

A GUIDE TO THE USE OF THE BINARY EDITOR MK.1.

JNPSD/0101A.

PRODUCED BY J.M.PINNOCK, MARCH 1973

A GUIDE TO THE USE OF THE BINARY EDITOR Mk.1.

LOADING PROCEDURE.

The Binary Editor is a standard binary tape, and is loaded as such, using BIN. If the tape is in good condition, the self-starting routine will print:

SHPSD/BINARY EDITOR I/g1g1A

If, however, there is a tear in the tape, or the high-speed reader develops myopia, BIN will sense this, and as a result, the HMEZ self-starting routine will print the following message:

CHECKSUM ERROR

ACC=XXXX

where XXXX was the number left in the accumulator after BIN had completed loading. This will enable the user to work out which bit has been lost in the tear. However, users are warned that if a checksum error occurs in the part of the tape that contains the self-starting routine itself, interesting and unpredictable things may occur! If there is a checksum error, but the user wishes to take a risk and continue, he should press "CONT" and the self-starting routine will proceed as normal.

The Binary Editor Mk.1 uses 4K of core storage, of which just under six pages is taken up by the program itself. The self-starting routine is overwritten by text during operation of the Binary Editor. If a low-speed version of BIN is being used at the time of loading, the self-starting routine will assume that the computer has not got a high-speed reader, and will alter all the high-speed text input commands as explained below. If the Binary Editor halts during operation, or does something similarly untoward, the restart location is \$200X, in field 2 of \$.

OPERATING PROCEDURE.

This is where the fun starts. There is a total of 14 commands in the Binary Editor Mk.1, consisting of six basic text input/output instructions, four text editing instructions, two high-speed text input instructions and two BIN-activating instructions. The method of operating these commands is by typing the command letter, followed by a carriage return, ~~ENTER~~ in command mode (see later). After this, proceed as explained below, with the method for the appropriate command.

1. THE BASIC TEXT INPUT/OUTPUT INSTRUCTIONS.

E ERASE TEXT IN STORE.

This command will reset the buffer counter, and any further text input using P or any other input command will be stored instead of the previous text.

R RECEIVE TEXT INPUT FROM TELETYPE/LOW-SPEED READER.

Use of this command will enable text, in the form of octal four-figure numbers, to be appended to the text already stored. To signify an origin, an asterisk is typed before the number. Due to the economical storage system of the Mk.1, an asterisk is stored as 7777. Thus, 7777 must not be used as a starting location or any other part of text. A series of asterisks in a row will be treated as a single one. If in the middle of writing a line it is required to erase one or more digits, the user should press the rubout key once for every digit to be erased, starting from the right. The Binary Editor will echo a back-arrow for every rubout typed. N.B. Once typed, an asterisk cannot be erased unless the command D is used. If the entire line typed so far is to be erased, the keys CTRL and U should be pressed simultaneously. The Binary Editor will print an exclamation mark back at you, expressing its horror at your decision. Do not return the carriage after this, but continue typing the number to be substituted. In general, return the carriage only after typing a complete line. In this context, the asterisk is considered to be not a complete line. When enough text has been typed in, a CTRL/L, or FORM-FEED, should be typed. If one is typed in the middle of a line, the current line will be ignored. After a CTRL/L is typed, the user will be returned to command mode.

The error diagnostic "?" will occur if:

1. Five digits are typed consecutively on one line.
2. A carriage return is typed too early.
3. An illegal character is typed.

The line during which this occurs will then be ignored, and the user should then retype it correctly.

WRITE ENTIRE TEXT IN STORE.

This command will enable the user to obtain a complete listing, in octal number format, of all the text he has in store. If the punch is switched on after typing the "W"Y, then a tape will be punched in correct format for the command H.

PUNCH BINARY TAPE OF ENTIRE TEXT.

This command will produce a binary tape of the octal numbers stored in core, which will facilitate the loading of these codes into core using BN.

The mode of operation of this command is rather complex, and the next few lines should be read carefully.

Before using the command L, the user should obtain some leader tape with either T or G, as explained below. After this, he should type "P", followed by a carriage return, in the normal manner. If he requires a field setting, he should next set bit 5 of the switch register to 1, and then bits 6-8 equal to the required field (fields 6-7 only permissible). Otherwise he should set bit 5 to 0. The operator should now switch the low-speed punch on, and set bit 6 of the switch register equal to 1. The Binary Editor will now punch one code-200 and an origin of 0200, in case the user forgot leader or an origin, a field setting if requested, and then a binary tape of the text currently in store, with a checksum. Having completed all this, the user will be returned to command mode, and he should then obtain some trailer, as explained below.

T SWITCH-REGISTER OPTION L/ADTR/TAILER.

After typing T and returning the carriage in the normal manner, the user should select which code of L/T (leader/trailer) he requires. This is done by setting bit 4 to:

0, for blank, or code-000 L/T.

1, for binary, or code-200 L/T.

When the correct setting has been obtained, the user should then switch the punch on, and set bit 6 of the switch register to 1. The Binary Editor will then produce continuous L/T until bit 6 has been reset to 0. The code can be altered during punching by merely altering the position of bit 4.

C COMBINATION CODE LEADER/TRAILET.

This command will produce leader tape the first time it is used, and trailer tape the second time, after which it will repeat the sequence. Leader tape is in the form of 60 blank characters followed by 30 code-200 characters, and trailer tape is in the form of 30 code-200 followed by 60 blank characters. After typing G and a carriage return, the user should switch the punch on and set bit 6 of the switch register equal to 1. It is evident that if T is used before punching, then G should not be used afterwards, since if G were used, it would produce leader tape in the trailer tape position and would have the effect, when the tape were used, of loading 60 zeros somewhere in store after the program that had just been loaded. Similarly, if G is used before punching, then T should not be used afterwards, since next time G were used, it would produce trailer tape in the position of leader tape, with equally disastrous consequences.

In all the above commands, the user should remember to switch the punch off after the instruction has been executed, before using another command.

2. THE TEXT EDITING INSTRUCTIONS.

L LIST SINGLE LINES OR GROUPS OF LINES.

The procedure with this instruction, as with O and D, is as follows.

After typing the command letter, and a carriage return, the user should ~~SIMPLY~~ type in the decimal line number of the first line. He then has a choice of two alternatives:

1. If he requires a listing of that line only, he must type a carriage return.

2. If he requires a listing of a group of lines starting with that line, he must type a space. The Binary Editor will then ~~simply~~ print "TO ", and the operator should then type in the decimal line number of the last line.

An example of each will clarify this:

1.

L

4

1234

2.

L

3 TO 6

*1234

00000

3452

Note, in the second example, that line 3 is just "*". This is because, when using group 2 commands, an asterisk is regarded as a line in its own right.

Use of the command L will enable the user to list parts of text with a view to using the commands O, D and I, below.

O OVERWRITE SINGLE LINES OR GROUPS OF LINES.

The initial procedure with this instruction is like the above. The operator should then type in as many lines as he has requested to be overwritten. He cannot insert or remove lines using this command.

If the user types a CTRL/L during input, a "?" will be typed, and ~~he~~ he will stay in input mode. Otherwise, procedure for input is identical to that for R.

D DELETE SINGLE LINES OR GROUPS OF LINES.

Use of this command will effectively remove the line or lines requested by the user.

I INSERT TEXT BEFORE A GIVEN LINE.

When using this command, the user should proceed as above, ~~SIMPLY~~ with the exception that he should only give one line number. He should then proceed exactly as for R, and the text thus input will be placed in code directly before the given line.

3. THE HIGH-SPEED TEXT INPUT INSTRUCTIONS.

B HIGH-SPEED BINARY TAPE READ-IN.

Before typing "B" and a carriage return, the user should place his tape in the HSR (high-speed reader) if there is one, otherwise with binary L/T under the reader head. After typing "B" etc., the computer will respond by reading in the tape, and depositing the codes in core after any existing text. It will then stop on the L/T at the end of the tape. If the computer has not got a high-speed reader, the input instructions will be modified so that the operator should do the above, substituting LSR (ASR 33 teletype low-speed reader) for HSR. The only difference is that the computer will halts the HSR at the end of the tape, whereupon the user should remove the tape from the LSP, and then press "CONT" on the computer console. With either reader, the user will be returned to command mode when the read-in is complete.

B HIGH-SPEED NUMERIC (OR SYMBOLIC) READ-IN.

The procedure for using N is as the above, apart from the format of the tape that is read in. A suitable format is that used by N (see earlier). But if a tape is to be prepared off-line, the following format should be adopted:

1. Blank leader tape (any amount).
2. Four characters which will be ignored (rubouts etc.).
3. Four-figure octal numbers, separated by two blank characters (carriage return, line-feed--blank here means ignored).
4. At the end of text, a carriage return, line-feed, followed by a bell (CTRL/G).

Any deviation from the above will result in misinterpretation, or the error diagnostic "?". Leader tape, when used in conjunction with numeric tape, should always be blank. Trailer tape is not read at all and any code can be used.

In both the above commands, if the following error diagnostic is printed:

BIN OVERWRITE IMMEDIATE

the user has two alternatives:

1. Give up, thus saving BIN, and start on something else.
2. Use the command again, and read in the rest of the tape, overwriting BIN as well as BIN. N.B. If using N, the tape should be repositioned to four places earlier before using the command again.

If alternative 2. is taken, the following error diagnostic may occur:

BUFFER OVERFLOW

in which case the user has no alternative but to give up and to go onto something else. Further attempts to read in more tape will result in the last line of text being overwritten and repetition of the error diagnostic.

4. THE BIN-ACTIVATING COMMANDS.

H HIGH-SPEED BINARY EDITOR PATCH READIN.

The Binary Editor has a number of accessory tapes, or patches, that will change small parts of the Binary Editor, according to the whim of the operator. The command H will temporarily transfer control to BIN in order to load these tapes. The patches are all self-starting, and control will be returned to the Binary Editor when they have been read in. This command must not be used if there is any text in store.

K KILL THE EDITOR.

This is not as drastic as it sounds! If this command is used, the computer will halt, and on pressing "CONT" on the computer console, total control will be transferred to BIN, and a different program tape can be loaded. This command should obviously only be used when the user has finished with the Binary Editor.

SUMMARY OF OPERATING PROCEDURE.

The normal sequence of commands is one of the following:

1. H (optional), R, W, L, X, C/T, P, C/T, E, R, . . . , K.
2. H (optional), B/N, . . . , K.

X represents any of the commands O, D or I. Obviously, this system is flexible, and sequences 1. and 2. can be used together during the same "run" of the Binary Editor.

OPERATIONAL MODES.

There are four "modes" which occur during operation of the Binary Editor:

1. Command mode. The Binary Editor is said to be in command mode if ~~HE~~ it is waiting for an instruction from the keyboard, as opposed to text.
2. Input mode. This is when text is being input from the keyboard using a group 1 input instruction, or a group 2 or 2 editing instruction. To return from input mode to command mode a CTRL/L, or FORM-FWD is typed, unless using command O.
3. Read-in mode. This is when text is being inout using a group 3 instruction, or when a group 4 instruction is being used. No return to command mode can be facilitated manually from the keyboard.
4. Text mode. This is when text is being output ~~HE~~ ~~HE~~ using the teletype/low-speed punch, with a group 1 or 2 instruction. Return to command mode is enabled by typing CTRL/C.

ERROR DIAGNOSTICS.

There are five error diagnostics, which are self-explanatory in meaning. These are listed on the next page.

| Error Diagnostic | Mode | Note |
|------------------------|------------------|--|
| ILLEGAL COMMAND | COMMAND | Occurs when either operator has used an illegal command letter, or has not typed a carriage return after the command letter. |
| UNAVAILABLE | COMMAND | Occurs when operator has used a command letter not available on this version of the Binary Editor. |
| BIN OUT FILE INTERRUPT | INPUT READ-IN | Occurs when end-of-text buffer reaches 7612, the first location of BIN. See notes on the group 3 commands for further details. |
| BUFFTR OVERFLOW | INPUT READ-IN | Occurs when the end-of-text buffer reaches 7777. No further text can be input. |
| ? | INPUT READ-IN | Occurs when an illegal character is input. See notes on E etc. for further details. |

USES OF THE BINARY EDITOR.

There are three main uses to which the Binary Editor can be put:

1. Generation of binary tapes of short machine-code programs.
Use of the Binary Editor will reduce a two-stage process (Symbolic Editor, Pal III Assembler) to a one-stage process.
2. Generation of binary data tapes, where symbolic format, if used with Pal III, would be a string of octal numbers anyway.
3. Alteration of compiler tapes to suit individual requirements.
Binary tape splicing would be easier automatically, using the Binary Editor, than manually, using LSP/LSP (low-speed punch) off-line.

In Binary Editor Ver. II onwards, the Binary Editor system is planned to expand and become even more flexible. Possibilities for further development include a machine-code tutor program for beginners, and, in the more distant future, an on-line Pal III mnemonic edit/assembly system that is economical on storage.

J.K.Pinnock, (March 1973).