EPROM PROGRAMMER
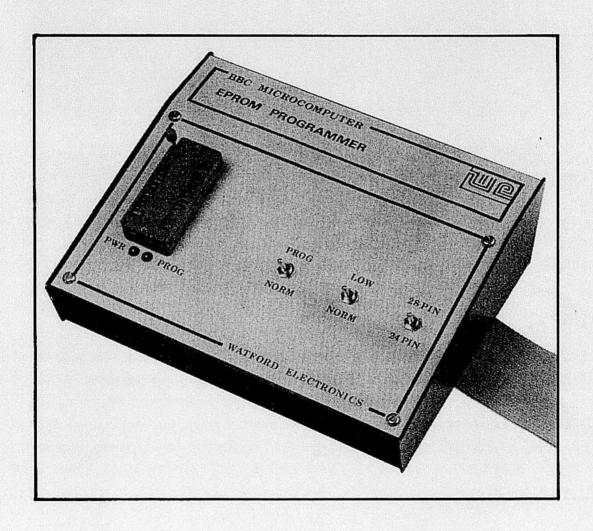## OPERATING MANUAL
BBC MICROCOMPUTER

℡ℚ Watford Electronics

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1.INTRODUCTION.

Congratulations on your purchase of the EPROM PROGRAMMER. This unit is designed to connect directly to a BBC Microcomputer model B, using the 1MHz bus. The decoding of the 1MHz bus by the programmer allows the teletext and prestel receivers to be attached at the same time. The programmer is fully self contained and requires only the accompanying EPROM software (no external power supplies are needed, only a nearby mains point). This unit is capable of programming six types of EPROMs.

    1. 27128
    2. 2764
    3. 2564
    4. 2532
    5. 2716 (single rail)
    6. 2516

The programmer accepts all of the more popular EPROM chips. Most manufacturers produce a single rail 2716 EPROM which is compatible with the programmer. Due to the extra voltage supplies which the TEXAS 2716 requires the Texas chip cannot be programed. The software supplied with the programmer has been developed to run on a BBC Computer model B with a series 1 operating system (1.0, 1.1, 1.2), which can be checked by typing *FX 0 .

2.CONNECTING THE PROGRAMMER

Inserting the software is a relatively easy task which will result in no damage to the BBC Microcomputer, although care must be exercised when performing this operation. Firstly you will need to switch the computer off and remove the lid by unscrewing the FOUR fixing screws, two at the rear and two under the keyboard. Next the keyboard will need to be released. After releasing the two or three screws (depending on the issue of the computer) the keyboard can be moved aside revealing five ROM sockets to the front and right of the computer. The EPROM software provided should now be inserted, with the notch to the back of the computer, into one of the four right hand sockets. Note that the ROM that is inserted furthest to the right will run on power up or CTRL-BREAK. The keyboard and lid should be re-fitted but it is suggested that the screws should not be inserted until testing is complete. The next step is to switch on the computer. If the normal prompt is not seen and a strange noise is heard from the speaker the unit should be switched off and the orientation of the EPROMs should be examined and a visual check made for any pins of the chip being bent under the socket; also check that the keyboard ribbon cable is connected properly. Now that we have the normal prompt the presence of the software can be checked by typing *HELP. Typing *EPROM or *EP. will now start the software running. The computer should now be powered off and the keyboard and lid screws firmly replaced.

The EPROM programer has only one connection to the BBC Microcomputer, this being a ribbon

cable to the 1MHz bus.The plug that connects to
the BBC Microcomputer should be inserted so that
the cable points in the downward direction. The
keyway on this plug should match the socket,
(Beware! this can be forced in the the wrong way
round). Once the ribbon cable has been connected
the mains cable should be plugged in. It is
advisable to switch the programmer on before the
BBC Micro as the reverse may cause the computer
to lock-up, which can be cleared easily by
depressing CTRL-BREAK. Please note no damage will
result because of this!

3.USING THE EPROM PROGRAMMER

3.1 SELECTING THE DEVICE.

Using the EPROM programmer is simple and
requires no expertise but provides some powerful
features for the more adventurous. To run the
programme just type *EPROM or *EP. for short. A
title page will be displayed and you will be
prompted for the type of device you wish to
select. Just enter the digit of the device
required.

e.g.
    4   will select a TMS2532 EPROM
    2   will select a M5L276K4 EPROM

A menu page will now be displayed showing the
type of device selected on the top row of the
screen. A return to the title page can be made at
any time by pressing <ESCAPE> when at the main
menu and a new device type can then be selected.

3.2 INSERTING AN EPROM.

Before inserting any EPROMs into the EPROM programmer the PROG/NORM switch must be set to NORM. The programmer should then be switched on and the EPROM inserted. The 24 PIN/28 PIN switch will not corrupt or damage an EPROM. The PROG/NORM switch may however corrupt the data within the EPROM. All of the EPROMs are inserted to the 28 pin Z.I.F socket on the front of the programmer. The lever on the top left of this socket must be in the upwards direction when inserting an EPROM and when inserted the lever must then be moved in downward direction locking the EPROM into place. The EPROM must be inserted so that the bottom pins on the EPROM match the bottom pins on the programmer socket (notch to the top). If the EPROM is a 24 pin device then the top two pins will be left free. If the EPROM is a 28 pin device then the top two pins will be filled. Inserting and removing EPROMs can be carried out while the programmer is switched on.

4. MENU OPTIONS.

Guide to operation.

Please note that <ESCAPE> aborts any operation.

Whenever the prompt 'Location ' is seen, it is the location where the operation will commence

Each time a READ , PROGRAM or VERIFY is performed, the previous 'New checksum' is moved to the 'Old checksum' and the new value inserted into the 'New checksum' slot.

The checksums may be displayed when at the main menu by pressing 'C'.

4.1 READING DATA FROM AN EPROM.

This option allows the contents of an EPROM to be read into the computers memory. This data can then be stored on tape or disc or written back into a blank EPROM. Pressing 1 will prompt you to set the switches on the programmer. The EPROM should then be inserted and the switches set. Pressing return will then continue the operation, or pressing escape will return to the main menu. This operation takes less than 2 seconds and will calculate the checksum for the EPROM inserted into the programmer. This checksum provides a numerical check for the EPROM, enabling faulty EPROMs to be isolated quickly. It is advisable to make a note of this number and to write it on a sticky label wich can be attached to the EPROM. It will save much confusion if someone manages to mix up your favorite EPROMs!

4.2 EMPTY CHECK.

This is a very handy option allowing an empty EPROM to be checked without overwriting the computers memory. It is essential that this check be made before attempting to program the EPROM! Beware! that an EPROM is considered empty when all the bits are set. Only set bits can be programmed to the unset state while only unset bits can be cleared by an ultra violet EPROM eraser. Therefore an empty EPROM will contain all hex FF's.

4.3 DISPLAY MEMORY.

This option allows a HEX and ASCII listing
of the current memory contents to be printed or
displayed. The memory contents could have been
read in from an EPROM or from tape or disc. When
selected this option will ask whether a hard copy
is required. If a printout is required then the
question must be answered with a Y and any other
key apart from <ESCAPE> will list but not print.
The computer will use the centronics parallel
interface unless otherwise specified with a *FX
command. The computer will then require the
address in memory you wish to start at. The
number entered must be HEX and depressing return
will start at zero. The computer will then
display the data, if the <ESCAPE> key is then
pressed the main menu will be returned to,
pressing the <SPACE-BAR> will halt the listing
which can be restarted by pressing the
<SPACE-BAR> again. The display consists of the
HEX address followed by the HEX of eight bytes of
data, this is then followed by the ASCII
equivalents of this data. If the data produces an
illegal ASCII code then a '.' will be displayed.
To see how useful this feature can be borrow an
old 0.1 operating system, read it in and display
the ROM. Now you know what those ACORN
programmers get up to!

4.4 EDIT MEMORY.

This option allows modifications to a EPROM to be made by hand. To move on or back a location then the left and right cursor keys can be used. It is also possible to move up or down one line at a time by using the up and down cursor keys, or 1/2 a page at a time by pressing the <SHIFT> key down and at the same time a cursor key.

Left-right arrows with the <SHIFT> key cause the cursor to jump to the end of the line.

<TAB> is used to change data entry modes, which are ASCII,HEX,DECIMAL and BINARY, the value will be inserted immediately in ASCII mode and upon pressing <RETURN> in any other mode.

Press <ESCAPE> to leave the edit mode.

4.5 PROGRAMMING AN EPROM.

The EPROM to be programmed should be inserted into the programmer. This option should then be selected. Do not switch the PROG/NORM switch to PROG until the computer prompts you. After selecting the appropriate switches the return key must then be pressed. The computer will then display a programming message. Programming will take an absolute maximum of seven minutes. The programming time depends entirely on the number of bytes required to be programmed . All bytes of data require a fifty millisecond programming pulse but bytes set to HEX FF will not be programmed. Therefore the programme time can be estimated by counting the number of bytes that are not equal to FFH. When the programming process is complete the PROG/NORM switch must be set to NORM! It is also recommended that a verification be made on the EPROM.

4.6 VERIFYING AN EPROM.

Verification of an EPROM can be easily carried out. The verification process does not alter the computers data store. To check an EPROM simply insert the device into the programmer then select the verification option. The computer will take a maximum of two seconds to calculate the checksum and compare the contents of the EPROM with the computers data store. If all is well the computer will display the resultant checksum. If the EPROM is faulty then the computer will indicate the values and the location of the first error. Check to see that you are verifying the correct EPROM, if so then erase the EPROM and try again. Eproms will fail to erase properly after many attempts and this should be taken into account when re-programming.

4.7 SAVING THE COMPUTERS MEMORY.

Saving of the computers data store is used to file away programs that may be required in the future. The save operation will request a filename of no more than seven letters for the disc filing system, and 10 for the tape and ECONET filing systems. The computer will warn you if there is an existing file of that name. The computer will transfer every byte of infomation from the data store to file with the size of this file depending on the size of the EPROM selected.

4.8 LOAD A FILE TO MEMORY.

This is a very powerful function allowing numerous M/C files to be loaded into the one EPROM (but without any of the *ROM (see section 4.9) capabilities , i.e. you have to write your own start-up code. The computer requires the filename to be loaded and the start address.

1. Load from a file.
   If the file being loaded is a
   complete saved file then the
   start address must be zero
   <RETURN>.

2. Load from the TUBE.
   If this is present.

The load function will load into memory starting at the specified location until an end of file is reached. Therefore if two M/C files are to be loaded into an EPROM. If the first file has a length of HEX 1000 then it can be loaded with a start address of 0000. If the second file also has a length of HEX 1000 then this can be can be loaded with a start address of 1000 completly filling the memory ready for loading into a 2764 EPROM.

4.9 BUILD AN RFS ROM.

The RFS is the ROM filing system. It is similar to the tape filing system, the main difference being that programmes in an RFS rom are available instantly, and the RFS rom cannot be written to directly. Thus any programme currently on tape or disk can become a permanent part of your system.

Using the RFS rom.

Simply type in *ROM then all LOAD, *LOAD, *DUMP etc. operations will be directed to it.
e.g. when in BASIC, type in
    '*ROM' and then '*.' .

Building the RFS rom.

Use option 8. to load the programmes into the memory, and the protect option if you wish your machine code programmes only to be '*RUN 'able (ONLY for M/C, BASIC will not LOAD Protected files).

Please note.

The same EPROM can only be reprogrammed if a file is added to the end, if you use DELETE, PROTECT or UNPROTECT operations then an EMPTY EPROM must be used. The RFS rom must be inserted in the same way as you inserted the EPROM software.

5. *COMMANDS.

The software provided allows the use of all *commands from the menu. The computer will clear the screen and execute the command.

6. COPYING AN EPROM

Firstly the user must select the type of EPROM to be copied. The EPROM should be inserted into the programmer. Option 1 should then be selected to read the contents of the EPROM into memory. A blank EPROM can then be inserted into the programmer. An empty check using option 2 must then be made. If this fails then another EPROM must be used. The EPROM can then be programmed using option 5. After programming it is advisable to verify the EPROM. If another copy is to be made of the EPROM then repeat this process from option 2. Option 1 is not required to be repeated.

7. THE BREAK KEY

The break key is automatically configured to restart the software. When a restart occurs the data area used by the software is left intact.

 e.g To transfer two 2764's into a 27128

1. Press <ESCAPE> and select a 27128.
2. Read in the low 2764.
3. Insert the high 2764.
   The LOW/NORM switch does not matter
   in this case.
4. Read in the high 2764
5. Program the 27128.