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SNOBOL 3, A List Processing Language
( Revision August, 1966 )

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# COMMON USERS GROUP PROGRAM REVIEW AND EVALUATION

(fill out in typewriter, ink or pencil)

Program No. ____________ Date ____________

Program Name: ______________________________

1. Does the abstract adequately describe what the program is and what it does? Yes____ No____
   Comment ______________________________

2. Does the program do what the abstract says? Yes____ No____
   Comment ______________________________

3. Is the description clear, understandable, and adequate? Yes____ No____
   Comment ______________________________

4. Are the Operating Instructions understandable and in sufficient detail? Yes____ No____
   Comment ______________________________
   Are the Sense Switch options adequately described (if applicable)? Yes____ No____
   Are the mnemonic labels identified or sufficiently understandable? Yes____ No____
   Comment ______________________________

5. Does the source program compile satisfactorily (if applicable)? Yes____ No____
   Comment ______________________________

6. Does the object program run satisfactorily? Yes____ No____
   Comment ______________________________

7. Number of test cases run_____. Are any restrictions as to data, size, range, etc. covered adequately in description? Yes____ No____
   Comment ______________________________

8. Does the Program meet the minimal standards of COMMON? Yes____ No____
   Comment ______________________________

9. Were all necessary parts of the program received? Yes____ No____
   Comment ______________________________

10. Please list on the back any suggestions to improve the usefulness of the program. These will be passed onto the author for his consideration.

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SNOBOL 3
David L. Wilson
University of Wisconsin-Milwaukee
Computing Center
Downer & Kenwood
Milwaukee, Wisconsin
1620 User's Group code - 3285

"Modifications or revisions to this program, as they occur, will be announced in the appropriate Catalog of Programs for IBM Data Processing Systems. When such an announcement occurs, users should order a complete new program from the Program Information Department."

## DECK LABELLING SHEET

| Deck Number | Sequence Number Range | Description |
|---|---|---|
| 1 | 00000 - 00043 | Object deck of Loader Program. |
| 2 | 00000 - 00209 | Core image deck of SNOBOL 3. First card is a *DLOAD. |
| 3 | 00000 - 00035 | Sample program |
| 4 | Various | Object decks of machine language functions. Includes MONITOR control cards. |
| 1 (Optional) | 00010 - 01500 | Source deck for Loader program. |
| 2 (Optional) | 00010 - 14380 | Source deck for SNOBOL 3. |
| 3 (Optional) | 00000 - 00454 | Source decks for machine language functions. Includes MONITOR control cards. |

Most of the following write up is adapted from the University of Michigan's write up for SNOBOL 3 on the 7090. This write up, in turn, borrows, heavily from write ups written by D. J. Farber, R. E. Griswold, and I. P. Polonsky of Bell Telephone Laboratories, Inc. in Holndel, New Jersey. This includes the article "SNOBOL, A String Manipulation Language" published in the Journal of the Association For Computing Machinery, Vol. 11, No. 2 (January, 1964), pp. 21-30. The sign (@) will be referred to as a prime or quote (').

Optional material will be forwarded only when specifically requested.

The SNOBOL language and the SNOBOL translator were developed at the Bell Telephone Laboratories in Holmdel, New Jersey, by D. J. Farber, R. E. Griswold, and I. P. Polonsky. The University of Michigan's version of the SNOBOL write-up has been used extensively in what follows.

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PROGRAM ABSTRACT

1. TITLE (If subroutine, state in Title): SNOBOL 3, A List Processing Language
Subject Classification 1.4

2. Author; Organization: David L. Wilson, University of Wisconsin-Milwaukee Computing Center
Date: August 1966 Users Group Membership Code: 3285

3. Direct Inquiries to Name: David L. Wilson
Phone: 414-228-4426

4. Description/Purpose: (5. Method; 6. Restriction/Range; When Applicable): SNOBOL permits easy manipulation of strings of alphabetic data. It contains capabilities for pattern matching, creating new strings, and recursive subroutines.

5. N/A

6. Most machine language functions, except for DEFINE, have been implemented. These functions are not available to the non-disk user.

7. Specifications (Check or fill in appropriate space):

a. Storage used by program 18K

b. Equipment required by program: Card X; Magnetic Tape__; Number of Drives__; Paper Tape__; Disk File__; Number of Drives__; TNS, TMF MF__; Auto divide__; Indirect addressing__; Floating Point Hardware__; 1620 Model I 20K; Model II__; 1443 Printer__; Index Registers__; Binary Capabilities__; Other (specify)______

Can program be used on lesser machine? Yes. Specify which requirements can be easily removed Auto divide--avoid division in source.

c. Programmed in: Fortran without Format__; Fortran with Format______, Fortran II__; Other Fortran (specify)_____; SPS (Specify assembler used) II-D; Other (specify)______

d. Type of Program: Mainline, complete X; Subroutine___; if subroutine, for use with SPS (specify type of SPS)____; Fortran (specify type of Fortran___; Other (specify)______

8. Additional Remarks: A loader is included for systems without a disk drive It replaces the non-disk GET and PUT routines and loads a core image deck. It can be used with any SPS II-D program.

# SNOBOL 3

## I. THE SNOBOL LANGUAGE

### 1. INTRODUCTION

The ability to manipulate symbolic rather than numeric data is becoming increasingly important in programming. As symbolic manipulations become more complex, programming in machine-oriented languages becomes increasingly tedious and cumbersom. A number of programming languages (COMIT, IPL-V, LISP, etc.) have been developed to aid the programmer in such problems. As interest in language translation, program compilation and combinatorial problems has increased, many of these languages have been used for types of problems for which they were never intended. It is clear that more general symbol manipulation languages will materially expand the class of problems that can be programmed with reasonable time and effort.

The string-oriented symbolic language SNOBOL has been developed with these problems in mind. The choice of the string of symbols as the basic data structure in SNOBOL was made because most symbol manipulation problems of current interest may be naturally described in terms of string manipulations. Unfortunately, no standard notation or accepted system of operations exists for string manipulations. Three basic operations seem essential, however, (1) creation of strings, (2) examination of the contents of strings, and (3) alteration of strings depending on their contents.

A system for accomplishing these basic operations forms the nucleus of SNOBOL. In constructing the syntax and selecting the notation for SNOBOL, the potential programmer was given careful consideration. Emphasis has been placed on simplicity and intuitiveness while maintaining so far as possible the inherent power of a high-level programming language.

### 2. BASIC CONCEPTS

2.1. Strings and String Names. The basic data structure in SNOBOL is a string of symbols. Names are assigned to strings to provide an easy way of referring to particular strings. The name of a string may be any string of numerals, letters, periods, and record marks (≠). The name must be at least one character long, and can be as long as wanted, restricted only to the provision that an element must be complete on one card. (See section 5 for indirect names) for example -

```
          Start 3≠A.7    .L1   124
```
[1]

Thus the string with name LINE.1 may have the contents

```
          ARØUND, ARØUND THE SUN WE GØ
```

2.2 String Formation. The most elementary type of string manipulation is the formation of strings. A string named LINE.1 with the contents given above is formed by the following rule

```
          LINE.1 = 'ARØUND, ARØUND THE SUN WE GØ'
```

The pair of primes specifies the literal contents of a string. Any symbols (except primes) can be placed within the primes. Since primes are delimiters, there is no way to build a prime into a program as a constant. Therefore the translator pre-defines the string whose name is QUØTE to contain a prime. All other strings (except literal strings, of course) are empty at the start of execution. Strings can also be formed by concatenation. Thus the rule

```
          LINE.1 = 'ARØUND, ARØUND' 'THE SUN WE GØ'
```

produces the same result as the preceding example.

Strings which have been named previously can be used to form new strings. For example, the rule

```
          EXAMPLE = LINE.1
```

forms a string named EXAMPLE with the same contents as the string named LINE.1.

Both literals and named strings can be used in formation. The sequence of rules

```
          LINE.1 = 'ARØUND, ARØUND THE SUN WE GØ'
          LINE.2 = 'THE MØØN GØES RØUND THE EARTH.'
          LINE.3 = 'WE DØ NØT DIE ØF DEATH'
```

[1] This and the next few examples are taken from Archibald MacLeish, 'Mother Goose's Garland,' collected poems, 1917-1952, Houghton Mifflin Co., Boston, Mass. Quoted by permission of the publishers.

```
        LINE.4 = 'WE DIE ØF VERTIGØ.'
    TEXT = LINE.1 '/' LINE.2 '/' LINE.3 '/' LINE.4
```

will form a composite string with slashes separating the lines in the conventional manner. Note that the spaces between string names and literals serve as break characters for distinguishing the elements to be concatenated. At least one space is required for separation, but more may be inserted.

In forming a string, the string itself may be used. Hence, after performing the two rules

```
        NUMBER = '1'
        NUMBER = NUMBER NUMBER '0'
```

The string NUMBER will contain the literals '110'.

2.3 Pattern Matching. The process of examining the contents of a string for a given substring is called pattern matching. For example, to determine whether the string named LINE.1 contains the literals 'RØUND', the following rule would suffice -

```
        LINE.1 'RØUND'
```

This rule is similar to a formation rule, but without the equal sign. The string LINE.1 is scanned from the left for an occurrence of the five literals 'RØUND' in succession. A pattern matching rule may succeed or fail. Section 3 describes how this success or failure may be recognized and used. If LINE.1 is formed as above, the scan would be successful. The string being scanned is not altered in any way.

The pattern may be specified by the concatenation of a number of literals and string names just as the contents of a string to be formed were specified. For example,

```
        TEXT LINE.1 '/' LINE.2
```

specifies a scan of the string named TEXT for an occurrence of the contents of the string LINE.1 immediately followed by the literal '/' and inturn immediately followed by the contents of the string LINE.2.

2.4 String Variables. The type of scanning described in the section 2.3 is clearly limited. One might, for example, want to know whether a string contains one substring followed by another, but with the second substring not necessarily immediately after the first. A string

variable in introduced to permit this kind of scanning. The rule

```
        LINE.1 'ARØUND' *FILLER*  'SUN'
```

is of this kind. Here we wish to know whether LINE.1 contains 'ARØUND' followed by 'SUN' with perhaps something between. The symbols *FILLER* represent a string variable which takes care of this 'something.' If LINE.1 is formed as in section 2.2, this scan would be successful. A string variable may be any string name bounded by asterisks.

A by-product of successfully matching a pattern containing a string variable is the formation of a new string which has the name given between the asterisks of the string variable. This newly formed string contains a copy of the substring of the scanned string where the string variable fitted, i.e. the 'something' previously mentioned. Note that this 'something' may be 'nothing', i.e., the string variable may end up with the void string (=NULL STRING, =EMPTY STRING, =STRING OF LENGTH ZERO) as contents. In the example give, a string named FILLER would be formed with the literal contents ', AROUND THE '. This newly formed string is entirely independent of the scanned string.

2.5 Replacement. One final rule permitting alteration of the contents of a string will complete the basic string manipulations. Suppose in the string LINE.2 we wished to replace 'EARTH' by 'GLOBE'. The following rule will accomplish this

```
        LINE.2 'EARTH' = 'GLØBE'
```

This rule scans LINE.2 for an occurrence of 'EARTH'. If this scan is successful, 'EARTH' is then replaced by 'GLØBE'. Thus LINE.2 would become 'THE MØØN GØES ARØUND THE GLØBE.'. If the scan fails, the string being scanned is not altered.

As before, the pattern may be any combination of named strings, literals, and string variables. Only the substring matching the pattern is replaced. As a case of special interest, writing nothing to the right of the equal sign causes the substring found by the scan to be deleted. Thus

```
        LINE.2 'EARTH' =
```

would delete 'EARTH' from LINE.2

Any string formed as the result of a successful pattern match of a string variable on the left side of the equal sign can be used in the replacement on the right side. Thus

```
          LINE.1  'ARØUND'  *FILLER*  'SUN' = FILLER
```

would result in the deletion of 'ARØUND' and 'SUN' from LINE.1.

2.6 Back Referencing. In the example above, the string formed as the result of a string variable in a successful pattern match was used for replacement in the same rule. It is even possible to use strings tentatively matched by string variables in the course of the scan. Thus a pattern may contain a string name which is the same as the name of a string variable used previously in the pattern. For example,

```
          *X*  M  X
```

is a pattern containing such back referencing. Since the scan proceeds from left to right, an attempt to find an occurrence of X will only be made after X is tentatively defined by *X*. If

```
          TEXT = '(C,D) (A,B) (D,C) (A,B)'
```

then the rule

```
          TEXT '(' *X* ')'  *Y*  '(' X ')'
```

would succeed, forming a string named X with the contents 'A,B'.

2.7 Other Types Of String Variables. The string variable described in section 2.4 was completely arbitrary in the sense that it could match any substring depending on the particular pattern and string being scanned. However, it is often desirable to restrict the types of substrings a string variable can match. For this purpose, there are two other types of string variables.

2.7.1 Balanced String Variables. Balanced string variables are useful for analyzing algebraic structures. A balanced string variable can only match a nonvoid substring which is balanced with respect to parentheses. Some examples of balanced substrings are

```
          A    A+(BC)     (((,AB)ACD))
```

The following substrings are not balanced -

```
          )(   (((A+B))+C))
```

to indicate a balanced string variable, the string name is bounded by parentheses and then by asterisks, e.g. *(CATCH)*

2.7.2 Fixed-length String Variables. A fixed-length string variable can only match a substring of specified length. A fixed-length string variable is indicated by appending to the string name a slash and the length. The length may be expressed either by a literal integer or the name of a string containing an integer. Thus *PAD/'3'* is a fixed-length string variable which can only match a substring of three characters. Similarly, *MATCH/N* where N = '15' can only match a substring of 15 characters.

## 3. PROGRAM STRUCTURE

In order to make use of the string manipulation facilities of SNOBOL, the rules are assembled into a program consisting of a number of statements which are executed in a prescribed order.

3.1 Statement Format. A statement, in general, consists of three parts, separated by blanks, in the following order -

(I) A LABEL, NAMING THE STATEMENT,
(II) A RULE, WHICH MAY BE ONE OF THE TYPES DESCRIBED IN SECTION 2, AND
(III) A GO-TO, WHICH MAY CONDITIONALLY SPECIFY WHICH LABELED STATEMENT IS TO BE EXECUTED NEXT.

3.1.1 Labels. A label must start with a letter or digit. The remaining characters can be anything but blanks. For example-

```
          LO   A*   C$$
```

A direct transfer can only be made to a label which satisfies the requirements for a string name. A label must start at the beginning of the statement (column 1 of the card). The label on a statement is optional. If a statement has no label, it must begin with a blank. A line beginning with an asterisk is a comment and is not executed.

3.1.2 Rules. Various types of rules were described in Section 2. In all of these types, a rule may be considered to consist of four parts, separated by blanks, in the following order -

(I) A STRING TO BE MANIPULATED, CALLED THE STRING REFERENCE,
(II) A LEFT SIDE, SPECIFYING A PATTERN,
(III) AN EQUAL SIGN, AND
(IV) A RIGHT SIDE, SPECIFYING A REPLACEMENT.

The string reference is mandatory. Any of the rest of the rule may be absent, depending on the particular rule. Literals may be used in the string reference field. For example,

```
        '0'  K      /S(TEST)F(LØØP)
```

A literal isn't a name. Therefore no right side may occur in a rule with a literal string reference.

3.1.3 Go-To. The go-to consists of a slash followed by one or more of the follwing parts-

(I) AN UNCONDITIONAL TRANSFER, WHICH HAS THE FORM (BA), SPECIFYING THAT UPON COMPLETION OF THE STATEMENT, THE NEXT STATEMENT TO BE EXECUTED IS THE STATEMENT WITH LABEL BA.
(II) A CONDITIONAL TRANSFER ON FAILURE, WHICH HAS THE FORM F(BB), SPECIFYING THAT IF THE STATEMENT FAILS, THE STATEMENT WITH LABEL BB IS TO BE EXECUTED NEXT.
(III) A CONDITIONAL TRANSFER ON SUCCESS, WHICH HAS THE FORM S(BC), SIMILAR TO FAILURE TRANSFER BUT WITH TRANSFER TO BC MADE ON SUCCESS.

Some examples of go-to's are

```
     /(MØRGAN)         /F(TIME)       /S(ARBØR)F(RESET)
```

3.1.4 Continuation. The SNOBOL translator reads statements from columns 1 to 72 of the source deck. Statements which are too long to fit on one card may be continued on to the next, and succeeding, cards, by punching a period in column 1 of the continuation cards. Statements may be broken across cards only at places where blanks are mandatory. That is, a string name, literal, or any other kind of element may not by split across cards.

3.1.5 Comments. Any card which has an asterisk in column 1 is a comments card. It is printed in the source program listing and then ignored. Comments cards may be placed anywhere ahead of the END card. Comment cards and continuation cards may be interspersed.

3.2 Program Format and Execution. A program consists of a sequence of statements followed by a statement with the label END and a string reference which is the label of the first program statement to be executed. Optionally, the END card may have no string reference in which case execution begins with the first statement in the program.

Statements are executed in succession unless a go-to specifies a transfer to some other statement in the program. In all situations where a go-to is not specified, control is transferred to the next statement in the program. The program execution terminates when a transfer to END is made.

As an example, consider the following simple program to remove all occurrences of the letters A,E,I,Ø and U from a string named TEXT (presumed to be already defined)-

```
START VØWEL = 'A,E,I,Ø,U,'
V1    VØWEL *V*  ',' = /F(END)
V2    TEXT V =        /S(V2)F(V1)
END START
```

The program execution begins with the statement labeled START, consequently forming a string named VØWEL. The next statement executed is V1 which names the first character in VØWEL to be V, and deletes this character and the comma following it. This rule will not fail the first time it is executed, hence control is transferred to the subsequent rule V2.

V2 looks in TEXT for the vowel and if successful deletes it, transferring control to V2 once more. This loop continues until all occurrences of the vowel have been removed. When V2 finally fails, control is transferred to V1 which selects another character from VØWEL, and so on. When VØWEL is exhausted, the program is terminated by transferring to END.

## 4. ARITHMETIC

Simple arithmetic may be performed on strings whose contents are integers. (i.e., only the digits 0 to 9, optionally preceded by a + or - sign, are legal. If blanks or other characters are present then the string is not an integer.) Binary operations of addition, subtraction, multiplication, division and exponentiation may be performed on the right side of any rule. The symbols for these operations are the operators

```
        + - * / **
```

respectively. For example L = A + B would form a string named L containing the arithmetic sum of the contents of strings A and B.

This arithmetic expression can be considered as a single element on the right side, and may occur in place of any right side element. For example, suppose a string has two indices, such as 'L.1.3'. We may have increment these indices by using the arithmetic operation. Suppose the name of 'L.1.3' is MARKER. The rule

```
        MARKER 'L.' *I* '.' *J* = 'L.' I + '1' '.' J + '1'
```

would increase both indices, so the MARKER would contain 'L.2.4'.

A rule containing arithmetic will fail if 1) either of the operands is not an integer, 2) too large a number would result from the operation (the current implementation has an upper limit of 10 digits and sign), or 3) division by zero is attempted.

The second condition is a fatal error.

Any number of these binary operations can be performed. More complicated expressions such as A + B + C and A + (B * C) may be effected by grouping with parentheses - see Section 6.

## 5. INDIRECTNESS

It is frequently convenient, and for many purposes

necessary, to be able to introduce a level of indirectness. This is accomplished in SNOBOL by writing $ in front of the string name. Thus if the string FACTØR contains the literals 'TERM', writing $FACTOR is the same as writing TERM. Note that whereas the DIRECT name of a string is limited to the form specified in Section 2.1, there is no restriction on the INDIRECT name of a string. That is, the contents of any string (except the empty string) may be used as the name of a string.

An example of the utility of such a feature is the ability of altering the effective go-to of a rule. Suppose I and J are strings containing numbers generated in the program. The rule

```
        LABEL = 'B' I '.'  J   /($LABEL)
```

first creates a string with literal contents depending on I and J. Suppose I is '3' and J is '2'. Then LABEL would be 'B3.2'. Thus indirectness here permits alteration for program flow depending on data (here I and J).

Another example is the analysis of text. Suppose that in the example of Section 2, the individual words in TEXT were also introduced as strings whose contents were lists of the possible parts of speech for the given word. Thus, the 'dictionary' might be formed as follows -

```
        ARØUND = 'ADVERB, PREPØSITIØN'
        THE    = 'ADJECTIVE, ADVERB'
        SUN    = 'NØUN, VERB'
        WE     = 'PRØNØUN'
        GO     = 'VERB, NØUN'
```

and so one. The following program then selects the first word in TEXT which might be a verb.

```
        PULL TEXT *WØRD*       ' ' = /F(FAIL)
             $WORD 'VERB'           /S(ØUT)F(PULL)
```

if TEXT contains a word which might be a verb, control is transferred to the statement labeled ØUT, but otherwise to fail.

The indirect feature is useful for specifying the return address of a surboutine. (See Section 8.2). Suppose CAP is the label of the first rule of a subroutine and

```
        /($RET)
```

is the go-to of the last rule executed in CAP. A call to the subroutine which returns to the rule with label A5 is given by the following rule -

```
        RET = 'A5'      /(CAP)
```

## 6. GROUPINGS

Concatenation of strings and arithmetic in any position, not just on right side, may be done by grouping elements in parentheses. For example,

```
        Z = M - N
        Z '-'          /S(LR)
```

can be replaced by

```
        (M - N)  '-'     /S(LR)
```

The following examples illustrate how groupings may be used. The lines

```
        I = '2'
        J = I + ( '3' ** I )
        $( 'RØW' J ) = 'ABC'
```

would give RØW11 the contents ABC. The lines

```
        I = 'I'
        SYSPIT    *$( 'P' I )* ' '
```

would read the next card image from the input tape and name everything up to the first blank P1.

Groupings may be nested to an arbitrary depth. Indefinite levels of indirectness and arbitrarily complex arithmetic may be written using groupings. For example,

```
        $($($($( X ))))
        ( A + ( B * C ) ) * ( '3' ** ( A - C ) )
        *A/( '5' - ( N + M ) )*
```

Groupings may be used anywhere in a statement that a literal is permissible. A grouping is not a name, and may not be used where a name is required. Therefore, the following uses of groupings are illegal -

```
        ( M + N ) = 'ABC'
        Z '5'       /S((R '7'))
```

indirectness applied to a grouping does yield a name. Thus,

```
        Z '5'       /S($(R '7' ))
```

is legal, and

```
        I = '2'
        $( 'LINE ' I ) = 'RESULT'
```

would give LINE 2 the contents RESULT

## 7. INPUT-OUTPUT

Input and output in SNOBOL are effected by associating string names with various input-output operations. The string names given in this section are pre-defined by SNOBOL.

7.1 Input. The string name SYSPIT is associated with the system input. Whenever SYSPIT is mentioned, a card image (80 columns of the card) is read from the 1622 card reader and becomes the contents of SYSPIT. For example,

```
        SYSPIT *LINE* ' '
```

since a new card is read into SYSPIT every time SYSPIT is mentioned, its contents are available only once for scanning. The statement will fail on last card indications (SNOBOL turns the last card indicator off after reading the end card.)

7.2 Output. The string name SYSPOT is associated with the system output (typewriter or printer). For example

```
        SYSPOT = 'THE SUM IS -' SUM
```

Similarly, as many output records as are necessary to contran the output will be produced. The string name SYSPIT will produce punch output as card(s) of 80 columns each.

SYSPOT and SYSPPT retain their contents like any other strings.

## 8. FUNCTIONS

Functions are one of the most important features of SNOBOL. These functions have strings as arguments and generate strings (possibly void) as values. A call on a function consists of the function name followed by a list of arguments (separated by commas) in parentheses. There must be no blanks between the function name and the following left parenthesis. For example, if SIZE is a function such that SIZE(X) is the number of characters in the string named X, then

```
          Z = 'ABC'
          SYSPØT = SIZE(Z)
                  Should Print 3.
```

Functions may be used in the same contexts as groupings.

The arguments in a function call may be any expression acceptable on the right side of a SNOBOL rule. For example,

```
          SIZEF( ZZ )
          G(SIZE(Z) + '3')
          F(FX,Y),F(Y,X) G('3'))
          G('3' *($Q + R))
```

Functions may signal failure instead of returning a value. A function which fails causes the statement in which it occurs to take its failure exit. When a function fails in a statement, execution of that statement ceases immediately. It is therefore important to know the order of evaluation within a statement --

(1) The string reference is evaluated.
(2) If there is a pattern, the pattern elements are evaluated left to right, and then a pattern match is attempted.
(3) If there is no pattern or the pattern match is successful, the right side, if any, is evaluated left to right.
(4) Finally the go-to appropriate to the success or failure of the rule is evaluated.

Thus in the rule

```
          $F(X) *A* G(B,C) = H(A) K /S($ADDR(A))
```

The following possibilities exist

(1) If F(X) fails, the statement fails immediately with no pattern match.
(2) If F(X) does not fail, but G(B,C) fails, the statement fails with no pattern match.
(3) If neither F(X) nor G(B,C) fail, but if the pattern match fails, the statement fails with no change in $F(X).
(4) If everything has occurred successfully through the pattern match, but H(A) fails, the statement fails with no change in $F(X).

The failure of a function in a go-to is a fatal error.

### 8.1 Machine Language Functions

#### 8.1.1 Scanner Control Functions.

8.1.1.1 MØDE Functions. A call of MØDE('ANCHØR') will cause the SNOBOL match pattern scanner to go into anchored mode. From then on, the first element of a pattern match specification must match from the beginning at the reference string in order for the match to be successful. A call of MØDE('UNACHØR') returns the scanner to the normal mode. A call of MØDE('INTEGER') will cause division to fail whenever the result has a non-zero remainder. A ** B will also fail if A is non-zero and B is negative. A call of MØDE('TRUNCATION') will return SNOBOL to the normal arithmetic mode. MØDE always takes the success exit and returns a null string.

8.1.1.2 ANCHOR and UNANCH Functions. If any of the elements of a match pattern specification is of the form ANCHØR() the match pattern scanner will go into anchored mode for that statement only. If any of the elements of a match pattern specification is of the form UNANCH() the match pattern scanner will go into unanchored (normal) mode for that statement only. These functions always take the success exit and return a null string.

8.1.2 SIZE Function. SIZE is a function such that SIZE(X) is the number of characters in the string named X. SIZE always takes the success exit.

8.1.3 TRIM Function. TRIM is a function such that TRIM(X) is the contents of the string named X with trailing blanks, if any, removed. TRIM is usually used for formatting input. Remember, however, that TRIM will not go past any identification material in Cols. 73-80 if one is using TRIM on the entire card image. TRIM always takes the success exit.

8.1.4 EQUALS and UNEQL Functions. EQUALS(X,Y) takes the success exit if X and Y are strings of equal length with identical contents. Otherwise the function will fail. UNEQL(X,Y) takes the failure exit if the strings X and Y have identical contents. Otherwise the function will succeed. These functions always return a functional value of a null string.

### 8.1.5 Arithmetic Functions

8.1.5.1 Relation Functions. The relation Functions take the success exit if the given numeric relation holds between the two integer strings it is called with. The failure exit is taken if the relation does not hold or if either of the two strings it is called with is not an integer. These functions always return a null value. The functions are:

| | |
|---|---|
| .EQ(X,Y) | Contents of X numerically equal to contents of Y |
| .NE(X,Y) | " " X numerically unequal " " " |
| .LE(X,Y) | " " X less than or equal " " " " |
| .LT(X,Y) | " " X less than " " " |
| .GE(X,Y) | " " X greater than or equal " " " |
| .GT(X,Y) | " " X greater than " " " |

8.1.5.2.NUM Function. .NUM(X) succeeds if X is numeric, and fails otherwise .NUM always returns on a null value.

8.1.5.3 .REMDR Function. .REMDR(X,Y) returns the remainder of the contents of X divided by the contents of Y. The function fails if the contents of Y is zero or if either of the strings is not an integer.

### 8.1.6 User Added Functions

There is space in the SNØBØL's subroutine table for five user added functions. The name and DIM number of such a function would have to be patched into the subroutine table in the object deck. If the user wishes to add more than five functions it would be best for him to remove the arithmetic functions. Consult the listings for further information.

## 8.2 SNØBØL - coded Recursive Subroutines

8.2.1 PUSH Function. The PUSH function has one argument consisting of the names of the strings to be pushed, separated by commas. The only restriction on such string names is that they may not contain any commas. Pusing a string saves the contents of the string in a push down list, and sets the contents of that string equal to the null string. The PUSH function gives a null returning value and always takes the success exit.

8.2.2 PØP Function. The PØP Function has one argument consisting of the names of the strings to be pushed, separated by commas. Popping a string recovers the next saved value from the push down for that string. If the string is popped more times than it is pushed, its contents will be null. The PØP function always takes the failure exit unless the push down lists of all of the strings it is to pop, as well as the strings themselves, are all empty. Thus, a push down list can be cleared by re-executing the PØP function until it succeeds. The PUSH and PØP Function were implemented in place of the DEFINE function. As of the date of this write-up, no other SNØBØL 3 has the PUSH and PØP functions.

8.2.3 Example. The following is an example of a SNØBØL coded recursive subroutine. This program calls a recursive factorial program to take the factorial of 12.

```
          ARG          = 'NEXT,12'                    /(NFACT)
NEXT      SYSPOT       = RET                          /(END)
NFACT     ARG           *ADDR* ',' *N*
          .LE(N,'1')                                  /S(FIN)
          ARG          = 'BACK,' N - '1' PUSH('ADDR,N')  /(NFACT)
BACK      PØP('ADDR,N')
          RET          = N * RET                      /($ADDR)
FIN       RET          = '1'                          /($ADDR)
END
```

This subroutine uses the fact that N ! = N* (N-1)! . When it is called to take the factorial of N where N is greater than 1 it calls itself to find the factorial of N-1 and then sets the returning value (RET) equal to N times the old returning value. The first statement is a call to the subroutine. The arguments, separated by commas, are placed into a string named ARG and control is transferred to the first statement of the subroutine, namely NFACT. In this case there are only two arguments, the statement label to which the subroutine is to return, and the number whose factorials is to be taken. The first statement of the subroutine puts the arguments into two strings; the return statement label will go into ADDR and the number will go into N . The next statement tests if N is less than or equal to 1. If it is, the returning value of the subroutine is set equal to 1 and control is transferred to the statement whose label name is the contents of ADDR.

Otherwise, the subroutine calls itself. That is, it sets ARG equal to a return statement label of BACK, followed by a comma, followed by the current value of N minus 1. It then calls PUSH to save the contents of ADDR (the return statement label) and N (the number whose factorial is being taken). Then the statement transfers control to NFACT, the first statement of the subroutine. Eventually the subroutine will return to BACK with the value of (N-1)! in the string RET. At BACK the values of ADDR and N are restored by calling PØP. The next statement sets the returning value of the subroutine equal to N times the old returning value, namely (N-1)! and transfers control to ADDR indirect. When the program gets back to NEXT, RET will contain the value of 12! which is printed out. The program is then terminated. This program used 11 levels of recursion. The maximum permitted is 99.

## 9. SCANNING ALGORITHM

In general, a pattern specified on the left side of a rule consists of a number of elements, i.e. named strings, literals or string variables. Examples in the preceding sections have described the substrings which each type of element can match. The way that a specified pattern matches a given string is usually clear. In cases where questions may arise, the following scanning algorithm, which describes the details of the pattern matching process, may be useful.

Rule 1. An attempt is made to match the first pattern element starting at the first symbol of the string. If this match cannot be made, the match is attempted starting at the next symbol of the string, and so on.

Rule 2. The matching process proceeds from left to right, successively matching pattern elements. Each

pattern element matches the shortest possible substring.

Rule 3. If at some point an element cannot match a substring, an attempt is made to obtain a new match for the preceding pattern element. This new match is accomplished by extending the substring formerly matched to obtain the next shortest acceptable value. If this extension cannot be made, Rule 3 is applied again. If there is no preceding element a new match is attempted according to Rule 1.

Rule 4. If the last pattern element is an arbitrary string variable (i.e. not fixed-length or balanced), its matching substring is extended to the end of the string.

The pattern match succeeds when the last pattern element has been matched. The pattern match fails when the first element cannot be matched.

Examples -

```
    1. Pattern -        'K' *(A)* 'ST'
       String -         K)AK(A+B+C)ST
```

Initially, the first pattern element matches the first occurrence of the letter K in the string. The second pattern element cannot be matched starting from a right parenthesis. Hence, according to Rule 3 an attempt is made to extend the substring matching the first pattern element. However, a constant cannot be extended. Therefore, a new match for the first pattern element is attempted according to Rule 1. Applying Rule 1 repeatedly, the first pattern element is finally matched with the second occurrence of the letter K. The second and third pattern elements then match the substrings (A+B+C) and ST respectively and the pattern match succeeds.

```
    2. Pattern-         'S' *(A)* 'S'
       String-          S)(S+A*B(S
```

The pattern match fails.

```
    3. Pattern-         *HV/'5'* *A* 'K' *B*
       String-          ABCDEFGHIJKLMNØ
```

The pattern match succeeds with the following values of the pattern elements

| | |
|---|---|
| *HV/'5' | ABCDE |
| *A* | FGHIJ |
| 'K' | K |
| *B* | LMNØ |

```
4. Pattern-             *A* *SUM/'3'* '≠'
   String-              364≠.
```
The pattern match succeeds with *A* matching the void string.

Examples with back referencing--
```
1. Pattern-             *A/'3'*  A
   String-              ABCDEFGHFGH
```
The pattern match succeeds with the scope of the match as underlined. The pattern elements have the following values
```
   *A/'3'*              FGH
   A                    FGH
2. Pattern-             *A* *B* '.' B A
   String-              32≠50679.97
```
The match succeeds as indicated with the following values
```
   *A*                  7
   *B*                  9
   '.'                  .
    B                   9
    A                   7
```
3. To illustrate the complexity that can occur in a pattern involving back referencing, consider the following example.
```
   Pattern-             *A* *(B)* *(C)* *D* C D B D C A *E* A E
   String-              BACCABACABABACACAB
```
An attempt to match this pattern will give insight into the difficulties involved. The values of the pattern elements are given below.[1]

## 10. SNOBOL COMPILER CONTROL CARDS

The SNOBOL compiler will recognize control cards and take appropriate action during compilation. Control cards are indicated by a minus sign in column 1. The first non-blank subfield (up to the next blank) is taken to be the control word for the card. The control cards are as follows--

10.1 EJECT
Eject to a new page in the listing of the SNOBOL program.

[1] *A* and *E* match void substrings. *(B)* and *(C)* match BAC and CAB respectively. *D* matches A.

10.2 LIST
Resume listing of the SNOBOL program.

10.3 PCC
Print control cards. PCC is a binary switch.

10.4 SPACE
Print a blank line in the program listing.

10.5 TITLE
Take the card for titling of the program listing.

10.6 UNLIST
Stop program listing.

10.7 PRINTER
Use 1443 printer for SYSPOT file instead of typewriter.

10.8 DUMP
Dump memory on the SYSPOT file at the end of execution.

## APPENDIX

Example of a SNOBOL program

The problem of alphabetizing a list of words using a Radix Sort illustrates the use of many of the features of SNOBOL. The program shows the format of the implementation.

In this procedure, 26 bins corresponding to the letters of the alphabet are used for filing words on successive passes. Suppose N is the number of letters in the longest word. The first pass is made on the Nth letter of the words, with each word being added to a bin corresponding to this Nth letter. Words which are shorter than N letters are filed in a special bin. After this pass, the list of words is reassembled from the bins starting with the special bin, followed by the contents of bins A through Z. The next pass is made on the (N-1)st letter and so on until N passes have been made. When the list is reassembled the last time, the words are in alphabetical order.

The SNOBOL program in the example executes the Radix Sort. For simplicity it is assumed that the number, N, of characters in the longest word appears left justified on the first data card. Successive data cards contain the list of words with a comma following each word, and with each data card terminating with blanks.

```
* ALPHABETIZATION USING A RADIX SORT TECHNIQUE
*
* FIRST THE SIZE OF THE LONGEST STRING, AND THEN THE LIST
* OF WORDS IS READ INTO STRINGS OF CORRESPONDING NAMES.
* AFTER PRINTING THE LIST THE WORDS ON 'LIST' ARE EXAMINED
* USING THE FIXED-LENGTH STRING VARIABLE FEATURE, IF THE
* WORD IS TOO SHORT, THE WORD IS ADDED TO THE SPECIAL BIN
* (NAMED 'BIN').  OTHERWISE THE LETTER CONTAINED IN'PIT'
* IS THE NAME OF THE BIN INTO WHICH THE WORD IS FILED
* USING THE INDIRECT FEATURE, AFTER ALL WORDS HAVE
* BEEN FILED, THE LIST IS REASSEMBLED AT STATEMENT L5
* AND FOLLOWING STATEMENTS.  NOTE THAT L5 PLACES THE
* CONTENTS OF 'BIN' IN 'LIST' AND AT THE SAME TIME VOIDS
* 'BIN' FOR THE NEXT PASS.  NEXT EACH OF THE BINS IS
* ADDED TO 'LIST' IN ALPHABETIC ORDER, AND THEN VOIDED.
* THE NEXT PASS IS THEN MADE.  WHEN 'SIZE' BECOMES
* NEGATIVE, THE LAST PASS HAS BEEN MADE AND THE ALPHABETIZED
* LIST IS PRINTED OUT.
*
BEGIN      SYSPIT   *SIZE* ' '
START      SYSPIT   *WORDS* ' '    /F(L0)
           LIST     = LIST WORDS   /(START)
L0         SYSPOT   = ' THE LIST TO BE ALPHABETIZED IS - ' LIST
L1         ALPHABET = 'ABCDEFGHIJKLMNOPQRSTUVWXYZ'
L2         SIZE     =  SIZE - '1'
           SIZE       '-'         /S(FIN)
L3         LIST     *WORD* ',' = /F(L5)
           WORD     *HEAD/SIZE*     *PIT/'1'*  /F(L4)
           $PIT     = $PIT WORD ','           /(L3)
L4         BIN      = BIN WORD ',' /(L3)
L5         BIN      *LIST* =
L6         ALPHABET *PIT/'1'* =               /F(L1)
           LIST     =    LIST   $PIT
           $PIT     =                        /(L6)
FIN        SYSPOT   = ' THE ALPHABETIZED LIST IS - ' LIST
END        BEGIN
9
```

```
ARMY,TEST,GLOBAL,ARMORY,GLOBE,ARM,TENSOR,ALIBI,
ARE,GLOW,TENSE,TOTAL,CANCEL,TONSIL,GLADIATOR,
MOBILE,MOTILE,ANY,TORSION,PLATITUDE,FUMBLE,
```

PROGRAM WRITE-UP

SNOBOL 3
August, 1965
David L. Wilson
University of Wisconsin-Milwaukee
Computing Center
Downer & Kenwood
Milwaukee, Wisconsin
Phone: 414-228-4426
User group membership code 3285

A. Restriction

Arithmetic done on a non-numeric string or division by zero will act as a function failute.

No element of a match pattern specification (including string variables) may exceed 4999 characters in length. The number of elements of a match pattern spe cification may not exceed 19.

DEFINE has not been implemented for 1620 SNOBOL3. Indirect string names may not exceed 499 character in length.

On continuation cards, the period is replaced by a blank. All continuation cards are checked separately for balanced quote marks and balanced parentheses.

B. STØPS

The program will loop if switch 2 (the interrupt switch) is on at entry time until the switch is turned off.

The card system will execute a halt at 00796 at the end of execution.

C. OPERATING INSTRUCTIONS

1. Card System

Decks 1 and 2 should be put together and loaded. Core need not be cleared. These decks should be followed by the SNOBOL source deck which, in turn, should be followed by the data. Once the halt at 00796 is executed one can execute the next SNOBOL program by doing a non-process run out on the cards in the read hopper; pressing start; and feeding the next SNOBOL program through.

2. Monitor System

Deck 1 should be kept for doing batch processing runs under the card system.

Deck 2 should have ≠≠ JOB and ≠≠ DUP cards placed in front of it. It should then be run through the MONITOR system.

SNOBOL can then be called by a ≠≠ JOB card, followed by an ≠≠XEQ SNOBOL card, followed by the source deck and data.

3. Sense Switches.

Sense switch 1 is used to print out the 'SNOBOL' statements as they are executed.

Sense switche 2 is used to interrupt a SNOBOL program. This will cause an ERROR 01 message.

Sense switches 3 and 4 are not used.

4. Program Switches

The first four columns of the second card of Deck #2 are zero. These are binary switches used by the interpreter. Any of them can be set initially on instead of initially off by putting a J in the corresponding column. The four switches are, in order, the switches for a printer, listing the source deck, printing control cards, and dumping memory at the end of execution. The next 4 columns contain twice the length of a line on the printer for those that have a 1443 printer. Assumed length is 120 characters.

5. Check Stop Switches

All check stop switches should be to program when running a SNOBOL program.

D. EQUIPMENT REQUIRED.

Required equipment: 1620 model I, 20K, indirect addressing, auto-divide, card I/O.

Development system: 1620 model II, 60K, automatic floating point, two 1311 disk drives, card I/O, and a plotter.

The system can take advantage of extra core up to 100K for storing strings, a disk drive for storing the interpreter, and a printer for SYSPØT output.

E. SNOBOL 3 WAS COMPILED ON SPS II-D

Note: The GØTØ slash is recognized by the fact that it is the only slash which has a blank before it and a non-blank character after it.

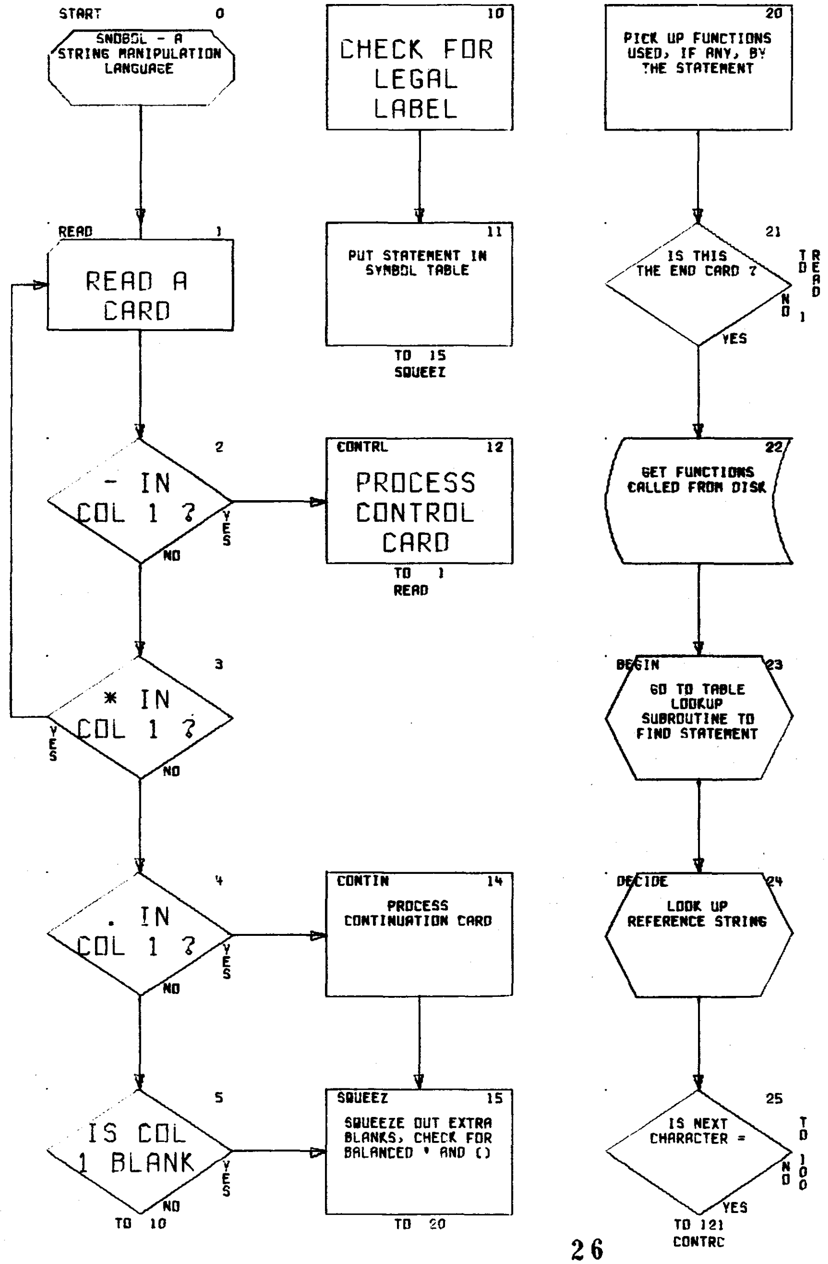
Note: In case a check stop occurs (usually because of an overlap condition), insert a branch to 00796 to go onto the next program.

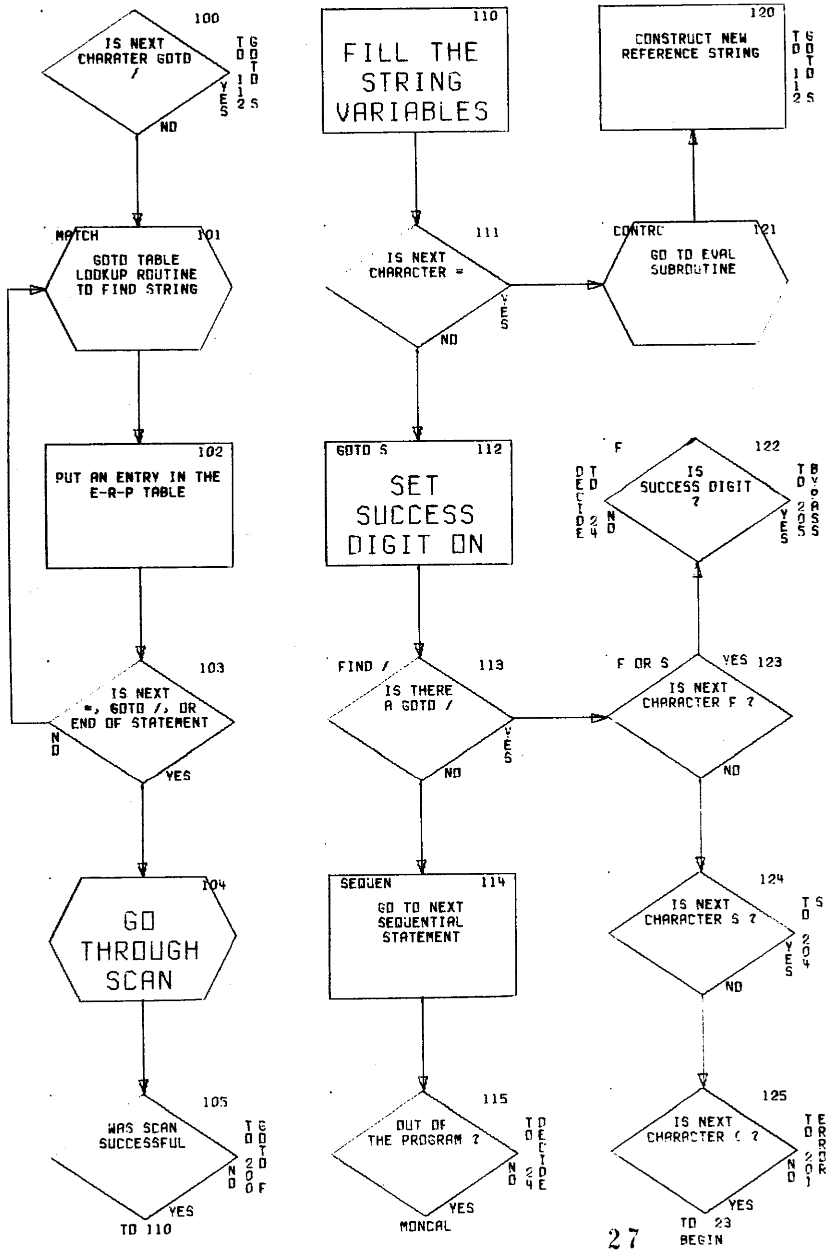
F. SNOBOL NUMBERED ERRØR MESSAGES

| | | |
|---|---|---|
| ERRØR | 01 - | PROGRAM INTERRUPTED BY OPERATOR |
| | 02 - | IMPROPER GROUPING |
| | 03 - | MISSING STRING NAME |
| | 04 - | IMPROPER STRING NAME |
| | 05 - | IMPROPER REFERENCE STRING |
| | 06 - | IMPROPER CONSTRUCTION SPECIFICATION |
| | 07 - | IMPROPER FILLER STRING |
| | 08 - | GROUPING NESTED DEEPER THAN 10 |
| | 09 - | INTEGER EXCEEDS 10 DIGITS |
| | 10 - | UNDEFINED STATEMENT LABEL |
| | 11 - | INCORRECT SUBROUTINE CALL |
| | 12 - | IMPROPER GO TO SPECIFICATION |
| | 13 - | FUNCTION FAILURE IN GO TO |
| | 14 - | IMPROPER FILLER SPECIFICATION |
| | 15 - | ERROR IN SNOBOL INTERPRETER |

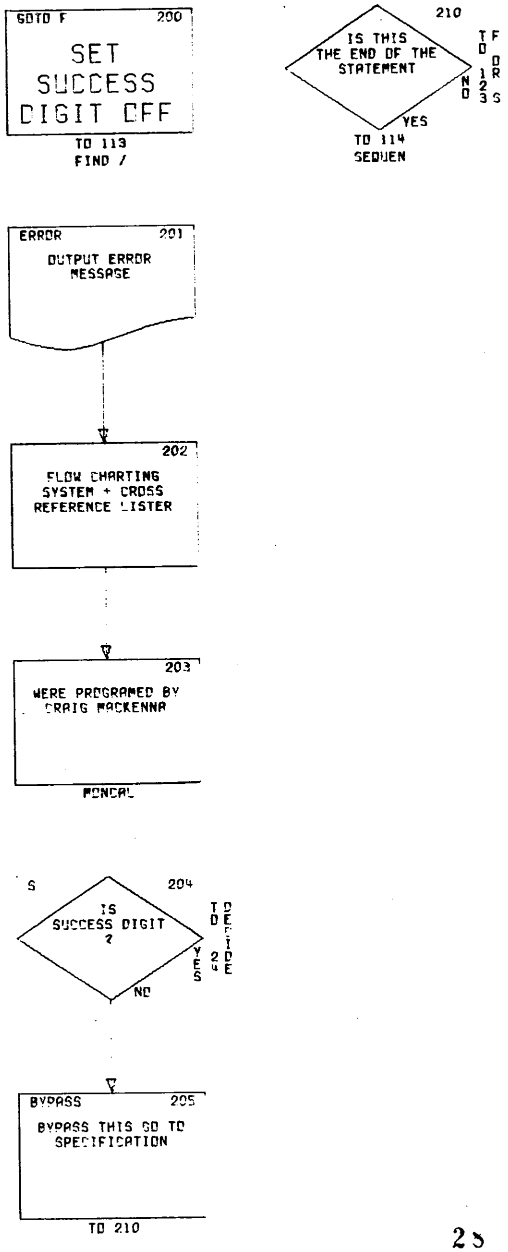
```
-TITLE        A SAMPLE SNOBOL PROGRAM
-PCC
-LIST
*    ALPHABETIZATION USING A RADIX SORT TECHNIQUE
*    READ THE NUMBER OF COLUMNS TO BE SORTED ON
      SYSPIT      *SZ* @ @
*    READ THE LIST OF WORDS TO BE ALPHABETIZED
      SYSPIT      *LT* @ @
*    DEFINE ALPHABETIZING SEQUENCE
1     AL          = @.ABCDEFGHIJKLMNOPQRSTUVWXYZ@
*    DECREASE SZ BY ONE
      SZ          = SZ - @1@
*    IF SZ IS NEGATIVE, WE ARE FINISHED
      SZ          @-@                             /S(F)
*    TAKE NEXT WORD FROM LIST - GO TO RECOMBINE WORDS ON FAILURE
3     LT          *WD* @,@ =                      /F(6)
*    PUT A PERIOD IN ‡
      ‡           = @.@
*    BYPASS FIRST SZ LETTERS IN WD AND PUT NEXT LETTER IN ‡
*    IF THIS STATEMENT FAILS (NO MORE THAN SZ LETTERS IN WD) THEN ‡ WILL
*      RETAIN ITS CONTENTS OF @.@
      WD          *HD/SZ* *‡/@1@*
*    ADD WORD INTO THE INDIRECT ‡ POCKET - GO BACK FOR NEXT WORD
      $‡          = $‡ WD @,@                     /(3)
*    TAKE OFF NEXT LETTER - GO BACK FOR NEXT COLUMN ON FAILURE
6     AL          *‡/@1@* =                       /F(1)
*    PLACE INDIRECT ‡ LIST BACK INTO LT
      LT          = LT $‡
*    DELETE INDIRECT ‡ STRING AND GO BACK FOR  NEXT LETTER
      EP          *$‡*                            /(6)
*    PRINT ALPHABETIZED LIST
F     SYSPOT      = LT
*THATS ALL FOLKS
END

ALIBI,ARE,ARM,ARMORY,ARMY,GLOBAL,GLOBE,TENSOR,TEST,
```

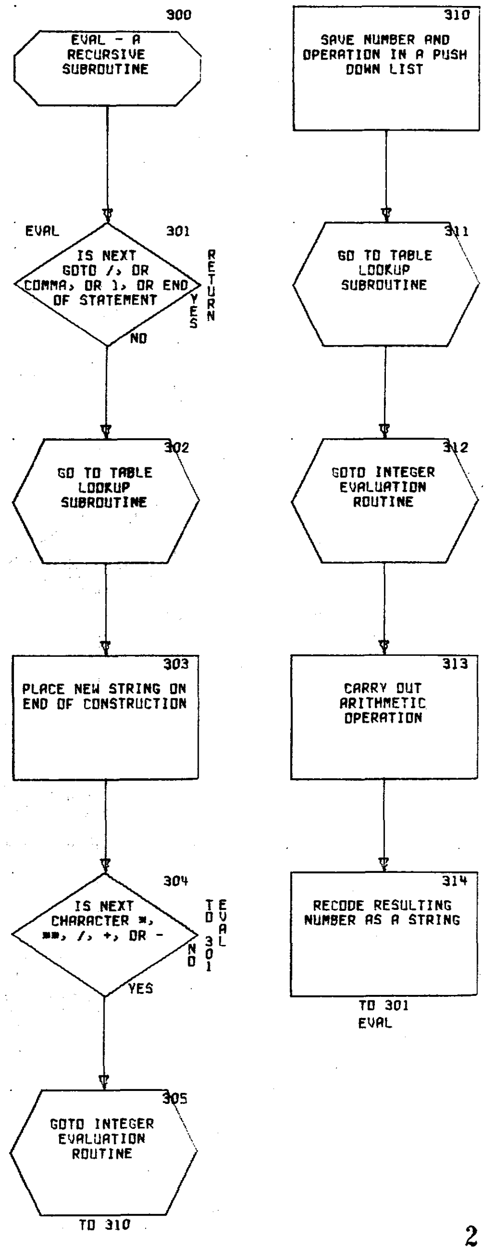


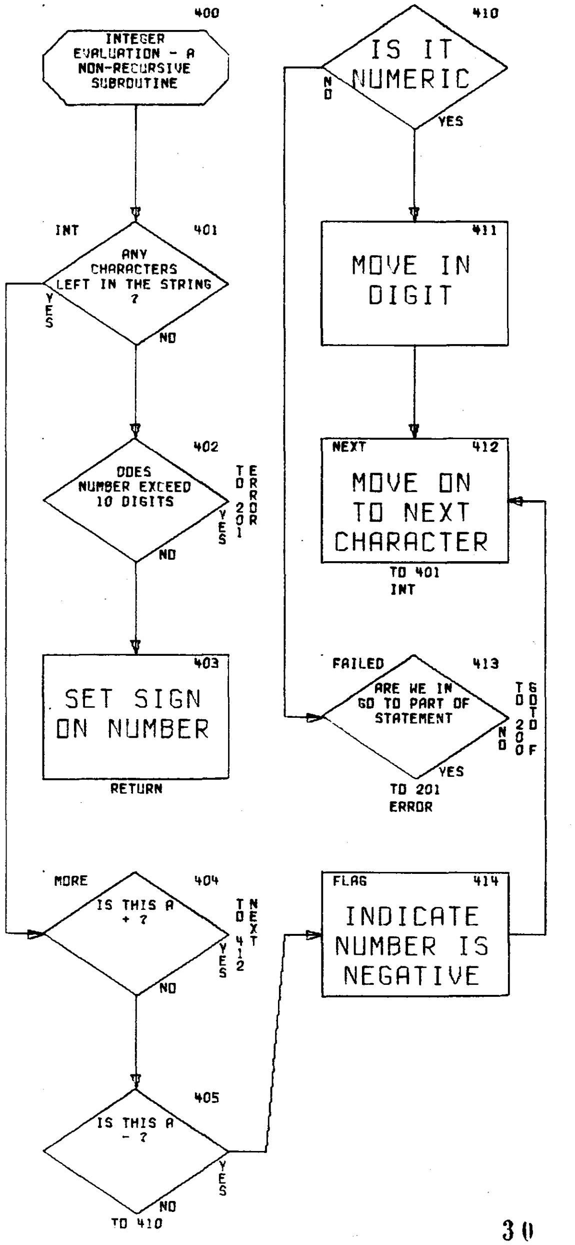


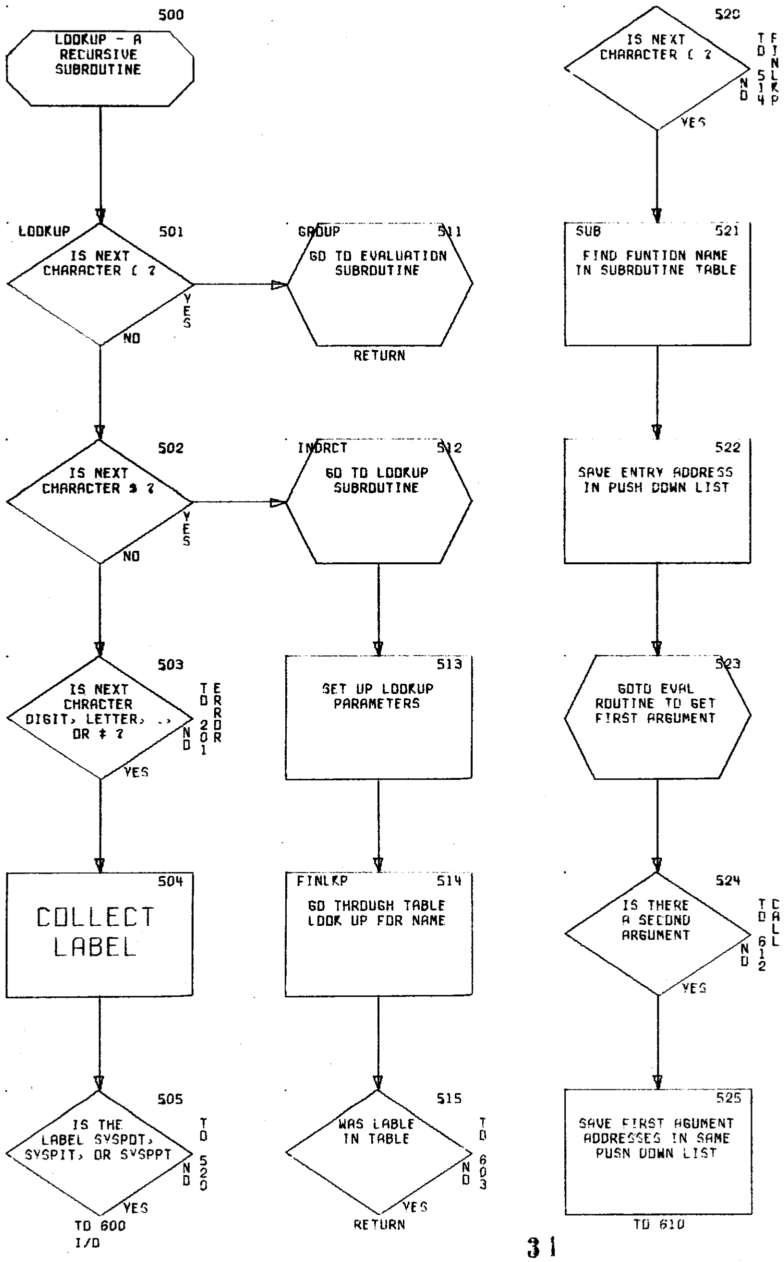
100
IS NEXT CHARATER GOTO /
YES TO GOTO 112S
NO
MATCH 101
GOTO TABLE LOOKUP ROUTINE TO FIND STRING
102
PUT AN ENTRY IN THE E-R-P TABLE
103
IS NEXT =, GOTO /, OR END OF STATEMENT
NO
YES
104
GO THROUGH SCAN
105
WAS SCAN SUCCESSFUL
NO TO GOTO 200F
YES
TO 110
110
FILL THE STRING VARIABLES
111
IS NEXT CHARACTER =
YES
NO
GOTO S 112
SET SUCCESS DIGIT ON
FIND / 113
IS THERE A GOTO /
YES
NO
SEQUEN 114
GO TO NEXT SEQUENTIAL STATEMENT
115
OUT OF THE PROGRAM ?
NO TO DECIDE 24
YES
MONCAL
120
CONSTRUCT NEW REFERENCE STRING
TO GOTO 112S
CONTRC 121
GO TO EVAL SUBROUTINE
F 122
IS SUCCESS DIGIT ?
NO TO DECIDE 24
YES TO BYPASS 205
F OR S
YES 123
IS NEXT CHARACTER F ?
NO
124
IS NEXT CHARACTER S ?
YES TO S 204
NO
125
IS NEXT CHARACTER ( ?
NO TO ERROR 201
YES
TO 23 BEGIN

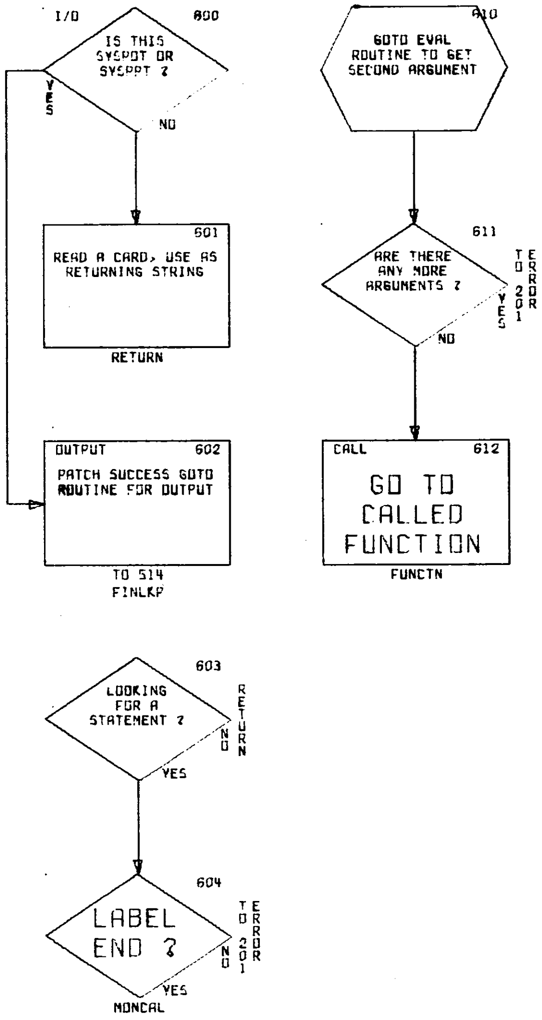


GOTO F 200
SET SUCCESS DIGIT OFF
TO 113 FIND /
ERROR 201
OUTPUT ERROR MESSAGE
202
FLOW CHARTING SYSTEM + CROSS REFERENCE LISTER
203
WERE PROGRAMED BY CRAIG MACKENNA
MONCAL
S 204
IS SUCCESS DIGIT ?
YES TO DECIDE 24
NO
BYPASS 205
BYPASS THIS GO TO SPECIFICATION
TO 210
210
IS THIS THE END OF THE STATEMENT
NO TO FOR 123S
YES
TO 114 SEQUEN


300
EVAL - A RECURSIVE SUBROUTINE
EVAL
301
IS NEXT GOTO /, OR COMMA, OR ), OR END OF STATEMENT
YES
RETURN
NO
302
GO TO TABLE LOOKUP SUBROUTINE
303
PLACE NEW STRING ON END OF CONSTRUCTION
304
IS NEXT CHARACTER *, **, /, +, OR -
NO
TO 301 EVAL
YES
305
GOTO INTEGER EVALUATION ROUTINE
TO 310
310
SAVE NUMBER AND OPERATION IN A PUSH DOWN LIST
311
GO TO TABLE LOOKUP SUBROUTINE
312
GOTO INTEGER EVALUATION ROUTINE
313
CARRY OUT ARITHMETIC OPERATION
314
RECODE RESULTING NUMBER AS A STRING
TO 301
EVAL


400
INTEGER EVALUATION - A NON-RECURSIVE SUBROUTINE
INT
401
ANY CHARACTERS LEFT IN THE STRING ?
YES
NO
402
DOES NUMBER EXCEED 10 DIGITS
YES
TO 201 ERROR
NO
403
SET SIGN ON NUMBER
RETURN
MORE
404
IS THIS A + ?
YES
TO 412 NEXT
NO
405
IS THIS A - ?
YES
NO
TO 410
410
IS IT NUMERIC
NO
YES
411
MOVE IN DIGIT
NEXT
412
MOVE ON TO NEXT CHARACTER
TO 401
INT
FAILED
413
ARE WE IN GO TO PART OF STATEMENT
NO
TO 200 GOTOF
YES
TO 201
ERROR
FLAG
414
INDICATE NUMBER IS NEGATIVE


500
LOOKUP - A RECURSIVE SUBROUTINE
LOOKUP
501
IS NEXT CHARACTER ( ?
YES
NO
GROUP
511
GO TO EVALUATION SUBROUTINE
RETURN
502
IS NEXT CHARACTER $ ?
YES
NO
INDRCT
512
GO TO LOOKUP SUBROUTINE
503
IS NEXT CHRACTER DIGIT, LETTER, ., OR # ?
NO
TO ERROR 201
YES
513
SET UP LOOKUP PARAMETERS
504
COLLECT LABEL
FINLKP
514
GO THROUGH TABLE LOOK UP FOR NAME
505
IS THE LABEL SYSPOT, SYSPIT, OR SYSPPT
NO
TO 520
YES
TO 600
I/O
515
WAS LABLE IN TABLE
NO
TO 603
YES
RETURN
520
IS NEXT CHARACTER ( ?
NO
TO 514
FINLKP
YES
SUB
521
FIND FUNTION NAME IN SUBROUTINE TABLE
522
SAVE ENTRY ADDRESS IN PUSH DOWN LIST
523
GOTO EVAL ROUTINE TO GET FIRST ARGUMENT
524
IS THERE A SECOND ARGUMENT
NO
TO 612
CALL
YES
525
SAVE FIRST AGUMENT ADDRESSES IN SAME PUSN DOWN LIST
TO 610


I/O
600
IS THIS SYSPOT OR SYSPPT ?
YES
NO
601
READ A CARD, USE AS RETURNING STRING
RETURN
OUTPUT
602
PATCH SUCCESS GOTO ROUTINE FOR OUTPUT
TO 514
FINLKP
603
LOOKING FOR A STATEMENT ?
NO
RETURN
YES
604
LABEL END ?
NO
TO ERROR 201
YES
NONCAL
610
GOTO EVAL ROUTINE TO GET SECOND ARGUMENT
611
ARE THERE ANY MORE ARGUMENTS ?
YES
TO ERROR 201
NO
CALL
612
GO TO CALLED FUNCTION
FUNCTN

The following is the last half of Bell Labs' description of the scanning algorithm.

## 2. The Scanning Algorithm

This section describes in detail an algorithm to achieve the pattern matching according to the rules given in Section 1.3. The total number of possible matches for pattern elements may grow quickly as the number of pattern elements or the length of the string increases. Clearly the greatest number of attempts will be made when the pattern fails to match. In applications such as SNOBOL, where the matching is done frequently, the efficiency of the scanning algorithm is critical. Consequently short cuts have been introduced. Weights associated with pattern elements are introduced to detect early in the matching process situations in which the string is too short to satisfy the requirements of the remaining pattern elements.

The situation that exists when a pattern element fails to match is used to bypass attempts at matches that would necessarily fail. The scanner is organized so that the complex mechanism required for matching balanced or back-referenced elements does not affect the efficiency of the scanner until these types of elements are encountered. Other short cuts will be described in appropriate places in the following sections.

### 2.1 Notation

(i) The pattern to be matched is denoted by

$$E_1 \ E_2 \ \ldots \ E_n$$

where $E_i$ refers to the $i^{th}$ pattern element

and

$$E_i = \begin{array}{lll} A & \text{for} & \text{an arbitrary string variable} \\ B & \text{for} & \text{a balanced string variable} \\ F & \text{for} & \text{a fixed-length string variable} \\ K & \text{for} & \text{a constant} \\ R & \text{for} & \text{a back-referencing constant} \end{array}$$

If $E_i = R$, the element back referenced by $E_i$ is denoted by

$E_i$*. When it is necessary to indicate that a string variable $E_i$ is back referenced, it is written $E_i^*$.

(ii) The string to be matched is denoted by

$$C_1\ C_2\ \cdots\ C_m$$

when $C_j$ is the $j^{th}$ symbol in the string.

(iii) The pointer $p_i$ is the index of the first symbol in the substring matching $E_i$.

## 2.2 Weights

A weight $r_i$ is assigned to each $E_i$ corresponding to the length of the shortest acceptable value of $E_i$. Thus

$$r_i = \begin{array}{l} 0 \quad \text{if} \quad E_i = A \\ 1 \quad \text{if} \quad E_i = B \\ \text{length of the constant if } E_i = K \\ \text{specified length if } E_i = F \\ r_i* \quad \text{if} \quad E_i = R \end{array}$$

The minimum length of the string to match pattern elements $E_i \cdots E_n$ is

$$w_i = \sum_{j=i}^{n} r_j$$

## 2.3 Augmented Pattern

To simplify the scanning algorithm and facilitate the handling of pointers, two dummy arbitrary string variables are added to the pattern. One is added to the beginning and one to the end. The scanner operates on this augmented pattern

$$E_o\ E_1\ \cdots\ E_n\ E_{n+1}$$

Since the arbitrary string variable $E_o$ can always be extended, no special mechanism is necessary to handle rule 1.

The dummy arbitrary string variable $E_{n+1}$ merely provides the pointer $p_{n+1}$ which determines the end of the substring matching $E_n$.

## 2.4 Basic Structure of the Scanner

In general when an attempt is being made to match $E_i$ the pointer $p_i$ has already been determined. A successful match for $E_i$ yields a value for $p_{i+1}$. Thus the pointers $p_i$ and $p_{i+1}$ identify the substring matching $E_i$.

Initially, according to rules 1 and 2, the void substring beginning at the first symbol of the string is assigned to $E_o$. This is accomplished by setting

$$p_o = p_1 = 1$$

Having assigned the void substring to $E_o$, an attempt is made to match $E_1$ starting at the $p_1$-st symbol of the string. The match then proceeds according to rules 2, 3, and 4. Figure 1 illustrates the general structure of the scanner. The remainder of Section 2 describes the details of the algorithm for handling rules 2 and 3.

## 2.5 Algorithm for Rule 2

Before an attempt is made to match $E_i$ the first time, a size test is made to assure that the string satisfies the

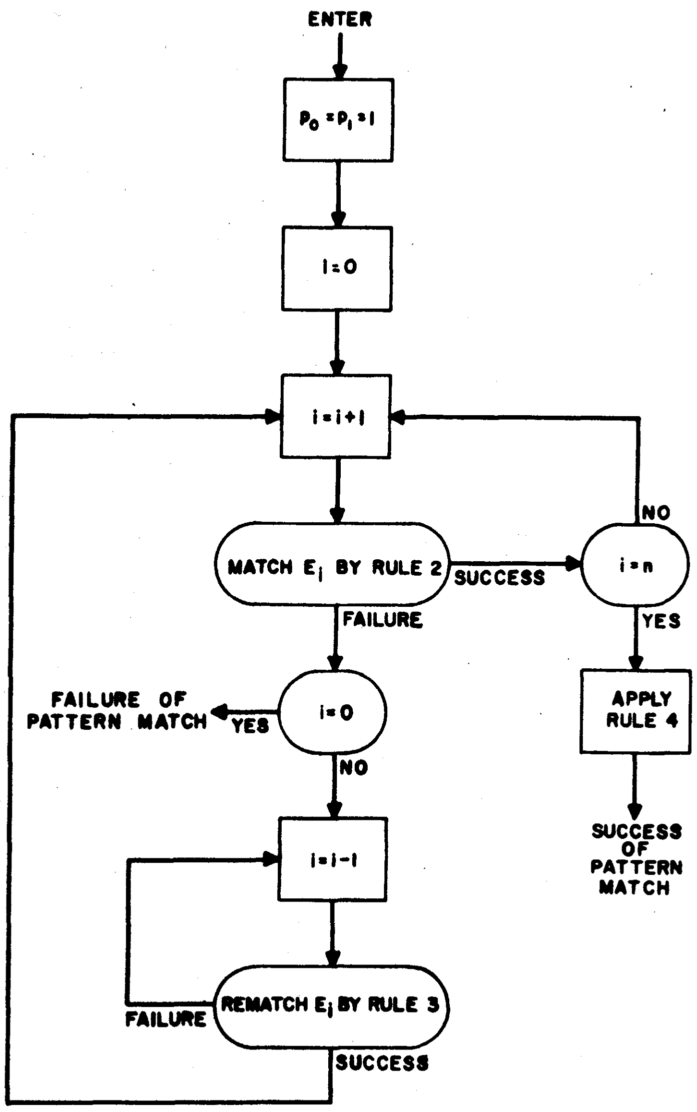


FIG. I

General Structure of Scanner

minimal length requirements of the pattern. This test is satisfied if

$$w_0 \leq m$$

In general the minimal requirements of $E_i \dots E_{n+1}$ are satisfied if

$$p_i - 1 + w_i \leq m$$

Otherwise a size failure occurs.

After the initial size test has been made, further size tests are necessary only when the length of a substring assigned to $E_i$ is greater than $r_i$.

According to rule 2 pointers are assigned to $E_i$ as follows:

(1) A: $p_{i+1} = p_i$ (assigning the void substring)

(2) F: $p_{i+1} = p_i + r_i$

(3) K: If $C_{p_i} \dots C_{p_i + r_i - 1}$ is the acceptable value of $E_i$, then $p_{i+1} = p_i + r_i$. Otherwise a match failure for $E_i$ occurs.

(4) R: Let s be the length of the string currently assigned to $E_i*$ $(s = p_{i^*+1} - p_{i^*})$. If $p_i + s > m$ a size failure occurs. If $C_{p_i} \dots C_{p_i + s - 1}$ is the same as the substring currently matching $E_i*$, then $p_{i+1} = p_i + s$. Otherwise a match failure occurs.

(5) B: If $C_{p_i}$ is not a parenthesis, $p_{i+1} = p_i + 1$. If $C_{p_i}$ is a right parenthesis, a match failure occurs.

Otherwise a parenthesis count is made to assign the shortest balanced substring to $E_i$. If no balanced substring beginning at $C_{p_i}$ can be found, a match failure occurs. The details of the method of finding the length s of the shortest balanced string beginning at $C_j$ are given in Figure 2.

The flow chart for the algorithm for rule 2 is given in Figure 3. The setting of the S flag is required for the application of rule 3 as will be explained later.

Note that it is necessary to apply a size test only after matching a B or R.

2.6 Algorithm for Rule 3

Efficiencies are introduced into the algorithm for rematching (rule 3) by considering separately the types of failures that occur.

2.6.1 Match Failure

A match failure for $E_i$ can occur if $E_i$ equals K, B, or R. According to rule 3 an attempt is to be made to rematch the preceding element $E_{i-1}$ by extending its matching substring. However, if $E_{i-1}$ equals F, R, or K, no extension can be made. This is equivalent to a match failure for $E_{i-1}$.

Therefore, the index i is decremented until $E_i$ equals A or B. If $E_i$ = A, set $p_{i+1} = p_{i+1}+1$ and return to rule 2. If $E_i$ = B, the rematch for $E_i$ is obtained by

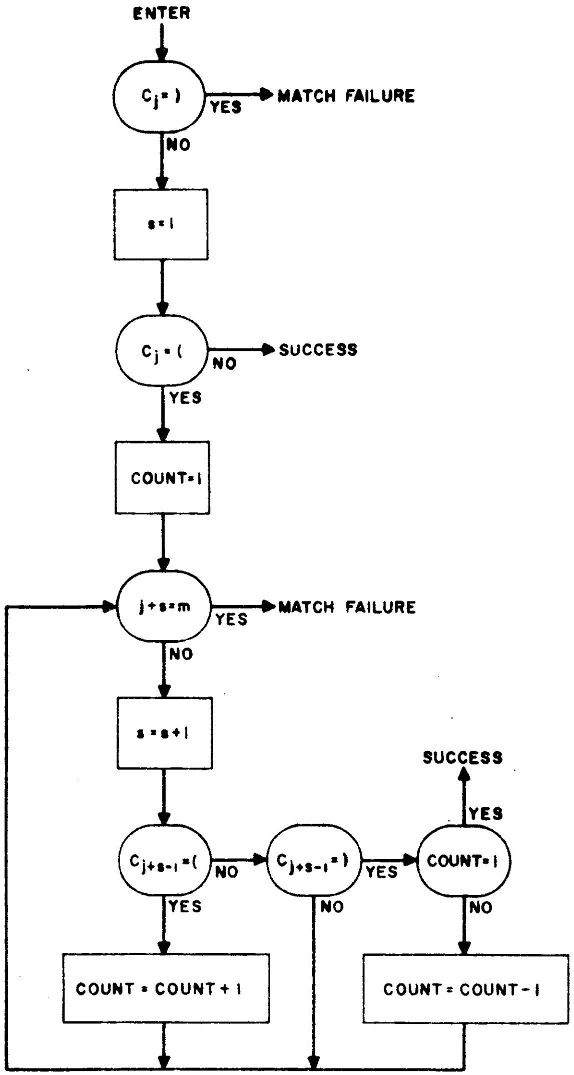


*FIG. 2*

Flow Chart for Balanced Scanner

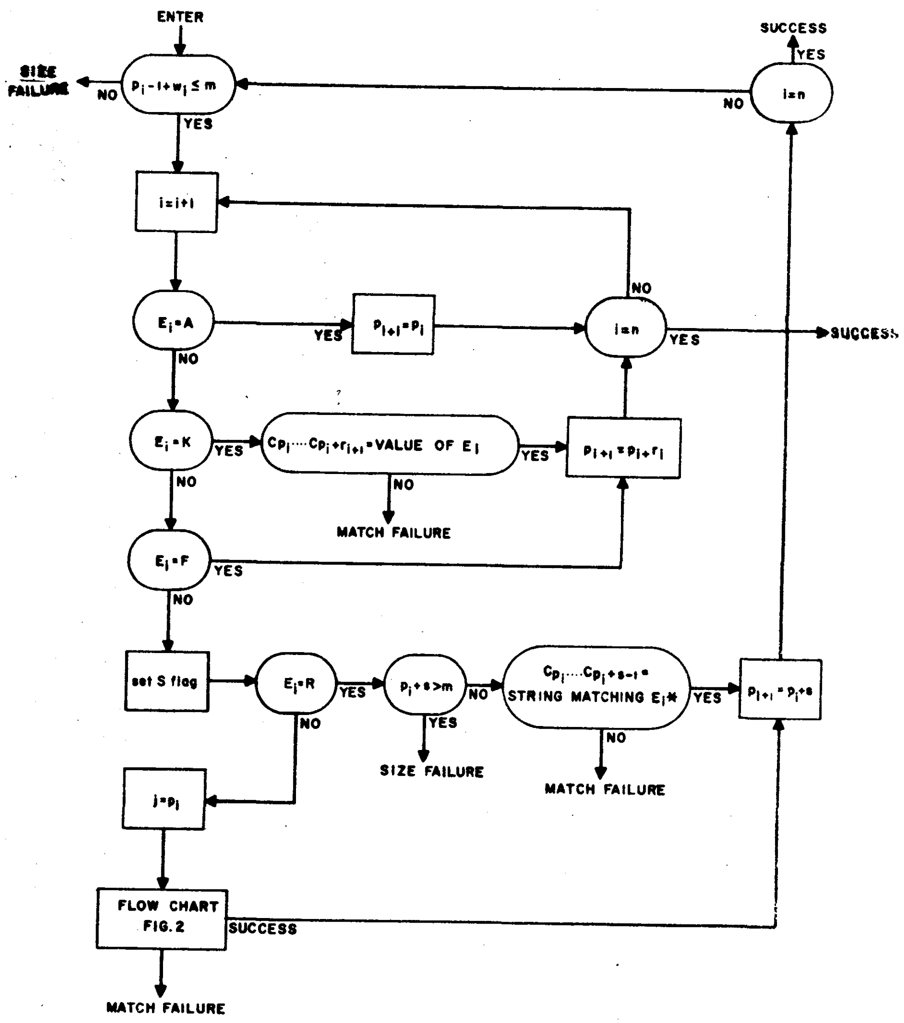


*FIG. 3*

Flow Chart for Rule 2

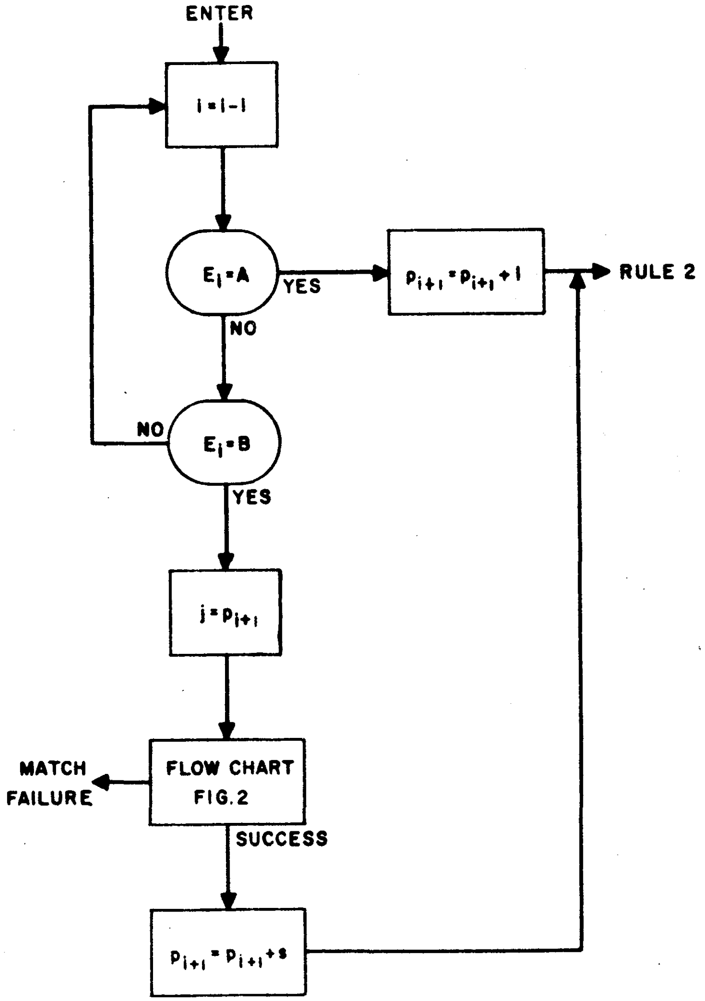


*FIG. 4*

Flow Chart for Match Failure

appending the shortest balanced substring starting at $C_{p_{i+1}}$ to the substring currently matching $E_i$. The length s of this balanced substring is obtained by the method described in Figure 2 and $p_{i+1}$ is set equal to $p_{i+1}$+s-1. Then return is made to rule 2. The flow chart of the algorithm for a match failure is given in Figure 4.

2.6.2 Size Failure

A size failure at $E_i$ occurs if the number of symbols remaining in the string is insufficient to satisfy the minimal requirements of the elements remaining to be matched. The pattern match can succeed only if shorter substrings can be assigned to previous elements. Although application of rule 3 can only lengthen matching substrings, the substrings assigned to subsequent elements may be shortened as a result.

If the S flag has not been set, only A, K, or F elements have been matched. No attempt to extend an A element can result in a shorter match because the matches made before the occurrence of the size failure have exhausted the possibilities of a shorter match. Hence the pattern match fails.

If the S flag is set, a shorter substring matching $E_o$ ... $E_i$ can be obtained only if a shorter match can be found for a B or A* (i.e., a back-referenced A) element. Thus, in applying rule 3 the index i is decremented until $E_i$ is B or A*. A B element $E_i$ may match a shorter substring if its

initial pointer $p_i$ is increased by rematching an element previous to $E_i$. A shorter match for an A* may be obtained in the same way, yielding a shorter value for the corresponding R element. Since a pattern match cannot succeed with the current value of $p_i$, a match failure for $E_i$ exists. The flow chart of the algorithm for handling size failure is given in Figure 5.

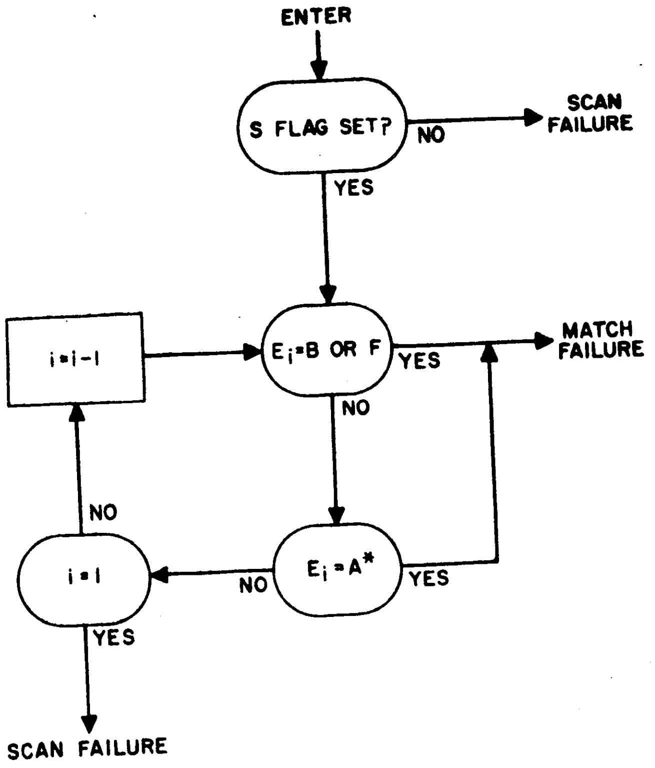


*FIG. 5*

Flow Chart for Size Failure

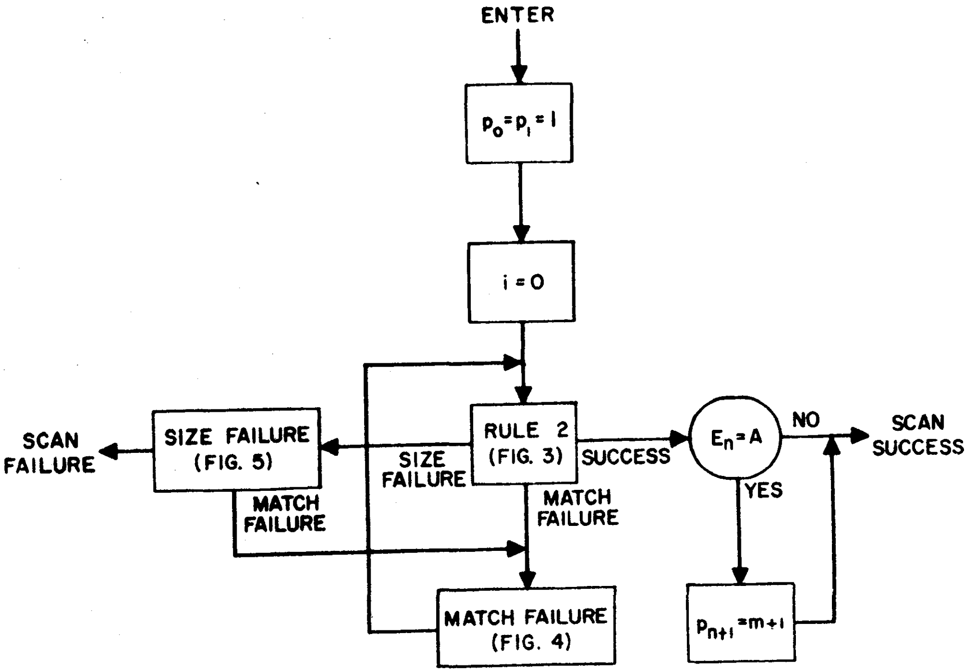


*FIG. 6*

Flow Chart of the Complete Scanner

## 2.7 Flow Chart of the Scanner

The method of matching patterns according to rules 1-3 has been described in the previous sections. Using the flow charts already introduced, the flow chart for the complete scanner is shown in Figure 6. Details concerning initialization and extending a terminal A element (rule 4) are included.

## ACKNOWLEDGMENT

The notation for describing patterns arose in the development of SNOBOL by the authors and Mr. D. J. Farber. The authors also gratefully acknowledge Mr. Farber's many helpful suggestions during the development of the scanning algorithm.

## REFERENCE

1. Farber, D.J., Griswold, R.E., and Polonsky, I.P., SNOBOL, A String Manipulation Language. J. ACM 11 (1964), 21-30.

```
00010*
00020******      SNOBOL, A STRING MANIPULATION LANGUAGE
00030******      FOR THE IBM 1620 MONITOR SYSTEM
00040*
00050           DORG  2302                                                        02302
00060 PRINTR DSC   1,0                                                           02302 00001
00070 LIST2  DSC   1,0                                                           02303 00001
00080 PCC2   DSC   1,0                                                           02304 00001
00090 DUMPSW DSC   1,0                                                           02305 00001
00100 LENGTH DC    4,240         ,,,LENGTH OF 1443 PRINTER LINE                  02309 00004
00110        DSC   2,10                                                          02310 00002
00120 SUBLST DSAC  6,  PUSH,,    ,,,SUBROUTINE LIST                              02323 00012
00130        DSC   5,600'                                                        02324 00005
00140        DAC   6,   POP,,    ,,,ENTRIES CONTAIN THE SUBROUTINE NAME          02331 00012
00150        DSC   5,601'        ,,,FOLLWED BY ITS DIM NUMBER AND A RECORD MAR   02342 00005
00160        DAC   6,.REMDR,,    ,,,THE DIM NUMBER  WILL BE FLAGED DURING        02349 00012
00170        DSC   5,602',,      ,,,THE READING OF THE PROGRAM IF THAT           02360 00005
00180        DAC   6,  MODE,,    ,,,SUBROUTINE IS CALLED                         02367 00012
00190        DSC   5,603',,      ,,,THE DIM NUMBER AND RECORD MARK WILL BE       02378 00005
00200        DAC   6,  SIZE,,    ,,,REPLACED BY THE ENTRY ADDRESS (DEND          02385 00012
00210        DSC   5,604',,      ,,,ADDRESS) TO THE SUBROUTINE AS THE            02396 00005
00220        DSAC  6,  TRIM,,    ,,,SUBROUTINES USED ARE LOADED ABOVE THE        02413 00012
00230        DSC   5,605',,      ,,,SOURCE PROGRAM.                              02414 00005
00240        DSAC  6,ANCHOR,,    ,,,ALL SUBROUTINES MUST BE RELOCATABLE          02431 00012
00250        DSC   5,606',,                                                      02432 00005
00260        DSAC  6,UNANCH,,    ,,,SUBROUTINE NAMES MUST BE RIGHT JUSTIFIED     02449 00012
00270        DSC   5,607',,                                                      02450 00005
00280        DAC   6,EQUALS,,                                                    02457 00012
00290        DSC   5,608',,                                                      02468 00005
00300        DAC   6, UNEQL,,                                                    02475 00012
00310        DSC   5,609',,                                                      02486 00005
```

```
00320        DAC   6,   .EQ,,                                                    02493 00012
00330        DSC   5,610',,                                                      02504 00005
00340        DAC   6,   .NE,,                                                    02511 00012
00350        DSC   5,611',,                                                      02522 00005
00360        DAC   6,   .LE,,                                                    02529 00012
00370        DSC   5,612',,                                                      02540 00005
00380        DAC   6,   .LT,,                                                    02547 00012
00390        DSC   5,613',,                                                      02558 00005
00400        DAC   6,   .GE,,                                                    02565 00012
00410        DSC   5,614',,                                                      02576 00005
00420        DAC   6,   .GT,,                                                    02583 00012
00430        DSC   5,615',,                                                      02594 00005
00440        DAC   6,  .NUM,,                                                    02601 00012
00450        DSC   5,616',,                                                      02612 00005
00460        DAC   6,RRRRRR,,                                                    02619 00012
00470        DSC   5,',,,                                                        02630 00005
00480        DAC   6,RRRRRR,,                                                    02637 00012
00490        DSC   5,',,,                                                        02648 00005
00500        DAC   6,RRRRRR,,                                                    02655 00012
00510        DSC   5,',,,                                                        02666 00005
00520        DAC   6,RRRRRR,,                                                    02673 00012
00530        DSC   5,',,,                                                        02684 00005
00540        DSAC  6,RRRRRR,,    ,,,A NAME OF RRRRRR INDICATES A DUMMY ENTRY     02701 00012
00550        DSC   5,',,,                                                        02702 00005
00560        DAC   6,     ',     ,,,TRAILER ENTRY                                02709 00012
00570        DC    1,'                                                           02720 00001
00580*
00590******      READ SOURCE CARDS, PLACE REC. MARK AFTER LAST CHARACTER,
00600******        STACK CARD IN CORE, SAVE ADDRESS OF WHERE IT WAS PUT.
00610*
00620 POT    DAC   7,SYSPOT ,                                                    02723 00014
```

```
00630 PPT     DAC    7,SYSPPT ,                                             02737 00014
00640 PIT     DAC    7,SYSPIT ,                                             02751 00014
00650 INPUT   DAC    50,                                               ,    02765 00100
00660         DSC    30,0                                                   02864 00030
00670         DSC    32,'                                                   02894 00032
00630 RMARK   DS     ,*                                                     02925 00000
00690 DCA     DCA    ,INPUT                                                 02926 00005 02765
                                                                            02931 00003 10G

00700         BNF    SKIPIT,CORE                                            02934 44 02994 02957
00710 START   TDM    0,-1,7          ,,,FIND CORE SIZE                      02946 15 00000 00001
00720         AM     CORE,20000                                             02958 11 02957 20000
00730         TR     -CORE,RMARK-1                                          02970 31 02957 02924
00740 CORE    DS     ,START+11                                              02957 00000
00750         BNR    *-24,0                                                 02982 45 02958 00000
00760 SKIPIT  BC2     *              ,,,MAKE SURE SW. 2 IS OFF              02994 46 02994 00200
00770         TFM    PL8,INPUT+8     ,,,DEFINE FOR ERROR 10 ON END CARD     03006 16 12011 02773
00780         TDM    ER,0            ,,,RESET ERROR INDICATOR               03018 15 03742 00000
00790         TF     PAST ,CORE                                             03030 26 03548 02957
00800         TD     PAST ,RMARK,6 ,,,PLACE IN TRAILER ENTRY                03042 25 03548 02925
00810         TFM    CURRNT,LAST-1                                          03054 16 03762 17868
00820 READ    BTM     GET,42,10                                             03066 17 12082 00042
00830         SF     INPUT-1         ,,,MAKE SURE FLAG IS STILL THERE       03078 32 02764 00000
00840         TDM    SLINDC,0                                               03090 15 03100 00000
00850 SLINDC  DS     ,*-1                                                   03100 00000
00860         TFM    SEARCH+6,INPUT+72*2                                    03102 16 03120 02909
00870 SEARCH  TD     *-*,RMARK       ,,,SET RECORD MARK                     03114 25 00000 02925
00880         SM     SEARCH+6,2,10                                          03126 12 03120 00002
00890 C00     DAC    1, ,*-2                                                03135 00002
00900         C      C00,SEARCH+6,11,,IS IT A BLANK                         03138 24 03135 03120
00910         BE     SEARCH                                                 03150 46 03114 01200
00920         CM     SEARCH+6,INPUT,,,TEST FOR BLANK CARD                   03162 14 03120 02765
```

```
00930         BL     READ                                                   03174 47 03066 01300
00940         CM     INPUT,20,10     ,,,CHECK FOR CONTRL CARD               03186 14 02765 00020
00950 C34     DC     2,34,*-2                                               03195 00002
00960         BE     CONTRL                                                 03198 46 16976 01200
00970         BNF    *+24,LIST2                                             03210 44 03234 02303
00980         BTM    WATY,INPUT                                             03222 17 12226 02765
00990         CM     INPUT,14,10     ,,,CHECK FOR COMMENT CARD              03234 14 02765 00014
01000         BE     READ                                                   03246 46 03066 01200
01010         TFM    CHECK+11,INPUT                                         03258 16 03877 02765
01020         TDM    SPDG,-1                                                03270 15 03900 00001
01030         CM     INPUT,40,10     ,,,MAKE SURE FIRST IS LETTER OR DIGIT  03282 14 02765 00040
01040 C40     DS     ,*                                                     03293 00000
01050 C03     DAC    1,.,*-2                                                03291 00002
01060         BL     NOT ME                                                 03294 47 03598 01300
01070         TFM    COLDIF,-1,9                                            03306 16 09395 00001
01080 CHLB    C      C00,-PLACE      ,,,FIND END OF LABEL                   03318 24 03135 03877
01090         BE     CHLBOT                                                 03330 46 03434 01200
01100         AM     PLACE,2,10                                             03342 11 03877 00002
01110         AM     COLDIF,2,10                                            03354 11 09395 00002
01120         BNR    CHLB,-PLACE                                            03366 45 03318 03877
01130         CM     PLACE,INPUT+6                                          03378 14 03877 02771
01140         BNE    ERI                                                    03390 47 03678 01200
01150         C     INPUT+4,END-2  ,,,MAYBE END CARD WITH NO LABEL          03402 24 02769 05285
01160         BNE    ERI                                                    03414 47 03678 01200
01170         B7     ENDC                                                   03426 49 04870 00000
01180 CHLBOT  TFM    PERMIS,00,9     ,,,SET UP LINKAGE TO TABLE LOOKUP ROUTINE  03434 16 07971 00000
01190         TDM    DEFINE,-1                                              03446 15 08248 00001
01200         TF     COLRET,PLACE                                           03458 26 08593 03877
01210         SM     COLRET,2,10                                            03470 12 08593 00002
01220         TF     2218+13,SBCKCL,,,CONTRUCT NEW SYMBOL TABLE ENTRY       03482 26 02231 04359
01230         TF     2218+4,CURRNT                                          03494 26 02222 03762
```

```
01240          A     2218+4,COLDIF                                            03506 21 02222 09395
01250          A      2218+9,COLDIF                                           03518 21 02227 09395
01260          SM     PAST,10,10                                              03530 12 03548 00010
01270          TF     -PAST,2218+9                                            03542 26 03548 02227
01280 PAST     DS     ,*-5                                                    03548 00000
01290          TFM    PUSH4,*+20,0                                            03554 16 08183 03574
01300          B7     FINLKP                                                  03566 49 08502 00000
01310 HP20     BD     CHECK,DEFINE                                            03574 43 03866 08248
01320          BTM    ERR1,ERRRR5                                             03586 17 03696 05251
01330 NOTME    CM     INPUT,0,10                                              03598 14 02765 00000
01340          BE     CHECK          ,,,    OR BLANK                          03610 46 03866 01200
01350          CM     INPUT,03,10    ,,,CHECK FOR CONTINUATUON                03622 14 02765 00003
01360          BNE     ERI                                                    03634 47 03678 01200
01370          TFM     INPUT,0,10    ,,,BLANK OUT PERIOD                      03646 16 02765 00000
01380          SM     CURRNT,2,10    ,,,GO BACK OVER REC MARK                 03658 12 03762 00002
01390          B7     CHECK                                                   03670 49 03866 00000
01400 ERI      BTM    ERR1,ERRRR                                              03678 17 03696 05143
01410          DS      5                                                      03694 00005
01420 ERR1     BD     *+24,LIST2                                              03696 43 03720 02303
01430          BTM     WATY,INPUT                                             03708 17 12226 02765
01440          BT      WATY,ERR1-1                                            03720 27 12226 03695
01450          TDM    ER,1                                                    03732 15 03742 00001
01460 ER       DS     ,*-1                                                    03742 00000
01470          TFM    CK2+11,0                                                03744 16 04749 00000
01480 OK       TR     LAST-1,INPUT-1,2,STACK CARD IN MEMORY                   03756 31 17868 02764
01490          SM     SEARCH+6,INPUT-4                                        03768 12 03120 02761
01500          A      CK+6,SEARCH+6                                           03780 21 03762 03120
01510          C      CURRNT,PAST    ,,,CHECK FOR OVERLAP                     03792 24 03762 03548
01520          BL     READ                                                    03804 47 03066 01300
01530 OVLAP    BTM    WATY,OVLP                                               03816 17 12226 03841
01540          BTM    EJECT,796                                               03828 17 12400 00796
```

```
01550 OVLP     DMES   ,A,CORE CVERLAP(E)                                      03841 00028
01560          DORG   *-1                                                     03866
01570 CHECK    C      C00,CHECK+11,11,,SQUEEZE OUT EXTRA BLANKS               03866 24 03135 03877
01580          BE     CK4                                                     03878 46 04498 01200
01590          TDM    SPDG,-1                                                 03890 15 03900 00001
01600 SPDG     DS     ,*-1                                                    03900 00000
01610          C      C34,CHECK+11,11,,CHECK FOR '                            03902 24 03195 03877
01620          BNE    MYPARN         ,,,NO - BRANCH TO PAREN CHECK            03914 47 03950 01200
01630          TD     *+23,OK2+11                                             03926 25 03949 04749
01640          TD     CK2+11,2310                                             03938 25 04749 02310
01650 MYPARN   BD     CK2+12,OK2+11 ,,,SKIP PAREN CHECK IF IN LITERAL         03950 43 04750 04749
01660          C      C24,-PLACE     ,,,CHECK FOR OPEN PAREN                  03962 24 13979 03877
01670 PLACE    DS     ,CHECK+11                                               03877 00000
01680          BNE    CN88                                                    03974 47 04430 01200
01690          AM     CK2+8,1,10                                              03986 11 04746 00001
01700          TF     SUBCHK,PLACE                                            03998 26 04033 03877
01710          SM     SUBCHK,2,10                                             04010 12 04033 00002
01720          C      C40,-SUBCHK    ,,,CHECK IF SUBROUTINE CALL              04022 24 03293 04033
01730 SUBCHK   DS     ,*                                                      04033 00000
01740          BH     OK2+12         ,,,NO BRANCH OUT                         04034 46 04750 01100
01750 SBCKLP   SM     SUBCHK,2,10    ,,,COLLECT SUBROUTINE NAME               04046 12 04033 00002
01760          C      C40,-SUBCHK    ,,,CHECK FOR NUMBER OR LETTER            04058 24 03293 04033
01770          BNH    SBCKLP         ,,,YES - BACK UP ANOTHER LETTER          04070 47 04046 01100
01780          C      C03,-SUBCHK    ,,,CHECK FOR A PERIOD                    04082 24 03291 04033
01790          BE     SBCKLP                                                  04094 46 04046 01200
01800 SBCKOT   AM     SUBCHK,1,10                                             04106 11 04033 00001
01810          SF     -SUBCHK                                                 04118 32 04033 00000
01820          TF     2218+13,SBCKCL                                          04130 26 02231 04359
01830          A      2218+13,-PLACE,,RECOVER NAME OF SUBROUTINE              04142 21 02231 03877
01840          CF     -SUBCHK                                                 04154 33 04033 00000
01850          BNF    SBCK2,SLINDC                                            04166 44 04274 03100
```

```
01860         C       2218+11,C56    ,,,CHECK FOR FOR NAME OF F , S, /, /F, OR /S   04178 24 02229 13931
01870         BE      CK2+12                                                        04190 46 04750 01200
01880         C       2218+11,C62                                                   04202 24 02229 10831
01890         BE      CK2+12                                                        04214 46 04750 01200
01900         C       2218+11,C61                                                   04226 24 02229 07111
01910         BE      CK2+12                                                        04238 46 04750 01200
01920         C       C61,2218+9                                                    04250 24 07111 02227
01930         BE      CK2+12                                                        04262 46 04750 01200
01940 SBCK2   TFM     SUBCK,SUBLST                                                  04274 16 04297 02323
01950         C       2218+11,-SUBCK,,,SEARCH LIST FOR SUBROUTINE                   04286 24 02229 04297
01960 SUBCK   DS      ,*                                                            04297 00000
01970         BE      SBCKFD                                                        04298 46 04398 01200
01980         AM      SUBCK,18,10                                                   04310 11 04297 00018
01990         BNR     SBCK2+12,-SUBCK                                               04322 45 04286 04297
02000         BTM     ERR1,ERRRR6    ,,,,TELL THEM YOU DID NOT FIND IT              04334 17 03696 04361
02010 SBCKCL  DSAC    7,        ,                                                   04359 00014
02020 ERRRR6  DMES    ,A,NO SUCH SUBROUTINE(E)                                      04361 00040
02030         DORG    *-1                                                           04398
02040 SBCKFD  AM      SUBCK,1,10                                                    04398 11 04297 00001
02050         SF      -SUBCK          ,,,SET CALLED INDICATOR                       04410 32 04297 00000
02060         B7      CK2+12                                                        04422 49 04750 00000
02070 CN88    C       C04,-PLACE                                                    04430 24 14147 03877
02080         BNE     CN87                                                          04442 47 04590 01200
02090         SM      CK2+8,1,10                                                    04454 12 04746 00001
02100         BNN     CK2+12                                                        04466 46 04750 01300
02110         TFM     CK2+8,-45,10                                                  04478 16 04746 00045
02120         B7      CK2+12                                                        04490 49 04750 00000
02130 OK4     BD      CK2,SPDG                                                      04498 43 04738 03900
02140         TF      TR+6,CHECK+11                                                 04510 26 04564 03877
02150         SM      TR+6,1,10                                                     04522 12 04564 00001
02160         TF      TR+11,CHECK+11                                                04534 26 04569 03877
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02170         AM      TR+11,1,10                                                    04546 11 04569 00001
02180 TR      TR      *-*,*-*         ,,,ERADICATE THE BLANK                        04558 31 00000 00000
02190         SM      SEARCH+6,2,10,,,                                              04570 12 03120 00002
02200         B7      CK2+24                                                        04582 49 04762 00000
02210 CN87    C      C0021,-PLACE    ,,,CHANGE GOTO / CODDING TO 61                 04590 24 12243 03877
02220         BNE     CK2+12                                                        04602 47 04750 01200
02230         AM      PLACE,2,10                                                    04614 11 03877 00002
02240         BD      *+20,-PLACE                                                   04626 43 04646 03877
02250         B7      CK2+24                                                        04638 49 04762 00000
02260         BD      CK2+24,OK2+8 ,,,BRANCH IF PAREN. COUNT NOT ZERO               04646 43 04762 04746
02270         SM      PLACE,3,10                                                    04658 12 03877 00003
02280         TDM     -PLACE,6                                                      04670 15 03877 00006
02290         AM      PLACE,3,10                                                    04682 11 03877 00003
02300         BNF     *+24,SLINDC                                                   04694 44 04718 03100
02310         BTM     ERR1,ERRR2                                                    04706 17 03696 05173
02320         TDM     SLINDC,-1                                                     04718 15 03100 00001
02330         B7      OK2+24                                                        04730 49 04762 00000
02340 OK2     TDM     SPDG,0                                                        04738 15 03900 00000
02350         AM      CHECK+11,2,10                                                 04750 11 03877 00002
02360         BNR     CHECK,CHECK+11,11  ,,,CHECK FOR END OF CARD                   04762 45 03866 03877
02370         TFM      ERR1-1,ERRRR3                                                04774 16 03695 05197
02380         BD      ERR1,OK2+11    ,,,ERURR IF ' NO BALANCED                      04786 43 03696 04749
02390         TFM     ERR1-1,ERRRR4                                                 04798 16 03695 05223
02400         BD      ERR1,OK2+8 ,, ,BRANCH IF PARENTHESIS UNBALANCED               04810 43 03696 04746
02410         CM      SEARCH+6,INPUT+6                                              04822 14 03120 02771
02420         BNH     OK             ,,,CHECK FOR END CARD                          04834 47 03756 01100
02430         C       INPUT+6,END                                                   04846 24 02771 05287
02440         BNE     OK                                                            04858 47 03756 01200
02450*
02460******      ANALIZE END CARD
02470*
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02480 ENDC   BTM   EJECT,*+12                                               04870 17 12400 04882
02490        BD    796,ER                                                   04882 43 00796 03742
025C0        SM    PAST,10,10                                               04894 12 03548 00010
02510        TF    -PAST,CURENT                                             04906 26 03548 05130
02520        TF    LISTS,PAST                                               04918 26 06857 03548
02530        TF    EPROG,CURRNT         ,,,SAVE END OF PROGRAM              04930 26 10881 03762
02540        SM    PAST,10,10    ,,,SET TRAILER ENTRY FOR STRING SYMBOL TABLE  04942 12 03548 00010
02550        TD    -PAST,RMARK                                              04954 25 03548 02925
02560        TFM   PLACE,INPUT+8                                            04966 16 03877 02773
02570        BLC   *             ,,,TURN OFF LAST CARD INDICATOR            04978 46 04978 00900
02580        TF    434,CURRNT    ,,,MOVE NEXT AVAL. CORE TO HIGH INDIC.     04990 26 00434 03762
02590        TFM   SUBCLL+11,SUBLST+1                                       05002 16 05025 02324
02600 SUBCLL TR    SUBCL,*-*     ,,,MOVE IN DIM NUMBER                      05014 31 05060 00000
02610        BNF   SBCLAR,SUBCL  ,,,BRANCH AROUND IF ROUTINE NOT CALLED     05026 44 05078 05060
02620        TFM   565,*+19      ,,,CALL LOAD THE SUBROUTINE                05038 16 00565 05057
02630        B7    716                                                      05050 49 00716 00000
02640        DSC   3,320                                                    05057 00003
02650 SUBCL  DSC   5,0000'                                                  05060 00005
02660        TR    SUBCLL+11,416,6,MOVE IN EXECUTION ADDRESS                05066 31 05025 00416
02670 SBCLAR AM    SUBCLL+11,18,10  ,,,MOVE TO NEXT ENTRY                   05078 11 05025 00018
02680        BNR   SUBCLL,SUBCLL+11,11,END OF TABLE CHECK                   05090 45 05014 05025
02690        TF    CURRNT,434    ,,,UP DATE CURRENT HIGH CORE               05102 26 03762 00434
027C0        B7    G089                                                     05114 49 05288 00000
02710*
02720*
02730 CURENT DC    10,0                                                     05130 00010
02740 QUENT  DC    10,9                                                     05140 00010
02750 ERRRR  DMES  ,A,ERROR IN LABEL(E)                                     05143 00032
02760        DORG   *-1                                                     05172
02770 ERRR2  DMES  ,A,INCORRECT /(E)                                        05173 00026
02780        DORG  *-1                                                      05196
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02790 EPRRR3 DMES  ,A,' UNBALANCED(E)                                       05197 00028
02800        DORG  *-1                                                      05222
02810 ERRRR4 DAC   14,() UNBALANCED',                                       05223 00028
02820 ERRRR5 DMES  ,A,REPEATED LABEL(E)                                     05251 00032
02830        DORG  *-1                                                      05280
02840 END    DSAC  4,END ,                                                  05287 00008
02850*
02860******     DECCDE FIRST VARIABLE, CHECK FOR EQUAL SIGN
02870*
02880 GC89   SM    PAST,10,10                                               05288 12 03548 00010
02890        TF    CUENT-5,CURRNT                                           05300 26 05135 03762
029C0        AM    CUENT-5,9,10                                             05312 11 05135 00009
02910        TF    -PAST,QUENT                                              05324 26 03548 05140
02920        SM    PAST,10,10                                               05336 12 03548 00010
02930        TR    -CURRNT,QUOTE-1,,,CREATE STRING CONTAING QUOTE (')       05348 31 03762 17852
02940        AM    CURRNT,14,10                                             05360 11 03762 00014
02950        TF    CURENT-5,CURRNT                                          05372 26 05125 03762
02960        TF    -PAST,CURENT                                             05384 26 03548 05130
02970        BNR   *+32,INPUT+6                                             05396 45 05428 02771
02980        TFM    PLACE,LAST-2 ,,,NO - START WITH FIRST STATEMENT         05408 16 03877 17867
02990        B7    YEAH2                                                    05420 49 10774 00000
03000        BTM   LOOK UP,*+12                                             05428 17 07962 05440
03010        TF    PLACE,PLACE2                                             05440 26 03877 06341
03020 GOTO   TF    PL8,PLACE                                                05452 26 12011 03877
03030        BNC1   COLE            ,,,CHECK IF TRACE SWITCH IS ON          05464 47 05536 00100
03040        TF     WTY+11,PLACE                                            05476 26 05535 03877
03050        SM    WTY+11,1,10                                              05488 12 05535 00001
03060        BNF    *-12,-WTY-11                                            05500 44 05488 05535
03070        AM    WTY+11,1,10                                              05512 11 05535 00001
03080 WTY    BTM   WATY,*-*                                                 05524 17 12226 00000
03090 COLE   BNC2   *+24  ,,,CHECK THE INTERRUPT SWITCH                     05536 47 05560 00200
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03100        BTM    ERROR,07100                                                  05548 17 11844 07100
03110        TF       CURRT2,CURRNT                                              05560 26 06329 03762
03120        C      C61,-PLACE                                                   05572 24 07111 03877
03130        BE     BRANHS                                                       05584 46 10774 01200
03140        C      C24,-PLACE     ,,,CHECK FOR A CONTRUCTED REFERENCE STRING    05596 24 13979 03877
03150        BE     CHNI                                                         05608 46 17688 01200
03160        BTM    LUOK2,*+12                                                   05620 17 08190 05632
03170 OHMY   TF     M,LSTR3                                                      05632 26 15517 02232
03180        SM     M,1,10                                                       05644 12 15517 00001
03190        TF     THERE,LK RET                                                 05656 26 13170 06281
03200        TF     WCRK1+9,M                                                    05668 26 13590 15517
03210        SM     THERE,1,10                                                   05680 12 13170 00001
03220        TF     ERP+9+21,THERE                                               05692 26 13191 13170
03230        BNR     *+20,-PLACE                                                 05704 45 05724 03877
03240        B7     YEAH2                                                        05716 49 10774 00000
03250        C      C00,-PLACE     ,,,CHECK FOR A BLANK                          05724 24 03135 03877
03260        BNE     *+24                                                        05736 47 05760 01200
03270        AM     PLACE,2,10                                                   05748 11 03877 00002
03280 C33    DAC    1,=,*-2                                                      05757 00002
03290        C      C33,-PLACE                                                   05760 24 05757 03877
03300        BE     CONST                                                        05772 46 09942 01200
03310        C     C61,-PLACE                                                    05784 24 07111 03877
03320        BE      BRANHS                                                      05796 46 10774 01200
03330        B7     SCAN           ,,,BRANCH TO NEW SCAN ROUTINE                 05808 49 13602 00000
03340 CURRNT DS     ,OK+6                                                        03762 00000
03350*
03360******     ROUTINE TO EVALUATE  - INCLUDES THE ARITHMETIC OPERATIONS
03370*
03380        DSA    ER90                                                         05819 00005 16964
03390 PUSH2  DSAC   50,                                                          05919 00100
03400        DC     1,'                                                          05920 00001
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03410        DS     5                                                            05925 00005
03420 EVAL   TR     PUSH2 - 99,PUSH2- 89                                         05926 31 05820 05830
03430        TF     PUSH2,EVAL-1  ,,,PUSH2 TO IS A PUSH DOWN LIST WITH           05938 26 05919 05925
03440        CF     PUSH2-4        ,,, A GROUP OF RETURN ADDRESSES AND           05950 33 05915 00000
03450 INEXT  DS     ,*                                                           05961 00000
03460        TF     PUSH2-5,CURRT2,,, POINTERS TO THE OUTPUT AREA                05962 26 05914 06329
03470        CF     PUSH2-9                                                      05974 33 05910 00000
03480        AM     PLACE,2,10                                                   05986 11 03877 00002
03490        BNR     QBL,-PLACE                                                  05998 45 06102 03877
03500 RET9   TR     -CURRT2,DSC00+2,,SET TRAILER RECORD MARK                     06010 31 06329 07251
03510        AM     CURRT2,2,10                                                  06022 11 06329 00002
03520        SF     PUSH2-9                                                      06034 32 05910 00000
03530 CLAST  DS     ,*                                                           06045 00000
03540        TF     CLAST ,PUSH2-5 ,,,PULL UP PUSH DOWN LIST                     06046 26 06045 05914
03550        SF     PUSH2-4                                                      06058 32 05915 00000
03560        TF     *+30,PUSH2                                                   06070 26 06100 05919
03570        TF     PUSH2,PUSH2-10                                               06082 26 05919 05909
03580        B7     *-*                                                          06094 49 00000 00000
03590 QBL    C      C00,-PLACE     ,,,CHECK FOR BLANK                            06102 24 03135 03877
03600        BNE    ON9                                                          06114 47 06138 01200
03610        AM     PLACE,2,10                                                   06126 11 03877 00002
03620 ON9    C      C04,-PLACE     ,,,CHECK FOR )                                06138 24 14147 03877
03630        BE     RET9                                                         06150 46 06010 01200
03640        C     C61,-PLACE                                                    06162 24 07111 03877
03650        BE     RET9                                                         06174 46 06010 01200
03660        C      C23,-PLACE                                                   06186 24 07043 03877
03670        BE     RET9                                                         06198 46 06010 01200
03680 LKUP   BTM    LOOK2,*+12                                                   06210 17 08190 06222
03690        TF     CF8+6,CURRT2                                                 06222 26 16810 06329
03700        SM     LSTR3,1,10                                                   06234 12 02232 00001
03710        S      CURRT2,LKRET                                                 06246 22 06329 06281
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03720        A     CURRT2,LSTR3                                         06258 21 06329 02232
03730        SF    -LKRET                                               06270 32 06281 00000
03740 LKRET  DC    5,0,*                                                06281 00005
03750        C     LKRET,LSTR3                                          06282 24 06281 02232
03760        BH    *+24          ,,,AVIOD MOVING A NULL STRING          06294 46 06318 01100
03770        TF    -CURRT2,-LSTR3                                       06306 26 06329 02232
03780        CF    -CF8-6                                               06318 33 16810 00000
03790 CURRT2 DC    5,0,*                                                06329 00005
03800        CF    -LKRET                                               06330 33 06281 00000
03810 PLACE2 DC    5,0,*                                                06341 00005
03820        AM    CURRT2,3,10                                          06342 11 06329 00003
03830 C14    DAC   1,*,*-2                                              06351 00002
03840 JION7  SM    CURRT2,2,10                                          06354 12 06329 00002
03850 C21    DAC   1,/,*-2                                              06363 00002
03860        BNR   *+20,-PLACE                                          06366 45 06386 03877
03870        B7    RET9                                                 06378 49 06010 00000
03880 QBL2   C     C00,-PLACE    ,,,SKIP BLANKS                         06386 24 03135 03877
03890        BNE   CN10                                                 06398 47 06422 01200
03900        AM    PLACE,2,10                                           06410 11 03877 00002
03910 C10    DAC   1,+,*-2                                              06419 00002
03920 CN10   C     C10,-PLACE    ,,,CHECK FOR +                         06422 24 06419 03877
03930        BE    ADD                                                  06434 46 06526 01200
03940        C     C20,-PLACE    ,,,CHECK FOR -                         06446 24 07019 03877
03950        BE    SUB                                                  06458 46 06546 01200
03960        C     C14,-PLACE    ,,,CHECK FOR *                         06470 24 06351 03877
03970        BE    MUL                                                  06482 46 06566 01200
03980        C     C21,-PLACE    ,,,CHECK FOR /                         06494 24 06363 03877
03990        BE    DIV                                                  06506 46 06634 01200
04000        B7    CN9                                                  06518 49 06138 00000
04010 ADD    TFM   EVRET  ,ADD2  ,,,SET UP CORRESPONDING RETURN         06526 16 06900 06902
04020        B7    EV                                                   06538 49 06646 00000
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04030 SUB    TFM   EVRET  ,SUB2                                         06546 16 06900 06922
04040        B7    EV                                                   06558 49 06646 00000
04050 MUL    TFM   EVRET  ,MUL2                                         06566 16 06900 06942
04060        AM    PLACE,2,10                                           06578 11 03877 00002
04070        C     C14,-PLACE   ,,,CHECK FOR **                         06590 24 06351 03877
04080        BNE   EV+12                                                06602 47 06658 01200
04090        TFM   EVRET,EXP2                                           06614 16 06900 07010
04100        B7    EV                                                   06626 49 06646 00000
04110 DIV    TFM   EVRET  ,DIV2                                         06634 16 06900 07194
04120 EV     AM    PLACE,2,10                                           06646 11 03877 00002
04130 C70    DAC   1,0,*-2                                              06655 00002
04140        TF    CURRT2,CF8+6                                         06658 26 06329 16810
04150        BTM   INT,*+12                                             06670 17 07566 06682
04160        BNR   *+20,-PLACE                                          06682 45 06702 03877
04170        B7   ER9                                                   06694 49 07802 00000
04180        TR    PUSH9-149,PUSH9-134                                  06702 31 17490 17505
04190        TF    PUSH9-10,EVRET                                       06714 26 17629 06900
04200        CF    PUSH9-14                                             06726 33 17625 00000
04210 NEXT   DC    5,0,*                                                06737 00005
04220        TF    PUSH9,INTRET                                         06738 26 17639 17431
04230        CF    PUSH9-9                                              06750 33 17630 00000
04240        C     C00,-PLACE                                           06762 24 03135 03877
04250        BNE   *+24                                                 06774 47 06798 01200
04260        AM    PLACE,2,10                                           06786 11 03877 00002
04270 C13    DAC   1,$,*-2                                              06795 00002
04280        BTM   LOOK2,*+12                                           06798 17 08190 06810
04290        BTM   INT,*+12                                             06810 17 07566 06822
04300        SF    PUSH9-9                                              06822 32 17630 00000
04310 KSP    DC    5,0,*                                                06833 00005
04320        TF    10,PUSH9                                             06834 26 00010 17639
04330        SF    PUSH9-14                                             06846 32 17625 00000
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04340 LISTS  DC     5,0,*                                            06857 00005
04350        TF     EVRET,PUSH9-10                                   06858 26 06900 17629
04360        TF     PUSH9,PUSH9-15                                   06870 26 17639 17624
04370        BV     *                                                06882 46 06882 01400
04380        B7     *-*                                              06894 49 00000 00000
04390 EVRET  DS     ,*                                               06900 00000
04400 ADD2   A      10,INTRET                                        06902 21 00010 17431
04410        B7     FINAR                                            06914 49 07242 00000
04420 SUB2   S      10,INTRET                                        06922 22 00010 17431
04430        B7     FINAR                                            06934 49 07242 00000
04440 MUL2   M      10,INTRET                                        06942 23 00010 17431
04450        SF     90                                               06954 32 00090 00000
04460        TF     10,99                                            06966 26 00010 00099
04470        CM     89,0,10                                          06978 14 00089 00000
04480        BNE    ER9                                              06990 47 07802 01200
04490        B7     FINAR                                            07002 49 07242 00000
04500 EXP2   CM     INTRET,0,10                                      07010 14 17431 00000
04510 C20    DAC    1,-,*-2                                          07019 00002
04520        BNL    EXP3-24                                          07022 46 07078 01300
04530        CM     10,0,10                                          07034 14 00010 00000
04540 C23    DAC    1,,,*-2                                          07043 00002
04550        BE     ER9                                              07046 46 07802 01200
04560        TF     10,ZERO                                          07058 26 00010 17441
04570        B7     FINAR                                            07070 49 07242 00000
04580        TF     20,10                                            07078 26 00020 00010
04590        TF     10,ONE                                           07090 26 00010 17451
04600 EXP3   SM     INTRET,1,10     ,,,DECRIMENT BY ONE              07102 12 17431 00001
04610 C61    DC     2,61,*-2                                         07111 00002
04620        BL     FINAR                                            07114 47 07242 01300
04630        M      10,20                                            07126 23 00010 00020
04640        SF     90                                               07138 32 00090 00000
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04650 PL2    DS     ,*                                               07149 00000
04660        CM     89,0,10                                          07150 14 00089 00000
04670        BNE    ER9                                              07162 47 07802 01200
04680        TF     10,99                                            07174 26 00010 00099
04690        B7     EXP3                                             07186 49 07102 00000
04700 DIV2   LD     99,10           ,,,THE DIVISION ALGORITHM        07194 28 00099 00010
04710        D      90,INTRET                                        07206 29 00090 17431
04720        TF     10,89                                            07218 26 00010 00089
04730        BV     FAILED          ,,,BRANCH IF DIVISION BY ZERO    07230 46 07914 01400
04740 FINAR  CF     FLAG            ,,,FINISH ARITHEMETIC OPERATION  07242 33 07314 00000
04750 DSC00  DSC    4,000',*-4                                       07249 00004
04760        BV     ER9                                              07254 46 07802 01400
04770        BNF    FLAG+12,10         ,,,THAT IS MF FLAG,10         07266 44 07326 00010
04780        CF     10                                               07278 33 00010 00000
04790        CM     10,0,1011                                        07290 14 00010 00000
04800        BZ     *+24            ,,,AVIOD CODING A NEGATIVE ZERO  07302 46 07326 01200
04810 FLAG   SF     FLAG                                             07314 32 07314 00000
04820        TF     80,MASK                                          07326 26 00080 17473
04830        TFM    Z+6,80                                           07338 16 07404 00080
04840        TF     20,10                                            07350 26 00020 00010
04850        TFM     10,0                                            07362 16 00010 00000
04860        CF     11                                               07374 33 00011 00000
04870        TFM    Z+11,20                                          07386 16 07409 00020
04880 Z      TD     *-*,*-*        ,,,NOW FOR A TNF                  07398 25 00000 00000
04890        SM     Z+6,2,10                                         07410 12 07404 00002
04900        SM     Z+11,1,10                                        07422 12 07409 00001
04910        CM     Z+11,0,610                                       07434 14 07409 00000
04920        BNE    Z               ,,,NON - ZERO, TAKE OFF ANOTHER DIGIT  07446 47 07398 01200
04930 JION8  BNF    *+36,FLAG                                        07458 44 07494 07314
04940        TFM    Z+6,20,67                                        07470 16 07404 00020
04950        SM     Z+6,2,10                                         07482 12 07404 00002
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04960          AM     Z+6,1,10                                             07494 11 07404 00001
04970 EXTRA    TR     81,RMARK-1                                           07506 31 00081 02924
04980 E        TR     -CURRT2,-Z-6                                         07518 31 06329 07404
04990          S      CURRT2,Z+6                                           07530 22 06329 07404
050C0          AM     CURRT2,81,10                                         07542 11 06329 00081
05010          B7     RET9-12                                              07554 49 05998 00000
05020*            EVALUATE INTERGER
05030          DS     5                                                    07565 00005
05040 INT      TFM    CNNST-10,0                                           07566 16 17650 00000
05050          TFM    PINT,CNNST-10                                        07578 16 07673 17650
05060          CF     FLAG                                                 07590 33 07314 00000
05070          AM     LKRET,1,10                                           07602 11 06281 00001
05080 BK82     C      LKRET,LSTR3          ,,,CHECK FOR END OF STRING      07614 24 06281 02232
05C90          BNH    CN28                                                 07626 47 07730 01100
05100          TF     INTRET,ZERO                                          07638 26 17431 17441
05110          SM     PINT,1,10                                            07650 12 07673 00001
05120          A      INTRET,-PINT                                         07662 21 17431 07673
05130 PINT     DS     ,*                                                   07673 00000
05140          C      -PINT,INTRET            ,,,CHECK FOR EXCEEDING 10 DIGITS  07674 24 07673 17431
05150          BNE    ER9                                                  07686 47 07802 01200
05160          BNF    *+24,FLAG                                            07698 44 07722 07314
05170          SF     INTRET                                               07710 32 17431 00000
05180          B7     INT-1,,6                                             07722 49 07565 00000
05190 CN28     C      C70,-LKRET                                           07730 24 06655 06281
052C0          BH     CN83                                                 07742 46 07814 01100
05210          TD     -PINT,-LKRET                                         07754 25 07673 06281
05220          AM     PINT,1,10                                            07766 11 07673 00001
05230 BK81     AM     LKRET,2,10                                           07778 11 06281 00002
05240          BNR    BK82,-PINT                                           07790 45 07614 07673
05250 ER9      BTM    ERROR,7900                                           07802 17 11844 07900
05260 CN83     C      C10,-LKRET                                           07814 24 06419 06281
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05270          BE     TBK81                                                07826 46 07902 01200
05280          C      C20,-LKRET                                           07838 24 07019 06281
05290          BNE    FAILED                                               07850 47 07914 01200
053C0          BNF    *+20,FLAG                                            07862 44 07882 07314
05310          B7     FAILED                                               07874 49 07914 00000
05320          SF     FLAG                                                 07882 32 07314 00000
05330 KSTR4    DS     ,*                                                   07893 00000
05340          B7     BK81                                                 07894 49 07778 00000
05350 TBK81    BNF    BK81,FLAG                                            07902 44 07778 07314
05360 FAILED   BNF    *+24,PERMIS-1                                        07914 44 07938 07970
05370          BTM    ERROR,17300                                          07926 17 11844 17300
05380          TF     PLACE,PL8                                            07938 26 03877 12011
05390          B7     BRANHF                                               07950 49 10794 00000
054C0*
05410******       TABLE LOOKUP ROUTINE
05420******       STRINGS ARE IN CORE AS  NNNNNNNNBCCCCCCCCCCCCCCCCCCCCCCC
05430******          NNNNNNNN  IS THE NAME OF THE STRING
05440******          B IS A BLANK
05450******          CCCCCCCCCCCCCCCCC IS THE CONTENTS OF THE STRING
05460******       THE ONLY FLAG IN THE STRING IS OVER THE FIRST
05470******          CHARATER OF THE NAME
05480******       THERE IS A LIST OF ADDRESS OF THE START OF STRINGS WORKING
05490******          DOWN FROM THE TOP OF CORE.
05500******       THE NEXT AVAL. LOCATION FOR A STRING IS IN CURRNT
05510******       CURRT2 CONTIANS THE TEMPORAY NEXT AVAL. LOCATION
05520******       PLACE IS THE CURRNT PLACE IN THE SOURCE STATEMENT
05530******       PAST CONTIANS THE BOTTOM OF THE LIST OF ADDRESSES
05540*
05550          DS     5                                                    07961 00005
05560 LOOKUP   TFM    PERMIS,11,1011                                       07962 16 07971 00011
05570 PERMIS   DC     3,0,*-2                                              07971 00003
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05580        TF    CURRT2,CURRNT                                          07974 26 06329 03762
05590        BTM   LOOK2,*+12                                             07986 17 08190 07998
05600 PEKMT  TF    PLACE2,LKRET                                           07998 26 06341 06281
05610        TFM   PERMIS,0,9                                             08010 16 07971 00000
05620        BNR    *+20,PLACE2                                           08022 45 08042 06341
05630        B7    -LOOKUP+1                                              08034 49 07961 00000
05640        AM    PLACE2,1,10                                            08042 11 06341 00001
05650        BNR   -LOOKUP+1,LSTR                                         08054 45 07961 08629
05660 ER10   BTM    ERROR,17000                                           08066 17 11844 17000
05670        DSA   ER90                                                   08082 00005 16964
05680 PUSH4  DSAC  50,                                                    08183 00100
05690        DC    1,'                                                    08184 00001
057C0        DS    5                                                      08189 00005
05710 LOOK2  TR    PUSH4- 99,PUSH4-89                                     08190 31 08084 08094
05720        C     CURRT2,PAST    ,,,CHECK FOR CORE OVERLAP               08202 24 06329 03548
05730        BNL   OVLAP                                                  08214 46 03816 01300
05740        TDM   PUSH4-9,0                                              08226 15 08174 00000
05750        TDM   CEFINE,-1                                              08238 15 08248 00001
05760 DEFINE DS    ,*-1                                                   08248 00000
05770 DFINE  DS    ,DEFINE                                                08248 00000
05780        TFM   LKRET,RMARK-1                                          08250 16 06281 02924
05790        TF    PUSH4,LOOK2-1                                          08262 26 08183 08189
05800        TD    LSTR,RMARK                                             08274 25 08629 02925
05810        CF    PUSH4-4                                                08286 33 08179 00000
05820        BNR    *+24,-PLACE                                           08298 45 08322 03877
05830 ER03   BTM   ERROR,07300                                            08310 17 11844 07300
05840        C     C24,-PLACE                                             08322 24 13979 03877
05850        BE    LKEVAL                                                 08334 46 09218 01200
05860        C     C34,-PLACE                                             08346 24 03195 03877
05870        BE    LLIT                                                   08358 46 08890 01200
05880        C     C13,-PLACE                                             08370 24 06795 03877
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05890        BE     INDIR5                                                08382 46 09018 01200
05900        C     C22,-PLACE                                             08394 24 08417 03877
05910        BE     *+60                                                  08406 46 08466 01200
05920 C22    DC     2,22,*                                                08417 00002
05930        C     C03,-PLACE                                             08418 24 03291 03877
05940        BE     *+36                                                  08430 46 08466 01200
05950        C     C40,-PLACE                                             08442 24 03293 03877
05960        BH     ER04                                                  08454 46 08726 01100
05970        BTM    COLCT,*+12                                            08466 17 09362 08478
05980        C      C24,-PLACE                                            08478 24 13979 03877
05990        BE     SUBCAL                                                08490 46 12558 01200
06000 FINLKP TF     LSTR,PAST                                             08502 26 08629 03548
06010        BNF     *+24,PERMIS                                          08514 44 08538 07971
06020        TF     LSTR,LISTS                                            08526 26 08629 06857
06030        B7     BNRTST-12                                             08538 49 08606 00000
06040******      BEGIN SYMBOL TABEL LOOK UP LOOP
06050 HP32   C      COLDIF,-LSTR  ,,,CHECK FOR SAME LENGTH                08546 24 09395 08629
06060        BNE    BNRTST-12     ,,,NO - GO ON TO NEXT ENTRY             08558 47 08606 01200
06070        TF     2218+9,-LSTR  ,,,MOVE SYMBOL TABLE ENTRY              08570 26 02227 08629
06080        C     -2218-4,-COLRET,,,NOW CHECK FOR SAME LABEL             08582 24 02222 08593
06090 COLRET DC     5,0,*                                                 08593 00005
06100        BE     FOUND         ,,,BRANCH IF LABEL FOUND                08594 46 08738 01200
06110        AM     LSTR,10,10    ,,,MOVE TO NEXT ENTRY                   08606 11 08629 00010
06120 BNRTST BNR    HP32,*-*,7    ,,,TEST FOR END OF TABLE                08618 45 08546 00000
06130 LSTR   DS     ,*                                                    08629 00000
06140******      END SYMBOL TABEL LOOK UP LOOP
06150 NOFIND TFM    LSTR3,RMARK-1                                         08630 16 02232 02924
06160        BNF    RETLK,PERMIS                                          08642 44 08846 07971
06170        BNF    RETLK,PERMIS-1                                        08654 44 08846 07970
06180        C      END-2,-COLRET      ,,,CHECK FOR END CARD              08666 24 05285 08593
06190        BNE    ER10                                                  08678 47 08066 01200
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06200         CM    COLDIF,5,10                                                          08690 14 09395 00005
06210 RIG     BNE   ER10                                                                 08702 47 08066 01200
06220 TDUMP   BTM   EJECT,DUMP                                                           08714 17 12400 11928
06230 ER04    BTM   ERROR,07400                                                          08726 17 11844 07400
06240 LSTR2   DS    ,2218+4                                                              02222 00000
06250 FOUND   BD    NOFIND,2218 +5,,,DONT ACCEPT A PUSHED STRING                         08738 43 08630 02223
06260         BD    NOFIND,2218+6                                                        08750 43 08630 02224
06270         SM    LSTR,10,10                                                           08762 12 08629 00010
06280         TF    2218+19,-LSTR                                                        08774 26 02237 08629
06290         SF    2218+17          ,,,CALCULATE LAST DIGIT + 1 OF FOUND STRING         08786 32 02235 00000
06300         S     2218+14,2218+19                                                      08798 22 02232 02237
06310 LSTR3   DS    ,2218+14                                                             02232 00000
06320         TF    LKRET,LSTR2                                                          08810 26 06281 02222
06330         AM    LKRET,3,10                                                           08822 11 06281 00003
06340         TDM   DFINE,0                                                              08834 15 08248 00000
06350 RETLK   SF    PUSH4-4                                                              08846 32 08179 00000
06360         TF    LOOK2-1,PUSH4                                                        08858 26 08189 08183
06370         TF    PUSH4,PUSH4-10                                                       08870 26 08183 08173
06380         B7    -LOOK2+1                                                             08882 49 08189 00000
06390 LLIT    TDM   DEFINE,0,10                                                          08890 15 08248 00000
06400         TD    COLDIF,RMARK  ,,,INDICATE VARIABLE NOT TO BE DELETED                 08902 25 09395 02925
06410         TF    LKRET,PLACE                                                          08914 26 06281 03877
06420         AM    LKRET,1,10                                                           08926 11 06281 00001
06430         AM    PLACE,2,10                                                           08938 11 03877 00002
06440         C     C34,-PLACE                                                           08950 24 03195 03877
06450         BNE   *-24                                                                 08962 47 08938 01200
06460         TF    LSTR3,PLACE                                                          08974 26 02232 03877
06470         SM    LSTR3,1,10                                                           08986 12 02232 00001
06480         AM    PLACE,2,10                                                           08998 11 03877 00002
06490         B7    RETLK                                                                09010 49 08846 00000
06500 INDIR5  AM    PLACE,2,10                                                           09018 11 03877 00002
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06510         TDM   PERMIS,0                                                             09030 15 07971 00000
06520         BTM   LOOK2,*+12                                                           09042 17 08190 09054
06530         TDM   DEFINE,-1                                                            09054 15 08248 00001
06540         C     KMKM+11,PUSH4                                                        09066 24 12793 08183
06550         BNE   *+24                                                                 09078 47 09102 01200
06560         TD    PERMIS,PERMIS-1                                                      09090 25 07971 07970
06570         SM    LSTR3,1,10                                                           09102 12 02232 00001
06580         TF    COLRET,LSTR3                                                         09114 26 08593 02232
06590         S     LSTR3,LKRET                                                          09126 22 02232 06281
06600         BNH   ER03                                                                 09138 47 08310 01100
06610         SF    LSTR3-2                                                              09150 32 02230 00000
06620         TF    COLDIF,LSTR3                                                         09162 26 09395 02232
06630         TF    KSP,LKRET                                                            09174 26 06833 06281
06640         AM    KSP,1,10                                                             09186 11 06833 00001
06650         TFM   LKRET,RMARK-1                                                        09198 16 06281 02924
06660         B7    FINLKP                                                               09210 49 08502 00000
06670 LKEVAL  BTM   EVAL,*+12                                                            09218 17 05926 09230
06680         SM    CURRT2,2,10                                                          09230 12 06329 00002
06690         TF    LKRET,CLAST                                                          09242 26 06281 06045
06700         TF     LSTR3,CURRT2                                                        09254 26 02232 06329
06710         TF    CURRT2,CLAST                                                         09266 26 06329 06045
06720         TD    LSTR,RMARK                                                           09278 25 08629 02925
06730         TD    COLDIF ,RMARK ,,,INDICATE NOT TO BE DELETED                          09290 25 09395 02925
06740         C     C04,-PLACE                                                           09302 24 14147 03877
06750         BE    *+24                                                                 09314 46 09338 01200
06760         BTM    ERROR,07200                                                         09326 17 11844 07200
06770         AM    PLACE,2,10                                                           09338 11 03877 00002
06780         B7    RETLK                                                                09350 49 08846 00000
06790         DS    5                                                                    09361 00005
06800 COLCT   TFM   COLDIF,-1,9    ,,,SUBROUTINE TO FIND END OF STRING NAME              09362 16 09395 00001
06810         TF    KSP,PLACE                                                            09374 26 06833 03877
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06820         AM     PLACE,2,10                                               09386 11 03877 00002
06830 COLDIF  DC     3,0,*-2                                                  09395 00003
06840         BNR    CN62,-PLACE                                              09398 45 09598 03877
06850         TFM    COLCT-1,FINLKP                                           09410 16 09361 08502
06860 RETCOL  TF     COLRET,PLACE                                             09422 26 08593 03877
06870         SM     COLRET,2,10                                              09434 12 08593 00002
06880         TF     99,PLACE                                                 09446 26 00099 03877
06890         S      99,KSP                                                   09458 22 00099 06833
06900         A      COLDIF,99                                                09470 21 09395 00099
06910         CM     COLDIF,11,10   ,,,CHECK FOR I/O INDICATION               09482 14 09395 00011
06920         BNE     -COLCT+1                                                09494 47 09361 01200
06930         BD     -COLCT+1,PERMIS                                          09506 43 09361 07971
06940         C      PIT+10,-COLRET                                           09518 24 02761 08593
06950         BE     READC                                                    09530 46 11746 01200
06960         C     PCT+10,-COLRET                                            09542 24 02733 08593
06970         BE     PRINT                                                    09554 46 11258 01200
06980         C      PPT+10,-COLRET                                           09566 24 02747 08593
06990         BE     PUNCH                                                    09578 46 11426 01200
070C0 BACKIN  B7     -COLCT+1                                                 09590 49 09361 00000
07010 ON62    C      C40,-PLACE                                               09598 24 03293 03877
07020         BL     COLCT+24                                                 09610 47 09386 01300
07030         C      C03,-PLACE                                               09622 24 03291 03877
07040         BE     COLCT+24                                                 09634 46 09386 01200
07050         C      C22,-PLACE     ,,,CHECK FOR A RECORD MARK                09646 24 08417 03877
07060         BE     COLCT+24                                                 09658 46 09386 01200
07070         B7     RETCOL                                                   09670 49 09422 00000
07080         DS     5                                                        09681 00005
07090 DELET   TF     2218+29,SBCKCL-4,,CREATE NEW SYMBOL TABLE ENTRY          09682 26 02247 04355
07100         TF     2218+24,CURRNT                                           09694 26 02242 03762
07110         A      2218+29,COLDIF                                           09706 21 02247 09395
07120         A      2218+24,2218+29                                          09718 21 02242 02247
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07130         TF     -PAST,2218+29                                            09730 26 03548 02247
07140         BD     -DELET+1,DEFINE,,SKIP DELET IF STRING NOT DEFINED        09742 43 09681 08248
07150         BNR    *+24,LSTR      ,,,NO DELETING SYSPIT                     09754 45 09778 08629
07160 ER05    BTM    ERROR,07500                                              09766 17 11844 07500
07170         S     LSTR2,COLDIF                                              09778 22 02222 09395
07180         TR    -LSTR2,-LSTR3   ,,,PULL DOWN STRINGS                      09790 31 02222 02232
07190         S     LSTR3,LSTR2     ,,,CALCULATE AMOUNT OF SHIFT              09802 22 02232 02222
07200         S      CURRNT,LSTR3   ,,,,UPDATE NEXT AVAL. CORE                09814 22 03762 02232
07210         AM     PAST,10,10                                               09826 11 03548 00010
07220         AM     LSTR,10,10                                               09838 11 08629 00010
07230 TRLOOP  TF     KSTR5,LSTR                                               09850 26 09904 08629
07240         SM     LSTR,10,10     ,,,UPDATE SYMBOL TABLE                    09862 12 08629 00010
07250         TF     2218+29,-LSTR                                            09874 26 02247 08629
07260         S     2218+24,LSTR3                                             09886 22 02242 02232
07270         TF     -KSTR5,2218+29                                           09898 26 09904 02247
07280 KSTR5   DS     ,*-5                                                     09904 00000
07290         C     KSTR5,PAST      ,,,CHECK FOR END OF SYMBOL TABLE          09910 24 09904 03548
07300         BNE    TRLOOP                                                   09922 47 09850 01200
07310         B7     -DELET+1                                                 09934 49 09681 00000
07320*
07330******     ROUTINE TO CONSTRUCT A NEW STRING
07340*
07350 CONST   BNR     *+20,COLDIF                                             09942 45 09962 09395
07360         B7     ER05                                                     09954 49 09766 00000
07370         SM     KSP,1,10                                                 09962 12 06833 00001
07380         SF     -KSP                                                     09974 32 06833 00000
07390         TF     CURRT2,CURRNT                                            09986 26 06329 03762
07400         S      CURRT2,KSP                                               09998 22 06329 06833
07410         A      CURRT2,COLRET                                            10010 21 06329 08593
07420         TF     -CURRT2,-COLRET                                          10022 26 06329 08593
07430         CF     -KSP                                                     10034 33 06833 00000
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07440        SF     -CURRNT                                                      10046 32 03762 00000
07450        AM      CURRT2,1,10                                                 10058 11 06329 00001
07460        TR     -CURRT2,DSC00+1                                              10070 31 06329 07250
07470        AM      CURRT2,2,10                                                 10082 11 06329 00002
07480        C       THERE,ERP+9+21                                              10094 24 13170 13191
07490        BE      FORGET                                                      10106 46 10178 01200
07500        S      CURRT2,THERE                                                 10118 22 06329 13170
07510        A       CURRT2,ERP+9+21                                             10130 21 06329 13191
07520        AM      ERP+9+21,1,10                                               10142 11 13191 00001
07530        S      ERP+9+21,SHIFT                                               10154 22 13191 16575
07540        TF     -CURRT2,-ERP-9-21                                            10166 26 06329 13191
07550 FORGET TF     FCRGT2+11,LSTR                                               10178 26 10417 08629
07560        TF      FURGT2+23,CULDIF                                            10190 26 10429 09395
07570        BTM     EVAL,*+12                                                   10202 17 05926 10214
07580        TF      CURR T,CURRT2                                               10214 26 10340 06329
07590        C       M,WORK1+9                                                   10226 24 15517 13590
07600        BE      FORGT2                                                      10238 46 10406 01200
07610        S      M,SHIFT                                                      10250 22 15517 16575
07620        S       WORK1+9,SHIFT                                               10262 22 13590 16575
07630        AM      WORK1+9,1,10                                                10274 11 13590 00001
07640        SM      CURR T,2,10                                                 10286 12 10340 00002
07650        S      CURRT ,WORK1+9                                               10298 22 10340 13590
07660        A       CURR T,M                                                    10310 21 10340 15517
07670        SF      -WORK1-9                                                    10322 32 13590 00000
07680        TR      -CURR T,DSC00+1                                             10334 31 10340 07250
07690 CURRT  DS      ,*-5                                                        10340 00000
07700        TF      -CURR T,-M                                                  10346 26 10340 15517
07710        CF      -WORK1-9                                                    10358 33 13590 00000
07720        AM      CURR T,3,10                                                 10370 11 10340 00003
07730        SM      CURRT2,2,10                                                 10382 12 06329 00002
07740        CF      -CURRT2                                                     10394 33 06329 00000
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07750 FORGT2 TFM     LSTR,*-*          ,,,RESTORE LOOK UP PARAMETERS FOR DELET   10406 16 08629 00000
07760        TFM     COLDIF,*-*                                                  10418 16 09395 00000
07770        TDM     CEFINE,-1                                                   10430 15 08248 00001
07780        CM     THERE,RMARK-2                                                10442 14 13170 02923
07790        BE      CONARN                                                      10454 46 10510 01200
07800        AM      LSTR,10,10                                                  10466 11 08629 00010
07810        TF      2218+9,-LSTR                                                10478 26 02227 08629
07820        TFM     PUSH4,*+20,0                                                10490 16 08183 10510
07830        B7      FOUND+24                                                    10502 49 08762 00000
07840 CONARN BTM     DELET,*+12                                                  10510 17 09682 10522
07850        BD      *+24,DEFINE                                                 10522 43 10546 08248
07860        S      CURRT,LSTR3       ,,,MODIFY BY AMOUNT OF SHIFT               10534 22 10340 02232
07870        SM      CURRT,2,10                                                  10546 12 10340 00002
07880        TF      CURRT2,CURRNT                                               10558 26 06329 03762
07890        A      CURRT2,COLDIF  ,,,CHECK IF CONSTRUCTED STRING IS NULL        10570 21 06329 09395
07900        AM      CURRT2,4,10                                                 10582 11 06329 00004
07910        BNR     *+20,-CURRT2  ,,,DONT PUT NULL STRING IN SYMBOL TABLE       10594 45 10614 06329
07920        B7      FINCON                                                      10606 49 10662 00000
07930        TF      CURRNT,CURRT                                                10614 26 03762 10340
07940        SM      PAST,10,10       ,,,PUT IN NEW SYMBOL TABLE HEADER          10626 12 03548 00010
07950        TF      CURENT-5,CURRNT                                             10638 26 05125 03762
07960        TF      -PAST,CURENT                                                10650 26 03548 05130
07970 FINCON BNR     *+20,-PLACE                                                 10662 45 10682 03877
07980        B7      YEAH2                                                       10674 49 10774 00000
07990        C      C61,-PLACE                                                   10682 24 07111 03877
08000        BE     BRANHS                                                       10694 46 10774 01200
08010        BTM     ERROR, 7600                                                 10706 17 11844 07600
08020 CONST2 TF      TFMZ+11,PLACE                                               10718 26 10765 03877
08030        TF      PLACE,PL8                                                   10730 26 03877 12011
08040        BTM     LOOK2,*+12                                                  10742 17 08190 10754
08050 TFMZ   TFM     PLACE,*-*                                                   10754 16 03877 00000
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08060        B7    CONST                                                  10766 49 09942 00000
08070*
08080******     ROUTINE TO HANDLE GOTO PART OF STATEMENT
08090*
08100 BRACHS TDM   SUC,-1                                                 10774 15 10783 00001
08110 BRANHS DS    ,BRACHS                                                10774 00000
08120 SUC    DC    2,0,*-2                                                10783 00002
08130        B7    BRACHF+12                                              10786 49 10806 00000
08140 BRACHF TDM   SUC,0                                                  10794 15 10783 00000
08150 BRANHF DS    ,BRACHF                                                10794 00000
08160 RETURN B7    *+8,2                                                  10806 49 10814 00002
08170 YEAH2  DS    ,BRANHS                                                10774 00000
08180        B7    CN63+36                                                10814 49 10938 00000
08190 YEAH3  AM    PLACE,2,10     ,,,MOVE PAST LABLE                      10822 11 03877 00002
08200 C62    DAC   1,S,*-2                                                10831 00002
08210        C     C00,-PLACE                                             10834 24 03135 03877
08220        BNE   *-24                                                   10846 47 10822 01200
08230        AM    PLACE,2,10                                             10858 11 03877 00002
08240        CM    PLACE,*-*                                              10870 14 03877 00000
08250 EPROG  DS    ,*                                                     10881 00000
08260        BNL   TDUMP                                                  10882 46 08714 01300
08270        B7    GOTO                                                   10894 49 05452 00000
08280 ON63   C     C61,-PLACE     ,,,FIND DIVIDING SLASH                  10902 24 07111 03877
08290        BE    CN638                                                  10914 46 10958 01200
08300        AM    PLACE,2,10                                             10926 11 03877 00002
08310        BNR   *-36,-PLACE                                            10938 45 10902 03877
08320        B7    YEAH3                                                  10950 49 10822 00000
08330 CN638  AM    PLACE,2,10                                             10958 11 03877 00002
08340        TDM   SUC2,1                                                 10970 15 11152 00001
08350        BNR   *+20,-PLACE                                            10982 45 11002 03877
08360        B7    YEAH2                                                  10994 49 10774 00000
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08370        C     C62,-PLACE                                             11002 24 10831 03877
08380        BE    FS                                                     11014 46 11110 01200
08390        C     C56,-PLACE                                             11026 24 13931 03877
08400        BE    FF                                                     11038 46 11130 01200
08410        C     C24,-PLACE                                             11050 24 13979 03877
08420        BE    GOTO2+12                                               11062 46 11166 01200
08430        C     C00,-PLACE                                             11074 24 03135 03877
08440        BE    ON638                                                  11086 46 10958 01200
08450 ER12   BTM   ERROR,17200                                            11098 17 11844 17200
08460 FS     BNF   GOTO2-12,SUC                                           11110 44 11142 10783
08470        B7    GOTO2                                                  11122 49 11154 00000
08480 FF     BNF   GOTO2,SUC                                              11130 44 11154 10783
08490        TDM   SUC2,0                                                 11142 15 11152 00000
08500 SUC2   DS    ,*-1                                                   11152 00000
08510 GOTO2  AM    PLACE,2,10                                             11154 11 03877 00002
08520        BNR    *+20,-PLACE                                           11166 45 11186 03877
08530        B7    ER12                                                   11178 49 11098 00000
08540        C     C24,-PLACE                                             11186 24 13979 03877
08550        BNE    ER12                                                  11198 47 11098 01200
08560        BD    *+24,SUC2                                              11210 43 11234 11152
08570        BTM   ADVANC,ON638+12                                        11222 17 12986 10970
08580        AM    PLACE,2,10                                             11234 11 03877 00002
08590        BTM   LOOKUP,GOTO-12                                         11246 17 07962 05440
08600*
08610******     INPUT - OUTPUT ROUTINES
08620*
08630 PRINT  TFM   TFM+11,POT                                             11258 16 11349 02723
08640        TFM   PNRET+6,PRINT2                                         11270 16 11392 11394
08650        TFM   RETURN+6,*+20                                          11282 16 10812 11302
08660        B7    BACKIN                                                 11294 49 09590 00000
08670        TFM   RETURN+6,RETURN+8                                      11302 16 10812 10814
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08680        BNF   RETURN,SUC                                 11314 44 10806 10783
08690        TF    TFM8K+11,PLACE                             11326 26 11373 03877
08700 TFM    TFM   PLACE,PPT                                  11338 16 03877 02737
08710        BTM   LOOK2,*+12                                 11350 17 08190 11362
08720 TFM8K  TFM   PLACE,*-*                                  11362 16 03877 00000
08730        TFM   RETURN+6,RETURN+8                          11374 16 10812 10814
08740 PNRET  B7    *-*                                        11386 49 00000 00000
08750 PRINT2 AM    LKRET,1,10                                 11394 11 06281 00001
08760        BT    WATY,LKRET                                 11406 27 12226 06281
08770        B7    RETURN                                     11418 49 10806 00000
08780 PUNCH  TFM   TFM+11,PPT                                 11426 16 11349 02737
08790        TFM   PNRET+6,PUNCH2                             11438 16 11392 11458
08800        B7    PRINT+24                                   11450 49 11282 00000
08810 PUNCH2 TFM   *+18,INPUT+158                             11458 16 11476 02923
08820        TFM   *-*,0                                      11470 16 00000 00000
08830        SM    *-6,4,10                                   11482 12 11476 00004
08840        CM    *-18,INPUT                                 11494 14 11476 02765
08850        BH    *-36                                       11506 46 11470 01100
08860        CF    INPUT-3       ,,,PUNCHED OUTPUT            11518 33 02762 00000
08870        TFM   KKRET,INPUT-1                              11530 16 11548 02764
08880 LP65   TD    *-*,-LKRET                                 11542 25 00000 06281
08890 KKRET  DS    ,*-5                                       11548 00000
08900        AM    KKRET,1,10                                 11554 11 11548 00001
08910        BNR   ARN65,-KKRET                               11566 45 11610 11548
08920        PUT   CCA                                        11578 16 00565 11601
                                                              11590 49 00532 02926
08930        B7    PUNCH2                                     11602 49 11458 00000
08940 ARN65  AM    LKRET,1,10                                 11610 11 06281 00001
08950        BNR   ARN66,-LKRET                               11622 45 11702 06281
08960        CM    KKRET,INPUT         ,,,CHECK FOR NULL OUTPUT   11634 14 11548 02765
08970        BE    *+36                                       11646 46 11682 01200
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08980        PUT   CCA                                        11658 16 00565 11681
                                                              11670 49 00532 02926
08990        CF    INPUT-1                                    11682 33 02764 00000
09000        B7    RETURN                                     11694 49 10806 00000
09010 ARN66  TD    -KKRET,-LKRET                              11702 25 11548 06281
09020        AM    KKRET,1,10                                 11714 11 11548 00001
09030        AM    LKRET,1,10                                 11726 11 06281 00001
09040        B7    LP65                                       11738 49 11542 00000
09050 READC  BLC   FAILED                                     11746 46 07914 00900
09060        BTM    GET,42,10                                 11758 17 12082 00042
09070        TD        COLDIF,RMARK                           11770 25 09395 02925
09080        TDM   CEFINE,0                                   11782 15 08248 00000
09090        TFM   LKRET,INPUT-1                              11794 16 06281 02764
09100        TFM    LSTR3,INPUT+159                           11806 16 02232 02924
09110        B7    RETLK                                      11818 49 08846 00000
09120*
09130******     MISC. ROUTINES
09140******         ERROR - TYPE ERROR MESSAGES
09150******         CUMP  - DUMP MEMORY AT END OF EXECUTION
09160******         GET   - READ A CARD, REPLACE REC. MARKS WITH 22
09170******         WATY  - PRINT IF THERE IS A PRINTER, OTHERWISE TYPE
09180******         EJECT - EJECT IF THERE IS A PRINTER, OTHERWISE RCTY
09190*
09200 ERMES  DMES  ,A,ERROR O(E)                              11827 00018
09210 ERROR  SM    PL8  ,1,10    ,,,ERROR MESSAGE ROUTINE     11844 12 12011 00001
09220        BNF   *-12,-PL8                                  11856 44 11844 12011
09230        AM    PL8  ,1,10                                 11868 11 12011 00001
09240        TD    ERROR-1,RMARK                              11880 25 11843 02925
09250        BTM   EJECT,*+12                                 11892 17 12400 11904
09260        BT    WATY,PL8                                   11904 27 12226 12011
09270        BTM   WATY,ERMES                                 11916 17 12226 11827
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09280 DUMP   BNF  T796,DUMPSW    ,,,THE DUMP MEMORY ROURINE          11928 44 11976 02305
09290        TR   -CURRNT,RMARK-1                                    11940 31 03762 02924
09300        AM   PAST,10,10                                         11952 11 03548 00010
09310        BNR  *+24,-PAST                                         11964 45 11988 03548
09320 T796   BTM  EJECT,796                                          11976 17 12400 00796
09330        TF   2218+9,-PAST                                       11988 26 02227 03548
09340        SF   2218+7                                             12000 32 02225 00000
09350 PL8    DC   5,0,*                                              12011 00005
09360        S    2218+4,2218+9                                      12012 22 02222 02227
09370        AM   2218+4,1,10                                        12024 11 02222 00001
09380        BT   WATY,2218+4                                        12036 27 12226 02222
09390        BWC  *                                                  12048 46 12048 00700
094C0        TFM  -2218-4,*-*                                        12060 16 02222 00000
09410        DC   2,',*                                              12071 00002
09420        B7   CUMP+24                                            12072 49 11952 00000
09430 BB     BB2                                                     12080 42 00000 00000
09440*
09450 GET    GET   DCA           ,,,READ INPUT CARDS ROUTINE         12082 16 00565 12105
                                                                     12094 49 00566 02926
09460        TFM  GET2+11,INPUT-2                                    12106 16 12141 02763
09470        AM   GET2+11,2,10                                       12118 11 12141 00002
09480 GET2   BNR  *-12,*-*                                           12130 45 12118 00000
09490        CM   GET2+11,RMARK                                      12142 14 12141 02925
09500        BNL  BB                                                 12154 46 12080 01300
09510        TDM  -GET2-11,2     ,,,CHANGE REC. MARK TO 22 CODING    12166 15 12141 00002
09520        SM   GET2+11,1,10                                       12178 12 12141 00001
09530        TDM  -GET2-11,2                                         12190 15 12141 00002
09540        SM   GET2+11,1,10                                       12202 12 12141 00001
09550        B7   GET2-12                                            12214 49 12118 00000
09560        DC   5,0                                                12225 00005
09570 WATY   BD   LUCKY,PRINTR   ,,,FOR THOSE PEOPLE WITH A PRINTER  12226 43 12264 02302
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09580        RCTY                                                    12238 34 00000 00102
09590 C0021  DSAC  2, /,*-6                                          12243 00004
09600        WATY  -WATY+1                                           12250 39 12225 00100
09610        BB2                                                     12262 42 00000 00000
09620 LUCKY  DS    ,*+1                                              12264 00000
09630        TF    FINDRM+11,WATY-1                                  12264 26 12307 12225
09640        B7    *+20                                              12276 49 12296 00000
09650        AM    FINDRM+11,2,10                                    12284 11 12307 00002
09660 FINDRM BNR   *-12,*-*                                          12296 45 12284 00000
09670        39    -WATY+1,900                                       12308 39 12225 00900
09680        BI    *,2500          ,,,TURN OFF PRINT CHECK INDICATOR 12320 46 12320 02500
09690        BNI   *+24,3400       ,,,NORMAL OVERFLOW TEST           12332 47 12356 03400
09700        34    0,971                                             12344 34 00000 00971
09710        A     WATY-1,LENGTH                                     12356 21 12225 02309
09720        C    WATY-1,FINDRM+11                                   12368 24 12225 12307
09730        BL    FINDRM+12                                         12380 47 12308 01300
09740        BB2                                                     12392 42 00000 00000
09750        DC    5,0                                               12398 00005
09760 EJECT  BD    LUCKY2,PRINTR ,,,EJECTION SUBROUTINE              12400 43 12432 02302
09770        RCTY                                                    12412 34 00000 00102
09780        B7    -EJECT+1                                          12424 49 12399 00000
09790 LUCKY2 34    0,971                                             12432 34 00000 00971
09800        B7    -EJECT+1                                          12444 49 12399 00000
09810*
09820******      SUBROUTINE CALLING SYSTEM  THE PART WRITTEN IN SPS
09830*
09840        DSA   ER90                                              12455 00005 16964
09850 SUBPSH DSAC  50,                                               12555 00100
09860        DC    1,'                                               12556 00001
09870 SUBCAL TF    2218+13,SBCKCL                                    12558 26 02231 04359
09880        TF    KALSUB+6,PLACE                                    12570 26 12612 03877
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09890        S      KALSUB+6,COLDIF,,RECOVER SUBROUTINE NAME              12582 22 12612 09395
09900        SM     KALSUB+6,2,10                                         12594 12 12612 00002
09910 KALSUB SF     *-*                                                   12606 32 00000 00000
09920        A      2218+13,-PLACE                                        12618 21 02231 03877
09930        CF     KALSUB+6,,6                                           12630 33 12612 00000
09940        TFM    KALSB+6,SUBLST                                        12642 16 12660 02323
09950 KALSB  C      *-*,2218+11                                           12654 24 00000 02229
09960        BE     KALFD                                                 12666 46 12710 01200
09970        AM     KALSB+6,18,10 ,,,SEARCH FOR ENTRY ADDRESS             12678 11 12660 00018
09980        BNR    KALSB,-KALSB-6                                        12690 45 12654 12660
09990        B7     BR90-12                                               12702 49 16952 00000
10000 KALFD  AM     KALSB+6,5,10  ,,,MOVE TO RECOVER ADDRESS              12710 11 12660 00005
10010        TR     SUBPSH-89,SUBPSH-74,,MOVE ENTRY ADDR. INTO PUSH DOWN LIST  12722 31 12466 12481
10020        TF     SUBPSH-10,-KALSB-6                                    12734 26 12545 12660
10030        CF     SUBPSH-14     ,,,THE FOLLOWING IS PURE PROCEDURE FOR  12746 33 12541 00000
10040        TFM    SUBPSH,0,2    ,,,  RECURSIVE ENTRY                    12758 16 12555 00000
10050        TF     SUBPSH-5,CURRT2                                       12770 26 12550 06329
10060 KMKM   CF     SUBPSH-9,PEKMT,7                                      12782 33 12546 07998
10070        BTM    EVAL,*+12                                             12794 17 05926 12806
10080        C      C04,-PLACE                                            12806 24 14147 03877
10090        BE     SUBOUT        ,,,BRANCH IF ONLY ONE ARGUMENT          12818 46 12902 01200
10100        TF     SUBPSH,CURRT2                                         12830 26 12555 06329
10110        CF     SUBPSH-4                                              12842 33 12551 00000
10120        BTM    EVAL,*+12                                             12854 17 05926 12866
10130        C      C04,-PLACE                                            12866 24 14147 03877
10140        BE     *+24          ,,,ERROR IF MORE THAN 2 ARGUMENTS       12878 46 12902 01200
10150 ER11   BTM    ERROR,17100                                           12890 17 11844 17100
10160 SUBOUT SF     SUBPSH-14                                             12902 32 12541 00000
10170        TF     2299,SUBPSH                                           12914 26 02299 12555
10180        TF     SUBPSH,SUBPSH-15,,POP UP PUSH DOWN LIST               12926 26 12555 12540
10190        SF     2290                                                  12938 32 02290 00000
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10200        SF     2295                                                  12950 32 02295 00000
10210        TF     CLAST,2294                                            12962 26 06045 02294
10220        B7     -2289         ,,,GO TO THE SUBROUTINE                 12974 49 02289 00000
10230 SV203  DC     5,0                                                   12985 00005
10240 ADVANC TFM     PARCNT,0,10  ,,,SUBPROGRAM TO ADVANCE TO MATCH PAENTHESIS  12986 16 14179 00000
10250 VG     AM     PLACE,2,10                                            12998 11 03877 00002
10260        C      C34,-PLACE                                            13010 24 03195 03877
10270        BNE    VG2                                                   13022 47 13046 01200
10280        TD     C34DIG,2310                                           13034 25 13045 02310
10290 C34DIG DS     ,*                                                    13045 00000
10300 VG2    BD     VG,C34DIG                                             13046 43 12998 13045
10310        C     C24,-PLACE                                             13058 24 13979 03877
10320        BNE     *+24                                                 13070 47 13094 01200
10330        AM     PARCNT,1,10                                           13082 11 14179 00001
10340        C     C04,-PLACE                                             13094 24 14147 03877
10350        BNE      VG                                                  13106 47 12998 01200
10360        SM     PARCNT,1,10                                           13118 12 14179 00001
10370        BNN     VG                                                   13130 46 12998 01300
10380        AM     PLACE,2,10                                            13142 11 03877 00002
10390        B7     -SV203                                                13154 49 12985 00000
10400*
10410******     REVISED PATTERN COMPARISION ROUTINE
10420*
10430 ERP    DSS   21*20                                                  13161 00420
10440*
10450******     ERP ENTRY IS AAAAAPPPPPLLLLTTWWWW'
10460******       AAAAA IS THE ADDRESS OF THE CONSTANT STING
10470******       PPPPP IS A PIONTER INTO THE STRING TO BE COMPARED
10480******     LLLL IS THE LENGTH OF THE CONSTANST STING
10490******       TT IS THE TYPE OF CONSTANT STRING
10500******     WWWW IS THE MINAMUM LENGTH REQUIRED BE REMAINING MATCH STRI
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10510******        ' IS A RECORD MARK
10520*
10530          DSC    21,-0000-0000-000K0-000',ERP                                    13161 00021
10540 WORK1    DSC    21,-0000-0000-000-0-000'                                        13581 00021
10550*
10560 SCAN     TFM    W,0,8                                                           13602 16 14241 00000
10570          TFM    I,ERP+21                                                        13614 16 14284 13182
10580 KINDF    BNR    *+20,-PLACE     ,,,CHECK FOR RECORD MARK                        13626 45 13646 03877
10590          B7     FINK                                                            13638 49 14810 00000
10600          TFM    WORK1+9,0                                                       13646 16 13590 00000
10610          C      C00,-PLACE      ,,,BLANK                                        13658 24 03135 03877
10620          BNE    *+24                                                            13670 47 13694 01200
10630          AM     PLACE,2,10                                                      13682 11 03877 00002
10640          C      C14,-PLACE      ,,,ASTERISK                                     13694 24 06351 03877
10650          BE     FILLEM                                                          13706 46 14342 01200
10660          C      C61,-PLACE      ,,,SLASH                                        13718 24 07111 03877
10670          BE     FINK                                                            13730 46 14810 01200
10680          C      C33,-PLACE                                                      13742 24 05757 03877
10690          BE     FINK                                                            13754 46 14810 01200
10700 REGUL    TF     PL2,PLACE                                                       13766 26 07149 03877
10710          TFM    WORK1+15,15,10                                                  13778 16 13596 00015
10720          SM     PL2,1,10                                                        13790 12 07149 00001
10730          BTM    LOOK2,*+12                                                      13802 17 08190 13814
10740          SF     -PL2            ,,,CHECK FOR BACK REFERENCE                     13814 32 07149 00000
10750          C      CURRT2,LSTR3                                                    13826 24 06329 02232
10760          BH     *+24                                                            13838 46 13862 01100
10770          TF     CURRT2,LSTR3                                                    13850 26 06329 02232
10780          SM     PLACE,2,10                                                      13862 12 03877 00002
10790          TF     PL6,PLACE                                                       13874 26 14125 03877
10800          S      PL6,PL2                                                         13886 22 14125 07149
10810          SM     PL6,1,10                                                        13898 12 14125 00001
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10820          TFM    II,ERP                                                          13910 16 13945 13161
10830 LPPP     AM     II,21,10                                                        13922 11 13945 00021
10840 C56      DAC     1,F,*-2                                                        13931 00002
10850          CM     I,*-*                                                           13934 14 14284 00000
10860 II       DS     ,*                                                              13945 00000
10870          BNH    REGUL2                                                          13946 47 14158 01100
10880          TR     WORK2,-II                                                       13958 31 14321 13945
10890          CM     WORK2+11,10,10                                                  13970 14 14332 00010
10900 C24      DAC    1,(, *-2                                                        13979 00002
10910          BH     LPPP                                                            13982 46 13922 01100
10920          A      WORK2+4,PL6                                                     13994 21 14325 14125
10930          C      WORK2+4,WORK2+9                                                 14006 24 14325 14330
10940          BNE    LPPP                                                            14018 47 13922 01200
10950          C      -PLACE,-WORK2-4                                                 14030 24 03877 14325
10960          BNE    LPPP                                                            14042 47 13922 01200
10970          TF     WORK1+4,II      ,,,BACK REFERENCE FOUND                         14054 26 13585 13945
10980          TF     WORK1+13,WORK2+13                                               14066 26 13594 14334
10990          CF     -PL2                                                            14078 33 07149 00000
11000          TFM    WORK1+15,25,10                                                  14090 16 13596 00025
11010          S      WORK2+4,PL6                                                     14102 22 14325 14125
11020          SF     WORK2+20                                                        14114 32 14341 00000
11030 PL6      DC     5,0,*                                                           14125 00005
11040          TR     -11,WORK2                                                       14126 31 13945 14321
11050 JIONF2   AM     PLACE,2,10                                                      14138 11 03877 00002
11060 C04      DAC    1,),*-2                                                         14147 00002
11070          B7     JIONF                                                           14150 49 14278 00000
11080 REGUL2   CF     -PL2                                                            14158 33 07149 00000
11090 SV100    DC    5,0,*                                                            14169 00005
11100          AM     PLACE,2,10                                                      14170 11 03877 00002
11110 PARCNT   DC     2,0,*-2                                                         14179 00002
11120          TF     WORK1+4,LSTR3 ,,,STRING IS NOT BACK REFERNCE                    14182 26 13585 02232
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11130        SM    WORK1+4,1,10                                                   14194 12 13585 00001
11140        TF    99,WORK1+4                                                     14206 26 00099 13585
11150        S     99,LKRET                                                       14218 22 00099 06281
11160        SF    96                                                             14230 32 00096 00000
11170 W      DS    ,*                                                             14241 00000
11180        AM    99,1,10                                                        14242 11 00099 00001
11190        BZ    KINDF         ,,,SKIP IF NULL CONSTANT STRING                  14254 46 13626 01200
11200        TF    WORK1+13,99                                                    14266 26 13594 00099
11210 JIONF  TR    -I,WORK1      ,,,MOVE IN ERP ENTRY                             14278 31 14284 13581
11220 I      DS    ,*-5                                                           14284 00000
11230        AM    I,21,10                                                        14290 11 14284 00021
11240        A     W,WORK1+13                                                     14302 21 14241 13594
11250        B7    KINDF                                                          14314 49 13626 00000
11260 WORK2  DSS   21                                                             14321 00021
11270 FILLEM AM    PLACE,2,10                                                     14342 11 03877 00002
11280        C     C24,-PLACE    ,,,CHECK FOR BALNCED STRING                      14354 24 13979 03877
11290        BE    BLNCD                                                          14366 46 14606 01200
11300        TF    WORK1+4,PLACE                                                  14378 26 13585 03877
11310 PUCK   C     C14,-PLACE                                                     14390 24 06351 03877
11320        BE    ER07+12                                                        14402 46 14498 01200
11330        C    C21,-PLACE,,   ,,,CHECK FOR A SLASH                             14414 24 06363 03877
11340        BE    ER07+12                                                        14426 46 14498 01200
11350        C     C34,-PLACE                                                     14438 24 03195 03877
11360        BE    ER07          ,,,NO LITTERALS ALLOWED IN FILLER DEFINITION     14450 46 14486 01200
11370        AM    PLACE,2,10                                                     14462 11 03877 00002
11380        BNR    PUCK,-PLACE                                                   14474 45 14390 03877
11390 ER07   BTM    ERROR,07700                                                   14486 17 11844 07700
11400        TFM   WORK1+13,0,8                                                   14498 16 13594 00000
11410        TFM   WORK1+15,0,10                                                  14510 16 13596 00000
11420        TF    WORK1+9,PLACE                                                  14522 26 13590 03877
11430        SM    WORK1+9,2,10                                                   14534 12 13590 00002
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11440        C     C21,-PLACE                                                     14546 24 06363 03877
11450        BE    FIXEDL                                                         14558 46 14698 01200
11460        C     C14,-PLACE                                                     14570 24 06351 03877
11470        BE    JIONF2                                                         14582 46 14138 01200
11480 ER15   BTM   ERROR,17400                                                    14594 17 11844 17400
11490 BLNCD  AM    PLACE,2,10    ,,,BALNCED STRING                                14606 11 03877 00002
11500        TF    WORK1+4,PLACE                                                  14618 26 13585 03877
11510        BTM     ADVANC,*+12                                                  14630 17 12986 14642
11520        TFM   WORK1+13,2,8                                                   14642 16 13594 00002
11530        TFM   WORK1+15,5,10                                                  14654 16 13596 00005
11540        TF    WORK1+9,PLACE                                                  14666 26 13590 03877
11550        SM    WORK1+9,4,10                                                   14678 12 13590 00004
11560        B7    ER15-24                                                        14690 49 14570 00000
11570 FIXEDL AM    PLACE,2,10    ,,,FIXED LENGTH STRING                           14698 11 03877 00002
11580        BTM   LOOK2,*+12                                                     14710 17 08190 14722
11590        BTM   INT,*+12                                                       14722 17 07566 14734
11600        BNF   *+20,INTRET                                                    14734 44 14754 17431
11610        B7    ER07                                                           14746 49 14486 00000
11620        SF    INTRET-3                                                       14754 32 17428 00000
11630        TF    WORK1+13,INTRET                                                14766 26 13594 17431
11640        A     WORK1+13,WORK1+13                                              14778 21 13594 13594
11650        TFM   WORK1+15,10,10                                                 14790 16 13596 00010
11660        B7    ER15-24                                                        14802 49 14570 00000
11670 FINK   TFM   WORK1+15,20,10,,,EXTRA FINAL EXTRY                             14810 16 13596 00020
11680        TF    CONST8+11,PLACE,,PLACE MAY BE DESTROYED LATER                  14822 26 16883 03877
11690        TR    -I,WORK1                                                       14834 31 14284 13581
11700 SFLAG  CF    SFLAG                                                          14846 33 14846 00000
11710        TF    ERP+9+21,THERE                                                 14858 26 13191 13170
11720        TFM   I,ERP         ,,,SET UP W VALUES                               14870 16 14284 13161
11730        TFM   ERP+15,0,10                                                    14882 16 13176 00000
11740 WLOOP  TR    WORK2,-I                                                       14894 31 14321 14284
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11750        TF     WORK2+19,W                                          14906 26 14340 14241
11760        S      W,WORK2+13                                          14918 22 14241 14334
11770        TR     -I,WORK2                                            14930 31 14284 14321
11780        AM     I,21,10                                             14942 11 14284 00021
11790        CM     WORK2+15,20,10                                      14954 14 14336 00020
11800        BNE    WLOOP                                               14966 47 14894 01200
11810        TFM    ERP+15,20,10                                        14978 16 13176 00020
11820        TR     -I,WORK2                                            14990 31 14284 14321
11830        TFM    I,ERP+21        ,,,SET UP I                         15002 16 14284 13182
11840 RULE2  TR     WORK1,-I                                            15014 31 13581 14284
11850        AM     I,21,10                                             15026 11 14284 00021
11860        TR     WORK2,-I                                            15038 31 14321 14284
11870        TF     SV100,WORK1+9 ,,,CHECK FOR SIZE FAILURE             15050 26 14169 13590
11880        A      SV100,WORK1+19                                      15062 21 14169 13600
11890        C      SV100,M                                             15074 24 14169 15517
11900        BH     SIZEF                                               15086 46 15782 01100
11910        TFM    *+30,BRTAB,711,,,COMPUTED GOTO                      15098 16 15128 15133
11920        S      *+18,WORK1+15                                       15110 22 15128 13596
11930        B7     *-*                                                 15122 49 00000 00000
11940 BRTAB  DSA    F,B,F,K,FINISH,R                                    15133 00005 15264
                                                                        15138 00005 15550
                                                                        15143 00005 15264
                                                                        15148 00005 15160
                                                                        15153 00005 16098
                                                                        15158 00005 15350
11950 K      TF     WORK2+9,WORK1+9,,CONSTANT STRING                    15160 26 14330 13590
11960        A      WORK2+9,WORK1+13                                    15172 21 14330 13594
11970        AM     WORK1+9,1,10                                        15184 11 13590 00001
11980        SF     -WORK1-9                                            15196 32 13590 00000
11990        C      -WORK2-9,-WORK1-4                                   15208 24 14330 13585
12000        CF     -WORK1-9                                            15220 33 13590 00000
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12010        BNE    MATCHF                                              15232 47 15912 01200
12020        TR     -I,WORK2                                            15244 31 14284 14321
12030        B7     RULE2                                               15256 49 15014 00000
12040 F      TF     WORK2+9,WORK1+9,,FILLER STRIG                       15264 26 14330 13590
12050        A      WORK2+9,WORK1+13                                    15276 21 14330 13594
12060        TR     -I,WORK2                                            15288 31 14284 14321
12070        B7     RULE2                                               15300 49 15014 00000
12080 WORK3  DSS    21                                                  15307 00021
12090 WORK4  DSS    21                                                  15328 00021
12100 R      SF     SFLAG           ,,,BACK REFERENCE                   15350 32 14846 00000
12110        TR     WORK3,-WORK1-4                                      15362 31 15307 13585
12120        AM     WORK1+4,21,10                                       15374 11 13585 00021
12130        TR     WORK4,-WORK1-4                                      15386 31 15328 13585
12140        S      WORK3+9,WORK4+9                                     15398 22 15316 15337
12150        BZ     F               ,,,CHECK FOR EMPTY FILLER           15410 46 15264 01200
12160        TF     WORK2+9,WORK1+9                                     15422 26 14330 13590
12170        S      WORK2+9,WORK3+9                                     15434 22 14330 15316
12180        C      WORK2+9,M                                           15446 24 14330 15517
12190        BH     SIZEF                                               15458 46 15782 01100
12200        AM     WORK1+9,1,10                                        15470 11 13590 00001
12210        SF     -WORK1-9                                            15482 32 13590 00000
12220        C      -WORK2-9,-WORK4-9                                   15494 24 14330 15337
12230        CF     -WORK1-9                                            15506 33 13590 00000
12240 M      DC     5,0,*                                               15517 00005
12250        BNE    MATCHF                                              15518 47 15912 01200
12260 MATCHS TR     -I,WORK2                                            15530 31 14284 14321
12270        B7     RULE2                                               15542 49 15014 00000
12280 B      TF     WORK2+9,WORK1+9                                     15550 26 14330 13590
12290        AM     WORK2+9,2,10                                        15562 11 14330 00002
12300        C      C04,-WORK2-9  ,,,CHECK FOR CLOSE PAREN              15574 24 14147 14330
12310        BE     MATCHF                                              15586 46 15912 01200
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12320        C     C24,-WORK2-9    ,,,CHECK FOR OPEN PAREN                      15598 24 13979 14330
12330        BNE   MATCHS                                                       15610 47 15530 01200
12340        SF    SFLAG           ,,,BALANCED STRING                           15622 32 14846 00000
12350        TFM   PARCNT,1,10                                                  15634 16 14179 00001
12360 BLOOP  AM    WORK2+9,2,10                                                 15646 11 14330 00002
12370        C     WORK2+9,M                                                    15658 24 14330 15517
12380        BH    MATCHF                                                       15670 46 15912 01100
12390        C     C24,-WORK2-9                                                 15682 24 13979 14330
12400        BNE   *+32                                                         15694 47 15726 01200
12410        AM    PARCNT,1,10                                                  15706 11 14179 00001
12420        B7    BLOOP                                                        15718 49 15646 00000
12430        C     C04,-WORK2-9    ,,,COMPARE FOR )                             15726 24 14147 14330
12440        BNE   BLOOP                                                        15738 47 15646 01200
12450        SM    PARCNT,1,10                                                  15750 12 14179 00001
12460        BZ    MATCHS                                                       15762 46 15530 01200
12470        B7    BLOOP                                                        15774 49 15646 00000
12480 SIZEF  BNF   BRACHF,SFLAG    ,,,SCAN FAILURE IF SFLAG NOT SET             15782 44 10794 14846
12490        SM    I,21,10                                                      15794 12 14284 00021
12500 DEC    SM    I,21,10         ,,,SIZE FAILURE                              15806 12 14284 00021
12510        TR    WORK1,-I                                                     15818 31 13581 14284
12520        TFM   *+30,BRTAB2,711                                              15830 16 15860 15865
12530        S     *+18,WORK1+15                                                15842 22 15860 13596
12540        B7    *-*                                                          15854 49 00000 00000
12550 BRTAB2 DSA   A,MATCHF+12,DEC,DEC,BRACHF,DEC                               15865 00005 15892
                                                                                15870 00005 15924
                                                                                15875 00005 15806
                                                                                15880 00005 15806
                                                                                15885 00005 10794
                                                                                15890 00005 15806
12560 A      BNF   DEC,WORK1+20                                                 15892 44 15806 13601
12570        B7    MATCHF+12                                                    15904 49 15924 00000
```

```
12580 MATCHF SM    I,21,10                                                      15912 12 14284 00021
12590        SM    I,21,10                                                      15924 12 14284 00021
12600        TR    WORK1,-I                                                     15936 31 13581 14284
12610        TFM   *+30,BRTAB3,711                                              15948 16 15978 15983
12620        S     *+18,WORK1+15                                                15960 22 15978 13596
12630        B7    *-*                                                          15972 49 00000 00000
12640 BRTAB3 DSA   A2,B2,MATCHF+12,MATCHF+12,A2,MATCHF+12                       15983 00005 16010
                                                                                15988 00005 16066
                                                                                15993 00005 15924
                                                                                15998 00005 15924
                                                                                16003 00005 16010
                                                                                16008 00005 15924
12650 A2     AM    I,21,10                                                      16010 11 14284 00021
12660        TR    WORK1,-I                                                     16022 31 13581 14284
12670        AM    WORK1+9,2,10                                                 16034 11 13590 00002
12680        TR    -I,WORK1                                                     16046 31 14284 13581
12690        B7    RULE2                                                        16058 49 15014 00000
12700 B2     AM    I,21,10         ,,,REMATCH BALANCED STRING                   16066 11 14284 00021
12710        TR    WORK2,-I                                                     16078 31 14321 14284
12720        B7    B+12                                                         16090 49 15562 00000
12730*
12740 FINISH SM    I,42,10                                                      16098 12 14284 00042
12750        TR    WORK2,-I        ,,,EXTEND LAST STRING IF ARBITRARY           16110 31 14321 14284
12760        AM    I,21,10                                                      16122 11 14284 00021
12770        CM    WORK2+15,0,10                                                16134 14 14336 00000
12780        BNE   *+36                                                         16146 47 16182 01200
12790        TF    WORK1+9,M                                                    16158 26 13590 15517
12800        TR    -I,WORK1                                                     16170 31 14284 13581
12810        TFM   I,ERP+21        ,,,CONSTRUCT FILLED STRINGS                  16182 16 14284 13182
12820        TFM   SHIFT,0                                                      16194 16 16575 00000
12830 KNLOOP TR    WORK1,-I                                                     16206 31 13581 14284
```

```
12840          AM    I,21,10                                              16218 11 14284 00021
12850          TR    WORK2,-I                                             16230 31 14321 14284
12860          TFM   *+30,BRTAB4,711                                      16242 16 16272 16277
12870          S     *+18,WORK1+15                                        16254 22 16272 13596
12880          B7    *-*                                                  16266 49 00000 00000
12890 BRTAB4 DSA     KONST,KONST,KONST,KNLOOP,CONST8,KNLOOP               16277 00005 16304
                                                                          16282 00005 16304
                                                                          16287 00005 16304
                                                                          16292 00005 16206
                                                                          16297 00005 16872
                                                                          16302 00005 16206
12900 KONST  TF      PLACE,WORK1+4                                        16304 26 03877 13585
12910        TF      CURRT2,CURRNT                                        16316 26 06329 03762
12920        BTM     LOOK2,*+12      ,,,CONSTRUCT FILLED VARIABLE         16328 17 08190 16340
12930        BNR     *+20,COLDIF                                          16340 45 16360 09395
12940        B7      ER07                                                 16352 49 14486 00000
12950        BD     AROUND,DEFINE                                         16360 43 16456 08248
12960        TF      SV100,WORK1+9                                        16372 26 14169 13590
12970        S       SV100,SHIFT                                          16384 22 14169 16575
12980        C       LSTR3,SV100                                          16396 24 02232 14169
12990        BH      AROUND                                               16408 46 16456 01100
13000        S       SHIFT,LSTR2                                          16420 22 16575 02222
13010        A       SHIFT,COLDIF                                         16432 21 16575 09395
13020        A      SHIFT,LSTR3                                           16444 21 16575 02232
13030 AROUND BTM     DELET,*+12                                           16456 17 09682 16468
13040        C       WORK1+ 9,WORK2+9                                     16468 24 13590 14330
13050        BE      KNLOOP          ,,,CHECK FOR EMPTY FILLER            16480 46 16206 01200
13060        TF      PLACE,WORK1+4                                        16492 26 03877 13585
13070        C      C13,-PLACE                                            16504 24 06795 03877
13080        BNE     *+36            ,,,PLACE OF NAME MAY HAVE MOVED      16516 47 16552 01200
13090        TF      CURRT2,CURRNT                                        16528 26 06329 03762
```

```
13100        BTM      LOOK2,*+12                                          16540 17 08190 16552
13110        S      WORK1+9,SHIFT                                         16552 22 13590 16575
13120        SM      WORK2+9,*-*                                          16564 12 14330 00000
13130 SHIFT  DS      ,*                                                   16575 00000
13140        SM      KSP,1,10                                             16576 12 06833 00001
13150        SF      -KSP                                                 16588 32 06833 00000
13160        TF      SF89+6,CURRNT                                        16600 26 16666 03762
13170        S       CURRNT,KSP                                           16612 22 03762 06833
13180        A       CURRNT,COLRET                                        16624 21 03762 08593
13190        TF      -CURRNT,-COLRET                                      16636 26 03762 08593
13200        CF      -KSP            ,,,LETS NOT LEAVE ANY STRAY FLAGS    16648 33 06833 00000
13210 SF89   SF      *-*                                                  16660 32 00000 00000
13220        AM      CURRNT,1,10                                          16672 11 03762 00001
13230        TR      -CURRNT,DSC00+1                                      16684 31 03762 07250
13240        AM      CURRNT,2,10                                          16696 11 03762 00002
13250        TF      CF8+6,CURRNT                                         16708 26 16810 03762
13260        AM      WORK1+9,1,10                                         16720 11 13590 00001
13270        S       CURRNT,WORK1+9                                       16732 22 03762 13590
13280        A       CURRNT,WORK2+9                                       16744 21 03762 14330
13290        SF      -WORK1-9                                             16756 32 13590 00000
13300        TR      -CURRNT,DSC00+1                                      16768 31 03762 07250
13310        TF      -CURRNT,-WORK2-9                                     16780 26 03762 14330
13320        CF      -WORK1-9                                             16792 33 13590 00000
13330 CF8    CF      *-*                                                  16804 33 00000 00000
13340        AM      CURRNT,1,10                                          16816 11 03762 00001
13350        SM      PAST,10,10                                           16828 12 03548 00010
13360        TF      CURENT-5,CURRNT                                      16840 26 05125 03762
13370        TF      -PAST,CURENT                                         16852 26 03548 05130
13380        B7      KNLOOP                                               16864 49 16206 00000
13390*
13400 CONST8 TFM     PLACE,*-*                                            16872 16 03877 00000
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13410          BNR    *+20,-PLACE                                         16884 45 16904 03877
13420          B7     YEAH2                                               16896 49 10774 00000
13430          C      C61,-PLACE                                          16904 24 07111 03877
13440          BE     BRANHS                                              16916 46 10774 01200
13450          C      C33,-PLACE                                          16928 24 05757 03877
13460          BE     CONST2                                              16940 46 10718 01200
13470          BTM    ERROR,17500                                         16952 17 11844 17500
13480 ER90     BTM    ERROR,07800                                         16964 17 11844 07800
13490*
13500******      DECCDE CONTROL CARS
13510*
13520 CONTRL BNR      *+20,INPUT+2   ,,,CONTROL CARD DECODER              16976 45 16996 02767
13530          B7     READ                                                16988 49 03066 00000
13540          TFM    FIND,INPUT                                          16996 16 17031 02765
13550          AM     FIND,2,10                                           17008 11 17031 00002
13560          C      C00,*-*                                             17020 24 03135 00000
13570 FIND     DS     ,*                                                  17031 00000
13580          BE     *-24                                                17032 46 17008 01200
13590          AM     FIND,4,10                                           17044 11 17031 00004
13600          BNR    *+20,-FIND                                          17056 45 17076 17031
13610          B7     TYPEC                                               17068 49 17136 00000
13620          TFM    *+18,CTAB                                           17076 16 17094 17161
13630 K83      C      *-*,-FIND                                           17088 24 00000 17031
13640          BE     FOUND 8                                             17100 46 17246 01200
13650          AM     *-18,12,10                                          17112 11 17094 00012
13660          BNR    *-36,*-30,11                                        17124 45 17088 17094
13670 TYPEC    BTM    WATY,INPUT                                          17136 17 12226 02765
13680          B7     READ                                                17148 49 03066 00000
13690 CTAB     DSAC   3,LIS,                                              17161 00006
13700          DSA    LIST                                                17166 00005 17278
13710          DSAC   3,PCC,                                              17173 00006
```

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13720          DSA    PCC                                                 17178 00005 17350
13730          DSAC   3,SPA,                                              17185 00006
13740          DSA    SPACE                                               17190 00005 17310
13750          DSAC   3,UNL,                                              17197 00006
13760          DSA    UNLIST                                              17202 00005 17330
13770          DSAC   3,DUM,                                              17209 00006
13780          DSA    CUMPST                                              17214 00005 17370
13790          DSAC   3,PRI,                                              17221 00006
13800          DSA    PRNT2                                               17226 00005 17390
13810          DSAC   3,EJE,                                              17233 00006
13820          DSA    EJECT2                                              17238 00005 17410
13830          DSAC   3,  ',                                              17245 00006
13840*
13850 FOUND8 AM       K83+6,5,10                                          17246 11 17094 00005
13860          SF     K83+6          ,,,CONTROL FUNCTION FOUND - BRANCH TO IT   17258 32 17094 00000
13870          B7     K83+6,,6                                            17270 49 17094 00000
13880 LIST     TDM    LIST2,-1                                            17278 15 02303 00001
13890 DTYPE    BNF    READ,PCC2                                           17290 44 03066 02304
13900          B7     TYPEC                                               17302 49 17136 00000
13910*
13920 SPACE    BTM    WATY,RMARK     ,,,SPACE ONE LINE                    17310 17 12226 02925
13930          B7     CTYPE                                               17322 49 17290 00000
13940*
13950 UNLIST TDM      LIST2,0                                             17330 15 02303 00000
13960          B7     CTYPE                                               17342 49 17290 00000
13970*
13980 PCC      TDM    PCC2,-1                                             17350 15 02304 00001
13990          B7     TYPEC                                               17362 49 17136 00000
14000 DUMPST TDM      CUMPSW,-1                                           17370 15 02305 00001
14010          B7     CTYPE                                               17382 49 17290 00000
14020 PRNT2    TDM    PRINTR,-1                                           17390 15 02302 00001
```

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14030        B7     DTYPE                                                        17402 49 17290 0̅0000
14040 EJECT2 BTM    EJECT,DTYPE                                                  17410 17 12400 1̅7290
14050 INTRET DC     10,0                                                         17431 00010
14060 ZERO   DC     10,0                                                         17441 00010
14070 ONE    DC     10,1                                                         17451 00010
14080 MASK   DSAC   11,00000000000,                                              17473 00022
14090        DSA     ER90                                                        17478 00005 1̅6964
14100        DSC     10,0                                                        17479 00010
14110        DSC    50,0                                                         17489 00050
14120 PUSH9  DSAC   50,                                            ,             17639 00100
14130        DC     1,'                                                          17640 00001
14140 CNNST  DC     20,0                                                         17660 00020
14150        DSC     20,0'                                                       17661 00020
14160 THERE  DS     ,ERP*9                                                       13170 00000
14170*
14180******      ROUTINE TO PREVENT MEMORY CONFLICT WHEN REFERNCE
14190******         STRING MUST BE CONTRUCTED
14200*
14210 OHDEAR DAC    3,- ',                                                       17683 00006
14220 OHNI   TFM    PLACE,OH DEAR ,,,OF ALL THE RIDICULOUS THINGS                17688 16 03877 1̅7683
14230        BTM     LOOK2,*+12                                                  17700 17 08190 1̅7712
14240        BTM    DELET,*+12                                                   17712 17 09682 1̅7724
14250        TF     PLACE,PL8                                                    17724 26 03877 12011
14260        TF     CURRT2,CURRNT                                                17736 26 06329 03762
14270        TR     -CURRNT,OH DEAR-1                                            17748 31 0376̅2 17682
14280        AM     CURRT2,4,10                                                  17760 11 06329 000̅04
14290        BTM     LOOK2,*+12                                                  17772 17 08190 1̅7784
14300        TF     CURRT2,LSTR3                                                 17784 26 06329 02232
14310        TF     CURRNT,CURRT2                                                17796 26 03762 06329
14320        TF     CURENT-5,CURRNT                                              17808 26 05125 03762
14330        SM     PAST,10,10                                                   17820 12 03548 0001̅0
```

```
14340        TF     -PAST,CURENT                                                 17832 26 0354̅8 05130
14350-       B7     OH MY                                                        17844 49 05632 00000
14360 QUOTE  DAC    08,QUOTE '',   ,,,SPECIAL STRING WHICH CONTAINS ONLY A QUOTE 17853 00016
14370 LAST   DAC   1, ,                                                          17869 00002
14380        DEND   START-12                                                     02934
```

SYMBOL TABLE

```
UNLIST 17330    TRLOOP 09850    SUBPSH 12555    SUBOUT 12902    SUBLST 02323
SUBCLL 05014    SUBCHK 04033    SUBCAL 12558    SLINDC 03100    SKIPIT 02994
SEARCH 03114    SBCLAR 05078    SBCKOT 04106    SBCKLP 04046    SBCKFD 04398
SBCKCL 04359    RETURN 10806    RETCOL 09422    REGUL2 14158    PUNCH2 11458
PRINT2 11394    PRINTR 02302    PLACE2 06341    PERMIS 07971    PARCNT 14179
OHDEAR 17683    NOFIND 08630    MYPARN 03950    MATCHS 15530    MATCHF 15912
LUCKY2 12432    LOOKUP 07962    LKEVAL 09218    LENGTH 02309    KNLOOP 16206
KALSUB 12606    JIONF2 14138    INTRET 17431    INDIR5 09018    FOUND8 17246
FORGT2 10406    FORGET 10178    FIXEDL 14698    FINLKP 08502    FINISH 16098
FINCRM 12296    FINCON 10662    FILLEM 14342    FAILED 07914    ERRRR6 04361
ERRRR5 05251    ERRRR4 05223    ERRRR3 05197    EJECT2 17410    DUMPSW 02305
DUMPST 17370    DEFINE 08248    C34DIG 13045    CURRT2 06329    CURRNT 03762
CURENT 05130    CONTRL 16976    CONST8 16872    CONST2 10718    CONARN 10510
COLRET 08593    COLDIF 09395    CHLBOT 03434    BRTAB4 16277    BRTAB3 15983
BRTAB2 15865    BRANHS 10774    BRANHF 10794    BRACHS 10774    BRACHF 10794
BNRTST 08618    BACKIN 09590    AROUND 16456    ADVANC 12986     A     15892
 ADD   06526     ADD2  06902     ARN65 11610     ARN66 11702     A2    16010
 B     15550     BB    12080     BK81  07778     BK82  07614     BLNCD 14606
 BLCOP 15646     BRTAB 15133     B2    16066     CF8   16804     CHECK 03866
 CHLB  03318     CLAST 06045     CNNST 17660     COLCT 09362     COLE  05536
 CCNST 09942     CORE  02957     CTAB  17161     CURRT 10340     C00   03135
 C0021 12243     C03   03291     C04   14147     C10   06419     C13   06795
 C14   06351     C20   07019     C21   06363     C22   08417     C23   07043
 C24   13979     C33   05757     C34   03195     C40   03293     C56   13931
 C61   07111     C62   10831     C70   06655     DCA   02926     DEC   15806
 DELET 09682     DFINE 08248     DIV   06634     DIV2  07194     DSC00 07249
 DTYPE 17290     DUMP  11928     E     07518     EJECT 12400     END   05287
 ENCC  04870     EPROG 10881     ER    03742     ERI   03678     ERMES 11827
 ERP   13161     ERROR 11844     ERRRR 05143     ERRR2 05173     ERR1  03696
 ERC3  08310     ERC4  08726     ER05  09766     ER07  14486     ER10  08066
 ER11  12890     ER12  11098     ER15  14594     ER9   07802     ER90  16964
 EV    06646     EVAL  05926     EVRET 06900     EXP2  07010     EXP3  07102
 EXTRA 07506     F     15264     FF    11130     FINAR 07242     FIND  17031
 FINK  14810     FLAG  07314     FOUND 08738     FS    11110     GET   12082
 GET2  12130     GOTO  05452     GOTO2 11154     G089  05288     HP20  03574
 HP32  08546     I     14284     II    13945     INPUT 02765     INT   07566
 JICNF 14278     JION7 06354     JION8 07458     K     15160     KALFD 12710
 KALSB 12654     KINDF 13626     KKRET 11548     KMKM  12782     KONST 16304
 KSP   06833     KSTR4 07893     KSTR5 09904     K83   17088     LAST  17869
 LIST  17278     LISTS 06857     LIST2 02303     LKRET 06281     LKUP  06210
 LLIT  08890     LOCK2 08190     LPPP  13922     LP65  11542     LSTR  08629
 LSTR2 02222     LSTR3 02232     LUCKY 12264     M     15517     MASK  17473
 MUL   06566     MUL2  06942     NEXT  06737     NOTME 03598     OHMY  05632
```

```
 OHNI  17688     OK    03756     OK2   04738     OK4   04498     ONE   17451
 ON10  06422     ON28  07730     ON62  09598     ON63  10902     ON638 10958
 ON83  07814     ON87  04590     ON88  04430     ON9   06138     OVLAP 03816
 OVLP  03841     PAST  03548     PCC   17350     PCC2  02304     PEKMT 07998
 PINT  07673     PIT   02751     PLACE 03877     PL2   07149     PL6   14125
 PL8   12011     PNRET 11386     POT   02723     PPT   02737     PRINT 11258
 PRNT2 17390     PUCK  14390     PUNCH 11426     PUSH2 05919     PUSH4 08183
 PUSH9 17639     QBL   06102     QBL2  06386     QUENT 05140     QUOTE 17853
 R     15350     READ  03066     READC 11746     REGUL 13766     RETLK 08846
 RET9  06010     RIG   08702     RMARK 02925     RULE2 15014     SBCK2 04274
 SCAN  13602     SFLAG 14846     SF89  16660     SHIFT 16575     SIZEF 15782
 SPACE 17310     SPCG  03900     START 02946     SUB   06546     SUBCK 04297
 SUBCL 05060     SUB2  06922     SUC   10783     SUC2  11152     SV100 14169
 SV203 12985     TBK81 07902     TDUMP 08714     TFM   11338     TFMZ  10754
 TFM8K 11362     THERE 13170     TNEXT 05961     TR    04558     TYPEC 17136
 T796  11976     VG    12998     VG2   13046     W     14241     WATY  12226
 WLCOP 14894     WORK1 13581     WORK2 14321     WORK3 15307     WORK4 15328
 WTY   05524     YEAH2 10774     YEAH3 10822     Z     07398     ZERO  17441
```

```
------------------------------------------------------------------------------------
12560A      BNF  DEC,WORK1&20
                                 12550BRTAB2DSA  A,MATCHF&12,DEC,DEC,BRACHF,DEC
------------------------------------------------------------------------------------
04C10ABD    TFM  EVRET  ,ADD2  ,,,SET UP CORRESPONDING RETURN
                                 03930      BE   ADD
------------------------------------------------------------------------------------
044C0ADD2   A    10,INTRET
                                 0401CADD   TFM  EVRET  ,ADD2  ,,,SET UP CORRESPONDING RETURN
------------------------------------------------------------------------------------
10240ADVANCTFM   PARCNT,0,10  ,,,SUBPROGRAM TO ADVANCE TO MATCH PAENTHESIS
                                 08570      BTM  ADVANC,ON638&12
                                 1151C      BTM    ADVANC,*&12
------------------------------------------------------------------------------------
08940ARN65 AM   LKRET,1,1C
                                 0891C      BNR  ARN65,-KKRET
------------------------------------------------------------------------------------
09C10ARN66 TD   -KKRET,-LKRET
                                 08950      BNR  ARN66,-LKRET
------------------------------------------------------------------------------------
13030AROUNDBTM  DELET,*&12
                                 12950      BD  AROUND,DEFINE
                                 12990      BH   AROUND
------------------------------------------------------------------------------------
12650A2     AM   I,21,10
                                 1264CBRTAB3DSA  A2,B2,MATCHF&12,MATCHF&12,A2,MATCHF&12
                                 12640BRTAB3DSA  A2,B2,MATCHF&12,MATCHF&12,A2,MATCHF&12
------------------------------------------------------------------------------------
12280B      TF   WORK2&9,WORK1&9
                                 1194CBRTAB DSA  F,B,F,K,FINISH,R
                                 12720      B7   B&12
------------------------------------------------------------------------------------
```

```
070C0BACKINB7   -COLCT&1
                                 08660      B7   BACKIN
------------------------------------------------------------------------------------
094308B     BB2
                                 C9500      BNL  BB
------------------------------------------------------------------------------------
05230BK81   AM   LKRET,2,10
                                 05340      B7   BK81
                                 05350TBK81 BNF  BK81,FLAG
------------------------------------------------------------------------------------
05080BK82   C    LKRET,LSTR3         ,,,CHECK FOR END OF STRING
                                 0524C      BNR  BK82,-PINT
------------------------------------------------------------------------------------
11490BLNCD AM   PLAOE,2,10    ,,,BALNCED STRING
                                 11290      BE   BLNCD
------------------------------------------------------------------------------------
12360BLOOP AM   WORK2&9,2,10
                                 12420      B7   BLOOP
                                 12440      BNE  BLOOP
                                 12470      B7   BLOOP
------------------------------------------------------------------------------------
06120BNRTSTBNR  HP32,*-*,7    ,,,TEST FOR END OF TABLE
                                 06030      B7   BNRTST-12
                                 06060      BNE  BNRTST-12     ,,,NO - GO ON TO NEXT ENTRY
------------------------------------------------------------------------------------
08140BRACHFTDM  SUC,0
                                 08130      B7   BRACHF&12
                                 08150BRANHFDS   ,BRACHF
                                 12480SIZEF BNF  BRACHF,SFLAG  ,,,SCAN FAILURE IF SFLAG NOT SET
                                 12550BRTAB2DSA  A,MATCHF&12,DEC,DEC,BRACHF,DEC
------------------------------------------------------------------------------------
081C0BRACHSTDM  SUC,-1
                                 0811CBRANHSDS   ,BRACHS
------------------------------------------------------------------------------------
```

```
08150BRANHFDS   ,BRACHF
                           05390       B7   BRANHF
------------------------------------------------------------------------------------------
08110BRANHSDS   ,BRACHS
                           03130       BE   BRANHS
                           C3320       BE     BRANHS
                           08CC0       BE   BRANHS
                           0817CYEAH2  DS     ,BRANHS
                           13440       BE   BRANHS
------------------------------------------------------------------------------------------
11940BRTAB DSA  F,B,F,K,FINISH,R
                           11910       TFM  *&30,BRTAB,711,,,COMPUTED GOTO
------------------------------------------------------------------------------------------
12550BRTAB2DSA  A,MATCHF&12,DEC,DEC,BRACHF,DEC
                           12520       TFM  *&30,BRTAB2,711
------------------------------------------------------------------------------------------
12640BRTAB3DSA  A2,B2,MATCHF&12,MATCHF&12,A2,MATCHF&12
                           1261C       TFM  *&30,BRTAB3,711
------------------------------------------------------------------------------------------
12890BRTAB4DSA  KONST,KONST,KONST,KNLOOP,CONST8,KNLCOP
                           12860       TFM  *&30,BRTAB4,711
------------------------------------------------------------------------------------------
127C0B2    AM   I,21,10        ,,,REMATCH BALANCED STRING
                           1264CBRTAB3DSA  A2,B2,MATCHF&12,MATCHF&12,A2,MATCHF&12
------------------------------------------------------------------------------------------
13330CF8   CF   *-*
                           03690       TF   CF8&6,CURRT2
                           C3780       CF   -CF8-6
                           0414C       TF   CURRT2,CF8&6
                           13250       TF   CF8&6,CURRNT
------------------------------------------------------------------------------------------
01570CHECK C    CCO,CHECK&11,11,,SQUEEZE OUT EXTRA BLANKS
                           01010       TFM  CHECK&11,INPUT
                           0131CHP20   BD   CHECK,DEFINE
                           0134C       BE   CHECK            ,,,   OR BLANK
                           C1390       B7   CHECK
```

```
                           01570CHECK C    C00,CHECK&11,11,,SQUEEZE OUT EXTRA BLANKS
                           01610      C    C34,CHECK&11,11,,CHECK FOR @
                           C167CPLACE DS   ,CHECK&11
                           0214C      TF   TR&6,CHECK&11
                           02160      TF   TR&11,CHECK&11
                           02350      AM   CHECK&11,2,10
                           C2360      BNR  CHECK,CHECK&11,11   ,,,CHECK FOR END OF CARD
                           02360      BNR  CHECK,CHECK&11,11   ,,,CHECK FOR END OF CARD
------------------------------------------------------------------------------------------
01080CHLB  C    CCO,-PLACE     ,,,FIND END OF LABEL
                           C1120       BNR  CHLB,-PLACE
------------------------------------------------------------------------------------------
01180CHLBOTTFM  PERMIS,00,9    ,,,SET UP LINKAGE TO TABLE LOOKUP ROUTINE
                           01C9C       BE   CHLBOT
------------------------------------------------------------------------------------------
03530CLAST DS   ,*
                           0354C       TF   CLAST ,PUSH2-5 ,,,PULL UP PUSH DOWN LIST
                           06690       TF   LKRET,CLAST
                           06710       TF   CURRT2,CLAST
                           1021C       TF   CLAST,2294
------------------------------------------------------------------------------------------
14140CNNST DC   20,C
                           0504CINT    TFM  CNNST-10,0
                           0505C       TFM  PINT,CNNST-10
------------------------------------------------------------------------------------------
068COCOLCT TFM  COLCIF,-1,9    ,,,SUBROUTINE TO FIND END OF STRING NAME
                           05970       BTM  COLCT,*&12
                           06850       TFM  COLCT-1,FINLKP
                           06920       BNE   -COLCT&1
                           06930       BD   -COLCT&1,PERMIS
                           07000BACKINB7    -COLCT&1
                           07020       BL   COLCT&24
                           07040       BE   COLCT&24
                           07060       BE   COLCT&24
------------------------------------------------------------------------------------------
06830COLDIFDC   3,0,*-2
                           01070       TFM  COLDIF,-1,9
                           01110       AM   COLDIF,2,10
                           01240       A   2218&4,COLDIF
                           01250       A     2218&9,COLDIF
                           06050HP32   C    COLDIF,-LSTR   ,,,CHECK FOR SAME LENGTH
                           06200       CM   COLDIF,5,10
                           06400       TD   COLDIF,RMARK   ,,,INDICATE VARIABLE NOT TO BE DELETED
```

```
                         06620       TF   COLDIF,LSTR3
                         06730       TD   COLDIF ,RMARK ,,,INDICATE NOT TO BE DELETED
                         06800COLCT  TFM  COLDIF,-1,9   ,,,SUBROUTINE TO FIND END OF STRING NAME
                         06900       A    COLDIF,99
                         06910       CM   COLDIF,11,10  ,,,CHECK FOR I/O INDICATION
                         07110       A    2218&29,COLDIF
                         07170       S   LSTR2,COLDIF
                         07350CONST  BNR   *&20,COLDIF
                         07560       TF   FORGT2&23,COLDIF
                         07760       TFM  COLDIF,*-*
                         07890       A   CURRT2,COLDIF  ,,,CHECK IF CONSTRUCTED STRING IS NULL
                         09070       TD       COLDIF,RMARK
                         09890       S    KALSUB&6,COLDIF,,RECOVER SUBROUTINE NAME
                         12930       BNR  *&20,COLDIF
                         13010       A    SHIFT,COLDIF

------------------------------------------------------------------------------------------------
03090COLE  BNC2  *&24  ,,,CHECK THE INTERRUPT SWITCH

                         03030       BNC1  COLE          ,,,CHECK IF TRACE SWITCH IS ON

------------------------------------------------------------------------------------------------
06090COLRETDC   5,0,*

                         01200       TF   COLRET,PLACE
                         01210       SM   COLRET,2,10
                         06080       C   -2218-4,-COLRET,,,NOW CHECK FOR SAME LABEL
                         06180       C    END-2,-COLRET      ,,,CHECK FOR END CARD
                         06580       TF   COLRET,LSTR3
                         06860RETCOLTF   COLRET,PLACE
                         06870       SM   COLRET,2,10
                         06940       C    PIT&10,-COLRET
                         06960       C   POT&10,-COLRET
                         06980       C    PPT&10,-COLRET
                         07410       A    CURRT2,COLRET
                         07420       TF   -CURRT2,-COLRET
                         13180       A    CURRNT,COLRET
                         13190       TF   -CURRNT,-COLRET

------------------------------------------------------------------------------------------------
07840CONARNBTM  DELET,*&12

                         07790       BE   CONARN

------------------------------------------------------------------------------------------------
07350CONST BNR   *&20,COLDIF

                         03300       BE   CONST
                         08060       B7   CONST

------------------------------------------------------------------------------------------------
08020CONST2TF   TFMZ&11,PLACE

                         13460       BE   CONST2

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13400CONST8TFM  PLACE,*-*

                         11680       TF   CONST8&11,PLACE,,PLACE MAY BE DESTROYED LATER
                         12890BRTAB4DSA   KONST,KONST,KONST,KNLOOP,CONST8,KNLOOP

------------------------------------------------------------------------------------------------
13520CONTRLBNR  *&2C,INPUT&2  ,,,CONTROL CARD DECODER

                         00960       BE   CONTRL

------------------------------------------------------------------------------------------------
00740CORE  DS    ,START&11

                         00700       BNF  SKIPIT,CORE
                         00720       AM   CORE,20000
                         00730       TR   -CORE,RMARK-1
                         00790       TF   PAST ,CORE

------------------------------------------------------------------------------------------------
13690CTAB  DSAC 3,LIS,

                         13620       TFM  *&18,CTAB

------------------------------------------------------------------------------------------------
02730CURENTDC   10,C

                         02510       TF   -PAST,CURENT
                         02950       TF   CURENT-5,CURRNT
                         02960       TF   -PAST,CURENT
                         07950       TF   CURENT-5,CURRNT
                         07960       TF   -PAST,CURENT
                         13360       TF   CURENT-5,CURRNT
                         13370       TF   -PAST,CURENT
                         14320       TF   CURENT-5,CURRNT
                         14340       TF   -PAST,CURENT

------------------------------------------------------------------------------------------------
03340CURRNTDS   ,OK&6

                         00810       TFM  CURRNT,LAST-1
                         01230       TF   2218&4,CURRNT
                         01380       SM   CURRNT,2,10    ,,,GO BACK OVER REC MARK
                         01510       C    CURRNT,PAST    ,,,CHECK FOR OVERLAP
                         02530       TF   EPROG,CURRNT       ,,,SAVE END OF PROGRAM
                         02580       TF   434,CURRNT     ,,,MOVE NEXT AVAL. CORE TO HIGH INDIC.
                         02690       TF   CURRNT,434     ,,,UP DATE CURRENT HIGH CORE
                         02890       TF   QUENT-5,CURRNT
                         02930       TR   -CURRNT,QUOTE-1,,,CREATE STRING CONTAING QUOTE %@¤
                         02940       AM   CURRNT,14,10
                         02950       TF   CURENT-5,CURRNT
                         03110       TF     CURRT2,CURRNT
                         05580       TF   CURRT2,CURRNT
                         07100       TF   2218&24,CURRNT
                         07200       S    CURRNT,LSTR3   ,,,,UPDATE NEXT AVAL. CORE
                         07390       TF   CURRT2,CURRNT
                         07440       SF   -CURRNT
```

```
                    07880        TF    CURRT2,CURRNT
                    07930        TF    CURRNT,CURRT
                    07950        TF    CURENT-5,CURRNT
                    09290        TR    -CURRNT,RMARK-1
                    12910        TF    CURRT2,CURRNT
                    13090        TF    CURRT2,CURRNT
                    13160        TF    SF89&6,CURRNT
                    13170        S     CURRNT,KSP
                    13180        A     CURRNT,COLRET
                    13190        TF    -CURRNT,-COLRET
                    13220        AM    CURRNT,1,10
                    13230        TR    -CURRNT,DSC00&1
                    13240        AM    CURRNT,2,10
                    13250        TF    CF8&6,CURRNT
                    13270        S     CURRNT,WORK1&9
                    13280        A     CURRNT,WORK2&9
                    13300        TR    -CURRNT,DSC00&1
                    13310        TF    -CURRNT,-WORK2-9
                    13340        AM    CURRNT,1,10
                    13360        TF    CURENT-5,CURRNT
                    14260        TF    CURRT2,CURRNT
                    14270        TR    -CURRNT,OH DEAR-1
                    14310        TF    CURRNT,CURRT2
                    14320        TF    CURENT-5,CURRNT

------------------------------------------------------------------------------------------
07690CURRT DS    ,*-5

                    07580        TF    CURR T,CURRT2
                    07640        SM    CURR T,2,10
                    07650        S    CURRT ,WORK1&9
                    07660        A     CURR T,M
                    07680        TR    -CURR T,DSC00&1
                    07700        TF    -CURR T,-M
                    07720        AM    CURR T,3,10
                    07860        S    CURRT,LSTR3      ,,,MODIFY BY AMOUNT OF SHIFT
                    07870        SM    CURRT,2,10
                    07930        TF    CURRNT,CURRT

------------------------------------------------------------------------------------------
03750CURRT2DC    5,C,*

                    03110        TF      CURRT2,CURRNT
                    03460        TF    PUSH2-5,CURRT2,,, POINTERS TO THE OUTPUT AREA
                    03500RET9    TR    -CURRT2,DSC00&2,,SET TRAILER RECORD MARK
                    03510        AM    CURRT2,2,10
                    03690        TF    CF8&6,CURRT2
                    03710        S     CURRT2,LKRET
                    03720        A     CURRT2,LSTR3
                    03770        TF    -CURRT2,-LSTR3
                    03820        AM    CURRT2,3,10
                    03840JION7   SM    CURRT2,2,10
                    04140        TF    CURRT2,CF8&6
                    04980E       TR    -CURRT2,-Z-6
                    04990        S     CURRT2,Z&6
                    05000        AM    CURRT2,81,10
                    05580        TF    CURRT2,CURRNT
                    05720        C     CURRT2,PAST      ,,,CHECK FOR CORE OVERLAP
                    06680        SM   CURRT2,2,10
```

```
                    06700        TF     LSTR3,CURRT2
                    06710        TF    CURRT2,CLAST
                    07390        TF    CURRT2,CURRNT
                    07400        S     CURRT2,KSP
                    07410        A     CURRT2,COLRET
                    07420        TF    -CURRT2,-COLRET
                    07450        AM    CURRT2,1,10
                    07460        TR    -CURRT2,DSC00&1
                    07470        AM    CURRT2,2,10
                    07500        S    CURRT2,THERE
                    07510        A     CURRT2,ERP&9&21
                    07540        TF    -CURRT2,-ERP-9-21
                    07580        TF    CURR T,CURRT2
                    07730        SM    CURRT2,2,10
                    07740        CF    -CURRT2
                    07880        TF    CURRT2,CURRNT
                    07890        A    CURRT2,COLDIF    ,,,CHECK IF CONSTRUCTED STRING IS NULL
                    07900        AM    CURRT2,4,10
                    07910        BNR   *&20,-CURRT2    ,,,DONT PUT NULL STRING IN SYMBOL TABLE
                    10050        TF    SUBPSH-5,CURRT2
                    10100        TF    SUBPSH,CURRT2
                    10750        C     CURRT2,LSTR3
                    10770        TF    CURRT2,LSTR3
                    12910        TF    CURRT2,CURRNT
                    13090        TF    CURRT2,CURRNT
                    14260        TF    CURRT2,CURRNT
                    14280        AM    CURRT2,4,10
                    14300        TF    CURRT2,LSTR3
                    14310        TF    CURRNT,CURRT2

------------------------------------------------------------------------------------------
00890C00    DAC  1, ,*-2

                    00900        C     C00,SEARCH&6,11,,IS IT A BLANK
                    01080CHLB    C     C00,-PLACE     ,,,FIND END OF LABEL
                    01570CHECK   C     C00,CHECK&11,11,,SQUEEZE OUT EXTRA BLANKS
                    03250        C     C00,-PLACE     ,,,CHECK FOR A BLANK
                    03590QBL     C     C00,-PLACE     ,,,CHECK FOR BLANK
                    03880QBL2    C     C00,-PLACE     ,,,SKIP BLANKS
                    04240        C     C00,-PLACE
                    08210        C     C00,-PLACE
                    08430        C    C00,-PLACE
                    10610        C     C00,-PLACE     ,,,BLANK
                    13560        C     C00,*-*

------------------------------------------------------------------------------------------
09590C0021 DSAC 2, /,*-6

                    02210DN87  C   C0021,-PLACE   ,,,CHANGE GOTO / CODDING TO 61

------------------------------------------------------------------------------------------
01050C03    DAC  1,.,*-2

                    01780        C     C03,-SUBCHK   ,,,CHECK FOR A PERIOD
                    05930        C    C03,-PLACE
                    07030        C     C03,-PLACE

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11060C04    DAC   1,¤,*-2

                                 0207CON88   C     C04,-PLACE
                                 03620ON9    C     C04,-PLACE    ,,,CHECK FOR ¤
                                 06740       C     C04,-PLACE
                                 10080       C     C04,-PLACE
                                 10130       C     C04,-PLACE
                                 10340       C    C04,-PLACE
                                 12300       C     C04,-WORK2-9  ,,,CHECK FOR CLOSE PAREN
                                 12430       C     C04,-WORK2-9  ,,,COMPARE FOR ■

-------------------------------------------------------------------------------------------------
03910C10    DAC   1,&,*-2

                                 03920ON10   C     C10,-PLACE    ,,,CHECK FOR &
                                 05260ON83   C     C10,-LKRET

-------------------------------------------------------------------------------------------------
04270C13    DAC   1,$,*-2

                                 05880       C     C13,-PLACE
                                 13070       C    C13,-PLACE

-------------------------------------------------------------------------------------------------
03830C14    DAC   1,*,*-2

                                 03960       C     C14,-PLACE    ,,,CHECK FOR *
                                 04070       C     C14,-PLACE   ,,,CHECK FOR **
                                 10640       C     C14,-PLACE    ,,,ASTERISK
                                 11310PUCK   C     C14,-PLACE
                                 11460       C     C14,-PLACE

-------------------------------------------------------------------------------------------------
04510C20    DAC   1,-,*-2

                                 03940       C     C20,-PLACE    ,,,CHECK FOR -
                                 05280       C     C20,-LKRET

-------------------------------------------------------------------------------------------------
03850C21    DAC   1,/,*-2

                                 03980       C     C21,-PLACE    ,,,CHECK FOR /
                                 11330       C    C21,-PLACE,,   ,,,CHECK FOR A SLASH
                                 11440       C     C21,-PLACE

-------------------------------------------------------------------------------------------------
05920C22    DC    2,22,*

                                 05900       C    C22,-PLACE
                                 07050       C     C22,-PLACE    ,,,CHECK FOR A RECORD MARK

-------------------------------------------------------------------------------------------------
04540C23    DAC   1,,,*-2

                                 03660       C     C23,-PLACE
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-------------------------------------------------------------------------------------------------
10900C24    DAC   1,%, *-2

                                 01660       C     C24,-PLACE    ,,,CHECK FOR OPEN PAREN
                                 03140       C     C24,-PLACE    ,,,CHECK FOR A CONTRUCTED REFERENCE STRING
                                 05840       C     C24,-PLACE
                                 05980       C     C24,-PLACE
                                 08410       C     C24,-PLACE
                                 08540       C     C24,-PLACE
                                 10310       C    C24,-PLACE
                                 11280       C     C24,-PLACE    ,,,CHECK FOR BALNCED STRING
                                 12320       C     C24,-WORK2-9  ,,,CHECK FOR OPEN PAREN
                                 12390       C     C24,-WORK2-9

-------------------------------------------------------------------------------------------------
03280C33    DAC   1,#,*-2

                                 03290       C     C33,-PLACE
                                 10680       C     C33,-PLACE
                                 13450       C     C33,-PLACE

-------------------------------------------------------------------------------------------------
00950C34    DC    2,34,*-2

                                 01610       C     C34,CHECK&11,11,,CHECK FOR @
                                 05860       C     C34,-PLACE
                                 06440       C     C34,-PLACE
                                 10260       C     C34,-PLACE
                                 11350       C     C34,-PLACE

-------------------------------------------------------------------------------------------------
10290C34DIGDS     ,*

                                 10280       TD    C34DIG,2310
                                 10300VG2    BD    VG,C34DIG

-------------------------------------------------------------------------------------------------
01040C40    DS    ,*

                                 01720       C     C40,-SUBCHK   ,,,CHECK IF SUBROUTINE CALL
                                 01760       C     C40,-SUBCHK   ,,,CHECK FOR NUMBER OR LETTER
                                 05950       C    C40,-PLACE
                                 07010CON62  C     C40,-PLACE

-------------------------------------------------------------------------------------------------
10840C56    DAC    1,F,*-2

                                 01860       C     2218&11,C56   ,,,CHECK FOR FOR NAME OF F , S, /, /F, OR /S
                                 08390       C     C56,-PLACE

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04610C61    DC    2,61,*-2

                                 01900       C     2218&11,C61
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```
                              01920       C     C61,2218&9
                              03120       C     C61,-PLACE
                              03310       C    C61,-PLACE
                              03640       C    C61,-PLACE
                              07990       C    C61,-PLACE
                              08280ON63   C    C61,-PLACE        ,,,FIND DIVIDING SLASH
                              10660       C     C61,-PLACE       ,,,SLASH
                              13430       C     C61,-PLACE

-------------------------------------------------------------------------------------------
08200C62    DAC   1,S,*-2

                              01880       C     2218&11,C62
                              08370       C     C62,-PLACE

-------------------------------------------------------------------------------------------
04130C70    DAC   1,0,*-2

                              05190ON28   C     C70,-LKRET

-------------------------------------------------------------------------------------------
00650DCA    DCA   ,INPUT

                              08920       PUT  DCA
                              C898C       PUT  DCA
                              09450GET    GET   DCA              ,,,READ INPUT CARDS ROUTINE

-------------------------------------------------------------------------------------------
12500DEC    SM    I,21,10         ,,,SIZE FAILURE

                              12550BRTAB2DSA  A,MATCHF&12,DEC,DEC,BRACHF,DEC
                              12550BRTAB2DSA  A,MATCHF&12,DEC,DEC,BRACHF,DEC
                              12550BRTAB2DSA  A,MATCHF&12,DEC,DEC,BRACHF,DEC
                              12560A      BNF   DEC,WORK1&20

-------------------------------------------------------------------------------------------
05760DEFINEDS     ,*-1

                              01190       TDM   DEFINE,-1
                              C1310HP20   BD    CHECK,DEFINE
                              05750       TDM   DEFINE,-1
                              05770DFINE  DS    ,DEFINE
                              06390LLIT   TDM   DEFINE,0,10
                              06530       TDM   DEFINE,-1
                              07140       BD    -DELET&1,DEFINE,,SKIP DELET IF STRING NOT DEFINED
                              0777C       TDM   DEFINE,-1
                              07850       BD    *&24,DEFINE
                              09080       TDM   DEFINE,0
                              12950       BD   AROUND,DEFINE

-------------------------------------------------------------------------------------------
07090DELET  TF    2218&29,SBCKCL-4,,CREATE NEW SYMBOL TABLE ENTRY

                              07140       BD    -DELET&1,DEFINE,,SKIP DELET IF STRING NOT DEFINED
                              0731C       B7    -DELET&1
```

```
                              07840CONARNBTM    DELET,*&12
                              13030AROUNDBTM    DELET,*&12
                              14240       BTM   DELET,*&12

-------------------------------------------------------------------------------------------
05770DFINE DS     ,DEFINE

                              0634C       TDM   DFINE,0

-------------------------------------------------------------------------------------------
04110DIV    TFM   EVRET  ,DIV2

                              03990       BE    DIV

-------------------------------------------------------------------------------------------
04700DIV2   LD    99,10           ,,,THE DIVISION ALGORITHM

                              0411CDIV    TFM   EVRET  ,DIV2

-------------------------------------------------------------------------------------------
04750DSC00 DSC    4,000@,*-4

                              03500RET9   TR    -CURRT2,DSC00&2,,SET TRAILER RECORD MARK
                              07460       TR    -CURRT2,DSC00&1
                              07680       TR    -CURR T,DSC00&1
                              13230       TR    -CURRNT,DSC00&1
                              13300       TR    -CURRNT,DSC00&1

-------------------------------------------------------------------------------------------
13890DTYPE BNF    REAC,PCC2

                              13930       B7    DTYPE
                              13960       B7    DTYPE
                              14010       B7    DTYPE
                              14030       B7    DTYPE
                              14040EJECT2BTM    EJECT,DTYPE

-------------------------------------------------------------------------------------------
09280DUMP   BNF T796,DUMPSW     ,,,THE DUMP MEMORY ROURINE

                              06220TDUMP BTM    EJECT,DUMP
                              09420       B7    DUMP&24

-------------------------------------------------------------------------------------------
14000DUMPSTTDM    DUMPSW,-1

                              13780       DSA   DUMPST

-------------------------------------------------------------------------------------------
00090DUMPSWDSC    1,0

                              09280DUMP   BNF T796,DUMPSW     ,,,THE DUMP MEMORY ROURINE
                              14000DUMPSTTDM    DUMPSW,-1
```

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------------------------------------------------------------------------------------------------
04980E      TR    -CURRT2,-Z-6
                                      *** UNREFERENCED ***

------------------------------------------------------------------------------------------------
09760EJECT BD    LUCKY2,PRINTR ,,,EJECTION SUBROUTINE

                                01540        BTM   EJECT,796
                                0248CENDC    BTM   EJECT,*&12
                                06220TDUMP   BTM   EJECT,DUMP
                                09250        BTM   EJECT,*&12
                                09320T796    BTM   EJECT,796
                                0978C        B7    -EJECT&1
                                0980C        B7    -EJECT&1
                                14040EJECT2BTM     EJECT,DTYPE

------------------------------------------------------------------------------------------------
14C40EJECT2BTM   EJECT,DTYPE

                                13820        DSA   EJECT2

------------------------------------------------------------------------------------------------
02840END    DSAC 4,END ,

                                0115C        C    INPUT&4,END-2   ,,,MAYBE END CARD WITH NO LABEL
                                02430        C     INPUT&6,END
                                06180        C     END-2,-COLRET        ,,,CHECK FOR END CARD

------------------------------------------------------------------------------------------------
02480ENDC   BTM   EJECT,*812

                                01170        B7    ENDC

------------------------------------------------------------------------------------------------
08250EPROG DS     ,*

                                02530        TF    EPROG,CURRNT         ,,,SAVE END OF PROGRAM

------------------------------------------------------------------------------------------------
01460ER     DS    ,*-1

                                00780        TDM   ER,0            ,,,RESET ERROR INDICATOR
                                C145C        TDM   ER,1
                                02490        BD    796,ER

------------------------------------------------------------------------------------------------
014C0ERI    BTM   ERR1,ERRRR

                                0114C        BNE   ERI
                                C116C        BNE   ERI
                                01360        BNE    ERI
```

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------------------------------------------------------------------------------------------------
092C0ERMES DMES ,A,ERROR 0%E¤

                                0927C        BTM   WATY,ERMES

------------------------------------------------------------------------------------------------
10430ERP    DSS   21*20

                                03220        TF    ERP&9&21,THERE
                                07480        C     THERE,ERP&9&21
                                C751C        A     CURRT2,ERP&9&21
                                07520        AM    ERP&9&21,1,10
                                07530        S    ERP&9&21,SHIFT
                                0754C        TF     -CURRT2,-ERP-9-21
                                10570        TFM   I,ERP&21
                                10820        TFM   II,ERP
                                11710        TF    ERP&9&21,THERE
                                11720        TFM   I,ERP           ,,,SET UP W VALUES
                                11730        TFM   ERP&15,0,10
                                1181C        TFM   ERP&15,20,10
                                11830        TFM   I,ERP&21        ,,,SET UP I
                                1281C        TFM   I,ERP&21        ,,,CONSTRUCT FILLED STRINGS
                                14160THERE DS      ,ERP&9

------------------------------------------------------------------------------------------------
09210ERROR SM    PL8   ,1,10     ,,,ERROR MESSAGE ROUTINE

                                03100        BTM   ERROR,07100
                                05250ER9     BTM   ERROR,7900
                                05370        BTM   ERROR,17300
                                05660ER10    BTM    ERROR,17000
                                05830ER03    BTM   ERROR,07300
                                06230ER04    BTM   ERROR,07400
                                06760        BTM    ERROR,07200
                                07160ER05    BTM   ERROR,07500
                                0801C        BTM   ERROR, 7600
                                08450ER12    BTM   ERROR,17200
                                09240        TD    ERROR-1,RMARK
                                10150ER11    BTM   ERROR,17100
                                11390ER07    BTM    ERROR,07700
                                11480ER15    BTM   ERROR,17400
                                13470        BTM   ERROR,17500
                                13480ER90    BTM   ERROR,07800

------------------------------------------------------------------------------------------------
02750ERRRR DMES ,A,ERROR IN LABEL%E¤

                                01400ERI     BTM   ERR1,ERRRR

------------------------------------------------------------------------------------------------
02790ERRRR3DMES ;A,a UNBALANCED%E¤

                                02370        TFM    ERR1-1,ERRRR3

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02810ERRRR4DAC  14,%¤ UNBALANCED@,
                          02390      TFM  ERR1-1,ERRRR4
-------------------------------------------------------------------------------------------------------
02820ERRRR5DMES ,A,REPEATED LABEL%E¤
                          01320      BTM  ERR1,ERRRR5
-------------------------------------------------------------------------------------------------------
02020ERRRR6DMES ,A,NO SUCH SUBROUTINE%E¤
                          02C00      BTM  ERR1,ERRRR6   ....TELL THEM YOU DID NOT FIND IT
-------------------------------------------------------------------------------------------------------
02770ERRR2 DMES ,A,INCORRECT /%E■
                          02310      BTM  ERR1,ERRR2
-------------------------------------------------------------------------------------------------------
01420ERR1  BD   *&24,LIST2
                          0132C      BTM  ERR1,ERRRR5
                          01400ERI   BTM  ERR1,ERRRR
                          01440      BT    WATY,ERR1-1
                          02000      BTM  ERR1,ERRRR6   ....TELL THEM YOU DID NOT FIND IT
                          0231C      BTM  ERR1,ERRR2
                          02370      TFM   ERR1-1,ERRRR3
                          02380      BD   ERR1,OK2&11   ...ERORR IF @ NO BALANCED
                          02390      TFM  ERR1-1,ERRRR4
                          02400      BD   ERR1,OK2&8 ,, ,BRANCH IF PARENTHESIS UNBALANCED
-------------------------------------------------------------------------------------------------------
05830ER03  BTM  ERRCR,07300
                          066CC      BNH  ER03
-------------------------------------------------------------------------------------------------------
06230ER04  BTM  ERRCR,07400
                          05960      BH   ER04
-------------------------------------------------------------------------------------------------------
07160ER05  BTM  ERRCR,07500
                          07360      B7   ER05
-------------------------------------------------------------------------------------------------------
11390ER07  BTM   ERROR,C7700
                          11320      BE   ER07&12
                          11340      BE   ER07&12
                          11360      BE   ER07          ...NO LITTERALS ALLOWED IN FILLER DEFINITION
```

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                          1161C      B7   ER07
                          1294C      B7   ER07
-------------------------------------------------------------------------------------------------------
05660ER10  BTM   ERROR,17C00
                          06190      BNE  ER10
                          0621CRIG   BNE  ER10
-------------------------------------------------------------------------------------------------------
10150ER11  BTM  ERRCR,17100
                            *** UNREFERENCED ***
-------------------------------------------------------------------------------------------------------
08450ER12  BTM  ERRCR,17200
                          08530      B7   ER12
                          08550      BNE   ER12
-------------------------------------------------------------------------------------------------------
11480ER15  BTM  ERROR,17400
                          11560      B7   ER15-24
                          11660      B7   ER15-24
-------------------------------------------------------------------------------------------------------
05250ER9   BTM  ERRCR,7900
                          04170      B7  ER9
                          04480      BNE  ER9
                          04550      BE   ER9
                          04670      BNE  ER9
                          04760      BV   ER9
                          0515C      BNE  ER9
-------------------------------------------------------------------------------------------------------
13480ER90  BTM  ERRCR,07800
                          0338C      DSA  ER90
                          05670      DSA  ER90
                          09840      DSA  ER90
                          09990      B7   ER90-12
                          14090      DSA   ER90
-------------------------------------------------------------------------------------------------------
04120EV    AM   PLACE,2,10
                          04020      B7   EV
                          04040      B7   EV
                          04080      BNE  EV&12
                          04100      B7   EV
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```

```
03420EVAL   TR    PUSH2 - 99,PUSH2- 89

                        03430        TF    PUSH2,EVAL-1   ,,,PUSH2 TO IS A PUSH DOWN LIST WITH
                        06670LKEVALBTM     EVAL,*&12
                        07570        BTM   EVAL,*&12
                        1007C        BTM   EVAL,*&12
                        10120        BTM   EVAL,*&12

-----------------------------------------------------------------------------------------
04390EVRET DS     ,*

                        04010ADD     TFM   EVRET   ,ADD2  ,,,SET UP CORRESPONDING RETURN
                        04030SUB     TFM   EVRET   ,SUB2
                        C4050MUL     TFM   EVRET   ,MUL2
                        04C90        TFM   EVRET,EXP2
                        C4110DIV     TFM   EVRET   ,DIV2
                        04190        TF    PUSH9-10,EVRET
                        04350        TF    EVRET,PUSH9-10

-----------------------------------------------------------------------------------------
045C0EXP2   CM    INTRET,C,10

                        04C90        TFM   EVRET,EXP2

-----------------------------------------------------------------------------------------
046C0EXP3   SM    INTRET,1,10    ,,,DECRIMENT BY ONE

                        C4520        BNL   EXP3-24
                        0469C        B7    EXP3

-----------------------------------------------------------------------------------------
04970EXTRA TR     81,RMARK-1

                           *** UNREFERENCED ***

-----------------------------------------------------------------------------------------
12040F      TF    WORK2&9,WORK189,,FILLER STRIG

                        1194CBRTAB DSA   F,B,F,K,FINISH,R
                        1194CBRTAB DSA   F,B,F,K,FINISH,R
                        1215C        BZ    F                 ,,,CHECK FOR EMPTY FILLER

-----------------------------------------------------------------------------------------
05360FAILEDBNF    *&24,PERMIS-1

                        0473C        BV    FAILED            ,,,BRANCH IF DIVISION BY ZERO
                        C5290        BNE   FAILED
                        0531C        B7    FAILED
                        C9C5CREADC   BLC   FAILED

-----------------------------------------------------------------------------------------
08480FF     BNF   GOTC2,SUC

                        C84C0        BE    FF
```

```
-----------------------------------------------------------------------------------------
11270FILLEMAM     PLACE,2,1C

                        1065C        BE    FILLEM

-----------------------------------------------------------------------------------------
04740FINAR CF     FLAG           ,,,FINISH ARITHEMETIC OPERATION

                        0441C        B7    FINAR
                        04430        B7    FINAR
                        C449C        B7    FINAR
                        C4570        B7    FINAR
                        04620        BL    FINAR

-----------------------------------------------------------------------------------------
07970FINCONBNR    *&2C,-PLACE

                        C7920        B7    FINCON

-----------------------------------------------------------------------------------------
13570FIND   DS    ,*

                        1354C        TFM   FIND,INPUT
                        13550        AM    FIND,2,10
                        13590        AM    FIND,4,10
                        136C0        BNR   *&20,-FIND
                        13630K83     C     *-*,-FIND

-----------------------------------------------------------------------------------------
09660FINDRMBNR    *-12,*-*

                        09630        TF    FINDRM&11,WATY-1
                        09650        AM    FINDRM&11,2,10
                        09720        C    WATY-1,FINDRM&11
                        C9730        BL    FINDRM&12

-----------------------------------------------------------------------------------------
12740FINISHSM     I,42,10

                        1194GBRTAB DSA   F,B,F,K,FINISH,R

-----------------------------------------------------------------------------------------
11670FINK   TFM   WORK1&15,20,10,,,EXTRA FINAL EXTRY

                        10590        B7    FINK
                        10670        BE    FINK
                        10690        BE    FINK

-----------------------------------------------------------------------------------------
06000FINLKPFF     LSTR,PAST

                        01300        B7    FINLKP
```

```
                    06660       B7   FINLKP
                    06850       TFM  COLCT-1,FINLKP

--------------------------------------------------------------------------------
11570FIXEDLAM   PLACE,2,10      ,,,FIXED LENGTH STRING

                    11450       BE   FIXEDL

--------------------------------------------------------------------------------
04810FLAG   SF   FLAG

                    0474CFINAR CF    FLAG           ,,,FINISH ARITHEMETIC OPERATION
                    04770      BNF   FLAG&12,10        ,,,THAT IS MF FLAG,10
                    04810FLAG  SF    FLAG
                    04930JION8 BNF   *&36,FLAG
                    05060      CF    FLAG
                    05160      BNF   *&24,FLAG
                    05300      BNF   *&20,FLAG
                    05320      SF    FLAG
                    0535CTBK81 BNF   BK81,FLAG

--------------------------------------------------------------------------------
07550FORGETTF  FORGT2&11,LSTR

                    07490       BE   FORGET

--------------------------------------------------------------------------------
07750FORGT2TFM  LSTR,*-*        ,,,RESTORE LOOK UP PARAMETERS FOR DELET

                    07550FORGETTF  FORGT2&11,LSTR
                    07560       TF   FORGT2&23,COLDIF
                    07600       BE   FORGT2

--------------------------------------------------------------------------------
06250FOUND BD   NCFIND,2218 &5,,,DONT ACCEPT A PUSHED STRING

                    06100       BE   FOUND          ,,,BRANCH IF LABEL FOUND
                    07830       B7   FOUND&24

--------------------------------------------------------------------------------
13850FOUND8AM   K8386,5,10

                    1364C       BE   FOUND 8

--------------------------------------------------------------------------------
08460FS     BNF  GOTC2-12,SUC

                    08380       BE   FS

--------------------------------------------------------------------------------
09450GET    GET   DCA           ,,,READ INPUT CARDS ROUTINE

                    C0820READ  BTM   GET,42,10
```

```
                    09C6C       BTM   GET,42,10

--------------------------------------------------------------------------------
09480GET2   BNR  *-12,*-*

                    09460       TFM  GET2&11,INPUT-2
                    09470       AM   GET2&11,2,10
                    09490       CM   GET2&11,RMARK
                    09510       TDM  -GET2-11,2     ,,,CHANGE REC. MARK TO 22 CODING
                    C9520       SM   GET2&11,1,10
                    09530       TDM  -GET2-11,2
                    0954C       SM   GET2&11,1,10
                    09550       B7   GET2-12

--------------------------------------------------------------------------------
03020GOTO   TF   PL8,PLACE

                    08270       B7   GOTO
                    08590       BTM  LOOKUP,GOTC-12

--------------------------------------------------------------------------------
08510GOTO2 AM   PLACE,2,10

                    08420       BE   GOTO2&12
                    08460FS     BNF  GOTO2-12,SUC
                    08470       B7   GOTO2
                    08480FF     BNF  GOTO2,SUC

--------------------------------------------------------------------------------
02880G089   SM   PAST,10,10

                    02700       B7   G089

--------------------------------------------------------------------------------
01310HP20   BD   CHECK,DEFINE

                       *** UNREFERENCED ***

--------------------------------------------------------------------------------
06050HP32   C    COLCIF,-LSTR   ,,,CHECK FOR SAME LENGTH

                    06120BNRTSTBNR  HP32,*-*,7     ,,,TEST FOR END OF TABLE

--------------------------------------------------------------------------------
112201      DS   ,*-5

                    10570       TFM  I,ERP&21
                    10850       CM   I,*-*
                    1121CJIONF  TR   -I,WORK1       ,,,MOVE IN ERP ENTRY
                    11230       AM   I,21,10
                    11690       TR   -I,WORK1
                    11720       TFM  I,ERP          ,,,SET UP W VALUES
                    11740WLOOP  TR   WORK2,-I
                    11770       TR   -I,WORK2
```

```
                         11780      AM   I,21,10
                         11820      TR   -I,WORK2
                         11830      TFM  I,ERP&21         ,,,SET UP I
                         11840RULE2 TR   WORK1,-I
                         11850      AM   I,21,10
                         11860      TR   WORK2,-I
                         12020      TR   -I,WORK2
                         12060      TR   -I,WORK2
                         12260MATCHSTR   -I,WORK2
                         12490      SM   I,21,10
                         12500DEC   SM   I,21,10          ,,,SIZE FAILURE
                         12510      TR   WORK1,-I
                         12580MATCHFSM   I,21,10
                         12590      SM   I,21,10
                         12600      TR   WORK1,-I
                         12650A2    AM   I,21,10
                         12660      TR   WORK1,-I
                         12680      TR   -I,WORK1
                         12700B2    AM   I,21,10          ,,,REMATCH BALANCED STRING
                         12710      TR   WORK2,-I
                         12740FINISHSM   I,42,10
                         12750      TR   WORK2,-I         ,,,EXTEND LAST STRING IF ARBITRARY
                         12760      AM   I,21,10
                         12800      TR   -I,WORK1
                         12810      TFM  I,ERP&21         ,,,CONSTRUCT FILLED STRINGS
                         12830KNLOOPTR   WORK1,-I
                         12840      AM   I,21,10
                         12850      TR   WORK2,-I

-------------------------------------------------------------------------------------------------------
10860II     DS    ,*

                         10820      TFM  II,ERP
                         10830LPPP  AM   II,21,10
                         10880      TR   WORK2,-II
                         10970      TF   WORK1&4,II       ,,,BACK REFERENCE FOUND
                         11040      TR   -II,WORK2

-------------------------------------------------------------------------------------------------------
06500INDIR5AM    PLACE,2,10

                         05890      BE   INDIR5

-------------------------------------------------------------------------------------------------------
00650INPUT DAC  50,

                         00770      TFM  PL8,INPUT&8      ,,,DEFINE FOR ERROR 10 ON END CARD
                         00830      SF   INPUT-1          ,,,MAKE SURE FLAG IS STILL THERE
                         00860      TFM  SEARCH&6,INPUT&72*2
                         00920      CM   SEARCH&6,INPUT,,,TEST FOR BLANK CARD
                         00940      CM   INPUT,20,10      ,,,CHECK FOR CONTRL CARD
                         00980      BTM  WATY,INPUT
                         00990      CM   INPUT,14,10      ,,,CHECK FOR COMMENT CARD
                         01010      TFM  CHECK&11,INPUT
                         01030      CM   INPUT,40,10      ,,,MAKE SURE FIRST IS LETTER OR DIGIT
                         01130      CM   PLACE,INPUT&6
                         01150      C   INPUT&4,END-2     ,,,MAYBE END CARD WITH NO LABEL
                         01330NOTME CM   INPUT,0,10
```

```
                         01350      CM   INPUT,03,10      ,,,CHECK FOR CONTINUATUON
                         01370      TFM   INPUT,0,10      ,,,BLANK OUT PERIOD
                         01430      BTM   WATY,INPUT
                         01480OK    TR   LAST-1,INPUT-1,2,STACK CARD IN MEMORY
                         01490      SM   SEARCH&6,INPUT-4
                         02410      CM   SEARCH&6,INPUT&6
                         02430      C    INPUT&6,END
                         02560      TFM  PLACE,INPUT&8
                         02970      BNR  *&32,INPUT&6
                         08810PUNCH2TFM  *&18,INPUT&158
                         08840      CM   *-18,INPUT
                         08860      CF   INPUT-3          ,,,PUNCHED OUTPUT
                         08870      TFM  KKRET,INPUT-1
                         08960      CM   KKRET,INPUT          ,,,CHECK FOR NULL OUTPUT
                         08990      CF   INPUT-1
                         09090      TFM  LKRET,INPUT-1
                         09100      TFM   LSTR3,INPUT&159
                         09460      TFM  GET2&11,INPUT-2
                         13520CONTRLBNR  *&20,INPUT&2     ,,,CONTROL CARD DECODER
                         13540      TFM  FIND,INPUT
                         13670TYPEC BTM  WATY,INPUT

-------------------------------------------------------------------------------------------------------
05040INT    TFM  CNNST-10,0

                         04150      BTM  INT,*&12
                         04290      BTM  INT,*&12
                         05180      B7   INT-1,,6
                         11590      BTM  INT,*&12

-------------------------------------------------------------------------------------------------------
14050INTRETDC    10,0

                         04220      TF   PUSH9,INTRET
                         04400ADD2  A    10,INTRET
                         04420SUB2  S    10,INTRET
                         04440MUL2  M    10,INTRET
                         04500EXP2  CM   INTRET,0,10
                         04600EXP3  SM   INTRET,1,10      ,,,DECRIMENT BY ONE
                         05100      TF   INTRET,ZERO
                         05120      A    INTRET,-PINT
                         05140      C    -PINT,INTRET             ,,,CHECK FOR EXCEEDING 10 DIGITS
                         05170      SF   INTRET
                         11600      BNF  *&20,INTRET
                         11620      SF   INTRET-3
                         11630      TF   WORK1&13,INTRET

-------------------------------------------------------------------------------------------------------
11210JIONF TR    -I,WORK1         ,,,MOVE IN ERP ENTRY

                         11070      B7   JIONF

-------------------------------------------------------------------------------------------------------
11050JIONF2AM    PLACE,2,10

                         11470      BE   JIONF2
```

```
-----------------------------------------------------------------------------------------------------
03840JICN7 SM   CURRT2,2,10

                      *** UNREFERENCED ***

-----------------------------------------------------------------------------------------------------
04930JIQN8 BNF  *&36,FLAG

                      *** UNREFERENCED ***

-----------------------------------------------------------------------------------------------------
11950K     TF   WORK2&9,WORK1&9,,CONSTANT STRING

                     11940BRTAB DSA  F,B,F,K,FINISH,R

-----------------------------------------------------------------------------------------------------
10000KALFD AM   KALSB&6,5,10  ,,,MOVE TO RECOVER ADDRESS

                     09960      BE   KALFD

-----------------------------------------------------------------------------------------------------
09950KALSB C    *-*,2218&11

                     09940      TFM  KALSB&6,SUBLST
                     09970      AM   KALSB&6,18,10 ,,,SEARCH FOR ENTRY ADDRESS
                     09980      BNR  KALSB,-KALSB-6
                     09980      BNR  KALSB,-KALSB-6
                     10000KALFD AM   KALSB&6,5,10  ,,,MOVE TO RECOVER ADDRESS
                     10020      TF   SUBPSH-10,-KALSB-6

-----------------------------------------------------------------------------------------------------
09910KALSUBSF   *-*

                     09880      TF   KALSUB&6,PLACE
                     09890      S    KALSUB&6,COLDIF,,RECOVER SUBROUTINE NAME
                     09900      SM   KALSUB&6,2,10
                     09930      CF   KALSUB&6,,6

-----------------------------------------------------------------------------------------------------
10580KINDF BNR  *&2C,-PLACE   ,,,CHECK FOR RECORD MARK

                     11190      BZ   KINDF          ,,,SKIP IF NULL CONSTANT STRING
                     11250      B7   KINDF

-----------------------------------------------------------------------------------------------------
08898KKRET DS   ,*-5

                     08870      TFM  KKRET,INPUT-1
                     08900      AM   KKRET,1,10
                     08910      BNR  ARN65,-KKRET
                     08960      CM   KKRET,INPUT         ,,,CHECK FOR NULL OUTPUT
                     09010ARN66 TD   -KKRET,-LKRET
```

```
                     09020      AM   KKRET,1,10

-----------------------------------------------------------------------------------------------------
10060KMKM  CF   SUBPSH-9,PEKMT,7

                     06540      C    KMKM&11,PUSH4

-----------------------------------------------------------------------------------------------------
12830KNLOOPTR   WORK1,-I

                     12890BRTAB4DSA  KONST,KONST,KONST,KNLOOP,CONST8,KNLOOP
                     12890BRTAB4DSA  KONST,KONST,KONST,KNLOOP,CONST8,KNLOOP
                     13050      BE   KNLOOP         ,,,CHECK FOR EMPTY FILLER
                     13380      B7   KNLOOP

-----------------------------------------------------------------------------------------------------
12900KONST TF   PLACE,WORK1&4

                     12890BRTAB4DSA  KONST,KONST,KONST,KNLOOP,CONST8,KNLOOP
                     12890BRTAB4DSA  KONST,KONST,KONST,KNLOOP,CONST8,KNLOOP
                     12890BRTAB4DSA  KONST,KONST,KONST,KNLOOP,CONST8,KNLOOP

-----------------------------------------------------------------------------------------------------
04310KSP   DC   5,0,*

                     06630      TF   KSP,LKRET
                     06640      AM   KSP,1,10
                     06810      TF   KSP,PLACE
                     06890      S    99,KSP
                     07370      SM   KSP,1,10
                     07380      SF   -KSP
                     07400      S    CURRT2,KSP
                     07430      CF   -KSP
                     13140      SM   KSP,1,10
                     13150      SF   -KSP
                     13170      S    CURRNT,KSP
                     13200      CF   -KSP           ,,,LETS NOT LEAVE ANY STRAY FLAGS

-----------------------------------------------------------------------------------------------------
05330KSTR4 DS   ,*

                      *** UNREFERENCED ***

-----------------------------------------------------------------------------------------------------
07280KSTR5 DS   ,*-5

                     07230TRLOOPTF   KSTR5,LSTR
                     07270      TF   -KSTR5,2218&29
                     07290      C   KSTR5,PAST      ,,,CHECK FOR END OF SYMBOL TABLE

-----------------------------------------------------------------------------------------------------
13630K83   C    *-*,-FIND

                     13850FOUND8AM   K83&6,5,10
```

```
                    13860      SF   K83&6          ,,,CONTROL FUNCTION FOUND - BRANCH TO IT
                    1387C      B7   K83&6,,6

------------------------------------------------------------------------------------------
14370LAST  DAC 1, ,

                    0081C      TFM  CURRNT,LAST-1
                    01480OK    TR   LAST-1,INPUT-1,2,STACK CARD IN MEMORY
                    02980      TFM   PLACE,LAST-2 ,,,NO - START WITH FIRST STATEMENT

------------------------------------------------------------------------------------------
001C0LENGTHDC   4,240         ,,,LENGTH OF 1443 PRINTER LINE

                    0971C      A    WATY-1,LENGTH

------------------------------------------------------------------------------------------
13880LIST  TDM  LIST2,-1

                    137CC      DSA  LIST

------------------------------------------------------------------------------------------
04340LISTS DC   5,0,*

                    02520      TF   LISTS,PAST
                    C6C2C      TF   LSTR,LISTS

------------------------------------------------------------------------------------------
CCC70LIST2 DSC  1,C

                    C097C      BNF  *&24,LIST2
                    C1420ERR1  BD   *&24,LIST2
                    1388CLIST  TDM  LIST2,-1
                    1395CUNLISTTDM  LIST2,0

------------------------------------------------------------------------------------------
06670LKEVALBTM  EVAL,*&12

                    C585C      BE   LKEVAL

------------------------------------------------------------------------------------------
03740LKRET DC   5,0,*

                    C319C      TF   THERE,LK RET
                    C371C      S    CURRT2,LKRET
                    C3730      SF   -LKRET
                    0375C      C    LKRET,LSTR3
                    038CC      CF   -LKRET
                    05070      AM   LKRET,1,10
                    05080BK82  C    LKRET,LSTR3         ,,,CHECK FOR END OF STRING
                    0519CON28  C    C70,-LKRET
                    0521C      TD   -PINT,-LKRET
                    05230BK81  AM   LKRET,2,10
                    05260ON83  C    C10,-LKRET
                    C528C      C    C20,-LKRET
```

```
                    C56CCPEKMT TF   PLACE2,LKRET
                    C578C      TFM  LKRET,RMARK-1
                    0632C      TF   LKRET,LSTR2
                    C6330      AM   LKRET,3,10
                    06410      TF   LKRET,PLACE
                    06420      AM   LKRET,1,10
                    06590      S    LSTR3,LKRET
                    C6630      TF   KSP,LKRET
                    C6650      TFM  LKRET,RMARK-1
                    C669C      TF   LKRET,CLAST
                    C875CPRINT2AM   LKRET,1,10
                    C8760      BT   WATY,LKRET
                    C888CLP65  TD   *-*,-LKRET
                    C894CARN65 AM   LKRET,1,10
                    C895C      BNR  ARN66,-LKRET
                    09C1CARN66 TD   -KKRET,-LKRET
                    C903C      AM   LKRET,1,10
                    09C90      TFM  LKRET,INPUT-1
                    1115C      S    99,LKRET

------------------------------------------------------------------------------------------
03680LKUP  BTM  LCCK2,*&12

                      *** UNREFERENCED ***

------------------------------------------------------------------------------------------
06390LLIT  TDM  DEFINE,0,10

                    C5870      BE   LLIT

------------------------------------------------------------------------------------------
05560LOOKUPTFM  PERMIS,11,1C11

                    03CCC      BTM  LOOK UP,*&12
                    05630      B7   -LOOKUP&1
                    05650      BNR  -LOOKUP&1,LSTR
                    C8590      BTM  LOOKUP,GOTC-12

------------------------------------------------------------------------------------------
05710LOOK2 TR   PUSH4- 99,PUSH4-89

                    03160      BTM  LOOK2,*&12
                    03680LKUP  BTM  LOOK2,*&12
                    04280      BTM  LOOK2,*&12
                    0559C      BTM  LOOK2,*&12
                    05790      TF   PUSH4,LOOK2-1
                    0636C      TF   LOOK2-1,PUSH4
                    06380      B7   -LOOK2&1
                    06520      BTM  LOOK2,*&12
                    08040      BTM  LOOK2,*&12
                    C871C      BTM  LOOK2,*&12
                    10730      BTM  LOOK2,*&12
                    11580      BTM  LOOK2,*&12
                    12920      BTM  LOOK2,*&12   ,,,CONSTRUCT FILLED VARIABLE
                    131CC      BTM   LOOK2,*&12
                    14230      BTM   LOOK2,*&12
                    14290      BTM   LOOK2,*&12
```

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------------------------------------------------------------------------------------------
10830LPPP  AM   II,21,1C

                      1091C         BH   LPPP
                      1094C         BNE  LPPP
                      10960         BNE  LPPP

------------------------------------------------------------------------------------------
08880LP65  TD   *-*,-LKRET

                      C904C         B7   LP65

------------------------------------------------------------------------------------------
06130LSTR  DS   ,*

                      05650         BNR  -LOOKUP&1,LSTR
                      058C0         TD   LSTR,RMARK
                      06C00FINLKPTF      LSTR,PAST
                      06020         TF   LSTR,LISTS
                      06050HP32     C    COLDIF,-LSTR   ,,,CHECK FOR SAME LENGTH
                      06070         TF   2218&9,-LSTR   ,,,MOVE SYMBOL TABLE ENTRY
                      0611C         AM   LSTR,10,10     ,,,MOVE TO NEXT ENTRY
                      0627C         SM   LSTR,10,10
                      0628C         TF   2218&19,-LSTR
                      06720         TD   LSTR,RMARK
                      07150         BNR  *&24,LSTR      ,,,NO DELETING SYSPIT
                      C7220         AM   LSTR,10,10
                      07230TRLOOPTF      KSTR5,LSTR
                      C7240         SM   LSTR,10,10     ,,,UPDATE SYMBOL TABLE
                      07250         TF   2218&29,-LSTR
                      0755CFORGETTF     FORGT2&11,LSTR
                      C7750FORGT2TFM     LSTR,*-*       ,,,RESTORE LOOK UP PARAMETERS FOR DELET
                      C78C0         AM   LSTR,10,10
                      0781C         TF   2218&9,-LSTR

------------------------------------------------------------------------------------------
06240LSTR2 DS   ,2218&4

                      06320         TF   LKRET,LSTR2
                      07170         S   LSTR2,COLDIF
                      C7180         TR  -LSTR2,-LSTR3   ,,,PULL DOWN STRINGS
                      07190         S   LSTR3,LSTR2     ,,,CALCULATE AMOUNT OF SHIFT
                      130C0         S    SHIFT,LSTR2

------------------------------------------------------------------------------------------
06310LSTR3 DS   ,2218&14

                      C3170OHMY     TF   M,LSTR3
                      0370C         SM   LSTR3,1,10
                      03720         A    CURRT2,LSTR3
                      C375C         C    LKRET,LSTR3
                      0377C         TF   -CURRT2,-LSTR3
                      0508CBK82     C    LKRET,LSTR3          ,,,CHECK FOR END OF STRING
                      06150NOFINDTFM     LSTR3,RMARK-1
                      0646C         TF   LSTR3,PLACE
```

```
                      0647C         SM   LSTR3,1,10
                      0657C         SM   LSTR3,1,10
                      0658C         TF   COLRET,LSTR3
                      06590         S    LSTR3,LKRET
                      0661C         SF   LSTR3-2
                      0662C         TF   COLDIF,LSTR3
                      0670C         TF    LSTR3,CURRT2
                      C7180         TR  -LSTR2,-LSTR3   ,,,PULL DOWN STRINGS
                      0719C         S   LSTR3,LSTR2     ,,,CALCULATE AMOUNT OF SHIFT
                      07200         S    CURRNT,LSTR3   ,,,,UPDATE NEXT AVAL. CORE
                      07260         S   2218&24,LSTR3
                      C7860         S   CURRT,LSTR3     ,,,MODIFY BY AMOUNT OF SHIFT
                      C9100         TFM   LSTR3,INPUT&159
                      10750         C    CURRT2,LSTR3
                      10770         TF   CURRT2,LSTR3
                      11120         TF   WORK1&4,LSTR3 ,,,STRING IS NOT BACK REFERNCE
                      1298C         C    LSTR3,SV100
                      13020         A   SHIFT,LSTR3
                      143C0         TF   CURRT2,LSTR3

------------------------------------------------------------------------------------------
09620LUCKY DS   ,*&1

                      09570WATY  BD   LUCKY,PRINTR  ,,,FOR THOSE PEOPLE WITH A PRINTER

------------------------------------------------------------------------------------------
09790LUCKY234   0,971

                      C9760EJECT BD   LUCKY2,PRINTR ,,,EJECTION SUBROUTINE

------------------------------------------------------------------------------------------
12240M     DC   5,0,*

                      0317COHMY     TF   M,LSTR3
                      03180         SM   M,1,10
                      0320C         TF   WORK1&9,M
                      07590         C    M,WORK1&9
                      07610         S   M,SHIFT
                      07660         A    CURR T,M
                      C7700         TF   -CURR T,-M
                      11890         C    SV100,M
                      12180         C    WORK2&9,M
                      12370         C    WORK2&9,M
                      12790         TF   WORK1&9,M

------------------------------------------------------------------------------------------
14080MASK  DSAC 11,C000C000000,

                      04820         TF   80,MASK

------------------------------------------------------------------------------------------
12580MATCHFSM   I,21,10

                      1201C         BNE  MATCHF
                      12250         BNE  MATCHF
                      12310         BE   MATCHF
```

```
                    12380        BH    MATCHF
                    12550BRTAB2DSA   A,MATCHF&12,DEC,DEC,BRACHF,DEC
                    12570        B7    MATCHF&12
                    1264CBRTAB3DSA   A2,B2,MATCHF&12,MATCHF&12,A2,MATCHF&12
                    12640BRTAB3DSA   A2,B2,MATCHF&12,MATCHF&12,A2,MATCHF&12
                    1264CBRTAB3DSA   A2,B2,MATCHF&12,MATCHF&12,A2,MATCHF&12

---------------------------------------------------------------------------
12260MATCHSTR   -I,WORK2

                    12330        BNE   MATCHS
                    12460        BZ    MATCHS

---------------------------------------------------------------------------
04050MUL    TFM   EVRET   ,MUL2

                    03970        BF    MUL

---------------------------------------------------------------------------
04440MUL2   M     1C,INTRET

                    C4C50MUL     TFM   EVRET   ,MUL2

---------------------------------------------------------------------------
01650MYPARNBD     OK2&12,OK2&11 ,,,SKIP PAREN CHECK IF IN LITERAL

                    01620        BNE   MYPARN         ,,,NO - BRANCH TO PAREN CHECK

---------------------------------------------------------------------------
04210NEXT   DC    5,0,*

                      *** UNREFERENCED ***

---------------------------------------------------------------------------
06150NOFINDTFM    LSTR3,RMARK-1

                    C6250FOUND BD    NOFIND,2218 &5,,,DONT ACCEPT A PUSHED STRING
                    C6260        BD    NOFIND,2218&6

---------------------------------------------------------------------------
01330NOTME CM     INPUT,0,10

                    C1060        BL    NOT ME

---------------------------------------------------------------------------
14210OHDEARDAC  3,- a,

                    14220OHNI    TFM   PLACE,OH DEAR ,,,OF ALL THE RIDICULOUS THINGS
                    1427C        TR    -CURRNT,OH DEAR-1

---------------------------------------------------------------------------
03170OHMY   TF    M,LSTR3

                    14350        B7    OH MY
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---------------------------------------------------------------------------
14220OHNI   TFM   PLACE,OH DEAR ,,,OF ALL THE RIDICULOUS THINGS

                    03150        BE    OHNI

---------------------------------------------------------------------------
01480OK     TR    LAST-1,INPUT-1,2,STACK CARD IN MEMORY

                    015C0        A     OK&6,SEARCH&6
                    02420        BNH   OK             ,,,CHECK FOR END CARD
                    0244C        BNE   OK
                    0334CCURRNTDS      ,OK&6

---------------------------------------------------------------------------
02340OK2    TDM   SPDG,0

                    01470        TFM   OK2&11,0
                    01630        TD    *&23,OK2&11
                    C164C        TD    OK2&11,2310
                    01650MYPARNBD      OK2&12,OK2&11 ,,,SKIP PAREN CHECK IF IN LITERAL
                    01650MYPARNBD      OK2&12,OK2&11 ,,,SKIP PAREN CHECK IF IN LITERAL
                    C169C        AM    OK2&8,1,10
                    C174C        BH    OK2&12         ,,,NO BRANCH OUT
                    01870        BE    OK2&12
                    0189C        BE    OK2&12
                    0191C        BE    OK2&12
                    0193C        BE    OK2&12
                    02060        B7    OK2&12
                    02090        SM    OK2&8,1,10
                    C21C0        BNN   OK2&12
                    C211C        TFM   OK2&8,-45,10
                    02120        B7    OK2&12
                    02130OK4     BD    OK2,SPDG
                    022C0        B7    OK2&24
                    02220        BNE   OK2&12
                    02250        B7    OK2&24
                    02260        BD    OK2&24,OK2&8 ,,,BRANCH IF PAREN. COUNT NOT ZERO
                    02260        BD    OK2&24,OK2&8 ,,,BRANCH IF PAREN. COUNT NOT ZERO
                    02330        B7    OK2&24
                    02380        BD    ERR1,OK2&11    ,,,ERORR IF a NO BALANCED
                    C24C0        BD    ERR1,OK2&8 ,, ,BRANCH IF PARENTHESIS UNBALANCED

---------------------------------------------------------------------------
02130OK4    BD    OK2,SPDG

                    0158C        BE    OK4

---------------------------------------------------------------------------
14070ONE    DC    1C,1

                    0459C        TF    10,ONE

---------------------------------------------------------------------------
03920ON10   C     C10,-PLACE    ,,,CHECK FOR &

                    0389C        BNE   ON10
```

```
---------------------------------------------------------------------------------------------------------------
05190ON28  C     C70,-LKRET

                                05090       BNH  ON28

---------------------------------------------------------------------------------------------------------------
07010ON62  C     C40,-PLACE

                                C684C       BNR  ON62,-PLACE

---------------------------------------------------------------------------------------------------------------
08280ON63  C    C61,-PLACE      ,,,FIND DIVIDING SLASH

                                0818C       B7   ON63&36

---------------------------------------------------------------------------------------------------------------
08330ON638 AM    PLACE,2,10

                                0829C       BE   ON638
                                C844C       BE   ON638
                                C857C       BTM  ADVANC,ON638&12

---------------------------------------------------------------------------------------------------------------
05260ON83  C     C1C,-LKRET

                                C52CC       BH   ON83

---------------------------------------------------------------------------------------------------------------
02210ON87  C    CCC21,-PLACE    ,,,CHANGE GOTO / CODDING TO 61

                                0208C       BNE  ON87

---------------------------------------------------------------------------------------------------------------
02070ON88  C     CC4,-PLACE

                                C1680       BNE  ON88

---------------------------------------------------------------------------------------------------------------
03620ON9   C     CC4,-PLACE     ,,,CHECK FOR ¤

                                036CC       BNE  ON9
                                C4CCC       B7   ON9

---------------------------------------------------------------------------------------------------------------
01530OVLAP BTM   WATY,OVLP

                                C5730       BNL  OVLAP

---------------------------------------------------------------------------------------------------------------
01550OVLP  DMES ,A,CORE OVERLAP%E¤

                                C153COVLAP BTM  WATY,OVLP
```

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---------------------------------------------------------------------------------------------------------------
11110PARCNTDC    2,0,*-2

                                1024CADVANCTFM   PARCNT,0,10   ,,,SUBPROGRAM TO ADVANCE TO MATCH PAENTHESIS
                                1033C      AM   PARCNT,1,10
                                10360      SM   PARCNT,1,10
                                12350      TFM  PARCNT,1,10
                                1241C      AM   PARCNT,1,10
                                1245C      SM   PARCNT,1,10

---------------------------------------------------------------------------------------------------------------
01280PAST  DS    ,*-5

                                0079C      TF   PAST ,CORE
                                C08CC      TD   PAST ,RMARK,6 ,,,PLACE IN TRAILER ENTRY
                                C1260      SM   PAST,10,10
                                01270      TF   -PAST,2218&9
                                0151C      C    CURRNT,PAST   ,,,CHECK FOR OVERLAP
                                C2500      SM   PAST,10,10
                                0251C      TF   -PAST,CURENT
                                C2520      TF   LISTS,PAST
                                0254C      SM   PAST,10,10    ,,,SET TRAILER ENTRY FOR STRING SYMBOL TABLE
                                C2550      TD   -PAST,RMARK
                                0288CGO89  SM   PAST,10,10
                                0291C      TF   -PAST,QUENT
                                02920      SM   PAST,10,10
                                02960      TF   -PAST,CURENT
                                05720      C    CURRT2,PAST   ,,,CHECK FOR CORE OVERLAP
                                060C0FINLKPTF   LSTR,PAST
                                07130      TF   -PAST,2218&29
                                C7210      AM   PAST,10,10
                                07290      C   KSTR5,PAST     ,,,CHECK FOR END OF SYMBOL TABLE
                                0794C      SM   PAST,10,10    ,,,PUT IN NEW SYMBOL TABLE HEADER
                                07960      TF   -PAST,CURENT
                                0930C      AM   PAST,10,10
                                C9310      BNR  *&24,-PAST
                                09330      TF   2218&9,-PAST
                                13350      SM   PAST,10,10
                                13370      TF   -PAST,CURENT
                                14330      SM   PAST,10,10
                                14340      TF   -PAST,CURENT

---------------------------------------------------------------------------------------------------------------
13980PCC   TDM  PCC2,-1

                                13720       DSA  PCC

---------------------------------------------------------------------------------------------------------------
00080PCC2  DSC  1,C

                                13890DTYPE BNF  READ,PCC2
                                13980PCC   TDM  PCC2,-1

---------------------------------------------------------------------------------------------------------------
056C0PEKMT TF   PLACE2,LKRET

                                10060KMKM  CF   SUBPSH-9,PEKMT,7
```

```
----------------------------------------------------------------------------------------------------
05570PERMISDC   3,0,*-2

                         01180CHLBOTTFM  PERMIS,00,9   ,,,SET UP LINKAGE TO TABLE LOOKUP ROUTINE
                         0536CFAILEDBNF  *&24,PERMIS-1
                         0556CLOOKUPTFM  PERMIS,11,1011
                         0561C      TFM  PERMIS,0,9
                         0601C      BNF   *&24,PERMIS
                         0616C      BNF  RETLK,PERMIS
                         06170      BNF  RETLK,PERMIS-1
                         0651C      TDM  PERMIS,0
                         C6560      TD   PERMIS,PERMIS-1
                         C6560      TD   PERMIS,PERMIS-1
                         C6930      BD   -COLCT&1,PERMIS

----------------------------------------------------------------------------------------------------
05130PINT  DS   ,*

                         0505C      TFM  PINT,CNNST-10
                         0511C      SM   PINT,1,10
                         C512C      A    INTRET,-PINT
                         05140      C    -PINT,INTRET          ,,,CHECK FOR EXCEEDING 10 DIGITS
                         0521C      TD   -PINT,-LKRET
                         C5220      AM   PINT,1,10
                         C524C      BNR  BK82,-PINT

----------------------------------------------------------------------------------------------------
00640PIT   DAC  7,SYSPIT ,

                         C694C      C    PIT&10,-COLRET

----------------------------------------------------------------------------------------------------
01670PLACE DS   ,CHECK&11

                         0108CCHLB  C    C00,-PLACE    ,,,FIND END OF LABEL
                         011CC      AM   PLACE,2,10
                         01120      BNR  CHLB,-PLACE
                         C113C      CM   PLACE,INPUT&6
                         012CC      TF   COLRET,PLACE
                         C1660      C    C24,-PLACE    ,,,CHECK FOR OPEN PAREN
                         C17C0      TF   SUBCHK,PLACE
                         C1830      A    2218&13,-PLACE,,RECOVER NAME OF SUBROUTINE
                         0207CON88  C    C04,-PLACE
                         0221CON87  C   C0021,-PLACE    ,,,CHANGE GOTO / CODDING TO 61
                         02230      AM   PLACE,2,10
                         0224C      BD   *&20,-PLACE
                         02270      SM   PLACE,3,10
                         C228C      TDM  -PLACE,6
                         C229C      AM   PLACE,3,10
                         C256C      TFM  PLACE,INPUT&8
                         0298C      TFM   PLACE,LAST-2 ,,,NO - START WITH FIRST STATEMENT
                         03C1C      TF   PLACE,PLACE2
                         03C20GOTO  TF   PL8,PLACE
                         0304C      TF    WTY&11,PLACE
                         03120      C    C61,-PLACE
                         0314C      C    C24,-PLACE    ,,,CHECK FOR A CONTRUCTED REFERENCE STRING
```

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                         C323C      BNR   *&20,-PLACE
                         03250      C    C00,-PLACE    ,,,CHECK FOR A BLANK
                         C3270      AM   PLACE,2,10
                         C3290      C     C33,-PLACE
                         0331C      C   C61,-PLACE
                         0348C      AM   PLACE,2,10
                         03490      BNR   QBL,-PLACE
                         C3590QBL   C    C00,-PLACE    ,,,CHECK FOR BLANK
                         0361C      AM   PLACE,2,10
                         C36200N9   C    C04,-PLACE    ,,,CHECK FOR ¤
                         0364C      C   C61,-PLACE
                         03660      C    C23,-PLACE
                         C3860      BNR  *&20,-PLACE
                         0388CQBL2  C    C00,-PLACE    ,,,SKIP BLANKS
                         C39CC      AM   PLACE,2,10
                         C39200N1C  C    C10,-PLACE    ,,,CHECK FOR &
                         C3940      C    C20,-PLACE    ,,,CHECK FOR -
                         03960      C    C14,-PLACE    ,,,CHECK FOR *
                         C398C      C    C21,-PLACE    ,,,CHECK FOR /
                         C4C60      AM   PLACE,2,10
                         C4070      C    C14,-PLACE   ,,,CHECK FOR **
                         C4120EV    AM   PLACE,2,10
                         C4160      BNR  *&20,-PLACE
                         C4240      C    C00,-PLACE
                         0426C      AM   PLACE,2,10
                         05380      TF   PLACE,PL8
                         05820      BNR   *&24,-PLACE
                         05840      C    C24,-PLACE
                         05860      C    C34,-PLACE
                         0588C      C    C13,-PLACE
                         059CC      C   C22,-PLACE
                         05930      C   C03,-PLACE
                         05950      C   C40,-PLACE
                         0598C      C    C24,-PLACE
                         C641C      TF   LKRET,PLACE
                         06430      AM   PLACE,2,10
                         06440      C    C34,-PLACE
                         06460      TF   LSTR3,PLACE
                         0648C      AM   PLACE,2,10
                         C65C0INDIR5AM   PLACE,2,10
                         06740      C    C04,-PLACE
                         0677C      AM   PLACE,2,10
                         0681C      TF   KSP,PLACE
                         C682C      AM   PLACE,2,10
                         C6840      BNR  ON62,-PLACE
                         0686CRETCOLTF   COLRET,PLACE
                         0688C      TF   99,PLACE
                         0701CON62  C    C40,-PLACE
                         07030      C    C03,-PLACE
                         07050      C    C22,-PLACE    ,,,CHECK FOR A RECORD MARK
                         C797CFINCONBNR  *&20,-PLACE
                         0799C      C   C61,-PLACE
                         08020CONST2TF   TFMZ&11,PLACE
                         08C30      TF   PLACE,PL8
                         C805CTFMZ  TFM  PLACE,*-*
                         08190YEAH3 AM   PLACE,2,10    ,,,MOVE PAST LABLE
                         08210      C    C00,-PLACE
                         0823C      AM   PLACE,2,10
                         C8240      CM   PLACE,*-*
                         082800N63  C   C61,-PLACE     ,,,FIND DIVIDING SLASH
                         083C0      AM   PLACE,2,10
```

```
08310       BNR  *-36,-PLACE
08330N638   AM   PLACE,2,10
08350       BNR  *&20,-PLACE
08370       C    C62,-PLACE
08390       C    C56,-PLACE
08410       C    C24,-PLACE
08430       C   C00,-PLACE
08510GOTO2  AM   PLACE,2,10
08520       BNR   *&20,-PLACE
08540       C    C24,-PLACE
08580       AM   PLACE,2,10
08690       TF   TFM8K&11,PLACE
08700TFM    TFM  PLACE,PPT
08720TFM8K  TFM  PLACE,*-*
09880       TF   KALSUB&6,PLACE
09920       A    2218&13,-PLACE
10080       C    C04,-PLACE
10130       C    C04,-PLACE
10250VG     AM   PLACE,2,10
10260       C    C34,-PLACE
10310       C   C24,-PLACE
10340       C   C04,-PLACE
10380       AM   PLACE,2,10
10580KINDF  BNR  *&20,-PLACE    ...CHECK FOR RECORD MARK
10610       C    C00,-PLACE     ...BLANK
10630       AM   PLACE,2,10
10640       C    C14,-PLACE     ...ASTERISK
10660       C    C61,-PLACE     ...SLASH
10680       C    C33,-PLACE
10700REGUL  TF   PL2,PLACE
10780       SM   PLACE,2,10
10790       TF   PL6,PLACE
10950       C    -PLACE,-WORK2-4
11050JIONF2AM    PLACE,2,10
11100       AM   PLACE,2,10
11270FILLEMAM    PLACE,2,10
11280       C    C24,-PLACE     ...CHECK FOR BALNCED STRING
11300       TF   WORK1&4,PLACE
11310PUCK   C    C14,-PLACE
11330       C   C21,-PLACE,,    ...CHECK FOR A SLASH
11350       C    C34,-PLACE
11370       AM   PLACE,2,10
11380       BNR   PUCK,-PLACE
11420       TF   WORK1&9,PLACE
11440       C    C21,-PLACE
11460       C    C14,-PLACE
11490BLNCD  AM   PLACE,2,10     ...BALNCED STRING
11500       TF   WORK1&4,PLACE
11540       TF   WORK1&9,PLACE
11570FIXEDLAM    PLACE,2,10     ...FIXED LENGTH STRING
11680       TF   CONST8&11,PLACE,,PLACE MAY BE DESTROYED LATER
12900KONST  TF   PLACE,WORK1&4
13060       TF   PLACE,WORK1&4
13070       C   C13,-PLACE
13400CONST8TFM   PLACE,*-*
13410       BNR  *&20,-PLACE
13430       C    C61,-PLACE
13450       C    C33,-PLACE
14220OHNI   TFM  PLACE,OH DEAR ...OF ALL THE RIDICULOUS THINGS
14250       TF   PLACE,PL8
```

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----------------------------------------------------------------------------------------------
03810PLACE2DC    5,0,*

                     03010       TF   PLACE,PLACE2
                     05600PEKMT  TF   PLACE2,LKRET
                     05620       BNR   *&20,PLACE2
                     05640       AM   PLACE2,1,10

----------------------------------------------------------------------------------------------
04650PL2    DS    ,*

                     10700REGUL  TF   PL2,PLACE
                     10720       SM   PL2,1,10
                     10740       SF   -PL2                 ...CHECK FOR BACK REFERENCE
                     10800       S    PL6,PL2
                     10990       CF   -PL2
                     11080REGUL2CF    -PL2

----------------------------------------------------------------------------------------------
11030PL6    DC    5,0,*

                     10790       TF   PL6,PLACE
                     10800       S    PL6,PL2
                     10810       SM   PL6,1,10
                     10920       A    WORK2&4,PL6
                     11010       S    WORK2&4,PL6

----------------------------------------------------------------------------------------------
09350PL8    DC    5,0,*

                     00770       TFM  PL8,INPUT&8      ...DEFINE FOR ERROR 10 ON END CARD
                     03020GOTO   TF   PL8,PLACE
                     05380       TF   PLACE,PL8
                     08030       TF   PLACE,PL8
                     09210ERROR  SM   PL8  ,1,10       ...ERROR MESSAGE ROUTINE
                     09220       BNF  *-12,-PL8
                     09230       AM   PL8  ,1,10
                     09260       BT   WATY,PL8
                     14250       TF   PLACE,PL8

----------------------------------------------------------------------------------------------
08740PNRET 87     *-*

                     08640       TFM  PNRET&6,PRINT2
                     08790       TFM  PNRET&6,PUNCH2

----------------------------------------------------------------------------------------------
00620POT    DAC   7,SYSPOT ,

                     06960       C   POT&10,-COLRET
                     08630PRINT  TFM  TFM&11,POT

----------------------------------------------------------------------------------------------
```

```
00630PPT   DAC  7,SYSPPT ,

                        0698C       C    PPT&10,-COLRET
                        C87COTFM    TFM  PLACE,PPT
                        0878CPUNCH  TFM  TFM&11,PPT

------------------------------------------------------------------------------------------------
08630PRINT TFM  TFM811,POT

                        C697C       BE   PRINT
                        088CC       B7   PRINT&24

------------------------------------------------------------------------------------------------
00060PRINTRDSC  1,0

                        C9570WATY   BD   LUCKY,PRINTR   ,,,FOR THOSE PEOPLE WITH A PRINTER
                        09760EJECT  BD   LUCKY2,PRINTR ,,,EJECTION SUBROUTINE
                        14C20PRNT2  TDM  PRINTR,-1

------------------------------------------------------------------------------------------------
08750PRINT2AM   LKRET,1,1C

                        C864C       TFM  PNRET&6,PRINT2

------------------------------------------------------------------------------------------------
14C20PRNT2 TDM  PRINTR,-1

                        138CC       DSA  PRNT2

------------------------------------------------------------------------------------------------
11310PUCK  C    C14,-PLACE

                        1138C       BNR   PUCK,-PLACE

------------------------------------------------------------------------------------------------
08780PUNCH TFM  TFM&11,PPT

                        0699C       BE   PUNCH

------------------------------------------------------------------------------------------------
08810PUNCH2TFM  *&18,INPUT&158

                        0879C       TFM  PNRET&6,PUNCH2
                        0893C       B7   PUNCH2

------------------------------------------------------------------------------------------------
03390PUSH2 DSAC 50,                                                        ,

                        C3420EVAL   TR   PUSH2 - 99,PUSH2- 89
                        03420EVAL   TR   PUSH2 - 99,PUSH2- 89
                        03430       TF   PUSH2,EVAL-1  ,,,PUSH2 TO IS A PUSH DOWN LIST WITH
                        C3440       CF   PUSH2-4       ,,, A GROUP OF RETURN ADDRESSES AND
                        03460       TF   PUSH2-5,CURRT2,,, POINTERS TO THE OUTPUT AREA
```

```
                        03470       CF   PUSH2-9
                        03520       SF   PUSH2-9
                        0354C       TF   CLAST ,PUSH2-5 ,,,PULL UP PUSH DOWN LIST
                        C3550       SF   PUSH2-4
                        03560       TF   *&30,PUSH2
                        C357C       TF   PUSH2,PUSH2-10
                        0357C       TF   PUSH2,PUSH2-10

------------------------------------------------------------------------------------------------
05680PUSH4 DSAC 5C,                                                        ,

                        C129C       TFM  PUSH4,*&20,0
                        C571CLOOK2  TR   PUSH4- 99,PUSH4-89
                        C571CLOOK2  TR   PUSH4- 99,PUSH4-89
                        0574C       TDM  PUSH4-9,0
                        C579C       TF   PUSH4,LOOK2-1
                        0581C       CF   PUSH4-4
                        0635CRETLK  SF   PUSH4-4
                        06360       TF   LOOK2-1,PUSH4
                        0637C       TF   PUSH4,PUSH4-10
                        C637C       TF   PUSH4,PUSH4-10
                        C654C       C    KMKM&11,PUSH4
                        07820       TFM  PUSH4,*&20,0

------------------------------------------------------------------------------------------------
14120PUSH9 DSAC 5C,                                                        ,

                        0418C       TR   PUSH9-149,PUSH9-134
                        C418C       TR   PUSH9-149,PUSH9-134
                        0419C       TF   PUSH9-10,EVRET
                        042CO       CF   PUSH9-14
                        C4220       TF   PUSH9,INTRET
                        C4230       CF   PUSH9-9
                        043CC       SF   PUSH9-9
                        04320       TF   10,PUSH9
                        C4330       SF   PUSH9-14
                        04350       TF   EVRET,PUSH9-10
                        0436C       TF   PUSH9,PUSH9-15
                        04360       TF   PUSH9,PUSH9-15

------------------------------------------------------------------------------------------------
03590QBL    C     C00,-PLACE     ,,,CHECK FOR BLANK

                        03490       BNR   QBL,-PLACE

------------------------------------------------------------------------------------------------
03880QBL2   C     CCC,-PLACE     ,,,SKIP BLANKS
                          *** UNREFERENCED ***

------------------------------------------------------------------------------------------------
02740QUENT DC    1C,9

                        0289C       TF   QUENT-5,CURRNT
                        029CO       AM   QUENT-5,9,10
                        0291C       TF   -PAST,QUENT
```

```
------------------------------------------------------------------------------------------------------
14360QUOTE DAC  08,CUOTE aa,  ,,,SPECIAL STRING WHICH CONTAINS ONLY A QUOTE
                           02930       TR   -CURRNT,QUOTE-1,,,CREATE STRING CONTAING QUOTE %a¤

------------------------------------------------------------------------------------------------------
12100R      SF   SFLAG          ,,,BACK REFERENCE
                           11940BRTAB DSA  F,B,F,K,FINISH,R

------------------------------------------------------------------------------------------------------
00820READ  BTM   GET,42,10
                           00930       BL   READ
                           01000       BE   READ
                           01520       BL   READ
                           13530       B7   READ
                           13680       B7   READ
                           13890TYPE  BNF  READ,PCC2

------------------------------------------------------------------------------------------------------
09050READC BLC  FAILED
                           06950       BE   READC

------------------------------------------------------------------------------------------------------
10700REGUL TF   PL2,PLACE
                              *** UNREFERENCED ***

------------------------------------------------------------------------------------------------------
11080REGUL2CF   -PL2
                           10870       BNH  REGUL2

------------------------------------------------------------------------------------------------------
06860RETCOLTF   COLRET,PLACE
                           07070       B7   RETCOL

------------------------------------------------------------------------------------------------------
06350RETLK SF   PUSH4-4
                           06160       BNF  RETLK,PERMIS
                           06170       BNF  RETLK,PERMIS-1
                           06490       B7   RETLK
                           06780       B7   RETLK
                           09110       B7   RETLK

------------------------------------------------------------------------------------------------------
08160RETURNB7   *&8,2
                           08650       TFM  RETURN&6,*&20
```

```
                           08670       TFM  RETURN&6,RETURN&8
                           08670       TFM  RETURN&6,RETURN&8
                           08680       BNF  RETURN,SUC
                           08730       TFM  RETURN&6,RETURN&8
                           08730       TFM  RETURN&6,RETURN&8
                           08770       B7   RETURN
                           09000       B7   RETURN

------------------------------------------------------------------------------------------------------
03500RET9  TR   -CURRT2,DSC00&2,,SET TRAILER RECORD MARK
                           03630       BE   RET9
                           03650       BE   RET9
                           03670       BE   RET9
                           03870       B7   RET9
                           05010       B7   RET9-12

------------------------------------------------------------------------------------------------------
06210RIG   BNE  ER1C
                              *** UNREFERENCED ***

------------------------------------------------------------------------------------------------------
00680RMARK DS   ,*
                           00730       TR   -CORE,RMARK-1
                           00800       TD   PAST ,RMARK,6 ,,,PLACE IN TRAILER ENTRY
                           00870SEARCHTD   *-*,RMARK     ,,,SET RECORD MARK
                           02550       TD   -PAST,RMARK
                           04970EXTRA TR   81,RMARK-1
                           05780       TFM  LKRET,RMARK-1
                           05800       TD   LSTR,RMARK
                           06150NOFINDTFM  LSTR3,RMARK-1
                           06400       TD   COLDIF,RMARK  ,,,INDICATE VARIABLE NOT TO BE DELETED
                           06650       TFM  LKRET,RMARK-1
                           06720       TD   LSTR,RMARK
                           06730       TD   COLDIF ,RMARK ,,,INDICATE NOT TO BE DELETED
                           07780       CM  THERE,RMARK-2
                           09070       TD       COLDIF,RMARK
                           09240       TD   ERROR-1,RMARK
                           09290       TR   -CURRNT,RMARK-1
                           09490       CM   GET2&11,RMARK
                           13920SPACE BTM  WATY,RMARK    ,,,SPACE ONE LINE

------------------------------------------------------------------------------------------------------
11840RULE2 TR   WORK1,-1
                           12030       B7   RULE2
                           12070       B7   RULE2
                           12270       B7   RULE2
                           12690       B7   RULE2

------------------------------------------------------------------------------------------------------
02010SBCKCLDSAC 7,         ,
                           01220       TF   2218&13,SBCKCL,,,CONTRUCT NEW SYMBOL TABLE ENTRY
```

```
                        01820        TF    2218&13,SBCKCL
                        07C9CDELET TF     2218&29,SBCKCL-4,,CREATE NEW SYMBOL TABLE ENTRY
                        0987CSUBCALTF     2218&13,SBCKCL

-------------------------------------------------------------------------------------------------
02040SBCKFDAM   SUBCK,1,10

                        C197C        BE    SBCKFD

-------------------------------------------------------------------------------------------------
01750SBCKLPSM   SUBCHK,2,10    ,,,COLLECT SUBROUTINE NAME

                        C177C        BNH   SBCKLP          ,,,YES - BACK UP ANOTHER LETTER
                        C179C        BE    SBCKLP

-------------------------------------------------------------------------------------------------
018C0SBCKOTAM   SUBCHK,1,10

                          *** UNREFERENCED ***

-------------------------------------------------------------------------------------------------
01940SBCK2 TFM  SUBCK,SUBLST

                        C185C        BNF   SBCK2,SLINDC
                        C199C        BNR   SBCK2&12,-SUBCK

-------------------------------------------------------------------------------------------------
02670SBCLARAM   SUBCLL&11,18,10  ,,,MOVE TO NEXT ENTRY

                        C261C        BNF   SBCLAR,SUBCL   ,,,BRANCH AROUND IF ROUTINE NOT CALLED

-------------------------------------------------------------------------------------------------
1C560SCAN   TFM  W,0,8

                        C333C        B7    SCAN            ,,,BRANCH TO NEW SCAN ROUTINE

-------------------------------------------------------------------------------------------------
00870SEARCHTD   *-*,RMARK      ,,,SET RECORD MARK

                        C086C        TFM   SEARCH&6,INPUT&72*2
                        0088C        SM    SEARCH&6,2,10
                        C09CC        C     C00,SEARCH&6,11,,IS IT A BLANK
                        C091C        BE    SEARCH
                        C0920        CM    SEARCH&6,INPUT,,,TEST FOR BLANK CARD
                        C149C        SM    SEARCH&6,INPUT-4
                        015CC        A     OK&6,SEARCH&6
                        0219C        SM    SEARCH&6,2,10,,,
                        C241C        CM    SEARCH&6,INPUT&6

-------------------------------------------------------------------------------------------------
117C0SFLAG CF   SFLAG

                        117CCSFLAG CF      SFLAG
```

```
                        121C0R       SF    SFLAG           ,,,BACK REFERENCE
                        1234C        SF    SFLAG           ,,,BALANCED STRING
                        1248CSIZEF BNF     BRACHF,SFLAG    ,,,SCAN FAILURE IF SFLAG NOT SET

-------------------------------------------------------------------------------------------------
13210SF89   SF   *-*

                        1316C        TF    SF89&6,CURRNT

-------------------------------------------------------------------------------------------------
13130SHIFT DS   ,*

                        07530        S    ERP&9&21,SHIFT
                        0761C        S    M,SHIFT
                        C7620        S     WORK1&9,SHIFT
                        12820        TFM   SHIFT,0
                        1297C        S     SV100,SHIFT
                        13CCC        S     SHIFT,LSTR2
                        13C1C        A     SHIFT,COLDIF
                        13C2C        A    SHIFT,LSTR3
                        1311C        S    WORK1&9,SHIFT

-------------------------------------------------------------------------------------------------
12480SIZEF BNF  BRACHF,SFLAG   ,,,SCAN FAILURE IF SFLAG NOT SET

                        119CC        BH    SIZEF
                        12190        BH    SIZEF

-------------------------------------------------------------------------------------------------
00760SKIPITBC2    *            ,,,MAKE SURE SW. 2 IS OFF

                        C07CC        BNF   SKIPIT,CORE

-------------------------------------------------------------------------------------------------
00850SLINDCDS   ,*-1

                        0084C        TDM   SLINDC,0
                        C185C        BNF   SBCK2,SLINDC
                        C23CC        BNF   *&24,SLINDC
                        0232C        TDM   SLINDC,-1

-------------------------------------------------------------------------------------------------
13920SPACE BTM  WATY,RMARK     ,,,SPACE ONE LINE

                        1374C        DSA   SPACE

-------------------------------------------------------------------------------------------------
016C0SPDG   DS   ,*-1

                        C1020        TDM   SPDG,-1
                        01590        TDM   SPDG,-1
                        C2130OK4     BD    OK2,SPDG
                        C234COK2     TDM   SPDG,0
```

```
----------------------------------------------------------------------
00710START TDM  0,-1,7         ,,,FIND CORE SIZE

                         0074CCORE  DS   ,START&11
                         1438C      DEND START-12

----------------------------------------------------------------------
04030SUB   TFM  EVRET  ,SUB2

                         03950      BE   SUB

----------------------------------------------------------------------
09870SUBCALTF   2218&13,SBCKCL

                         05990      BE   SUBCAL

----------------------------------------------------------------------
01730SUBCHKDS   ,*

                         01700      TF   SUBCHK,PLACE
                         01710      SM   SUBCHK,2,10
                         01720      C    C40,-SUBCHK    ,,,CHECK IF SUBROUTINE CALL
                         01750SBCKLPSM   SUBCHK,2,10    ,,,COLLECT SUBROUTINE NAME
                         01760      C    C40,-SUBCHK    ,,,CHECK FOR NUMBER OR LETTER
                         01780      C    C03,-SUBCHK    ,,,CHECK FOR A PERIOD
                         C18CCSBCKOTAM   SUBCHK,1,10
                         01810      SF   -SUBCHK
                         01840      CF   -SUBCHK

----------------------------------------------------------------------
01960SUBCK DS   ,*

                         0194CSBCK2 TFM  SUBCK,SUBLST
                         01950      C    2218&11,-SUBCK,,,SEARCH LIST FOR SUBROUTINE
                         01980      AM   SUBCK,18,10
                         0199C      BNR  SBCK2&12,-SUBCK
                         0204CSBCKFDAM   SUBCK,1,10
                         02050      SF   -SUBCK         ,,,SET CALLED INDICATOR

----------------------------------------------------------------------
02650SUBCL DSC  5,CC00@

                         026CCSUBCLLTR   SUBCL,*-*      ,,,MOVE IN DIM NUMBER
                         0261C      BNF  SBCLAR,SUBCL   ,,,BRANCH AROUND IF ROUTINE NOT CALLED

----------------------------------------------------------------------
026C0SUBCLLTR   SUBCL,*-*      ,,,MOVE IN DIM NUMBER

                         02590      TFM  SUBCLL&11,SUBLST&1
                         02660      TR   SUBCLL&11,416,6,MOVE IN EXECUTION ADDRESS
                         0267CSBCLARAM   SUBCLL&11,18,10   ,,,MOVE TO NEXT ENTRY
                         02680      BNR  SUBCLL,SUBCLL&11,11,END OF TABLE CHECK
                         02680      BNR  SUBCLL,SUBCLL&11,11,END OF TABLE CHECK
```

```
----------------------------------------------------------------------
00120SUBLSTDSAC 6,  PUSH,,     ,,,SUBROUTINE LIST

                         0194CSBCK2 TFM  SUBCK,SUBLST
                         02590      TFM  SUBCLL&11,SUBLST&1
                         09940      TFM  KALSB&6,SUBLST

----------------------------------------------------------------------
10160SUBOUTSF   SUBPSH-14

                         1009C      BE   SUBOUT         ,,,BRANCH IF ONLY ONE ARGUMENT

----------------------------------------------------------------------
09850SUBPSHDSAC 5C,                                          ,

                         10010      TR   SUBPSH-89,SUBPSH-74,,MOVE ENTRY ADDR. INTO PUSH DOWN LIST
                         10010      TR   SUBPSH-89,SUBPSH-74,,MOVE ENTRY ADDR. INTO PUSH DOWN LIST
                         10020      TF   SUBPSH-10,-KALSB-6
                         10030      CF   SUBPSH-14      ,,,THE FOLLOWING IS PURE PROCEDURE FOR
                         10040      TFM  SUBPSH,0,2     ,,,  RECURSIVE ENTRY
                         1005C      TF   SUBPSH-5,CURRT2
                         10060KMKM  CF   SUBPSH-9,PEKMT,7
                         10100      TF   SUBPSH,CURRT2
                         1011C      CF   SUBPSH-4
                         10160SUBOUTSF   SUBPSH-14
                         10170      TF   2299,SUBPSH
                         10180      TF   SUBPSH,SUBPSH-15,,POP UP PUSH DOWN LIST
                         10180      TF   SUBPSH,SUBPSH-15,,POP UP PUSH DOWN LIST

----------------------------------------------------------------------
04420SUB2  S    1C,INTRET

                         04C3CSUB   TFM  EVRET  ,SUB2

----------------------------------------------------------------------
08120SUC   DC   2,0,*-2

                         081C0BRACHSTDM  SUC,-1
                         0814CBRACHFTDM  SUC,0
                         08460FS    BNF  GOTO2-12,SUC
                         C8480FF    BNF  GOTO2,SUC
                         0868C      BNF  RETURN,SUC

----------------------------------------------------------------------
085C0SUC2  DS   ,*-1

                         0834C      TDM  SUC2,1
                         C8490      TDM  SUC2,0
                         08560      BD   *&24,SUC2

----------------------------------------------------------------------
11090SV100 DC   5,0,*

                         11870      TF   SV100,WORK1&9 ,,,CHECK FOR SIZE FAILURE
                         11880      A     SV100,WORK1&19
                         11890      C     SV100,M
                         12960      TF    SV100,WORK1&9
                         12970      S     SV100,SHIFT
                         12980      C     LSTR3,SV100

--------------------------------------------------------------------------------------------------
10230SV203 DC    5,C

                         10390      B7    -SV203

--------------------------------------------------------------------------------------------------
05360TBK81 BNF   BK81,FLAG

                         C527C      BE    TBK81

--------------------------------------------------------------------------------------------------
06220TDUMP BTM   EJECT,DUMP

                         08260      BNL TDUMP

--------------------------------------------------------------------------------------------------
087C0TFM   TFM   PLACE,PPT

                         08630PRINT TFM   TFM&11,POT
                         C878CPUNCH TFM   TFM&11,PPT

--------------------------------------------------------------------------------------------------
08C50TFMZ  TFM   PLACE,*-*

                         C8C20CONST2TF    TFMZ&11,PLACE

--------------------------------------------------------------------------------------------------
08720TFM8K TFM   PLACE,*-*

                         0869C      TF    TFM8K&11,PLACE

--------------------------------------------------------------------------------------------------
14160THERE DS    ,ERP&9

                         C319C      TF    THERE,LK RET
                         0321C      SM    THERE,1,10
                         03220      TF    ERP&9&21,THERE
                         C748C      C     THERE,ERP&9&21
                         075CC      S    CURRT2,THERE
                         C778C      CM   THERE,RMARK-2
                         1171C      TF    ERP&9&21,THERE

--------------------------------------------------------------------------------------------------
03450TNEXT DS    ,*

                           *** UNREFERENCED ***
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```
--------------------------------------------------------------------------------------------------
02180TR    TR    *-*,*-*        ,,,ERADICATE THE BLANK

                         C214C      TF    TR&6,CHECK&11
                         C215C      SM    TR&6,1,10
                         0216C      TF    TR&11,CHECK&11
                         0217C      AM    TR&11,1,10

--------------------------------------------------------------------------------------------------
07230TRLOOPTF    KSTR5,LSTR

                         C73CC      BNE   TRLOOP

--------------------------------------------------------------------------------------------------
13670TYPEC BTM   WATY,INPUT

                         1361C      B7    TYPEC
                         139CC      B7    TYPEC
                         13990      B7    TYPEC

--------------------------------------------------------------------------------------------------
09320T796  BTM   EJECT,796

                         0928CDUMP  BNF T796,DUMPSW     ,,,THE DUMP MEMORY ROURINE

--------------------------------------------------------------------------------------------------
13950UNLISTTCM   LIST2,0

                         13760      DSA   UNLIST

--------------------------------------------------------------------------------------------------
10250VG    AM    PLACE,2,1C

                         10300VG2   BD    VG,C34DIG
                         10350      BNE     VG
                         1037C      BNN    VG

--------------------------------------------------------------------------------------------------
103C0VG2   BC    VG,C34DIG

                         10270      BNE   VG2

--------------------------------------------------------------------------------------------------
11170W     DS    ,*

                         10560SCAN  TFM   W,0,8
                         11240      A     W,WORK1&13
                         11750      TF    WORK2&19,W
                         1176C      S     W,WORK2&13

--------------------------------------------------------------------------------------------------
```

```
09570WATY  BD   LUCKY,PRINTR  ,,,FOR THOSE PEOPLE WITH A PRINTER

                      00980       BTM  WATY,INPUT
                      01430       BTM   WATY,INPUT
                      01440       BT    WATY,ERR1-1
                      01530OVLAP  BTM  WATY,OVLP
                      03080WTY    BTM  WATY,*-*
                      08760       BT   WATY,LKRET
                      09260       BT   WATY,PL8
                      09270       BTM  WATY,ERMES
                      09380       BT   WATY,2218&4
                      09600       WATY  -WATY&1
                      09630       TF   FINDRM&11,WATY-1
                      09670       39   -WATY&1,900
                      09710       A    WATY-1,LENGTH
                      09720       C   WATY-1,FINDRM&11
                      13670TYPEC  BTM  WATY,INPUT
                      13920SPACE  BTM  WATY,RMARK     ,,,SPACE ONE LINE

-----------------------------------------------------------------------------------
11740WLOOP TR   WORK2,-I

                      11800       BNE  WLOOP

-----------------------------------------------------------------------------------
10540WORK1 DSC  21,-0000-0000-000-0-000@

                      03200       TF   WORK1&9,M
                      07590       C    M,WORK1&9
                      07620       S    WORK1&9,SHIFT
                      07630       AM   WORK1&9,1,10
                      07650       S   CURRT ,WORK1&9
                      07670       SF   -WORK1-9
                      07710       CF   -WORK1-9
                      10600       TFM  WORK1&9,0
                      10710       TFM  WORK1&15,15,10
                      10970       TF   WORK1&4,II       ,,,BACK REFERENCE FOUND
                      10980       TF   WORK1&13,WORK2&13
                      11000       TFM  WORK1&15,25,10
                      11120       TF   WORK1&4,LSTR3 ,,,STRING IS NOT BACK REFERNCE
                      11130       SM   WORK1&4,1,10
                      11140       TF   99,WORK1&4
                      11200       TF   WORK1&13,99
                      11210JIONF  TR   -I,WORK1         ,,,MOVE IN ERP ENTRY
                      11240       A    W,WORK1&13
                      11300       TF   WORK1&4,PLACE
                      11400       TFM  WORK1&13,0,8
                      11410       TFM  WORK1&15,0,10
                      11420       TF   WORK1&9,PLACE
                      11430       SM   WORK1&9,2,10
                      11500       TF   WORK1&4,PLACE
                      11520       TFM  WORK1&13,2,8
                      11530       TFM  WORK1&15,5,10
                      11540       TF   WORK1&9,PLACE
                      11550       SM   WORK1&9,4,10
                      11630       TF   WORK1&13,INTRET
                      11640       A    WORK1&13,WCRK1&13
                      11640       A    WORK1&13,WCRK1&13
                      11650       TFM  WORK1&15,10,10
```

```
                      11670FINK   TFM  WORK1&15,20,10,,,EXTRA FINAL EXTRY
                      11690       TR   -I,WORK1
                      11840RULE2  TR   WORK1,-I
                      11870       TF   SV100,WORK1&9 ,,,CHECK FOR SIZE FAILURE
                      11880       A    SV100,WORK1&19
                      11920       S    *&18,WORK1&15
                      11950K      TF   WORK2&9,WORK1&9,,CONSTANT STRING
                      11960       A    WORK2&9,WORK1&13
                      11970       AM   WORK1&9,1,10
                      11980       SF   -WORK1-9
                      11990       C    -WORK2-9,-WORK1-4
                      12000       CF   -WORK1-9
                      12040F      TF   WORK2&9,WORK1&9,,FILLER STRIG
                      12050       A    WORK2&9,WORK1&13
                      12110       TR   WORK3,-WORK1-4
                      12120       AM   WORK1&4,21,10
                      12130       TR   WORK4,-WORK1-4
                      12160       TF   WORK2&9,WORK1&9
                      12200       AM   WORK1&9,1,10
                      12210       SF   -WORK1-9
                      12230       CF   -WORK1-9
                      12280B      TF   WORK2&9,WORK1&9
                      12510       TR   WORK1,-I
                      12530       S    *&18,WORK1&15
                      12560A      BNF  DEC,WORK1&20
                      12600       TR   WORK1,-I
                      12620       S    *&18,WORK1&15
                      12660       TR   WORK1,-I
                      12670       AM   WORK1&9,2,10
                      12680       TR   -I,WORK1
                      12790       TF   WORK1&9,M
                      12800       TR   -I,WORK1
                      12830KNLOOPTR    WORK1,-I
                      12870       S    *&18,WORK1&15
                      12900KONST  TF   PLACE,WORK1&4
                      12960       TF   SV100,WORK1&9
                      13040       C    WORK1& 9,WORK2&9
                      13060       TF   PLACE,WORK1&4
                      13110       S   WORK1&9,SHIFT
                      13260       AM   WORK1&9,1,10
                      13270       S    CURRNT,WORK1&9
                      13290       SF   -WORK1-9
                      13320       CF   -WORK1-9

-----------------------------------------------------------------------------------
11260WORK2 DSS  21

                      10880       TR   WORK2,-II
                      10890       CM   WORK2&11,10,10
                      10920       A    WORK2&4,PL6
                      10930       C    WORK2&4,WORK2&9
                      10930       C    WORK2&4,WORK2&9
                      10950       C    -PLACE,-WORK2-4
                      10980       TF   WORK1&13,WORK2&13
                      11010       S    WORK2&4,PL6
                      11020       SF   WORK2&20
                      11040       TR   -II,WORK2
                      11740WLOOP  TR   WORK2,-I
                      11750       TF   WORK2&19,W
                      11760       S    W,WORK2&13
```

```
                             11770         TR    -I,WORK2
                             11790         CM    WORK2&15,20,10
                             11820         TR    -I,WORK2
                             11860         TR    WORK2,-I
                             11950K        TF    WORK2&9,WORK1&9,,CONSTANT STRING
                             11960         A     WORK2&9,WORK1&13
                             1199C         C     -WORK2-9,-WORK1-4
                             12020         TR    -I,WORK2
                             1204CF        TF    WORK2&9,WORK1&9,,FILLER STRIG
                             1205C         A     WORK2&9,WORK1&13
                             12C6C         TR    -I,WORK2
                             12160         TF    WORK2&9,WORK1&9
                             1217C         S     WORK2&9,WORK3&9
                             12180         C     WORK2&9,M
                             12220         C     -WORK2-9,-WORK4-9
                             12260MATCHSTR       -I,WORK2
                             1228CB        TF    WORK2&9,WORK1&9
                             1229C         AM    WORK2&9,2,10
                             123C0         C     C04,-WORK2-9   ,,,CHECK FOR CLOSE PAREN
                             12320         C     C24,-WORK2-9   ,,,CHECK FOR OPEN PAREN
                             12360BLOOP    AM    WORK2&9,2,10
                             12370         C     WORK2&9,M
                             12390         C     C24,-WORK2-9
                             12430         C     C04,-WORK2-9   ,,,COMPARE FOR ¤
                             1271C         TR    WORK2,-I
                             12750         TR    WORK2,-I       ,,,EXTEND LAST STRING IF ARBITRARY
                             12770         CM    WORK2&15,0,10
                             12850         TR    WORK2,-I
                             1304C         C     WORK1& 9,WORK2&9
                             13120         SM    WORK2&9,*-*
                             1328C         A     CURRNT,WORK2&9
                             1331C         TF    -CURRNT,-WORK2-9

-------------------------------------------------------------------------------------
12C80WORK3 DSS   21

                             1211C         TR    WORK3,-WORK1-4
                             1214C         S     WORK3&9,WORK4&9
                             1217C         S     WORK2&9,WORK3&9

-------------------------------------------------------------------------------------
12C90WORK4 DSS   21

                             12130         TR    WORK4,-WORK1-4
                             1214C         S     WORK3&9,WORK4&9
                             1222C         C     -WORK2-9,-WORK4-9

-------------------------------------------------------------------------------------
03C80WTY   BTM   WATY,*-*

                             0304C         TF     WTY&11,PLACE
                             0305C         SM    WTY&11,1,10
                             03060         BNF    *-12,-WTY-11
                             C307C         AM    WTY&11,1,10

-------------------------------------------------------------------------------------
08170YEAH2 DS    ,BRANHS

                             0299C         B7    YEAH2            146



                             0324C         B7    YEAH2
                             C798C         B7    YEAH2
                             C836C         B7    YEAH2
                             13420         B7    YEAH2

-------------------------------------------------------------------------------------
0819OYEAH3 AM    PLACE,2,10      ,,,MOVE PAST LABLE

                             08320         B7    YEAH3

-------------------------------------------------------------------------------------
04880Z     TD    *-*,*-*         ,,,NOW FOR A TNF

                             C483C         TFM   Z&6,80
                             0487C         TFM   Z&11,20
                             04890         SM    Z&6,2,10
                             049CC         SM    Z&11,1,10
                             C491C         CM    Z&11,0,610
                             04920         BNE   Z                        ,,,NON - ZERO, TAKE OFF ANOTHER DIGIT
                             0494C         TFM   Z&6,20,67
                             04950         SM    Z&6,2,10
                             C496C         AM    Z&6,1,10
                             C4980E        TR    -CURRT2,-Z-6
                             0499C         S     CURRT2,Z&6

-------------------------------------------------------------------------------------
14060ZERO  DC    10,C

                             0456C         TF    10,ZERO
                             051CC         TF    INTRET,ZERC
```

```
00010         DC     1,',401                                          00401 00001
00020 HIGH    DS     ,434                                             00434 00000
00030 BKPT    DS     ,467                                             00467 00000
00040         DORG   520                                              00520
00050 IORBC   NOP             ,,,WHO NEEDS A READ BACK CHECK          00520 41 00000 00000
00060 IOPT    TFM    DFILE+11, TT2  ,,,PUT ENTRY                      00532 16 01201 01103
00070         B      IOGT+12                                          00544 49 00578 00000
00080         DORG   *-1                                              00554
00090 IOSK    NOP    ,,7      ,,,WHO NEEDS A SEEK                     00554 41 00000 00000
00100 IOGT    TFM    DFILE+11, TT1    ,,, GET ENTRY                   00566 16 01201 01091
00110         TFM    BKPT,X01                                         00578 16 00467 01130
00120         BA     ERROR                                            00590 46 00624 01900
00130 ERRET   B      BKPT,,6                                          00602 49 00467 00000
00140         DORG   *-4                                              00609
00150 INDS    DC     2,06    ,,,READ CHECK                            00610 00002
00160         DC     2,07 ,,,WRITE CHECK                              00612 00002
00170         DC     2,16    ,,,MBR-E                                 00614 00002
00180         DC     2,17    ,,,MBR-O                                 00616 00002
00190         DC     1,'                                              00617 00001
00200 PRNIND  DC     1,0    ,,,PRINT CHECK-MAYBE                      00618 00001
00210 RMARK   DC     1,'                                              00619 00001
00220         DC     4,0                                              00623 00004
00230         DORG   624                                              00624
00240 ERROR   TF     *+21,INDS,7, CHECK ERROR IND.                    00624 26 00645 00610
00250         BNI    *+24,*-*                                         00636 47 00660 00000
00260         SF     ERROR+11,,6,   SET ERROR FLAG                    00648 32 00635 00000
00270         AM     ERROR+11,2,10                                    00660 11 00635 00002
00280         BD     ERROR, ERROR+11,11, CHECK END OF TABLE           00672 43 00624 00635
00290         TFM    ERROR+11, INDS,, RESET                           00684 16 00635 00610
00300         RCTY                                                    00696 34 00000 00102
00310         B      ERTYPE                                           00708 49 00820 00000
```

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00320         DORG   *-4                                              00715
00330 IORT    DS     ,IOGT-1                                          00565 00000
00340 IOCAL   TFM    DFILE+11,TT1,,    CALL ENTRY                     00716 16 01201 01091
00350         TR     CNTWD, IORT,11,                                  00728 31 01305 00565
00360         TFM    BKPT,X01+36                                      00740 16 00467 01166
00370         AM     IORT,9,10                                        00752 11 00565 00009
00380         BNF    ERRET-12,CNTWD+7                                 00764 44 00590 01312
00390         AM     IORT,4,10                                        00776 11 00565 00004
00400         B      ERRET-12                                         00788 49 00590 00000
00410         DORG   *-4                                              00795
00420 MONCAL  H             ,,,CALL EXIT ENTRY                        00796 48 00000 00000
00430         B      *-*    ,,,BRANCH TO EXECUTE                      00808 49 00000 00000
00440 ERTYPE  WATY   ERMES    ,,,TYPE MESSAGE                         00820 39 00955 00100
00450         TF     RTAD-1,IORT                                      00832 26 00951 00565
00460         WNTY   RTAD-5    ,,,TYPE RETURN ADDRESS                 00844 38 00947 00100
00470         SPTY                                                    00856 34 00000 00101
00480         WNTY   INDS-1    ,,,TYPE INDICATORS                     00868 38 00609 00100
00490         CF     INDS       ,,,CLEAR ERROR FLAG INDICATION        00880 33 00610 00000
00500         CF     INDS+2                                           00892 33 00612 00000
00510         CF     INDS+4                                           00904 33 00614 00000
00520         CF     INDS+6                                           00916 33 00616 00000
00530         CF     INDS+8                                           00928 33 00618 00000
00540         B      BKPT,,6                                          00940 49 00467 00000
00550 RTAD    DC     1,'                                              00952 00001
00560 ERMES   DAC    11,I/O ERROR ',                                  00955 00022
00570 DIO     RCTY          ,,,DISK I10 ENTRY                         00976 34 00000 00102
00580         WATY   DKMES                                            00988 39 01049 00100
00590         TF     RTAD-1,IORT                                      01000 26 00951 00565
00600         WNTY   RTAD-5                                           01012 38 00947 00100
00610         H                                                       01024 48 00000 00000
00620         B      -IORT                                            01036 49 00565 00000
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00630 DKMES  DAC    21,ATTEMPT TO USE DISK',                            01049 00042
00640 TT1    DC     2,16    ,,,TABLE OF I10 MODE + DEVICE              01091 00002
00650        DC     2,36                                               01093 00002
00660        DC     2,56                                               01095 00002
00670        DC     2,17                                               01097 00002
00680        DC     2,37                                               01099 00002
00690        DC     2,57                                               01101 00002
00700 TT2    DC     2,18    ,,,OUTPUT                                  01103 00002
00710        DC     2,28                                               01105 00002
00720        DC     2,48                                               01107 00002
00730        DC     2,19                                               01109 00002
00740        DC     2,29                                               01111 00002
00750        DC     2,49                                               01113 00002
00760        DC     4,0098          ,,,PRINTER CONSTANTS               01117 00004
00770        DC     4,0099                                             01121 00004
00780        DC     4,1098                                             01125 00004
00790        DC     4,1099                                             01129 00004
00800 X01    TF     *+23,IORT,11    ,,,RECOVER DISCRIPTOR              01130 26 01153 00565
00810        TR     CNTWD,*-*                                          01142 31 01305 00000
00820        AM     IORT,1,10    ,,,CALCULATE RETURN                   01154 11 00565 00001
00830        BNF    DIO,CNTWD+5    ,,,CHECK FOR DKIO                   01166 44 00976 01310
00840        A      CFILE+11,CNTWD+6                                   01178 21 01201 01311
00850 DFILE  TF     IOP+10,*-*                                         01190 26 01272 00000
00860        TD     IOP+1, IOP+10                                      01202 25 01263 01272
00870        CM     CNTWD+6,12,10    ,,,CHECK FOR PRINTER              01214 14 01311 00012
00880        BNH    IOP                                                01226 47 01262 01100
00890        TFM    PRNIND,25,10    ,,,PRINT CHECK                     01238 16 00618 00025
00900        TD     IOP+11,IOP+7   ,,,SET Q11                          01250 25 01273 01269
00910 IOP    RN     CNTWD+4,*-*,6, I/O BUCKET                          01262 36 01309 00000
00920        TF     BKPT,IORT                                          01274 26 00467 00565
00930        BA     ERROR    ,,,ERROR CHECK                            01286 46 00624 01900
```

```
00940        B      IORT    ,,6                                        01298 49 00565 00000
00950        DORG   *-4                                                01305
00960 CNTWD  DS     1                                                  01305 00001
00970        DS     12                                                 01317 00012
00980******     LOADER
00990 LOADER RNCD   1       ,,,READ DLOAD CARD                         01318 36 00001 00500
01000        CM     6, 614,9    ,,,CHECK IT                            01330 14 00006 00614
01010        BE     OK                                                 01342 46 01378 01200
01020        H                                                         01354 48 00000 00000
01030        B      LOADER                                             01366 49 01318 00000
01040 OK     SF     39                                                 01378 32 00039 00000
01050        TF     HIGH,43    ,,MORE CORE ADDRESS                     01390 26 00434 00043
01060        SF     44                                                 01402 32 00044 00000
01070        TF     MONCAL+18,48,,MORE XEQ ADDRESS                     01414 26 00814 00048
01080        TFM    SEQ,1                                              01426 16 01850 00001
01090 READ   RNCD   -HIGH    ,,,READ PROGRAM                           01438 36 00434 00500
01100        TF     HIGH2,HIGH                                         01450 26 01485 00434
01110        AM     HIGH2,79,10                                        01462 11 01485 00079
01120        C      SEQ,*-*                                            01474 24 01850 00000
01130        BNE    SEQER    ,,,CHECK SEQUENCE                         01486 47 01738 01200
01140        TF     HIGH2,HIGH                                         01498 26 01485 00434
01150        AM     HIGH,75,10                                         01510 11 00434 00075
01160        AM     SEQ,1,10                                           01522 11 01850 00001
01170        TFM    BKPT,*+24                                          01534 16 00467 01558
01180        BA     ERROR    ,,,CHECK INDICATORS                       01546 46 00624 01900
01190        BNF    READ,-HIGH2                                        01558 44 01438 01485
01200        TD     -HIGH,RMARK                                        01570 25 00434 00619
01210        TR     1,-HIGH2    ,,,CHECK FOR TRAILER                   01582 31 00001 01485
01220 HIGH2  DS     ,READ+47                                           01485 00000
01230        BNR    READ,6                                             01594 45 01438 00006
01240        TF     76,-HIGH                                           01606 26 00076 00434
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01250          SF     76                                                    01618 32 00076 00000
01260          TFM    BD+11,7                                               01630 16 01653 00007
01270 BD       BD     READ,*-*                                              01642 43 01438 00000
01280          AM     BD+11,1,10                                            01654 11 01653 00001
01290          BNF    BD,BD+11,11                                           01666 44 01642 01653
01300          CM     BD+11,76                                              01678 14 01653 00076
01310          BNE    READ                                                  01690 47 01438 01200
01320          CM     5,99999                                               01702 14 00005 99999
01330          BNE    READ                                                  01714 47 01438 01200
01340          B      MONCAL +18,,6,EXECUTE                                 01726 49 00814 00000
01350 SEQER    RCTY                                                         01738 34 00000 00102
01360          WATY   MES1 ,,,                                              01750 39 01859 00100
01370          TFM    SEQ2,0                                                01762 16 01856 00000
01380          A      SEQ2,-HIGH2                                           01774 21 01856 01485
01390          WNTY   SEQ2-4                                                01786 38 01852 00100
01400          WATY   MES2                                                  01798 39 01901 00100
01410          WNTY   SEQ-4                                                 01810 38 01846 00100
01420          H                                                            01822 48 00000 00000
01430          B      READ                                                  01834 49 01438 00000
01440 SEQ      DC     5,0                                                   01850 00005
01450          DC     1,'                                                   01851 00001
01460 SEQ2     DC     5,0                                                   01856 00005
01470          DC     1,'                                                   01857 00001
01480 MES1     DAC    21,SEQUENCE ERROR, WAS ',                             01859 00042
01490 MES2     DAC    12, SHOULD BE ',                                      01901 00024
01500          DEND   LOADER                                                01318
```

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******      PUSH   FUNCTION
 ENTRY  BD     ER11,2295       ,,,ERROR IF SECOND ARGUMENT IS PRESENT       00000 43 12890 02295
        AM     2294,1,10                                                    00012 11 02294 00001
        TFM    COLDIF,-1,9                                                  00024 16 09395 00001
        B7    BNR                                                           00036 49 00092 00000
 LOOP   C      C23,-2294                                                    00044 24 07043 02294
        BE     OUT                                                          00056 46 00104 01200
        AM     COLDIF,2,10                                                  00068 11 09395 00002
        AM     2294,2,10       ,,,COLLECT NAME OF STRING                    00080 11 02294 00002
 BNR    BNR    LOOP,-2294                                                   00092 45 00044 02294
 OUT    BNF    *+20,COLDIF     ,,,DON'T WORK WITH A NULL NAME               00104 44 00124 09395
        B7     BYPASS                                                       00116 49 00252 00000
        TF     COLRET,2294                                                  00124 26 08593 02294
        SM     COLRET,2,10                                                  00136 12 08593 00002
        TF     BNR2+11,PAST                                                 00148 26 00251 03548
        B7     BNR2-12                                                      00160 49 00228 00000
 LOOK   C     COLDIF,-BNR2-11                                               00168 24 09395 00251
        BNE    BNR2-12         ,,,LOOK FOR STRINGS WITH THAT NAME           00180 47 00228 01200
        TF     2218+9,-BNR2-11                                              00192 26 02227 00251
        C      -2218-4,-COLRET                                              00204 24 02222 08593
        BE     FD                                                           00216 46 00304 01200
        AM     BNR2+11,10,10                                                00228 11 00251 00010
 BNR2   BNR    LOOK,*-*                                                     00240 45 00168 00000
 BYPASS BNR    *+32,-2294      ,,,TEST IF DONE                              00252 45 00284 02294
        TF     CURRT2,CLAST                                                 00264 26 06329 06045
        B7    LKEVAL+24                                                     00276 49 09242 00000
        AM     2294,2,10                                                    00284 11 02294 00002
        B7     ENTRY+24                                                     00296 49 00024 00000
 FD     SF     2218+5          ,,,FOUND A STRING                            00304 32 02223 00000
        BV     *                                                            00316 46 00316 01400
        AM     2218+6,1,10                                                  00328 11 02224 00001
        BV     ER11           ,,,ERROR IF MORE THAN 99 LEVALS OF RECURSION   00340 46 12890 01400
        CF     2218+5                                                        00352 33 02223 00000
        TF     -BNR2-11,2218+9                                               00364 26 00251 02227
        B7     BNR2-12        ,,,GO BACK TO SEE IF MORE HAS TO BE PUSHED     00376 49 00228 00000
        DEND   ENTRY                                                         00000
******     POP    FUNCTION
 ENTRY  BD     ER11,2295      ,,,ERROR IF SECOND ARGUMENT IS PRESENT         00000 43 12890 02295
        TFM    BR+6,LKEVAL+24,,,SET UP FOR SUCCESS EXIT                      00012 16 00294 09242
        AM     2294,1,10                                                     00024 11 02294 00001
        TFM    COLDIF,-1,9                                                   00036 16 09395 00001
        B7    BNR                                                            00048 49 00104 00000
 LOOP   C      C23,-2294                                                     00056 24 07043 02294
        BE     CUT                                                           00068 46 00116 01200
        AM     COLDIF,2,10                                                   00080 11 09395 00002
        AM     2294,2,10      ,,,COLLECT NAME OF STRING                      00092 11 02294 00002
 BNR    BNR    LOOP,-2294                                                    00104 45 00056 02294
 OUT    BNF    *+20,COLDIF    ,,,DON'T WORK WITH A NULL NAME                 00116 44 00136 09395
        B7     BYPASS                                                        00128 49 00264 00000
        TF     BNR2+11,PAST                                                  00136 26 00263 03548
        TF     COLRET,2294                                                   00148 26 08593 02294
        SM     COLRET,2,10                                                   00160 12 08593 00002
        B7     BNR2-12                                                       00172 49 00240 00000
 LOOK   C     CCLDIF,-BNR2-11                                                00180 24 09395 00263
        BNE    BNR2-12        ,,,LOOK FOR STRINGS WITH THAT NAME             00192 47 00240 01200
        TF     2218+9,-BNR2-11                                               00204 26 02227 00263
        C      -2218-4,-COLRET                                               00216 24 02222 08593
        BE     FD                                                            00228 46 00316 01200
        AM     BNR2+11,10,10                                                 00240 11 00263 00010
 BNR2   BNR    LOOK,*-*                                                      00252 45 00180 00000
 BYPASS BNR    ARN ,-2294     ,,,TEST IF DONE                                00264 45 00296 02294
        TF     CURRT2,CLAST                                                  00276 26 06329 06045
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 BR     B7     *-*            ,,,PRE SET BRANCH                              00288 49 00000 00000
 ARN    AM     2294,2,10                                                     00296 11 02294 00002
        B7     ENTRY+36                                                      00308 49 00036 00000
 FD     SF     2218+5         ,,,FOUND A STRING                              00316 32 02223 00000
        TFM    BR+6,FAILED    ,,,SET TO FAILURE EXIT                         00328 16 00294 07914
        SM     2218+6,1,10                                                   00340 12 02224 00001
        CF     2218+5                                                        00352 33 02223 00000
        TF     -BNR2-11,2218+9                                               00364 26 00263 02227
        BNF    BNR2-12,2218+6,,,TEST IF STRING POPPED OUT OF EXISTANCE       00376 44 00240 02224
        TF     LSTR,BNR2+11                                                  00388 26 08629 00263
        SM     LSTR,10,10                                                    00400 12 08629 00010
        TF     2218+19,-LSTR                                                 00412 26 02237 08629
        SF     2218+17                                                       00424 32 02235 00000
        S      2218+14,2218+19                                               00436 22 02232 02237
        TDM    DEFINE,0                                                      00448 15 08248 00000
        TD     TDM+11,-CLAST                                                 00460 25 00507 06045
        TD     -CURRNT,RMARK                                                 00472 25 03762 02925
        BTM    DELET,*+12                                                    00484 17 09682 00496
 TDM    TDM    -CLAST,*-*                                                    00496 15 06045 00000
        B7     BNR2-12                                                       00508 49 00240 00000
        DEND   ENTRY                                                         00000
******     .REMDR FUNCTION
 ENTRY  BD     *+20,2295      ,,,TEST IF SECOND ARGUMENT IS PRESENT          00000 43 00020 02295
        B7     ER11           ,,,NO - TYPE ERROR ER11                        00012 49 12890 00000
        TF     LKRET,2294     ,,,SET UP PARAMETERS FOR INT ROUTINE           00020 26 06281 02294
        TF     LSTR3,2299                                                    00032 26 02232 02299
        SM     LSTR3,2,10                                                    00044 12 02232 00002
        BTM    INT,*+12       ,,,EVALUATE INTERGER                           00056 17 07566 00068
        TF     10,INTRET                                                     00068 26 00010 17431
        TF     LKRET,2299     ,,,SET UP PARAMETERS FOR INT ROUTINE           00080 26 06281 02299
        TF     LSTR3,CURRT2                                                  00092 26 02232 06329
        SM     LSTR3,2,10                                                     00104 12 02232 00002
        BTM    INT,*+12        ,,,EVALUATE INTERGER                           00116 17 07566 00128
        BV     *               ,,,TURN OFF OVER FLOW                          00128 46 00128 01400
        LD     99,10                                                          00140 28 00099 00010
        D     90,INTRET                                                       00152 29 00090 17431
        BV     FAILED          ,,,FAILURE ON DIVISION BY ZERO                 00164 46 07914 01400
        TF     10,99                                                          00176 26 00010 00099
        TF     CURRT2,CLAST                                                   00188 26 06329 06045
        TFM    E+42,*+20                                                      00200 16 07560 00220
        B7     FINAR           ,,,CODE RESULT AS A STRING                     00212 49 07242 00000
        TFM    E+42,RET9-12                                                   00220 16 07560 05998
        B7     LKEVAL+24                                                      00232 49 09242 00000
        DEND   ENTRY                                                          00000
******       MODE   FUNCTION
 ENTRY  BD     ER11,2295       ,,,ERROR IF SECOND ARGUMENT IS PRESENT         00000 43 12890 02295
        TF     CURRT2,CLAST    ,,,INDICATE NULL RETURNING STRING              00012 26 06329 06045
        SF     -CLAST                                                         00024 32 06045 00000
        AM     2294,1,10                                                      00036 11 02294 00001
        BNR    *+20,-2294                                                     00048 45 00068 02294
        B7    ER11             ,,,EROR IF NO 1ST ARGUMENT                     00060 49 12890 00000
        CM     -2294,41,10     ,,,CHECK 1ST CHARATER OF ARGUMENT              00068 14 02294 00041
        BE     ANCHOR          ,,,BRANCH IF 'ANCHOR'                          00080 46 00172 01200
        CM     -2294,64,10                                                    00092 14 02294 00064
        BE     UNANCH          ,,,BRANCH IF 'UNANCHOR'                        00104 46 00192 01200
        CM     -2294,49,10                                                    00116 14 02294 00049
        BE     INTEGR          ,,,BRANCH IF 'INTERGER'                        00128 46 00212 01200
        CM     -2294,63,10                                                    00140 14 02294 00063
        BE     TRUNCT          ,,,BRANCH IF 'TRUNCATION'                      00152 46 00300 01200
        B7     E R11           ,,,ERROR OTHERWISE                             00164 49 12890 00000
 ANCHOR TFM    BRTAB3+20,BRA CHF                                              00172 16 16003 10794
        B7     LKEVAL+24       ,,,TAKE SUCCESS EXIT                           00184 49 09242 00000
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 UNANCH TFM    BRTAB3+20,A2                                                   00192 16 16003 16010
        B7     LKEVAL+24       ,,,TAKE SUCCESS EXIT                           00204 49 09242 00000
 INTEGR TFM    EXP2+5*12+6,FAILED,,GO INTO INTERGER MODE                      00212 16 07076 07914
        TDM    CIV2+3*12+1,9                                                  00224 15 07231 00009
        TFM    CIV2+3*12+6,*+20                                               00236 16 07236 00256
        B7     LKEVAL+24       ,,,TAKE SUCCESS EXIT                           00248 49 09242 00000
        BV     FAILED          ,,,PATCH TO DIVISION ROUTINE                   00256 46 07914 01400
        CM     99,0,10         ,,,MAKE SURE REMAINDER IS ZERO                 00268 14 00099 00000
        BNE    FAILED                                                         00280 47 07914 01200
        B7     FINAR                                                          00292 49 07242 00000
 TRUNCT TFM    EXP2+5*12+6,FINAR,,RETURN TO TRUNCATION MODE                   00300 16 07076 07242
        TDM    DIV2+3*12+1,6                                                  00312 15 07231 00006
        TFM    CIV2+3*12+6,FAILED                                             00324 16 07236 07914
        B7     LKEVAL+24       ,,,TAKE SUCCESS EXIT                           00336 49 09242 00000
        DEND   ENTRY                                                          00000
******       SIZE   FUNCTION
 ENTRY  BD     ER11,2295       ,,,ERROR IF SECOND ARGUMENT IS PRESENT         00000 43 12890 02295
        S      CURRT2,2294        ,,,CALCULATE SIZE OF STRING                 00012 22 06329 02294
        SM     CURRT2,2,10                                                    00024 12 06329 00002
        MM     CURRT2,5,10                                                    00036 13 06329 00005
        CF     93                                                             00048 33 00093 00000
        SF     89                                                             00060 32 00089 00000
        TF     10,98                                                          00072 26 00010 00098
        BV     *               ,,,TURN OFF OVER FLOW                          00084 46 00084 01400
        TF     CURRT2,CLAST                                                   00096 26 06329 06045
        TFM    E+42,*+20                                                      00108 16 07560 00128
        B7     FINAR           ,,,CODE RESULT AS A STRING                     00120 49 07242 00000
        TFM    E+42,RET9-12                                                   00128 16 07560 05998
        B7     LKEVAL+24                                                      00140 49 09242 00000
        DEND   ENTRY                                                          00000
******       TRIM   FUNCTION
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 ENTRY  BD    ER11,2295      ,,,ERROR IF SECOND ARGUMENT IS PRESENT      00000 43 12890 02295
        SM    CURRT2,3,10                                                00012 12 06329 00003
        C    CLAST,CURRT2                                                00024 24 06045 06329
        BH    CONE                                                       00036 46 00092 01100
        C     C00,-CURRT2    ,,,DROP TRAILING BLANKS                     00048 24 03135 06329
        BNE    DONE                                                      00060 47 00092 01200
        SM    CURRT2,2,10                                                00072 12 06329 00002
        B7    ENTRY+24                                                   00084 49 00024 00000
 DONE   AM    CURRT2,1,10                                                00092 11 06329 00001
        B7    LKEVAL+24      ,,,THIS FUNCTION CAN NOT FAIL               00104 49 09242 00000
        DEND  ENTRY                                                      00000
******     ANCHOR FUNCTION
 ENTRY  BD    ER11,2295      ,,,ERROR IF SECOND ARGUMENT IS PRESENT      00000 43 12890 02295
        TF    RSTR+11,BRTAB3+20                                          00012 26 00091 16003
        TFM   BRTAB3+20,BRACHF,,ANCHOR MODE FOR THIS STATEMENT ONLY      00024 16 16003 10794
        TF    RSTR+23,RETURN+6                                           00036 26 00103 10812
        TFM   RETURN+6,RSTR                                              00048 16 10812 00080
        TF    CURRT2,CLAST   ,,,INDICATE NULL RETURNING STRING           00060 26 06329 06045
        B7    LKEVAL+24      ,,,TAKE SUCCESS EXIT                        00072 49 09242 00000
 RSTR   TFM   BRTAB3+20,*-*                                              00080 16 16003 00000
        TFM   RETURN +6,*-*                                              00092 16 10812 00000
        B7    RETURN                                                     00104 49 10806 00000
        DEND  ENTRY                                                      00000
******     UNANCH FUNCTION
 ENTRY  BD    ER11,2295      ,,,ERROR IF SECOND ARGUMENT IS PRESENT      00000 43 12890 02295
        TF    RSTR+11,BRTAB3+20                                          00012 26 00091 16003
        TFM   BRTAB3+20,A2   ,,,UNANCHORED MODE FOR THIS STATEMENT ONLY  00024 16 16003 16010
        TF    RSTR+23,RETURN+6                                           00036 26 00103 10812
        TFM   RETURN+6,RSTR                                              00048 16 10812 00080
        TF    CURRT2,CLAST   ,,,INDICATE NULL RETURNING STRING           00060 26 06329 06045
        B7    LKEVAL+24      ,,,TAKE SUCCESS EXIT                        00072 49 09242 00000
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 RSTR   TFM   BRTAB3+20,*-*                                              00080 16 16003 00000
        TFM   RETURN +6,*-*                                              00092 16 10812 00000
        B7    RETURN                                                     00104 49 10806 00000
        DEND  ENTRY                                                      00000
******     EQUALS FUNCTION
 ENTRY  BD    *+20,2295      ,,,TEST IF SECOND ARGUMENT IS PRESENT       00000 43 00020 02295
        B7    ER11           ,,,NO - TYPE ERROR ER11                     00012 49 12890 00000
        S     2294,2299                                                  00020 22 02294 02299
        A     2294,CURRT2    ,,,CHECK IF STRING LENGTHS ARE EQUAL        00032 21 02294 06329
        S     2294,2299                                                  00044 22 02294 02299
        BNZ   FAILED         ,,,NO - TAKE FAILURE EXIT                   00056 47 07914 01200
        SF    -CLAST                                                     00068 32 06045 00000
        SM    2299,2,10                                                  00080 12 02299 00002
        SM    CURRT2,2,10                                                00092 12 06329 00002
        C     2299,CLAST     ,,,CHECK FOR A NULL STRING                  00104 24 02299 06045
        BNH    SUC                                                       00116 47 00152 01100
        C     -2299,-CURRT2  ,,,COMPARE STRING CONTENTS                  00128 24 02299 06329
        BNE   FAILED         ,,,FAILURE IF NOT EQUAL                     00140 47 07914 01200
 SUC    TF    CURRT2,CLAST   ,,,INDICATE NULL RETURNING STRING           00152 26 06329 06045
        B7    LKEVAL+24      ,,,TAKE SUCCESS EXIT                        00164 49 09242 00000
        DEND  ENTRY                                                      00000
******     UNECL  FUNCTION
 ENTRY  BD    *+20,2295      ,,,TEST IF SECOND ARGUMENT IS PRESENT       00000 43 00020 02295
        B7    ER11           ,,,NO - TYPE ERROR ER11                     00012 49 12890 00000
        TF    SVCUR,CURRT2   ,,,SAVE CURRT2 VALUE                        00020 26 00103 06329
        TF    CURRT2,CLAST   ,,,INDICATE NULL RETURNING STRING           00032 26 06329 06045
        S     2294,2299                                                  00044 22 02294 02299
        A     2294,SVCUR     ,,,CHECK IF STRING LENGTHS ARE EQUAL        00056 21 02294 00103
        S     2294,2299                                                  00068 22 02294 02299
        BNZ   LKEVAL+24      ,,,NO - TAKE SUCCESS EXIT                   00080 47 09242 01200
        SF    -CLAST                                                     00092 32 06045 00000
 SVCUR  DS     ,*                                                          00103 00000
        SM     2299,2,10                                                   00104 12 02299 00002
        SM     SVCUR,2,10                                                  00116 12 00103 00002
        C      2299,CLAST     ,,,CHECK FOR A NULL STRING                   00128 24 02299 06045
        BNH    FAILED                                                      00140 47 07914 01100
        C      -2299,-SVCUR   ,,,COMPARE STRING CONTENTS                   00152 24 02299 00103
        BNE    LKEVAL+24      ,,,FAILURE ON EQUALITY                       00164 47 09242 01200
        B7     FAILED                                                      00176 49 07914 00000
        DEND   FNTRY                                                       00000
******     .EQ    FUNCTION
 ENTRY  BD     *+20,2295      ,,,TEST IF SECOND ARGUMENT IS PRESENT        00000 43 00020 02295
        B7     ER11           ,,,NO - TYPE ERROR ER11                      00012 49 12890 00000
        TF     LKRET,2294     ,,,SET UP PARAMETERS FOR INT ROUTINE         00020 26 06281 02294
        TF     LSTR3,2299                                                  00032 26 02232 02299
        SM     LSTR3,2,10                                                  00044 12 02232 00002
        BTM    INT,*+12       ,,,EVALUATE INTERGER                         00056 17 07566 00068
        TF     99,INTRET                                                   00068 26 00099 17431
        TF     LKRET,2299     ,,,SET UP PARAMETERS FOR INT ROUTINE         00080 26 06281 02299
        TF     LSTR3,CURRT2                                                00092 26 02232 06329
        SM     LSTR3,2,10                                                  00104 12 02232 00002
        BTM    INT,*+12       ,,,EVALUATE INTERGER                         00116 17 07566 00128
        TF     CURRT2,CLAST   ,,,INDICATE NULL RETURNING STRING            00128 26 06329 06045
        C      99,INTRET      ,,,COMPARE THE TWO NUMBERS                   00140 24 00099 17431
        BE     LKEVAL+24      ,,,BRANCH IF THE CONDITION IS FULFILLED      00152 46 09242 01200
        B7     FAILED         ,,,OTHERWISE - FAILURE                       00164 49 07914 00000
        DEND   ENTRY                                                       00000
******     .NE    FUNCTION
 ENTRY  BD     *+20,2295      ,,,TEST IF SECOND ARGUMENT IS PRESENT        00000 43 00020 02295
        B7     ER11           ,,,NO - TYPE ERROR ER11                      00012 49 12890 00000
        TF     LKRET,2294     ,,,SET UP PARAMETERS FOR INT ROUTINE         00020 26 06281 02294
        TF     LSTR3,2299                                                  00032 26 02232 02299
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        SM     LSTR3,2,10                                                  00044 12 02232 00002
        BTM    INT,*+12       ,,,EVALUATE INTERGER                         00056 17 07566 00068
        TF     99,INTRET                                                   00068 26 00099 17431
        TF     LKRET,2299     ,,,SET UP PARAMETERS FOR INT ROUTINE         00080 26 06281 02299
        TF     LSTR3,CURRT2                                                00092 26 02232 06329
        SM     LSTR3,2,10                                                  00104 12 02232 00002
        BTM    INT,*+12       ,,,EVALUATE INTERGER                         00116 17 07566 00128
        TF     CURRT2,CLAST   ,,,INDICATE NULL RETURNING STRING            00128 26 06329 06045
        C      99,INTRET      ,,,COMPARE THE TWO NUMBERS                   00140 24 00099 17431
        BNE    LKEVAL+24      ,,,BRANCH IF THE CONDITION IS FULFILLED      00152 47 09242 01200
        B7     FAILED         ,,,OTHERWISE - FAILURE                       00164 49 07914 00000
        DEND   ENTRY                                                       00000
******     .LE    FUNCTION
 ENTRY  BD     *+20,2295      ,,,TEST IF SECOND ARGUMENT IS PRESENT        00000 43 00020 02295
        B7     ER11           ,,,NO - TYPE ERROR ER11                      00012 49 12890 00000
        TF     LKRET,2294     ,,,SET UP PARAMETERS FOR INT ROUTINE         00020 26 06281 02294
        TF     LSTR3,2299                                                  00032 26 02232 02299
        SM     LSTR3,2,10                                                  00044 12 02232 00002
        BTM    INT,*+12       ,,,EVALUATE INTERGER                         00056 17 07566 00068
        TF     99,INTRET                                                   00068 26 00099 17431
        TF     LKRET,2299     ,,,SET UP PARAMETERS FOR INT ROUTINE         00080 26 06281 02299
        TF     LSTR3,CURRT2                                                00092 26 02232 06329
        SM     LSTR3,2,10                                                  00104 12 02232 00002
        BTM    INT,*+12       ,,,EVALUATE INTERGER                         00116 17 07566 00128
        TF     CURRT2,CLAST   ,,,INDICATE NULL RETURNING STRING            00128 26 06329 06045
        C      99,INTRET      ,,,COMPARE THE TWO NUMBERS                   00140 24 00099 17431
        BNH    LKEVAL+24      ,,,BRANCH IF THE CONDITION IS FULFILLED      00152 47 09242 01100
        B7     FAILBD         ,,,OTHERWISE - FAILURE                       00164 49 07914 00000
        DEND   ENTRY                                                       00000
******     .LT    FUNCTION
 ENTRY  BD     *+20,2295      ,,,TEST IF SECOND ARGUMENT IS PRESENT        00000 43 00020 02295
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          B7    ER11          ,,,NO - TYPE ERROR ER11                       00012 49 12890 00000
          TF    LKRET,2294    ,,,SET UP PARAMETERS FOR INT ROUTINE          00020 26 06281 02294
          TF    LSTR3,2299                                                  00032 26 02232 02299
          SM    LSTR3,2,10                                                  00044 12 02232 00002
          BTM   INT,*+12      ,,,EVALUATE INTERGER                          00056 17 07566 00068
          TF    99,INTRET                                                   00068 26 00099 17431
          TF    LKRET,2299    ,,,SET UP PARAMETERS FOR INT ROUTINE          00080 26 06281 02299
          TF    LSTR3,CURRT2                                                00092 26 02232 06329
          SM    LSTR3,2,10                                                  00104 12 02232 00002
          BTM   INT,*+12      ,,,EVALUATE INTERGER                          00116 17 07566 00128
          TF    CURRT2,CLAST  ,,,INDICATE NULL RETURNING STRING             00128 26 06329 06045
          C     99,INTRET     ,,,COMPARE THE TWO NUMBERS                    00140 24 00099 17431
          BL    LKEVAL+24     ,,,BRANCH IF THE CONDITION IS FULFILLED       00152 47 09242 01300
          B7    FAILED        ,,,OTHERWISE - FAILURE                        00164 49 07914 00000
          DEND  ENTRY                                                       00000
******      .GE    FUNCTION
 ENTRY    BD    *+20,2295     ,,,TEST IF SECOND ARGUMENT IS PRESENT         00000 43 00020 02295
          B7    ER11          ,,,NO - TYPE ERROR ER11                       00012 49 12890 00000
          TF    LKRET,2294    ,,,SET UP PARAMETERS FOR INT ROUTINE          00020 26 06281 02294
          TF    LSTR3,2299                                                  00032 26 02232 02299
          SM    LSTR3,2,10                                                  00044 12 02232 00002
          BTM   INT,*+12      ,,,EVALUATE INTERGER                          00056 17 07566 00068
          TF    99,INTRET                                                   00068 26 00099 17431
          TF    LKRET,2299    ,,,SET UP PARAMETERS FOR INT ROUTINE          00080 26 06281 02299
          TF    LSTR3,CURRT2                                                00092 26 02232 06329
          SM    LSTR3,2,10                                                  00104 12 02232 00002
          BTM   INT,*+12      ,,,EVALUATE INTERGER                          00116 17 07566 00128
          TF    CURRT2,CLAST  ,,,INDICATE NULL RETURNING STRING             00128 26 06329 06045
          C     99,INTRET     ,,,COMPARE THE TWO NUMBERS                    00140 24 00099 17431
          BNL   LKEVAL+24     ,,,BRANCH IF THE CONDITION IS FULFILLED       00152 46 09242 01300
          B7    FAILED        ,,,OTHERWISE - FAILURE                        00164 49 07914 00000
```

```
          DEND  ENTRY                                                       00000
******      .GT    FUNCTION
 ENTRY    BD    *+20,2295     ,,,TEST IF SECOND ARGUMENT IS PRESENT         00000 43 00020 02295
          B7    ER11          ,,,NO - TYPE ERROR ER11                       00012 49 12890 00000
          TF    LKRET,2294    ,,,SET UP PARAMETERS FOR INT ROUTINE          00020 26 06281 02294
          TF    LSTR3,2299                                                  00032 26 02232 02299
          SM    LSTR3,2,10                                                  00044 12 02232 00002
          BTM   INT,*+12      ,,,EVALUATE INTERGER                          00056 17 07566 00068
          TF    99,INTRET                                                   00068 26 00099 17431
          TF    LKRET,2299    ,,,SET UP PARAMETERS FOR INT ROUTINE          00080 26 06281 02299
          TF    LSTR3,CURRT2                                                00092 26 02232 06329
          SM    LSTR3,2,10                                                  00104 12 02232 00002
          BTM   INT,*+12      ,,,EVALUATE INTERGER                          00116 17 07566 00128
          TF    CURRT2,CLAST  ,,,INDICATE NULL RETURNING STRING             00128 26 06329 06045
          C     99,INTRET     ,,,COMPARE THE TWO NUMBERS                    00140 24 00099 17431
          BH    LKEVAL+24     ,,,BRANCH IF THE CONDITION IS FULFILLED       00152 46 09242 01100
          B7    FAILED        ,,,OTHERWISE - FAILURE                        00164 49 07914 00000
          DEND  ENTRY                                                       00000
******      .NUM   FUNCTION
 ENTRY    BD    ER11,2295     ,,,ERROR IF SECOND ARGUMENT IS PRESENT        00000 43 12890 02295
          TF    LKRET,2294    ,,,SET UP PARAMETERS FOR INT ROUTINE          00012 26 06281 02294
          TF    LSTR3,CURRT2                                                00024 26 02232 06329
          SM    LSTR3,2,10                                                  00036 12 02232 00002
          BTM   INT,*+12      ,,,EVALUATE INTERGER                          00048 17 07566 00060
          TF    CURRT2,CLAST  ,,,INDICATE NULL RETURNING STRING             00060 26 06329 06045
          B7    LKEVAL+24     ,,,TAKE SUCCESS EXIT                          00072 49 09242 00000
          DEND  ENTRY                                                       00000
```