GENERAL PRECISION, INC. / COMMERCIAL COMPUTER DIVISION

ABSTRACT

"Symbolic Tape Edit," program K8-01.0, determines the acceptability of symbolically-coded program tapes to ROAR III, program H2-01.2, and controls the format of these tapes. The ROAR-language tapes will only be checked for errors which would prohibit their assembly by ROAR; that is, improper addresses, commands, or location references. The program also contains a feature which can be used for modifying already processed programs.

STORAGE

MAIN MEMORY REQUIRED	A11 (for program and table storage)
RECIRCULATING SECTORS USED	A11

INPUT

"Symbolic Tape Edit" accepts for input any symbolic ROAR-language tape and operates on it by either checking and correcting such a tape and providing format control, or by modifying a previously processed tape, providing it has a controlled format.

In the first case, a SENSE SWITCH 16 option has been provided to bypass the entry of a modifications tape. In the second case, a modifications tape containing any desired program changes in the format defined below must be entered into the computer prior to processing of the object program. Changes may be made a line at a time or in sets of sequential lines when a modifications tape is used.

Instructions on the tape to be processed or on the modifications tape need not contain any stop codes to indicate blank fields, unless they are succeeded by any characters. The subject program will supply stop codes thus omitted. Any legal instructions may be used. They must be followed immediately by a carriage return.

INPUT (Cont.)

For example:

*RAU*A***(C.R.)

may be entered in the form

*RAU*A*(C.R.)

and similarly

*HED****(C.R.)

may be entered as

HED(C.R.)

The carriage return does not terminate input of all instructions. There are four exceptions which may extend to more than one line. These indicate their length to the subject program as follows:

1. SUB- This pseudo-command defines its length by the number in the field following the pseudo-command.
2. SET- This pseudo-command introduces a word of indefinite length, terminated by a blank field.
3. COM- This pseudo-command introduces comments of unlimited length, terminated by a stop code. All carriage returns and tabs will be retained.
4. ($\overline{56}$)($\overline{57}$)($\overline{56}$) - This pseudo-command introduces comments of unlimited length, terminated by a stop code preceded by ($\overline{56}$). All carriage returns and tabs will be retained.

Each of the above must still be followed by a carriage return. All other instructions must be limited to one line.

Five input codes have been provided which control the modification features of the subject program. These are entered through the specified reader via a previously prepared modifications tape when modifying a program which has a controlled format.

P Code Example: P18*

The "P" input code designates the number of the page where changes are to be made. Repetition of the page number with each modification on the same page is optional.

INPUT (Cont.)

L Code — Example: L9*

The "L" input code designates the number of the line on a page where a change is to be made. The line number must be indicated for each alteration code (see below). Each separate line on a page, including all deleted lines, but excluding the page number and insertions being entered, must be included in the line count. The line count begins again at the top of the page for each successive modification. Also, a new count must begin with each page.

I Code — Example: I3*

The "I" input code inserts any desired instructions immediately following the line indicated in the pertinent "L" code. As many sequential insertions as desired—up to the capacity of the changes table, about 628—may be made with one code; their number being stated in the code. The capacity of the changes table is 628 only when no addresses of more than four characters and no remarks are to be inserted; it will decrease whenever these conditions are not met. A carriage return must follow each instruction inserted. Note that line number zero may be used to make insertions which are to precede the first line on a page. Each "I" code must be followed by the lines to be inserted, and it must be immediately preceded by an "L" code.

D Code — Example: D1*

The "D" input code deletes a designated number of lines, beginning with the line indicated in the pertinent "L" code. As many sequential deletions as desired, including the last line on a page, may be made with one code; their number being stated in the code. Each "D" code must be immediately preceded by an "L" code.

R Code — Example: R6*

The "R" input code replaces one original line with one changed line. In this one-for-one replacement, as many lines must be inserted as are to be deleted. As many sequential replacements as needed, including the last line on a page, may be effected with one code; the number being indicated in the code. Each "R" code must be followed by the lines to be inserted, and it must be immediately preceded by an "L" code.

INPUT (Cont.)

A sixth input code, FINI*, has been provided to indicate the end of the modifications tape and must be included as the last word on all such tapes.

If the object program tape does not have a controlled format, that is, if only the error diagnosis and format control features of the subject program are to be used, SENSE SWITCH 16 must be depressed before editing of the object program is begun. As the object tape is read, a new tape will be punched by the selected output unit in acceptable ROAR format. If any errors are discovered in the object program, the computer will select the proper error printout device and print an error indication, followed by the specific instructions involved (see "OUTPUT"); after which the required correction must be entered, along with instructions to be retained, using the input device which will be selected by the program.

If the object program tape format has been controlled by the subject program and changes are to be made, these changes must be punched into a special modifications tape, using the input codes described above. This tape must then be read in through the specified device, immediately following the answer to the computer query, "FIRST PAGE NO." (see below). When the modifications have been stored, the computer will print "CORRECTIONS IN" and stop if no errors have been detected in the modifications tape. If an error does occur, the computer will print "BAD TAPE" and stop. If the error is one for which the subject program has provided a diagnostic printout, the BAD TAPE printout will be preceded by this error diagnosis. If errors result, the modifications tape should be rectified before it is re-entered.

If too many alterations are contained on the modifications tape, the computer will store as many as possible, select the proper output device, print "FULL", execute a carriage return, print "CORRECTIONS IN", and stop.

NOTE: When entering program corrections via the typewriter following an error printout, be sure the manual input light is glowing whenever input is attempted, as hesitation will occur when the computer reads certain instructions.

If the object program contains logical groups of instructions, each group may be forced to begin on the first line of a page by punching a backspace on the object program tape as the first character of the first line of each group. This does not limit the use of the backspace to this function; it may also be entered as a character in any field.

INPUT (Cont.)

When modifying instructions of more than one line, the "R" code can not be used. When a "D" code is used, each line to be deleted must be included even if several lines make up a single instruction. Any "I" code used must indicate only the number of instructions to be inserted, even though an instruction is longer than one line, as the computer will read to the carriage return at the end of the instruction.

Prior to commencing input of the object program tape, the computer will designate certain required information by the following printouts.

Request	Meaning and Response
SINGLE CHAR. MODE PLEASE	The SINGLE CHARACTER MODE button on the reader right-hand panel must be depressed.
NO. OF LINES S OR D =	Enter the number of single lines per page (at 1/6 of an inch to a line) and specify whether the printout is to have single (S) or double (D) line-spacing. This information is to be entered as three characters (e.g., 51D or 51S would be used for an 8-1/2 inch page).
I/O SELECTIONS	Enter four Input/Output Selection codes, each followed by a stop code, to specify the desired input and output devices. Devices are required for input of modifications tape and object program tape, output of new tape, input of corrections for error printouts, and output of errors found. Selections must be made in the order shown. The subject program will make standard selections—64*97*68*98*—only upon receipt of a stop code. Any of these may be changed by input of any preceding designations, the desired new designation, and a stop code; e.g., if the high-speed punch is to be used for output of the new tape, 64*106** is required even though the first is a standard selection. (See RPC-4000 Programming Manual for list of Input/Output Selection Codes.)

INPUT (Cont.)

Request	Meaning and Response
FIRST PAGE NO.	Enter the number to be used as the first output page number, followed by a stop code. If printout is to begin with page one, either 1* or just a stop code may be typed.

CALLING SEQUENCE

"Symbolic Tape Edit" is entered by transferring to its initial location.

OUTPUT

"Symbolic Tape Edit" produces a new object program tape in the specified format including all changes. A printout of this new format may be obtained concurrently by using a dual select code, such as 99, for the output device. Options have been provided, to include extra carriage returns when needed (see "SENSE SWITCH OPTIONS").

Commands in the object program will be considered by the subject program as belonging to two separate groups. All machine language commands and ROAR pseudo-commands HEX, ALF, DEC, PRC, SRT, and SLT comprise one group, while all the other pseudo-commands comprise the other. The instructions containing these commands are referred to as executable instructions and general pseudo-instructions, respectively.

When checking a program, the subject program first reads and stores, without punching or printing, any general pseudo-instructions encountered, until an executable instruction is reached which contains no error. When this executable instruction has been read and stored, all stored general pseudo-instructions will be punched onto the new tape. The subject program then reads and stores without punching any pseudo-instructions encountered, until another executable instruction, containing no error, has been read and stored. When this occurs, the preceding executable instruction and any intervening general pseudo-instructions will be punched onto the new tape. This procedure will be followed until the last instruction in the object program has been read and stored.

OUTPUT (Cont.)

To punch the last instruction, depress SENSE SWITCH 1 before all the object program's trailing blank tape runs through the reading device. If all the tape has run through, depress START COMPUTE after depressing SENSE SWITCH 1. After this last instruction has been punched, the computer will select the typewriter for input and output, and the manual input light will glow. Depress START COMPUTE to transfer control to the initializing portion of the program to process another tape. The only printout that will occur will be "FIRST PAGE NO."

When an error is diagnosed by the subject program, the computer will select the typewriter (if normal device selections are used) and print the type of error, followed by the object program's two executable instructions presently stored and all general pseudo-instructions in between. Corrections, along with any instructions and pseudo-instructions which are to be retained must then be input. Each instruction must be followed by a carriage return. SENSE SWITCH 32 must be implemented (see "PROGRAM STOPS") before the computer will continue reading from the object program tape. Any errors found will not be punched into the new tape.

When it is found, during alteration of a previously processed tape, that the changes stored from the modifications tape are not in proper sequence, the computer will skip the ones that are out of order, select the error printout device, print the input codes, page numbers, and line numbers of the bypassed instructions, and continue with program operation. The modifications tape instructions will also be checked for acceptability to ROAR.

NOTE: When indicating that changes are out of order: there will be one "D" printout for each group of deletions, there will be as many "I" printouts as there are insertions in a group, and there will be both "I" and "D" printouts for any "R" codes (no R printout as such).

OPERATING PROCEDURE

1. OPERATING TIME

The subject program will process from 1200 to 1400 lines per hour (deletions are more rapidly effected than insertions).

OPERATING PROCEDURE

2. LOADING PROCEDURE

The program tape is in symbolic, ROAR-language format and is to be assembled by ROAR III. All necessary region reservations and header tags are included on the tape.

3. INPUT-OUTPUT DEVICES REQUIRED

Selection of input and output devices may be made by the subject program or by the operator. The selections are indicated in response to the printout "I/O SELECTIONS", see "INPUT."

4. SENSE SWITCH OPTIONS

Sense Switch	Function
1	RAISED - No effect. DEPRESSED - Causes computer to punch last line of program being processed.
2	Not used.
4	RAISED - No effect. DEPRESSED - Replaces the line feeds between pages with carriage returns. This allows listing by RPC-4700 Flexowriters and any RPC-4500 or 4600 System typewriters with 21-inch carriages as they have no line feed ability.
8	RAISED - No effect. DEPRESSED - Provides two carriage returns between lines instead of one. This allows double-space listing by RPC-4700 Flexowriters as the single-space setting for carriage returns must be used. "S" response to number of lines query must have been provided.

OPERATING PROCEDURE

4. SENSE SWITCH OPTIONS (Cont.)

Sense Switch	Function
16	RAISED - Allows object program to be processed through use of modifications tape.
	DEPRESSED - Allows object program to be processed without input of modifications tape.
32	RAISED - No effect.
	DEPRESSED - Allows program operation to continue after error stop when START COMPUTE is also implemented (see "PROGRAM STOPS").

5. OPERATION OF PROGRAM

a. After the subject program is loaded, depress START COMPUTE (transfer to beginning location is included on the tape, and is therefore accomplished automatically).

b. If only format control function is to be implemented, depress SENSE SWITCH 16.

c. Place modifications tape in reader.

d. Respond to all requests printed out.

e. Computer will read entire modifications tape, print "CORRECTIONS IN", and stop.

f. Place object program tape in reader.

g. Depress START COMPUTE.

h. When computer has read entire object tape, depress SENSE SWITCH 1 to punch last instruction (follow by depression of START COMPUTE if entire object program blank tape trailer has read through and instruction is not punched).

OPERATING PROCEDURE

5. OPERATION OF PROGRAM (Cont.)

i. Depress START COMPUTE to return to subject program to process another tape (only printout that will recur is "FIRST PAGE NO.").

NOTE: If only format control feature is to be used, step c and step e are omitted.

6. INFORMATION PRINTOUTS

IMPROPER ADDRESS IMPROPER ORDER LOCATION NOT BLANK IMPROPER LOCATION LOCATION IS NECESSARY	Diagnostic error printouts indicating that corrections are required in the object program. See "PROGRAM STOPS" for remedial action.
BAD TAPE	Modifications tape contains an error This may be preceded by a diagnostic error printout. Modifications tape should be rectified and re-entered.
CORRECTIONS IN	Modifications tape has been read by the computer. Printout is omitted if SENSE SWITCH 16 has been depressed.

7. PROGRAM STOPS

When the computer stops as a result of encountering an error, make any required corrections, depress SENSE SWITCH 32, depress START COMPUTE, raise SENSE SWITCH 32, depress START COMPUTE, and computer will continue editing the object program tape.

COMMENT

The subject program may be relocated in memory if only the format control function is to be used (i.e., if no modifications tape is to be employed). The program should not be relocated beyond Track 68.