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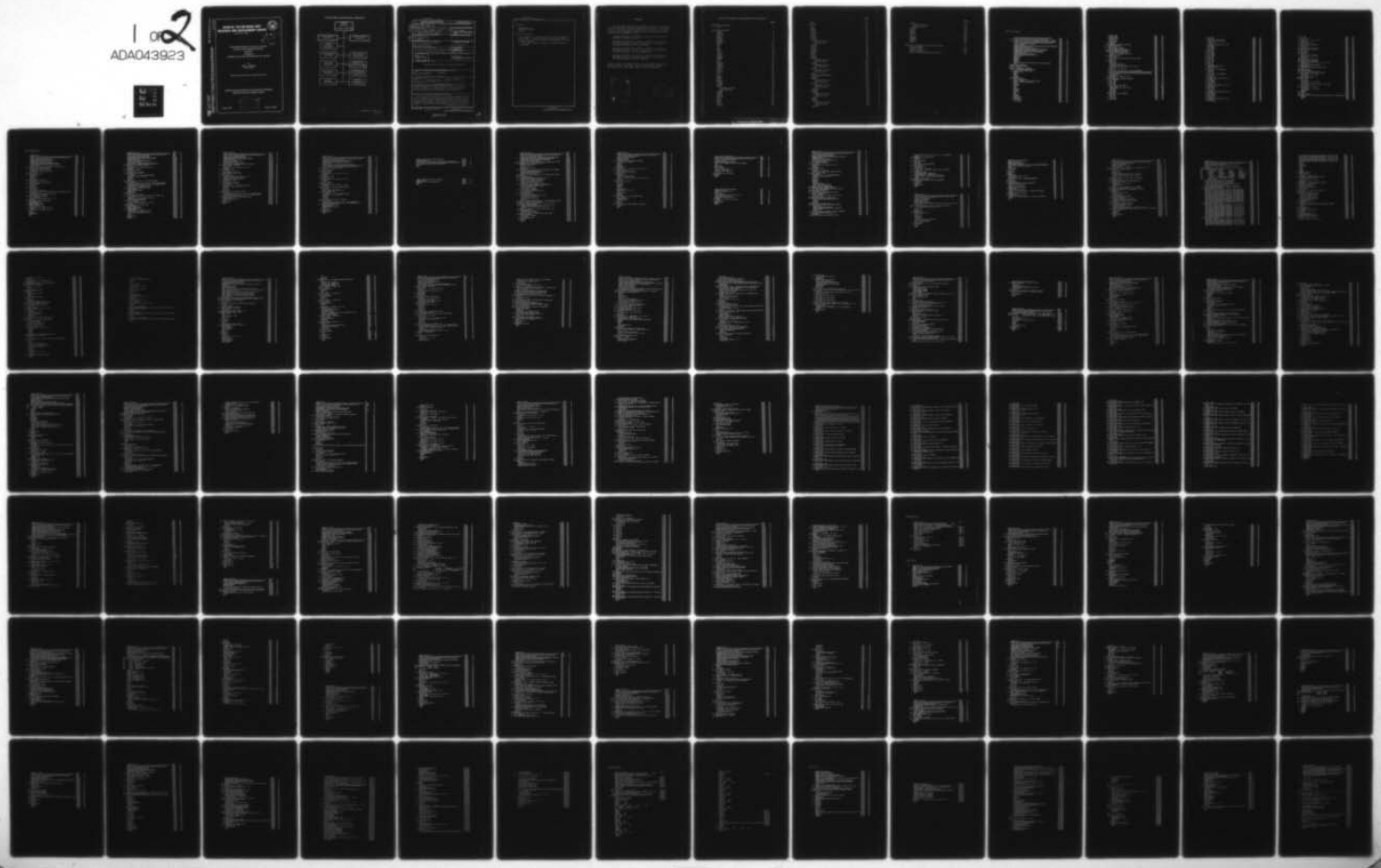

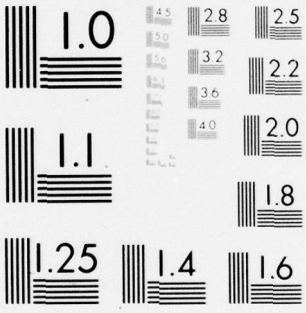

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DAVID W. TAYLOR NAVAL SHIP RESEARCH AND DEVELOPMENT CENTER

Bethesda, Md. 20084

MAINTENANCE MANUAL FOR AUDIT, A SYSTEM FOR ANALYZING SESCOMP SOFTWARE

VOLUME 2

APPENDIX B

LISTINGS OF THE AUDIT SOFTWARE FOR THE CDC 6000

by

Robert J. Wybraniec
Richard Regen

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RESEARCH AND DEVELOPMENT REPORT

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VOLUME 2 – APPENDIX B – LISTINGS OF THE AUDIT SOFTWARE FOR THE CDC 6000

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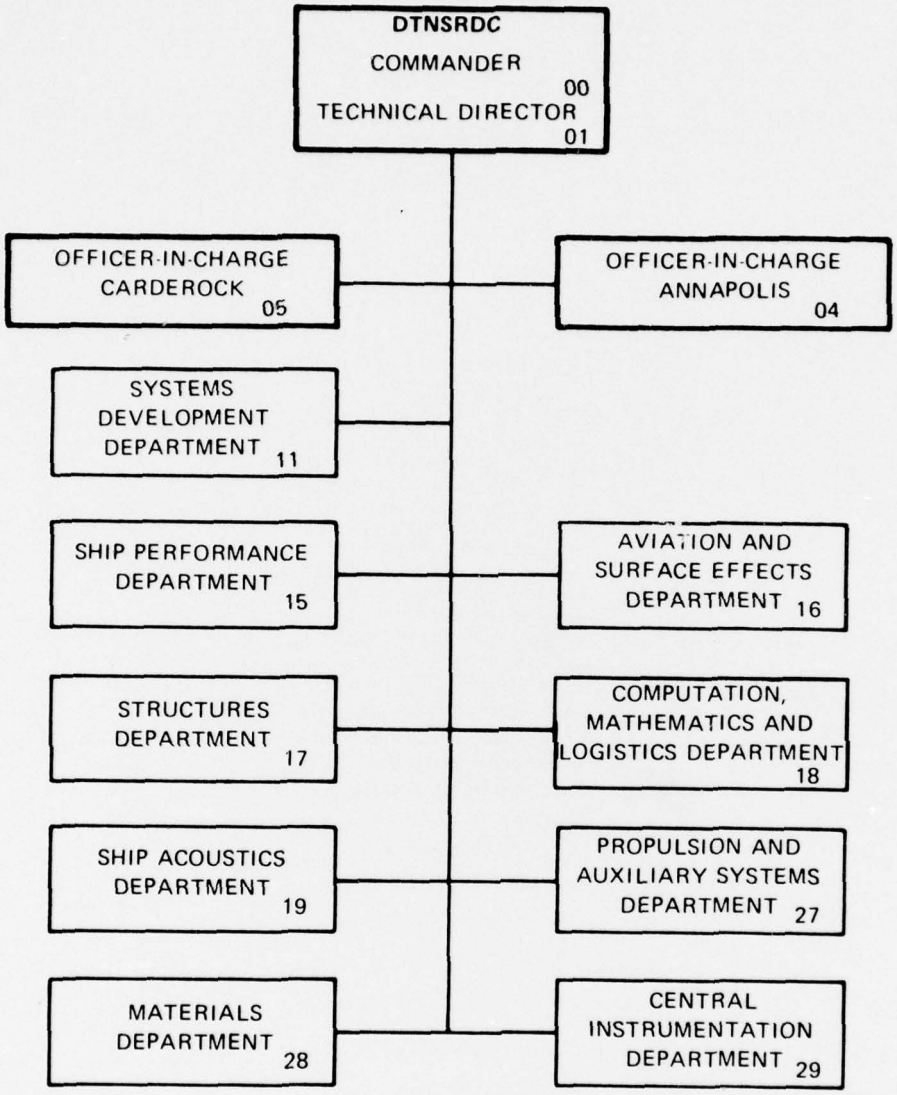

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The AUDIT documentation provides the maintenance programmer personnel with the information to effectively maintain and use the AUDIT software. The AUDIT software examines FORTRAN computer programs or modules developed under the sescomp system for compliance with certain prescribed standards (SESCOMPSPEC's) and produces reports detailing the deviations from those standards. The AUDIT software also examines a program unit to detect and

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SSH15001 and S0308001,
11837001

(Block 20 continued)

report improper use of undefined variables along the program unit's possible paths. In addition, AUDIT has an option which enables the user to test the effect of changes in word length on the output of computer programs.

This report contains the listings of the AUDIT software for the CDC 6000.

FOREWORD

The use and maintenance of AUDIT, a software system for analyzing SESCOMP contractor-supplied software, is documented as a set of four separately bound David W. Taylor Naval Ship Research and Development Center volumes sharing the common report number--DTNSRDC 77-0075:

- Maintenance Manual for AUDIT, a System for Analyzing SESCOMP Software, Volume 1
- Maintenance Manual for AUDIT, a System for Analyzing SESCOMP Software, Volume 2; Appendix B - Listings of the AUDIT Software for the CDC 6000
- Maintenance Manual for AUDIT, a System for Analyzing SESCOMP Software, Volume 3; Appendix C - Listings of the AUDIT Software for the UNIVAC 1108
- Maintenance Manual for AUDIT, a System for Analyzing SESCOMP Software, Volume 4; Appendix D - Listings of the AUDIT Software for the IBM 360

Volume 1 describes AUDIT and the use and maintenance of the AUDIT software. The other three volumes offer software listings for the CDC 6000, UNIVAC 1108, and IBM 360.

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INDEX TO PROGRAMS AND SUBPROGRAMS IN APPENDIX B

	Page
AUDIT Main Program	1
Main	1
AUDIT Subprograms	5
ARIF	5
ASGOTO	6
ASSIGN	7
AUXIO	8
BITGET	9
BITPUT	9
BLKSTR	10
BUILD	11
CAA	12
CAI	12
CALL	13
CALL2	14
CAR	15
CHKLST	16
CLASS	17
CMPARE	20
CNVRT	21
COM	23
COMCHK	25
COMEXT	28
COMSCH	29
CTGOTO	30
DATA	31
DESCRP	33
DIMEN	34
DO	36
EQUIV	38
ERROR	41
EXPR	47
EXPRCK	49
FLOWCK	50
FNCSTR	54
FORM	56
FORTRAN Version	56
GIRL Version	56
FORMEL	57
FRMAT	58
GENROL	60
GLOTAB	61
GNLE	62
GOTO	64
GROUP	65
GRT	66
IMPTYP	67

PRECEDING PAGE BLANK-NOT FILMED

	Page
INIT	68
INTRIN	70
IO	71
IOSTR	73
IPREV	74
ITYPE	74
LOGCHK	75
LOGIF	76
LOOPCK	77
LVDLET	78
LVEXIT	81
FORTRAN Version	81
GIRL Version	83
LVFECH	84
LVFIND	85
LVGRN	87
LVNSRT	88
LVSETP	94
MODID	95
NEXT	96
NXTBLK	96
PARSE	97
FORTRAN Version	97
GIRL Version	102
PHONEY	103
FORTRAN Version	103
GIRL Version	103
PRNTS	104
FORTRAN Version	104
GIRL Version	107
PROG	107
Q1COMP,Q1DPRE,Q1REAL	108
REALCK	114
RECOG	115
FORTRAN Version	115
GIRL Version	118
RECOV	119
FORTRAN Version	119
GIRL Version	121
ROLCHK	122
SEARCH	122
SEMANT	123
FORTRAN Version	123
GIRL Version	145
SEPAR	152
SIMP	153
SLEVEL	154
FORTRAN Version	154
GIRL Version	155
SQUEEZ	156

	Page
SSTOP	157
FORTRAN Version	157
GIRL Version	158
STATNO	159
STFNC	161
STORE	162
STSRCH	162
SUB	163
SUBCHK	165
SWITCH	167
SYMTAB	168
TYPE	170
Auxiliary Programs and Associated Data	172
Program GRAPH	172
Syntax Graph	172
Program SESLIST	178
Basic Interface Definition File	179

AUDIT Main Program

```
      PROGRAM MAIN(INPUT=65,OUTPUT=65,TAPE5=INPUT,TAPE6=OUTPUT,          MAIN      3
     * TAPE7=65,TAPE8=65,TAPE9=513,TAPE4=513,TAPE19=513)                 MAIN      4
C****IF UNIVAC 1108 - PLACE A "C" IN COLUMN 1 OF PREVIOUS TWO CARDS      MAIN      5
      COMMON A(1326),D(500),IDTBL(8,500),INITID(3),LASTID(3),ISRCH(3),   RICH      2
     * JPTR,N,M,JTYP,LSTART,N2,IFNCNM,LOGID,NXTID,IDTYP,NID,LOC,         CY58A    80
     2 LTYP,ITYP,IBLKDT,MODE,IERR,IDES                                   RICH      4
      DIMENSION IORD(15)                                                 MAIN      7
      COMMON/GLOBAL/NBLK,NREF,NSUBS,BLKTBL(200),EXTTBL(100),ISUBS(100)   MAIN      8
      COMMON/INPOUT/NCALL,IN,IOP                                         MAIN      9
      COMMON/LABELS/STATRA(2,200),NLABEL                                 MAIN     10
      COMMON/LIST/NLIST,NINTFC,ISUBLT(2,200),INTFAC(300)                 MAIN     11
      COMMON/DOLOOP/ISTACK(4,50),NSTACK,ILOOP,IOVFLW                     MAIN     12
      COMMON/BASBLK/IBLOCK(2500),NBLOCK,NB,NBRNCH                        CY58A     1
      COMMON/FLOW/IFL,IRP                                                MAIN     14
      COMMON/STFUNC/NSTFNC,ISTFNC(10)                                    MAIN     15
      INTEGER A,BLANK,STATRA,BLKTBL,EXTTBL                               MAIN     16
      DATA BLANK/1H /                                                    MAIN     17
      REWIND 4                                                           MAIN     18
      REWIND 19                                                          MAIN     19
      REWIND 7                                                           MAIN     20
      REWIND 8                                                           MAIN     21
      REWIND 9                                                           MAIN     22
      DATA IORD/29,30,31,32,25,26,19,20,21,22,23,24,26,27,35/            MAIN     23
      IOP=8                                                              MAIN     24
C**READ INPUT PARAMETERS                                                 MAIN     25
C**MODE - MODE OF OPERATION                                              MAIN     26
C**IN - INPUT FILE                                                       MAIN     27
C**IFL - FLOW ANALYSIS PARAMETER                                         MAIN     28
C**INTR - INTRINSIC FUNCTION PARAMETER                                   MAIN     29
      READ(5,12) MODE,IN,IFL,INTR                                        MAIN     30
   12 FORMAT(I1,3I4)                                                     MAIN     31
      NCALL=0                                                            MAIN     32
      NREF=0                                                             MAIN     33
      NBLK=0                                                             MAIN     34
      NSUBS=0                                                            MAIN     35
      IRP=IFL-1                                                          MAIN     36
C** READ SESCOMP LIST                                                    MAIN     37
      READ(4) NLIST,NINTFC                                               MAIN     38
      READ(4) ((ISUBLT(I,J),I=1,2),J=1,NLIST)                            MAIN     39
      READ(4) (INTFAC(I),I=1,NINTFC)                                     MAIN     40
    4 ISTAT=0                                                            MAIN     41
      IOVFLW=0                                                           MAIN     42
      NLABEL=0                                                           MAIN     43
      NID=0                                                              MAIN     44
      JJ=0                                                               MAIN     45
      IBLKDT=0                                                           MAIN     46
      NSTACK=0                                                           MAIN     47
      NBLOCK=0                                                           MAIN     48
      ILOOP=0                                                            MAIN     49
      NB=0                                                               MAIN     50
      IBLKST=0                                                           MAIN     51
      NSTFNC=0                                                           MAIN     52
      WRITE(6,13)                                                        MAIN     53
   13 FORMAT(1H1)                                                        MAIN     54
      IFNCNM=BLANK                                                       MAIN     55
      DO 2 I=1,8                                                         MAIN     56
      DO 2 J=1,500                                                       MAIN     57
```

```
    2 IOTBL(I,J)=0                                                      MAIN      58
      DO 3 I=1,200                                                      MAIN      59
      STATRA(1,I)=0                                                     MAIN      60
    3 STATRA(2,I)=0                                                     MAIN      61
      DO 5 I=1,3                                                        MAIN      62
      INITID(I)=0                                                       MAIN      63
    5 LASTID(I)=0                                                       MAIN      64
  700 CONTINUE                                                          MAIN      65
      IF(NBLOCK .GT. 2500) GO TO 7000                                   MAIN      66
C** READ NEXT STATEMENT                                                 MAIN      67
      CALL BUILD                                                        MAIN      68
C** WRITE OUT NEXT STATEMENT                                             MAIN      69
      WRITE(6,1000) (A(I),I=1,N)                                        MAIN      70
 1000 FORMAT(//6X,100A1,13(/6X,100A1))                                  MAIN      71
C** SKIP IF COMMENT OR BLANK CARD                                        MAIN      72
      IF(A(1) .EQ. 1HC) GO TO 700                                       MAIN      73
      IF(NEXT(1) .EQ. BLANK) GO TO 700                                  MAIN      74
      JJ=JJ+1                                                           MAIN      75
C** CLASSIFY STATEMENT                                                  MAIN      76
      CALL CLASS                                                        MAIN      77
      IF(ITYP .GT. 18 .AND. ITYP .NE. 28) GO TO 1320                    MAIN      78
      CALL STATNO                                                       MAIN      79
 1320 JPTR=7                                                            MAIN      80
      IPREC=ISTAT                                                       MAIN      81
      ISTAT=ITYP                                                        MAIN      82
      IF(JJ .EQ. 1) GO TO 7                                             MAIN      83
      IF(IBLKDT .EQ. 0) GO TO 6                                         MAIN      84
      IF(ITYP .GE. 18 .AND. ITYP .LE. 27) GO TO 8                       MAIN      85
      GO TO 220                                                         MAIN      86
    6 IF(LTYP .EQ. 9) GO TO 120                                         MAIN      87
      GO TO 8                                                           MAIN      88
    7 IF(ITYP .LT. 29 .OR. ITYP .GT. 32) CALL ERROR(2)                  MAIN      89
    8 GO TO (60,70,80,90,100,110,20,140,20,20,40,40,50,50,50,120,130,   MAIN      90
     1 2000,10,10,10,10,10,170,180,190,200,210,150,30,30,160,220,220,   MAIN      91
     2 220,220),ITYP                                                    MAIN      92
   10 DO 15 I=1,11                                                      MAIN      93
      IF(IPREC .EQ. IORD(I)) GO TO 17                                   MAIN      94
   15 CONTINUE                                                          MAIN      95
C** GO TO APPROPRIATE STATEMENT PROCESSOR                               MAIN      96
      CALL ERROR(2)                                                     MAIN      97
   17 CALL TYPE                                                         MAIN      98
      GO TO 500                                                         MAIN      99
   20 CALL SIMP                                                         MAIN     100
      GO TO 500                                                         MAIN     101
   30 IF(JJ .NE. 1) CALL ERROR(2)                                       MAIN     102
      DO 35 I=1,20                                                      MAIN     103
      IF(NEXT(JPTR) .NE. 1HF) GO TO 35                                  MAIN     104
      JPTR=JPTR-1                                                       MAIN     105
      CALL SUB                                                          MAIN     106
      GO TO 500                                                         MAIN     107
   35 CONTINUE                                                          MAIN     108
   38 IF(JJ .NE. 1) CALL ERROR(2)                                       MAIN     109
      CALL SUB                                                          MAIN     110
      GO TO 500                                                         MAIN     111
   40 CALL IO                                                           MAIN     112
      GO TO 500                                                         MAIN     113
   50 CALL AUXIO                                                        MAIN     114
```

```
      GO TO 500                                                         MAIN      115
   60 CALL INIT                                                         MAIN      116
      WRITE(6,66) (A(I),I=1,N)                                          MAIN      117
      IF(ITYP .NE. 35) GO TO 500                                        MAIN      118
      ISTAT=35                                                          MAIN      119
      DO 67 I=1,15                                                      MAIN      120
      IF(IPREC .EQ. IORD(I)) GO TO 500                                  MAIN      121
   67 CONTINUE                                                          MAIN      122
      CALL ERROR(2)                                                     MAIN      123
      GO TO 500                                                         MAIN      124
   70 CALL ASSIGN                                                       MAIN      125
      GO TO 500                                                         MAIN      126
   80 CALL GOTO                                                         MAIN      127
      GO TO 500                                                         MAIN      128
   90 CALL ASGOTO                                                       MAIN      129
      GO TO 500                                                         MAIN      130
  100 CALL CTGOTO                                                       MAIN      131
      GO TO 500                                                         MAIN      132
  110 CALL ARIF                                                         MAIN      133
      GO TO 500                                                         MAIN      134
  120 CALL LOGIF                                                        MAIN      135
      GO TO 500                                                         MAIN      136
  130 CALL DO                                                           MAIN      137
      GO TO 500                                                         MAIN      138
  140 CALL CALL                                                         MAIN      139
      WRITE(6,66) (A(I),I=1,N)                                          MAIN      140
   66 FORMAT(6X,72A1)                                                   MAIN      141
      GO TO 500                                                         MAIN      142
  150 IF(JJ .NE. 1) CALL ERROR(2)                                       MAIN      143
      IBLKDT=1                                                          MAIN      144
      CALL SIMP                                                         MAIN      145
      GO TO 500                                                         MAIN      146
  160 IF(JJ .NE. 1) CALL ERROR(2)                                       MAIN      147
      CALL PROG                                                         MAIN      148
      GO TO 500                                                         MAIN      149
  170 DO 175 I=1,12                                                     MAIN      150
      IF(IPREC .EQ. IORD(I)) GO TO 177                                  MAIN      151
  175 CONTINUE                                                          MAIN      152
      CALL ERROR(2)                                                     MAIN      153
  177 CALL DIMEN                                                        MAIN      154
      GO TO 500                                                         MAIN      155
  180 DO 185 I=1,5                                                      MAIN      156
      IF(IPREC .EQ. IORD(I)) GO TO 187                                  MAIN      157
  185 CONTINUE                                                          MAIN      158
      CALL ERROR(2)                                                     MAIN      159
  187 CALL COM                                                          MAIN      160
      GO TO 500                                                         MAIN      161
  190 DO 195 I=1,13                                                     MAIN      162
      IF(IPREC .EQ. IORD(I)) GO TO 197                                  MAIN      163
  195 CONTINUE                                                          MAIN      164
      CALL ERROR(2)                                                     MAIN      165
  197 CALL EQUIV                                                        MAIN      166
      GO TO 500                                                         MAIN      167
  200 DO 205 I=1,14                                                     MAIN      168
      IF(IPREC .EQ. IORD(I)) GO TO 207                                  MAIN      169
  205 CONTINUE                                                          MAIN      170
      CALL ERROR(2)                                                     MAIN      171
```

```
  207 CALL DATA                                                         MAIN      172
      GO TO 500                                                         MAIN      173
  210 DO 215 I=1,6                                                      MAIN      174
      IF(IPREC .EQ. IORD(I)) GO TO 217                                  MAIN      175
  215 CONTINUE                                                          MAIN      176
      CALL ERROR(2)                                                     MAIN      177
  217 IF(N .GT. 72) GO TO 240                                           MAIN      178
      WRITE(IOP,218) (A(I),I=1,N)                                       MAIN      179
  218 FORMAT(72A1)                                                      MAIN      180
      GO TO 250                                                         MAIN      181
  240 WRITE(IOP,245) (A(I),I=1,N)                                       MAIN      182
  245 FORMAT(72A1/(5X,1H*,66A1))                                        MAIN      183
  250 CALL FRMAT                                                        MAIN      184
      GO TO 700                                                         MAIN      185
  220 CALL ERROR(1)                                                     MAIN      186
  500 CONTINUE                                                          MAIN      187
      IF(N .GT. 72) GO TO 540                                           MAIN      188
      WRITE(IOP,520) (A(I),I=1,N)                                       MAIN      189
  520 FORMAT(72A1)                                                      MAIN      190
      GO TO 600                                                         MAIN      191
  540 WRITE(IOP,545) (A(I),I=1,N)                                       MAIN      192
  545 FORMAT(72A1/(5X,1H*,66A1))                                        MAIN      193
  600 IF(MODE .NE. 1) GO TO 700                                         MAIN      194
      IF(ITYP .LT. 30 .OR. ITYP .GT. 32) GO TO 700                      MAIN      195
      WRITE(IOP,610)                                                    MAIN      196
  610 FORMAT(5X,15H COMPLEX Q1COMP)                                     MAIN      197
      WRITE(IOP,620)                                                    MAIN      198
  620 FORMAT(5X,24H DOUBLE PRECISION Q1DPRE)                            MAIN      199
      GO TO 700                                                         MAIN      200
 2000 WRITE(IOP,2020)                                                   MAIN      201
 2020 FORMAT(6X,3HEND)                                                  MAIN      202
      IF(N .NE. 72) WRITE(6,2100)                                       MAIN      203
 2100 FORMAT(6X,22H ILLEGAL END STATEMENT)                              MAIN      204
      CALL SUBCHK                                                       MAIN      205
      IF(INTR .NE. 1) GO TO 3205                                        MAIN      206
      CALL INTRIN                                                       MAIN      207
C** DISPLAY SYMBOL TABLE                                                MAIN      208
 3205 CALL SYMTAB                                                       MAIN      209
      CALL GRT                                                          MAIN      210
      CALL COMCHK                                                       MAIN      211
      IF(IOVFLW .EQ. 1) GO TO 3210                                      MAIN      212
      CALL LOOPCK                                                       MAIN      213
      IF(IFL .EQ. 0 .OR. IBLKDT .EQ. 1) GO TO 3210                      MAIN      214
      CALL FLOWCK                                                       MAIN      215
 3210 IF(IERR .NE. 2) GO TO 4                                           MAIN      216
      CALL GLOTAB                                                       MAIN      217
      IF(MODE .EQ. 1) GO TO 6000                                        MAIN      218
      CALL GENROL                                                       MAIN      219
      REWIND 9                                                          MAIN      220
 6000 REWIND 8                                                          MAIN      221
      STOP                                                              MAIN      222
 7000 WRITE(6,7005)                                                     MAIN      223
 7005 FORMAT(/////5X,54H OVERFLOW OF BASIC BLOCK TABLE - PROCESSING TERM MAIN      224
     *INATED)                                                           MAIN      225
      STOP                                                              MAIN      226
      END                                                               MAIN      227
```

AUDIT Subprograms

```
      SUBROUTINE ARIF                                                   ARIF      2
      COMMON A(1326),D(500),IDTBL(8,500),INITID(3),LASTID(3),ISRCH(3),  RICH      2
     * JPTR,N,M,JTYP,LSTART,N2,IFNCNM,LOGID,NXTID,IDTYP,NID,LOC,        CY58A    80
     2 LTYP,ITYP,IBLKDT,MODE,IERR,IDES                                  RICH      4
      COMMON/TYP/NQQ,RHSTYP,NQ2,NQ3,LHSTYP                              ARIF      4
      COMMON/STRING/NTYPE,NSTR,STR(500)                                 ARIF      5
      COMMON/LABELS/STATRA(2,200),NLABEL                                ARIF      6
      COMMON/BASBLK/IBLOCK(2500),NBLOCK,NB,NBRNCH                       CY58A    32
      INTEGER A,STATRA,STR,COMMA,BLANK,RHSTYP,AY,EF                     ARIF      8
      INTEGER BITPUT                                                    ARIF      9
      DATA LPAR/1H(/,COMMA/1H,/,BLANK/1H /,AY/1HI/,EF/1HF/              ARIF     10
C** ARITHMETIC IF STATEMENT PROCESSOR                                   ARIF     11
      IF(NEXT(JPTR) .NE. AY) GO TO 20                                   ARIF     12
      IF(NEXT(JPTR) .NE. EF) GO TO 20                                   ARIF     13
      IF(NEXT(JPTR) .NE. LPAR) GO TO 20                                 ARIF     14
      JPTR=JPTR-1                                                       ARIF     15
C** PARSE THE EXPRESSION                                                ARIF     16
      CALL EXPR                                                         ARIF     17
      NSTR=NSTR+1                                                       ARIF     18
      STR(NSTR)= -5                                                     ARIF     19
      NTYPE=1                                                           ARIF     20
      CALL PARSE                                                        ARIF     21
C** PROCESS FUNCTION REFERENCES                                         ARIF     22
      CALL FNCSTR                                                       ARIF     23
      IF(RHSTYP .EQ. 1) CALL ERROR(42)                                  ARIF     24
C** STORE BASIC BLOCKS                                                  ARIF     25
      CALL BLKSTR                                                       ARIF     26
      NBRNCH=0                                                          ARIF     27
      DO 10 I=1,3                                                       ARIF     28
C** GET NEXT BRANCH                                                     ARIF     29
      CALL GNLE                                                         ARIF     30
      IF(JTYP .NE. 5) GO TO 20                                          ARIF     31
C** GET STATEMENT NUMBER TABLE LOCATION AND SET "REFERENCED" FLAG       ARIF     32
      CALL STSRCH                                                       ARIF     33
      STATRA(2,LOC)=BITPUT(STATRA(2,LOC),1,12)                          ARIF     34
      IF( NBRNCH .EQ. 0) GO TO 5                                        ARIF     35
C** CHECK FOR DUPLICATE BRANCHES                                        ARIF     36
      DO 3 J=1,NBRNCH                                                   ARIF     37
      IF(LOC .EQ. IBLOCK(NBLOCK-J+1)) GO TO 7                           ARIF     38
    3 CONTINUE                                                          ARIF     39
C** STORE BRANCH IN BASIC BLOCK TABLE                                   ARIF     40
    5 NBLOCK=NBLOCK+1                                                   ARIF     41
      IBLOCK(NBLOCK)=LOC                                                ARIF     42
C** INCREMENT BRANCH COUNTER                                            ARIF     43
      NBRNCH=NBRNCH+1                                                   ARIF     44
    7 IF(I .EQ. 3) GO TO 10                                             ARIF     45
      IF(NEXT(JPTR) .NE. COMMA) GO TO 20                                ARIF     46
   10 CONTINUE                                                          ARIF     47
      IF(NEXT(JPTR) .NE. BLANK) GO TO 20                                ARIF     48
      NB=1                                                              ARIF     49
      RETURN                                                            ARIF     50
   20 CALL ERROR(7)                                                     ARIF     51
      RETURN                                                            ARIF     52
      END                                                               ARIF     53
```

```
      SUBROUTINE ASGOTO                                                 ASGOTO     2
      COMMON A(1326),D(500),IDTBL(8,500),INITID(3),LASTID(3),ISRCH(3),  RICH       2
     * JPTR,N,M,JTYP,LSTART,N2,IFNCNM,LOGID,NXTID,IDTYP,NID,LOC,        CY58A     80
     2 LTYP,ITYP,IBLKDT,MODE,IERR,IDES                                  RICH       4
      COMMON/LABELS/STATRA(2,200),NLABEL                                ASGOTO     4
      COMMON/BASBLK/IBLOCK(2500),NBLOCK,NB,NBRNCH                       CY58A     29
      DIMENSION IALPH(4)                                                ASGOTO     6
      INTEGER STATRA,BLANK,COMMA,RPAR,A                                 ASGOTO     7
      INTEGER BITPUT,BITGET                                             ASGOTO     8
      DATA (IALPH(I),I=1,4)/1HG,1HO,1HT,1HO/                            ASGOTO     9
      DATA BLANK/1H /,COMMA/1H,/,LPAR/1H(/,RPAR/1H)/                    ASGOTO    10
C** ASSIGNED GO TO STATEMENT PROCESSOR                                  ASGOTO    11
      DO 5 I=1,4                                                        ASGOTO    12
      IF(NEXT(JPTR) .NE. IALPH(I)) GO TO 30                             ASGOTO    13
    5 CONTINUE                                                          ASGOTO    14
C** GET VARIABLE REFERENCE                                              ASGOTO    15
      CALL GNLE                                                         ASGOTO    16
      IF(JTYP .NE. 2) GO TO 30                                          ASGOTO    17
C** GET SYMBOL TABLE LOCATION                                           ASGOTO    18
      CALL SEARCH                                                       ASGOTO    19
      IF(ISRCH(2) .EQ. 1) CALL ERROR(10,NXTID)                          ASGOTO    20
      IF(ISRCH(1) .EQ. 1) GO TO 10                                      ASGOTO    21
      IDTYP=1                                                           ASGOTO    22
      CALL STORE                                                        ASGOTO    23
      LOC=NID                                                           ASGOTO    24
C** GET TYPE AND CHECK THAT IT IS INTEGER VARIABLE                      ASGOTO    25
   10 CALL IMPTYP                                                       ASGOTO    26
      IF(BITGET(IDTBL(3,LOC),10,3) .NE. 4) CALL ERROR(39,NXTID)         ASGOTO    27
      IF(BITGET(IDTBL(3,LOC),1,1) .EQ. 1) CALL ERROR(14,NXTID)          ASGOTO    28
      IF(NEXT(JPTR) .NE. COMMA) GO TO 30                                ASGOTO    29
      IF(NEXT(JPTR) .NE. LPAR) GO TO 30                                 ASGOTO    30
C** STORE REFERENCE IN BASIC BLOCK TABLE                                ASGOTO    31
      NBLOCK=NBLOCK+1                                                   ASGOTO    32
      IBLOCK(NBLOCK)=5000+LOC                                           ASGOTO    33
      NBRNCH=0                                                          ASGOTO    34
C** GET NEXT BRANCH                                                     ASGOTO    35
   20 CALL GNLE                                                         ASGOTO    36
      IF(JTYP .NE. 5) GO TO 30                                          ASGOTO    37
C** GET STATEMENT NUMBER TABLE LOCATION AND SET "GOTO" FLAG             ASGOTO    38
      CALL STSRCH                                                       ASGOTO    39
      STATRA(2,LOC)=BITPUT(STATRA(2,LOC),1,12)                          ASGOTO    40
      IF(NBRNCH .EQ. 0) GO TO 25                                        ASGOTO    41
C** CHECK FOR DUPLICATE BRANCHES                                        ASGOTO    42
      DO 22 I=1,NBRNCH                                                  ASGOTO    43
      IF(LOC .EQ. IBLOCK(NBLOCK-I+1)) GO TO 27                          ASGOTO    44
   22 CONTINUE                                                          ASGOTO    45
C** STORE BRANCH IN BASIC BLOCK TABLE                                   ASGOTO    46
   25 NBLOCK=NBLOCK+1                                                   ASGOTO    47
      IBLOCK(NBLOCK)=LOC                                                ASGOTO    48
C** INCREMENT BRANCH COUNTER                                            ASGOTO    49
      NBRNCH=NBRNCH+1                                                   ASGOTO    50
   27 IF(NEXT(JPTR) .EQ. COMMA) GO TO 20                                ASGOTO    51
      IF(A(JPTR-1) .NE. RPAR) GO TO 30                                  ASGOTO    52
      IF(NEXT(JPTR) .NE. BLANK) GO TO 30                                ASGOTO    53
      NB=1                                                              ASGOTO    54
      RETURN                                                            ASGOTO    55
   30 CALL ERROR(7)                                                     ASGOTO    56
      RETURN                                                            ASGOTO    57
      END                                                               ASGOTO    58
```

```
      SUBROUTINE ASSIGN                                                 ASSIGN     2
      COMMON A(1326),D(500),IDTBL(8,500),INITID(3),LASTID(3),ISRCH(3),  RICH       2
     * JPTR,N,M,JTYP,LSTART,N2,IFNCNM,LOGID,NXTID,IDTYP,NID,LOC,        CY58A     80
     2 LTYP,ITYP,IBLKDT,MODE,IERR,IDES                                  RICH       4
      COMMON/LABELS/STATRA(2,200),NLABEL                                ASSIGN     4
      COMMON/BASBLK/IBLOCK(2500),NBLOCK,NB,NBRNCH                       CY58A     30
      DIMENSION IALPH(6)                                                ASSIGN     6
      INTEGER BLANK,TEE,OH,STATRA                                       ASSIGN     7
      INTEGER BITPUT,BITGET                                             ASSIGN     8
      DATA BLANK/1H /,TEE/1HT/,OH/1HO/                                  ASSIGN     9
      DATA (IALPH(I),I=1,6)/1HA,1HS,1HS,1HI,1HG,1HN/                    ASSIGN    10
C** ASSIGN STATEMENT PROCESSOR                                          ASSIGN    11
      DO 5 I=1,6                                                        ASSIGN    12
      IF(NEXT(JPTR) .NE. IALPH(I)) GO TO 20                             ASSIGN    13
    5 CONTINUE                                                          ASSIGN    14
C** GET STATEMENT LABEL                                                 ASSIGN    15
      CALL GNLE                                                         ASSIGN    16
      IF(JTYP .NE. 5) GO TO 20                                          ASSIGN    17
C** SEARCH STATEMENT NUMBER TABLE                                       ASSIGN    18
      CALL STSRCH                                                       ASSIGN    19
C** SET "ASSIGN" FLAG                                                   ASSIGN    20
      STATRA(2,LOC)=BITPUT(STATRA(2,LOC),1,12)                          ASSIGN    21
      IF(NEXT(JPTR) .NE. TEE) GOTO 20                                   ASSIGN    22
      IF(NEXT(JPTR) .NE. OH) GO TO 20                                   ASSIGN    23
C** GET VARIABLE REFERENCE                                              ASSIGN    24
      CALL GNLE                                                         ASSIGN    25
      IF(JTYP .NE. 2) GO TO 20                                          ASSIGN    26
C** GET SYMBOL TABLE LOCATION                                           ASSIGN    27
      CALL SEARCH                                                       ASSIGN    28
      IF(ISRCH(2) .EQ. 1) CALL ERROR(10,NXTID)                          ASSIGN    29
      IF(ISRCH(1) .EQ. 1) GO TO 10                                      ASSIGN    30
      IDTYP=1                                                           ASSIGN    31
      CALL STORE                                                        ASSIGN    32
      LOC=NID                                                           ASSIGN    33
C** CHECK THAT IT IS AN INTEGER VARIABLE                                ASSIGN    34
   10 CALL IMPTYP                                                       ASSIGN    35
      IF(BITGET(IDTBL(3,LOC),10,3) .NE. 4) CALL ERROR(39,NXTID)         ASSIGN    36
      IF(BITGET(IDTBL(3,LOC),1,1) .EQ. 1) CALL ERROR(14,NXTID)          ASSIGN    37
      IF(NEXT(JPTR) .NE. BLANK) GO TO 20                                ASSIGN    38
C** STORE ASSIGNED VARIABLE IN BASIC BLOCK TABLE                        ASSIGN    39
      NBLOCK=NBLOCK+1                                                   ASSIGN    40
      IBLOCK(NBLOCK)=4000+LOC                                           ASSIGN    41
      RETURN                                                            ASSIGN    42
   20 CALL ERROR(7)                                                     ASSIGN    43
      RETURN                                                            ASSIGN    44
      END                                                               ASSIGN    45
```

```
      SUBROUTINE AUXIO                                                  AUXIO      2
      COMMON A(1326),D(500),IDTBL(8,500),INITID(3),LASTID(3),ISRCH(3),  RICH       2
     * JPTR,N,M,JTYP,LSTART,N2,IFNCNM,LOGID,NXTID,IDTYP,NID,LOC,        CY58A     80
     2 LTYP,ITYP,IBLKDT,MODE,IERR,IDES                                  RICH       4
      COMMON/BASBLK/IBLOCK(2500),NBLOCK,NB,NBRNCH                       CY58A     12
      DIMENSION IALPH1(6),IALPH2(9),IALPH3(7)                           AUXIO      5
      INTEGER BITGET                                                    AUXIO      6
      DATA (IALPH1(I),I=1,6)/1HR,1HE,1HW,1HI,1HN,1HD/                   AUXIO      7
      DATA (IALPH2(I),I=1,9)/1HB,1HA,1HC,1HK,1HS,1HP,1HA,1HC,1HE/       AUXIO      8
      DATA (IALPH3(I),I=1,7)/1HE,1HN,1HD,1HF,1HI,1HL,1HE/               AUXIO      9
C** AUXILARY I/O STATEMENT PROCESSOR                                    AUXIO     10
      IT=16-ITYP                                                        AUXIO     11
      IF(IT-2) 25,15,5                                                  AUXIO     12
C** REWIND STATEMENT                                                    AUXIO     13
    5 DO 10 I=1,6                                                       AUXIO     14
      IF(NEXT(JPTR) .NE. IALPH1(I)) GO TO 50                            AUXIO     15
   10 CONTINUE                                                          AUXIO     16
      GO TO 40                                                          AUXIO     17
C** BACKSPACE STATEMENT                                                 AUXIO     18
   15 DO 20 I=1,9                                                       AUXIO     19
      IF(NEXT(JPTR) .NE. IALPH2(I)) GO TO 50                            AUXIO     20
   20 CONTINUE                                                          AUXIO     21
      GO TO 40                                                          AUXIO     22
C** ENDFILE STATEMENT                                                   AUXIO     23
   25 DO 30 I=1,7                                                       AUXIO     24
      IF(NEXT(JPTR) .NE. IALPH3(I)) GO TO 50                            AUXIO     25
   30 CONTINUE                                                          AUXIO     26
C** GET I/O DEVICE - MUST BE INTEGER VARIABLE                            AUXIO     27
   40 CALL GNLE                                                         AUXIO     28
      IF(JTYP .NE. 2) GO TO 60                                          AUXIO     29
      IF(NEXT(JPTR) .NE. 1H ) GO TO 50                                  AUXIO     30
C** STORE IN SYMBOL TABLE                                               AUXIO     31
      CALL SEARCH                                                       AUXIO     32
      IF(ISRCH(2) .EQ. 1) CALL ERROR(10,NXTID)                          AUXIO     33
      IF(ISRCH(1) .EQ. 1) GO TO 45                                      AUXIO     34
      IDTYP=1                                                           AUXIO     35
      CALL STORE                                                        AUXIO     36
      LOC=NID                                                           AUXIO     37
C** SET TYPE AND CHECK THAT IT IS INTEGER                                AUXIO     38
   45 CALL IMPTYP                                                       AUXIO     39
      IF(BITGET(IDTBL(3,LOC),10,3) .NE. 4) CALL ERROR(22)               AUXIO     40
      IF(BITGET(IDTBL(3,LOC),1,1) .EQ. 1) CALL ERROR(14,NXTID)          AUXIO     41
C** STORE IN BASIC BLOCK TABLE                                           AUXIO     42
      NBLOCK=NBLOCK+1                                                   AUXIO     43
      IBLOCK(NBLOCK)=2000+LOC                                           AUXIO     44
      RETURN                                                            AUXIO     45
   50 CALL ERROR(7)                                                     AUXIO     46
      RETURN                                                            AUXIO     47
   60 CALL ERROR(22)                                                    AUXIO     48
      RETURN                                                            AUXIO     49
      END                                                               AUXIO     50
```

```
      INTEGER FUNCTION BITGET(ILOC,IPOS,IWIDTH)                         BITGET     2
      DIMENSION IMASK(18)                                               BITGET     3
      DATA (IMASK(I),I=1,18)/1B,3B,7B,17B,37B,77B,177B,377B,777B,       BITGET     4
     1 1777B,3777B,7777B,17777B,37777B,77777B,177777B,377777B,777777B/  BITGET     5
      BITGET=SHIFT(ILOC,IPOS) .AND. IMASK(IWIDTH)                       BITGET     6
      RETURN                                                            BITGET     7
      END                                                               BITGET     8
```

```
      INTEGER FUNCTION BITPUT(ILOC,IVAL,IPOS)                           BITPUT     2
      NSHIFT=60-IPOS                                                    BITPUT     3
      BITPUT=ILOC .OR. SHIFT(IVAL,NSHIFT)                               BITPUT     4
      RETURN                                                            BITPUT     5
      END                                                               BITPUT     6
```

```
      SUBROUTINE BLKSTR                                                 BLKSTR     2
      COMMON A(1326),D(500),IDTBL(8,500),INITID(3),LASTID(3),ISRCH(3),  RICH       2
     * JPTR,N,M,JTYP,LSTART,N2,IFNCNM,LOGID,NKTID,IDTYP,NID,LOC,        CY58A     80
     2 LTYP,ITYP,IBLKDT,MODE,IERR,IDES                                  RICH       4
      COMMON/FUNC/IFNCRA(5,12),MARGS,IARGS(50),FNCLOC(5),NFUNC          CY58A     45
      COMMON/LIST/NLIST,NINTFC,ISUBLT(2,200),INTFAC(300)                BLKSTR     5
      COMMON/BASBLK/IBLOCK(2500),NBLOCK,NB,NBRNCH                       CY58A     46
      INTEGER BITPUT,BITGET,FNCLOC                                      BLKSTR     7
C** THIS ROUTINE IS CALLED AFTER PARSING AN EXPRESSION, TO STORE        BLKSTR     8
C** INFORMATION IN THE BASIC BLOCK TABLE                                BLKSTR     9
      IF(MARGS .EQ. 0) RETURN                                           BLKSTR    10
      DO 100 I=1,MARGS                                                  BLKSTR    11
      IOSTAT=2                                                          BLKSTR    12
      ICOL=20*MOD(I-1,3)+10                                             BLKSTR    13
      IVR=(I+2)/3                                                       BLKSTR    14
C** GET SYMBOL TABLE LOCATION OF NEXT VARIABLE IN THE STATEMENT         BLKSTR    15
      LOC=BITGET(IARGS(IVR),ICOL,10)                                    BLKSTR    16
      NFNC=BITGET(IARGS(IVR),ICOL+3,3)                                  BLKSTR    17
      IF(NFNC .EQ. 0) GO TO 60                                          BLKSTR    18
C** VARIABLE IS A FUNCTION ARGUMENT - GET SYMBOL TABLE LOCATION         BLKSTR    19
C** OF FUNCTION                                                        BLKSTR    20
      ILOC=FNCLOC(NFNC)                                                 BLKSTR    21
C** GET POSITION OF VARIABLE IN ARGUMENT LIST                           BLKSTR    22
      NARG=BITGET(IARGS(IVR),ICOL+9,6)                                  BLKSTR    23
C** GET SYMBOL TABLE LOCATION OF FUNCTION                               BLKSTR    24
      INDEX=BITGET(IDTBL(3,ILOC),36,9)                                  BLKSTR    25
      IF(INDEX .EQ. 0) GO TO 60                                         BLKSTR    26
C** GET INTERFACE DEFINITION TABLE POINTER                              BLKSTR    27
      IPTR=BITGET(ISUBLT(2,INDEX),60,15)+(NARG-1)/6                     BLKSTR    28
      JVAR=BITGET(ISUBLT(2,INDEX ),14,1)                                BLKSTR    29
      ICOL=9*MOD(NARG-1,6)+9                                            BLKSTR    30
      IF(JVAR .EQ. 1) ICOL=9                                            BLKSTR    31
C** GET I/O STATUS OF ARGUMENT                                          BLKSTR    32
      IOSTAT=BITGET(INTFAC(IPTR),ICOL,3)                                BLKSTR    33
      KPTR=(NARG+11)/6                                                  BLKSTR    34
      ICOL2=54+ICOL/9                                                   BLKSTR    35
C** SET "EXPRESSION" FLAG                                               BLKSTR    36
      IEXP=BITGET(IFNCRA(NFNC,KPTR),ICOL2,1)                            BLKSTR    37
      IF(IOSTAT .EQ. 2) GO TO 60                                        BLKSTR    38
      IF(IEXP .NE. 0) GO TO 40                                          BLKSTR    39
      IF(IOSTAT .EQ. 1) GO TO 60                                        BLKSTR    40
      GO TO 80                                                          BLKSTR    41
C** ARGUMENT APPEARS IN EXPRESSION BUT IS NOT DESIGNATED "LOGICAL       BLKSTR    42
C** INPUT" - MUST BE CLASS 0 FUNCTION                                   BLKSTR    43
C** IF CLASS 0 FUNCTION, CHANGE STATUS TO "LOGICAL INPUT" -             BLKSTR    44
C** OTHERWISE ISSUE DIAGNOSTIC                                          BLKSTR    45
   40 IF(BITGET(ISUBLT(2,INDEX),10,4) .NE. 0) GO TO 90                  BLKSTR    46
      INTFAC(IPTR)=BITPUT(INTFAC(IPTR),2,ICOL)                          BLKSTR    47
      IOSTAT=2                                                          BLKSTR    48
C** VARIABLE IS REFERENCED - STORE IN BASIC BLOCK TABLE                 BLKSTR    49
   60 NBLOCK=NBLOCK+1                                                   BLKSTR    50
      IBLOCK(NBLOCK)=2000+LOC                                           BLKSTR    51
      IF(IOSTAT .EQ. 2) GO TO 100                                       BLKSTR    52
C** VARIABLE IS DEFINED - STORE IN BASIC BLOCK TABLE                    BLKSTR    53
   80 NBLOCK=NBLOCK+1                                                   BLKSTR    54
      IBLOCK(NBLOCK)=1000+LOC                                           BLKSTR    55
      GO TO 100                                                         BLKSTR    56
   90 CALL ERROR(55,NARG)                                               BLKSTR    57
  100 CONTINUE                                                          BLKSTR    58
      RETURN                                                            BLKSTR    59
      END                                                               BLKSTR    60
```

```
      SUBROUTINE BUILD                                                  BUILD      2
      COMMON A(1326),D(500),IDTBL(8,500),INITID(3),LASTID(3),ISRCH(3),  RICH       2
     * JPTR,N,M,JTYP,LSTART,N2,IFNCNM,LOGID,NXTID,IDTYP,NID,LOC,        CY58A     80
     2 LTYP,ITYP,IBLKDT,MODE,IERR,IDES                                  RICH       4
      COMMON/INPOUT/NCALL,IN,IOP                                        BUILD      4
      INTEGER A,B,BLANK                                                 BUILD      5
      COMMON/WASTE/B(72)                                                BUILD      6
C** THIS ROUTINE READS IN THE NEXT STATEMENT                            BUILD      7
      DATA BLANK/1H /,ICE/1HC/                                          BUILD      8
      IERR=0                                                            BUILD      9
      NFIRST=1                                                          BUILD     10
      NCONTU=0                                                          BUILD     11
      NCALL=NCALL+1                                                     BUILD     12
   50 CONTINUE                                                          BUILD     13
      IF(NFIRST .EQ. 1 .AND. NCALL .NE. 1) GO TO 1                      BUILD     14
C** READ NEXT CARD                                                      BUILD     15
      READ(IN,100) (B(I),I=1,72)                                        BUILD     16
      IF(EOF (IN) .NE. 0) GO TO 10                                      BUILD     17
  100 FORMAT(72A1)                                                      BUILD     18
    1 CONTINUE                                                          BUILD     19
      IF(NFIRST .EQ. 1) GO TO 2                                         BUILD     20
      IF(B(1) .EQ. ICE) GO TO 9                                         BUILD     21
      IF(B(6) .NE. BLANK .AND. B(6) .NE. 1H0) GO TO 6                   BUILD     22
      GO TO 9                                                           BUILD     23
    2 CONTINUE                                                          BUILD     24
C** STORE FIRST 72 COLUMNS                                              BUILD     25
      DO 3 I=1,72                                                       BUILD     26
      A(I)=B(I)                                                         BUILD     27
    3 CONTINUE                                                          BUILD     28
      NFIRST=0                                                          BUILD     29
      NCHAR=72                                                          BUILD     30
      GO TO 50                                                          BUILD     31
    6 NCONTU=NCONTU+1                                                   BUILD     32
      IF(NCONTU .LE. 19) GO TO 7                                        BUILD     33
      IERR=1                                                            BUILD     34
      CALL ERROR(4)                                                     BUILD     35
      RETURN                                                            BUILD     36
    7 CONTINUE                                                          BUILD     37
C** STORE COLUMNS 7-72 OF CONTINUATION CARD                             BUILD     38
      DO 8 I=1,66                                                       BUILD     39
    8 A(NCHAR+I)=B(I+6)                                                 BUILD     40
      NCHAR=NCHAR+66                                                    BUILD     41
      GO TO 50                                                          BUILD     42
   10 IERR=2                                                            BUILD     43
    9 CONTINUE                                                          BUILD     44
C** END OF STATEMENT, STORE NUMBER OF CHARACTERS                        BUILD     45
      N=NCHAR                                                           BUILD     46
      RETURN                                                            BUILD     47
      END                                                               BUILD     48
```

```
      SUBROUTINE CAA(ISTR,MSTR,ID)                                      CAA        2
      COMMON A(1326),D(500),IDTBL(8,500),INITID(3),LASTID(3),ISRCH(3),  RICH       2
     * JPTR,N,M,JTYP,LSTART,N2,IFNCNM,LOGID,NXTID,IDTYP,NID,LOC,        CY58A     80
     2 LTYP,ITYP,IBLKDT,MODE,IERR,IDES                                  RICH       4
      DIMENSION ISTR(6)                                                 CAA        4
      DATA MASK/77000000000000000008/                                   CAA        5
      IF(MSTR .GT. 6 .AND. ITYP .NE. 28) CALL ERROR(6)                  CAA        6
      ID=0                                                              CAA        7
      NSHIFT=66                                                         CAA        8
      DO 20 I=1,10                                                      CAA        9
      NSHIFT=NSHIFT-6                                                   CAA       10
      IF(I .GT. MSTR) GO TO 10                                          CAA       11
      J=ISTR(I) .AND. MASK                                              CAA       12
      ID=ID .OR. SHIFT(J,NSHIFT)                                        CAA       13
      GO TO 20                                                          CAA       14
   10 ID=ID .OR. SHIFT(1L ,NSHIFT)                                      CAA       15
   20 CONTINUE                                                          CAA       16
      RETURN                                                            CAA       17
      END                                                               CAA       18
```

```
      SUBROUTINE CAI(ISTR,MSTR,INTVAL)                                  CAI        2
      DIMENSION ISTR(10)                                                CAI        3
      IF(MSTR .GT. 10) GO TO 20                                         CAI        4
      INTVAL=0                                                          CAI        5
      DO 10 I=1,MSTR                                                    CAI        6
      INT=(SHIFT(ISTR(I), 6) .AND. 77B) - 27                            CAI        7
      IF(INT .EQ. 0) GO TO 10                                           CAI        8
      INTVAL=INTVAL+INT*10**(MSTR-I)                                    CAI        9
   10 CONTINUE                                                          CAI       10
      IF(INTVAL .GT. (2**31-1)) GO TO 20                                CAI       11
      RETURN                                                            CAI       12
   20 CALL ERROR(3)                                                     CAI       13
      RETURN                                                            CAI       14
      END                                                               CAI       15
```

```
      SUBROUTINE CALL                                                   CALL      2
      COMMON A(1326),D(500),IDTBL(8,500),INITID(3),LASTID(3),ISRCH(3),  RICH      2
     * JPTR,N,M,JTYP,LSTART,N2,IFNCNM,LOGID,NXTID,IDTYP,NID,LOC,        CY58A    80
     2 LTYP,ITYP,IBLKDT,MODE,IERR,IDES                                  RICH      4
      COMMON/STRING/NTYPE,NSTR,STR(500)                                 CALL      4
      COMMON/LIST/NLIST,NINTFC,ISUBLT(2,200),INTFAC(300)                CALL      5
      DIMENSION IALPH(4)                                                CALL      6
      INTEGER BLANK,BITPUT,BITGET                                       CALL      7
      DATA (IALPH(I),I=1,4)/1HC,1HA,1HL,1HL/                            CALL      8
      DATA LPAR/1H(/,BLANK/1H /                                         CALL      9
C** CALL STATEMENT PROCESSOR                                            CALL     10
      DO 5 I=1,4                                                        CALL     11
      IF(NEXT(JPTR) .NE. IALPH(I)) GO TO 50                             CALL     12
    5 CONTINUE                                                          CALL     13
      IPTR=JPTR                                                         CALL     14
C** GET SUBROUTINE NAME                                                 CALL     15
      CALL GNLE                                                         CALL     16
      IF(JTYP .NE. 2) GO TO 50                                          CALL     17
      IF(NXTID .EQ. IFNCNM) CALL ERROR(10,NXTID)                        CALL     18
C** STORE IN SYMBOL TABLE                                               CALL     19
      CALL SEARCH                                                       CALL     20
      IF(ISRCH(1) .EQ. 1) CALL ERROR(24,NXTID)                          CALL     21
      IF(ISRCH(2) .EQ. 1) GO TO 8                                       CALL     22
      IDTYP=2                                                           CALL     23
      CALL STORE                                                        CALL     24
      LOC=NID                                                           CALL     25
    8 CONTINUE                                                          CALL     26
      ILOC=LOC                                                          CALL     27
      NXT=NEXT(JPTR)                                                    CALL     28
      IF(NXT .EQ. LPAR) GO TO 17                                        CALL     29
      IF(NXT .NE. BLANK) GO TO 50                                       CALL     30
C** SUBROUTINE HAS NO ARGUMENT LIST                                     CALL     31
C** CHECK IF NAME HAS APPEARED PREVIOUSLY                               CALL     32
      IF(BITGET(IDTBL(3,LOC),18,1) .EQ. 1) GO TO 20                     CALL     33
C** NAME HAS NOT YET APPEARED                                           CALL     34
C** SET "APPEARED" FLAG                                                 CALL     35
      IDTBL(3,LOC)=BITPUT(IDTBL(3,LOC),1,18)                            CALL     36
C** SEARCH THE SESCOMP LIST                                             CALL     37
      DO 10 I=1,NLIST                                                   CALL     38
      IF(IDTBL(1,LOC) .NE. ISUBLT(1,I)) GO TO 10                        CALL     39
C** NAME FOUND IN LIST                                                  CALL     40
C** STORE LIST LOCATION IN SYMBOL TABLE                                 CALL     41
      IDTBL(3,LOC)=BITPUT(IDTBL(3,LOC),I,36)                            CALL     42
      LISTLC=I                                                          CALL     43
      GO TO 22                                                          CALL     44
   10 CONTINUE                                                          CALL     45
C** NAME IS NOT IN SESCOMP LIST                                         CALL     46
C** PUT NAME IN LIST AND ISSUE WARNING MESSAGE                          CALL     47
      NLIST=NLIST+1                                                     CALL     48
      ISUBLT(1,NLIST)=IDTBL(1,LOC)                                      CALL     49
      IDTBL(3,LOC)=BITPUT(IDTBL(3,LOC),NLIST,36)                        CALL     50
      CALL ERROR(52)                                                    CALL     51
      RETURN                                                            CALL     52
C** NAME HAS PREVIOUSLY APPEARED - GET LIST LOCATION                    CALL     53
   20 LISTLC=BITGET(IDTBL(3,LOC),36,9)                                  CALL     54
   22 CONTINUE                                                          CALL     55
C** CHECK THAT NUMBER OF ARGUMENTS IS ZERO                              CALL     56
```

```
      IF(BITGET(ISUBLT(2,LISTLC),6,6) .NE. 0) CALL ERROR(26)          CALL      57
      RETURN                                                          CALL      58
C** SUBROUTINE HAS AN ARGUMENT LIST                                   CALL      59
   17 JPTR=IPTR                                                       CALL      60
      NTYPE=1                                                         CALL      61
C** PARSE THE STATEMENT                                               CALL      62
      CALL EXPR                                                       CALL      63
      CALL PARSE                                                      CALL      64
C** PROCESS ALL EXTERNAL REFERENCES                                   CALL      65
      CALL FNCSTR                                                     CALL      66
C** STORE BASIC BLOCKS                                                CALL      67
      CALL BLKSTR                                                     CALL      68
      IF(MODE .EQ. 1) GO TO 48                                        CALL      69
C** ROLL CALL MODE - MAY HAVE TO ISSUE A CALL TO "ROLCHK"              CALL      70
      LOC=ILOC                                                        CALL      71
C** GET SUBROUTINE CLASS                                              CALL      72
      INDEX=BITGET(IDTBL(3,LOC),36,9)                                 CALL      73
      KLAS=BITGET(ISUBLT(2,INDEX),10,4)                               CALL      74
C** IF SESCOMP MODULE - ISSUE A CALL TO "ROLCHK"                       CALL      75
      IF(KLAS .EQ. 1 .OR. KLAS .EQ. 2) CALL CALL2                     CALL      76
      RETURN                                                          CALL      77
C** VARIABLE PRECISION MODE                                           CALL      78
C** ISSUE CALLS TO VARIABLE PRECISION SUBROUTINES                      CALL      79
   48 JPTR=IPTR-1                                                     CALL      80
      CALL CNVRT                                                      CALL      81
      RETURN                                                          CALL      82
   50 CALL ERROR(7)                                                   CALL      83
      RETURN                                                          CALL      84
      END                                                             CALL      85
```

```
      SUBROUTINE CALL2                                                CALL2      2
      COMMON A(1326),D(500),IDTBL(8,500),INITID(3),LASTID(3),ISRCH(3),  RICH     2
     * JPTR,N,M,JTYP,LSTART,N2,IFNCNM,LOGID,NXTID,IDTYP,NID,LOC,      CY58A     80
     2 LTYP,ITYP,IBLKDT,MODE,IERR,IDES                                RICH       4
      INTEGER A,D,COMMA,RPAR                                          CALL2      4
      INTEGER BITPUT,BITGET                                           CALL2      5
      DIMENSION IALPH(13)                                             CALL2      6
      DATA RPAR/1H)/,COMMA/1H,/                                       CALL2      7
      DATA (IALPH(I),I=1,13)/1HC,1HA,1HL,1HL,1H ,1HR,1HO,1HL,1HC,1HH,  CALL2      8
     1 1HK,1H ,1H(/                                                   CALL2      9
C** THIS ROUTINE GENERATES A CALL TO "ROLCHK" OF THE FORM             CALL2     10
C**       CALL ROLCHK(1HN,1HA,1HM,1HE,1H ,1H )                        CALL2     11
      DO 15 J=1,13                                                    CALL2     12
      K=J+6                                                           CALL2     13
      A(K)=IALPH(J)                                                   CALL2     14
   15 CONTINUE                                                        CALL2     15
C** GENERATE ARGUMENT LIST                                            CALL2     16
      DO 20 I=1,6                                                     CALL2     17
      KK=19+4*I                                                       CALL2     18
      A(KK-3)=1H1                                                     CALL2     19
      A(KK-2)=1HH                                                     CALL2     20
      IPOS=6*I                                                        CALL2     21
      IVL=BITGET(IDTBL(1,LOC),IPOS,6)                                 CALL2     22
      A(KK-1)=BITPUT(0,IVL,6)                                         CALL2     23
      IF(I .EQ. 6) GO TO 25                                           CALL2     24
   20 A(KK)=COMMA                                                     CALL2     25
   25 A(KK)=RPAR                                                      CALL2     26
      N=KK                                                            CALL2     27
      RETURN                                                          CALL2     28
      END                                                             CALL2     29
```

```
      SUBROUTINE CAR(RN,NCHAR,IDES)                                     CAR      2
      DIMENSION IHOL(4)                                                 CAR      3
      INTEGER RN(40),BLANK,CHAR                                         CAR      4
      DOUBLE PRECISION DPVAL                                            CAR      5
      DATA RMAX,RMIN,BLANK/1.0E+38,1.0E-38,55000000000000000008/        CAR      6
      IF(NCHAR .GT. 20*(IDES+1)) RETURN                                 CAR      7
      KOUNT=0                                                           CAR      8
      ICHAR=NCHAR+1                                                     CAR      9
      DO 5 I=1,4                                                        CAR     10
    5 IHOL(I)=0                                                         CAR     11
      NW=2*IDES+3                                                       CAR     12
   10 NW=NW-1                                                           CAR     13
      NSHIFT=0                                                          CAR     14
   15 KOUNT=KOUNT+1                                                     CAR     15
      IF(KOUNT .GT. NCHAR) GO TO 20                                     CAR     16
      ICHAR=ICHAR-1                                                     CAR     17
      CHAR=RN(ICHAR) .AND. 77000000000000000008                         CAR     18
      GO TO 25                                                          CAR     19
   20 CHAR=BLANK                                                        CAR     20
   25 NSHIFT=NSHIFT+6                                                   CAR     21
      IHOL(NW)=IHOL(NW) .OR. SHIFT(CHAR,NSHIFT)                         CAR     22
      IF(NSHIFT .LT. 60) GO TO 15                                       CAR     23
      IF(NW .GT. 1) GO TO 10                                            CAR     24
      IF(IDES .EQ. 1) GO TO 35                                          CAR     25
      DECODE(20,30,IHOL(1)) RVAL                                        CAR     26
   30 FORMAT(E20.0)                                                     CAR     27
      IF(RVAL .EQ. 0.0) RETURN                                          CAR     28
      IF(RVAL .GT. RMAX .OR. RVAL .LT. RMIN) CALL ERROR(46)             CAR     29
      RETURN                                                            CAR     30
   35 DECODE(40,40,IHOL(1)) DPVAL                                       CAR     31
   40 FORMAT(D40.0)                                                     CAR     32
      IF(DPVAL .EQ. 0.0) RETURN                                         CAR     33
      IF(DPVAL .GT. RMAX .OR. DPVAL .LT. RMIN) CALL ERROR(46)           CAR     34
      RETURN                                                            CAR     35
      END                                                               CAR     36
```

```
      SUBROUTINE CHKLST                                                 CHKLIST     2
      COMMON A(1326),D(500),IDTBL(8,500),INITID(3),LASTID(3),ISRCH(3),  RICH        2
     * JPTR,N,M,JTYP,LSTART,N2,IFNCNM,LOGID,NXTID,IDTYP,NID,LOC,        CY58A      80
     2 LTYP,ITYP,IBLKDT,MODE,IERR,IDES                                  RICH        4
      DIMENSION IQUIV(100)                                              CHKLIST     4
      EQUIVALENCE(IQUIV(1),A(301))                                      CHKLIST     5
      INTEGER BITGET                                                    CHKLIST     6
C** THIS ROUTINE IS CALLED PRIOR TO THE FLOW ANALYSIS TO FLAG           CHKLIST     7
C** ALL INITIALLY DEFINED VARIABLES                                     CHKLIST     8
      NQUIV=0                                                           CHKLIST     9
      DO 30 I=1,NID                                                     CHKLIST    10
      IDTBL(8,I)=0                                                      CHKLIST    11
      IF(BITGET(IDTBL(3,I),14,1) .EQ. 1) GO TO 20                       CHKLIST    12
      IF(BITGET(IDTBL(3,I),16,1) .EQ. 1) GO TO 5                        CHKLIST    13
      IF(BITGET(IDTBL(3,I),12,1) .EQ. 1) GO TO 15                       CHKLIST    14
      GO TO 10                                                          CHKLIST    15
C** VARIABLE IN COMMON - SET INITIALLY DEFINED FLAG                     CHKLIST    16
    5 IDTBL(8,I)=1                                                      CHKLIST    17
   10 IF(BITGET(IDTBL(3,I),17,1) .NE. 1) GO TO 30                       CHKLIST    18
C** VARIABLE IS EQUIVALENCED - STORE IN LIST                            CHKLIST    19
      NQUIV=NQUIV+1                                                     CHKLIST    20
      IF(NQUIV .GT. 100) GO TO 60                                       CY58A      52
      IQUIV(NQUIV)=I                                                    CHKLIST    21
      GO TO 30                                                          CHKLIST    22
C** VARIABLE IS FORMAL PARAMETER - FLAG IF INPUT                        CHKLIST    23
   15 IF(BITGET(IDTBL(3,I),37,1) .EQ. 0) GO TO 30                       CHKLIST    24
C** VARIABLE IS DEFINED BY DATA STATEMENT OR IS INPUT                   CHKLIST    25
   20 IDTBL(8,I)=1                                                      CHKLIST    26
   30 CONTINUE                                                          CHKLIST    27
      IF(NQUIV .EQ. 0) RETURN                                           CHKLIST    28
      DO 50 J=1,NQUIV                                                   CHKLIST    29
      NXQV=IQUIV(J)                                                     CHKLIST    30
C** GET NEXT EQUIVALENCED VARIABLE                                      CHKLIST    31
   35 NXQV=IDTBL(7,NXQV)                                                CHKLIST    32
      IF(NXQV .EQ. IQUIV(J)) GO TO 50                                   CHKLIST    33
      IF(IDTBL(8,NXQV) .EQ. 0) GO TO 35                                 CHKLIST    34
C** VARIABLE IN EQUIVALENCE LINK IS DEFINED                             CHKLIST    35
      IQV=NXQV                                                          CHKLIST    36
C** CHECK TYPE OF DEFINED VARIABLE                                      CHKLIST    37
      KTYPE=BITGET(IDTBL(3,IQV),10,3)                                   CHKLIST    38
   40 NXQV=IDTBL(7,NXQV)                                                CHKLIST    39
      IF(NXQV .EQ. IQV) GO TO 50                                        CHKLIST    40
      IF(BITGET(IDTBL(3,NXQV),10,3)  NE. KTYPE) GO TO 40                CHKLIST    41
C** VARIABLE IN EQUIVALENCE LINK HAS SAME TYPE - SET FLAG TO "DEFINED"  CHKLIST    42
      IDTBL(8,NXQV)=1                                                   CHKLIST    43
      GO TO 40                                                          CHKLIST    44
   50 CONTINUE                                                          CHKLIST    45
      RETURN                                                            CHKLIST    46
   60 CALL ERROR(94)                                                    CY58A      53
      RETURN                                                            CY58A      54
      END                                                               CHKLIST    47
```

```
      SUBROUTINE CLASS                                                  CLASS      2
      COMMON A(1326),D(500),IDTBL(8,500),INITID(3),LASTID(3),ISRCH(3),  RICH       2
     * JPTR,N,M,JTYP,LSTART,N2,IFNCNM,LOGID,NXTID,IDTYP,NID,LOC,        CY58A     80
     2 LTYP,ITYP,IBLKDT,MODE,IERR,IDES                                  RICH       4
      DIMENSION KALP(48),KSUC(48),KFAL(48),KDEC(10),KF(8)               CLASS      4
      INTEGER A                                                         CLASS      5
C** THIS ROUTINE CLASSIFIES FORTRAN STATEMENTS INTO 36 CLASSES          CLASS      6
C** AND STORES THE CLASS IN "ITYP"                                      CLASS      7
C**         1-ASSIGNMENT   2-ASSIGN        3-GO TO         4-ASSD. GO TO  CLASS      8
C**         5-COMP. GO TO  6-ARITH. IF     7-CONTINUE      8-CALL         CLASS      9
C**         9-RETURN       10-STOP         11-READ         12-WRITE       CLASS     10
C**         13-REWIND      14-BACKSPACE    15-ENDFILE      16-LOGICAL IF  CLASS     11
C**         17-DO          18-END          19-INTEGER      20-REAL        CLASS     12
C**         21-DOUB. PREC. 22-COMPLEX      23-LOGICAL      24-DIMENSION   CLASS     13
C**         25-COMMON      26-EQUIVALENCE  27-DATA         28-FORMAT      CLASS     14
C**         29-BLOCK DATA  30-SUBROUTINE   31-FUNCTION     32-PROGRAM     CLASS     15
C**         33-36  INVALID                                                CLASS     16
      DATA KDEC(1),KDEC(2),KDEC(3),KDEC(4),KDEC(5),                     CLASS     17
     1  KDEC(6),KDEC(7),KDEC(8),KDEC(9),KDEC(10)                        CLASS     18
     2  /1H0,1H1,1H2,1H3,1H4,1H5,1H6,1H7,1H8,1H9/                       CLASS     19
      DATA KF(1),KF(2),KF(3),KF(4),KF(5),KF(6),KF(7),KF(8)              CLASS     20
     1   /1HF,1HU,1HN,1HC,1HT,1HI,1HO,1HN/                              CLASS     21
      DATA KC,KBLNK,KLPAR,KRPAR,KEQ  /1HC,1H ,1H(,1H),1H=/              CLASS     22
      DATA KH,KSLSH,KASTK,KZERO,KCMA  /1HH,1H/,1H*,1H0,1H,/             CLASS     23
C** CHARACTER ARRAY FOR TREE SCAN                                       CLASS     24
      DATA KALP( 1),KALP( 2),KALP( 3),KALP( 4) /1HI,1HF,1HN,1HG/        CLASS     25
      DATA KALP( 5),KALP( 6),KALP( 7),KALP( 8) /1HO,1HT,1HO,1H(/        CLASS     26
      DATA KALP( 9),KALP(10),KALP(11),KALP(12) /1HC,1HA,1HO,1HN/        CLASS     27
      DATA KALP(13),KALP(14),KALP(15),KALP(16) /1HM,1HM,1HP,1HR/        CLASS     28
      DATA KALP(17),KALP(18),KALP(19),KALP(20) /1HE,1HA,1HD,1HL/        CLASS     29
      DATA KALP(21),KALP(22),KALP(23),KALP(24) /1HT,1HW,1HF,1HO/        CLASS     30
      DATA KALP(25),KALP(26),KALP(27),KALP(28) /1HU,1HD,1HI,1HA/        CLASS     31
      DATA KALP(29),KALP(30),KALP(31),KALP(32) /1HO,1HU,1HW,1HS/        CLASS     32
      DATA KALP(33),KALP(34),KALP(35),KALP(36) /1HT,1HU,1HE,1HN/        CLASS     33
      DATA KALP(37),KALP(38),KALP(39),KALP(40) /1HD,1HF,1HX,1HO/        CLASS     34
      DATA KALP(41),KALP(42),KALP(43),KALP(44) /1HB,1HA,1HL,1HA/        CLASS     35
      DATA KALP(45),KALP(46),KALP(47),KALP(48)/1HL,1HP,1HR,1HO/         CLASS     36
C** SUCCEED LINK FOR TREE SCAN                                          CLASS     37
      DATA KSUC( 1),KSUC( 2),KSUC( 3),KSUC( 4) /  2, -6,-19,  5/        CLASS     38
      DATA KSUC( 5),KSUC( 6),KSUC( 7),KSUC( 8) /  6,  7,  8, -5/        CLASS     39
      DATA KSUC( 9),KSUC(10),KSUC(11),KSUC(12) / 10, -8, 12, -7/        CLASS     40
      DATA KSUC(13),KSUC(14),KSUC(15),KSUC(16) / 14,-25,-22, 17/        CLASS     41
      DATA KSUC(17),KSUC(18),KSUC(19),KSUC(20) / 18, 19,-11,-20/        CLASS     42
      DATA KSUC(21),KSUC(22),KSUC(23),KSUC(24) / -9,-13, 24,-28/        CLASS     43
      DATA KSUC(25),KSUC(26),KSUC(27),KSUC(28) /-31, 27,-24,-27/        CLASS     44
      DATA KSUC(29),KSUC(30),KSUC(31),KSUC(32) / 30,-21,-12, 33/        CLASS     45
      DATA KSUC(33),KSUC(34),KSUC(35),KSUC(36) /-10,-30, 36, 37/        CLASS     46
      DATA KSUC(37),KSUC(38),KSUC(39),KSUC(40) / 38,-15,-34,-26/        CLASS     47
      DATA KSUC(41),KSUC(42),KSUC(43),KSUC(44) / 42,-14,-29, -2/        CLASS     48
      DATA KSUC(45),KSUC(46),KSUC(47),KSUC(48) /-23,47,48,-32/          CLASS     49
C** FAIL LINK FOR TREE SCAN                                             CLASS     50
      DATA KFAL( 1),KFAL( 2),KFAL( 3),KFAL( 4) /  4,  3,-36,  9/        CLASS     51
      DATA KFAL( 5),KFAL( 6),KFAL( 7),KFAL( 8) /-36,-36,-36, -3/        CLASS     52
      DATA KFAL( 9),KFAL(10),KFAL(11),KFAL(12) / 16, 11,-36, 13/        CLASS     53
      DATA KFAL(13),KFAL(14),KFAL(15),KFAL(16) /-36, 15,-36, 23/        CLASS     54
      DATA KFAL(17),KFAL(18),KFAL(19),KFAL(20) /-36, 21, 20,-36/        CLASS     55
      DATA KFAL(21),KFAL(22),KFAL(23),KFAL(24) / 22,-36, 26, 25/        CLASS     56
```

```
      DATA KFAL(25),KFAL(26),KFAL(27),KFAL(28) /-36, 31, 28, 29/
      DATA KFAL(29),KFAL(30),KFAL(31),KFAL(32) /-36,-36, 32, 35/
      DATA KFAL(33),KFAL(34),KFAL(35),KFAL(36) / 34,-36, 41, 39/
      DATA KFAL(37),KFAL(38),KFAL(39),KFAL(40) /-36,-18, 40,-36/
      DATA KFAL(41),KFAL(42),KFAL(43),KFAL(44) / 44, 43,-36, 45/
      DATA KFAL(45),KFAL(46),KFAL(47),KFAL(48) / 46,-36,-36,-36/
      LTYP=0
      IPTR=7
    5 CONTINUE
      JSAVE=KBLNK
      JSW=0
      ISW=0
      JEQ=0
      JCMA=0
      JHOLL=0
C** ASSIGNMENT SCAN LOOP
      DO 26 J=IPTR,N
      JCH=A(J)
      IF(JCH .EQ. KBLNK) GO TO 26
C** IF NOT BLANK, CHECK FOR HOLLERITH SWITCH
      IF(JHOLL .LE. 0) GO TO 12
      DO 8 L=1,10
      IF(JCH .EQ. KDEC(L)) GO TO 10
    8 CONTINUE
C** FIRST TIME, NO INTEGER MEANS NOT HOLLERITH
      IF(JHOLL .LE. 1) GO TO 11
C** OTHERWISE LOOK FOR "H"
      IF(JCH-KH) 11,32,11
C** STILL FITS HOLLERITH SYNTAX
   10 JHOLL=JHOLL+1
      GO TO 25
C** NOT A HOLLERITH CONSTANT, SET SWITCH OFF
   11 JHOLL=0
C** TEST OTHER CHARACTERS (),=/*
   12 IF(JCH .EQ. KLPAR) GO TO 20
      IF(JCH .EQ. KRPAR) GO TO 18
      IF(JCH .EQ. KCMA) GO TO 22
      IF(JCH .EQ. KEQ) GO TO 23
      IF(JCH .EQ. KSLSH) GO TO 21
      IF(JCH-KASTK) 25,21,25
C** RIGHT PAREN FOUND
   18 JSW=JSW-1
      IF(JSW .GT. 0) GO TO 25
C** SET SWITCH TO ALLOW ONLY ONE MORE NON-BLANK CHARACTER
      ISW=1
      GO TO 26
C** LEFT PAREN FOUND
   20 JSW=JSW+1
C** SET HOLLERITH SWITCH FOR (,/*
   21 JHOLL=1
      GO TO 25
C** COMMA FOUND, CHECK LEVEL
   22 IF(JSW) 30,30,21
C** EQUAL SIGN FOUND, CHECK LEVEL
   23 IF(JSW .GT. 0) GO TO 32
      JEQ=1
C** TEST IF TERMINATED BY SWITCH SET
```

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   25 IF(ISW .GT. 0) GO TO 27                                          CLASS    114
   26 CONTINUE                                                         CLASS    115
      GO TO 28                                                         CLASS    116
C** SAVE LAST CHARACTER IF TERMINATED EARLY                            CLASS    117
   27 JSAVE=JCH                                                        CLASS    118
C** ONE NON-BLANK CHARACTER AFTER A RIGHT PAREN                        CLASS    119
C** MIGHT BE AN ASSIGNMENT                                             CLASS    120
      JP=J                                                             CLASS    121
   28 IF(JEQ .LE. 0) GO TO 32                                          CLASS    122
      JTP=1                                                            CLASS    123
      GO TO 55                                                         CLASS    124
C** UPPER LEVEL COMMA FOUND                                            CLASS    125
C** MIGHT BE A DO                                                      CLASS    126
   30 JCMA=1                                                           CLASS    127
      IF(JEQ .LE. 0) GO TO 32                                          CLASS    128
      JTP=17                                                           CLASS    129
      GO TO 55                                                         CLASS    130
C** HOLLERITH CONSTANT FOUND                                           CLASS    131
   32 J=1                                                              CLASS    132
      ISW=IPTR                                                         CLASS    133
   33 JCH=A(ISW)                                                       CLASS    134
      IF(JCH .EQ. KBLNK) GO TO 37                                      CLASS    135
C** TEST AGAINST CURRENT TREE CHARACTER                                CLASS    136
   34 IF(JCH .EQ. KALP(J)) GO TO 36                                    CLASS    137
C** IF NO MATCH, TRY NEXT IN TREE                                      CLASS    138
   35 J=KFAL(J)                                                        CLASS    139
      IF (J) 39,39,34                                                  CLASS    140
C** CHARACTER MATCHES, TRY NEXT IN TREE                                CLASS    141
   36 J=KSUC(J)                                                        CLASS    142
      IF(J .LE. 0) GO TO 39                                            CLASS    143
   37 ISW=ISW+1                                                        CLASS    144
      IF(ISW .LE. N) GO TO 33                                          CLASS    145
C** RUN OUT OF CHARACTERS                                              CLASS    146
      JCH=KBLNK                                                        CLASS    147
      GO TO 35                                                         CLASS    148
C** CLASSIFICATION COMPLETED, FORM TYPE CODE                           CLASS    149
   39 JTP=-J                                                           CLASS    150
C** CHECK TO SEE IF MORE TREATMENT NEEDED                              CLASS    151
      IF(JTP-3) 55,45,40                                               CLASS    152
   40 IF(JTP-6) 55,43,41                                               CLASS    153
   41 IF(JTP .LT. 19) GO TO 55                                         CLASS    154
      IF(JTP-23) 47,47,55                                              CLASS    155
C** LOGICAL IF SEPARATION TEST                                         CLASS    156
   43 DO 44 L=1,10                                                     CLASS    157
      IF(JSAVE .EQ. KDEC(L)) GO TO 55                                  CLASS    158
   44 CONTINUE                                                         CLASS    159
      LTYP=9                                                           CLASS    160
      JTP=16                                                           CLASS    161
      IPTR=JP                                                          CLASS    162
      GO TO 5                                                          CLASS    163
C** SEPARATE ASSIGNED AND UNCONDITIONAL GOTOS                          CLASS    164
   45 IF(JCMA .LE. 0) GO TO 55                                         CLASS    165
      JTP=4                                                            CLASS    166
      GO TO 55                                                         CLASS    167
C** CHECK WHETHER THIS IS A TYPE STATEMENT OR TYPED FUNCTION           CLASS    168
   47 L=11                                                             CLASS    169
      GO TO 52                                                         CLASS    170
   48 L=L+1                                                            CLASS    171
      IF(L .GT. N) GO TO 55                                            CLASS    172
      IF(A(L) .EQ. KBLNK) GO TO 48                                     CLASS    173
   50 IF(A(L) .EQ. KF(ISW)) GO TO 53                                   CLASS    174
      IF(ISW .EQ. 1) GO TO 48                                          CLASS    175
   52 ISW=1                                                            CLASS    176
      GO TO 50                                                         CLASS    177
   53 ISW=ISW+1                                                        CLASS    178
      IF(ISW .LE. 8) GO TO 48                                          CLASS    179
      JTP=31                                                           CLASS    180
   55 ITYP=JTP                                                         CLASS    181
C** ALL RESULTS COME HERE FOR RETURN                                   CLASS    182
      RETURN                                                           CLASS    183
      END                                                              CLASS    184
```

```
      SUBROUTINE CMPARE
      DIMENSION IROLCK(100),ISUB(100)
      REWIND 3
      NSUB=0
      NC=0
      DO 5 I=1,100
      READ(9) ISUB(I)
      IF(EOF(9) .NE. 0) GO TO 7
      NSUB=NSUB+1
    5 CONTINUE
    7 IF(NSUB .EQ. 0) RETURN
      DO 40 L=1,12
      MODE=L-1
      NROLL=0
      DO 10 I=1,100
      READ(3) IROLCK(I)
      IF(EOF(3) .NE. 0) GO TO 15
      NROLL=NROLL+1
   10 CONTINUE
   15 IF(NROLL .EQ. 0) GO TO 35
      DO 30 J=1,NSUB
      DO 20 K=1,NROLL
      IF(IROLCK(K) .EQ. ISUB(J)) GO TO 30
   20 CONTINUE
      NC=1
      WRITE(6,25) ISUB(J),MODE
   25 FORMAT(/29X,12H SUBROUTINE ,A6,53H WAS NOT CALLED IN THE ROLL CALL
     * MODE FOR MODE INDEX ,I3)
   30 CONTINUE
      GO TO 40
   35 WRITE(6,36) MODE
   36 FORMAT(/32X,65H NO SUBROUTINES WERE CALLED IN THE ROLL CALL MODE F
     *OR MODE INDEX ,I3)
      NC=1
   40 CONTINUE
      IF(NC .EQ. 0) WRITE(6,50)
   50 FORMAT(/41X,50H ALL SUBROUTINES WERE CALLED IN THE ROLL CALL MODE)
      RETURN
      END
```

```
      SUBROUTINE CNVRT                                                  CNVRT     2
      COMMON A(1326),D(500),IDTBL(8,500),INITID(3),LASTID(3),ISRCH(3),  RICH      2
     * JPTR,N,M,JTYP,LSTART,N2,IFNCNM,LOGID,NXTID,IDTYP,NID,LOC,        CY58A    80
     2 LTYP,ITYP,IBLKDT,MODE,IERR,IDFS                                  RICH      4
      COMMON/STRING/NTYPE,NSTR,STR(500)                                 CNVRT     4
      DIMENSION IOP(8),ILOG(7,2),JLOG(2,3),IFUNC1(6),IFUNC2(6),         CNVRT     5
     1 IFUNC3(6)                                                        CNVRT     6
      INTEGER STR,A,D,DECPT                                             CNVRT     7
      INTEGER BITPUT,BITGET                                             CNVRT     8
      DATA (IOP(I),I=1,8)/1H+,1H-,1H/,1H(,1H),1H,,1H*,1H*/              CNVRT     9
      DATA (((ILOG(I,J),J=1,2),I=1,7)/1HL,1HT,1HL,1HE,1HG,1HT,1HG,1HE,  CNVRT    10
     1 1HE,1HQ,1HN,1HE,1HO,1HR/                                         CNVRT    11
      DATA ((JLOG(I,J),J=1,3),I=1,2)/1HA,1HN,1HO,1HN,1HO,1HT/           CNVRT    12
      DATA (IFUNC1(I),I=1,6)/1HQ,1H1,1HR,1HE,1HA,1HL/                   CNVRT    13
      DATA (IFUNC2(I),I=1,6)/1HQ,1H1,1HD,1HP,1HR,1HE/                   CNVRT    14
      DATA (IFUNC3(I),I=1,6)/1HQ,1H1,1HC,1HO,1HM,1HP/                   CNVRT    15
      DATA DECPT/1H./                                                   CNVRT    16
C** THIS ROUTINE IS CALLED IN THE VARIABLE PRECISION MODE TO DECODE     CNVRT    17
C** THE STRING WHICH IS RETURNED BY THE PARSER AFTER VARIABLE           CNVRT    18
C** PRECISION CALLS HAVE BEEN INSERTED                                  CNVRT    19
      DO 5 J=1,JPTR                                                     CNVRT    20
    5 D(J)=A(J)                                                         CNVRT    21
C** THIS LOOP LOOKS AT EVERY STRING ELEMENT INDIVIDUALLY                CNVRT    22
      J=JPTR                                                            CNVRT    23
      DO 100 K=1,NSTR                                                   CNVRT    24
      IF(STR(K) .GT. 0) GO TO 40                                        CNVRT    25
C** SPECIAL CHARACTER OR OPERATOR                                       CNVRT    26
      DO 10 I=1,8                                                       CNVRT    27
      IF(STR(K) .NE. -I) GO TO 10                                       CNVRT    28
C** LOGICAL OPERATOR FOUND - STORE IN "D"                               CNVRT    29
C** CHARACTER FOUND - STORE IN "D"                                      CNVRT    30
      D(J+1)=IOP(I)                                                     CNVRT    31
      N3=1                                                              CNVRT    32
      IF(I .NE. 8) GO TO 100                                            CNVRT    33
      D(J+2)=IOP(I)                                                     CNVRT    34
      N3=2                                                              CNVRT    35
      GO TO 100                                                         CNVRT    36
   10 CONTINUE                                                          CNVRT    37
      DO 15 I=1,7                                                       CNVRT    38
      L=I+8                                                             CNVRT    39
      IF(STR(K) .NE. -L) GO TO 15                                       CNVRT    40
C** LOGICAL OPERATOR FOUND - STORE IN "D"                               CNVRT    41
      D(J+1)=DECPT                                                      CNVRT    42
      D(J+2)=ILOG(I,1)                                                  CNVRT    43
      D(J+3)=ILOG(I,2)                                                  CNVRT    44
      D(J+4)=DECPT                                                      CNVRT    45
      N3=4                                                              CNVRT    46
      GO TO 100                                                         CNVRT    47
   15 CONTINUE                                                          CNVRT    48
      DO 20 I=1,2                                                       CNVRT    49
      L=I+15                                                            CNVRT    50
      IF(STR(K) .NE. -L) GO TO 20                                       CNVRT    51
      D(J+1)=DECPT                                                      CNVRT    52
      D(J+2)=JLOG(I,1)                                                  CNVRT    53
      D(J+3)=JLOG(I,2)                                                  CNVRT    54
      D(J+4)=JLOG(I,3)                                                  CNVRT    55
      D(J+5)=DECPT                                                      CNVRT    56
```

```
      N3=5                                                              CNVRT     57
      GO TO 100                                                         CNVRT     58
   20 CONTINUE                                                          CNVRT     59
C** MUST BE A CALL TO A VARIABLE PRECISION SUBROUTINE                   CNVRT     60
      KL=1                                                              CNVRT     61
      IF(STR(K) .EQ. -0) KL=2                                           CNVRT     62
      IF(STR(K) .EQ. -10000) KL=4                                       CNVRT     63
      IF(STR(K) .EQ. -20000) KL=3                                       CNVRT     64
      GO TO(110,25,30,35),KL                                            CNVRT     65
C** CALL TO "Q1REAL" - STORE IN "D"                                     CNVRT     66
   25 DO 27 I=1,6                                                       CNVRT     67
      D(J+I)=IFUNC1(I)                                                  CNVRT     68
   27 CONTINUE                                                          CNVRT     69
      N3=6                                                              CNVRT     70
      GO TO 100                                                         CNVRT     71
C** CALL TO "Q1DPRE" - STORE IN "D"                                     CNVRT     72
   30 DO 32 I=1,6                                                       CNVRT     73
      D(J+I)=IFUNC2(I)                                                  CNVRT     74
   32 CONTINUE                                                          CNVRT     75
      N3=6                                                              CNVRT     76
      GO TO 100                                                         CNVRT     77
C** CALL TO "Q1COMP" - STORE IN "D"                                     CNVRT     78
   35 DO 37 I=1,6                                                       CNVRT     79
      D(J+I)=IFUNC3(I)                                                  CNVRT     80
   37 CONTINUE                                                          CNVRT     81
      N3=6                                                              CNVRT     82
      GO TO 100                                                         CNVRT     83
   40 IF(STR(K) .LT. 1000001) GO TO 110                                 CNVRT     84
      N3=STR(K)/1.E6                                                    CNVRT     85
      NLOC=(STR(K)/10001)*10000                                         CNVRT     86
      JPTR=STR(K)-NLOC                                                  CNVRT     87
      KLOC=STR(K)-N3*1.E6                                               CNVRT     88
      IF(KLOC .LT. 400000 .OR. KLOC .GT. 500000) GO TO 50               CNVRT     89
      IHL=(KLOC-400000)/10000                                           CY61       1
      IF(IHL .EQ. 5) GO TO 60                                           CY61       2
C** CONSTANT FOUND - STORE IN "D"                                       CNVRT     90
      DO 45 I=1,N3                                                      CNVRT     91
      D(J+I)=NEXT(JPTR)                                                 CNVRT     92
   45 CONTINUE                                                          CNVRT     93
      GO TO 100                                                         CNVRT     94
C** VARIABLE FOUND - STORE IN "D"                                       CNVRT     95
   50 DO 55 I=1,N3                                                      CNVRT     96
      IPOS=6*I                                                          CNVRT     97
      ICHAR=BITGET(IDTBL(1,JPTR),IPOS,6)                                CNVRT     98
   55 D(J+I)=BITPUT(0,ICHAR,6)                                          CNVRT     99
      GO TO 100                                                         CY61       3
   60 KPTR=JPTR-1                                                       CY61       4
      DO 65 I=1,N3                                                      CY61       5
   65 D(J+I)=A(KPTR+I)                                                  CY61       6
  100 J=J+N3                                                            CNVRT    100
      N=J                                                               CNVRT    101
      DO 105 I=1,N                                                      CNVRT    102
  105 A(I)=D(I)                                                         CNVRT    103
      RETURN                                                            CNVRT    104
  110 CALL ERROR(23)                                                    CNVRT    105
      RETURN                                                            CNVRT    106
      END                                                               CNVRT    107
```

```
      SUBROUTINE COM                                                    COM        2
      COMMON A(1326),D(500),IDTBL(8,500),INITID(3),LASTID(3),ISRCH(3),  RICH       2
     * JPTR,N,M,JTYP,LSTART,N2,IFNCNM,LOGID,NXTID,IDTYP,NID,LOC,        CY58A     80
     2 LTYP,ITYP,IBLKDT,MODE,IERR,IDFS                                  RICH       4
      DIMENSION IDIM(3),IALPH(6)                                        COM        4
      INTEGER SLASH,COMMA,BLANK,A,RPAR                                  COM        5
      INTEGER BITPUT,BITGET                                             COM        6
      DATA (IALPH(I),I=1,6)/1HC,1HO,1HM,1HM,1HO,1HN/                    COM        7
      DATA SLASH/1H//,COMMA/1H,/,BLANK/1H /,RPAR/1H)/,LPAR/1H(/         COM        8
C** COMMON STATEMENT PROCESSOR                                          COM        9
      DO 10 I=1,6                                                       COM       10
      IF(NEXT(JPTR) .NE. IALPH(I)) GO TO 60                             COM       11
   10 CONTINUE                                                          COM       12
      IF(NEXT(JPTR) .EQ. SLASH) GO TO 15                                COM       13
      JPTR=JPTR-1                                                       COM       14
C** BLANK COMMON                                                        COM       15
   12 NXTID=BLANK                                                       COM       16
      GO TO 20                                                          COM       17
C** GET NAME OF LABELLED COMMON BLOCK                                   COM       18
   15 CALL GNLE                                                         COM       19
      IF(A(JPTR-1) .EQ. SLASH) GO TO 12                                 COM       20
      IF(JTYP .NE. 2) GO TO 60                                          COM       21
      IF(NEXT(JPTR) .NE. SLASH) GO TO 60                                COM       22
C** STORE NAME IN SYMBOL TABLE                                          COM       23
   20 CALL COMSCH                                                       COM       24
      IF(ISRCH(3) .EQ. 1) GO TO 25                                      COM       25
      IDTYP=3                                                           COM       26
      CALL STORE                                                        COM       27
      ICMLOC=NID                                                        COM       28
      GO TO 27                                                          COM       29
   25 ICMLOC=LOC                                                        COM       30
C** GET LOCATION OF LAST VARIABLE IN BLOCK                              COM       31
      LSTLOC=IDTBL(6,ICMLOC)                                            COM       32
C** GET NEXT VARIABLE IN BLOCK AND STORE IN SYMBOL TABLE                COM       33
   27 CALL GNLE                                                         COM       34
      IF(JTYP .NE. 2) GO TO 60                                          COM       35
      CALL SEARCH                                                       COM       36
      IF(ISRCH(2) .EQ. 1) CALL ERROR(10,NXTID)                          COM       37
      IF(ISRCH(1) .EQ. 1) GO TO 28                                      COM       38
      IDTYP=1                                                           COM       39
      CALL STORE                                                        COM       40
      LOC=NID                                                           COM       41
C** CHECK VALIDITY AND SET "COMMON" FLAG                                COM       42
   28 IF(BITGET(IDTBL(3,LOC),12,1) .EQ. 1) CALL ERROR(17,NXTID)         COM       43
      IF(BITGET(IDTBL(3,LOC),16,1) .EQ. 1) CALL ERROR(53,NXTID)         COM       44
      IDTBL(3,LOC)=BITPUT(IDTBL(3,LOC),1,16)                            COM       45
      ICMSIZ=1                                                          COM       46
      IF(NEXT(JPTR) .NE. LPAR) GO TO 40                                 COM       47
      IF(BITGET(IDTBL(3,LOC),1,1) .NE. 0) GO TO 80                      COM       48
C** VARIABLE IS DIMENSIONED                                             COM       49
      I=0                                                               COM       50
   35 I=I+1                                                             COM       51
C** GET NEXT DIMENSION AND CHECK SIZE                                   COM       52
      CALL GNLE                                                         COM       53
      IF(JTYP .NE. 5) GO TO 60                                          COM       54
      IDIM(I)=N2                                                        COM       55
      ICMSIZ=ICMSIZ*N2                                                  COM       56
```

```
      IF(N2 .GT. (2**17-1) .OR. N2 .LE. 0) CALL ERROR(8)
      IF(NEXT(JPTR) .EQ. COMMA) GO TO 35
      IF(A(JPTR-1) .NE. RPAR) GO TO 60
      K=NEXT(JPTR)
C** SET "DIMENSIONED" FLAG
      IDTBL(3,LOC)=BITPUT(IDTBL(3,LOC),1,1)
      IF(I .GT. 3) GO TO 60
C** STORE NO. OF DIMENSIONS AND DIMENSION SIZES IN SYMBOL TABLE
      IDTBL(3,LOC)=BITPUT(IDTBL(3,LOC),I,7)
      IF(I-2) 34,32,30
   30 IDTBL(4,LOC)=BITPUT(IDTBL(4,LOC),IDIM(3),36)
   32 IDTBL(4,LOC)=BITPUT(IDTBL(4,LOC),IDIM(2),18)
   34 IDTBL(3,LOC)=BITPUT(IDTBL(3,LOC),IDIM(1),36)
   40 IF(IDTBL(5,ICMLOC) .EQ. 0) GO TO 45
C** SET POINTER FROM PREVIOUS VARIABLE TO PRESENT VARIABLE IN
C** COMMON LINK
      IDTBL(5,LSTLOC)=LOC
      GO TO 47
C** FIRST VARIABLE IN BLOCK, STORE LOCATION IN SYMBOL TABLE
   45 IDTBL(5,ICMLOC)=LOC
C** RESET COMMON BLOCK SIZE AND STORE
   47 IDTBL(4,ICMLOC)=IDTBL(4,ICMLOC)+ICMSIZ
C** RESET "LAST VARIABLE IN BLOCK" TO PRESENT VARIABLE
      IDTBL(6,ICMLOC)=LOC
C** STORE COMMON LOCATION TO ASSOCIATE THIS VARIABLE
C** WITH THAT COMMON BLOCK
      IDTBL(6,LOC)=ICMLOC
      LSTLOC=LOC
      IF(A(JPTR-1) .EQ. COMMA) GO TO 27
      IF(A(JPTR-1) .NE. SLASH) GO TO 50
C** END OF COMMON BLOCK, COMPLETE COMMON LINK
      IDTBL(5,LOC)=IDTBL(5,ICMLOC)
      GO TO 15
   50 IF(NEXT(JPTR) .NE. BLANK) GO TO 60
C** END OF COMMON BLOCK, COMPLETE COMMON LINK
      IDTBL(5,LOC)=IDTBL(5,ICMLOC)
      RETURN
   60 CALL ERROR(7)
      RETURN
   80 CALL ERROR(14,NXTID)
      RETURN
      END
```

```
      SUBROUTINE COMCHK                                                 COMCHK     2
      COMMON A(1326),D(500),IDTBL(8,500),INITID(3),LASTID(3),ISRCH(3),  RICH       2
     * JPTR,N,M,JTYP,LSTART,N2,IFNCNM,LOGID,NXTID,IDTYP,NID,LOC,        CY58A     80
     2 LTYP,ITYP,IBLKDT,MODE,IERR,IDES                                  RICH       4
      COMMON/LIST/NLIST,NINTFC,ISUBLT(2,200),INTFAC(300)                COMCHK     4
      COMMON/GLOBAL/NBLK,NREF,NSUBS,BLKTBL(200),EXTTBL(100),ISUBS(100)  COMCHK     5
      INTEGER BITGET,CMBLK(2,20),TP,SZ,PREVTP,BLKTBL                    COMCHK     6
      INTEGER SESCOM(13),SESERR                                         COMCHK     7
      DIMENSION ITPS(6),IORD(6)                                         COMCHK     8
      DATA IORD/1,2,5,4,3,6/                                            COMCHK     9
      DATA SESCOM/4HCASE,3HINA,3HINB,3HINC,3HIOX,5HNPAGX,4HLINX,3HIOY,  COMCHK    10
     $ 5HNPAGY,4HLINY,3HIOZ,5HNPAGZ,4HLINZ/                             COMCHK    11
C** THIS ROUTINE IS CALLED AFTER MODULE PROCESSING TO COMPLETE          COMCHK    12
C** THE PROCESSING OF COMMON BLOCKS                                     COMCHK    13
      SESERR=0                                                          COMCHK    14
      NSES=0                                                            COMCHK    15
      ICTGR2=0                                                          COMCHK    16
      IBLK=INITID(3)                                                    COMCHK    17
      MODCLS=0                                                          COMCHK    18
      LC2=BITGET(IDTBL(3,1),36,9)                                       COMCHK    19
      IF(LC2 .EQ. 0 .OR. IBLKDT .EQ. 1) GO TO 1                         COMCHK    20
      MODCLS=BITGET(ISUBLT(2,LC2),10,4)                                 COMCHK    21
    1 IF(IBLK .EQ. 0) GO TO 120                                         COMCHK    22
      IF(IDTBL(1,IBLK) .EQ. 1H ) GO TO 3                                COMCHK    23
C** GET SESCOMP LIST LOCATION OF COMMON BLOCK                           COMCHK    24
      LISTLC=BITGET(IDTBL(3,IBLK),36,9)                                 COMCHK    25
C** GET COMMON BLOCK CLASS                                              COMCHK    26
      KLAS=BITGET(ISUBLT(2,LISTLC),10,4)                                COMCHK    27
C** GET COMMON BLOCK SIZE                                               COMCHK    28
      ISZ=BITGET(ISUBLT(2,LISTLC),30,15)                                COMCHK    29
C** CHECK SIZE                                                          COMCHK    30
      IF(IDTBL(4,IBLK) .NE. ISZ) GO TO 70                               COMCHK    31
      GO TO 5                                                           COMCHK    32
C** BLANK COMMON                                                        COMCHK    33
    3 IF(MODCLS .NE. 1 .AND. MODCLS .NE. 2) GO TO 5                     COMCHK    34
C** IF CLASS 1 OR 2 - CHECK SIZE                                        COMCHK    35
      IBNKSZ=BITGET(ISUBLT(2,LC2),30,15)                                COMCHK    36
      IF(IDTBL(4,IBLK) .NE. IBNKSZ) CALL ERROR(58,2H//)                 COMCHK    37
    5 NBLOC=0                                                           COMCHK    38
      ISUM=0                                                            COMCHK    39
      NTP=0                                                             COMCHK    40
      TP=0                                                              COMCHK    41
      ICOMST=IDTBL(5,IBLK)                                              COMCHK    42
      LOC=ICOMST                                                        COMCHK    43
   10 PREVTP=TP                                                         COMCHK    44
C** GET TYPE OF NEXT VARIABLE IN COMMON BLOCK                           COMCHK    45
      IF(BITGET(IDTBL(3,LOC),11,1) .EQ. 1) GO TO 15                     COMCHK    46
      TP=1                                                              COMCHK    47
      IFST=BITGET(IDTBL(1,LOC),6,6)                                     COMCHK    48
      IF(IFST .LE. 14 .AND. IFST .GE. 9) TP=4                           COMCHK    49
      GO TO 18                                                          COMCHK    50
   15 TP=BITGET(IDTBL(3,LOC),10,3)                                      COMCHK    51
C** GET SIZE OF VARIABLE                                                COMCHK    52
   18 SZ=1                                                              COMCHK    53
      NDIM=BITGET(IDTBL(3,LOC),7,6)                                     COMCHK    54
      IF(NDIM .EQ. 0) GO TO 22                                          COMCHK    55
      DO 20 I=1,NDIM                                                    COMCHK    56
```

```
      NW=3+(I/2)                                                        COMCHK     57
      ICOL=18*(MOD(I,2)+1)                                              COMCHK     58
   20 SZ=SZ*BITGET(IDTBL(NW,LOC),ICOL,18)                               COMCHK     59
   22 IF(TP .NE. 2 .AND. TP .NE. 3) GO TO 25                            COMCHK     60
C** DOUBLE PRECISION OR COMPLEX VARIABLE                                COMCHK     61
C** CHECK THAT IT BEGINS ON EVEN LOCATION WITHIN COMMON BLOCK           COMCHK     62
      IF(MOD(ISUM,2) .NE. 0)CALL ERROR(64,IDTBL(1,LOC),IDTBL(1,IBLK))   COMCHK     63
      ISUM=ISUM+SZ                                                      COMCHK     64
   25 ISUM=ISUM+SZ                                                      COMCHK     65
C** CHECK FOR PROPER ORDER OF VARIABLES IN BLOCK DATA SUBROUTINE        COMCHK     66
      IF(IBLKDT .EQ. 1 .AND. IORD(PREVTP+1) .GT. IORD(TP+1))            COMCHK     67
     $ CALL ERROR(65,IDTBL(1,IBLK))                                     COMCHK     68
      IF(KLAS .EQ. 10 .OR. IDTBL(1,IBLK) .EQ. 1H ) GO TO 38             COMCHK     69
      IF(KLAS .EQ. 9) GO TO 35                                          COMCHK     70
      IF(KLAS .EQ. 7) GO TO 40                                          COMCHK     71
C** CATEGORY 2 COMMON BLOCK - CHECK THAT IT IS GROUPED BY TYPE          COMCHK     72
      ICTGR2=1                                                          COMCHK     73
      IF(TP .EQ. PREVTP) GO TO 35                                       COMCHK     74
      IF(PREVTP .EQ. 0) GO TO 32                                        COMCHK     75
      DO 30 I=1,NTP                                                     COMCHK     76
      IF(TP .EQ. ITPS(I)) GO TO 110                                     COMCHK     77
   30 CONTINUE                                                          COMCHK     78
   32 NTP=NTP+1                                                         COMCHK     79
      ITPS(NTP)=TP                                                      COMCHK     80
C** CHECK THAT VARIABLE WAS USED                                        COMCHK     81
   35 IF(IBLKDT .EQ. 1) GO TO 38                                        COMCHK     82
      IF(BITGET(IDTBL(3,LOC),38,1) .EQ. 0) CALL ERROR(75,IDTBL(1,LOC))  COMCHK     83
   38 LOC=IDTBL(5,LOC)                                                  COMCHK     84
      IF(LOC .NE. ICOMST) GO TO 10                                      COMCHK     85
      GO TO 65                                                          COMCHK     86
C** CATEGORY 1 COMMON BLOCK - STORE VARIABLE TYPES AND SIZES BY GROUP   COMCHK     87
   40 IF(TP .EQ. PREVTP) GO TO 45                                       COMCHK     88
      NBLOC=NBLOC+1                                                     COMCHK     89
      CMBLK(1,NBLOC)=TP                                                 COMCHK     90
      CMBLK(2,NBLOC)=0                                                  COMCHK     91
   45 CMBLK(2,NBLOC)=CMBLK(2,NBLOC)+SZ                                  COMCHK     92
      IF(IDTBL(1,IBLK) .NE. 6HSESCOM) GO TO 85                          COMCHK     93
C** CHECK VARIABLES IN COMMON BLOCK "SESCOM"                            COMCHK     94
      NSES=NSES+1                                                       COMCHK     95
      IF(NSES .GT. 13) GO TO 80                                         COMCHK     96
      IF(IDTBL(1,LOC) .EQ. SESCOM(NSES)) GO TO 85                       COMCHK     97
   80 SESERR=1                                                          COMCHK     98
   85 LOC=IDTBL(5,LOC)                                                  COMCHK     99
      IF(LOC .NE. ICOMST) GO TO 10                                      COMCHK    100
C** CHECK INTERFACE DEFINITION FOR COMMON BLOCK                         COMCHK    101
C** GET INTERFACE DEFINITION TABLE POINTERS                             COMCHK    102
      IPTR=BITGET(ISUBLT(2,LIST(LC),60,12)                              COMCHK    103
      NDPTR=IPTR+(NBLOC-1)/3                                            COMCHK    104
      KOUNT=0                                                           COMCHK    105
      NGRP=NBLOC                                                        COMCHK    106
C** THESE TWO LOOPS CHECK THE INTERFACE DEFINITION                      COMCHK    107
      DO 50 I=IPTR,NDPTR                                                COMCHK    108
      ICOL=0                                                            COMCHK    109
      DO 50 J=1,3                                                       COMCHK    110
      KOUNT=KOUNT+1                                                     COMCHK    111
      IF(KOUNT .GT. NBLOC) GO TO 65                                     COMCHK    112
      ICOL=ICOL+17                                                      COMCHK    113
```

```
C** GET GROUP SIZE                                                      COMCHK    114
      SZ=BITGET(INTFAC(I),ICOL,17)                                      COMCHK    115
      ICOL=ICOL+3                                                       COMCHK    116
C** GET GROUP TYPE                                                      COMCHK    117
      TP=BITGET(INTFAC(I),ICOL,3)                                       COMCHK    118
      IF(TP .NE. 0) GO TO 48                                            COMCHK    119
      CMBLK(2,KOUNT)=CMBLK(2,KOUNT)-SZ                                  COMCHK    120
      IF(CMBLK(2,KOUNT) .EQ. 0) GO TO 50                                COMCHK    121
      IF(CMBLK(2,KOUNT) .LT. 0) GO TO 90                                COMCHK    122
      KOUNT=KOUNT-1                                                     COMCHK    123
      NGRP=NGRP+1                                                       COMCHK    124
      GO TO 50                                                          COMCHK    125
C** CHECK INTERFACE DEFINITION FOR SIZE AND TYPE                        COMCHK    126
   48 IF(CMBLK(1,KOUNT) .NE. TP .OR. CMBLK(2,KOUNT) .NE. SZ) GO TO 90   COMCHK    127
   50 CONTINUE                                                          COMCHK    128
      IF(NGRP .NE. BITGET(ISUBLT(2,LISTLC),6,6)) GO TO 90               COMCHK    129
   65 IBLK=IDTBL(2,IBLK)                                                COMCHK    130
      GO TO 1                                                           COMCHK    131
   70 CALL ERROR(58,IDTBL(1,IBLK))                                      COMCHK    132
      GO TO 65                                                          COMCHK    133
   90 CALL ERROR(57,IDTBL(1,IBLK))                                      COMCHK    134
      GO TO 65                                                          COMCHK    135
  110 CALL ERROR(63,IDTBL(1,IBLK))                                      COMCHK    136
      GO TO 65                                                          COMCHK    137
C** CHECK THAT COMMON BLOCK "SESCOM" IS WELL DEFINED                    COMCHK    138
  120 IF(ICTGR2 .EQ. 0 .AND. (MODCLS .EQ. 1 .OR. MODCLS .EQ. 2))        COMCHK    139
     $ CALL ERROR(73)                                                   COMCHK    140
      IF(NSES .EQ. 0) GO TO 130                                         COMCHK    141
      IF(SESERR .EQ. 1 .OR. NSES .LT. 13) CALL ERROR(48)                COMCHK    142
      RETURN                                                            COMCHK    143
  130 CALL ERROR(66)                                                    COMCHK    144
      RETURN                                                            COMCHK    145
      END                                                               COMCHK    146
```

```
      SUBROUTINE COMEXT                                                 COMEXT      2
      COMMON A(1326),D(500),IDTBL(8,500),INITID(3),LASTID(3),ISRCH(3),  RICH       2
     * JPTR,N,M,JTYP,LSTART,N2,IFNCNM,LOGID,NXTID,IDTYP,NID,LOC,        CY58A      80
     2 LTYP,ITYP,IBLKDT,MODE,IERR,IOFS                                  RICH       4
      INTEGER BITGET                                                    COMEXT      4
C** THIS ROUTINE CHECKS TO SEE IF AN EQUIVALENCE STATEMENT              COMEXT      5
C** EXTENDS COMMON                                                      COMEXT      6
      ICOMLC=0                                                          COMEXT      7
C** GET COMMON INFORMATION FROM SYMBOL TABLE                            COMEXT      8
      ICOMNM=IDTBL(6,LOC)                                               COMEXT      9
      ICOMST=IDTBL(5,ICOMNM)                                            COMEXT     10
      ICOMND=IDTBL(6,ICOMNM)                                            COMEXT     11
      ICOMSZ=IDTBL(4,ICOMNM)                                            COMEXT     12
      NXTLOC=ICOMND                                                     COMEXT     13
C** THIS LOOP COMPUTES THE NUMBER OF COMMON LOCATIONS TO THE LEFT OF    COMEXT     14
C** THE EQUIVALENCED VARIABLE                                           COMEXT     15
      DO 20 I=1,ICOMSZ                                                  COMEXT     16
      NXTLOC=IDTBL(5,NXTLOC)                                            COMEXT     17
      MUL=1                                                             COMEXT     18
      ISZ=1                                                             COMEXT     19
C** GET VARIABLE TYPE                                                   COMEXT     20
      ITP=BITGET(IDTBL(3,NXTLOC),10,3)                                  COMEXT     21
C** IF COMPLEX OR DOUBLE PRECISION, SET MULTIPLIER TO 2                 COMEXT     22
      IF(ITP .EQ. 2 .OR. ITP .EQ. 3) MUL=2                              COMEXT     23
      IF(LOC .EQ. NXTLOC) GO TO 25                                      COMEXT     24
      IF(BITGET(IDTBL(3,NXTLOC),1,1) .EQ. 1) GO TO 10                   COMEXT     25
C** NON-DIMENSIONED VARIABLE                                            COMEXT     26
      GO TO 20                                                          COMEXT     27
   10 NDIM=BITGET(IDTBL(3,NXTLOC),7,6)                                  COMEXT     28
C** DIMENSIONED VARIABLE - GET SIZE OF ARRAY                            COMEXT     29
      DO 15 J=1,NDIM                                                    COMEXT     30
      IWRD=3+J/2                                                        COMEXT     31
      IPOS=(MOD(J,2)+1)*18                                              COMEXT     32
      ISZ=ISZ*BITGET(IDTBL(IWRD,NXTLOC),IPOS,18)                        COMEXT     33
   15 CONTINUE                                                          COMEXT     34
   20 ICOMLC=ICOMLC+ISZ*MUL                                             COMEXT     35
   25 ILFT=ICOMLC                                                       COMEXT     36
C** COMPUTE NUMBER OF COMMON LOCATIONS TO THE RIGHT OF THE              COMEXT     37
C** EQUIVALENCED VARIABLE                                               COMEXT     38
      IRHT=ICOMSZ-ICOMLC                                                COMEXT     39
      NXTLOC=LOC                                                        COMEXT     40
C** GET OFFSET OF EQUIVALENCED VARIABLE                                 COMEXT     41
      IOFFST=IDTBL(8,NXTLOC)                                            COMEXT     42
   30 NXTLOC=IDTBL(7,NXTLOC)                                            COMEXT     43
      IF(NXTLOC .EQ. LOC) RETURN                                        COMEXT     44
C** GET OFFSET OF NEXT VARIABLE IN EQUIVALENCE LINK                     COMEXT     45
      IOFF2=IDTBL(8,NXTLOC)                                             COMEXT     46
C** CHECK TO SEE IF COMMON WAS EXTENDED TO THE LEFT                     COMEXT     47
      IF((IOFFST-IOFF2) .GT. ILFT) GO TO 50                             COMEXT     48
      ITP=BITGET(IDTBL(3,NXTLOC),10,3)                                  COMEXT     49
      ISZ=1                                                             COMEXT     50
      IF(ITP .NE. 2 .AND. ITP .NE. 3) GO TO 32                          COMEXT     51
C** IF VARIABLE IS COMPLEX OR DOUBLE PRECISION, CHECK THAT IT BEGINS    COMEXT     52
C** ON AN EVEN LOCATION WITHIN COMMON BLOCK                             COMEXT     53
      IF(MOD((ILFT-IOFFST+IOFF2),2).NE. 0)CALL ERROR(64,IDTBL(1,NXTLOC)) COMEXT     54
      ISZ=2                                                             COMEXT     55
   32 IF(BITGET(IDTBL(3,NXTLOC),1,1) .NE. 1) GO TO 40                   COMEXT     56
```

```
      NDIM=BITGET(IDTBL(3,NXTLOC),7,6)                                  COMEXT     57
C** DIMENSIONED VARIABLE - GET SIZE OF ARRAY                            COMEXT     58
      DO 35 I=1,NDIM                                                    COMEXT     59
      IWRD=3+I/2                                                        COMEXT     60
      IPOS=(MOD(I,2)+1)*18                                              COMEXT     61
      ISUB=BITGET(IDTBL(IWRD,NXTLOC),IPOS,18)                           COMEXT     62
      ISZ=ISZ*ISUB                                                      COMEXT     63
   35 CONTINUE                                                          COMEXT     64
C** CHECK TO SEE IF COMMON WAS EXTENDED TO THE RIGHT                    COMEXT     65
   40 IF((ISZ-(IOFFST-IOFF2)) .GT. IRHT) GO TO 50                       COMEXT     66
      GO TO 30                                                          COMEXT     67
   50 CALL ERROR(47)                                                    COMEXT     68
      RETURN                                                            COMEXT     69
      END                                                               COMEXT     70
```

```
      SUBROUTINE COMSCH                                                 COMSCH      2
      COMMON A(1326),D(500),IDTBL(8,500),INITID(3),LASTID(3),ISRCH(3),  RICH        2
     * JPTR,N,M,JTYP,LSTART,N2,IFNCNM,LOGID,NXTID,IDTYP,NID,LOC,        CY58A      80
     2 LTYP,ITYP,IBLKDT,MODE,IERR,IDES                                  RICH        4
C** THIS ROUTINE SEARCHES THE SYMBOL TABLE FOR A COMMON BLOCK NAME      COMSCH      4
C** AND RETURNS        ISRCH(3)=1 - FOUND        =0 - NOT FOUND         COMSCH      5
C**                   LOC - SYMBOL TABLE LOCATION WHERE NAME WAS FOUND  COMSCH      6
      J=INITID(3)                                                       COMSCH      7
      IF(J .EQ. 0) GO TO 15                                             COMSCH      8
      DO 10 I=1,NID                                                     COMSCH      9
      IF(IDTBL(1,J) .NE. NXTID) GO TO 5                                 COMSCH     10
      ISRCH(3)=1                                                        COMSCH     11
      LOC=J                                                             COMSCH     12
      RETURN                                                            COMSCH     13
    5 J=IDTBL(2,J)                                                      COMSCH     14
      IF(J .EQ. 0) GO TO 15                                             COMSCH     15
   10 CONTINUE                                                          COMSCH     16
   15 ISRCH(3) =0                                                       COMSCH     17
      RETURN                                                            COMSCH     18
      END                                                               COMSCH     19
```

```
      SUBROUTINE CTGOTO                                                 CTGOTO     2
      COMMON A(1326),D(500),IDTBL(8,500),INITID(3),LASTID(3),ISRCH(3),  RICH       2
     * JPTR,N,M,JTYP,LSTART,N2,IFNCNM,LOGID,NXTID,IDTYP,NID,LOC,        CY58A     80
     2 LTYP,ITYP,IBLKDT,MODE,IERR,IDES                                  RICH       4
      COMMON/LABELS/STATRA(2,200),NLABEL                                CTGOTO     4
      COMMON/BASBLK/IBLOCK(2500),NBLOCK,NB,NBRNCH                       CY58A     28
      DIMENSION IALPH(4)                                                CTGOTO     6
      INTEGER STATRA,A,BLANK,RPAR,COMMA                                 CTGOTO     7
      INTEGER BITPUT,BITGET                                             CTGOTO     8
      DATA BLANK/1H /,COMMA/1H,/,LPAR/1H(/,RPAR/1H)/                    CTGOTO     9
      DATA (IALPH(I),I=1,4)/1HG,1HO,1HT,1HO/                            CTGOTO    10
C** COMPUTED GO TO STATEMENT PROCESSOR                                  CTGOTO    11
      DO 5 I=1,4                                                        CTGOTO    12
      IF(NEXT(JPTR) .NE. IALPH(I)) GO TO 30                             CTGOTO    13
    5 CONTINUE                                                          CTGOTO    14
      IF(NEXT(JPTR) .NE. LPAR) GO TO 30                                 CTGOTO    15
      NBLOCK=NBLOCK+1                                                   CTGOTO    16
      JBLOCK=NBLOCK                                                     CTGOTO    17
      NBRNCH=0                                                          CTGOTO    18
C** GET NEXT STATEMENT LABEL                                            CTGOTO    19
   10 CALL GNLE                                                         CTGOTO    20
      IF(JTYP .NE. 5) GO TO 30                                          CTGOTO    21
C** SEARCH STATEMENT NUMBER TABLE AND SET "GOTO" FLAG                   CTGOTO    22
      CALL STSRCH                                                       CTGOTO    23
      STATRA(2,LOC)=BITPUT(STATRA(2,LOC),1,12)                          CTGOTO    24
      IF(NBRNCH .EQ. 0) GO TO 15                                        CTGOTO    25
C** CHECK FOR POSSIBLE DUPLICATE BRANCHES                               CTGOTO    26
      DO 12 I=1,NBRNCH                                                  CTGOTO    27
      IF(LOC .EQ. IBLOCK(NBLOCK-I+1)) GO TO 17                          CTGOTO    28
   12 CONTINUE                                                          CTGOTO    29
C** STORE BRANCH IN BASIC BLOCK TABLE                                   CTGOTO    30
   15 NBLOCK=NBLOCK+1                                                   CTGOTO    31
      IBLOCK(NBLOCK)=LOC                                                CTGOTO    32
C** INCREMENT BRANCH COUNTER                                            CTGOTO    33
      NBRNCH=NBRNCH+1                                                   CTGOTO    34
   17 IF(NEXT(JPTR) .EQ. COMMA) GO TO 10                                CTGOTO    35
      IF(A(JPTR-1) .NE. RPAR) GO TO 30                                  CTGOTO    36
      IF(NEXT(JPTR) .NE. COMMA) GO TO 30                                CTGOTO    37
C** GET VARIABLE REFERENCE                                              CTGOTO    38
      CALL GNLE                                                         CTGOTO    39
      IF(JTYP .NE. 2) GO TO 30                                          CTGOTO    40
C** GET SYMBOL TABLE LOCATION                                           CTGOTO    41
      CALL SEARCH                                                       CTGOTO    42
      IF(ISRCH(2) .EQ. 1) CALL ERROR(10,NXTID)                          CTGOTO    43
      IF(ISRCH(1) .EQ. 1) GO TO 20                                      CTGOTO    44
      IDTYP=1                                                           CTGOTO    45
      CALL STORE                                                        CTGOTO    46
      LOC=NID                                                           CTGOTO    47
C** CHECK THAT REFERENCE IS INTEGER VARIABLE                            CTGOTO    48
   20 CALL IMPTYP                                                       CTGOTO    49
      IF(BITGET(IDTBL(3,LOC),10,3) .NE. 4) CALL ERROR(39,NXTID)         CTGOTO    50
      IF(BITGET(IDTBL(3,LOC),1,1) .EQ. 1) CALL ERROR(14,NXTID)          CTGOTO    51
      IF(NEXT(JPTR) .NE. BLANK) GO TO 30                                CTGOTO    52
C** STORE REFERENCE IN BASIC BLOCK TABLE                                CTGOTO    53
      IBLOCK(JBLOCK)=2000+LOC                                           CTGOTO    54
      NB=1                                                              CTGOTO    55
      RETURN                                                            CTGOTO    56
   30 CALL ERROR(7)                                                     CTGOTO    57
      RETURN                                                            CTGOTO    58
      END                                                               CTGOTO    59
```

```
      SUBROUTINE DATA                                                   DATA      2
      COMMON A(1326),D(500),IDTBL(8,500),INITID(3),LASTID(3),ISRCH(3),  RICH      2
     * JPTR,N,M,JTYP,LSTART,N2,IFNCNM,LOGID,NXTID,IDTYP,NID,LOC,        CY58A    80
     2 LTYP,ITYP,IBLKDT,MODE,IERR,IDES                                  RICH      4
      DIMENSION IALPH(4)                                                DATA      4
      INTEGER A,RPAR,COMMA,SLASH,BLANK,ASTRIK,PLUS                      DATA      5
      INTEGER BITPUT,BITGET                                             DATA      6
      DATA LPAR/1H(/,RPAR/1H)/,COMMA/1H,/,SLASH/1H//,BLANK/1H /,        DATA      7
     1   ASTRIK/1H*/,PLUS/1H+/,MINUS/1H-/                               DATA      8
      DATA (IALPH(I),I=1,4)/1HD,1HA,1HT,1HA/                            DATA      9
C** DATA STATEMENT PROCESSOR                                            DATA     10
      DO 5 I=1,4                                                        DATA     11
      IF(NEXT(JPTR) .NE. IALPH(I)) GO TO 60                             DATA     12
    5 CONTINUE                                                          DATA     13
    6 LST1SZ=0                                                          DATA     14
      LST2SZ=0                                                          DATA     15
    8 ISZ=1                                                             DATA     16
C** GET NEXT VARIABLE NAME                                              DATA     17
      CALL GNLE                                                         DATA     18
      IF(JTYP .NE. 2) GO TO 60                                          DATA     19
C** STORE IN SYMBOL TABLE                                               DATA     20
      CALL SEARCH                                                       DATA     21
      IF(ISRCH(2) .EQ. 1) CALL ERROR(10,NXTID)                          DATA     22
      IF(ISRCH(1) .EQ. 1) GO TO 9                                       DATA     23
      IDTYP=1                                                           DATA     24
      CALL STORE                                                        DATA     25
      LOC=NID                                                           DATA     26
    9 IF(BITGET(IDTBL(3,LOC),12,1) .EQ. 1) CALL ERROR(30,NXTID)         DATA     27
C** SET TYPE                                                            DATA     28
      CALL IMPTYP                                                       DATA     29
      IF(BITGET(IDTBL(3,LOC),16,1) .EQ. 0) GOTO 10                      DATA     30
C** VARIABLE IN COMMON - MUST BE BLOCK DATA SUBPROGRAM                  DATA     31
C** MUST ALSO BE LABELLED COMMON                                        DATA     32
      ICOMLC=IDTBL(6,LOC)                                               DATA     33
      IF(IBLKDT .EQ. 0 .OR. IDTBL(1,ICOMLC) .EQ. BLANK) CALL ERROR(28,  DATA     34
     *NXTID)                                                            DATA     35
   10 IF(NEXT(JPTR) .NE. LPAR) GO TO 25                                 DATA     36
      IF(BITGET(IDTBL(3,LOC),1,1) .EQ. 0) GO TO 90                      DATA     37
C** SUBSCRIPTED VARIABLE - GET NO. OF DIMENSIONS                        DATA     38
      NDIM=BITGET(IDTBL(3,LOC),7,6)                                     DATA     39
C** THIS LOOP CHECKS THE SUBSCRIPTS AGAINST THE ACTUAL DIMENSIONS       DATA     40
C** TO CHECK THEIR VALIDITY                                             DATA     41
      I=0                                                               DATA     42
   15 I=I+1                                                             DATA     43
      CALL GNLE                                                         DATA     44
      IF(JTYP .NE. 5) GO TO 60                                          DATA     45
      IF(N2 .LE. 0) CALL ERROR(8)                                       DATA     46
      IWRD=3+I/2                                                        DATA     47
      IPOS=18*MOD(I,2)+18                                               DATA     48
      IF(N2 .GT. BITGET(IDTBL(IWRD, LOC),IPOS,18)) CALL ERROR(18)       DATA     49
      IF(NEXT(JPTR) .EQ. COMMA) GO TO 15                                DATA     50
      IF(I .NE. NDIM) GO TO 80                                          DATA     51
      IF(A(JPTR-1) .NE. RPAR) GO TO 80                                  DATA     52
      GO TO 35                                                          DATA     53
C** NON-SUBSCRIPTED VARIABLE                                            DATA     54
   25 JPTR=JPTR-1                                                       DATA     55
      IF(BITGET(IDTBL(3,LOC),1,1) .EQ. 0) GO TO 35                      DATA     56
```

```
C** ARRAY NAME                                                          DATA
      NDIM=BITGET(IDTBL(3,LOC),7,6)                                     DATA
C** THIS LOOP CALCULATES THE SIZE OF THE ARRAY                           DATA
      DO 30 I=1,NDIM                                                    DATA
      IWRD=3+I/2                                                        DATA
      IPOS=18*MOD(I,2)+18                                               DATA
   30 ISZ=ISZ*BITGET(IDTBL(IWRD,LOC),IPOS,18)                           DATA
      IF(BITGET(IDTBL(3,LOC),14,1) .EQ. 1) CALL ERROR(29,IDTBL(1,LOC))  DATA
C** INCREMENT VARIABLE LIST SIZE BY APPROPRIATE AMOUNT                  DATA
   35 LST1SZ=LST1SZ+ISZ                                                 DATA
C** SET "DATA" FLAG                                                     DATA
      IDTBL(3,LOC)=BITPUT(IDTBL(3,LOC),1,14)                            DATA
      IF(NEXT(JPTR) .EQ. COMMA) GO TO 8                                 DATA
      IF(A(JPTR-1) .NE. SLASH) GO TO 60                                 DATA
C** SLASH ENCOUNTERED - END OF VARIABLE LIST                             DATA
   40 NRPEAT=1                                                          DATA
      CALL GNLE                                                         DATA
C** GET NEXT CONSTANT                                                   DATA
      IF(JTYP .EQ. 3) GO TO 47                                          DATA
      IF(JTYP .NE. 5) GO  TO 45                                         DATA
C** INTEGER - MAY BE A REPEAT COUNT                                     DATA
      IF(NEXT(JPTR) .NE. ASTRIK) GO TO 50                               DATA
C** REPEAT COUNT - SET VALUE                                            DATA
      NRPEAT=N2                                                         DATA
C** GET NEXT CONSTANT                                                   DATA
      CALL GNLE                                                         DATA
C** CONSTANT MAY BE PRECEDED BY PLUS OR MINUS                            DATA
   45 IF(A(JPTR-1) .NE. PLUS .AND. A(JPTR-1) .NE. MINUS) GO TO 47       DATA
C** PLUS OR MINUS FOUND, GET NEXT CHARACTER                              DATA
      CALL GNLE                                                         DATA
   47 KK=NEXT(JPTR)                                                     DATA
   50 IF(JTYP .GE. 3.AND. JTYP .LE. 6) GO TO 55                         DATA
      IF(JTYP .EQ. 7 .AND. (LOGID .EQ. 10 .OR. LOGID .EQ. 11)) GO TO 35 DATA
      GO TO 70                                                          DATA
   55 LST2SZ=LST2SZ+NRPEAT                                              DATA
C** INCREMENT CONSTANT LIST SIZE                                        DATA
      IF(A(JPTR-1) .EQ. COMMA) GO TO 40                                 DATA
      IF(A(JPTR-1) .NE. SLASH) GO TO 60                                 DATA
C** COMPARE SIZE OF CONSTANT LIST WITH SIZE OF VARIABLE LIST             DATA
      IF(LST1SZ .NE. LST2SZ) CALL ERROR(31)                             DATA
      IF(NEXT(JPTR) .EQ. COMMA) GO TO 6                                 DATA
      IF(A(JPTR-1) .NE. BLANK) GO TO 60                                 DATA
      RETURN                                                            DATA
   60 CALL ERROR(7)                                                     DATA
      RETURN                                                            DATA
   70 CALL ERROR(23)                                                    DATA
      RETURN                                                            DATA
   80 CALL EPROR(19)                                                    DATA
      RETURN                                                            DATA
   90 CALL ERROR(13,IDTBL(1,LOC))                                       DATA
      RETURN                                                            DATA
      END                                                               DATA
```

```
      SUBROUTINE DESCRP                                                 DESCRP     2
      COMMON A(1326),D(500),IDTBL(8,500),INITID(3),LASTID(3),ISRCH(3),  RICH      2
     * JPTR,N,M,JTYP,LSTART,N2,IFNCNM,LOGID,NXTID,IDTYP,NID,LOC,        CY58A     80
     2 LTYP,ITYP,IBLKDT,MODE,IERR,IDES                                  RICH      4
      COMMON/FORMAT/IDESST,IDESND,IGPST,IGPND,IGRP,SEPST,SEPND,         CY58A      5
     1 DIR,ICOM,ISEP                                                    DESCRP     5
      DIMENSION FORMT(7)                                                DESCRP     6
      INTEGER A,FORMT,DECPT,BLANK,PEE,EX,AICH                           DESCRP     7
      DATA (FORMT(I),I=1,7)/1HF,1HE,1HG,1HD,1HI,1HL,1HA/                DESCRP     8
      DATA DECPT/1H./,BLANK/1H /,PEE/1HP/,EX/1HX/,AICH/1HH/,MINUS/1H-/  DESCRP     9
C** THIS ROUTINE CHECKS THE SYNTAX OF A FIELD DESCRIPTOR AND RETURNS    DESCRP    10
C**       IDES=1 - VALID                                                DESCRP    11
C**       IDES=0 - INVALID                                              DESCRP    12
      ISCLFC=0                                                          DESCRP    13
      INT=0                                                             DESCRP    14
      IMINUS=0                                                          DESCRP    15
      IDES=1                                                            DESCRP    16
      IF(NEXT(IDESST) .NE. MINUS) GO TO 5                               DESCRP    17
C** MINUS SIGN FOUND, SCALE FACTOR SHOULD FOLLOW                        DESCRP    18
      IMINUS=1                                                          DESCRP    19
      GO TO 6                                                           DESCRP    20
    5 JPTR=IDESST                                                       DESCRP    21
    6 CONTINUE                                                          DESCRP    22
      CALL GNLE                                                         DESCRP    23
      IF(JTYP .EQ. 3) GO TO 80                                          DESCRP    24
      IF(JTYP .EQ. 5) GO TO 10                                          DESCRP    25
      IF(JTYP .NE. 2) GO TO 15                                          DESCRP    26
      IF(NXTID .EQ. PEE .AND. ISCLFC .EQ. 0) GO TO 20                   DESCRP    27
      IF(INT .EQ. 1 .AND. N2 .LT. 1) GO TO 15                           DESCRP    28
      IF(ISCLFC .EQ. 0 .AND. IMINUS .EQ. 1) GO TO 15                    DESCRP    29
      GO TO 25                                                          DESCRP    30
   10 INT=1                                                             DESCRP    31
      GO TO 6                                                           DESCRP    32
C** INTEGER FOUND                                                       DESCRP    33
   15 IDES=0                                                            DESCRP    34
      RETURN                                                            DESCRP    35
   20 IF(INT .EQ. 0) GO TO 15                                           DESCRP    36
C** SCALE FACTOR FOUND                                                  DESCRP    37
      ISCLFC=1                                                          DESCRP    38
      INT=0                                                             DESCRP    39
      GO TO 6                                                           DESCRP    40
C** GET TYPE OF FIELD DESCRIPTOR                                        DESCRP    41
   25 DO 30 I=1,7                                                       DESCRP    42
      IF(NXTID .EQ. FORMT(I)) GO TO 45                                  DESCRP    43
   30 CONTINUE                                                          DESCRP    44
      IF(NXTID .NE. EX .OR. ISCLFC .EQ. 1 .OR. INT .EQ. 0) GO TO 15     DESCRP    45
      GO TO 80                                                          DESCRP    46
   45 CALL GNLE                                                         DESCRP    47
C** GET FIELD WIDTH                                                     DESCRP    48
      IF(JTYP .NE. 5) GO TO 15                                          DESCRP    49
      NWIDTH=N2                                                         DESCRP    50
      IF(I .LE. 4) GO TO 60                                             DESCRP    51
C** FIELD TYPE IS I,L, OR A                                             DESCRP    52
      IF(ISCLFC .EQ. 1 .OR. NWIDTH .LT. 1 .OR. (I .EQ. 7 .AND. NWIDTH   DESCRP    53
     $ .GT. 4)) GO TO 15                                                DESCRP    54
      IDESND=JPTR-1                                                     DESCRP    55
      RETURN                                                            DESCRP    56
C** FIELD TYPE IS F,E,G OR D                                            DESCRP    57
   60 IF(NEXT(JPTR) .NE. DECPT) GO TO 15                                DESCRP    58
      IF(NWIDTH .LT. 2) GO TO 15                                        DESCRP    59
      CALL GNLE                                                         DESCRP    60
      IF(JTYP .NE. 5) GO TO 15                                          DESCRP    61
C** GET NUMBER OF DECIMAL PLACES                                        DESCRP    62
      NDCPLS=N2                                                         DESCRP    63
      IDESND=JPTR-1                                                     DESCRP    64
      IF(I .EQ. 1) GO TO 65                                             DESCRP    65
C** CHECK VALIDITY OF FIELD DESCRIPTOR SIZE                             DESCRP    66
      IF(NWIDTH .LT. (NDCPLS+6)) GO TO 15                               DESCRP    67
      RETURN                                                            DESCRP    68
   65 IF(NWIDTH .LT. NDCPLS) GO TO 15                                   DESCRP    69
      RETURN                                                            DESCRP    70
   80 IDESND=JPTR-1                                                     DESCRP    71
      RETURN                                                            DESCRP    72
      END                                                               DESCRP    73
```

```
      SUBROUTINE DIMEN                                                  DIMEN      2
      COMMON A(13261),D(500),IDTBL(8,500),INITID(3),LASTID(3),ISRCH(3),  RICH       2
     * JPTR,N,M,JTYP,LSTART,N2,IFNCNM,LOGID,NXTID,IDTYP,NID,LOC,        CY58A     80
     2 LTYP,ITYP,IBLKDT,MODE,IERR,IDES                                  RICH       4
      DIMENSION IALPH(9),IDIM(3)                                        DIMEN      4
      INTEGER A,D,RPAR,COMMA                                            DIMEN      5
      INTEGER BITPUT,BITGET,COMLOC                                      DIMEN      6
      DATA (IALPH(I),I=1,9)/1HD,1HI,1HM,1HE,1HN,1HS,1HI,1HO,1HN/        DIMEN      7
      DATA LPAR/1H(/,RPAR/1H)/,COMMA/1H,/                               DIMEN      8
C** DIMENSION STATEMENT PROCESSOR                                       DIMEN      9
C** CHECK SPELLING                                                      DIMEN     10
      DO 10 I=1,9                                                       DIMEN     11
      IF(NEXT(JPTR) .NE. IALPH(I)) GO TO 110                            DIMEN     12
   10 CONTINUE                                                          DIMEN     13
C** GET NEXT DIMENSIONED VARIABLE AND STORE IN SYMBOL TABLE              DIMEN     14
   12 CALL GNLE                                                         DIMEN     15
      IF(JTYP .NE. 2) GO TO 110                                         DIMEN     16
      CALL SEARCH                                                       DIMEN     17
      IF(ISRCH(2) .EQ. 1) CALL ERROR(10,NXTID)                          DIMEN     18
      IF(ISRCH(1) .EQ. 1) GO TO 5                                       DIMEN     19
      IDTYP=1                                                           DIMEN     20
      CALL STORE                                                        DIMEN     21
      LOC=NID                                                           DIMEN     22
C** IF PREVIOUSLY DIMENSIONED, ISSUE DIAGNOSTIC                         DIMEN     23
    5 IF(BITGET(IDTBL(3,LOC),1,1) .NE. 0) CALL ERROR(11,NXTID)          DIMEN     24
C** SET TYPE                                                            DIMEN     25
      CALL IMPTYP                                                       DIMEN     26
C** SET "DIMENSIONED" FLAG                                              DIMEN     27
      IDTBL(3,LOC)=BITPUT(IDTBL(3,LOC),1,1)                             DIMEN     28
      IE=LOC                                                            DIMEN     29
      IF(NEXT(JPTR) .NE. LPAR) GO TO 110                                DIMEN     30
      INCR=1                                                            DIMEN     31
      I=0                                                               DIMEN     32
   15 I=I+1                                                             DIMEN     33
C** GET NEXT DIMENSION                                                  DIMEN     34
      CALL GNLE                                                         DIMEN     35
      IF(JTYP .NE. 5) GO TO 13                                          DIMEN     36
C** DIMENSION IS A CONSTANT, CHECK SIZE                                 DIMEN     37
      IDIM(I)=N2                                                        DIMEN     38
      IF(N2 .GT. (2**17-1) .OR. N2 .LE. 0) CALL ERROR(8)                DIMEN     39
      INCR=INCR*N2                                                      DIMEN     40
      GO TO 14                                                          DIMEN     41
   13 IF(JTYP .NE. 2) GO TO 110                                         DIMEN     42
C** VARIABLE DIMENSION, STORE IN SYMBOL TABLE AND CHECK VALIDITY        DIMEN     43
      IDTYP=1                                                           DIMEN     44
      CALL SEARCH                                                       DIMEN     45
      IF(ISRCH(2) .NE. 0) CALL ERROR(10,NXTID)                          DIMEN     46
      IF(ISRCH(1) .EQ. 1) GOTO 25                                       DIMEN     47
      IDTYP=1                                                           DIMEN     48
      CALL STORE                                                        DIMEN     49
      LOC=NID                                                           DIMEN     50
   25 IF(BITGET(IDTBL(3,LOC),12,1) .NE. 1) CALL ERROR(9)                DIMEN     51
      IF(BITGET(IDTBL(3,LOC),1,1) .NE. 0) GO TO 120                     DIMEN     52
C** SET "VARIABLE DIMENSION" FLAG                                       DIMEN     53
      IDTBL(3,LOC)=BITPUT(IDTBL(3,LOC),1,13)                            DIMEN     54
C** SET TYPE AND MAKE SURE IT IS INTEGER                                DIMEN     55
      CALL IMPTYP                                                       DIMEN     56
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      IF(BITGET(IDTBL(3,LOC),10,3) .NE. 4) CALL ERROR(9)                DIMEN     57
      IDIM(I)=2**17+LOC                                                 DIMEN     58
   14 IF(NEXT(JPTR) .EQ. COMMA) GO TO 15                                DIMEN     59
      IF(A(JPTR-1) .NE. RPAR) GO TO 110                                 DIMEN     60
      LOC=IE                                                            DIMEN     61
C** STORE NO. OF DIMENSIONS                                             DIMEN     62
      IDTBL(3,LOC)=BITPUT(IDTBL(3,LOC),I,7)                             DIMEN     63
      IF(I .GT. 3) GO TO 110                                            DIMEN     64
      IF(I-2) 35,30,24                                                  DIMEN     65
   24 IDTBL(4,LOC)=BITPUT(IDTBL(4,LOC),IDIM(3),36)                      DIMEN     66
C** STORE DIMENSION SIZES                                               DIMEN     67
   30 IDTBL(4,LOC)=BITPUT(IDTBL(4,LOC),IDIM(2),18)                      DIMEN     68
   35 IDTBL(3,LOC)=BITPUT(IDTBL(3,LOC),IDIM(1),36)                      DIMEN     69
      IF(BITGET(IDTBL(3,LOC),16,1) .NE. 1) GO TO 50                     DIMEN     70
C** VARIABLE IN COMMON, RESET COMMON BLOCK SIZE                         DIMEN     71
      COMLOC=IDTBL(6,LOC)                                               DIMEN     72
      IT=1                                                              DIMEN     73
      ITP=BITGET(IDTBL(3,LOC),10,3)                                     DIMEN     74
      IF(ITP .EQ. 2 .OR. ITP .EQ. 3) IT=2                               DIMEN     75
      IDTBL(4,COMLOC)=IDTBL(4,COMLOC)+IT*(INCR-1)                       DIMEN     76
   50 CONTINUE                                                          DIMEN     77
      IF(NEXT(JPTR) .EQ. COMMA) GO TO 12                                DIMEN     78
      IF(JPTR .GT. N) RETURN                                            DIMEN     79
  110 CALL ERROR(7)                                                     DIMEN     80
      RETURN                                                            DIMEN     81
  120 CALL ERROR(14,NXTID)                                              DIMEN     82
      RETURN                                                            DIMEN     83
      END                                                               DIMEN     84
```

```
      SUBROUTINE DO                                                     DO        2
      COMMON A(1326),D(500),IDTBL(8,500),INITID(3),LASTID(3),ISRCH(3),  RICH      2
     * JPTR,N,M,JTYP,LSTART,N2,IFNCNM,LOGID,NXTID,IDTYP,NID,LOC,        CY58A    80
     2 LTYP,ITYP,IBLKDT,MODE,IERR,INES                                  RICH      4
      COMMON/LABELS/STATRA(2,200),NLABEL                                DO        4
      COMMON/DOLOOP/ISTACK(4,50),NSTACK,ILOOP,IOVFLW                    DO        5
      COMMON/BASBLK/IBLOCK(2500),NBLOCK,NB,NBRNCH                       CY58A    31
      DIMENSION PARAM(3)                                                DO        7
      INTEGER A,BLANK,COMMA,EQUALS,DEE,OH,PARAM,STATRA                  DO        8
      INTEGER BITPUT,BITGET                                             DO        9
      DATA BLANK/1H /,COMMA/1H,/,EQUALS/1H=/,DEE/1HD/,OH/1HO/           DO       10
C** DO STATEMENT PROCESSOR                                              DO       11
      IF(NEXT(JPTR) .NE. DEE) GO TO 50                                  DO       12
      IF(NEXT(JPTR) .NE. OH) GO TO 50                                   DO       13
C** GET DO TERMINAL                                                     DO       14
      CALL GNLE                                                         DO       15
      IF(JTYP .NE. 5) GOTO 50                                           DO       16
C** SEARCH STATEMENT NUMBER TABLE                                       DO       17
      CALL STSRCH                                                       DO       18
C** SET FLAGS                                                           DO       19
      STATRA(2,LOC)=BITPUT(STATRA(2,LOC),1,12)                          DO       20
      STATRA(2,LOC)=BITPUT(STATRA(2,LOC),1,15)                          DO       21
      IF(IOVFLW .EQ. 1) GO TO 2                                         DO       22
C** INCREMENT DO STACK COUNTER                                          DO       23
      NSTACK=NSTACK+1                                                   DO       24
      IF(NSTACK .GT. 50) GO TO 1                                        DO       25
C** STORE DO TERMINAL AND "CURRENT LOOP" IN DO STACK                    DO       26
      ISTACK(1,NSTACK)=LOC                                              DO       27
      ISTACK(2,NSTACK)=0                                                DO       28
      ISTACK(3,NSTACK)=ILOOP                                            DO       29
C** RESET VALUE OF CURRENT LOOP                                         DO       30
      ILOOP=NSTACK                                                      DO       31
      GO TO 2                                                           DO       32
    1 IOVFLW=1                                                          DO       33
      WRITE(6,60)                                                       DO       34
   60 FORMAT(///5X,50H DO STACK OVERFLOW - DO LOOP PROCESSING TERMINATED DO       35
     *)                                                                 DO       36
C** GET DO INDEX                                                        DO       37
    2 CALL GNLE                                                         DO       38
      IF(JTYP .NE. 2) GO TO 50                                          DO       39
C** GET SYMBOL TABLE LOCATION                                           DO       40
      CALL SEARCH                                                       DO       41
      IF(ISRCH(2) .EQ. 1) CALL ERROR(10,NXTID)                          DO       42
      IF(ISRCH(1) .EQ. 1) GO TO 5                                       DO       43
      IDTYP=1                                                           DO       44
      CALL STORE                                                        DO       45
      LOC=NID                                                           DO       46
C** CHECK THAT INDEX IS AN INTEGER VARIABLE                             DO       47
    5 CALL IMPTYP                                                       DO       48
      IF(BITGET(IDTBL(3,LOC),10,3) .NE. 4) CALL ERROR(40,NXTID)         DO       49
      IF(BITGET(IDTBL(3,LOC),1,1) .EQ. 1) CALL ERROR(14,NXTID)          DO       50
      IF(NEXT(JPTR) .NE. EQUALS) GO TO 50                               DO       51
      IF(IOVFLW .EQ. 1) GO TO 8                                         DO       52
C** STORE DO INDEX IN BASIC BLOCK TABLE                                 DO       53
      NBLOCK=NBLOCK+1                                                   DO       54
      IBLOCK(NBLOCK)=3000+LOC                                           DO       55
C** STORE DO INDEX IN DO STACK                                          DO       56
```

```
      ISTACK(4,NSTACK)=LOC                                              DO        57
    8 PARAM(3)=1                                                        DO        58
C** GET NEXT DO PARAMETER                                               DO        59
      DO 30 I=1,3                                                       DO        60
      CALL GNLE                                                         DO        61
      IF(JTYP .NE. 5) GO TO 10                                          DO        62
C** DO PARAMETER IS AN INTEGER - STORE VALUE                            DO        63
      PARAM(I)=N2                                                       DO        64
      IF(N2 .LE. 0) CALL ERROR(41)                                      DO        65
      GO TO 20                                                          DO        66
   10 IF(JTYP .NE. 2) GO TO 50                                          DO        67
C** DO PARAMETER IS A VARIABLE - GET SYMBOL TABLE LOCATION              DO        68
      CALL SEARCH                                                       DO        69
      IF(ISRCH(2) .EQ. 1) CALL ERROR(10,NXTID)                          DO        70
      IF(ISRCH(1) .EQ. 1) GO TO 15                                      DO        71
      IDTYP=1                                                           DO        72
      CALL STORE                                                        DO        73
      LOC=NID                                                           DO        74
C** CHECK THAT IT IS AN INTEGER                                         DO        75
   15 CALL IMPTYP                                                       DO        76
      IF(BITGET(IDTBL(3,LOC),10,3) .NE. 4) CALL ERROR(40,NXTID)         DO        77
      IF(BITGET(IDTBL(3,LOC),1,1) .EQ. 1) CALL ERROR(14,NXTID)          DO        78
C** STORE DO PARAMETER IN BASIC BLOCK TABLE                             DO        79
      NBLOCK=NBLOCK+1                                                   DO        80
      IBLOCK(NBLOCK)=7000+LOC                                           DO        81
C** STORE LOOP IN SYMBOL TABLE                                          DO        82
      IDTBL(3,LOC)=BITPUT(IDTBL(3,LOC),ILOOP,36)                        DO        83
      PARAM(I)=0                                                        DO        84
   20 IF(I .EQ. 3) GO TO 30                                             DO        85
      IF(I .EQ. 1) GO TO 25                                             DO        86
      IF(NEXT(JPTR) .EQ. BLANK) GO TO 35                                DO        87
      JPTR=JPTR-1                                                       DO        88
   25 IF(NEXT(JPTR) .NE. COMMA) GO TO 50                                DO        89
   30 CONTINUE                                                          DO        90
      IF(NEXT(JPTR) .NE. BLANK) GO TO 50                                DO        91
C** CHECK SIZES OF DO PARAMETERS                                        DO        92
   35 IF(PARAM(1) .EQ. 0 .OR. PARAM(2) .EQ. 0) GO TO 40                 DO        93
      IF(PARAM(2) .LT. PARAM(1)) CALL ERROR(41)                         DO        94
      IF(PARAM(3) .EQ. 0) GO TO 40                                      DO        95
      IF((PARAM(2)+PARAM(3)-1) .GT. (2**17-2)) CALL ERROR(41)           DO        96
C** STORE BRANCH IN BASIC BLOCK TABLE                                   DO        97
   40 NBLOCK=NBLOCK+1                                                   DO        98
      IBLOCK(NBLOCK)=998                                                DO        99
      NBRNCH=1                                                          DO       100
      NB=1                                                              DO       101
      RETURN                                                            DO       102
   50 CALL ERROR(7)                                                     DO       103
      RETURN                                                            DO       104
      END                                                               DO       105
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      SUBROUTINE EQUIV                                                  EQUIV      2
      COMMON A(1326),D(500),IDTBL(8,500),INITID(3),LASTID(3),ISRCH(3),  RICH       2
     * JPTR,N,M,JTYP,LSTART,N2,IFNCNM,LOGID,NXTID,IDTYP,NID,LOC,        CY58A     80
     2 LTYP,ITYP,IBLKDT,MODE,IERR,IDES                                  RICH       4
      DIMENSION IALPH(11),IDIM(3),ISUB(3)                               EQUIV      4
      INTEGER BITPUT,BITGET                                             EQUIV      5
      INTEGER A,RPAR,COMMA,BOFFST,BLANK                                 EQUIV      6
      DATA (IALPH(I),I=1,11)/1HE,1HQ,1HU,1HI,1HV,1HA,1HL,1HE,1HN,1HC,   EQUIV      7
     1 1HE/                                                             EQUIV      8
      DATA LPAR/1H(/,RPAR/1H)/,COMMA/1H,/,BLANK/1H /                    EQUIV      9
C** EQUIVALENCE STATEMENT PROCESSOR                                     EQUIV     10
      DO 5 I=1,11                                                       EQUIV     11
      IF(NEXT(JPTR) .NE. IALPH(I)) GO TO 130                            EQUIV     12
    5 CONTINUE                                                          EQUIV     13
    8 IF(NEXT(JPTR) .NE. LPAR) GO TO 130                                EQUIV     14
      LSTLOC=0                                                          EQUIV     15
      BOFFST=0                                                          EQUIV     16
      J=0                                                               EQUIV     17
  120 J=J+1                                                             EQUIV     18
C** GET NEXT VARIABLE AND STORE IN SYMBOL TABLE                         EQUIV     19
      CALL GNLE                                                         EQUIV     20
      ILOC=1                                                            EQUIV     21
      IF(JTYP .NE. 2) GO TO 130                                         EQUIV     22
      CALL SEARCH                                                       EQUIV     23
      IF(ISRCH(2) .EQ. 1) CALL ERROR(10,NXTID)                          EQUIV     24
      IF(ISRCH(1) .EQ. 1) GO TO 9                                       EQUIV     25
      IDTYP=1                                                           EQUIV     26
      CALL STORE                                                        EQUIV     27
      LOC=NID                                                           EQUIV     28
    9 CALL IMPTYP                                                       EQUIV     29
      IF(BITGET(IDTBL(3,LOC),12,1) .EQ. 1) CALL ERROR(20,NXTID)         EQUIV     30
      IF(NEXT(JPTR) .NE. LPAR) GO TO 30                                 EQUIV     31
      IF(BITGET(IDTBL(3,LOC),1,1) .NE. 1) GO TO 150                     EQUIV     32
C** SUBSCRIPTED VARIABLE                                                EQUIV     33
      NDIM=BITGET(IDTBL(3,LOC),7,6)                                     EQUIV     34
      DO 10 I=1,NDIM                                                    EQUIV     35
C** GET NEXT SUBSCRIPT                                                  EQUIV     36
      CALL GNLE                                                         EQUIV     37
      IF(JTYP .NE. 5) GO TO 130                                         EQUIV     38
      IDIM(I)=N2                                                        EQUIV     39
      IF(N2 .LE. 0) CALL ERROR(8)                                       EQUIV     40
      IWRD=3+I/2                                                        EQUIV     41
      IPOS=18*MOD(I,2)+18                                               EQUIV     42
C** GET CORRESPONDING DIMENSION FROM SYMBOL TABLE                       EQUIV     43
      ISUB(I)=BITGET(IDTBL(IWRD,LOC),IPOS,18)                           EQUIV     44
      IF(N2 .GT. ISUB(I)) CALL ERROR(18)                                EQUIV     45
      IF(NEXT(JPTR) .EQ. COMMA) GO TO 10                                EQUIV     46
      IF(A(JPTR-1) .NE. RPAR) GO TO 130                                 EQUIV     47
      GO TO 15                                                          EQUIV     48
   10 CONTINUE                                                          EQUIV     49
      GO TO 140                                                         EQUIV     50
C** CALCULATE DISTANCE OF SUBSCRIPT FROM BEGINNING OF ARRAY             EQUIV     51
   15 NDIM=I                                                            EQUIV     52
      ILOC=IDIM(1)                                                      EQUIV     53
      IF(NDIM .EQ. 1) GO TO 25                                          EQUIV     54
      ILOC=ILOC+(IDIM(2)-1)*ISUB(1)                                     EQUIV     55
      IF(NDIM .EQ. 2) GO TO 25                                          EQUIV     56
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      ILOC=ILOC+(IDIM(3)-1)*ISUB(1)*ISUB(2)                             EQUIV     57
   25 IT=BITGET(IDTBL(3,LOC),10,3)                                      EQUIV     58
C** ADJUST DISTANCE IF DOUBLE PREC. OR COMPLEX                          EQUIV     59
      IF(IT .EQ. 2 .OR. IT .EQ. 3) ILOC=2*ILOC                          EQUIV     60
C** CALCULATE OFFSET OF VARIABLE FROM BEGINNING OF EQUIVALENCE LINK     EQUIV     61
      IOFFST=1-ILOC-BOFFST                                              EQUIV     62
      GO TO 45                                                          EQUIV     63
   30 IF(BITGET(IDTBL(3,LOC),1,1) .NE. 0) CALL ERROR(14,NXTID)          EQUIV     64
C** NON-SUBSCRIPTED VARIABLE, SET OFFSET=BASE OFFSET                    EQUIV     65
      IOFFST=BOFFST                                                     EQUIV     66
      JPTR=JPTR-1                                                       EQUIV     67
   45 IF(BITGET(IDTBL(3,LOC),17,1) .EQ. 1) GO TO 57                     EQUIV     68
C** VARIABLE NOT PREVIOUSLY EQUIVALENCED,SET "EQUIVALENCED" FLAG        EQUIV     69
      IDTBL(3,LOC)=BITPUT(IDTBL(3,LOC),1,17)                            EQUIV     70
C** BRANCH IF NO VARIABLES YET IN EQUIVALENCE LINK                      EQUIV     71
      IF(LSTLOC .EQ. 0) GO TO 50                                        EQUIV     72
C** SET POINTER FROM PREVIOUS VARIABLE TO PRESENT VARIABLE              EQUIV     73
      IDTBL(7,LSTLOC)=LOC                                               EQUIV     74
      GO TO 55                                                          EQUIV     75
C** SET BEGINNING OF EQUIVALENCE LINK                                   EQUIV     76
   50 IFSTLC=LOC                                                        EQUIV     77
C** STORE OFFSET OF VARIABLE IN SYMBOL TABLE                            EQUIV     78
   55 IDTBL(8,LOC)=IOFFST                                               EQUIV     79
C** RESET "LAST VARIABLE IN LINK" TO PRESENT VARIABLE                   EQUIV     80
      LSTLOC=LOC                                                        EQUIV     81
C** IF FIRST VARIABLE IN LINK, PROCESSING DONE                          EQUIV     82
      IF(J .NE. 1) GO TO 100                                            EQUIV     83
      GO TO 98                                                          EQUIV     84
C** VARIABLE HAS BEEN PREVIOUSLY EQUIVALENCED                           EQUIV     85
   57 LOC3=LOC                                                          EQUIV     86
   58 LOC3=IDTBL(7,LOC3)                                                EQUIV     87
      IF(LOC3 .EQ. 0) GO TO 59                                          EQUIV     88
      IF(LOC3 .EQ. LOC) GO TO 60                                        EQUIV     89
      GO TO 58                                                          EQUIV     90
   59 JLOC=ILOC+IDTBL(8,LOC)                                            EQUIV     91
      IF(JLOC .NE. IDIS) CALL ERROR(20,IDTBL(1,LOC))                    EQUIV     92
      GO TO 100                                                         EQUIV     93
C** RE-OPEN LINK AND SET FIRST LOCATION TO PRESENT VARIABLE             EQUIV     94
   60 IF(LSTLOC .NE. 0) GO TO 63                                        EQUIV     95
      IFSTLC=LOC                                                        EQUIV     96
      GO TO 65                                                          EQUIV     97
   63 IDTBL(7,LSTLOC)=LOC                                               EQUIV     98
   65 LOC2=LOC                                                          EQUIV     99
C** THIS LOOP FINDS THE END OF THE LINK                                 EQUIV    100
   70 NXTLOC=IDTBL(7,LOC2)                                              EQUIV    101
      IF(NXTLOC .EQ. LOC) GO TO 75                                      EQUIV    102
      LOC2=NXTLOC                                                       EQUIV    103
      GO TO 70                                                          EQUIV    104
C** LINK IS RE-OPENED HERE                                              EQUIV    105
   75 IDTBL(7,LOC2)=0                                                   EQUIV    106
C** RESET LAST VARIABLE IN LINK TO PRESENT VARIABLE                     EQUIV    107
      LSTLOC=LOC2                                                       EQUIV    108
C** CALCULATE OFFSET DIFFERENCE BETWEEN PRESENT AND OLD OFFSETS         EQUIV    109
      IOFFDF=IOFFST-IDTBL(8,LOC)                                        EQUIV    110
      IF(IOFFDF) 80,98,90                                               EQUIV    111
C** NEW OFFSET IS LESS THAN OLD OFFSET                                  EQUIV    112
C** ALL OFFSETS FROM HERE ON IN EQUIVALENCE LINK MUST BE CHANGED        EQUIV    113
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   80 LOC2=LOC                                                          EQUIV     114
   85 IDTBL(8,LOC2)=IDTBL(8,LOC2)+IOFFDF                                EQUIV     115
      LOC2=IDTBL(7,LOC2)                                                EQUIV     116
      IF(LOC2 .EQ. 0) GO TO 98                                          EQUIV     117
      GO TO 85                                                          EQUIV     118
C** NEW OFFSET GREATER THAN OLD OFFSET                                  EQUIV     119
C** OFFSETS OF PREVIOUS VARIABLES IN LINK MUST BE CHANGED               EQUIV     120
   90 LOC2=IFSTLC                                                       EQUIV     121
   95 IF(LOC2 .EQ. LOC) GO TO 97                                        EQUIV     122
      IDTBL(8,LOC2)=IDTBL(8,LOC2)-IOFFDF                                EQUIV     123
      LOC2=IDTBL(7,LOC2)                                                EQUIV     124
      GO TO 95                                                          EQUIV     125
C** RESET BASE OFFSET                                                   EQUIV     126
   97 BOFFST=BOFFST-IOFFDF                                              EQUIV     127
   98 IDIS=ILOC+IDTBL(8,LOC)                                            EQUIV     128
  100 IF(NEXT(JPTR) .EQ. COMMA) GO TO 120                               EQUIV     129
      IF(A(JPTR-1) .NE. RPAR) GO TO 130                                 EQUIV     130
      IF(J .EQ. 1) GO TO 130                                            EQUIV     131
C** CLOSE EQUIVALENCE LINK                                              EQUIV     132
      IDTBL(7,LSTLOC)=IFSTLC                                            EQUIV     133
      JK=0                                                              EQUIV     134
      LOC3=IFSTLC                                                       EQUIV     135
C** TRAVERSE EQUIVALENCE LINK                                           EQUIV     136
      I=0                                                               EQUIV     137
  110 I=I+1                                                             EQUIV     138
      LOC3=IDTBL(7,LOC3)                                                EQUIV     139
      IF(BITGET(IDTBL(3,LOC3),16,1) .EQ. 0) GO TO 105                   EQUIV     140
C** VARIABLE IN COMMON, INCREMENT COUNTER                               EQUIV     141
      JK=JK+1                                                           EQUIV     142
C** IF TOO MANY VARIABLES IN COMMON, ISSUE DIAGNOSTIC                   EQUIV     143
      IF(JK .GT. 1) CALL ERROR(21,IDTBL(1,LOC3),IDTBL(1,LOC1))          EQUIV     144
      LOC1=LOC3                                                         EQUIV     145
      LOC=LOC3                                                          EQUIV     146
C** CHECK TO SEE IF COMMON WAS EXTENDED                                 EQUIV     147
      CALL COMEXT                                                       EQUIV     148
  105 IF(LOC3 .NE. IFSTLC) GO TO 110                                    EQUIV     149
      IF(NEXT(JPTR) .EQ. BLANK) RETURN                                  EQUIV     150
      IF(A(JPTR-1) .EQ. COMMA) GO TO 8                                  EQUIV     151
  130 CALL ERROR(7)                                                     EQUIV     152
      RETURN                                                            EQUIV     153
  140 CALL ERROR(19)                                                    EQUIV     154
      RETURN                                                            EQUIV     155
  150 CALL ERROR(13,NXTID)                                              EQUIV     156
      RETURN                                                            EQUIV     157
      END                                                               EQUIV     158
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      SUBROUTINE ERROR(IERROR,INUM,INUM2)                               ERROR     2
      COMMON A(1326),D(500),IDTBL(8,500),INITID(3),LASTID(3),ISRCH(3),  RICH      2
     * JPTR,N,M,JTYP,LSTART,N2,IFNCNM,LOGID,NXTID,IDTYP,NID,LOC,        CY58A    80
     2 LTYP,ITYP,IBLKDT,MODE,IERR,IDES                                  RICH      4
      COMMON/FLOW/IFL                                                   ERROR     4
C** ERROR MESSAGE GENERATOR                                             ERROR     5
      WRITE(6,1)                                                        ERROR     6
    1 FORMAT(1X,100H*****************************************************ERROR     7
     1*********************************************)                   ERROR     8
      GO TO (5,15,25,35,45,55,65,75,85,95,105,115,125,135,145,155,165,  ERROR     9
     A175,185,195,205,215,225,235,245,255,265,275,285,295,305,315,325,  ERROR    10
     * 335,345,355,365,375,385,395,405,415,425,435,445,455,465,475,485, ERROR    11
     * 495,505,515,525,535,545,555,565,575,585,595,605,615,625,635,645, ERROR    12
     $ 655,665,675,685,695,705,715,725,735,745,755,765,775,785,795,805, ERROR    13
     $ 815,825,835,845,855,865,875,885,895,905,915,925,935,945),IERROR  CY58A    55
    5 WRITE(6, 10)                                                      ERROR    15
   10 FORMAT(6X,26H THIS STATEMENT IS ILLEGAL)                          ERROR    16
      GO TO 1000                                                        ERROR    17
   15 WRITE(6, 20)                                                      ERROR    18
   20 FORMAT(6X,31H THIS STATEMENT IS OUT OF ORDER)                     ERROR    19
      GO TO 1000                                                        ERROR    20
   25 WRITE(6, 30)                                                      ERROR    21
   30 FORMAT(6X,39H VALUE OF INTEGER CONSTANT IS TOO LARGE)             ERROR    22
      GO TO 1000                                                        ERROR    23
   35 WRITE(6, 40)                                                      ERROR    24
   40 FORMAT(6X,28H TOO MANY CONTINUATION CARDS)                        ERROR    25
      GO TO 1000                                                        ERROR    26
   45 WRITE(6, 50)                                                      ERROR    27
   50 FORMAT(6X,30H HOLLERITH STRING IS TOO LARGE)                      ERROR    28
      GO TO 1000                                                        ERROR    29
   55 WRITE(6, 60)                                                      ERROR    30
   60 FORMAT(6X,26H VARIABLE NAME IS TOO LONG)                          ERROR    31
      GO TO 1000                                                        ERROR    32
   65 WRITE(6, 70)                                                      ERROR    33
   70 FORMAT(6X,31H SYNTAX ERROR IN THIS STATEMENT)                     ERROR    34
      IF(ITYP .LE. 18 .AND. IFL .GT. 0) IFL=-1                          ERROR    35
      GO TO 1000                                                        ERROR    36
   75 WRITE(6, 80)                                                      ERROR    37
   80 FORMAT(6X,46H ARRAY DIMENSION IS OUTSIDE OF ALLOWABLE RANGE)      ERROR    38
      GO TO 1000                                                        ERROR    39
   85 WRITE(6, 90)                                                      ERROR    40
   90 FORMAT(6X,45H ILLEGAL VARIABLE DIMENSION IN THIS STATEMENT)       ERROR    41
      GO TO 1000                                                        ERROR    42
   95 WRITE(6,100) INUM                                                 ERROR    43
  100 FORMAT(6X,33H THE FUNCTION OR SUBROUTINE NAME ,A6,18H IS USED ILLE ERROR    44
     *GALLY)                                                            ERROR    45
      GO TO 1000                                                        ERROR    46
  105 WRITE(6,110) INUM                                                 ERROR    47
  110 FORMAT(6X,14H THE VARIABLE ,A6,32H HAS BEEN PREVIOUSLY DIMENSIONED ERROR    48
     *)                                                                 ERROR    49
      GO TO 1000                                                        ERROR    50
  115 WRITE(6,120) INUM                                                 ERROR    51
  120 FORMAT(6X,14H THE VARIABLE ,A6,26H HAS BEEN PREVIOUSLY TYPED)     ERROR    52
      GO TO 1000                                                        ERROR    53
  125 WRITE(6,130) INUM                                                 ERROR    54
  130 FORMAT(6X,14H THE VARIABLE ,A6,38H IS ILLEGALLY FOLLOWED BY A LEFT ERROR    55
     * PAREN)                                                           ERROR    56
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      GO TO 1000                                                        ERRCR      57
  135 WRITE(6,140) INUM                                                 ERROR      58
  140 FORMAT(6X,26H THE DIMENSIONED VARIABLE ,A6,16H IS USED ILLEGALLY) ERRCR      59
      GO TO 1000                                                        ERRCR      60
  145 WRITE(6,150) INUM                                                 ERROR      61
  150 FORMAT(6X,18H STATEMENT NUMBER ,I5,15H IS NOT DEFINED)            ERROR      62
      IF(IFL .GT. 0) IFL=-1                                             ERROR      63
      GO TO 1000                                                        ERRCR      64
  155 WRITE(6,160) INUM                                                 ERRCR      65
  160 FORMAT(6X,18H STATEMENT NUMBER ,I5,18H IS NOT REFERENCED)         ERRCR      66
      GO TO 1000                                                        ERROR      67
  165 WRITE(6,170) INUM                                                 ERRCR      68
  170 FORMAT(6X,18H ILLEGAL VARIABLE ,A6,10H IN COMMON)                 ERROR      69
      GO TO 1000                                                        ERRCR      70
  175 WRITE(6,180)                                                      ERRCR      71
  180 FORMAT(6X,43H VALUE OF ARRAY SUBSCRIPT EXCEEDS DIMENSION)         ERRCR      72
      GO TO 1000                                                        ERRCR      73
  185 WRITE(6,190)                                                      ERRCR      74
  190 FORMAT(6X,25H ERROR IN ARRAY SUBSCRIPT)                           ERRCR      75
      GO TO 1000                                                        ERRCR      76
  195 WRITE(6,200) INUM                                                 ERROR      77
  200 FORMAT(6X,18H ILLEGAL VARIABLE ,A6,16H IS EQUIVALENCED)           ERRCR      78
      GO TO 1000                                                        ERRCR      79
  205 WRITE(6,210) INUM,INUM2                                           ERRCR      80
  210 FORMAT(6X,22H THE COMMON VARIABLES ,A6,5H AND ,A6,17H ARE EQUIVALE ERROR     81
     *NCED)                                                             ERRCR      82
      GO TO 1000                                                        ERROR      83
  215 WRITE(6,220)                                                      ERRCR      84
  220 FORMAT(6X,19H ILLEGAL I/O DEVICE)                                 ERROR      85
      GO TO 1000                                                        ERROR      86
  225 WRITE(6,230)                                                      ERROR      87
  230 FORMAT(6X,37H ILLEGAL CHARACTER IN THIS EXPRESSION)               ERROR      88
      GO TO 1000                                                        ERROR      89
  235 WRITE(6,240) INUM                                                 ERROR      90
  240 FORMAT(6X,25H ILLEGAL SUBROUTINE NAME ,A6)                        ERROR      91
      GO TO 1000                                                        ERROR      92
  245 WRITE(6,250)                                                      ERROR      93
  250 FORMAT(6X,50H SUBROUTINE TABLE OVERFLOW - PROCESSING TERMINATED)  ERROR      94
      GO TO 1000                                                        ERRCR      95
  255 WRITE(6,260) INUM                                                 ERRCR      96
  260 FORMAT(6X,77H INCORRECT NUMBER OF ARGUMENTS IN CALLING SEQUENCE OF ERROR     97
     $ FUNCTION OR SUBROUTINE ,A6)                                      ERROR      98
      GO TO 1000                                                        ERRCR      99
  265 WRITE(6,270)                                                      ERRCR     100
  270 FORMAT(6X,19H ILLEGAL ASSIGNMENT)                                 ERROR     101
      GO TO 1000                                                        ERRCR     102
  275 WRITE(6,280) INUM                                                 ERROR     103
  280 FORMAT(6X,14H THE VARIABLE ,A6,42H APPEARS IN A DATA STATEMENT AND ERRCR     104
     * IN COMMON)                                                       ERROR     105
      GO TO 1000                                                        ERROR     106
  285 WRITE(6,290) INUM                                                 ERROR     107
  290 FORMAT(6X,14H THE VARIABLE ,A6,44H HAS PREVIOUSLY APPEARED IN A DA ERRCR     108
     *TA STATEMENT)                                                     ERROR     109
      GO TO 1000                                                        ERROR     110
  295 WRITE(6,300) INUM                                                 ERRCR     111
  300 FORMAT(6X,22H THE FORMAL PARAMETER ,A6,31H APPEARS IN THIS DATA ST ERROR     112
     *ATEMENT)                                                          ERROR     113
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      GO TO 1000                                                        ERROR    114
  305 WRITE(6,310)                                                      ERROR    115
  310 FORMAT(6X,24H LIST SIZES DO NOT MATCH)                            ERROR    116
      GO TO 1000                                                        ERROR    117
  315 WRITE(6,320)                                                      ERROR    118
  320 FORMAT(6X,24H ILLEGAL STATEMENT LABEL)                            ERROR    119
      IF(IFL .GT. 0) IFL=-1                                             ERROR    120
      GO TO 1000                                                        ERROR    121
  325 WRITE(6,330)                                                      ERROR    122
  330 FORMAT(6X,26H DUPLICATE STATEMENT LABEL)                          ERROR    123
      IF(IFL .GT. 0) IFL=-1                                             ERROR    124
      GO TO 1000                                                        ERROR    125
  335 WRITE(6,340)                                                      ERROR    126
  340 FORMAT(6X,34H THIS STATEMENT CAN NOT BE REACHED)                  ERROR    127
      GO TO 1000                                                        ERROR    128
  345 WRITE(6,350)                                                      ERROR    129
  350 FORMAT(6X,31H DO LOOPS ARE IMPROPERLY NESTED)                     ERROR    130
      GO TO 1000                                                        ERROR    131
  355 WRITE(6,360)                                                      ERROR    132
  360 FORMAT(6X,32H FORMAT STATEMENT IS NOT LABELED)                    ERROR    133
      GO TO 1000                                                        ERROR    134
  365 WRITE(6,370)                                                      ERROR    135
  370 FORMAT(6X,20H ILLEGAL DO TERMINAL)                                ERROR    136
      GO TO 1000                                                        ERROR    137
  375 WRITE(6,380)                                                      ERROR    138
  380 FORMAT(6X,37H LAST EXECUTABLE STATEMENT IS ILLEGAL)               ERROR    139
      IF(IFL .GT. 0) IFL=-1                                             ERROR    140
      GO TO 1000                                                        ERROR    141
  385 WRITE(6,390) INUM                                                 ERROR    142
  390 FORMAT(6X,24H THE VARIABLE REFERENCE ,A6,18H IS NOT AN INTEGER)   ERROR    143
      GO TO 1000                                                        ERROR    144
  395 WRITE(6,400) INUM                                                 ERROR    145
  400 FORMAT(6X,27H THE DO PARAMETER OR INDEX ,A6,18H IS NOT AN INTEGER) ERROR    146
      GO TO 1000                                                        ERROR    147
  405 WRITE(6,410)                                                      ERROR    148
  410 FORMAT(6X,52H VALUE OF DO PARAMETER IS OUTSIDE OF ALLOWABLE RANGE) ERROR    149
      GO TO 1000                                                        ERROR    150
  415 WRITE(6,420)                                                      ERROR    151
  420 FORMAT(6X,32H COMPLEX EXPRESSIONS ARE ILLEGAL)                    ERROR    152
      GO TO 1000                                                        ERROR    153
  425 WRITE(6,430)                                                      ERROR    154
  430 FORMAT(6X,24H ILLEGAL VARIABLE FORMAT)                            ERROR    155
      GO TO 1000                                                        ERROR    156
  435 WRITE(6,440)                                                      ERROR    157
  440 FORMAT(6X,39H THIS STATEMENT SHOULD HAVE AN I/O LIST)             ERROR    158
      GO TO 1000                                                        ERROR    159
  445 WRITE(6,450)                                                      ERROR    160
  450 FORMAT(6X,50H STATEMENT FOLLOWING LOGICAL EXPRESSION IS ILLEGAL)  ERROR    161
      GO TO 1000                                                        ERROR    162
  455 WRITE(6,460)                                                      ERROR    163
  460 FORMAT(6X,44H REAL NUMBER LIES OUTSIDE OF ALLOWABLE RANGE)        ERROR    164
      GO TO 1000                                                        ERROR    165
  465 WRITE(6,470)                                                      ERROR    166
  470 FORMAT(6X,42H THIS EQUIVALENCE STATEMENT EXTENDS COMMON)          ERROR    167
      GO TO 1000                                                        ERROR    168
  475 WRITE(6,480)                                                      ERROR    169
  480 FORMAT(6X,40H ILLEGAL VARIABLE IN COMMON BLOCK SESCOM)            ERROR    170
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      GO TO 1000                                                        ERROR     171
  485 WRITE(6,490) INUM                                                 ERROR     172
  490 FORMAT(6X,12H SUBPROGRAM ,A6,19H HAS INCORRECT TYPE)              ERROR     173
      GO TO 1000                                                        ERROR     174
  495 WRITE(6,500) INUM                                                 ERROR     175
  500 FORMAT(6X,23H WARNING - ARGUMENT NO.,I3,34H MAY HAVE INCORRECT DIM ERROR    176
     *ENSIONALITY)                                                      ERROR     177
      GO TO 1000                                                        ERROR     178
  505 WRITE(6,510) INUM                                                 ERROR     179
  510 FORMAT(6X,13H ARGUMENT NO.,I3,19H HAS INCORRECT TYPE)             ERROR     180
      GO TO 1000                                                        ERROR     181
  515 WRITE(6,520)                                                      ERROR     182
  520 FORMAT(6X,49H WARNING - THIS MODULE IS NOT IN THE SESCOMP LIST)   ERROR     183
      GO TO 1000                                                        ERROR     184
  525 WRITE(6,530) INUM                                                 ERROR     185
  530 FORMAT(6X,14H THE VARIABLE ,A6,29H PREVIOUSLY APPEARS IN COMMON)  ERROR     186
      GO TO 1000                                                        ERROR     187
  535 WRITE(6,540) INUM                                                 ERROR     188
  540 FORMAT(6X,13H ARGUMENT NO.,I3,11H IS INVALID)                     ERROR     189
      GO TO 1000                                                        ERROR     190
  545 WRITE(6,550) INUM                                                 ERROR     191
  550 FORMAT(6X,13H ARGUMENT NO.,I3,29H IS DESIGNATED LOGICAL OUTPUT)   ERROR     192
      GO TO 1000                                                        ERROR     193
  555 WRITE(6,560) INUM                                                 ERROR     194
  560 FORMAT(6X,29H ILLEGAL COMMON BLOCK NAME - ,A6)                    ERROR     195
      GO TO 1000                                                        ERROR     196
  565 WRITE(6,570) INUM                                                 ERROR     197
  570 FORMAT(6X,41H WARNING - VARIABLE TYPE IN COMMON BLOCK ,A6,41H DOES ERROR    198
     $ NOT AGREE WITH INTERFACE DEFINITION)                             ERROR     199
      GO TO 1000                                                        ERROR     200
  575 WRITE(6,580) INUM                                                 ERROR     201
  580 FORMAT(6X,14H COMMON BLOCK ,A6,19H HAS INCORRECT SIZE)            ERROR     202
      GO TO 1000                                                        ERROR     203
  585 WRITE(6,590)                                                      ERROR     204
  590 FORMAT(6X,58H EXTERNAL REFERENCE TABLE OVERFLOW - PROCESSING TERMI ERROR    205
     $NATED)                                                            ERROR     206
      GO TO 1000                                                        ERROR     207
  595 WRITE(6,600)                                                      ERROR     208
  600 FORMAT(6X,52H COMMON BLOCK TABLE OVERFLOW - PROCESSING TERMINATED) ERROR    209
      GO TO 1000                                                        ERROR     210
  605 WRITE(6,610) INUM                                                 ERROR     211
  610 FORMAT(6X,29H ILLEGAL COMMON BLOCK NAME - ,A6)                    ERROR     212
      GO TO 1000                                                        ERROR     213
  615 WRITE(6,620) INUM                                                 ERROR     214
  620 FORMAT(6X,14H COMMON BLOCK ,A6,27H IS NOT IN THE SESCOMP LIST)    ERROR     215
      GO TO 1000                                                        ERROR     216
  625 WRITE(6,630) INUM                                                 ERROR     217
  630 FORMAT(6X,25H CATEGORY 2 COMMON BLOCK ,A6,23H IS NOT GROUPED BY TY ERROR    218
     $PE)                                                               ERROR     219
      GO TO 1000                                                        ERROR     220
  635 WRITE(6,640) INUM,INUM2                                           ERROR     221
  640 FORMAT(6X,38H DOUBLE PRECISION OR COMPLEX VARIABLE ,A6,56H DOES NO ERROR    222
     $T BEGIN ON AN EVEN LOCATION WITHIN COMMON BLOCK ,A6)              ERROR     223
      GO TO 1000                                                        ERROR     224
  645 WRITE(6,650) INUM                                                 ERROR     225
  650 FORMAT(6X,26H VARIABLE IN COMMON BLOCK ,A6,16H IS OUT OF ORDER)   ERROR     226
      GO TO 1000                                                        ERROR     227
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655 WRITE(6,660)                                                        ERROR    228
660 FORMAT(6X,56H THE COMMON BLOCK SESCOM DOES NOT APPEAR IN THIS PROG ERROR    229
   $RAM)                                                                ERROR    230
    GO TO 1000                                                          ERROR    231
665 WRITE(6,670) INUM                                                   ERROR    232
670 FORMAT(6X,14H THE DO INDEX ,A6,13H IS REDEFINED)                    ERROR    233
    RETURN                                                              ERROR    234
675 WRITE(6,680) INUM                                                   ERROR    235
680 FORMAT(6X,24H THE VARIABLE DIMENSION ,A6,13H IS REDEFINED)          ERROR    236
    RETURN                                                              ERROR    237
685 WRITE(6,690) INUM                                                   ERROR    238
690 FORMAT(6X,23H THE ASSIGNED VARIABLE ,A6,24H IS ILLEGALLY REFERENCE ERROR    239
   $D)                                                                  ERROR    240
    RETURN                                                              ERROR    241
695 WRITE(6,700) INUM                                                   ERROR    242
700 FORMAT(6X,14H THE VARIABLE ,A6,30H IS REFERENCED BUT NOT DEFINED)   ERROR    243
    RETURN                                                              ERROR    244
705 WRITE(6,710) INUM                                                   ERROR    245
710 FORMAT(6X,14H THE VARIABLE ,A6,45H IS REFERENCED ILLEGALLY BY AN A ERROR    246
   $SSIGNED GO TO)                                                      ERROR    247
    RETURN                                                              ERROR    248
715 WRITE(6,720) INUM                                                   ERROR    249
720 FORMAT(6X,18H THE DO PARAMETER ,A6,13H IS REDEFINED)                ERROR    250
    RETURN                                                              ERROR    251
725 WRITE(6,730)                                                        ERROR    252
730 FORMAT(6X,49H THIS MODULE CONTAINS NO CATEGORY 2 COMMON BLOCKS)     ERROR    253
    GO TO 1000                                                          ERROR    254
735 WRITE(6,740) INUM                                                   ERROR    255
740 FORMAT(6X,24H THE ANSI FUNCTION NAME ,A6,27H IS MISUSED IN THIS PR ERROR    256
   $OGRAM)                                                              ERROR    257
    GO TO 1000                                                          ERROR    258
745 WRITE(6,750) INUM                                                   ERROR    259
750 FORMAT(6X,14H THE VARIABLE ,A6,60H APPEARS IN A CATEGORY 2 OR 3 CO ERROR    260
   $MMON BLOCK BUT IS NEVER USED)                                       ERROR    261
    GO TO 1000                                                          ERROR    262
755 WRITE(6,760)                                                        ERROR    263
760 FORMAT(6X,75H ARRAY SUBSCRIPT OR IMPLIED DO PARAMETER MAY LIE OUTS ERROR    264
   $IDE OF ALLOWABLE RANGE)                                             ERROR    265
    GO TO 1000                                                          ERROR    266
765 WRITE(6,770) INUM,INUM2                                             ERROR    267
770 FORMAT(6X,22H MIXED MODE COMBINING ,A6,6H WITH ,A6)                 ERROR    268
    GO TO 1000                                                          ERROR    269
775 WRITE(6,780) INUM                                                   ERROR    270
780 FORMAT(6X,33H INCORRECT EXPONENT AT CHAR. NO. ,I3)                  ERROR    271
    GO TO 1000                                                          ERROR    272
785 WRITE(6,790) INUM                                                   ERROR    273
790 FORMAT(6X,47H VAR-CONST CONFUSION IN SUBSCRIPT AT CHAR. NO. ,I3)    ERROR    274
    GO TO 1000                                                          ERROR    275
795 WRITE(6,800) INUM,INUM2                                             ERROR    276
800 FORMAT(6X,40H SUBSCRIPT CONSTANT OR VARIABLE OF TYPE ,A6,14H AT CH ERROR    277
   $AR. NO. ,I3)                                                        ERROR    278
    GO TO 1000                                                          ERROR    279
805 WRITE(6,810) INUM                                                   ERROR    280
810 FORMAT(6X,52H TOO MANY SUBSCRIPTS FOR THIS VARIABLE AT CHAR. NO. , ERROR    281
   $I3)                                                                 ERROR    282
    GO TO 1000                                                          ERROR    283
815 WRITE(6,820) INUM                                                   ERROR    284
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820 FORMAT(6X,51H TOO FEW SUBSCRIPTS FOR THIS VARIABLE AT CHAR. NO. ,  ERROR   285
   $I3)                                                                ERROR   286
    GO TO 1000                                                         ERROR   287
825 WRITE(6,830) INUM                                                  ERROR   288
830 FORMAT(6X,52H ILLEGAL TYPE IN RELATIONAL EXPRESSION AT CHAR. NO. , ERROR   289
   $I3)                                                                ERROR   290
    GO TO 1000                                                         ERROR   291
835 WRITE(6,840) INUM                                                  ERROR   292
840 FORMAT(6X,40H TOO MANY ARGUMENTS IN CALLING SEQUENCE ,I3)          ERROR   293
    GO TO 1000                                                         ERROR   294
845 WRITE(6,850)                                                       ERROR   295
850 FORMAT(6X,41H TOO MANY FUNCTION REFS IN THIS STATEMENT)            ERROR   296
    GO TO 1000                                                         ERROR   297
855 WRITE(6,860) INUM                                                  ERROR   298
860 FORMAT(6X,26H INVALID FORMAL PARAMETER ,A6)                        ERROR   299
    GO TO 1000                                                         ERROR   300
865 WRITE(6,870) INUM                                                  ERROR   301
870 FORMAT(6X,19H THE FUNCTION NAME ,A6,33H MAY HAVE BEEN PREVIOUSLY M ERROR   302
   *ISUSED)                                                            ERROR   303
    GO TO 1000                                                         ERROR   304
875 WRITE(6,880) INUM                                                  ERROR   305
880 FORMAT(6X,39H ILLEGAL FIELD DESCRIPTOR AT CHAR. NO. ,I4)           ERROR   306
    GO TO 1000                                                         CY58A    56
885 WRITE(6,890)                                                       CY58A    57
890 FORMAT(6X,38H TOO MANY FUNCTION DEFINING STATEMENTS)               CY58A    58
    GO TO 1000                                                         CY58A    59
895 WRITE(6,900)                                                       CY58A    60
900 FORMAT(6X,71H TOO MANY EXTERNAL REFERENCES IN THIS STATEMENT - PRO CY58A    61
   $CESSING TERMINATED)                                                CY58A    62
    GO TO 1000                                                         CY58A    63
905 WRITE(6,910)                                                       CY58A    64
910 FORMAT(6X,46H STATEMENT IS TOO LONG - PROCESSING TERMINATED)       CY58A    65
    GO TO 1000                                                         CY58A    66
915 WRITE(6,920)                                                       CY58A    67
920 FORMAT(6X,46H SESCOMP LIST OVERFLOW - PROCESSING TERMINATED)       CY58A    68
    GO TO 1000                                                         CY58A    69
925 WRITE(6,930)                                                       CY58A    70
930 FORMAT(6X,63H OVERFLOW OF INTERFACE DEFINITION TABLE - PROCESSING  CY58A    71
   $TERMINATED)                                                        CY58A    72
    GO TO 1000                                                         CY58A    73
935 WRITE(6,940)                                                       CY58A    74
940 FORMAT(6X,32H TOO MANY EQUIVALENCED VARIABLES)                     CY58A    75
    GO TO 1000                                                         CY58A    76
945 WRITE(6,950)                                                       CY58A    77
950 FORMAT(6X,61H TOO MANY VARIABLES IN THIS STATEMENT - PROCESSING TE CY58A    78
   $RMINATED)                                                          CY58A    79
1000 WRITE(6,1)                                                        ERROR   307
     RETURN                                                            ERROR   308
     END                                                               ERROR   309
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      SUBROUTINE EXPR                                                   EXPR      2
      COMMON A(1326),D(500),IDTBL(8,500),INITID(3),LASTID(3),ISRCH(3),  RICH      2
     * JPTR,N,M,JTYP,LSTART,N2,IFNCNM,LOGID,NXTID,IDTYP,NID,LOC,        CY58A    80
     2 LTYP,ITYP,IBLKDT,MODE,IERR,IDES                                  RICH      4
      COMMON/FUNC/IFNCRA(5,12),MARGS,IARGS(50),FNCLOC(5),NFUNC          CY58A    13
      COMMON/STRING/NTYPE,NSTR,STR(500)                                 EXPR      5
      COMMON/LIST/NLIST,NINTFC,ISUBLT(2,200),INTFAC(300)                EXPR      6
      COMMON/BASBLK/IBLOCK(2500),NBLOCK,NB,NBRNCH                       CY58A    14
      INTEGER FNCLOC,OPRA(6),BITPUT,BITGET                              EXPR      8
      INTEGER D,ASTRIK,DEE,EQUALS,STR,A,COMMA,RPAR,BLANK                EXPR      9
      DATA (OPRA(I),I=1,6)/1H+,1H-,1H/,1H(,1H),1H,/,ASTRIK/1H*/,DEE/1HD/ EXPR    10
     1 ,EQUALS/1H=/,COMMA/1H,/,RPAR/1H)/,LPAR/1H(/,BLANK/1H /           EXPR     11
C** EXPRESSION PROCESSOR                                                EXPR     12
C** THIS ROUTINE ENCODES ARITHMETIC AND LOGICAL EXPRESSIONS             EXPR     13
C** AND I/O LISTS FOR INPUT TO THE PARSER                               EXPR     14
      LP=0                                                              EXPR     15
      NFUNC=0                                                           EXPR     16
      K=0                                                               EXPR     17
      IEXPST=NBLOCK+1                                                   EXPR     18
      MARGS=0                                                           EXPR     19
  200 K=K+1                                                             EXPR     20
C** GET NEXT LANGUAGE ELEMENT IN STATEMENT                              EXPR     21
      CALL GNLE                                                         EXPR     22
C** NO MORE CHARACTERS LEFT, RETURN                                     EXPR     23
      IF(JTYP .EQ. 0) RETURN                                            EXPR     24
C** NOT A SPECIAL CHARACTER, KEEP GOING                                 EXPR     25
      IF(JTYP .NE. 1) GO TO 20                                          EXPR     26
      IF(LTYP .EQ. 9 .OR. ITYP .EQ. 6) GO TO 2                          EXPR     27
      IF(ITYP .EQ. 1 .OR. ITYP .EQ. 35) GO TO 1                         EXPR     28
      GO TO 5                                                           EXPR     29
C** CHECK FOR END OF EXPRESSION IN "IF" STATEMENT                       EXPR     30
C** EQUAL SIGN TERMINATES STRING                                        EXPR     31
    1 IF(D(1) .EQ. EQUALS) RETURN                                       EXPR     32
      GO TO 5                                                           EXPR     33
    2 IF(D(1) .EQ. RPAR .AND. LP .EQ. 1) RETURN                         EXPR     34
C** SPECIAL CHARACTER LOOP                                              EXPR     35
    5 DO 10 I=1,6                                                       EXPR     36
      IF(D(1) .NE. OPRA(I)) GO TO 10                                    EXPR     37
C** ENCODE SPECIAL CHARACTER                                            EXPR     38
      STR(K)=-I                                                         EXPR     39
      IF(I .EQ. 4) GO TO 6                                              EXPR     40
      IF(I .EQ. 5) GO TO 7                                              EXPR     41
      GO TO 100                                                         EXPR     42
C** LEFT PAREN FOUND - INCREMENT COUNTER                                EXPR     43
    6 LP=LP+1                                                           EXPR     44
      GO TO 100                                                         EXPR     45
C** RIGHT PAREN FOUND - DECREMENT COUNTER                               EXPR     46
    7 LP=LP-1                                                           EXPR     47
      GO TO 100                                                         EXPR     48
   10 CONTINUE                                                          EXPR     49
      IF(D(1) .NE. EQUALS) GO TO 12                                     EXPR     50
C** ENCODE EQUALS SIGN                                                  EXPR     51
      STR(K)=-18                                                        EXPR     52
      GO TO 100                                                         EXPR     53
   12 IF(D(1) .NE. ASTRIK) GO TO 110                                    EXPR     54
      IF(D(2) .EQ. ASTRIK .AND. M .GT. 1) GO TO 15                      EXPR     55
C** ENCODE ASTRIK                                                       EXPR     56
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      STR(K)=-7                                                         EXPR     57
      GO TO 100                                                         EXPR     58
C** ENCODE EXPONENTIATION SIGN                                          EXPR     59
   15 STR(K)=-8                                                         EXPR     60
      GO TO 100                                                         EXPR     61
   20 IF(JTYP .NE. 7) GO TO 30                                          EXPR     62
      IF(LOGID .GT. 9) GO TO 25                                         EXPR     63
C** ENCODE LOGICAL OPERATOR                                             EXPR     64
      STR(K)=-(LOGID+8)                                                 EXPR     65
      GO TO 100                                                         EXPR     66
C** ENCODE LOGICAL CONSTANT                                             EXPR     67
   25 STR(K)=LSTART+440000+M*1000000                                    EXPR     68
      GO TO 100                                                         EXPR     69
   30 IF(JTYP .NE. 4) GO TO 40                                          EXPR     70
      IF(IDES .EQ. 0) GO TO 35                                          EXPR     71
C** ENCODE DOUBLE PRECISION CONSTANT                                    EXPR     72
      STR(K)=LSTART+420000+M*1000000                                    EXPR     73
      GO TO 100                                                         EXPR     74
   35 CONTINUE                                                          EXPR     75
C** ENCODE REAL CONSTANT                                                EXPR     76
      STR(K)=LSTART+400000+M*1000000                                    EXPR     77
      GO TO 100                                                         EXPR     78
   40 IF(JTYP .NE. 6) GO TO 50                                          EXPR     79
C** ENCODE COMPLEX CONSTANT                                             EXPR     80
      STR(K)=LSTART+410000+M*1000000                                    EXPR     81
      GO TO 100                                                         EXPR     82
   50 IF(JTYP .NE. 5) GO TO 55                                          CY58A    15
C** ENCODE INTEGER                                                      EXPR     84
      STR(K)=LSTART+430000+M*1000000                                    EXPR     85
      GO TO 100                                                         EXPR     86
   55 IF(JTYP .NE. 3) GO TO 60                                          CY58A    16
      STR(K)=LSTART+450000+M*1000000                                    CY58A    17
      IF(ITYP .NE. 8) CALL ERROR(23)                                    CY58A    18
      GO TO 100                                                         CY58A    19
   60 IF(JTYP .NE. 2) GO TO 110                                         EXPR     87
C** VARIABLE FOUND - SEARCH SYMBOL TABLE                                EXPR     88
      CALL SEARCH                                                       EXPR     89
      IBETA=0                                                           EXPR     90
      IF(NEXT(JPTR) .NE. LPAR) GO TO 64                                 EXPR     91
      IF(ISRCH(1) .EQ. 0) GO TO 62                                      EXPR     92
      IF(BITGET(IDTBL(3,LOC),1,1) .EQ. 1) GO TO 67                      EXPR     93
C** VARIABLE IS NOT DIMENSIONED - MUST BE A FUNCTION                    EXPR     94
C** CHANGE STORAGE IN SYMBOL TABLE                                      EXPR     95
      CALL SWITCH                                                       EXPR     96
      IBETA=5                                                           EXPR     97
      GO TO 63                                                          EXPR     98
C** FUNCTION REFERENCE                                                  EXPR     99
   62 IBETA=5                                                           EXPR    100
      IF(ISRCH(2) .EQ. 1) GO TO 63                                      EXPR    101
C** FUNCTION NOT YET STORED                                             EXPR    102
      IDTYP=2                                                           EXPR    103
      CALL STORE                                                        EXPR    104
      LOC=NID                                                           EXPR    105
      DO 70 I=1,NLIST                                                   EXPR    106
      IF(ISUBLT(1,I) .NE. IDTBL(1,LOC)) GO TO 70                        EXPR    107
C** FUNCTION NAME FOUND IN SESCOMP LIST                                 EXPR    108
      IF(BITGET(ISUBLT(2,I),10,4) .NE. 4) GO TO 63                      EXPR    109
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C** INTRINSIC FUNCTION - STORE TYPE IN SYMBOL TABLE                    EXPR     110
      ITP=BITGET(ISUBLT(2,I),13,3)                                     EXPR     111
      IDTBL(3,LOC)=BITPUT(IDTBL(3,LOC),ITP,10)                         EXPR     112
      IDTBL(3,LOC)=BITPUT(IDTBL(3,LOC),1,11)                           EXPR     113
      GO TO 63                                                         EXPR     114
   70 CONTINUE                                                         EXPR     115
C** PUT FUNCTION IN FUNCTION LIST                                       EXPR     116
   63 NFUNC=NFUNC+1                                                    EXPR     117
      IF(NFUNC .GT. 5) GO TO 120                                       CY58A     20
      FNCLOC(NFUNC)=LOC                                                EXPR     118
      GO TO 68                                                         EXPR     119
C** NON-DIMENSIONED VARIABLE                                            EXPR     120
   64 IF(ISRCH(2) .NE. 1) GO TO 65                                     EXPR     121
C** FUNCTION NAME NOT FOLLOWED BY LEFT PAREN, MUST BE THIS FUNCTION     EXPR     122
      IF(NXTID .NE. IFNCNM) CALL ERROR(10,NXTID)                       EXPR     123
C** STORE IN SYMBOL TABLE                                               EXPR     124
   65 IF(ISRCH(1) .EQ. 1) GO TO 67                                     EXPR     125
      IDTYP=1                                                          EXPR     126
      CALL STORE                                                       EXPR     127
      LOC=NID                                                          EXPR     128
      GO TO 68                                                         EXPR     129
C** SET DIMENSIONALITY                                                  EXPR     130
   67 IBETA=BITGET(IDTBL(3,LOC),7,6)                                   EXPR     131
      IF(NXTID .NE. IFNCNM) GO TO 68                                   EXPR     132
      IBETA=0                                                          EXPR     133
      LOC=IDES                                                         EXPR     134
   68 CALL IMPTYP                                                      EXPR     135
C** SET TYPE                                                           EXPR     136
      IALPH=BITGET(IDTBL(3,LOC),10,3)-1                                EXPR     137
      JPTR=JPTR-1                                                      EXPR     138
C** ENCODE VARIABLE                                                     EXPR     139
      STR(K)=LOC+10000*IALPH+100000*IBETA+1000000*M                    EXPR     140
  100 NSTR=K                                                           EXPR     141
      IF(NSTR .GT. 500) GO TO 130                                      CY58A     21
      GO TO 200                                                        EXPR     142
  110 CALL ERROR(23)                                                   EXPR     143
      RETURN                                                           EXPR     144
  120 CALL ERROR(90)                                                   CY58A     22
      STOP                                                             CY58A     23
  130 CALL ERROR(91)                                                   CY58A     24
      STOP                                                             CY58A     25
      END                                                              EXPR     145
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      SUBROUTINE EXPRCK                                                EXPRCK     2
      COMMON A(1326),D(500),IDTBL(8,500),INITID(3),LASTID(3),ISRCH(3), RICH       2
     * JPTR,N,M,JTYP,LSTART,N2,IFNCNM,LOGID,NXTID,IDTYP,NID,LOC,        CY58A     80
     2 LTYP,ITYP,IBLKDT,MODE,IERR,IDES                                 RICH       4
      COMMON/TYP/NQQ,RHSTYP,NQ2,NQ3,LHSTYP                             EXPRCK     4
      DIMENSION IA(5,5)                                                EXPRCK     5
      INTEGER RHSTYP                                                   EXPRCK     6
      DATA ((IA(I,J),I=1,5),J=1,5)/1,0,0,1,0,0,1,0,0,0,1,0,1,1,0,      EXPRCK     7
     1   1,0,1,1,0,0,0,0,0,1/                                          EXPRCK     8
C** THIS ROUTINE IS CALLED BY THE ASSIGNMENT STATEMENT PROCESSOR TO     EXPRCK     9
C** CHECK THE "LEFT SIDE TYPE" AND "RIGHT SIDE TYPE" TO SEE IF THE      EXPRCK    10
C** ASSIGNMENT IS VALID                                                 EXPRCK    11
      IF(IA(LHSTYP,RHSTYP+1) .EQ. 0) CALL ERROR(27)                    EXPRCK    12
      RETURN                                                           EXPRCK    13
      END                                                              EXPRCK    14
```

```
      SUBROUTINE FLOWCK                                                 FLOWCK      2
      COMMON A(1326),D(500),IDTBL(8,500),INITID(3),LASTID(3),ISRCH(3),  RICH       2
     * JPTR,N,M,JTYP,LSTART,N2,IFNCNM,LOGID,NXTID,IDTYP,NID,LOC,        CY58A      80
     2 LTYP,ITYP,IBLKOT,MODE,IERR,IOES                                  RICH        4
      COMMON/BASBLK/IBLOCK(2500),NBLOCK,NB,NBRNCH                       CY58A      50
      COMMON/DOLOOP/ISTACK(4,50),NSTACK,ILOOP,IOVFLW                    FLOWCK      5
      COMMON/LABELS/STATRA(2,200),NLABEL                                FLOWCK      6
      COMMON/FLOW/IFL,IRP                                               FLOWCK      7
      DIMENSION IPATH(100),ISTCK(100)                                   FLOWCK      8
      INTEGER FLWLST(100),BRANCH,STATRA                                 FLOWCK      9
      INTEGER BITPUT,BITGET                                             FLOWCK     10
      EQUIVALENCE (IPATH(1),A(1)),(ISTCK(1),A(101)),(FLWLST(1),A(201))  FLOWCK     11
C** FLOW ANALYSIS ALGORITHM - CHECKS EVERY POSSIBLE PATH OF FLOW        FLOWCK     12
C** THROUGH THE PROGRAM                                                 FLOWCK     13
      IF(IFL .EQ. -1) GO TO 3000                                        FLOWCK     14
      CLTM1=SECOND(T)                                                   FLOWCK     15
      IRX=0                                                             FLOWCK     16
      NSTCK=0                                                           FLOWCK     17
      NFLOW=0                                                           FLOWCK     18
      NOC=0                                                             FLOWCK     19
      NPTHS=0                                                           FLOWCK     20
C** START WITH FIRST BASIC BLOCK                                        FLOWCK     21
      IBLKST=1                                                          FLOWCK     22
C** SET INITIALLY DEFINED VARIABLES                                     FLOWCK     23
      CALL CHKLST                                                       FLOWCK     24
      WRITE(6,8)                                                        FLOWCK     25
    8 FORMAT(1H1,38H****** RESULTS OF FLOW ANALYSIS ******//)           FLOWCK     26
    5 DO 10 I=1,NID                                                     FLOWCK     27
   10 IDTBL(2,I)=IDTBL(8,I)                                             FLOWCK     28
   12 IF(NFLOW .EQ. 0) GO TO 20                                         FLOWCK     29
      NOC=0                                                             FLOWCK     30
C** THIS COMPUTES THE NUMBER OF DUPLICATE OCCURANCES FOR THE            FLOWCK     31
C** CURRENT BASIC BLOCK                                                 FLOWCK     32
      DO 15 I=1,NFLOW                                                   FLOWCK     33
      IF(IABS(FLWLST(I)) .NE. IBLKST) GO TO 15                          FLOWCK     34
      NOC=NOC+1                                                         FLOWCK     35
   15 CONTINUE                                                          FLOWCK     36
C** TERMINATE FLOW ANALYSIS FOR THIS PATH IF TOO MANY OCCURANCES        FLOWCK     37
      IF(NOC .GT. IRP) GO TO 1500                                       FLOWCK     38
C** ADD BLOCK TO CURRENT FLOW PATH                                      FLOWCK     39
   20 NFLOW=NFLOW+1                                                     FLOWCK     40
      IF(NFLOW .GT. 100) GO TO 4000                                     FLOWCK     41
      FLWLST(NFLOW)=IBLKST                                              FLOWCK     42
C** GET END OF BLOCK                                                    FLOWCK     43
      IEND=BITGET(IBLOCK(IBLKST),28,16)-1                               FLOWCK     44
      IF(IEND .EQ. -1) IEND=NBLOCK                                      FLOWCK     45
C** GET NUMBER OF BRANCHES FROM BLOCK                                   FLOWCK     46
      NBR=BITGET(IBLOCK(IBLKST),6,6)                                    FLOWCK     47
C** GET BLOCK OF NEXT BRANCH                                            FLOWCK     48
      ISTART=IEND-NBR+1                                                 FLOWCK     49
      IBLKST=NXTBLK(ISTART,IEND)                                        FLOWCK     50
      IF(NBR .EQ. 1) GO TO 25                                           FLOWCK     51
      FLWLST(NFLOW)=-FLWLST(NFLOW)                                      FLOWCK     52
C** MORE THAN ONE BRANCH                                                FLOWCK     53
C** STORE NEXT BLOCK ON STACK AS NEGATIVE NUMBER                        FLOWCK     54
      NSTCK=NSTCK+1                                                     FLOWCK     55
      IF(NSTCK .GT. 100) GO TO 5000                                     FLOWCK     56
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```
      ISTCK(NSTCK)=-NXTBLK(IEND,IEND)                                   FLOWCK     57
      IF(NBR .EQ. 2) GO TO 25                                           FLOWCK     58
C** MORE THAN TWO BRANCHES - PUT ALL REMAINING BRANCHES ON STACK        FLOWCK     59
      DO 22 J=3,NBR                                                     FLOWCK     60
      NSTCK=NSTCK+1                                                     FLOWCK     61
      IF(NSTCK .GT. 100) GO TO 5000                                     FLOWCK     62
   22 ISTCK(NSTCK)=NXTBLK(IEND-J+2,IEND)                                FLOWCK     63
   25 IF(IBLKST .NE. 0) GO TO 12                                        FLOWCK     64
C** ALL BRANCHES HAVE BEEN PLACED ON CURRENT FLOW PATH OR THE STACK      FLOWCK     65
C** BEGIN TRACING THROUGH PATH                                           FLOWCK     66
      NPATH=0                                                           FLOWCK     67
C** INCREMENT PATH COUNTER                                              FLOWCK     68
      NPTHS=NPTHS+1                                                     FLOWCK     69
      DO 1000 I=1,NFLOW                                                 FLOWCK     70
C** GET NEXT BLOCK IN PATH                                              FLOWCK     71
      BRANCH=IABS(FLWLST(I))                                            FLOWCK     72
C** SET POINTER TO FIRST VARIABLE IN BLOCK                              FLOWCK     73
      ISTART=BRANCH+1                                                   FLOWCK     74
C** GET START OF NEXT BLOCK                                             FLOWCK     75
      NXBLOK=BITGET(IBLOCK(BRANCH),28,16)                               FLOWCK     76
      IF(NXBLOK .EQ. 0) NXBLOK=NBLOCK+1                                 FLOWCK     77
C** GET STATEMENT NUMBER OF BLOCK                                       FLOWCK     78
      ISL=BITGET(IBLOCK(BRANCH),36,8)                                   FLOWCK     79
C** GET DO LOOP CONTAINING BLOCK                                        FLOWCK     80
      ILOOP=BITGET(IBLOCK(BRANCH),12,6)                                 FLOWCK     81
C** GET NUMBER OF BRANCHES FROM BLOCK                                   FLOWCK     82
      NBR=BITGET(IBLOCK(BRANCH),6,6)                                    FLOWCK     83
C** SET POINTER TO LAST VARIABLE IN BLOCK                               FLOWCK     84
      IEND=NXBLOK-NBR-1                                                 FLOWCK     85
C** BLOCK HAS STATEMENT LABEL - STORE IN STATEMENT LABEL LIST            FLOWCK     86
C** SET "USED" FLAG                                                     FLOWCK     87
      IF(ISL .EQ. 0) GO TO 45                                           FLOWCK     88
      NPATH=NPATH+1                                                     FLOWCK     89
      IPATH(NPATH)=STATRA(1,ISL)                                        FLOWCK     90
      STATRA(2,ISL)=BITPUT(STATRA(2,ISL),1,18)                          FLOWCK     91
   45 IF(IBLOCK(ISTART) .LT. 1000) GO TO 1000                           FLOWCK     92
C** THIS LOOP EXAMINES ALL VARIABLES IN THE BLOCK                       FLOWCK     93
      DO 500 J=ISTART,IEND                                              FLOWCK     94
C** GET VARIABLE CLASS        1 - DEFINED   2 - REFERENCED   3 - DO INDEX FLOWCK     95
C**                          4 - ASSIGNED  5 - REFERENCED BY ASSN. GOTO FLOWCK     96
C**                          6 - MADE UNDEFINED   7 - DO PARAMETER     FLOWCK     97
      IT=IBLOCK(J)/1000                                                 FLOWCK     98
C** GET SYMBOL TABLE LOCATION OF VARIABLE                                FLOWCK     99
      LOC=IBLOCK(J)-IT*1000                                             FLOWCK    100
      GO TO(50,60,70,80,90,100,200),IT                                  FLOWCK    101
C** VARIABLE IS DEFINED                                                 FLOWCK    102
   50 IF(BITGET(IDTBL(3,LOC),13,1) .EQ. 1) GO TO 120                    FLOWCK    103
      IF(IDTBL(2,LOC) .EQ. 2) GO TO 55                                  FLOWCK    104
      IF(IDTBL(2,LOC) .EQ. 4) GO TO 180                                 FLOWCK    105
C** SET DEFINED FLAG                                                    FLOWCK    106
   52 IDTBL(2,LOC)=1                                                    FLOWCK    107
   30 IF(BITGET(IDTBL(3,LOC),17,1) .EQ. 0) GO TO 500                    FLOWCK    108
C** VARIABLE IS EQUIVALENCED - GET TYPE                                 FLOWCK    109
      KTYPE=BITGET(IDTBL(3,LOC),10,3)                                   FLOWCK    110
C** SET ALL VARIABLES OF SAME TYPE WHICH ARE EQUIVALENCED TO THIS ONE    FLOWCK    111
C** TO "DEFINED"                                                        FLOWCK    112
C** SET ALL VARIABLES OF DIFFERENT TYPE TO "UNDEFINED"                   FLOWCK    113
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      NXQV=LOC                                                          FLOWCK    114
   53 NXQV=IDTBL(7,NXQV)                                                FLOWCK    115
      IF(NXQV .EQ. LOC) GO TO 500                                       FLOWCK    116
      IF(BITGET(IDTBL(3,NXQV),10,3) .EQ. KTYPE) GO TO 54                FLOWCK    117
      IDTBL(2,NXQV)=0                                                   FLOWCK    118
      GO TO 53                                                          FLOWCK    119
   54 IDTBL(2,NXQV)=1                                                   FLOWCK    120
      GO TO 53                                                          FLOWCK    121
C** FLAG INDICATES THAT VARIABLE WAS ONCE A DO INDEX                    FLOWCK    122
C** MAKE SURE THAT IT IS NOT CURRENTLY A DO INDEX                       FLOWCK    123
   55 IF(ILOOP .EQ. 0) GO TO 52                                         FLOWCK    124
   57 IF(LOC .EQ. ISTACK(4,ILOOP)) GO TO 110                            FLOWCK    125
      IF(ISTACK(3,ILOOP) .EQ. 0) GO TO 52                               FLOWCK    126
      ILOOP=ISTACK(3,ILOOP)                                             FLOWCK    127
      GO TO 57                                                          FLOWCK    128
C** VARIABLE IS REFERENCED                                              FLOWCK    129
C** IF UNDEFINED OR ASSIGNED, ISSUE DIAGNOSTIC                          FLOWCK    130
   60 IF(IDTBL(2,LOC) .EQ. 0) GO TO 140                                 FLOWCK    131
      IF(IDTBL(2,LOC) .EQ. 3) GOTO 130                                  FLOWCK    132
C** SET "REFERENCED" FLAG                                               FLOWCK    133
      GO TO 500                                                         FLOWCK    134
C** VARIABLE IS A DO INDEX                                              FLOWCK    135
   70 IF(BITGET(IDTBL(3,LOC),13,1) .EQ. 1) GO TO 120                    FLOWCK    136
      IF(IDTBL(2,LOC) .EQ. 2) GO TO 75                                  FLOWCK    137
C** SET "DO INDEX" FLAG                                                 FLOWCK    138
   72 IDTBL(2,LOC)=2                                                    FLOWCK    139
      GO TO 500                                                         FLOWCK    140
C** FLAG INDICATES THAT VARIABLE WAS ONCE A DO INDEX                    FLOWCK    141
C** MAKE SURE THAT IT IS NOT CURRENTLY A DO INDEX                       FLOWCK    142
   75 IF(ILOOP .EQ. 0) GO TO 72                                         FLOWCK    143
   77 IF(LOC .EQ. ISTACK(4,ILOOP)) GO TO 110                            FLOWCK    144
      IF(ISTACK(3,ILOOP) .EQ. 0) GO TO 72                               FLOWCK    145
      ILOOP=ISTACK(3,ILOOP)                                             FLOWCK    146
      GO TO 77                                                          FLOWCK    147
C** VARIABLE IS ASSIGNED                                                FLOWCK    148
   80 IF(BITGET(IDTBL(3,LOC),13,1) .EQ. 1) GO TO 120                    FLOWCK    149
      IF(IDTBL(2,LOC) .EQ. 2) GO TO 85                                  FLOWCK    150
C** SET "ASSIGNED" FLAG                                                 FLOWCK    151
   82 IDTBL(2,LOC)=3                                                    FLOWCK    152
      GO TO 500                                                         FLOWCK    153
C** FLAG INDICATES THAT VARIABLE WAS ONCE A DO INDEX                    FLOWCK    154
C** MAKE SURE THAT IT IS NOT CURRENTLY A DO INDEX                       FLOWCK    155
   85 IF(ILOOP .EQ. 0) GO TO 82                                         FLOWCK    156
   87 IF(LOC .EQ. ISTACK(4,ILOOP)) GO TO 110                            FLOWCK    157
      IF(ISTACK(3,ILOOP) .EQ. 0) GO TO 82                               FLOWCK    158
      ILOOP=ISTACK(3,ILOOP)                                             FLOWCK    159
      GO TO 87                                                          FLOWCK    160
C** VARIABLE IS REFERENCED BY ASSIGNED GO TO                            FLOWCK    161
C** MAKE SURE VARIABLE WAS ASSIGNED                                     FLOWCK    162
   90 IF(IDTBL(2,LOC) .NE. 3) GO TO 150                                 FLOWCK    163
      GO TO 500                                                         FLOWCK    164
C** VARIABLE IS MADE UNDEFINED                                          FLOWCK    165
  100 IDTBL(2,LOC)=0                                                    FLOWCK    166
      GO TO 500                                                         FLOWCK    167
C** THIS LOOP CHECKS TO SEE IF A DO PARAMETER HAS BEEN REDEFINED        FLOWCK    168
  180 JLOOP=BITGET(IDTBL(3,LOC),36,18)                                  FLOWCK    169
  185 IF(ILOOP .EQ. JLOOP) GO TO 160                                    FLOWCK    170
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      ILOOP=ISTACK(3,ILOOP)                                             FLOWCK    171
      IF(ILOOP .EQ. 0) GO TO 30                                         FLOWCK    172
      GO TO 185                                                         FLOWCK    173
C** VARIABLE IS A DO PARAMETER                                          FLOWCK    174
C** IF UNDEFINED OR ASSIGNED ISSUE DIAGNOSTIC                           FLOWCK    175
  200 IF(IDTBL(2,LOC) .EQ. 0) GO TO 140                                 FLOWCK    176
      IF(IDTBL(2,LOC) .EQ. 3) GO TO 130                                 FLOWCK    177
      IDTBL(2,LOC)=4                                                    FLOWCK    178
      GO TO 500                                                         FLOWCK    179
C** SET ERROR CODES                                                     FLOWCK    180
  110 IERC=67                                                           FLOWCK    181
      GO TO 400                                                         FLOWCK    182
  120 IERC=68                                                           FLOWCK    183
      GO TO 400                                                         FLOWCK    184
  130 IERC=69                                                           FLOWCK    185
      GO TO 400                                                         FLOWCK    186
  140 IERC=70                                                           FLOWCK    187
      GO TO 400                                                         FLOWCK    188
  150 IERC=71                                                           FLOWCK    189
      GO TO 400                                                         FLOWCK    190
  160 IERC=72                                                           FLOWCK    191
  400 IRX=1                                                             FLOWCK    192
C** SET ERROR FLAG AND ISSUE DIAGNOSTIC                                 FLOWCK    193
      IF(BITGET(IDTBL(3,LOC),15,1) .EQ. 1) GO TO 500                    FLOWCK    194
      IDTBL(3,LOC)=BITPUT(IDTBL(3,LOC),1,15)                            FLOWCK    195
      CALL ERROR(IERC,IDTBL(1,LOC))                                     FLOWCK    196
      IF(IERC .NE. 70 .OR. NPATH .EQ. 0) GO TO 500                      FLOWCK    197
      WRITE(6,410) (IPATH(K),K=1,NPATH)                                 FLOWCK    198
  410 FORMAT(6X,15H ALONG THE PATH,(10I6))                              FLOWCK    199
  500 CONTINUE                                                          FLOWCK    200
 1000 CONTINUE                                                          FLOWCK    201
C** SCANNING OF THIS PATH COMPLETE - GET NEXT PATH                       FLOWCK    202
C** STARTING FROM BOTTOM OF FLOW PATH, FIND FIRST NEGATIVE NUMBER        FLOWCK    203
 1500 IF(FLWLST(NFLOW) .GT. 0) GO TO 1600                               FLOWCK    204
C** NEGATIVE NUMBER FOUND - TAKE NEXT BRANCH FROM TOP OF STACK           FLOWCK    205
      IBLKST=IABS(ISTCK(NSTCK))                                         FLOWCK    206
      IF(ISTCK(NSTCK) .LT. 0) FLWLST(NFLOW)=-FLWLST(NFLOW)              FLOWCK    207
      NSTCK=NSTCK-1                                                     FLOWCK    208
      NOC=0                                                             FLOWCK    209
      GO TO 5                                                           FLOWCK    210
 1600 NFLOW=NFLOW-1                                                     FLOWCK    211
      IF(NFLOW .GT. 0) GO TO 1500                                       FLOWCK    212
C** NO MORE BRANCHES LEFT                                               FLOWCK    213
      IF(NLABEL .EQ. 0) GO TO 2010                                      FLOWCK    214
C** THIS LOOP CHECKS TO SEE IF STATEMENT LABELS WERE ALL REFERENCED      FLOWCK    215
      DO 2000 J=1,NLABEL                                                FLOWCK    216
      IF(BITGET(STATRA(2,J),6,6) .EQ. 28) GO TO 2000                    FLOWCK    217
      IF(BITGET(STATRA(2,J),18,3) .EQ. 1) GO TO 2000                    FLOWCK    218
      WRITE(6,1800) STATRA(1,J)                                         FLOWCK    219
      IRX=1                                                             FLOWCK    220
 1800 FORMAT(6X,57H THERE IS NO COMPLETE PATH THAT CONTAINS STATEMENT NU FLOWCK    221
     1MBER,I6)                                                          FLOWCK    222
 2000 CONTINUE                                                          FLOWCK    223
 2010 IF(IRX .EQ. 0) WRITE(6,2020)                                      FLOWCK    224
 2020 FORMAT(//6X,16H NO ERRORS FOUND)                                  FLOWCK    225
      WRITE(6,2100) NPTHS                                               FLOWCK    226
 2100 FORMAT(//////6X,25H NUMBER OF PATHS CHECKED-,I6)                  FLOWCK    227
      CLTM2=SECOND(T)                                                   FLOWCK    228
      TOTTIM=CLTM2-CLTM1                                                FLOWCK    229
      WRITE(6,2700) TOTTIM                                              FLOWCK    230
 2700 FORMAT(//46X,20H FLOW ANALYSIS TOOK ,F8.3,11H CP SECONDS)         FLOWCK    231
      RETURN                                                            FLOWCK    232
 3000 WRITE(6,3001)                                                     FLOWCK    233
 3001 FORMAT(//31X,57H FLOW ANALYSIS WAS NOT PERFORMED DUE TO ERRORS IN FLOWCK    234
     $PROGRAM)                                                          FLOWCK    235
      IFL=IRP+1                                                         FLOWCK    236
      RETURN                                                            FLOWCK    237
 4000 WRITE(6,4001)                                                     FLOWCK    238
 4001 FORMAT(//29X,63H TABLE OVERFLOW DURING FLOW ANALYSIS - FLOW ANALYS FLOWCK    239
     $IS TERMINATED)                                                    FLOWCK    240
      RETURN                                                            FLOWCK    241
 5000 WRITE(6,5001)                                                     FLOWCK    242
 5001 FORMAT(//29X,63H STACK OVERFLOW DURING FLOW ANALYSIS - FLOW ANALYS FLOWCK    243
     $IS TERMINATED)                                                    FLOWCK    244
      RETURN                                                            FLOWCK    245
      END                                                               FLOWCK    246
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      SUBROUTINE FNCSTR                                                 FNCSTR     2
      COMMON A(1326),D(500),IDTBL(8,500),INITID(3),LASTID(3),ISRCH(3),  RICH       2
     * JPTR,N,M,JTYP,LSTART,N2,IFNCNM,LOGID,NXTID,IDTYP,NID,LOC,        CY58A     80
     2 LTYP,ITYP,IBLKDT,MODE,IERR,IDES                                  RICH       4
      COMMON/FUNC/IFNCRA(5,12),MARGS,IARGS(50),FNCLOC(5),NFUNC          CY58A     37
      COMMON/LIST/NLIST,NINTFC,ISUBLT(2,200),INTFAC(300)                FNCSTR     5
      INTEGER FNCLOC,BITPUT,BITGET                                      FNCSTR     6
C** THIS ROUTINE IS CALLED AFTER PARSING AN EXPRESSION, TO PROCESS       FNCSTR     7
C** ALL FUNCTION REFERENCES IN THE EXPRESSION                            FNCSTR     8
      IF(NFUNC .EQ. 0) RETURN                                           FNCSTR     9
      DO 40 I=1,NFUNC                                                   FNCSTR    10
C** GET SYMBOL TABLE LOCATION OF NEXT FUNCTION                           FNCSTR    11
      LOC=FNCLOC(I)                                                     FNCSTR    12
C** SKIP IF STATEMENT FUNCTION                                           FNCSTR    13
      IF(BITGET(IDTBL(3,LOC),19,1) .EQ. 1) GO TO 50                     FNCSTR    14
C** GET NUMBER OF ARGUMENTS                                              FNCSTR    15
      NARG=IFNCRA(I,1)                                                  FNCSTR    16
      IVAR=0                                                            FNCSTR    17
C** GET FUNCTION TYPE                                                    FNCSTR    18
      ITP=BITGET(IDTBL(3,LOC),10,3)                                     FNCSTR    19
      IF(BITGET(IDTBL(3,LOC),18,1) .EQ. 1) GO TO 20                     FNCSTR    20
C** FUNCTION NAME HAS NOT YET APPEARED IN PROGRAM - SET FLAG             FNCSTR    21
      IDTBL(3,LOC)=BITPUT(IDTBL(3,LOC),1,18)                            FNCSTR    22
C** SEARCH SESCOMP LIST FOR NAME                                         FNCSTR    23
      DO 5 J=1,NLIST                                                    FNCSTR    24
      IF(IDTBL(1,LOC) .NE. ISUBLT(1,J)) GO TO 5                         FNCSTR    25
C** NAME FOUND - STORE SESCOMP LIST LOCATION IN SYMBOL TABLE             FNCSTR    26
      IDTBL(3,LOC)=BITPUT(IDTBL(3,LOC),J,36)                            FNCSTR    27
      LISTLC=J                                                          FNCSTR    28
      GO TO 21                                                          FNCSTR    29
    5 CONTINUE                                                          FNCSTR    30
C** NAME NOT FOUND IN SESCOMP LIST - ISSUE DIAGNOSTIC                    FNCSTR    31
      CALL ERROR(52)                                                    FNCSTR    32
C** STORE NAME IN SESCOMP LIST                                           FNCSTR    33
      NLIST=NLIST+1                                                     FNCSTR    34
      IF(NLIST .GT. 200) GO TO 60                                       CY58A     38
      ISUBLT(1,NLIST)=IDTBL(1,LOC)                                      FNCSTR    35
C** STORE LIST LOCATION IN SYMBOL TABLE                                  FNCSTR    36
      IDTBL(3,LOC)=BITPUT(IDTBL(3,LOC),NLIST,36)                        FNCSTR    37
C** INCREMENT INTERFACE DEFINITION TABLE POINTER                         FNCSTR    38
      IPTR=NINTFC+1                                                     FNCSTR    39
      IF(ITYP .EQ. 8 .AND. I .EQ. 1) ITP=0                              FNCSTR    40
C** STORE INTERFACE DEFINITION TABLE POINTER AND FUNCTION TYPE IN        FNCSTR    41
C** SESCOMP LIST                                                        FNCSTR    42
      ISUBLT(2,NLIST)=BITPUT(IPTR,ITP,13)                               FNCSTR    43
C** STORE NO. OF ARGUMENTS IN SESCOMP LIST                               FNCSTR    44
      ISUBLT(2,NLIST)=BITPUT(ISUBLT(2,NLIST),NARG,6)                    FNCSTR    45
C** UPDATE INTERFACE DEFINITION TABLE COUNTER                            FNCSTR    46
      NINTFC=IPTR+(NARG-1)/6                                            FNCSTR    47
      IF(NINTFC .GT. 300) GO TO 70                                      CY58A     39
C** STORE INTERFACE DEFINITION                                           FNCSTR    48
      DO 10 J=IPTR,NINTFC                                               FNCSTR    49
   10 INTFAC(J)=IFNCRA(I,J-IPTR+2)                                      FNCSTR    50
      GO TO 40                                                          FNCSTR    51
C** FUNCTION NAME HAS PREVIOUSLY OCCURED - GET SESCOMP LIST LOCATION     FNCSTR    52
   20 LISTLC=BITGET(IDTBL(3,LOC),36,9)                                  FNCSTR    53
C** GET INTERFACE DEFINITION TABLE POINTER                               FNCSTR    54
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   21 IPTR=BITGET(ISUBLT(2,LISTLC),60,15)                          FNCSTR    55
      IF(BITGET(ISUBLT(2,LISTLC),14,1) .EQ. 1) GO TO 22            FNCSTR    56
C** GET NO. OF ARGUMENTS AND CHECK VALIDITY                        FNCSTR    57
      NAR2=BITGET(ISUBLT(2,LISTLC),6,6)                            FNCSTR    58
      IF(NARG .NE. NAR2) CALL ERROR(26,IDTBL(1,LOC))               FNCSTR    59
      NARGS=MIND(NARG,NAR2)                                        FNCSTR    60
      GO TO 24                                                     FNCSTR    61
C** VARIABLE NO. OF ARGUMENTS - SET FLAG                           FNCSTR    62
   22 IVAR=1                                                       FNCSTR    63
      IF(NARG .LT. 2) CALL ERROR(26,IDTBL(1,LOC))                  FNCSTR    64
      NARGS=NARG                                                   FNCSTR    65
C** SET ARGUMENT TYPE AND DIMENSIONALITY                            FNCSTR    66
      ITP1=BITGET(INTFAC(IPTR),3,3)                                FNCSTR    67
      NDIM1=BITGET(INTFAC(IPTR),6,3)                               FNCSTR    68
   24 IF(ITYP .EQ. 8 .AND. I .EQ. 1) GO TO 25                      FNCSTR    69
      IF(BITGET(ISUBLT(2,LISTLC),10,4) .EQ. 4) GO TO 25            FNCSTR    70
C** CHECK TYPES OF INTRINSIC FUNCTIONS                             FNCSTR    71
      JTP=BITGET(ISUBLT(2,LISTLC),13,3)                            FNCSTR    72
      IF(JTP .NE. ITP) CALL ERROR(49,IDTBL(1,LOC))                 FNCSTR    73
C** SET INTERFACE DEFINITION TABLE POINTER                         FNCSTR    74
   25 NOPTR=IPTR+(NARGS-1)/6                                       FNCSTR    75
      KOUNT=0                                                      FNCSTR    76
C** THESE TWO LOOPS CHECK THE ARGUMENT LIST AGAINST THE            FNCSTR    77
C** INTERFACE DEFINITION                                           FNCSTR    78
      DO 32 K=IPTR,NOPTR                                           FNCSTR    79
      ICOL1=-6                                                     FNCSTR    80
      ICOL2=-3                                                     FNCSTR    81
      DO 32 J=1,6                                                  FNCSTR    82
      KOUNT=KOUNT+1                                                FNCSTR    83
      IF(KOUNT .GT. NARGS) GO TO 40                                FNCSTR    84
      ICOL1=ICOL1+9                                                FNCSTR    85
      ICOL2=ICOL2+9                                                FNCSTR    86
      IF(IVAR .EQ. 1) GO TO 26                                     FNCSTR    87
C** GET ARGUMENT TYPE AND DIMENSIONALITY FROM SYMBOL TABLE         FNCSTR    88
      ITP1=BITGET(INTFAC(K),ICOL1,3)                               FNCSTR    89
      NDIM1=BITGET(INTFAC(K),ICOL2,3)                              FNCSTR    90
   26 ITP2=BITGET(IFNCRA(I,K-IPTR+2),ICOL1,3)                      FNCSTR    91
      NDIM2=BITGET(IFNCRA(I,K-IPTR+2),ICOL2,3)                     FNCSTR    92
C** CHECK DIMENSIONALITY AND TYPE FOR VALIDITY                     FNCSTR    93
      IF(NDIM1 .NE. NDIM2) CALL ERROR(50,KOUNT)                    FNCSTR    94
      IF(ITP2 .EQ. 0) GO TO 32                                     FNCSTR    95
      IF(ITP1 .EQ. 0) GO TO 28                                     FNCSTR    96
      IF(ITP1 .NE. ITP2) CALL ERROR(51,KOUNT)                      FNCSTR    97
      GO TO 32                                                     FNCSTR    98
   28 INTFAC(K)=BITPUT(INTFAC(K),ITP2,ICOL1)                       FNCSTR    99
   32 CONTINUE                                                     FNCSTR   100
      GO TO 40                                                     FNCSTR   101
C** STATEMENT FUNCTION - CALL STATEMENT FUNCTION PROCESSOR         FNCSTR   102
   50 CALL STFNC(I)                                                CY58A     40
   40 CONTINUE                                                     FNCSTR   104
      RETURN                                                       FNCSTR   105
   60 CALL ERROR(92)                                               CY58A     41
      STOP                                                         CY58A     42
   70 CALL ERROR(93)                                               CY58A     43
      STOP                                                         CY58A     44
      END                                                          FNCSTR   106
```

FORTRAN Version

```
      SUBROUTINE FORM                                                   FORM2  2
      COMMON/LVARGS/LVFUNC,LVVARG,LVVAD,LVVPOS,LVVTYP,        LVVAL,
     +LVHEAD,LVVNVL,LVDEST,LVVALS(10),LVTYPE(10),LVSKIP
      COMMON/LVTABL/LVTSIZ,LVMAP(     1)/LVVSEQ/LVSIZE,LVSQSP(      1)
      COMMON /HL/ HOL,ACTION,FUNC1,FUNC2,FUNC3,LEFT,RIGHT,STRING        FORM2  3
      COMMON /VAR/ VFOR,NCHAR,NCHARP,CHAR,NDICT                         FORM2  4
      COMMON /TYP/ NARRAY,TYPE1,TYPE2,ERRFLG                            FORM2  5
      COMMON /STRING/ NTYPE,NSTR,STR                                    FORM2  6
      INTEGER BITPUT,BITGET                                             FORM2  7
      INTEGER VFOR(15),CHAR,STR(1)                                      FORM2  8
      LOGICAL ERRFLG                                                    FORM2  9
      GO TO 25000
25001 CONTINUE
      IF(CHAR .NE. 1HX) NDICT=-NL[illegible]                            FORM2 11
      NCHARP=NCHARP+1                                                   FORM2 12
      STR(NCHARP)=NDICT                                                 FORM2 13
      IF(.NOT. ERRFLG) RETURN                                           FORM[illegible] 14
      NCHAR=NCHAR+1                                                     FORM[illegible] 15
      NC=1+(NCHARP-1)/8                                                 FORM2 16
      ICHAR=BITGET(CHAR,6,6)                                            FORM2 17
      VFOR(NC)=BITPUT(VFOR(NC),ICHAR,6*NCHAR)                           FORM2 18
      IF(NCHAR .EQ. 8) NCHAR=0                                          FORM2 19
      RETURN
25000 CONTINUE
      GO TO 25001
      END
```

GIRL Version

```
$     SUBROUTINE FORM                                                   FORM2      2
      COMMON /HL/ HOL,ACTION,FUNC1,FUNC2,FUNC3,LEFT,RIGHT,STRING        FORM2      3
      COMMON /VAR/ VFOR,NCHAR,NCHARP,CHAR,NDICT                         FORM2      4
      COMMON /TYP/ NARRAY,TYPE1,TYPE2,ERRFLG                            FORM2      5
      COMMON /STRING/ NTYPE,NSTR,STR                                    FORM2      6
      INTEGER BITPUT,BITGET                                             FORM2      7
      INTEGER VFOR(15),CHAR,STR(1)                                      FORM2      8
      LOGICAL ERRFLG                                                    FORM2      9
G     EXECUTE                                                           FORM2     10
      IF(CHAR .NE. 1HX) NDICT=-NDICT                                    FORM2     11
      NCHARP=NCHARP+1                                                   FORM2     12
      STR(NCHARP)=NDICT                                                 FORM2     13
      IF(.NOT. ERRFLG) RETURN                                           FORM2     14
      NCHAR=NCHAR+1                                                     FORM2     15
      NC=1+(NCHARP-1)/8                                                 FORM2     16
      ICHAR=BITGET(CHAR,6,6)                                            FORM2     17
      VFOR(NC)=BITPUT(VFOR(NC),ICHAR,6*NCHAR)                           FORM2     18
      IF(NCHAR .EQ. 8) NCHAR=0                                          FORM2     19
G     COMPLETE                                                          FORM2     20
```

```
      SUBROUTINE FORMEL                                                 FORM      2
      COMMON A(1326),D(500),IDTBL(8,500),INITID(3),LASTID(3),ISRCH(3),  RICH      2
     * JPTR,N,M,JTYP,LSTART,N2,IFNCNM,LOGID,NXTID,IDTYP,NID,LOC,        CY58A    80
     2 LTYP,ITYP,IBLKDT,MODE,IERR,IDES                                  RICH      4
      INTEGER B(50),D,BITGET                                            FORM      4
C** THIS ROUTINE IS CALLED BY "GNLE" TO PROCESS LANGUAGE ELEMENTS        FORM      5
      GO TO(100,10,20,30,40,50,100,100),JTYP                            FORM      6
C** PACK NAME INTO SINGLE WORD AND STORE IN "NXTID"                     FORM      7
   10 CALL CAA(D,M,NXTID)                                               FORM      8
      RETURN                                                            FORM      9
   20 DO 25 I=1,10                                                      FORM     10
      IF(D(I) .NE. 1HH) GO TO 25                                        FORM     11
C** GET SIZE OF HOLLERITH STRING                                        FORM     12
      CALL CAI(D,I-1,N2)                                                FORM     13
      IF(N2 .LT. 1) GO TO 110                                           FORM     14
      M=N2+I                                                            FORM     15
      IF(M .GT. 500) CALL ERROR(5)                                      FORM     16
      JPTR=LSTART+M                                                     FORM     17
C** CHECK FOR NON-STANDARD CHARACTER IN STRING                          FORM     18
      IST=I+1                                                           FORM     19
      DO 22 J=IST,M                                                     FORM     20
      ICHAR=BITGET(D(J),6,6)                                            FORM     21
      IF(ICHAR .GT. 57B) GO TO 120                                      FORM     22
   22 CONTINUE                                                          FORM     23
      IF(ITYP .EQ. 2B) RETURN                                           FORM     24
      IF(N2 .GT. 4) CALL ERROR(5)                                       FORM     25
      RETURN                                                            FORM     26
   25 CONTINUE                                                          FORM     27
      CALL ERROR(3)                                                     FORM     28
      RETURN                                                            FORM     29
C** CHECK VALIDITY OF REAL NUMBER                                       FORM     30
   30 CALL CAR(D,M,IDES)                                                FORM     31
      RETURN                                                            FORM     32
C** CHECK VALIDITY OF INTEGER AND STORE VALUE IN "N2"                   FORM     33
   40 CALL CAI(D,M,N2)                                                  FORM     34
      RETURN                                                            FORM     35
C** CHECK VALIDITY OF COMPLEX NUMBER                                    FORM     36
   50 DO 55 I=2,M                                                       FORM     37
      IF(D(I) .EQ. 1H,) GO TO 60                                        FORM     38
   55 B(I-1)=D(I)                                                       FORM     39
   60 CALL CAR(B,I-2,IDES)                                              FORM     40
      M2=M-I-1                                                          FORM     41
      DO 65 J=1,M2                                                      FORM     42
   65 B(J)=D(I+J)                                                       FORM     43
      CALL CAR(B,M2,IDES)                                               FORM     44
  100 RETURN                                                            FORM     45
  110 CALL ERROR(7)                                                     FORM     46
      RETURN                                                            FORM     47
  120 CALL ERROR(23)                                                    FORM     48
      RETURN                                                            FORM     49
      END                                                               FORM     50
```

```
      SUBROUTINE FRMAT                                                  FRMAT      2
      COMMON A(1326),D(500),IDTBL(8,500),INITID(3),LASTID(3),ISRCH(3),  RICH       2
     * JPTR,N,M,JTYP,LSTART,N2,IFNCNM,LOGID,NXTID,IDTYP,NID,LOC,        CY58A     80
     2 LTYP,ITYP,IBLKDT,MODE,IERR,IDES                                  RICH       4
      COMMON/FORMAT/IDESST,IDESND,IGPST,IGPND,IGRP,SEPST,SEPND,         CY58A      2
     1 DIR,ICOM,ISEP                                                    FRMAT      5
      DIMENSION RPLOC(20),IALPH(6)                                      FRMAT      6
      INTEGER A,RPLOC,AICH,RPAR,BLANK,SEPST,SEPND,DIR                   FRMAT      7
      DATA BLANK/1H /,AICH/1HH/,LPAR/1H(/,RPAR/1H)/                     FRMAT      8
      DATA (IALPH(I),I=1,6)/1HF,1HO,1HR,1HM,1HA,1HT/                    FRMAT      9
C** THIS ROUTINE PROCESSES FORMAT STATEMENTS AND RETURNS                FRMAT     10
C**      IFRMT=1 - VALID      IFRMAT=0 - INVALID                        FRMAT     11
      IFRMT=0                                                           FRMAT     12
C** CHECK SPELLING                                                      FRMAT     13
      DO 4 I=1,6                                                        FRMAT     14
      IF(NEXT(JPTR) .NE. IALPH(I)) GO TO 70                             FRMAT     15
    4 CONTINUE                                                          FRMAT     16
      NSTART=JPTR                                                       FRMAT     17
      IF(NEXT(JPTR) .NE. LPAR) GO TO 70                                 FRMAT     18
      DO 10 I=1,N                                                       FRMAT     19
      IF(ITYPE(JPTR) .EQ. 2) GO TO 1                                    FRMAT     20
      IF(JPTR .GT. N) GO TO 12                                          FRMAT     21
      GO TO 10                                                          FRMAT     22
    1 JPTR=JPTR-1                                                       FRMAT     23
      CALL GNLE                                                         FRMAT     24
      IF(JTYP .NE. 3) GO TO 10                                          FRMAT     25
      J1=JPTR-1                                                         FRMAT     26
      IH=0                                                              FRMAT     27
C** PUT BLANKS IN HOLLERITH STRINGS                                     FRMAT     28
      DO 5 J=LSTART,J1                                                  FRMAT     29
      IF(IH .EQ. 1) GO TO 3                                             FRMAT     30
      IF(A(J) .EQ. AICH) IH=1                                           FRMAT     31
      GO TO 5                                                           FRMAT     32
    3 A(J)=BLANK                                                        FRMAT     33
    5 CONTINUE                                                          FRMAT     34
   10 CONTINUE                                                          FRMAT     35
   12 NPAR=0                                                            FRMAT     36
      NRP=0                                                             FRMAT     37
      DO 20 I=NSTART,N                                                  FRMAT     38
      IF(A(I) .NE. LPAR) GO TO 15                                       FRMAT     39
      NPAR=NPAR+1                                                       FRMAT     40
      IF(NPAR .GT. 3) GO TO 70                                          FRMAT     41
      GO TO 20                                                          FRMAT     42
   15 IF(A(I) .NE. RPAR) GO TO 20                                       FRMAT     43
      NPAR=NPAR-1                                                       FRMAT     44
      NRP=NRP+1                                                         FRMAT     45
C** STORE LOCATIONS OF RIGHT PARENS                                     FRMAT     46
      RPLOC(NRP)=I                                                      FRMAT     47
      IF(NPAR .LT. 0) GO TO 70                                          FRMAT     48
   20 CONTINUE                                                          FRMAT     49
      IF(NPAR .NE. 0) GO TO 70                                          FRMAT     50
      IF(NEXT(RPLOC(NRP)+1) .NE. BLANK) GO TO 70                        FRMAT     51
      DO 60 I=1,NRP                                                     FRMAT     52
      IGPND=RPLOC(I)                                                    FRMAT     53
      DO 25 J=1,N                                                       FRMAT     54
      K=IGPND-J                                                         FRMAT     55
      IF(A(K) .NE. LPAR) GO TO 25                                       FRMAT     56
```

```
C** GET CORRESPONDING LEFT PAREN FOR RIGHT PAREN                    FRMAT    57
      IGPST=K                                                       FRMAT    58
      GO TO 30                                                      FRMAT    59
   25 CONTINUE                                                      FRMAT    60
C** CHECK SYNTAX OF GROUP                                            FRMAT    61
   30 CALL GROUP                                                    FRMAT    62
      IF(IGRP .EQ. 0) RETURN                                        FRMAT    63
      IF(I .EQ. NRP) GO TO 65                                       FRMAT    64
      JPTR=IGPST-1                                                  FRMAT    65
   31 CONTINUE                                                      FRMAT    66
      IF(IPREV(JPTR) .EQ. 2) GO TO 31                               FRMAT    67
      IGPST=JPTR+2                                                  FRMAT    68
      SEPST=IGPND+1                                                 FRMAT    69
C** CHECK NEXT SEPARATOR                                             FRMAT    70
      DIR=1                                                         FRMAT    71
      CALL SEPAR                                                    FRMAT    72
      IF(ISEP .NE. 1) GO TO 40                                      FRMAT    73
      IGPND=SEPND                                                   FRMAT    74
      GO TO 50                                                      FRMAT    75
   40 IF(NEXT(SEPST) .NE. RPAR) GO TO 70                            FRMAT    76
C** CHECK PRECEDING SEPARATOR                                        FRMAT    77
      SEPST=IGPST-1                                                 FRMAT    78
      DIR=-1                                                        FRMAT    79
      CALL SEPAR                                                    FRMAT    80
      IF(ISEP .NE. 1) GO TO 45                                      FRMAT    81
      IGPST=SEPND                                                   FRMAT    82
      GO TO 50                                                      FRMAT    83
   45 IF(A(SEPND) .NE. LPAR) GO TO 70                               FRMAT    84
   50 DO 55 J=IGPST,IGPND                                           FRMAT    85
      A(J)=BLANK                                                    FRMAT    86
   55 CONTINUE                                                      FRMAT    87
   60 CONTINUE                                                      FRMAT    88
   65 IFRMT=1                                                       FRMAT    89
      RETURN                                                        FRMAT    90
   70 CALL ERROR(7)                                                 FRMAT    91
      RETURN                                                        FRMAT    92
      END                                                           FRMAT    93
```

```
      SUBROUTINE GENROL                                                 GENROL     2
      COMMON A(1326),D(500),IDTBL(8,500),INITID(3),LASTID(3),ISRCH(3),  RICH       2
     * JPTR,N,M,JTYP,LSTART,N2,IFNCNM,LOGID,NXTID,IDTYP,NID,LOC,        CY58A     80
     2 LTYP,ITYP,IBLKOT,MODE,IERR,IOES                                  RICH       4
      COMMON/GLOBAL/NBLK,NREF,NSUBS,BLKTBL(200),EXTTBL(100),ISUBS(100)  GENROL     4
      COMMON/LIST/NLIST,NINTFC,ISUBLT(2,200),INTFAC(300)                GENROL     5
      COMMON/INPOUT/NCALL,IN,IOP                                        GENROL     6
      COMMON/WASTE/IDUM(63)                                             GENROL     7
      INTEGER BLKTBL,EXTTBL,BITGET                                      GENROL     8
C** THIS ROUTINE IS CALLED IN THE ROLL CALL MODE TO GENERATE THE MAIN    GENROL     9
C** ROLL CALL PROGRAM                                                   GENROL    10
      WRITE(6,2)                                                        GENROL    11
    2 FORMAT(1H1)                                                       GENROL    12
C** GENERATE PROGRAM CARD                                               GENROL    13
      WRITE(IOP,4)                                                      GENROL    14
    4 FORMAT(5X,48H PROGRAM ROLCAL(OUTPUT,TAPE6=OUTPUT,TAPE3,TAPE9,/    GENROL    15
     * 5X,44H* TAPE10,TAPE11,TAPE12,TAPE13,TAPE14,TAPE15))              GENROL    16
      IF(NBLK .EQ. 0) GO TO 6                                           GENROL    17
      K=-1                                                              GENROL    18
C** THIS LOOP GENERATES COMMON STATEMENTS                               GENROL    19
      DO 5 I=1,NBLK                                                     GENROL    20
      K=K+1                                                             GENROL    21
      INDEX=BLKTBL(I)                                                   GENROL    22
      ISZ=BITGET(ISUBLT(2,INDEX),30,15)                                 GENROL    23
      WRITE(IOP,3) ISUBLT(1,INDEX),K,ISZ                                GENROL    24
    3 FORMAT(5X,8H COMMON/,A6,3H/IX,I2,1H(,I6,1H))                      GENROL    25
    5 CONTINUE                                                          GENROL    26
C** GENERATE LOOP TO DUMMY OUT COMMON BLOCKS                            GENROL    27
    6 WRITE(IOP,7) MODE                                                 GENROL    28
    7 FORMAT(5X,4H J=1/5X,6H MODE=,I1/5X,10H REWIND 13/5X,10H REWIND 14/ GENROL    29
     $ 5X,10H REWIND 15/5X,13H DO 10 I=1,13/5X,6H J=J-1)                GENROL    30
      IF(NBLK .EQ. 0) GO TO 22                                          GENROL    31
      K=-1                                                              GENROL    32
      DO 20 I=1,NBLK                                                    GENROL    33
      K=K+1                                                             GENROL    34
      KK=1000+K                                                         GENROL    35
      INDEX=BLKTBL(I)                                                   GENROL    36
      ISZ=BITGET(ISUBLT(2,INDEX),30,15)                                 GENROL    37
      WRITE(IOP,10) KK,ISZ,K,KK                                         GENROL    38
   10 FORMAT(5X,4H DO ,I4,5H K=1,,I6/5X,3H IX,I2,5H(K)=1/1X,I4,         GENROL    39
     $ 9H CONTINUE)                                                     GENROL    40
      IF(ISUBLT(1,INDEX) .NE. 6HSESCOM) GO TO 20                        GENROL    41
C** SET I/O DEVICES IN COMMON BLOCK SESCOM                              GENROL    42
      WRITE(IOP,15) K,K,K                                               GENROL    43
   15 FORMAT(5X,3H IX,I2,7H(17)=10/5X,3H IX,I2,7H(20)=11/               GENROL    44
     * 5X,3H IX,I2,7H(23)=12)                                           GENROL    45
   20 CONTINUE                                                          GENROL    46
C** GENERATE CALL TO THE MODULE AND DUMMY ARGUMENT LIST - MODULE        GENROL    47
C** CONTAINS CALLS TO "ROLCHK"                                          GENROL    48
   22 NARG=BITGET(IDTBL(3,1),7,6)                                       GENROL    49
      DO 30 I=1,NARG                                                    GENROL    50
      IF(I .EQ. NARG) GO TO 25                                          GENROL    51
      IDUM(I)=2HD,                                                      GENROL    52
      GO TO 30                                                          GENROL    53
   25 IDUM(I)=2HJ)                                                      GENROL    54
   30 CONTINUE                                                          GENROL    55
      WRITE(IOP,35) (IDTBL(1,1),(IDUM(I),I=1,NARG))                     GENROL    56
   35 FORMAT(5X,6H CALL ,A6,1H(,41A2/5X,1H1,1X,22A2)                    GENROL    57
C** GENERATE REMAINDER OF PROGRAM INCLUDING CALLS TO ROLL CALL          GENROL    58
C** AUXILIARY PROGRAMS "MODID" AND "COMPARE"                            GENROL    59
      WRITE(IOP,40)                                                     GENROL    60
   40 FORMAT(5X,23H IF(MODE .EQ. 3)GO TO 5/5X,14H CALL MODID(J)/        GENROL    61
     $ 3X,12H 5 ENDFILE 3/2X,12H 10 CONTINUE/5X,12H CALL CMPARE/        GENROL    62
     $ 5X,9H REWIND 3/5X,10H REWIND 13/5X,10H REWIND 14/5X,10H REWIND 15 GENROL    63
     $ /5X,5H STOP/5X,4H END)                                           GENROL    64
      RETURN                                                            GENROL    65
      END                                                               GENROL    66
```

```
      SUBROUTINE GLOTAB                                                 GLOTAB     2
      COMMON A(1326),D(500),IDTBL(8,500),INITID(3),LASTID(3),ISRCH(3),  RICH       2
     * JPTR,N,M,JTYP,LSTART,N2,IFNCNM,LOGID,NXTID,IDTYP,NID,LOC,        CY58A     80
     2 LTYP,ITYP,IBLKDT,MODE,IERR,IDES                                  RICH       4
      COMMON/GLOBAL/NBLK,NREF,NSUBS,BLKTBL(200),EXTTBL(100),ISUBS(100)  GLOTAB     4
      COMMON/LIST/NLIST,NINTFC,ISUBLT(2,200),INTFAC(300)                GLOTAB     5
      INTEGER BITGET,BLKTBL,EXTTBL,KLAS(2,7)                            GLOTAB     6
      DATA KLAS/10HUSER SUPPL,3HIED,10HSUBROUTINE,7H MODULE,            GLOTAB     7
     * 10HFUNCTION M,5HODULE,9HANCILLARY,10HSUBPROGRAM,10HANSI FUNCT,   GLOTAB     8
     * 3HION,10HMAIN PROGR,2HAM,10HEXTRAORDIN,10HARY SUBPR./            GLOTAB     9
C** THIS ROUTINE DISPLAYS THE GLOBAL REFERENCE TABLE                    GLOTAB    10
      WRITE(6,1)                                                        GLOTAB    11
    1 FORMAT(1H1,48X,23H GLOBAL REFERENCE TABLE)                        GLOTAB    12
      IF(NREF .EQ. 0) GO TO 25                                          GLOTAB    13
C** DISPLAY EXTERNAL REFERENCES                                         GLOTAB    14
      WRITE(6,2)                                                        GLOTAB    15
    2 FORMAT(//50X,20H EXTERNAL REFERENCES)                             GLOTAB    16
      DO 20 I=1,NREF                                                    GLOTAB    17
C** GET SESCOMP LIST LOCATION                                           GLOTAB    18
      INDEX=EXTTBL(I)                                                   GLOTAB    19
C** SET SUBPROGRAM CLASS                                                GLOTAB    20
      J=BITGET(ISUBLT(2,INDEX),10,4)                                    GLOTAB    21
      WRITE(6,10) ISUBLT(1,INDEX),KLAS(1,J+1),KLAS(2,J+1)               GLOTAB    22
   10 FORMAT(45X,A6,4X,2A10)                                            GLOTAB    23
   20 CONTINUE                                                          GLOTAB    24
   25 IF(NBLK .EQ. 0 .OR. (NBLK .EQ. 1 .AND. ISUBLT(1,BLKTBL(1)) .EQ.   GLOTAB    25
     $ 1H )) GO TO 40                                                   GLOTAB    26
C** DISPLAY LABELLED COMMON BLOCKS                                      GLOTAB    27
      WRITE(6,30)                                                       GLOTAB    28
   30 FORMAT(//49X,23H LABELLED COMMON BLOCKS/43X,11H BLOCK NAME,7X,    GLOTAB    29
     $ 5H SIZE,7X,6H CLASS)                                             GLOTAB    30
      DO 38 J=1,NBLK                                                    GLOTAB    31
C** GET SESCOMP LIST LOCATION                                           GLOTAB    32
      INDEX=BLKTBL(J)                                                   GLOTAB    33
C** GET COMMON BLOCK CATEGORY                                           GLOTAB    34
      ICAT=BITGET(ISUBLT(2,INDEX),10,4)-6                               GLOTAB    35
      ISZ=BITGET(ISUBLT(2,INDEX),30,15)                                 GLOTAB    36
   35 FORMAT(46X,A6,5X,I8,5X,9HCATEGORY ,I2)                            GLOTAB    37
      WRITE(6,35) ISUBLT(1,INDEX),ISZ,ICAT                              GLOTAB    38
   38 CONTINUE                                                          GLOTAB    39
C** DISPLAY SUBROUTINES                                                 GLOTAB    40
   40 WRITE(6,45)                                                       GLOTAB    41
   45 FORMAT(///48X,24H SUBROUTINES ENCOUNTERED)                        GLOTAB    42
      DO 60 I=1,NSUBS                                                   GLOTAB    43
C** GET SUBROUTINE CLASS                                                GLOTAB    44
      INDEX=ISUBS(I)                                                    GLOTAB    45
      J=BITGET(ISUBLT(2,INDEX),10,4)                                    GLOTAB    46
      WRITE(6,10) ISUBLT(1,INDEX),KLAS(1,J+1),KLAS(2,J+1)               GLOTAB    47
   60 CONTINUE                                                          GLOTAB    48
      RETURN                                                            GLOTAB    49
      END                                                               GLOTAB    50
```

```
      SUBROUTINE GNLE                                                   GNLE      2
      COMMON A(1326),D(500),IDTBL(8,500),INITID(3),LASTID(3),ISRCH(3),  RICH      2
     * JPTR,N,M,JTYP,LSTART,N2,IFNCNM,LOGID,NXTID,IDTYP,NID,LOC,        CY58A    80
     2 LTYP,ITYP,IBLKDT,MODE,IERR,IDES                                  RICH      4
      COMMON/LOGIC/LOG,LOGST                                            GNLE      4
      COMMON/REALNO/IREAL,IRELNO,IP                                     GNLE      5
      INTEGER A,D,BLANK,PLUS,EQUALS,SLASH,RPAR,COMMA,ASTRIK,            GNLE      6
     1 AICH,DECPT                                                       GNLE      7
      DATA BLANK/1H /,PLUS/1H+/,MINUS/1H-/,EQUALS/1H=/,SLASH/1H//,      GNLE      8
     1 RPAR/1H)/,COMMA/1H,/,ASTRIK/1H*/,AICH/1HH/,LPAR/1H(/,DECPT/1H./  GNLE      9
C** THIS ROUTINE SCANS THE INPUT STRING STARTING AT "JPTR" AND RETURNS  GNLE     10
C** THE NEXT LANGUAGE ELEMENT                                           GNLE     11
C**       JTYP=0 - BLANK                                               GNLE     12
C**       JTYP=1 - ARITHMETIC OPERATOR                                 GNLE     13
C**       JTYP=2 - NAME                                                GNLE     14
C**       JTYP=3 - HOLLERITH STRING                                    GNLE     15
C**       JTYP=4 - REAL NUMBER                                         GNLE     16
C**       JTYP=5 - INTEGER                                             GNLE     17
C**       JTYP=6 - COMPLEX NUMBER                                      GNLE     18
C**       JTYP=7 - LOGICAL OPERATOR OR CONSTANT                        GNLE     19
C**       JTYP=8 - INVALID                                             GNLE     20
      JTYP=0                                                            GNLE     21
      NXT=NEXT(JPTR)                                                    GNLE     22
      IF(NXT .EQ. BLANK) RETURN                                         GNLE     23
      LSTART=JPTR-1                                                     GNLE     24
      IF(NXT .EQ. PLUS) GO TO 1                                         GNLE     25
      IF(NXT .EQ. RPAR) GO TO 1                                         GNLE     26
      IF(NXT .EQ. MINUS) GO TO 1                                        GNLE     27
      IF(NXT .EQ. SLASH) GO TO 1                                        GNLE     28
      IF(NXT .EQ. COMMA) GO TO 1                                        GNLE     29
      IF(NXT .EQ. EQUALS) GO TO 1                                       GNLE     30
      GO TO 2                                                           GNLE     31
    1 JTYP=1                                                            GNLE     32
      M=1                                                               GNLE     33
      GO TO 90                                                          GNLE     34
    2 IF(NXT .NE. ASTRIK) GO TO 4                                       GNLE     35
      IF(NEXT(JPTR) .NE. ASTRIK) GO TO 1                                GNLE     36
      M=2                                                               GNLE     37
      JTYP=1                                                            GNLE     38
      GO TO 90                                                          GNLE     39
    4 IF(NXT .NE. LPAR) GO TO 40                                        GNLE     40
      IF(LSTART .EQ. 1) GO TO 10                                        GNLE     41
      IM1=LSTART-1                                                      GNLE     42
      IF(IPREV(IM1) .NE. 3) GO TO 1                                     GNLE     43
   10 CONTINUE                                                          GNLE     44
      NXT=NEXT(LSTART+1)                                                GNLE     45
      IF(NXT .EQ. BLANK) GO TO 120                                      GNLE     46
      IF(NXT .NE. PLUS .AND. NXT .NE. MINUS) GO TO 22                   GNLE     47
      IP=JPTR                                                           GNLE     48
      GO TO 24                                                          GNLE     49
   22 IP=JPTR-1                                                         GNLE     50
   24 CALL REALCK                                                       GNLE     51
      IF(IREAL .EQ. 0) GO TO 1                                          GNLE     52
      IF(IDES .EQ. 1) GO TO 1                                           GNLE     53
      IF(NEXT(IRELNO+1) .NE. COMMA) GO TO 1                             GNLE     54
      NXT=NEXT(JPTR)                                                    GNLE     55
      IF( NXT .NE. PLUS .AND. NXT .NE. MINUS) GO TO 30                  GNLE     56
```

```
      IP=JPTR                                                           GNLE      57
      GO TO 35                                                          GNLE      58
   30 IP=JPTR-1                                                         GNLE      59
   35 CALL REALCK                                                       GNLE      60
      IF(IREAL .EQ. 0) GO TO 120                                        GNLE      61
      IF(IDES .EQ. 1) GO TO 120                                         GNLE      62
      IF(NEXT(IRELND+1) .NE. RPAR) GO TO 120                            GNLE      63
      JTYP=6                                                            GNLE      64
      M=JPTR-LSTART                                                     GNLE      65
      GO TO 90                                                          GNLE      66
   40 IF(NXT .NE. DECPT) GO TO 50                                       GNLE      67
      ITP=ITYPE(JPTR)                                                   GNLE      68
      IF(ITP-2) 42,44,120                                               GNLE      69
   42 LOGST=LSTART+1                                                    GNLE      70
      CALL LOGCHK                                                       GNLE      71
      IF(LOG .EQ. 0) GO TO 120                                          GNLE      72
      JTYP=7                                                            GNLE      73
      M=JPTR-LSTART                                                     GNLE      74
      GO TO 90                                                          GNLE      75
   44 IP=LSTART                                                         GNLE      76
      CALL REALCK                                                       GNLE      77
      IF(IREAL .EQ. 0) GO TO 120                                        GNLE      78
      JTYP=4                                                            GNLE      79
      M=IRELND-LSTART+1                                                 GNLE      80
      GO TO 90                                                          GNLE      81
   50 CONTINUE                                                          GNLE      82
      IF(ITYPE(LSTART) .NE. 2) GO TO 85                                 GNLE      83
      IF(ITYP .EQ. 28) GO TO 54                                         GNLE      84
      IP=LSTART                                                         GNLE      85
      CALL REALCK                                                       GNLE      86
      IF(IREAL .EQ. 0) GO TO 54                                         GNLE      87
      JTYP=4                                                            GNLE      88
      M=IRELND-LSTART+1                                                 GNLE      89
      GO TO 90                                                          GNLE      90
   54 JPTR=LSTART+1                                                     GNLE      91
   55 IF(ITYPE(JPTR) .EQ. 2) GO TO 57                                   GNLE      92
      GO TO 65                                                          GNLE      93
   57 IF(JPTR .GT. N) GO TO 60                                          GNLE      94
      GO TO 55                                                          GNLE      95
   60 M=N-LSTART+1                                                      GNLE      96
      JTYP=5                                                            GNLE      97
      GO TO 90                                                          GNLE      98
   65 IF(A(JPTR-1) .NE. AICH) GO TO 67                                  GNLE      99
      IF(ITYP .EQ. 8 .OR. ITYP .EQ. 28 .OR. ITYP .EQ. 27) GO TO 70      GNLE     100
   67 M=JPTR-LSTART-1                                                   GNLE     101
      JTYP=5                                                            GNLE     102
      GO TO 90                                                          GNLE     103
   70 IF(JPTR .GT. N) GO TO 120                                         GNLE     104
      M=N-LSTART+1                                                      GNLE     105
      IF(M .GT. 500) M=500                                              GNLE     106
      JTYP=3                                                            GNLE     107
      GO TO 90                                                          GNLE     108
   85 CONTINUE                                                          GNLE     109
      IF(ITYPE(LSTART) .NE. 1) GO TO 120                                GNLE     110
      IF(ITYP .EQ. 28) GO TO 100                                        GNLE     111
   88 CONTINUE                                                          GNLE     112
      IF(ITYPE(JPTR) .NE. 3) GO TO 86                                   GNLE     113
```

```
      M=JPTR-LSTART-1                                                   GNLE      114
      JTYP=2                                                            GNLE      115
      GO TO 90                                                          GNLE      116
   86 IF(JPTR .GT. N) GO TO 87                                          GNLE      117
      GO TO 88                                                          GNLE      118
  100 M=1                                                               GNLE      119
      JTYP=2                                                            GNLE      120
      GO TO 90                                                          GNLE      121
   87 M=N-LSTART+1                                                      GNLE      122
      JTYP=2                                                            GNLE      123
   90 CONTINUE                                                          GNLE      124
C** STORE THE NEXT ELEMENT IN "D"                                       GNLE      125
C** SQUEEZE BLANKS OUT OF STRING                                        GNLE      126
      DO 91 L=1,M                                                       GNLE      127
      LL=LSTART+L-1                                                     GNLE      128
      D(L)=A(LL)                                                        GNLE      129
   91 CONTINUE                                                          GNLE      130
      JPTR=LSTART+M                                                     GNLE      131
      CALL SQUEEZ                                                       GNLE      132
C** PROCESS THE ELEMENT                                                 GNLE      133
      CALL FORMEL                                                       GNLE      134
      RETURN                                                            GNLE      135
  120 CONTINUE                                                          GNLE      136
      JTYP=8                                                            GNLE      137
      RETURN                                                            GNLE      138
      END                                                               GNLE      139
```

```
      SUBROUTINE GOTO                                                   GOTO        2
      COMMON A(1326),D(500),IDTBL(8,500),INITID(3),LASTID(3),ISRCH(3),  RICH        2
     * JPTR,N,M,JTYP,LSTART,N2,IFNCNM,LOGID,NXTID,IDTYP,NID,LOC,        CY58A      80
     2 LTYP,ITYP,IBLKDT,MODE,IERR,IDES                                  RICH        4
      COMMON/LABELS/STATRA(2,200),NLABEL                                GOTO        4
      COMMON/BASBLK/IBLOCK(2500),NBLOCK,NB,NBRNCH                       CY58A      27
      DIMENSION IALPH(4)                                                GOTO        6
      INTEGER STATRA,BLANK                                              GOTO        7
      INTEGER BITPUT                                                    GOTO        8
      DATA (IALPH(I),I=1,4)/1HG,1HO,1HT,1HO/                            GOTO        9
      DATA BLANK/1H /                                                   GOTO       10
C** "GO TO" STATEMENT PROCESSOR                                         GOTO       11
      DO 5 I=1,4                                                        GOTO       12
      IF(NEXT(JPTR) .NE. IALPH(I)) GO TO 10                             GOTO       13
    5 CONTINUE                                                          GOTO       14
C** GET STATEMENT LABEL                                                 GOTO       15
      CALL GNLE                                                         GOTO       16
      IF(JTYP .NE. 5) GO TO 10                                          GOTO       17
C** SEARCH STATEMENT NUMBER TABLE AND SET "GO TO" FLAG                  GOTO       18
      CALL STSRCH                                                       GOTO       19
      STATRA(2,LOC)=BITPUT(STATRA(2,LOC),1,12)                          GOTO       20
      IF(NEXT(JPTR) .NE. BLANK) GO TO 10                                GOTO       21
C** STORE BRANCH IN BASIC BLOCK TABLE                                   GOTO       22
      NBLOCK=NBLOCK+1                                                   GOTO       23
      IBLOCK(NBLOCK)=LOC                                                GOTO       24
      NBRNCH=1                                                          GOTO       25
      NB=1                                                              GOTO       26
      RETURN                                                            GOTO       27
   10 CALL ERROR(7)                                                     GOTO       28
      RETURN                                                            GOTO       29
      END                                                               GOTO       30
```

```
      SUBROUTINE GROUP                                                  GROUP      2
      COMMON A(1326),D(500),IDTBL(8,500),INITID(3),LASTID(3),ISRCH(3),  RICH       2
     * JPTR,N,M,JTYP,LSTART,N2,IFNCNM,LOGID,NXTID,IDTYP,NID,LOC,        CY58A     80
     2 LTYP,ITYP,IBLKDT,MODE,IERR,IDES                                  RICH       4
      COMMON/FORMAT/IDESST,IDESND,IGPST,IGPND,IGRP,SEPST,SEPND,         CY58A      3
     1 DIR,ICOM,ISEP                                                    GROUP      5
      INTEGER A,RPAR,SEPST,SEPND,DIR                                    GROUP      6
      DATA RPAR/1H)/                                                    GROUP      7
      IF(NEXT(IGPST+1) .EQ. RPAR) GO TO 20                              GROUP      8
C** THIS ROUTINE CHECKS THE SYNTAX OF A GROUP OF FIELD DESCRIPTORS      GROUP      9
C** AND RETURNS    IGRP=1 - VALID                                       GROUP     10
C**                IGRP=0 - INVALID                                     GROUP     11
      SEPST=JPTR-1                                                      GROUP     12
      DIR=1                                                             GROUP     13
      CALL SEPAR                                                        GROUP     14
C** CHECK INITIAL SEPARATOR                                             GROUP     15
      IF(ISEP .EQ. -1 .OR. ICOM .EQ. 1) GO TO 30                        GROUP     16
      IF(ISEP .EQ. 0) IDESST=SEPST                                      GROUP     17
      IF(ISEP .EQ. 1) IDESST=SEPND+1                                    GROUP     18
      IF(NEXT(IDESST) .EQ. RPAR) GO TO 20                               GROUP     19
C** CHECK FINAL SEPARATOR                                               GROUP     20
      SEPST=IGPND-1                                                     GROUP     21
      DIR=-1                                                            GROUP     22
      CALL SEPAR                                                        GROUP     23
      IF(ISEP .EQ. -1 .OR. ICOM .EQ. 1) GO TO 30                        GROUP     24
      DIR=1                                                             GROUP     25
   10 CONTINUE                                                          GROUP     26
C** CHECK NEXT DESCRIPTOR                                               GROUP     27
      CALL DESCRP                                                       GROUP     28
      IF(IDES .EQ. 0) GO TO 40                                          GROUP     29
      SEPST=IDESND+1                                                    GROUP     30
      IF(NEXT(SEPST) .EQ. RPAR) GO TO 20                                GROUP     31
C** CHECK NEXT SEPARATOR                                                GROUP     32
      CALL SEPAR                                                        GROUP     33
      IF(ISEP .EQ. 0 .OR. ISEP .EQ. -1) GO TO 30                        GROUP     34
      IDESST=SEPND+1                                                    GROUP     35
      IF(NEXT(IDESST) .NE. RPAR) GO TO 10                               GROUP     36
   20 IGRP=1                                                            GROUP     37
      RETURN                                                            GROUP     38
   30 IGRP=0                                                            GROUP     39
      CALL ERROR(7)                                                     GROUP     40
      RETURN                                                            GROUP     41
   40 CALL ERROR(88,IDESST)                                             GROUP     42
      IGRP=0                                                            GROUP     43
      RETURN                                                            GROUP     44
      END                                                               GROUP     45
```

```
      SUBROUTINE GRT                                                    GRT        2
      COMMON A(1326),D(500),IDTBL(8,500),INITID(3),LASTID(3),ISRCH(3),  RICH       2
     * JPTR,N,M,JTYP,LSTART,N2,IFNCNM,LOGID,NXTID,IDTYP,NID,LOC,        CY58A     80
     2 LTYP,ITYP,IBLKDT,MODE,IERR,IDES                                  RICH       4
      COMMON/GLOBAL/NBLK,NREF,NSUBS,BLKTBL(200),EXTTBL(100),ISUBS(100)  GRT        4
      COMMON/LIST/NLIST,NINTFC,ISUBLT(2,200),INTFAC(300)                GRT        5
      INTEGER EXTTBL,BLKTBL,BLANK,BITPUT,BITGET                         GRT        6
      DATA BLANK/1H /                                                   GRT        7
C** THIS ROUTINE IS CALLED AFTER MODULE PROCESSING IS COMPLETE, TO       GRT        8
C** MAKE ENTRIES INTO THE GLOBAL REFERENCE TABLE                        GRT        9
      WRITE(6,1)                                                        GRT       10
    1 FORMAT(//)                                                        GRT       11
C** START WITH FIRST SUBPROGRAM NAME                                    GRT       12
      ISUB=INITID(2)                                                    GRT       13
      IF(ISUB .EQ. 0) GO TO 15                                          GRT       14
C** GET NEXT SUBPROGRAM NAME                                            GRT       15
   10 ISUB=IDTBL(2,ISUB)                                                GRT       16
      IF(ISUB .EQ. 0) GO TO 15                                          GRT       17
C** SKIP IF STATEMENT FUNCTION                                          GRT       18
      IF(BITGET(IDTBL(3,ISUB),19,1) .EQ. 1) GO TO 10                    GRT       19
      IF(NREF .EQ. 0) GO TO 4                                           GRT       20
C** SEARCH EXTERNAL REFERENCE TABLE TO SEE IF NAME ALREADY STORED       GRT       21
      DO 3 K=1,NREF                                                     GRT       22
      INDEX=EXTTBL(K)                                                   GRT       23
      IF(IDTBL(1,ISUB) .EQ. ISUBLT(1,INDEX)) GO TO 10                   GRT       24
    3 CONTINUE                                                          GRT       25
C** NAME NOT YET STORED - INCREMENT EXTERNAL REFERENCE COUNTER          GRT       26
    4 NREF=NREF+1                                                       GRT       27
      IF(NREF .GT. 100) GO TO 50                                        GRT       28
C** STORE SESCOMP LIST LOCATION OF NAME IN EXTERNAL REFERENCE TABLE     GRT       29
      EXTTBL(NREF)=BITGET(IDTBL(3,ISUB),36,9)                           GRT       30
      IF(MODE .EQ. 1) GO TO 10                                          GRT       31
C** ROLL CALL MODE - CHECK SUBPROGRAM CLASS                             GRT       32
      KLAS=BITGET(ISUBLT(2,EXTTBL(NREF)),10,4)                          GRT       33
C** IF SESCOMP MODULE - WRITE NAME ON AUXILIARY FILE FOR FURTHER USE    GRT       34
      IF(KLAS .EQ. 1 .OR. KLAS .EQ. 2) WRITE(9) IDTBL(1,ISUB)           GRT       35
      GO TO 10                                                          GRT       36
C** GET FIRST COMMON BLOCK NAME                                         GRT       37
   15 IBLK=INITID(3)                                                    GRT       38
   20 IF(IBLK .EQ. 0) RETURN                                            GRT       39
      IF(IDTBL(1,IBLK) .EQ. 1H ) GO TO 45                               GRT       40
C** SEARCH SYMBOL TABLE FOR NAME                                        GRT       41
      DO 25 I=1,NLIST                                                   GRT       42
      IF(IDTBL(1,IBLK) .NE. ISUBLT(1,I)) GO TO 25                       GRT       43
C** NAME FOUND IN SYMBOL TABLE                                          GRT       44
      LISTLC=I                                                          GRT       45
      IF(BITGET(ISUBLT(2,I),10,4) .EQ. 7) GO TO 30                      GRT       46
      IF(BITGET(ISUBLT(2,I),30,15) .NE. 0) GO TO 30                     GRT       47
C** NOT CATEGORY 1 COMMON BLOCK - GET SIZE AND STORE                    GRT       48
      ISZ=IDTBL(4,IBLK)                                                 GRT       49
      ISUBLT(2,I)=BITPUT(ISUBLT(2,I),ISZ,30)                            GRT       50
      GO TO 30                                                          GRT       51
   25 CONTINUE                                                          GRT       52
C** COMMON BLOCK NOT FOUND IN SESCOMP LIST - IF NOT BLANK COMMON,       GRT       53
C** ISSUE DIAGNOSTIC                                                    GRT       54
      CALL ERROR(62,IDTBL(1,IBLK))                                      GRT       55
C** STORE COMMON BLOCK NAME IN SESCOMP LIST                             GRT       56
```

```
      NLIST=NLIST+1                                                     GRT        57
      ISUBLT(1,NLIST)=IDTBL(1,IBLK)                                     GRT        58
C** STORE COMMON BLOCK SIZE IN SESCOMP LIST                             GRT        59
      ISZ=IDTBL(4,IBLK)                                                 GRT        60
      ISUBLT(2,NLIST)=SHIFT(ISZ,30) .OR. SHIFT(10,50)                   GRT        61
      LISTLC=NLIST                                                      GRT        62
C** STORE LIST LOCATION IN SYMBOL TABLE                                 GRT        63
   30 IDTBL(3,IBLK)=BITPUT(IDTBL(3,IBLK),LISTLC,36)                     GRT        64
      IF(NBLK .EQ. 0) GO TO 40                                          GRT        65
C** SEARCH COMMON BLOCK LIST FOR NAME                                   GRT        66
      DO 35 K=1,NBLK                                                    GRT        67
      IF(LISTLC .EQ. BLKTBL(K)) GO TO 45                                GRT        68
   35 CONTINUE                                                          GRT        69
C** NAME NOT FOUND IN COMMON BLOCK LIST                                 GRT        70
C** INCREMENT COMMON BLOCK COUNTER AND STORE IN LIST                    GRT        71
   40 NBLK=NBLK+1                                                       GRT        72
      IF(NBLK .GT. 200) GO TO 60                                        GRT        73
      BLKTBL(NBLK)=LISTLC                                               GRT        74
   45 IBLK=IDTBL(2,IBLK)                                                GRT        75
      GO TO 20                                                          GRT        76
   50 CALL ERROR(59)                                                    GRT        77
      STOP                                                              GRT        78
   60 CALL ERROR(60)                                                    GRT        79
      STOP                                                              GRT        80
      END                                                               GRT        81
```

```
      SUBROUTINE IMPTYP                                                 IMPTYP      2
      COMMON A(1326),D(500),IDTBL(8,500),INITID(3),LASTID(3),ISRCH(3),  RICH        2
     * JPTR,N,M,JTYP,LSTART,N2,IFNCNM,LOGID,NXTID,IDTYP,NID,LOC,        CY58A      80
     2 LTYP,ITYP,IBLKOT,MODE,IERR,IDES                                  RICH        4
      DIMENSION IALPH(6)                                                IMPTYP      4
      INTEGER D,BITPUT,BITGET                                           IMPTYP      5
      DATA (IALPH(I),I=1,6)/1HI,1HJ,1HK,1HL,1HM,1HN/                    IMPTYP      6
C** THIS ROUTINE CHECKS THAT THE VARIABLE TYPE HAS BEEN SET             IMPTYP      7
C** IF NOT, THE TYPE IS SET IMPLICITLY                                  IMPTYP      8
      IF(BITGET(IDTBL(3,LOC),11,1) .EQ. 1) GO TO 20                     IMPTYP      9
C** TYPE NOT YET SET, SET "TYPE SET" FLAG                               IMPTYP     10
      IDTBL(3,LOC)=BITPUT(IDTBL(3,LOC),1,11)                            IMPTYP     11
      DO 10 I=1,6                                                       IMPTYP     12
      IF(D(1) .NE. IALPH(I)) GO TO 10                                   IMPTYP     13
C** VARIABLE BEGINS WITH I,J,K,L,M, OR N - SET TYPE TO INTEGER          IMPTYP     14
      IDTBL(3,LOC)=BITPUT(IDTBL(3,LOC),4,10)                            IMPTYP     15
      GO TO 20                                                          IMPTYP     16
   10 CONTINUE                                                          IMPTYP     17
C** VARIABLE DOES NOT BEGIN WITH I,J,K,L,M, OR N - SET TYPE TO REAL     IMPTYP     18
      IDTBL(3,LOC)=BITPUT(IDTBL(3,LOC),1,10)                            IMPTYP     19
C** IF EXECUTABLE STATEMENT, SET FLAG                                   IMPTYP     20
   20 IF(ITYP .LE. 18) IDTBL(3,LOC)=BITPUT(IDTBL(3,LOC),1,38)           IMPTYP     21
      RETURN                                                            IMPTYP     22
      END                                                               IMPTYP     23
```

```
      SUBROUTINE INIT                                                   INIT      2
      COMMON A(1326),D(500),IDTBL(8,500),INITID(3),LASTID(3),ISRCH(3),  RICH      2
     * JPTR,N,M,JTYP,LSTART,N2,IFNCNM,LOGID,NXTID,IDTYP,NID,LOC,        CY58A    80
     2 LTYP,ITYP,IBLKDT,MODE,IERR,IDES                                  RICH      4
      COMMON/FUNC/IFNCRA(5,12),MARGS,IARGS(50),FNCLOC(5),NFUNC          CY58A     7
      COMMON/STRING/NTYPE,NSTR,STR(500)                                 INIT      5
      COMMON/TYP/NQQ,RHSTYP,NQ2,NQ3,LHSTYP                              INIT      6
      COMMON/LIST/NLIST,NINTFC,ISUBLT(2,200),INTFAC(300)                INIT      7
      COMMON/BASBLK/IBLOCK(2500),NBLOCK,NB,NBRNCH                       CY58A     8
      COMMON/STFUNC/NSTFNC,ISTFNC(10)                                   INIT      9
      INTEGER RHSTYP                                                    INIT     10
      INTEGER A,EQUALS,COMMA,RPAR,STR                                   INIT     11
      INTEGER BITPUT,BITGET,FNCLOC                                      INIT     12
      DATA EQUALS/1H=/,LPAR/1H(/,COMMA/1H,/,RPAR/1H)/                   INIT     13
C** ASSIGNMENT STATEMENT PROCESSOR                                      INIT     14
      IFN=0                                                             INIT     15
      NTYPE=1                                                           INIT     16
      IPTR=JPTR                                                         INIT     17
C** GET ASSIGNED VARIABLE                                               INIT     18
      CALL GNLE                                                         INIT     19
      IF(JTYP .NE. 2) GO TO 40                                          INIT     20
      CALL SEARCH                                                       INIT     21
      IF(NEXT(JPTR) .NE. EQUALS) GO TO 6                                INIT     22
C** ASSIGNED VARIABLE IS NOT DIMENSIONED                                INIT     23
      LOC2=0                                                            INIT     24
      IF(ISRCH(2) .NE. 1) GO TO 2                                       INIT     25
C** VARIABLE IS A FUNCTION, MUST BE THE FUNCTION NAME                   INIT     26
      IF(NXTID .NE. IFNCNM) CALL ERROR(10,NXTID)                        INIT     27
      IFN=1                                                             INIT     28
C** SET TYPE                                                            INIT     29
      CALL IMPTYP                                                       INIT     30
      LOC2=LOC                                                          INIT     31
    2 IF(ISRCH(1) .NE. 1) GO TO 18                                      INIT     32
      IF(LOC2 .EQ. 0) GO TO 4                                           INIT     33
      LOC=IDES                                                          INIT     34
      GO TO 5                                                           INIT     35
C** STORE IN SYMBOL TABLE                                               INIT     36
   18 IDTYP=1                                                           INIT     37
      CALL STORE                                                        INIT     38
      LOC=NID                                                           INIT     39
      IF(LOC2 .EQ. 0) GO TO 4                                           INIT     40
      IDTBL(3,LOC)=IDTBL(3,LOC2)                                        INIT     41
      GO TO 5                                                           INIT     42
C** SET TYPE                                                            INIT     43
    4 CALL IMPTYP                                                       INIT     44
C** SET "LEFT SIDE TYPE" TO VARIABLE TYPE                                INIT     45
    5 LHSTYP=BITGET(IDTBL(3,LOC),10,3)                                  INIT     46
      IF(LHSTYP .EQ. 5) NTYPE=2                                         INIT     47
      GO TO 30                                                          INIT     48
    6 IF(A(JPTR-1) .NE. LPAR) GO TO 40                                  INIT     49
      IF(ISRCH(1) .EQ. 1) GO TO 12                                      INIT     50
      IF(ISRCH(2) .NE. 1) GO TO 15                                      INIT     51
      CALL ERROR(10,NXTID)                                              INIT     52
      GO TO 6                                                           INIT     53
C** FUNCTION DEFINING STATEMENT                                         INIT     54
C** STORE VARIABLE AS FUNCTION                                          INIT     55
   15 IDTYP=2                                                           INIT     56
```

```
      CALL STORE                                                        INIT      57
      LOC=NID                                                           INIT      58
      GO TO 8                                                           INIT      59
    7 CALL SWITCH                                                       INIT      60
C** SET TYPE                                                            INIT      61
    8 CALL IMPTYP                                                       INIT      62
      LHSTYP=BITGET(IDTBL(3,LOC),10,3)                                  INIT      63
      IF(LHSTYP .EQ. 5) NTYPE=2                                         INIT      64
      NARG=0                                                            INIT      65
      ITYP=35                                                           INIT      66
C** STORE IN STATEMENT FUNCTION TABLE                                   INIT      67
      NSTFNC=NSTFNC+1                                                   INIT      68
      IF(NSTFNC .GT. 10) GO TO 60                                       CY58A      9
      ISTFNC(NSTFNC)=LOC                                                INIT      69
      LOC1=LOC                                                          INIT      70
C** SET "STATEMENT FUNCTION" FLAG                                       INIT      71
      IDTBL(3,LOC)=BITPUT(IDTBL(3,LOC),1,19)                            INIT      72
C** GET NEXT ARGUMENT                                                   INIT      73
   10 CALL GNLE                                                         INIT      74
      IF(JTYP .NE. 2) GO TO 50                                          INIT      75
C** STORE ARGUMENT IN SYMBOL TABLE                                      INIT      76
      NARG=NARG+1                                                       INIT      77
      CALL SEARCH                                                       INIT      78
      IF(ISRCH(2) .EQ. 1) CALL ERROR(54,NARG)                           INIT      79
      IF(ISRCH(1) .EQ. 1) GO TO 20                                      INIT      80
      IDTYP=1                                                           INIT      81
      CALL STORE                                                        INIT      82
      LOC=NID                                                           INIT      83
      GO TO 25                                                          INIT      84
   20 IF(BITGET(IDTBL(3,LOC),1,1) .EQ. 1) CALL ERROR(54,NARG)           INIT      85
   25 CALL IMPTYP                                                       INIT      86
      IF(NEXT(JPTR) .EQ. COMMA) GO TO 10                                INIT      87
      IF(A(JPTR-1) .NE. RPAR) GO TO 40                                  INIT      88
C** STORE NO. OF ARGUMENTS IN SYMBOL TABLE                              INIT      89
      IDTBL(3,LOC1)=BITPUT(IDTBL(3,LOC1),NARG,7)                        INIT      90
      IF(NEXT(JPTR) .EQ. EQUALS) GO TO 32                               INIT      91
      GO TO 40                                                          INIT      92
   12 IF(BITGET(IDTBL(3,LOC),1,1) .NE. 1) GO TO 7                       INIT      93
C** VARIABLE IS DIMENSIONED                                             INIT      94
C** SET TYPE                                                            INIT      95
      CALL IMPTYP                                                       INIT      96
      LHSTYP=BITGET(IDTBL(3,LOC),10,3)                                  INIT      97
      IF(LHSTYP .EQ. 5) NTYPE=2                                         INIT      98
      JPTR=IPTR                                                         INIT      99
      JBLOCK=NBLOCK+1                                                   INIT     100
C** PARSE THE LEFT-HAND SIDE                                            INIT     101
      CALL EXPR                                                         INIT     102
      CALL PARSE                                                        INIT     103
C** STORE BASIC BLOCKS                                                  INIT     104
      CALL BLKSTR                                                       INIT     105
      IBLOCK(JBLOCK)=IBLOCK(JBLOCK) - 1000                              INIT     106
      GO TO 32                                                          INIT     107
C** SIMPLE VARIABLE, STORE IN BASIC BLOCK TABLE                          INIT     108
   30 NBLOCK=NBLOCK+1                                                   INIT     109
      JBLOCK=NBLOCK                                                     INIT     110
      IBLOCK(NBLOCK)=1000+LOC                                           INIT     111
   32 NTMS=0                                                            INIT     112
```

```
      IPTR=JPTR                                                         INIT      113
C** PARSE THE RIGHT-HAND SIDE                                           INIT      114
      CALL EXPR                                                         INIT      115
      IF(JPTR .LE. N) CALL ERROR(7)                                     INIT      116
      CALL PARSE                                                        INIT      117
C** PROCESS FUNCTION REFERENCES                                         INIT      118
      CALL FNCSTR                                                       INIT      119
C** CHECK IF ASSIGNMENT IS LEGAL                                         INIT      120
      CALL EXPRCK                                                       INIT      121
      IF(ITYP .EQ. 35) GO TO 36                                         INIT      122
C** STORE BASIC BLOCKS FOR RIGHT-HAND SIDE                               INIT      123
      CALL BLKSTR                                                       INIT      124
      IBLOCK(NBLOCK+1)=IBLOCK(JBLOCK)                                   INIT      125
      DO 34 K=JBLOCK,NBLOCK                                             INIT      126
   34 IBLOCK(K)=IBLOCK(K+1)                                             INIT      127
      IF(LTYP .EQ. 1) RETURN                                            INIT      128
   36 IF(MODE .NE. 1) GO TO 35                                          INIT      129
      IF(RHSTYP .EQ. 3 .OR. RHSTYP .EQ. 4) RETURN                       INIT      130
      IF(NSTR .LT. 6) RETURN                                            INIT      131
      JPTR=IPTR-1                                                       INIT      132
C** VARIABLE PRECISION MODE                                             INIT      133
C** GENERATE CALLS TO VARIABLE PRECISION SUBROUTINES                    INIT      134
      CALL CNVRT                                                        INIT      135
      RETURN                                                            INIT      136
C** ROLL CALL MODE                                                      INIT      137
C** GENERATE CALL TO "ROLCHK" IF NECESSARY                               INIT      138
   35 IF(NFUNC .EQ. 0) RETURN                                           INIT      139
      IF(IFN .EQ. 1) RETURN                                             INIT      140
C** LOOK AT EVERY FUNCTION CALL IN STATEMENT                             INIT      141
      DO 38 J=1,NFUNC                                                   INIT      142
      LOC=FNCLOC(J)                                                     INIT      143
      INDEX=BITGET(IDTBL(3,LOC),36,9)                                   INIT      144
      KLAS=BITGET(ISUBLT(2,INDEX),10,4)                                 INIT      145
      IF(KLAS .NE. 1 .AND. KLAS .NE. 2) GO TO 38                        INIT      146
C** SUBROUTINE OR FUNCTION MODULE - ISSUE A CALL TO "ROLCHK"             INIT      147
      CALL CALL2                                                        INIT      148
      RETURN                                                            INIT      149
   38 CONTINUE                                                          INIT      150
      RETURN                                                            INIT      151
   40 CALL ERROR(7)                                                     INIT      152
      RETURN                                                            INIT      153
   50 CALL ERROR(15)                                                    INIT      154
      RETURN                                                            INIT      155
   60 CALL ERROR(89)                                                    CY58A      10
      RETURN                                                            CY58A      11
      END                                                               INIT      156
```

```
      SUBROUTINE INTRIN                                                 INTRIN      2
      COMMON A(1326),D(500),IDTBL(8,500),INITID(3),LASTID(3),ISRCH(3),  RICH        2
     * JPTR,N,M,JTYP,LSTART,N2,IFNCNM,LOGID,NXTID,IDTYP,NID,LOC,        CY58A      80
     2 LTYP,ITYP,IBLKDT,MODE,IERR,IDES                                  RICH        4
      COMMON/LIST/NLIST,NINTFC,ISUBLT(2,200),INTFAC(300)                INTRIN      4
      INTEGER BITGET                                                    INTRIN      5
C** THIS ROUTINE IS CALLED AFTER PROCESSING THE MODULE, TO CHECK THAT    INTRIN      6
C** NO INTRINSIC FUNCTION NAMES HAVE BEEN MISUSED                        INTRIN      7
      DO 100 I=1,NLIST                                                  INTRIN      8
      IF(BITGET(ISUBLT(2,I),10,4) .NE. 4) GO TO 100                     INTRIN      9
C** GET NEXT INTRINSIC FUNCTION NAME FROM SESCOMP LIST                  INTRIN     10
      NXTID=ISUBLT(1,I)                                                 INTRIN     11
C** SEARCH SYMBOL TABLE FOR NAME                                        INTRIN     12
      CALL SEARCH                                                       INTRIN     13
      CALL COMSCH                                                       INTRIN     14
C** IF FOUND, ISSUE DIAGNOSTIC                                          INTRIN     15
      IF(ISRCH(1) .EQ. 1 .OR. ISRCH(3) .EQ. 1) CALL ERROR(74,NXTID)     INTRIN     16
  100 CONTINUE                                                          INTRIN     17
      RETURN                                                            INTRIN     18
      END                                                               INTRIN     19
```

```
      SUBROUTINE IO                                                     IO        2
      COMMON A(1326),D(500),IDTBL(8,500),INITID(3),LASTID(3),ISRCH(3),  RICH      2
     * JPTR,N,M,JTYP,LSTART,N2,IFNCNM,LOGID,NXTID,IDTYP,NID,LOC,        CY58A    88
     2 LTYP,ITYP,IBLKDT,MODE,IERR,IDES                                  RICH      4
      COMMON/STRING/NTYPE,NSTR,STR(500)                                 IO        4
      COMMON/LABELS/STATRA(2,200),NLABEL                                IO        5
      COMMON/BASBLK/IBLOCK(2500),NBLOCK,NB,NBRNCH                       CY58A    33
      COMMON/INPOUT/NCALL,IN,IOP                                        IO        7
      DIMENSION IALPH1(4),IALPH2(5),IALPH3(8)                           IO        8
      INTEGER A,STATRA,RPAR,COMMA,BLANK                                 IO        9
      INTEGER BITPUT,BITGET                                             IO       10
      DATA LPAR/1H(/,RPAR/1H)/,COMMA/1H,/,BLANK/1H /                    IO       11
      DATA (IALPH1(I),I=1,4)/1HR,1HE,1HA,1HD/                           IO       12
      DATA (IALPH2(I),I=1,5)/1HW,1HR,1HI,1HT,1HE/                       IO       13
      DATA (IALPH3(I),I=1,8)/1HC,1HO,1HN,1HT,1HI,1HN,1HU,1HE/           IO       14
C** I/O STATEMENT PROCESSOR                                             IO       15
      IFRMT=0                                                           IO       16
      IF(ITYP .EQ. 12) GO TO 10                                         IO       17
      DO 5 I=1,4                                                        IO       18
      IF(NEXT(JPTR) .NE. IALPH1(I)) GO TO 50                            IO       19
    5 CONTINUE                                                          IO       20
      GO TO 20                                                          IO       21
C** WRITE STATEMENT                                                     IO       22
   10 DO 15 I=1,5                                                       IO       23
      IF(NEXT(JPTR) .NE. IALPH2(I)) GO TO 50                            IO       24
   15 CONTINUE                                                          IO       25
   20 IF(NEXT(JPTR) .NE. LPAR) GO TO 50                                 IO       26
C** GET I/O DEVICE                                                      IO       27
      CALL GNLE                                                         IO       28
C** IF NOT VARIABLE, ISSUE DIAGNOSTIC                                   IO       29
      IF(JTYP .EQ. 2) GO TO 22                                          IO       30
C** READ STATEMENT                                                      IO       31
      CALL ERROR(22)                                                    IO       32
      GO TO 28                                                          IO       33
C** VARIABLE I/O DEVICE - GET SYMBOL TABLE LOCATION                     IO       34
   22 CALL SEARCH                                                       IO       35
      IF(ISRCH(2) .EQ. 1) CALL ERROR(10,NXTID)                          IO       36
      IF(ISRCH(1) .EQ. 1) GO TO 25                                      IO       37
      IDTYP =1                                                          IO       38
      CALL STORE                                                        IO       39
      LOC=NID                                                           IO       40
C** CHECK THAT THE DEVICE IS INTEGER VARIABLE                            IO       41
   25 CALL IMPTYP                                                       IO       42
      IF(BITGET(IDTBL(3,LOC),1,1) .EQ. 1) CALL ERROR(14,NXTID)          IO       43
      IF(BITGET(IDTBL(3,LOC),10,3) .NE. 4) CALL ERROR(22)               IO       44
C** STORE IN BASIC BLOCK TABLE                                          IO       45
      NBLOCK=NBLOCK+1                                                   IO       46
      IBLOCK(NBLOCK)=2000+LOC                                           IO       47
   28 IF(NEXT(JPTR) .EQ. COMMA) GO TO 40                                IO       48
      JPTR=JPTR-1                                                       IO       49
      GO TO 30                                                          IO       50
C** FORMATTED I/O STATEMENT - GET STATEMENT NUMBER                      IO       51
   40 CALL GNLE                                                         IO       52
      IF(JTYP .NE. 5) GO TO 26                                          IO       53
C** GET STATEMENT NUMBER TABLE LOCATION AND SET "REFERENCED" FLAG       IO       54
      CALL STSRCH                                                       IO       55
      STATRA(2,LOC)=BITPUT(STATRA(2,LOC),1,12)                          IO       56
```

```
      GO TO 29                                                          IO        57
   26 IF(JTYP .NE. 2) GO TO 50                                          IO        58
C** VARIABLE FORMAT - GET SYMBOL TABLE LOCATION                         IO        59
      CALL SEARCH                                                       IO        60
      IF(ISRCH(2) .EQ. 1) CALL ERROR(10,NXTID)                          IO        61
      IF(ISRCH(1) .EQ. 1) GO TO 27                                      IO        62
      IDTYP=1                                                           IO        63
      CALL STORE                                                        IO        64
      LOC=NID                                                           IO        65
   27 CALL IMPTYP                                                       IO        66
C** CHECK THAT VARIABLE FORMAT IS AN ARRAY                               IO        67
      IF(BITGET(IDTBL(3,LOC),1,1) .NE. 1) CALL ERROR(43)                IO        68
   29 IFRMT=1                                                           IO        69
   30 IF(NEXT(JPTR) .NE. RPAR) GO TO 50                                 IO        70
      IF(NEXT(JPTR) .NE. BLANK) GO TO 35                                IO        71
C** NO I/O LIST - MUST NOT BE UNFORMATTED WRITE                          IO        72
      IF(ITYP .EQ. 12 .AND. IFRMT .EQ. 0) CALL ERROR(44)                IO        73
      GO TO 36                                                          IO        74
C** STATEMENT HAS AN I/O LIST                                            IO        75
   35 JPTR=JPTR-1                                                       IO        76
C** PARSE THE I/O LIST                                                   IO        77
      CALL EXPR                                                         IO        78
      NTYPE=3                                                           IO        79
      CALL PARSE                                                        IO        80
C** STORE BASIC BLOCKS                                                   IO        81
      CALL IOSTR                                                        IO        82
   36 IF(MODE .NE. 1 .AND. ITYP .EQ. 11) GO TO 37                       IO        83
      RETURN                                                            IO        84
C** READ STATEMENT IN ROLL CALL MODE                                     IO        85
   37 IF(ITYPE(1) .EQ. 2) GO TO 42                                      IO        86
C** MAKE READ STATEMENT A COMMENT STATEMENT                              IO        87
      A(1)=1HC                                                          IO        88
      RETURN                                                            IO        89
C** STATEMENT HAS LABEL - GENERATE CONTINUE STATEMENT WITH SAME LABEL    IO        90
   42 WRITE(IOP,45) (A(I),I=1,6),(IALPH3(I),I=1,8)                      IO        91
   45 FORMAT(72A1)                                                      IO        92
C** MAKE READ STATEMENT A COMMENT AND DELETE LABEL                       IO        93
      A(1)=1HC                                                          IO        94
      DO 47 I=2,6                                                       IO        95
   47 A(I)=1H                                                           IO        96
      RETURN                                                            IO        97
   50 CALL ERROR(7)                                                     IO        98
      RETURN                                                            IO        99
      END                                                               IO       100
```

```
      SUBROUTINE IOSTR                                                  IOSTR      2
      COMMON A(1326),D(500),IDTBL(8,500),INITID(3),LASTID(3),ISRCH(3),  RICH       2
     * JPTR,N,M,JTYP,LSTART,N2,IFNCNM,LOGID,NXTID,IDTYP,NID,LOC,        CY58A     80
     2 LTYP,ITYP,IBLKDT,MODE,IERR,IDES                                  RICH       4
      COMMON/FUNC/IFNCRA(5,12),MARGS,IARGS(50),FNCLOC(5),NFUNC          CY58A     34
      COMMON/BASBLK/IBLOCK(2500),NBLOCK,NB,NBRNCH                       CY58A     35
      INTEGER BITGET                                                    IOSTR      6
C** THIS ROUTINE IS CALLED AFTER PARSING AN I/O LIST, TO STORE          IOSTR      7
C** INFORMATION IN THE BASIC BLOCK TABLE                                IOSTR      8
      DO 100 I=1,MARGS                                                  IOSTR      9
C** INCREMENT BLOCK COUNTER                                             IOSTR     10
      NBLOCK=NBLOCK+1                                                   IOSTR     11
      ICOL=20*MOD(I-1,3)+10                                             IOSTR     12
      IVR=(I+2)/3                                                       IOSTR     13
C** GET SYMBOL TABLE LOCATION OF VARIABLE                               IOSTR     14
      LOC=BITGET(IARGS(IVR),ICOL,10)                                    IOSTR     15
C** GET CLASS OF VARIABLE     ISUB=0  -  I/O VARIABLE                  IOSTR     16
C**                          ISUB=1  -  SUBSCRIPT                     IOSTR     17
C**                          ISUB=2  -  IMPLIED DO INDEX              IOSTR     18
      ISUB=BITGET(IARGS(IVR),ICOL+5,2)                                  IOSTR     19
      IF(ISUB .EQ. 1) GO TO 90                                          IOSTR     20
      IF(ISUB .EQ. 2) GO TO 20                                          IOSTR     21
      IF(ITYP .EQ. 11) GO TO 80                                         IOSTR     22
      IF(ITYP .EQ. 12) GO TO 90                                         IOSTR     23
   20 IDEF=BITGET(IARGS(IVR),ICOL+10,5)                                 IOSTR     24
C** IMPLIED DO                                                          IOSTR     25
      NMOVE=I-IDEF-1                                                    IOSTR     26
C** MOVE DO INDEX TO BEGINNING OF BLOCK                                 IOSTR     27
      DO 30 J=1,NMOVE                                                   IOSTR     28
      ITEMP=NBLOCK-J                                                    IOSTR     29
   30 IBLOCK(ITEMP+1)=IBLOCK(ITEMP)                                     IOSTR     30
      IBLOCK(ITEMP)=1000+LOC                                            IOSTR     31
C** UNDEFINE DO INDEX AT END OF BLOCK                                   IOSTR     32
      NBLOCK=NBLOCK+1                                                   IOSTR     33
      IBLOCK(NBLOCK)=6000+LOC                                           IOSTR     34
      GO TO 100                                                         IOSTR     35
C** VARIABLE IS DEFINED - STORE IN BASIC BLOCK TABLE                    IOSTR     36
   80 IBLOCK(NBLOCK)=1000+LOC                                           IOSTR     37
      GO TO 100                                                         IOSTR     38
C** VARIABLE IS REFERENCED - STORE IN BASIC BLOCK TABLE                 IOSTR     39
   90 IBLOCK(NBLOCK)=2000+LOC                                           IOSTR     40
  100 CONTINUE                                                          IOSTR     41
      RETURN                                                            IOSTR     42
      END                                                               IOSTR     43
```

```
      FUNCTION IPREV(IA)                                                IPREV      2
      COMMON A(1326),D(500),IDTBL(8,500),INITID(3),LASTID(3),ISRCH(3),  RICH       2
     * JPTR,N,M,JTYP,LSTART,N2,IFNCNM,LOGID,NXTID,IDTYP,NID,LOC,        CY58A     80
     2 LTYP,ITYP,IBLKDT,MODE,IERR,IDES                                  RICH       4
      INTEGER A,BLANK                                                   IPREV      4
      DATA BLANK/1H /                                                   IPREV      5
C** THIS FUNCTION CALLS "ITYPE" TO GET THE CLASS OF THE                 IPREV      6
C** PREVIOUS CHARACTER                                                  IPREV      7
      DO 10 I=1,N                                                       IPREV      8
      J=IA-I+1                                                          IPREV      9
      IF(J .EQ. 0) GO TO 20                                             IPREV     10
      IF(A(J) .EQ. BLANK) GO TO 10                                      IPREV     11
      IPREV=ITYPE(J)                                                    IPREV     12
      JPTR=J-1                                                          IPREV     13
      RETURN                                                            IPREV     14
   10 CONTINUE                                                          IPREV     15
   20 IPREV=3                                                           IPREV     16
      JPTR=0                                                            IPREV     17
      RETURN                                                            IPREV     18
      END                                                               IPREV     19
```

```
      FUNCTION ITYPE(ID)                                                ITYPE      2
      COMMON A(1326),D(500),IDTBL(8,500),INITID(3),LASTID(3),ISRCH(3),  RICH       2
     * JPTR,N,M,JTYP,LSTART,N2,IFNCNM,LOGID,NXTID,IDTYP,NID,LOC,        CY58A     80
     2 LTYP,ITYP,IBLKDT,MODE,IERR,IDES                                  RICH       4
      INTEGER BITGET                                                    ITYPE      4
C** THIS FUNCTION CALLS "NEXT" TO GET THE NEXT CHARACTER IN THE INPUT   ITYPE      5
C** STRING AND RETURNS          ITYPE=1 - LETTER                        ITYPE      6
C**                            ITYPE=2 - DIGIT                         ITYPE      7
C**                            ITYPE=3 - OTHER                         ITYPE      8
      NXT=NEXT(ID)                                                      ITYPE      9
      IVAL=BITGET(NXT,6,6)                                              ITYPE     10
C****IF UNIVAC 1108 - PLACE A "C" IN COLUMN 1 OF NEXT TWO CARDS         ITYPE     11
      IF(IVAL .GE. 1RA .AND. IVAL .LE. 1RZ) GO TO 10                    ITYPE     12
      IF(IVAL .GE. 1R0 .AND. IVAL .LE. 1R9) GO TO 20                    ITYPE     13
C****IF CDC 6700 - PLACE A "C" IN COLUMN 1 OF NEXT TWO CARDS            ITYPE     14
C     IF(IVAL .GE. 06 .AND. IVAL .LE. 037) GO TO 10                     ITYPE     15
C     IF(IVAL .GE. 060 .AND. IVAL .LE. 071) GO TO 20                    ITYPE     16
      ITYPE=3                                                           ITYPE     17
      IF(IVAL .GT. 1R.) CALL ERROR(23)                                  ITYPE     18
      RETURN                                                            ITYPE     19
   10 ITYPE=1                                                           ITYPE     20
      RETURN                                                            ITYPE     21
   20 ITYPE=2                                                           ITYPE     22
      RETURN                                                            ITYPE     23
      END                                                               ITYPE     24
```

```
      SUBROUTINE LOGCHK                                                 LOGCHK      2
      COMMON A(1326),D(500),IDTBL(8,500),INITID(3),LASTID(3),ISRCH(3),  RICH        2
     * JPTR,N,M,JTYP,LSTART,N2,IFNCNM,LOGID,NXTID,IDTYP,NID,LOC,        CY58A      80
     2 LTYP,ITYP,IBLKDT,MODE,IERR,IDES                                  RICH        4
      COMMON/LOGIC/LOG,LOGST                                            LOGCHK      4
      DIMENSION LOGOP(11),LOGRA(5)                                      LOGCHK      5
      DATA (LOGOP(I),I=1,11)/2HLT,2HLE,2HGT,2HGE,2HEQ,2HNE,2HOR,3HAND,  LOGCHK      6
     * 3HNOT,4HTRUE,5HFALSE/                                            LOGCHK      7
      JPTR=LOGST                                                        LOGCHK      8
C** FORM CHARACTER STRING CONTAINING LOGICAL OPERATOR                   LOGCHK      9
      DO 10 I=1,6                                                       LOGCHK     10
      NXT=NEXT(JPTR)                                                    LOGCHK     11
      IF(NXT .EQ. 1H.) GO TO 12                                         LOGCHK     12
   10 LOGRA(I)=NXT                                                      LOGCHK     13
      GO TO 20                                                          LOGCHK     14
   12 IF(I .LT. 3) GO TO 20                                             LOGCHK     15
C** PACK THE LOGICAL OPERATOR                                           LOGCHK     16
      CALL CAA(LOGRA,I-1,LOG)                                           LOGCHK     17
C** COMPARE WITH VALID OPERATORS                                        LOGCHK     18
      DO 15 I=1,11                                                      LOGCHK     19
      IF(LOG .EQ. LOGOP(I)) GO TO 30                                    LOGCHK     20
C** THIS ROUTINE CHECKS TO SEE IF A LOGICAL OPERATOR OR CONSTANT IS VALI LOGCHK     21
   15 CONTINUE                                                          LOGCHK     22
   20 LOG=0                                                             LOGCHK     23
C** INVALID OPERATOR                                                    LOGCHK     24
      RETURN                                                            LOGCHK     25
   30 LOG=1                                                             LOGCHK     26
C** VALID OPERATOR                                                      LOGCHK     27
      LOGID=I                                                           LOGCHK     28
      RETURN                                                            LOGCHK     29
      END                                                               LOGCHK     30
```

```
      SUBROUTINE LOGIF                                                  LOGIF     2
      COMMON A(1326),D(500),IDTBL(8,500),INITID(3),LASTID(3),ISRCH(3),  RICH      2
     * JPTR,N,M,JTYP,LSTART,N2,IFNCNM,LOGID,NXTID,IDTYP,NID,LOC,        CY58A    80
     2 LTYP,ITYP,IBLKDT,MODE,IERR,IDES                                  RICH      4
      COMMON/STRING/NTYPE,NSTR,STR(500)                                 LOGIF     4
      COMMON/BASBLK/IBLOCK(2500),NBLOCK,NB,NBRNCH                       CY58A    36
      INTEGER A,STR,BLANK,AY,EF                                         LOGIF     6
      DATA LPAR/1H(/,BLANK/1H /,AY/1HI/,EF/1HF/                         LOGIF     7
C** "LOGICAL IF" STATEMENT PROCESSOR                                    LOGIF     8
      IF(NEXT(JPTR) .NE. AY) GO TO 110                                  LOGIF     9
      IF(NEXT(JPTR) .NE. EF) GO TO 110                                  LOGIF    10
      IF(NEXT(JPTR) .NE. LPAR) GO TO 110                                LOGIF    11
      JPTR=JPTR-1                                                       LOGIF    12
C** PARSE THE LOGICAL EXPRESSION                                        LOGIF    13
      CALL EXPR                                                         LOGIF    14
      NSTR=NSTR+1                                                       LOGIF    15
      STR(NSTR)= -5                                                     LOGIF    16
      NTYPE=2                                                           LOGIF    17
      CALL PARSE                                                        LOGIF    18
C** PROCESS FUNCTION REFERENCES                                         LOGIF    19
      CALL FNCSTR                                                       LOGIF    20
C** STORE BASIC BLOCKS                                                  LOGIF    21
      CALL BLKSTR                                                       LOGIF    22
      IF(ITYP .GT. 15) GO TO 130                                        LOGIF    23
      LTYP=1                                                            LOGIF    24
C** PROCESS STATEMENT FOLLOWING LOGICAL EXPRESSION BY GOING TO THE      LOGIF    25
C** APPROPRIATE STATEMENT PROCESSOR                                     LOGIF    26
      GO TO (10,20,30,40,50,60,70,80,70,70,90,90,100,100,100),ITYP      LOGIF    27
   10 CALL INIT                                                         LOGIF    28
      RETURN                                                            LOGIF    29
   20 CALL ASSIGN                                                       LOGIF    30
      RETURN                                                            LOGIF    31
   30 CALL GOTO                                                         LOGIF    32
   35 NBLOCK=NBLOCK+1                                                   LOGIF    33
      IBLOCK(NBLOCK)=998                                                LOGIF    34
      NBRNCH=2                                                          LOGIF    35
      RETURN                                                            LOGIF    36
   40 CALL ASGOTO                                                       LOGIF    37
   45 NBLOCK=NBLOCK+1                                                   LOGIF    38
      IBLOCK(NBLOCK)=998                                                LOGIF    39
      NBRNCH=NBRNCH+1                                                   LOGIF    40
      RETURN                                                            LOGIF    41
   50 CALL CTGOTO                                                       LOGIF    42
      GO TO 45                                                          LOGIF    43
   60 CALL ARIF                                                         LOGIF    44
      GO TO 45                                                          LOGIF    45
   70 CALL SIMP                                                         LOGIF    46
      IF(ITYP .EQ. 7) RETURN                                            LOGIF    47
      GO TO 35                                                          LOGIF    48
   80 CALL CALL                                                         LOGIF    49
      RETURN                                                            LOGIF    50
   90 CALL IO                                                           LOGIF    51
      RETURN                                                            LOGIF    52
  100 CALL AUXIO                                                        LOGIF    53
      RETURN                                                            LOGIF    54
  110 CALL ERROR(7)                                                     LOGIF    55
      RETURN                                                            LOGIF    56
  130 CALL ERROR(45)                                                    LOGIF    57
      RETURN                                                            LOGIF    58
      END                                                               LOGIF    59
```

```
      SUBROUTINE LOOPCK                                                 LOOPCK     2
      COMMON/LABELS/STATRA(2,200),NLABEL                                LOOPCK     3
      COMMON/DOLOOP/ISTACK(4,50),NSTACK,ILOOP                           LOOPCK     4
      COMMON/BASBLK/IBLOCK(2500),NBLOCK,NB,NBRNCH                       CY58A     49
      INTEGER STATRA,BITGET                                             LOOPCK     6
C** THIS ROUTINE IS CALLED AFTER MODULE PROCESSING TO CHECK DO LOOP     LOOPCK     7
C** STRUCTURE                                                           LOOPCK     8
      IF(NSTACK .EQ. 0) RETURN                                          LOOPCK     9
C** START AT BEGINNING OF BASIC BLOCK TABLE                             LOOPCK    10
      IBLKST=1                                                          LOOPCK    11
C** GET LAST LOCATION IN BLOCK                                          LOOPCK    12
   10 IBLKND=BITGET(IBLOCK(IBLKST),28,16)-1                             LOOPCK    13
C** GET LOOP WHICH CONTAINS BLOCK                                       LOOPCK    14
      LOOP2=BITGET(IBLOCK(IBLKST),12,6)                                 LOOPCK    15
C** GET NO. OF BRANCHES FROM BLOCK                                      LOOPCK    16
      NBR=BITGET(IBLOCK(IBLKST),6,6)                                    LOOPCK    17
      IF(IBLKND .EQ. -1) IBLKND=NBLOCK                                  LOOPCK    18
      IST=IBLKND-NBR+1                                                  LOOPCK    19
C** THIS LOOP EXAMINES ALL BRANCHES FROM THE BLOCK                      LOOPCK    20
C** AND CHECKS THAT THEY ARE VALID                                      LOOPCK    21
      DO 100 I=IST,IBLKND                                               LOOPCK    22
      JLOOP=LOOP2                                                       LOOPCK    23
      IF(IBLOCK(I) .GE. 998) GO TO 100                                  LOOPCK    24
      IBLK=IBLOCK(I)                                                    LOOPCK    25
C** GET BASIC BLOCK WHICH CONTAINS BRANCH                               LOOPCK    26
      NXTBLK=BITGET(STATRA(2,IBLK),36,18)                               LOOPCK    27
C** GET DO LOOP WHICH CONTAINS THE BLOCK                                LOOPCK    28
      KLOOP=BITGET(IBLOCK(NXTBLK),12,6)                                 LOOPCK    29
      IF(KLOOP .EQ. 0) GO TO 100                                        LOOPCK    30
      IF(JLOOP .EQ. 0) GO TO 200                                        LOOPCK    31
C** BOTH BLOCKS ARE CONTAINED IN DO LOOPS                               LOOPCK    32
C** TRAVERSE THE DO STACK TO DETERMINE IF BRANCH IS LEGAL                LOOPCK    33
   50 IF(JLOOP .EQ. KLOOP) GO TO 100                                    LOOPCK    34
      JLOOP=ISTACK(3,JLOOP)                                             LOOPCK    35
      IF(JLOOP .EQ. 0) GO TO 200                                        LOOPCK    36
      GO TO 50                                                          LOOPCK    37
  200 IBLK=IBLOCK(I)                                                    LOOPCK    38
      WRITE(6,201) STATRA(1,IBLK)                                       LOOPCK    39
  201 FORMAT(6X,65H ILLEGAL TRANSFER INTO THE RANGE OF A DO LOOP AT STAT LOOPCK    40
     1EMENT NUMBER,I6)                                                  LOOPCK    41
  100 CONTINUE                                                          LOOPCK    42
      IF(IBLKND .EQ. NBLOCK) RETURN                                     LOOPCK    43
C** GET START OF NEXT BLOCK                                             LOOPCK    44
      IBLKST=IBLKND+1                                                   LOOPCK    45
      GO TO 10                                                          LOOPCK    46
      END                                                               LOOPCK    47
```

```
      SUBROUTINE LVDLET                                                 LVDLET 2
      COMMON/LVARGS/IFUNC,IARG,IADD,IPOS,ITYP,IVAL,LSTHED,NVAL,         LVDLET 3
     +  IDSTRY,IVALS(10),ITYP1(10),NSKIP                                LVDLET 4
      INTEGER FLGSPC,FL0MSK,FL1MSK,FL2MSK,FL5MSK,FLG67,REGASP,THIS      LVDLET 5
     + ,FL3MSK,FL4MSK,SEQSPC                                            LVDLET 6
      COMMON/LVVTR1/MEMSZE,REGASP,NODSPC(    1)/LVVTR2/LSTSPC(    1)/  LVDLET 7
     *LVVTR3/LNKSPC(    1)/LVVTR4/FLGSPC(    1)                        LVDLET 8
      COMMON/LVFLAG/FL0MSK,FL1MSK,FL2MSK,FL3MSK,FL4MSK,FL5MSK,FLG67     LVDLET 9
      COMMON /LVTABL/ MAPSZE,MAP(1) /LVVSEQ/ ISEQSZ,SEQSPC(1)           LVDLET10
      DATA NFLG02/137B/                                                 LVDLET11
      KONFLC=0                                                          LVDLET12
C     DETERMINE DIRECTION TO PROCEED FOR MULTIVALUE LISTS               LVDLET13
      JPOS=IPOS                                                         LVDLET14
      IPOS=IABS(IPOS)                                                   LVDLET15
      IF(IADD.NE.-1)  GO TO  74                                         LVDLET16
      IF(IARG.EQ.-1) GO TO 66                                           LVDLET17
      IADD=IFUNC+IARG                                                   LVDLET18
      IF(IADD.GT.MEMSZE) IADD=IADD-MEMSZE                               LVDLET19
      IF((FLGSPC(IADD).AND.FL5MSK).EQ.0)      GO TO 99                  LVDLET20
    1 IF(NODSPC(IADD).EQ.IARG) GO TO 4                                  LVDLET21
C     SEARCH CONFLICT LIST FOR THE FUNCTION                             LVDLET22
      IADD=LNKSPC(IADD)                                                 LVDLET23
      IF((FLGSPC(IADD).AND. FL5MSK) .NE.0) GO TO 99                     LVDLET24
      GO TO 1                                                           LVDLET25
   66 IADD=IFUNC                                                        LVDLET26
C     TO DELETE A SPECIFIC TYPE OF NODE (INDEXED DELETE), GO TO 72      LVDLET27
    4 IF(ITYP.NE.-1) GO TO 72                                           LVDLET28
      IF((FLGSPC(IADD).AND.FL0MSK).EQ.0)  GO TO 6                       LVDLET29
      ISADD=LSTSPC(IADD)                                                LVDLET30
C     DELETE ENTIRE MULTIVALUED FUNCTION, RETRIEVE FIRST VALUE          LVDLET31
      IVAL=NODSPC(ISADD)                                                LVDLET32
    5 NXTADD=LSTSPC(ISADD)                                              LVDLET33
      NODSPC(ISADD)=NODSPC(REGASP)                                      LVDLET34
      LSTSPC(ISADD)=REGASP                                              LVDLET35
      LNKSPC(ISADD)=0                                                   LVDLET36
      FLGSPC(ISADD)=0                                                   LVDLET37
      LSTSPC(NODSPC(REGASP))=ISADD                                      LVDLET38
      NODSPC(REGASP)=ISADD                                              LVDLET39
      IF((FLGSPC(NXTADD).AND.FL0MSK).NE.0) GO TO 2                      LVDLET40
      ISADD=NXTADD                                                      LVDLET41
      GO TO 5                                                           LVDLET42
C     FUNCTION IS SINGLE VALUED, RETRIEVE VALUE                         LVDLET43
    6 IVAL=LSTSPC(IADD)                                                 LVDLET44
    2 IF((FLGSPC(IADD).AND.FL5MSK).EQ.0) GO TO 68                       LVDLET45
      NXFUNC=LNKSPC(IADD)                                               LVDLET46
      IF((FLGSPC(NXFUNC).AND.FL5MSK).NE.0)GO TO 10                      LVDLET47
      NODSPC(IADD)=NODSPC(NXFUNC)                                       LVDLET48
      LSTSPC(IADD)=LSTSPC(NXFUNC)                                       LVDLET49
      LNKSPC(IADD)=LNKSPC(NXFUNC)                                       LVDLET50
      FLGSPC(IADD)=FLGSPC(NXFUNC)                                       LVDLET51
      FLGSPC(IADD)=FLGSPC(IADD).OR.FL5MSK                               LVDLET52
      IF((FLGSPC(IADD).AND.FL0MSK).EQ.0) GO TO 9                        LVDLET53
      KVAL=LSTSPC(IADD)                                                 LVDLET54
    8 KVAL=LSTSPC(KVAL)                                                 LVDLET55
      IF((FLGSPC(LSTSPC(KVAL)).AND.FL0MSK).EQ.0)  GO TO 8               LVDLET56
      LSTSPC(KVAL)=IADD                                                 LVDLET57
    9 IADD=NXFUNC                                                       LVDLET58
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```
 10   NODSPC(IADD)=NODSPC(REGASP)                                        LVDLET59
      LSTSPC(IADD)=REGASP                                                LVDLET60
      LNKSPC(IADD)=0                                                     LVDLET61
      FLGSPC(IADD)=0                                                     LVDLET62
      NODSPC(LSTSPC(IADD))=IADD                                          LVDLET63
      LSTSPC(NODSPC(IADD))=IADD                                          LVDLET64
      RETURN                                                             LVDLET65
 72   IF((FLGSPC(IADD).AND.FLOMSK).NE.0)  GO TO 20                       LVDLET66
      IF(IPOS.NE.1) GO TO 99                                             LVDLET67
      IF(ITYP.EQ.3) GO TO 6                                              LVDLET68
      ISTYP=(FLGSPC(IADD).AND.FLG67)                                     LVDLET69
      IF(ISTYP.EQ.ITYP) GO TO 6                                          LVDLET70
 99   IVAL=-1                                                            LVDLET71
      RETURN                                                             LVDLET72
 20   IND=0                                                              LVDLET73
      FLGSPC(IADD)=FLGSPC(IADD).OR.FL4MSK                                LVDLET74
      LAST=IADD                                                          LVDLET75
      IF(JPOS)121,99,21                                                  LVDLET76
121   LAST1=LNKSPC(LSTSPC(IADD))                                         LVDLET77
      THIS=LAST1                                                         LVDLET78
      GO TO 27                                                           LVDLET79
 21   IF(JPOS.LT.0) GO TO 80                                             LVDLET80
      THIS=LSTSPC(LAST)                                                  LVDLET81
      IF((FLGSPC(THIS).AND.FLOMSK).NE.0) GO TO 99                        LVDLET82
      GO TO 27                                                           LVDLET83
 80   THIS=LNKSPC(LAST)                                                  LVDLET84
      IF(THIS.EQ.LAST1) GO TO 99                                         LVDLET85
 27   IF(ITYP.EQ.3) GO TO 23                                             LVDLET86
      ISTYP=(FLGSPC(THIS).AND.FLG67)                                     LVDLET87
      IF(ISTYP.EQ.ITYP)   GO TO 23                                       LVDLET88
 22   LAST=THIS                                                          LVDLET89
      GO TO 21                                                           LVDLET90
 23   IND=IND+1                                                          LVDLET91
      IF(IND.NE.IPOS)     GO TO 22                                       LVDLET92
C    RETRIEVE THE IPOS(TH OF THE KTYP(TH VALUE BEFORE DELETING           LVDLET93
      IVAL=NODSPC(THIS)                                                  LVDLET94
      MADD=IADD                                                          LVDLET95
      IF(JPOS.GT.0) GO TO 55                                             LVDLET96
      NEXT=LNKSPC(THIS)                                                  LVDLET97
      IF(THIS.EQ.LAST1) GO TO 82                                         LVDLET98
      LNKSPC(LAST)=NEXT                                                  LVDLET99
      GO TO 83                                                           LVDLE100
 82   LNKSPC(LSTSPC(IADD))=NEXT                                          LVDLE101
 83   IF(NEXT.EQ.LAST1) GO TO 84                                         LVDLE102
      LSTSPC(NEXT)=LAST                                                  LVDLE103
      GO TO 85                                                           LVDLE104
 84   LSTSPC(IADD)=LAST                                                  LVDLE105
 85   IADD=THIS                                                          LVDLE106
      GO TO 86                                                           LVDLE107
 55   NEXT=LSTSPC(THIS)                                                  LVDLE108
      IF((FLGSPC(NEXT).AND.FLOMSK).NE.0) GO TO 50                        LVDLE109
      LNKSPC(NEXT)=LAST                                                  LVDLE110
      GO TO 24                                                           LVDLE111
 50   LNKSPC(LSTSPC(IADD))=LAST                                          LVDLE112
 24   IADD=THIS                                                          LVDLE113
      JLAST=LNKSPC(THIS)                                                 LVDLE114
      IF((FLGSPC(LSTSPC(JLAST)).AND.FLOMSK).NE.0) LNKSPC(NEXT)=JLAST     LVDLE115
```

```
      LSTSPC(LAST)=NEXT                                                 LVDLE116
   86 KLAST=LSTSPC(MADD)                                                LVDLE117
      IF(LNKSPC(KLAST).NE.KLAST) GO TO 10                               LVDLE118
C                                                                       LVDLE119
C     CONVERT TO SINGLE VALUE LIST                                      LVDLE120
C                                                                       LVDLE121
      LSTSPC(MADD)=NODSPC(KLAST)                                        LVDLE122
      FLGSPC(MADD)=(FLGSPC(MADD).OR.FLGSPC(KLAST)).AND.NFLG02           LVDLE123
      FLGSPC(KLAST)=0                                                   LVDLE124
      LNKSPC(KLAST)=0                                                   LVDLE125
      NODSPC(KLAST)=NODSPC(REGASP)                                      LVDLE126
      LSTSPC(KLAST)=REGASP                                              LVDLE127
      NODSPC(LSTSPC(KLAST))=KLAST                                       LVDLE128
      LSTSPC(NODSPC(KLAST))=KLAST                                       LVDLE129
      GO TO 10                                                          LVDLE130
   74 IF(((FLGSPC(IADD).AND.FL0MSK).NE.0).OR.((FLGSPC(IADD).AND.FL2MSK) LVDLE131
     *        .EQ.0))    GO TO 99                                       LVDLE132
      LAST=LNKSPC(IADD)                                                 LVDLE133
      NEXT=LSTSPC(IADD)                                                 LVDLE134
      LSTSPC(LAST)=NEXT                                                 LVDLE135
      IF((FLGSPC(NEXT).AND.FL0MSK).NE.0)    GO TO 10                    LVDLE136
      LNKSPC(NEXT)=LAST                                                 LVDLE137
      GO TO 10                                                          LVDLE138
   68 NEXT=LNKSPC(IADD)                                                 LVDLE139
      NEXT1=NEXT                                                        LVDLE140
   25 IF(LNKSPC(NEXT1).EQ.IADD)  GO TO 26                               LVDLE141
      NEXT1=LNKSPC(NEXT1)                                               LVDLE142
      GO TO 25                                                          LVDLE143
   26 LNKSPC(NEXT1)=NEXT                                                LVDLE144
      KONFLC=1                                                          LVDLE145
      GO TO 10                                                          LVDLE146
      END                                                               LVDLE147
```

FORTRAN Version

```
      SUBROUTINE LVEXIT(N)                                              LVEXIT 2
      COMMON/LVARGS/LVFUNC,LVVARG,LVVAD,LVVPOS,LVVTYP,        LVVAL,
     +LVHEAD,LVVNVL,LVDEST,LVVALS(10),LVTYPE(10),LVSKIP
      COMMON/LVTABL/LVTSIZ,LVMAP(     1)/LVVSEQ/LVSIZE,LVSOSP(      1)
      COMMON /TYP/ NN(3),ERRFLG                                         LVEXIT 3
      COMMON /STRING/ NTYPE,NSTR                                        LVEXIT 4
      COMMON /NEED/ START,ASSOC,LEVEL,STOP                              LVEXIT 5
      INTEGER R,RTEMP,STJ,STACK,ASSOC,START,STOP                        LVEXIT 6
      COMMON /GIRL/ MM(19),OPRAND                                       LVEXIT 7
      COMMON /HL/ HOL,ACTION,FUNC1,FUNC2,FUNC3,LEFT,RIGHT,STRING,MAXJ   LVEXIT 8
      COMMON /NTIMES/ NTIMES,MAXI                                       LVEXIT 9
      COMMON/NEEDS/STJ,JSTACK,R,JAS,J,JLAST,RTEMP,STACK(400)            LVEXIT10
      INTEGER STRING,HOL,ACTION,RIGHT,FUNC1,FUNC2,FUNC3,OPRAND          LVEXIT11
      LOGICAL ERRFLG                                                    LVEXIT12
      GO TO 25000
25001 CONTINUE
      IF(MAXJ .NE. 0) PRINT 100,MAXJ                                    LVEXIT14
  100 FORMAT(1X,44H STATEMENT IS TOO COMPLEX. CORRECT TO CHAR. ,I3)     LVEXIT15
      IF(MAXJ .EQ. 0) PRINT 200,MAXI,NSTR                               LVEXIT16
  200 FORMAT(1X,29H STATEMENT TOO LONG AT CHAR. ,I3,3H OF,I3)           LVEXIT17
C COMMENTS USED IN CASE OF GIRS PROBLEMS WHEN MEMORY USED UP            LVEXIT18
C     GO TO 10                                                          LVEXIT19
C     IF(MAXJ .EQ. 0) GO TO 50                                          LVEXIT20
      IF(MAXJ .EQ. 0) GO TO 10                                          LVEXIT21
      DO 30 NCHAR=1,MAXJ                                                LVEXIT22
      LVVPOS =       NCHAR
      LVVTYP =    3
      LVFUNC=          HOL
      LVVARG=      STRING
      CALL LVFIND(LV2       A,LV2       B,LV2       C,LV2       D)
      LV1     AAD =      STRING
      IF (LVVAL.NE.-1) LV1     AAD = LVVAL
      LV1     AAI = LV1     AAD
      LVVAD=-1
      LVVTYP=-1
      LVVPOS=1
      LVFUNC=       LEFT
      LVVARG=LV1     AAI
      CALL LVDLET
      LV1     AAI = LV1     AAD
      LVVAD=-1
      LVVTYP=-1
      LVVPOS=1
      LVFUNC=      RIGHT
      LVVARG=LV1     AAI
      CALL LVDLET
      LV1     AAI = LV1     AAD
      LVVAD=-1
      LVVTYP=-1
      LVVPOS=1
      LVFUNC=        HOL
      LVVARG=LV1     AAI
      CALL LVDLET
      LV1     AAI = LV1     AAD
      LVVAD=-1
      LVVTYP=-1
      LVVPOS=1
```

```
      LVFUNC=     STRING
      LVVARG=LV1     AAI
      CALL LVDLET
   30 CONTINUE                                                          LVEXIT24
      LVVAD=-1
      LVVTYP=-1
      LVVPOS=1
      LVFUNC=     STRING
      LVVARG=     STRING
      CALL LVDLET
      LV1     AAD =      OPRAND
      LVVAD=-1
      LVVTYP=-1
      LVVPOS=1
      LVFUNC=     OPRAND
      LVVARG=LV1     AAD
      CALL LVDLET
      LVVAD=-1
      LVVTYP=-1
      LVVPOS=1
      LVFUNC=     STRING
      LVVARG=LV1     AAD
      CALL LVDLET
      LVVAD=-1
      LVVTYP=-1
      LVVPOS=1
      LVFUNC=     ACTION
      LVVARG=LV1     AAD
      CALL LVDLET
      LVVAD=-1
      LVVTYP=-1
      LVVPOS=1
      LVFUNC=      FUNC1
      LVVARG=LV1     AAD
      CALL LVDLET
   10 CONTINUE                                                          LVEXIT27
      REWIND 19                                                         LVEXIT28
      NTIMES=0                                                          LVEXIT29
C  10 CONTINUE                                                          LVEXIT30
C     REWIND 99                                                         LVEXIT31
C     NTIMES=0                                                          LVEXIT32
      J=NSTR+1                                                          LVEXIT33
      R=STOP                                                            LVEXIT34
      STJ=R                                                             LVEXIT35
      ERRFLG=.TRUE.                                                     LVEXIT36
      JSTACK=1                                                          LVEXIT37
      STACK(JSTACK)=SHIFT(STOP,45) .OR. SHIFT(100,30) .OR. SHIFT(J,15)  LVEXIT38
C     NSTR=0                                                            LVEXIT39
      NSTR=MAXJ                                                         LVEXIT40
      RETURN
25000 CONTINUE
      LV2       A=LV2       B=LV2       C=LV2       D=0
      GO TO 25001
      END
```

GIRL Version

```
$       SUBROUTINE LVEXIT(N)                                            LVEXIT    2
        COMMON /TYP/ NN(3),ERRFLG                                       LVEXIT    3
        COMMON /STRING/ NTYPE,NSTR                                      LVEXIT    4
        COMMON /NEED/ START,ASSOC,LEVEL,STOP                            LVEXIT    5
        INTEGER R,RTEMP,STJ,STACK,ASSOC,START,STOP                      LVEXIT    6
        COMMON /GIRL/ MM(19),OPRAND                                     LVEXIT    7
        COMMON /HL/ HOL,ACTION,FUNC1,FUNC2,FUNC3,LEFT,RIGHT,STRING,MAXJ LVEXIT    8
        COMMON /NTIMES/ NTIMES,MAXI                                     LVEXIT    9
        COMMON/NEEDS/STJ,JSTACK,R,JAS,J,JLAST,RTEMP,STACK(400)          LVEXIT   10
        INTEGER STRING,HOL,ACTION,RIGHT,FUNC1,FUNC2,FUNC3,OPRAND        LVEXIT   11
        LOGICAL ERRFLG                                                  LVEXIT   12
G       EXECUTE                                                         LVEXIT   13
        IF(MAXJ .NE. 0) PRINT 100,MAXJ                                  LVEXIT   14
  100   FORMAT(1X,44H STATEMENT IS TOO COMPLEX. CORRECT TO CHAR. ,I3)   LVEXIT   15
        IF(MAXJ .EQ. 0) PRINT 200,MAXI,NSTR                             LVEXIT   16
  200   FORMAT(1X,29H STATEMENT TOO LONG AT CHAR. ,I3,3H OF,I3)         LVEXIT   17
C COMMENTS USED IN CASE OF GIRS PROBLEMS WHEN MEMORY USED UP            LVEXIT   18
C       GO TO 10                                                        LVEXIT   19
C       IF(MAXJ .EQ. 0) GO TO 50                                        LVEXIT   20
        IF(MAXJ .EQ. 0) GO TO 10                                        LVEXIT   21
        DO 30 NCHAR=1,MAXJ                                              LVEXIT   22
G       STRING+HOL.NCHAR(-LEFT,-RIGHT,-HOL,-STRING)                     LVEXIT   23
   30   CONTINUE                                                        LVEXIT   24
G       STRING-STRING                                                   LVEXIT   25
G       OPRAND(-OPRAND,-STRING,-ACTION,-FUNC1)                          LVEXIT   26
   10   CONTINUE                                                        LVEXIT   27
        REWIND 19                                                       LVEXIT   28
        NTIMES=0                                                        LVEXIT   29
C  10   CONTINUE                                                        LVEXIT   30
C       REWIND 99                                                       LVEXIT   31
C       NTIMES=0                                                        LVEXIT   32
        J=NSTR+1                                                        LVEXIT   33
        R=STOP                                                          LVEXIT   34
        STJ=R                                                           LVEXIT   35
        ERRFLG=.TRUE.                                                   LVEXIT   36
        JSTACK=1                                                        LVEXIT   37
        STACK(JSTACK)=SHIFT(STOP,45) .OR. SHIFT(100,30) .OR. SHIFT(J,15) LVEXIT   38
C       NSTR=0                                                          LVEXIT   39
        NSTR=MAXJ                                                       LVEXIT   40
G       COMPLETE                                                        LVEXIT   41
```

```
      SUBROUTINE LVFECH(N)                                              LVFECH 2
      INTEGER FLGSPC,SEQSPC,REGASP                                      LVFECH 3
      COMMON /LVTABL/ MAPSZE,MAP(1) /LVVSEQ/ ISEQSZ,SEQSPC(1)           LVFECH 4
      COMMON/LVVTR1/MEMSZE,REGASP,NODSPC(    1)/LVVTR2/LSTSPC(    1)/  LVFECH 5
     *LVVTR3/LNKSPC(    1)/LVVTR4/FLGSPC(    1)                        LVFECH 6
      COMMON/LVRAND/ KPRIME,KS,KX,KDY,KDX,KTEMP                         LVFECH 7
      READ(N) MEMSZE,REGASP,KPRIME,KS,KX,KTEST,KDY,KTEMP,KDX,KNUM       LVFECH 8
     +,ISEQSZ                                                           LVFECH 9
      READ(N)(NODSPC(I),I=1,MEMSZE)                                     LVFECH10
      READ(N)(LSTSPC(I),I=1,MEMSZE)                                     LVFECH11
      READ(N)(LNKSPC(I),I=1,MEMSZE)                                     LVFECH12
      READ(N)(FLGSPC(I),I=1,MEMSZE)                                     LVFECH13
      READ(N)(SEQSPC(I),I=1,ISEQSZ)                                     LVFECH14
      PRINT 10                                                          LVFECH15
   10 FORMAT(1H ,*  GRAPH HAS BEEN PLACED INTO MEMORY*,//)              LVFECH16
      RETURN                                                            LVFECH17
      END                                                               LVFECH18
```

```
      SUBROUTINE LVFIND(INDEX,INDXAD,KFUNC,KARG)                        LVFIND 2
      COMMON/LVARGS/IFUNC,IARG,IADD,IPOS,ITYP,IVAL,LSTHED,NVAL,         LVFIND 3
     +  IDSTRY,IVALS(10),ITYP1(10),NSKIP.                               LVFIND 4
      INTEGER FLGSPC,REGASP,FL0MSK,FL1MSK,FL2MSK,FL3MSK,FL4MSK,FL5MSK,  LVFIND 5
     + FLG67,SEQSPC                                                     LVFIND 6
      COMMON/LVFLAG/FL0MSK,FL1MSK,FL2MSK,FL3MSK,FL4MSK,FL5MSK,FLG67     LVFIND 7
      COMMON /LVTABL/ MAPSZE,MAP(1) /LVVSEQ/ ISEQS7,SEQSPC(1)           LVFIND 8
      COMMON/LVVTR1/MEMSZE,REGASP,NODSPC(   1)/LVVTR2/LSTSPC(   1)/     LVFIND 9
     *LVVTR3/LNKSPC(   1)/LVVTR4/FLGSPC(   1)                           LVFIND10
      DATA NFLAG4/3678/                                                 LVFIND11
      IADD=IFUNC+IARG                                                   LVFIND12
      IF(IADD.GT.MEMSZE) IADD=IADD-MEMSZE                               LVFIND13
      LSTHED=0                                                          LVFIND14
      IF((FLGSPC(IADD).AND.FL5MSK).EQ.0) GO TO 99                       LVFIND15
    1 IF(NODSPC(IADD).EQ.IARG)  GO TO 4                                 LVFIND16
      IADD=LNKSPC(IADD)                                                 LVFIND17
      IF((FLGSPC(IADD).AND.FL5MSK).NE.0) GO TO 99                       LVFIND18
      GO TO 1                                                           LVFIND19
    4 IF((FLGSPC(IADD).AND.FL0MSK).NE.0)  GO TO 14                      LVFIND20
      ISTYP=(FLGSPC(IADD).AND.FLG67)                                    LVFIND21
      IF(ITYP.EQ.3) GO TO 11                                            LVFIND22
      IF(ISTYP.EQ.3)ISTYP=2                                             LVFIND23
      IF(ISTYP.NE.ITYP)  GO TO 99                                       LVFIND24
   11 IVAL=LSTSPC(IADD)                                                 LVFIND25
      IF((IPOS.NE.1).AND.(IPOS.NE.-1))  GO TO 99                        LVFIND26
      ITYP=(FLGSPC(IADD).AND.FLG67)                                     LVFIND27
      LSTHED=-1                                                         LVFIND28
      RETURN                                                            LVFIND29
   14 LSTHED=IADD                                                       LVFIND30
      IND=0                                                             LVFIND31
      KNDEX=IABS(INDEX)                                                 LVFIND32
      JPOS=IABS(IPOS)                                                   LVFIND33
      IF(NSKIP.EQ.1) GO TO 50                                           LVFIND34
      IF((KFUNC.NE.IFUNC).OR.(KARG.NE.IARG)) GO TO 50                   LVFIND35
      IF((FLGSPC(LSTHED).AND.FL4MSK).NE.0) GO TO 50                     LVFIND36
      IF((IPOS*INDEX).LE.0) GO TO 50                                    LVFIND37
      IF(JPOS.LT.2) GO TO 50                                            LVFIND38
      NDX=FLGSPC(INDXAD)                                                LVFIND39
      IF((NDX.AND.FL5MSK).NE.0)  GO TO 50                               LVFIND40
      IF((NDX.AND.FL1MSK).EQ.0)  GO TO 50                               LVFIND41
      IF(JPOS.GE.KNDEX)  GO TO 25                                       LVFIND42
      IF((JPOS+JPOS).LE.KNDEX)  GO TO 50                                LVFIND43
      IF(IPOS) 30,99,40                                                 LVFIND44
   50 FLGSPC(LSTHED)=FLGSPC(LSTHED).AND.NFLAG4                          LVFIND45
      IF(IPOS) 20,99,10                                                 LVFIND46
C                                                                       LVFIND47
COUNT DOWN FROM THE TOP  OF THE LIST                                    LVFIND48
C                                                                       LVFIND49
   10 IADD=LSTSPC(IADD)                                                 LVFIND50
      IF((FLGSPC(IADD).AND.FL0MSK).NE.0)  GO TO 99                      LVFIND51
      ISTYP=(FLGSPC(IADD).AND.FLG67)                                    LVFIND52
      IF(ITYP.EQ.3) GO TO 22                                            LVFIND53
      IF(ISTYP.EQ.3)ISTYP=2                                             LVFIND54
      IF(ISTYP.NE.ITYP) GO TO 10                                        LVFIND55
   22 IND=IND+1                                                         LVFIND56
      IF(IND.NE.JPOS) GO TO 10                                          LVFIND57
   28 IVAL=NODSPC(IADD)                                                 LVFIND58
```

```
      ITYP=(FLGSPC(IADD).AND.FLG67)                                     LVFIND59
   55 INDEX=IPOS                                                        LVFIND60
      INDXAD=IADD                                                       LVFIND61
      KFUNC=IFUNC                                                       LVFIND62
      KARG=IARG                                                         LVFIND63
      RETURN                                                            LVFIND64
C                                                                       LVFIND65
COUNT UP FROM THE BOTTOM OF THE LIST                                    LVFIND66
C                                                                       LVFIND67
   20 IADD=LSTSPC(IADD)                                                 LVFIND68
      KTEST=0                                                           LVFIND69
   23 IADD=LNKSPC(IADD)                                                 LVFIND70
      IF(KTEST.EQ.0) GO TO 24                                           LVFIND71
      IF((FLGSPC(LSTSPC(IADD)).AND.FLOMSK).NE.0)  GO TO 99              LVFIND72
   24 KTEST=1                                                           LVFIND73
      ISTYP=(FLGSPC(IADD).AND.FLG67)                                    LVFIND74
      IF(ITYP.EQ.3) GO TO 21                                            LVFIND75
      IF(ISTYP.EQ.3)ISTYP=2                                             LVFIND76
      IF(ISTYP.NE.ITYP) GO TO 23                                        LVFIND77
   21 IND=IND+1                                                         LVFIND78
      IF(IND.NE.JPOS) GO TO 23                                          LVFIND79
   29 IVAL=NODSPC(IADD)                                                 LVFIND80
      ITYP=(FLGSPC(IADD).AND.FLG67)                                     LVFIND81
      GO TO 55                                                          LVFIND82
   25 IF(IPOS) 40,99,30                                                 LVFIND83
C                                                                       LVFIND84
COUNT DOWN FROM INDXADD                                                 LVFIND85
C                                                                       LVFIND86
   30 JPOS=IABS(JPOS-KNDEX)                                             LVFIND87
      IADD=INDXAD                                                       LVFIND88
      IF(JPOS.EQ.0) GO TO 28                                            LVFIND89
      GO TO 10                                                          LVFIND90
C                                                                       LVFIND91
COUNT UP FROM INDXADD                                                   LVFIND92
C                                                                       LVFIND93
   40 JPOS=IABS(JPOS-KNDEX)                                             LVFIND94
      IADD=INDXAD                                                       LVFIND95
      IF(JPOS.EQ.0) GO TO 29                                            LVFIND96
      KTEST=1                                                           LVFIND97
      GO TO 23                                                          LVFIND98
   99 IVAL=-1                                                           LVFIND99
      INDEX=INDXAD=KFUNC=KARG=0                                         LVFIN100
      RETURN                                                            LVFIN101
      END                                                               LVFIN102
```

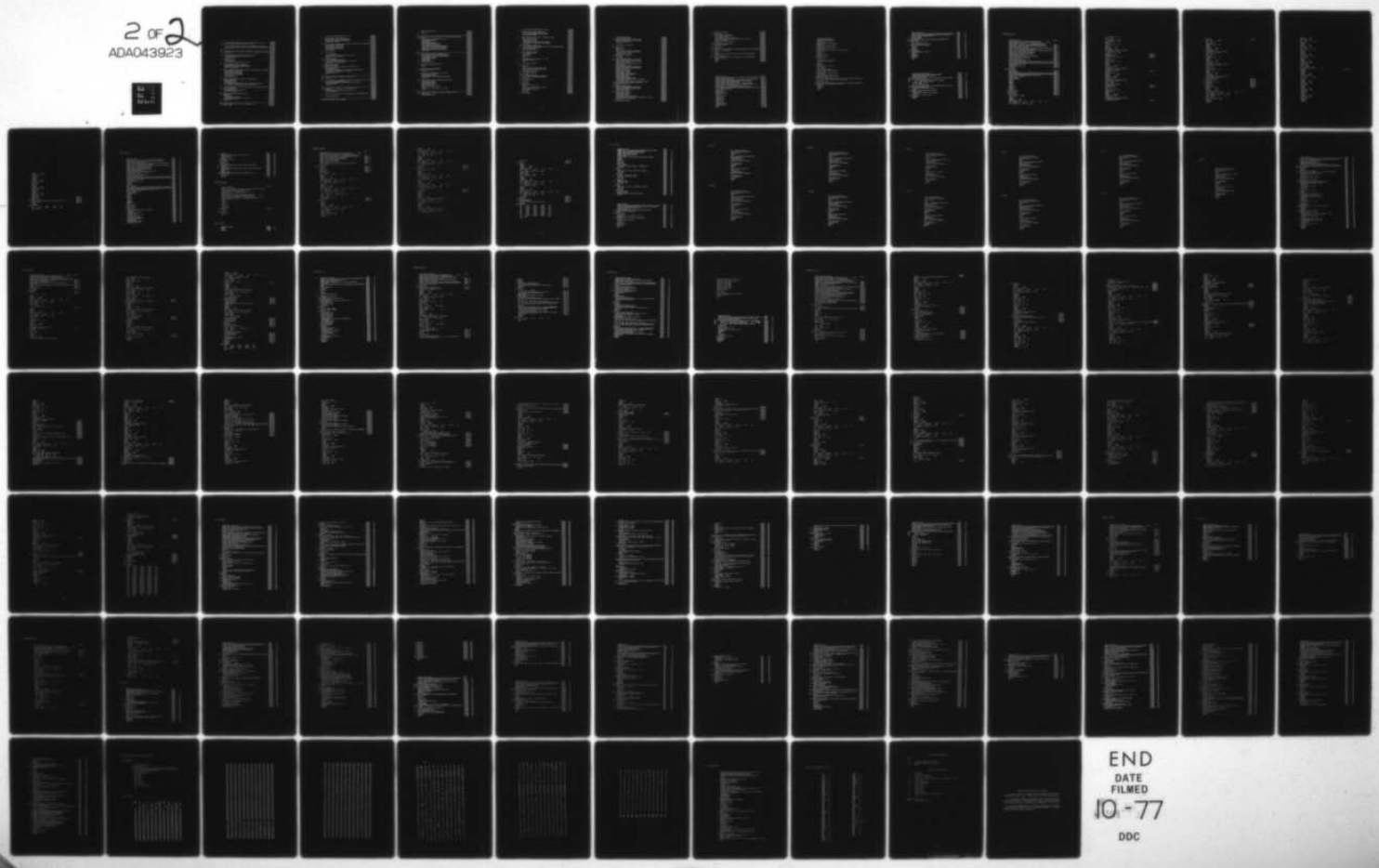
```
      SUBROUTINE LVGRN(NODE)                                            LVGRL  2
      INTEGER FLGSPC,REGASP                                             LVGRL  3
      COMMON/LVVTR1/MEMSZE,REGASP,NODSPC(    1)/LVVTR2/LSTSPC(    1)/  LVGRL  4
     *LVVTR3/LNKSPC(    1)/LVVTR4/FLGSPC(    1)                        LVGRL  5
      COMMON/LVRAND/ KPRIME,KSEED,NROW,KDNODE,KDROW,KTEMP               LVGRL  6
      NODE=KTEMP+KDNODE                                                 LVGRL  7
      KTEMP=NODE                                                        LVGRL  8
      KDNODE=KDNODE+1                                                   LVGRL  9
      IF(NODE.GT.MEMSZE) GO TO 5                                        LVGRL 10
      RETURN                                                            LVGRL 11
C     RESIDUE GENERATION ?                                              LVGRL 12
    5 IF(NROW.GT.KPRIME) GO TO 10                                       LVGRL 13
      NROW=NROW+KSEED                                                   LVGRL 14
      IF(NROW.GT.KPRIME) NROW=NROW-KPRIME                               LVGRL 15
      NODE=NROW                                                         LVGRL 16
      KTEMP=NODE                                                        LVGRL 17
      KDNODE=KPRIME+1                                                   LVGRL 18
C     RESIDUE GENERATION ?                                              LVGRL 19
      IF(NODE.NE.KSEED) RETURN                                          LVGRL 20
      NROW=0                                                            LVGRL 21
      KDROW=KPRIME                                                      LVGRL 22
C     RESIDUE GENERATION                                                LVGRL 23
   10 KDROW=KDROW+1                                                     LVGRL 24
      NROW=NROW+KDROW                                                   LVGRL 25
      NODE=NROW                                                         LVGRL 26
      KTEMP=NODE                                                        LVGRL 27
      KDNODE=KDROW                                                      LVGRL 28
      IF(NODE.GT.MEMSZE) GO TO 20                                       LVGRL 29
      RETURN                                                            LVGRL 30
   20 PRINT 15                                                          LVGRL 31
   15 FORMAT(1H ,*ERROR...NUMBER OF NODES EXCEEDS REQUESTED MEMORY,*/*  LVGRL 32
     *     PROGRAM IS TERMINATED.*)                                     LVGRL 33
      STOP                                                              LVGRL 34
      END                                                               LVGRL 35
```

```
      SUBROUTINE LVNSRT                                                 LVNSRT 2
      COMMON/LVARGS/IFUNC,IARG,IADD,IPOS,ITYP2,IVAL,LSTHED,NVAL,        LVNSRT 3
     +  IDSTRY,IVALS(10),ITYP(10),NSKIP                                 LVNSRT 4
      INTEGER FLGSPC,FL0MSK,FL1MSK,FL2MSK,FL5MSK,FLG67,REGASP,TEMP,THIS,LVNSRT 5
     + FLGTMP,TWO,THREE,HEAD,OLDLOC,ASPREG,SEQSPC,FL3MSK,FL4MSK         LVNSRT 6
      COMMON/LVVTR1/MEMSZE,REGASP,NODSPC(    1)/LVVTR2/LSTSPC(    1)/  LVNSRT 7
     *LVVTR3/LNKSPC(    1)/LVVTR4/FLGSPC(    1)                        LVNSRT 8
      COMMON/LVFLAG/FL0MSK,FL1MSK,FL2MSK,FL3MSK,FL4MSK,FL5MSK,FLG67     LVNSRT 9
      COMMON /LVTABL/ MAPSZE,MAP(1) /LVVSEQ/ ISEQSZ,SEQSPC(1)           LVNSRT10
      DATA TWO/28/,THREE/38/,NFLG67/3748/                               LVNSRT11
C                                                                       LVNSRT12
      FLGTMP=FL1MSK                                                     LVNSRT13
C                                                                       LVNSRT14
      IF(REGASP.EQ.LSTSPC(REGASP)) GO TO 98                             LVNSRT15
C                                                                       LVNSRT16
C   FORM FIRST WORD OF SINGLE OR MULTIVALUED FUNCTION                   LVNSRT17
      IF(NVAL.EQ.1)GO TO 20                                             LVNSRT18
      LSTTMP=REGASP                                                     LVNSRT19
      FLGTMP=(FLGTMP.OR.FL2MSK)                                         LVNSRT20
      FLGTMP=(FLGTMP.OR.FL0MSK)                                         LVNSRT21
      GO TO 21                                                          LVNSRT22
   20 LSTTMP=IVALS(1)                                                   LVNSRT23
   21 FLGTMP=(FLGTMP.OR.ITYP(1))                                        LVNSRT24
C                                                                       LVNSRT25
C-----------------------------------------------------------------------LVNSRT26
C-DETERMINE ADDRESS FOR FUNCTION                                        LVNSRT27
      IADD=IFUNC+IARG                                                   LVNSRT28
      IF(IADD.GT.MEMSZE) IADD=IADD-MEMSZE                               LVNSRT29
C                                                                       LVNSRT30
C   IF THAT ADDRESS IS ALREADY IN WORKING SPACE, GO TO 25               LVNSRT31
      IF(IDSTRY-1) 125,300,350                                          LVNSRT32
  125 IF((FL1MSK.AND.FLGSPC(IADD)).NE.0) GO TO 25                       LVNSRT33
C                                                                       LVNSRT34
C    UPDATE REGASP(IF NECESSARY)                                        LVNSRT35
      IF(IADD .EQ. REGASP) REGASP=LSTSPC(IADD)                          LVNSRT36
C                                                                       LVNSRT37
C   UPDATE AVAILABLE SPACE                                              LVNSRT38
      LSTSPC(NODSPC(IADD))=LSTSPC(IADD)                                 LVNSRT39
      NODSPC(LSTSPC(IADD))=NODSPC(IADD)                                 LVNSRT40
C                                                                       LVNSRT41
C    INSERT FUNCTION                                                    LVNSRT42
      NODSPC(IADD)=IARG                                                 LVNSRT43
      LSTSPC(IADD)=LSTTMP                                               LVNSRT44
      LNKSPC(IADD)=IADD                                                 LVNSRT45
C    FLAG 4 IS SET BECAUSE THIS INSERTION MIGHT BE A RECREATION OF AN   LVNSRT46
C    OLD LIST                                                           LVNSRT47
      FLGSPC(IADD)=FLGSPC(IADD).OR.FLGTMP.OR.FL4MSK.OR.FL5MSK           LVNSRT48
C                                                                       LVNSRT49
C   INSERT ANY ADDITIONAL FUNCTION VALUES                               LVNSRT50
      HEAD=IADD                                                         LVNSRT51
      OLDLOC=IADD                                                       LVNSRT52
      IF(NVAL.GT.1)GO TO 50                                             LVNSRT53
C                                                                       LVNSRT54
C   IF LAST CELL OF AVAILABLE SPACE WAS USED, WRITE MESSAGE             LVNSRT55
      IF(REGASP.EQ.LSTSPC(REGASP)) GO TO 909                            LVNSRT56
      IVAL=IABS(IVALS(1))                                               LVNSRT57
      RETURN                                                            LVNSRT58
```

AD-A043 923 DAVID W TAYLOR NAVAL SHIP RESEARCH AND DEVELOPMENT CE--ETC F/G 9/2
MAINTENANCE MANUAL FOR AUDIT. A SYSTEM FOR ANALYZING SESCOMP SO--ETC(U)
AUG 77 R J WYBRANIEC, R REGEN

UNCLASSIFIED DTNSRDC-77-0075-VOL-2 NL

2 OF 2
ADA043923



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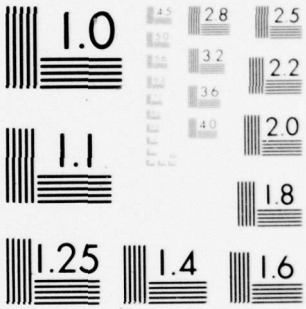

MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS 1963-A

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C                                                                       LVNSRT59
C    IF THAT ADDRESS CONTAINS THE HEAD OF A CONFLICT LIST, GO TO 41     LVNSRT60
  25  IF((FL5MSK.AND.FLGSPC(IADD)).GT.0) GO TO 41                       LVNSRT61
C                                                                       LVNSRT62
C    IF THAT ADDRESS CONTAINS A VALUE ON A MULTIVALUE LIST, GO TO 35    LVNSRT63
      IF((FL2MSK.AND.FLGSPC(IADD)).GT.0.AND.(FL0MSK.AND.FLGSPC(IADD)).EQLVNSRT64
     *.0) GO TO 35                                                      LVNSRT65
C                                                                       LVNSRT66
C-----------------------------------------------------------------------LVNSRT67
C-THE ADDRESS CONTAINS A FUNCTION ON A CONFLICT LIST,BUT NOT THE HEAD OFLVNSRT68
      THIS=IADD                                                         LVNSRT69
C                                                                       LVNSRT70
C    FIND THE PRECEDING FUNCTION ON THE CONFLICT LIST                   LVNSRT71
 26   IF(LNKSPC(LNKSPC(THIS)).EQ.IADD)GO TO 27                          LVNSRT72
      THIS=LNKSPC(THIS)                                                 LVNSRT73
      GO TO 26                                                          LVNSRT74
 27   LAST=LNKSPC(THIS)                                                 LVNSRT75
      NEWLOC=REGASP                                                     LVNSRT76
      IF(REGASP.EQ.LSTSPC(REGASP)) GO TO 98                             LVNSRT77
C                                                                       LVNSRT78
C    UPDATE AVAILABLE SPACE AND REGASP                                  LVNSRT79
      LSTSPC(NODSPC(REGASP))=LSTSPC(REGASP)                             LVNSRT80
      NODSPC(LSTSPC(REGASP))=NODSPC(REGASP)                             LVNSRT81
      REGASP=LSTSPC(REGASP)                                             LVNSRT82
                                                                        LVNSRT83
C    MOVE THE FUNCTION ON A CONFLICT LIST TO THE FIRST CELL OF AVAILABLE LVNSRT84
      NODSPC(NEWLOC)=NODSPC(IADD)                                       LVNSRT85
      LSTSPC(NEWLOC)=LSTSPC(IADD)                                       LVNSRT86
      LNKSPC(NEWLOC)=LNKSPC(IADD)                                       LVNSRT87
      FLGSPC(NEWLOC)=FLGSPC(IADD)                                       LVNSRT88
      FLGSPC(IADD)=0                                                    LVNSRT89
      LNKSPC(LAST)=NEWLOC                                               LVNSRT90
C                                                                       LVNSRT91
C    INSERT THIS FUNCTION AS THE HEAD OF A CONFLICT LIST                LVNSRT92
      NODSPC(IADD)=IARG                                                 LVNSRT93
      LNKSPC(IADD)=IADD                                                 LVNSRT94
      LSTSPC(IADD)=LSTTMP                                               LVNSRT95
      FLGSPC(IADD)=FLGSPC(IADD).OR.FLGTMP.OR.FL4MSK.OR.FL5MSK           LVNSRT96
      IF((FLGSPC(NEWLOC).AND.FL0MSK).EQ.0)  GO TO 34                    LVNSRT97
C                                                                       LVNSRT98
C    IF THE FUNCTION THAT WAS MOVED IS THE HEAD OF A MULTIVALUE LIST,FIX LVNSRT99
      NEXT=LSTSPC(NEWLOC)                                               LVNSR100
 30   NEXT=LSTSPC(NEXT)                                                 LVNSR101
      IF(LSTSPC(NEXT).NE.IADD)GO TO 30                                  LVNSR102
      LSTSPC(NEXT)=NEWLOC                                               LVNSR103
C                                                                       LVNSR104
C    INSERT ANY ADDITIONAL FUNCTION VALUES                              LVNSR105
  34  HEAD=IADD                                                         LVNSR106
      OLDLOC=IADD                                                       LVNSR107
      IF(NVAL.GT.1)GO TO 50                                             LVNSR108
      IF(REGASP.EQ.LSTSPC(REGASP)) GO TO 909                            LVNSR109
      IVAL=IABS(IVALS(1))                                               LVNSR110
      RETURN                                                            LVNSR111
C                                                                       LVNSR112
C-----------------------------------------------------------------------LVNSR113
C-THE ADDRESS CONTAINS A VALUE ON A MULTIVALUE LIST                     LVNSR114
  35  NEWLOC=REGASP                                                     LVNSR115
```

```
      IF(REGASP.EQ.LSTSPC(REGASP)) GO TO 98                             LVNSR116
C                                                                       LVNSR117
C   UPDATE AVAILABLE SPACE AND REGASP                                   LVNSR118
      LSTSPC(NODSPC(REGASP))=LSTSPC(REGASP)                             LVNSR119
      NODSPC(LSTSPC(REGASP))=NODSPC(REGASP)                             LVNSR120
      REGASP=LSTSPC(REGASP)                                             LVNSR121
C                                                                       LVNSR122
C   MOVE THE VALUE ON A MULTIVALUE LIST TO THE FIRST CELL OF AVAILABLE SLVNSR123
      NODSPC(NEWLOC)=NODSPC(IADD)                                       LVNSR124
      LSTSPC(NEWLOC)=LSTSPC(IADD)                                       LVNSR125
      LNKSPC(NEWLOC)=LNKSPC(IADD)                                       LVNSR126
      FLGSPC(NEWLOC)=FLGSPC(IADD)                                       LVNSR127
      FLGSPC(IADD)=0                                                    LVNSR128
C                                                                       LVNSR129
C     RESET POINTERS                                                    LVNSR130
C                                                                       LVNSR131
      L1=LSTSPC(NEWLOC)                                                 LVNSR132
      IF((FLOMSK.AND.FLGSPC(L1)).EQ.0) GO TO 200                        LVNSR133
      LNKSPC(LSTSPC(L1))=NEWLOC                                         LVNSR134
      GO TO 201                                                         LVNSR135
 200  LNKSPC(L1)=NEWLOC                                                 LVNSR136
 201  KZVAL=LSTSPC(LNKSPC(NEWLOC))                                      LVNSR137
      IF((FLGSPC(KZVAL).AND.FLOMSK).NE.0)  GO TO 38                     LVNSR138
      LSTSPC(LNKSPC(NEWLOC))=NEWLOC                                     LVNSR139
      GO TO 39                                                          LVNSR140
  38  LSTSPC(KZVAL)=NEWLOC                                              LVNSR141
  39  NODSPC(IADD)=IARG                                                 LVNSR142
C   INSERT THIS FUNCTION AS THE HEAD OF A CONFLICT LIST                 LVNSR143
      LNKSPC(IADD)=IADD                                                 LVNSR144
      LSTSPC(IADD)=LSTTMP                                               LVNSR145
      FLGSPC(IADD)=FLGSPC(IADD).OR.FLGTMP.OR.FL4MSK.OR.FL5MSK           LVNSR146
      IF(REGASP.EQ.LSTSPC(REGASP)) GO TO 909                            LVNSR147
      IVAL=IABS(IVALS(1))                                               LVNSR148
      RETURN                                                            LVNSR149
C                                                                       LVNSR150
C-----------------------------------------------------------------------LVNSR151
C-THE ADDRESS CONTAINS THE HEAD OF A CONFLICT LIST                      LVNSR152
 41   THIS=IADD                                                         LVNSR153
C                                                                       LVNSR154
C   IF THE FUNCTION TO BE INSERTED IS NOT ON THE CONFLICT LIST, GO TO 60LVNSR155
  42  IF(NODSPC(THIS).EQ.IARG)GO TO 43                                  LVNSR156
      IF((FLGSPC(LNKSPC(THIS)).AND.FL5MSK).NE.0) GO TO 60               LVNSR157
      THIS=LNKSPC(THIS)                                                 LVNSR158
      GO TO 42                                                          LVNSR159
C                                                                       LVNSR160
C-----------------------------------------------------------------------LVNSR161
C-THE FUNCTION TO BE INSERTED IS ON THE CONFLICT LIST                   LVNSR162
  43  HEAD=THIS                                                         LVNSR163
      IF((FLOMSK.AND.FLGSPC(THIS)).EQ.0) GO TO 51                       LVNSR164
      NEXT=LSTSPC(THIS)                                                 LVNSR165
C                                                                       LVNSR166
C     OLDLOC IS THE LOCATION OF THE LAST VALUE ON THE MULTIVALUE LIST   LVNSR167
C                                                                       LVNSR168
      OLDLOC=LNKSPC(NEXT)                                               LVNSR169
C                                                                       LVNSR170
C-----------------------------------------------------------------------LVNSR171
C-INSERT ADDITIONAL FUNCTION VALUES                                     LVNSR172
```

```
 50   LSTASP=NODSPC(REGASP)                                          LVNSR173
      IN=0                                                           LVNSR174
      GO TO 56                                                       LVNSR175
C                                                                    LVNSR176
C-------------------------------------------------------------------LVNSR177
C-FORM MULTIVALUE LIST TO ADD VALUE(S) TO SINGLE-VALUED FUNCTION     LVNSR178
  51  IN=0                                                           LVNSR179
      IF(REGASP.EQ.LSTSPC(REGASP))GO TO 98                           LVNSR180
      LSTASP=NODSPC(REGASP)                                          LVNSR181
      NEWLOC=REGASP                                                  LVNSR182
      REGASP=LSTSPC(REGASP)                                          LVNSR183
      NODSPC(NEWLOC)=LSTSPC(THIS)                                    LVNSR184
      TEMP=(FLGSPC(THIS).AND.FLG67)                                  LVNSR185
      FLGSPC(NEWLOC)=(TEMP.OR.FLGSPC(NEWLOC))                        LVNSR186
      FLGSPC(THIS)=(FLGSPC(THIS).AND.NFLG67)                         LVNSR187
      FLGSPC(THIS)=(FL2MSK.OR.FLGSPC(THIS))                          LVNSR188
      FLGSPC(THIS)=(FL0MSK.OR.FLGSPC(THIS))                          LVNSR189
      OLDLOC=THIS                                                    LVNSR190
C                                                                    LVNSR191
C-------------------------------------------------------------------LVNSR192
C   INSERT ANOTHER VALUE ON MULTIVALUE LIST                          LVNSR193
 52   FLGSPC(NEWLOC)=(FL2MSK.OR.FLGSPC(NEWLOC))                      LVNSR194
      FLGSPC(NEWLOC)=(FL1MSK.OR.FLGSPC(NEWLOC))                      LVNSR195
      LSTSPC(OLDLOC)=NEWLOC                                          LVNSR196
      LNKSPC(NEWLOC)=OLDLOC                                          LVNSR197
      OLDLOC=NEWLOC                                                  LVNSR198
 56   NEWLOC=REGASP                                                  LVNSR199
      IF(IN.GT.0)GO TO 57                                            LVNSR200
C                                                                    LVNSR201
C   NO VALUES HAVE BEEN INSERTED YET                                 LVNSR202
      IN=1                                                           LVNSR203
      GO TO 58                                                       LVNSR204
C                                                                    LVNSR205
C   SOME VALUES HAVE BEEN INSERTED                                   LVNSR206
 57   IF(IN.EQ.NVAL)GO TO 67                                         LVNSR207
      IN=IN+1                                                        LVNSR208
C                                                                    LVNSR209
   58 IF(REGASP.EQ.LSTSPC(REGASP)) GO TO 909                         LVNSR210
      REGASP=LSTSPC(REGASP)                                          LVNSR211
      NODSPC(NEWLOC)=IVALS(IN)                                       LVNSR212
      FLGSPC(NEWLOC)=(ITYP(IN).OR.FLGSPC(NEWLOC))                    LVNSR213
      GO TO 52                                                       LVNSR214
C                                                                    LVNSR215
C   END MULTIVALUE LIST AND UPDATE AVAILABLE SPACE                   LVNSR216
 67   LSTSPC(OLDLOC)=HEAD                                            LVNSR217
      NODSPC(REGASP)=LSTASP                                          LVNSR218
      LSTSPC(LSTASP)=REGASP                                          LVNSR219
      IVAL=IABS(IVALS(1))                                            LVNSR220
      LNKSPC(LSTSPC(HEAD))=OLDLOC                                    LVNSR221
      NVAL=IN                                                        LVNSR222
      IF(REGASP.EQ.LSTSPC(REGASP)) GO TO 909                         LVNSR223
      RETURN                                                         LVNSR224
C                                                                    LVNSR225
C-------------------------------------------------------------------LVNSR226
C-THE FUNCTION TO BE INSERTED IS NOT ON THE CONFLICT LIST            LVNSR227
 60   ASPREG=REGASP                                                  LVNSR228
      LSTASP=NODSPC(REGASP)                                          LVNSR229
```

```
      IF(REGASP.EQ.LSTSPC(REGASP)) GO TO 98                             LVNSR230
C                                                                       LVNSR231
C   UPDATE AVAILABLE SPACE AND REGASP                                   LVNSR232
      LSTSPC(NODSPC(REGASP))=LSTSPC(REGASP)                             LVNSR233
      NODSPC(LSTSPC(REGASP))=NODSPC(REGASP)                             LVNSR234
      REGASP=LSTSPC(REGASP)                                             LVNSR235
C                                                                       LVNSR236
C   INSERT FUNCTION IN FIRST CELL OF AVAILABLE SPACE                    LVNSR237
      NODSPC(ASPREG)=IARG                                               LVNSR238
      IF(NVAL.EQ.1)GO TO 611                                            LVNSR239
      LSTSPC(ASPREG)=REGASP                                             LVNSR240
      FLGSPC(ASPREG)=(FL2MSK.OR.FLGSPC(ASPREG))                         LVNSR241
      FLGSPC(ASPREG)=(FL0MSK.OR.FLGSPC(ASPREG))                         LVNSR242
      GO TO 612                                                         LVNSR243
 611  LSTSPC(ASPREG)=IVALS(1)                                           LVNSR244
 612  FLGSPC(ASPREG)=FLGSPC(ASPREG).OR.ITYP(1).OR.FL1MSK.OR.FL4MSK     LVNSR245
      LNKSPC(ASPREG)=LNKSPC(THIS)                                       LVNSR246
      LNKSPC(THIS)=ASPREG                                               LVNSR247
      IF(NVAL.EQ.1)GO TO 613                                            LVNSR248
C                                                                       LVNSR249
C   INSERT ADDITIONAL VALUES                                            LVNSR250
      LSTASP=NODSPC(REGASP)                                             LVNSR251
      OLDLOC=ASPREG                                                     LVNSR252
      HEAD=ASPREG                                                       LVNSR253
      IN=0                                                              LVNSR254
      GO TO 56                                                          LVNSR255
 613  IF(REGASP.EQ.LSTSPC(REGASP)) GO TO 909                            LVNSR256
      IVAL=IABS(IVALS(1))                                               LVNSR257
      RETURN                                                            LVNSR258
C                                                                       LVNSR259
C     DESTRUCTIVE INSERTION                                             LVNSR260
C                                                                       LVNSR261
 350  IADD1=IADD                                                        LVNSR262
      INDEX=0                                                           LVNSR263
      CALL LVFIND(INDEX,INDEX,INDEX,INDEX)                              LVNSR264
      FLGSPC(IADD)=FLGSPC(IADD).OR.FL4MSK                               LVNSR265
      IF(IVAL.EQ.-1) GO TO 90                                           LVNSR266
      IF(LSTHED) 354,90,356                                             LVNSR267
 354  LSTSPC(IADD)=IVALS(1)                                             LVNSR268
      GO TO 365                                                         LVNSR269
 356  NODSPC(IADD)=IVALS(1)                                             LVNSR270
 365  FLGSPC(IADD)=FLGSPC(IADD).AND.NFLG67                              LVNSR271
      FLGSPC(IADD)=FLGSPC(IADD).OR.ITYP(1)                              LVNSR272
      GO TO 360                                                         LVNSR273
 90   IF(IPOS)91,99,92                                                  LVNSR274
 91   IPOS=IPOS+1                                                       LVNSR275
      GO TO 93                                                          LVNSR276
 92   IPOS=IPOS-1                                                       LVNSR277
 93   IADD=IADD1                                                        LVNSR278
      IF(IPOS.EQ.0) GO TO 125                                           LVNSR279
      INDEX=0                                                           LVNSR280
      CALL LVFIND(INDEX,INDEX,INDEX,INDEX)                              LVNSR281
      IF(IVAL.EQ.-1) GO TO 99                                           LVNSR282
      IF(IPOS.LT.0) GO TO 370                                           LVNSR283
      IADD=IADD1                                                        LVNSR284
      GO TO 125                                                         LVNSR285
 370  NEWLOC=REGASP                                                     LVNSR286
```

```
      IF(LSTHED) 325,99,375                                             LVNSR287
C     UPDATE AVAILABLE SPACE                                            LVNSR288
  375 LSTSPC(NODSPC(REGASP))=LSTSPC(REGASP)                             LVNSR289
      NODSPC(LSTSPC(REGASP))=NODSPC(REGASP)                             LVNSR290
      REGASP=LSTSPC(REGASP)                                             LVNSR291
      GO TO 377                                                         LVNSR292
C                                                                       LVNSR293
C     NONDESTRUCTIVE INSERTION                                          LVNSR294
C                                                                       LVNSR295
  300 IADD1=IADD                                                        LVNSR296
      NEWLOC=REGASP                                                     LVNSR297
      INDEX=0                                                           LVNSR298
      CALL LVFIND(INDEX,INDEX,INDEX,INDEX)                              LVNSR299
      FLGSPC(IADD)=FLGSPC(IADD).OR.FL4MSK                               LVNSR300
      IF(IVAL.EQ.-1) GO TO 90                                           LVNSR301
      IF(LSTHED) 344,90,346                                             LVNSR302
  344 IF(IPOS.GT.0) GO TO 325                                           LVNSR303
      IADD=IADD1                                                        LVNSR304
      GO TO 125                                                         LVNSR305
C     CREATE MULTIVALUE LIST                                            LVNSR306
 325  LSTSPC(NODSPC(REGASP))=LSTSPC(REGASP)                             LVNSR307
      NODSPC(LSTSPC(REGASP))=NODSPC(REGASP)                             LVNSR308
      REGASP=LSTSPC(REGASP)                                             LVNSR309
      IF(REGASP.EQ.LSTSPC(REGASP)) GO TO 909                            LVNSR310
      NWLOC2=REGASP                                                     LVNSR311
C     UPDATE AVAILABLE SPACE                                            LVNSR312
      LSTSPC(NODSPC(REGASP))=LSTSPC(REGASP)                             LVNSR313
      NODSPC(LSTSPC(REGASP))=NODSPC(REGASP)                             LVNSR314
      REGASP=LSTSPC(REGASP)                                             LVNSR315
      NODSPC(NEWLOC)=IVALS(1)                                           LVNSR316
      LSTSPC(NEWLOC)=NWLOC2                                             LVNSR317
      LNKSPC(NEWLOC)=NWLOC2                                             LVNSR318
      FLGSPC(NEWLOC)=FLGTMP.OR.FL2MSK                                   LVNSR319
      NODSPC(NWLOC2)=LSTSPC(IADD)                                       LVNSR320
      LSTSPC(NWLOC2)=IADD                                               LVNSR321
      LNKSPC(NWLOC2)=NEWLOC                                             LVNSR322
      KLGTEP=FLGSPC(IADD).AND.FLG67                                     LVNSR323
      FLGSPC(NWLOC2)=(FL1MSK.OR.FL2MSK).OR.KLGTEP                       LVNSR324
      LSTSPC(IADD)=NEWLOC                                               LVNSR325
      FLGSPC(IADD)=(FLGSPC(IADD).OR.FL0MSK).OR.FL2MSK                   LVNSR326
  320 IF(REGASP.EQ.LSTSPC(REGASP)) GO TO 909                            LVNSR327
  360 IVAL=IABS(IVALS(1))                                               LVNSR328
      RETURN                                                            LVNSR329
C     UPDATE AVAILABLE SPACE                                            LVNSR330
 346  LSTSPC(NODSPC(REGASP))=LSTSPC(REGASP)                             LVNSR331
      NODSPC(LSTSPC(REGASP))=NODSPC(REGASP)                             LVNSR332
      REGASP=LSTSPC(REGASP)                                             LVNSR333
      IF(IPOS.LT.0) GO TO 347                                           LVNSR334
 377  ISTLOC=LNKSPC(IADD)                                               LVNSR335
      NODSPC(NEWLOC)=IVALS(1)                                           LVNSR336
      LSTSPC(NEWLOC)=IADD                                               LVNSR337
      LNKSPC(NEWLOC)=ISTLOC                                             LVNSR338
      FLGSPC(NEWLOC)=FLGTMP.OR.FL2MSK                                   LVNSR339
      IF((FLGSPC(LSTSPC(ISTLOC)).AND.FL0MSK).EQ.0) GO TO 321            LVNSR340
      LSTSPC(LSTSPC(ISTLOC))=NEWLOC                                     LVNSR341
      GO TO 322                                                         LVNSR342
  321 LSTSPC(ISTLOC)=NEWLOC                                             LVNSR343
```

```
  322 LNKSPC(IADD)=NEWLOC                                              LVNSR344
      GO TO 320                                                        LVNSR345
  347 NODSPC(NEWLOC)=IVALS(1)                                          LVNSR346
      LSTSPC(NEWLOC)=LSTSPC(IADD)                                      LVNSR347
      LNKSPC(NEWLOC)=IADD                                              LVNSR348
      FLGSPC(NEWLOC)=FLGTMP.OR.FL2MSK                                  LVNSR349
      IF((FLGSPC(LSTSPC(IADD)).AND.FL0MSK).EQ.0) GO TO 323             LVNSR350
      KZVAL=LSTSPC(IADD)                                               LVNSR351
      LNKSPC(LSTSPC(KZVAL))=NEWLOC                                     LVNSR352
      GO TO 324                                                        LVNSR353
  323 LNKSPC(LSTSPC(IADD))=NEWLOC                                      LVNSR354
  324 LSTSPC(IADD)=NEWLOC                                              LVNSR355
      GO TO 320                                                        LVNSR356
   98 IVAL=-3                                                          LVNSR357
      PRINT 20001                                                      LVNSR358
20001 FORMAT(  * ERROR...THERE IS NO ADDITIONAL SPACE FOR THE GRAPH, THELVNSR359
     * PROGRAM IS TERMINATED*)                                          LVNSR360
      STOP                                                             LVNSR361
   99 IVAL=-1                                                          LVNSR362
 22   FORMAT(1X,I5,1H(,I5,35H) USED LAST CELL OF AVAILABLE SPACE)       LVNSR363
      RETURN                                                           LVNSR364
 909  PRINT 22,IFUNC,IARG                                              LVNSR365
C    THIS INSERTION HAS FILLED GIRS MEMORY - CALL A USER SUPPLIED       LVNSR366
C    PROGRAM - LVEXIT.                                                  LVNSR367
      IVAL=-1                                                          LVNSR368
      RETURN                                                           LVNSR369
      END                                                              LVNSR370
```

```
      SUBROUTINE LVSETP                                                LVSETP 2
      INTEGER FLGSPC,FLAGSP,REGASP,BINFIL,FL0MSK,FL1MSK,FL2MSK,FL5MSK,  LVSETP 3
     + FL3MSK,FL4MSK,FLG67,SEQSPC                                      LVSETP 4
      COMMON/LVFLAG/FL0MSK,FL1MSK,FL2MSK,FL3MSK,FL4MSK,FL5MSK,FLG67     LVSETP 5
      COMMON/LVVTR5/BINFIL,KOMPAN,NODESP(1)/LVVTR6/LISTSP(1)            LVSETP 6
     + /LVVTR7/LINKSP(1)/LVVTR8/FLAGSP(1)                               LVSETP 7
      COMMON /LVTABL/ MAPSZE,MAP(1) /LVVSEQ/ ISEQSZ,SEQSPC(1)           LVSETP 8
      COMMON/LVVTR1/MEMSZE,REGASP,NODSPC(    1)/LVVTR2/LSTSPC(    1)/  LVSETP 9
     *LVVTR3/LNKSPC(    1)/LVVTR4/FLGSPC(    1)                        LVSETP10
      COMMON/LVRAND/ KPRIME,KSEED,NROW,KDNODE,KDROW,KTEMP               LVSETP11
      DATA FL0MSK/200B/,FL1MSK/100B/,FL2MSK/40B/,FL5MSK/4B/,FLG67/3B/,  LVSETP12
     + FL3MSK/20B/,FL4MSK/10B/                                          LVSETP13
      KSEED=KPRIME/2                                                   LVSETP14
      NROW=KSEED                                                       LVSETP15
      KTEMP=KSEED-KPRIME                                               LVSETP16
      KDNODE=KPRIME                                                    LVSETP17
      REGASP=1                                                         LVSETP18
      DO 10 I=2,MEMSZE                                                 LVSETP19
      LNKSPC(I)=0                                                      LVSETP20
      FLGSPC(I)=0                                                      LVSETP21
      NODSPC(I)=I-1                                                    LVSETP22
 10   LSTSPC(I-1)=I                                                    LVSETP23
      FLGSPC(1)=0                                                      LVSETP24
      LNKSPC(1)=0                                                      LVSETP25
      NODSPC(1)=MEMSZE                                                 LVSETP26
      LSTSPC(MEMSZE)=1                                                 LVSETP27
      RETURN                                                           LVSETP28
      END                                                              LVSETP29
```

```
      SUBROUTINE MODIO(MODE)
      DIMENSION IBUF(80),IEND(3)
      IF(MODE .NE. 0) GO TO 5
      WRITE(13,1)
    1 FORMAT(5X,16H OUTPUT DEVICE X)
      WRITE(14,2)
    2 FORMAT(5X,16H OUTPUT DEVICE Y)
      WRITE(15,3)
    3 FORMAT(5X,16H OUTPUT DEVICE Z)
      WRITE(6,6)
    6 FORMAT(1H1,52X,27H RESULTS OF ROLL CALL CHECK)
    5 DO 10 I=10,12
      ENDFILE I
      REWIND I
      READ(I,7) ICHAR
    7 FORMAT(A1)
   10 IEND(I-9)=EOF(I)
      IEOF=0
      DO 15 I=1,3
      IF(IEND(I) .NE. 0) GO TO 15
      IF(IEOF .EQ. 1) GO TO 40
      IEOF=1
      IOUT=9+I
   15 CONTINUE
      IF(IEOF .EQ. 0) GO TO 50
      REWIND IOUT
      IOUT2=IOUT+3
      WRITE(IOUT2,20) MODE
   20 FORMAT(//20X,12H MODE INDEX=,I3)
      DO 30 I=1,100
      READ(IOUT,25) (IBUF(J),J=1,80)
   25 FORMAT(80A1)
      IF(EOF(IOUT) .NE. 0) GO TO 60
   30 WRITE(IOUT2,25) (IBUF(J),J=1,80)
   40 WRITE(6,45) MODE
   45 FORMAT(//21X,86H **ERROR IN ROLL CALL CHECK - MORE THAN 1 OUTPUT D
     *EVICE WAS WRITTEN ON FOR MODE INDEX ,I3,2H**)
      GO TO 60
   50 WRITE(6,55) MODE
   55 FORMAT(//25X,79H **ERROR IN ROLL CALL CHECK - NO OUTPUT DEVICES WE
     *RE WRITTEN ON FOR MODE INDEX ,I3,2H**)
   60 REWIND 10
      REWIND 11
      REWIND 12
      RETURN
      END
```

```
      FUNCTION NEXT(IA)                                                 NEXT      2
      COMMON A(1326),D(500),IDTBL(8,500),INITID(3),LASTID(3),ISRCH(3),  RICH      2
     * JPTR,N,M,JTYP,LSTART,N2,IFNCNM,LOGID,NXTID,IDTYP,NID,LOC,        CY58A    80
     2 LTYP,ITYP,IBLKDT,MODE,IERR,IDES                                  RICH      4
      INTEGER A,BLANK                                                   NEXT      4
      DATA BLANK/1H /                                                   NEXT      5
C** THIS FUNCTION RETURNS THR NEXT NON-BLANK CHARACTER IN THE            NEXT      6
C** INPUT STREAM                                                        NEXT      7
      IF(IA .GT. N) GO TO 15                                            NEXT      8
      DO 10 I=IA,N                                                      NEXT      9
      IF(A(I) .EQ. BLANK) GO TO 10                                      NEXT     10
C** "A(I)" IS THE NEXT CHARACTER                                        NEXT     11
      NEXT=A(I)                                                         NEXT     12
      JPTR=I+1                                                          NEXT     13
      RETURN                                                            NEXT     14
   10 CONTINUE                                                          NEXT     15
      NEXT=BLANK                                                        CY55      1
C** NO MORE CHARACTERS IN STRING                                        NEXT     17
      JPTR=N+1                                                          NEXT     18
      RETURN                                                            NEXT     19
   15 NEXT=BLANK                                                        CY55      2
      JPTR=IA+1                                                         CY55      3
      RETURN                                                            CY55      4
      END                                                               NEXT     20
```

```
      FUNCTION NXTBLK(ILOC,IEND)                                        NXTBLK    2
      COMMON/BASBLK/IBLOCK(2500),NBLOCK,NB,NBRNCH                       CY58A    51
      COMMON/LABELS/STATRA(2,200),NLABEL                                NXTBLK    4
      INTEGER STATRA,BITGET                                             NXTBLK    5
C** THIS ROUTINE RETURNS THE STARTING LOCATION OF THE BASIC BLOCK       NXTBLK    6
C** WHICH A BRANCH POINTS TO                                            NXTBLK    7
C**       ILOC - BASIC BLOCK TABLE LOCATION OF BRANCH                  NXTBLK    8
C**       IEND - END OF CURRENT BLOCK                                  NXTBLK    9
      I=IBLOCK(ILOC)                                                    NXTBLK   10
      IF(I .EQ. 999) GO TO 10                                           NXTBLK   11
      IF(I .EQ. 998) GO TO 5                                            NXTBLK   12
C** BRANCH IS A STATEMENT LABEL - RETRIEVE BASIC BLOCK START FROM       NXTBLK   13
C** THE STATEMENT NUMBER TABLE                                          NXTBLK   14
      NXTBLK=BITGET(STATRA(2,I),36,18)                                  NXTBLK   15
      RETURN                                                            NXTBLK   16
C** BRANCH IS TO NEXT BASIC BLOCK IN TABLE                              NXTBLK   17
    5 NXTBLK=IEND+1                                                     NXTBLK   18
      IF(NXTBLK .GT. NBLOCK) CALL ERROR(38)                             NXTBLK   19
      RETURN                                                            NXTBLK   20
C** RETURN OR STOP - END OF PATH                                        NXTBLK   21
   10 NXTBLK=0                                                          NXTBLK   22
      RETURN                                                            NXTBLK   23
      END                                                               NXTBLK   24
```

FORTRAN Version

```
      SUBROUTINE PARSE                                                  PARSE  2
      COMMON/LVARGS/LVFUNC,LVVARG,LVVAD,LVVPOS,LVVTYP,        LVVAL,
     +LVHEAD,LVVNVL,LVDEST,LVVALS(10),LVTYPE(10),LVSKIP
      COMMON/LVTABL/LVTSIZ,LVMAP(     1)/LVVSEQ/LVSIZE,LVSQSP(      1)
      COMMON/NEEDS/STJ,JSTACK,R,JAS,J,JLAST,RTEMP,STACK(400)            PARSE  3
      COMMON/FUNC/  NARY(5,12),MARGS,IARGS(50),FNCLOC(5),NFUNC          CY58B  1
      COMMON /STRING/ NTYPE,NSTR,STR                                    PARSE  5
      COMMON /GIRL/NTERMS,PLUS,MINUS,SLASH,LPAR,RPAR,COMMA,STAR,EXP,LT, PARSE  6
     +LE,GT,GE,EQ,NE,OR,AND,NOT,EQUALS,OPRAND                           PARSE  7
      COMMON /HL/ HOL,ACTION,FUNC1,FUNC2,FUNC3,LEFT,RIGHT,STRING,MAXJ   PARSE  8
      COMMON /NEED/ START,ASSOC,LEVEL,STOP                              PARSE  9
      COMMON /TYP/ NARRAY,TYPE1,TYPE2,ERRFLG                            PARSE 10
      COMMON/NOPAR/NOPAR,NDEP,NDEPTH,NFLAG                              PARSE 11
      COMMON /NTIMES/ NTIMES,I                                          PARSE 12
      COMMON/VAR/VFOR(15),NUMCHR,NCHFP,CHAR,NDICT                       CY58B  2
      INTEGER TYPE1,TYPE2,START,TYP(3)                                  PARSE 14
      LOGICAL ERRFLG,FAIL                                               PARSE 15
      INTEGER STR(1),STEMP,ST,DICT(19)                                  PARSE 16
      EQUIVALENCE(DICT(1),PLUS)                                         PARSE 17
      INTEGER PLUS,MINUS,SLASH,LPAR,RPAR,COMMA,STAR,EXP,LT,LE,GT,GE,EQ, PARSE 18
     +NE,OR,AND,NOT,EQUALS,OPRAND,ASSOC,LEVEL,STOP,ACTION,HOL,LEFT,RIGHTPARSE 19
     +,STRING,FUNC1,FUNC2,FUNC3                                         PARSE 20
      DATA NTIMES /0/                                                   PARSE 22
      IF(NTIMES .GT. 0) GO TO 3                                         PARSE 23
      NTIMES=1                                                          PARSE 24
      GO TO 25000
25001 CONTINUE
      CALL PHONEY                                                       PARSE 26
      CALL LVFECH(19)                                                   PARSE 27
      READ(19)PLUS,MINUS,SLASH,LPAR,RPAR,COMMA,STAR,EXP,LT,LE,GT,GE,EQ, PARSE 28
     +NE,OR,AND,NOT,EQUALS,OPRAND,ASSOC,LEVEL,STOP,ACTION,HOL,LEFT,RIGHTPARSE 29
     +,STRING,FUNC1,FUNC2,FUNC3,NTERMS,(TYP(I),I=1,3)                   PARSE 30
    3 IF(NSTR .LE. 0) RETURN                                            PARSE 31
      ERRFLG=.FALSE.                                                    PARSE 32
      START=TYP(NTYPE)                                                  PARSE 33
      NARGS=0                                                           PARSE 34
      NFLAG=0                                                           PARSE 35
      MAXJ=0                                                            PARSE 36
      NOPAR=0                                                           PARSE 37
      TYPE1=-1                                                          PARSE 38
      TYPE2=-1                                                          PARSE 39
      NARRAY=-1                                                         PARSE 40
      NDEPTH=0                                                          PARSE 41
      NDEP=0                                                            PARSE 42
      DO 20 I=1,50                                                      PARSE 43
   20 IARGS(I)=0                                                        PARSE 44
      DO 22 I=1,60                                                      PARSE 45
   22 NARY(I)=0                                                         PARSE 46
      DO 10 I=1,NSTR                                                    PARSE 47
      LV1     AAB =      STRING
      LVVPOS =            I
      LVVTYP =    3
      LVFUNC=          HOL
      LVVARG= LV1     AAB
      CALL LVFIND(LV2       A,LV2       B,LV2       C,LV2       D)
      LV1     AAC = LV1     AAB
      IF (LVVAL.NE.-1) LV1     AAC = LVVAL
```

```
      NTEMP = LV1     AAC
  LVVTR = LVVAL
  LVVAL = -100
  IF (LVVTR.NE.-1) GO TO
  CALL LVGRN(LV1     AAC)
  LVDEST=  0
  LVTYPE(1) =  0
  LVVALS(1) = LV1     AAC
  LVVNVL =  1
  LVFUNC =         HOL
  LVVARG=LV1     AAB
  CALL LVNSRT
  IF(LVVAL.LT.0) CALL LVEXIT(LVVAL)
  IF(LVVAL.LT.0) RETURN
      NTEMP = LV1     AAC
4 CONTINUE                                                          PARSE 49
  IF(ERRFLG) GO TO 25                                               PARSE 50
  ST=IABS(STR(I))                                                   PARSE 51
  IF(STR(I) .LT. 0) GO TO 6                                         PARSE 52
  LVDEST=  0
  LV1     AAB = ST
  LVTYPE(1) =  1
  LVVALS(1) = LV1     AAB
  LVDEST=  0
  LVVNVL =  1
  LVFUNC =         HOL
  LVVARG=      NTEMP
  CALL LVNSRT
  IF(LVVAL.LT.0) CALL LVEXIT(LVVAL)
  IF(LVVAL.LT.0) RETURN
  IF(ERRFLG) GO TO 25                                               PARSE 54
  LVDEST=  0
  LVTYPE(1) =  0
  LVVALS(1) =      OPRAND
  LVVNVL =  1
  LVFUNC =      STRING
  LVVARG=     STRING
  CALL LVNSRT
  IF(LVVAL.LT.0) CALL LVEXIT(LVVAL)
  IF(LVVAL.LT.0) RETURN
  LVVTR = LVVAL
  LVVAL = -100
  IF (LVVTR.NE.-1) GO TO          10
  IF(ERRFLG) GO TO 25                                               PARSE 56
6 STEMP=DICT(ST)                                                    PARSE 57
  LVDEST=  0
  LV1     AAC = STEMP
  LVTYPE(1) =  1
  LVVALS(1) = LV1     AAC
  LVDEST=  0
  LVVNVL =  1
  LVFUNC =      STRING
  LVVARG=     STRING
  CALL LVNSRT
  IF(LVVAL.LT.0) CALL LVEXIT(LVVAL)
  IF(LVVAL.LT.0) RETURN
  IF(ERRFLG) GO TO 25                                               PARSE 59
```

```
 10 CONTINUE                                                            PARSE 60
    LV1     AAD =      OPRAND
    LVDEST=  0
    LV1     AAE = 0
    LVTYPE(1) =  1
    LVVALS(1) = LV1     AAE
    LVDEST=  0
    LVVNVL =  1
    LVFUNC =       FUNC2
    LVVARG=LV1     AAD
    CALL LVNSRT
    IF(LVVAL.LT.0) CALL LVEXIT(LVVAL)
    IF(LVVAL.LT.0) RETURN
    LVDEST=  0
    LV1     AAF = 0
    LVTYPE(1) =  1
    LVVALS(1) = LV1     AAF
    LVDEST=  0
    LVVNVL =  1
    LVFUNC =       FUNC3
    LVVARG=LV1     AAD
    CALL LVNSRT
    IF(LVVAL.LT.0) CALL LVEXIT(LVVAL)
    IF(LVVAL.LT.0) RETURN
    LVDEST=  0
    LV1     AAG = 0
    LVTYPE(1) =  1
    LVVALS(1) = LV1     AAG
    LVDEST=  0
    LVVNVL =  1
    LVFUNC =       LEVEL
    LVVARG=LV1     AAD
    CALL LVNSRT
    IF(LVVAL.LT.0) CALL LVEXIT(LVVAL)
    IF(LVVAL.LT.0) RETURN
    CALL RECOG(FAIL)                                                    PARSE 62
    IF(FAIL) GO TO 40                                                   PARSE 63
 25 CONTINUE                                                            PARSE 64
    IF(ERRFLG) PRINT 100                                                PARSE 65
100 FORMAT(/)                                                           PARSE 66
    CALL PRNTS                                                          PARSE 67
    NCHAR=C                                                             PARSE 68
 30 NCHAR=NCHAR+1                                                       PARSE 69
    LVVPOS =       NCHAR
    LVVTYP =    3
    LVFUNC=         HOL
    LVVARG=     STRING
    CALL LVFIND(LV2       E,LV2       F,LV2       G,LV2       H)
    LV1     AAD =      STRING
    IF (LVVAL.NE.-1) LV1     AAD = LVVAL
    LVVTR = LVVAL
    LVVAL = -100
    IF (LVVTR.EQ.-1) GO TO          35
    LV1     AAH = LV1     AAD
    LVVAD=-1
    LVVTYP=-1
    LVVPOS=1
```

```
      LVFUNC=       LEFT
      LVVARG=LV1     AAH
      CALL LVDLET
      LV1     AAH = LV1     AAD
      LVVAD=-1
      LVVTYP=-1
      LVVPOS=1
      LVFUNC=      RIGHT
      LVVARG=LV1     AAH
      CALL LVDLET
      LV1     AAH = LV1     AAD
      LVVAD=-1
      LVVTYP=-1
      LVVPOS=1
      LVFUNC=        HOL
      LVVARG=LV1     AAH
      CALL LVDLET
      LV1     AAH = LV1     AAD
      LVVAD=-1
      LVVTYP=-1
      LVVPOS=1
      LVFUNC=     STRING
      LVVARG=LV1     AAH
      CALL LVDLET
      LVVTR = LVVAL
      LVVAL = -100
      IF (LVVTR.EQ.-1) GO TO          30
      IF (LVVTR.NE.-1) GO TO          30
   35 CONTINUE                                                    PARSE 71
      LVVAD=-1
      LVVTYP=-1
      LVVPOS=1
      LVFUNC=     STRING
      LVVARG=     STRING
      CALL LVDLET
      LV1     AAD =      OPRAND
      LVVAD=-1
      LVVTYP=-1
      LVVPOS=1
      LVFUNC=     OPRAND
      LVVARG=LV1     AAD
      CALL LVDLET
      LVVAD=-1
      LVVTYP=-1
      LVVPOS=1
      LVFUNC=     STRING
      LVVARG=LV1     AAD
      CALL LVDLET
      LVVAD=-1
      LVVTYP=-1
      LVVPOS=1
      LVFUNC=     ACTION
      LVVARG=LV1     AAD
      CALL LVDLET
      LVVAD=-1
      LVVTYP=-1
      LVVPOS=1
```

```
      LVFUNC=      FUNC1
      LVVARG=LV1     AAD
      CALL LVDLET
      LVVAD=-1
      LVVTYP=-1
      LVVPOS=1
      LVFUNC=      FUNC2
      LVVARG=LV1     AAD
      CALL LVDLET
      LVVAD=-1
      LVVTYP=-1
      LVVPOS=1
      LVFUNC=      FUNC3
      LVVARG=LV1     AAD
      CALL LVDLET
      LVVAD=-1
      LVVTYP=-1
      LVVPOS=1
      LVFUNC=      LEVEL
      LVVARG=LV1     AAD
      CALL LVDLET
      NSTR=NCHRP                                                        PARSE 74
      RETURN                                                            PARSE 75
   40 PRINT 300,MAXJ                                                    PARSE 76
  300 FORMAT(1X,34H PARSE FAILED AFTER CHARACTER NO. ,I3)               PARSE 77
      ERRFLG=.TRUE.                                                     PARSE 78
      GO TO 25                                                          PARSE 79
      RETURN
25000 CONTINUE
      LV2       A=LV2       B=LV2       C=LV2       D=0
      LV2       E=LV2       F=LV2       G=LV2       H=0
      GO TO 25001
      END
```

GIRL Version

```
$       SUBROUTINE PARSE                                                PARSE     2
        COMMON/NEEDS/STJ,JSTACK,R,JAS,J,JLAST,RTEMP,STACK(400)          PARSE     3
        COMMON/FUNC/  NARY(5,12),MARGS,IARGS(50),FNCLOC(5),NFUNC        CY588     1
        COMMON /STRING/ NTYPE,NSTR,STR                                  PARSE     5
        COMMON /GIRL/NTERMS,PLUS,MINUS,SLASH,LPAR,RPAR,COMMA,STAR,EXP,LT,  PARSE  6
       +LE,GT,GE,EQ,NE,OR,AND,NOT,EQUALS,OPRAND                         PARSE     7
        COMMON /HL/ HOL,ACTION,FUNC1,FUNC2,FUNC3,LEFT,RIGHT,STRING,MAXJ  PARSE     8
        COMMON /NEED/ START,ASSOC,LEVEL,STOP                            PARSE     9
        COMMON /TYP/ NARRAY,TYPE1,TYPE2,ERRFLG                          PARSE    10
        COMMON/NOPAR/NOPAR,NDEP,NDEPTH,NFLAG                            PARSE    11
        COMMON /NTIMES/ NTIMES,I                                        PARSE    12
        COMMON/VAR/VFOR(15),NUMCHR,NCHRP,CHAR,NDICT                     CY588     2
        INTEGER TYPE1,TYPE2,START,TYP(3)                                PARSE    14
        LOGICAL ERRFLG,FAIL                                             PARSE    15
        INTEGER STR(1),STEMP,ST,DICT(19)                                PARSE    16
        EQUIVALENCE(DICT(1),PLUS)                                       PARSE    17
        INTEGER PLUS,MINUS,SLASH,LPAR,RPAR,COMMA,STAR,EXP,LT,LE,GT,GE,EQ,  PARSE 18
       +NE,OR,AND,NOT,EQUALS,OPRAND,ASSOC,LEVEL,STOP,ACTION,HOL,LEFT,RIGHT PARSE 19
       +,STRING,FUNC1,FUNC2,FUNC3                                       PARSE    20
        DATA NTIMES /0/                                                 PARSE    22
        IF(NTIMES .GT. 0) GO TO 3                                       PARSE    23
        NTIMES=1                                                        PARSE    24
G       EXECUTE                                                         PARSE    25
        CALL PHONEY                                                     PARSE    26
        CALL LVFECH(19)                                                 PARSE    27
        READ(19)PLUS,MINUS,SLASH,LPAR,RPAR,COMMA,STAR,EXP,LT,LE,GT,GE,EQ,  PARSE 28
       +NE,OR,AND,NOT,EQUALS,OPRAND,ASSOC,LEVEL,STOP,ACTION,HOL,LEFT,RIGHT PARSE 29
       +,STRING,FUNC1,FUNC2,FUNC3,NTERMS,(TYP(I),I=1,3)                 PARSE    30
      3 IF(NSTR .LE. 0) RETURN                                          PARSE    31
        ERRFLG=.FALSE.                                                  PARSE    32
        START=TYP(NTYPE)                                                PARSE    33
        NARGS=0                                                         PARSE    34
        NFLAG=0                                                         PARSE    35
        MAXJ=0                                                          PARSE    36
        NOPAR=0                                                         PARSE    37
        TYPE1=-1                                                        PARSE    38
        TYPE2=-1                                                        PARSE    39
        NARRAY=-1                                                       PARSE    40
        NDEPTH=0                                                        PARSE    41
        NDEP=0                                                          PARSE    42
        DO 20 I=1,50                                                    PARSE    43
     20 IARGS(I)=0                                                      PARSE    44
        DO 22 I=1,60                                                    PARSE    45
     22 NARY(I)=0                                                       PARSE    46
        DO 10 I=1,NSTR                                                  PARSE    47
G       STRING(+HOL.I 'NTEMP//4,HOL $ 'NTEMP)                           PARSE    48
      4 CONTINUE                                                        PARSE    49
        IF(ERRFLG) GO TO 25                                             PARSE    50
        ST=IABS(STR(I))                                                 PARSE    51
        IF(STR(I) .LT. 0) GO TO 6                                       PARSE    52
G       NTEMP HOL ''ST''                                                PARSE    53
        IF(ERRFLG) GO TO 25                                             PARSE    54
G       STRING STRING OPRAND//10                                        PARSE    55
        IF(ERRFLG) GO TO 25                                             PARSE    56
      6 STEMP=DICT(ST)                                                  PARSE    57
G       STRING STRING ''STEMP''                                         PARSE    58
        IF(ERRFLG) GO TO 25                                             PARSE    59
```

```
   10 CONTINUE                                                          PARSE      60
G     OPRAND(FUNC2 ''0'',FUNC3 ''0'',LEVEL ''0'')                        PARSE      61
      CALL RECOG(FAIL)                                                   PARSE      62
      IF(FAIL) GO TO 40                                                  PARSE      63
   25 CONTINUE                                                           PARSE      64
      IF(ERRFLG) PRINT 100                                               PARSE      65
  100 FORMAT(/)                                                          PARSE      66
      CALL PRNTS                                                         PARSE      67
      NCHAR=0                                                            PARSE      68
   30 NCHAR=NCHAR+1                                                      PARSE      69
G     STRING+HOL.NCHAR/35(-LEFT,-RIGHT,-HOL,-STRING/30/30)               PARSE      70
   35 CONTINUE                                                           PARSE      71
G     STRING-STRING                                                      PARSE      72
G     OPRAND(-OPRAND,-STRING,-ACTION,-FUNC1,-FUNC2,-FUNC3,-LEVEL)        PARSE      73
      NSTR=NCHRP                                                         PARSE      74
      RETURN                                                             PARSE      75
   40 PRINT 300,MAXJ                                                     PARSE      76
  300 FORMAT(1X,34H PARSE FAILED AFTER CHARACTER NO. ,I3)                PARSE      77
      ERRFLG=.TRUE.                                                      PARSE      78
      GO TO 25                                                           PARSE      79
G     COMPLETE                                                           PARSE      80
```

FORTRAN Version

```
      SUBROUTINE PHONEY                                                 PHONEY 2
      INTEGER FLGSPC,FLAGSP
      COMMON /LVVTR1/LVVSZE,LVVGSP,NODSPC( 1000)/LVVTR2/LSTSPC( 1000)/
     *LVVTR3/LNKSPC( 1000)/LVVTR4/FLGSPC( 1000)
      COMMON/LVVTR5/LVFILE,LVCMPR,NODESP(      1)
     +/LVVTR6/LISTSP(      1)/LVVTR7/LINKSP(      1)
     +/LVVTR8/FLAGSP(      1)
      COMMON/LVRAND/LVKPRM,LVKS,LVKX,LVKOY,LVKDX,LVTEMP
      COMMON/LVARGS/LVFUNC,LVVARG,LVVAD,LVVPOS,LVVTYP,        LVVAL,
     +LVHEAD,LVVNVL,LVDEST,LVVALS(10),LVTYPE(10),LVSKIP
      COMMON/LVTABL/LVTSIZ,LVMAP(     1)/LVVSEQ/LVSIZE,LVSQSP(      1)
      LVVSZE =    1000
      LVFILE=  0
      LVCMPR= 0
      LVSIZE=      1
      LVSKIP= 1
      LVKPRM=  17
      CALL LVSETP
      GO TO 25000
25001 CONTINUE
      RETURN                                                            PHONEY 4
      STOP
25000 CONTINUE
      GO TO 25001
      END
```

GIRL Version

```
      SUBROUTINE PHONEY                                                 PHONEY     2
G     EXECUTE                                                           PHONEY     3
      RETURN                                                            PHONEY     4
G     COMPLETE                                                          PHONEY     5
```

FORTRAN Version

```
      SUBROUTINE PRNTS                                                  PRNTS  2
      COMMON/LVARGS/LVFUNC,LVVARG,LVVAD,LVVPOS,LVVTYP,        LVVAL,
     +LVHEAD,LVVNVL,LVDEST,LVVALS(10),LVTYPE(10),LVSKIP
      COMMON/LVTABL/LVTSIZ,LVMAP(     1)/LVVSEQ/LVSIZE,LVSQSP(     1)
      COMMON /HL/ HOL,ACTION,FUNC1,FUNC2,FUNC3,LEFT,RIGHT,STRING        PRNTS  3
      COMMON /VAR/ VFOR,NCHAR,NCHARP,CHAR,NDICT                         PRNTS  4
      COMMON /TYP/ NARRAY,TYPE1,TYPE2,ERRFLG                            PRNTS  5
      COMMON /STRING/ NTYPE,NSTR,STR                                    PRNTS  6
      COMMON /GIRL/ NNN(19),OPRAND                                      PRNTS  7
      LOGICAL ERRFLG                                                    PRNTS  8
      INTEGER VFOR(15),CHAR,STRING,HOL,RIGHT,STR(1),OPRAND              PRNTS  9
      GO TO 25000
25001 CONTINUE
      NCHAR=0                                                           PRNTS 11
      NCHARP=0                                                          PRNTS 12
      DO 5 I=1,15                                                       PRNTS 13
    5 VFOR(I)=0                                                         PRNTS 14
      NINT=NTMP=1                                                       PRNTS 15
      DO 10 I=1,NSTR                                                    PRNTS 16
      LV1     AAD =      STRING
      LVVPOS =           I
      LVVTYP =    3
      LVFUNC=         HOL
      LVVARG= LV1     AAD
      CALL LVFIND(LV2       A,LV2       B,LV2       C,LV2       D)
      LV1     AAI = LV1     AAD
      IF (LVVAL.NE.-1) LV1     AAI = LVVAL
            NODE = LV1     AAI
      LVVPOS =           I
      LVVTYP =    3
      LVFUNC=      STRING
      LVVARG= LV1     AAD
      CALL LVFIND(LV2       E,LV2       F,LV2       G,LV2       H)
      LV1     AAI = LV1     AAD
      IF (LVVAL.NE.-1) LV1     AAI = LVVAL
              N1 = LV1     AAI
      LVVAL = -100
      IF (         N1.NE.     OPRAND) LVVAL = -1
      LVVTR = LVVAL
      LVVAL = -100
      IF (LVVTR.EQ.-1) GO TO          16
      NINT=NINT+1                                                       PRNTS 18
   16 J=0                                                               PRNTS 19
   20 J=J+1                                                             PRNTS 20
      LVVPOS =           J
      LVVTYP =    3
      LVFUNC=        LEFT
      LVVARG=        NODE
      CALL LVFIND(LV2       I,LV2       J,LV2       K,LV2       L)
      LV1     AAD =      NODE
      IF (LVVAL.NE.-1) LV1     AAD = LVVAL
      LVVTR = LVVAL
      LVVAL = -100
      IF (LVVTR.EQ.-1) GO TO          30
      LV1     AAI = LV1     AAD
      LVVPOS =           1
      LVVTYP =    3
```

```
      LVFUNC=          HOL
      LVVARG= LV1      AAI
      CALL LVFIND(LV2        M,LV2        N,LV2        O,LV2        P)
      LV1     AAJ = LV1      AAI
      IF (LVVAL.NE.-1) LV1      AAJ = LVVAL
            CHAR = LV1      AAJ
      LV1     AAJ = LV1      AAD
      LVVPOS =            2
      LVVTYP =    3
      LVFUNC=          HOL
      LVVARG= LV1      AAJ
      CALL LVFIND(LV2        Q,LV2        R,LV2        S,LV2        T)
      LV1     AAI = LV1      AAJ
      IF (LVVAL.NE.-1) LV1      AAI = LVVAL
           NDICT = LV1      AAI
      CALL FORM                                                        PRNTS 22
      GO TO 20                                                         PRNTS 23
   30 CONTINUE                                                         PRNTS 24
      IF(NINT .GT. NTMP) GO TO 35                                      PRNTS 25
      LV1     AAD =            N1
      LVVPOS =            1
      LVVTYP =    3
      LVFUNC=          HOL
      LVVARG= LV1      AAD
      CALL LVFIND(LV2        U,LV2        V,LV2        W,LV2        X)
      LV1     AAI = LV1      AAD
      IF (LVVAL.NE.-1) LV1      AAI = LVVAL
            CHAR = LV1      AAI
      LVVPOS =            2
      LVVTYP =    3
      LVFUNC=          HOL
      LVVARG= LV1      AAD
      CALL LVFIND(LV2        Y,LV2        Z,LV2        0,LV2        1)
      LV1     AAI = LV1      AAD
      IF (LVVAL.NE.-1) LV1      AAI = LVVAL
           NDICT = LV1      AAI
      CALL FORM                                                        PRNTS 27
      GO TO 37                                                         PRNTS 28
   35 NTMP=NINT                                                        PRNTS 29
      LVVTYP = 3
      LVVPOS = 1
      LVINDX = 0
      LVFUNC=          HOL
      LVVARG=         NODE
      CALL LVFIND(LVINDX,LVINDX,LVINDX,LVINDX)
      LV1     AAD =         NODE
      IF (LVVAL.NE.-1) LV1      AAD = LVVAL
           NDICT = LV1      AAD
      LVVTYP = 3
      LVVPOS = 1
      LVINDX = 0
      LVFUNC=          HOL
      LVVARG=      OPRAND
      CALL LVFIND(LVINDX,LVINDX,LVINDX,LVINDX)
      LV1     AAD =      OPRAND
      IF (LVVAL.NE.-1) LV1      AAD = LVVAL
            CHAR = LV1      AAD
```

```
      CALL FORM                                                         PRNTS 32
   37 J=0                                                               PRNTS 33
   40 J=J+1                                                             PRNTS 34
      LVVPOS =            J
      LVVTYP =    3
      LVFUNC=        RIGHT
      LVVARG=         NODE
      CALL LVFIND(LV2       2,LV2       3,LV2       4,LV2       5)
      LV1     AAD =        NODE
      IF (LVVAL.NE.-1) LV1     AAD = LVVAL
      LVVTR = LVVAL
      LVVAL = -100
      IF (LVVTR.EQ.-1) GO TO          10
      LV1     AAI = LV1     AAD
      LVVPOS =            1
      LVVTYP =    3
      LVFUNC=          HOL
      LVVARG= LV1     AAI
      CALL LVFIND(LV2       6,LV2       7,LV2       8,LV2       9)
      LV1     AAJ = LV1     AAI
      IF (LVVAL.NE.-1) LV1     AAJ = LVVAL
           CHAR = LV1     AAJ
      LV1     AAJ = LV1     AAD
      LVVPOS =            2
      LVVTYP =    3
      LVFUNC=          HOL
      LVVARG= LV1     AAJ
      CALL LVFIND(LV2      AA,LV2      AB,LV2      AC,LV2      AD)
      LV1     AAI = LV1     AAJ
      IF (LVVAL.NE.-1) LV1     AAI = LVVAL
          NDICT = LV1     AAI
      CALL FORM                                                         PRNTS 36
      GO TO 40                                                          PRNTS 37
   10 CONTINUE                                                          PRNTS 38
      NC=1+(NCHARP-1)/8                                                 PRNTS 39
  100 FORMAT(1X,15A8)                                                   PRNTS 40
      IF(ERRFLG) PRINT 100,(VFOR(I),I=1,NC)                             PRNTS 41
      RETURN
25000 CONTINUE
      LV2       A=LV2       B=LV2       C=LV2       D=0
      LV2       E=LV2       F=LV2       G=LV2       H=0
      LV2       I=LV2       J=LV2       K=LV2       L=0
      LV2       M=LV2       N=LV2       O=LV2       P=0
      LV2       Q=LV2       R=LV2       S=LV2       T=0
      LV2       U=LV2       V=LV2       W=LV2       X=0
      LV2       Y=LV2       Z=LV2       0=LV2       1=0
      LV2       2=LV2       3=LV2       4=LV2       5=0
      LV2       6=LV2       7=LV2       8=LV2       9=0
      LV2      AA=LV2      AB=LV2      AC=LV2      AD=0
      GO TO 25001
      END
```

GIRL Version

```
$     SUBROUTINE PRNTS                                                  PRNTS      2
      COMMON /HL/ HOL,ACTION,FUNC1,FUNC2,FUNC3,LEFT,RIGHT,STRING        PRNTS      3
      COMMON /VAR/ VFOR,NCHAR,NCHARP,CHAR,NDICT                         PRNTS      4
      COMMON /TYP/ NARRAY,TYPE1,TYPE2,ERRFLG                            PRNTS      5
      COMMON /STRING/ NTYPE,NSTR,STR                                    PRNTS      6
      COMMON /GIRL/ NNN(19),OPRAND                                      PRNTS      7
      LOGICAL ERRFLG                                                    PRNTS      8
      INTEGER VFOR(15),CHAR,STRING,HOL,RIGHT,STR(1),OPRAND              PRNTS      9
G     EXECUTE                                                           PRNTS     10
      NCHAR=0                                                           PRNTS     11
      NCHARP=0                                                          PRNTS     12
      DO 5 I=1,15                                                       PRNTS     13
    5 VFOR(I)=0                                                         PRNTS     14
      NINT=NTMP=1                                                       PRNTS     15
      DO 10 I=1,NSTR                                                    PRNTS     16
G     STRING(+HOL.I 'NODE,+STRING.I 'N1=OPRAND/16)                      PRNTS     17
      NINT=NINT+1                                                       PRNTS     18
   16 J=0                                                               PRNTS     19
   20 J=J+1                                                             PRNTS     20
G     NODE+LEFT.J/30 (+HOL.1 'CHAR,+HOL.2 'NDICT)                       PRNTS     21
      CALL FORM                                                         PRNTS     22
      GO TO 20                                                          PRNTS     23
   30 CONTINUE                                                          PRNTS     24
      IF(NINT .GT. NTMP) GO TO 35                                       PRNTS     25
G     N1(+HOL.1 'CHAR,+HOL.2 'NDICT)                                    PRNTS     26
      CALL FORM                                                         PRNTS     27
      GO TO 37                                                          PRNTS     28
   35 NTMP=NINT                                                         PRNTS     29
G     NODE+HOL 'NDICT                                                   PRNTS     30
G     OPRAND+HOL 'CHAR                                                  PRNTS     31
      CALL FORM                                                         PRNTS     32
   37 J=0                                                               PRNTS     33
   40 J=J+1                                                             PRNTS     34
G     NODE+RIGHT.J/10 (+HOL.1 'CHAR,+HOL.2 'NDICT)                      PRNTS     35
      CALL FORM                                                         PRNTS     36
      GO TO 40                                                          PRNTS     37
   10 CONTINUE                                                          PRNTS     38
      NC=1+(NCHARP-1)/8                                                 PRNTS     39
  100 FORMAT(1X,15A8)                                                   PRNTS     40
      IF(ERRFLG) PRINT 100,(VFOR(I),I=1,NC)                             PRNTS     41
G     COMPLETE                                                          PRNTS     42
```

```
      SUBROUTINE PROG                                                   PROG       2
      COMMON A(1326),D(500),IDTBL(8,500),INITID(3),LASTID(3),ISRCH(3),  RICH       2
     * JPTR,N,M,JTYP,LSTART,N2,IFNCNM,LOGID,NXTID,IDTYP,NID,LOC,        CY58A     80
     2 LTYP,ITYP,IBLKDT,MODE,IERR,IDES                                  RICH       4
      DIMENSION IALPH(7)                                                PROG       4
      DATA (IALPH(I),I=1,7)/1HP,1HR,1HO,1HG,1HR,1HA,1HM/                PROG       5
C** PROGRAM STATEMENT PROCESSOR                                         PROG       6
      JPTR=7                                                            PROG       7
C** CHECK SPELLING                                                      PROG       8
      DO 5 I=1,7                                                        PROG       9
      IF(NEXT(JPTR) .NE. IALPH(I)) GO TO 10                             PROG      10
    5 CONTINUE                                                          PROG      11
C** GET PROGRAM NAME AND STORE IN SYMBOL TABLE                           PROG      12
      CALL GNLE                                                         PROG      13
      IF(JTYP .NE. 2) GO TO 10                                          PROG      14
      IDTYP=2                                                           PROG      15
      CALL STORE                                                        PROG      16
      RETURN                                                            PROG      17
   10 CALL ERROR(7)                                                     PROG      18
      RETURN                                                            PROG      19
      END                                                               PROG      20
```

40 Bits

```
REAL FUNCTION Q1REAL(X)
DATA R/77777777777774000008/
Q1REAL=AND(X,R)
RETURN
END
DOUBLE PRECISION FUNCTION Q1DPRE(X)
DOUBLE PRECISION X,T
DIMENSION W(2)
EQUIVALENCE(T,W(1))
DATA R/77777777777774000008/
T=X
W(1)=AND(W(1),R)
W(2)=AND(W(2),R)
Q1DPRE=T
RETURN
END
COMPLEX FUNCTION Q1COMP(X)
COMPLEX X,T
DIMENSION W(2)
EQUIVALENCE(T,W(1))
DATA R/77777777777774000008/
T=X
W(1)=AND(W(1),R)
W(2)=AND(W(2),R)
Q1COMP=T
RETURN
END
```

39 Bits

```
REAL FUNCTION Q1REAL(X)
DATA R/77777777777700000008/
Q1REAL=AND(X,R)
RETURN
END
DOUBLE PRECISION FUNCTION Q1DPRE(X)
DOUBLE PRECISION X,T
DIMENSION W(2)
EQUIVALENCE(T,W(1))
DATA R/77777777777700000008/
T=X
W(1)=AND(W(1),R)
W(2)=AND(W(2),R)
Q1DPRE=T
RETURN
END
COMPLEX FUNCTION Q1COMP(X)
COMPLEX X,T
DIMENSION W(2)
EQUIVALENCE(T,W(1))
DATA R/77777777777700000008/
T=X
W(1)=AND(W(1),R)
W(2)=AND(W(2),R)
Q1COMP=T
RETURN
END
```

38 Bits

```
REAL FUNCTION Q1REAL(X)
DATA R/77777777777760000000B/
Q1REAL=AND(X,R)
RETURN
END
DOUBLE PRECISION FUNCTION Q1DPRE(X)
DOUBLE PRECISION X,T
DIMENSION W(2)
EQUIVALENCE(T,W(1))
DATA R/777777777777600000000B/
T=X
W(1)=AND(W(1),R)
W(2)=AND(W(2),R)
Q1DPRE=T
RETURN
END
COMPLEX FUNCTION Q1COMP(X)
COMPLEX X,T
DIMENSION W(2)
EQUIVALENCE(T,W(1))
DATA R/777777777777600000000B/
T=X
W(1)=AND(W(1),R)
W(2)=AND(W(2),R)
Q1COMP=T
RETURN
END
```

37 Bits

```
REAL FUNCTION Q1REAL(X)
DATA R/77777777777740000000B/
Q1REAL=AND(X,R)
RETURN
END
DOUBLE PRECISION FUNCTION Q1DPRE(X)
DOUBLE PRECISION X,T
DIMENSION W(2)
EQUIVALENCE(T,W(1))
DATA R/777777777777400000000B/
T=X
W(1)=AND(W(1),R)
W(2)=AND(W(2),R)
Q1DPRE=T
RETURN
END
COMPLEX FUNCTION Q1COMP(X)
COMPLEX X,T
DIMENSION W(2)
EQUIVALENCE(T,W(1))
DATA R/777777777777400000000B/
T=X
W(1)=AND(W(1),R)
W(2)=AND(W(2),R)
Q1COMP=T
RETURN
END
```

36 Bits

```
REAL FUNCTION Q1REAL(X)
DATA R/777777777777000000008/
Q1REAL=AND(X,R)
RETURN
END
DOUBLE PRECISION FUNCTION Q1DPRE(X)
DOUBLE PRECISION X,T
DIMENSION W(2)
EQUIVALENCE(T,W(1))
DATA R/777777777777000000008/
T=X
W(1)=AND(W(1),R)
W(2)=AND(W(2),R)
Q1DPRE=T
RETURN
END
COMPLEX FUNCTION Q1COMP(X)
COMPLEX X,T
DIMENSION W(2)
EQUIVALENCE(T,W(1))
DATA R/777777777777000000008/
T=X
W(1)=AND(W(1),R)
W(2)=AND(W(2),R)
Q1COMP=T
RETURN
END
```

35 Bits

```
REAL FUNCTION Q1REAL(X)
DATA R/777777777776000000008/
Q1REAL=AND(X,R)
RETURN
END
DOUBLE PRECISION FUNCTION Q1DPRE(X)
DOUBLE PRECISION X,T
DIMENSION W(2)
EQUIVALENCE(T,W(1))
DATA R/777777777776000000008/
T=X
W(1)=AND(W(1),R)
W(2)=AND(W(2),R)
Q1DPRE=T
RETURN
END
COMPLEX FUNCTION Q1COMP(X)
COMPLEX X,T
DIMENSION W(2)
EQUIVALENCE(T,W(1))
DATA R/777777777776000000008/
T=X
W(1)=AND(W(1),R)
W(2)=AND(W(2),R)
Q1COMP=T
RETURN
END
```

34 Bits

```
REAL FUNCTION Q1REAL(X)
DATA R/77777777777400000000B/
Q1REAL=AND(X,R)
RETURN
END
DOUBLE PRECISION FUNCTION Q1DPRE(X)
DOUBLE PRECISION X,T
DIMENSION W(2)
EQUIVALENCE(T,W(1))
DATA R/77777777777400000000B/
T=X
W(1)=AND(W(1),R)
W(2)=AND(W(2),R)
Q1DPRE=T
RETURN
END
COMPLEX FUNCTION Q1COMP(X)
COMPLEX X,T
DIMENSION W(2)
EQUIVALENCE(T,W(1))
DATA R/77777777777400000000B/
T=X
W(1)=AND(W(1),R)
W(2)=AND(W(2),R)
Q1COMP=T
RETURN
END
```

33 Bits

```
REAL FUNCTION Q1REAL(X)
DATA R/77777777777000000000B/
Q1REAL=AND(X,R)
RETURN
END
DOUBLE PRECISION FUNCTION Q1DPRE(X)
DOUBLE PRECISION X,T
DIMENSION W(2)
EQUIVALENCE(T,W(1))
DATA R/77777777777000000000B/
T=X
W(1)=AND(W(1),R)
W(2)=AND(W(2),R)
Q1DPRE=T
RETURN
END
COMPLEX FUNCTION Q1COMP(X)
COMPLEX X,T
DIMENSION W(2)
EQUIVALENCE(T,W(1))
DATA R/77777777777000000000B/
T=X
W(1)=AND(W(1),R)
W(2)=AND(W(2),R)
Q1COMP=T
RETURN
END
```

32 Bits

```
REAL FUNCTION Q1REAL(X)
DATA R/77777777776000000000B/
Q1REAL=AND(X,R)
RETURN
END
DOUBLE PRECISION FUNCTION Q1DPRE(X)
DOUBLE PRECISION X,T
DIMENSION W(2)
EQUIVALENCE(T,W(1))
DATA R/77777777776000000000B/
T=X
W(1)=AND(W(1),R)
W(2)=AND(W(2),R)
Q1DPRE=T
RETURN
END
COMPLEX FUNCTION Q1COMP(X)
COMPLEX X,T
DIMENSION W(2)
EQUIVALENCE(T,W(1))
DATA R/77777777776000000000B/
T=X
W(1)=AND(W(1),R)
W(2)=AND(W(2),R)
Q1COMP=T
RETURN
END
```

31 Bits

```
REAL FUNCTION Q1REAL(X)
DATA R/77777777774000000000B/
Q1REAL=AND(X,R)
RETURN
END
DOUBLE PRECISION FUNCTION Q1DPRE(X)
DOUBLE PRECISION X,T
DIMENSION W(2)
EQUIVALENCE(T,W(1))
DATA R/77777777774000000000B/
T=X
W(1)=AND(W(1),R)
W(2)=AND(W(2),R)
Q1DPRE=T
RETURN
END
COMPLEX FUNCTION Q1COMP(X)
COMPLEX X,T
DIMENSION W(2)
EQUIVALENCE(T,W(1))
DATA R/77777777774000000000B/
T=X
W(1)=AND(W(1),R)
W(2)=AND(W(2),R)
Q1COMP=T
RETURN
END
```

30 Bits

```
REAL FUNCTION Q1REAL(X)
DATA R/77777777770000000000B/
Q1REAL=AND(X,R)
RETURN
END
DOUBLE PRECISION FUNCTION Q1DPRE(X)
DOUBLE PRECISION X,T
DIMENSION W(2)
EQUIVALENCE(T,W(1))
DATA R/77777777770000000000B/
T=X
W(1)=AND(W(1),R)
W(2)=AND(W(2),R)
Q1DPRE=T
RETURN
END
COMPLEX FUNCTION Q1COMP(X)
COMPLEX X,T
DIMENSION W(2)
EQUIVALENCE(T,W(1))
DATA R/77777777770000000000B/
T=X
W(1)=AND(W(1),R)
W(2)=AND(W(2),R)
Q1COMP=T
RETURN
END
```

```
      SUBROUTINE REALCK                                                 REAL      2
      COMMON A(1326),D(500),IDTBL(8,500),INITID(3),LASTID(3),ISRCH(3),  RICH      2
     * JPTR,N,M,JTYP,LSTART,N2,IFNCNM,LOGID,NXTID,IDTYP,NID,LOC,        CY58A    80
     2 LTYP,ITYP,IBLKDT,MODE,IERR,IDES                                  RICH      4
      COMMON/LOGIC/LOG,LOGST                                            REAL      4
      COMMON/REALNO/IREAL,IRELND,IP                                     REAL      5
      INTEGER A,DECPT,EEE,PLUS,MINUS,DEE,ELOC                           REAL      6
      DATA DECPT/1H./,EEE/1HE/, PLUS/1H+/, MINUS/1H-/,DEE/1HD/          REAL      7
C** THIS ROUTINE CHECKS A CHARACTER STRING TO SEE IF IT CONSTITUTES     REAL      8
C** A REAL NUMBER                                                       REAL      9
      IDES=0                                                            REAL     10
      IRELND=0                                                          REAL     11
      IF(IP .GE. N) GO TO 90                                            REAL     12
C** CHECK THAT FIRST CHARACTER IS A DECIMAL POINT OR NUMBER             REAL     13
      IF(NEXT(IP) .EQ. DECPT) GO TO 5                                   REAL     14
      IF(ITYPE(IP) .EQ. 2) GO TO 10                                     REAL     15
      GO TO 90                                                          REAL     16
    5 IF(JPTR .GT. N) GO TO 90                                          REAL     17
      IF(ITYPE(JPTR) .NE. 2) GO TO 90                                   REAL     18
      GO TO 20                                                          REAL     19
   10 IF(JPTR .GT. N) GO TO 90                                          REAL     20
   12 IF(ITYPE(JPTR) .EQ. 2) GO TO 15                                   REAL     21
C** CHECK THAT STRING CONTAINS A DECIMAL POINT                          REAL     22
      IF(A(JPTR-1) .NE. DECPT) GO TO 90                                 REAL     23
      LOGST=JPTR                                                        REAL     24
      CALL LOGCHK                                                       REAL     25
      IF(LOG .EQ. 1) GO TO 90                                           REAL     26
      JPTR=LOGST                                                        REAL     27
      GO TO 20                                                          REAL     28
   15 IF(JPTR .GT. N) GO TO 90                                          REAL     29
      GO TO 12                                                          REAL     30
   20 IREAL=1                                                           REAL     31
      IF(JPTR .GT. N) GO TO 35                                          REAL     32
   22 IF(ITYPE(JPTR) .EQ. 2) GO TO 25                                   REAL     33
      IF(A(JPTR-1) .EQ. EEE) GO TO 24                                   REAL     34
      IF(A(JPTR-1) .NE. DEE) GO TO 30                                   REAL     35
      IDES=1                                                            REAL     36
   24 ELOC=JPTR-2                                                       REAL     37
      GO TO 40                                                          REAL     38
   25 IF(JPTR .GT. N) GO TO 35                                          REAL     39
      GO TO 22                                                          REAL     40
   30 ELOC=JPTR-2                                                       REAL     41
   32 IRELND=ELOC                                                       REAL     42
C** NUMBER IS NOT IN "E" OR "D" FORMAT, RETURN                          REAL     43
      RETURN                                                            REAL     44
   35 IRELND=N                                                          REAL     45
      RETURN                                                            REAL     46
   40 IF(JPTR .GT. N) GO TO 32                                          REAL     47
C** NUMBER IS "E" OR "D" FORMAT                                         REAL     48
      NXT=NEXT(JPTR)                                                    REAL     49
      IF(NXT .EQ. PLUS .OR. NXT .EQ. MINUS) GO TO 45                    REAL     50
      IF(ITYPE(JPTR-1) .NE. 2) GO TO 32                                 REAL     51
      IF(JPTR .GT. N) GO TO 35                                          REAL     52
      GO TO 47                                                          REAL     53
   45 IF(JPTR .GT. N) GO TO 32                                          REAL     54
      IF(ITYPE(JPTR) .NE. 2) GO TO 32                                   REAL     55
   47 IF(ITYPE(JPTR) .EQ. 2) GO TO 50                                   REAL     56
      IRELND=JPTR-2                                                     REAL     57
      RETURN                                                            REAL     58
   50 IF(JPTR .GT. N) GO TO 35                                          REAL     59
      GO TO 47                                                          REAL     60
   90 IREAL=0                                                           REAL     61
      RETURN                                                            REAL     62
      END                                                               REAL     63
```

FORTRAN Version

```
      SUBROUTINE RECOG(FIN)                                             RECOG  2
      COMMON/LVARGS/LVFUNC,LVVARG,LVVAD,LVVPOS,LVVTYP,        LVVAL,
     +LVHEAD,LVVNVL,LVDEST,LVVALS(10),LVTYPE(10),LVSKIP
      COMMON/LVTABL/LVTSIZ,LVMAP(     1)/LVVSEQ/LVSIZE,LVSQSP(     1)
      COMMON /HL/ HOL,ACTION,FUNC1,FUNC2,FUNC3,LEFT,RIGHT,STRING,MAXJ   RECOG  3
      COMMON /NEED/ START,ASSOC,LEVEL,STOP                              RECOG  4
      COMMON /STRING/ NNN(2),STR                                        RECOG  5
      COMMON/NEEDS/STJ,JSTACK,R,JAS,J,JLAST,RTEMP,STACK(400)            RECOG  6
      INTEGER HOL                                                       RECOG  7
      INTEGER START,ASSOC,STOP,RETRN,R,STJ,STACK,STR(1),ACTION,STRING,  RECOG  8
     $ RTEMP                                                            RECOG  9
      LOGICAL FAIL,FIN                                                  RECOG 10
      FIN=.FALSE.                                                       RECOG 11
      GO TO 25000
25001 CONTINUE
      JSTACK=0                                                          RECOG 13
      J=1                                                               RECOG 14
               R =       START
      LVVPOS =            J
      LVVTYP =    3
      LVFUNC=      STRING
      LVVARG=      STRING
      CALL LVFIND(LV2       A,LV2       B,LV2       C,LV2       D)
      LV1     AAD =      STRING
      IF (LVVAL.NE.-1) LV1     AAD = LVVAL
      LVVTP = LVVAL
      LVVAL = -100
      IF (LVVTP.EQ.-1) GO TO          70
            STJ = LV1     AAD
      M=-1                                                              RECOG 17
      LVVPOS =            1
      LVVTYP =    3
      LVFUNC=         HOL
      LVVARG=      STRING
      CALL LVFIND(LV2       E,LV2       F,LV2       G,LV2       H)
      LV1     AAD =      STRING
      IF (LVVAL.NE.-1) LV1     AAD = LVVAL
      LVDEST=   0
      LV1     AAH = M
      LVTYPE(1) =   1
      LVVALS(1) = LV1     AAH
      LVDEST=   0
      LVVNVL =   1
      LVFUNC =      STRING
      LVVARG=LV1     AAD
      CALL LVNSRT
      IF(LVVAL.LT.0) CALL LVEXIT(LVVAL)
      IF(LVVAL.LT.0) RETURN
    6 CONTINUE                                                          RECOG 19
   12 CONTINUE
      LV1     AAD =            R
      LVVTYP = 3
      LVVPOS = 1
      LVINDX = 0
      LVFUNC=       ASSOC
      LVVARG= LV1     AAD
      CALL LVFIND(LVINDX,LVINDX,LVINDX,LVINDX)
```

```
      LV1     AAI = LV1     AAD
      IF (LVVAL.NE.-1) LV1     AAI = LVVAL
      LVVTR = LVVAL
      LVVAL = -100
      IF (LVVTR.NE.-1) GO TO          15
      LVVTYP = 3
      LVVPOS = 1
      LVINDX = 0
      LVFUNC=        STOP
      LVVARG= LV1     AAD
      CALL LVFIND(LVINDX,LVINDX,LVINDX,LVINDX)
      LV1     AAI = LV1     AAD
      IF (LVVAL.NE.-1) LV1     AAI = LVVAL
      LVVTR = LVVAL
      LVVAL = -100
      IF (LVVTR.NE.-1) GO TO          15
      LVVAL = -100
      IF (LV1     AAD.NE.       STOP) LVVAL = -1
      LVVTR = LVVAL
      LVVAL = -100
      IF (LVVTR.EQ.-1) GO TO          20
   15 JSTACK=JSTACK+1                                                  RECOG 21
      STACK(JSTACK)=SHIFT(R,45) .OR. SHIFT(J,15)                       RECOG 22
   20 CONTINUE
      LVVTYP = 3
      LVVPOS = 1
      LVINDX = 0
      LVFUNC=      ACTION
      LVVARG=           R
      CALL LVFIND(LVINDX,LVINDX,LVINDX,LVINDX)
      LV1     AAD =           R
      IF (LVVAL.NE.-1) LV1     AAD = LVVAL
      LVVTR = LVVAL
      LVVAL = -100
      IF (LVVTR.EQ.-1) GO TO          22
               N = LV1     AAD
      CALL SEMANT(N,FAIL)                                              RECOG 24
      IF(FAIL) GO TO 99                                                RECOG 25
      GO TO 25                                                         RECOG 26
   22 CONTINUE
      LVVTYP = 3
      LVVPOS = 1
      LVINDX = 0
      LVFUNC=         STJ
      LVVARG=           R
      CALL LVFIND(LVINDX,LVINDX,LVINDX,LVINDX)
      LV1     AAD =           R
      IF (LVVAL.NE.-1) LV1     AAD = LVVAL
      LVVTR = LVVAL
      LVVAL = -100
      IF (LVVTR.EQ.-1) GO TO          99
               R = LV1     AAD
   25 J=J+1                                                            RECOG 28
      IF(J .GT. MAXJ) MAXJ=J                                           RECOG 29
   31 CONTINUE
      LVVPOS =           J
      LVVTYP =    3
```

```
      LVFUNC=     STRING
      LVVARG=     STRING
      CALL LVFIND(LV2       I,LV2       J,LV2       K,LV2       L)
      LV1    AAD =      STRING
      IF (LVVAL.NE.-1) LV1     AAD = LVVAL
             STJ = LV1     AAD
      LVVTR = LVVAL
      LVVAL = -100
      IF (LVVTR.NE.-1) GO TO            6
   40 STJ=-1                                                          RECOG 31
      LVVTYP = 3
      LVVPOS = 1
      LVINDX = 0
      LVFUNC=     ACTION
      LVVARG=           R
      CALL LVFIND(LVINDX,LVINDX,LVINDX,LVINDX)
      LV1    AAD =           R
      IF (LVVAL.NE.-1) LV1     AAD = LVVAL
      LVVTR = LVVAL
      LVVAL = -100
      IF (LVVTR.EQ.-1) GO TO           42
               N = LV1     AAD
      CALL SEMANT(N,FAIL)                                             RECOG 33
      IF(FAIL) GO TO 99                                               RECOG 34
   42 CALL SSTOP(FAIL)                                                RECOG 35
      IF(FAIL) GO TO 99                                               RECOG 36
      JSTACK=JSTACK+1                                                 RECOG 37
      STACK(JSTACK)=SHIFT(R,45) .OR. SHIFT(J,15)                      RECOG 38
      LVVTYP = 3
      LVVPOS = 1
      LVINDX = 0
      LVFUNC=     ACTION
      LVVARG=           R
      CALL LVFIND(LVINDX,LVINDX,LVINDX,LVINDX)
      LV1    AAD =           R
      IF (LVVAL.NE.-1) LV1     AAD = LVVAL
      LVVTR = LVVAL
      LVVAL = -100
      IF (LVVTR.EQ.-1) GO TO           44
               N = LV1     AAD
      CALL SEMANT(N,FAIL)                                             RECOG 40
      IF(FAIL) GO TO 99                                               RECOG 41
   44 CALL SLEVEL(FAIL)                                               RECOG 42
      IF(FAIL) RETURN                                                 RECOG 43
      GO TO 40                                                        RECOG 44
   99 CONTINUE                                                        RECOG 45
      CALL RECOV(RETRN)                                               RECOG 46
      IF(RETRN .LT. 0) GO TO 70                                       RECOG 47
      LVVAL = -100
      IF (      RETRN.NE.     ASSOC) LVVAL = -1
      LVVTR = LVVAL
      LVVAL = -100
      IF (LVVTR.NE.-1) GO TO           30
      IF(RETRN .EQ. 0) GO TO 10                                       RECOG 49
      CALL SLEVEL(FAIL)                                               RECOG 50
      IF(FAIL) GO TO 65                                               RECOG 51
      GO TO 30                                                        RECOG 52
   65 IF(JSTACK .LE. 1) GO TO 70                                      RECOG 53
      JSTACK=JSTACK-1                                                 RECOG 54
      GO TO 99                                                        RECOG 55
   70 FIN=.TRUE.                                                      RECOG 56
      RETURN                                                          RECOG 57
      RETURN
25000 CONTINUE
      LV2       A=LV2       B=LV2       C=LV2       D=0
      LV2       E=LV2       F=LV2       G=LV2       H=0
      LV2       I=LV2       J=LV2       K=LV2       L=0
      GO TO 25001
      END
```

GIRL Version

```
$       SUBROUTINE RECOG(FIN)                                           RECOG     2
        COMMON /HL/ HOL,ACTION,FUNC1,FUNC2,FUNC3,LEFT,RIGHT,STRING,MAXJ RECOG     3
        COMMON /NEED/ START,ASSOC,LEVEL,STOP                            RECOG     4
        COMMON /STRING/ NNN(2),STR                                      RECOG     5
        COMMON/NEEDS/STJ,JSTACK,R,JAS,J,JLAST,RTEMP,STACK(400)          RECOG     6
        INTEGER HOL                                                     RECOG     7
        INTEGER START,ASSOC,STOP,RETRN,R,STJ,STACK,STR(1),ACTION,STRING, RECOG     8
      $ RTEMP                                                           RECOG     9
        LOGICAL FAIL,FIN                                                RECOG    10
        FIN=.FALSE.                                                     RECOG    11
G       EXECUTE                                                         RECOG    12
        JSTACK=0                                                        RECOG    13
        J=1                                                             RECOG    14
G       START 'R                                                        RECOG    15
G       STRING+STRING.J/70 'STJ                                         RECOG    16
        M=-1                                                            RECOG    17
G       STRING+HOL.1 STRING ''M''                                       RECOG    18
    6   CONTINUE                                                        RECOG    19
G  10   R(+ASSOC//15,+STOP//15,=STOP/20)                                RECOG    20
   15   JSTACK=JSTACK+1                                                 RECOG    21
        STACK(JSTACK)=SHIFT(R,45) .OR. SHIFT(J,15)                      RECOG    22
G  20   R+ACTION/22 'N                                                  RECOG    23
        CALL SEMANT(N,FAIL)                                             RECOG    24
        IF(FAIL) GO TO 99                                               RECOG    25
        GO TO 25                                                        RECOG    26
G  22   R+STJ/99 'R                                                     RECOG    27
   25   J=J+1                                                           RECOG    28
        IF(J .GT. MAXJ) MAXJ=J                                          RECOG    29
G  30   STRING+STRING.J 'STJ//6                                         RECOG    30
   40   STJ=-1                                                          RECOG    31
G       R+ACTION/42 'N                                                  RECOG    32
        CALL SEMANT(N,FAIL)                                             RECOG    33
        IF(FAIL) GO TO 99                                               RECOG    34
   42   CALL SSTOP(FAIL)                                                RECOG    35
        IF(FAIL) GO TO 99                                               RECOG    36
        JSTACK=JSTACK+1                                                 RECOG    37
        STACK(JSTACK)=SHIFT(R,45) .OR. SHIFT(J,15)                      RECOG    38
G       R+ACTION/44 'N                                                  RECOG    39
        CALL SEMANT(N,FAIL)                                             RECOG    40
        IF(FAIL) GO TO 99                                               RECOG    41
   44   CALL SLEVEL(FAIL)                                               RECOG    42
        IF(FAIL) RETURN                                                 RECOG    43
        GO TO 40                                                        RECOG    44
   99   CONTINUE                                                        RECOG    45
        CALL RECOV(RETRN)                                               RECOG    46
        IF(RETRN .LT. 0) GO TO 70                                       RECOG    47
G       RETRN=ASSOC//30                                                 RECOG    48
        IF(RETRN .EQ. 0) GO TO 10                                       RECOG    49
        CALL SLEVEL(FAIL)                                               RECOG    50
        IF(FAIL) GO TO 65                                               RECOG    51
        GO TO 30                                                        RECOG    52
   65   IF(JSTACK .LE. 1) GO TO 70                                      RECOG    53
        JSTACK=JSTACK-1                                                 RECOG    54
        GO TO 99                                                        RECOG    55
   70   FIN=.TRUE.                                                      RECOG    56
        RETURN                                                          RECOG    57
G       COMPLETE                                                        RECOG    58
```

FORTRAN Version

```
      SUBROUTINE RECOV(RETRN)                                           RECOV  2
      COMMON/LVARGS/LVFUNC,LVVARG,LVVAD,LVVPOS,LVVTYP,        LVVAL,
     +LVHEAD,LVVNVL,LVDEST,LVVALS(10),LVTYPE(10),LVSKIP
      COMMON/LVTABL/LVTSIZ,LVMAP(     1)/LVVSEQ/LVSIZE,LVSOSP(      1)
      COMMON /NEED/ START,ASSOC,LEVEL,STOP                              RECOV  3
      COMMON/NEEDS/STJ,JSTACK,R,JAS,J,JLAST,RTEMP,STACK(400)            RECOV  4
      COMMON /STRING/ NNN(2),STR                                        RECOV  5
      COMMON /HL/ HOL,ACTION,FUNC1,FUNC2,FUNC3,LEFT,RIGHT,STRING        RECOV  6
      INTEGER START,ASSOC,STOP,STACK,STR(1),STJ,R,STRING,RETRN,TEMP     RECOV  7
     $ ,RIGHT,HOL,BITGET,BITPUT                                         RECOV  8
      GO TO 25000
25001 CONTINUE
   10 R=BITGET(STACK(JSTACK),15,15)                                     RECOV 10
      JAS=BITGET(STACK(JSTACK),30,15)+1                                 RECOV 11
      LVVPOS =         JAS
      LVVTYP =    3
      LVFUNC=       ASSOC
      LVVARG=           R
      CALL LVFIND(LV2       A,LV2       B,LV2       C,LV2       D)
      LV1     AAD =           R
      IF (LVVAL.NE.-1) LV1     AAD = LVVAL
            TEMP = LV1     AAD
      LVVTR = LVVAL
      LVVAL = -100
      IF (LVVTR.NE.-1) GO TO          30
   15 CONTINUE
      LV1     AAD =           R
      LVVAL = -100
      IF (LV1   . AAD.NE.       STOP) LVVAL = -1
      LVVTR = LVVAL
      LVVAL = -100
      IF (LVVTR.NE.-1) GO TO          40
      LVVTYP = 3
      LVVPOS = 1
      LVINDX = 0
      LVFUNC=        STOP
      LVVARG= LV1     AAD
      CALL LVFIND(LVINDX,LVINDX,LVINDX,LVINDX)
      LV1     AAH = LV1     AAD
      IF (LVVAL.NE.-1) LV1     AAH = LVVAL
      LVVTR = LVVAL
      LVVAL = -100
      IF (LVVTR.EQ.-1) GO TO          16
      LVVAL = -100
      IF (LV1     AAH.NE.       STOP) LVVAL = -1
      LVVTR = LVVAL
      LVVAL = -100
      IF (LVVTR.NE.-1) GO TO          40
               R = LV1     AAH
      J=BITGET(STACK(JSTACK),45,15)                                     RECOV 14
      JSTACK=JSTACK-1                                                   RECOV 15
      RETRN=0                                                           RECOV 16
      RETURN                                                            RECOV 17
   16 JSTACK=JSTACK-1                                                   RECOV 18
      IF(JSTACK .LE. 0) GO TO 20                                        RECOV 19
      IF(BITGET(STACK(JSTACK),45,15) .LT. J) CALL SEMANT(0,FAIL)        RECOV 20
      J=BITGET(STACK(JSTACK),45,15)                                     RECOV 21
```

```
      GO TO 10                                                          RECOV 22
   20 RETRN=-1                                                          RECOV 23
      RETURN                                                            RECOV 24
   40 CONTINUE                                                          RECOV 25
      J=BITGET(STACK(JSTACK),45,15)                                     RECOV 26
      ISTCK=BITGET(STACK(JSTACK),60,15)                                 RECOV 27
      IF(ISTCK .GT. 0 .AND. ISTCK .LT. 77777B) GO TO 16                 RECOV 28
      RETRN=STOP                                                        RECOV 29
      RETURN                                                            RECOV 30
   30 CONTINUE
               R =        TEMP
      IF(JSTACK .EQ. 1) GO TO 35                                        RECOV 32
      IF(R .NE. BITGET(STACK(JSTACK),15,15)) GO TO 35                   RECOV 33
      NTEMP=BITGET(STACK(JSTACK-1),15,15)                               RECOV 34
      JMARK=JSTACK                                                      RECOV 35
   31 STACK(JMARK)=STACK(JMARK) .OR. 77777B                             RECOV 36
      JMARK=JMARK-1                                                     RECOV 37
      ISTCK=BITGET(STACK(JMARK),15,15)                                  RECOV 38
      IF(R .EQ. ISTCK .AND. BITGET(STACK(JMARK),60,15) .EQ. 77777B)     RECOV 39
     $ GO TO 15                                                         RECOV 40
      IF(R .EQ. ISTCK .AND. JMARK .NE. 0) GO TO 31                      RECOV 41
      IF(R .NE. NTEMP .OR. JAS .NE. BITGET(STACK(JSTACK-1),30,15)       RECOV 42
     $ .OR. BITGET(STACK(JSTACK-1),60,15) .NE. 77777B) GO TO 35         RECOV 43
      GO TO 15                                                          RECOV 44
   35 CONTINUE                                                          RECOV 45
      IF(BITGET(STACK(JSTACK),45,15) .LT. J) CALL SEMANT(0,FAIL)        RECOV 46
      STACK(JSTACK)=STACK(JSTACK) .AND. 7777700000777777777B            RECOV 47
      STACK(JSTACK)=BITPUT(STACK(JSTACK),JAS,30)                        RECOV 48
      J=BITGET(STACK(JSTACK),45,15)                                     RECOV 49
      IF(BITGET(STACK(JSTACK),60,15) .NE. 77777B)                       RECOV 50
     $ STACK(JSTACK)=STACK(JSTACK) .AND. 7777777777777700000B           RECOV 51
      RETRN=ASSOC                                                       RECOV 52
      RETURN                                                            RECOV 53
      RETURN
25000 CONTINUE
      LV2       A=LV2       B=LV2       C=LV2       D=0
      GO TO 25001
      END
```

GIRL Version

```
$       SUBROUTINE RECOV(RETRN)                                          RECOV     2
        COMMON /NEED/ START,ASSOC,LEVEL,STOP                             RECOV     3
        COMMON/NEEDS/STJ,JSTACK,R,JAS,J,JLAST,RTEMP,STACK(400)           RECOV     4
        COMMON /STRING/ NNN(2),STR                                       RECOV     5
        COMMON /HL/ HOL,ACTION,FUNC1,FUNC2,FUNC3,LEFT,RIGHT,STRING       RECOV     6
        INTEGER START,ASSOC,STOP,STACK,STR(1),STJ,R,STRING,RETRN,TEMP    RECOV     7
      $ ,RIGHT,HOL,BITGET,BITPUT                                         RECOV     8
G       EXECUTE                                                          RECOV     9
   10   R=BITGET(STACK(JSTACK),15,15)                                    RECOV    10
        JAS=BITGET(STACK(JSTACK),30,15)+1                                RECOV    11
G       R+ASSOC.JAS 'TEMP//30                                            RECOV    12
G  15   R(=STOP//40,+STOP/16=STOP//40 'R)                                RECOV    13
        J=BITGET(STACK(JSTACK),45,15)                                    RECOV    14
        JSTACK=JSTACK-1                                                  RECOV    15
        RETRN=0                                                          RECOV    16
        RETURN                                                           RECOV    17
   16   JSTACK=JSTACK-1                                                  RECOV    18
        IF(JSTACK .LE. 0) GO TO 20                                       RECOV    19
        IF(BITGET(STACK(JSTACK),45,15) .LT. J) CALL SEMANT(0,FAIL)       RECOV    20
        J=BITGET(STACK(JSTACK),45,15)                                    RECOV    21
        GO TO 10                                                         RECOV    22
   20   RETRN=-1                                                         RECOV    23
        RETURN                                                           RECOV    24
   40   CONTINUE                                                         RECOV    25
        J=BITGET(STACK(JSTACK),45,15)                                    RECOV    26
        ISTCK=BITGET(STACK(JSTACK),60,15)                                RECOV    27
        IF(ISTCK .GT. 0 .AND. ISTCK .LT. 777778) GO TO 16                RECOV    28
        RETRN=STOP                                                       RECOV    29
        RETURN                                                           RECOV    30
G  30   TEMP 'R                                                          RECOV    31
        IF(JSTACK .EQ. 1) GO TO 35                                       RECOV    32
        IF(R .NE. BITGET(STACK(JSTACK),15,15)) GO TO 35                  RECOV    33
        NTEMP=BITGET(STACK(JSTACK-1),15,15)                              RECOV    34
        JMARK=JSTACK                                                     RECOV    35
   31   STACK(JMARK)=STACK(JMARK) .OR. 777778                            RECOV    36
        JMARK=JMARK-1                                                    RECOV    37
        ISTCK=BITGET(STACK(JMARK),15,15)                                 RECOV    38
        IF(R .EQ. ISTCK .AND. BITGET(STACK(JMARK),60,15) .EQ. 777778)    RECOV    39
      $ GO TO 15                                                         RECOV    40
        IF(R .EQ. ISTCK .AND. JMARK .NE. 0) GO TO 31                     RECOV    41
        IF(R .NE. NTEMP .OR. JAS .NE. BITGET(STACK(JSTACK-1),30,15)      RECOV    42
      $ .OR. BITGET(STACK(JSTACK-1),60,15) .NE. 777778) GO TO 35         RECOV    43
        GO TO 15                                                         RECOV    44
   35   CONTINUE                                                         RECOV    45
        IF(BITGET(STACK(JSTACK),45,15) .LT. J) CALL SEMANT(0,FAIL)       RECOV    46
        STACK(JSTACK)=STACK(JSTACK) .AND. 7777700000777777777778         RECOV    47
        STACK(JSTACK)=BITPUT(STACK(JSTACK),JAS,30)                       RECOV    48
        J=BITGET(STACK(JSTACK),45,15)                                    RECOV    49
        IF(BITGET(STACK(JSTACK),60,15) .NE. 777778)                      RECOV    50
      $ STACK(JSTACK)=STACK(JSTACK) .AND. 7777777777777777000008         RECOV    51
        RETRN=ASSOC                                                      RECOV    52
        RETURN                                                           RECOV    53
G       COMPLETE                                                         RECOV    54
```

```
      SUBROUTINE ROLCHK(I1,I2,I3,I4,I5,I6)
      DIMENSION IARG(6)
      DATA MASK/77000000000000000000B/
      IARG(1)=I1 .AND. MASK
      IARG(2)=I2 .AND. MASK
      IARG(3)=I3 .AND. MASK
      IARG(4)=I4 .AND. MASK
      IARG(5)=I5 .AND. MASK
      IARG(6)=I6 .AND. MASK
      ISUBNM=55555555B
      NSHIFT=66
      DO 10 I=1,6
      NSHIFT=NSHIFT-6
   10 ISUBNM=OR(ISUBNM,SHIFT(IARG(I),NSHIFT))
      WRITE(3) ISUBNM
      RETURN
      END
```

```
      SUBROUTINE SEARCH                                                 SEARCH     2
      COMMON A(1326),D(500),IDTBL(8,500),INITID(3),LASTID(3),ISRCH(3),  RICH       2
     * JPTR,N,M,JTYP,LSTART,N2,IFNCNM,LOGID,NXTID,IDTYP,NID,LOC,        CY58A     80
     2 LTYP,ITYP,IBLKDT,MODE,IERR,IDES                                  RICH       4
C** THIS ROUTINE SEARCHES THE SYMBOL TABLE FOR A NAME AND RETURNS        SEARCH     4
C**      ISRCH(1)=1 - NAME FOUND IN VARIABLE LIST      =0 - NOT FOUND    SEARCH     5
C**      ISRCH(2)=1 - NAME FOUND IN FUNCTION LIST      =0 - NOT FOUND    SEARCH     6
C**      LOC - SYMBOL TABLE LOCATION WHERE NAME WAS FOUND                SEARCH     7
      DO 20 K=1,2                                                       SEARCH     8
      J=INITID(K)                                                       SEARCH     9
      IF(J .EQ. 0) GO TO 15                                             SEARCH    10
      DO 10 I=1,NID                                                     SEARCH    11
      IF(IDTBL(1,J) .NE. NXTID) GO TO 5                                 SEARCH    12
      ISRCH(K)=1                                                        SEARCH    13
      IDES=LOC                                                          SEARCH    14
      LOC=J                                                             SEARCH    15
      GO TO 20                                                          SEARCH    16
    5 J=IDTBL(2,J)                                                      SEARCH    17
      IF(J .EQ. 0) GO TO 15                                             SEARCH    18
   10 CONTINUE                                                          SEARCH    19
   15 ISRCH(K)=0                                                        SEARCH    20
   20 CONTINUE                                                          SEARCH    21
      RETURN                                                            SEARCH    22
      END                                                               SEARCH    23
```

FORTRAN Version

```
      SUBROUTINE SEMANT(N,FAIL)                                         SEMANT 2
      COMMON/LVARGS/LVFUNC,LVVARG,LVVAD,LVVPOS,LVVTYP,        LVVAL,
     +LVHEAD,LVVNVL,LVDEST,LVVALS(10),LVTYPE(10),LVSKIP
      COMMON/LVTABL/LVTSIZ,LVMAP(     1)/LVVSEQ/LVSIZE,LVSQSP(     1)
      COMMON/FUNC/  NARY(5,12),MARGS,IARGS(50),FNCLOC(5),NFUNC          CY58B  3
      COMMON/HL/HOL,ACTION,FUNC1,FUNC2,FUNC3,LEFT,RIGHT,STRING,MAXJ     SEMANT 4
      COMMON /TYP/ NARRAY,TYPE1,TYPE2,ERRFLG                            SEMANT 5
      COMMON /STRING/ NTYPE,NSTR,STR                                    SEMANT 6
      COMMON /JL/ JSTOP                                                 SEMANT 7
      COMMON /GIRL/NTERMS,PLUS,MINUS,SLASH,LPAR,RPAR,COMMA,STAR,EXP,LT, SEMANT 8
     +LE,GT,GE,EQ,NE,OR,AND,NOT,EQUALS,OPRAND                           SEMANT 9
      COMMON/NEEDS/STJ,JSTACK,R,JAS,J,JLAST,RTEMP,STACK(400)            SEMANT10
      COMMON /NEED/ START,ASSOC,LEVEL,STOP                              SEMANT11
      COMMON/NOPAR/NOPAR,NDEP,NDEPTH,NFLAG                              SEMANT12
      INTEGER HOL,ACTION,FUNC,LEFT,RIGHT,STRING,RPAR,STJ,R,STACK        SEMANT13
     +,EXP,FUNC1,FUNC2,FUNC3,TYPE1,TYPE2,TYPE(5),STR(1),STOP            SEMANT14
     $ ,ALPHA,BETA,GAMMA,OPRAND,EQUALS,AND,OR,COMMA                     SEMANT15
      LOGICAL SKIP,FLAG,ERRFLG,FAIL,NOTFLG                              SEMANT16
      INTEGER FUNCRF,ZERO,BITPUT,PLUS,FL(3),BITGET                      SEMANT17
      INTEGER GETTYP,GETDIM                                             SEMANT18
      DATA FLAG/.FALSE./,FUNCRF/86/,ZERO/0/                             SEMANT19
      DATA (TYPE(I),I=1,5)/4HREAL,6HCOMPLX,6HDOUBLE,6HINTEGR,6HLOGICL/  SEMANT20
      GETTYP(II)=MOD(II,100000)/10000                                   SEMANT21
      GETDIM(II)=MOD(II,1000000)/100000                                 SEMANT22
      GO TO 25000
25001 CONTINUE
      FAIL=.FALSE.                                                      SEMANT24
      IF(N .EQ. 0) GO TO 999                                            SEMANT25
      GO TO(10,20,30,40,50,60,70,80,90,1000,1100,1200,1300,1400,1500,   SEMANT26
     $ 1600),N                                                          SEMANT27
   10 CONTINUE
      LVVTYP = 3
      LVVPOS = 1
      LVINDX = 0
      LVFUNC=         STJ
      LVVARG=           R
      CALL LVFIND(LVINDX,LVINDX,LVINDX,LVINDX)
      LV1     AAD =           R
      IF (LVVAL.NE.-1) LV1     AAD = LVVAL
      LVVTR = LVVAL
      LVVAL = -100
      IF (LVVTR.EQ.-1) GO TO          11
               R = LV1     AAD
      LVVTR = LVVAL
      LVVAL = -100
      IF (LVVTR.NE.-1) GO TO          12
   11 FAIL=.TRUE.                                                       SEMANT29
      RETURN                                                            SEMANT30
C PRIMARY RECOGNIZED                                                    SEMANT31
   12 IF(STJ .EQ. PLUS .OR. STJ .EQ. MINUS) GO TO 126                   SEMANT32
      IF(STJ .NE. RPAR) GO TO 121                                       SEMANT33
      JSTACK=JSTACK+1                                                   SEMANT34
      STACK(JSTACK)=SHIFT(STOP,45) .OR. SHIFT(J,15)                     SEMANT35
      NTMP=R                                                            SEMANT36
      CALL SLEVEL(SKIP)                                                 SEMANT37
      JSTACK=JSTACK-1                                                   SEMANT38
      R=NTMP                                                            SEMANT39
```

```
      JLAST=1                                                           SEMANT40
      IF(JSTOP .GT. 0) JLAST=BITGET(STACK(JSTOP),45,15)                 SEMANT41
      LVVPOS =       JLAST
      LVVTYP =    3
      LVFUNC=          HOL
      LVVARG=      STRING
      CALL LVFIND(LV2       A,LV2       B,LV2       C,LV2       D)
      LV1     AAD =      STRING
      IF (LVVAL.NE.-1) LV1     AAD = LVVAL
      LV1     AAI = LV1     AAD
      LVVAD=-1
      LVVTYP=-1
      LVVPOS=1
      LVFUNC=     STRING
      LVVARG=LV1     AAI
      CALL LVDLET
      LV1     AAI = LV1     AAD
      LVDEST=  0
      LV1     AAJ = TYPE1
      LVTYPE(1) =  1
      LVVALS(1) = LV1     AAJ
      LVDEST=  0
      LVVNVL =  1
      LVFUNC =      STRING
      LVVARG=LV1     AAI
      CALL LVNSRT
      IF(LVVAL.LT.0) CALL LVEXIT(LVVAL)
      IF(LVVAL.LT.0) RETURN
      RETURN                                                            SEMANT43
  121 CONTINUE                                                          SEMANT44
C  GET TYPE                                                             SEMANT45
      BETA=GETDIM(STR(J))                                               SEMANT46
      IF(BETA .NE. 5) GO TO 125                                         SEMANT47
C  OPERAND IS A FUNCTION REFERENCE                                      SEMANT48
      IF(NDEP .EQ. 0) GO TO 18                                          SEMANT49
      LVVPOS=-LVVPOS
      LVVTYP=  3
      LVVPOS=          1
      LVDEST=  2
      LV1     AAD = 1
      LVTYPE(1) =  1
      LVVALS(1) = LV1     AAD
      LVDEST=  2
      LVVNVL =  1
      LVFUNC =       FUNC1
      LVVARG=     OPRAND
      CALL LVNSRT
      IF(LVVAL.LT.0) CALL LVEXIT(LVVAL)
      IF(LVVAL.LT.0) RETURN
   18 R=FUNCRF                                                          SEMANT51
      JSTACK=JSTACK+1                                                   SEMANT52
      STACK(JSTACK)=SHIFT(R,45) .OR. SHIFT(J+1,15)                      SEMANT53
  125 ALPHA=GETTYP(STR(J))                                              SEMANT54
      IF(TYPE1 .GE. 0) GO TO 13                                         SEMANT55
C  SET TYPE OF STATEMENT                                                SEMANT56
      TYPE1=ALPHA                                                       SEMANT57
      IF(NTYPE .EQ. 3) TYPE1=-1                                         SEMANT58
```

```
  126 CONTINUE
      LVVPOS =          J
      LVVTYP =   3
      LVFUNC=        HOL
      LVVARG=     STRING
      CALL LVFIND(LV2      E,LV2      F,LV2      G,LV2      H)
      LV1    AAI =     STRING
      IF (LVVAL.NE.-1) LV1    AAI = LVVAL
      LV1    AAK = LV1    AAI
      LVVAD=-1
      LVVTYP=-1
      LVVPOS=1
      LVFUNC=    STRING
      LVVARG=LV1    AAK
      CALL LVDLET
      LV1    AAK = LV1    AAI
      LVDEST=  0
      LV1    AAL = TYPE1
      LVTYPE(1) =  1
      LVVALS(1) = LV1    AAL
      LVDEST=  0
      LVVNVL =  1
      LVFUNC =     STRING
      LVVARG=LV1    AAK
      CALL LVNSRT
      IF(LVVAL.LT.0) CALL LVEXIT(LVVAL)
      IF(LVVAL.LT.0) RETURN
      RETURN                                                            SEMANT60
   13 IF(FLAG) GO TO 15                                                 SEMANT61
C  CHECK FOR MIXED MODE EXPRESSION                                      SEMANT62
      IF(TYPE1 .EQ. ALPHA .OR. ALPHA .EQ. 5) GO TO 16                   CY60   1
      N1=TYPE1+1                                                        SEMANT64
      N2=ALPHA+1                                                        SEMANT65
      ERRFLG=.TRUE.                                                     SEMANT66
      CALL ERROR(77,TYPE(N1),TYPE(N2))                                  SEMANT67
      LVVPOS =          J
      LVVTYP =   3
      LVFUNC=        HOL
      LVVARG=     STRING
      CALL LVFIND(LV2      I,LV2      J,LV2      K,LV2      L)
      LV1    AAI =     STRING
      IF (LVVAL.NE.-1) LV1    AAI = LVVAL
      LV1    AAK = LV1    AAI
      LVVAD=-1
      LVVTYP=-1
      LVVPOS=1
      LVFUNC=    STRING
      LVVARG=LV1    AAK
      CALL LVDLET
      LV1    AAK = LV1    AAI
      LVDEST=  0
      LV1    AAM = TYPE1
      LVTYPE(1) =  1
      LVVALS(1) = LV1    AAM
      LVDEST=  0
      LVVNVL =  1
      LVFUNC =     STRING
```

```
      LVVARG=LV1     AAK
      CALL LVNSRT
      IF(LVVAL.LT.0) CALL LVEXIT(LVVAL)
      IF(LVVAL.LT.0) RETURN
      RETURN                                                            SEMANT69
C  PARSING  AN EXPONENT                                                 SEMANT70
   15 IF(ALPHA .EQ. 3 .AND. TYPE1 .EQ. 3) GO TO 16                      SEMANT71
      IF((TYPE1 .EQ. 0 .OR. TYPE1 .EQ. 2) .AND. (ALPHA .EQ. 0 .OR.      SEMANT72
     $ ALPHA .EQ. 2)) GO TO 16                                          SEMANT73
      CALL ERROR(78,J)                                                  SEMANT74
      ERRFLG=.TRUE.                                                     SEMANT75
      LVVPOS =          J
      LVVTYP =   3
      LVFUNC=        HOL
      LVVARG=     STRING
      CALL LVFIND(LV2      M,LV2      N,LV2      O,LV2      P)
      LV1    AAI =     STRING
      IF (LVVAL.NE.-1) LV1    AAI = LVVAL
      LV1    AAK = LV1    AAI
      LVVAD=-1
      LVVTYP=-1
      LVVPOS=1
      LVFUNC=    STRING
      LVVARG=LV1    AAK
      CALL LVDLET
      LV1    AAK = LV1    AAI
      LVDEST=  0
      LV1    AAN = TYPE1
      LVTYPE(1) =  1
      LVVALS(1) = LV1    AAN
      LVDEST=  0
      LVVNVL =  1
      LVFUNC =     STRING
      LVVARG=LV1    AAK
      CALL LVNSRT
      IF(LVVAL.LT.0) CALL LVEXIT(LVVAL)
      IF(LVVAL.LT.0) RETURN
      RETURN                                                            SEMANT77
   16 IF((.NOT. FLAG .AND. TYPE1 .LT. ALPHA).OR.(FLAG .AND. ALPHA .NE. 3SEMANT78
     + .AND. TYPE1 .LT. ALPHA)) TYPE1=ALPHA                             SEMANT79
      LVVPOS =          J
      LVVTYP =   3
      LVFUNC=        HOL
      LVVARG=     STRING
      CALL LVFIND(LV2      Q,LV2      R,LV2      S,LV2      T)
      LV1    AAI =     STRING
      IF (LVVAL.NE.-1) LV1    AAI = LVVAL
      LV1    AAK = LV1    AAI
      LVVAD=-1
      LVVTYP=-1
      LVVPOS=1
      LVFUNC=    STRING
      LVVARG=LV1    AAK
      CALL LVDLET
      LV1    AAK = LV1    AAI
      LVDEST=  0
      LV1    AAO = TYPE1
```

```
      LVTYPE(1) =  1
      LVVALS(1) = LV1     AAO
      LVDEST=  0
      LVVNVL =  1
      LVFUNC =      STRING
      LVVARG=LV1     AAK
      CALL LVNSRT
      IF(LVVAL.LT.0) CALL LVEXIT(LVVAL)
      IF(LVVAL.LT.0) RETURN
      RETURN                                                            SEMANT81
C  WILL SCAN AN EXPONENT                                                SEMANT82
   20 IF(STJ .LT. 0) RETURN                                             SEMANT83
      LVVTYP = 3
      LVVPOS = 1
      LVINDX = 0
      LVFUNC=          STJ
      LVVARG=            R
      CALL LVFIND(LVINDX,LVINDX,LVINDX,LVINDX)
      LV1     AAI =            R
      IF (LVVAL.NE.-1) LV1     AAI = LVVAL
      LVVTR = LVVAL
      LVVAL = -100
      IF (LVVTR.EQ.-1) GO TO          11
               R = LV1     AAI
      FLAG=.TRUE.                                                       SEMANT85
      RETURN                                                            SEMANT86
C  RECOGNIZED A TERM,PRODUCT OR PRIMARY PERHAPS NEEDING PARENTHESIZATIONSEMANT87
   30 CONTINUE                                                          SEMANT88
      KTMP=R                                                            SEMANT89
      IF(NDEP .EQ. 0) GO TO 34                                          SEMANT90
      LVVPOS=-LVVPOS
      LVVTYP=  3
      LVVPOS=          1
      LVDEST=  2
      LV1     AAI = 1
      LVTYPE(1) =  1
      LVVALS(1) = LV1     AAI
      LVDEST=  2
      LVVNVL =  1
      LVFUNC =       FUNC1
      LVVARG=     OPRAND
      CALL LVNSRT
      IF(LVVAL.LT.0) CALL LVEXIT(LVVAL)
      IF(LVVAL.LT.0) RETURN
   34 CONTINUE                                                          SEMANT92
      ITEST=0                                                           SEMANT93
      IF(STJ .LT. 0) GO TO 31                                           SEMANT94
      LVVTYP = 3
      LVVPOS = 1
      LVINDX = 0
      LVFUNC=          STJ
      LVVARG=            R
      CALL LVFIND(LVINDX,LVINDX,LVINDX,LVINDX)
      LV1     AAK =            R
      IF (LVVAL.NE.-1) LV1     AAK = LVVAL
               R = LV1     AAK
      LVVTR = LVVAL
```

```
      LVVAL = -100
      IF (LVVTR.NE.-1) GO TO          32
   31 CONTINUE
      LVVTYP = 3
      LVVPOS = 1
      LVINDX = 0
      LVFUNC=        STOP
      LVVARG=          R
      CALL LVFIND(LVINDX,LVINDX,LVINDX,LVINDX)
      LV1    AAK =          R
      IF (LVVAL.NE.-1) LV1    AAK = LVVAL
      LVVTR = LVVAL
      LVVAL = -100
      IF (LVVTR.EQ.-1) GO TO          39
            R = LV1    AAK
      IF(STJ .LT. 0 .AND. KTMP .EQ. 889) GO TO 38                       SEMANT97
      ITEST=-1                                                          SEMANT98
   32 CONTINUE                                                          SEMANT99
C IF UNARY PLUS OR MINUS RETURN                                         SEMAN100
      ISTCK=BITGET(STACK(JSTOP),15,15)                                  SEMAN101
      IF(ISTCK .NE. 288 .AND. ISTCK .NE. 110) GO TO 33                  SEMAN102
      JLAST=BITGET(STACK(JSTOP),45,15)-1                                SEMAN103
      IF(ISTCK .EQ. 288) JLAST=JLAST-1                                  SEMAN104
      LVVPOS =       JLAST
      LVVTYP =    3
      LVFUNC=         HOL
      LVVARG=     STRING
      CALL LVFIND(LV2       U,LV2       V,LV2       W,LV2       X)
      LV1    AAK =     STRING
      IF (LVVAL.NE.-1) LV1    AAK = LVVAL
      LV1    AAP = LV1    AAK
      LVVAD=-1
      LVVTYP=-1
      LVVPOS=1
      LVFUNC=    STRING
      LVVARG=LV1    AAP
      CALL LVDLET
      LV1    AAP = LV1    AAK
      LVDEST=  0
      LV1    AAQ = TYPE1
      LVTYPE(1) =  1
      LVVALS(1) = LV1    AAQ
      LVDEST=  0
      LVVNVL =  1
      LVFUNC =     STRING
      LVVARG=LV1    AAP
      CALL LVNSRT
      IF(LVVAL.LT.0) CALL LVEXIT(LVVAL)
      IF(LVVAL.LT.0) RETURN
      LVVPOS =           J
      LVVTYP =    3
      LVFUNC=         HOL
      LVVARG=     STRING
      CALL LVFIND(LV2       Y,LV2       Z,LV2       0,LV2       1)
      LV1    AAK =     STRING
      IF (LVVAL.NE.-1) LV1    AAK = LVVAL
      LV1    AAP = LV1    AAK
```

```
      LVVAD=-1
      LVVTYP=-1
      LVVPOS=1
      LVFUNC=     STRING
      LVVARG=LV1     AAP
      CALL LVDLET
      LV1     AAP = LV1     AAK
      LVDEST=  0
      LV1     AAR = TYPE1
      LVTYPE(1) =  1
      LVVALS(1) = LV1     AAR
      LVDEST=  0
      LVVNVL =  1
      LVFUNC =     STRING
      LVVARG=LV1     AAP
      CALL LVNSRT
      IF(LVVAL.LT.0) CALL LVEXIT(LVVAL)
      IF(LVVAL.LT.0) RETURN
      IF(ITEST .LT. 0) J=J-1                                            SEMAN107
      RETURN                                                            SEMAN108
   33 CONTINUE                                                          SEMAN109
      IF(ITEST .LT. 0) J=J-1                                            SEMAN110
      JSTACK=JSTACK+1                                                   SEMAN111
      STACK(JSTACK)=SHIFT(STOP,45) .OR. SHIFT(J,15)                     SEMAN112
      NTMP=R                                                            SEMAN113
      CALL SLEVEL(SKIP)                                                 SEMAN114
      JSTACK=JSTACK-1                                                   SEMAN115
      R=NTMP                                                            SEMAN116
      JLAST=1                                                           SEMAN117
      IF(JSTOP .GT. 0) JLAST=BITGET(STACK(JSTOP),45,15)                 SEMAN118
      NTMP=TYPE1                                                        SEMAN119
      JJ=JLAST                                                          SEMAN120
      IF(BITGET(STACK(JSTACK),15,15) .EQ. 418 .AND. JLAST .GT. 1)       SEMAN121
     $ JJ=JLAST-1                                                       SEMAN122
      LVVPOS =          JJ
      LVVTYP =   3
      LVFUNC=        HOL
      LVVARG=     STRING
      CALL LVFIND(LV2       2,LV2       3,LV2       4,LV2       5)
      LV1     AAK =     STRING
      IF (LVVAL.NE.-1) LV1     AAK = LVVAL
      LVVTYP = 3
      LVVPOS = 1
      LVINDX = 0
      LVFUNC=     STRING
      LVVARG= LV1     AAK
      CALL LVFIND(LVINDX,LVINDX,LVINDX,LVINDX)
      LV1     AAP = LV1     AAK
      IF (LVVAL.NE.-1) LV1     AAP = LVVAL
           TYPE1 = LV1     AAP
      IF(.NOT. FLAG .OR. NTMP .EQ. 3) GO TO 35                          SEMAN124
      IF((NTMP.EQ.0.OR.NTMP.EQ.2).AND.(TYPE1.EQ.0.OR.TYPE1.EQ.2))GOTO 35SEMAN125
      ERRFLG=.TRUE.                                                     SEMAN126
      CALL ERROR(78,J)                                                  SEMAN127
   35 CONTINUE                                                          SEMAN128
      IF(TYPE1 .GT. 2 .OR. NTYPE .GT. 1) GO TO 38                       SEMAN129
      FUNC=FUNC1                                                        SEMAN130
```

```
      IF(TYPE1 .EQ. 1) FUNC=FUNC2                                       SEMAN131
      IF(TYPE1 .EQ. 2) FUNC=FUNC3                                       SEMAN132
      LVVPOS =       JLAST
      LVVTYP =    3
      LVFUNC=         HOL
      LVVARG=      STRING
      CALL LVFIND(LV2       6,LV2       7,LV2       8,LV2       9)
      LV1     AAP =      STRING
      IF (LVVAL.NE.-1) LV1     AAP = LVVAL
      LV1     AAK = LV1     AAP
      LV1     AAS =        LEFT
      LVVTYP=  3
      LVVPOS=          1
      LVDEST=  1
      LVTYPE(1) =  0
      LVVALS(1) =        LPAR
      LVVNVL =  1
      LVFUNC = LV1     AAS
      LVVARG=LV1     AAK
      CALL LVNSRT
      IF(LVVAL.LT.0) CALL LVEXIT(LVVAL)
      IF(LVVAL.LT.0) RETURN
      LV1     AAK = LV1     AAP
      LVVTYP=  3
      LVVPOS=          1
      LVDEST=  1
      LVTYPE(1) =  0
      LVVALS(1) =        FUNC
      LVVNVL =  1
      LVFUNC = LV1     AAS
      LVVARG=LV1     AAK
      CALL LVNSRT
      IF(LVVAL.LT.0) CALL LVEXIT(LVVAL)
      IF(LVVAL.LT.0) RETURN
      LVVPOS =           J
      LVVTYP =    3
      LVFUNC=         HOL
      LVVARG=      STRING
      CALL LVFIND(LV2       AA,LV2      AB,LV2      AC,LV2      AD)
      LV1     AAP =      STRING
      IF (LVVAL.NE.-1) LV1     AAP = LVVAL
      LVDEST=  0
      LVTYPE(1) =  0
      LVVALS(1) =        RPAR
      LVVNVL =  1
      LVFUNC =       RIGHT
      LVVARG=LV1     AAP
      CALL LVNSRT
      IF(LVVAL.LT.0) CALL LVEXIT(LVVAL)
      IF(LVVAL.LT.0) RETURN
   38 IF(ITEST .LT. 0 .AND. STJ .LT. 0) J=J+1                           SEMAN135
      FLAG=.FALSE.                                                      SEMAN136
      RETURN                                                            SEMAN137
   39 FLAG=.FALSE.                                                      SEMAN138
      GO TO 11                                                          SEMAN139
C  CHECK FOR CORRECTNESS OF SUBSCRIPTS AND DO IMPLIED LIST PARAMETERS   SEMAN140
   40 NR=R                                                              SEMAN141
```

```
      LVVTYP = 3
      LVVPOS = 1
      LVINDX = 0
      LVFUNC=          STJ
      LVVARG=            R
      CALL LVFIND(LVINDX,LVINDX,LVINDX,LVINDX)
      LV1     AAP =            R
      IF (LVVAL.NE.-1) LV1     AAP = LVVAL
      LVVTR = LVVAL
      LVVAL = -100
      IF (LVVTR.EQ.-1) GO TO          11
               R = LV1     AAP
      NBETA=GETDIM(STR(J))                                              SEMAN143
      IF(NR .EQ. 359 .AND. NBETA .NE. 4) GO TO 47                       SEMAN144
      ALPHA=GETTYP(STR(J))                                              SEMAN145
      GAMMA=STR(J)/1000000                                              SEMAN146
      IF(NTYPE .EQ. 3) GO TO 45                                         SEMAN147
      IF(NR .EQ. 839 .AND. NBETA .EQ. 0) GO TO 45                       SEMAN148
      IF(NR .EQ. 359) GO TO 45                                          SEMAN149
      IF(NR .EQ. 21 .AND. NBETA .EQ. 4) GO TO 45                        SEMAN150
      IF(NBETA .EQ. 0 .AND. NR .EQ. 935) GO TO 45                       SEMAN151
      IF(NTYPE .EQ. 2 .AND. NR .EQ. 935 .AND. STR(J-1) .NE. -7) GO TO 45SEMAN152
      IF(NTYPE .EQ. 2 .AND. NR .EQ. 359 .AND. NBETA .EQ. 0) GO TO 11    SEMAN153
      CALL ERROR(79,J)                                                  SEMAN154
      ERRFLG=.TRUE.                                                     SEMAN155
   45 CONTINUE                                                          SEMAN156
      IF(GAMMA .GE. 6 .AND. NBETA .EQ. 4) CALL ERROR(76)                SEMAN157
      IF(ALPHA .EQ. 3) GO TO 46                                         SEMAN158
      N1=ALPHA+1                                                        SEMAN159
      ERRFLG=.TRUE.                                                     SEMAN160
      CALL ERROR(80,TYPE(N1),J)                                         SEMAN161
   46 IF(NBETA .EQ. 4) RETURN                                           SEMAN162
      MARGS=MARGS+1                                                     SEMAN163
      LV1     AAP =       OPRAND
      LVDEST=  0
      LV1     AAS = MARGS
      LVTYPE(1) =  1
      LVVALS(1) = LV1     AAS
      LVDEST=  0
      LVVNVL =  1
      LVFUNC =       FUNC2
      LVVARG=LV1     AAP
      CALL LVNSRT
      IF(LVVAL.LT.0) CALL LVEXIT(LVVAL)
      IF(LVVAL.LT.0) RETURN
      LVDEST=  0
      LV1     AAK = J
      LVTYPE(1) =  1
      LVVALS(1) = LV1     AAK
      LVDEST=  0
      LVVNVL =  1
      LVFUNC =       FUNC3
      LVVARG=LV1     AAP
      CALL LVNSRT
      IF(LVVAL.LT.0) CALL LVEXIT(LVVAL)
      IF(LVVAL.LT.0) RETURN
      LVDEST=  0
```

```
      LV1     AAT = NDEPTH
      LVTYPE(1) =  1
      LVVALS(1) = LV1     AAT
      LVDEST=  0
      LVVNVL =  1
      LVFUNC =       LEVEL
      LVVARG=LV1     AAP
      CALL LVNSRT
      IF(LVVAL.LT.0) CALL LVEXIT(LVVAL)
      IF(LVVAL.LT.0) RETURN
      IVR=(MARGS+2)/3                                                   SEMAN165
      IF(IVR .GT. 50) GO TO 1610                                        CY58B  5
      ICOL=20*MOD(MARGS-1,3)+10                                         SEMAN166
      IVAL=MOD(STR(J),10000)                                            SEMAN167
      IARGS(IVR)=BITPUT(IARGS(IVR),IVAL,ICOL)                           SEMAN168
      IF(NR .EQ. 839) GO TO 49                                          SEMAN169
      IF(NTYPE .NE. 3) RETURN                                           SEMAN170
C  FLAG SUBSCRIPT IN I/O LIST                                           SEMAN171
      IARGS(IVR)=BITPUT(IARGS(IVR),1,ICOL+5)                            SEMAN172
      RETURN                                                            SEMAN173
C FLAG DO INDEX IN I/O LIST                                             SEMAN174
   49 IARGS(IVR)=BITPUT(IARGS(IVR),2,ICOL+5)                            SEMAN175
      IF(NFLAG .LT. 1) RETURN                                           SEMAN176
      IARGS(IVR)=BITPUT(IARGS(IVR),FL(NFLAG),ICOL+10)                   SEMAN177
      RETURN                                                            SEMAN178
   47 NR=R                                                              SEMAN179
C   SUBSCRIPT DOES NOT BEGIN WITH CONSTANT, FORCE SEARCH FOR VARIABLE   SEMAN180
      GO TO 11                                                          SEMAN181
C  CHECK FOR PROPER NUMBER OF SUBSCRIPTS                                SEMAN182
   50 IF( BETA .EQ. 4 .OR. R .NE. 452) GO TO 52                         SEMAN183
      MARGS=MARGS+1                                                     SEMAN184
      LV1     AAP =      OPRAND
      LVDEST=  0
      LV1     AAU = MARGS
      LVTYPE(1) =  1
      LVVALS(1) = LV1     AAU
      LVDEST=  0
      LVVNVL =  1
      LVFUNC =       FUNC2
      LVVARG=LV1     AAP
      CALL LVNSRT
      IF(LVVAL.LT.0) CALL LVEXIT(LVVAL)
      IF(LVVAL.LT.0) RETURN
      LVDEST=  0
      LV1     AAV = J-1
      LVTYPE(1) =  1
      LVVALS(1) = LV1     AAV
      LVDEST=  0
      LVVNVL =  1
      LVFUNC =       FUNC3
      LVVARG=LV1     AAP
      CALL LVNSRT
      IF(LVVAL.LT.0) CALL LVEXIT(LVVAL)
      IF(LVVAL.LT.0) RETURN
      LVDEST=  0
      LV1     AAW = NDEPTH
      LVTYPE(1) =  1
```

```
      LVVALS(1) = LV1     AAW
      LVDEST=  0
      LVVNVL =  1
      LVFUNC =       LEVEL
      LVVARG=LV1     AAP
      CALL LVNSRT
      IF(LVVAL.LT.0) CALL LVEXIT(LVVAL)
      IF(LVVAL.LT.0) RETURN
      IVR=(MARGS+2)/3                                                   SEMAN186
      IF(IVR .GT. 50) GO TO 1610                                        CY588  6
      ICOL=20*MOD(MARGS-1,3)+10                                         SEMAN187
      IVAL=MOD(STR(J-1),10000)                                          SEMAN188
      IARGS(IVR)=BITPUT(IARGS(IVR),IVAL,ICOL)                           SEMAN189
      IF(NOPAR .LE. 0) GO TO 52                                         SEMAN190
      LVVPOS =           1
      LVVTYP =   3
      LVVPOS=-LVVPOS
      LVFUNC=      ACTION
      LVVARG=      OPRAND
      CALL LVFIND(LV2      AE,LV2      AF,LV2      AG,LV2      AH)
      LV1     AAP =      OPRAND
      IF (LVVAL.NE.-1) LV1     AAP = LVVAL
      LVVTR = LVVAL
      LVVAL = -100
      IF (LVVTR.EQ.-1) GO TO          52
           MFUNC = LV1     AAP
      IARGS(IVR)=BITPUT(IARGS(IVR),MFUNC ,ICOL+3)                       SEMAN192
      IARGS(IVR)=BITPUT(IARGS(IVR),NARGS,ICOL+9)                        SEMAN193
C IF NO STRING LEFT, RETURN IF CONSTANT,VARIABLE OR I/O LIST            SEMAN194
   52 IF(STJ .LT. 0 .AND. (BETA .EQ. 0 .OR. BETA .EQ. 4                 SEMAN195
     $ .OR. NTYPE .EQ. 3)) RETURN                                       SEMAN196
      IF(BETA .GT. NARRAY) GO TO 55                                     SEMAN197
      ERRFLG=.TRUE.                                                     SEMAN198
      CALL ERROR(81,J)                                                  SEMAN199
   55 IF(R .EQ. 452) NARRAY=0                                           SEMAN200
      IF(R .EQ. 318) NARRAY=1                                           SEMAN201
      IF(R .EQ.  60) NARRAY=2                                           SEMAN202
      IF(R .EQ. 103) NARRAY=3                                           SEMAN203
      IF(STJ .LT. 0) GO TO 58                                           SEMAN204
      LVVTYP = 3
      LVVPOS = 1
      LVINDX = 0
      LVFUNC=         STJ
      LVVARG=           R
      CALL LVFIND(LVINDX,LVINDX,LVINDX,LVINDX)
      LV1     AAP =           R
      IF (LVVAL.NE.-1) LV1     AAP = LVVAL
            R = LV1     AAP
      LVVTR = LVVAL
      LVVAL = -100
      IF (LVVTR.NE.-1) GO TO          56
   58 IF(NTYPE .EQ. 3 .AND. NARRAY .EQ. 0) GO TO 57                     SEMAN206
      IF(BETA .GE. 1 .AND. BETA .LE. 3 .AND. NOPAR .EQ. 0)              SEMAN207
     * CALL ERROR(82,J)                                                 SEMAN208
   57 NARRAY=-1                                                         SEMAN209
      GO TO 11                                                          SEMAN210
   56 IF(NTYPE .EQ. 3 .AND. NARRAY .EQ. 0) RETURN                       SEMAN211
```

```
      IF(STJ .EQ. RPAR .AND. NARRAY .LT.  BETA .AND. J .EQ. MAXJ)        SEMAN212
     $ CALL ERROR(82,J)                                                  SEMAN213
      IF(STJ .EQ. RPAR) NARRAY=-1                                        SEMAN214
      RETURN                                                             SEMAN215
C  RESET TYPE OF STATEMENT IN ANTICIPATION OF SEARCH FOR BOOLEAN PRIMARYSEMAN216
   60 CONTINUE                                                           SEMAN217
      NOTFLG=.FALSE.                                                     SEMAN218
      IF(STR(J-1) .EQ. -17) NOTFLG=.TRUE.                                SEMAN219
      TYPE1=-1                                                           SEMAN220
      LVVPOS =          J
      LVVTYP =   3
      LVFUNC=        HOL
      LVVARG=     STRING
      CALL LVFIND(LV2     AI,LV2     AJ,LV2     AK,LV2     AL)
      LV1    AAP =     STRING
      IF (LVVAL.NE.-1) LV1    AAP = LVVAL
      LV1    AAX = LV1    AAP
      LVVAD=-1
      LVVTYP=-1
      LVVPOS=1
      LVFUNC=    STRING
      LVVARG=LV1    AAX
      CALL LVDLET
      LV1    AAX = LV1    AAP
      LVDEST=  0
      LV1    AAY = TYPE1
      LVTYPE(1) =  1
      LVVALS(1) = LV1    AAY
      LVDEST=  0
      LVVNVL =  1
      LVFUNC =     STRING
      LVVARG=LV1    AAX
      CALL LVNSRT
      IF(LVVAL.LT.0) CALL LVEXIT(LVVAL)
      IF(LVVAL.LT.0) RETURN
      IF(STJ .NE. OPRAND) GO TO 65                                       SEMAN222
      ALPHA=GETTYP(STR(J))                                               SEMAN223
      BETA=GETDIM(STR(J))                                                SEMAN224
      IF(ALPHA .NE. 4) GO TO 11                                          SEMAN225
   65 CONTINUE                                                           SEMAN226
      LVVTYP = 3
      LVVPOS = 1
      LVINDX = 0
      LVFUNC=        STJ
      LVVARG=          R
      CALL LVFIND(LVINDX,LVINDX,LVINDX,LVINDX)
      LV1    AAP =          R
      IF (LVVAL.NE.-1) LV1    AAP = LVVAL
      LVVTR = LVVAL
      LVVAL = -100
      IF (LVVTR.EQ.-1) GO TO          11
              R = LV1    AAP
      RETURN                                                             SEMAN228
C  IF BOOLEAN PRIMARY IS AN ARETHMETIC COMPARE CONTINUE PARSING PRIMARY SEMAN229
   70 IF(STJ .LT. 0) RETURN                                              SEMAN230
      IF(TYPE1 .EQ. 4) GO TO 75                                          SEMAN231
      LVVTYP = 3
```

```
      LVVPOS = 1
      LVINDX = 0
      LVFUNC=         STJ
      LVVARG=           R
      CALL LVFIND(LVINDX,LVINDX,LVINDX,LVINDX)
      LV1     AAP =           R
      IF (LVVAL.NE.-1) LV1     AAP = LVVAL
                R = LV1     AAP
      LVVTR = LVVAL
      LVVAL = -100
      IF (LVVTR.EQ.-1) GO TO          11
C  RELATIONAL OPERATOR FOUND                                            SEMAN233
      IF(NDEP .EQ. 0) RETURN                                            SEMAN234
      LVVPOS=-LVVPOS
      LVVTYP=  3
      LVVPOS=          1
      LVDEST=  2
      LV1     AAP = 1
      LVTYPE(1) =  1
      LVVALS(1) = LV1     AAP
      LVDEST=  2
      LVVNVL =  1
      LVFUNC =       FUNC1
      LVVARG=    OPRAND
      CALL LVNSRT
      IF(LVVAL.LT.0) CALL LVEXIT(LVVAL)
      IF(LVVAL.LT.0) RETURN
      RETURN                                                            SEMAN236
C  IF BOOLEAN VARIABLE OR CONSTANT, SET STATE TO STOP                   SEMAN237
   75 R=STOP                                                            SEMAN238
      JSTACK=JSTACK+1                                                   SEMAN239
      STACK(JSTACK)=SHIFT(R,45) .OR. SHIFT(J,15)                        SEMAN240
      GO TO 11                                                          SEMAN241
C  COMPARE TYPES ON BOTH SIDES OF RELATIONAL EXPRESSION                 SEMAN242
   80 IF(TYPE1 .EQ. 0 .OR. TYPE1 .EQ. 2 .OR. TYPE1 .EQ. 3) GO TO 85     SEMAN243
      ERRFLG=.TRUE.                                                     SEMAN244
      CALL ERROR(83,J)                                                  SEMAN245
      TYPE1=-1                                                          SEMAN246
      LVVPOS =          J
      LVVTYP =    3
      LVFUNC=         HOL
      LVVARG=     STRING
      CALL LVFIND(LV2     AM,LV2     AN,LV2     AO,LV2     AP)
      LV1     AAX =     STRING
      IF (LVVAL.NE.-1) LV1     AAX = LVVAL
      LV1     AAZ = LV1     AAX
      LVVAO=-1
      LVVTYP=-1
      LVVPOS=1
      LVFUNC=    STRING
      LVVARG=LV1     AAZ
      CALL LVDLET
      LV1     AAZ = LV1     AAX
      LVDEST=  0
      LV1     AAO = TYPE1
      LVTYPE(1) =  1
      LVVALS(1) = LV1     AAO
```

```
      LVDEST=  0
      LVVNVL =  1
      LVFUNC =      STRING
      LVVARG=LV1     AAZ
      CALL LVNSRT
      IF(LVVAL.LT.0) CALL LVEXIT(LVVAL)
      IF(LVVAL.LT.0) RETURN
   85 TYPE2=TYPE1                                                       SEMAN248
      GO TO 11                                                          SEMAN249
C  BOOLEAN PRIMARY RECOGNIZED-SET TYPE TO BOOLEAN AND CONTINUE PARSE    SEMAN250
   90 IF(TYPE1 .EQ. TYPE2 .OR. TYPE1+TYPE2 .EQ. 2 .OR.                  SEMAN251
     + TYPE2 .LT. 0) GO TO 95                                           SEMAN252
      N1=TYPE1+1                                                        SEMAN253
      N2=TYPE2+1                                                        SEMAN254
      CALL ERROR(77,TYPE(N1),TYPE(N2))                                  SEMAN255
      ERRFLG=.TRUE.                                                     SEMAN256
   95 TYPE1=4                                                           SEMAN257
      TYPE2=-1                                                          SEMAN258
      IF(STJ .LT. 0) RETURN                                             SEMAN259
      LVVPOS =          J
      LVVTYP =   3
      LVFUNC=        HOL
      LVVARG=     STRING
      CALL LVFIND(LV2     AQ,LV2     AR,LV2     AS,LV2     AT)
      LV1    AAX =     STRING
      IF (LVVAL.NE.-1) LV1    AAX = LVVAL
      LV1    AAZ = LV1    AAX
      LVVAO=-1
      LVVTYP=-1
      LVVPOS=1
      LVFUNC=    STRING
      LVVARG=LV1    AAZ
      CALL LVDLET
      LV1    AAZ = LV1    AAX
      LVDEST=  0
      LV1    AA1 = TYPE1
      LVTYPE(1) =  1
      LVVALS(1) = LV1    AA1
      LVDEST=  0
      LVVNVL =  1
      LVFUNC =      STRING
      LVVARG=LV1     AAZ
      CALL LVNSRT
      IF(LVVAL.LT.0) CALL LVEXIT(LVVAL)
      IF(LVVAL.LT.0) RETURN
      GO TO 11                                                          SEMAN261
C  PARSE REACHED BLIND ALLEY-MUST BACK UP AND REMOVE PARENTHESES CREATEDSEMAN262
  999 JM=BITGET(STACK(JSTACK),45,15)                                    SEMAN263
      K=JM                                                              SEMAN264
      DO 996 KK=JM,J                                                    SEMAN265
      LVVPOS =          K
      LVVTYP =   3
      LVFUNC=        HOL
      LVVARG=     STRING
      CALL LVFIND(LV2     AU,LV2     AV,LV2     AW,LV2     AX)
      LV1    AAX =     STRING
      IF (LVVAL.NE.-1) LV1    AAX = LVVAL
```

```
      LVVTR = LVVAL
      LVVAL = -100
      IF (LVVTR.EQ.-1) GO TO          995
      LVVPOS =            1
      LVVTYP =    3
      LVFUNC=      STRING
      LVVARG= LV1     AAX
      CALL LVFIND(LV2      AY,LV2      AZ,LV2      A0,LV2      A1)
      LV1     AAZ = LV1     AAX
      IF (LVVAL.NE.-1) LV1     AAZ = LVVAL
      LVVTR = LVVAL
      LVVAL = -100
      IF (LVVTR.EQ.-1) GO TO          996
          TYPE1 = LV1     AAZ
      GO TO 995                                                         SEMAN267
  996 K=K-1                                                             SEMAN268
  995 CONTINUE                                                          SEMAN269
      DO 998 I=JM,J                                                     SEMAN270
      LVVPOS =            I
      LVVTYP =    3
      LVFUNC=          HOL
      LVVARG=      STRING
      CALL LVFIND(LV2      A2,LV2      A3,LV2      A4,LV2      A5)
      LV1     AAZ =      STRING
      IF (LVVAL.NE.-1) LV1     AAZ = LVVAL
      LV1     AAX = LV1     AAZ
      LVVAD=-1
      LVVTYP=-1
      LVVPOS=1
      LVFUNC=       LEFT
      LVVARG=LV1     AAX
      CALL LVDLET
      LV1     AAX = LV1     AAZ
      LVVAD=-1
      LVVTYP=-1
      LVVPOS=1
      LVFUNC=      RIGHT
      LVVARG=LV1     AAX
      CALL LVDLET
  998 CONTINUE                                                          SEMAN272
  980 CONTINUE
      LVVPOS =            1
      LVVTYP =    3
      LVVPOS=-LVVPOS
      LVFUNC=       FUNC3
      LVVARG=      OPRAND
      CALL LVFIND(LV2      A6,LV2      A7,LV2      A8,LV2      A9)
      LV1     AAZ =      OPRAND
      IF (LVVAL.NE.-1) LV1     AAZ = LVVAL
            JN = LV1     AAZ
      IF(JN .LT. JM) GO TO 985                                          SEMAN274
      LV1     AAZ =      OPRAND
      LVVPOS =            1
      LVVTYP =    3
      LVVPOS=-LVVPOS
      LVFUNC=       FUNC2
      LVVARG= LV1     AAZ
```

```
      LVVAD=-1
      CALL LVDLET
      LVVPOS =            1
      LVVTYP =    3
      LVVPOS=-LVVPOS
      LVFUNC=       FUNC3
      LVVARG= LV1     AAZ
      LVVAD=-1
      CALL LVDLET
      LVVPOS =            1
      LVVTYP =    3
      LVVPOS=-LVVPOS
      LVFUNC=       LEVEL
      LVVARG= LV1     AAZ
      LVVAD=-1
      CALL LVDLET
      GO TO 980                                                         SEMAN276
  985 CONTINUE
      LVVPOS =            1
      LVVTYP =    3
      LVVPOS=-LVVPOS
      LVFUNC=       FUNC2
      LVVARG=      OPRAND
      CALL LVFIND(LV2      BA,LV2      BB,LV2      BC,LV2      BD)
      LV1     AAZ =      OPRAND
      IF (LVVAL.NE.-1) LV1     AAZ = LVVAL
           MARGS = LV1     AAZ
      LVVPOS =            1
      LVVTYP =    3
      LVVPOS=-LVVPOS
      LVFUNC=       LEVEL
      LVVARG=      OPRAND
      CALL LVFIND(LV2      BE,LV2      BF,LV2      BG,LV2      BH)
      LV1     AAZ =      OPRAND
      IF (LVVAL.NE.-1) LV1     AAZ = LVVAL
          NDEPTH = LV1     AAZ
      RETURN                                                            SEMAN279
                                                                        SEMAN280
C    RECOGNIZED FUNCTION-PREPARE TO SET TYPE OF ARGUMENTS FOR THE 'NDEPTHSEMAN281
C            FUNCTION IN THIS STMT                                      SEMAN282
 1000 CONTINUE                                                          SEMAN283
      NDEPTH=NDEPTH+1                                                   SEMAN284
      NDEP=NDEP+1                                                       SEMAN285
      NARGS=0                                                           SEMAN286
      LVVTYP = 3
      LVVPOS = 1
      LVINDX = 0
      LVFUNC=         STJ
      LVVARG=           R
      CALL LVFIND(LVINDX,LVINDX,LVINDX,LVINDX)
      LV1     AAZ =           R
      IF (LVVAL.NE.-1) LV1     AAZ = LVVAL
      LVVTR = LVVAL
      LVVAL = -100
      IF (LVVTR.EQ.-1) GO TO          11
              R = LV1     AAZ
      NARGS=1                                                           SEMAN288
```

```
      LV1     AAZ =      OPRAND
      LVDEST=  0
      LV1     AAX = TYPE1
      LVTYPE(1) =  1
      LVVALS(1) = LV1     AAX
      LVDEST=  0
      LVVNVL =  1
      LVFUNC =      OPRAND
      LVVARG=LV1     AAZ
      CALL LVNSRT
      IF(LVVAL.LT.0) CALL LVEXIT(LVVAL)
      IF(LVVAL.LT.0) RETURN
      LVDEST=  0
      LV1     AA2 = NARGS
      LVTYPE(1) =  1
      LVVALS(1) = LV1     AA2
      LVDEST=  0
      LVVNVL =  1
      LVFUNC =      STRING
      LVVARG=LV1     AAZ
      CALL LVNSRT
      IF(LVVAL.LT.0) CALL LVEXIT(LVVAL)
      IF(LVVAL.LT.0) RETURN
      LVDEST=  0
      LV1     AA3 = NDEPTH
      LVTYPE(1) =  1
      LVVALS(1) = LV1     AA3
      LVDEST=  0
      LVVNVL =  1
      LVFUNC =      ACTION
      LVVARG=LV1     AAZ
      CALL LVNSRT
      IF(LVVAL.LT.0) CALL LVEXIT(LVVAL)
      IF(LVVAL.LT.0) RETURN
      LVDEST=  0
      LV1     AAZ = 0
      LVTYPE(1) =  1
      LVVALS(1) = LV1     AAZ
      LVDEST=  0
      LVVNVL =  1
      LVFUNC =      FUNC1
      LVVARG=    OPRAND
      CALL LVNSRT
      IF(LVVAL.LT.0) CALL LVEXIT(LVVAL)
      IF(LVVAL.LT.0) RETURN
      TYPE1=-1                                                          SEMAN291
      NOPAR=NOPAR+1                                                     SEMAN292
      RETURN                                                            SEMAN293
                                                                        SEMAN294
C KEEP TRACK OF THE NUMBER AND TYPES OF ARGUMENTS IN FUNCTION CALLS     SEMAN295
C   MUST USE STACK FOR POSSIBLE RECURSIVE FUNCTION USE                  SEMAN296
 1100 CONTINUE                                                          SEMAN297
      LVVTYP = 3
      LVVPOS = 1
      LVINDX = 0
      LVFUNC=        STJ
      LVVARG=          R
```

```
      CALL LVFIND(LVINDX,LVINDX,LVINDX,LVINDX)
      LV1     AA4 =            R
      IF (LVVAL.NE.-1) LV1     AA4 = LVVAL
      LVVTR = LVVAL
      LVVAL = -100
      IF (LVVTR.EQ.-1) GO TO          11
               R = LV1     AA4
      LV1     AA4 =      OPRAND
      LVVPOS =            1
      LVVTYP =    3
      LVVPOS=-LVVPOS
      LVFUNC=      STRING
      LVVARG= LV1     AA4
      CALL LVFIND(LV2      BI,LV2      BJ,LV2      BK,LV2      BL)
      LV1     AA5 = LV1     AA4
      IF (LVVAL.NE.-1) LV1     AA5 = LVVAL
      LVVTR = LVVAL
      LVVAL = -100
      IF (LVVTR.EQ.-1) GO TO        1103
           NARGS = LV1     AA5
      LVVPOS =            1
      LVVTYP =    3
      LVVPOS=-LVVPOS
      LVFUNC=      STRING
      LVVARG= LV1     AA4
      LVVAD=-1
      CALL LVDLET
      LVVPOS =            1
      LVVTYP =    3
      LVVPOS=-LVVPOS
      LVFUNC=      ACTION
      LVVARG= LV1     AA4
      CALL LVFIND(LV2      BM,LV2      BN,LV2      BO,LV2      BP)
      LV1     AA5 = LV1     AA4
      IF (LVVAL.NE.-1) LV1     AA5 = LVVAL
           MFUNC = LV1     AA5
      LVVPOS =            1
      LVVTYP =    3
      LVVPOS=-LVVPOS
      LVFUNC=       FUNC1
      LVVARG=      OPRAND
      CALL LVFIND(LV2      BQ,LV2      BR,LV2      BS,LV2      BT)
      LV1     AA4 =      OPRAND
      IF (LVVAL.NE.-1) LV1     AA4 = LVVAL
            IEXP = LV1     AA4
 1103 CONTINUE                                                          SEMAN301
C  STORE ARGUMENT TYPES                                                 SEMAN302
      IF(NDEPTH .GT. 5) CALL ERROR(85)                                  SEMAN303
      IF(NDEPTH .GT. 5) GO TO 1130                                      SEMAN304
      IF(NARGS .LE. 63) GO TO 1104                                      SEMAN305
      ERRFLG=.TRUE.                                                     SEMAN306
      CALL ERROR(84,NDEPTH)                                             SEMAN307
      GO TO 11                                                          SEMAN308
 1104 CONTINUE                                                          SEMAN309
      MM=(11+NARGS)/6                                                   SEMAN310
      ITEMP=NARGS-6*(MM-2)                                              SEMAN311
      ICOL=9*ITEMP-6                                                    SEMAN312
```

```
      NARY(MFUNC,MM)=BITPUT(NARY(MFUNC,MM),MOD((TYPE1+1),6),ICOL)        CY60   2
      IF(STR(J-2) .NE. -6 .AND. STR(J-2) .NE. -4) GO TO 1130             SEMAN314
      NDIM=GETDIM(STR(J-1))                                              SEMAN315
      IF(NDIM .GE. 4) GO TO 1130                                         SEMAN316
C  STORE DIMENSIONALITY OF ARGUMENTS                                     SEMAN317
      NARY(MFUNC ,MM)=BITPUT(NARY(MFUNC ,MM),NDIM,ICOL+3)                SEMAN318
 1130 CONTINUE                                                           SEMAN319
      NARY(MFUNC ,MM)=BITPUT(NARY(MFUNC ,MM),IEXP,54+ITEMP)              SEMAN320
      IF(STJ .EQ. COMMA) GO TO 1105                                      SEMAN321
      NARY(MFUNC,1)=NARGS                                                SEMAN322
      LV1     AA4 =       OPRAND
      LVVPOS =            1
      LVVTYP =    3
      LVVPOS=-LVVPOS
      LVFUNC=      ACTION
      LVVARG= LV1     AA4
      LVVAD=-1
      CALL LVDLET
      LVVPOS =            1
      LVVTYP =    3
      LVVPOS=-LVVPOS
      LVFUNC=      OPRAND
      LVVARG= LV1     AA4
      CALL LVFIND(LV2      BU,LV2      BV,LV2      BW,LV2      BX)
      LV1     AA5 = LV1     AA4
      IF (LVVAL.NE.-1) LV1     AA5 = LVVAL
      LVVTR = LVVAL
      LVVAL = -100
      IF (LVVTR.EQ.-1) GO TO        1135
           TYPE1 = LV1     AA5
      LV1     AA4 =       OPRAND
      LVVPOS =            1
      LVVTYP =    3
      LVVPOS=-LVVPOS
      LVFUNC=       FUNC1
      LVVARG= LV1     AA4
      LVVAD=-1
      CALL LVDLET
      LVVPOS =            1
      LVVTYP =    3
      LVVPOS=-LVVPOS
      LVFUNC=      OPRAND
      LVVARG= LV1     AA4
      LVVAD=-1
      CALL LVDLET
 1135 NOPAR=NOPAR-1                                                      SEMAN325
      NDEP=NDEP-1                                                        SEMAN326
      RETURN                                                             SEMAN327
 1105 TYPE1=-1                                                           SEMAN328
      LVVPOS =            J
      LVVTYP =    3
      LVFUNC=         HOL
      LVVARG=      STRING
      CALL LVFIND(LV2      BY,LV2      BZ,LV2      B0,LV2      B1)
      LV1     AA4 =       STRING
      IF (LVVAL.NE.-1) LV1     AA4 = LVVAL
      LV1     AA5 = LV1     AA4
```

```
      LVVAD=-1
      LVVTYP=-1
      LVVPOS=1
      LVFUNC=     STRING
      LVVARG=LV1     AA5
      CALL LVDLET
      LV1     AA5 = LV1     AA4
      LVDEST=  0
      LV1     AA6 = TYPE1
      LVTYPE(1) =  1
      LVVALS(1) = LV1     AA6
      LVDEST=  0
      LVVNVL =  1
      LVFUNC =      STRING
      LVVARG=LV1     AA5
      CALL LVNSRT
      IF(LVVAL.LT.0) CALL LVEXIT(LVVAL)
      IF(LVVAL.LT.0) RETURN
      NARGS=NARGS+1                                                     SEMAN330
      LVDEST=  0
      LV1     AA4 = NARGS
      LVTYPE(1) =  1
      LVVALS(1) = LV1     AA4
      LVDEST=  0
      LVVNVL =  1
      LVFUNC =      STRING
      LVVARG=    OPRAND
      CALL LVNSRT
      IF(LVVAL.LT.0) CALL LVEXIT(LVVAL)
      IF(LVVAL.LT.0) RETURN
      LVVPOS=-LVVPOS
      LVVTYP=  3
      LVVPOS=          1
      LVDEST=  2
      LV1     AA5 = 0
      LVTYPE(1) =  1
      LVVALS(1) = LV1     AA5
      LVDEST=  2
      LVVNVL =  1
      LVFUNC =       FUNC1
      LVVARG=    OPRAND
      CALL LVNSRT
      IF(LVVAL.LT.0) CALL LVEXIT(LVVAL)
      IF(LVVAL.LT.0) RETURN
      RETURN                                                            SEMAN333
C  SAVE TYPE OF STAEMENT WHILE PARSING EXPONENT                         SEMAN334
 1200 CONTINUE                                                          SEMAN335
      LVVPOS =           J
      LVVTYP =   3
      LVFUNC=         HOL
      LVVARG=     STRING
      CALL LVFIND(LV2     B2,LV2     B3,LV2     B4,LV2     B5)
      LV1     AA7 =      STRING
      IF (LVVAL.NE.-1) LV1     AA7 = LVVAL
      LV1     AA8 = LV1     AA7
      LVVAD=-1
      LVVTYP=-1
```

```
      LVVPOS=1
      LVFUNC=     STRING
      LVVARG=LV1     AA8
      CALL LVDLET
      LV1     AA8 = LV1     AA7
      LVDEST=  0
      LV1     AA9 = TYPE1
      LVTYPE(1) =  1
      LVVALS(1) = LV1     AA9
      LVDEST=  0
      LVVNVL =  1
      LVFUNC =      STRING
      LVVARG=LV1     AA8
      CALL LVNSRT
      IF(LVVAL.LT.0) CALL LVEXIT(LVVAL)
      IF(LVVAL.LT.0) RETURN
      TYPE1=-1                                                          SEMAN337
      LVVTYP = 3
      LVVPOS = 1
      LVINDX = 0
      LVFUNC=          STJ
      LVVARG=            R
      CALL LVFIND(LVINDX,LVINDX,LVINDX,LVINDX)
      LV1     AA7 =            R
      IF (LVVAL.NE.-1) LV1     AA7 = LVVAL
      LVVTR = LVVAL
      LVVAL = -100
      IF (LVVTR.EQ.-1) GO TO          11
               R = LV1     AA7
      RETURN                                                            SEMAN339
 1300 CONTINUE                                                          SEMAN340
      IF(STJ .LT. 0) RETURN                                             SEMAN341
      IF(STJ .NE. AND .AND. STJ .NE. OR .AND. STJ .NE. NOT) GO TO 11    SEMAN342
      LVVTYP = 3
      LVVPOS = 1
      LVINDX = 0
      LVFUNC=          STJ
      LVVARG=            R
      CALL LVFIND(LVINDX,LVINDX,LVINDX,LVINDX)
      LV1     AA7 =            R
      IF (LVVAL.NE.-1) LV1     AA7 = LVVAL
      LVVTR = LVVAL
      LVVAL = -100
      IF (LVVTR.EQ.-1) GO TO          11
               R = LV1     AA7
      IF(NDEP .EQ. 0) RETURN                                            SEMAN344
C  LOGICAL OPERATOR FOUND                                               SEMAN345
      LVVPOS=-LVVPOS
      LVVTYP=  3
      LVVPOS=          1
      LVDEST=  2
      LV1     AA7 = 1
      LVTYPE(1) =  1
      LVVALS(1) = LV1     AA7
      LVDEST=  2
      LVVNVL =  1
      LVFUNC =      FUNC1
```

```
      LVVARG=     OPRAND
      CALL LVNSRT
      IF(LVVAL.LT.0) CALL LVEXIT(LVVAL)
      IF(LVVAL.LT.0) RETURN
      RETURN                                                            SEMAN347
 1400 CONTINUE
      LVVTYP = 3
      LVVPOS = 1
      LVINDX = 0
      LVFUNC=          STJ
      LVVARG=            R
      CALL LVFIND(LVINDX,LVINDX,LVINDX,LVINDX)
      LV1     AA8 =            R
      IF (LVVAL.NE.-1) LV1     AA8 = LVVAL
      LVVTR = LVVAL
      LVVAL = -100
      IF (LVVTR.EQ.-1) GO TO          11
               R = LV1     AA8
C  LEFT PAREN FOUND IN I/O LIST                                          SEMAN349
      NFLAG=NFLAG+1                                                     SEMAN350
      FL(NFLAG)=MARGS                                                   SEMAN351
      RETURN                                                            SEMAN352
 1500 CONTINUE
      LVVTYP = 3
      LVVPOS = 1
      LVINDX = 0
      LVFUNC=          STJ
      LVVARG=            R
      CALL LVFIND(LVINDX,LVINDX,LVINDX,LVINDX)
      LV1     AA8 =            R
      IF (LVVAL.NE.-1) LV1     AA8 = LVVAL
      LVVTR = LVVAL
      LVVAL = -100
      IF (LVVTR.EQ.-1) GO TO          11
               R = LV1     AA8
      IF(STJ .EQ. COMMA) RETURN                                         SEMAN354
C  RIGHT PAREN FOUND IN I/O LIST                                        SEMAN355
      NFLAG=NFLAG-1                                                     SEMAN356
      RETURN                                                            SEMAN357
 1600 CONTINUE                                                          SEMAN358
      TYPE1=4                                                           SEMAN359
      RETURN                                                            CY58B  7
 1610 CALL ERROR(95)                                                    CY58B  8
      STOP                                                              CY58B  9
      RETURN
25000 CONTINUE
      LV2       A=LV2       B=LV2       C=LV2       D=0
      LV2       E=LV2       F=LV2       G=LV2       H=0
      LV2       I=LV2       J=LV2       K=LV2       L=0
      LV2       M=LV2       N=LV2       O=LV2       P=0
      LV2       Q=LV2       R=LV2       S=LV2       T=0
      LV2       U=LV2       V=LV2       W=LV2       X=0
      LV2       Y=LV2       Z=LV2       0=LV2       1=0
      LV2       2=LV2       3=LV2       4=LV2       5=0
      LV2       6=LV2       7=LV2       8=LV2       9=0
      LV2      AA=LV2      AB=LV2      AC=LV2      AD=0
      LV2      AE=LV2      AF=LV2      AG=LV2      AH=0
      LV2      AI=LV2      AJ=LV2      AK=LV2      AL=0
      LV2      AM=LV2      AN=LV2      AO=LV2      AP=0
      LV2      AQ=LV2      AR=LV2      AS=LV2      AT=0
      LV2      AU=LV2      AV=LV2      AW=LV2      AX=0
      LV2      AY=LV2      A7=LV2      AC=LV2      A1=0
      LV2      A2=LV2      A3=LV2      A4=LV2      A5=0
      LV2      A6=LV2      A7=LV2      A8=LV2      A9=0
      LV2      BA=LV2      BB=LV2      BC=LV2      BD=0
      LV2      BE=LV2      BF=LV2      BG=LV2      BH=0
      LV2      BI=LV2      BJ=LV2      BK=LV2      BL=0
      LV2      BM=LV2      BN=LV2      BO=LV2      BP=0
      LV2      BQ=LV2      BR=LV2      BS=LV2      BT=0
      LV2      BU=LV2      BV=LV2      BW=LV2      BX=0
      LV2      BY=LV2      B7=LV2      B0=LV2      B1=0
      LV2      B2=LV2      B3=LV2      B4=LV2      B5=0
      GO TO 25001
      END
```

GIRL Version

```
$       SUBROUTINE SEMANT(N,FAIL)                                       SEMANT     2
        COMMON/FUNC/  NARY(5,12),MARGS,IARGS(50),FNCLOC(5),NFUNC        CY58B      3
        COMMON/HL/HOL,ACTION,FUNC1,FUNC2,FUNC3,LEFT,RIGHT,STRING,MAXJ   SEMANT     4
        COMMON /TYP/ NARRAY,TYPE1,TYPE2,ERRFLG                          SEMANT     5
        COMMON /STRING/ NTYPE,NSTR,STR                                  SEMANT     6
        COMMON /JL/ JSTOP                                               SEMANT     7
        COMMON /GIRL/NTERMS,PLUS,MINUS,SLASH,LPAR,RPAR,COMMA,STAR,EXP,LT, SEMANT   8
       +LE,GT,GE,EQ,NE,OR,AND,NOT,EQUALS,OPRAND                         SEMANT     9
        COMMON/NEEDS/STJ,JSTACK,R,JAS,J,JLAST,RTEMP,STACK(400)          SEMANT    10
        COMMON /NEED/ START,ASSOC,LEVEL,STOP                            SEMANT    11
        COMMON/NOPAR/NOPAR,NDEP,NDEPTH,NFLAG                            SEMANT    12
        INTEGER HOL,ACTION,FUNC,LEFT,RIGHT,STRING,RPAR,STJ,R,STACK      SEMANT    13
       +,EXP,FUNC1,FUNC2,FUNC3,TYPE1,TYPE2,TYPE(5),STR(1),STOP          SEMANT    14
       $ ,ALPHA,BETA,GAMMA,OPRAND,EQUALS,AND,OR,COMMA                   SEMANT    15
        LOGICAL SKIP,FLAG,ERRFLG,FAIL,NOTFLG                            SEMANT    16
        INTEGER FUNCRF,ZERO,BITPUT,PLUS,FL(3),BITGET                    SEMANT    17
        INTEGER GETTYP,GETDIM                                           SEMANT    18
        DATA FLAG/.FALSE./,FUNCRF/86/,ZERO/0/                           SEMANT    19
        DATA (TYPE(I),I=1,5)/4HREAL,6HCOMPLX,6HDOUBLE,6HINTEGR,6HLOGICL/ SEMANT   20
        GETTYP(II)=MOD(II,100000)/10000                                 SEMANT    21
        GETDIM(II)=MOD(II,1000000)/100000                               SEMANT    22
G       EXECUTE                                                         SEMANT    23
        FAIL=.FALSE.                                                    SEMANT    24
        IF(N .EQ. 0) GO TO 999                                          SEMANT    25
        GO TO(10,20,30,40,50,60,70,80,90,1000,1100,1200,1300,1400,1500, SEMANT    26
       $ 1600),N                                                        SEMANT    27
G  10   R+STJ/11 *R//12                                                 SEMANT    28
   11   FAIL=.TRUE.                                                     SEMANT    29
        RETURN                                                          SEMANT    30
C PRIMARY RECOGNIZED                                                    SEMANT    31
   12   IF(STJ .EQ. PLUS .OR. STJ .EQ. MINUS) GO TO 126                 SEMANT    32
        IF(STJ .NE. RPAR) GO TO 121                                     SEMANT    33
        JSTACK=JSTACK+1                                                 SEMANT    34
        STACK(JSTACK)=SHIFT(STOP,45) .OR. SHIFT(J,15)                   SEMANT    35
        NTMP=R                                                          SEMANT    36
        CALL SLEVEL(SKIP)                                               SEMANT    37
        JSTACK=JSTACK-1                                                 SEMANT    38
        R=NTMP                                                          SEMANT    39
        JLAST=1                                                         SEMANT    40
        IF(JSTOP .GT. 0) JLAST=BITGET(STACK(JSTOP),45,15)               SEMANT    41
G       STRING+HOL.JLAST(-STRING,STRING ''TYPE1'')                      SEMANT    42
        RETURN                                                          SEMANT    43
  121   CONTINUE                                                        SEMANT    44
C  GET TYPE                                                             SEMANT    45
        BETA=GETDIM(STR(J))                                             SEMANT    46
        IF(BETA .NE. 5) GO TO 125                                       SEMANT    47
C  OPERAND IS A FUNCTION REFERENCE                                      SEMANT    48
        IF(NDEP .EQ. 0) GO TO 18                                        SEMANT    49
G       OPRAND FUNC1-.-1 ''1''                                          SEMANT    50
   18   R=FUNCRF                                                        SEMANT    51
        JSTACK=JSTACK+1                                                 SEMANT    52
        STACK(JSTACK)=SHIFT(R,45) .OR. SHIFT(J+1,15)                    SEMANT    53
  125   ALPHA=GETTYP(STR(J))                                            SEMANT    54
        IF(TYPE1 .GE. 0) GO TO 13                                       SEMANT    55
C  SET TYPE OF STATEMENT                                                SEMANT    56
        TYPE1=ALPHA                                                     SEMANT    57
        IF(NTYPE .EQ. 3) TYPE1=-1                                       SEMANT    58
```

```
G 126 STRING+HOL.J(-STRING,STRING ''TYPE1'')                          SEMANT     59
      RETURN                                                          SEMANT     60
   13 IF(FLAG) GO TO 15                                               SEMANT     61
C  CHECK FOR MIXED MODE EXPRESSION                                    SEMANT     62
      IF(TYPE1 .EQ. ALPHA .OR. ALPHA .EQ. 5) GO TO 16                 CY60        1
      N1=TYPE1+1                                                      SEMANT     64
      N2=ALPHA+1                                                      SEMANT     65
      ERRFLG=.TRUE.                                                   SEMANT     66
      CALL ERROR(77,TYPE(N1),TYPE(N2))                                SEMANT     67
G     STRING+HOL.J(-STRING,STRING ''TYPE1'')                          SEMANT     68
      RETURN                                                          SEMANT     69
C  PARSING  AN EXPONENT                                               SEMANT     70
   15 IF(ALPHA .EQ. 3 .AND. TYPE1 .EQ. 3) GO TO 16                    SEMANT     71
      IF((TYPE1 .EQ. 0 .OR. TYPE1 .EQ. 2) .AND. (ALPHA .EQ. 0 .OR.    SEMANT     72
     $ ALPHA .EQ. 2)) GO TO 16                                        SEMANT     73
      CALL ERROR(78,J)                                                SEMANT     74
      ERRFLG=.TRUE.                                                   SEMANT     75
G     STRING+HOL.J(-STRING,STRING ''TYPE1'')                          SEMANT     76
      RETURN                                                          SEMANT     77
   16 IF((.NOT. FLAG .AND. TYPE1 .LT. ALPHA).OR.(FLAG .AND. ALPHA .NE. 3 SEMANT  78
     + .AND. TYPE1 .LT. ALPHA)) TYPE1=ALPHA                           SEMANT     79
G     STRING+HOL.J(-STRING,STRING ''TYPE1'')                          SEMANT     80
      RETURN                                                          SEMANT     81
C  WILL SCAN AN EXPONENT                                              SEMANT     82
   20 IF(STJ .LT. 0) RETURN                                           SEMANT     83
G     R+STJ/11 'R                                                     SEMANT     84
      FLAG=.TRUE.                                                     SEMANT     85
      RETURN                                                          SEMANT     86
C  RECOGNIZED A TERM,PRODUCT OR PRIMARY PERHAPS NEEDING PARENTHESIZATION SEMANT  87
   30 CONTINUE                                                        SEMANT     88
      KTMP=R                                                          SEMANT     89
      IF(NDEP .EQ. 0) GO TO 34                                        SEMANT     90
G     OPRAND FUNC1-.-1 ''1''                                          SEMANT     91
   34 CONTINUE                                                        SEMANT     92
      ITEST=0                                                         SEMANT     93
      IF(STJ .LT. 0) GO TO 31                                         SEMANT     94
G     R+STJ 'R//32                                                    SEMANT     95
G  31 R+STOP/39 'R                                                    SEMANT     96
      IF(STJ .LT. 0 .AND. KTMP .EQ. 889) GO TO 38                     SEMANT     97
      ITEST=-1                                                        SEMANT     98
   32 CONTINUE                                                        SEMANT     99
C IF UNARY PLUS OR MINUS RETURN                                       SEMANT    100
      ISTCK=BITGET(STACK(JSTOP),15,15)                                SEMANT    101
      IF(ISTCK .NE. 288 .AND. ISTCK .NE. 110) GO TO 33                SEMANT    102
      JLAST=BITGET(STACK(JSTOP),45,15)-1                              SEMANT    103
      IF(ISTCK .EQ. 288) JLAST=JLAST-1                                SEMANT    104
G     STRING+HOL.JLAST(-STRING,STRING ''TYPE1'')                      SEMANT    105
G     STRING+HOL.J(-STRING,STRING ''TYPE1'')                          SEMANT    106
      IF(ITEST .LT. 0) J=J-1                                          SEMANT    107
      RETURN                                                          SEMANT    108
   33 CONTINUE                                                        SEMANT    109
      IF(ITEST .LT. 0) J=J-1                                          SEMANT    110
      JSTACK=JSTACK+1                                                 SEMANT    111
      STACK(JSTACK)=SHIFT(STOP,45) .OR. SHIFT(J,15)                   SEMANT    112
      NTMP=R                                                          SEMANT    113
      CALL SLEVEL(SKIP)                                               SEMANT    114
      JSTACK=JSTACK-1                                                 SEMANT    115
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      R=NTMP                                                            SEMANT    116
      JLAST=1                                                           SEMANT    117
      IF(JSTOP .GT. 0) JLAST=BITGET(STACK(JSTOP),45,15)                 SEMANT    118
      NTMP=TYPE1                                                        SEMANT    119
      JJ=JLAST                                                          SEMANT    120
      IF(BITGET(STACK(JSTACK),15,15) .EQ. 418 .AND. JLAST .GT. 1)       SEMANT    121
     $ JJ=JLAST-1                                                       SEMANT    122
G     STRING+HOL.JJ+STRING 'TYPE1                                       SEMANT    123
      IF(.NOT. FLAG .OR. NTMP .EQ. 3) GO TO 35                          SEMANT    124
      IF((NTMP.EQ.0.OR.NTMP.EQ.2).AND.(TYPE1.EQ.0.OR.TYPE1.EQ.2))GOTO 35 SEMANT  125
      ERRFLG=.TRUE.                                                     SEMANT    126
      CALL ERROR(78,J)                                                  SEMANT    127
   35 CONTINUE                                                          SEMANT    128
      IF(TYPE1 .GT. 2 .OR. NTYPE .GT. 1) GO TO 38                       SEMANT    129
      FUNC=FUNC1                                                        SEMANT    130
      IF(TYPE1 .EQ. 1) FUNC=FUNC2                                       SEMANT    131
      IF(TYPE1 .EQ. 2) FUNC=FUNC3                                       SEMANT    132
G     STRING+HOL.JLAST LEFT(.1 LPAR,.1 FUNC)                            SEMANT    133
G     STRING+HOL.J RIGHT RPAR                                           SEMANT    134
   38 IF(ITEST .LT. 0 .AND. STJ .LT. 0) J=J+1                           SEMANT    135
      FLAG=.FALSE.                                                      SEMANT    136
      RETURN                                                            SEMANT    137
   39 FLAG=.FALSE.                                                      SEMANT    138
      GO TO 11                                                          SEMANT    139
C  CHECK FOR CORRECTNESS OF SUBSCRIPTS AND DO IMPLIED LIST PARAMETERS   SEMANT    140
   40 NR=R                                                              SEMANT    141
G     R+STJ/11 'R                                                       SEMANT    142
      NBETA=GETDIM(STR(J))                                              SEMANT    143
      IF(NR .EQ. 359 .AND. NBETA .NE. 4) GO TO 47                       SEMANT    144
      ALPHA=GETTYP(STR(J))                                              SEMANT    145
      GAMMA=STR(J)/1000000                                              SEMANT    146
      IF(NTYPE .EQ. 3) GO TO 45                                         SEMANT    147
      IF(NR .EQ. 839 .AND. NBETA .EQ. 0) GO TO 45                       SEMANT    148
      IF(NR .EQ. 359) GO TO 45                                          SEMANT    149
      IF(NR .EQ. 21 .AND. NBETA .EQ. 4) GO TO 45                        SEMANT    150
      IF(NBETA .EQ. 0 .AND. NR .EQ. 935) GO TO 45                       SEMANT    151
      IF(NTYPE .EQ. 2 .AND. NR .EQ. 935 .AND. STR(J-1) .NE. -7) GO TO 45 SEMANT   152
      IF(NTYPE .EQ. 2 .AND. NR .EQ. 359 .AND. NBETA .EQ. 0) GO TO 11    SEMANT    153
      CALL ERROR(79,J)                                                  SEMANT    154
      ERRFLG=.TRUE.                                                     SEMANT    155
   45 CONTINUE                                                          SEMANT    156
      IF(GAMMA .GE. 6 .AND. NBETA .EQ. 4) CALL ERROR(76)                SEMANT    157
      IF(ALPHA .EQ. 3) GO TO 46                                         SEMANT    158
      N1=ALPHA+1                                                        SEMANT    159
      ERRFLG=.TRUE.                                                     SEMANT    160
      CALL ERROR(80,TYPE(N1),J)                                         SEMANT    161
   46 IF(NBETA .EQ. 4) RETURN                                           SEMANT    162
      MARGS=MARGS+1                                                     SEMANT    163
G     OPRAND(FUNC2 ''MARGS'',FUNC3 ''J'',LEVEL ''NDEPTH'')              SEMANT    164
      IVR=(MARGS+2)/3                                                   SEMANT    165
      IF(IVR .GT. 50) GO TO 1610                                        CY58B       5
      ICOL=20*MOD(MARGS-1,3)+10                                         SEMANT    166
      IVAL=MOD(STR(J),10000)                                            SEMANT    167
      IARGS(IVR)=BITPUT(IARGS(IVR),IVAL,ICOL)                           SEMANT    168
      IF(NR .EQ. 839) GO TO 49                                          SEMANT    169
      IF(NTYPE .NE. 3) RETURN                                           SEMANT    170
C  FLAG SUBSCRIPT IN I/O LIST                                           SEMANT    171
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      IARGS(IVR)=BITPUT(IARGS(IVR),1,ICOL+5)                            SEMANT    172
      RETURN                                                            SEMANT    173
C FLAG DO INDEX IN I/O LIST                                             SEMANT    174
   49 IARGS(IVR)=BITPUT(IARGS(IVR),2,ICOL+5)                            SEMANT    175
      IF(NFLAG .LT. 1) RETURN                                           SEMANT    176
      IARGS(IVR)=BITPUT(IARGS(IVR),FL(NFLAG),ICOL+10)                   SEMANT    177
      RETURN                                                            SEMANT    178
   47 NR=R                                                              SEMANT    179
C   SUBSCRIPT DOES NOT BEGIN WITH CONSTANT, FORCE SEARCH FOR VARIABLE   SEMANT    180
      GO TO 11                                                          SEMANT    181
C  CHECK FOR PROPER NUMBER OF SUBSCRIPTS                                SEMANT    182
   50 IF( BETA .EQ. 4 .OR. R .NE. 452) GO TO 52                         SEMANT    183
      MARGS=MARGS+1                                                     SEMANT    184
G     OPRAND(FUNC2 ''MARGS'',FUNC3 ''J-1'',LEVEL ''NDEPTH'')            SEMANT    185
      IVR=(MARGS+2)/3                                                   SEMANT    186
      IF(IVR .GT. 50) GO TO 1610                                        CY588       6
      ICOL=20*MOD(MARGS-1,3)+10                                         SEMANT    187
      IVAL=MOD(STR(J-1),10000)                                          SEMANT    188
      IARGS(IVR)=BITPUT(IARGS(IVR),IVAL,ICOL)                           SEMANT    189
      IF(NOPAR .LE. 0) GO TO 52                                         SEMANT    190
G     OPRAND+ACTION.-1/52 'MFUNC                                        SEMANT    191
      IARGS(IVR)=BITPUT(IARGS(IVR),MFUNC ,ICOL+3)                       SEMANT    192
      IARGS(IVR)=BITPUT(IARGS(IVR),NARGS,ICOL+9)                        SEMANT    193
C IF NO STRING LEFT, RETURN IF CONSTANT,VARIABLE OR I/O LIST            SEMANT    194
   52 IF(STJ .LT. 0 .AND. (BETA .EQ. 0 .OR. BETA .EQ. 4                 SEMANT    195
     $ .OR. NTYPE .EQ. 3)) RETURN                                       SEMANT    196
      IF(BETA .GT. NARRAY) GO TO 55                                     SEMANT    197
      ERRFLG=.TRUE.                                                     SEMANT    198
      CALL ERROR(81,J)                                                  SEMANT    199
   55 IF(R .EQ. 452) NARRAY=0                                           SEMANT    200
      IF(R .EQ. 318) NARRAY=1                                           SEMANT    201
      IF(R .EQ.  60) NARRAY=2                                           SEMANT    202
      IF(R .EQ. 103) NARRAY=3                                           SEMANT    203
      IF(STJ .LT. 0) GO TO 56                                           SEMANT    204
G     R+STJ 'R//56                                                      SEMANT    205
   56 IF(NTYPE .EQ. 3 .AND. NARRAY .EQ. 0) GO TO 57                     SEMANT    206
      IF(BETA .GE. 1 .AND. BETA .LE. 3 .AND. NOPAR .EQ. 0)              SEMANT    207
     * CALL ERROR(82,J)                                                 SEMANT    208
   57 NARRAY=-1                                                         SEMANT    209
      GO TO 11                                                          SEMANT    210
   56 IF(NTYPE .EQ. 3 .AND. NARRAY .EQ. 0) RETURN                       SEMANT    211
      IF(STJ .EQ. RPAR .AND. NARRAY .LT.  BETA .AND. J .EQ. MAXJ)       SEMANT    212
     $ CALL ERROR(82,J)                                                 SEMANT    213
      IF(STJ .EQ. RPAR) NARRAY=-1                                       SEMANT    214
      RETURN                                                            SEMANT    215
C  RESET TYPE OF STATEMENT IN ANTICIPATION OF SEARCH FOR BOOLEAN PRIMARY SEMANT    216
   60 CONTINUE                                                          SEMANT    217
      NOTFLG=.FALSE.                                                    SEMANT    218
      IF(STR(J-1) .EQ. -17) NOTFLG=.TRUE.                               SEMANT    219
      TYPE1=-1                                                          SEMANT    220
G     STRING+HOL.J(-STRING,STRING ''TYPE1'')                            SEMANT    221
      IF(STJ .NE. OPRAND) GO TO 65                                      SEMANT    222
      ALPHA=GETTYP(STR(J))                                              SEMANT    223
      BETA=GETDIM(STR(J))                                               SEMANT    224
      IF(ALPHA .NE. 4) GO TO 11                                         SEMANT    225
   65 CONTINUE                                                          SEMANT    226
G     R+STJ/11 'R                                                       SEMANT    227
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      RETURN                                                            SEMANT    228
C  IF BOOLEAN PRIMARY IS AN ARETHMETIC COMPARE CONTINUE PARSING PRIMARY  SEMANT    229
   70 IF(STJ .LT. 0) RETURN                                             SEMANT    230
      IF(TYPE1 .EQ. 4) GO TO 75                                         SEMANT    231
G     R+STJ 'R/11                                                       SEMANT    232
C  RELATIONAL OPERATOR FOUND                                            SEMANT    233
      IF(NDEP .EQ. 0) RETURN                                            SEMANT    234
G     OPRAND FUNC1-.-1 ''1''                                            SEMANT    235
      RETURN                                                            SEMANT    236
C  IF BOOLEAN VARIABLE OR CONSTANT, SET STATE TO STOP                   SEMANT    237
   75 R=STOP                                                            SEMANT    238
      JSTACK=JSTACK+1                                                   SEMANT    239
      STACK(JSTACK)=SHIFT(R,45) .OR. SHIFT(J,15)                        SEMANT    240
      GO TO 11                                                          SEMANT    241
C  COMPARE TYPES ON BOTH SIDES OF RELATIONAL EXPRESSION                 SEMANT    242
   80 IF(TYPE1 .EQ. 0 .OR. TYPE1 .EQ. 2 .OR. TYPE1 .EQ. 3) GO TO 85     SEMANT    243
      ERRFLG=.TRUE.                                                     SEMANT    244
      CALL ERROR(83,J)                                                  SEMANT    245
      TYPE1=-1                                                          SEMANT    246
G     STRING+HOL.J(-STRING,STRING ''TYPE1'')                            SEMANT    247
   85 TYPE2=TYPE1                                                       SEMANT    248
      GO TO 11                                                          SEMANT    249
C  BOOLEAN PRIMARY RECOGNIZED-SET TYPE TO BOOLEAN AND CONTINUE PARSE    SEMANT    250
   90 IF(TYPE1 .EQ. TYPE2 .OR. TYPE1+TYPE2 .EQ. 2 .OR.                  SEMANT    251
     + TYPE2 .LT. 0) GO TO 95                                           SEMANT    252
      N1=TYPE1+1                                                        SEMANT    253
      N2=TYPE2+1                                                        SEMANT    254
      CALL ERROR(77,TYPE(N1),TYPE(N2))                                  SEMANT    255
      ERRFLG=.TRUE.                                                     SEMANT    256
   95 TYPE1=4                                                           SEMANT    257
      TYPE2=-1                                                          SEMANT    258
      IF(STJ .LT. 0) RETURN                                             SEMANT    259
G     STRING+HOL.J(-STRING,STRING ''TYPE1'')                            SEMANT    260
      GO TO 11                                                          SEMANT    261
C  PARSE REACHED BLIND ALLEY-MUST BACK UP AND REMOVE PARENTHESES CREATED SEMANT    262
  999 JM=BITGET(STACK(JSTACK),45,15)                                    SEMANT    263
      K=JM                                                              SEMANT    264
      DO 996 KK=JM,J                                                    SEMANT    265
G     STRING+HOL.K/995+STRING.1/996 'TYPE1                              SEMANT    266
      GO TO 995                                                         SEMANT    267
  996 K=K-1                                                             SEMANT    268
  995 CONTINUE                                                          SEMANT    269
      DO 998 I=JM,J                                                     SEMANT    270
G     STRING+HOL.I(-LEFT,-RIGHT)                                        SEMANT    271
  998 CONTINUE                                                          SEMANT    272
G 980 OPRAND+FUNC3.-1 'JN                                               SEMANT    273
      IF(JN .LT. JM) GO TO 985                                          SEMANT    274
G     OPRAND(+FUNC2-.-1,+FUNC3-.-1,+LEVEL-.-1)                          SEMANT    275
      GO TO 980                                                         SEMANT    276
G 985 OPRAND+FUNC2.-1 'MARGS                                            SEMANT    277
G     OPRAND+LEVEL.-1 'NDEPTH                                           SEMANT    278
      RETURN                                                            SEMANT    279
                                                                        SEMANT    280
C   RECOGNIZED FUNCTION-PREPARE TO SET TYPE OF ARGUMENTS FOR THE 'NDEPTH SEMANT    281
C            FUNCTION IN THIS STMT                                      SEMANT    282
 1000 CONTINUE                                                          SEMANT    283
      NDEPTH=NDEPTH+1                                                   SEMANT    284
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      NDEP=NDEP+1                                                       SEMANT    285
      NARGS=0                                                           SEMANT    286
G     R+STJ/11 'R                                                       SEMANT    287
      NARGS=1                                                           SEMANT    288
G     OPRAND(OPRAND ''TYPE1'',STRING''NARGS'',ACTION ''NDEPTH'')        SEMANT    289
G     OPRAND FUNC1 ''0''                                                SEMANT    290
      TYPE1=-1                                                          SEMANT    291
      NOPAR=NOPAR+1                                                     SEMANT    292
      RETURN                                                            SEMANT    293
                                                                        SEMANT    294
C KEEP TRACK OF THE NUMBER AND TYPES OF ARGUMENTS IN FUNCTION CALLS     SEMANT    295
C   MUST USE STACK FOR POSSIBLE RECURSIVE FUNCTION USE                  SEMANT    296
 1100 CONTINUE                                                          SEMANT    297
G     R+STJ/11 'R                                                       SEMANT    298
G     OPRAND(+STRING.-1/1103 'NARGS,+STRING-.-1,+ACTION.-1 'MFUNC)      SEMANT    299
G     OPRAND+FUNC1.-1 'IEXP                                             SEMANT    300
 1103 CONTINUE                                                          SEMANT    301
C  STORE ARGUMENT TYPES                                                 SEMANT    302
      IF(NDEPTH .GT. 5) CALL ERROR(85)                                  SEMANT    303
      IF(NDEPTH .GT. 5) GO TO 1130                                      SEMANT    304
      IF(NARGS .LE. 63) GO TO 1104                                      SEMANT    305
      ERRFLG=.TRUE.                                                     SEMANT    306
      CALL ERROR(84,NDEPTH)                                             SEMANT    307
      GO TO 11                                                          SEMANT    308
 1104 CONTINUE                                                          SEMANT    309
      MM=(11+NARGS)/6                                                   SEMANT    310
      ITEMP=NARGS-6*(MM-2)                                              SEMANT    311
      ICOL=9*ITEMP-6                                                    SEMANT    312
      NARY(MFUNC,MM)=BITPUT(NARY(MFUNC,MM),MOD((TYPE1+1),6),ICOL)       CY60        2
      IF(STR(J-2) .NE. -6 .AND. STR(J-2) .NE. -4) GO TO 1130            SEMANT    314
      NDIM=GETDIM(STR(J-1))                                             SEMANT    315
      IF(NDIM .GE. 4) GO TO 1130                                        SEMANT    316
C  STORE DIMENSIONALITY OF ARGUMENTS                                    SEMANT    317
      NARY(MFUNC ,MM)=BITPUT(NARY(MFUNC ,MM),NDIM,ICOL+3)               SEMANT    318
 1130 CONTINUE                                                          SEMANT    319
      NARY(MFUNC ,MM)=BITPUT(NARY(MFUNC ,MM),IEXP,54+ITEMP)             SEMANT    320
      IF(STJ .EQ. COMMA) GO TO 1105                                     SEMANT    321
      NARY(MFUNC,1)=NARGS                                               SEMANT    322
G     OPRAND(+ACTION-.-1,+OPRAND.-1/1135 'TYPE1)                        SEMANT    323
G     OPRAND(+FUNC1-.-1,+OPRAND-.-1)                                    SEMANT    324
 1135 NOPAR=NOPAR-1                                                     SEMANT    325
      NDEP=NDEP-1                                                       SEMANT    326
      RETURN                                                            SEMANT    327
 1105 TYPE1=-1                                                          SEMANT    328
G     STRING+HOL.J(-STRING,STRING ''TYPE1'')                            SEMANT    329
      NARGS=NARGS+1                                                     SEMANT    330
G     OPRAND STRING ''NARGS''                                           SEMANT    331
G     OPRAND FUNC1-.-1 ''0''                                            SEMANT    332
      RETURN                                                            SEMANT    333
C  SAVE TYPE OF STAEMENT WHILE PARSING EXPONENT                         SEMANT    334
 1200 CONTINUE                                                          SEMANT    335
G     STRING+HOL.J(-STRING,STRING ''TYPE1'')                            SEMANT    336
      TYPE1=-1                                                          SEMANT    337
G     R+STJ/11 'R                                                       SEMANT    338
      RETURN                                                            SEMANT    339
 1300 CONTINUE                                                          SEMANT    340
      IF(STJ .LT. 0) RETURN                                             SEMANT    341
```

```
      IF(STJ .NE. AND .AND. STJ .NE. OR .AND. STJ .NE. NOT) GO TO 11      SEMANT    342
G     R+STJ/11 *R                                                         SEMANT    343
      IF(NDEP .EQ. 0) RETURN                                              SEMANT    344
C  LOGICAL OPERATOR FOUND                                                 SEMANT    345
G     OPRAND FUNC1-.-1 **1**                                              SEMANT    346
      RETURN                                                              SEMANT    347
G1400 R+STJ/11 *R                                                         SEMANT    348
C  LEFT PAREN FOUND IN I/O LIST                                           SEMANT    349
      NFLAG=NFLAG+1                                                       SEMANT    350
      FL(NFLAG)=MARGS                                                     SEMANT    351
      RETURN                                                              SEMANT    352
G1500 R+STJ/11 *R                                                         SEMANT    353
      IF(STJ .EQ. COMMA) RETURN                                           SEMANT    354
C  RIGHT PAREN FOUND IN I/O LIST                                           SEMANT    355
      NFLAG=NFLAG-1                                                       SEMANT    356
      RETURN                                                              SEMANT    357
 1600 CONTINUE                                                            SEMANT    358
      TYPE1=4                                                             SEMANT    359
      RETURN                                                              CY58B       7
 1610 CALL ERROR(95)                                                      CY58B       8
      STOP                                                                CY58B       9
G     COMPLETE                                                            SEMANT    360
```

```
      SUBROUTINE SEPAR                                                  SEPAR      2
      COMMON A(1326),D(500),IDTBL(8,500),INITID(3),LASTID(3),ISRCH(3),  RICH       2
     * JPTR,N,M,JTYP,LSTART,N2,IFNCNM,LOGID,NXTID,IDTYP,NID,LOC,        CY58A     80
     2 LTYP,ITYP,IBLKDT,MODE,IERR,IDES                                  RICH       4
      COMMON/FORMAT/IDESST,IDESND,IGPST,IGPND,IGRP,SEPST,SEPND,         CY58A      4
     1 DIR,ICOM,ISEP                                                    SEPAR      5
      INTEGER A,SEPST,SEPND,DIR,BLANK,SLASH,COMMA                       SEPAR      6
      DATA BLANK/1H /,SLASH/1H//,COMMA/1H,/                             SEPAR      7
C** THIS ROUTINE CHECKS THE SYNTAX OF FIELD SEPARATORS AND RETURNS      SEPAR      8
C**       ISEP=1 - VALID                                                SEPAR      9
C**       ISEP=0 - NON-SEPARATOR                                        SEPAR     10
C**       ISEP=-1 - INVALID                                             SEPAR     11
      ICOM=0                                                            SEPAR     12
      ISLASH=0                                                          SEPAR     13
      DO 20 I=1,N                                                       SEPAR     14
      JJ=SEPST+DIR*(I-1)                                                SEPAR     15
      IF(A(JJ) .EQ. BLANK) GO TO 20                                     SEPAR     16
      IF(A(JJ) .EQ. SLASH) GO TO 5                                      SEPAR     17
      IF(A(JJ) .EQ. COMMA) GO TO 10                                     SEPAR     18
      GO TO 30                                                          SEPAR     19
    5 CONTINUE                                                          SEPAR     20
      ISLASH=1                                                          SEPAR     21
      IF(ICOM .EQ. 1) GO TO 40                                          SEPAR     22
      GO TO 20                                                          SEPAR     23
   10 IF(ISLASH .EQ. 1 .OR. ICOM .EQ. 1) GO TO 40                       SEPAR     24
      ICOM=1                                                            SEPAR     25
   20 CONTINUE                                                          SEPAR     26
      GO TO 40                                                          SEPAR     27
   30 IF(ISLASH .EQ. 0 .AND. ICOM .EQ. 0) GO TO 35                      SEPAR     28
      ISEP=1                                                            SEPAR     29
      SEPND=JJ-DIR                                                      SEPAR     30
      RETURN                                                            SEPAR     31
   35 CONTINUE                                                          SEPAR     32
      ISEP=0                                                            SEPAR     33
      SEPND=JJ                                                          SEPAR     34
      RETURN                                                            SEPAR     35
   40 ISEP=-1                                                           SEPAR     36
      RETURN                                                            SEPAR     37
      END                                                               SEPAR     38
```

```
      SUBROUTINE SIMP                                                   SIMP      2
      COMMON A(1326),D(500),IDTBL(8,500),INITID(3),LASTID(3),ISRCH(3),  RICH      2
     * JPTR,N,M,JTYP,LSTART,N2,IFNCNM,LOGID,NXTID,IDTYP,NID,LOC,        CY58A    80
     2 LTYP,ITYP,IBLKDT,MODE,IERR,IDES                                  RICH      4
      COMMON/BASBLK/IBLOCK(2500),NBLOCK,NB,NBRNCH                       CY58A     6
      DIMENSION IALPH1(7),IALPH2(9),IALPH3(5),IALPH4(10)                SIMP      5
      DATA (IALPH1(I),I=1,7)/1HR,1HE,1HT,1HU,1HR,1HN,1H /,              SIMP      6
     1 (IALPH2(I),I=1,9)/1HC,1HO,1HN,1HT,1HI,1HN,1HU,1HE,1H /,          SIMP      7
     2 (IALPH3(I),I=1,5)/1HS,1HT,1HO,1HP,1H /                           SIMP      8
     3 ,(IALPH4(I),I=1,10)/1HB,1HL,1HO,1HC,1HK,1HD,1HA,1HT,1HA,1H /     SIMP      9
C** THIS ROUTINE PROCESSES RETURN,CONTINUE,STOP, AND BLOCK DATA         SIMP     10
      IF(ITYP .EQ. 10) GO TO 25                                         SIMP     11
      IF(ITYP .EQ. 7) GOTO 15                                           SIMP     12
      IF(ITYP .EQ. 29) GO TO 35                                         SIMP     13
C** CHECK RETURN STATEMENT AND STORE BRANCH IN BASIC BLOCK TABLE        SIMP     14
      DO 10 I=1,7                                                       SIMP     15
      IF(NEXT(JPTR) .NE. IALPH1(I)) GO TO 50                            SIMP     16
   10 CONTINUE                                                          SIMP     17
      NB=1                                                              SIMP     18
      NBRNCH=1                                                          SIMP     19
      NBLOCK=NBLOCK+1                                                   SIMP     20
      IBLOCK(NBLOCK)=999                                                SIMP     21
      RETURN                                                            SIMP     22
C** CHECK CONTINUE STATEMENT                                            SIMP     23
   15 DO 20 I=1,9                                                       SIMP     24
      IF(NEXT(JPTR) .NE. IALPH2(I)) GO TO 50                            SIMP     25
   20 CONTINUE                                                          SIMP     26
      RETURN                                                            SIMP     27
C** CHECK STOP STATEMENT AND STORE BRANCH IN BASIC BLOCK TABLE          SIMP     28
   25 DO 30 I=1,5                                                       SIMP     29
      IF(NEXT(JPTR) .NE. IALPH3(I)) GO TO 50                            SIMP     30
   30 CONTINUE                                                          SIMP     31
      NB=1                                                              SIMP     32
      NBRNCH=1                                                          SIMP     33
      NBLOCK=NBLOCK+1                                                   SIMP     34
      IBLOCK(NBLOCK)=999                                                SIMP     35
      RETURN                                                            SIMP     36
C** CHECK BLOCK DATA STATEMENT                                          SIMP     37
   35 DO 40 I=1,10                                                      SIMP     38
      IF(NEXT(JPTR) .NE. IALPH4(I)) GO TO 50                            SIMP     39
   40 CONTINUE                                                          SIMP     40
      RETURN                                                            SIMP     41
   50 CALL ERROR(7)                                                     SIMP     42
      RETURN                                                            SIMP     43
      END                                                               SIMP     44
```

FORTRAN Version

```
      SUBROUTINE SLEVEL(FAIL)                                           SLEVEL 2
      COMMON/LVARGS/LVFUNC,LVVARG,LVVAD,LVVPOS,LVVTYP,        LVVAL,
     +LVHEAD,LVVNVL,LVDEST,LVVALS(10),LVTYPE(10),LVSKIP
      COMMON/LVTABL/LVTSIZ,LVMAP(     1)/LVVSEQ/LVSIZE,LVSQSP(      1)
      COMMON /NEED/ START,ASSOC,LEVEL,STOP                              SLEVEL 3
      COMMON/NEEDS/STJ,JSTACK,R,JAS,J,JLAST,RTEMP,STACK(400)            SLEVEL 4
      COMMON /STRING/ NNN(2),STR                                        SLEVEL 5
      COMMON /JL/ JSTOP                                                 SLEVEL 6
      INTEGER START,STOP,ASSOC,STACK,STR(1),STJ,R,RTEMP                 SLEVEL 7
      INTEGER BITGET                                                    SLEVEL 8
      LOGICAL FAIL                                                      SLEVEL 9
      GO TO 25000
25001 CONTINUE
      RTEMP=0                                                           SLEVEL11
      JSTOP=JSTACK                                                      SLEVEL12
   10 IF(JSTOP .EQ. 0) GO TO 40                                         SLEVEL13
      NPNTR=BITGET(STACK(JSTOP),60,15)                                  SLEVEL14
      IF(NPNTR .GT. 0 .AND. NPNTR .LT. 77777B) GO TO 20                 SLEVEL15
      IF(BITGET(STACK(JSTOP),30,15) .NE. 0) GO TO 30                    SLEVEL16
      JSTOP=JSTOP-1                                                     SLEVEL17
      GO TO 10                                                          SLEVEL18
   20 JSTOP=NPNTR-1                                                     SLEVEL19
      GO TO 10                                                          SLEVEL20
   30 STACK(JSTACK)=STACK(JSTACK) .AND. 77777777777777700000B           SLEVEL21
      STACK(JSTACK)=STACK(JSTACK) .OR. JSTOP                            SLEVEL22
      JAS=BITGET(STACK(JSTOP),30,15)                                    SLEVEL23
      R=BITGET(STACK(JSTOP),15,15)                                      SLEVEL24
      RTEMP=R                                                           SLEVEL25
      LVVPOS =          JAS
      LVVTYP =    3
      LVFUNC=       LEVEL
      LVVARG=          R
      CALL LVFIND(LV2       A,LV2       B,LV2       C,LV2       D)
      LV1     AAD =           R
      IF (LVVAL.NE.-1) LV1     AAD = LVVAL
               R = LV1     AAD
      FAIL=.FALSE.                                                      SLEVEL27
      IF(BITGET(STACK(JSTOP),60,15) .EQ. 77777B)                        SLEVEL28
     $ STACK(JSTOP)=STACK(JSTOP) .AND. 77777777777777700000B            SLEVEL29
      RETURN                                                            SLEVEL30
   40 FAIL=.TRUE.                                                       SLEVEL31
      RETURN                                                            SLEVEL32
      RETURN
25000 CONTINUE
      LV2       A=LV2       B=LV2       C=LV2       D=0
      GO TO 25001
      END
```

GIRL Version

```
$       SUBROUTINE SLEVEL(FAIL)                                          SLEVEL     2
        COMMON /NEED/ START,ASSOC,LEVEL,STOP                             SLEVEL     3
        COMMON/NEEDS/STJ,JSTACK,R,JAS,J,JLAST,RTEMP,STACK(400)           SLEVEL     4
        COMMON /STRING/ NNN(2),STR                                       SLEVEL     5
        COMMON /JL/ JSTOP                                                SLEVEL     6
        INTEGER START,STOP,ASSOC,STACK,STR(1),STJ,R,RTEMP                SLEVEL     7
        INTEGER BITGET                                                   SLEVEL     8
        LOGICAL FAIL                                                     SLEVEL     9
G       EXECUTE                                                          SLEVEL    10
        RTEMP=0                                                          SLEVEL    11
        JSTOP=JSTACK                                                     SLEVEL    12
   10   IF(JSTOP .EQ. 0) GO TO 40                                        SLEVEL    13
        NPNTR=BITGET(STACK(JSTOP),60,15)                                 SLEVEL    14
        IF(NPNTR .GT. 0 .AND. NPNTR .LT. 77777B) GO TO 20                SLEVEL    15
        IF(BITGET(STACK(JSTOP),30,15) .NE. 0) GO TO 30                   SLEVEL    16
        JSTOP=JSTOP-1                                                    SLEVEL    17
        GO TO 10                                                         SLEVEL    18
   20   JSTOP=NPNTR-1                                                    SLEVEL    19
        GO TO 10                                                         SLEVEL    20
   30   STACK(JSTACK)=STACK(JSTACK) .AND. 77777777777777000000B          SLEVEL    21
        STACK(JSTACK)=STACK(JSTACK) .OR. JSTOP                           SLEVEL    22
        JAS=BITGET(STACK(JSTOP),30,15)                                   SLEVEL    23
        R=BITGET(STACK(JSTOP),15,15)                                     SLEVEL    24
        RTEMP=R                                                          SLEVEL    25
G       R+LEVEL.JAS 'R                                                   SLEVEL    26
        FAIL=.FALSE.                                                     SLEVEL    27
        IF(BITGET(STACK(JSTOP),60,15) .EQ. 77777B)                       SLEVEL    28
      $ STACK(JSTOP)=STACK(JSTOP) .AND. 77777777777777000000B            SLEVEL    29
        RETURN                                                           SLEVEL    30
   40   FAIL=.TRUE.                                                      SLEVEL    31
        RETURN                                                           SLEVEL    32
G       COMPLETE                                                         SLEVEL    33
```

```
      SUBROUTINE SQUEEZ                                                 SQUEEZE    2
      COMMON A(1326),D(500),IDTBL(8,500),INITID(3),LASTID(3),ISRCH(3),  RICH       2
     * JPTR,N,M,JTYP,LSTART,N2,IFNCNM,LOGID,NXTID,IDTYP,NID,LOC,        CY58A     80
     2 LTYP,ITYP,IBLKDT,MODE,IERR,IDES                                  RICH       4
      INTEGER A,D,BLANK,AICH                                            SQUEEZE    4
      DATA BLANK/1H /,AICH/1HH/                                         SQUEEZE    5
C** THE PURPOSE OF THIS ROUTINE IS TO SQUEEZE THE BLANKS OUT OF A       SQUEEZE    6
C** CHARACTER STRING "D" WHICH CONSTITUTES A LANGUAGE ELEMENT           SQUEEZE    7
      J=0                                                               SQUEEZE    8
      DO 10 I=1,M                                                       SQUEEZE    9
      IF(D(I) .EQ. BLANK) GO TO 10                                      SQUEEZE   10
      J=J+1                                                             SQUEEZE   11
      D(J)=D(I)                                                         SQUEEZE   12
      IF(D(J) .NE. AICH) GO TO 10                                       SQUEEZE   13
      IF(JTYP .NE. 3) GO TO 10                                          SQUEEZE   14
C** IF CHARACTER STRING CONSTITUTES A HOLLERITH CONSTANT, RETURN        SQUEEZE   15
      M=M+J-I                                                           SQUEEZE   16
      RETURN                                                            SQUEEZE   17
   10 CONTINUE                                                          SQUEEZE   18
      M=J                                                               SQUEEZE   19
C** SET "M" = SIZE OF STRING                                            SQUEEZE   20
      RETURN                                                            SQUEEZE   21
      END                                                               SQUEEZE   22
```

FORTRAN Version

```
      SUBROUTINE SSTOP(FAIL)                                            SSTOP  2
      COMMON/LVARGS/LVFUNC,LVVARG,LVVAD,LVVPOS,LVVTYP,        LVVAL,
     +LVHEAD,LVVNVL,LVDEST,LVVALS(10),LVTYPE(10),LVSKIP
      COMMON/LVTABL/LVTSIZ,LVMAP(     1)/LVVSEQ/LVSIZE,LVSOSP(      1)
      COMMON /NEED/ START,ASSOC,LEVEL,STOP                              SSTOP  3
      COMMON/NEEDS/STJ,JSTACK,R,JAS,J,JLAST,PTEMP,STACK(400)            SSTOP  4
      COMMON /STRING/ NNN(2),STR                                        SSTOP  5
      INTEGER START,STOP,ASSOC,STACK,STR(1),STJ,R,TEMP                  SSTOP  6
      INTEGER BITGET,BITPUT                                             SSTOP  7
      LOGICAL FAIL                                                      SSTOP  8
      GO TO 25000
25001 CONTINUE
      JSTOPS=JSTACK                                                     SSTOP 10
    5 CONTINUE
      LVVTYP = 3
      LVVPOS = 1
      LVINDX = 0
      LVFUNC=       ASSOC
      LVVARG=            R
      CALL LVFIND(LVINDX,LVINDX,LVINDX,LVINDX)
      LV1     AAD =           R
      IF (LVVAL.NE.-1) LV1     AAD = LVVAL
      LVVTR = LVVAL
      LVVAL = -100
      IF (LVVTR.EQ.-1) GO TO          10
      JSTOPS=JSTOPS+1                                                   SSTOP 12
      ISTCK=BITGET(STACK(JSTOPS),45,15)                                 SSTOP 13
      STACK(JSTOPS)=SHIFT(ISTCK,15) .OR. SHIFT(R,45)                    SSTOP 14
   10 CONTINUE
      LV1     AAD =           R
      LVVAL = -100
      IF (LV1     AAD.NE.       STOP) LVVAL = -1
      LVVTR = LVVAL
      LVVAL = -100
      IF (LVVTR.NE.-1) GO TO          20
      LVVTYP = 3
      LVVPOS = 1
      LVINDX = 0
      LVFUNC=        STOP
      LVVARG= LV1     AAD
      CALL LVFIND(LVINDX,LVINDX,LVINDX,LVINDX)
      LV1     AAI = LV1     AAD
      IF (LVVAL.NE.-1) LV1     AAI = LVVAL
      LVVTR = LVVAL
      LVVAL = -100
      IF (LVVTR.EQ.-1) GO TO          30
               R = LV1     AAI
      LVVTR = LVVAL
      LVVAL = -100
      IF (LVVTR.EQ.-1) GO TO           5
      IF (LVVTR.NE.-1) GO TO           5
   20 FAIL=.FALSE.                                                      SSTOP 16
      RETURN                                                            SSTOP 17
   30 CONTINUE
      LVVAL = -100
      IF (     JSTACK.NE.     JSTOPS) LVVAL = -1
      LVVTR = LVVAL
```

```
      LVVAL = -100
      IF (LVVTR.EQ.-1) GO TO          40
      FAIL=.TRUE.                                                       SSTOP 19
      RETURN                                                            SSTOP 20
   40 R=BITGET(STACK(JSTOPS),15,15)                                     SSTOP 21
      JAS=BITGET(STACK(JSTOPS),30,15)+1                                 SSTOP 22
      LVVPOS =         JAS
      LVVTYP =    3
      LVFUNC=       ASSOC
      LVVARG=            R
      CALL LVFIND(LV2       A,LV2       B,LV2       C,LV2       D)
      LV1     AAD =          R
      IF (LVVAL.NE.-1) LV1     AAD = LVVAL
            TEMP = LV1     AAD
      LVVTR = LVVAL
      LVVAL = -100
      IF (LVVTR.NE.-1) GO TO          50
      JSTOPS=JSTOPS-1                                                   SSTOP 24
      LVVTR = LVVAL
      LVVAL = -100
      IF (LVVTR.NE.-1) GO TO          30
   50 STACK(JSTOPS)=STACK(JSTOPS) .AND. 77777000007777777777B           SSTOP 26
      STACK(JSTOPS)=BITPUT(STACK(JSTOPS),JAS,30)                        SSTOP 27
      LVVAL = -100
      IF (          R.NE.       TEMP) LVVAL = -1
      LVVTR = LVVAL
      LVVAL = -100
      IF (LVVTR.NE.-1) GO TO          40
               R =        TEMP
      LVVTR = LVVAL
      LVVAL = -100
      IF (LVVTR.NE.-1) GO TO           5
      RETURN
25001 CONTINUE
      LV2       A=LV2       B=LV2       C=LV2       D=0
      GO TO 25001
      END
```

GIRL Version

```
$     SUBROUTINE SSTOP(FAIL)                                            SSTOP      2
      COMMON /NEED/ START,ASSOC,LEVEL,STOP                              SSTOP      3
      COMMON/NEEDS/STJ,JSTACK,R,JAS,J,JLAST,RTEMP,STACK(400)            SSTOP      4
      COMMON /STRING/ NNN(2),STR                                        SSTOP      5
      INTEGER START,STOP,ASSOC,STACK,STR(1),STJ,R,TEMP                  SSTOP      6
      INTEGER BITGET,BITPUT                                             SSTOP      7
      LOGICAL FAIL                                                      SSTOP      8
G     EXECUTE                                                           SSTOP      9
      JSTOPS=JSTACK                                                     SSTOP     10
G   5 R+ASSOC/10                                                        SSTOP     11
      JSTOPS=JSTOPS+1                                                   SSTOP     12
      ISTCK=BITGET(STACK(JSTOPS),45,15)                                 SSTOP     13
      STACK(JSTOPS)=SHIFT(ISTCK,15) .OR. SHIFT(R,45)                    SSTOP     14
G  10 R(=STOP//20,+STOP/30 *R/5/5)                                      SSTOP     15
  20  FAIL=.FALSE.                                                      SSTOP     16
      RETURN                                                            SSTOP     17
G  30 JSTACK=JSTOPS/40                                                  SSTOP     18
      FAIL=.TRUE.                                                       SSTOP     19
      RETURN                                                            SSTOP     20
  40  R=BITGET(STACK(JSTOPS),15,15)                                     SSTOP     21
      JAS=BITGET(STACK(JSTOPS),30,15)+1                                 SSTOP     22
G     R+ASSOC.JAS *TEMP//50                                             SSTOP     23
      JSTOPS=JSTOPS-1                                                   SSTOP     24
G     //30                                                              SSTOP     25
  50  STACK(JSTOPS)=STACK(JSTOPS) .AND. 77777000007777777777B           SSTOP     26
      STACK(JSTOPS)=BITPUT(STACK(JSTOPS),JAS,30)                        SSTOP     27
G     R=TEMP//40                                                        SSTOP     28
G     TEMP *R//5                                                        SSTOP     29
G     COMPLETE                                                          SSTOP     30
```

```
      SUBROUTINE STATNO                                                 STATNO     2
      COMMON A(1326),D(500),IDTBL(8,500),INITID(3),LASTID(3),ISRCH(3),  RICH      2
     * JPTR,N,M,JTYP,LSTART,N2,IFNCNM,LOGID,NXTID,IDTYP,NID,LOC,        CY58A     80
     2 LTYP,ITYP,IBLKDT,MODE,IERR,IDES                                  RICH      4
      COMMON/LABELS/STATRA(2,200),NLABEL                                STATNO     4
      COMMON/DOLOOP/ISTACK(4,50),NSTACK,ILOOP,IOVFLW                    STATNO     5
      COMMON/BASBLK/IBLOCK(2500),NBLOCK,NB,NBRNCH                       CY58A     26
      INTEGER A,BLANK,STATRA                                            STATNO     7
      INTEGER BITPUT,BITGET                                             STATNO     8
      DATA BLANK/1H /                                                   STATNO     9
C** THIS ROUTINE PROCESSES STATEMENT NUMBERS,BASIC BLOCKS, AND DO LOOPS STATNO    10
      LOC=0                                                             STATNO    11
      DO 5 I=1,5                                                        STATNO    12
      IF(A(I) .NE. BLANK) GO TO 10                                      STATNO    13
    5 CONTINUE                                                          STATNO    14
C** STATEMENT IS UNLABELLED                                             STATNO    15
      IF(ITYP .NE. 18) GO TO 7                                          STATNO    16
C** END STATEMENT                                                       STATNO    17
      IF(IBLKDT .EQ. 1) RETURN                                          STATNO    18
C** STORE NUMBER OF BRANCHES IN BASIC BLOCK TABLE                       STATNO    19
      IF(NBRNCH .EQ. 0) GO TO 110                                       STATNO    20
      IBLOCK(IBLKST)=BITPUT(IBLOCK(IBLKST),NBRNCH,6)                    STATNO    21
      RETURN                                                            STATNO    22
C** IF FORMAT STATEMENT, ISSUE DIAGNOSTIC                               STATNO    23
    7 IF(ITYP .EQ. 28) GO TO 90                                         STATNO    24
C** UNLABELLED STATEMENT MAY NEED FURTHER PROCESSING                    STATNO    25
      IF(NBLOCK .EQ. 0) GO TO 8                                         STATNO    26
      IF(IBLOCK(NBLOCK) .EQ. 998) GO TO 32                              STATNO    27
      IF(NB .EQ. 2) GO TO 31                                            STATNO    28
      IF(NB .EQ. 1) GO TO 70                                            STATNO    29
      RETURN                                                            STATNO    30
C** FIRST STATEMENT IN PROGRAM - INITIALIZE BASIC BLOCK TABLE           STATNO    31
    8 NBLOCK=1                                                          STATNO    32
      GO TO 34                                                          STATNO    33
C** LABELLED STATEMENT                                                  STATNO    34
   10 IF(ITYP .EQ. 18) GO TO 50                                         STATNO    35
      JPTR=I                                                            STATNO    36
C** GET STATEMENT LABEL AND CHECK THAT IT IS INTEGER                    STATNO    37
      CALL GNLE                                                         STATNO    38
      IF(JTYP .NE. 5) GO TO 50                                          STATNO    39
      IF(A(6) .NE. BLANK) GO TO 50                                      STATNO    40
      IF(JPTR .LT. 6) GO TO 50                                          STATNO    41
C** STORE IN STATEMENT NUMBER TABLE                                     STATNO    42
      CALL STSRCH                                                       STATNO    43
      IF(BITGET(STATRA(2,LOC),9,3) .EQ. 1) GO TO 60                     STATNO    44
C** SET "DEFINED" FLAG                                                  STATNO    45
      STATRA(2,LOC)=BITPUT(STATRA(2,LOC),1,9)                           STATNO    46
      IF(LTYP .EQ. 9) GO TO 20                                          STATNO    47
C** STORE STATEMENT TYPE                                                STATNO    48
      STATRA(2,LOC)=BITPUT(STATRA(2,LOC),ITYP,6)                        STATNO    49
      GO TO 30                                                          STATNO    50
   20 STATRA(2,LOC)=BITPUT(STATRA(2,LOC),9,6)                           STATNO    51
   30 IF(ITYP .EQ. 28) RETURN                                           STATNO    52
      IF(NBLOCK .EQ. 0) GO TO 8                                         STATNO    53
      IF(NB .EQ. 1) GO TO 32                                            STATNO    54
C** STORE BRANCH FOR PREVIOUS BLOCK                                     STATNO    55
   31 NBLOCK=NBLOCK+1                                                   STATNO    56
```

```
      IBLOCK(NBLOCK)=998                                                STATNO     57
      NBRNCH=1                                                          STATNO     58
C** CLOSE OUT PREVIOUS BLOCK                                            STATNO     59
   32 NB=0                                                              STATNO     60
C** INCREMENT BLOCK COUNTER - START OF NEXT BLOCK                       STATNO     61
      NBLOCK=NBLOCK+1                                                   STATNO     62
C** STORE POINTER TO NEXT BLOCK                                         STATNO     63
      IBLOCK(IBLKST)=BITPUT(IBLOCK(IBLKST),NBLOCK,28)                   STATNO     64
C** STORE NO. OF BRANCHES                                               STATNO     65
      IBLOCK(IBLKST)=BITPUT(IBLOCK(IBLKST),NBRNCH,6)                    STATNO     66
C** CHECK THAT DO INDICES ARE MADE UNDEFINED AT END OF BLOCK            STATNO     67
      J1=IBLKST+1                                                       STATNO     68
      J2=NBLOCK-NBRNCH-1                                                STATNO     69
      IF(IBLOCK(J2) .GT. 6000) GO TO 34                                 STATNO     70
      J21=J2-1                                                          STATNO     71
   21 IF(IBLOCK(J1) .LT. 6000) GO TO 34                                 STATNO     72
      IRES=IBLOCK(J1)                                                   STATNO     73
      DO 22 K2=J1,J21                                                   STATNO     74
   22 IBLOCK(K2)=IBLOCK(K2+1)                                           STATNO     75
      IBLOCK(J2)=IRES                                                   STATNO     76
      GO TO 21                                                          STATNO     77
C** OPEN THE NEW BLOCK                                                  STATNO     78
   34 IBLKST=NBLOCK                                                     STATNO     79
      NBRNCH=0                                                          STATNO     80
C** STORE DO LOOP POINTER                                               STATNO     81
      IBLOCK(IBLKST)=BITPUT(0,ILOOP,12)                                 STATNO     82
      IF(LOC .EQ. 0) RETURN                                             STATNO     83
C** STORE LOCATION OF STATEMENT NUMBER OF BLOCK                         STATNO     84
      IBLOCK(IBLKST)=BITPUT(IBLOCK(IBLKST),LOC,36)                      STATNO     85
C** STORE BLOCK START IN STATEMENT NUMBER TABLE                         STATNO     86
      STATRA(2,LOC)=BITPUT(STATRA(2,LOC),IBLKST,36)                     STATNO     87
      IF(BITGET(STATRA(2,LOC),15,3) .NE. 1) RETURN                      STATNO     88
      IF(IOVFLW .EQ. 1) RETURN                                          STATNO     89
      IF(LOC .NE. ISTACK(1,ILOOP)) GO TO 80                             STATNO     90
      IF(ITYP .GE. 3 .AND. ITYP .LE. 6) GO TO 100                       STATNO     91
      IF( ITYP .EQ. 9 .OR. ITYP .EQ. 10 .OR. ITYP .EQ. 17) GO TO 100    STATNO     92
C** DO TERMINAL STATEMENT                                               STATNO     93
      NB=2                                                              STATNO     94
C** CLOSE OUT LOOP                                                      STATNO     95
      ISTACK(2,ILOOP)=1                                                 STATNO     96
C** STORE DO INDEX IN BASIC BLOCK TABLE                                 STATNO     97
      NBLOCK=NBLOCK+1                                                   STATNO     98
      IBLOCK(NBLOCK)=6000+ISTACK(4,ILOOP)                               STATNO     99
      KLOOP=ILOOP-1                                                     STATNO    100
C** RESET VALUE OF THE "CURRENT LOOP"                                   STATNO    101
      DO 40 J=1,KLOOP                                                   STATNO    102
      LOOP=ILOOP-J                                                      STATNO    103
      IF(ISTACK(2,LOOP) .EQ. 1) GO TO 40                                STATNO    104
      IF(ISTACK(1,LOOP) .EQ. LOC) GO TO 35                              STATNO    105
      ILOOP=LOOP                                                        STATNO    106
      RETURN                                                            STATNO    107
   35 ISTACK(2,LOOP)=1                                                  STATNO    108
      NBLOCK=NBLOCK+1                                                   STATNO    109
      IBLOCK(NBLOCK)=6000+ISTACK(4,LOOP)                                STATNO    110
   40 CONTINUE                                                          STATNO    111
      ILOOP=0                                                           STATNO    112
      RETURN                                                            STATNO    113
```

```
   50 IERC=32                                                           STATNO    114
      GO TO 200                                                         STATNO    115
   60 IERC=33                                                           STATNO    116
      GO TO 200                                                         STATNO    117
   70 IERC=34                                                           STATNO    118
      GO TO 200                                                         STATNO    119
   80 IERC=35                                                           STATNO    120
      GO TO 200                                                         STATNO    121
   90 IERC=36                                                           STATNO    122
      GO TO 200                                                         STATNO    123
  100 IERC=37                                                           STATNO    124
      GO TO 200                                                         STATNO    125
  110 IERC=38                                                           STATNO    126
  200 CALL ERROR(IERC)                                                  STATNO    127
      RETURN                                                            STATNO    128
      END                                                               STATNO    129
```

```
      SUBROUTINE STFNC(NFNC)                                            CY58A      47
      COMMON A(1326),D(500),IDTBL(8,500),INITID(3),LASTID(3),ISRCH(3),  RICH        2
     * JPTR,N,M,JTYP,LSTART,N2,IFNCNM,LOGID,NXTID,IDTYP,NID,LOC,        CY58A      80
     2 LTYP,ITYP,IBLKDT,MODE,IERR,IDES                                  RICH        4
      COMMON/FUNC/IFNCRA(5,12),MARGS,IARGS(50),FNCLOC(5),NFUNC          CY58A      48
      INTEGER BITGET                                                    STFUNC      5
C** STATEMENT FUNCTION PROCESSOR                                        STFUNC      6
C** GET NO. OF ARGUMENTS FROM SYMBOL TABLE                              STFUNC      7
      NARG=BITGET(IDTBL(3,LOC),7,6)                                     STFUNC      8
C** CHECK CORRECTNESS OF NO. OF ARGUMENTS                               STFUNC      9
      NAR2=IFNCRA(NFNC,1)                                               STFUNC     10
      IF(NARG .NE. NAR2) CALL ERROR(26,IDTBL(1,LOC))                    STFUNC     11
      NARGS=MIN0(NARG,NAR2)                                             STFUNC     12
      KOUNT=0                                                           STFUNC     13
      NT=1+(NARGS-1)/6                                                  STFUNC     14
C** THESE TWO LOOPS CHECK TYPE AND DIMENSIONALITY OF ARGUMENTS          STFUNC     15
      DO 10 I=1,NT                                                      STFUNC     16
      ICOL1=-6                                                          STFUNC     17
      ICOL2=-3                                                          STFUNC     18
      DO 10 J=1,6                                                       STFUNC     19
      KOUNT=KOUNT+1                                                     STFUNC     20
      IF(KOUNT .GT. NARGS) RETURN                                       STFUNC     21
      ICOL1=ICOL1+9                                                     STFUNC     22
      ICOL2=ICOL2+9                                                     STFUNC     23
C** GET DIMENSIONALITY - IF NOT 0, ISSUE DIAGNOSTIC                     STFUNC     24
      IF(BITGET(IFNCRA(NFNC,I+1),ICOL2,3) .NE. 0) CALL ERROR(50,KOUNT)  STFUNC     25
C** GET TYPE                                                            STFUNC     26
      ITP1=BITGET(IFNCRA(NFNC,I+1),ICOL1,3)                             STFUNC     27
      IF(ITP1 .EQ. 0) GO TO 10                                          STFUNC     28
C** CHECK CORRECTNESS OF TYPE                                           STFUNC     29
      ITP2=BITGET(IDTBL(3,LOC+KOUNT),10,3)                              STFUNC     30
      IF(ITP1 .NE. ITP2) CALL ERROR(51,KOUNT)                           STFUNC     31
   10 CONTINUE                                                          STFUNC     32
      RETURN                                                            STFUNC     33
      END                                                               STFUNC     34
```

```
      SUBROUTINE STORE                                                  STORE      2
      COMMON A(1326),D(500),IDTBL(8,500),INITID(3),LASTID(3),ISRCH(3),  RICH       2
     * JPTR,N,M,JTYP,LSTART,N2,IFNCNM,LOGID,NXTID,IDTYP,NID,LOC,        CY58A     80
     2 LTYP,ITYP,IBLKDT,MODE,IERR,IDES                                  RICH       4
C** THIS ROUTINE STORES A NAME "NXTID" IN THE SYMBOL TABLE AND UPDATES  STORE      4
C** SYMBOL TABLE POINTERS                                              STORE      5
      NID=NID+1                                                         STORE      6
      IF(NID .GT. 500) GO TO 20                                         STORE      7
      IF(INITID(IDTYP) .NE. 0) GO TO 5                                  STORE      8
      INITID(IDTYP)=NID                                                 STORE      9
    5 CONTINUE                                                          STORE     10
      IDTBL(1,NID)=NXTID                                                STORE     11
      IDTBL(2,NID)=0                                                    STORE     12
      IF(LASTID(IDTYP) .EQ. 0) GO TO 10                                 STORE     13
      LAST=LASTID(IDTYP)                                                STORE     14
      IDTBL(2,LAST)=NID                                                 STORE     15
   10 LASTID(IDTYP)=NID                                                 STORE     16
      RETURN                                                            STORE     17
   20 WRITE(6,25)                                                       STORE     18
   25 FORMAT(/////5X,46H SYMBOL TABLE OVERFLOW - PROCESSING TERMINATED) STORE     19
      STOP                                                              STORE     20
      END                                                               STORE     21
```

```
      SUBROUTINE STSRCH                                                 STSRCH     2
      COMMON A(1326),D(500),IDTBL(8,500),INITID(3),LASTID(3),ISRCH(3),  RICH       2
     * JPTR,N,M,JTYP,LSTART,N2,IFNCNM,LOGID,NXTID,IDTYP,NID,LOC,        CY58A     80
     2 LTYP,ITYP,IBLKDT,MODE,IERR,IDES                                  RICH       4
      COMMON/LABELS/STATRA(2,200),NLABEL                                STSRCH     4
      INTEGER STATRA                                                    STSRCH     5
C** THIS ROUTINE SEARCHES THE STATEMENT NUMBER TABLE AND STORES THE     STSRCH     6
C** NUMBER IN THE TABLE IF NOT FOUND                                    STSRCH     7
      IF(NLABEL .EQ. 0) GO TO 15                                        STSRCH     8
      DO 10 I=1,NLABEL                                                  STSRCH     9
      IF(STATRA(1,I) .NE. N2) GO TO 10                                  STSRCH    10
C** STATEMENT NUMBER FOUND IN TABLE - RETURN LOCATION WHERE FOUND       STSRCH    11
      LOC=I                                                             STSRCH    12
      RETURN                                                            STSRCH    13
   10 CONTINUE                                                          STSRCH    14
C** STATEMENT NUMBER NOT FOUND - INCREMENT COUNTER                      STSRCH    15
   15 NLABEL=NLABEL+1                                                   STSRCH    16
      IF(NLABEL .GT. 200) GO TO 20                                      STSRCH    17
C** STORE STATEMENT NUMBER AND RETURN LOCATION WHERE STORED             STSRCH    18
      LOC=NLABEL                                                        STSRCH    19
      STATRA(1,LOC)=N2                                                  STSRCH    20
      RETURN                                                            STSRCH    21
   20 WRITE(6,25)                                                       STSRCH    22
   25 FORMAT(/////5X,53H STATEMENT NO. TABLE OVERFLOW - PROCESSING TERMI STSRCH    23
     *NATED)                                                            STSRCH    24
      STOP                                                              STSRCH    25
      END                                                               STSRCH    26
```

```
      SUBROUTINE SUB                                                    SUB        2
      COMMON A(1326),D(500),IDTBL(8,500),INITID(3),LASTID(3),ISRCH(3),  RICH       2
     * JPTR,N,M,JTYP,LSTART,N2,IFNCNM,LOGID,NXTID,IDTYP,NID,LOC,        CY58A     80
     2 LTYP,ITYP,IBLKDT,MODE,IERR,IOES                                  RICH       4
      DIMENSION IALPH(10),IALPH2(8),KT(5)                               SUB        4
      INTEGER BLANK,COMMA,RPAR,A,D                                      SUB        5
      INTEGER BITPUT                                                    SUB        6
      DATA (IALPH(I),I=1,10)/1HS,1HU,1HB,1HR,1HO,1HU,1HT,1HI,1HN,1HE/   SUB        7
      DATA (IALPH2(I),I=1,8)/1HF,1HU,1HN,1HC,1HT,1HI,1HO,1HN/           SUB        8
      DATA (KT(I),I=1,5)/1HR,1HC,1HD,1HI,1HL/                           SUB        9
      DATA BLANK/1H /,LPAR/1H(/,RPAR/1H)/,COMMA/1H,/                    SUB       10
C** SUBROUTINE AND FUNCTION STATEMENT PROCESSOR                         SUB       11
      NARG=0                                                            SUB       12
      ISTATE=0                                                          SUB       13
      IF(ITYP .EQ. 30) GO TO 5                                          SUB       14
C** FUNCTION STATEMENT                                                  SUB       15
    2 DO 3 I=1,8                                                        SUB       16
      IF(NEXT(JPTR) .NE. IALPH2(I)) GO TO 50                            SUB       17
    3 CONTINUE                                                          SUB       18
      GO TO 12                                                          SUB       19
C** SUBROUTINE STATEMENT                                                SUB       20
    5 DO 10 I=1,10                                                      SUB       21
      IF(NEXT(JPTR) .NE. IALPH(I)) GO TO 50                             SUB       22
   10 CONTINUE                                                          SUB       23
      GO TO 17                                                          SUB       24
   12 IPTR=JPTR                                                         SUB       25
      IFRST=NEXT(1)                                                     SUB       26
      IF(IFRST .EQ. 1HF) GO TO 14                                       SUB       27
C** FUNCTION IS A TYPED FUNCTION, GET TYPE                              SUB       28
      DO 13 I=1,5                                                       SUB       29
      IF(IFRST .NE. KT(I)) GO TO 13                                     SUB       30
      ISTATE=I                                                          SUB       31
      GO TO 14                                                          SUB       32
   13 CONTINUE                                                          SUB       33
   14 JPTR=IPTR                                                         SUB       34
C** GET NAME OF SUBROUTINE OR FUNCTION AND STORE IN SYMBOL TABLE        SUB       35
   17 CALL GNLE                                                         SUB       36
      IF(JTYP .NE. 2) GO TO 50                                          SUB       37
      IDTYP=2                                                           SUB       38
      CALL STORE                                                        SUB       39
      IE=D(1)                                                           SUB       40
      IF(ITYP .NE. 31) GO TO 15                                         SUB       41
C** FUNCTION MUST BE FOLLOWED BY ARGUMENT LIST                          SUB       42
      IF(NEXT(JPTR) .NE. LPAR) GO TO 50                                 SUB       43
      IFNCNM=NXTID                                                      SUB       44
      GO TO 20                                                          SUB       45
   15 IF(NEXT(JPTR) .EQ. BLANK) GO TO 30                                SUB       46
      IF(A(JPTR-1) .NE. LPAR) GO TO 50                                  SUB       47
C** GET NEXT ARGUMENT                                                   SUB       48
   20 CALL GNLE                                                         SUB       49
      IF(JTYP .NE. 2) GO TO 60                                          SUB       50
      CALL SEARCH                                                       SUB       51
      IF(ISRCH(1) .NE. 0 .OR.  ISRCH(2) .NE. 0) CALL ERROR(86,NXTID)    SUB       52
      IDTYP=1                                                           SUB       53
      CALL STORE                                                        SUB       54
C** SET "FORMAL PARAMETER" FLAG                                         SUB       55
      IDTBL(3,NID)=BITPUT(IDTBL(3,NID),1,12)                            SUB       56
```

```
C** INCREMENT ARGUMENT COUNTER                                          SUB
      NARG=NARG+1                                                       SUB
      IF(NEXT(JPTR) .EQ. RPAR) GO TO 30                                 SUB
      IF(A(JPTR-1) .NE. COMMA) GO TO 50                                 SUB
      GO TO 20                                                          SUB
   30 LOC=1                                                             SUB
      D(1)=IE                                                           SUB
C** CHECK NO. OF ARGUMENTS AND STORE IN SYMBOL TABLE                     SUB
      IF(NARG .GT. 63) CALL ERROR(83)                                   SUB
      IDTBL(3,LOC)=BITPUT(IDTBL(3,LOC),NARG,7)                          SUB
      IF(ITYP .EQ. 30) RETURN                                           SUB
      IF(ISTATE .EQ. 0) GO TO 55                                        SUB
C** IF TYPED FUNCTION, STORE TYPE AND SET "TYPE SET" FLAG                SUB
      IDTBL(3,LOC)=BITPUT(IDTBL(3,LOC),ISTATE,10)                       SUB
      IDTBL(3,LOC)=BITPUT(IDTBL(3,LOC),1,11)                            SUB
      RETURN                                                            SUB
C** SET FUNCTION TYPE IMPLICITLY                                         SUB
   55 CALL IMPTYP                                                       SUB
      RETURN                                                            SUB
   50 CALL ERROR(7)                                                     SUB
      RETURN                                                            SUB
   60 CALL ERROR(86,NXTID)                                              SUB
      RETURN                                                            SUB
      END                                                               SUB
```

```
      SUBROUTINE SUBCHK                                                 SUBCHK      2
      COMMON A(1326),D(500),IDTBL(8,500),INITID(3),LASTID(3),ISRCH(3),  RICH        2
     * JPTR,N,M,JTYP,LSTART,N2,IFNCNM,LOGID,NXTID,IDTYP,NID,LOC,        CY58A      80
     2 LTYP,ITYP,IBLKDT,MODE,IERR,IDES                                  RICH        4
      COMMON/GLOBAL/NBLK,NREF,NSUBS,BLKTBL(200),EXTTBL(100),ISUBS(100)  SUBCHK      4
      COMMON/LIST/NLIST,NINTFC,ISUBLT(2,200),INTFAC(300)                SUBCHK      5
      INTEGER BITPUT,BITGET                                             SUBCHK      6
C** AFTER PROCESSING OF THE MODULE IS COMPLETED, THIS ROUTINE IS CALLED SUBCHK      7
C** TO PROCESS THE SUBROUTINE NAME AND ARGUMENT LIST                   SUBCHK      8
      IF(IBLKDT .EQ. 1) RETURN                                          SUBCHK      9
C** INCREMENT SUBROUTINE COUNTER                                       SUBCHK     10
      NSUBS=NSUBS+1                                                     SUBCHK     11
      IF(NSUBS .GT. 100) GO TO 50                                       SUBCHK     12
C** GET NUMBER OF ARGUMENTS AND TYPE                                   SUBCHK     13
      NARG=BITGET(IDTBL(3,1),7,6)                                       SUBCHK     14
      ITP=BITGET(IDTBL(3,1),10,3)                                       SUBCHK     15
      IF(BITGET(IDTBL(3,1),18,1) .EQ. 1) GO TO 15                       SUBCHK     16
C** MODULE ARGUMENT LIST HAS NOT YET BEEN ENCOUNTERED - SET FLAG       SUBCHK     17
      IDTBL(3,1)=BITPUT(IDTBL(3,1),1,18)                                SUBCHK     18
C** SEARCH SESCOMP LIST                                                SUBCHK     19
      DO 5 I=1,NLIST                                                    SUBCHK     20
      IF(IDTBL(1,1) .NE. ISUBLT(1,I)) GO TO 5                           SUBCHK     21
C** NAME FOUND IN SESCOMP LIST                                         SUBCHK     22
      LISTLC=I                                                          SUBCHK     23
C** STORE LIST LOCATION IN SYMBOL TABLE                                SUBCHK     24
      IDTBL(3,1)=BITPUT(IDTBL(3,1),LISTLC,36)                           SUBCHK     25
      GO TO 20                                                          SUBCHK     26
    5 CONTINUE                                                          SUBCHK     27
C** NAME NOT FOUND IN SESCOMP LIST - ISSUE DIAGNOSTIC                  SUBCHK     28
      CALL ERROR(52)                                                    SUBCHK     29
C** ADD NAME TO SESCOMP LIST                                           SUBCHK     30
      NLIST=NLIST+1                                                     SUBCHK     31
      ISUBLT(1,NLIST)=IDTBL(1,1)                                        SUBCHK     32
C** ADD NAME TO SUBROUTINE TABLE                                       SUBCHK     33
      ISUBS(NSUBS)=NLIST                                                SUBCHK     34
      ISUBLT(2,NLIST)=0                                                 SUBCHK     35
C** STORE LIST LOCATION IN SYMBOL TABLE                                SUBCHK     36
      IDTBL(3,1)=BITPUT(IDTBL(3,1),NLIST,36)                            SUBCHK     37
      IF(NARG .EQ. 0) RETURN                                            SUBCHK     38
C** MODULE HAS ARGUMENTS-STORE ATTRIBUTES IN INTERFACE DEFINITION TABLE SUBCHK     39
      IPTR=NINTFC+1                                                     SUBCHK     40
C** STORE POINTER TO INTERFACE DEFINITION TABLE AND NUMBER OF ARGS.     SUBCHK     41
      ISUBLT(2,NLIST)=BITPUT(IPTR,NARG,6)                               SUBCHK     42
C** STORE TYPE                                                         SUBCHK     43
      ISUBLT(2,NLIST)=BITPUT(ISUBLT(2,NLIST),ITP,13)                    SUBCHK     44
      NINTFC=IPTR+(NARG-1)/6                                            SUBCHK     45
      KOUNT=0                                                           SUBCHK     46
C** THESE TWO LOOPS CONSTRUCT THE INTERFACE DEFINITION FOR THE MODULE  SUBCHK     47
      DO 10 I=IPTR,NINTFC                                               SUBCHK     48
      INTFAC(I)=0                                                       SUBCHK     49
      ICOL1=-6                                                          SUBCHK     50
      ICOL2=-3                                                          SUBCHK     51
      DO 10 J=1,6                                                       SUBCHK     52
      KOUNT=KOUNT+1                                                     SUBCHK     53
      IF(KOUNT .GT. NARG) RETURN                                        SUBCHK     54
      ICOL1=ICOL1+9                                                     SUBCHK     55
      ICOL2=ICOL2+9                                                     SUBCHK     56
```

```
C** GET TYPE AND DIMENSIONALITY OF NEXT ARGUMENT                        SUBCHK
      ITP=BITGET(IDTBL(3,KOUNT+1),10,3)                                 SUBCHK
      NDIM=BITGET(IDTBL(3,KOUNT+1),7,6)                                 SUBCHK
      IDTBL(3,KOUNT+1)=BITPUT(IDTBL(3,KOUNT+1),1,37)                    SUBCHK
C** STORE IN INTERFACE DEFINITION                                       SUBCHK
      INTFAC(I)=BITPUT(INTFAC(I),ITP,ICOL1)                             SUBCHK
   10 INTFAC(I)=BITPUT(INTFAC(I),NDIM,ICOL2)                            SUBCHK
      RETURN                                                            SUBCHK
C** MODULE PREVIOUSLY ENCOUNTERED - GET SESCOMP LIST LOCATION           SUBCHK
C** FROM SYMBOL TABLE                                                  SUBCHK
   15 LISTLC=BITGET(IDTBL(3,1),36,9)                                    SUBCHK
C** STORE NAME IN SUBROUTINE TABLE                                      SUBCHK
   20 ISUBS(NSUBS)=LISTLC                                               SUBCHK
C** GET MODULE CLASS AND NO. OF ARGUMENTS                               SUBCHK
      KLAS=BITGET(ISUBLT(2,LISTLC),10,4)                                SUBCHK
      NAR2=BITGET(ISUBLT(2,LISTLC),6,6)                                 SUBCHK
C** CHECK NO. OF ARGUMENTS                                              SUBCHK
      IF(NARG .NE. NAR2) CALL ERROR(26,IDTBL(1,1))                      SUBCHK
      NARGS=MIN0(NARG,NAR2)                                             SUBCHK
C** CHECK TYPE                                                          SUBCHK
      IF(ITP.NE.BITGET(ISUBLT(2,LISTLC),13,3))CALL ERROR(49,IDTBL(1,1)) SUBCHK
      IF(NARGS .EQ. 0) RETURN                                           SUBCHK
C** MODULE HAS ARGUMENTS - CHECK INTERFACE DEFINITION FOR VALIDITY      SUBCHK
C** COMPUTE INTERFACE DEFINITION TABLE POINTERS                         SUBCHK
      IPTR=BITGET(ISUBLT(2,LISTLC),60,15)                               SUBCHK
      NDPTR=IPTR+(NARGS-1)/6                                            SUBCHK
      KOUNT=0                                                           SUBCHK
C** THESE TWO LOOPS CHECK THE ARGUMENTS AGAINST THE INTERFACE DEFINITION SUBCHK
      DO 25 I=IPTR,NDPTR                                                SUBCHK
      ICOL1=-6                                                          SUBCHK
      ICOL2=-3                                                          SUBCHK
      DO 25 J=1,6                                                       SUBCHK
      KOUNT=KOUNT+1                                                     SUBCHK
      IF(KOUNT .GT. NARGS) RETURN                                       SUBCHK
      ICOL1=ICOL1+9                                                     SUBCHK
      ICOL2=ICOL2+9                                                     SUBCHK
C** GET TYPE AND DIMENSIONALITY FROM INTERFACE DEFINITION TABLE         SUBCHK
      ITP=BITGET(INTFAC(I),ICOL1,3)                                     SUBCHK
      NDIM=BITGET(INTFAC(I),ICOL2,3)                                    SUBCHK
C** GET TYPE AND DIMENSIONALITY FROM SYMBOL TABLE                       SUBCHK
      ITP2=BITGET(IDTBL(3,KOUNT+1),10,3)                                SUBCHK
      NDIM2=BITGET(IDTBL(3,KOUNT+1),7,6)                                SUBCHK
C** GET I/O STATUS FROM INTERFACE DEFINITION TABLE                      SUBCHK
      IOSTAT=BITGET(INTFAC(I),ICOL2+3,3)                                SUBCHK
      IF(IOSTAT .EQ. 2 .OR. KLAS .EQ. 0) IOSTAT=1                       SUBCHK
      IDTBL(3,KOUNT+1)=BITPUT(IDTBL(3,KOUNT+1),IOSTAT,37)               SUBCHK
C** CHECK DIMENSIONALITY                                                SUBCHK
      IF(NDIM .NE. NDIM2) CALL ERROR(50,KOUNT)                          SUBCHK
      IF(ITP2 .NE. 0) GO TO 23                                          SUBCHK
      ITP2=1                                                            SUBCHK
      IFST=BITGET(IDTBL(1,KOUNT+1),6,6)                                 SUBCHK
      IF(IFST .LE. 14 .AND. IFST .GE. 9) ITP2=4                         SUBCHK
C** CHECK TYPE                                                          SUBCHK
   23 IF(ITP .NE. ITP2) CALL ERROR(51,KOUNT)                            SUBCHK
   25 CONTINUE                                                          SUBCHK
      RETURN                                                            SUBCHK
   50 CALL ERROR(25)                                                    SUBCHK
      STOP                                                              SUBCHK
      END                                                               SUBCHK
```

```
      SUBROUTINE SWITCH                                                 SWITCH      2
      COMMON A(1326),D(500),IDTBL(8,500),INITID(3),LASTID(3),ISRCH(3),  RICH       2
     * JPTR,N,M,JTYP,LSTART,N2,IFNCNM,LOGID,NXTID,IDTYP,NID,LOC,        CY58A      80
     2 LTYP,ITYP,IBLKDT,MODE,IERR,IDES                                  RICH        4
C** THIS ROUTINE SWITCHES THE SYMBOL TABLE STORAGE OF A NAME FROM       SWITCH      4
C** VARIABLE TO FUNCTION                                               SWITCH      5
      DO 20 I=1,NID                                                     SWITCH      6
      IF(IDTBL(2,I) .NE. LOC) GO TO 20                                  SWITCH      7
      IDTBL(2,I)=IDTBL(2,LOC)                                           SWITCH      8
C** CHANGE SYMBOL TABLE POINTER                                         SWITCH      9
      IF(LASTID(1) .EQ. LOC) LASTID(1)=I                                SWITCH     10
      GO TO 30                                                          SWITCH     11
   20 CONTINUE                                                          SWITCH     12
      INITID(1)=IDTBL(2,LOC)                                            SWITCH     13
C** ADD NAME TO FUNCTION LIST                                           SWITCH     14
   30 LAST=LASTID(2)                                                    SWITCH     15
      IDTBL(2,LAST)=LOC                                                 SWITCH     16
      IDTBL(2,LOC)=0                                                    SWITCH     17
      LASTID(2)=LOC                                                     SWITCH     18
      CALL ERROR(87,IDTBL(1,LOC))                                       SWITCH     19
      RETURN                                                            SWITCH     20
      END                                                               SWITCH     21
```

```
      SUBROUTINE SYMTAB                                                 SYMTAB      2
      COMMON A(1326),D(500),IDTBL(8,500),INITID(3),LASTID(3),ISRCH(3),  RICH        2
     * JPTR,N,M,JTYP,LSTART,N2,IFNCNM,LOGID,NXTID,IDTYP,NID,LOC,        CY58A      80
     2 LTYP,ITYP,IBLKDT,MODE,IERR,IDES                                  RICH        4
      COMMON/LABELS/STATRA(2,200),NLABEL                                SYMTAB      4
      COMMON/LIST/NLIST,NINTFC,ISUBLT(2,200),INTFAC(300)                SYMTAB      5
      COMMON/STFUNC/NSTFNC,ISTFNC(10)                                   SYMTAB      6
      DIMENSION ITABEL(5)                                               SYMTAB      7
      INTEGER TYPE(5),DIMS(3),BITGET,STATRA                             SYMTAB      8
      DATA (TYPE(I),I=1,5)/4HREAL,6HCOMPLX,6HDOUBLE,6HINTEGR,6HLOGICL/  SYMTAB      9
      DATA (DIMS(I),I=1,3)/1H1,1H2,1H3/                                 SYMTAB     10
C** THIS ROUTINE DISPLAYS THE SYMBOL TABLE                              SYMTAB     11
      IF(NID .LE. 1) RETURN                                             SYMTAB     12
      IF(IBLKDT .EQ. 1) GO TO 2                                         SYMTAB     13
      INTL=INITID(2)                                                    SYMTAB     14
C** DISPLAY HEADING                                                     SYMTAB     15
      WRITE(6,1) IDTBL(1,INTL)                                          SYMTAB     16
    1 FORMAT(//////45X,25H SYMBOL TABLE FOR MODULE ,A6)                 SYMTAB     17
      GO TO 4                                                           SYMTAB     18
    2 WRITE(6,3)                                                        SYMTAB     19
    3 FORMAT(//////46X,28H SYMBOL TABLE FOR BLOCK DATA)                 SYMTAB     20
    4 LOC=INITID(1)                                                     SYMTAB     21
      IF(LOC .EQ. 0) GO TO 28                                           SYMTAB     22
C** DISPLAY VARIABLES                                                   SYMTAB     23
      WRITE(6,5)                                                        SYMTAB     24
    5 FORMAT(//56X,9HVARIABLES/30X,4HNAME,12X,4HTYPE,31X,10HRELOCATION) SYMTAB     25
  100 ITABEL(1)=IDTBL(1,LOC)                                            SYMTAB     26
C** SKIP IF NOT USED                                                    SYMTAB     27
      IF(BITGET(IDTBL(3,LOC),11,1) .EQ. 0) GO TO 27                     SYMTAB     28
C** GET TYPE                                                            SYMTAB     29
      I=BITGET(IDTBL(3,LOC),10,3)                                       SYMTAB     30
      ITABEL(2)=TYPE(I)                                                 SYMTAB     31
      IF(BITGET(IDTBL(3,LOC),1,1) .EQ. 0) GO TO 16                      SYMTAB     32
C** GET DIMENSIONALITY                                                  SYMTAB     33
      ITABEL(3)=5HARRAY                                                 SYMTAB     34
      I=BITGET(IDTBL(3,LOC),7,6)                                        SYMTAB     35
      ITABEL(4)=DIMS(I)                                                 SYMTAB     36
      GO TO 18                                                          SYMTAB     37
   16 ITABEL(3)=1H                                                      SYMTAB     38
      ITABEL(4)=1H                                                      SYMTAB     39
   18 IF(BITGET(IDTBL(3,LOC),12,1) .EQ. 0) GO TO 20                     SYMTAB     40
C** VARIABLE IS FORMAL PARAMETER                                        SYMTAB     41
      ITABEL(5)=5HF. P.                                                 SYMTAB     42
      GO TO 25                                                          SYMTAB     43
   20 IF(BITGET(IDTBL(3,LOC),16,1) .EQ. 1) GO TO 22                     SYMTAB     44
      ITABEL(5)=1H                                                      SYMTAB     45
      GO TO 25                                                          SYMTAB     46
C** VARIABLE IN COMMON - GET COMMON BLOCK NAME                          SYMTAB     47
   22 ICOMNM=IDTBL(6,LOC)                                               SYMTAB     48
      ITABEL(5)=IDTBL(1,ICOMNM)                                         SYMTAB     49
      IF(ITABEL(5) .EQ. 1H ) ITABEL(5)=2H//                             SYMTAB     50
C** DISPLAY LINE                                                        SYMTAB     51
   25 WRITE(6,26) (ITABEL(I),I=1,5)                                     SYMTAB     52
   26 FORMAT(30X,A6,11X,A6,14X,A5,1X,A1,7X,A6)                          SYMTAB     53
   27 LOC=IDTBL(2,LOC)                                                  SYMTAB     54
      IF(LOC .NE. 0) GO TO 100                                          SYMTAB     55
   28 IF(IBLKDT .EQ. 1) GO TO 60                                        SYMTAB     56
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      LOC=IDTBL(2,INTL)                                                 SYMTAB     57
      IF(LOC .EQ. 0) GO TO 60                                           SYMTAB     58
C** DISPLAY EXTERNALS                                                   SYMTAB     59
      WRITE(6,31)                                                       SYMTAB     60
   31 FORMAT(//55X,10H EXTERNALS/44X,4HNAME,10X,4HTYPE,10X,4HARGS)      SYMTAB     61
   30 ITABEL(1)=IDTBL(1,LOC)                                            SYMTAB     62
C** GET SESCOMP LIST LOCATION                                           SYMTAB     63
      LISTLC=BITGET(IDTBL(3,LOC),36,9)                                  SYMTAB     64
      IF(LISTLC .EQ. 0) GO TO 39                                        SYMTAB     65
C** GET TYPE                                                            SYMTAB     66
      ITP=BITGET(ISUBLT(2,LISTLC),13,3)                                 SYMTAB     67
      IF(ITP .EQ. 0) GO TO 32                                           SYMTAB     68
      ITABEL(2)=TYPE(ITP)                                               SYMTAB     69
      GO TO 35                                                          SYMTAB     70
   32 ITABEL(2)=1H                                                      SYMTAB     71
   35 IF(BITGET(ISUBLT(2,LISTLC),14,1) .EQ. 1) GO TO 37                 SYMTAB     72
C** GET NUMBER OF ARGUMENTS                                             SYMTAB     73
      ITABEL(3)=BITGET(ISUBLT(2,LISTLC),6,6)                            SYMTAB     74
C** DISPLAY LINE                                                        SYMTAB     75
      WRITE(6,36) (ITABEL(I),I=1,3)                                     SYMTAB     76
   36 FORMAT(44X,A6,8X,A6,8X,I2)                                        SYMTAB     77
      GO TO 39                                                          SYMTAB     78
   37 WRITE(6,38) ITABEL(1),ITABEL(2)                                   SYMTAB     79
   38 FORMAT(44X,A6,8X,A6,8X,2H>1)                                      SYMTAB     80
   39 LOC=IDTBL(2,LOC)                                                  SYMTAB     81
      IF(LOC .NE. 0) GO TO 30                                           SYMTAB     82
   60 IF(NSTFNC .EQ. 0) GO TO 40                                        SYMTAB     83
C** DISPLAY STATEMENT FUNCTIONS                                         SYMTAB     84
      WRITE(6,62)                                                       SYMTAB     85
   62 FORMAT(//50X,20H STATEMENT FUNCTIONS/                             SYMTAB     86
     $ 44X,4HNAME,10X,4HTYPE,10X,4HARGS)                                SYMTAB     87
      DO 70 I=1,NSTFNC                                                  SYMTAB     88
C** GET SYMBOL TABLE LOCATION                                           SYMTAB     89
      LC=ISTFNC(I)                                                      SYMTAB     90
C** GET TYPE                                                            SYMTAB     91
      ITP=BITGET(IDTBL(3,LC),10,3)                                      SYMTAB     92
C** GET NUMBER OF ARGUMENTS                                             SYMTAB     93
      NRG=BITGET(IDTBL(3,LC),7,6)                                       SYMTAB     94
C** DISPLAY LINE                                                        SYMTAB     95
   70 WRITE(6,36) IDTBL(1,LC),TYPE(ITP),NRG                             SYMTAB     96
   40 IF(NLABEL .EQ. 0) GO TO 50                                        SYMTAB     97
C** DISPLAY STATEMENT NUMBERS                                           SYMTAB     98
      WRITE(6,42)                                                       SYMTAB     99
   42 FORMAT(//51X,17H STATEMENT LABELS)                                SYMTAB    100
      WRITE(6,45) (STATRA(1,I),I=1,NLABEL)                              SYMTAB    101
   45 FORMAT(40X,5I8)                                                   SYMTAB    102
      DO 47 I=1,NLABEL                                                  SYMTAB    103
      IF(BITGET(STATRA(2,I),9,3) .NE. 1) CALL ERROR(15,STATRA(1,I))     SYMTAB    104
      IF(BITGET(STATRA(2,I),12,3) .NE. 1) CALL ERROR(16,STATRA(1,I))    SYMTAB    105
   47 CONTINUE                                                          SYMTAB    106
   50 LOC=INITID(3)                                                     SYMTAB    107
      IF(LOC .EQ. 0) RETURN                                             SYMTAB    108
C** DISPLAY COMMON BLOCKS                                               SYMTAB    109
      WRITE(6,52)                                                       SYMTAB    110
   52 FORMAT(//53X,14H COMMON BLOCKS/50X,4HNAME,10X,6HLENGTH)           SYMTAB    111
   51 ITABEL(1)=IDTBL(1,LOC)                                            SYMTAB    112
      IF(ITABEL(1) .EQ. 1H ) ITABEL(1)=2H//                             SYMTAB    113
      WRITE(6,55) ITABEL(1),IDTBL(4,LOC)                                SYMTAB    114
   55 FORMAT(50X,A6,8X,I8)                                              SYMTAB    115
      LOC=IDTBL(2,LOC)                                                  SYMTAB    116
      IF(LOC .NE. 0) GO TO 51                                           SYMTAB    117
      RETURN                                                            SYMTAB    118
      END                                                               SYMTAB    119
```

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      SUBROUTINE TYPE                                                   TYPE      2
      COMMON A(1326),D(500),IDTBL(8,500),INITID(3),LASTID(3),ISRCH(3),  RICH      2
     * JPTR,N,M,JTYP,LSTART,N2,IFNCNM,LOGID,NXTID,IDTYP,NID,LOC,        CY58A    80
     2 LTYP,ITYP,IBLKDT,MODE,IERR,IDES                                  RICH      4
      DIMENSION IALPH1(7),IALPH2(7),IALPH3(4),IALPH4(7),IALPH5(15),     TYPE      4
     1 IDIM(3)                                                          TYPE      5
      INTEGER A,RPAR,COMMA,BLANK                                        TYPE      6
      INTEGER BITPUT,BITGET,COMLOC                                      TYPE      7
      DATA (IALPH1(I),I=1,7)/1HL,1HO,1HG,1HI,1HC,1HA,1HL/,              TYPE      8
     1 (IALPH2(I),I=1,7) /1HI,1HN,1HT,1HE,1HG,1HE,1HR/,                 TYPE      9
     2 (IALPH3(I),I=1,4)/1HR,1HE,1HA,1HL/,                              TYPE     10
     3 (IALPH4(I),I=1,7)/1HC,1HO,1HM,1HP,1HL,1HE,1HX/,                  TYPE     11
     4 (IALPH5(I),I=1,15)/1HD,1HO,1HU,1HB,1HL,1HE,1HP,1HR,1HE,1HC,      TYPE     12
     5 1HI,1HS,1HI,1HO,1HN/                                             TYPE     13
      DATA LPAR/1H(/,RPAR/1H)/,COMMA/1H,/,BLANK/1H /                    TYPE     14
C** TYPE STATEMENT PROCESSOR                                            TYPE     15
      MUL=1                                                             TYPE     16
      IT=ITYP-18                                                        TYPE     17
      GO TO (10,20,30,40,50),IT                                         TYPE     18
C** INTEGER STATEMENT                                                   TYPE     19
   10 DO 15 I=1,7                                                       TYPE     20
      IF(NEXT(JPTR) .NE. IALPH2(I)) GO TO 110                           TYPE     21
   15 CONTINUE                                                          TYPE     22
      ISTATE=4                                                          TYPE     23
      GO TO 60                                                          TYPE     24
C** REAL STATEMENT                                                      TYPE     25
   20 DO 25 I=1,4                                                       TYPE     26
      IF(NEXT(JPTR) .NE. IALPH3(I)) GO TO 110                           TYPE     27
   25 CONTINUE                                                          TYPE     28
      ISTATE=1                                                          TYPE     29
      GO TO 60                                                          TYPE     30
C** DOUBLE PRECISION STATEMENT                                          TYPE     31
   30 DO 35 I=1,15                                                      TYPE     32
      IF(NEXT(JPTR) .NE. IALPH5(I)) GO TO 110                           TYPE     33
   35 CONTINUE                                                          TYPE     34
      MUL=2                                                             TYPE     35
      ISTATE=3                                                          TYPE     36
      GO TO 60                                                          TYPE     37
C** COMPLEX STATEMENT                                                   TYPE     38
   40 DO 45 I=1,7                                                       TYPE     39
      IF(NEXT(JPTR) .NE. IALPH4(I)) GO TO 110                           TYPE     40
   45 CONTINUE                                                          TYPE     41
      MUL=2                                                             TYPE     42
      ISTATE=2                                                          TYPE     43
      GO TO 60                                                          TYPE     44
C** LOGICAL STATEMENT                                                   TYPE     45
   50 DO 55 I=1,7                                                       TYPE     46
      IF(NEXT(JPTR) .NE. IALPH1(I)) GO TO 110                           TYPE     47
   55 CONTINUE                                                          TYPE     48
      ISTATE=5                                                          TYPE     49
   60 ISUB=0                                                            TYPE     50
      INCR=MUL                                                          TYPE     51
C** GET NEXT VARIABLE IN TYPE STATEMENT                                 TYPE     52
      CALL GNLE                                                         TYPE     53
      IF(JTYP .NE. 2) GO TO 110                                         TYPE     54
      CALL SEARCH                                                       TYPE     55
      IF(ISRCH(2) .EQ. 1) CALL ERROR(10,NXTID)                          TYPE     56
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      IF(ISRCH(1) .EQ. 1) GO TO 62                                      TYPE      57
C** STORE IN SYMBOL TABLE IF NOT FOUND                                  TYPE      58
      IDTYP=1                                                           TYPE      59
      CALL STORE                                                        TYPE      60
      LOC=NID                                                           TYPE      61
C** IF PREVIOUSLY TYPED, ISSUE DIAGNOSTIC                               TYPE      62
   62 IF(BITGET(IDTBL(3,LOC),11,1) .NE. 0) GO TO 120                    TYPE      63
      IF(NEXT(JPTR) .NE. LPAR) GO TO 87                                 TYPE      64
C** DIMENSIONED VARIABLE                                                TYPE      65
      ISUB=1                                                            TYPE      66
      IE=LOC                                                            TYPE      67
      I=0                                                               TYPE      68
   68 I=I+1                                                             TYPE      69
C** GET NEXT DIMENSION                                                  TYPE      70
      CALL GNLE                                                         TYPE      71
      IF(JTYP .NE. 5) GO TO 65                                          TYPE      72
C** DIMENSION IS A CONSTANT, CHECK SIZE                                 TYPE      73
      IDIM(I)=N2                                                        TYPE      74
      IF(N2 .GT. (2**17-1) .OR. N2 .LE. 0) CALL ERROR(8)                TYPE      75
      INCR=INCR*N2                                                      TYPE      76
      GO TO 67                                                          TYPE      77
   65 IF(JTYP .NE. 2) GO TO 110                                         TYPE      78
C** VARIABLE DIMENSION, STORE IN SYMBOL TABLE AND CHECK VALIDITY        TYPE      79
      CALL SEARCH                                                       TYPE      80
      IF(ISRCH(2) .EQ. 1) CALL ERROR(10,NXTID)                          TYPE      81
      IF(ISRCH(1) .EQ. 1) GO TO 66                                      TYPE      82
      IDTYP=1                                                           TYPE      83
      CALL STORE                                                        TYPE      84
      LOC=NID                                                           TYPE      85
   66 IF(BITGET(IDTBL(3,LOC),12,1) .NE. 1) CALL ERROR(9)                TYPE      86
      IF(BITGET(IDTBL(3,LOC),1,1) .NE. 0) GO TO 130                     TYPE      87
C** SET TYPE AND MAKE SURE IT IS INTEGER                                TYPE      88
      CALL IMPTYP                                                       TYPE      89
      IF(BITGET(IDTBL(3,LOC),10,3) .NE. 4) CALL ERROR(9)                TYPE      90
      IDTBL(3,LOC)=BITPUT(IDTBL(3,LOC),1,13)                            TYPE      91
      IDIM(I)=2**17+LOC                                                 TYPE      92
   67 IF(NEXT(JPTR) .EQ. COMMA) GO TO 68                                TYPE      93
      IF(A(JPTR-1) .NE. RPAR) GO TO 110                                 TYPE      94
      K=NEXT(JPTR)                                                      TYPE      95
      LOC=IE                                                            TYPE      96
C** CHECK THAT VARIABLE IS NOT PREVIOUSLY DIMENSIONED                   TYPE      97
C** SET "DIMENSIONED" FLAG                                              TYPE      98
      IF(BITGET(IDTBL(3,LOC),1,1) .NE. 0) CALL ERROR(11,IDTBL(1,LOC))   TYPE      99
      IDTBL(3,LOC)=BITPUT(IDTBL(3,LOC),1,1)                             TYPE     100
      IF(I .GT. 3) GO TO 110                                            TYPE     101
      IF(I-2) 85,80,75                                                  TYPE     102
C** STORE NO. OF DIMENSIONS AND DIMENSION SIZES IN SYMBOL TABLE         TYPE     103
   75 IDTBL(4,LOC)=BITPUT(IDTBL(4,LOC),IDIM(3),36)                      TYPE     104
   80 IDTBL(4,LOC)=BITPUT(IDTBL(4,LOC),IDIM(2),18)                      TYPE     105
   85 IDTBL(3,LOC)=BITPUT(IDTBL(3,LOC),IDIM(1),36)                      TYPE     106
      IDTBL(3,LOC)=BITPUT(IDTBL(3,LOC),I,7)                             TYPE     107
   87 IF(INCR .EQ. 1) GO TO 90                                          TYPE     108
      IF(BITGET(IDTBL(3,LOC),16,1) .NE. 1) GO TO 90                     TYPE     109
C** VARIABLE IN COMMON, RESET COMMON BLOCK SIZE IF NECESSARY            TYPE     110
      COMLOC=IDTBL(6,LOC)                                               TYPE     111
      IDTBL(4,COMLOC)=IDTBL(4,COMLOC)+INCR-1                            TYPE     112
C** SET "TYPE SET" FLAG AND STORE TYPE IN SYMBOL TABLE                  TYPE     113
   90 IDTBL(3,LOC)=BITPUT(IDTBL(3,LOC),ISTATE,10)                       TYPE     114
      IDTBL(3,LOC)=BITPUT(IDTBL(3,LOC),1,11)                            TYPE     115
      IF(A(JPTR-1) .EQ. COMMA) GO TO 60                                 TYPE     116
      IF(NEXT(JPTR) .EQ. BLANK) RETURN                                  TYPE     117
  110 CALL ERROR(7)                                                     TYPE     118
      RETURN                                                            TYPE     119
  120 CALL ERROR(12,NXTID)                                              TYPE     120
      RETURN                                                            TYPE     121
  130 CALL ERROR(14,NXTID)                                              TYPE     122
      RETURN                                                            TYPE     123
      END                                                               TYPE     124
```

Auxiliary Programs and Associated Data

Program GRAPH

```
      PROGRAM GRAPH(INPUT,TAPE4)
      DIMENSION INT(1000)
   10 FORMAT(12I6)
   20 FORMAT(2I6,A6,I6,A6,7I6/A6,2I6,A6,3I6,A6,I6,A6,2I6/A6,4I6,A6,3I6,
     $ A6,2I6/A6,2I6,A6,8I6/A6,I6,A6,I6,A6,I6,A6,3I6,2A6/3I6,A6,3I6,A6,
     $ 3I6,A6/7I6,A6,4I6/5I6,A6,6I6/(12I6))
      READ 10,(INT(I),I=1,11)
      WRITE(4) (INT(I),I=1,11)
      READ 20,INT
      WRITE(4) INT
      READ 10,INT
      WRITE(4) INT
      READ 10,INT
      WRITE(4) INT
      READ 10,INT
      WRITE(4) INT
      READ 10,INT(1)
      WRITE(4) INT(1)
      READ 10,(INT(I),I=1,34)
      WRITE(4) (INT(I),I=1,34)
      STOP
      END
```

Syntax Graph

1000	99	17	8	17	0	21	74	0	0	1	
359	60'		1-		2	103	103	67	3	3	4
\	72	5RL		0	669	483		10CP		10000	349
•	7	480	795	795DP		20000	21	81		9	42
	18	480'		930	10	935	6	183	935	480	256
(	120		235		13"		14	346	47(	OR	
15	795	795>		16	391	411NT		17	322	359X	
19	28	47	359	29	935	977>		110	67	318	318
29	228	359	40	935/		130	3	72	11	72	60
29	60	999	99	100	101	102	103	104	105	106	40
107	62	109	111	112	113	114	115	116	117	118	119
10	120	122	123	124	125	126	127	81	62	128	21
131	133	134	135	136	137	157	138	93	140	142	143
144	145	146	147	81	480	148	151	152	153	154	155
156	110	157	159	93	114	160	163	164	165	166	167
168	285	60	169	172	173	86	174	88	130	176	179
135	114	72	180	184	185	186	187	188	189	516	190
192	193	194	195	86	130	196	199	133	200	202	203
204	205	206	207	208	209	210	211	212	103	126	208
213	217	208	218	220	221	222	223	224	710	225	553
227	182	229	231	480	292	232	235	126	236	150	238
566	240	242	243	244	157	245	247	248	182	249	251
252	253	254	255	256	257	258	318	150	259	262	175
263	591	265	593	267	269	270	271	272	273	274	228
275	277	278	279	280	281	282	283	284	175	285	287
288	289	290	291	292	293	294	228	295	297	298	299
300	301	302	256	630	303	306	307	378	308	263	310
312	313	314	315	316	317	208	480	318	321	322	346
323	325	326	327	328	329	263	330	332	333	334	288
335	337	338	339	348	341	342	343	670	235	344	347
348	349	350	351	352	353	354	288	355	357	358	418
359	361	315	362	364	365	366	367	368	322	369	371
372	285	373	375	376	377	378	379	380	381	315	382
384	711	385	387	388	322	389	391	392	3	393	285
395	397	398	399	353	400	292	402	404	405	406	407

408	409	410	411	412	346	413	415	416	417	418	419
353	420	422	423	424	425	426	753	318	427	430	431
385	432	86	434	436	437	438	439	440	441	442	443
444	445	446	447	896	448	450	451	385	452	454	455
346	456	110	458	460	461	462	463	464	465	378	466
468	359	796	469	472	473	474	475	476	477	411	478
480	133	481	483	484	485	486	487	378	488	490	491
445	492	494	495	555	496	498	499	500	501	502	503
504	505	506	507	508	509	510	511	445	512	840	514
516	517	518	519	520	521	522	523	524	525	519	526
418	528	483	530	532	533	487	534	536	537	538	539
452	540	542	28	543	545	546	547	548	549	483	550
552	553	487	445	554	557	558	885	559	561	452	562
564	565	566	567	568	569	570	571	572	573	574	60
529	575	578	579	580	581	582	583	584	585	586	72
587	589	480	590	592	483	593	595	529	596	208	598
600	601	602	88	603	931	605	519	607	609	610	611
612	613	614	615	942	616	618	619	620	621	622	623
624	625	626	627	628	629	630	631	632	633	634	635
636	527	637	639	640	641	642	643	644	645	646	647
648	649	650	651	978	652	654	655	982	656	658	659
660	661	662	663	664	665	666	667	668	669	322	670
672	673	674	675	676	677	678	679	680	681	8	682
684	11	685	687	688	689	690	603	691	693	694	695
696	697	698	699	700	701	702	703	704	705	706	707
708	157	709	711	712	603	713	715	669	716	718	719
720	721	722	723	724	725	726	727	728	729	730	731
732	733	734	735	669	736	738	739	740	741	742	743
744	745	746	747	748	749	750	751	752	753	754	755
756	757	758	759	760	761	762	763	764	765	766	767
768	769	770	771	772	773	774	775	776	777	778	779
780	781	108	782	784	785	786	787	788	789	790	791
792	445	793	795	796	797	710	752	452	798	802	803
804	805	806	807	808	809	810	811	812	813	814	815
816	817	818	752	819	821	822	823	824	235	825	827
828	829	830	483	831	318	833	835	836	837	838	839
840	841	842	843	844	845	846	847	848	839	849	851
852	853	854	855	856	857	858	859	860	861	862	863
864	865	866	867	868	869	870	871	872	873	874	875
876	877	878	879	880	881	882	883	884	885	886	887
888	889	890	891	892	893	894	895	896	897	898	899
900	901	902	903	904	795	905	907	908	519	909	911
912	913	914	915	916	917	918	919	920	921	922	923
924	884	925	927	928	929	930	931	932	933	934	935
936	937	938	939	930	940	942	943	944	935	945	947
948	839	949	951	952	953	954	955	956	957	958	959
960	961	962	963	964	965	966	967	968	28	969	971
972	973	974	975	976	889	977	979	980	981	982	983
896	984	986	987	988	989	990	991	992	993	994	995
996	997	998	889								
43	89	4	683	6	66	8	149	710	657	21	24
12	89	617	17	268	19	800	44	28	23	783	13
26	228	130	29	820	31	241	89	266	35	305	37
38	36	130	15	4	345	129	191	89	4	130	178
50	428	94	89	54	471	56	515	445	67	42	61
560	710	839	65	606	5	346	69	653	12	896	73
686	15	4	78	93	535	10	33	889	15	84	555
86	577	89	87	88	10	8	89	597	386	93	98
519	108	100	101	102	103	104	105	106	107	109	96
111	93	112	113	114	115	116	117	118	119	120	122
4	123	124	125	126	127	128	131	1	175	133	4
134	135	136	137	138	140	182	142	133	143	144	145
146	147	148	151	7	130	152	153	154	155	156	157
159	208	160	163	157	228	164	165	166	167	168	169
172	315	5	173	174	176	89	179	89	29	180	184
208	555	11	185	186	187	188	189	190	192	28	193

194	195	196	199	10	603	200	202	235	203	204	205
206	207	208	209	210	211	212	213	217	5	89	110
218	220	452	221	222	223	224	225	227	483	229	25
231	133	232	235	130	235	236	238	3	240	157	242
30	243	244	245	247	89	248	249	251	150	252	253
254	255	256	257	258	259	262	89	3	263	265	519
267	80	269	16	270	271	272	273	274	275	277	256
278	279	280	281	282	283	284	285	287	3	288	289
290	291	292	293	294	295	297	285	298	299	300	301
302	303	306	346	34	307	308	310	411	312	29	313
314	315	316	317	318	321	1	130	322	323	325	445
326	327	328	329	330	332	292	333	334	335	337	263
338	339	340	341	342	343	344	347	59	2	348	349
350	351	352	353	354	355	357	889	358	359	361	89
362	364	256	365	366	367	368	369	371	208	372	373
375	89	376	377	378	379	380	381	382	384	285	385
387	51	388	389	391	126	392	393	395	21	397	13
398	399	400	402	208	404	1	405	406	407	408	409
410	411	412	413	415	89	416	417	418	419	420	422
89	423	424	425	426	427	430	49	5	431	432	434
29	436	529	437	438	439	440	441	442	443	444	445
446	447	448	450	935	451	452	454	418	455	456	458
13	460	288	461	462	463	464	465	466	468	89	469
472	4	53	473	474	475	476	477	478	480	378	481
483	263	484	485	486	487	488	490	13	491	492	494
29	495	496	498	603	499	500	501	502	503	504	505
506	507	508	509	510	511	512	514	480	516	55	517
518	519	520	521	522	523	524	525	526	528	62	530
3	532	669	533	534	536	76	537	538	539	540	542
89	543	545	47	546	547	548	549	550	552	710	553
554	557	83	6	558	559	561	60	562	564	5	565
566	567	568	569	570	571	572	573	574	575	578	81
85	579	580	581	582	583	584	585	586	587	589	529
590	592	7	593	595	14	596	598	95	600	110	601
602	603	605	669	607	64	609	89	610	611	612	613
614	615	616	618	40	619	620	621	622	623	624	625
626	627	628	629	630	631	632	633	634	635	636	637
639	5	640	641	642	643	644	645	646	647	648	649
650	651	652	654	68	655	656	658	90	659	660	661
662	663	664	665	666	667	668	669	670	672	385	673
674	675	676	677	678	679	680	681	682	684	3	685
687	72	688	689	690	691	693	89	694	695	696	697
698	699	700	701	702	703	704	705	706	707	708	709
711	182	712	713	715	9	716	718	208	719	720	721
722	723	724	725	726	727	728	729	730	731	732	733
734	735	736	738	88	739	740	741	742	743	744	745
746	747	748	749	750	751	752	753	754	755	756	757
758	759	760	761	762	763	764	765	766	767	768	769
770	771	772	773	774	775	776	777	778	779	780	781
782	784	22	785	786	787	788	789	790	791	792	793
795	114	796	797	798	802	89	18	487	803	804	805
806	807	808	809	810	811	812	813	814	815	816	817
818	819	821	28	822	823	824	825	827	322	828	829
830	831	833	752	835	40	836	837	838	839	840	841
842	843	844	845	846	847	848	849	851	884	852	853
854	855	856	857	858	859	860	861	862	863	864	865
866	867	868	869	870	871	872	873	874	875	876	877
878	879	880	881	882	883	884	885	886	887	888	889
890	891	892	893	894	895	896	897	898	899	900	901
902	903	904	905	907	15	908	909	911	62	912	913
914	915	916	917	918	919	920	921	922	923	924	925
927	930	928	929	930	931	932	933	934	935	936	937
938	939	940	942	977	943	944	945	947	3	948	949
951	4	952	953	954	955	956	957	958	959	960	961
962	963	964	965	966	967	968	969	971	710	972	973
974	975	976	977	979	89	980	981	982	983	984	986

89	987	988	989	990	991	992	993	994	995	996	997
998	999	99	3								
43	2	4	3	6	5	8	7	9	90	11	13
12	14	40	17	16	19	18	44	21	23	22	24
26	25	110	29	28	31	30	32	80	35	34	717
38	37	191	15	41	59	1	20	45	46	276	52
50	49	94	324	54	53	56	55	394	58	42	61
60	737	311	65	64	66	459	69	68	433	370	73
72	139	158	78	77	76	493	33	82	178	84	83
86	85	89	88	87	10	241	92	95	51	93	98
97	96	0	0	0	0	0	0	0	0	0	108
0	27	0	0	0	0	0	0	0	0	0	0
121	0	0	0	0	0	0	0	129	130	0	132
0	0	0	0	0	0	74	0	141	0	0	0
0	0	0	0	149	150	0	0	0	0	0	0
0	75	0	0	161	162	0	0	0	0	0	0
0	170	171	0	0	0	175	0	177	81	0	0
181	182	183	0	0	0	0	0	0	0	39	0
0	0	0	0	197	198	0	0	201	0	0	0
0	0	0	0	0	0	0	0	0	214	215	216
0	0	219	0	0	0	0	0	0	226	0	228
0	230	0	0	233	234	0	0	237	0	239	0
91	0	0	0	0	246	0	0	0	250	0	0
0	0	0	0	0	0	0	260	261	0	0	264
0	266	0	268	0	0	0	0	0	0	0	47
0	0	0	0	0	0	0	0	0	286	0	0
0	0	0	0	0	0	0	296	0	0	0	0
0	0	0	304	305	0	0	0	309	0	63	0
0	0	0	0	0	0	319	320	0	0	0	48
0	0	0	0	0	0	331	0	0	0	0	336
0	0	0	0	0	0	0	0	345	346	0	0
0	0	0	0	0	0	0	356	0	0	0	360
0	0	363	0	0	0	0	0	0	71	0	0
0	374	0	0	0	0	0	0	0	0	383	0
0	386	0	0	0	390	0	0	0	57	0	396
0	0	0	0	401	0	403	0	0	0	0	0
0	0	0	0	0	414	0	0	0	0	0	0
421	0	0	0	0	0	0	428	429	0	0	0
70	0	435	0	0	0	0	0	0	0	0	0
0	0	0	0	449	0	0	0	453	0	0	0
457	0	67	0	0	0	0	0	0	0	467	0
0	470	471	0	0	0	0	0	0	0	479	0
0	482	0	0	0	0	0	0	489	0	0	0
79	0	0	0	497	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	513	0	515	0
0	0	0	0	0	0	0	0	0	0	527	0
529	0	531	0	0	0	535	0	0	0	0	0
541	0	0	544	0	0	0	0	0	0	551	0
0	0	555	556	0	0	0	560	0	0	563	0
0	0	0	0	0	0	0	0	0	0	0	576
577	0	0	0	0	0	0	0	0	0	0	588
0	0	591	0	0	594	0	0	597	0	599	0
0	0	0	604	0	606	0	608	0	0	0	0
0	0	0	0	617	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	638	0	0	0	0	0	0	0	0	0	0
0	0	0	0	653	0	0	0	657	0	0	0
0	0	0	0	0	0	0	0	0	0	671	0
0	0	0	0	0	0	0	0	0	0	683	0
0	686	0	0	0	0	0	692	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	710	0	0	0	714	0	0	36	0	0	0
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0	0	0	0	62	0	0	0	0	0	0	0
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1	0	783	0	0	0	0	0	0	0	0	0
0	794	0	0	0	0	799	800	801	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	820	0	0	0	0	0	826	0	0
0	0	0	832	0	834	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	850	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
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0	0	0	0	0	906	0	0	0	910	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	925	0	0	0	0	0	0	0	0	0	0
0	0	0	0	941	0	0	0	0	946	0	0
0	950	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	970	0	0
0	0	0	0	0	978	0	0	0	0	0	0
985	0	0	0	0	0	0	0	0	0	0	0
0	0	0	1000								
96	76	99	97	99	97	96	96	76	97	76	97
99	76	97	99	97	96	96	99	76	99	97	236
99	97	72	96	96	99	97	76	97	99	97	232
99	97	72	99	77	97	96	97	76	77	72	72
99	97	99	72	99	97	99	97	72	76	99	99
97	72	72	99	97	236	72	99	97	73	72	99
97	73	73	96	76	96	72	99	72	73	96	96
96	96	96	236	96	99	73	76	96	97	96	96
76	96	0	0	0	0	0	0	0	0	0	236
0	76	0	0	0	0	0	0	0	0	0	0
77	0	0	0	0	0	0	0	236	76	0	77
0	0	0	0	0	0	76	0	76	0	0	0
0	0	0	0	236	76	0	0	0	0	0	0
0	76	0	0	76	76	0	0	0	0	0	0
0	76	77	0	0	0	76	0	76	76	0	0
76	76	77	0	0	0	0	0	0	0	236	0
0	0	0	0	77	76	0	0	76	0	0	0
0	0	0	0	0	0	0	0	0	77	76	76
0	0	76	0	0	0	0	0	0	76	0	236
0	76	0	0	76	76	0	0	77	0	76	0
236	0	0	0	0	76	0	0	0	76	0	0
0	0	0	0	0	0	0	76	77	0	0	76
0	236	0	236	0	0	0	0	0	0	0	76
0	0	0	0	0	0	0	0	0	77	0	0
0	0	0	0	0	0	0	76	0	0	0	0
0	0	0	76	236	0	0	0	76	0	76	0
0	0	0	0	0	0	77	76	0	0	0	76
0	0	0	0	0	0	76	0	0	0	0	76
0	0	0	0	0	0	0	0	236	77	0	0
0	0	0	0	0	0	0	76	0	0	0	76
0	0	76	0	0	0	0	0	0	76	0	0
0	76	0	0	0	0	0	0	0	0	76	0
0	236	0	0	0	76	0	0	0	76	0	77
0	0	0	0	76	0	77	0	0	0	0	0
0	0	0	0	0	76	0	0	0	0	0	0
76	0	0	0	0	0	0	236	77	0	0	0
76	0	76	0	0	0	0	0	0	0	0	0
0	0	0	0	76	0	0	0	76	0	0	0
77	0	76	0	0	0	0	0	0	0	76	0
0	77	236	0	0	0	0	0	0	0	76	0
0	76	0	0	0	0	0	0	77	0	0	0
76	0	0	0	76	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	76	0	236	0
0	0	0	0	0	0	0	0	0	0	76	0
77	0	76	0	0	0	236	0	0	0	0	0
76	0	0	76	0	0	0	0	0	0	76	0

0	0	236	77	0	0	0	236	0	0	77	0
0	0	0	0	0	0	0	0	0	0	0	76
236	0	0	0	0	0	0	0	0	0	0	76
0	0	77	0	0	77	0	0	236	0	76	0
0	0	0	76	0	236	0	76	0	0	0	0
0	0	0	0	236	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
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0	0	0	0	0	0	0	0	0	76	0	0
0	0	0	0	0	76	0	0	0	0	0	0
76	0	0	0	0	0	0	0	0	0	0	0
0	0	0	77								
0											
8	391	982	349	942	516	553	591	630	670	711	753
796	840	885	931	978	42	11	48	68	89	111	675
154	642	137	593	108	566	19	29	228	483		

Program SESLIST

```
      PROGRAM SESLIST(INPUT,OUTPUT,TAPE5=INPUT,LIST,TAPE4=LIST)
      INTEGER TYPE,CLASS,BLKTYP(100),BLKSIZ(100)
      DIMENSION ISUBLT(2,200),INTFAC(300),IARGS(200)
      EQUIVALENCE (BLKTYP(1),IARGS(1)),(BLKSIZ(1),IARGS(101))
      NLIST=0
      IPTR=1
    1 READ(5,5) NAME,NARGS,TYPE,CLASS,ISIZE
    5 FORMAT(A6,1X,3I2,1X,I6)
      IF(ISIZE .LT. 1) ISIZE=0
      IF(EOF(5) .NE. 0) GO TO 40
      NLIST=NLIST+1
      IVAR=0
      ISUBLT(1,NLIST)=NAME
      IF(NARGS .EQ. -1) NARGS=IVAR=1
      ISUBLT(2,NLIST)=SHIFT(NARGS,54) .OR. SHIFT(TYPE,47) .OR.
     $ SHIFT(CLASS,50) .OR. SHIFT(ISIZE,30)
      IF(NARGS .EQ. 0) GO TO 1
      ISUBLT(2,NLIST)=ISUBLT(2,NLIST) .OR. IPTR .OR. SHIFT(IVAR,46)
      IF(CLASS .EQ. 7) GO TO 25
      JPTR=IPTR
      INC=1+(NARGS-1)/6
      IPTR=IPTR+INC
      NOPTR=IPTR-1
      NPARAM=3*NARGS
      READ(5,10) (IARGS(I),I=1,NPARAM)
   10 FORMAT(20(3I1,1X))
      KOUNT=0
      DO 20 I=JPTR,NOPTR
      INTFAC(I)=0
      NSHIFT=60
      DO 20 K=1,18
      KOUNT=KOUNT+1
      IF(KOUNT .GT. NPARAM) GO TO 1
      NSHIFT=NSHIFT-3
   20 INTFAC(I)=INTFAC(I) .OR. SHIFT(IARGS(KOUNT),NSHIFT)
      GO TO 1
   25 JPTR=IPTR
      INC=1+(NARGS-1)/3
      IPTR=IPTR+INC
      NOPTR=IPTR-1
      READ(5,27) (BLKSIZ(I),BLKTYP(I),I=1,NARGS)
   27 FORMAT(10(I6,1X,I1))
      KOUNT=0
      DO 30 I=JPTR,NOPTR
      INTFAC(I)=0
      NSHIFT=60
      DO 30 K=1,3
      KOUNT=KOUNT+1
      IF(KOUNT .GT. NARGS) GO TO 1
      NSHIFT=NSHIFT-17
      INTFAC(I)=INTFAC(I) .OR. SHIFT(BLKSIZ(KOUNT),NSHIFT)
      NSHIFT=NSHIFT-3
   30 INTFAC(I)=INTFAC(I) .OR. SHIFT(BLKTYP(KOUNT),NSHIFT)
      GO TO 1
   40 WRITE(4) NLIST,NOPTR
      WRITE(4) ((ISUBLT(I,J),I=1,2),J=1,NLIST)
      WRITE(4) (INTFAC(I),I=1,NOPTR)
      PRINT 50,NLIST
   50 FORMAT(////42X,*NEW LIST HAS BEEN CREATED CONTAINING*,I4,* NAMES*)
      STOP
      END
```

Basic Interface Definition File

```
ABS      1 1 4
102
AINT     1 1 4
102
ALOG     1 1 4
102
ALOG10   1 1 4
102
AMAX0   -1 1 4
402
AMAX1   -1 1 4
102
AMIN0   -1 1 4
402
AMIN1   -1 1 4
102
AMOD     2 1 4
102 102
AIMAG    1 1 4
202
ATAN     1 1 4
102
ATAN2    2 1 4
102 102
CABS     1 1 4
202
CCOS     1 2 4
202
CEXP     1 2 4
202
CLOG     1 2 4
202
CMPLX    2 2 4
102 102
CONJG    1 2 4
202
COS      1 1 4
102
CSIN     1 2 4
202
CSQRT    1 2 4
202
DABS     1 3 4
302
DATAN    1 3 4
302
DATAN2   2 3 4
302 302
DBLE     1 3 4
102
DCOS     1 3 4
302
DEXP     1 3 4
302
DIM      2 1 4
102 102
DLOG     1 3 4
302
DLOG10   1 3 4
302
DMAX1   -1 3 4
302
DMIN1   -1 3 4
302
DMOD     2 3 4
302 302
DSIGN    2 3 4
302 302
DSIN     1 3 4
302
DSQRT    1 3 4
302
EXP      1 1 4
102
FLOAT    1 1 4
402
IABS     1 4 4
402
IDIM     2 4 4
402 402
IDINT    1 4 4
302
IFIX     1 4 4
102
INT      1 4 4
102
ISIGN    2 4 4
402 402
MAX0    -1 4 4
402
MAX1    -1 4 4
102
MIN0    -1 4 4
402
MIN1    -1 4 4
102
MOD      2 4 4
402 402
REAL     1 1 4
202
SESCOM   2 0 7      25
    13 0     12 4
SIGN     2 1 4
102 102
SIN      1 1 4
102
SNGL     1 1 4
302
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