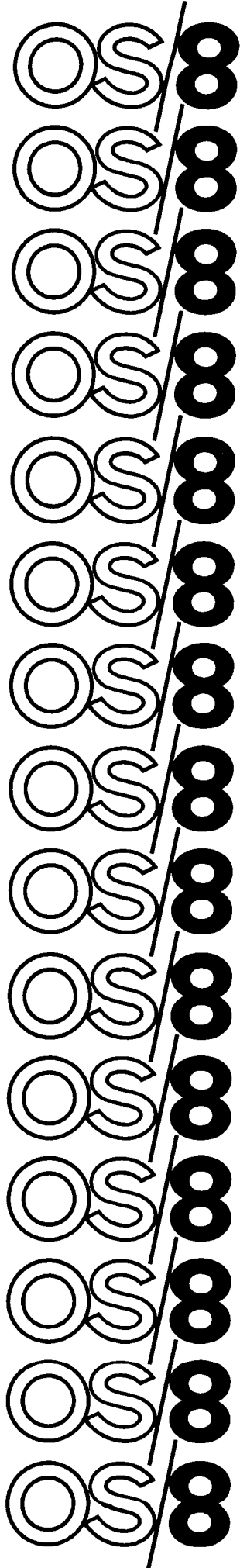


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# epic

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DEC-S8-UPTHA-B-D

EPIC

USER'S MANUAL

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Your attention is invited to the last two pages of this document. The "How to Obtain Software Information" page tells you how to keep up-to-date with DEC's software. Completion and return of the "Reader's Comments" page is beneficial to both you and DEC; all comments received are acknowledged and are considered when documenting subsequent manuals.

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## PREFACE

The program described in this manual is part of the OS/8 software system. The reader should be familiar with Chapter 9 (OS/8) of Introduction to Programming before using EPIC.



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# EPIC

## 1.0 INTRODUCTION

EPIC, the Edit, Punch and Compare utility program for OS/8, is designed primarily to assist users by performing the following functions:

1. Read and punch paper tape files and patches
2. Edit arbitrary files
3. Compare files in any format

When EPIC is loaded, the command line determines which function is desired.

Each of these functions is discussed as a separate topic in this manual. This manual assumes an elementary knowledge of OS/8.

## 2.0 HARDWARE REQUIREMENTS

EPIC runs on the minimum hardware configuration required for OS/8.

## 3.0 LOADING EPIC

To load the EPIC program type R EPIC in response to the OS/8 monitor's dot (.). Specify the EPIC function desired by including one of the following numeric options in the file command line:

- Ø paper tape
- 1 edit
- 2 compare

Examples:

```
.R EPIC)
*TRANS.AS</Ø$           punch the file TRANS stored on
                           SYS.

.R EPIC)
*DTAL:FILEA.SV</1$       fetch FILEA from DTAL for editing

.R EPIC)
*DSK:ABC.SV<DTAL:XYZ.SV/2$ compare file ABC on the disk with
                           file XYZ on DTAL and output block
                           numbers and locations of each non-
                           match on the Teletype.
```

After one of these numeric options has been included in a command, it need not be specified again in subsequent sequential commands requiring the same option. Specifying the number puts EPIC in a mode and it remains in that mode until another number is specified. Initially, EPIC is set to option 0. The character ALTMODE, which prints as \$ on the Teletype<sup>1</sup>, is used to terminate a command that includes a numeric option. The response to the OS/8 \* depends on the capability needed; the format of the response is discussed in sections 4.0, 5.0 and 6.0 of this manual.

### 3.1 Restart Procedure

EPIC can be restarted at location 0200. Default options remain active (refer to Section 4.2). If restarting after having used the paper tape option, the Help message (refer to section 7.0) is destroyed. Set bit 0 of the Switch Register to 0 before restarting in this case, to avoid any arbitrary output.

## 4.0 PAPER TAPE FACILITY

The paper tape option (/0) of EPIC punches OS/8 files and file patches onto paper tape and creates OS/8 files from paper tapes. Whole files or patches (blocks) of files can be read or punched.<sup>2</sup> Parity checks are punched to assure accurate reads. Note that a unique paper tape format is used so that tapes must be both punched and read by EPIC. A file punched by PIP, for example, is not acceptable to EPIC.

### 4.1 Command Format

To request the paper tape facility, the option 0 must be specified. The form of the response to the command decoder's \*<sup>3</sup> determines whether a tape is to be punched or read. In both cases, no input files or devices are specified. To punch a tape, the file name is

---

<sup>1</sup> Teletype is a registered trademark of the Teletype Corporation.

<sup>2</sup> This is the method used to supply long patches to RTPS FORTRAN IV users.

<sup>3</sup> Throughout this manual system output is indicated by under-scoring.

specified; to read a tape, no file name is required (that information is encoded on the paper tape). The command line specifying the mode of EPIC is terminated by ALTMODE.

To punch a tape, the response is:

```
*dev:name</Ø/other options$
```

To read a tape, the response is:

```
*dev:</Ø/other options$
```

If a file name is specified, EPIC looks up the name on the specified device and punches the file (including the file name) onto paper tape. If no file name is specified, EPIC reads in a paper tape and enters it onto the output device under the name it read in from the tape.

The other options for handling paper tape are:

L	Use low speed paper tape reader or punch
E	Do not punch end of tape upon completion
P	Punch or read a patch (instead of the whole file)
Z	Set relative block to Ø
=n	Punch relative block n
Y	Clear default name

These options can be combined to achieve the desired results.

L Option: If the /L option is not specified, EPIC assumes a high-speed paper tape device. Thus, SYS:</Ø means read a tape from the high-speed reader to device SYS but SYS:</Ø/L means read it from the low-speed device.

E Option: The /E option can be used to punch a series of patches to a file for all patches except the last one. With the /E option the end of tape mark is not punched. The end of tape must have the "end of tape" punch, a 377 punch and a length of leader/trailer tape.

- P Option:** The /P option is required to indicate the tape to be read or punched is a patch, not an entire file. Generally, the command required to read in a patch is simply dev:</P. File name and block specifications are already punched on the tape. Option /Z or =n must be used with the /P option to indicate punching block 0 or some other block (relative block n), respectively. The patch is read on top of an existing file on the specified output device, i.e., modifying an old file, not creating a new one.
- Y Option:** The /Y option is used to clear the default file name when switching from punching to reading paper tape and when reading more than one paper tape.

#### 4.2 Default Options

Throughout EPIC, if options, files, or devices are not specified, the program defaults to the last such item specified. There is an initial default device: SYS is assumed if no output device is specified. No options are assumed initially, however, except for relative block 0. Note that device and file name options carry between EPIC modes 0, 1 and 2. Specifying an option (i.e., L, P, E, Z, etc.) in a command string disables default to any options from the previous command (except 0, 1, 2)

For example, to punch blocks 0, 1 and 30 of the file TRANS on the SYS device and read them back onto that file on DTA3, the commands are:

```

.R EPIC
*TRANS</P/E/Z$           Punch block 0 of TRANS on high-
                           speed punch with no end of tape
                           punch. Note that EPIC defaults to
                           the paper-tape option initially
                           so 0 is not required in this case.

*=1 )                   Punch block 1 of file TRANS with
                           no end of tape character on high
                           speed device.

*=30/P )                Punch block 30 of the file TRANS
                           on high-speed punch. Punch end
                           of tape (P disables E).

*DTA3:</Y )             Read the tape from the high speed
                           device and put out to file whose
                           name is encoded in the patch on
                           device DTA3 until end of tape is
                           reached. File name and relative
                           block are punched on the tape so
                           this information is not necessary.
                           Y clears the default name.(TRANS)

```

### 4.3 Error Conditions

If an error occurs while reading a block of paper tape, EPIC outputs an appropriate error message (refer to Appendix A), and halts; the user should reposition the paper tape to the leader/trailer just in front of the block just read before continuing (refer to Appendix C); three consecutive read errors terminate the command. When EPIC is reading in a non patch file it checks the initial block read of every tape and every block that is reread because of error to determine if the read was accurate up to name and block number. If the wrong block number or file name is read, EPIC outputs an appropriate message indicating the type of error and halts with AC=7777 to allow the user to reposition the tape over the correct block or enter the correct tape before continuing.

### 4.4 Low Speed I/O

The execution of EPIC differs for low speed I/O. Before starting a low speed punch EPIC halts with 7777 in the AC to allow the user to turn on the low speed punch and then press the CONT key on the computer console. Upon completion of a punch command EPIC halts with the AC=Ø to allow the user to turn off the punch. When the CONT key is pressed, EPIC recalls the command decoder. For low speed input EPIC halts only upon completion of the read.

If a file or a series of files to be punched exceeds 32 blocks, EPIC segments it by punching end of tape after 32 blocks. This end of tape punch is done automatically and independently of the E option; its purpose is to keep tapes physically short enough to fit into a paper tape tray. Upon physical end of tape, EPIC halts with the AC=Ø if the low speed punch is being used to allow the user to turn off the punch before continuing. As soon as the punch is turned off, EPIC outputs the message END OF TAPE ENTER NEXT and then halts with the AC=7777 to allow both high and low speed users to remove the paper tape. Note that low speed users get both halts, but high speed users only get the 7777 halt. In general, a halt with AC=Ø means turn paper tape device off and a halt with AC=7777 means turn device on. All halts are terminated by depressing the console CONTinue key. If EPIC encounters end of tape while reading a non-patch

file it outputs the message END OF TAPE ENTER NEXT and halts with AC=7777 indicating that the file is segmented across a number of tapes and that the user should enter the next tape.

#### 4.6 Device Codes

Most of the execute time is spent waiting for paper tape devices. During I/O wait, EPIC holds the device code and version number in the AC. The device code is in bits 3-5 and the version number is in bits 6-11. The codes are as follows

1	high speed reader
2	high speed punch
3	low speed reader (console TTY)
4	low speed punch (console TTY)

If the user forgets to turn on the high speed reader, EPIC hangs with lxx in the AC. EPIC can always be restarted at 0200 (refer to Section 3.1). The OS/8 CTRL/C is normally in effect; the exceptions are when EPIC is waiting for a paper tape device or when input is from the low speed reader.

#### NOTE

When input is from the low speed reader EPIC forces the output device to be SYS because it is the only OS/8 I/O handler that does not check for CTRL/C.

Thus, if the user were to enter the command:

```
DTA2:+/L)
```

EPIC would force it to be

```
SYS:+/L)
```

#### 5.0 EDITING CAPABILITY

Option 1 of EPIC is the file editing and searching facility. With this feature, patches can be added directly to the file by specifying relative blocks and locations in the file.

## 5.1 Initial Command Format

The general format of a command for the editing option is:

```
_.R EPIC )  
_*dev:name</options/l$
```

The /l\$ specifies edit mode for EPIC.

As with the paper tape option, default conditions apply. If no device and/or file name is specified, the last one mentioned is used.

When editing, the only option available in the initial command is

```
/Y          Clear default name (if one exists)
```

Editing is performed one block at a time. The relative block currently being processed is the current block; the location currently being processed is the current location ( $\emptyset$ -377). Relative block  $\emptyset$  is the first block of the file if a file name is specified or block  $\emptyset$  of the device if no file name is specified.

## 5.2 Editing Commands

After the initial (file specification) command, a series of keyboard commands are used to perform the editing. The general format of an editing command is

```
x  
or  
x,n1,n2
```

where x is a command letter and n1,n2 are octal numeric arguments. If a numeric argument is used, the letter is followed by a comma. Up to  $32_{10}$  characters can be typed on a line. Default conditions apply to these commands as well. If carriage return is the only character typed as an editing command, the last command specified is executed. The commands available are as follows:

```
E          Exit to command decoder; write out current block  
           of file if it has been modified.
```

R,n Read relative block n (octal) of file and set current location to  $\emptyset$ . Do not write current block. If n is not specified, the current block is read. If the relative block is out of range, a ? is printed. There are 1341 blocks per OS/8 tape and 6260 per RK8 disk platter.

W Write the current block of file if it has been modified and read in the next sequential block of the file. If the current block is the last block of the file, a ? is printed and the current location is unmodified.

S,n1,n2 Search the current block for the value n1 with the mask n2. If either n1 or n2 or both are omitted, the last value specified is used. The initial mask is 7777. Masking is performed in a logical AND fashion. If the S command is terminated by the RETURN key the search is for the current block only. If terminated by the LINE FEED key, the search continues to the end of the file. If the search fails (either in the block for a carriage return or at end of file for line feed) EPIC prints a ?. If the search is successful EPIC prints

m1 m2  
m3 /

where m1 is the relative block, m2 is the relative location within the block and m3 is the contents of the location. (m1 is omitted if a previous match was found in the same block.) To change the contents, type the new contents (octal) after the slash. To continue the search type the LINE FEED key; to terminate the search type the RETURN key. (If the contents are not to be changed, type one of the terminators.)

O,n Open location n of the current block. If n is not specified, the last opened location is the default. If there is no default, location  $\emptyset$  is opened. EPIC responds with

m1 /

which is the contents of location n. This location may be modified as in search. Terminating with the LINE FEED key closes the current location and opens the next. If the current location is the last one in the block, location  $\emptyset$  of the next block is opened and the current block is written out as if it had been modified.

C Print current status, as:

m1 (F or B) m2 m3 m4

where m1 is the current block, m2 is the current location, m3 is the search word and m4 is



the mask word. If F is typed, the file has been modified since option 1 was requested; B indicates the current block has been modified. Once a modified block has been written to the file, the F is the only code output.

Thus a reasonable sequence is:

<pre> .R EPIC *DSK:ISOMER&lt;/1\$ R,2) S,3126,777) ? + 0004 0110 3124 /3121)  ,,7777 0004 0132  3126 / 3127 C) 0004 B 0132 3126 7777  W) ? R,2) O,10) 1367 /1364+ 3324 /)  E)  * - </pre>	<pre> Call EPIC  Edit file ISOMER on DSK Read block 2 Search for a 312x in that block<sup>1</sup> Not there. Search for it throughout the file<sup>2</sup> Found at block 4, location 110 Change contents to 3121 Search for 31xx throughout the rest of the block (locations 110-377) Found at location 132 of block 4. Contains 3126. Change to 3127. Check status At location 132 of block 4 which has been modified; the current search word is 3126 and mask is 7777. Write block 4. Block 4 written but file is only four blocks long,no block 5 to read. Read block 2 Open location 10 Contains 1367. Change to 1364. Check next location. No modifi- cations. Exit editing option. </pre>
---	---

## 6.0 COMPARE CAPABILITY

A third feature of EPIC is file compare (/2). Because EPIC uses an absolute location compare technique, there are no limitations in the data format or length of the file.

### 6.1 Command Format

Option 2 of EPIC requires only one command, specified as:

```
dev1:file1<dev2:file2/options/2$
```

<sup>1</sup>) = RETURN key

<sup>2</sup>+ = LINE FEED key

The device and file name of one file to be compared is specified to the left of the angle bracket, the device and file name of the other to the right of the bracket. The options are:

- A Abort when the first non-match is found
- B List physical block number for each file where a non-match exists

If no options are specified, the block numbers and locations of each non-match are listed on the Teletype. Note that the initial default device and file name to the right of the angle bracket (input) are DTAØ and block Ø of the input device, respectively.

For example, to compare files PYTHG1 and PYTHG2 on 2 tapes and find all unequal locations, the sequence can be as follows:

```
*DTA1:PYTHG1<DTA2:PYTHG2/2$
DTA1:0174 DTA2:0631
0152 7450 3421
0153 5741 2021
0154 3421 3022
*
```

To compare them and list unequal blocks the command is:

```
*DTA1:PYTHG1<DTA2:PYTHG2/B/2$
```

If this block match followed the preceding locations match command, a sufficient command and its results are:

```
*/B)
DTA1:0174 DTA2:0631
```

To abort after the first non-match, the sequence is:

```
*/A)
DTA1:0174 DTA2:0631
```

## 7.0 HELP MESSAGE

The Help message reminds users familiar with EPIC of the options and their notation. This message can be printed on the Teletype when the program is called and before the command decoder's asterisk. To have the message printed, bit 0 of the console switches (Right Switches for PDP-12 users) must be set to 1. Printing can be aborted by setting bit 0 to 0. When the next carriage return occurs in the message, the message stops and the command decoder's asterisk is printed. The command to EPIC can then be typed.

The Help message is:

```
MODE SELECT IS /(DIGIT)$
MODE FUNCTION
0  PIAP I/O
1  FED
2  COMPARE
H SET HI BIT =N
Y CLR DEFAULT NAME
Z 0 TO =N
NULL SECT REPEATS
---
PIAP I/O
L LOW SPEED
P PATCH MODE
E DON'T PUNCH EOT
=N REL BLK TO PATCH
NO OUT FILE IS READ
---
COMPARE
A ABORT
B BAD BLOCKS ONLY
DEV:F1<DEV:F2
---
FED
R,N1  READ BLK N1
W      WRITE CUR. BLK
O,N1  OPEN LOC N
S,N1,V2 SEARCH FOR N1
      WITH MASK N2
C      CUR. STATUS
E      EXIT TO DECODER

*
```

When familiar with the options (after reading the rest of the manual), a glance through this list should pinpoint the options required for the EPIC job. In the message, PTAP refers to the paper tape option and FED to file editing.

## APPENDIX A

### ERROR MESSAGES

EPIC can print one of the following error messages when performing paper tape (option Ø) operations.

<u>Message</u>	<u>Explanation</u>
BAD =BLK	When EPIC is punching a patch it checks the block specified by "=n" to see if it is within range. If the block is out of range EPIC outputs this error message and returns to the command decoder. For example if a file JOE were two blocks long and the user requested: JOE:+/P=3 the error message would be printed.
END OF TAPE	EPIC was expecting a block of tape and found end of tape instead. EPIC halts with AC=7777 to allow the user to reposition the tape. When the user depresses CONTinue EPIC attempts to read the block.
END OF TAPE ENTER NEXT	When EPIC is reading a file that is segmented across a number of paper tapes and encounters the end of a segment, it outputs this message and halts with AC=7777 to allow the user to enter the next segment of paper tape. Press the Console CONT key to continue reading.
I/O ERROR	If EPIC encounters an error while reading or writing a mass storage device, or a paper tape read fails three consecutive times, it outputs this error message, deletes the output file if one exists, and returns to the command decoder.
L/T ERROR	EPIC was expecting leader trailer and found non-leader trailer while attempting to read a block. The program prints this error message and halts with AC=7777 to allow the user to reposition the tape then press the Computer Console CONT key.

NEED:name1 FOUND name2

EPIC read a block of tape for the file NAME2 when it was expecting a block of the file NAME1. This error would typically occur when a user comes to the end of a segment for NAME1 and enters some segment of NAME2 instead of the next segment for NAME1. EPIC halts with AC=7777 to allow the user to enter the correct paper tape.

NEED:n1FOUND:n2

EPIC read block n2 of the file when it was expecting block n1 of the file. EPIC halts with AC=7777 to allow the user to reposition the paper tape. This error typically occurs when the user repositions the tape to the wrong block after a read error.

PARITY ERROR

EPIC failed to read a block correctly, e.g. the reader dropped some bits. EPIC halts with AC=7777 to allow the user to reposition the tape so that it can try the read again.

PTR:NAME IS TOO BIG FOR dev:

The paper tape file NAME will not fit on the specified output device DEV:. EPIC aborts the command and returns to the command decoder. EPIC makes the check for size before writing on the output device.

USR n dev:name

The USR encountered an error while attempting to perform a fetch, lookup, enter, or close on the file NAME on device DEV. n=1 is a fetch, n=2 is lookup, n=3 is enter, n=4 is close. EPIC aborts the command and returns to the command decoder. For example, if the user requests EPIC to punch a file on SYS that does not exist:

SYS:NILL+

EPIC outputs the message

USR 0002 SYS:NILL

indicating that it could not find the file NILL on the device SYS.

APPENDIX B

LOADING RTPS FORTRAN IV FROM PAPER TAPE

For users who will be initially loading FORTRAN from paper tape, the paper tape capability of EPIC is used. The 10 files

F4.SV  
 PASS2.SV  
 PASS20.SV  
 PASS3.SV  
 RALF.SV  
 LOAD.SV  
 FORRTS.FT  
 LIBRA.SV  
 EZGEN.SV  
 FORIO.SV

are on separate paper tapes and can be read in any order. After they have all been read, the FORTRAN library, FORLIB, which is 8 tapes long, must be read in sequentially, as indicated by the number on the label on each tape. The whole procedure is:

.R EPIC )	Call EPIC
<u>*DTA1: &lt;</u> )	Read 1 file from high speed reader to DTA1. If RETURN only is typed SYS is the default device.
<u>*/Y</u> )	Clear default name, read 2nd file.
<u>*/Y</u> )	Clear default name, read 3rd file.
<u>*/Y</u> )	Clear default name, read 4th file.
<u>*/Y</u> )	Clear default name, read 5th file.
<u>*/Y</u> )	Clear default name, read 6th file.
<u>*/Y</u> )	Clear default name, read 7th file.
<u>*/Y</u> )	Clear default name, read 8th file.
<u>*/Y</u> )	Clear default name, read 9th file.
<u>*/Y</u> )	Clear default name, read 10th file.
<u>*/Y</u> )	Clear default name, read first library tape.
<u>END OF TAPE ENTER NEXT</u>	Put 2nd tape in printer, press CONT.
<u>END OF TAPE ENTER NEXT</u>	Put 3rd tape in printer, press CONT.
<u>END OF TAPE ENTER NEXT</u>	Put 4th tape in printer, press CONT.
<u>END OF TAPE ENTER NEXT</u>	Put 5th tape in printer, press CONT.
<u>END OF TAPE ENTER NEXT</u>	Put 6th tape in printer, press CONT.
<u>END OF TAPE ENTER NEXT</u>	Put 7th tape in printer, press CONT.
<u>END OF TAPE ENTER NEXT</u>	Press CONT.
<u>*↑C</u>	Type CTRL/C to return to the OS/8 Monitor.

After all 18 tapes have been read successfully, the entire FORTRAN system is on mass storage.

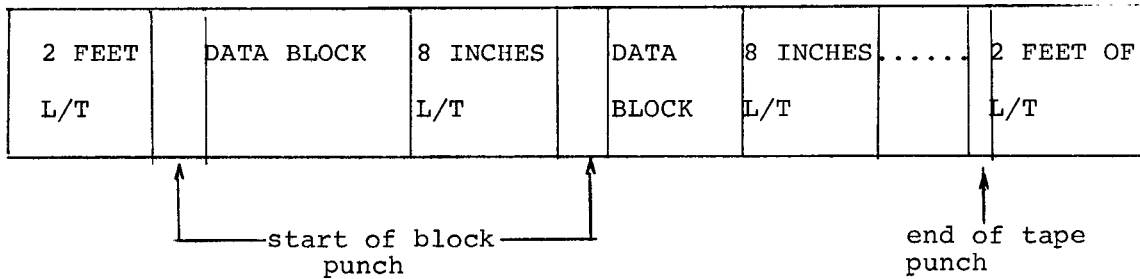




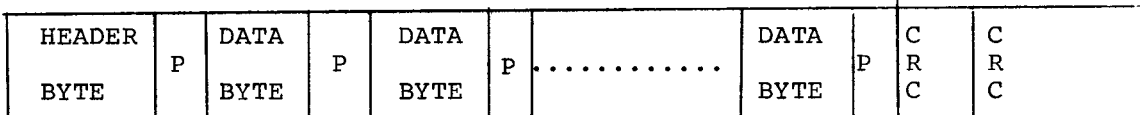
APPENDIX C

PAPER TAPE FORMAT

Paper tapes punched by EPIC have the following format:



Leader trailer is any string of 0 or 200 punches; usually it's just 200 punches; leader trailer is terminated by a 201 punch which indicates the start of a data block. The first punch after the last data block is 377 which is end of tape. Each data block has the following format:



Each byte is 12 punches (96 bits) and corresponds to 8 12 bit words; each byte is followed by an even odd parity punch of the eight words in the byte. Each block is terminated by two CRC punches of longitudinal parity.

The header byte contains information about the file e.g., file name and relative block number. The data bytes constitute the actual data of the block; there are 32 data bytes per 256 word block.



APPENDIX D

LOADING EPIC FROM PAPER-TAPE

For users who receive EPIC on paper-tape, use the following procedure to load the tape and save it on a mass storage device.

<u>.R</u> ABSLDR )	Use ABSLDR
*PTR:\$↑ )	Read from reader; after ↑ is output, type any key to start reader
<u>.SA</u> SYS EPIC 0-7577;0200=0 )	Save on mass storage with starting address of 200



## APPENDIX E

### EPIC ASSEMBLY INSTRUCTIONS

The PAL/8 (version 7) assembler is used to assemble EPIC as follows:

```
._R PAL8 )  
*_dev:EPIC.BN,dev:EPIC.LS<dev:EPIC.PA )
```

To create the save file, use ABSLDR:

._R ABSLDR )	Call ABSLDR
*_dev:EPIC.BN\$	Search for EPIC.BN on device specified
._SA dev EPIC 0-7577; 0200=0 )	Save EPIC on device specified. 0-7577 = area in core used during execution. 0200 = restart address



## APPENDIX F

### EPIC INTERNAL DESCRIPTION

EPIC has historical roots in RTPS FORTRAN and is an extension of a program called SHOP (short form PIP) whose purpose was to facilitate PIPing of the standard FORTRAN system programs. SHOP allowed file transfers to be performed with a minimum amount of keyboard input. The body of routines that supported SHOP provided the foundation for EPIC and the internal and external characteristics of EPIC originate from the basic SHOP subroutines. PTAP, FED, and COMPAR all draw upon these routines. The description that follows discusses first the central routines and secondly the constituent parts of EPIC.

#### 1.0 CENTRAL ROUTINE

The routine DECOD calls the OS/8 command decoder and translates its page 37 output into a format for use by the EPIC routines. The routine SETDV is called to fill the device tables OUTTBL, and INTBL with the unit codes. If no output or input was specified the respective tables are left unaltered i.e., the last set is used. The routine DODFN is called to get the default file name. DECOD also sets up the =n arguments checking for /H and /Z. If ALT MODE terminated the input line DECOD checks /n (digit) to select the new mode, DECOD then goes into its selected mode calling either PTAP, FED, or COMPAR.

The EPIC routine SWITCH is called to interpret OS/8 switches. Its input is a string of OS/8 switch addresses (17643-17645) and switch flags; its output is setting the flags to either 0 or -1 depending upon whether the user typed any alphabetic (A-X) switch options to the command decoder. If only /H or no switches were input SWITCH does not process the table i.e., the last set of switches specified remain in effect.

EPIC has a set of routines to facilitate TTY output. These are TTOTXT, TYPNAM, OCTOUT, TYPDEV which output a message in six bit ASCII, type an OS/8 file name, type a 12 bit octal digit, and type an OS/8 device name respectively. The routine DOUSR is called to

do all LOOKUPS, ENTERS, and CLOSES. The routine GETHAN is called to fetch an OS/8 device handler. The routines READ and WRITE are called to read from or write on OS/8 mass storage devices.

## 2.0 PTAP

If EPIC is in paper tape mode the routine PTAP is called PTAP in turn calls the SWITCH routine and then looks at the name to determine whether a file is to be read or punched, no name is interpreted as read. The basic unit of a paper tape file is called a byte and consists of 12 frames of data followed by a parity frame. The format of the paper tape is discussed in Appendix C of this manual. The paper tape input routines read one byte at a time and pack the data into 12 bit words until a 256 word buffer is filled whereupon a block of data is written out. The punching process is just the reverse i.e., a 256 word block of data is unpacked into a series of 12 frame bytes, and punched. A full block is transferred by calling either the routine PREAD or PWRITE.

Transfers to and from mass storage devices is accomplished in the normal manner through OS/8 device handlers. The routine PREAD scans over leader trailer until it finds a 201 punch indicating start of block; after which 33 bytes of tape are read in. The first byte is header information and contains EPIC version number, file name, relative block, and file length in that order. The other 32 bytes contain the data for the block. A parity frame accompanies each byte; one bit of parity for each 12 bit word in the byte. The end of each block contains two CRC words of longitudinal parity. PREAD uses the routines GETBYT to read a byte of paper tape; PACK to convert three 8 bit frames into two 12 bit words; DOPAR to compute byte parity and DOCRC to compute block parity. The current version of EPIC has no error correction routines i.e., if an error occurs in reading the only alternative is to reread the block. PWRITE punches one block of paper tape and employs the routines PUTBYT, DOPAR, and DOCRC in a manner analogous to that of PREAD.

## 3.0 COMPAR

The COMPAR routine is fairly straight forward and occupies one page of core. The routine SWITCH is called to set the switch option flags. The starting block and length are determined via page 37

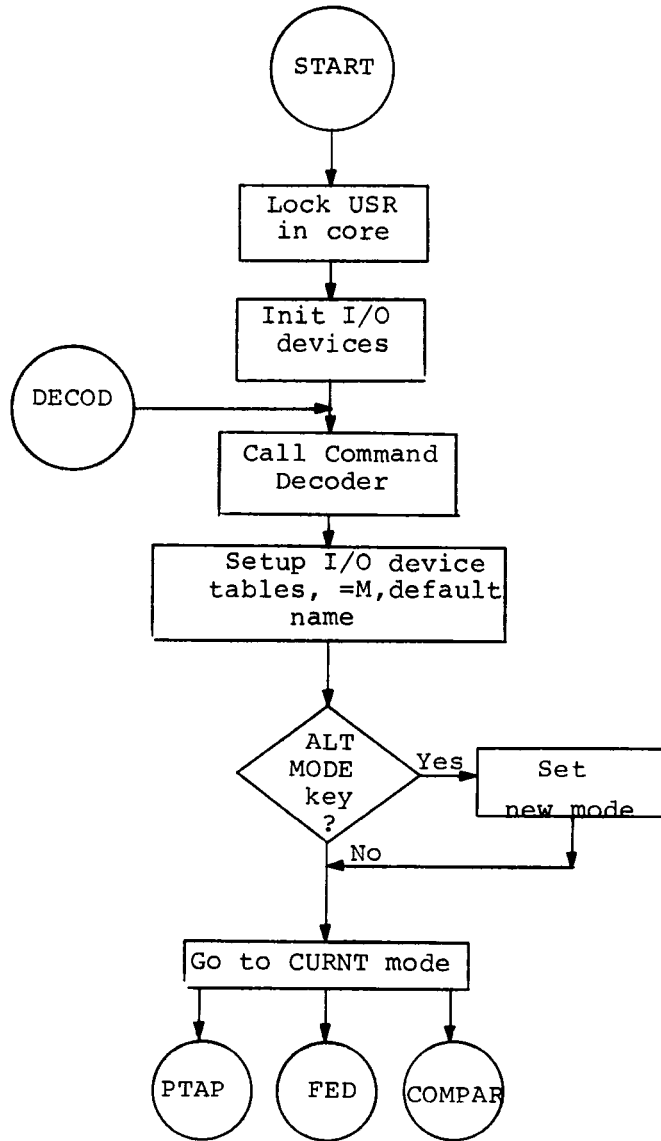


field 1 and the routine DOUSR. The routine READ is called to get the data and then each word of each file is compared. If a bad compare is encountered the routine OCTOUT is called to output block numbers and data words.

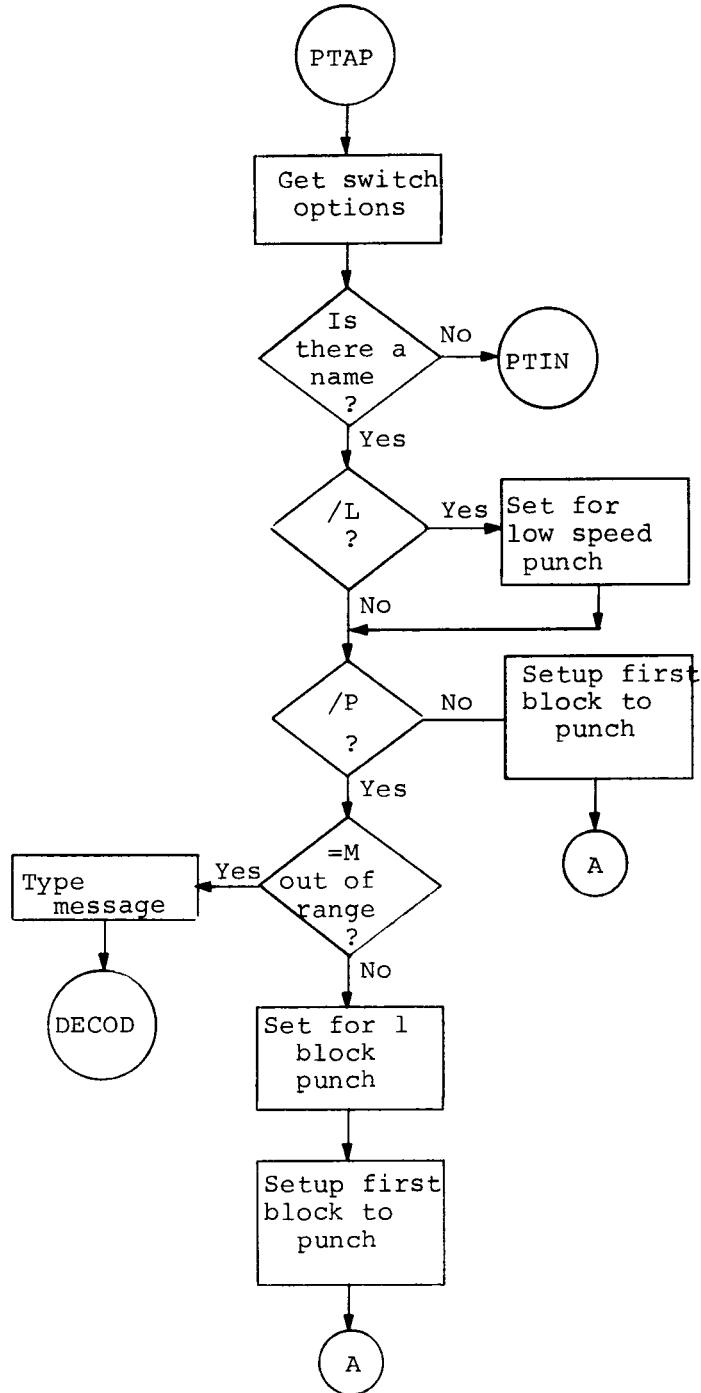
#### 4.0 FED

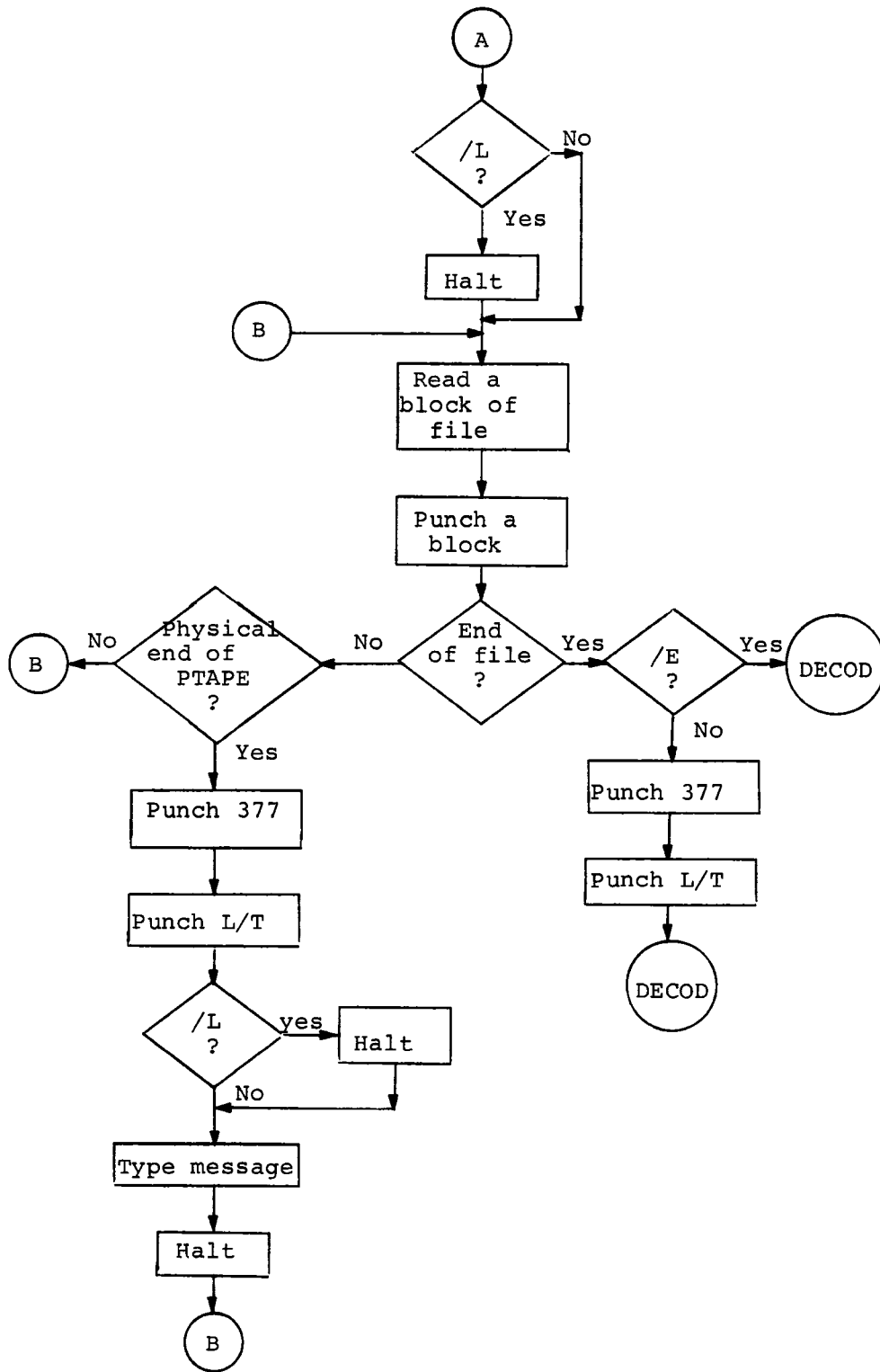
Unlike other EPIC modes FED gets its own command input from the keyboard. The routine GINP gets keyboard input and packs it in a 32 word buffer (8 bit ASCII). Character interpretive routines include GETC (get a character), G6BIT (get a string of 6 bit ASCII), and GOCTAL (get an octal constant). The locations RBLK, CLOC, SRWD, and MSKWD are respectively the relative block number, current location, search and mask words; these arguments are used by the various routines. For example, in the R command GOCTAL is called to get a relative block number. If no argument is specified, RBLK itself is used as the "new" relative block number. Most of the commands are short and fairly straight forward. The R, W, and E commands for instance take up 56 locations.

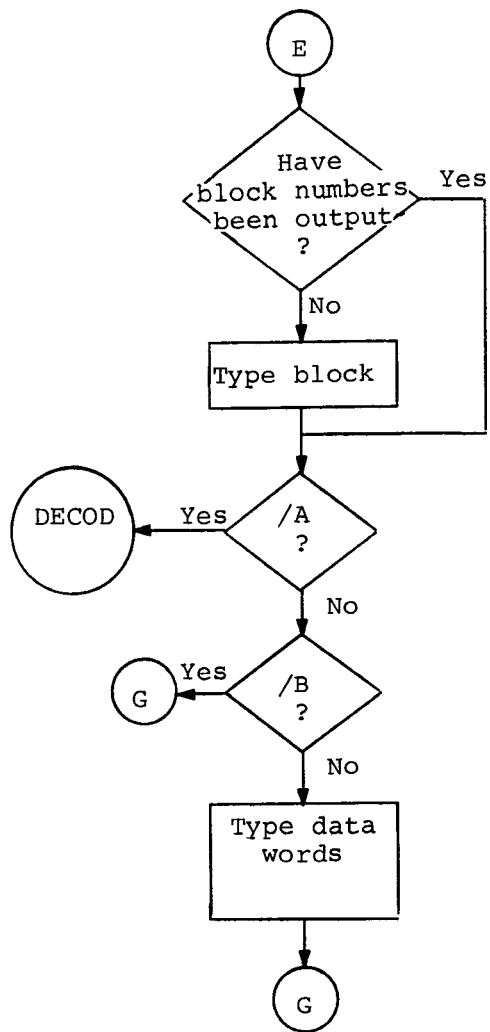
5.0 Flow Charts



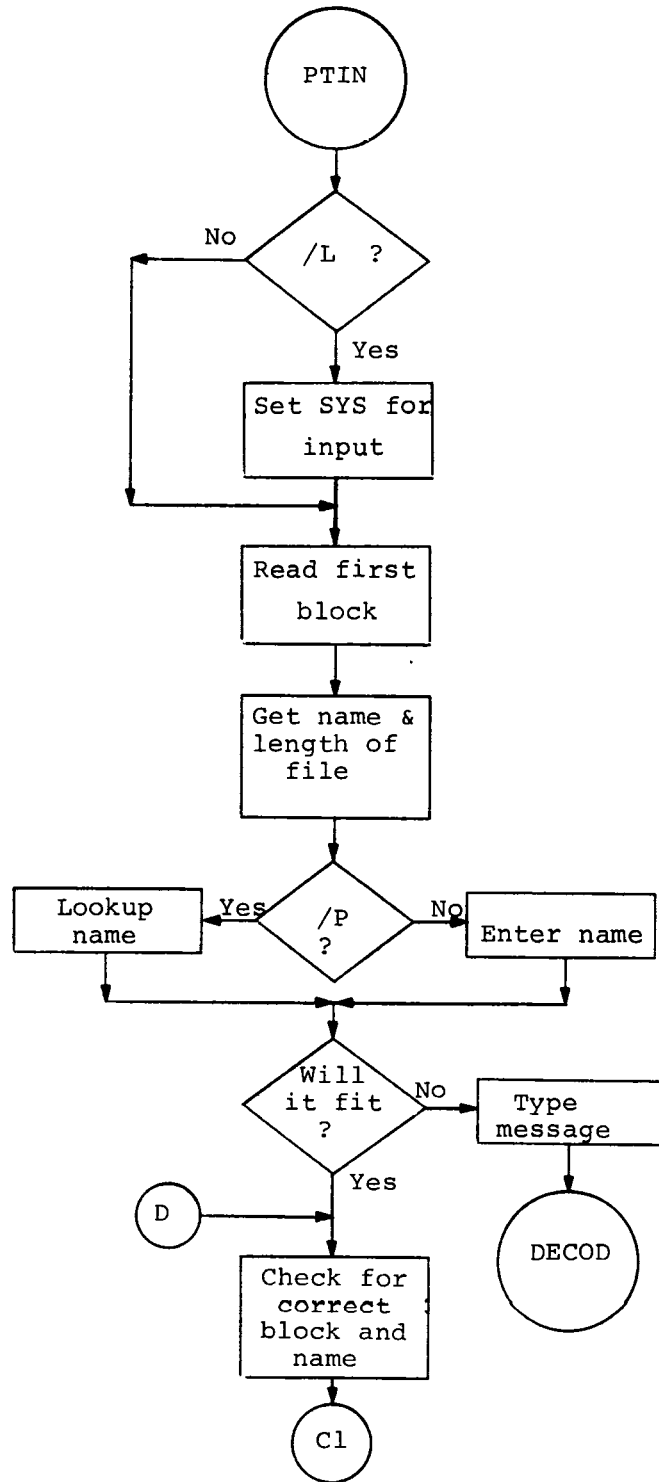
5.1 PTAP

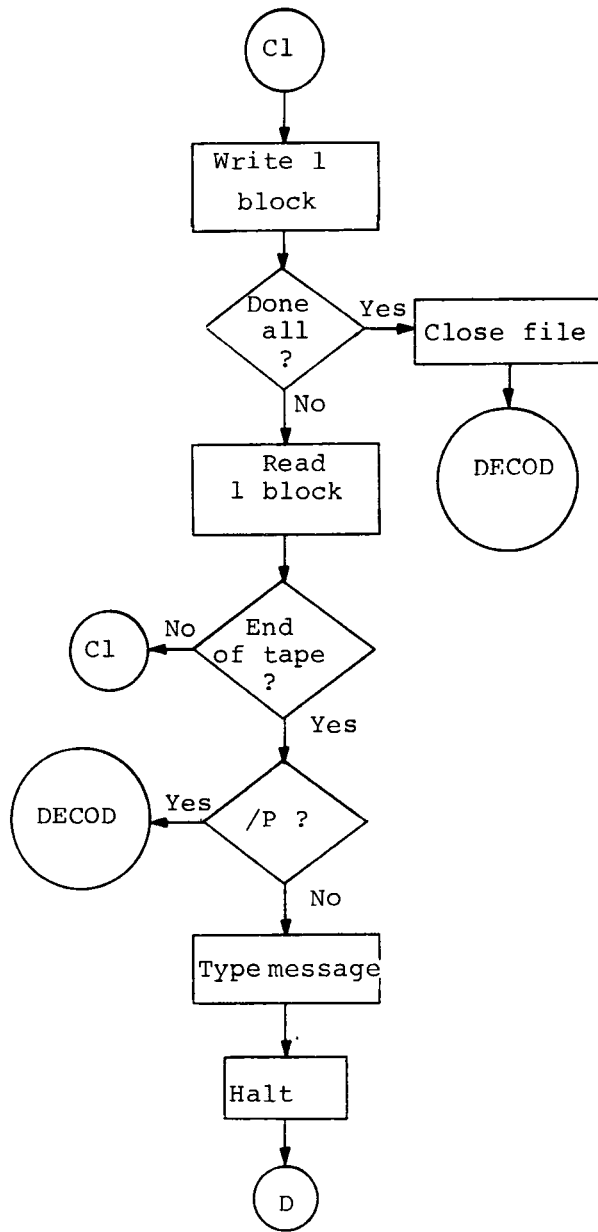


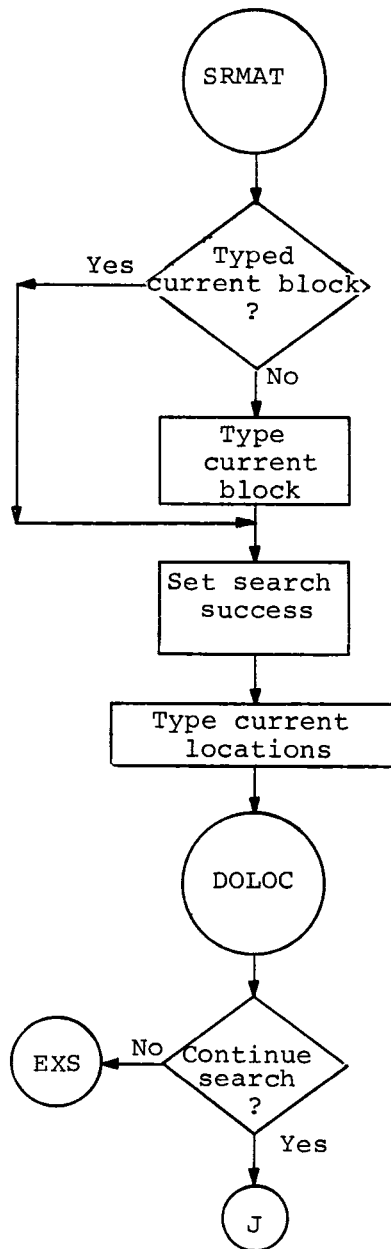




5.2 PTIN

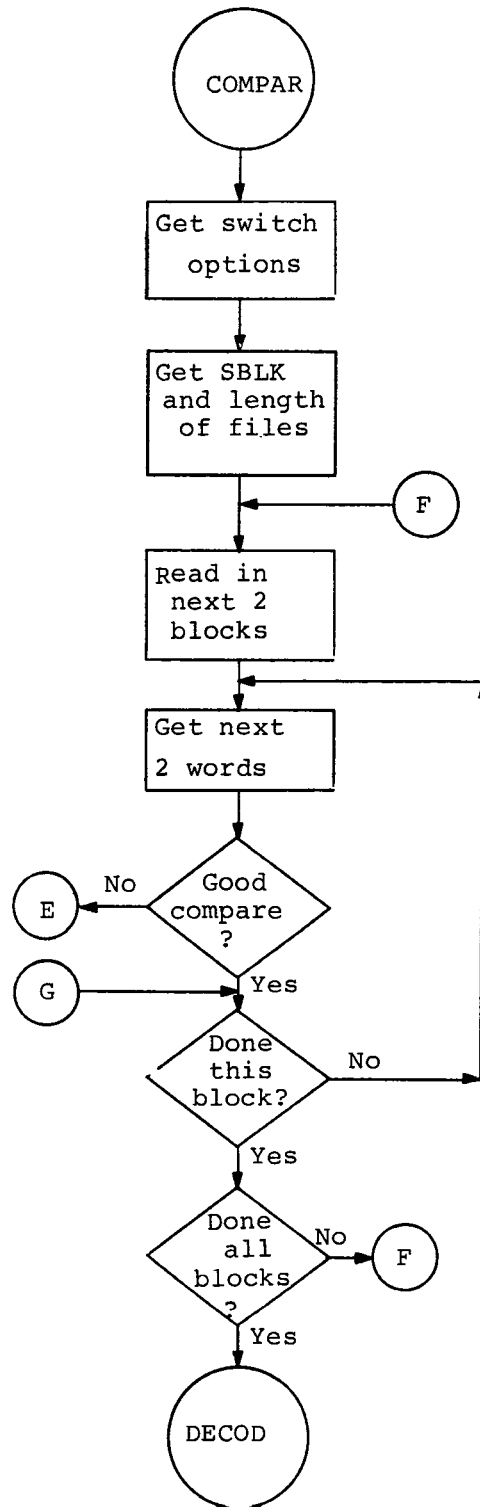




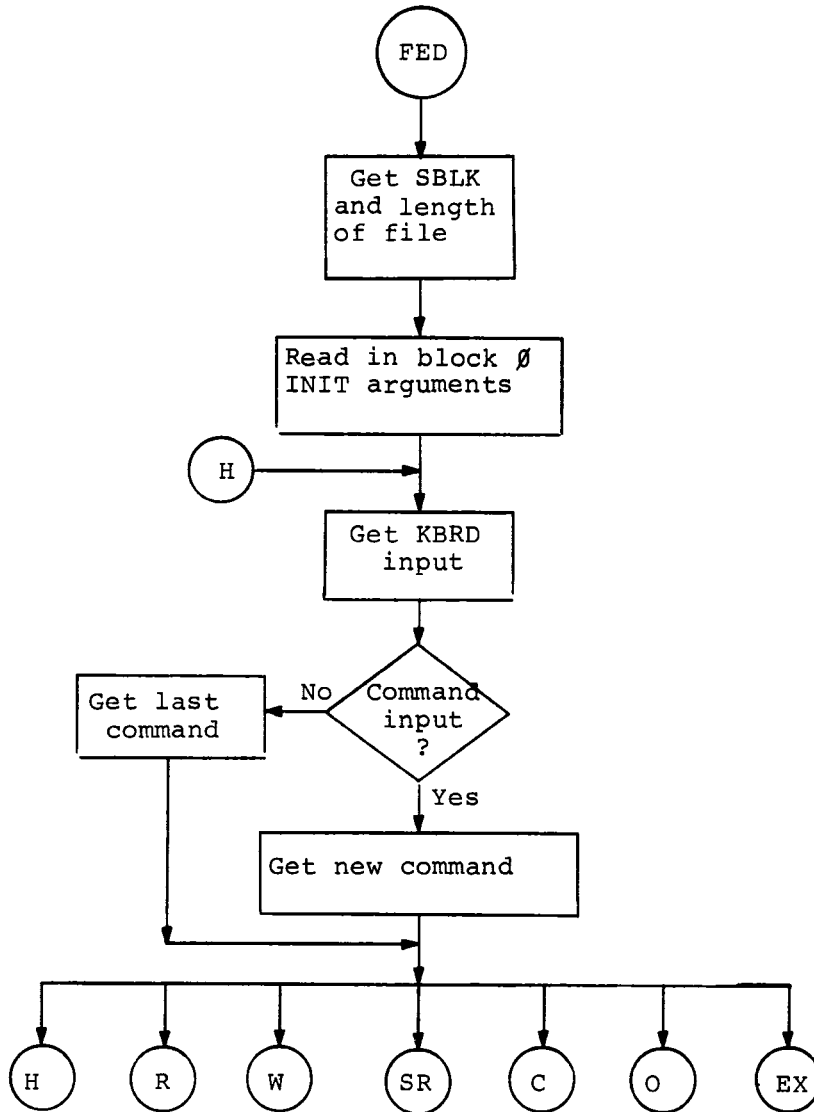


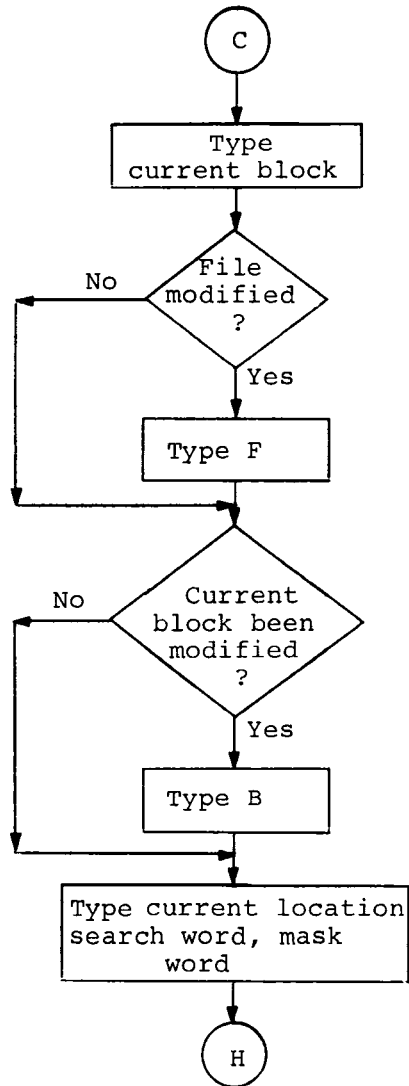


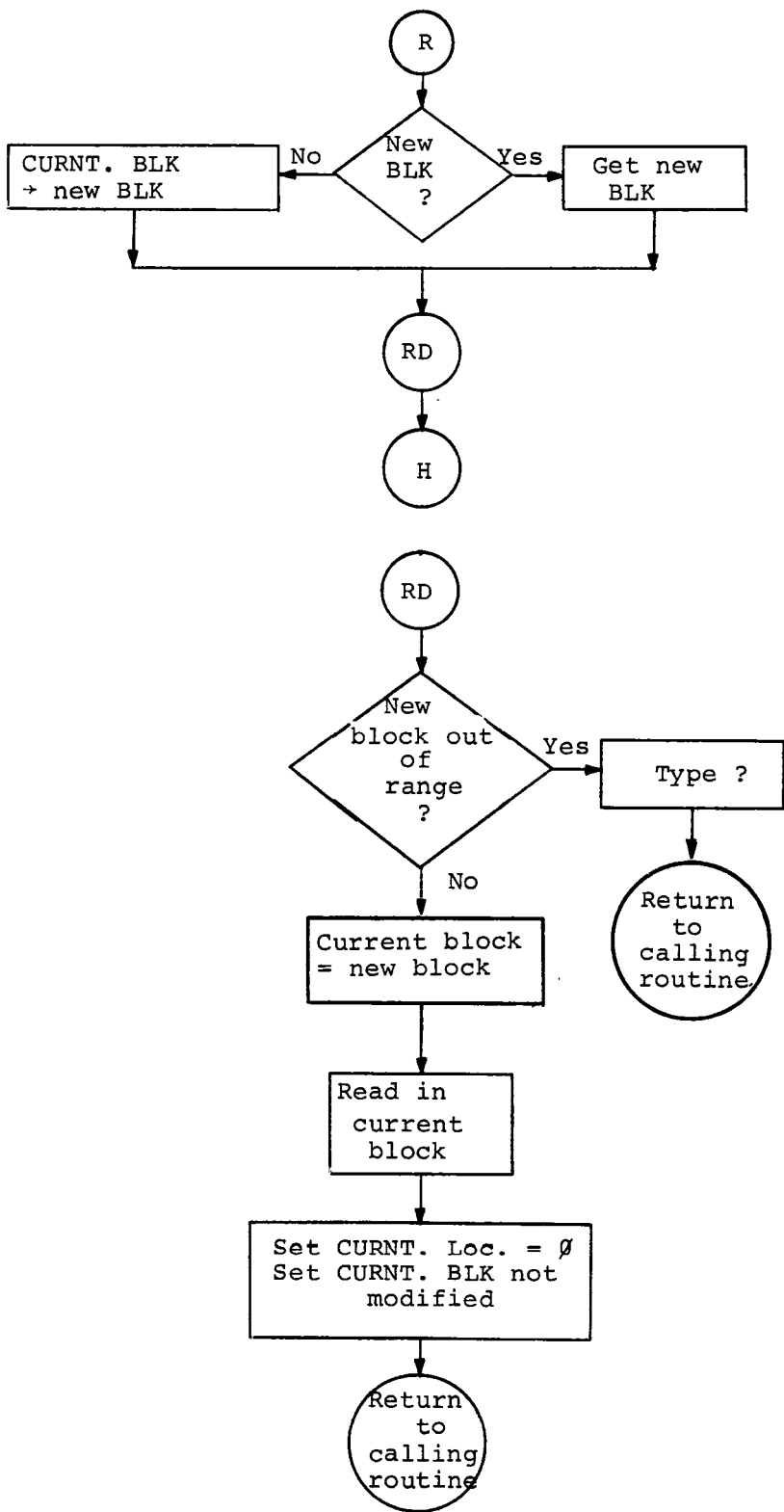
5.3 COMPAR

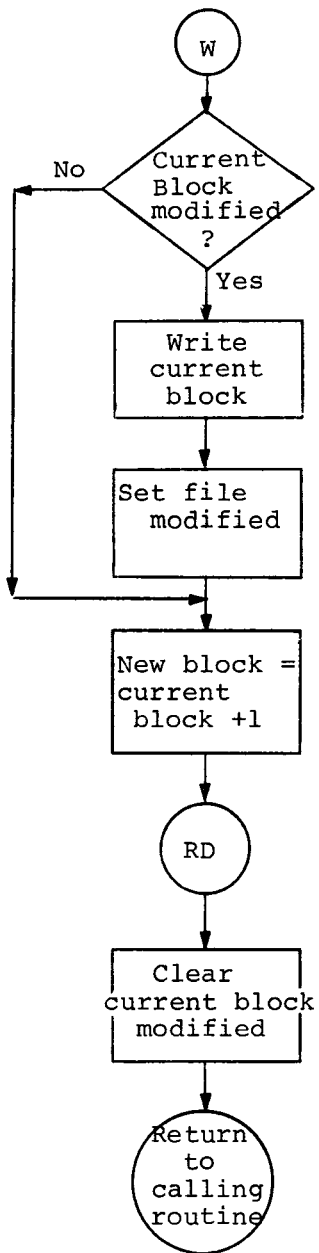


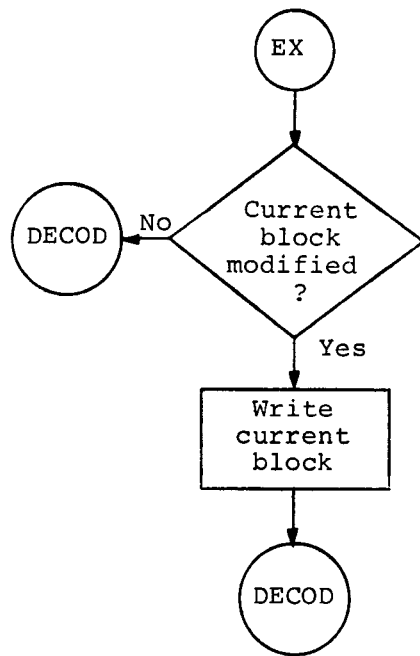
5.4 FED

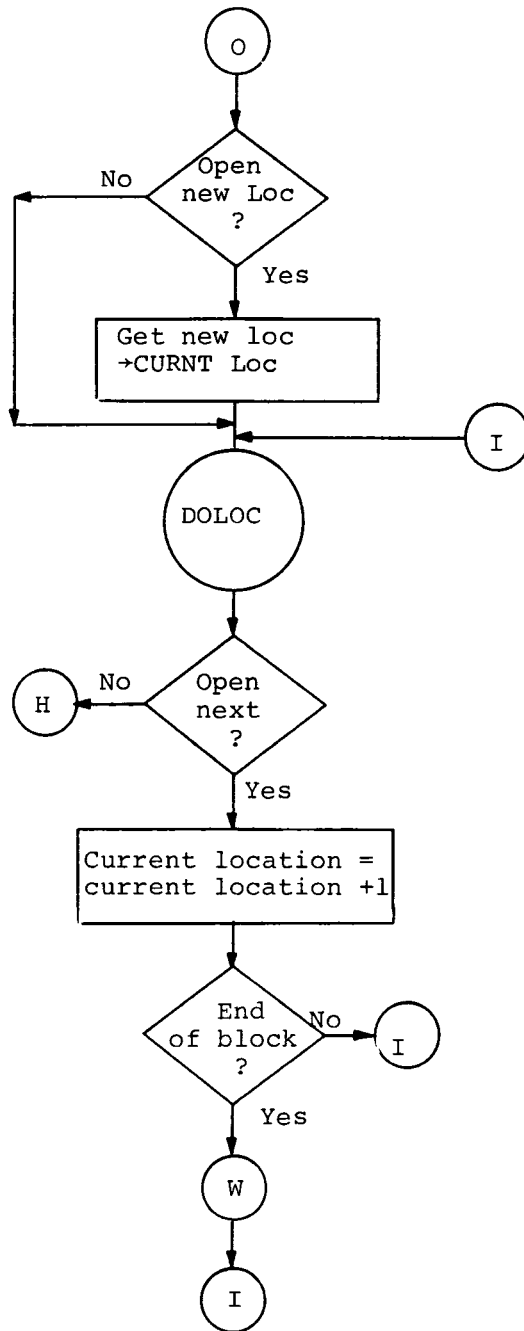




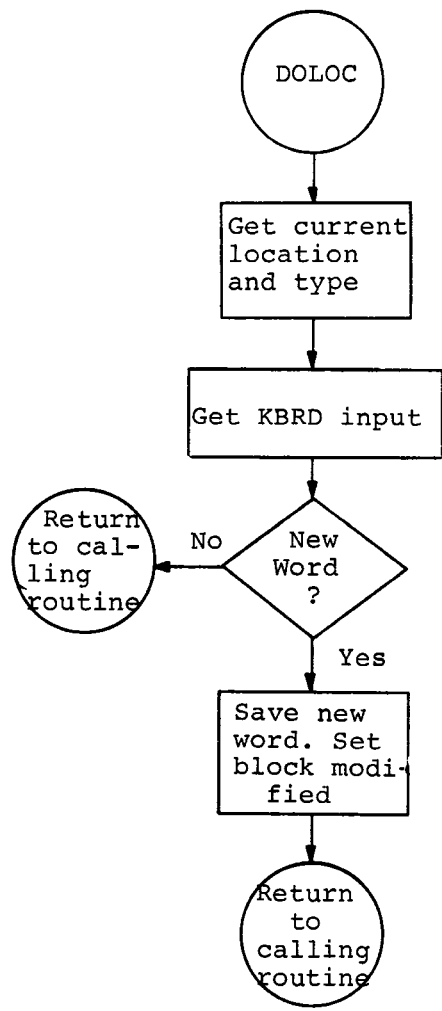




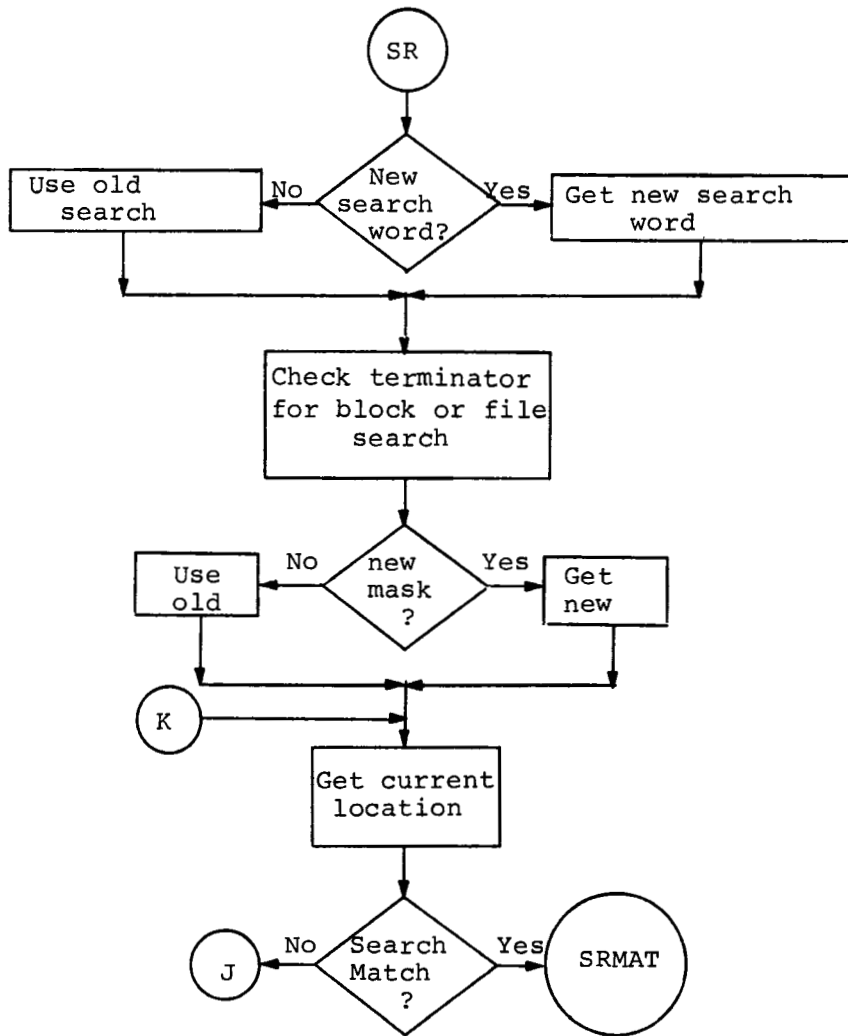


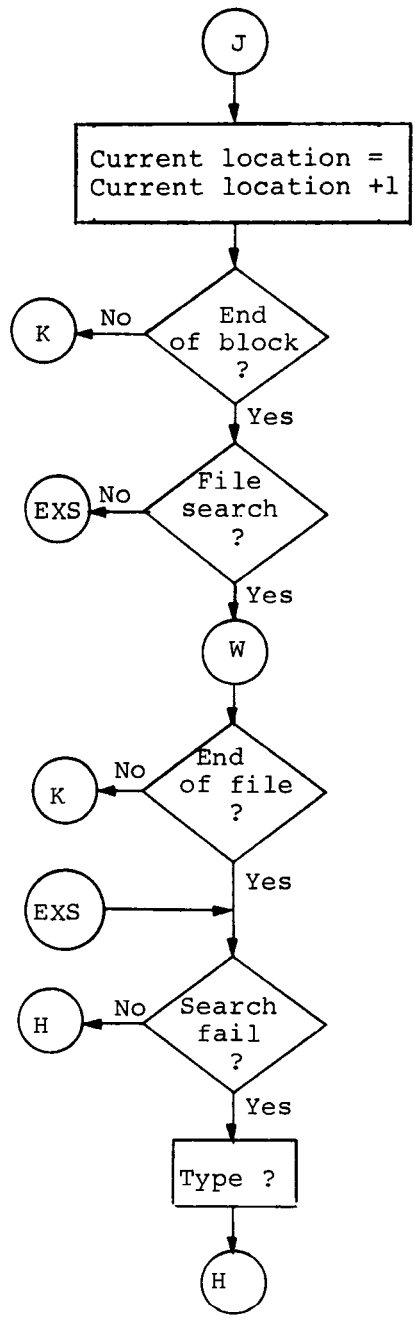


5.5 DOLOC









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