RC 4000 COMPUTER®

SPECIFICATION

SOFTWARE

SLANG 3

This specification – which is preliminary and may be subject to change – describes the Slang 3 assembler developed for the extended RC 4000 computer with drum and/or disc as backing store. The assembler translates a program written in the symbolic language Slang into a binary object program.

The Slang 2 assembler, developed for the small RC 4000 computer without backing store, is not described here as it is essentially the same as Slang 3.

Source Language

Storage locations can be assembled as bytes, words, and double words.

A byte is either an operation part or an arithmetic expression. An expression can include parentheses and the operators add, subtract, multiply, divide, logical and, logical or, and logical shift. The operands can be numbers with radix 2 to 9, integers, or symbolic addresses called identifiers.

A word is either a full instruction (an operation part followed by an expression) or an expression. Textstrings are stored in consecutive words with 3 characters per word represented in the ISO 7-bit character code. A double word is a real number in the Algol 60 sense.

The scope and usage of identifiers are defined by a block structure very much like that of Algol 60.

Programs that exceed storage capacity during assembly can be divided into segments, a segment being a block for which binary output is produced immediately at the end of the block. The assembly of a block can be conditioned by the value of an expression.

The Slang program text can be input to the assembler from typewriter, paper tape, punched cards, magnetic tape, drum, or disc. Paper tape must be one-inch tape with 8 tracks punched in either the RC Flexowriter code or the ISO 7-bit character code. Punched cards must be 12-row, 80-column cards punched in the Hollerith code that is standard for the given installation. Input from drum, disc, or magnetic tape must be represented in the ISO 7-bit character code with 3 characters per word.

Translation

The assembler occupies about 2,000 words of the core store. The rest of the available storage area is divided between the assembled program and a table of identifiers as follows: assembled program = actual binary size; identifier table = 2 words per declared identifier.

The internal assembly speed is from 2,000 to 6,000 characters/second approximately, depending on the amount of comments in the Slang text.

RCSL 82-H 0023

Examples of Slang Statements

```
; slang examples
b. a4, b7, c3, d14, g12                ; program block, declarations
h.b3:    al w2, rs w3 x2, a5: 294      ; byte statement
         (:a5-b3:)<1+2.1011
w.g5:    2.101, -8 388 608             ; word statement
  d13=   8.1011<15+12x(:a5+b3:)        ; assignment
         <:this is a textstring:>
  a3:c2: jl  x1+8
         rl w2 x1+2.111
f.       -0.45, 9.23₁₀-49              ; real statement
m.this is a message
i.                                     ; identifier listing
  c3=5, m.redefine c3:
t.                                     ; input is taken from the typewriter
c.c3-4, c3=(:k+3:)/2, i. z.            ; conditional assembling
s. g5, e7                              ; segment
w.g2:    rl.w3(x2+e7.)
  e7:    al.w2 4.3201+g2. e.           ; end segment
e.                                     ; end program
```

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