IDENTIFICATION

PRODUCT CODE:	DEC-12-AJAA-LA
PRODUCT NAME:	FOCAL-12 LISTING
DATE CREATED:	JANUARY 11, 1971
MAINTAINER:	SOFTWARE SERVICES

```
                        /FOCL12.37
                        /COPYRIGHT 1970, DIGITAL EQUIPMENT CORP., MAYNARD, MASS. 01754
                        FMODE                   /********
                        FIXMRI FPOW=5000/PSEUDO-FLOATING POINT INSTRUCTIONS.
                        FIXMRI FADD=1000
                        FIXMRI FSUB=2000
                        FIXMRI FMUL=4000
                        FIXMRI FDIV=3000
                        FIXMRI FGET=0000
                        FIXMRI FPUT=6000
          7000          FNOR=7000
          0000          FEXT=0
          0000          FXIT=0
          4407          FINT=JMS I 7
          6101          SMP=6101
                        /MISCELLANEOUS ITEMS
          0001          *1
0001      5403                  JMP I .+2       /INTERRUPT PROCESSOR ENTRY .
0002      0000          LWETMP, 0               /********
0003      2603                          INTRPT
0004      0004          DDTJR,  DDTJR   /USED FOR DEBUGGING
0005      0013          P13,    13      /CONSTANT
0006      0100          C100,   100     /CONSTANT
          0000          T=00            /TEXT FIELD NO.
          0000          P=00            /PROGRAM FIELD NO.
          7000          CDF=7000        /(X=MEM) = OPR
0007      6400                  FPNT    /ADDRESS OF FLOATING POINT INTERPRETER, (LOC *7)
                        /AUTO-INDEX REGISTERS = (START OF SAVE BY QUAD)
0010      0000          AXIN,   0       /STORAGE INDEX (LOC *10)
0011      0000          XRT,    0       /EXTRA XR
0012      0000          XRT2,   0       /EXTRA XR
0013      3600          PDLXR,  BEGIN-1 /PUSHDOWN LIST INDEX REGISTER.
0014      3117          FLTXR,  IOBUF-1 /XR FOR FLOATING POINT
0015      0000          FLTXR2, 0       /EXTRA FOR F.P.
0016      7402          TELSW,  HLT     /TELETYPE IN PROGRESS SWITCH
          0017          TEXTP=. /TEXT POINTERS (LOC *17)
0017      3214          AXOUT,  FRSTX   /OUTPUT INDEX
0020      0000          XCT,    0       /UNPACK SWITCH
0021      0000          GTEM,   0       /UNPACK STORAGE
0022      2407          PC,     FLTZER  /PROGRAM COUNTER
0023      0000          THISLN, 0       /LINE POINTER FROM 'FINDLN'
0024      0000          THISOP, 0       /CURRENT 'EVAL' OPERATION
0025      0000          LASTLN, 0       /BACK POINTER FROM 'FINDLN'
0026      0001          DEBGSW, 1       /DEBUG SWITCH  ; NON-ZERO FOR LITERAL.
0027      0000          PACKST, 0       /RUBOUT PROTECTION
0030      0000          PT1,    0       /VARIABLE POINTER
0031      3216          LASTV,  BUFBEG  /ADDRESS OF LAST VARIABLE
0032      0000          T1,     0       /TEMPORARY REGISTER - MAIN
0033      0000          T3,     0       /TEMP REGISTER FOR OUTPUT
0034      0000          INBUF,  0       /KEYBOARD INPUT BUFFER
0035      4617          BOTTOM, FEXP-1  /********/LAST LOCATION CURRENTLY AVAILABLE IN FIELD ZERO **
0036      0000          INSUB,  0       /0= GETC) #0 = READC
0037      0000          HINBUF, 0       /HIGH SPEED INPUT BUFFER
                        /PAGE ZERO OF THE
                        /FLOATING POINT ARITHMETIC INTERPRETER FOR FOCAL
```

```
                *40
EX1,    .       /OPERAND STORAGE
AC1H,   .
AC1L,   .
OVER1,  .
                FLAC=,  /FLOATING ACCUMULATOR
EXP,    0       /F,A,
HORD,   0
LORD,   0
OVER2,  .
SIGNF,  0               /FLOATIN SIGN
MINSKI, ACMINS          /NEGATE FLAC SUBROUTINE
FISW,   2004            /OUTPUT FORMAT
INTEGER,FIX             /FIX FLAC
GETSGN=TAD FLAC+1
RETURN=JMP I EFUN3I
                *54
                /VARIABLES    =   INITIALIZED FOR THE DIALOGUE
SORTCN, 0       /NUMBER IN TABLE FROM SORTC
LASTOP, 0       /LAST OPERATION FOR EVAL
                EFOP=,          /FUNCTION CODE,
ATSW,   0       /ASK-TYPE SWITCH
CNTR,   -20     /DELETE AND ERROR COUNTER(USED BY F,P, ALSO)
                STARTV=,        /=END FOR 8K
BUFR,   BUFBEG  /NEXT LOCATION IN BUFFER = LAST LOCATION OF TEXT;
GADD,   0               /********
XCTIN,  I33     /PACK SWITCH
OUTDEV, XOUTL   /POINTER TO OUT, SUB.   (OUTL)=FOR DEBUGGING
INDEV,  XI33    /POINTER TO IN, SUB.    (I33)=FOR DEBUGGING
NAGSW,  0001    /NOT ALL AND/OR GROUP SWITCH(4000=ONE)1=ALL)0=GROUP))(0000)=FOR TSS-8
CHAR,   215     /THE MOST IMPORTANT REGISTER
LINENO, 0000    /LINE NUMBER READ BY GETLN)(0400)=FOR TSS-8
GINC,   WORDS*2 /=6 FOR 4=WORD = CONSTANT
T2,     2       /TEMP REGISTER = FOR NEW INST, ROUTINES,
                /FOR DEBUGGING, SET OUTL AND I33 INTO OUTDEV AND INDEV)
                /ALSO PATCH THE ERROR ROUTINE = FOUR
                /PATCHES PLUS TWO FOR THE HIGH SPEED READER,
                LIST6=; /INPUT LIST FOR "SFOUND",
                        214     /F,F,
                        207     /BELL
                LIST7=;
                        203     /CONTROL-C FOR DEBUGGING AND TSS8
P337,   337     /LEFT ARR
CLF,    212     /L,F,
                LIST3=; /EXCRETION LIST
CCR,    215     /LIST BRANCHER,
OMPSW,  HLT     /(SEARCH CHARACTER)=VARIABLE
                /=0000 FOR TRACE ON,
                /THE REST OF PAGE ZERO IS PURE TO THE MULTI-USER SYSTEM
                M100=,
P7700,  7700    /LEFT MASK
PER,    256     /PERIOD
M77,    -77     /EXTEND CODE TEST
P7600,  7600    /GROUP MASK
M20,    -20     /CONSTANT
```

```
        Ø1Ø6   177     P177,    177      /STEP MASK
        Ø1Ø7   Ø17     P17,     17       /BCD MASK
        Ø11Ø   Ø277    P277,    277      /"?"
        Ø111   7776    M2,      -2       /CONSTANT
        Ø112   7477    MINUSA,  -3Ø1     /CONSTANT
        Ø113   Ø26Ø    C26Ø,    26Ø      /ASCII FOR ZERO
        Ø114   754Ø    M24Ø,    -24Ø     /SPACE TEST
        Ø115   7522    MPER,    -256     /PERIOD TEST
        Ø116   7563    MCR,     -215     /C.R. TEST
        Ø117   7775    MFLT,    -WORDS   /= -4 FOR 4-WORD
        Ø12Ø   7773    M5,      -5       /PAREN TEST
        Ø121   7767    M11,     -11      /PAREN TEST
        Ø122   ØØ77    P77,     77       /RIGHT MASK
        Ø123   Ø2ØØ    C2ØØ,    2ØØ      /CONSTANTS
        Ø124   4ØØØ    P4ØØØ,   4ØØØ     /NAGSW TEST CONSTANT (FOR PDP-5)
        Ø125   2Ø32    FLARGP,  FLARG    /DATA ADDRESS
        Ø126   2157    PTCH,    CHIN     /GENERAL CHARACTER INPUT ROUTINE.
        Ø127   5715    DOUBLE,  MULT2    /MULTIPLY FLAC BY 2
        Ø13Ø   6ØØØ    FOUTPUT,FLOUTP    /FLOATING OUTPUT
        Ø131   62ØØ    FINPUT,  FLINTP   /FLOATING INPUT
        Ø132   314Ø    COMBUF,  COMEIN   /COMMAND BUFFER START
        Ø133   32Ø6    CFRS,    FRST     /ADDRESS OF DUMMY LINE.
        Ø134   314Ø    END,     COMEIN   /FIRST LOCATION USED IN 8K.
        Ø135   3216    ENDT,    BUFBEG   /START OF STORAGE AREA **
        Ø136   2Ø21    EFUN3I,  EFUN3    /FUNCTION RETURN
        Ø137   24Ø7    CFRSX,   FLTZER   /POINTER TO ZERO DATA


                       /'FINPUT' USES CHAR AND GETC OR READC TO DEVELOP
                       /A NUMBER WHICH IS THEN STORED VIA PT1.
               ØØØ3    WORDS=3 /OR 4
                       /NEW INSTRUCTIONS!
               454Ø    PUSHJ=JMS I .    /RECURSIVE SUBROUTINE CALL
        Ø14Ø   Ø521             XPUSHJ
               1413    POPA=TAD I PDLXR/RESTORE AC
               5541    POPJ=JMP I .     /SUBROUTINE RETURN
        Ø141   1565             XPOPJ
               4542    PUSHA=JMS I .    /SAVE AC
        Ø142   Ø477             XPUSHA
               4543    PUSHF=JMS I .    /SAVE GROUP OF DATA
        Ø143   Ø534             PD2
               4544    POPF=JMS I .     /RESTORE GROUP
        Ø144   Ø554             PD3
               4545    GETC=JMS I .     /UNPACK A CHARACTER
        Ø145   2274             UTRA
               4546    PACKC=JMS I .    /PACK A CHARACTER
        Ø146   25Ø2             PACBUF
               4547    SORTJ=JMS I .    /SORT AND BRANCH ON AC OR CHAR
        Ø147   1312             SORTB
               455Ø    SORTC=JMS I .    /SORT CHAR
        Ø15Ø   Ø721             XSORTC
               4551    PRINTC=JMS I .   /PRINT AC OR CHAR
        Ø151   2465             OUT
               4552    READC=JMS I .    /READ DATA INTO CHAR AND PRINT IT
        Ø152   2157    RDIV,    CHIN
```

```
                4553    PRNTLN=JMS I .  /PRINT C(LINENO)
0153            2425            XPRNT
                4554    GETLN=JMS I .   /UNPACK AND FORM A LINENUMBER
0154             332            XGETLN
                4555    FINDLN=JMS I .  /SEARCH FOR A GIVEN LINE
0155            2244            XFIND
                4556    ENDLN=JMS I .   /INSERT LINE POINTERS
0156            2360            XENDLN
                4557    RTL6=JMS I .    /ROTATE LEFT SIX
0157             413            XRTL6
                4560    SPNOR=JMS I .   /IGNORE SPACES AND LEADING ZEROS
0160            1535            XSPNOR
                4561    TESTN=JMS I .   /PERIOD, OTHER, NUMBER
0161            1546            XTESTN
                4562    TSTLPR=JMS I .  /SKIP IF 5<SORTCN<= 11 (I.E. AN L=PAR)
0162            2037            LPRTST
                4563    TSTGRP=JMS I .  /SKIP IF G(AC) = G(LINENO)
0163             744            GRPTST
                4564    TESTC=JMS I .   /TERM, NUMBER, FUNCTION, LETTER= AND IGNORE SPACES.
0164            1700            XTESTC
                4565    DELETE=JMS I .  /REMOVE OLD TEXT LINE
0165            2064    PSIN,   XDELETE
                4566    ERROR2=JMS I .  /EXCESS SOMETHING ERROR
                4566    ERROR3=JMS I .  /MISCELLANEOUS ERROR
                4566    ERROR4=JMS I .  /FORMAT ERROR
0166            2726            ERR2
                        /USED BY 8K
                        /FOCAL'S COMMAND/INPUT DRIVER
                4167    *167                    /********
0167            0000    SUBS2,  0               /********
0170            0000    LESUB2, 0               /********
0171            0000    SUBS,   0               /********
0172            6163    LEFPUT, LEPUT           /********
0173            0000    LESUBS, 0               /********
0174            7657    PWAIT,  WAIT            /********
0175            7672    PCLEAR, CLEAR           /********
0176            3601            BEGIN   /BECOMES (RECOVR+1) **
0177            7610    START,  SKP CLA         /PROGRAM START FROM SELF
0200            5576            JMP I .+2       /CONSOLE START, SW=200,
0201            1137            TAD CFRSX       /(PC) => 0
0202            3022            DCA PC          /FOR COMMAND MODE
0203            7001            IAC             /USE ONE IN THE AC TO
0204            3100            DCA DMPSW       /INIT UNPACK AND TRACE SWITCH,
0205            3026            DCA DEBGSW      /ENABLE TRACE FOR INPUT OF (?),
0206            1226            TAD COMBOT      /PROTECT COMMAND BUFFER,
0207            3313            DCA POLXR       /NO PATCH TEST,
0210            1225            TAD CSTAR       /ANNOUNCE PRESENCE
0211            4551            PRINTC          /BY TYPING THE LEAD-IN CHARACTER
0212            1132    IBAR,   TAD COMBUF      /INITIALIZE COMMAND BUFFER
0213            3210            DCA AXIN        /FOR UNPACKING,
0214            3262            DCA XCTIN
0215            1132            TAD COMBUF      /RUBOUT PROTECTION
0216            3027            DCA PACKST
0217            4552    IGNOR,  READC           /READ COMMAND STRING
0220            4547            SORTJ
```

```
                        LIST7=1
                        INLIST=LIST7
          PACKC         /SAVE STRING CHARACTER,
          JMP IGNOR
CSTAR,    252           /ACKNOWLEDGE CHARACTER
COMBOT,   COMEOUT+12    /END OF COMMAND BUFFER,LESS PROTECTION COUNT.
          /COMMAND/INPUT PROCESSOR
IRETN,    PACKC         /START TO PACK C.R.
          PACKC         /FINISH C.R.
          TAD COMBUF    /INITIALIZE "TEXTP"
GONE,     DCA AXOUT     /SETUP CURRENT LINE
          DCA XCT
          GETC          /READ FIRST CHARACTER,
          TAD BOTTOM    /INIT PUSH-DOWN-LIST
          DCA PDLXR
          SPNOR         /IGNORE LEADING BLANKS
          TESTN         /DOES THE LINE BEGIN WITH 1-9?
          JMP GZERR     /PERIOD =ILLEGAL GROUP ZERO USAGE
          JMP INPUTX    /NO
          ISZ DEBGSW    /YES,DISABLE TRACE FOR REPACKING
          GETLN         /READ THIS LINE NUMBER
          TAD P4000     /TEST  FOR SINGLE LINE,
          TAD NAGSW
          SZA CLA
          ERROR3        /ILLEGAL LINE NUMBER ON INPUT
          TAD BUFR      /SET POINTERS
          DCA AXIN
          DCA XCTIN
          TAD LINENO    /SAVE LINE #
          DCA I AXIN    /(X-MEM)
          SPNOR         /IGNORE SPACES AFTER LINE NUMBER
          SKP
          GETC          /READ 1ST AFTER LINENO TERMINATOR,
SRETN,    PACKC         /SAVE TEXT AND RESTORE DATA FIELD
          TAD CHAR      /TEST FOR END OF INPUT STRING
          TAD MCR
          SZA CLA
          JMP .+5
          DELETE        /REMOVE OLD LINE, IF ANY,
          ENDLN         /INSERT NEW LINE
          JMP START     /POINTERS MUST BE REINITIALIZED
INPUTX,   PUSHJ         /PROCESS IMMEDIATE COMMAND,
                  PROC
          TAD I PC      /CHECK NEXT LINE (X-MEM)
          SNA           /END OF PROGRAM?
          JMP START     /YES
          DCA PC        /SAVE NEW LINE NO,
          TAD PC        /START NEW LINE
          IAC
          JMP GONE      /PROCESS OTHER COMMANDS
          /TEXT LINE BUFFER FORMAT*
          /#1 : POINTER OR ZERO IN LAST
          /#2 : LINENO
          /#3 - #N+1 : TEXT
          /#N : C.R,
```

```
                        /LINE NUMBER FORMATION
0372  0000  XGETLN, 0              /DEVELOP I.D. = "GETLN"
0373  4562        SPNOR           /IGNORE LEADING SPACES,
0374  1066        TAD CHAR        /"ALL" IS A SPECIAL ARGUMENT,
0375  1112        TAD MINUSA
0376  7650        SNA CLA
0377  5322        JMP TESTA
0310  3036        DCA INSUB       /CALL 'GETC' FROM 'INPUT' VIA 'DECON'
0311  4771        JMS I LCON      /(DECONV - IN FLOAT,)
0312  1047        TAD FLAC+3      /GROUP TOO LARGE?
0313  0372        AND P7740
0314  1046        TAD FLAC+2
0315  7640        SZA CLA
0316  4566        ERROR2          /GROUP NUMBER TOO LARGE
0317  1047        TAD FLAC+3
0320  4557        RTL6
0321  7004        RAL
0322  3067  TESTA, DCA LINENO
0323  4561        TESTN           /TEST3
0324  4545        GETC            /READ STEP NUMBER,
0325  4561        TESTN           /TEST4, OTHER
0326  5340        JMP GERR        /DOUBLE PERIODS
0327  5352        JMP GEXIT       /OTHER
0330  1054        TAD SORTCN      /NUMBER
0331  7106        RTL CLL
0332  1054        TAD SORTCN
0333  7004        RAL
0334  1067        TAD LINENO
0335  3067        DCA LINENO
0336  4545        GETC            /READ SECOND STEP NUMBER,
0337  4561        TESTN           /TEST4, OTHER
0340  4566  GERR,  ERROR4         /DOUBLE PERIODS
0341  5352        JMP GEXIT       /OTHER
0342  1054        TAD SORTCN      /NUMBER
0343  1067        TAD LINENO
0344  3067        DCA LINENO
0345  4545        GETC            /TEST FOR CORRECT TERMINATOR
0346  4561        TESTN           /CHECK SIZE
0347  5340        JMP GERR        /,
0350  7410        SKP
0351  4566        ERROR2          /TOO LARGE A LINE NUMBER,
0352  7100  GEXIT, CLL             /CLEAR LINK BIT
0353  1067        TAD LINENO      /TEST FOR GROUP NUMBER,
0354  0104        AND P7600
0355  7640        SZA CLA
0356  7020        CML
0357  1067        TAD LINENO
0360  0106        AND P177        /REPARE "NAGSW"
0361  7460        SNL SZA
0362  4566  GZERR, ERROR2          /0,X = ERROR:ILLEGAL LINE NUMBER,
0363  7640        SZA CLA
0364  1373        TAD P2000
0365  7020        CML
0366  7004        RAL
0367  3065        DCA NAGSW
```

```
331  0370  5722          JMP I XGETLN
332  0371  5670  LCON,   DECONV
333  0372  7740  P7740,  7740
334  0373  2000  P2000,  2000
335                /RANGE OF ACCEPTIBLE LINE NUMBERS = 1,01 TO 31,99
336                /NAGSW:
337                /GROUP=0200
338                /LINE=4000
339                /ALL=0001
340                /LIST OF FUNCTION ADDRESSES, (NAMES ARE IN "FNTABL")
341       0374     FNTABF=.
342  0374  2016          XABS    /ABS    =ABSOLUTE VALUE
343  0375  2012          XSGN    /SGN    =SIGN PART
344  0376  1156          XINT    /ITR    =INTEGER PART
345  0377  7602          XDISP   /DIS    /********
346  0400  1145          XRAN    /RAN    =RANDOM NUMBER
347  0401  1341          XADC    /ADC    =READ ANALOG TO DIGITAL CONVERTER
348  0402  5000          ARTN    /ATN    =
349  0403  4620          FEXP    /EXP    =EXPONENTIAL FUNCTIONS
350  0404  5040          FLOG    /LOG    =
351  0405  5204          FSIN    /SIN    =TRIG FUNCTIONS
352  0406  5177          FCOS    /COS    =
353  0407  7400          XSQRT   /SQT    =SQUARE ROOT
354  0410  2725  PFNEW,  ERROR5  /NEW    =USER DEFINED FUNCTIONS
355  0411  2725  PFX,    ERROR5  /FX     /********
356  0412  2725  PFZ,    ERROR5  /FZ     /********
357  0413  0000  XRTL6,  0       /ROTATE AC LEFT SIX = "RTL6"
358  0414  7106          CLL RTL
359  0415  7006          RTL
360  0416  7006          RTL
361  0417  5613          JMP I XRTL6
362                /RECURSIVE OPERATE, EXECUTE, OR CALL
363  0420  4554  DO,     GETLN           /EXECUTE ONE LINE, A GROUP,OR ALL
364  0421  1022          TAD PC          /SAVE ADDRESS
365  0422  4542          PUSHA           /OF CURRENT LINE
366  0423  4543          PUSHF           /SAVE REST OF THIS LINE
367  0424  0017                TEXTP     /ADDRESS OF TEXT POINTERS
368  0425  4543  DOGRP,  PUSHF           /SAVE NAGSW: CHAR: AND LINENO,
369  0426  1065                NAGSW
370  0427  1065          TAD NAGSW       /CHECK DATA FROM GETLN,
371  0430  7710          SPA CLA         /SKIP IF GROUP OR ALL
372  0431  5263          JMP DOONE       /DO ONE LINE
373  0432  4555          FINDLN          /INIT FOR GROUP AND SET THISLN
374  0433  7000          NOP
375  0434  1023          TAD THISLN      /TEST FOR GOOD GROUP NUMBER,
376  0435  3011          DCA XRT
377  0436  1411          TAD I XRT       /(X=MEM)
378  0437  4563          TSTGRP
379  0440  4566          ERROR2          /NO SUCH GROUP NUMBER
380  0441  4543  DOGRP1, PUSHJ           /EXECUTE OBJECT LINE AND SET PC,
381  0442  1606                PROCESS-2
382  0443  4544          POPF            /RESTORE THE DATA
383  0444  1065                NAGSW
384  0445  1422          TAD I PC        /CHECK FOR END OF TEXT (X=MEM)
385  0446  7450          SNA
```

```
                JMP DCONT       /ALL DONE
                IAC
                DCA PT1         /SAVE POINTER TO LINENO
                TAD NAGSW       /CHECK FOR GROUP
                SMA SZA CLA
                JMP .+4         /DO ALL
                TAD I PT1       /TEST GROUP (X=MEM)
                TSTGRP
                JMP DCONT       /NOT IN GROUP
                TAD I PT1       /READ NEXT LINE NO, (X=MEM)
                DCA LINENO
                JMP DGRP        /CONTINUE THE SUBROUTINE
DOONE,          FINDLN          /FIND THE LINE
                ERROR2          /NO SUCH LINE NUMBER
                PUSHJ           /EXECUTE IT
                        PROCESS
                POPF            /RESTORE CHAR
                        NAGSW
DCONT,          POPF            /RESTORE TEXT POINTERS
                        TEXTP
                POPA            /RESTORE ADDRESS OF CURRENT LINE,
                DCA PC
                JMP I .+1       /CONTINUE PROCESSING THIS LINE,
                        PROC
/PUSHDOWN LIST CONTROLS
XPUSHA, 0       /PUSHDOWN THE AC = "PUSHA"
                DCA T2          /BACKUP POINTER
                CMA             /AND THEN
                JMS PCHK        /CHECK CORE USAGE
                TAD T2          /OK
                DCA I PDLXR     /PUSH DOWN LIST POINTER
                CMA             /BACKUP AGAIN
                JMS PCHK
                JMP I XPUSHA
PCHK,           0
                TAD PDLXR       /INC IN AC
                DCA PDLXR
                TAD PDLXR
                CIA CLL
                TAD LASTV
                SZL CLA
                ERROR3          /STORAGE FILLED BY PUSH-DOWN LIST
                JMP I PCHK
XPUSHJ, 0       /RECURSIVE SUBROUTINE CALL = "PUSHJ"
                TAD I XPUSHJ
                DCA T2          /SAVE SUBR, ADDR,
                CMA
                JMS PCHK
                TAD XPUSHJ
                IAC
                DCA I PDLXR     /SAVE RETURN
                CMA
                JMS PCHK
                JMP I T2        /TRANSFER CONTROL
PD2,            0               /SAVE A FLOATING POINT NUMBER = "PUSHF"
```

```
 441  0535  7240            CLA CMA          /COMPUTE VARIABLE ADDR
 442  0536  1734            TAD I .-2
 443  0537  3311            DCA XRT
 444  0540  2334            ISZ PD2          /FIX RETURN
 445  0541  1117            TAD MFLT         /COMPUTE PUSH. POINTER
 446  0542  4310            JMS PCHK
 447  0543  1117            TAD MFLT
 448  0544  3071            DCA T2
 449  0545  1411            TAD I XRT
 450  0546  3413            DCA I PDLXR
 451  0547  2071            ISZ T2
 452  0550  5345            JMP .-3
 453  0551  1117            TAD MFLT         /RESET POINTER
 454  0552  4310            JMS PCHK
 455  0553  5734            JMP I PD2
 456
 457
 458  0554  0000  PD3,      0                / RESTORE A FLOATING POINT NUMBER = "POPF"
 459  0555  7240            CLA CMA          /GET VAR. ADDR.
 460  0556  1754            TAD I PD3
 461  0557  2354            ISZ PD3
 462  0560  3011            DCA XRT
 463  0561  1117            TAD MFLT
 464  0562  3071            DCA T2
 465  0563  1413            TAD I PDLXR      /MOVE
 466  0564  3411            DCA I XRT
 467  0565  2071            ISZ T2
 468  0566  5363            JMP .-3
 469  0567  5754            JMP I PD3        /EXIT
 470        0570  INLIST=.          /INPUT CONTROL CHARACTERS
 471  0570  2740                    RECOVR   /C.C. = BREAK
 472  0571  0212                    IBAR     /B.A. = RESTART
 473  0572  0217                    IGNOR    /L.F. = IGNORE
 474  0573  0227                    IRETN    /C.R. = TERMINATE STRING
 475  0574  1075  FLIST2, FLIMIT   /,=STANDARD
 476  0575  1137                    FINFIN   /;=SHORT
 477  0576  2725                    ERROR5   /CR=DUMB
 478  0577  1065  FLIST1, FINCR     /,=STANDARD FORMAT
 479  0600  0610                    PROCESS  /;=SETIPLUS ,,,
 480  0601  0614                    PC1      /C.R.=SET COMMAND.
 481  0602  7472  MF,       -306    /USED BY TESTC
 482              /PRIMARY CONTROL AND TRANSFER
 483  0603  4554  GOTO.    GETLN            /READ THE LINE NUMBER REQUESTED
 484  0604  4555            FINDLN           /LOCATE IT AND RESET TEXTP
 485  0605  4566            ERROR2           /NOT THERE
 486  0606  1023            TAD THISLN       /SET PC
 487  0607  3022            DCA PC
 488  0610  4545  PROCESS,GETC             /TEST FOR END OF LINE
 489  0611  1066  PROC.    TAD CHAR         /FIRST CHARACTER READY = USE PROC
 490  0612  1116            TAD MCR
 491  0613  7650            SNA CLA
 492  0614  5541  PC1,     POPJ             /EXIT "PROCESS"
 493  0615  4550            SORTC            /IGNORE "SPACE",",", AND ";".
 494  0616  1374                    GLIST-1
 495  0617  5210            JMP PROCESS
```

```
0622 1066          TAD CHAR          /SAVE COMMAND CHARACTER
0621 0375          AND P337          /EXECUTE LOWER CASE ALSO
0622 4542          PUSHA
0623 4545          GETC              /GO TO TERMINATOR
0624 4552          SORTC
0625 1374                GLIST=1
0626 7410          SKP
0627 5223          JMP .+4
0630 1413          POPA
0631 4547          SORTJ             /GO TO COMMAND
0632 0773                COMLST=1
0633 0165                COMGO=COMLST
0634 4566          ERROR2            /ILLEGAL COMMAND
 614     COMMENTS=PC1    /ALSO IS CONTINUE


                   /OUTPUT COMMAND TEXT
0635 4554     WRITE, GETLN            /SET LINENO
0636 2026          ISZ DEBGSW        /DISABLE TRACE
0637 4555          FINDLN            /SEARCH FOR LINE NUMBER
0640 5267          JMP WTESTG        /NOT THERE OR GROUP
0641 1067          TAD LINENO
0642 7640          SZA CLA
0643 4553          PRNTLN            /PRINT LINE NUMBER AND A SPACE.
0644 4545          GETC
0645 4551          PRINTC            /PRINT TEXT OF A LINE.
0646 1066          TAD CHAR
0647 1116          TAD MCR
0650 7640          SZA CLA           /SKIP IF END OF LINE
0651 5244          JMP .+5
0652 1423          TAD I THISLN      /TEST FOR END OF TEXT (X=MEM)
0653 7450     WTEST2, SNA
0654 5271          JMP WX+2          /EXIT!DO NEXT INDIRECT LINE.
0655 7001          IAC
0656 3030          DCA PT1           /SAVE POINTER TO LINENO OF NEXT
0657 1065          TAD NAGSW
0660 7700          SMA CLA
0661 1430          TAD I PT1         /(X=MEM)
0662 4563          TSTGRP            /TRY NEXT LINENO FOR GROUP.
0663 5273          JMP WX
0664 1430     WALL, TAD I PT1         /SET LINENO (X=MEM)
0665 3067          DCA LINENO
0666 5237          JMP WRITE+2
0667 1023     WTESTG, TAD THISLN      /INIT GROUP PRINTOUT
0670 5253          JMP WTEST2
0671 3026          DCA DEBGSW
0672 5541          POPJ
0673 1065     WX,  TAD NAGSW
0674 7750          SPA SNA CLA       /SKIP IF ALL
0675 5271          JMP WX+2
0676 4551          PRINTC            /PRINT C.R. AGAIN
0677 5264          JMP WALL
0700 0000     XTESTC, 0         /TEST THE NATURE OF THE NEXT ALPHANUMERIC = "TESTC"
0701 4560          SPNOR             /IGNORE SPACES
0702 4552          SORTC             /TEST THE VARIABLE TERMINATORS
```

```
Ø7Ø3  1771                     TERMS-1
Ø7Ø4  57ØØ             JMP I XTESTC    /YES - SORTC IS SET
Ø7Ø5  1Ø66             TAD CHAR        /NO
Ø7Ø6  23ØØ             ISZ XTESTC
Ø7Ø7  12Ø2             TAD MF
Ø71Ø  765Ø             SNA CLA         /TEST FOR "F"
Ø711  5317             JMP XT3
Ø712  4561             TESTN
Ø713  57ØØ             JMP I XTESTC    /,
Ø714  741Ø             SKP             /OTHER
Ø715  57ØØ             JMP I XTESTC    /NUMBER
Ø716  23ØØ             ISZ XTESTC
Ø717  23ØØ      XT3,   ISZ XTESTC      /RETURNS:T;N;F;A
Ø72Ø  57ØØ             JMP I XTESTC
Ø721  ØØØØ      XSORTC, Ø        /SORT CHAR AGAINST TABLE - "SORTC"
Ø722  1721             TAD I XSORTC
Ø723  3Ø12             DCA XRT2        /1ST ARG IS LIST-1
Ø724  1412             TAD I XRT2
Ø725  751Ø             SPA             /LIST IS ENDED BY A NEGATIVE NUMBER
Ø726  534Ø             JMP SEXC        /2AND EXIT - NOT IN LIST
Ø727  7Ø41             CIA
Ø73Ø  1Ø66             TAD CHAR
Ø731  764Ø             SZA CLA         /COMPARE
Ø732  5324             JMP .-6
Ø733  1721             TAD I XSORTC    /COMPUTE INCREMENT : Ø - N
Ø734  7Ø4Ø             CMA
Ø735  1Ø12             TAD XRT2
Ø736  3Ø54             DCA SORTCN
Ø737  741Ø             SKP             /1ST EXIT - YES
Ø74Ø  2321      SEXC,  ISZ XSORTC
Ø741  2321             ISZ XSORTC
Ø742  73ØØ             CLA CLL
Ø743  5721             JMP I XSORTC
Ø744  ØØØØ      GRPTST, Ø        /AC VS LINENO - "TSTGRP"
Ø745  Ø1Ø4             AND P76ØØ
Ø746  7Ø41             CIA
Ø747  3Ø71             DCA T2
Ø75Ø  1Ø67             TAD LINENO
Ø751  Ø1Ø4             AND P76ØØ
Ø752  1Ø71             TAD T2
Ø753  765Ø             SNA CLA
Ø754  2344             ISZ GRPTST
Ø755  5744             JMP I GRPTST
                /INPUT FROM TEXT OR KEYBOARD:
                /IF BACK-ARROW, RESTART INPUT
Ø756  ØØØØ      INPUT,  Ø              /INPUT A CHARACTER
Ø757  1Ø36             TAD INSUB       /NON-ZERO FOR KEYBOARD
Ø76Ø  764Ø             SZA CLA
Ø761  5364             JMP .+3
Ø762  4545             GETC
Ø763  5756             JMP I INPUT
Ø764  4552             READC
Ø765  4547             SORTJ
Ø766  6776                     SPECIAL-1
Ø767  34Ø2                     INFIX-SPECIAL
```

```
0770 5756          JMP I INPUT
0771 1035  ILIST,  IF1                /,
0772 0610          PROCESS            /;
0773 0614          PC1                /CR
                             /ENGLISH-FRENCH
      0774  COMLST=,         /COMMAND DECODING LIST
0774 0323          323       /SET     - ORGANIZE
0775 0306          306       /FOR     - QUAND
0776 0311          311       /IF      - SI
0777 0304          304       /DO      - FAIZ
1000 0307          307       /GOTO    - VA
1001 0303          303       /COMMENT- COMMENTE
1002 0301          301       /ASK     - DEMANDE
1003 0324          324       /TYPE    - TAPE
1004 0317          317       /OUTPUT /********
1005 0305          305       /ERASE   - BIFFE
1006 0327          327       /WRITE   - INSCRIS
1007 0315          315       /MODIFY - MODIFIE
1010 0321          321       /QUIT    - ARRETE
1011 0322          322       /RETURN - RETOURNE
1012 0314          314       /LIBR*****
            /THIS COMMAND LIST IS SPEED OPTIMIZED.


            /CONDITIONAL TRANSFER PROCESS,
1013 4564  IF,     TESTC              /IGNORE SPACES AND TEST
1014 4637          JMS I IECALL       /T
1015 2013          ISZ PDLXR          /N-DUMP THE (EFOP)
1016 4640          JMS I IPART        /F-CHECK FOR PAREN MATCH
1017 1111          TAD M2             /A
1020 3032          DCA T1
1021 1045          TAD FLAC+1         /TEST -,0,+
1022 7510          SPA
1023 2032          ISZ T1             /N-TO   -1,-2,-3
1024 7750          SPA SNA CLA
1025 2032  IF3,    ISZ T1             /COUNT COMMAS
1026 7410          SKP
1027 5765          JMP I COMGO+4      /TRANSFER
1030 4547          SORTJ              /SEARCH TEXT UNTILL ;IC.R.
1031 1375                  TLIST-1
1032 7373                  ILIST-TLIST
1033 4545          GETC
1034 5230          JMP .-4
1035 4545  IF1,    GETC               /MOVE PAST COMMA
1036 5225          JMP IF3
1037 1601  IECALL, ECALL
1040 2051  IPART,  PARTEST
            /LOOP CONTROL STATEMENT
      1241  SETT=,                    /SUBSET OF "FOR".
1041 4540  FOR,    PUSHJ              /LOOPS, ETC.
1042 1401                  GETARG     /LOOK FOR "=" NEXT
1043 4560          SPNOR              /IGNORE SPACES
1044 1066          TAD CHAR
1045 1335          TAD MEQ
1046 7440          SZA
```

```
661  1047  4566            ERROR4          /LEFT OF "=" IN ERROR! 'FOR' OR 'SET'
662  1050  1330            TAD PT1
663  1051  4542            PUSHA           /SAVE POINTER TO VARIABLE
664  1052  4540            PUSHJ
665  1053  1612                    EVAL-1  /GET INITIAL VALUE EXPRESSION
666  1054  1413            POPA
667  1055  3030            DCA PT1
668  1056  4407            FINT            /INITIALIZE NOW,
669  1057  6430            FPUT I PT1
670  1060  7000            FXIT
671  1061  4547            SORTJ           /TEST LAST CHAR FROM "EVAL"
672  1062  1375                    TLIST-1
673  1063  7201                    FLIST1-TLIST
674  1064  4566            ERROR4          /EXCESS R-PAR
675  1065  1030    FINCR,  TAD PT1         /SAVE VARIABLE ADDRESS *
676  1066  4542            PUSHA
677  1067  4540            PUSHJ           /EVALUATE THE INCREMENT,IF ANY,
678  1070  1612                    EVAL-1
679  1071  4547            SORTJ           /TEST TERMINATORS
680  1072  1375                    TLIST-1
681  1073  7176                    FLIST2-TLIST
682  1074  4566            ERROR4          /ILLEGAL TERMINATOR IN 'FOR'
683  1075  4543    FLIMIT, PUSHF           /SAVE THE INCREMENT,    *
684  1076  2032                    FLARG
685  1077  4540            PUSHJ           /GET THE LIMIT(NO ERROR DETECTION AFTER LIMIT)
686  1100  1612                    EVAL-1
687  1101  4543    FCONT,  PUSHF           /SAVE THE LIMIT *
688  1102  2032                    FLARG
689  1103  4543            PUSHF           /SAVE TEXT OF OBJECT STATEMENTS
690  1104  0017                    TEXTP
691  1105  4540            PUSHJ           /DO THE OBJECT STATEMENTS
692  1106  0610                    PROCESS
693  1107  4544            POPF            /RESTORE REMAINING TEXT,
694  1110  0017                    TEXTP
695  1111  4544            POPF            /GET LIMIT
696  1112  2032                    FLARG
697  1113  4544            POPF            /GET INCREMENT
698  1114  7470                    ITER1
699  1115  1413            POPA            /GET VARIABLE ADDRESS
700  1116  3030            DCA PT1
701  1117  4407            FINT            /INCREMENT AND TEST
702  1120  0430            FGET I PT1      /LOAD THE VARIABLE
703  1121  1733            FADD I FINKP    /INCREMENT IT
704  1122  6430            FPUT I PT1      /CHANGE IT
705  1123  2525            FSUB I FLARGP   /TEST IT
706  1124  7000            FXIT
707  1125  1045            TAD FLAC+1
708  1126  7740            SMA SZA CLA
709  1127  5541            POPJ            /END OF LOOP
710  1130  1030            TAD PT1
711  1131  4542            PUSHA           /SAVE ADDRESS *
712  1132  4543            PUSHF           /SAVE INCREMENT AGAIN *
713  1133  7470    FINKP,          ITER1
714  1134  5301            JMP FCONT
715  1135  7503    MEQ,    -275
```

```
 716  1136  7524  XCOM,   -254
 717  1137  4543  FINFIN, PUSHF              /SET INCREMENT TO ONE.
 718  1140  2405                FLTONE
 719  1141  5301          JMP FCONT
 720                     /
 721                     /SAME FRAN = JUST MOVED
 722                     /
 723  1142  0000  RANO,   0000               /********
 724  1143  2000          2000               /********
 725  1144  0000          0000               /********
 726  1145  4407  XRAN,   FINT               /********
 727  1146  1342          FADD    RANO       /********
 728  1147  4755          FMUL I  CRUDDY     /********
 729  1150  6342          FPUT    RANO       /********
 730  1151  1000          FXIT               /********
 731  1152  3342          DCA     RANO       /********
 732  1153  3044          DCA     FLAC       /********
 733  1154  5536          JMP I   EFUN3I     /********
 734  1155  6160  CRUDDY, RANMUL             /********
 735                     /TAKE THE INTEGER PART
 736  1156  4453  XINT,   JMS I INTEGER     /(FIX)
 737  1157  7200          CLA
 738  1160  5536          JMP I EFUN3I
 739        1161  COMGO=, /COMMAND ROUTINE ADDRESSES
 740  1161  1041          SETT
 741  1162  1041          FOR
 742  1163  1013          IF
 743  1164  0420          DO
 744  1165  0603          GOTO               /(REFERENCED)
 745  1166  0614          COMMENT
 746  1167  1200          ASK
 747  1170  1201          TYPE
 748  1171  7706          OUTPUT             /********
 749  1172  2206          ERASE
 750  1173  0635          WRITE
 751  1174  1254          MODIFY
 752  1175  0177          START   /RETURN TO COMMAND MODE VIA 'QUIT'
 753  1176  1563          RETRN
 754  1177  6346          LTAPE              /********
 755                     /INPUT-OUTPUT STATEMENTS
 756  1200  7240  ASK,    CLA CMA            /REMEMBER WHICH CALL.
 757  1201  3056  TYPE,   DCA ATSW
 758  1202  4547  TASK,   SORTJ              /SPECIAL CHAR? *****
 759  1203  1367                ALIST-1
 760  1204  1200                ATLIST-ALIST
 761  1205  2056          ISZ ATSW           /TEST QUOTE SWITCH
 762  1206  5223          JMP TYPE2
 763  1207  4540          PUSHJ              /DO ASK; SETUP PT1
 764  1210  1401                GETARG
 765  1211  1066          TAD CHAR           /SAVE IN-LINE CHARACTER.
 766  1212  4542          PUSHA
 767  1213  1253          TAD COL            /TYPE COLON
 768  1214  4551          PRINTC             /(CLA)= TO SUPRESS ":"
 769  1215  2036          ISZ INSUB          /INDICATE 'READC'
 770  1216  7001          IAC                /POINT PAST CHAR
```

```
                        JMS I FINPUT    /READ DATA AND SAVE
                        POPA            /RE-TEST LAST TERMINATOR
                        DCA CHAR
                        JMP ASK         /CONTINUE PROCESSING
TYPE2,  PUSHJ           /DO TYPE
                                EVAL
                        JMS I FOUTPUT   /PRINT
                        JMP TYPE
TQUOT,  ISZ DEBGSW      /DISABLE TRACE
                        GETC            /TYPE LITERALS
                        SORTJ
                                TLIST2-1
                                TLIST3-TLIST2
                        PRINTC
                        JMP TQUOT+1
TINTR,  GETC            /PASS PERCENT SIGN
                        GETLN           /READ FORMAT CONTROL: "X7,03"
                        TAD LINENO
                        DCA FISW        /SAVE FORMAT CODE
                        JMP TASK
TCRLF2, TAD CCR         /SPLAT=CR ALONE
                        JMS I OUTDEV
                        IAC             /NON-PRINTING DELAY FOR C,R, *****
TCRLF,  TAD CCR         /EXCLAMATION POINT=CR,LF,
                        PRINTC
TASK4,  DCA DEBGSW      /*
                        GETC            /*
                        JMP TASK
COL,    272             /":"
/IF DEBGSW=0 ! ENABLE FLIP-FLOP "DMPSW"
/       #0: DISABLE AND RETURN ALL"?" ! S,
/IF DMPSW = 0: TRACE ON, IF ENABLED
/       #0: TRACE OFF
/IF BOTH = 0 ! PRINT TRACE,
/SEARCH ROUTINES
MODIFY, GETLN           /READ LINE NO:
                        FINDLN          /LOOK IT UP NOW,
                        ERROR2          /NOT THERE = BAD COMMAND UNLESS ZERO,
                        TAD BUFR        /SET POINTERS
                        DCA AXIN        /FOR INPUT
                        DCA XCTIN
                        TAD LINENO      /COPY THE SAME LINE NUMBER,
                        DCA I AXIN      /(X-MEM)
                        TAD AXIN        /SAVE START OF NEW LINE
                        DCA PACKST
SCONT,  JMS I INDEV     /READ THE TELETYPE INPUT SILENTLY,
                        DCA LIST3+1     /SAVE SEARCH CHARACTER
                        ISZ DEBGSW      /NO BREAKS,
SCHAR,  GETC            /TYPE=TEST=F,F,
                        PRINTC          /PLAYBACK THE TEXT
                        SORTJ           /LOOK FOR MATCH
                                LIST3-1
                                LISTGO-LIST3
                        PACKC           /SAVE NEW LINE,
                        JMP SCHAR
```

```
 826  1300  1062  SBAR,   TAD BUFR          /RESTART-B,A,
 827  1301  7001          IAC
 828  1302  3012          DCA AXIN          /SET POINTERS
 829  1303  3762          DCA XCTIN
 830  1304  4552  SFOUND, READC             /READ FROM KEYBOARD
 831  1305  4547          SORTJ             /TEST
 832  1306  0071                LIST6=1
 833  1307  1267                SRNLST=LIST6
 834  1310  4546  SGOT,   PACKC             /PACK CHAR,
 835  1311  5304          JMP SFOUND        /MORE
 836  1312  0000  SORTB,  0        /SORT AND BRANCH ROUTINE, = "SORTJ"
 837  1313  7450          SNA
 838  1314  1066          TAD CHAR          /ASSUME CHAR IF AC=0
 839  1315  7041          CIA
 840  1316  3071          DCA T2            /SAVE SORT ITEM
 841  1317  1712          TAD I SORTB       /FIRST ARG IS LIST LESS ONE
 842  1320  2312          ISZ SORTB         /2AND IS INTRA-LIST LENGTH
 843  1321  3012          DCA XRT2
 844  1322  1412          TAD I XRT2
 845  1323  7510          SPA               /**LISTS ENDED BY NEGATIVE NUMBERS**
 846  1324  5336          JMP SEX           /READ EXIT
 847  1325  1071          TAD T2            /FIND ADDRESS
 848  1326  7640          SZA CLA
 849  1327  5322          JMP .+5
 850  1330  1012          TAD XRT2          /MATCH FOUND,
 851  1331  1712          TAD I SORTB
 852  1332  3071          DCA T2
 853  1333  1471          TAD I T2
 854  1334  3071          DCA T2            /DEBUG : AC = ADDRESS
 855  1335  5471          JMP I T2
 856  1336  2312  SEX,    ISZ SORTB         /MATCH NOT FOUND,
 857  1337  7300          CLA CLL
 858  1340  5712          JMP I SORTB       /RETURN TO CALLING SEQUENCE,
 859                /ANALOGUE TO DIGITAL CONVERSION FOR PDP-12
 860  1341  4453  XADC,   JMS I INTEGER
 861  1342  0360          AND     037       /********
 862  1343  1357          TAD     OSAMP     /********
 863  1344  3347          DCA     .+3       /********
 864  1345  6002          IOF               /********
 865  1346  6141          6141    /LINC     /********
 866  1347  0100          0100    /SAM ?    /********
 867  1350  0002          0002    /PDP      /********
 868  1351  6001          ION               /********
 869  1352  3045          DCA     FLAC+1    /********
 870  1353  3046          DCA     FLAC+2    /********
 871  1354  7326          CLA CLL CML RTL   /********
 872  1355  3044          DCA     FLAC      /********
 873  1356  5536          JMP I   EFUN3I    /********
 874  1357  0100  OSAMP,  0100    /SAM 0    /********
 875  1360  0037  037,    37                /********
 876        1361  SRNLST=.          /'MODIFY' CONTROL CHARACTER TABLE
 877  1361  1271          SCHAR     /F,F, = CONTINUE
 878  1362  1266          SCONT     /BELL = CHANGE SEARCH CHARACTER
 879  1363  2740          RECOVR    /C,C, = BREAK
 880  1364  1300          SBAR      /B,A, = RESTART
```

```
 881  1365  1267            SCONT=1 /L.F. = FINISH THE LINE AS BEFORE.
 882        1366    LISTGO=.
 883  1366  1261            SETN    /C.R. = END THE LINE HERE AS IS.
 884  1367  1312            SGOT    /CHAR = SEARCH CHARACTER
 885        1370    ALIST=. / ASK/TYPE LIST OF CONTROLS.
 886  1370  1245            245     /%
 887  1371  1242            242     /"
 888  1372  1241            241     /!
 889  1373  1243            243     /#
 890  1374  1244            244     /$///
 891        1375    GLIST=.
 892  1375  1240            240     /SPACE
 893        1376    TLIST=.
 894  1376  1254            254     /,
 895  1377  1273            273     /;
 896  1400  1215            215     /C.R.
 897                  /THIS LIST IS ENDED BY 'TESTC',
 898                  /FIND OR ENTER A VARIABLE IN THE LIST.
 899  1401  4564    GETARG, TESTC           /FIRST LETTER OF ARG
 900  1402  7200    P7200,  7200            /******** LETS F THRU
 901  1403  4566            ERROR4          /********
 902  1404  7000            NOP             /********
 903  1405  3062    GETVAR, DCA XCTIN       /PACK INTO ADD.
 904  1406  4546            PACKC
 905  1407  4545            GETC            /SECOND LETTER
 906  1410  4550            SORTC           /TERMINATOR?
 907  1411  1771                    TERMS=1
 908  1412  5224            JMP GSERCH      /YES
 909  1413  1066            TAD CHAR        /NO
 910  1414  0122            AND P77         /SAVE 2AND LETTER OF NAME
 911  1415  1061            TAD QADD
 912  1416  3061            DCA QADD
 913  1417  4545            GETC            /IGNORE THE REST
 914  1420  4550            SORTC
 915  1421  1771                    TERMS=1
 916  1422  5224            JMP GSERCH
 917  1423  5217            JMP .=4
 918  1424  4562    GSERCH, TSTLPR          /LOOK FOR SUBSCRIPT VIA SORTCN
 919  1425  5235            JMP GS1         /NOT SUBSCRIPTED BY L=PAR.
 920  1426  1061            TAD QADD                /SAVE NAME
 921  1427  3056            DCA EFOP        /FOR RECURSIVE AND ERROR CHECK
 922  1430  4663            JMS I GECALL    /TO EVAL
 923  1431  1413            POPA
 924  1432  3061            DCA QADD                /RESTORE NAME
 925  1433  4662            JMS I PTEST     /TEST PAREN MATCH, ETC.
 926  1434  1453            JMS I INTEGER   /CONVERT TO 12=BIT NUMBER.
 927  1435  3171    GS1,    DCA SUBS        /SAVE SUBSCRIPT
 928  1436  1061            TAD     QADD    /******** LETS F THRU
 929  1437  0101            AND     P7700   /********
 930  1440  1202            TAD     P7200   /********
 931  1441  7650            SNA CLA         /********
 932  1442  5322            JMP     FFF     /********
 933  1443  1060            TAD STARTV      /SEARCH FOR VARIABLE(CHANGE FOR X=MEM)
 934  1444  3030    GS3,    DCA PT1
 935  1445  1030            TAD PT1
```

```
 936  1446  7041          CIA
 937  1447  1031          TAD LASTV       /TEST FOR END OF LIST
 938  1450  7752          SPA SNA CLA
 939  1451  5264          JMP GS2         /END SEARCH
 940  1452  1430          TAD I PT1       /GET TABLE ENTRY
 941  1453  7041          CIA
 942  1454  1061          TAD QADD
 943  1455  7650          SNA CLA
 944  1456  5310          JMP GFND1       /FOUND XX
 945  1457  1030  GS4,    TAD PT1         /TRY NEXT ONE
 946  1460  1070          TAD GINC
 947  1461  5244          JMP GS3
 948  1462  2051  PTEST,  PARTEST
 949  1463  1601  GECALL, ECALL
 950  1464  1031  GS2,    TAD LASTV       /ADD THE VARIABLE
 951  1465  1005          TAD P13         /TEST STORAGE LIMITS
 952  1466  7141          CIA CLL
 953  1467  1013          TAD PDLXR
 954  1470  7620          SNL CLA
 955  1471  4566          ERROR3
 956  1472  1031          TAD LASTV       /UPDATE THE LIST.
 957  1473  1070          TAD GINC
 958  1474  3031          DCA LASTV
 959  1475  1061          TAD QADD                /SAVE NAME
 960  1476  3430          DCA I PT1
 961  1477  2030          ISZ PT1         /SAVE SUBSCRIPT
 962  1500  1171          TAD SUBS
 963  1501  3430          DCA I PT1
 964  1502  2030          ISZ PT1         /SET PT1
 965  1503  4407          FINT
 966  1504  0537          FGET I CFRSX
 967  1505  6430          FPUT I PT1
 968  1506  6000          FXIT
 969  1507  5541          POPJ            /EXIT
 970  1510  1030  GFND1,  TAD PT1         /FOUND SAME
 971  1511  3011          DCA XRT         /TEST SUBSCRIPTS
 972  1512  1411          TAD I XRT
 973  1513  7041          CIA
 974  1514  1171          TAD SUBS
 975  1515  7640          SZA CLA
 976  1516  5257          JMP GS4         /WRONG SUBSCRIPT
 977  1517  2030          ISZ PT1         /SET POINTER TO DATA
 978  1520  2030          ISZ PT1
 979  1521  5541          POPJ
 980  1522  3030  FFF,     DCA     PT1     /******** SAVES SUBSCRIPT ON F
 981  1523  1061          TAD     QADD    /********
 982  1524  3002          DCA     LWETMP  /********
 983  1525  1045          TAD     HORD    /********
 984  1526  3170          DCA     LESUB2  /********
 985  1527  1171          TAD     SUBS    /********
 986  1530  3167          DCA     SUBS2   /********
 987  1531  5541          POPJ            /********
 988  1532  0242  TLIST2, 242             /********
 989  1533  0215          215             /********
 990  1534  7520  M260,   -260            /********
```

```
                                        /********
1535  0000  XSPNOR, 0                   /IGNORE LEADING SPACES = "SPNOR"
1536  1066          TAD CHAR
1537  1114          TAD M242
1540  7640          SZA CLA
1541  5735          JMP I XSPNOR
1542  4545          GETC
1543  5336          JMP XSPNOR+1
                                        /******** RECODING FOR SPACE
1544  7506  M272,   -272                /********
1545  0012  012,    12                  /********
                                        /********
                                        /********
1546  0000  XTESTN, 0                   /RETURNS; ;; OTHER; NUMBER = "TESTN"
1547  1066          TAD CHAR
1550  1115          TAD MPER
1551  7640          SZA CLA
1552  2346          ISZ XTESTN
1553  1066          TAD     CHAR        /******** RECODING FOR SPACE
1554  1344          TAD     M272        /********
1555  7100          CLL                 /********
1556  1345          TAD     012         /********
1557  3054          DCA     SORTCN      /********
1560  7430          SZL                 /********
1561  2346          ISZ     XTESTN      /********
1562  5746          JMP I   XTESTN      /********
                                        /********
                    /EXIT FROM A "DO" SUBROUTINE
1563  1137  RETRN,  TAD CFRSX           /(PC) => 0
1564  3022          DCA PC
1565  1413  XPOPJ,  TAD I PDLXR         /RECURSIVE EXIT = "POPJ"
1566  3071          DCA T2
1567  5471          JMP I T2
1570        ATLIST=,          /ASK=TYPE CONTROL CHARACTER TABLE
1570  1236          TINTR     /% = FORMAT DELIMITER
1571  1227          TQUOT     /" = LITERAL DELIMITER
1572  1246          TCRLF     /! = CARRIAGE RETURN AND LINE FEED
1573  1243          TCRLF2    /# = CARRIAGE RETURN ONLY
1574  3052          TDUMP     /$/= DUMP THE SYMBOL TABLE CONTENTS
1575  1250          TASK4     /SP= TERMINATOR FOR NAMES
1576  1250          TASK4     /, = TERMINATOR FOR EXPRESSIONS
1577  0610          PROCESS   /; = TERMINATOR FOR COMMANDS
1600  0614          PC1       /C.R. = TERMINATOR FOR STRINGS
                    /$ = FOR 'TDUMP' TERMINATES THE COMMAND.
                    /EVALUATE AN EXPRESSION WHICH
                    /TERMINATES WITH AN R-PAR,; OR C.R. AND
                    /LEAVE THE RESULT IN FLAC AND IN FLARG.
1601  0000  ECALL,  0          /RECURSIVE CALL TO "EVAL"
1602  1054          TAD SORTCN        /SAVE 'SORTCN','LASTOP',AND 'EFOP'
1603  4542          PUSHA
1604  1055          TAD LASTOP
1605  4542          PUSHA
1606  1056          TAD EFOP          /SAVE FUNCTION CODE.
1607  4542          PUSHA
1610  1201          TAD ECALL         /RETURN TO CALLING
```

```
1046  1611  4542          PUSHA           /ADDRESS AFTER NEXT POPJ
1047  1612  4545          GETC            /MOVE PAST EXTRA CHARACTER
1048  1613  3055  EVAL,   DCA LASTOP      /EVAUATION CONTROLLER (CHECKPOINT ?)
1049  1614  4564          TESTC           /TEST CHARACTER AND IGNORE SPACES
1050  1615  5227          JMP ETERM1      /TERMINATOR
1051  1616  5332          JMP ENUM        /NUMBER
1052  1617  5343          JMP EFUN        /FUNCTION
1053  1620  4540          PUSHJ           /LETTER OF VARIABLE
1054  1621  1405                GETVAR    /FIND OR CREATE VARIABLE;ALSO SET PT1.
1055  1622  4564  OPNEXT, TESTC           /PT1=>ARG
1056  1623  5244          JMP ETERMN      /T
1057  1624  0212  ECHOLST,0212            /N=ERROR IN FORMAT
1058  1625  0377          0377            /F
1059  1626  4566          ERROR4          /L = MISSING OPERATOR
1060  1627  1137  ETERM1, TAD CFRSX       /SET PT1,
1061  1630  3030          DCA PT1         /TO POINT TO ZERO
1062  1631  1111          TAD M2          /TEST FOR UNARY OPERATIONS
1063  1632  1054          TAD SORTCN
1064  1633  7450          SNA
1065  1634  5247          JMP ETERM       /CREATE DUMMY FOR UNARY MINUS
1066  1635  7001          IAC
1067  1636  7650          SNA CLA
1068  1637  5323          JMP ARGNXT      /IGNORE UNARY PLUS
1069  1640  1054          TAD SORTCN      /TEST FOR NULL PARENS,
1070  1641  1121          TAD M11
1071  1642  7710          SPA CLA
1072  1643  5364          JMP ELPAR       /MIGHT BE AN L-PAR,
1073  1644  4562  ETERMN, TSTLPR
1074  1645  7410          SKP
1075  1646  4566          ERROR4          /OPERATOR MISSING BEFORE PAREN
1076  1647  1054  ETERM,  TAD SORTCN      /SET FROM "TESTC"="SORTC"
1077  1650  3024          DCA THISOP
1078  1651  1024          TAD THISOP
1079  1652  1121          TAD M11
1080  1653  7700          SMA CLA         /END?
1081  1654  3024          DCA THISOP      /"THISOP" EQUIV. TO END OF EXP,
1082  1655  1024  ETERM2, TAD THISOP      /COMPARE PRIORITIES
1083  1656  7041          CIA
1084  1657  1055          TAD LASTOP
1085  1660  7710          SPA CLA
1086  1661  5310          JMP EPAR        /CONTINUE
1087  1662  1055          TAD LASTOP      /FIND OPERATION
1088  1663  7112          CLL RTR
1089  1664  7012          RTR
1090  1665  1331          TAD OPTABL
1091  1666  3274          DCA FLOP
1092  1667  1055          TAD LASTOP
1093  1670  7640          SZA CLA         /TEST FOR END OF DATA INTO FLOATING AC,
1094  1671  4544          POPF            /GET LAST DATA
1095  1672  0044                FLAC
1096  1673  4407          FINT
1097  1674  0000  FLOP,   00              /(FLOPR I PT1)***/
1098  1675  6525          FPUT I FLARGP   /SAVE RESULT
1099  1676  0000          FXIT
1100  1677  1125          TAD FLARGP
```

```
1161  1770  3030          DCA PT1
1162  1771  1024          TAD THISOP
1163  1772  1055          TAD LASTOP      /=0?
1164  1773  7650          SNA CLA
1165  1774  5541          POPJ            /EXIT "EVAL"
1166  1775  1413          POPA            /GET PRIOR OP
1167  1776  3055          DCA LASTOP
1168  1777  5255          JMP ETERM2      /COMPARE THIS OP
1169  1710  4562  EPAR,   TSTLPR          /TEST FOR SUB-EXPRESSION
1170  1711  7410          SKP
1171  1712  5366          JMP EPAR2       /GO EVALUATE EXPRESSION
1172  1713  1055          TAD LASTOP      /CONTINUE READING THE EXPRESSION
1173  1714  4542          PUSHA           /SAVE "LASTOP",
1174  1715  1030          TAD PT1
1175  1716  3320          DCA .+2
1176  1717  4543          PUSHF           /SAVE LAST ARGUMENT
1177  1720  .000                00
1178  1721  1024          TAD THISOP      /MORE TO COME
1179  1722  3055          DCA LASTOP
1180  1723  4545  ARGNXT, GETC            /READ 1ST CHAR OF AN ARG,
1181  1724  4564          TESTC           /DO SPECIAL CHECK
1182  1725  5364          JMP ELPAR       /COULD BE LEFT PAREN
1183  1726  5332          JMP ENUM        /N
1184  1727  5343          JMP EFUN        /F
1185  1730  5220          JMP OPNEXT-2    /L
1186  1731  0430  OPTABL, FGET I PT1      /BASE FOR OPERATION COMPUTATION
1187  1732  4543  ENUM,   PUSHF           /TO PROCESS A NUMBER,SAVE AC
1188  1733  0044                FLAC
1189  1734  1125          TAD FLARGP      /SET POINTER AS FOR A VARIABLE,
1190  1735  3030          DCA PT1
1191  1736  3036          DCA INSUB       /POINT TO 'GETC' AND USE CHAR
1192  1737  4531          JMS I FINPUT    /READ TEXT NUMBER => (PT1)
1193  1740  4544          POPF            /RESTORE THE AC
1194  1741  0044                FLAC
1195  1742  5222          JMP OPNEXT      /CONTINUE
1196  1743  3056  EFUN,   DCA EFOP        /SET CODE
1197  1744  4545          GETC            /READ FUNCTION NAME.(1,2,OR 3 LETTERS)
1198  1745  4564          TESTC           /******** SEPARATES FILE BECAUSE F DIGIT
1199  1746  5355          JMP     EFUN2   /********
1200  1747  5771          JMP I   PFNUM   /********
1201  1750  7000          NOP             /********
1202  1751  1056          TAD     EFOP    /********
1203  1752  7104          CLL RAL         /MISH-MASH HASH CODE
1204  1753  1066          TAD CHAR
1205  1754  5343          JMP EFUN
1206  1755  4562  EFUN2,  TSTLPR
1207  1756  4566          ERROR4          /MUST BE FOLLOWED BY PARENS TO SET ARGUMENT
1208  1757  4201          JMS ECALL       /CALL "EVAL" TO COMPUTE ARGUMENT
1209  1760  1413          POPA            /BRANCH ON FUNCTION CODE;RETURN VIA EFUN3!.
1210  1761  4547          SORTJ
1211  1762  2166                FNTABL-1
1212  1763  6205                FNTABF-FNTABL
1213  1764  4562  ELPAR,  TSTLPR          /LEFT PAREN OR FELL THROUGH FUNCTION TABLE
1214  1765  4566          ERROR4          /DOUBLE OPERATORS OR ILLEGAL FUNCTION NAME.
1215  1766  4201  EPAR2,  JMS ECALL       /EVALUATE NESTED EXPRESSION
```

```
1767 2213          ISZ PDLXR           /DUMP EXTRA ARG.
1770 5536          JMP I EFUN3I
1771 6311 PFNUM,   FNUM                /********
     1772 TERMS=.           /TERMINATOR TABLE FOR 'EVAL' AND 'GETVAR'
1772 0240          240                 /SPACE  0
1773 0253          253                 /+      1
1774 0255          255                 /-      2
1775 0257          257                 //      3
1776 0252          252                 /*      4
1777 0336          336                 /UP ARR 5
2000 0250          250                 /(      6 L-PARS
2001 0333          333                 /[      7
2002 0274          274                 /<      10
2003 0251          251                 /)      11 R-PARS
2004 0335          335                 /]      12
2005 0276          276                 />      13
2006 0254          254                 /,      14
2007 0273          273                 /;      15
2010 0215          215                 /C.R.   16
2011 0275          275          /= TO END GETARG FROM 'SET'
          /TWO MINOR FUNCTIONS
2012 4543 XSGN,    PUSHF               /TAKE SIGN*1 OF FLARG
2013 2405                   FLTONE
2014 4544          POPF
2015 0044                   FLAC
2016 1233 XABS,    TAD FLARG+1         /TAKE ABSOLUTE VALUE OF FLAC
2017 7710          SPA CLA             /SKIP TO CONTINUE
2020 4451          JMS I MINSKI        /NEGATE THE FLOATING AC
          /CONTINUATION OF FUNCTION CALLS.
2021 4407 EFUN3,   FINT
2022 7000          FNOR                /NORMALIZE FUNCTION RETURN
2023 6232          FPUT FLARG          /SAVE FUNCTION VALUE
2024 0000          FXIT
2025 1125          TAD FLARGP          /SET POINTER
2026 3030          DCA PT1
2027 4251          JMS PARTEST
2030 5631          JMP I .+1           /FUNCTION RETURN IS OK
2031 1622                   OPNEXT

2032 0000 FLARG,   0        /DATA TEMPORARY STORAGE
2033 0000          0
2034 0000          0
2035 0000          0
2036 0003 P3,      3
2037 0000 LPRTST,  0                   /SKIP IF LEFT PAREN. = 'TSTLPR'
2040 1054          TAD SORTCN
2041 1121          TAD M11
2042 7700          SMA CLA
2043 5637          JMP I LPRTST
2044 1054          TAD SORTCN
2045 1120          TAD M5
2046 7740          SMA SZA CLA
2047 2237          ISZ LPRTST
2050 5637          JMP I LPRTST
2051 0000 PARTEST,0                    /TEST THE PAREN MATCHINGS
```

```
1211  2052  1413          POPA            /RESTORE LAST OPERATION
1212  2053  3355          DCA LASTOP
1213  2054  1236          TAD P3          /+3 TO COMPARE CODES
1214  2055  1413          POPA            /GET LAST PAREN CODE.
1215  2056  7041          CIA             /CHECK FOR PAREN MATCH,
1216  2057  1054          TAD SORTCN      /(STILL SET FROM THE LAST "EVAL")
1217  2060  7640          SZA CLA         /SKIP IF MATCH
1218  2061  4566          ERROR4          /PAREN ERROR
1219  2062  4545          GETC            /MOVE PAST R-PAR
1220  2063  5651          JMP I PARTEST
1221                /THE DELETE A LINE ROUTINE
1222  2064  0000  XDELETE,0              /UNCHAIN A LINE AND RECOVER THE SPACE.
1223  2065  6002          IOF             /PROTECT POINTER CHANGES FROM INTERRUPTIONS
1224  2066  4555          FINDLN          /SETS "THISLN" AND "LASTLN".
1225  2067  5664          JMP I XDELETE   /ALREADY GONE
1226  2070  2026          ISZ DEBGSW      /DISABLE TRACE
1227  2071  4545          GETC            /MEASURE LENGTH
1228  2072  1066          TAD CHAR
1229  2073  1116          TAD MCR
1230  2074  7640          SZA CLA
1231  2075  5271          JMP .+4
1232  2076  1017          TAD AXOUT       /SAVE LAST ADDRESS
1233  2077  7040          CMA
1234  2100  1023          TAD THISLN
1235  2101  3057          DCA CNTR        /LENGTH < 0
1236  2102  1133          TAD CFRS        /IT IS ILLEGAL TO DELETE THE FIRST LINE
1237  2103  7041          CIA
1238  2104  1023          TAD THISLN
1239  2105  7650          SNA CLA
1240  2106  5177          JMP START       /JUST IGNORE SUCH COMMANDS
1241  2107  7000          CDF T           /CHANGE DATA FIELD TO TEXT,(X-MEM)
1242  2110  1423          TAD I THISLN    /DISCONNECT
1243  2111  3425          DCA I LASTLN
1244  2112  1133          TAD CFRS        /START LIST AT TOP
1245  2113  3071  DOK,     DCA T2          /EXAMINATION ADDRESS
1246  2114  1471          TAD I T2        /GET THE NEXT ADDR,
1247  2115  7450          SNA             /TEST FOR END
1248  2116  5331          JMP DONE        /YES-WRAP UP ALL,
1249  2117  3032          DCA T1          /SAVE NEXT ADDRESS,
1250  2120  1023          TAD THISLN      /COMPARE LINE POSITIONS
1251  2121  7141          CIA CLL
1252  2122  1032          TAD T1
1253  2123  7630          SZL CLA         /SKIP IF THISLN > X
1254  2124  1057          TAD CNTR        /CHANGE (X) TO ACCOUNT FOR
1255  2125  1032          TAD T1          /GARBAGE COLLECTION,
1256  2126  3471          DCA I T2
1257  2127  1032          TAD T1          /GET NEXT
1258  2130  5313          JMP DOK
1259                /GARBAGE COLLECTION
1260  2131  7040  DONE,    CMA             /BACKUP L FOR XR
1261  2132  1023          TAD THISLN
1262  2133  3011          DCA XRT
1263  2134  1057          TAD CNTR        /SETUP END OF HOSE
1264  2135  7040          CMA
1265  2136  1023          TAD THISLN
```

```
1266  2137  3012          DCA XRT2
1267  2140  1057          TAD CNTR        /CORRECT END OF BUFFER POINTER,
1268  2141  1060          TAD BUFR
1269  2142  3360          DCA BUFR
1270  2143  1012          TAD AXIN        /COMPUTE COUNT
1271  2144  7040          CMA
1272  2145  1012          TAD XRT2
1273  2146  3032          DCA T1
1274  2147  1010          TAD AXIN
1275  2150  1057          TAD CNTR
1276  2151  3010          DCA AXIN
1277  2152  1412          TAD I XRT2      /SIPHON LOWER PART,
1278  2153  3411          DCA I XRT
1279  2154  2032          ISZ T1
1280  2155  5352          JMP .+3
1281  2156  5265          JMP XDELETE+1   /RESET 'LASTLN','THISLN', AND DATA FIELD.
1282  2157  0000  CHIN,   0               /READ IN A CHARACTER SUBR, = "READC"
1283  2160  4464          JMS I INDEV
1284  2161  3066          DCA CHAR
1285  2162  4550          SORTC           /LINEFEED OR RUBOUT?
1286  2163  1623                ECHOLST+1
1287  2164  5757          JMP I CHIN      /YES
1288  2165  4551          PRINTC          /ECHO THE INPUT
1289  2166  5757          JMP I CHIN
1290        2167  FNTABL=.
1291  2167  2533          2533    /ABS
1292  2170  2650          2650    /SGN
1293  2171  2636          2636    /ITR
1294  2172  2565          2565    /DIS
1295  2173  2630          2630    /RAN
1296  2174  2517          2517    /ADC
1297  2175  2572          2572    /ATN
1298  2176  2624          2624    /EXP
1299  2177  2625          2625    /LOG
1300  2200  2654          2654    /SIN    /LIST OF CODED FUNCTION NAMES
1301  2201  2575          2575    /COS
1302  2202  2702          2702    /SQT
1303  2203  2631          2631    /NEW
1304  2204  0330          0330    /FX     /********
1305  2205  0332          0332    /FZ     /********
1306                /ERASE SINGLE LINES, GROUPS, OR VARIABLES
1307  2206  4564  ERASE,  TESTC           /TEST THE SECOND WORD, IF ANY,
1308  2207  5241          JMP ERVX        /ERASE VARIABLES
1309  2210  5224          JMP ERL         /LINES OR GROUPS
1310  2211  5215          JMP .+4         /ERROR
1311  2212  1066          TAD CHAR        /ALL TEXT
1312  2213  1112          TAD MINUSA
1313  2214  7440          SZA
1314  2215  4566          ERROR3          /BAD ARG FOR ERASE,
1315  2216  1135  ERT,    TAD ENDT        /ERASE ALL TEXT **
1316  2217  3060          DCA BUFR
1317  2220  3533          DCA I CFRS      /(X="EM)
1318  2221  1060  ERV,    TAD STARTV      /ERASE VARIABLES **
1319  2222  3031          DCA LASTV
1320  2223  5177          JMP START       /POINTERS MAY BE DIFFERENT NOW,
```

```
1321  2224  4554  ERL,  GETLN           /ERASE LINES.
1322  2225  1060        TAD BUFR        /PROTECT REST OF TEXT.
1323  2226  3312        DCA AXIN
1324  2227  4565  ERG,  DELETE         /EXTRACT ONE LINE
1325  2230  2023        ISZ THISLN
1326  2231  1065        TAD NAGSW
1327  2232  7700        SMA CLA
1328  2233  1423        TAD I THISLN    /(X=MEM)
1329  2234  4563        TSTGRP          /SKIP IF G(AC) = G(LINENO)
1330  2235  5221        JMP ERV
1331  2236  1423        TAD I THISLN    /(X=MEM)
1332  2237  3067        DCA LINENO
1333  2240  5227        JMP ERG
1334  2241  1060  ERVX, TAD STARTV     /INIT VARIABLES MAY BE INDIRECT COMMAND
1335  2242  3031        DCA LASTV
1336  2243  5541        POPJ
1337                    /ROUTINE CALLED VIA "FINDLN"!
1338                    /SEARCH FOR A GIVEN LINE I.D. =[ "LINENO" ]
1339                    /1ST RETURN IF NOT FOUND,
1340                    /2AND IF FOUND,
1341                    /"THISLN" = FOUND LINE OR NEXT LARGER,
1342                    /"LASTLN" = LESSER AND/OR LAST,
1343                    /"TEXTP" IS SET
1344  2244  0000  XFIND, 0
1345  2245  1133        TAD CFRS        /INITIALIZE POINTERS TO FIRST LINE
1346  2246  3025        DCA LASTLN
1347  2247  1133        TAD CFRS
1348  2250  3023  FINDN, DCA THISLN     /SAVE THIS ONE
1349  2251  1023        TAD THISLN
1350  2252  3011        DCA XRT
1351  2253  1067        TAD LINENO
1352  2254  7141        CLL CMA IAC     /CLEAR LINK AND NEGATE LINENO,
1353  2255  1411        TAD I XRT       /LINENO=0 WILL ALSO BE FOUND(X=MEM)
1354  2256  7450        SNA
1355  2257  2244        ISZ     XFIND   /********
1356  2260  7630        SZL CLA
1357  2261  5267        JMP FEND3       /PAST IT.
1358  2262  1023        TAD THISLN      /MOVE POINTERS
1359  2263  3025        DCA LASTLN
1360  2264  1423        TAD I THISLN    /END OF TEXT? (X=MEM)
1361  2265  7440        SZA
1362  2266  5250        JMP FINDN       /NOT YET
1363                                    /********
1364                                    /********
1365  2267  1023  FEND3, TAD THISLN     /1ST RETURN = NOT FOUND
1366  2270  7001        IAC
1367  2271  3017        DCA AXOUT       /SET "TEXTP",
1368  2272  3020        DCA XCT
1369  2273  5644        JMP I XFIND
1370  2274  0000  UTRA,  0              /UNPACK CHARACTER, = "GETC"
1371  2275  4330        JMS GET1
1372  2276  7710  UTE,   SPA CLA        /NORM & EXTEND
1373  2277  1006        TAD C100        /300=337 & 340=376
1374  2300  1357        TAD M137        /240=276 & 200=236
1375  2301  1066        TAD CHAR
```

```
1376  2322  7450          SNA
1377  2323  5316          JMP UTX           /"?" FOUND
1378  2324  1075          TAD P337
1379  2325  3066  UTQ,    DCA CHAR
1380  2326  1026          TAD DEBGSW
1381  2327  1100          TAD DMPSW
1382  2330  7650          SNA CLA           /PRINT ONLY IF BOTH ARE ZERO.
1383  2331  4551          PRINTC
1384  2332  5674          JMP I UTRA
1385  2333  4330  EXTR,   JMS GET1
1386  2334  7040          CMA
1387  2335  5276          JMP UTE
1388  2336  1026  UTX,    TAD DEBGSW        /TEST FOR TRACE-ENABLED
1389  2337  7640          SZA CLA
1390  2340  5326          JMP .+6
1391  2341  1100          TAD DMPSW         /FLIP THE TRACE FLOP
1392  2342  7650          SNA CLA
1393  2343  7001          IAC
1394  2344  3100          DCA DMPSW
1395  2345  5275          JMP UTRA+1        /GET NEXT CHARACTER INSTEAD.
1396  2346  1110          TAD P277          /TRACE DISABLED = RETURN "?"
1397  2347  5305          JMP UTQ
1398  2350  0000  GET1,   0                 /UNPACK 6-BITS
1399  2351  2020          ISZ XCT           /STARTS=0
1400  2352  5345          JMP GET3
1401  2353  1021          TAD GTEM
1402  2354  0122  GEND,   AND P77
1403  2355  3066          DCA CHAR          /SAVE
1404  2356  1066          TAD CHAR
1405  2357  1103          TAD M77
1406  2360  7650          SNA CLA
1407  2361  5313          JMP EXTR          /EXTENDED
1408  2362  1066          TAD CHAR
1409  2363  1356          TAD M40
1410  2364  5730          JMP I GET1
1411  2365  1417  GET3,   TAD I AXOUT      /(X-MEM)
1412  2366  3021          DCA GTEM
1413  2367  7040          CMA
1414  2370  3020          DCA XCT
1415  2371  1021          TAD GTEM
1416  2372  7112          RTR CLL
1417  2373  7012          RTR
1418  2374  7012          RTR
1419  2375  5334          JMP GEND
1420  2376  7740  M40,    -40
1421  2377  7641  M137,   -137
1422  2400  0000  XENDLN, 0       /TERMINATE THE BUFFERED LINE - "ENDLN"
1423  2401  7000          CDF T             /(X-MEM)
1424  2402  1425          TAD I LASTLN      /SAVE OLD POINTER
1425  2403  3460          DCA I BUFR
1426  2404  1060          TAD BUFR          /POINT TO NEW LAST LINE
1427  2405  3425          DCA I LASTLN
1428  2406  1061          TAD QADD                  /CHECK FOR EXTRA INFO
1429  2407  7440          SZA
1430  2410  3410          DCA I AXIN
```

```
1431  2371  1310          TAD AXIN        /COMPUTE NEW END OF BUFFER
1432  2372  7001          IAC
1433  2373  3060          DCA BUFR
1434  2374  1060          TAD STARTV      /RESET VARIABLE LIST (X-MEM)
1435  2375  3031          DCA LASTV
1436  2376  5760          JMP I XENDLN
1437        2377    TLIST3=.          /LITERAL TERMINATORS
1438  2377  1251          TASK4   /"
1439  2400  0614          PC1     /C.R. = AUTOMATIC QUOTE MATCH
1440        2401    INFIX=.           /DATA CONTROL CHARACTERS
1441  2401  6202          FLINTP*2        /LEFT ARROW     = KILL
1442  2402  0757          INPUT*1         /RUBOUT         = IGNORE
1443  2403  0757          INPUT*1         /L.F.           = IGNORE
1444  2404  6250          ENDFI*5         /ALT MODE       = EXIT
1445  2405  0001    FLTONE; 0001    /(NO RELATIVE REFERENCES)
1446  2406  2000          2000
1447  2407  0000    FLTZER; 0000
1448  2410  0000          0000
1449  2411  0000          0000
1450  2412  0000          0000
1451  2413  7766    M12,    -12     /DECIMAL CONVERSION FACTOR FOR "PRNT"
1452  2414  0000    I33,    0               /NO-INTERRUPT INPUT ROUTINE
1453  2415  6031          KSF
1454  2416  5215          JMP .-1
1455  2417  6036          KRB
1456  2420  0106          AND P177        /IGNORE PARITY BIT
1457  2421  7450          SNA
1458  2422  5215          JMP .-5
1459  2423  1123          TAD C200
1460  2424  5614          JMP I I33
1461  2425  0000    XPRNT,  0       /PRINT A LINE NUMBER = "PRNTLN"
1462  2426  1067          TAD LINENO
1463  2427  4557          RTL6
1464  2430  0122          AND P77
1465  2431  4242          JMS PRNT        /TWO DIGIT "PART" NUMBER
1466  2432  1102          TAD PER
1467  2433  4551          PRINTC          /PERIOD FOR SEPARATION
1468  2434  1067          TAD LINENO
1469  2435  4242          JMS PRNT        /TWO DIGIT "STEP" NUMBER.
1470  2436  1356          TAD M140
1471  2437  3066          DCA CHAR        /SAVE SPACE IN CHAR.
1472  2440  4551          PRINTC          /PRINT TRAILING SPACE
1473  2441  5625          JMP I XPRNT
1474        0032    VAL=T1
1475  2442  0000    PRNT,   0       /PRINT TWO DECIMAL DIGITS
1476  2443  0106          AND P177
1477  2444  3032          DCA VAL
1478  2445  1113          TAD C260
1479  2446  3033          DCA T3
1480  2447  5252          JMP .+3
1481  2450  2033          ISZ T3
1482  2451  3032    XYZ,    DCA VAL
1483  2452  1032          TAD VAL
1484  2453  1213          TAD M12
1485  2454  7500          SMA
```

```
1486  2455  5253          JMP XYZ-1
1487  2456  7200          CLA
1488  2457  1033          TAD T3
1489  2460  4551          PRINTC
1490  2461  1032          TAD VAL
1491  2462  1113          TAD C260
1492  2463  4551          PRINTC
1493  2464  5642          JMP I PRNT
1494  2465  0000  OUT,     0                   /OUTPUT A CHARACTER = "PRINTC"
1495  2466  7450          SNA                 /USE (AC) OR (CHAR)
1496  2467  1066          TAD CHAR
1497  2470  1116          TAD MCR
1498  2471  7450          SNA
1499  2472  5276          JMP OUTCR
1500  2473  1077          TAD CCR
1501  2474  4463          JMS I OUTDEV
1502  2475  5665  OUTX,    JMP I OUT
1503  2476  1077  OUTCR,   TAD CCR
1504  2477  4463          JMS I OUTDEV
1505  2520  1076          TAD CLF
1506  2521  5274          JMP OUTX-1
1507  2522  0000  PACBUF,  0                   /PACK A CHARACTER = "PACKC"
1508  2523  1110          TAD P277
1509  2524  7041          CIA
1510  2525  1066          TAD CHAR
1511  2526  7450          SNA                 /CHANGE 277 TO 337
1512  2527  1352          TAD P40
1513  2530  1101          TAD M100
1514  2531  7450          SNA                 /TEST FOR RUBOUT.
1515  2532  5755          JMP I RUBIT
1516  2533  1353          TAD P377
1517  2534  3071          DCA T2              /SAVE INPUT ITEM
1518  2535  1071          TAD T2              /SO THAT QUESTION DOESN'T MAKE
1519  2536  0354          AND C140            /CHAR LOOK LIKE A LEFT-ARROW
1520  2537  1356          TAD M140
1521  2540  7440          SZA                 /DATA WORD.
1522  2541  1354          TAD C140
1523  2542  7650          SNA CLA
1524  2543  5332          JMP ESCA            /340-377 AND 200-237
1525  2544  1071  PA1,     TAD T2              /240-337
1526  2545  0122          AND P77
1527  2546  7440          SZA                 /IGNORE 300
1528  2547  4335          JMS PCK1
1529  2550  7000  PACX,    CDF P               /(X-MEM)
1530  2551  5702          JMP I PACBUF
1531  2552  1122  ESCA,    TAD P77
1532  2553  4335          JMS PCK1
1533  2554  5324          JMP PA1
1534  2555  0000  PCK1,    0
1535  2556  2062          ISZ XCTIN           /=0 TO START
1536  2557  5357          JMP ROT
1537  2560  1061          TAD QADD
1538  2561  3410          DCA I AXIN          /(X-MEM)
1539  2562  3061          DCA QADD                    /CLEAR PACKING WORD
1540  2563  1313          TAD PDLXR           /CHECK FOR OVERFLOW
```

```
1541  2544  7141          CMA IAC CLL
1542  2545  1005          TAD P13          /RESERVATIONS FOR PUSH-DOWN LIST
1543  2546  1710          TAD AXIN
1544  2547  7620          SNL CLA
1545  2550  5735          JMP I PCK1
1546  2551  4566          ERROR2           /FULL BUFFER
1547  2552  0040  P40,     40
1548  2553  0377  P377,    377
1549  2554  0140  C140,    140
1550  2555  3004  RUBIT,   RUB1
1551  2556  7640  M140,    -140
1552  2557  4557  ROT,     RTL6    /(EAE)
1553  2560  3061          DCA QADD
1554  2561  7040          CMA
1555  2562  3062          DCA XCTIN
1556  2563  5735          JMP I PCK1
1557                /
1558                /PART OF INTERFACE TO FLD1 TO ALLOW
1559                /GETTING OF CHARS FROM TEXT
1560                /
1561  2564  4545  CGETX,   GETC             /********
1562  2565  1066          TAD     CHAR      /********
1563  2566  6213          6213    /CIF CDF 10/********
1564  2567  5770          JMP I   .+1       /********
1565  2570  1137          CGETRET           /********
1566  2571  4566  ERRFIL,  ERROR4           /********
1567  2572  4540  LM,      PUSHJ             /*
1568  2573  1612          EVAL-1            /*
1569  2574  4453          JMS I INTEGER     /*
1570  2575  6212          6212              /*
1571  2576  5777          JMP I .+1         /*
1572  2577  1402          LMAKE             /*
1573                /USED BY BK
1574        2600  *2600
1575                /INTERRUPT PROCESSOR,
1576  2600  0000  SAVAC,   0        /CONTENTS OF AC
1577  2601  0000  SAVLK,   0        /CONTENTS OF LINK
1578  2602  7575  MBREAK,  -203     /CONTROL-C
1579  2603  3200  INTRPT,  DCA SAVAC        /SAVE WORKING DATA
1580  2604  7010          RAR
1581  2605  3201          DCA SAVLK
1582  2606  6041          TSF               /GIVE OUTPUT PRIORITY
1583  2607  5225          JMP KINT
1584  2610  6042          TCF
1585  2611  3016          DCA TELSW         /TURN OFF THE IN-PROGRESS FLAG,
1586  2612  1665          TAD I OPTRI
1587  2613  7450          SNA
1588  2614  5225          JMP KINT          /DONE
1589  2615  6044          TPC               /TYPE NEXT,
1590  2616  3016          DCA TELSW         /CLEAR AC AND TURN ON THE FLAG,
1591  2617  3665          DCA I OPTRI       /ZERO OUT THE DATA AREA
1592  2620  1265          TAD OPTRI
1593  2621  7001          IAC
1594  2622  0107          AND P17
1595  2623  1263          TAD OPTR0
```

```
[illegible]4 3265           DCA OPTRI
2625 6031    KINT,  KSF                 /CHECK FOR KEYBOARD FIRST
2626 5246           JMP EXIT
2627 6036           KRB                 /READ BUFFER AND CLEAR FLAG TO FETCH NEXT
2630 0176           AND P177            /IGNORE BLANK AND L-T AND PARITY BIT.
2631 7450           SNA
2632 5246           JMP EXIT
2633 1123           TAD C200
2634 3262           DCA SIN
2635 1262           TAD SIN
2636 1202           TAD MBREAK          /MANUAL STOP?
2637 7650           SNA CLA
2640 5340           JMP RECOVR
2641 1034           TAD INBUF           /ANY SPACE?
2642 7640           SZA CLA
2643 4566           ERROR2              /WILL WAIT FOR OUTPUT BUFFER
2644 1262           TAD SIN
2645 3034           DCA INBUF           /SAVE INPUT
2646 6131    EXIT,  CLSK                /********
2647 5253           JMP     NOCLK       /********
2650 6135           CLSA                /********
2651 7200           CLA                 /********
2652 3261           DCA     CLKFLG      /********
             /
             /KW12 CLOCK INTERRUPT ROUTINE
             /
2653 6244    NOCLK, RMF
2654 1201           TAD SAVLK
2655 7104           RAL CLL
2656 1200           TAD SAVAC
2657 6001           ION
2660 5400    EXITJ, JMP I 0             /MODIFIED FOR PDP-5
2661 0000    CLKFLG, 0                  /******** SET TO 0 EVERY INTERRUPT
2662 0000    SIN,   0
2663 3120    OPTR0, IOBUF   /OUTPUT POINTERS
2664 3120    OPTRO, IOBUF   /VARS
2665 3120    OPTRI, IOBUF
2666 0000    XI33,  0                   /VIA (INDEV)
2667 1034           TAD INBUF           /ANY INPUT?
2670 7450           SNA                 /******** REFRESH SCOPE WHILE WAITING
2671 4574           JMS I   PWAIT       /******** FOR INPUT
2672 3276           DCA XOUTL
2673 3034           DCA INBUF           /CLEAR INPUT BUFFER
2674 1276           TAD XOUTL
2675 5666           JMP I XI33
2676 0000    XOUTL, 0                   /VIA (OUTDEV)
2677 3266           DCA XI33            /SAVE CURRENT CHARACTER.
2700 6001           ION                 /BE SURE INTERRUPT IS ON.
2701 1664           TAD I OPTRO         /ANY ROOM?
2702 7640           SZA CLA             /A CHARACTER IS NON-ZERO
2703 4574           JMS I   PWAIT       /******** REFRESH SCOPE
2704 6002           IOF
2705 1016           TAD TELSW           /IN PROGRESS?
2706 7640           SZA CLA
2707 5314           JMP .+5
```

```
1651  2710  1266          TAD XI33        /NO
1652  2711  6046          TLS             /TYPE CHARACTER,
1653  2712  3316          DCA TELSW       /SET IN-PROGRESS FLAG,
1654  2713  5323          JMP .+12        /RETURN
1655  2714  1266          TAD XI33        /SEND DATA
1656  2715  3664          DCA I OPTRO
1657  2716  1264          TAD OPTRO       /SET POINTERS
1658  2717  7001          IAC
1659  2720  0107          AND P17
1660  2721  1263          TAD OPTR0
1661  2722  3264          DCA OPTRO
1662  2723  6001          ION
1663  2724  5676          JMP I XOUTL
1664                /ERROR RECOVERY PROCEEDURE
1665  2725  3326    ERROR5, DCA .+1         /ERROR CALLED FROM A TABLE
1666  2726  0000    ERR2,   0               /LIMIT EXCEEDED
1667  2727  7240          CLA CMA         /COMPUTE CALLING ADDRESS (ALSO "SPACE")
1668  2730  1326          TAD ERR2        /AND USE IT AS ERROR NUMBER.
1669  2731  3067          DCA LINENO      /SAVE ERROR CODE.
1670  2732  6001          ION             /                (JMP,+4) = FOR DEBUGGING
1671  2733  1016          TAD TELSW       /WAIT FOR OUTPUT TO FINISH
1672  2734  7640          SZA CLA
1673  2735  5333          JMP .-2
1674  2736  6002          IOF             /DISABLE INTERRUPT FOR INITIALIZATIONS
1675  2737  5342          JMP .+3
1676  2740  1123    RECOVR, TAD C200
1677  2741  3067          DCA LINENO      /SAVE ERROR NUMBER
1678                /****
1679  2742  1105          TAD M20         /SETUP INIT COUNT
1680  2743  3057          DCA CNTR
1681  2744  7040          CMA
1682  2745  1263          TAD OPTR0
1683  2746  3010          DCA AXIN        /INIT I/O BUFFERS,
1684  2747  2016          ISZ TELSW       /*
1685  2750  7000          CDF             /(X-MEM RESET)
1686  2751  3410          DCA I AXIN
1687  2752  2057          ISZ CNTR
1688  2753  5351          JMP .-2
1689  2754  3034          DCA INBUF       /INIT KEY-BUFR,
1690  2755  1263          TAD OPTR0       /INIT TTY POINTERS,
1691  2756  3265          DCA OPTRI
1692  2757  1263          TAD OPTR0
1693  2760  3264          DCA OPTRO
1694  2761  7040    RECOVX, CMA             /PREPARE A STOP BIT FOR TTY
1695  2762  6046          TLS             /AND RAISE FLAG,        (NOP) = FOR DEBUGGING
1696  2763  1101          TAD P7700       /MAKE A "?",
1697  2764  4551          PRINTC          /AND TURN ON THE INTERRUPT
1698  2765  4553          PRNTLN          /PRINT ERROR NUMBER AND,
1699  2766  2022          ISZ PC
1700  2767  1422          TAD I PC        /UNLESS IT IS ZERO, (X-MEM)
1701  2770  7450          SNA
1702  2771  5377          JMP .+6
1703  2772  3067          DCA LINENO
1704  2773  1101          TAD P7700       /PRINT ATSIGN
1705  2774  4551          PRINTC
```

```
1726  3775  4551          PRINTC          /PRINT SPACE AGAIN AND
1727  3776  4553          PRNTLN          /PRINT LINE OF ERROR.
1728  3777  1077          TAD CCR
1729  4000  4551          PRINTC
1730  4001  1126          TAD PTCH        /RESET "READC"
1731  4002  3152          DCA RDIV        /IF AN ERROR OCCURS,
1732  4003  5177          JMP START       /INTERRUPT WILL BE RE-ENABLED SOON.
1733                /CHRACTER REMOVAL ROUTINE
1734  4004  1062    RUB1, TAD XCTIN       /RUBOUT ONE LETTER
1735  4005  7640          SZA CLA
1736  4006  5214          JMP .+6
1737  4007  1010          TAD AXIN
1738  4010  7041          CIA
1739  4011  1027          TAD PACKST
1740  4012  7700          SMA CLA         /TEST NULL LINE
1741  4013  5641          JMP I RUB5
1742  4014  1251          TAD SPLAT       /FOR A RUBOUT ACKNOWLEDGEMENT
1743  4015  4551          PRINTC
1744  4016  1010          TAD AXIN
1745  4017  3071          DCA T2
1746  4020  7000          CDF T           /(X-MEM)
1747  4021  2062          ISZ XCTIN       /TEST HALF
1748  4022  5242          JMP RUB2
1749  4023  1471          TAD I T2        /"ADD" IS FULL.
1750  4024  3122          AND P77
1751  4025  1103          TAD M77
1752  4026  7640          SZA CLA         /TEST FOR EXTEND
1753  4027  5237          JMP RUB4
1754  4030  7040    RUB3, CMA             /SET SWITCH
1755  4031  3062          DCA XCTIN
1756  4032  7040          CMA             /BACKUP POINTER
1757  4033  1010          TAD AXIN
1758  4034  3010          DCA AXIN
1759  4035  1471          TAD I T2        /RESET ADD
1760  4036  3131          AND P7700
1761  4037  3061    RUB4, DCA QADD
1762  4040  5641          JMP I RUB5
1763  4041  2530    RUB5, PACX
1764  4042  1471    RUB2, TAD I T2        /CHECK FOR EXTENDED
1765  4043  7131          AND P7700
1766  4044  1006          TAD C100
1767  4045  7640          SZA CLA
1768  4046  5230          JMP RUB3
1769  4047  3471          DCA I T2        /SAVE CORRECTION
1770  4050  5231          JMP RUB3+1
1771  4051  0334    SPLAT, 334
1772                /SYMBOL TABLE TYPEOUT ROUTINE
1773  4052  1060    TDUMP, TAD STARTV     /INIT POINTER FOR SYMBOL DUMP,(X-MEM)
1774  4053  3030          DCA PT1
1775  4054  1031          TAD LASTV       /TEST FOR END OF LIST
1776  4055  7041          CIA
1777  4056  1030          TAD PT1
1778  4057  7650          SNA CLA
1779  4060  5541          POPJ
1780  4061  1430          TAD I PT1       /GET THE VARIABLE
```

```
1761  3062  3316          DCA OP+1          /(DCA I (4)=FOR(X=MEM))ISAVE NAME
1762  3063  1315          TAD OP            /SETUP UNPACK POINTERS
1763  3064  3017          DCA AXOUT
1764  3065  3023          DCA XCT
1765  3066  4545          GETC              /READ AND PRINT "XX("
1766  3067  4551          PRINTC
1767  3070  4545          GETC
1768  3071  4551          PRINTC
1769  3072  4545          GETC
1770  3073  4551          PRINTC
1771  3074  2030          ISZ PT1
1772  3075  1430          TAD I PT1         /PRINT SUBSCRIPT TO 99
1773  3076  4714          JMS I PRNT2
1774  3077  4545          GETC              /PRINT ")"
1775  3100  4551          PRINTC
1776  3101  2030          ISZ PT1
1777  3102  4407          FINT              /PICK UP VALUE
1778  3103  0430          FGET I PT1
1779  3104  7000          FXIT
1780  3105  4530          JMS I FOUTPUT     /PRINT VALUE
1781  3106  1077          TAD CCR
1782  3107  4551          PRINTC
1783  3110  1070          TAD GINC
1784  3111  1111          TAD M2
1785  3112  1030          TAD PT1
1786  3113  5253          JMP TDUMP+1
1787  3114  2442  PRNT2,  PRNT
1788  3115  3115  OP,     .                 / (X=MEM)
1789  3116  0000          0000              / (X=MEM)
1790  3117  5051          5051              /(THESE GO IN 10005 FOR X=MEM)
1791                      /OUTPUT CHARACTER BUFFER (ADDRESS IS A MULTIPLE OF 20)
1792        3120          IOBUF=3120
1793        3140          COMEIN=IOBUF+20 /COMMAND = INPUT BUFFER
1794        3206          COMEOUT=COMEIN+46
1795        3206          *COMEOUT
1796  3206  0000  FRST,   0         /TEXT POINTER
1797  3207  0000          0000      /DUMMY LINE NO,
1798  3210  0340          0340              /********
1799  3211  0617          0617      /FO
1800  3212  0301          0301      /CA
1801  3213  1455          1455              /********
1802  3214  6162  FRSTX,  6162              /********
1803  3215  7715          7715      /DUMMY C,R,
1804                      /TO SAVE TEXT ,SAVE C(BUFR), C(LASTV), AND C( FRST TO C(BUFR))
1805                      /WITH ODT=JR46,  THE TAPES MAY BE TOGETHER WITH
1806                      /THE SYMBOLIC DUMP LAST ! FOCAL + FLOAT + DIALOG ,
1807                      /LOADING THE LAST SECTION MAY BE CONSIDERED OPTIONAL,
1808        3216          BUFREG=.                  /TEXT BUFFER STARTS HERE,
1809        3600          *3600
1810  3600  2741  01,     RECOVR+1/STARTING ADDRESS
1811  3601  1200  BEGIN,  TAD 01  /INITIALIZE ANY 8-FAMILY COMPUTER,
1812  3602  3176          DCA START-1
1813  3603  7000          NOP/(IOPRESET)  /********
1814  3604  4575          JMS I   PCLEAR  /******** INITIALIZE POINT DISPLAY
1815  3605  7300          CLA CLL
```

```
1816  3636  3414          DCA I FLTXR
1817  3637  2057          ISZ CNTR/INITIALIZED BY LOAD.
1818  3640  5236          JMP .-2 /CLEAR INPUT BUFFER
1819  3641  7200  T12,     CLA             /******** FIX UP DIAL I/O ROUTINES
1820  3642  6213          6213    /CIF CDF 10/********
1821  3643  3667          DCA I   G7775   /********
1822  3644  1262          TAD     G5772   /********
1823  3645  3670          DCA I   G7776   /********
1824  3646  1263          TAD     G5773   /********
1825  3647  3671          DCA I   G7777   /********
1826  3650  6201          6201    /CDF 0  /********
1827  3651  4666          JMS I   G7774   /********
1828  3652  3655          GBLOK           /********
1829  3653  6212          6212    /CIF 10 /********
1830  3654  4664          JMS I   G7200   /********
1831  3655  6211          6211    /CDF 10 /********
1832  3656  2400          2400            /********
1833  3657  6211          6211    /CDF 10 /********
1834  3660  7400          7400            /********
1835  3661  7400          400             /********
1836  3662  6212          6212    /CIF 10 /********
1837  3663  4667          JMS I   G7775   /******** WRITE MILDRED INTO UPPER
1838  3664  3651          RITEOU          /******** SOURCE WORKING AREA
1839  3665  6132          CLLR            /******** INITIALIZE CLOCK
1840  3666  6134          CLEN            /********
1841  3667  7240          CLA CMA         /********
1842  3670  6133          CLAB            /********
1843  3671  1261          TAD     G101    /********
1844  3672  6132          CLLR            /********
1845  3673  6135          CLSA            /********
1846  3674  7200          CLA             /********
1847  3675  6046          TLS             /********
1848  3676  6001          ION             /********
1849  3677  5650          JMP I   .+1     /********
1850  3700  2216          ERT             /******** ERASE ALL
1851  3701  0110  RITEOU, 110             /********
1852  3702  0030          30              /********
1853  3703  0076          76              /********
1854  3704  0002          2               /********
1855  3705  0100  GBLOK,  100             /********
1856  3706  0025          25              /********
1857  3707  0023          23              /********
1858  3710  0001          1               /********
1859  3711  0101  G101,   101             /********
1860  3712  5772  G5772,  5772            /********
1861  3713  5773  G5773,  5773            /********
1862  3714  7200  G7200,  7200            /********
1863  3715  7773  G7773,  7773            /********
1864  3716  7774  G7774,  7774            /********
1865  3717  7775  G7775,  7775            /********
1866  3720  7776  G7776,  7776            /********
1867  3721  7777  G7777,  7777            /********
1868        4620  *4600*20
1869  4620  1045  FEXP,   GETSGN                  /TAKE ABSOLUTE VALUE
1870  4621  7710          SPA CLA
```

```
1871  4622  4724          JMS I NEGP
1872  4623  3033          DCA T3  /C(SIGN)=-1 IF I X2<0
1873  4624  4407          FINT
1874  4625  4313          FMUL LG2E
1875  4626  4675          FPUT I X2
1876  4627  0000          FEXT
1877  4630  4453          JMS I INTEGER   /TAKE INTEGER PART
1878  4631  3325          DCA FLAG2       /SAVE LOW ORDER DATA
1879  4632  4407          FINT
1880  4633  7300          FNOR
1881  4634  6676          FPUT I XSQ2
1882  4635  1675          FGET I X2
1883  4636  2676          FSUB I XSQ2
1884  4637  6675          FPUT I X2
1885  4640  4675          FMUL I X2
1886  4641  6676          FPUT I XSQ2
1887  4642  1310          FADD DF
1888  4643  6326          FPUT TEMP
1889  4644  1305          FGET CF
1890  4645  3326          FDIV TEMP
1891  4646  2675          FSUB I X2
1892  4647  1277          FADD AF
1893  4650  6326          FPUT TEMP
1894  4651  1302          FGET BF
1895  4652  4676          FMUL I XSQ2
1896  4653  1326          FADD TEMP
1897  4654  6326          FPUT TEMP
1898  4655  1675          FGET I X2
1899  4656  3326          FDIV TEMP
1900  4657  4321          FMUL TWO
1901  4660  1316          FADD ONE
1902  4661  0000          FEXT
1903  4662  1325          TAD FLAG2
1904  4663  1044          TAD FLAC
1905  4664  3044          DCA FLAC
1906  4665  2033          ISZ T3
1907  4666  5536          RETURN
1908  4667  4407          FINT
1909  4670  6675          FPUT I X2
1910  4671  1316          FGET ONE
1911  4672  3675          FDIV I X2
1912  4673  0000          FEXT
1913  4674  5536          RETURN
1914                /CONSTANTS FOR FEXP
1915  4675  5321  X2,     X
1916  4676  5325  XSQ2,   XSQR
1917  4677  0004  AF,     0004
1918  4700  2372          2372
1919  4701  1402          1402
1920  4702  7774  BF,     7774
1921  4703  2157          2157
1922  4704  5157          5157
1923  4705  0012  CF,     0012
1924  4706  5454          5454
1925  4707  0343          0343
```

```
1926    4710  0007    DF,     0007
1927    4711  2566            2566
1928    4712  5341            5341
1929    4713  0001    LG2E,   0001
1930    4714  2705            2705
1931    4715  2435            2435
1932    4716  0001    ONE,    0001
1933    4717  2000            2000
1934    4720  0000            0000
1935    4721  0002    TWO,    0002
1936    4722  2000            2000
1937    4723  0000            0000
1938    4724  5163    NEGP,   FNEG
1939    4725  0000    FLAG2,  0
1940    4726  0000    TEMP,   0
1941    4727  0000            0
1942    4730  0000            0
1943    4731  0000            0
1944                  /MAIN ALGORITHM FOR ARCTANGENT
1945    4732  4407    ARCALG, FINT
1946    4733  3675            FGET I X2
1947    4734  4675            FMUL I X2
1948    4735  6676            FPUT I XSQ2
1949    4736  4374            FMUL BET2
1950    4737  1371            FADD BET1
1951    4740  4676            FMUL I XSQ2
1952    4741  1366            FADD BET2
1953    4742  6326            FPUT TEMP
1954    4743  3363            FGET ALF2
1955    4744  4676            FMUL I XSQ2
1956    4745  1360            FADD ALF1
1957    4746  4676            FMUL I XSQ2
1958    4747  1355            FADD ALF2
1959    4750  4675            FMUL I X2
1960    4751  3326            FDIV TEMP
1961    4752  0000            FEXT
1962    4753  5754            JMP I ,+1
1963    4754  5024                ARCRTN
1964                  /CONSTANTS = FLOATING ARC TANGENT
1965    4755  0000    ALF2,   0000
1966    4756  2437            2437
1967    4757  1643            1643
1968    4760  7777    ALF1,   7777
1969    4761  3304            3304
1970    4762  4434            4434
1971    4763  7773    ALF2,   7773
1972    4764  3306            3306
1973    4765  5454            5454
1974    4766  0000    BET2,   0000
1975    4767  2437            2437
1976    4770  1646            1646
1977    4771  0000    BET1,   0000
1978    4772  2427            2427
1979    4773  2323            2323
1980    4774  7775    BET2,   7775
```

```
1981    4775  3427            3427
1982    4776  7052            7052
1983                  /FLOATING POINT ARC TANGENT
1984          5000    *5000
1985    5000  1045    ARTN,   GETSGN          /TAKE ABSOLUTE VALUE
1986    5001  7710            SPA CLA
1987    5002  4363            JMS FNEG
1988    5003  3333            DCA T3
1989    5004  4407            FINT
1990    5005  6635            FPUT I X1
1991    5006  2637            FSUB I CON1
1992    5007  0000            FEXT
1993    5010  1045            GETSGN
1994    5011  7710            SPA CLA
1995    5012  5221            JMP GO          /LESS THAN ONE
1996    5013  4407            FINT
1997    5014  0637            FGET I CON1
1998    5015  3635            FDIV I X1
1999    5016  6635            FPUT I X1
2000    5017  0000            FEXT
2001    5020  7240            CLA CMA
2002    5021  3362    GO,     DCA FLAG1       /SIGN FLAG OF RESULT
2003    5022  5623            JMP I .+1       /CALL ALGORITHM
2004    5023  4732                  ARCALG
2005    5024  2362    ARCRTN, ISZ FLAG1       /RETURN HERE
2006    5025  5634            JMP I EXIT1
2007    5026  4407            FINT
2008    5027  6635            FPUT I X1
2009    5030  0636            FGET I PI2
2010    5031  2635            FSUB I X1
2011    5032  0000            FEXT
2012    5033  5634            JMP I .+1
2013    5034  5301    EXIT1,  EXIT2
2014                  /CONSTANTS FOR ARCTANGENT
2015    5035  5321    X1,     X
2016    5036  5315    PI2,    PIOT
2017    5037  4716    CON1,   ONE
2018    5040  1045    FLOG,   GETSGN  /FLOATING LOGARITHM
2019    5041  7450            SNA
2020    5042  4566            ERROR3          /ZERO ARGUEMENT FOR LOG
2021    5043  7710            SPA CLA
2022    5044  4566            ERROR4          /*
2023    5045  4407            FINT
2024    5046  6756            FPUT I TEM
2025    5047  2637            FSUB I CON1
2026    5050  0000            FEXT
2027    5051  1045            GETSGN
2028    5052  7450            SNA
2029    5053  5536            RETURN
2030    5054  7700            SMA CLA
2031    5055  5264            JMP STARTL
2032    5056  4407            FINT
2033    5057  0637            FGET I CON1
2034    5060  3756            FDIV I TEM
2035    5061  6756            FPUT I TEM
```

```
2036  5062  7040          FEXT
2037  5063  7240          CLA CMA
2038  5064  3233  STARTL, DCA T3
2039  5065  1235          TAD P13
2040  5066  3044          DCA FLAC
2041  5067  7240          CMA
2042  5070  1756          TAD I TEM
2043  5071  3045          DCA FLAC+1
2044  5072  3046          DCA FLAC+2
2045  5073  3047          DCA FLAC+3
2046  5074  7001          IAC
2047  5075  3756          DCA I TEM
2048  5076  4407          FINT
2049  5077  4357          FMUL LOG2
2050  5100  6635          FPUT I X1
2051  5101  1756          FGET I TEM
2052  5102  2637          FSUB I CON1
2053  5103  6756          FPUT I TEM
2054  5104  4353          FMUL LOG8
2055  5105  1350          FADD LOG7
2056  5106  4756          FMUL I TEM
2057  5107  1345          FADD LOG6
2058  5110  4756          FMUL I TEM
2059  5111  1342          FADD LOG5
2060  5112  4756          FMUL I TEM
2061  5113  1337          FADD L4
2062  5114  4756          FMUL I TEM
2063  5115  1334          FADD L3
2064  5116  4756          FMUL I TEM
2065  5117  1331          FADD L2
2066  5120  4756          FMUL I TEM
2067  5121  1326          FADD L1
2068  5122  4756          FMUL I TEM
2069  5123  1635          FADD I X1
2070  5124  0000          FEXT
2071  5125  5634          JMP I EXIT1
2072  5126  0000  L1,     0000
2073  5127  3777          3777
2074  5130  7742          7742
2075  5131  7777  L2,     7777
2076  5132  4000          4000
2077  5133  4100          4100
2078  5134  7777  L3,     7777
2079  5135  2517          2517
2080  5136  0310          0310
2081  5137  7776  L4,     7776
2082  5140  4113          4113
2083  5141  7211          7211
2084                      /LOGARITHM CONSTANTS
2085  5142  7776  LOG5,   7776
2086  5143  2535          2535
2087  5144  3301          3301
2088  5145  7775  LOG6,   7775
2089  5146  4766          4766
2090  5147  3771          3771
```

```
2091    5150  7774    LOG7,   7774
2092    5151  2236            2236
2093    5152  4304            4304
2094    5153  7771    LOG8,   7771
2095    5154  4544            4544
2096    5155  1735            1735
2097    5156  4726    TEM,    TEMP
2098    5157  0000    LOG2,   0
2099    5160  2613            2613
2100    5161  4414            4414
2101    5162  0000    FLAG1,  0
2102    5163  0000    FNEG,   0
2103    5164  4451            JMS I MINSKI
2104    5165  7240            CLA CMA
2105    5166  5763            JMP I FNEG
2106    5167  6213    LO,     6213    /CIF CDF 10/********
2107    5170  5126            JMP     XLO     /********
2108    5171  6213    LC,     6213    /CIF CDF 10/********
2109    5172  5130            JMP     XLC     /********
2110    5173  6213    LL,     6213    /CIF CDF 10/********
2111    5174  5132            JMP     XLL     /********
2112                  /FLOATING POINT SINE AND COSINE
2113
2114
2115
2116          5177    *5177
2117    5177  4407    FCOS,   FINT            /COS(X)=SIN(PI/2-X)
2118    5200  6321            FPUT X
2119    5201  0315            FGET PIOT
2120    5202  2321            FSUB X
2121    5203  0000            FEXT
2122    5204  1045    FSIN,   GETSGN
2123    5205  7740            SMA SZA CLA
2124    5206  5214            JMP MOD
2125    5207  1045            GETSGN
2126    5210  7700            SMA CLA
2127    5211  5536            RETURN          /YES SIN(0)=0
2128    5212  4451            JMS I MINSKI
2129    5213  7040            CMA             /NO:SIN(-X)=-SIN(X)
2130    5214  3033    MOD,    DCA T3
2131                          /REDUCE X MODULO 2 PI
2132    5215  4407            FINT
2133    5216  3305            FDIV TWOPI
2134    5217  6325            FPUT XSOR
2135    5220  0000            FEXT
2136    5221  4453            JMS I INTEGER
2137    5222  4407            FINT
2138    5223  7000            FNOR
2139    5224  6321            FPUT X
2140    5225  0325            FGET XSOR
2141    5226  2321            FSUB X
2142    5227  4305            FMUL TWOPI
2143    5230  6321            FPUT X
2144    5231  2311            FSUB PI         /X<PI?
2145    5232  0000            FEXT
```

```
2146  5233  1345          GETSGN
2147  5234  7710          SPA CLA
2148  5235  5244          JMP PCHECK      /YES
2149  5236  4427          FINT            /NO, SIN(X-PI)=-SIN(X)
2150  5237  6321          FPUT X
2151  5240  0000          FEXT
2152  5241  1033          TAD T3          /INVERT THE SIGN
2153  5242  7040          CMA
2154  5243  3033          DCA T3
2155  5244  4407  PCHECK, FINT            /X<PI/2?
2156  5245  0321          FGET X
2157  5246  2315          FSUB PIOT
2158  5247  0002          FEXT
2159  5250  1045          GETSGN
2160  5251  7710          SPA CLA
2161  5252  5260          JMP PALG        /YES
2162  5253  4407          FINT            /NO
2163  5254  0311          FGET PI         /SIN(X)=SIN(PI-X)
2164  5255  2321          FSUB X
2165  5256  6321          FPUT X
2166  5257  0000          FEXT
2167  5260  4407  PALG,   FINT
2168  5261  0321          FGET X
2169  5262  3315          FDIV PIOT
2170  5263  6321          FPUT X
2171  5264  4321          FMUL X
2172  5265  6325          FPUT XSQR
2173  5266  0331          FGET C9
2174  5267  4325          FMUL XSQR
2175  5270  1335          FADD C7
2176  5271  4325          FMUL XSQR
2177  5272  1341          FADD C5
2178  5273  4325          FMUL XSQR
2179  5274  1345          FADD C3
2180  5275  4325          FMUL XSQR
2181  5276  1315          FADD PIOT
2182  5277  4321          FMUL X
2183  5300  0000          FEXT
2184  5301  2033  EXIT2,  ISZ T3
2185  5302  5536          RETURN
2186  5303  4451          JMS I MINSKI
2187  5304  5536          RETURN
2188                      /CONSTANTS AND POINTERS
2189  5305  0003  TWOPI,  0003
2190  5306  3110          3110
2191  5307  3756          3756    /(3755) = FOR 4-WORD
2192  5310  3235          3235
2193  5311  0002  PI,     0002
2194  5312  3110          3110
2195  5313  3756          3756
2196  5314  3235          3235
2197  5315  0001  PIOT,   0001            /USED BY SINE AND COSINE
2198  5316  3110          3110
2199  5317  3756          3756
2200  5320  3235          3235
```

```
5321  0000    X,      0000
5322  0000            0000
5323  0000            0000
5324  0000            0000
5325  0000    XSQR,   0000
5326  0000            0000
5327  0000            0000
5330  0000            0000
                      /SINE CONSTANTS
5331  7764    C9,     7764
5332  2501            2501
5333  7015            7015
5334  1042            1042
5335  7771    C7,     7771
5336  5464            5464
5337  5514            5514
5340  6150            6150
5341  7775    C5,     7775
5342  2431            2431
5343  5361            5361
5344  4736            4736
5345  0000    C3,     0000
5346  5325            5325
5347  0414            0414
5350  3167            3167
              /END OF EXTENDED FUNCTIONS.
              /
              /HANDLES O I, EXPRESSION
              /SETS CLOCK ACCORDING TO EXPRESSION
              /
5351  4540    SETCLK, PUSHJ                 /********
5352  1612            EVAL-1                /********
5353  4407            FINT                  /********
5354  4375            FMUL     MHUNDRD      /********
5355  0000            FEXT                  /********
5356  6132            CLLR                  /********
5357  6134            CLEN                  /********
5360  4453            JMS I    INTEGER      /********
5361  6133            CLAB                  /********
5362  7200            CLA                   /********
5363  1006            TAD      C100         /********
5364  6132            CLLR                  /********
5365  1123            TAD      C200         /********
5366  6134            CLEN                  /********
5367  1374            TAD      O4600        /********
5370  6132            CLLR                  /********
5371  7200            CLA                   /********
5372  5773            JMP I    .+1          /********
5373  0611            PROC                  /********
5374  4600    O4600,  4600                  /********
5375  0007    MHUNDRD,7147001O              /********
5376  4730
5377  1000
              /PAGE 1 - INPUT/OUTPUT ROUTINES FOR THE FOCAL
              /FLOATING POINT PACKAGE.
```

```
2254                    /IN THE COMMENTS BELOW:-
2255                    / F = NUMBER OF DIGITS TO BE OUTPUT      =FISW
2256                    / D = NUMBER OF DECIMAL PLACES           =DECP
2257                    / E = DECIMAL EXPONENT                   =BEXP
2258                    / P = NUMBER OF PLACES REMAINING TO BE
2259                    /     PRINTED BEFORE DECIMAL POINT
2260            5400    *5400
2261            0006    DIGITS=6        /NUMBER OF DECIMAL DIGITS OUT
2262    5400    0000    TGO,    0
2263    5401    3334            DCA SCOUNT      /SAVE MAX, NUMBER OF DIGITS AVAILABLE = *SET COUNTS*
2264    5402    1052            TAD FISW
2265    5403    4557            RTL6
2266    5404    0122            AND P77
2267    5405    3032            DCA T1
2268    5406    1032            TAD T1
2269    5407    7041            CIA             /NO, COMPUTE FIELD SIZES
2270    5410    7450            SNA
2271    5411    1326            TAD MD
2272    5412    3335            DCA FCOUNT
2273    5413    1052            TAD FISW        /(JMP FPRNT) = FOR NO ROUNDGIN,
2274    5414    7450            SNA             /FLOATING OUTPUT?
2275    5415    5241            JMP R6          /YES, ROUND OFF TO MAX,NO.  PLACES
2276    5416    0122            AND P77
2277    5417    3333            DCA DECP
2278    5420    1335            TAD FCOUNT
2279    5421    1333            TAD DECP
2280    5422    7510            SPA             / F-D > 0 ?
2281    5423    5230            JMP .+5         /YES
2282    5424    7240            CLA CMA         /NO,
2283    5425    1032            TAD T1
2284    5426    3333            DCA DECP        /MAKE D = F-1
2285    5427    7040            CMA
2286    5430    1033            TAD T3          /COMPARE DECIMAL EXPONENT
2287    5431    7500            SMA             / F-D > E?
2288    5432    7200            CLA             /NO, ROUND OFF TO F PLACES
2289    5433    1032            TAD T1          /YES
2290    5434    7510            SPA             / D+E < 0 ?
2291    5435    5263            JMP FPRNT+2     /YES, NO ROUNDING NEEDED, GO TO PRINT
2292    5436    1326            TAD MD          /NO, ROUND TO D+E PLACES,
2293    5437    7500            SMA             /TO A MAXIMUM OF D PLACES
2294    5440    7200            CLA
2295    5441    1327    R6,     TAD RND2        / *ROUND UP *
2296    5442    3071            DCA T2          /SAVE NUMBER+1 OF PLACES TO ROUND TO.
2297    5443    1731            TAD I BUFST
2298    5444    1071            TAD T2          /SET UP BUFFER ADDRESS AT WHICH
2299    5445    3336            DCA PLCE        /ROUNDING OFF SHOULD START
2300    5446    1071            TAD T2
2301    5447    7041            CIA             /SET UP COUNT OF MAXIMUM NUMBER
2302    5450    3071            DCA T2          /OF CARRIES ALLOWABLE
2303    5451    1325            TAD K5          /LITTLE EXTRA ON FIRST DIGIT,
2304    5452    2736    RET,    ISZ I PLCE      /ADD 1 TO DIGIT AT CURRENT POSITION
2305    5453    1736            TAD I PLCE
2306    5454    1330            TAD DM12
2307    5455    7710            SPA CLA         /CARRY REQUIRED?
2308    5456    5265            JMP FPRNT       /NO, GO TO OUTPUT
```

```
2359     5457  3736          DCA I PLCE      /YES, MAKE CURRENT DIGIT ZERO
2310     5460  2371          ISZ T2          /BEGINNING OF BUFFER REACHED?
2311     5461  5321          JMP DECR        /NO, DECREMENT BUFFER ADDRESS AND REPEAT
2312     5462  2736          ISZ I PLCE      /YES, SET MANTISSA TO 0.1
2313     5463  2033          ISZ T3          /COMPENSATE BY INCREMENTING EXPONENT
2314     5464  7200          CLA
2315     5465  1052  FPRNT,  TAD FISW        /AUTO-INDEX REGISTER ALREADY SET, = *PRINT*
2316     5466  7650          SNA CLA         / F = 0 ?
2317     5467  5356          JMP FLOUT       /YES, OUTPUT AS FLOATING NUMBER
2318     5470  1335          TAD FCOUNT
2319     5471  1033          TAD T3
2320     5472  7540          SMA SZA         / E > F ?
2321     5473  5355          JMP FLOUT-1     /YES,CONVERT TO E FORMAT
2322     5474  1333          TAD DECP
2323     5475  7500          SMA             / E < F-D ?
2324     5476  7200          CLA             /NO, TAKE P = E
2325     5477  7041          CIA             /YES, TAKE P = F-D
2326     5500  1033          TAD T3
2327     5501  7041          CIA
2328     5502  3032          DCA T1          /SET UP MINUS P
2329     5503  1033  BACK,   TAD T3          /PRINT DD.DDD
2330     5504  1032          TAD T1
2331     5505  7650          SNA CLA         / P = E ?
2332     5506  5343          JMP DIG         /YES, PRINT DIGIT
2333     5507  1032          TAD T1          /NO,
2334     5510  7001          IAC
2335     5511  7710          SPA CLA         / P > 1 ?
2336     5512  1105          TAD M20 /YES, TAKE SPACE (240-260); OTHERWISE ZERO
2337     5513  4336  IN,     JMS OUTA        /PRINT CHARACTER
2338     5514  2032          ISZ T1          /P CHARACTERS PRINTED?
2339     5515  5303          JMP BACK        /NO
2340     5516  1102          TAD PER         /YES,
2341     5517  4551          PRINTC          /PRINT DECIMAL POINT
2342     5520  5303          JMP BACK
2343     5521  7040  DECR,   CMA             /BACKUP TO TOP OF BUFFER.
2344     5522  1336          TAD PLCE
2345     5523  3336          DCA PLCE
2346     5524  5252          JMP RET
2347     5525  0004  K5,     4
2348     5526  7772  MD,     -DIGITS
2349     5527  0007  RND2,   DIGITS+1
2350     5530  7766  OM12,   -12
2351     5531  6150  BUFST,  SADR
2352     5532  6154  OPUT,   OUTDG
2353     5533  0000  DECP,   0               /MODIFIABLE LOCATIONS
2354     5534  0000  SCOUNT, 0
2355     5535  0000  FCOUNT, 0
2356           5536  PLCE=.
2357     5536  0000  OUTA,   0               /MODIFIED REGISTERS.
2358     5537  4732          JMS I OPUT      /PRINT CHARACTER
2359     5540  2335          ISZ FCOUNT      /F CHARACTERS PRINTED?
2360     5541  5736          JMP I OUTA      /NO, RETURN
2361     5542  5600          JMP I TGO       /YES, NUMBER FINSHED
2362     5543  7040  DIG,    CMA
2363     5544  1033          TAD T3          /REDUCE E, BY 1
```

```
2364  5545  3033          DCA T3
2365  5546  2334          ISZ SCOUNT      /ARE ALL SIG. FIGS. USED?
2366  5547  5353          JMP .+4         /NO
2367  5550  7040          CMA             /YES.
2368  5551  3334          DCA SCOUNT      /RESET COUNT TO -1
2369  5552  5313          JMP IN          /AND LEAVE C(AC) = 0
2370  5553  1414          TAD I FLTXR     /TAKE NEXT DIGIT FROM BUFFER
2371  5554  5313          JMP IN
2372                /DO FLOATING OUTPUT
2373  5555  7200          CLA             /IF OUTPUT TOO LARGE,
2374  5556  4732    FLOUT, JMS I OPUT     /PRINT "0"
2375  5557  1102          TAD PER
2376  5560  4551          PRINTC          /PRINT "."
2377  5561  2200          ISZ TGO         /SECOND RETURN
2378  5562  1414          TAD I FLTXR     /TAKE NEXT DIGIT FROM BUFFER
2379  5563  4336          JMS OUTA        /PRINT IT
2380  5564  2334          ISZ SCOUNT      /TEST FOR END OF INPUT
2381  5565  5362          JMP .-3         /AND REPEAT
2382  5566  7040          CMA
2383  5567  3334          DCA SCOUNT      /OUTPUT EXTRA ZEROS.
2384  5570  5363          JMP .+5
2385  5571  0000    ABSOLV, 0
2386  5572  1045          TAD HORD
2387  5573  3050          DCA SIGNF
2388  5574  1045          TAD HORD
2389  5575  7710          SPA CLA
2390  5576  4451          JMS I MINSKI
2391  5577  5771          JMP I ABSOLV
2392                /DOUBLE PRECISION DECIMAL-BINARY
2393                /INPUT AND CONVERSION FOR + OR - XXX...
2394        5600    *5600
2395  5600  0000    DECONV, 0
2396  5601  3046          DCA LORD
2397  5602  3044          DCA EXP         /ZERO THE EXPONENT AND
2398  5603  3045          DCA HORD        /INITIALIZE FLOATING AC.
2399  5604  3047          DCA OVER2
2400  5605  3314          DCA DNUMBR
2401  5606  3050          DCA SIGNF
2402  5607  1066          TAD CHAR        /ALLOW KEYBOARD SIGN CHECKS.
2403  5610  1264          TAD MPLUS
2404  5611  7450          SNA
2405  5612  5220          JMP .+6         /+SIGN! GET NEXT
2406  5613  1111          TAD M2          /CHECK - SIGN
2407  5614  7640          SZA CLA
2408  5615  5221          JMP .+4
2409  5616  7040          CMA             /INIT SIGN CHECK TO POS.
2410  5617  3050          DCA SIGNF
2411  5620  4666          JMS I XINPUT    /GET NEXT
2412  5621  1066          TAD CHAR        /A SPACE PERHAPS?
2413  5622  1265          TAD MSPACE
2414  5623  7650          SNA CLA
2415  5624  5220          JMP .+4
2416  5625  4227          JMS DECON
2417  5626  5600          JMP I DECONV
2418  5627  0000    DECON,  0
```

```
2419  563Ø  1Ø66          TAD CHAR        /TEST LEAD CHARACTER FOR TERMINATOR
2420  5631  1262          TAD MINE
2421  5632  7653          SNA CLA
2422  5633  5627          JMP I DECON     /E
2423  5634  4561          TESTN
2424  5635  5627          JMP I DECON     /.
2425  5636  5247          JMP OTST        /OTHER
2426  5637  1Ø54          TAD SORTCN      /N
2427  5640  3313  DSAVE,  DCA DIGIT       /YES
2428  5641  4267          JMS MULT1Ø      /REMAIN MUST =Ø SINCE OVERFLOW IS CHECKED
2429  5642  2314          ISZ ONUMBR      /COUNT DIGITS
2430  5643  7640          SZA CLA
2431  5644  4566          ERROR2          /INPUT-OVERFLOW ERROR
2432  5645  4666          JMS I XINPUT
2433  5646  5230          JMP DECON+1     /CONTINUE
2434  5647  1Ø66  DTST,   TAD CHAR        /ALLOW A-Z
2435  565Ø  1112          TAD MINUSA
2436  5651  7710          SPA CLA
2437  5652  5627          JMP I DECON
2438  5653  1Ø66          TAD CHAR
2439  5654  1263          TAD MINUSZ
2440  5655  7740          SZA SMA CLA
2441  5656  5627          JMP I DECON     /USE SIX BITS OF ASCII
2442  5657  1Ø66          TAD CHAR
2443  566Ø  Ø122          AND P77
2444  5661  5240          JMP DSAVE
2445  5662  7473  MINE,   =305    /(7532)= FOR AMPERSAND
2446  5663  7446  MINUSZ, =332
2447  5664  7525  MPLUS,  =253
2448  5665  7540  MSPACE, =240
2449  5666  Ø756  XINPUT, INPUT
2450  5667  ØØØØ  MULT1Ø, Ø       /ROUTINE TO MULTIPLY FLAC BY TEN (1Ø)
2451  567Ø  1Ø47          TAD OVER2
2452  5671  3Ø43          DCA OVER1
2453  5672  1Ø46          TAD LORD        /DOUBLE PRECISION WORD
2454  5673  3Ø42          DCA AC1L        /BY TEN (DECIMAL)
2455  5674  1Ø45          TAD HORD        /REMAIN=REMAINDER
2456  5675  3Ø41          DCA AC1H
2457  5676  3312          DCA REMAIN      /CLEAR OVERFLOW WORD
2458  5677  4315          JMS MULT2       /CALL SUBROUTINE TO
2459  57ØØ  4315          JMS MULT2       /MULTIPLY BY TWO
2460  57Ø1  4333          JMS DUBLAD      /CALL DOUBLE ADD
2461  57Ø2  4315          JMS MULT2
2462  57Ø3  1313          TAD DIGIT       /ADD LAST DIGIT RECEIVED
2463  57Ø4  3Ø43          DCA OVER1
2464  57Ø5  3Ø42          DCA AC1L
2465  57Ø6  3Ø41          DCA AC1H
2466  57Ø7  4333          JMS DUBLAD
2467  571Ø  1312          TAD REMAIN      /EXIT WITH REMAINDER
2468  5711  5667          JMP I MULT1Ø    /IN AC
2469  5712  ØØØØ  REMAIN, Ø
2470  5713  ØØØØ  DIGIT,  Ø       /STORAGE FOR DIGIT
2471  5714  ØØØØ  ONUMBR, Ø       /=NUMBER OF DIGITS
2472  5715  ØØØØ  MULT2,  Ø       /MULTIPLY  OVER2, LORD, HORD BY 2
2473  5716  1Ø47          TAD OVER2
```

```
2474  5717  7104          CLL RAL /CARRY INSERT BIT IS IN LINK
2475  5720  3047          DCA OVER2
2476  5721  1046          TAD LORD
2477  5722  7004          RAL
2478  5723  3046          DCA LORD
2479  5724  1045          TAD HORD
2480  5725  7004          RAL
2481  5726  3045          DCA HORD
2482  5727  1312          TAD REMAIN
2483  5730  7004          RAL
2484  5731  3312          DCA REMAIN
2485  5732  5715          JMP I MULT2
2486  5733  0000  DUBLAD, 0       /TRIPLE PRECISION ADDITION
2487  5734  7300          CLA CLL
2488  5735  1047          TAD OVER2
2489  5736  1043          TAD OVER1
2490  5737  3047          DCA OVER2
2491  5740  7004          RAL
2492  5741  1046          TAD LORD
2493  5742  1042          TAD AC1L
2494  5743  3046          DCA LORD
2495  5744  7004          RAL
2496  5745  1045          TAD HORD
2497  5746  1041          TAD AC1H
2498  5747  3045          DCA HORD
2499  5750  7004          RAL
2500  5751  1312          TAD REMAIN              /WITH OVERFLOW
2501  5752  3312          DCA REMAIN
2502  5753  5733          JMP I DUBLAD
2503  5754  0000  DIV1,   0       /SHIFT OPERAND RIGHT
2504  5755  7300          CLA CLL         /TRIPLE PRECISION
2505  5756  1041          TAD AC1H
2506  5757  7510          SPA
2507  5760  7120          CLL CML
2508  5761  7010          RAR
2509  5762  3041          DCA AC1H
2510  5763  1042          TAD AC1L
2511  5764  7010          RAR
2512  5765  3042          DCA AC1L
2513  5766  1043          TAD OVER1
2514  5767  7010          RAR
2515  5770  3043          DCA OVER1
2516  5771  2040          ISZ EX1
2517  5772  5754          JMP I DIV1
2518  5773  5754          JMP I DIV1
2519  5774  4566  FSSERR, ERROR4          /********(SUBSCRIPT ERROR FOR FILE VARIABLE-OR NOT DEFINED)
2520        6000  *6000
2521              /FLOATING OUTPUT CONVERSION ROUTINE
2522  6000  0000  FLOUTP, 0
2523  6001  7610          SKP CLA         /********/GETS RID OF . IN PRINTOUT
2524              LMODE
2525  6002  6377  OPTR,   6377            /********
2526              PMODE
2527  6003  1045          TAD HORD        /NUMBER>0??
2528  6004  7700          SMA CLA
```

```
2529  6005  1334          TAD SMSP        /PRINT "-" OR A SPACE.
2530  6006  1336          TAD SMIN
2531  6007  4551          FPRNTC
2532  6010  4753          JMS I ABSOL2
2533  6011  3033  FG02,   DCA T3          /INITIALIZE DECIMAL EXPONENT
2534  6012  1344          TAD EXP         /IS EXP 0 TO 47
2535  6013  7510          SPA
2536  6014  5227          JMP FG03        /TOO LARGE!MULTIPLY BY 1/10.
2537  6015  7440          SZA
2538  6016  1341          TAD M4
2539  6017  7750          SPA SNA CLA
2540  6020  5234          JMP FG04
2541  6021  4407          FINT
2542  6022  4744          FMUL I PPTEN
2543  6023  0000          FEXT
2544  6024  7001          IAC
2545  6025  1033          TAD T3
2546  6026  5211          JMP FG02
2547  6027  4407  FG03,   FINT
2548  6030  4752          FMUL I TENPT
2549  6031  0000          FEXT
2550  6032  7040          CMA
2551  6033  5225          JMP .-6
2552  6034  3745  FG04,   DCA I DPT       /MULTIPLY BY TWO TO POSITION BIT0
2553  6035  3746          DCA I REPT      /CLEAR OVERFLOW WORD
2554  6036  1350          TAD SADR        /INIT BUFFER POINTER
2555  6037  3014          DCA FLTXR
2556  6040  1044          TAD EXP         /COMPUTE BITS IN 1ST DIGIT
2557  6041  7140          CMA CLL
2558  6042  3354          DCA OUTDG       /TEMP COUNT
2559  6043  1343          TAD DCOUNT      /SETUP COUNT OF TOTAL OUTPUT
2560  6044  3044          DCA EXP
2561  6045  4527          JMS I DOUBLE    /ROTATE OUT THE 1ST 4 BITS
2562  6046  2354          ISZ OUTDG
2563  6047  5245          JMP .-2
2564  6050  1746          TAD I REPT      /TEST FOR 10-15,0,1-9
2565  6051  7450          SNA
2566  6052  5270          JMP FG05        /IGNORE 1ST ZERO
2567  6053  1342          TAD FM12
2568  6054  7710          SPA CLA
2569  6055  5264          JMP .+7         /0-9
2570  6056  7001          IAC
2571  6057  3414          DCA I FLTXR     /OUTPUT A 1
2572  6060  2044          ISZ EXP         /COUNT THE DIGIT
2573  6061  1342          TAD FM12        /CORRECT REMAINDER
2574  6062  2033          ISZ T3          /BUMP DECIMAL EXPONENT
2575  6063  7000          NOP
2576  6064  1746          TAD I REPT      /COMPUTE RESULTANT OR SECOND DIGIT
2577  6065  2033          ISZ T3
2578  6066  7000          NOP
2579  6067  7410          SKP
2580  6070  4747  FG05,   JMS I M10PT     /IE, .672X10=6+.72,, ETC
2581  6071  3414          DCA I FLTXR
2582  6072  2044          ISZ EXP         /ALL DIGITS OUTPUT??
2583  6073  5270          JMP .-3         /NO! CONTINUE
```

```
2584  6[illegible]74  1352          TAD SADR        /INIT BUFFER POINTER
2585  6075  3014          DCA FLTXR
2586  6076  1343          TAD DCOUNT
2587  6077  4751          JMS I ROUND     /OUTPUT MANTISSA
2588  6100  5600          JMP I FLOUTP    /FIXED POINT DONE
2589  6101  1333          TAD CHRT        /PRINT "E"
2590  6102  4551          PRINTC
2591                /OUTPUT THE EXPONENT
2592  6103  1033          TAD T3          /TAKE ABSOLUTE VALUE OF EXPONENT
2593  6104  7510          SPA
2594  6105  7041          CIA
2595  6106  3045          DCA HORD                /SAVE * POWER
2596  6107  1033          TAD T3          /PRINT SIGN
2597  6110  7700          SMA CLA
2598  6111  1111          TAD M2
2599  6112  1336          TAD SMIN
2600  6113  4551          PRINTC
2601  6114  1045          TAD HORD
2602  6115  2044          ISZ EXP
2603  6116  1337          TAD M144
2604  6117  7500          SMA
2605  6120  5315          JMP .+3
2606  6121  1340          TAD C144
2607  6122  3045          DCA HORD                /SAVE TENS AND UNITS
2608  6123  7040          CMA             /OUTPUT HUNDREDS
2609  6124  1044          TAD EXP
2610  6125  7440          SZA             /UNLESS ZERO
2611  6126  4354          JMS OUTDG
2612  6127  1045          TAD HORD        /PRINT TWO DIGITS
2613  6130  4732          JMS I PRNTI
2614  6131  5600          JMP I FLOUTP
2615  6132  2442  PRNTI,  PRNT
2616  6133  0305  CHRT,   305     /E  (0246) + FOR AMPERSAND
2617  6134  7763  SMSP,   240+255 /
2618  6135  0275  PEQ,    275
2619  6136  0255  SMIN,   255
2620  6137  7634  M144,   -144    /+100
2621  6140  0144  C144,   0144    /+100
2622  6141  7774  M4,     -4
2623  6142  7766  FM12,   -12
2624  6143  7771  DCOUNT, -DIGITS-1       /NUMBER OF DIGITS OUTPUT
2625  6144  6275  PPTEN,  PTEN    /IEI
2626  6145  5713  DPT,    DIGIT
2627  6146  5712  REPT,   REMAIN  /OVERFLOW FROM INTEGER MULTIPLY
2628  6147  5667  M10PT,  MULT10
2629  6150  7467  SADR,   BUFFER-1
2630  6151  5400  ROUND,  TGO     /ACTUAL OUTPUT ROUTINE
2631  6152  6271  TENPT,  TEN
2632  6153  5571  ABSOL2, ABSOLV
2633  6154  0000  OUTDG,  0       /OUTPUT ONE DIGIT
2634  6155  1113          TAD C260
2635  6156  4551          PRINTC
2636  6157  5754          JMP I OUTDG
2637  6160  7750  RANMUL, 7750123331573[illegible]  /********
      6161  2333
```

```
                6162  5733
2638            6163  1167    LEPUT,  TAD     SUBS2   /******** CALLS STORING ROUTINE FOR
2639            6164  3171            DCA     SUBS    /******** S FN(X)=
2640            6165  1170            TAD     LESUB2  /********
2641            6166  3173            DCA     LESUBS  /********
2642            6167  1002            TAD     LWEIMP  /********
2643            6170  6212            6212            /********
2644            6171  4775            JMS I   STORIT  /********
2645            6172  2407            ISZ I   7       /********
2646            6173  5774            JMP I   .+1     /********
2647            6174  6401            FPNT+1          /********
2648            6175  2000    STORIT, ITSTOR          /********
2649            6176  6213    LS,     6213    /CIF CDF 10/******** LIBRARY SAVE
2650            6177  5134            JMP     XLS     /********
2651                          /USED BY 8K
2652                          /FLOATING POINT INPUT
2653                  6200    *6200
2654            6200  0000    FLINTP, 0               /IF C(AC) = 0, USE CHAR
2655            6201  7640            SZA CLA         /IF C(AC) NON-ZERO , GET NEXT
2656            6202  4706            JMS I XIN       /GET FIRST CHAR
2657            6203  1066            TAD CHAR        /IGNORE LEADING SPACES
2658            6204  1114            TAD M240
2659            6205  7650            SNA CLA
2660            6206  5202            JMP .-4
2661            6207  4702            JMS I DPCVPT    /READ FIRST DIGIT GROUP
2662            6210  1066            TAD CHAR        /AND SET "SIGNF"
2663            6211  1115            TAD MPER
2664            6212  7640            SZA CLA         /ENDED BY PERIOD?
2665            6213  5221            JMP FIGO1
2666            6214  4706            JMS I XIN       /YES, READ 2AND GROUP
2667            6215  3705            DCA I DPN
2668            6216  4703            JMS I DCONP
2669            6217  1705            TAD I DPN       /SAVE NUMBER OF DIGITS IN T3
2670            6220  7041            CMA IAC
2671            6221  3033    FIGO1,  DCA T3          /NO,
2672            6222  1310            TAD P43
2673            6223  3044            DCA EXP
2674            6224  4704            JMS I RESOL5
2675            6225  4707            JMS I INORM     /NORMALIZE FIRST, THEN
2676            6226  4407            FINT
2677            6227  6430            FPUT I PT1      /SAVE NUMBER
2678            6230  0000            FEXT
2679            6231  1066            TAD CHAR
2680            6232  1301            TAD MINUSE
2681            6233  7640            SZA CLA         /"E" READ IN?
2682            6234  5246            JMP ENDFI+3     /NO
2683            6235  4706            JMS I XIN       /YES, READ 3RD DIGIT GROUP
2684            6236  4702            JMS I DPCVPT    /I.E. CONVERT DECIMAL EXPONENT
2685            6237  4704            JMS I RESOL5
2686            6240  1047            TAD OVER2
2687            6241  1033            TAD T3          /C(SEXP)PLACES TO RIGHT
2688            6242  3033            DCA T3          /OF LAST DIGIT
2689                          /COMPENSATE FOR DECIMAL EXPONENTS
2690            6243  4407    ENDFI,  FINT            /RESTORE MANTISSA
2691            6244  6430            FGET I PT1
```

```
2692  6245  0000          FEXT
2693  6246  1033          TAD T3          /TEST DECIMAL EXPONENT
2694  6247  7450          SNA
2695  6250  5600          JMP I FLINTP    /FINISHED
2696  6251  7700          SMA CLA
2697  6252  5261          JMP FIG04
2698  6253  4407          FINT            /, IS TO THE LEFT!
2699  6254  4275          FMUL PTEN       /TIMES ,1000
2700  6255  6431          FPUT I PT1
2701  6256  0000          FEXT
2702  6257  7001          IAC
2703  6260  5266          JMP .+6
2704  6261  4407  FIG04,  FINT            /, IS TO THE RIGHT!
2705  6262  4271          FMUL TEN        /MULTIPLY BY 10
2706  6263  6430          FPUT I PT1
2707  6264  0000          FEXT
2708  6265  7040          CMA
2709  6266  1033          TAD T3
2710  6267  3033          DCA T3
2711  6270  5246          JMP ENOFI+3
2712  6271  0004  TEN,     0004
2713  6272  2400          2400
2714  6273  0000          0000
2715  6274  0000          0000
2716  6275  7775  PTEN,    7775
2717  6276  3146          3146
2718  6277  3147          3147    /(3146) = FOR 4-WORD
2719  6300  3150          3150
2720  6301  7473  MINUSE;  -305    /(7532) = FOR AMPERSAND
2721  6302  5600  DPCVPT;  DECONV
2722  6303  5627  DCONP,   DECON
2723  6304  7173  RESOL5;  RESOLV
2724  6305  5714  DPN,     DNUMBR
2725  6306  0756  XIN,     INPUT
2726  6307  7335  INORM,   DNORM
2727  6310  0043  P43,     43
2728                /END OF FLOATING POINT INPUT
2729                /7 FREE
2730                /USED BY H.S. READER
2731
2732
2733
2734                /
2735                /CALLS LOADING ROUTINE FOR FILE
2736                /VARIABLES IN EXPRESSIONS; CALLED BY EFUN3!
2737                /
2738        6311    *6311                   /********
2739  6311  1066  FNUM,   TAD     CHAR      /********
2740  6312  3056          DCA     EFOP      /********
2741  6313  4545          GETC              /********
2742  6314  4550          SORTC             /********
2743  6315  1771          TERMS-1           /********
2744  6316  7410          SKP               /********
2745  6317  5313          JMP     .-4       /********
2746  6320  4562          TSTLPR            /********
```

```
2747  6321  4566                ERROR4          /********
2748  6322  4734                JMS I   PECALL  /********
2749  6323  4453                JMS I   INTEGER /********
2750  6324  3171                DCA     SUBS    /********
2751  6325  1345                TAD     HORD    /********
2752  6326  3173                DCA     LESUBS  /********
2753  6327  1413                POPA            /********
2754  6330  6212                6212            /******** FILE NO.
2755  6331  4733                JMS I   LOADIT  /********
2756  6332  5536                JMP I   EFUN3I  /********
2757  6333  1533    LOADIT, ITLOAD              /********
2758  6334  1601    PECALL, ECALL               /********
2759  6335  0000    PASS,   0
2760  6336  4545            GETC
2761  6337  1066            TAD     CHAR
2762  6340  4542            PUSHA
2763  6341  4545            GETC
2764  6342  4550            SORTC
2765  6343  1374            GLIST=1
2766  6344  5735            JMP I   PASS
2767  6345  5341            JMP     .+4
2768  6346  4335    LTAPE,  JMS     PASS
2769  6347  1066            TAD     CHAR    /********
2770  6350  1374            TAD     MINCOM  /********
2771  6351  7640            SZA CLA         /********
2772  6352  5357            JMP     LERR    /********
2773  6353  1413            POPA            /********
2774  6354  4547            SORTJ           /******** JMPS ON SUBCOMMAND OF LIBR XXXX
2775  6355  6365            LLIST=1         /********
2776  6356  7772            LGO=LLIST       /********
2777  6357  4566    LERR,   ERROR4          /********
2778  6360  5167    LGO,    LO              /********
2779  6361  5171            LC              /********
2780  6362  2572            LM              /********
2781  6363  5173            LL              /********
2782  6364  6176            LS              /********
2783  6365  6375            LG              /********
2784  6366  0317    LLIST,  317             /********
2785  6367  0303            303             /********
2786  6370  0315            315             /********
2787  6371  0314            314             /********
2788  6372  0323            323             /********
2789  6373  0307            307             /********
2790  6374  7524    MINCOM, -254            /********
2791  6375  6213    LG,     6213            /********
2792  6376  5136            JMP     XLG     /********
2793        6400    *6400
2794                / FLOATING-POINT INTERPRETER FOR FOCAL.
2795  6400  0000    FPNT,   0
2796  6401  7300            CLA CLL
2797  6402  3047            DCA OVER2       /(NOP) = FOR 4-WORD
2798  6403  3043            DCA OVER1       /(NOP) = FOR 4-WORD.
2799  6404  1600            TAD I FPNT      /GET NEXT INSTRUCTION
2800  6405  7450            SNA
2801  6406  5600            JMP I FPNT      /FAST EXIT
```

```
2802  6407  3264          DCA JUMP
2803  6410  1264          TAD JUMP
2804  6411  0123          AND C200        /GET PAGE BIT
2805  6412  7650          SNA CLA         /PAGE ZERO?
2806  6413  5216          JMP .+3         /YES
2807  6414  1104          TAD P7600       /NO
2808  6415  0200          AND FPNT        /C(FPNT)0-4 CONTAINS PAGE BITS
2809  6416  3040          DCA ADDR
2810  6417  1106          TAD P177        /GET 7 BIT ADDRESS
2811  6420  0264          AND JUMP
2812  6421  1040          TAD ADDR
2813  6422  3040          DCA ADDR
2814  6423  1265          TAD INDRCT      /INDIRECT BIT=1?
2815  6424  0264          AND JUMP
2816  6425  7650          SNA CLA
2817  6426  5233          JMP LOOP01      /NO-GO ON
2818  6427  1440          TAD I ADDR      /YES ,DEFER ,W/O AUTO-INDEX
2819  6430  7450          SNA             /******** IF PT1 WAS ZERO, IT IS A
2820  6431  5572          JMP I   LEFPUT  /******** FILE VARIABLE
2821  6432  3040          DCA ADDR
2822  6433  2200  LOOP01, ISZ FPNT
2823  6434  7040          CMA
2824  6435  1040          TAD ADDR
2825  6436  3015          DCA FLTXR2
2826  6437  1264          TAD JUMP        /GET COMMAND
2827  6440  7106          CLL RTL
2828  6441  7006          RTL
2829  6442  0107          AND P17         /GET BITS 0-2;IE OPCODE
2830  6443  7450          SNA
2831  6444  5271          JMP FLGT
2832  6445  1266          TAD TABLE       /LOOKUP IN TABLE
2833  6446  3264          DCA JUMP
2834  6447  1664          TAD I JUMP
2835  6450  7450          SNA
2836  6451  5267          JMP FLPT
2837  6452  3264          DCA JUMP
2838  6453  1306          TAD CEX1        /SAVE FLOATING ARGUEMENT,UNLESS'GET' OR 'PUT'
2839  6454  3014          DCA FLTXR
2840  6455  1117          TAD MFLT
2841  6456  3057          DCA CNTR
2842  6457  1415          TAD I FLTXR2
2843  6460  3414          DCA I FLTXR
2844  6461  2057          ISZ CNTR
2845  6462  5257          JMP .-3
2846  6463  5664          JMP I JUMP      /GO THERE
2847  6464  0000  JUMP,   0
2848        0040  ADDR=EX1
2849  6465  0400  INDRCT, 0400
2850  6466  6575  TABLE,  ITABLE
2851  6467  1305  FLPT,   TAD CEXP       /EXP TO (ADDR)
2852  6470  5275          JMP .+5
2853  6471  1305  FLGT,   TAD CEXP       /(ADDR) TO EXP
2854  6472  3015          DCA FLTXR2
2855  6473  7040          CMA
2856  6474  1040          TAD ADDR
```

```
2857  6475  3014          DCA FLTXR       /SAVE 'FROM' ADDRESS
2858  6476  1117          TAD MFLT        /3 OR 4 WORDS
2859  6477  3057          DCA CNTR
2860  6500  1414          TAD I FLTXR
2861  6501  3415          DCA I FLTXR2
2862  6502  2057          ISZ CNTR
2863  6503  5300          JMP .-3
2864  6504  5201          JMP FPNT+1
2865  6505  0043  CEXP,    EXP-1
2866  6506  0037  CEX1,    EX1-1
2867  6507  4767  FLSU,    JMS I OPMINS    /FSUB-2 - NEGATE THE OPERAND
2868  6510  4772  FLAD,    JMS I ALGN      /FLAD-1 - FIRST ALIGN EXPONENTS
2869  6511  5201          JMP FPNT+1      /RETURN IF NO ALIGNMENT IS POSSIBLE
2870  6512  4774          JMS I RAR2      /TRIPLE PRECISION ADDDITION
2871  6513  4773          JMS I RAR1      /SINCE BITS ARE SHIFTED
2872  6514  4775          JMS I TRAD      /RIGHT
2873  6515  4771  NORF,    JMS I NORM      /NORMALIZE THE RESULT
2874  6516  5201          JMP FPNT+1      /HINTIUSE 70ØX FOR FUNCTIONS.
2875                      /INTERPRETIVE POWER
2876  6517  1045  FLEX,    TAD HORD        /ZERO?
2877  6520  7200          CLA             /CROCK****
2878  6521  5327          JMP .+6
2879  6522  3044  ZERO,    DCA EXP         /YES
2880  6523  3045          DCA HORD
2881  6524  3046          DCA LORD
2882  6525  3047          DCA OVER2
2883  6526  5201          JMP FPNT+1
2884  6527  4543          PUSHF           /AC TO A * POWER
2885  6530  0044                FLAC
2886  6531  4543          PUSHF           /SETUP ARGUMENT ( THE EXPONENT)
2887  6532  0040                EX1
2888  6533  4544          POPF
2889  6534  0044                FLAC
2890  6535  4453          JMS I INTEGER   /ONLY POSITIVE, INTEGER  EXPONENTS
2891  6536  7510          SPA
2892  6537  5344          JMP .+5         /(COULD DIVIDE)
2893  6540  7040          CMA
2894  6541  3264          DCA JUMP        /TEMP STORAGE
2895  6542  3043          DCA OVER1       /(NOP) - FOR 4-WORD
2896  6543  1045          TAD HORD
2897  6544  7640          SZA CLA
2898  6545  4566          ERROR2          /TOO LARGE OR NEGATIVE EXPONENT
2899  6546  4543          PUSHF           /INITIALIZE TO ONE.
2900  6547  2405                FLTONE
2901  6550  4544          POPF
2902  6551  0044                FLAC
2903  6552  4544          POPF
2904  6553  7470                ITER1
2905  6554  5362          JMP .+6
2906  6555  4543          PUSHF
2907  6556  7470                ITER1
2908  6557  4544          POPF
2909  6560  0040                EX1
2910  6561  4770          JMS I MULT      /"MULT"
2911  6562  2264          ISZ JUMP
```

```
2912  6563  5355          JMP .+6
2913  6564  5221          JMP FPNT+1
2914  6565  4770  FLMY,   JMS I MULT      /MULTIPLY
2915  6566  5221          JMP FPNT+1
2916  6567  7153  OPMINS,  MINUS2
2917  6570  7004  MULT,    DMULT
2918  6571  7335  NORM,    DNORM
2919  6572  6623  ALGN,    ALIGN
2920  6573  5754  RAR1,    DIV1
2921  6574  6757  RAR2,    DIV2
2922  6575  5733  TRAD,    DUBLAD
2923        6575  ITABLE=.+1
2924  6576  6510          FLAD
2925  6577  6507          FLSU
2926  6600  7107          FLDV
2927  6601  6565          FLMY
2928  6602  6517          FLEX
2929  6603  0000          0000
2930  6604  6515          NORF
2931  6605  0000  ACMINS,  0        /ROUTINE TO  COMPLEMENT FLAC = VIA "MINSKI"
2932  6606  7200          CLA             /********(IS THIS CLA NECESSARY)
2933  6607  1047          TAD     OVER2   /******** RECODING FOR SPACE
2934  6610  7161          CLL CML CIA     /********
2935  6611  3047          DCA     OVER2   /********
2936  6612  7004          RAL             /********
2937  6613  1046          TAD     LORD    /********
2938  6614  7061          CML CIA         /********
2939  6615  3046          DCA     LORD    /********
2940  6616  7004          RAL             /********
2941  6617  1045          TAD     HORD    /********
2942  6620  7061          CML CIA         /********
2943  6621  3045          DCA     HORD    /********
2944  6622  5605          JMP I   ACMINS
2945  6623  0000  ALIGN,  0        /SUBROUTINE TO ALIGN
2946  6624  1045          TAD HORD        /BINARY POINTS
2947  6625  7450          SNA
2948  6626  1046          TAD LORD        /IS MANTISSA ZERO?
2949  6627  7650          SNA CLA
2950  6630  5311          JMP NOX1        /YES, RESULT=OPERAND
2951  6631  1041          TAD AC1H        /NO,IS OPERAND ZERO?
2952  6632  7450          SNA
2953  6633  1042          TAD AC1L
2954  6634  7450          SNA
2955  6635  1043          TAD OVER1
2956  6636  7650          SNA CLA
2957  6637  5623          JMP I ALIGN     /YES, EXIT.
2958  6640  1040          TAD EX1
2959  6641  7041          CMA IAC
2960  6642  1044          TAD EXP
2961  6643  7450          SNA             /ARE EXPONENTS EQUAL?
2962  6644  5273          JMP ADONE       /YES
2963  6645  3205          DCA ACMINS
2964  6646  1205          TAD ACMINS
2965  6647  7500          SMA             /NO
2966  6650  7041          CIA             /NEGATE AND
```

```
2967  6651  3322          DCA AMOUNT      /SAVE THE DIFFERENCE
2968  6652  1322          TAD AMOUNT
2969  6653  1336          TAD TEST2
2970  6654  7710          SPA CLA         /CAN THE EXPONENTS BE ALIGNED?
2971  6655  5275          JMP NOX         /NO, USE LARGER OF THE TWO.
2972  6656  1235          TAD ACMINS      /YES, SHIFT THE SMALLER
2973  6657  7700          SMA CLA
2974  6660  5265          JMP ASHFT
2975  6661  4357          JMS DIV2
2976  6662  2322          ISZ AMOUNT
2977  6663  5261          JMP .-2
2978  6664  5273          JMP ADONE
2979  6665  7040  ASHFT,   CMA
2980  6666  1040          TAD EX1
2981  6667  3040          DCA EX1
2982  6670  4723          JMS I TAG1
2983  6671  2322          ISZ AMOUNT
2984  6672  5270          JMP .-2
2985  6673  2223  ADONE,   ISZ ALIGN
2986  6674  5623          JMP I ALIGN
2987  6675  1040  NOX,     TAD EX1         /MISSION IMPOSSIBLE!
2988  6676  7700          SMA CLA         /CHECK FOR SIGN DIFFERENCE
2989  6677  5304          JMP NOX2
2990  6700  1044          TAD EXP
2991  6701  7700          SMA CLA
2992  6702  5623          JMP I ALIGN     /=+
2993  6703  5306          JMP .+3         /=-
2994  6704  1044  NOX2,    TAD EXP
2995  6705  7700          SMA CLA
2996  6706  1205          TAD ACMINS      /TEMP STORAGE OF DIFFERENCE, BOTH POS EXP OR BOTH NEG;
2997  6707  7740          SMA SZA CLA
2998  6710  5623          JMP I ALIGN     /OK (+=)
2999  6711  1040  NOX1,    TAD EX1         /USE LARGER
3000  6712  3044          DCA EXP
3001  6713  1041          TAD AC1H
3002  6714  3045          DCA HORD
3003  6715  1042          TAD AC1L
3004  6716  3046          DCA LORD
3005  6717  1043          TAD OVER1
3006  6720  3047          DCA OVER2
3007  6721  5623          JMP I ALIGN
3008  6722  0000  AMOUNT,  0
3009  6723  5754  TAG1,    DIV1
3010                /LEAVE 12 BIT ANSWER IN AC UPON RETURN
3011                /LEAVE FLAC AS AN INTEGER,
3012  6724  0000  FIX,     0               /VIA (INTEGER)
3013  6725  4751          JMS I ABSOL
3014  6726  1044          TAD EXP         /TEST FOR FRACTION
3015  6727  7750          SPA SNA CLA
3016  6730  5353          JMP FIXM        /DOUBLE CHECK FOR MINUS ONE.
3017  6731  7001          IAC
3018  6732  3043          DCA OVER1
3019  6733  1350          TAD P27         /INIT ALIGNMENT
3020  6734  3040          DCA EX1
3021  6735  4223          JMS ALIGN       /DO THE ALIGNMENT TO AN INTEGER
```

```
3022  6736  0027  TEST2,  0027            /ALREADY DONE! (43)=FOR 4=WORD
3023  6737  2047          ISZ OVER2
3024  6740  5344          JMP .+4
3025  6741  2046          ISZ LORD
3026  6742  7410          SKP
3027  6743  2045          ISZ HORD
3028  6744  3047          DCA OVER2       /CLEAR THE FRACTION
3029  6745  4752          JMS I RESOL
3030  6746  1046          TAD LORD        /EXIT WITH LOW ORDER RESULT IN AC.
3031  6747  5724          JMP I FIX
3032  6750  0027  B27,     27
3033  6751  5571  ABSOL,  ABSOLV
3034  6752  7173  RESOL,  RESOLV
3035  6753  3044  FIXM,   DCA EXP         /CLEAR EXPONENT
3036  6754  3045          DCA HORD
3037  6755  3046          DCA LORD
3038  6756  5344          JMP TEST2+6
3039  6757  0000  DIV2,   0       /SHIFT FLAC RIGHT
3040  6760  7300          CLA CLL
3041  6761  1045          TAD HORD
3042  6762  7510          SPA
3043  6763  7020          CML
3044  6764  7010          RAR
3045  6765  3045          DCA HORD
3046  6766  1046          TAD LORD
3047  6767  7010          RAR
3048  6770  3046          DCA LORD
3049  6771  1047          TAD OVER2
3050  6772  7010          RAR
3051  6773  3047          DCA OVER2
3052  6774  2044          ISZ EXP
3053  6775  5757          JMP I DIV2
3054  6776  5757          JMP I DIV2
3055        6777  SPECIAL=.       /INPUT CHARACTERS
3056  6777  0337          337     /LEFT ARROW
3057  7000  0377          377     /RUBOUT
3058  7001  0212          212     /L.F.
3059  7002  0375          375     /ALT MODE
3060  7003  7777          =1
3061              /(A+B+C)*(D+E+F)=A*D,A*E,B*D,B*E
3062  7004  0000  DMULT,  0       /N= PRECISION MULTIPLY WITH
3063  7005  7001          IAC     /PRODUCT IN TRIPLE PRECISION
3064  7006  1040          TAD EX1 /ADD EXPONENTS+1
3065  7007  4324          JMS SIGN        /AND DETERMINE SIGN OF RESULT
3066  7010  7710          SPA CLA
3067  7011  4353          JMS MINUS2
3068  7012  3301          DCA DATUM=1     /INITIALIZE RESULT
3069  7013  3300          DCA DATUM=2
3070  7014  3277          DCA DATUM=3
3071  7015  3276          DCA DATUM=4
3072  7016  1045          TAD A           /A*D
3073  7017  3751          SAVE            /STORE IN MP2
3074  7020  1041          TAD D           /SINGLE PRECISION MULTIPLY
3075  7021  4752          MULTY
3076  7022  0002          2               /ACCUMULATE STARTING IN #2 DATA WORD
```

```
3077  7023  1042          TA  E           /A*E
3078  7024  4752          MULTY
3079  7025  0003          3
3080  7026  1046          TAD B           /B*D
3081  7027  3751          SAVE
3082  7030  1241          TAD D
3083  7031  4752          MULTY
3084  7032  0003          3
3085  7033  1042          TAD E           /B*E
3086  7034  4752          MULTY
3087  7035  0004          4
3088  7036  5263  DMULT4,  JMP DMDONE      /(DCA DATUM-5)-FOR 4-WORD
3089  7037  3274          DCA DATUM-6
3090  7040  1043          TAD F           /A*F
3091  7041  3751          SAVE
3092  7042  1045          TAD A
3093  7043  4752          MULTY
3094  7044  0004          4
3095  7045  1046          TAD B           /B*F
3096  7046  4752          MULTY
3097  7047  0005          5
3098  7050  1047          TAD C           /C*D
3099  7051  3751          SAVE
3100  7052  1241          TAD D
3101  7053  4752          MULTY
3102  7054  0004          4
3103  7055  1042          TAD E           /C*E
3104  7056  4752          MULTY
3105  7057  0005          5
3106  7060  1043          TAD F           /C*F
3107  7061  4752          MULTY
3108  7062  0006          6
3109  7063  1301  DMDONE,  TAD DATUM-1     /COPY RESULT
3110  7064  3045          DCA HORD
3111  7065  1300          TAD DATUM-2
3112  7066  3046          DCA LORD
3113  7067  1277          TAD DATUM-3
3114  7070  3047          DCA OVER2
3115  7071  4301          JMS MULDIV
3116  7072  3047          DCA OVER2       /(NOP) - FOR 4-WORD
3117  7073  5604          JMP I DMULT
3118        7102  DATUM=.+6       /INTERMEDIATE STORAGE
3119  7074  0000          0/#6-LOW ORDER RESULT
3120  7075  0000          0/#5
3121  7076  0000          0/#4
3122  7077  0000          0/#3
3123  7100  0000          0/#2
3124                      /#1-HIGH ORDER RESULT
3125  7101  0000  MULDIV,  0       /TERMINATE MULTIPLY AND DIVIDE.
3126  7102  2050          ISZ SIGNF               /CORRECT FOR SIGN
3127  7103  4451          JMS I MINSKI
3128  7104  4747          JMS I NORMF     /SHIFT LEFT
3129  7105  7000          NOP             /*
3130  7106  5701          JMP I MULDIV
3131  7107  1041  FLDV,   TAD AC1H        /41DIVIDE
```

```
3132  7110  7650          SNA CLA
3133  7111  4566          ERROR2          /DIVISION BY ZERO
3134  7112  1040          TAD EX1         /SUBTRACT EXPONENTS+1
3135  7113  7041          CMA IAC
3136  7114  7001          IAC
3137  7115  4324          JMS SIGN        /SET UP SIGNS
3138  7116  7700          SMA CLA
3139  7117  4353          JMS MINUS2      /NEGATE DIVISOR
3140  7120  4750          JMS I DIVIDE    /DIVIDE
3141  7121  4301          JMS MULDIV
3142  7122  5723          JMP I .+1
3143  7123  6401                FPNT+1
3144                /THIS SUBROUTINE PREPARES MULTIPLY AND DIVIDE
3145                /FOR ANY COMBINATION OF SIGNED ARGUMENTS AND FOR ZERO,
3146                /THE RESULT OF EITHER IS ZERO IF FLAC = 0,
3147                /RESULT OF MULTIPLY IS ZERO IF EITHER IS ZERO;
3148                /DIVISION BY ZERO IS CHECKED BEFORE THIS
3149                /ROUTINE IS CALLED.
3150                /THE CALLING AC CONTAINS AN UPDATE VALUE FOR THE
3151                /EXPONENT, THE RETURNING AC CONTAINS THE SIGN OF
3152                /THE ARGUMENT FOR FURTHER TESTING BY EACH ROUTINE,
3153  7124  0000    SIGN,   0               /TEST AND SAVE SIGN OF RESULT
3154  7125  1044          TAD EXP /COMPUTE NEW EXPONENT FOR MUL=DIV,
3155  7126  3044          DCA EXP
3156  7127  1124          TAD P4000       /LOAD 4000 TO XOR THE SIGN BITS.
3157  7130  0045          AND HORD
3158  7131  1041          TAD AC1H
3159  7132  7700          SMA CLA         /RESULT MAY BE ZERO
3160  7133  7040          CMA
3161  7134  3050          DCA SIGNF
3162  7135  1045          TAD HORD
3163  7136  7450          SNA
3164  7137  5746          JMP I REVIT     /ANSWER IS ZERO,
3165  7140  7710          SPA CLA         /TAKE ABSOLUTE VALUE OF FLAC
3166  7141  4451          JMS I MINSKI
3167  7142  1041          TAD AC1H
3168  7143  7450          SNA             /RESULT OF EITHER MAY BE ZERO
3169  7144  5746          JMP I REVIT
3170  7145  5724          JMP I SIGN
3171                /SIGN OF RESULT = SIGNF
3172                /+=-1
3173                /-=0
3174  7146  6522    REVIT,  ZERO
3175  7147  7335    NORMF,  DNORM
3176  7150  7261    DIVIDE, DURDIV
3177        3751    SAVE=DCA I .
3178  7151  7256          MP2
3179        4752    MULTY=JMS I .
3180  7152  7200          MP4
3181        0045    A=FLAC+1
3182        0046    B=FLAC+2
3183        0047    C=FLAC+3
3184        0041    D=AC1H
3185        0042    E=AC1L
3186        0043    F=OVER1
```

```
3187  7153  0000  MINUS2, 0          /NEGATE OPERAND
3188  7154  7300          CLA CLL     /TRIPLE PRECISION
3189  7155  1043          TAD OVER1
3190  7156  7041          CMA IAC
3191  7157  3043          DCA OVER1
3192  7160  1042          TAD AC1L
3193  7161  7040          CMA
3194  7162  7430          SZL
3195  7163  7101          IAC CLL
3196  7164  3042          DCA AC1L
3197  7165  1041          TAD AC1H
3198  7166  7040          CMA
3199  7167  7430          SZL
3200  7170  7101          IAC CLL
3201  7171  3041          DCA AC1H
3202  7172  5753          JMP I MINUS2
3203  7173  0000  RESOLV, 0
3204  7174  1050          TAD  SIGNF
3205  7175  7710          SPA CLA
3206  7176  4451          JMS I MINSKI
3207  7177  5773          JMP I RESOLV
3208        7200  *7200
3209  7200  0000  MP4,     0        /SINGLE PRECISION, UNSIGNED MULTIPLY = "MULTY"
3210  7201  7450          SNA      /NO RESULT ADDED IF ZERO
3211  7202  5600          JMP I MP4
3212                      /FOR EAE INSERT THE FOLLOWING!
3213                      /7203  3206  DCA ,+3
3214                      /7204  1256  TAD MP2
3215                      /7205  7425  MQL MUY
3216                      /7206  0000  0
3217                      /7207  3253  DCA MP5
3218                      /7210  7501  MQA
3219                      /7211  3255  DCA MP3
3220                      /7212  5227  JMP ,+15
3221  7203  3254          DCA MP1          /12 BITS BY 12 BITS
3222  7204  3253          DCA MP5
3223  7205  1257          TAD THIR
3224  7206  3255          DCA MP3
3225  7207  7100          CLL
3226  7210  1254  MP6,    TAD MP1
3227  7211  7010          RAR
3228  7212  3254          DCA MP1
3229  7213  1253          TAD MP5
3230  7214  7420          SNL
3231  7215  5220          JMP ,+3
3232  7216  7100          CLL
3233  7217  1256          TAD MP2
3234  7220  7010          RAR
3235  7221  3253          DCA MP5 /SAVE HIGH ORDER RESULT
3236  7222  2255          ISZ MP3
3237  7223  5210          JMP MP6
3238  7224  1254          TAD MP1 /CORRECT LOW ORDER RESULT
3239  7225  7010          RAR
3240  7226  3255          DCA MP3
3241  7227  1600          TAD I MP4        /PICKUP SCALE FACTOR
```

```
3242  7230  7041          CIA
3243  7231  1252          TAD DATUMA      /COMPUTE ADDRESS
3244  7232  3254          DCA MP1         /TEMP
3245  7233  1255          TAD MP3         /LOW ORDER PART
3246  7234  7100          CLL
3247  7235  1654          TAD I MP1       /ACCUMULATE
3248  7236  3654          DCA I MP1
3249  7237  2254          ISZ MP1
3250  7240  7004          RAL
3251  7241  1253          TAD MP5
3252  7242  1654          TAD I MP1
3253  7243  3654          DCA I MP1
3254  7244  7420          SNL
3255  7245  5600          JMP I MP4       /NO CARRY
3256  7246  2254          ISZ MP1
3257  7247  2654          ISZ I MP1
3258  7250  5630          JMP I MP4       /EXIT
3259  7251  5246          JMP .-3         /CARRY AGAIN
3260                      /////
3261  7252  7102  DATUMA, DATUM
3262  7253  0000  MP5,    0               /PRODUCT
3263  7254  0000  MP1,    0               /MULTIPLIER
3264  7255  0000  MP3,    0
3265  7256  0000  MP2,    0               /MULTIPLICAND
3266  7257  7764  THIR,   -14     /12 BITS
3267  7260  7751  MIF,    -27             /(-43) - FOR 4-WORD(=7735)
3268  7261  0000  DUBDIV,  0       /2 OR 3  PRECISION DIVIDE
3269  7262  3200          DCA MP4
3270  7263  3254          DCA MP1
3271  7264  1260          TAD MIF         /INIT BIT COUNTER
3272  7265  3255          DCA MP3
3273  7266  7410          SKP
3274  7267  4527  DV3,    JMS I DOUBLE    /SHIFT FLAC LEFT
3275  7270  7100          CLL
3276  7271  1042          TAD AC1L        /COMBINE ONE POSITION AND (4-WORD)
3277  7272  1046          TAD LORD
3278  7273  3256          DCA MP2         /SAVE RESULT
3279  7274  7004          RAL
3280  7275  1045          TAD HORD        /ADD OVERFLOW
3281  7276  1041          TAD AC1H
3282  7277  7420          SNL             /SKIP IF OVERFLOW
3283  7300  5304          JMP .+4
3284  7301  3045          DCA HORD        /UPDATE FLAC
3285  7302  1256          TAD MP2
3286  7303  3046          DCA LORD
3287  7304  7200          CLA             /CLEAR ACCUMULATOR
3288  7305  1254          TAD MP1         /SAVE OVERFLOW BITS CIRCULARLY
3289  7306  7004          RAL
3290  7307  3254          DCA MP1
3291  7310  1200          TAD MP4
3292  7311  7004          RAL
3293  7312  3200          DCA MP4
3294  7313  2255          ISZ MP3         /TEST FOR END OF DIVIDE
3295  7314  5267          JMP DV3
3296  7315  1254          TAD MP1         /LOAD RESULTS
```

```
3297  7316  3046          DCA LORD
3298  7317  1200          TAD MP4
3299  7320  3045          DCA HORD
3300  7321  5661          JMP I DUBDIV    /(NOP)
3301  7322  7004          RAL             /EXTRA FOR 4-WORD
3302  7323  3335          DCA DNORM
3303  7324  2255          ISZ MP3         /TEST FOR END OF DIVIDE
3304  7325  5267          JMP DV3
3305  7326  1335          TAD DNORM
3306  7327  3045          DCA HORD
3307  7330  1200          TAD MP4
3308  7331  3046          DCA LORD
3309  7332  1254          TAD MP1
3310  7333  3047          DCA OVER2
3311  7334  5661          JMP I DUBDIV
3312  7335  0000  DNORM,  0       /SUBROUTINE TO NORMALIZE FLAC
3313  7336  4775          JMS I ABSOL3
3314  7337  4366          JMS TEST4
3315  7340  1045          TAD HORD
3316  7341  7450          SNA             /IS MANTISSA=0?
3317  7342  1047          TAD OVER2
3318  7343  7450          SNA
3319  7344  1046          TAD LORD
3320  7345  7650          SNA CLA
3321  7346  5363          JMP EXIT3       /YES
3322  7347  1045          TAD HORD
3323  7350  7104          RAL CLL
3324  7351  7710          SPA CLA         /WILL SHIFT BE TOO FAR?
3325  7352  5360          JMP .+6
3326  7353  4527          JMS I DOUBLE
3327  7354  7140          CMA CLL
3328  7355  1044          TAD EXP
3329  7356  3044          DCA EXP
3330  7357  5347          JMP .-10
3331  7360  4776          JMS I RESOL3
3332  7361  4366          JMS TEST4       /DON'T LEAVE 4000
3333  7362  5735          JMP I DNORM
3334  7363  3044  EXIT3,  DCA EXP         /SET TO ZERO
3335  7364  5735          JMP I DNORM     /RETURN
3336  7365  6757  XRAR2,  DIV2
3337  7366  0000  TEST4,  0
3338  7367  1045          TAD HORD        /TEST FOR 4000
3339  7370  7510          SPA
3340  7371  7041          CIA
3341  7372  7710          SPA CLA
3342  7373  4765          JMS I XRAR2     /SHIFT BACK
3343  7374  5766          JMP I TEST4
3344  7375  5571  ABSOL3, ABSOLV
3345  7376  7173  RESOL3, RESOLV
3346        7400  *7400
3347              /PAGE 18
3348                    /FLOATING SQUARE ROOT FUNCTION
3349  7400  4437  XSORT,  FINT
3350  7401  6274          FPUT FPAC1      /VALUE
3351  7402  0000          FEXT            /NEWTON'S METHOD IS USED
```

```
3352  7403  1345          GETSGN
3353  7404  7710          SPA CLA
3354  7405  4566          ERROR2          /NUMBER IS NEGATIVE-IMAGINARY ROOTS
3355  7406  1044          TAD EXP         /LINK IS -0 FROM FINT
3356  7407  7510          SPA             /MATCH THE SIGN WITH LINK BIT
3357  7410  7020          CML
3358  7411  7010          RAR
3359  7412  3270          DCA ITER1       /MAKE FIRST APPROXIMATION
3360  7413  7430          SZL             /TEST LSB OF EXP
3361  7414  2270          ISZ ITER1
3362  7415  7000  07000,  NOP             /********
3363  7416  1267          TAD SQCON1
3364  7417  3271          DCA ITER1+1
3365  7420  3272          DCA ITER1+2
3366  7421  3273          DCA ITER1+3
3367  7422  1275          TAD FPAC1+1
3368  7423  7450          SNA
3369  7424  1276          TAD FPAC1+2
3370  7425  7650          SNA CLA
3371  7426  5265          JMP SQEND       /NUMBER=0
3372  7427  4407  CLCU,   FINT
3373  7430  6274          FGET FPAC1
3374  7431  3270          FDIV ITER1
3375  7432  1270          FADD ITER1
3376  7433  6000          FEXT
3377  7434  7240          CLA CMA
3378  7435  1044          TAD EXP
3379  7436  3044          DCA EXP
3380  7437  1044          TAD EXP
3381  7440  7041          CMA IAC
3382  7441  1270          TAD ITER1
3383  7442  7640          SZA CLA         /ARE EXPONENTS EQUAL?
3384  7443  5261          JMP ROOTGO      /NO
3385  7444  1045          TAD HORD        /ARE HIGH-ORDER MANTISSAS EQUAL?
3386  7445  7041          CMA IAC
3387  7446  1271          TAD ITER1+1
3388  7447  7640          SZA CLA
3389  7450  5261          JMP ROOTGO      /NO
3390  7451  1046          TAD LORD
3391  7452  7041          CMA IAC
3392  7453  1272          TAD ITER1+2     /DO LOW-ORDER MANTISSAS AGREE
3393  7454  7500          SMA
3394  7455  7041          CMA IAC         /WITHIN ONE BIT?
3395  7456  7001          IAC
3396  7457  7700          SMA CLA
3397  7460  5536          RETURN
3398  7461  4407  ROOTGO, FINT
3399  7462  6270          FPUT ITER1
3400  7463  6000          FEXT
3401  7464  5227          JMP CLCU
3402  7465  3044  SQEND,  DCA EXP
3403  7466  5536          RETURN
3404  7467  3015  SQCON1, 3015
3405        7470  BUFFER=.
3406  7470  0000  ITER1,  0
```

```
7471  0000
7472  0000
7473  0000
7474  0020        FRA1,   0
7475  0000                0
7476  0030                0
7477  7503                BUFFER+13           /ADDRESS OF NEXT FREE LOCATION IN 10-DIGIT VERSION,
                                      /*7503  /********
7500  0000        SCOPOU, 0                   /******** OUTPUT ROUTINE FOR SCOPE
7501  0106                AND     P177        /******** STORES CHARS IN FLD1, LOCS 400-777
7502  1367                TAD     C7763       /********
7503  7440                SZA                 /********
7504  5310                JMP     NOCRLF      /********
7505  3364        CRLF,   DCA     NCOLS       /********
7506  2365                ISZ     NFEEDS      /********
7507  5321                JMP     ITSOK       /********
7510  1371        NOCRLF, TAD     C7655       /********
7511  7100                CLL                 /********
7512  1006                TAD     C100        /********
7513  7420                SNL                 /********
7514  7610                SKP CLA             /********
7515  1361                TAD     NLINES      /********
7516  7450                SNA                 /********
7517  5700                JMP I   SCOPOU      /********
7520  2364                ISZ     NCOLS       /********
7521  6002        ITSOK,  IOF                 /********
7522  6141                LINC                /********
                  LMODE                       /********
7523  0644                LDF 4               /********
7524  1362                STH I   OPTR        /********
7525  0011                CLR                 /********
7526  0002                PDP                 /********
                  PMODE                       /********
7527  6201                6201                /********
7530  2366                ISZ     NCHARS      /********
7531  1366                TAD     NCHARS      /********
7532  1215                TAD     C7000       /********
7533  7710                SPA CLA             /********
7534  1361                TAD     NLINES      /********
7535  1365                TAD     NFEEDS      /********
7536  7710                SPA CLA             /********
7537  5356                JMP     NOHANG      /********
7540  1366                TAD     NCHARS      /********
7541  6213                6213                /******** TOO MANY LINES/CHARS DISPLAYED
7542  4020                JMS     WAITER      /******** HANG ON DISPLAY UNTIL SOMETHING IS TYPED
7543  6031                KSF                 /********
7544  5340                JMP     .-4         /********
7545  6034                KRS                 /********
7546  1372                TAD     C7566       /********
7547  7650                SNA CLA             /********
7550  6032                KCC                 /******** IGNORE LINE FEED
7551  1370                TAD     C6377       /********
7552  3774                DCA I   PPTR        /******** CLEAR
7553  3366                DCA     NCHARS      /******** THE
7554  3365                DCA     NFEEDS      /******** CHARACTER
```

```
3462  7555  3364          DCA     NCOLS   /******** DISPLAY
3463  7556  6001  NOHANG, ION             /********
3464  7557  1364          TAD     NCOLS   /********
3465  7560  1373          TAD     07716   /********
3466  7561  7740  NLINES, SMA SZA CLA     /********
3467  7562  5305          JMP     CRLF    /********
3468  7563  5700          JMP I   SCOPOU  /********
3469  7564  0000  NCOLS,  0               /********
3470  7565  0000  NFEEDS,  0              /********
3471  7566  0000  NCHARS,  0              /********
3472  7567  7763  07763,  7763
3473  7570  6377  06377,  6377
3474  7571  7655  07655,  7655            /********
3475  7572  7566  07566,  7566            /********
3476  7573  7716  07716,  7716            /********
3477  7574  6002  PPTR,   OPTR            /********
3478        7576  *7576                   /********
3479              /
3480              /FDIS FUNCTION - STORES 2 WORDS
3481              /PER CALL IN 2200 THRU 5777 IN FLD1
3482              /
3483  7576  4453  CALLIN, JMS I   INTEGER /********
3484  7577  6213          6213            /********
3485  7600  5601          JMP I   .+1     /********
3486  7601  2071          INCALL          /********
3487  7602  4407  XDISP,  FINT            /********
3488  7603  4251          FMUL    FORHUN  /********
3489  7604  0000          FEXT    /********
3490  7605  4453          JMS I   INTEGER /********
3491  7606  7510          SPA     /********
3492  7607  7041          CIA     /********
3493  7610  3350          DCA     STEMP   /********
3494  7611  1066          TAD     CHAR    /********
3495  7612  1256          TAD     MMCOM   /********
3496  7613  7640          SZA CLA /********
3497  7614  4566          ERROR3  /********
3498  7615  4540          PUSHJ   /********
3499  7616  1612          EVAL+1  /********
3500  7617  4407          FINT    /********
3501  7620  4253          FMUL    FIVHUN  /********
3502  7621  0000          FEXT    /********
3503  7622  4453          JMS I   INTEGER /********
3504  7623  3351          DCA     STEMP2  /********
3505  7624  1271          TAD     SPTR
3506  7625  1247          TAD     MLIMIT
3507  7626  7650          SNA CLA
3508  7627  4566          ERROR3
3509  7630  6002          IOF     /********
3510  7631  6211          6211    /CDF 10 /********
3511  7632  7350          CLA CLL CMA RAR
3512  7633  0350          AND     STEMP
3513  7634  3671          DCA I   SPTR    /********
3514  7635  2271          ISZ     SPTR    /********
3515  7636  1351          TAD     STEMP2  /********
3516  7637  1250          TAD     07400   /********
```

```
3517    7642  3671          DCA I   SPTR    /********
3518    7641  2271          ISZ     SPTR    /********
3519    7642  7240          CLA CMA         /********
3520    7643  3671          DCA I   SPTR    /********
3521    7644  6201          6201    /CDF 0  /********
3522    7645  6001          ION             /********
3523    7646  5536          JMP I   EFUN3]  /********
3524    7647  2202    MLIMIT; -5776         /(-LAST LOC OF DISP POINTS-1)
3525    7650  7400    07400,  7400          /********
3526    7651   011    FORHUN; 11;2700       /********
        7652  2700
3527    7653   011    FIVHUN; 11;3770;0     /********
        7654  3770
        7655  0000
3528    7656  7524    MMCOM,  -254          /********
3529                    /
3530                    /JMS WAIT IS EQUIVALENT
3531                    /TO JMP .-2 WITH A REFRESH OF
3532                    /THE DISPLAY ON THE WAY
3533                    /
3534    7657  0000    WAIT,   0             /********
3535    7660  7346            CLA CLL CMA RTL /********
3536    7661  1257            TAD     WAIT    /********
3537    7662  3257            DCA     WAIT    /********
3538    7663  6002            IOF             /********
3539    7664  1732            TAD I   PNCHARS /********
3540    7665  6213            6213    /CIF CDF 10/********
3541    7666  4020            JMS     WAITER  /********
3542    7667  6001            ION             /********
3543    7670  5657            JMP I   WAIT    /********
3544    7671  1000    SPTR,   1000          /********
3545    7672  0000    CLEAR,  0             /******** CLEAR POINTS FROM THE SCOPE
3546    7673  1304            TAD     ODISSP  /********
3547    7674  3271            DCA     SPTR    /********
3548    7675  6002            IOF             /********
3549    7676  6211            6211    /CDF 10 /********
3550    7677  7240            CLA CMA         /********
3551    7700  3671            DCA I   SPTR    /********
3552    7701  6201            6201    /CDF 0  /********
3553    7702  6001            ION             /********
3554    7703  5672            JMP I   CLEAR   /********
3555    7704  2200    ODISSP; 2200          /********(FORST LOC OF DISP POINTS)
3556    7705  6335    PPASS,  PASS
3557    7706  4705    OUTPUT; JMS I   PPASS
3558    7707  1413            POPA    /******** JUMPS ON SUBCOMMAND OF OUTPUT XXX
3559    7710  4547            SORTJ   /********
3560    7711  7721            OLIST-1 /********
3561    7712  7772            OGO-OLIST/********
3562    7713  4566    OERROR; ERROR3  /********
3563    7714  7752    OGO,    OC      /********
3564    7715  7761            OD      /********
3565    7716  7753            OE      /********
3566    7717  7763            OS      /********
3567    7720  7771            OT      /********
3568    7721  7734            OI      /********
```

```
3569  7722  303   OLIST,  303     /********
3570  7723  304           304     /********
3571  7724  305           305     /********
3572  7725  323           323     /********
3573  7726  324           324     /********
3574  7727  311           311     /********
3575  7730  6377  006377, 6377    /********
3576  7731  0611  OEXIT,  PROC            /********
3577  7732  7566  PNCHARS,NCHARS          /********
3578  7733  6002  POPTR,  OPTR            /********
3579  7734  1066  OI,     TAD     CHAR    /********
3580  7735  1256          TAD     MMCOM   /********
3581  7736  7650          SNA CLA         /********
3582  7737  5746          JMP I   PSETCLK /******** O I, EXPRESSION
3583  7740  2745          ISZ I   PCLKFLG /********
3584  7741  1745          TAD I   PCLKFLG /********
3585  7742  7640          SZA CLA         /********
3586  7743  4257          JMS     WAIT    /********
3587  7744  5731          JMP I   OEXIT
3588  7745  2661  PCLKFLG,CLKFLG          /********
3589  7746  5351  PSETCLK,SETCLK          /********
3590        7750  *7750                   /********
3591  7750  0000  STEMP,  0               /********
3592  7751  0000  STEMP2, 0               /********
3593  7752  4575  OC,     JMS I   PCLEAR  /********
3594  7753  3732  OE,     DCA I   PNCHARS /********
3595  7754  1330          TAD     006377  /********
3596  7755  3733          DCA I   POPTR   /********
3597  7756  3777          DCA I   PNFEEDS /********
3598  7757  3776          DCA I   PNCOLS  /********
3599  7760  5731          JMP I   OEXIT   /********
3600  7761  7000  OD,     NOP     /********
3601  7762  4257          JMS     WAIT    /********
3602  7763  6002  OS,     IOF     /********
3603  7764  6141          6141    /LINC   /********
3604  7765  0004          0004    /ESF    /********
3605  7766  0002          0002    /PDP    /********
3606  7767  6001          ION             /********
3607  7770  1375          TAD     PSCOPOU /******** SET OUTDEV TO SCOPOU
3608  7771  1374  OT,     TAD     PXOUTL  /******** SET OUTDEV TO XOUTL
3609  7772  3063          DCA     OUTDEV  /********
3610  7773  5731          JMP I   OEXIT   /********
3611  7774  2676  PXOUTL, XOUTL   /********
3612  7775  4602  PSCOPOU,SCOPOU-XOUTL    /********
3613  7776  7564  PNCOLS, NCOLS           /********
3614  7777  7565  PNFEEDS,NFEEDS          /********
3615        0001  FIELD 1          /********
```

```
0200  01111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
0100  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

0200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
0300  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

0400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
0500  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

0600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
0700  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

1000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1100  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

1200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1300  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

1400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1500  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

1600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1700  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

2000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
2100  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

2200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
2300  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

2400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
2500  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

2600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
2700  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

3000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
3100  11111111  11111111  00000000  00000000  00000000  00000000  00000000  00000000

3200  00000011  11111100  00000000  00000000  00000000  00000000  00000000  00000000
3300  00000000  00000000  00000000  00000000  00000000  00000000  00000000  00000000

3400
3500

3600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11000000
3700  00000000  00000000  00000000  00000000  00000000  00000000  00000000  00000000
```

```
4000
4100
4200
4300
4400
4500
4600  00000000  00000000  11111111  11111111  11111111  11111111  11111111  11111111
4700  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111110

5000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
5100  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111001
5200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
5300  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
5400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
5500  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
5600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
5700  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111000

6000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
6100  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
6200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
6300  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111110
6400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
6500  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
6600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
6700  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

7000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
7100  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
7200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
7300  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111110
7400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
7500  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111011
7600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
```

```
               0001    *1              /********
       0001    0000    XQ,             /********
       0002    0400    0256,   400     /(REFERENCED AS LOC 2)
       0003    0200    0200,   200     /(REFERENBED AS LOC 3)
       0004    0125    085,    125     /(REFERENCED AS LOC 4)
       0005    0000    GAMMA,  0       /********
       0006    0000    CHRCNT, 0       /********
       0007    0360    0360,   360     /********
               0010    *10             /********
       0010    0000    XR1,    0       /********
       0011    0000    BLK2,   0       /UNIT
       0012    0000            0       /ADDRESS
       0013    0000            0       /BLOCK NUMBER
       0014    0001            1       /NUMBER OF BLOCKS
       0015    0760    0760,   760     /********
       0016    0000    ALPHA,  0       /********
       0017    0000    BETA,   0       /********
               0020    *20             /********
                       /
                       /ENTERED WITH NO. CHARS IN AC; REFRESH
                       /FOR CHARS AND POINTS
                       /
       0020    0000    WAITER, 0                       /********
       0021    7450            SNA                     /********
       0022    5061            JMP     NOASCII         /********
       0023    7040            CMA                     /********
       0024    3006            DCA     CHRCNT          /********
       0025    1076            TAD     04377           /********
       0026    3005            DCA     GAMMA           /********
       0027    1007            TAD     0360            /********
       0030    3077            DCA     Y               /********
       0031    3001            DCA     XQ              /********
       0032    6141            LINC                    /********
                       LMODE
       0033    1325    CHRLUP, LDH I GAMMA             /********
       0034    0450            AZE                     /********
       0035    6045            JMP GOODY               /********
       0036    2077            ADD Y                   /********
       0037    2015            ADD 0760                /********
       0040    1560            BCL I                   /********
       0041    7000            7000                    /********
       0042    4077            STC Y                   /********
       0043    4001            STC XQ                  /********
       0044    6056            JMP CHREND              /********
       0045    0241    GOODY,  ROL 1                   /********
       0046    2003            ADD 0200                /********
       0047    4016            STC ALPHA               /********
       0050    2077            ADD Y                   /********
       0051    1756            DSC ALPHA               /********
       0052    1776            DSC I ALPHA             /********
       0053    0221            XSK I XQ                /********
       0054    0221            XSK I XQ                /********
       0055    0011            CLR                     /********
       0056    0226    CHREND, XSK I CHRCNT            /********
       0057    6033            JMP CHRLUP              /******** ONE TIME PER CHAR
```

```
3671  0060  0467          SKP                 /********
3672  0061  6141  NOASCII, LINC               /********
3673  0062  1077          SET I BETA          /********
3674  0063  2200          2200                /********
3675  0064  0645          LDF 5               /********
3676  0065  6102          JMP SUBR            /********
3677  0066  1077          SET I BETA          /********
3678  0067  2000          2000                /********
3679  0070  0646          LDF 6               /********
3680  0071  6102          JMP SUBR            /********
3681  0072  0002  WEXIT,  PDP                 /********
3682                      PMODE
3683  0073  6203          6203     /CIF CDF 0        /********
3684  0074  7200          CLA                 /********
3685  0075  5420          JMP I    WAITER     /********
3686  0076  4377  04377,   4377    /********
3687  0077  0000  Y,       0       /********
3688  0100  0171  PSUBS,   SUBS    /********
3689  0101  0173  PLESUBS, LESUBS  /********
3690                      LMODE               /********
3691  0102  0056  SUBR,    SET ALPHA           /******** DISPLAYS POINTS
3692  0103  0000          0000                /********
3693  0104  0415          KST                 /********
3694  0105  0467          SKP                 /********
3695  0106  6072          JMP WEXIT           /********
3696  0107  0500          IOB                 /********
3697  0110  6041          TSF                 /********
3698  0111  0467          SKP                 /********
3699  0112  6072          JMP WEXIT           /********
3700  0113  1017          LDA BETA            /********
3701  0114  0467          SKP                 /********
3702  0115  1037  WAITLP,  LDA I BETA          /********
3703  0116  0451          APO                 /********
3704  0117  6072          JMP WEXIT           /********
3705  0120  4005          STC GAMMA           /********
3706  0121  1037          LDA I BETA          /********
3707  0122  0145          DIS GAMMA           /********
3708  0123  0217          XSK BETA            /********
3709  0124  6115          JMP WAITLP          /********
3710  0125  6016          JMP ALPHA           /********
3711                      PMODE               /********
3712  0126  5527  XLO,     JMP I    .+1        /********
3713  0127  1431          LOPEN               /********
3714  0130  5531  XLC,     JMP I    .+1        /********
3715  0131  1520          LCLOSE              /********
3716  0132  5533  XLL,     JMP I    .+1        /********
3717  0133  1203          LLOAD               /********
3718  0134  5535  XLS,     JMP I    .+1        /********
3719  0135  1233          LSAVE               /********
3720  0136  5537  XLG,     JMP I    .+1        /********
3721  0137  1202          LCHAIN              /********
3722  0140  7774  X7774,   7774
3723  0141  7775  X7775,   7775
3724  0142  1171  PLNUM,   LNUM
3725  0143  1000  PGETRHS, GETRHS
```

```
3726  0144  1160    PLDMILD,LDMILD
3727  0145  1177    P5LNAM, LNAME+5
3728  0146  1230    P6LNAM, LNAME+6
3729  0147  0000    CHFLAG, 0
3730  0150  0000    HISS,   0
3731  0151  0000    LOSS,   0
3732  0152  2135    PFILTAB,FILTAB
3733  0153  1342    PLOOKUP,LUKUP
3734  0154  1600    PCOMMON,COMMON
3735  0155  1361    PREPLAC,REPLACE
3736  0156  0000    MYTEMP, 0
3737  0157  0000    MYTMP2, 0
3738  0160  2076    PFINISH,FINISH
3739  0161  0000    SWITCH, 0
3740  0162  0000    SWTMP,  0
3741  0163  2124    PB1FLG, B1FLG=1
3742  0164  0000    MYAC1,  0
3743  0165  0000    MYAC2,  0
3744  0166  0000    MYAC3,  0
3745  0167  0044    P1FLAC, FLAC
3746  0170  0045    P2FLAC, FLAC+1
3747  0171  0046    P3FLAC, FLAC+2
3748  0172  7764    07764,  7764
3749  0173  6000    06000,  6000
3750  0174  7420    07420,  7420
3751        0177    *177
3752  0177  6203    FERROR, 6203
3753  0200  5601            JMP I   .+1
3754  0201  5774            FSSERR
3755        0202    *202
3756        0200    CHARTAB=.-2
3757  0202  4477            4477;7744
      0203  7744
3758  0204  5177            5177;2651
      0205  2651
3759  0206  4136            4136;2241
      0207  2241
3760  0210  4177            4177;3641
      0211  3641
3761  0212  4577            4577;4145
      0213  4145
3762  0214  4477            4477;4044
      0215  4044
3763  0216  4136            4136;2645
      0217  2645
3764  0220  1077            1077;7710
      0221  7710
3765  0222  7741            7741;0041
      0223  0041
3766  0224  4142            4142;4076
      0225  4076
3767  0226  1077            1077;4324
      0227  4324
3768  0230  0177            0177;0301
      0231  0301
```

```
3769    0232  3077          3077;7732
        0233  7732
3770    0234  3077          3077;7706
        0235  7706
3771    0236  4177          4177;7741
        0237  7741
3772    0240  4477          4477;3044
        0241  3044
3773    0242  4276          4276;0376
        0243  0376
3774    0244  4477          4477;3146
        0245  3146
3775    0246  5121          5121;4651
        0247  4651
3776    0250  4040          4040;4077
        0251  4077
3777    0252  2177          2177;7701
        0253  7701
3778    0254  0176          0176;7402
        0255  7402
3779    0256  0677          0677;7701
        0257  7701
3780    0260  1463          1463;6314
        0261  6314
3781    0262  0770          0770;7007
        0263  7007
3782    0264  4543          4543;6151
        0265  6151
3783    0266  4177          4177;0000
        0267  0000
3784    0270  1020          1020;0204
        0271  0204
3785    0272  0000          0000;7741
        0273  7741
3786    0274  2000          2000;2076
        0275  2076
3787    0276  1604          1604;0404
        0277  0404
3788    0300  0000          0000;0000
        0301  0000
3789    0302  7500          7500;0000
        0303  0000
3790    0304  7000          7000;0070
        0305  0070
3791    0306  7624          7624;2476
        0307  2476
3792    0310  5721          5721;4671
        0311  4671
3793    0312  6661          6661;4333
        0313  4333
3794    0314  5166          5166;0526
        0315  0526
3795    0316  7000          7000;0000
        0317  0000
3796    0320  3600          3600;0041
```

```
                0321  0041
3797            0322  4100            4100;0036
                0323  0036
3798            0324  2050            2050;0050
                0325  0050
3799            0326  0404            0404;0437
                0327  0437
3800            0330  0500            0500;0006
                0331  0006
3801            0332  0404            0404;0404
                0333  0404
3802            0334  0001            0001;0000
                0335  0000
3803            0336  0601            0601;4030
                0337  4030
3804            0340  4536            4536;3651
                0341  3651
3805            0342  2101            2101;0177
                0343  0177
3806            0344  4523            4523;2151
                0345  2151
3807            0346  4122            4122;2651
                0347  2651
3808            0350  2414            2414;0477
                0351  0477
3809            0352  5172            5172;0651
                0353  0651
3810            0354  1506            1506;4225
                0355  4225
3811            0356  4443            4443;6050
                0357  6050
3812            0360  5126            5126;2651
                0361  2651
3813            0362  5122            5122;3651
                0363  3651
3814            0364  2200            2200;0000
                0365  0000
3815            0366  4601            4601;0000
                0367  0000
3816            0370  1000            1000;4224
                0371  4224
3817            0372  1212            1212;1212
                0373  1212
3818            0374  2442            2442;0010
                0375  0010
3819            0376  4020            4020;2055
                0377  2055
3820                        /400-777 ARE CHARACTER DISPLAY AREA
3821                1000    *1000
3822                        /
3823                        /GET RIGHT HAND SIDE - USED IN
3824                        /PROCESSING OF COMMANDS (LIBR) WHICH NEED
3825                        /A FILE NAME; EXPECTS THE FORM FILE, UNIT
3826                        /
3827            1000  0000  GETRHS; 0
```

```
1001 3675           DCA I  PLEFLAG
1002 1322           TAD    PLNAME
1003 3011           DCA    BLK2
1004 1326           TAD    07770
1005 3012           DCA    BLK2+1
1006 1324   PLLP1,  TAD    077
1007 3411           DCA I  BLK2
1010 2012           ISZ    BLK2+1
1011 5206           JMP    PLLP1
1012 1322           TAD    PLNAME
1013 3011           DCA    BLK2
1014 1326           TAD    07770
1015 3012           DCA    BLK2+1
1016 4333   PLLP2,  JMS    CGET
1017 5236           JMP    IGOTIT
1020 5330           JMP    RHSERR
1021 0324           AND    077
1022 1277           TAD    M43
1023 7450           SNA
1024 5261           JMP    NUMSGN
1025 1300           TAD    PP43
1026 3411           DCA I  BLK2
1027 2012           ISZ    BLK2+1
1030 5216           JMP    PLLP2
1031 4333           JMS    CGET
1032 5236           JMP    IGOTIT
1033 5330           JMP    RHSERR
1034 7200           CLA
1035 5231           JMP    .-4
1036 1322   IGOTIT, TAD    PLNAME
1037 3011           DCA    BLK2
1040 1327           TAD    07774
1041 3012           DCA    BLK2+1
1042 1322           TAD    PLNAME
1043 3013           DCA    BLK2+2
1044 1411   PLLP3,  TAD I  BLK2
1045 7106           CLL RTL
1046 7006           RTL
1047 7006           RTL
1050 1411           TAD I  BLK2
1051 3413           DCA I  BLK2+2
1052 2012           ISZ    BLK2+1
1053 5244           JMP    PLLP3
1054 7326           CLA CLL CML RTL
1055 3376           DCA    LNAME+4
1056 4301   MORNUM, JMS    OCTNUM
1057 5600           JMP I  GETRHS
1060 5330           JMP    RHSERR
                    /
                    /SCAN OFF THE NUMBER - SET THE FLAG
                    /WHICH SAYS IT WAS A NUMBER
                    /
1061 1012   NUMSGN, TAD    BLK2+1
1062 1323           TAD    010
1063 7650           SNA CLA
```

```
3883  1064  4301          JMS     OCTNUM
3884  1065  5330          JMP     RHSERR
3885  1066  1371          TAD     LNUM
3886  1067  3545          DCA I   P5LNAM
3887  1070  1276          TAD     FLAGJ
3888  1071  3675          DCA I   PLEFLAG
3889  1072  7240          CLA CMA
3890  1073  3546          DCA I   P6LNAM
3891  1074  5256          JMP     MORNUM
3892  1075  1462  PLEFLAG,LEFLAG
3893  1076  5265  FLAGJ,  LEFLAG*38177*5200
3894  1077  7735  M43,    -43
3895  1100  0043  PP43,   43
3896  1101  0000  OCTNUM, 0
3897                /
3898                /SUBR TO GEN AN OCTAL NUMBER
3899                /
3900  1102  3371  PLLP4,  DCA     LNUM
3901  1103  4333          JMS     CGET
3902  1104  2301          ISZ     OCTNUM
3903  1105  5701          JMP I   OCTNUM
3904  1106  0324          AND     077
3905  1107  1325          TAD     07710
3906  1110  7100          CLL
3907  1111  1323          TAD     010
3908  1112  3333          DCA     CGET
3909  1113  7420          SNL
3910  1114  5330          JMP     RHSERR
3911  1115  1371          TAD     LNUM
3912  1116  7106          CLL RTL
3913  1117  7104          CLL RAL
3914  1120  1333          TAD     CGET
3915  1121  5302          JMP     PLLP4
3916  1122  1171  PLNAME, LNAME-1
3917  1123  0010  010,    10
3918  1124  0077  077,    77
3919  1125  7710  07710,  7710
3920  1126  7770  07770,  7770
3921  1127  7774  07774,  7774
3922  1130  6203  RHSERR, 6203          /RIGHT HAND SIDE ERROR
3923  1131  5732          JMP I   .+1
3924  1132  6357          LERR
3925  1133  0000  CGET,   0             /INTERFACE WITH FIELD ZERO
3926  1134  6203          6203        /      JMS CGET
3927  1135  5736          JMP I   .+1 /      JMP <COMMA>
3928  1136  2564          CGETX       /      JMP <CARRET OR SEMICOLON>
3929  1137  1354  CGETRET,TAD     07524 /      JMP <OTHER(CHAR IS IN AC)>
3930  1140  7450          SNA
3931  1141  5733          JMP I   CGET
3932  1142  2333          ISZ     CGET
3933  1143  1355          TAD     07761
3934  1144  7450          SNA
3935  1145  5733          JMP I   CGET
3936  1146  1356          TAD     056
3937  1147  7450          SNA
```

```
3938  1150  5733          JMP I   CGET
3939  1151  1357          TAD     0215
3940  1152  2333          ISZ     CGET
3941  1153  5733          JMP I   CGET
3942  1154  7524    07524, 7524
3943  1155  7761    07761, 7761
3944  1156  0056    056,   56
3945  1157  0215    0215,  215
3946                /
3947                /BRINGS MILDRED INTO CORE
3948                /
3949  1160  0000    LDMILD, 0
3950  1161  6002          IOF
3951  1162  4540          JMS I   X7774
3952  1163  1165          MLDBLK
3953  1164  5760          JMP I   LDMILD
3954  1165  0110    MLDBLK, 110
3955  1166  0030          30
3956  1167  0076          76
3957  1170  0002          2
3958        1171    *1171
3959  1171  0000    LNUM,   0       /-------
3960  1172  0000    LNAME,  0;0;0;0;0;0
      1173  0000
      1174  0000
      1175  0000
      1176  0000
      1177  0000
3961  1200  0000    MVCTR,  0
3962  1201  0000    MVPTR,  0       /-------(REFERENCED AS A BLOCK)
3963  1202  7240    LCHAIN, CLA CMA
3964                /
3965                /LIBRARY LOAD
3966                /
3967  1203  3147    LLOAD,  DCA     CHFLAG
3968  1204  4543          JMS I   PGETRHS
3969  1205  4544          JMS I   PLDMILD
3970  1206  4342          JMS     LUKUP
3971  1207  1546          TAD I   PSLNAM
3972  1210  7041          CIA
3973  1211  1327          TAD     LLENGTH
3974  1212  7640          SZA CLA
3975  1213  5356          JMP     FILERR+2
3976  1214  1542          TAD I   PLNUM
3977  1215  3324          DCA     LSBLK
3978  1216  1545          TAD I   PSLNAM
3979  1217  3326          DCA     FILSTRT
3980  1220  4540          JMS I   X7774
3981  1221  1324          LSBLK
3982  1222  7350          CLA CLL CMA RAR
3983  1223  3010          DCA     XR1
3984  1224  1410          TAD I   XR1
3985  1225  1174          TAD     07420   /FIRST WD MUST BE 0360
3986  1226  7640          SZA CLA
3987  1227  5356          JMP     FILERR+2
```

```
3988  1230  1324          TAD     LOADJ
3989  1231  4262          JMS     MOO
3990  1232  5254          JMP     XGETOUT
3991                /
3992                /LIBRARY SAVE
3993                /
3994  1233  3147  LSAVE,  DCA     CHFLAG
3995  1234  4543          JMS I   PGETRHS
3996  1235  4544          JMS I   PLDMILD
3997  1236  1327          TAD     LLENGTH
3998  1237  3546          DCA I   P6LNAM
3999  1240  4361          JMS     REPLACE
4000  1241  1542          TAD I   PLNUM
4001  1242  3324          DCA     LSBLK
4002  1243  1545          TAD I   P5LNAM
4003  1244  3326          DCA     FILSTRT
4004  1245  7350          CLA CLL CMA RAR
4005  1246  3010          DCA     XR1
4006  1247  1007          TAD     0360
4007  1250  3410          DCA I   XR1
4008  1251  4262          JMS     MOO
4009  1252  4541          JMS I   X7775
4010  1253  1324          LSBLK
4011  1254  6203  XGETOUT,6203
4012  1255  6001          ION
4013  1256  2147          ISZ     CHFLAG
4014  1257  5722          JMP I   PSTART
4015  1260  5661          JMP I   .+1
4016  1261  0603          GOTO
4017                /
4018                /THE WORDS ARE READ/WRITTEN FROM LOC 4000
4019                /OF FLD1) THIS ROUTINE MOVES THEM THERE
4020                /
4021  1262  0000  MOO,    0
4022  1263  3306          DCA     DEJUMP
4023  1264  1330          TAD     PTBL
4024  1265  3200          DCA     MVCTR
4025  1266  1600  MOOLUP, TAD I   MVCTR
4026  1267  2200          ISZ     MVCTR
4027  1270  7450          SNA
4028  1271  5275          JMP     MOOEND
4029  1272  3201          DCA     MVPTR
4030  1273  4305          JMS     MOVMOV
4031  1274  5266          JMP     MOOLUP
4032  1275  1323  MOOEND, TAD     MVCNT
4033  1276  3200          DCA     MVCTR
4034  1277  2201          ISZ     MVPTR
4035  1300  4305          JMS     MOVMOV
4036  1301  2200          ISZ     MVCTR
4037  1302  5277          JMP     .-3
4038  1303  5662          JMP I   MOO
4039  1304  5314  LOADJ,  JMP     NOTSAV
4040  1305  0000  MOVMOV, 0
4041  1306  7402  DEJUMP, HLT
```

```
4043  1310  1621          TAD I   MVPTR
4044  1311  6211          6211
4045  1312  3410          DCA I   XR1
4046  1313  5705          JMP I   MOVMOV
4047  1314  6211  NOTSAV, 6211
4048  1315  1410          TAD I   XR1
4049  1316  6201          6201
4050  1317  3601          DCA I   MVPTR
4051  1320  6211          6211
4052  1321  5705          JMP I   MOVMOV
4053  1322  0177  PSTART, START
4054  1323  6366  MVCNT,  FRST-FEXP
4055  1324  0000  LSBLK,  0
4056  1325  0030          30      /*14000
4057  1326  0000  FILSTRT,0
4058  1327  0004  LLENGTH,4
4059  1330  1331  PTBL,   .+1
4060  1331  0035          BOTTOM
4061  1332  3410          PFNEW
4062  1333  0411          PFX
4063  1334  0412          PFZ
4064  1335  0060          BUFR
4065  1336  0031          LASTV
4066  1337  0013          PDLXR
4067  1340  3206          FRST
4068  1341  0000          0
4069                /
4070                /USES MILDREDS LOOKUP
4071                /
4072  1342  0000  LUKUP,  0
4073  1343  6141          6141    /LINC
4074  1344  0606          0606    /LIF 6
4075  1345  1020          1020    /LDA I
4076  1346  1171          LNUM
4077  1347  6020          6020    /JMP 20
4078  1350  7354          FILERR&1777+6000
4079  1351  0002          0002    /PDP
4080  1352  7200          CLA
4081  1353  5742          JMP I   LUKUP
4082  1354  0002  FILERR, 0002    /PDP
4083  1355  7200          CLA
4084  1356  6203          6203    /CIF CDF 0
4085  1357  5760          JMP I   .+1
4086  1360  2571          ERRFIL
4087                /
4088                /USES MILDREDS REPLACE
4089                /
4090  1361  0000  REPLACE,0
4091  1362  6141          LINC
4092                      LMODE
4093  1363  0606          LIF     6
4094  1364  1020          LDA I
4095  1365  1171          LNUM
4096  1366  6022          JMP     22
4097  1367  7372          JMP     SAMEN   /ALREADY THERE
```

```
4098  1372  7354          JMP     FILERR  /NOT ENUF ROOM
4099  1371  7375          JMP     ENREPL
4100  1372  6036  SAMEN,  LIF     6
4101  1373  6024          JMP     24
4102  1374  7354          JMP     FILERR  /NOT ENUF ROOM! SHOULD NOT HAPPEN
4103  1375  0002  ENREPL,  PDP
4104                      PMODE
4105  1376  7200          CLA
4106  1377  5761          JMP I   REPLACE
4107        1400  *1400
4108  1400  7524  MINCMA,  -254
4109  1401  0066  PCHAR,   CHAR
4110  1402  3157  LMAKE,   DCA     MYTMP2  /LIBRARY MAKE
4111  1403  6201          6201
4112  1404  1601          TAD I   PCHAR
4113  1405  6211          6211
4114  1406  1200          TAD     MINCMA
4115  1407  7640          SZA CLA
4116  1410  5623          JMP I   PRHSERR
4117  1411  4543          JMS I   PGETRHS
4118  1412  4544          JMS I   PLDMILD
4119  1413  1157          TAD     MYTMP2
4120  1414  3546          DCA I   P6LNAM
4121  1415  4555          JMS I   PREPLAC
4122  1416  6203  LXIT.    6203
4123  1417  6001          ION
4124  1420  5621          JMP I   PPROC
4125  1421  0611  PPROC,   PROC
4126  1422  1133  PGETC,   CGET
4127  1423  1130  PRHSERR, RHSERR
4128  1424  7510  07510,   7510
4129  1425  0010  0010,    10
4130  1426  7455  MCS,     -323
4131  1427  0012  CSMCI,   323-311
4132  1430  0003  CIMCF,   311-306
4133                      /FILTAB ENTRY = TYPE
4134                      /               LENGTH
4135                      /               UNIT
4136                      /               FIRST BLOCK
4137                      /WHERE TYPE     0 =     UNDEFINED
4138                      /               1 =     UNSIGNED(1 WD)
4139                      /               2 =     SIGNED(2 WD)
4140                      /               3 =     FLOATING POINT(3 WD)
4141  1431  4302  LOPEN,   JMS     COMSUB  /LIBRARY OPEN
4142  1432  4022          JMS I   PGETC
4143  1433  5236          JMP     .+3
4144  1434  7000          NOP
4145  1435  5257          JMP     ERXIT
4146  1436  4366          JMS     GETCX
4147  1437  1226          TAD     MCS
4148  1440  7450          SNA
4149  1441  5251          JMP     ITSSS
4150  1442  1227          TAD     CSMCI
4151  1443  7450          SNA
4152  1444  7452          SNA     CLA
```

```
4153  1445  1230          TAD     CIMCF
4154  1446  7640          SZA CLA
4155  1447  5623          JMP I   PRHSERR
4156  1450  7001  ITSFF,  IAC
4157  1451  7001  ITSSS,  IAC
4158  1452  7001  ITSII,  IAC
4159  1453  3157          DCA     MYTMP2
4160  1454  4622          JMS I   PGETC
4161  1455  5261          JMP     .+4
4162  1456  7000          NOP
4163  1457  7200  ERXIT,  CLA
4164  1460  5623          JMP I   PRHSERR
4165  1461  4543          JMS I   PGETRHS
4166  1462  0000  LEFLAG,  0       /(OR JMP .+3 IF GETRHS GOT A #)
4167  1463  4544          JMS I   PLOMILD
4168  1464  4553          JMS I   PLOOKUP
4169  1465  1157          TAD     MYTMP2
4170  1466  3556          DCA I   MYTEMP
4171  1467  2156          ISZ     MYTEMP
4172  1470  1546          TAD I   P6LNAM
4173  1471  3556          DCA I   MYTEMP
4174  1472  2156          ISZ     MYTEMP
4175  1473  1542          TAD I   PLNUM
4176  1474  3556          DCA I   MYTEMP
4177  1475  2156          ISZ     MYTEMP
4178  1476  1545          TAD I   P5LNAM
4179  1477  3556          DCA I   MYTEMP
4180  1500  5216          JMP     LXIT
4181  1501  7472  07472,  7472
4182                      /
4183                      /SCANS OFF FN AND LEAVES POINTER IN MYTEMP
4184                      /
4185  1502  0000  COMSUB,  0
4186  1503  4366          JMS     GETCX
4187  1504  1301          TAD     07472
4188  1505  7650          SNA CLA         /F
4189  1506  4366          JMS     GETCX
4190  1507  1224          TAD     07510
4191  1510  7100          CLL
4192  1511  1225          TAD     0010
4193  1512  7420          SNL
4194  1513  5257          JMP     ERXIT
4195  1514  7106          CLL RTL
4196  1515  1152          TAD     PFILTAB
4197  1516  3156          DCA     MYTEMP
4198  1517  5702          JMP I   COMSUB
4199                      /
4200                      /LIBRARY CLOSE
4201                      /
4202  1520  4302  LCLOSE,  JMS     COMSUB
4203  1521  4622          JMS I   PGETC
4204  1522  5623          JMP I   PRHSERR
4205  1523  7410          SKP
4206  1524  5257          JMP     ERXIT
4207  1525  3556          DCA I   MYTEMP
```

```
1526 6002          IOF
1527 4560          JMS I   PFINISH
1530 7347          CLA CLL IAC RTL
1531 4560          JMS I   PFINISH
1532 5216          JMP     LXIT
                /
                /FILE VARIABLE LOADER
                /
1533 0000       ITLOAD, 0
1534 4554          JMS I   PCOMMON
                /
                /VARIABLE IS NOW IN MEMORY! LOSS
                /POINT AT IT! ONE OF THE FOLLOWING 3 CHOICES WILL BE TAKEN, ACCORDING
                /TO TYPE
                /
1535 5346          JMP     IRETLD
1536 5341          JMP     SRETLD
1537 1551       FRETLD, TAD I   LOSS
1540 2151          ISZ     LOSS
1541 3164       SRETLD, DCA    MYAC1
1542 1551          TAD I   LOSS
1543 3165          DCA     MYAC2
1544 2151          ISZ     LOSS
1545 5354          JMP     CRETLD
1546 1370       IRETLD, TAD    027
1547 3164          DCA     MYAC1
1550 1551          TAD I   LOSS
1551 7710          SPA CLA
1552 7040          CMA
1553 3165          DCA     MYAC2
1554 1551       CRETLD, TAD I  LOSS
1555 3166          DCA     MYAC3
1556 6203          6203
1557 1164          TAD     MYAC1
1560 3567          DCA I   P1FLAC
1561 1165          TAD     MYAC2
1562 3570          DCA I   P2FLAC
1563 1166          TAD     MYAC3
1564 3571          DCA I   P3FLAC
1565 5733          JMP I   ITLOAD
1566 0000       GETCX,  0
1567 4622          JMS I   PGETC
1570 0027       027,    27
1571 5623          JMP I   PRHSERR
1572 5766          JMP I   GETCX
     1600       *1600
                /
                /SUBSCRIPTING FOR FILE VAIABLES
                /ENTER WITH FILE NO. IN AC
1600 0000       COMMON, 0
1601 0376          AND     07
1602 7106          CLL RTL
1603 1152          TAD     PFILTAB
1604 [illegible]   DCA     [illegible]
```

```
4263  1606  3150          DCA     HISS
4264  1607  1500          TAD I   PSUBS   /SUBSCRIPTS
4265  1610  3151          DCA     LOSS
4266  1611  6211          6211
4267  1612  1556          TAD I   MYTEMP
4268  1613  7650          SNA CLA
4269  1614  5177          JMP     FERROR
4270  1615  1556          TAD I   MYTEMP
4271  1616  3011          DCA     BLK2
4272  1617  1411          TAD I   BLK2    /(REFERENCES LOCS 2,3,4)
4273  1620  3011          DCA     BLK2
4274  1621  3013          DCA     BLK2+2
4275  1622  1011  PREDIV, TAD     BLK2    /DIVIDES BY NO. ENTRIES/BLOCK
4276  1623  7141          CLL CIA
4277  1624  1150          TAD     HISS
4278  1625  7420          SNL
4279  1626  5232          JMP     DIVDIV
4280  1627  3150          DCA     HISS
4281  1630  2013          ISZ     BLK2+2
4282  1631  5222          JMP     PREDIV
4283  1632  7200  DIVDIV, CLA
4284  1633  1172          TAD     07764
4285  1634  3012          DCA     BLK2+1  /LOW ORDER SUBSCRIPT, THEN POINTER
4286  1635  1151  DIVLUP, TAD     LOSS
4287  1636  7104          CLL RAL
4288  1637  3151          DCA     LOSS
4289  1640  1150          TAD     HISS
4290  1641  7004          RAL
4291  1642  3150          DCA     HISS
4292  1643  1011          TAD     BLK2
4293  1644  7141          CLL CIA
4294  1645  1150          TAD     HISS
4295  1646  7430          SZL
4296  1647  3150          DCA     HISS
4297  1650  7200          CLA
4298  1651  1013          TAD     BLK2+2
4299  1652  7004          RAL
4300  1653  3013          DCA     BLK2+2
4301  1654  7430          SZL
4302  1655  5177          JMP     FERROR
4303  1656  2012          ISZ     BLK2+1
4304  1657  5235          JMP     DIVLUP
4305  1660  1556          TAD I   MYTEMP
4306  1661  2156          ISZ     MYTEMP
4307  1662  7041          CIA
4308  1663  3012          DCA     BLK2+1
4309  1664  7410          SKP
4310  1665  2200          ISZ     COMMON  /SETS UP COMMON XIT ACCORDING TO FILE TYPE
4311  1666  1150          TAD     HISS
4312  1667  2012          ISZ     BLK2+1  /TBLK (RELATIVE) IS IN BLK2+2
4313  1670  5265          JMP     .+3
4314  1671  3151          DCA     LOSS
4315  1672  1013          TAD     BLK2+2
4316  1673  7140          CLL CMA
4317  1674  1556          TAD I   MYTEMP /(THE LENGTH)
```

```
1675  762?         S?_ CLA /SUBSCRIPT IS TOO LONG
1676  5177         JMP     FERROR
1677  2156         ISZ     MYTEMP
1700  1556         TAD I   MYTEMP
1701  3011         DCA     BLK2
1702  2156         ISZ     MYTEMP
1703  1556         TAD I   MYTEMP  /STARTING TBLK
1704  1013         TAD     BLK2+2
1705  3013         DCA     BLK2+2  /ABSOLUTE TBLK
1706  4351         JMS     CHECK
1707  7307         CLA CLL IAC RTL
1710  4351         JMS     CHECK
1711  1161         TAD     SWITCH  /ALTERNATE THE BUFFERS
1712  7650         SNA CLA
1713  7327         CLA CLL IAC RTL
1714  3161         DCA     SWITCH
1715  6002         IOF
1716  1161         TAD     SWITCH
1717  4560         JMS I   PFINISH
1720  1161         TAD     SWITCH
1721  1163         TAD     PB1FLG
1722  3010         DCA     XR1
1723  7201         CLA IAC
1724  3410         DCA I   XR1
1725  1011         TAD     BLK2
1726  3410         DCA I   XR1
1727  1410         TAD I   XR1
1730  3012         DCA     BLK2+1
1731  1013         TAD     BLK2+2
1732  3410         DCA I   XR1
1733  4540         JMS I   X7774   /READ IT IN
1734  0011         BLK2
1735  1161         TAD     SWITCH  /THE VARIABLE IS IN MEMORY
1736  7106 ITSAGO, CLL RTL
1737  7006         RTL
1740  7006         RTL
1741  1173         TAD     06000
1742  1151         TAD     LOSS
1743  3151         DCA     LOSS
1744  7346         CLA CLL CMA RTL
1745  1010         TAD     XR1
1746  3150         DCA     HISS
1747  6001         ION
1750  5600         JMP I   COMMON
1751  0000 CHECK,   0
1752  3162         DCA     SWTMP
1753  1162         TAD     SWTMP
1754  1163         TAD     PB1FLG
1755  3010         DCA     XR1
1756  1410         TAD I   XR1
1757  7650         SNA CLA
1760  5751         JMP I   CHECK
1761  1410         TAD I   XR1
1762  7041         CIA
1763  1011         TAD     BLK2
```

```
4373    1764  7640          SZA CLA
4374    1765  5751          JMP I   CHECK
4375    1766  2010          ISZ     XR1
4376    1767  1410          TAD I   XR1
4377    1770  7041          CIA
4378    1771  1013          TAD     BLK2+2
4379    1772  7640          SZA CLA
4380    1773  5751          JMP I   CHECK
4381    1774  1162          TAD     SWTMP
4382    1775  5336          JMP     ITSAGO  /BLK IS IN MEMORY ALREADY
4383    1776  0007  07,     7
4384          2000  *2000
4385                /
4386                /FILE VARIABLE STORER
4387                /
4388    2000  0000  ITSTOR,  0
4389    2001  3010          DCA     XR1
4390    2002  1567          TAD I   P1FLAC
4391    2003  3164          DCA     MYAC1
4392    2004  1570          TAD I   P2FLAC
4393    2005  3165          DCA     MYAC2
4394    2006  1571          TAD I   P3FLAC
4395    2007  3166          DCA     MYAC3
4396    2010  1010          TAD     XR1
4397    2011  4554          JMS I   PCOMMON /BLK IS IN MEMORY; LOSS POINTS AT IT
4398    2012  5266          JMP     URETST
4399    2013  5224          JMP     SRETST
4400    2014  1164  FRETST,  TAD     MYAC1
4401    2015  3551          DCA I   LOSS
4402    2016  2151          ISZ     LOSS
4403    2017  1165          TAD     MYAC2
4404    2020  3551          DCA I   LOSS
4405    2021  2151          ISZ     LOSS
4406    2022  1166          TAD     MYAC3
4407    2023  5271          JMP     INCALL
4408    2024  1164  SRETST,  TAD     MYAC1
4409    2025  7450          SNA
4410    2026  5244          JMP     STOKOK
4411    2027  7700          SMA CLA
4412    2030  5251          JMP     STOOBG  /MUST BE LESS THAN MAGN. 1
4413    2031  7100  NORMLE,  CLL
4414    2032  1165          TAD     MYAC2
4415    2033  7510          SPA
4416    2034  7020          CML
4417    2035  7010          RAR
4418    2036  3165          DCA     MYAC2
4419    2037  1166          TAD     MYAC3
4420    2040  7010          RAR
4421    2041  3166          DCA     MYAC3
4422    2042  2164          ISZ     MYAC1
4423    2043  5231          JMP     NORMLE
4424    2044  1165  STOKOK,  TAD     MYAC2
4425    2045  3551          DCA I   LOSS
4426    2046  2151          ISZ     LOSS
4427    2047  1166          TAD     MYAC3
```

```
4428  2050  5271          JMP     INCALL
4429  2051  1165  STOOBG, TAD     MYAC2
4430  2052  7120          CLL CML
4431  2053  7700          SMA CLA
4432  2054  7060          CMA CML
4433  2055  7010          RAR
4434  2056  3551          DCA I   LOSS
4435  2057  2151          ISZ     LOSS
4436  2060  1165          TAD     MYAC2
4437  2061  7700          SMA CLA
4438  2062  7344          CLA CLL CMA RAL
4439  2063  7001          IAC
4440  2064  3551  UZERST, DCA I   LOSS
4441  2065  5272          JMP     CRETST
4442  2066  6203  URETST, 6203
4443  2067  5670          JMP I   .+1
4444  2070  7576          CALLIN
4445  2071  3551  INCALL, DCA I   LOSS
4446  2072  7240  CRETST, CLA CMA
4447  2073  3550          DCA I   HISS
4448  2074  6203          6203
4449  2075  5620          JMP I   ITSTOR
4450  2076  0000  FINISH, 0
4451  2077  1163          TAD     PB1FLG
4452  2100  3010          DCA     XR1
4453  2101  1410          TAD I   XR1
4454  2102  7700          SMA CLA
4455  2103  5676          JMP I   FINISH
4456  2104  1010          TAD     XR1
4457  2105  3321          DCA     BLOCK
4458  2106  7201          CLA IAC
4459  2107  3721          DCA I   BLOCK
4460  2110  1410          TAD I   XR1
4461  2111  3321          DCA     BLOCK
4462  2112  1410          TAD I   XR1
4463  2113  3322          DCA     BLOCK+1
4464  2114  1410          TAD I   XR1
4465  2115  3323          DCA     BLOCK+2
4466  2116  4541          JMS I   X7775
4467  2117  2121          BLOCK
4468  2120  5676          JMP I   FINISH
4469  2121  0000  BLOCK, 0       /UNIT
4470  2122  0000          0       /ADDRESS/256
4471  2123  0000          0       /BLOCKNUM
4472  2124  0001          1       /BLOCKCOUNT
4473                      /
4474                      /BXFLG=0 IF THE BUFFER IS FREE
4475                      /     =+ IF THE BUFFER IS OCCUPIED
4476                      /     =- IF OCCUPIED AND SOMETHING HAS
4477                      /      CHANGED; IE MUST BE WRITTEN OUT
4478                      /BXBLK CONTAINS THE TBLK WHICH IS IN THE BUFFER
4479                      /PB1FLG POINTS TO B1FLG; ADDIGNS SWITCH MAKES
4480                      /IT POINT AT B2FLG
4481                      /
```

```
4483  2126  0000  B1UNIT; 0
4484  2127  0034        34
4485  2130  0000  B1BLK;  0
4486  2131  0000  B2FLG;  0
4487  2132  0000  B2UNIT; 0
4488  2133  0035        35
4489  2134  0000  B2BLK;  0
4490              /
4491              /FILE DEFINITIONS = 4 WORDS APIECE
4492              /=TYPE (1,2,3=U,S,F) 0 FOR UNDEFINED)
4493              /=LENGTH (7777 IF #)
4494              /=UNIT
4495              /=FIRST BLOCK
4496              /
4497
4498  2135  0000  FILTAB; 0,0,0,0,0,0,0,0
      2136  0000
      2137  0000
      2140  0000
      2141  0000
      2142  0000
      2143  0000
      2144  0000
4499  2145  0000        0,0,0,0,0,0,0,0
      2146  0000
      2147  0000
      2150  0000
      2151  0000
      2152  0000
      2153  0000
      2154  0000
4500  2155  0000        0,0,0,0,0,0,0,0
      2156  0000
      2157  0000
      2160  0000
      2161  0000
      2162  0000
      2163  0000
      2164  0000
4501  2165  0000        0,0,0,0,0,0,0,0
      2166  0000
      2167  0000
      2170  0000
      2171  0000
      2172  0000
      2173  0000
      2174  0000
4502              .
```

```
/000  01111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
/100  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111001
/200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
/300  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
/400
/500
/600
/700

1000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1100  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1300  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1500  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11100000
1600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1700  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111110

2000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
2100  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111000
2200
2300
2400
2500
2600
2700

3000
3100
3200
3300
3400
3500
3600
3700
```

```
4000
4100

4200
4300

4400
4500

4600
4700


5000
5100

5200
5300

5400
5500

5600
5700


6000
6100

6200
6300

6400
6500

6600
6700


7000
7100

7200
7300

7400
7500

7600
7700
```

```
A        0045
ABSOL    6751
ABSOL2   6153
ABSOL3   7375
ABSOLV   5571
ACIH     0041
ACIL     0042
ACMINS   6605
ADDR     0040
ADONE    6673
AF       4677
ALF1     4760
ALF2     4763
ALF3     4755
ALGN     6572
ALIGN    6623
ALIST    1370
ALPHA    0016
AMOUNT   6722
ARCALG   4732
ARCRTN   5024
ARGNXT   1723
ARTN     5000
ASHFT    6665
ASK      1200
ATLIST   1570
ATSW     0056
AXIN     0010
AXOUT    0017
B        0046
B1BLK    2130
B1FLG    2125
B1UNIT   2126
B2BLK    2134
B2FLG    2131
B2UNIT   2132
BACK     5503
BEGIN    3601
BET1     4771
BET2     4774
BETA     0017
BET3     4766
BF       4702
BLK2     0011
BLOCK    2121
BOTTOM   0035
BUFBEG   3216
BUFFER   7473
BUFR     0060
BUFST    5531
C        0047
C100     0036
C140     2554
C144     6140
C220     0123
C260     0113
C3       5345
C5       5341
C7       5335
C9       5331
CALLIN   7576
CCR      0077
CDF      7000
CEX1     6506
CEXP     6505
CF       4705
CFRS     0133
CFRSX    0137
CGET     1133
CGETRE   1137
CGETX    2564
CHAR     0066
CHARTA   0200
CHECK    1751
CHFLAG   0147
CHIN     2157
CHRCNT   0006
CHREND   0056
CHRLUP   0033
CHRT     6133
CIMCF    1430
CLCU     7427
CLEAR    7672
CLF      0076
CLKFLG   2661
CNTR     0057
COL      1253
COMBOT   0226
COMBUF   0132
COMEIN   3140
COMEOU   3206
COMGO    1161
COMLST   0774
COMMEN   0614
COMMON   1600
COMSUB   1502
CON1     5037
CRETLD   1554
CRETST   2072
CRLF     7505
CRUDDY   1155
CSMCI    1427
CSTAR    0225
D        0041
D256     0002
D85      0004
DATUM    7102
DATUMA   7252
DCONP    6303
DCONT    0471
DCOUNT   6143
DDTJR    0004
DEBGSW   0026
DECON    5627
DECONV   5600
DECP     5533
DECR     5521
DEJUMP   1306
DELETE   4565
DF       4710
DGRP     0425
DGRP1    0441
DIG      5543
DIGIT    5713
DIGITS   0006
DIV1     5754
DIV2     6757
DIVDIV   1632
DIVIDE   7150
DIVLUP   1635
DMDONE   7063
DMPSW    0100
DMULT    7004
DMULT4   7036
DNORM    7335
DNUMBR   5714
DO       0420
DOK      2113
DONE     2131
DOONE    0463
DOUBLE   0127
DPCVPT   6302
DPN      6305
DPT      6145
DSAVE    5640
DTST     5647
DUBDIV   7261
DUBLAD   5733
DV3      7267
E        0042
ECALL    1601
ECHOLS   1624
EFOP     0056
EFUN     1743
EFUN2    1755
EFUN3    2021
EFUN3I   2136
ELPAP    1764
END      7134
ENDFI    6243
ENDLN    4556
ENDT     0135
ENREPL   1375
ENUM     1732
EPAR     1710
EPAR2    1766
ERASE    2226
ERG      2227
ERL      2224
ERR2     2726
ERRFIL   2571
ERROR2   4566
ERROR3   4566
ERROR4   4566
ERROR5   2725
ERT      2216
ERV      2221
ERVX     2241
ERXIT    1457
ESCA     2532
ETERM    1647
ETERM1   1627
ETERM2   1655
ETERMN   1644
EVAL     1613
EX1      0040
EXIT     2646
EXIT1    5034
EXIT2    5301
EXIT3    7363
EXITJ    2660
EXP      0044
EXTR     2313
F        0043
FCONT    1101
FCOS     5177
FCOUNT   5535
FEND3    2267
FERROR   0177
FEXP     4620
FEXT     0000
FFF      1522
FGO2     6011
FGO3     6027
FGO4     6034
FGO5     6070
FIGO1    6221
FIGO4    6261
```

FI[illegible]R	1354	FRETLD	1537	IF	[illegible]13	LESURS	2173
FIISTR	1326	FRETST	2014	IF1	1035	LG	6375
FIITAB	2135	FRST	3206	IF3	1025	LG2E	4713
FINCR	1465	FRSTX	3214	IGNOR	0217	LGO	6368
FINDLN	4555	FSIN	5204	IGOTIT	1036	LINENO	2067
FINDV	2253	FSSERR	5774	ILIST	0771	LIST3	2077
FINFIN	1137	FXIT	0000	IN	5513	LIST6	2072
FINISH	2076	G101	3661	INBUF	0034	LIST7	2074
FINKP	1133	G5772	3662	INCALL	2071	LISTGO	1366
FINPUT	0131	G5773	3663	INDEV	0064	LL	5173
FINT	4407	G7200	3664	INDRCT	6465	LLENGT	1327
FISW	0052	G7773	3665	INFIX	2401	LLIST	6366
FIVHUN	7653	G7774	3666	INLIST	0570	LLOAD	1203
FIX	6724	G7775	3667	INORM	6307	LM	2572
FIXM	6753	G7776	3670	INPUT	0756	LMAKE	1402
FLAC	0044	G7777	3671	INPUTX	0271	LNAME	1172
FLAD	6510	GAMMA	0005	INSUB	0036	LNUM	1171
FLAG1	5162	GBLOK	3655	INTEGE	0053	LO	5167
FLAG2	4725	GECALL	1463	INTRPT	2603	LOADIT	6333
FLAGJ	1076	GEND	2334	IOBUF	3120	LOADJ	1304
FLARG	2032	GERR	0340	IPART	1040	LOG2	5157
FLARGP	0125	GET1	2330	IRETLD	1546	LOG5	5142
FLOV	7107	GET3	2345	IRETN	0227	LOG6	5145
FLEX	6517	GETARG	1401	ITABLE	6575	LOG7	5150
FLGT	6471	GETC	4545	ITER1	7470	LOG8	5153
FLIMIT	1075	GETCX	1566	ITLOAD	1533	LOOP01	6433
FLINTP	6200	GETLN	4554	ITSAGO	1736	LOPEN	1431
FLIST1	0577	GETRHS	1000	ITSFF	1450	LORD	0046
FLIST2	0574	GETSGN	1045	ITSII	1452	LOSS	0151
FLMY	6565	GETVAR	1405	ITSOK	7521	LPRTST	2037
FLOG	5040	GEXIT	0352	ITSSS	1451	LS	6176
FLOP	1674	GFND1	1510	ITSTOR	2000	LSAVE	1233
FLOUT	5556	GINC	0070	JUMP	6464	LSBLK	1324
FLOUTP	6000	GLIST	1375	K5	5525	LTAPE	6346
FLPT	6467	GO	5021	KINT	2625	LUKUP	1342
FLSU	6507	GONE	0232	L1	5126	LWETMP	0002
FLTONE	2435	GOODY	0045	L2	5131	LXIT	1416
FLTXR	0014	GOTO	0603	L3	5134	M100	0101
FLTXR2	0015	GRPTST	0744	L4	5137	M10PT	6147
FLTZER	2407	GS1	1435	LASTLN	0025	M11	0121
FM12	6142	GS2	1464	LASTOP	0055	M12	2413
FNEG	5163	GS3	1444	LASTV	0031	M137	2357
FNOR	7000	GS4	1457	LC	5171	M140	2556
FNTABF	0374	GSERCH	1424	LCHAIN	1202	M144	6137
FNTABL	2167	GTEM	0021	LCLOSE	1520	M2	0111
FNUM	6311	GZERR	0362	LCON	0371	M20	0105
FOR	1041	HINBUF	0037	LDMILD	1160	M240	0114
FORHUN	7651	HISS	0150	LEFLAG	1462	M260	1534
FOUTPU	0133	HORD	0045	LEFPUT	0172	M272	1544
FPAC1	7474	I33	2414	LEPUT	6163	M4	5141
FPNT	6400	IBAR	0212	LERR	6357	M40	2356
FPRNT	5465	IECALL	1037	LESUR2	0170	M43	1077

```
%5      120
%77     123
%BREAK  2642
%COM    1136
%CR      116
%CS     1426
%D      5526
%EQ     1135
%F      7602
%FIT     117
%HUNDR  5375
%IF     7260
%INCMA  1400
%INCOM  6374
%INE    5662
%INSKI  0051
%INUS2  7153
%INUSA  0112
%INUSE  6301
%INUSZ  5663
%LOBLK  1165
%LIMIT  7647
%MCOM   7656
%OD     5214
%ODIFY  1254
%OO     1262
%OOEND  1275
%OOLUP  1266
%ORNUM  1056
%OVMOV  1305
%P1     7254
%P2     7256
%P3     7255
%P4     7200
%P5     7253
%P6     7210
%PPR    0115
%PLUS   5664
%SPACE  5665
%UI DIV 7101
%UI T   6570
%UI T10 5667
%UI T2  5715
%UI TY  4752
%VCNT   1323
%VCTR   1200
%VPTR   1201
%YAC1    164
%YAC2    165
%YAC3    166
%YTEMP   156
%YTMP2   157
ABSW    0065
ACHARS  7566
ACOLS   7564
AEGP    4724
AFEEDS  7565
ALINES  7561
AOASCI  0061
AOCLK   2653
AOCRLF  7513
AOHANG  7556
AORF    6515
AORM    6571
AORMF   7147
AORMLE  2031
AOTSAV  1314
AOX     6675
AOX1    6711
AOX2    6704
AUMSGN  1061
B1      3600
B10     1123
B12     1545
B200    0003
B215    1157
B27     1570
B360    0007
B37     1360
B4377   0076
B4600   5374
B56     1156
B6000   0173
B6377   7570
B7      1776
B7000   7415
B7400   7650
B7420   0174
B7472   1501
B7510   1424
B7524   1154
B7566   7572
B760    0015
B7655   7571
B77     1124
B7710   1125
B7716   7573
B7761   1155
B7763   7567
B7764   0172
B7770   1126
B7774   1127
BC      7752
BCTNUM  1101
BD      7761
BDISSP  7704
BE      7753
BERROR  7713
BEXIT   7731
BGO     7714
BI      7734
BLIST   7722
BM12    5530
BNE     4716
B010    1425
B06377  7730
BP      3115
BPMINS  6567
BPNEXT  1622
BPTABL  1731
BPTR    6002
BPTRV   2663
BPTRI   2665
BPTRO   2664
BPUT    5532
BS      7763
BSAMP   1357
BT      7771
BUT     2465
BUTA    5536
BUTCR   2476
BUTDEV  0063
BUTDG   6154
BUTPUT  7706
BUTX    2475
BVER1   0043
BVER2   0047
C       0000
C13     0005
C17     0107
C177    0106
C1FLAC  0167
C2000   0373
C27     6750
C277    0110
C2FLAC  0170
C3      2036
C337    0075
C377    2553
C3FLAC  0171
C40     2552
C4000   0124
C43     6310
C5LNAM  0145
C6LNAM  0146
C7200   1402
C7600   0134
C77     0122
C7700   0121
C7740   0372
CA1     2524
CACBUF  2502
CACKC   4546
CACKST  0027
CACX    2530
CALG    5260
CARTES  2051
CASS    6335
CB1FLG  0163
CC      0022
CC1     0614
CCHAR   1401
CCHECK  5244
CCHK    0510
CCK1    2535
CCLEAR  0175
CCLKFL  7745
CCOMMO  0154
CD2     0534
CD3     0554
CDLXR   0013
CECALL  6334
CEQ     6135
CER     0102
CFILTA  0152
CFINIS  0160
CFNEW   0410
CFNUM   1771
CFX     0411
CFZ     0412
CGETC   1422
CGETRH  0143
CI      5311
CI2     5036
CIOT    5315
CLCE    5536
CLOMIL  0144
CLEFLA  1075
CLESUB  0101
CLLP1   1006
CLLP2   1016
CLLP3   1044
CLLP4   1102
CLNAME  1122
CLNUM   0142
CLOOKU  0153
CNCHAR  7732
CNCOLS  7776
```

PN[illegible]	7777	RET	5432	SRNLST	[illegible]61	TYPE	12[illegible]1
POP1	1413	RETRN	1563	START	0177	TYPE2	1223
POPF	4544	RETURN	5536	STARTL	5064	URETST	2066
POPL	5541	REVIT	7146	STARTV	0060	UTE	2276
POPTR	7733	RHSERR	1132	STEMP	7750	UTO	2305
PP43	11[illegible]	RITEOU	3651	STEMP2	7751	UTRA	2274
PPASS	7705	RND2	5527	STOKOK	2044	UTX	2316
PPROC	1421	ROOTGO	7461	STOOBG	2051	UZERST	2064
PPTEN	6144	ROT	2557	STORIT	6175	VAL	0032
PPTR	7574	ROUND	6151	SUBR	0102	WAIT	7657
PRECIV	1622	RTL6	4557	SUBS	0171	WAITER	0020
PREPLA	0155	RUB1	3004	SUBS2	0167	WAITLP	0115
PRHSER	1423	RUB2	3042	SWITCH	0161	WALL	0664
PRINTC	4551	RUB3	3030	SWTMP	0162	WEXIT	0072
PRNT	2442	RUB4	3037	T	0000	WORDS	0003
PRNT2	3114	RUB5	3041	T1	0032	WRITE	0635
PRNTI	6132	RUBIT	2555	T12	3611	WTEST2	0653
PRNTLN	4553	SADR	6150	T2	0071	WTESTG	0667
PROC	0611	SAMEN	1372	T3	0033	WX	0673
PROCES	0610	SAVAC	2600	TABLE	6466	X	5321
PSCOPO	7775	SAVE	3751	TAG1	6723	X1	5035
PSETCL	7746	SAVLK	2601	TASK	1202	X2	4675
PSIN	0165	SBAR	1300	TASK4	1250	X7774	0140
PSTART	1322	SCHAR	1271	TCRLF	1246	X7775	0141
PSUBS	0100	SCONT	1266	TCRLF2	1243	XABS	2016
PTI	0030	SCOPOU	7500	TDUMP	3052	XADC	1341
PTBL	1330	SCOUNT	5534	TELSW	0016	XCT	0020
PTCH	0126	SETCLK	5351	TEM	5156	XCTIN	0062
PTEN	6275	SETT	1041	TEMP	4726	XDELET	2064
PTEST	1462	SEX	1336	TEN	6271	XDISP	7602
PUSHA	4542	SEXC	0740	TENPT	6152	XENDLN	2360
PUSHF	4543	SFOUND	1304	TERMS	1772	XFIND	2244
PUSHJ	4540	SGOT	1310	TEST2	6736	XGETLN	0302
PWAIT	0174	SIGN	7124	TEST4	7366	XGETOU	1254
PXOUTL	7774	SIGNF	0050	TESTA	0322	XI33	2666
QADD	0061	SIN	2662	TESTC	4564	XIN	6306
R6	5441	SMIN	6136	TESTN	4561	XINPUT	5666
RANMUL	6160	SMP	6101	TEXTP	0017	XINT	1156
RAND	1142	SMSP	6134	TGO	5400	XLC	0130
RAR1	6573	SORTB	1312	THIR	7257	XLG	0136
RAR2	6574	SORTC	4550	THISLN	0023	XLL	0132
RDIV	0152	SORTCN	0254	THISOP	0024	XLO	0126
READC	4552	SORTJ	4547	TINTR	1236	XLS	0134
RECOVR	2740	SPECIA	6777	TLIST	1376	XOUTL	2676
RECOVX	2761	SPLAT	3051	TLIST2	1532	XPOPJ	1565
REMAIN	5712	SPNOR	4560	TLIST3	2377	XPRNT	2425
REPLAC	1361	SPTR	7671	TQUOT	1227	XPUSHA	0477
REPT	6146	SQCON1	7467	TRAD	6575	XPUSHJ	0521
RESOL	6752	SQEND	7465	TSTGRP	4563	XQ	0001
RESOL3	7376	SRETLO	1541	TSTLPR	4562	XR1	0010
RESOL5	6304	SRETN	0261	TWO	4721	XRAN	1145
RESOLV	7173	SRETST	2024	TWOPI	5305	XRAR2	7365

```
        XR*      311
        XR*2     312
        XR*.6    413
        XSC.     312
        XSORTC   721
        XSP.OR  1535
        XS*2    4676
        XS*R    5325
        XSORT   7432
        XT3      717
        XTFSTC   700
        XTFSTN  1546
        XY*     2451
        Y        377
        ZERO    6522


ERRORS DETECTED: 0

LINKS GENERATED: 0

RUN-TIME:  40 SECONDS

4K CORE USED
```

UFST	2297	2351#												
	3098	3183#												
107	23#	1373	1746	2241	3425									
140	1519	1522	1549#											
144	2606	2621#												
200	124#	1459	1603	1676	2243	2874								
C260	116#	1478	1491	2634										
3	2179	2222#												
C5	2177	2218#												
7	2175	2214#												
C9	2173	2210#												
CALLIN	3483#	4444												
CCR	171#	791	794	1500	1503	1708	1761							
CDF	26#	1241	1423	1529	1685	1726								
CEX1	2838	2866#												
CEXP	2851	2853	2865#											
CF	1889	1923#												
CFRS	132#	1236	1244	1317	1345	1347								
CFRSX	136#	205	966	1019	1060									
CGET	3841	3852	3931	3908	3914	3925#	3931	3932	3935	3938	3940	3941	4126	
CGETRE	1565	3929#												
CGETX	1561#	3928												
CHAR	86#	255	279	489	496	522	553	572	658	765	773	838	909	993
	1225	1309	1144	1228	1284	1311	1375	1379	1403	1404	1408	1471	1496	1510
	1562	2402	2412	2419	2434	2438	2442	2657	2662	2679	2739	2761	2769	3494
	3579	4109												
CHARTA	3756#													
CHECK	4327	4329	4362#	4369	4374	4380								
CHFLAG	3729#	3967	3994	4013										
CHIN	127	165	1282#	1287	1289									
CHRCNT	3622#	3642	3669											
CHREND	3659	3669#												
CHRLUP	3650#	3670												
CHRT	2589	2616#												
CIMCF	4132#	4153												
CLCU	3372#	3401												
CLEAR	201	3545#	3554											
CLF	99#	1505												
CLKFLG	1618	1628#	3588											
CNTR	78#	1235	1254	1263	1267	1275	1680	1687	1817	2841	2844	2859	2862	
COL	767	799#												
COMBOT	210	226#												
COMBUF	131#	214	217	230										
COMEIN	131	133	1793#	1794										
COMEOU	226	1794#	1795											
COMGO	507	643	739#											
COMLST	506	507	611#											
COMMEN	509#	745												
COMMON	3734	4257#	4310	4361										
COMSUB	4141	4185#	4198	4202										
CON1	1991	1997	2017#	2025	2033	2052								
CRETLD	4231	4238#												
CRETST	4441	4446#												

```
MP6         3226#   3237
MPER         118#   1226    2663
MPLUS       2423    2447#
MSPACE      2413    2448#
MULDIV      3115    3125#   3130    3141
MULT        2910    2914    2917#
MULT10      2428    2457#   2468    2628
MULT2        128    2458    2459    2461    2472#   2485
MULTY       3275    3078    3083    3086    3093    3096    3101    3104    3107    3179#
MVCNT       4032    4054#
MVCTR       3961#   4024    4025    4026    4033    4036
MVPTR       3962#   4029    4034    4043    4050
MYAC1       3742#   4227    4233    4241    4391    4400    4408    4422
MYAC2       3743#   4229    4237    4243    4393    4403    4414    4418    4424    4429    4436
MYAC3       3744#   4239    4245    4395    4406    4419    4421    4427
MYTEMP      3736#   4170    4171    4173    4174    4176    4177    4179    4197    4207    4261    4267    4270    4305
            4326    4317    4320    4321    4323    4324
MYTMP2      3737#   4110    4119    4159    4169
NAGSW         85#    243     330     369     370     393     389     403     531     543    1326
NCHARS      3441    3442    3449    3460    3471#   3577
NCOLS       3420    3431    3462    3464    3469#   3613
NEGP        1871    1938#
NFEEDS      3421    3446    3461    3470#   3614
NLINES      3428    3445    3466#
NOASCI      3640    3672#
NOCLK       1615    1622#
NOCRLF      3419    3423#
NOHANG      3448    3463#
NORF        2873#   2930
NORM        2873    2918#
NORMF       3128    3175#
NORMLE      4413#   4423
NOTSAV      4039    4047#
NOX         2971    2987#
NOX1        2950    2999#
NOX2        2989    2994#
NUMSGN      3847    3880#
O1          1810#   1811
O10         3881    3907    3917#
O12         1001#   1012
O200        3619#   3661
O215        3939    3945#
O27         4232    4250#
O360        3623#   3645    4006
O37          861     875#
O4377       3643    3686#
O4600       2245    2259#
O56         3936    3944#
O6000       3749#   4354
O6377       3458    3473#
O7          4258    4383#
O7000       3362#   3443
O7400       3516    3525#
```