

After RESET, if M is pressed, the machine code monitor is entered, and one of seven single letter commands is available. Unfortunately, if any other letter is pressed instead, the machine hangs up, and RESET has to be pressed to return to normal use. Each command has a set of parameters which are associated with that command's use, and if these are miss-typed in certain ways, the machine hangs again. This fragility in the software is irritating if you type fast, as mistakes are inevitable. Each command must be used, therefore, with some care as to format.

When the machine code monitor is entered, an immediate display of the registers is shown at the top of the screen, and subsequent commands, including those performing scrolls to the screen, leave this line of registers displayed at all times. The R function can be used to modify the contents of this line for various purposes. The modifications to this line are loaded into the MPU registers when the G function is used—the location to which control is transferred by G is determined by the PC value shown at the top of screen. While R is being used, the cursor steps along on the line beneath the register fields being modified. By this means, the contents are not obscured by the cursor block. The cursor may be moved back and forth at will to modify any position on the line.

M allows any set of locations to be examined and modified byte by byte. A useful display feature has been included here, whereby consecutive locations treated in this way are listed vertically down the screen rather than being confined, as with the old monitor, to a one-line display. The vertical line scrolls when it reaches the bottom of the screen, leaving the register line intact. M can also be used to search through any designated

memory block for all occurrences of a particular byte. Each occurrence, with its address, is listed on the screen, and at the end the total number found is displayed.

V allows a formatted block of memory to be displayed—with scrolling if the block does not fit onto the screen. The scroll rate may be very conveniently slowed down, as for BASIC, by the use of SPACE.

B allows a block move of data in any direction. The start and end addresses of the block to be moved are given, along with the new start address for that block.

S and L have been described in the Tape Handling section above.

Breakpoints are implemented, for debugging, to allow either a branch out to the machine code monitor, or to an address specified by the user—again, maximum flexibility being the watchword.

Finally, the RS232C output of the machine may be used after the delay, and other cassette-priority routines, have been disabled by:

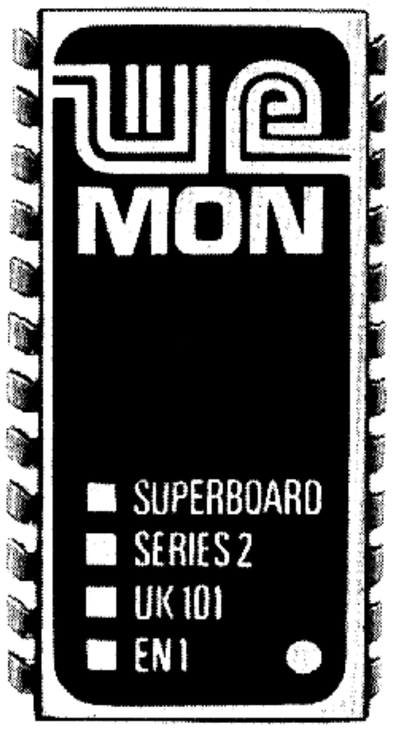
POKE517,255

This allows a serial system printer to be used under program control, instead of the parallel printer referred to earlier.

CONCLUSION

In addition to the above facilities, there is a very large number of subroutine entry points and functional locations included in the manual. It is fair, therefore, for the manufacturers to claim that WEMON is able to satisfy both the beginner's need for an easy to use system, and the experienced user's need for maximum flexibility and utilisation of the system offered. The version of the manual used for this review was a pre-production copy of the document, and many changes have since been incorporated; however, most of the functions are quite adequately described, and the hardware modifications well sketched.

It is inevitable that a comparison will be made between this monitor and the ever increasing number of UK101 type monitors flooding into existance. It is impressive to note that *bit for bit* this has been priced to be the cheapest monitor around; and, as it is implemented efficiently on a 4K (bytes) EPROM, it is inevitably the most sophisticated.



It was suggested that there is a user-settable location in the machine code monitor, which the machine branches to, allowing extra commands to be added, although this was not apparent in the reviewed version of the manual.

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