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RAE NOTES - ISSUE NO. 1

Synertek Systems Corporation's Resident Assembler Editor (RAE-1) for the SYM-1 makes the SYM-1 the foundation of a powerful development tool and/or word processing system. Only the proper peripherals (rapid access mass storage and printer) need to be added. While RAE has three "built-in" vectors, LOOKUP, ENTER (i.e., save), and DC (Disk system Command), to permit a full range of file management operations, and a "built-in" printer control, none of these are described in the Reference Manual.

There is also no published information on how RAE, BAS, and a DOS (Disk Operating System) can share overlapping portions of page zero without conflict. The need for these kinds of information is urgent, according to the letters and phone calls we are receiving. We agree, because we had to spend so many person-hours working out the details for ourselves. This series of RAE NOTES is our attempt to help fill the information gap on "How to Interface with RAE." In the very near future we will be publishing other issues of RAE NOTES covering the above topics.

The purpose of this issue of the RAE NOTES is to provide a "Reference Card" which will list the most important features of RAE in a more convenient form than does the manual. Also, two features of RAE not described in the manual, PR /, and FO S ll, are described in the section headed SUGGESTIONS FOR USE. The Reference Card is designed to be folded, "accordion-fashion", into a 2 3/4 inch by 5 7/8 inch pamphlet, that may be used as a "book-mark", or carried in a shirt pocket. Alternately, it (or a Xerox copy) may be laminated, or inserted in a transparent plastic holder, for notebook or bench-top use.

NOTICE: We tried out every feature of RAE described in a preliminary draft of the manual, on a Cassette/RAM version, and found RAE to act as described below. Two bytes were changed in the ROM version; this change causes the READ recorder (Number 1) remote control relay to initialize in the ON condition. If you have connected the relay, you will probably want to turn it off with ↑T1 until you are ready to read.

RELOCATION

During assembly, as object code is developed, it may be stored in memory for immediate use in its desired location, with .OS, or elsewhere, by adding .MC le. It may then be dumped on tape through the monitor SAVE operations (S2 or S1), and reloaded where desired with monitor LOAD (L2 or L1).

If sufficient memory is always available to hold both the text file, etc., and the object code, object code may be relocated wherever desired by saving the source code with PU, recalling the source code when needed with GE, and reassembling to the desired location. This is the method suggested for inputting the relocating loader each time it is to be used, unless, of

course, it is desired to use it always at a fixed memory location.

Where memory is limited use of the relocating loader is recommended. To store object code in a form which can be relocated by the relocating loader enter

```
.BA $0  
.OC
```

in the source code. After AS, dump with OU Ffn. The source code will be dumped to tape in 256 byte blocks through the relocating buffer. Then use PU X to create an EOF marker on the tape.

The relocating loader uses memory locations 00E0 (lo) and 00E1 (hi) for the desired starting address of the module to be relocated, 0110 for fn, and 00C8 for the address (hi) of its buffer.

After entering the desired values through the monitor, .G to the loader's assigned starting address. The loader will return to the monitor with a BRK instruction after an EOF or a tape read error. Since no error message is provided, correct loading should be verified by using the .R command to examine the A register. 00 indicates a good load, EE indicates a bad load.

The use of .RC and .RS permit portions of a relocatable program to be fixed (perhaps for reference by ("links" to) other programs) while still allowing for modification of internal addresses by the loader.

TAPE OPERATIONS

The following commands, pseudo-ops, and control codes involve the tape operations:

```

PUT      Ffn   ln1   ln2
PUT      X
GET      Ffn   ln1
GET      Ffn   Append
DUPLICATE Ffn
OUTPUT   Ffn
OFF      tn
ON       tn
PASS
CLEAR
↑Ttn
.CT

```

PU will store all lines between ln1 and ln2 in a file designated by fn. If fn is not specified, 0 is assumed. F must precede the fn, or the fn will be interpreted as a ln. If only a single line number is entered, only that one line will be recorded. If no line numbers are entered the entire file will be recorded. The most recently entered fn will appear as part of all future error messages. PU X will record an end of file marker (EOF). The fn assigned to EOF is EE.

GE will read the tape until file fn is read and stored. If fn is not specified the first file read will be stored. During reading each file read will be listed with its fn and length. The specified file will be stored, and its region of memory will be listed. Lengths and memory areas are given in hexadecimal. If file number fn is not found, reading will continue until an

EOF is encountered. If A is entered, the file will be stored at the end of (appended to) the current file. If a ln is entered the file will be stored after that ln in the current file and all higher numbered lines in the current file will be deleted. It is advisable to use NU to renumber after appending.

DU permits making duplicate tapes, with corrections, if desired. If fn is omitted the tape is duplicated until EOF; otherwise file fn is read but not duplicated. It may be corrected, recorded with PU, and DU may then be continued.

OF and ON will turn the designated tape decks off and on. If tn is not specified, 0 is assumed. ↑Ttn will toggle the designated tape deck without the need for a carriage return.

CL will turn off the tape decks in addition to resetting the files.

OU, PA, and .CT are discussed elsewhere.

ASSEMBLY FROM TAPE

Programs may be developed as individual modules, each module separately dumped to tape via PU, and the modules combined in the desired sequence and assembled by RAE as follows:

At least the first module must contain .OS

Only the last module may contain .EN

Sequence the desired modules on a single tape, using GE and PU, or DU, editing for .OS and .EN as required.

Enter the command sequence: CL, 9999 .CT, AS ln (9999 is selected as larger than any ln in AS ln)

After the message "READY FOR PASS 2", rewind the tape, using ON ↑ OF 1, or ↑T1, ↑T1, and enter the command sequence: CL, 9999 .CT, PA

File numbers are ignored, ln in AS ln is used for all modules.