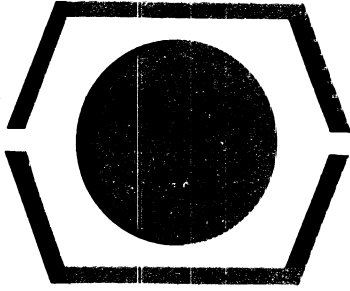


?1328 H.S. EQUIPMENT  
?26.MF DELETE X-FUNCT.



# DECUS

## PROGRAM LIBRARY

DECUS NO.

FOCAL8-52 LISTING

TITLE

FOCAL 5/69

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```

1          /***** FOCAL, 5/69 *****/
2
3          EXPUNGE
4          /PROCESSOR INSTRUCTIONS
5          FIXMRI AND=0000
6          FIXMRI TAD=1000
7          FIXMRI ISZ=2000
8          FIXMRI DCA=3000
9          FIXMRI JMS=4000
10         FIXMRI JMP=5000
11         /FLOATING POINT INSTRUCTIONS
12         FIXMRI FPW=0000
13         FIXMRI FAD=1000
14         FIXMRI FSB=2000
15         FIXMRI FMY=3000
16         FIXMRI FDV=4000
17         FIXMRI FGT=5000
18         FIXMRI FPT=6000
19
20         7000   FNR=7000
21         0000   FLXT=0
22         4407   FENT=JMS I 7
23         7000   NUP=7000
24         7200   CLA=7200
25         7100   CLL=7100
26         7040   CMA=7040
27         7004   RAL=7004
28         7020   CML=7020
29         7010   RAR=7010
30         7012   RIR=7012
31         7006   RIL=7006
32         7001   IAC=7001
33         7500   SMA=7500
34         7440   SZA=7440
35         7510   SPA=7510
36         7450   SNA=7450
37         7420   SNL=7420
38         7430   SZL=7430
39         7410   SKP=7410
40         7041   CIA=7041
41         6001   IUN=6001
42         6002   IUF=6002
43         6031   KSF=6031
44         6036   KHR=6036
45         6041   TSF=6041
46         6042   TCF=6042
47         6044   TPC=6044
48         6046   TLS=6046
49         6011   RSF=6011
50         6012   RKB=6012
51         6014   RFC=6014
52
          FIXTAB

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53
54 / * FOCAL * - BY RICK MERRILL - FOR THE FAMILY OF 8.
55 /REVISED BY EDWARD TAFT 5/69
56
57 /MISCELLANEOUS ITEMS
58 *1
59 0001 5402 JMP I ,+1 /INTERRUPT PROCESSOR ENTRY
60 0002 2603 INTRPI
61 0003 7477 MINUSA, -301 /CONSTANT
62 0004 0000 FNEGSW, 0 /USED FOR CALCULATING SIGNS
63 0005 0013 P13, 13 /CONSTANT
64 0006 0100 C100, 100 /CONSTANT
65 0007 6600 FPNT /ADDRESS OF FLOATING POINT INTERPRETER.
66
67 /AUTO-INDEX REGISTERS
68
69 0010 0000 AXIN, 0 /STORAGE INDEX
70 0011 0000 XRT, 0 /EXTRA XR
71 0012 0000 XRT2, 0 /EXTRA XR
72 0013 0000 PULXR, 0 /PUSHDOWN LIST INDEX REGISTER.
73 0014 3377 FLTXR, 1000F-1 /XR15 FOR FLOATING POINT
74 0015 0200 C200, 200 /CONSTANT
75 0016 0000 XRT3, 0 /USED BY PUSHDOWN LIST CONTROLS
76
77
78 0017 TEXIP=, /TEXT POINTERS
79 0017 3430 AXOUT, FRSTX /OUTPUT INDEX
80 0020 0000 XCT, 0 /UNPACK SWITCH
81 0021 0000 GFM, 0 /UNPACK STORAGE
82
83 /NUMBERS
84
85 0022 0256 PER, 256 /PERIOD
86 0023 7701 M77, -77 /RIGHT MASK
87 0024 7600 P7600, 7600 /GROUP MASK
88 0025 7760 M20, -20 /CONSTANT
89 0026 0177 P177, 177 /STEP MASK
90 0027 5577 BOTTOM, 0BC00V-1/END OF TEXT BUFFER
91 4430 FLOAT= JMS I , /FLOAT C(AC) SUBROUTINE
92 0030 7332 XFLOAT
93 0031 0017 P17, 17 /BCD MASK
94 0032 0277 P277, 277 /"?"
95 0033 0240 C240, 240 /SPACE
96 0034 7776 M2, -2 /CONSTANT
97 0035 0002 P2, 2 /CONSTANT
98 0036 0260 C260, 260 /ASCII FOR ZERO
99 0037 0000 HINBUF, 0 /HIGH SPEED INPUT BUFFER

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100
101      0040      FLOP=, /FLOATING OPERAND STORAGE
102      0040 0000      FLOPP, 0
103      0041 0000      FLOP1, 0
104      0042 0000      FLOP2, 0
105      0043 0000      FLOP3, 0
106      0044      FLAC=, /FLOATING POINT ACCUMULATOR
107      0044 0000      FLACP, 0
108      0045 0000      FLAC1, 0
109      0046 0000      FLAC2, 0
110      0047 0000      FLAC3, 0
111      4450      NEGATE= JMS I . /NEGATE FLAC ROUTINE
112      0050 6676      NEGAC
113      0051 0010      TOTDIG, 10 /TOTAL DIGITS IN OUTPUT FIELD
114      4452      FIX= JMS I . /FIX FLAC ROUTINE
115      0052 7311      XFIX
116      0053 0000      TANCTR, 0 /CARRIAGE INDEX
117
118      /CONSTANTS
119
120
121      0054      LIST6=, /INPUT LIST FOR "SFOUND".
122      0054 0337      P337, 337 /LEFT ARR
123      0055 0214      214 /L.F.
124      0056 0207      207 /BELL
125      0057 0212      CLF, 212 /L.F.
126      0060 0060      LIST3=, /EXCRETION LIST
127      0060 0215      CCR, 215 /LIST BRANCHER,
128      0061 0000      0 /SEARCH CHARACTER (VARIABLE)
129
130      0062      M100=,
131      0062 7700      P7700, 7700 /LEFT MASK
132      0063 7540      M240, -240 /SPACE TEST
133      0064 7522      MPFR, -256 /PERIOD TEST
134      0065 7563      MCR, -215 /C.R. TEST
135      0066 0066      MFLT=, /3-WORD FLOATING POINT
136      0066 7775      M3, -3
137      0067 7773      M5, -5 /PAREN TEST
138      0070 7767      M11, -11 /PAREN TEST
139      0071 0077      P77, 77 /RIGHT MASK
140
141      0072 6170      FUINPUT;BDCONV /FLOATING OUTPUT
142      0073 5600      FINPU1, BDCONV /FLOATING INPUT
143      0074 2527      CUMBUF, COMEIN /COMMAND BUFFER START
144      0075 3420      CFRS, FRST /ADDRESS OF DUMMY LINE.
145      0076 3432      END, RUFBEG /FIRST LOCATION USED.
146      0077 3432      ENDT, RUFBEG /START OF STORAGE AREA **
147      5500      RETURN= JMP I . /FUNCTION RETURN
148      0100 2056      EFUN31, EFUN3

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/NEW INSTRUCTIONS:

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      4501 PUSHJ=JMS I . /RECURSIVE SUBROUTINE CALL
      0523 XPUSHJ
      1413 POPA=IAD I PPLXR/RESTORE AC
      5502 POPJ=JMP I . /SUBROUTINE RETURN
      1556 XPOPJ
      4503 PUSHA=JMS I . /SAVE AC
      0501 XPUSHA
      4504 PUSHA=JMS I . /SAVE GROUP OF DATA
      0532 PD2
      4505 POPF=JMS I . /RESTORE GROUP
      0550 PU3
      4506 GETC=JMS I . /UNPACK A CHARACTER
      2315 UTRN
      4507 PACKC=JMS I . /PACK A CHARACTER
      3023 PACBUF
      4510 SURTJ=JMS I . /SORT AND BRANCH ON AC OR CHAR
      1353 SORTR
      4511 SURTC=JMS I . /SORT CHAR
      0733 XSORTC
      4512 PRINTC=JMS I . /PRINT AC OR CHAR
      2477 OUT
      4513 READC=JMS I . /READ ASR-33 INTO CHAR AND PRINT IT
      2463 CHIN
      4514 PRNTLN=JMS I . /PRINT C(LINENO)
      6151 XPRNTLN
      4515 GETLN=JMS I . /UNPACK AND FORM A LINENUMBER
      0312 XGETLN
      4516 FINDLN=JMS I . /SEARCH FOR A GIVEN LINE
      2265 XFIND
      4517 ENDLN=JMS I . /INSERT LINE POINTERS
      2417 XENDLN
      4520 RIL6=JMS I . /ROTATE LEFT SIX
      0305 XRTL6
      4521 SPNOR=JMS I . /IGNORE SPACES AND LEADING ZEROS
      1524 XSPNOR
      4522 TESTN=JMS I . /PERIOD; OTHER; NUMBER
      1533 XTESTN
      4523 TSTLPR=JMS I . /SKIP IF 5<SORTCN<= 11 (I.E. AN L-PAR)
      2077 LPRST1
      4524 TSTGPP=JMS I . /SKIP IF G(AC) = G(LINENO)
      2451 GRPTST
      4525 TESTC=JMS I . /TERM; NUMBER; FUNCTION; LETTER
      0713 XTSTC
      4526 ERROR=JMS I . /GENERAL ERROR ROUTINE
      2736 ERR2

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197
198
199 #127 0000 SORTCN, 4 /NUMBER IN TABLE FROM SORTC
200 #130 0000 LASTOP, 0 /LAST OPERATION FOR EVAL
201 #131 0000 FCODE, /FUNCTION CODE.
202 #131 0000 ATSA, /ASK-TYPE SWITCH
203 #132 7700 CNTN, -25 /DELETE AND ERROR COUNTER(USED BY F.P. ALSO)
204
205 #133 0004 DECP, 4 /NUMBER OF DECIMAL POINTS
206
207 #134 0134 STARTV, /=END FOR BK
208
209 #134 3432 RUFN, RUFBF6 /NEXT LOCATION IN RUFFER = LAST LOCATION OF TEXT.
210
211 #135 0000 ADI, 0 /CHAR FOR INPUT
212 #136 0000 XOTIA, 0 /PACK SWITCH
213 #137 2675 OUTDEV, XOUTL /OUTPUT SUBROUTINE
214 #140 2655 INDEV, XIAS /INPUT SUBROUTINE
215
216 #141 0001 NAGSW, 0001 /NOT ALL AND/OR GROUP SWITCH (4000=ONE;1=ALL;0=GROUP)
217 #142 0215 CHAR, 215 /THE MOST IMPORTANT REGISTER
218 #143 0000 LINENO, 0000 /LINE NUMBER READ BY GETLN
219 #144 0005 GINC, 5 /WORDS TO STORE 1 VARIABLE
220
221 #145 1575 PC, FLTZER /PROGRAM COUNTER
222 #146 0000 THISLN, 0 /LINE POINTER FROM 'FINDLN'
223 #147 0000 THISOP, 0 /CURRENT 'EVAL' OPERATION
224 #150 0000 LASTLN, 0 /BACK POINTER FROM 'FINDLN'
225 #151 0001 DEBGS, 1 /DEBUG SWITCH ; NON-ZERO FOR LITERAL.
226 #152 0001 DRPSW, 1 /=0 FOR TRACE ON.
227 #153 0000 PACKSI, 0 /RUBOUT PROTECTION
228 #154 0000 P11, 0 /VARIABLE POINTER
229 #155 3432 LASTV, RUFBF6 /ADDRESS OF LAST VARIABLE
230 #156 0000 T1, 0 /TEMPORARY REGISTER - MAIN
231 #157 0000 T2, 0 /TEMP REGISTER - FOR NEW INST. ROUTINES.
232 #160 2034 FLANGP, FLARG /DATA ADDRESS
233 #161 2463 P1CH, CHIN /GENERAL CHARACTER INPUT ROUTINE.
234 /USED BY NEW FLOATING PT. PACKAGE
235 #162 0000 TEMP1, 0
236 #163 0000 TEMP2, 0
237 #164 0000 TEMP3, 0
238 4565 TSTERM= JMS I, /TEST FOR ;CR
239 #165 2514 XTSTERM /RETURNS: OTHER, ; OR CR, COMMA
240 #0000 DIGITS=6 /SIGNIFICANT DIGITS

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241          /FOCAL'S COMMAND/INPUT DRIVER
242
243          /LOCATION 176 SET TO BEGIN FOR INITIALIZATION, THEN TO
244          /RECOVR+1 THEREAFTER, FOR CONSOLE START AT 0200
245          0177
246          0177 7610  START,  SKP CLA          /PROGRAM START FROM SELF
247          0200 5576          JMP I .-?          /CONSOLE START: SW=200.
248          0201 1227          TAD CFRSX          /PC => 0
249          0202 3145          DCA PC          /FOR COMMAND MODE
250          0203 3151          DCA DEBGSW        /ENABLE TRACE FOR INPUT OF (?).
251          0204 1226          TAD COMBUF        /PROTECT COMMAND BUFFER.
252          0205 3013          DCA PDLXR        /NO PATCH TEST.
253          0206 2152          ISZ DMPSW        /INIT UNPACK AND TRACE SWITCH.
254          0207 3061          DCA LIST3+1      /CLEAR SEARCH CHARACTER FOR INPUT.
255          0210 1054          TAD P337          /ANNOUNCE PRESENCE
256          0211 4512          PRINTC          /BY TYPING THE LEAD-IN CHARACTER
257          0212 1074          IBAH,  TAD COMBUF        /INITIALIZE COMMAND BUFFER
258          0213 3010          DCA AXIN          /FOR UNPACKING.
259          0214 3136          DCA XCTIN
260          0215 1074          TAD COMBUF        /RUBOUT PROTECTION
261          0216 3153          DCA PACKST
262          0217 4513          IGNOR,  READC          /READ COMMAND STRING
263          0220 4510          SORTJ
264          0221 0053          LIST6-1
265          0222 0510          INLIST-LIST6
266          0223 4507          PACKC          /SAVE STRING CHARACTER.
267          0224 5217          JMP IGNOR
268          0225 4000          /LINE NUMBER TEST
269          0225 4000          P4000, 4000
270          0226 2612          COMBUF, COMOUT+12 /END OF COMMAND BUFFER, LESS PROTECTION COUNT.
271          0227 1575          CFRSX, FLTZER    /POINTER FOR PC=COMMAND OR INPUT
272          0227 1575          /END OF PROGRAM

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273                                     /COMMAND/INPUT PROCESSOR
274
275      0230  4507  IRETN,  PACKC      /START TO PACK C.R.
276      0231  4507  PACKC      /FINISH C.R.
277      0232  1074  TAD COMBUF  /INITIALIZE "TEXT"
278      0233  3017  GONE,     DCA AACUT  /SETUP CURRENT LINE
279      0234  3020  DCA XCT
280      0235  4506  GETC      /READ FIRST CHARACTER.
281      0236  1027  TAD BOTTOM  /INIT PUSH-DOWN-LIST
282      0237  3013  DCA PDLXF
283      0240  4521  SFRDUP     /IGNORE LEADING PLANKS
284      0241  4522  TESTN     /DOES THE LINE BEGIN WITH 1-9?
285      0242  4526  ERROR4    /ILLEGAL GROUP ZERO USAGE
286      0243  5274  JMP INPUTX  /NO
287      0244  6002  IUF       /YFS, STOP INPUT MOMENTARILY.
288      0245  2151  IS? DEBGSW /DISABLE TRACE FOR REPACKING
289      0246  4515  GETLN     /READ THIS LINE NUMBER
290      0247  1141  TAD NAGSW
291      0250  1225  TAD P4000   /TEST FOR SINGLE LINE
292      0251  7640  SZA CLA
293      0252  4526  ERRORS    /ILLEGAL LINE NUMBER ON INPUT
294      0253  1134  TAD BUFR  /SET POINTERS
295      0254  3010  DCA AXIN
296      0255  3136  DCA XCTIN
297      0256  1143  TAD LINENO  /SAVE LINE #
298      0257  3410  DCA I AXIN  /((X-MEM)
299      0260  4521  SFRDUP     /IGNORE SPACES AFTER LINE NUMBER
300      0261  7410  SKF
301      0262  4506  GETC      /READ 1ST AFTER LINENO TERMINATOR.
302      0263  4507  PACKC      /SAVE TEXT AND RESTORE DATA FIELD
303      0264  1142  TAD CHAR  /TEST FOR END OF INPUT STRING
304      0265  1065  TAD MCR
305      0266  7640  SZA CLA
306      0267  5262  JMP .-5
307      0270  4501  PUSHJ
308      0271  2111  DELETE
309      0272  4517  ENPDM
310      0273  5177  JMP START  /INSERT NEW LINE
311
312      0274  4501  INPUTX, PUSHJ /PROCESS IMMEDIATE COMMAND.
313
314      0275  0616  PROC
315      0276  1545  TAD I PC  /CHECK NEXT LINE (X-MEM)
316      0277  7450  SNA      /END OF PROGRAM?
317      0300  5177  JMP START  /YES
318      0301  3145  DCA PC    /SAVE NEW LINE NO.
319      0302  1145  TAD PC    /START NEW LINE
320      0303  7001  IAC
321      0304  5233  JMP GONE   /PROCESS OTHER COMMANDS
322
323      /TEXT LINE BUFFER FORMAT:
324      /#1 : POINTER OR ZERO IN LAST
325      /#2 : LINENO
326      /#3 - #N+1 : TEXT
327      /#1 : C.R.

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326
327 0305 0000 XRTL6, 0 /ROTATE AC LEFT 6
328 0306 7106 CLL RIL
329 0307 7006 RTL
330 0310 7006 RTL
331 0311 5710 JMP I XRTL6
332
333 /PROCESS A LINE NUMBER - "GETLN"
334 0312 0000 XGETLN, 0
335 0313 4521 SPNCR
336 0314 1225 TAD P4000 /INITIALIZE TO SINGLE LINE
337 0315 3141 DCA NAGSW
338 0316 4511 SORTC /TEST FOR A SIGN
339 0317 6114 SMLIST-1
340 0320 5370 JMP EVLN /EVALUATE IN FLOATING POINT
341 0321 4766 JMS I IIPINT /FIXED POINT: GET GROUP
342 0322 4522 TESTN
343 0323 4506 GETC /GO PAST . IF THERE
344 0324 4506 JMS GEG /GET 1ST STEP DIGIT
345 0325 7106 CLL RIL /MULTIPLY BY TEN
346 0326 1127 TAD SORTCN
347 0327 7004 RAL
348 0330 4506 JMS GEG /GET 2ND STEP DIGIT
349 0331 1143 TAD LINENO /COMPARE
350 0332 7450 GEXIT, SNA
351 0333 3141 DCA NAGSW /MUST BE GROUP
352 0334 3143 DCA LINENO /SAVE STEP NUMRER
353 0335 1164 TAD DECNUM /GROUP
354 0336 7450 SNA
355 0337 5347 JMP GIESTA /GROUP 0: MUST BE "ALL"
356 0340 4520 RTL6 /CONSTRUCT LINE NUMBER
357 0341 7004 RAL
358 0342 1143 TAD LINENO
359 0343 3143 DCA LINENO
360 0344 1164 TAD DECNUM /TEST FOR LEGAL GROUP
361 0345 0367 AND C7700
362 0346 5351 JMP .+3
363 0347 2141 GIESTA, ISZ NAGSW /SET TO "ALL"
364 0350 1143 TAD LINENO /MAKE SURE LINE # IS ZERO
365 0351 7650 SNA CLA
366 0352 4522 TESTN /OK; TEST FOR EXTRA DIGITS
367 0353 5361 JMP LNERP /DOUBLE ., ILLFGAL C. 0, OR C.>15
368 0354 5712 JMP I XGETLN /OK
369 0355 5361 JMP LNERP /TOO MANY DIGITS

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370
371 0356 0000 GEG, 0 /GET A STEP DIGIT
372 0357 3143 DCA LINENO
373 0360 4522 TESTN
374 0361 4526 LNERP, ERROP /DOUBLE PERIODS
375 0362 5331 JMP GEXIT-1 /NO DIGIT
376 0363 4506 GETC /DIGIT, PASS IT
377 0364 1127 TAP SORTON /EXIT WITH VALUE
378 0365 5756 JMP T GEG
379
380 0366 6010 INPINT, DECINT
381 0367 7760 C7700, 7760
382
383
384 0370 4501 /EVALUATE A LINE NUMBER IN FLOATING POINT
385 0371 1601 EVLN, PUSHD /GET VALUE
386 0372 4452 FVAL
387 0373 4503 FIX /GET GROUP #
388 0374 1045 PUSHA
389 0375 7640 TAU FLAG1
390 0376 5361 SZA CLA
391 0377 4407 JMP LNERP /100 BIG
392 0400 7000 FENT /GET STEP #
393 0401 2500 FNP
394 0402 3014 FSP I FLAGP /THIS GIVES -(FRACTIONAL PART)
395 0403 3014 FMY I FP0P
396 0404 2015 FSP I FP10P /KILL ANY ROUND OFF ERROR
397 0405 0000 FEAT
398 0406 4450 NEGATE
399 0407 1413 POFA /RESTORE GROUP
400 0410 3164 DCA DECNUM
401 0411 4452 FIX
402 0412 5613 JMP I .+1
403 0413 0332 GEXIT
404
405 0414 5770 F10P, FLTEN
406 0415 5773 FP10P, FLPTEN
407
408 /RANGE OF ACCEPTIBLE LINE NUMBERS = 1.01 TO 15.99
409
410 /NAGSW:
411 /GROUP=0000
412 /LINE=4000
413 /ALL=0001

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414 /RECURSIVE OPERATE, EXECUTE, OR CALL
415
416 0416 4515 DU, GETLN /EXECUTE ONE LINE, A GROUP, OR ALL
417 0417 1145 TAD PC /SAVE ADDRESS
418 0420 4503 PUSHA /OF CURRENT LINE
419 0421 4504 PUSHF /SAVE REST OF THIS LINE
420 0422 0017 TEXTP /ADDRESS OF TEXT POINTERS
421 0423 4504 DGRP, PUSHF /SAVE NAGSW, CHAR, AND LINENO.
422 0424 0141 NAGSW
423 0425 1141 TAD NAGSW /CHECK DATA FROM GETLN.
424 0426 7710 SPA CLA /SKIP IF GROUP OR ALL
425 0427 5254 JMP DOONE /DO ONE LINE
426 0430 4516 FINDLN /INIT FOR GROUP AND SET THISLN
427 0431 5273 JMP TGRP2
428 0432 4501 DGRP1, PUSHJ /EXECUTE OBJECT LINE AND SET PC.
429 0433 0613 PROCESS-2
430 0434 4505 POPF /RESTORE THE DATA
431 0435 0141 NAGSW
432 0436 1545 TAD I PC /CHECK FOR END OF TEXT (X-MEM)
433 0437 7450 SNA
434 0440 5262 JMP DCONT /ALL DONE
435 0441 7001 IAC
436 0442 3154 DCA PT1 /SAVE POINTER TO LINENO
437 0443 1141 TAD NAGSW /CHECK FOR GROUP
438 0444 7740 SMA SZA CLA
439 0445 5251 JMP ,+4 /DO ALL
440 0446 1554 TAD I PT1 /TEST GROUP (X-MEM)
441 0447 4524 TSTGRP
442 0450 5262 JMP DCONT /NOT IN GROUP
443 0451 1554 TAD I PT1 /READ NEXT LINE NO. (X-MEM)
444 0452 3143 DCA LINENO
445 0453 5223 JMP DGRP /CONTINUE THE SUBROUTINE
446
447 0454 4516 DQONE, FINDLN /FIND THE LINE
448 0455 4526 ERROR2 /NO SUCH LINE NUMBER
449 0456 4501 PUSHJ /EXECUTE IT
450 0457 0613 PROCESS
451 0460 4505 POPF /RESTORE CHAR
452 0461 0141 NAGSW
453 0462 4505 DCONT, POPF /RESTORE TEXT POINTERS
454 0463 0017 TEXTP
455 0464 1413 POPA /RESTORE ADDRESS OF CURRENT LINE.
456 0465 3145 DCA PC
457 0466 4565 TSTERM /GO TO TERMINATOR
458 0467 5266 JMP , -1
459 0470 5672 JMP I , +2 /END OF DO, CONTINUE PROCESSING
460 0471 5216 JMP DO /COMMA, DO ANOTHER
461 0472 0616 PROC

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462					
463	0473	1146	TGRP2,	TAD THISLN	/TEST FOR GOOD GROUP NUMBER.
464	0474	3011		DCA XMT	
465	0475	1411		TAD I XMT	
466	0476	4524		TSTGRP	
467	0477	4526		ERROR2	/NO SUCH GROUP NUMBER
468	0500	5232		JMP DGRP1	

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469                                     /PUSHDOWN LIST CONTROLS
470 /
471 0501 0000 XPUSHA, 0 /PUSHDOWN THE AC - "PUSHA"
472 0502 3332 DCA PD2 /SAVE AC
473 0503 7040 CMA /BACK UP POINTER
474 0504 4310 JMS PCHK /CHECK CORE USAGE
475 0505 1332 TAD PD2
476 0506 3416 DCA I XRT3 /SAVE
477 0507 5701 JMP I XPUSHA
478
479 0510 0000 PCHK, 0
480 0511 1013 TAD PDLXR /INC IN AC
481 0512 3013 DCA PDLXR
482 0513 1013 TAD PDLXR
483 0514 3016 DCA XRT3 /DUPLICATE POINTER
484 0515 1013 TAD PDLXR
485 0516 7141 CLI CIA
486 0517 1155 TAD LASTV
487 0520 7630 SEL CLA
488 0521 4526 ERROR /STORAGE FILLED BY PUSHDOWN LIST
489 0522 5710 JMP I PCHK
490
491 0523 0000 XPUSHJ, 0 /RECURSIVE SUBROUTINE CALL - "PUSHJ"
492 0524 7201 CLA IAC
493 0525 1323 TAD XPUSHJ /SAVE RETURN
494 0526 4301 JMS XPUSHA /(PUSHA)
495 0527 1723 TAD I XPUSHJ /TO NEW ROUTINE
496 0530 3323 DCA XPUSHJ
497 0531 5723 JMP I XPUSHJ
498
499 0532 0000 PD2, 0 /SAVE A FLOATING PT NUMBER - "PUSHF"
500 0533 7240 CLA CMA /COMPUTE ADDRESS
501 0534 1732 TAD I PD2
502 0535 3011 DCA XRT
503 0536 2332 ISZ PD2
504 0537 1066 TAD M3 /BACKUP THREE
505 0540 4310 JMS PCHK
506 0541 1411 TAD I XRT /SAVE 3 WORDS
507 0542 3416 DCA I XRT3
508 0543 1411 TAD I XRT
509 0544 3416 DCA I XRT3
510 0545 1411 TAD I XRT
511 0546 3416 DCA I XRT3
512 0547 5732 JMP I PD2

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513
514 0550 0000 PDS, 0 /RESTORE A FLOATING PT # - "POPF"
515 0551 7240 PLA CMA
516 0552 1750 TAD I PDS
517 0553 2350 ISA PDS
518 0554 3011 DCA XRT
519 0555 1410 TAD I POLAR
520 0556 3411 DCA I XRT
521 0557 1410 TAD I POLAR
522 0560 3411 DCA I XRT
523 0561 1410 TAD I POLAR
524 0562 3411 DCA I XRT
525 0563 5750 JMP I PDS
526 /
527 /INPUT CONTROL CHARACTERS
528 0564 0212 INLIST, INAR /B.A.=RESTART
529 0565 0223 IGNOR+4 /F.F.
530 0566 0223 IGNOR+4 /BELL
531 0567 0217 IGNOR /L.F.=IGNORED
532 0570 0230 INETM /C.R.=TERMINATE INPUT
533 /
534 /LIST OF FUNCTION ADDRESSES
535 0571 2053 ENFARF, XABS /ABSOLUTE VALUE
536 0572 7535 FSGN /SIGN PART
537 0573 1156 XIPT /INTEGR PART
538 0574 1145 XDYS /DIS- DISPLAY Y AND INTENSIFY
539 0575 7351 FRAN /RANDOM NUMBER
540 0576 1153 XDYS /SET X-COORDINATE FOR DISPLAY
541 0577 2414 XADC /READ ANALOG-DIGITAL CONVERTER
542 0600 2735 ERRORS /ATN THESE ROUTINES NOT IN PACKAGE
543 0601 2735 ERRORS /EXP
544 0602 2735 ERRORS /LOG
545 0603 2735 ERRORS /SIN
546 0604 2735 ERRORS /COS
547 0605 7462 FSQT /SQUARE ROOT
548 0606 2735 ERRORS /NEW- USFR-DEFINED FUNCTION
549 /
550 0607 7472 MF, -306 /USED BY TESTC

```

```

551          /PRIMARY CONTROL AND TRANSFER
552
553 0610 4515 GOTO,  GETLN      /READ THE LINE NUMBER REQUESTED
554 0611 4516          FINDLN   /LOCATE IT AND RESET TEXTP
555 0612 4526          FRROM2    /NOT THERE OR A TIGHT LOOP.
556 0613 1146          TAD THISLN /SFT PC
557 0614 3145          DCA PC
558 0615 4506 PROCESS;GETC      /TEST FOR END OF LINE
559 0616 4511 PROC,  SORTC      /FIRST CHARACTER READY = USE PROC
560 0617 0057          CCR-1
561 0620 5502 PC1;  POPJ          /EXIT "PROCESS"
562 0621 4511          SORTC      /IGNORE SPACE ; ,
563 0622 1140          GLIST-1
564 0623 5215          JMP PROCESS
565 0624 1142          TAD CHAR   /SAVE COMMAND CHARACTER
566 0625 4503          PUSHA
567 0626 4506          GETC        /GO TO TERMINATOR
568 0627 4511          SORTC
569 0630 2002          TERMS-4
570 0631 7410          SKP
571 0632 5226          JMP ,-4
572 0633 4521          SPNOR
573 0634 1413          PUPA
574 0635 4510          SORTJ      /GO DO COMMAND
575 0636 0755          COMLST-1
576 0637 0206          COMGO-COMLST
577 0640 4526          ERROR2     /ILLEGAL COMMAND
578          /****
579
580          0620  COMMENTS=PC1    /ALSO IS CONTINUE
581

```



```

582          /OUTPUT COMMAND TEXT
583
584      0641 4711  WRITE,  JMS I WTXS      /SAVE CHAR AND TEXT POINTERS
585      0642 4515          GETLN        /SET LINENO
586      0643 2151          ISZ DEBGSW   /DISABLE TRACE
587      0644 4516          FINDLN      /SEARCH FOR LINE NUMBER
588      0645 5274          JMP WTESTG   /NOT THERE OR GROUP
589      0646 1143          TAD LINENO
590      0647 7640          SZA CLA
591      0650 4514          PRNTLN        /PRINT LINE NUMBER AND A SPACE.
592      0651 4506          GETC
593      0652 4512          PRINTC       /PRINT TEXT OF A LINE.
594      0653 1142          TAD CHAR
595      0654 1065          TAD MCR
596      0655 7640          SZA CLA      /SKIP IF END OF LINE
597      0656 5251          JMP .-5
598      0657 1546          TAD I THISLN /TEST FOR END OF TEXT-(X-MEM)
599      0660 7450          WTEST2, SNA
600      0661 5303          JMP WEXIT  /WRITE FINISHED
601      0662 7001          IAC
602      0663 3154          DCA PT1   /SAVE POINTER TO LINENO OF NEXT (X-MEM)
603      0664 1141          TAD NAGSM
604      0665 7700          SMA CLA
605      0666 1554          TAD I PT1  /-(X-MEM)
606      0667 4524          TSTGRP   /TRY NEXT LINENO FOR GROUP.
607      0670 5276          JMP WX
608      0671 1554          WALL,  TAD I PT1  /SET LINENO (X-MEM)
609      0672 3143          DCA LINENO
610      0673 5244          JMP WRITE+3
611
612      0674 1146          ///
613      0675 5200          WTESTG, TAD THISLN /INIT GROUP PRINTOUT
614
615      0676 1141          ////
616      0677 7750          WX,  TAD NAGSM
617      0700 5303          SPA SNA CLA /SKIP IF ALL
618      0701 4512          JMP WEXIT
619      0702 5271          PRINTC /PRINT C.R. AGAIN
620
621      0703 4712          ////
622      0704 3151          WEXIT,  JMS I WTXR  /RESTORE CURRENT LINE
623      0705 4505          DCA DEBGSW /RESTORE TRACE
624      0706 5305          TSTERM
625      0707 5216          JMP .-1
626      0710 5241          JMP PROC  /END OF WRITE
627
628      0711 2435          ////
629      0712 2445          WTXR,  TXTSAV  /COMMA, MORE TO WRITE
          TXTR,  TXTR

```

```

630
631 0713 0000 XTESTC, 0 /TEST THE NATURE OF THE NEXT ALPHANUMERIC - "TESTC"
632 0714 4521 SPNOX /IGNORE SPACES
633 0715 4511 SORTC /TEST THE VARIABLE TERMINATORS
634 0716 2000 TERMS-1
635 0717 5713 JMP I XTFSTC /YES - SORTCN IS SET
636 0720 2313 ISZ XTESTC
637 0721 4522 TESTM
638 0722 5713 JMP I XTFSTC /.(PART OF NUMBER)
639 0723 7410 SKP /OTHER
640 0724 5713 JMP I XTESTC /NUMBER
641 0725 1142 TAD CHAR /TEST FOR "F"
642 0726 1207 TAD MF
643 0727 7640 SZA CLA
644 0730 2313 ISZ XTESTC /NO
645 0731 2313 ISZ XTESTC /RETURNS:
646 0732 5713 JMP I XTFSTC /TERMINATOR;NUMBER;FUNCTION;OTHER
647
648 0733 0000 ////
649 0734 1733 XSORTC, 0 /SORT CHAR AGAINST TABLE - "SORTC"
650 0735 3012 TAD I XSORTC
651 0736 1412 DCA XRT2 /1ST ARG IS LIST-1
652 0737 7510 TAD I XRT2
653 0740 5352 SPA /LIST IS ENDED BY A NEGATIVE NUMBER
654 0741 7041 JMP SEXC /2AND EXIT = NOT IN LIST
655 0742 1142 CIA
656 0743 7640 TAD CHAR
657 0744 5336 SZA CLA /COMPARE
658 0745 1733 JMP ,-6
659 0746 7040 TAD I XSORTC /COMPUTE INCREMENT : 0 - N
660 0747 1012 CMA
661 0750 3127 TAD XRT2
662 0751 7410 DCA SORTCN
663 0752 2333 SEXC, ISZ YSORTC /1ST EXIT = YES
664 0753 2333 ISZ XSORTC
665 0754 7300 CLA GLL
666 0755 5733 JMP I XSORTC
667

```

			/COMMAND DECODING LIST	
668				
669	0756	0323	CMMLST, 323	/SET
670	0757	0306	306	/FOR
671	0760	0311	311	/IF
672	0761	0304	304	/DO
673	0762	0307	307	/GOTO
674	0763	0303	303	/COMMENT OR CONTINUE
675	0764	0301	301	/ASK
676	0765	0324	324	/TYPE
677	0766	0314	314	/LIBRARY
678	0767	0305	305	/ERASE
679	0770	0327	327	/WRITE
680	0771	0315	315	/MODIFY
681	0772	0321	321	/QUIT
682	0773	0322	322	/RETURN
683	0774	0317	317	/OPTION
684	0775	0310	310	/HELLO

```

605 /CONDITIONAL TRANSFER PROCESS
606 / IF (EXP) A,B,C
607 0776 4511 IF, SORTC /LOOK FOR L-PAR
608 0777 1022 PLPR-1
609 1000 7410 SKP
610 1001 4526 ERFOF /NO ( AFTER IF
611 1002 4501 PUSHJ /EVALUATE EXPRESSION
612 1003 1000 EVAL-1
613 1004 4506 GETC /PASS )
614 1005 1045 TAD FLAC1 /TEST FOR -,0,+
615 1006 7710 SPA CLA
616 1007 5622 JMP I PGOTO /NEGATIVE, USE 1ST REF
617 1010 4565 TSTERM /0 OR POS, GET TO NEXT
618 1011 5210 JMP ,-1
619 1012 5703 JMP I PRCP /; OR CR, CONTINUE SAME LINE
700 1013 1045 TAD FLAC1 /COMMA, SEE IF 0 OR POS
701 1014 7650 SNA CLA
702 1015 5622 JMP I PGOTO /ZERO, USE 2ND REF
703 1016 4565 TSTERM /POSITIVE, GET TO NEXT
704 1017 5210 JMP ,-1
705 1020 5703 JMP I PRCP /; OR CR
706 1021 5622 JMP I PGOTO /COMMA, USE 3RD REF
707 1022 0610 PGOTO, GOTO
708 1023 0250 PLPR, 250

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709          /ASSIGNMENT AND LOOP CONTROL
710          SET=.
711      1024 4501  FUR,  PUSHJ      /GET POINTER TO VAR.
712      1025 1404          GETARG
713      1026 4521          SPNOR
714      1027 4511          SORTC      /SEARCH FOR =
715      1030 2024          TERMS+17-1
716      1031 7410          SKP
717      1032 4526          ERROR      /LEFT OF = IN ERROR: "FOR" OR "SET"
718      1033 1154          TAD PT1    /SAVE VARIABLE POINTER
719      1034 3332          DCA PT2
720      1035 4501          PUSHJ      /EVALUATE INITIAL EXPRESSION
721      1036 1600          EVAL-1
722      1037 4407          FENT      /SAVE INITIAL VALUE
723      1040 6732          FPT I PT2
724      1041 0000          FEXT
725      1042 4565          TSTERM    /CHECK TERMINATOR
726      1043 4526          ERROR      /PROBABLY EXCESS R-PAR
727      1044 5703          JMP I PRCP /; OR CR: THIS IS A SET; CONTINUE
728      1045 1332          TAD PT2    /COMMA, SAVE LOOP VAR POINTER
729      1046 4503          PUSHA
730      1047 4501          PUSHJ      /EVALUATE SECOND EXPRESSION
731      1050 1601          EVAL
732      1051 4565          TSTERM    /CHECK TERMINATOR
733      1052 4526          ERROR      /EXCESS R-PAR OR BAD TERMINATOR
734      1053 5317          JMP ONEINC /; OR CR, THAT'S ALL (INC=1)
735      1054 4504          PUSHF      /COMMA, SAVE INCREMENT
736      1055 2034          FLARG
737      1056 4501          PUSHJ      /EVALUATE FINAL EXPRESSION
738      1057 1601          EVAL
739      1060 4504          SFINAL, PUSHF /SAVE FINAL VALUE
740      1061 2034          FLARG
741      1062 4724          JMS I FTXS /SAVE CHAR AND TEXT POINTERS
742      1063 4430          FLOAT      /FLOAT A ZERO TO START
743      1064 4407          FCONT, FENT /COMPARE LOOP VAR TO FINAL
744      1065 1732          FAD I PT2 /LOOP VAR
745      1066 6732          FPT I PT2
746      1067 2560          FSB I FLARGP /FINAL
747      1070 0000          FEXT
748      1071 1013          TAD PULXR /CHECK SIGN OF INCREMENT
749      1072 1322          TAD PINC
750      1073 3332          DCA PT2
751      1074 1732          TAD I PT2
752      1075 7710          SPA CLA
753      1076 4450          NEGATE    /BACKWARD COUNTING
754      1077 1045          TAD FLAC1
755      1100 7740          SMA SZA CLA
756      1101 5326          JMP FEND  /LIMIT REACHED OR EXCEEDED

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757
758 1102 4501          PUSHJ          /NOT YET, DO OBJECT STATEMENTS
759 1103 0010          PRCP,   PRCP          /RESET TO BEGINNING OF OBJ. STMT.
760 1104 4725          JMS J FIXR          /RESTORE LIMIT
761 1105 4505          POPF          /RESTORE INC
762 1106 2034          FLAG          /RESTORE INC
763 1107 4505          POPF          /RESTORE INC
764 1110 0244          FLAG          /RESTORE INC
765 1111 1413          POPA          /RESTORE LOOP VAR POINTED
766 1112 3332          DCA F12          /RESTORE LOOP VAR POINTED
767 1113 1323          TAD M13          /PUSH DOWN ALL OF ABOVE
768 1114 1013          TAD PULXR          /PUSH DOWN ALL OF ABOVE
769 1115 3013          DCA PULXR          /PUSH DOWN ALL OF ABOVE
770 1116 5264          JMP FCONT          /PUSH DOWN ALL OF ABOVE
771
772 1117 4504          ONE INC, PUSHF          /NO INCREMENT GIVEN, SET TO 1
773 1120 1573          FLONE          /NO INCREMENT GIVEN, SET TO 1
774 1121 5260          JMP SFINAL          /NO INCREMENT GIVEN, SET TO 1
775
776 1122 0011          PINC,   11          /NO INCREMENT GIVEN, SET TO 1
777 1123 7765          M13,   -13         /NO INCREMENT GIVEN, SET TO 1
778 1124 2435          FIXS,  TXTSAV          /NO INCREMENT GIVEN, SET TO 1
779 1125 2443          FIXR,  TXTRES          /NO INCREMENT GIVEN, SET TO 1
780 1126 1005          FEND,  TAD F13          /END OF LOOP
781 1127 1013          TAD PULXR          /REMOVE VALUES FROM PUSHDOWN LIST
782 1130 3013          DCA PULXR          /REMOVE VALUES FROM PUSHDOWN LIST
783 1131 5502          POPJ          /REMOVE VALUES FROM PUSHDOWN LIST
784 1132 0000          P12,   0           /REMOVE VALUES FROM PUSHDOWN LIST
785
786
787 1133 0246          ALIST,  246          /ASK/TYPE SPECIAL CHARACTERS
788 1134 0245          ALIST,  245          /ASK/TYPE SPECIAL CHARACTERS
789 1135 0242          ALIST,  242          /ASK/TYPE SPECIAL CHARACTERS
790 1136 0241          ALIST,  241          /ASK/TYPE SPECIAL CHARACTERS
791 1137 0243          ALIST,  243          /ASK/TYPE SPECIAL CHARACTERS
792 1140 0244          ALIST,  244          /ASK/TYPE SPECIAL CHARACTERS
793 1141 0240          GLIST,  240          /SPACE
794 1142 0254          TLIST,  254          /SPACE
795 1143 0273          ALIST,  273          /;
796 1144 0215          ALIST,  215          /C.R.

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797                                     /SET Y AND INTENSIFY THE POINT
798 1145 4452 XSYS, FIX
799 1146 6063          6063 /DYL
800 1147 7200          CLAR
801 1150 1301          TAD SW
802 1151 6053          6053 /DXL DIX
803 1152 7410          SKP
804
805 /
806 /SET X
807 1153 4452 XSYS, FIX
808 1154 3301          DCA SW /DXL
809 1155 5500          RETURN
810 /
811 /TAKE THE INTEGER PART
812 1156 4452 XINT, FIX
813 1157 7200          CLAR
814 1160 5000          RETURN
815 1161 6000          X0, 0
816 //
817 1162 1252 TLSTS, TASK4 /"
818 1163 1210          TASK /D.R. - AUTOMATIC QUOTE MATCH
819 /COMMAND PROMPTERS
820 1164 1024 CONGO, SET
821 1165 1024          FOR
822 1166 0776          IF
823 1167 0416          EG
824 1170 0610          COTO
825 1171 0620          COMMENTS
826 1172 1206          ASK
827 1173 1207          TYPE
828 1174 2755          LIBRARY
829 1175 2226          ERASE
830 1176 0641          WRITE
831 1177 1273          MODIFY
832 1200 0177          START
833 1201 1554          RETURN
834 1202 6446          OPTION
835 1203 3274          PELL0
836 //
837 1204 3040 FACLS2, EQUES
838 1205 3065          EQU1

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030                               /INPUT-OUTPUT STATEMENTS
039
040     1206 7240   ASK,   CLA CMA           /REMEMBER WHICH CALL.
041     1207 3131   TYPE,  DCA ATSW
042     1210 3151   TASK,  DCA DEBGSW      /RE-ENABLE THE TRACE
043     1211 4510   SUBTJ  SUBTJ           /SPECIAL CHARACTER?
044     1212 1132
045     1213 0426           ALIST-1
046     1214 2131           ATLIST-ALIST
047     1215 5227           IS? ATSW      /TEST QUOTE SWITCH
048     1216 4501           JMP TYPE2
049     1217 1404           PUSHJ         /DO ASK; SETUP PT1
050     1220 4636           GETARG
051     1221 1233           JMS I TTXTS   /PROTECT TEXT
052     1222 4512           TAB COL     /TYPE COLON
053     1223 4626   TASKCL, PRINTG      /((CLA) TO SUPPRESS ":"
054     1224 4637           JMS I INTERP  /CALL INPUT CONVERSION ROUTINE
055     1225 5206           JMS I TTXTR   /RESTORE TEXT
056     1226 3306           JMP ASK      /CONTINUE PROCESSING
057
058     1227 4501   INTERP, INTASK
059     1230 1601   ////
060     1231 4505   TYPE2,  PUSHJ         /DO TYPE
061     1232 4526           TSTERM      EVAL
062     1233 0272           ERROR       /BAD TERMINATOR IN "TYPE"
063     1234 4640   CUL,   272
064     1235 5207           JMS I DOTS   /PRINT
065     1236 2435           JMP TYPE
066     1237 2443   TIXIS, TIXTR, TIXTS, TIXTR, TIXRES
067     1240 3365   CUIS,  OUTPT

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869
870 1241 2151 TQUOT, IS? DERGSW /DISABLE TRACE
871 1242 4506 GETC /TYPE LITERALS
872 1243 4510 SORTJ
873 1244 1404 TLIST2-1
874 1245 7555 TLIST3-TLIST2
875 1246 4512 PRINTC
876 1247 5242 JMP TQUOT+1
877
878 1250 1060 TCRLE, TAB CCR /SLASH=CR,LF.
879 1251 4512 PRINTC
880 1252 4506 TASK4, GETC /MOVE TO NEXT CHARACTER
881 1253 5210 JMP TASK
882
883 1254 1000 TCRLE2, TAB CCR /SPLAT=CR
884 1255 4537 JMS I OUTDEV
885 1256 1015 TAB C200 /DELAY FOR C.R.
886 1257 5251 JMP TCRLE+1
887
888
889 /IF DERGSW=0 : ENABLE FLIP-FLOP "UMPSW"
890 / #0: DISABLE AND RETURN ALL"?* ' S.
891 /IF UMPSW = 0: TRACE ON, IF ENABLED
892 / #0: TRACE OFF
893 /IF BOTH = 0 : PRINT TRACE.
894
895 1260 4506 TIRLE, GETC /PASS PERCENT SIGN
896 1261 4072 JMS I INTG /READ FORMAT CONTROL: "x7.3"
897 1262 1164 TAB DECNUM /INTEGER PART (TOTAL DIGITS)
898 1263 3051 DCA TOTDIG
899 1264 4522 TESTM /GET PAST . IF ANY
900 1265 4506 GETC
901 1266 4672 JMS I INTG /RIGHT-HAND PART (DECIMAL PLACES)
902 1267 1164 TAB DECNUM
903 1270 3133 DCA DECP
904 1271 5210 JMP TASK
905 1272 6010 INTG, DECINT

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906          /SEARCH ROUTINES
907
908      1273 4515  MODIFY, GETLN      /READ LINE NO.
909      1274 4516          FINDLN      /LOOK IT UP NOW.
910      1275 4526          ERROF2      /NOT THERE = BAD COMMAND UNLESS ZERO.
911      1276 1134          TAB RUFER   /SET POINTERS
912      1277 3010          DCA AXIN     /FOR INPUT
913      1300 3130          DCA XCTIN
914      1301 1143          TAB LINE#    /COPY THE SAME LINE NUMBER.
915      1302 7450          SKA          /CHECK FOR ALL
916      1303 5275          JMP MODIFY+2 /ERROR IN ARG
917      1304 3410          DCA I AXIN   /CX-MEM)
918      1305 1010          TAB AXIN     /SAVE START OF NEW LINE
919      1306 3153          DCA PACKST
920      1307 4540  SGOVT, JMS I INDEV   /READ THE TELETYPE INPUT SILENTLY.
921      1310 3061          DCA LIST3+1  /SAVE SEARCH CHARACTER
922      1311 2151          ISY DEBGSW   /NO BREAKS,
923      1312 4506  SCHAR, GETC         /TYPE+TEST-F.F.
924      1313 4512          PRINTC
925      1314 4510          SORTJ        /LOOK FOR MATCH
926      1315 0057          LIST3-1
927      1316 1322          LISTG0-LIST3
928      1317 4507          PACKC        /SAVE NEW LINE.
929      1320 5312          JMP SCHAR
930
931      1321 1134  SBAK,  TAB RUFER     /RESTART-B.A.
932      1322 7001          IAC
933      1323 3010          DCA AXIN     /SET POINTERS
934      1324 3130          DCA XCTIN
935      1325 4513  SFOUND, READC       /READ FROM KEYBOARD
936      1326 4510          SORTJ        /TEST
937      1327 0053          LIST6-1
938      1330 1322          SRNLST-LIST6
939      1331 4507  SGOVT,  PACKC        /PACK CHAR.
940      1332 5325          JMP SFOUND   /MORE

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```

941
942 1333 0000 SORTR, W /SORT AND BRANCH ROUTINE. - "SORTJ"
943 1334 7450 SRA
944 1335 1142 TAB CHAR /ASSUME CHAR IF AC=0
945 1336 7041 CIA
946 1337 3157 DCA T2 /SAVE SORT ITEM
947 1340 1733 TAB I SORTR /FIRST ARG IS LIST LESS ONE
948 1341 2533 ISZ SORTR /2ARG IS INTRA-LIST LENGTH
949 1342 3012 DCA XRT2
950 1343 1412 TAB I XRT2
951 1344 7510 SPA /**LISTS ENDED BY NEGATIVE NUMBERS**
952 1345 5357 JMP SEX /READ EXIT
953 1346 1157 TAB T2 /LINE ADDRESS
954 1347 7640 SZA CLA
955 1350 5343 JMP ,+5
956 1351 1012 TAB XRT2 /MATCH FOUND.
957 1352 1733 TAB I SORTR
958 1353 3333 DCA SORTR /SETUP RETURN
959 1354 1733 TAB I SORTR
960 1355 3333 DCA SORTR
961 1356 7410 SKP
962 1357 2333 SEX, ISZ SORTR /MATCH NOT FOUND.
963 1360 7300 CLA CLL
964 1361 5733 JMP I SORTR /RETURN TO CALLING SEQUENCE.

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```
905
906 1362 4501  TAB,  PUSHJ          /TABULATE TO A PARTICULAR COLUMN
907 1363 1600          EVAL-1
908 1364 4452          FIX          /GET COLUMN NUMBER
909 1365 7141          CLL CIA
910 1366 7001          IAC
911 1367 1053          TAD TACTM
912 1370 7630          SZL CLA
913 1371 5210          JMP TASK          /ALREADY THERE OR PAST IT
914 1372 1033          TAD C240
915 1373 4512          PRINTC
916 1374 1046          TAD FLAG2          /TEST AGAIN
917 1375 5365          JMP TACTM
918          SRNLST=          /'MODIFY' CONTROL CHARACTER TABLE
919 1376 1321          SHAR          /B.A. = RESTART
920 1377 1312          SCHAP          /F.F. = CONTINUE
921 1400 1307          SCONT          /BELL = CHANGE SEARCH CHARACTER
922 1411 1310          SCONT+1 /L.F. = FINISH THE LINE AS BEFORE.
923
924 1402 0263          /C.R. - END THE MODIFIED LINE HERE
925 1403 1331          SGT          /FOUND SEARCH CHARACTER
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```

935
937
938 1404 4525 GETARG, TESTC /FIRST LETTER OF ARG
939 1405 0242 TLIST2, #242 /"
940 1406 0215 #215 /C.R. - FUNCTION OR NUMBER IS NOT AN ARG.
941 1407 4526 ERROR4 /BAD ARGUMENT IN 'FOR', 'SET', OR 'ASK'
942 1410 7240 CLA CMA /"GETARG" CAN CREATE NEW VAR.
943 1411 4503 GETVAR, PUSHA /"GETVAR" WILL NOT
944 1412 3136 DCA XCTIM /PACK INTO ADD.
945 1413 4507 PACKC
946 1414 4506 GETC /SECOND LETTER
947 1415 4511 SORTC /TERMINATOR?
948 1416 2005 TERMS-1
949 1417 5222 JMP .+3 /YES
1000 1420 1142 TAB CHAR /NO
1001 1421 0071 AND F77 /SAVE 2ND LETTER OF NAME
1002 1422 1135 TAB ADD
1003 1423 4503 PUSHA
1004 1424 4511 SORTC /IGNORE THE REST
1005 1425 2005 TERMS-1
1006 1426 5231 JMP .+3
1007 1427 4506 GETC
1008 1430 5224 JMP .-4
1009 1431 4523 TSTLPR /LOOK FOR SUBSCRIPT VIA SORTCN
1010 1432 5243 JMP GS1 /NOT SUBSCRIPTED BY L-PAR.
1011 1433 1130 TAB LASTOP /SAVE LAST OPERATION
1012 1434 4503 PUSHA
1013 1435 4501 PUSHJ /MOVE PAST L-PAR AND
1014 1436 1000 EVAL-1 /EVALUATE THE SUBSCRIPT.
1015 1437 4506 /MOVE PAST R-PAR
1016 1440 1413 PUPA
1017 1441 3136 DCA LASTOP /RECALL LAST OPERATION
1018 1442 4452 FIX
1019 1443 3324 GS1, DCA SUBS /SAVE SUBSCRIPT
1020 1444 1413 PUPA
1021 1445 3135 DCA ADD /RESTORE NAME
1022 1446 1134 TAB STARTV /SEARCH FOR VARIABLE
1023 1447 3154 GS3, DCA PT1
1024 1450 1154 TAB PT1
1025 1451 3011 DCA XRT
1026 1452 1154 TAB PT1
1027 1453 7041 CIA
1028 1454 1155 TAB LASTV /TEST FOR END OF LIST
1029 1455 7750 SPA SNA CLA
1030 1456 5267 JMP GS2 /END SEARCH
1031 1457 1554 TAB I PT1 /GET TABLE ENTRY
1032 1458 7041 CIA
1033 1461 1135 TAB ADD
1034 1462 7050 SNA CLA
1035 1463 5312 JMP GFND1 /FOUND XX

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1036
1037      1464 1154      GS4,   TAD PT1           /TRY NEXT ONE
1038      1465 1144           TAD GINC
1039      1466 5247           JMP GS3
1040      1467 2413      GS2,   ISZ I PDLXR      /VAR. NOT FOUND, CAN I MAKE ONE?
1041      1470 4526           FRROR      /UNDEFINED VAR, USED IN EXPRESSION
1042      1471 1155           TAD LASTV      /OK, ADD THE VARIABLE
1043      1472 1005           TAD E13       /TEST STORAGE LIMITS
1044      1473 7141           CIA CLL
1045      1474 1013           TAD PDLXR
1046      1475 7620           SNL CLA
1047      1476 4526           ERRORS
1048      1477 1155           TAD LASTV      /UPDATE THE LIST.
1049      1500 1144           TAD GINC
1050      1501 3155           DCA LASTV
1051      1502 1135           TAD ADD       /SAVE NAME
1052      1503 3554           DCA I PT1
1053      1504 1324           TAD SUBS      /SAVE SUBSCRIPT
1054      1505 3411           DCA I XRT
1055      1506 3411           DCA I XRT      /INITIALIZE VAR. TO ZERO
1056      1507 3411           DCA I XRT
1057      1510 3411           DCA I XRT
1058      1511 5320           JMP GS5       /EXIT
1059
1060      1512 1411      GEND1, TAD I XRT      /FOUND NAME, TEST SUBSCRIPT
1061      1513 7041           CIA
1062      1514 1324           TAD SUBS
1063      1515 7640           SZA CLA
1064      1516 5264           JMP GS4       /WRONG SUBSCRIPT
1065      1517 2013           ISZ PDLXR
1066      1520 2154      GS5,   ISZ PT1      /SET POINTER TO DATA
1067      1521 2154           ISZ PT1
1068      1522 5502           POPJ
1069
1070      1523 1575      P0,   FLTZER
1071

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1072          /IGNORE LEADING SPACES - "SPROR"
1073
1074          1524 SURSE.
1075          1524 0000 XSPOR.
1076          1525 1142 TAB CHAR
1077          1526 1063 TAB P240
1078          1527 7640 SZA CLA
1079          1530 5724 JMP I XSPOR
1080          1531 4506 GETC
1081          1532 5325 JAR XSPOR+1
1082
1083          /SEE IF NEXT CHARACTER IS A NUMBER
1084          1533 0000 XTESTN.
1085          1534 1142 TAB CHAR
1086          1535 1064 TAB PPER
1087          1536 7440 SZA
1088          1537 2333 ISZ XTESTN
1089          1540 1322 TAB NIST1
1090          1541 7500 SZA
1091          1542 5350 JMP NTEST
1092          1543 1353 TAB NIST2
1093          1544 7510 SZA
1094          1545 5350 JMP NTEST
1095          1546 3127 DCA SORTCV
1096          1547 2333 ISZ XTESTN
1097          1550 7500 NIFX11, CLA CLL
1098          1551 5733 JMP I XTESTN
1099
1100          1552 7764 NIST1, 257-272
1101          1553 0012 NIST2, 272-260

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1102                               /EXIT FROM A "DO" SUBROUTINE
1103
1104
1105      1554 1323      RETRN,  TAD P0  /(PC) => 0
1106      1555 3145      DCA PC
1107      1556 1413      XPOPJ,  TAD I PULXP  /RECURSIVE EXIT - "POPJ"
1108      1557 3157      DCA T2
1109      1560 5557      JMP I T2
1110
1111
1112                               /ASK-TYPE CONTROL CHARACTER TABLE
1113      1561 1362      AILISI, TAE  /& - TABULATION DELIMITER
1114      1562 1260      TINTR  /% - FORMAT DELIMITER
1115      1563 1241      TQUOT  /" - LITERAL DELIMITER
1116      1564 1250      TCRLF  /! - CARRIAGE RETURN AND LINE FEED
1117      1565 1254      TCRLF2 /# - CARRIAGE RETURN ONLY
1118      1566 3125      TDUMP  /$/- DUMP THE SYMBOL TABLE CONTENTS
1119      1567 1252      TASK4  /SP- TERMINATOR FOR NAMES
1120      1570 1252      TASK4  /, - TERMINATOR FOR EXPRESSIONS
1121      1571 0615      PROCESS /; - TERMINATOR FOR COMMANDS
1122      1572 0620      PC1    /C,R. - TERMINATOR FOR STRINGS
1123
1124                               /
1124      1573 0001      FLTONE, 0001
1125      1574 0000
1126      1575 0000      FLTZER, 0000
1127      1576 0000
1128      1577 0000

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1129 /EVALUATE AN EXPRESSION WHICH
1130 /TERMINATES WITH AN R-PAR,; OR C,R, AND
1131 /LFAVE THE RESULT IN FLAC AND IN FLARG.
1132
1133
1134
1135
1136 1600 4506 GETC /MOVE PAST EXTRA CHARACTER
1137 1601 3130 EVAL, DCA LASTOP /EVALUATION CONTROLLER (CHECKPOINT ?)
1138 1602 4525 TESTC /TEST CHARACTER AND IGNORE SPACES
1139 1603 5215 JMP ETERM1 /TERMINATION
1140 1604 5332 JMP ENUM /NUMBER
1141 1605 5342 JMP EFUN /FUNCTION
1142 1606 4501 PUSHJ /LETTER OF VARIABLE
1143 1607 1411 GETVAR /FIND OR CREATE VARIABLE; ALSO SET PT1.
1144 1610 4525 OPNEXT, TESTC /PT1=>ARG
1145 1611 5236 JMP ETERM1 /T
1146 1612 0212 ECHULST, V212 /N-ERROR IN FORMAT
1147 1613 0377 0377 /F
1148 1614 4526 ERROR4 /L - MISSING OPERATOR
1149
1150 1615 4504 ETERM1, PUSHF /INITIALIZE RESULT TO ZERO.
1151 1616 1575 FLTZER
1152 1617 4505 PUFF
1153 1620 2034 FLARG
1154 1621 1100 TAU FLARGP /SET PT1.
1155 1622 3154 DCA P11
1156 1623 1034 TAU M2 /TEST FOR UNARY OPERATIONS
1157 1624 1127 TAU SORTCN
1158 1625 7450 SNA
1159 1626 5241 JMP ETERM /CREATE DUMMY FOR UNARY MINUS
1160 1627 7001 IAC
1161 1630 7650 SNA CLA
1162 1631 5323 JMP ARGX1 /IGNORE UNARY PLUS
1163 1632 1127 TAU SORTCN /TEST FOR NULL PARENS.
1164 1633 1070 TAU M11
1165 1634 7710 SFA CLA
1166 1635 5353 JMP FLPAR /MIGHT BE AN L-PAR.
1167 1636 4523 ETERM, TSTLPR
1168 1637 7410 SKP
1169 1640 4526 ERROR4 /OPERATOR MISSING BEFORE PAREN
1170 1641 1127 ETERM, TAU SORTCN /SET FROM "TESTC"--"SORTC"
1171 1642 3147 DCA THISOP
1172 1643 1147 TAU THISOP
1173 1644 1070 TAU M11
1174 1645 7700 SFA CLA /END?
1175 1646 3147 DCA THISOP /"THISOP" EQUIV. TO END OF EXP.

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1176
1177      1647 7201      ETERM2, CLA IAC          /COMPARE PRIORITIES
1178      1650 0147          AND THISOP          /PRIORITIES ARE: (+),(*/),(+-),PUT
1179      1651 1147          TAD THISOP
1180      1652 7041          CIA
1181      1653 3274          DCA FLOPR
1182      1654 7001          IAC
1183      1655 0130          AND LASTOP
1184      1656 1130          TAD LASTOP
1185      1657 1274          TAD FLOPR
1186      1660 7710          SPA CLA
1187      1661 5310          JMP FPAR          /CONTINUE
1188      1662 1130          TAD LASTOP          /FIND OPERATION FROM TABLE
1189      1663 1331          TAD OPTARL
1190      1664 3274          DCA FLOPR
1191      1665 1674          TAD I FLOPR
1192      1666 3274          DCA FLOPR
1193      1667 1130          TAD LASTOP
1194      1670 7640          SZA CLA          /TEST FOR END OF DATA INTO FLOATING AC.
1195      1671 4505          PUPF          /GET LAST DATA
1196      1672 0044          FLAC
1197      1673 4407          FENT
1198      1674 0000      FLOPR, 00          / (FLOPR I PT1) +-*/+
1199      1675 6560          FPT I FLARGP      /SAVE RESULT
1200      1676 0000          FEXT
1201      1677 1160          TAD FLARGP
1202      1700 3154          DCA PT1
1203      1701 1147          TAD THISOP
1204      1702 1130          TAD LASTOP          /=0?
1205      1703 7650          SNA CLA
1206      1704 5502          POPJ          /EXIT "EVAL"
1207      1705 1413          POPA          /GET PRIOR OP
1208      1706 3130          DCA LASTOP
1209      1707 5247          JMP ETERM2          /COMPARE THIS OP
1210
1211      1710 4523      ////
1212      1711 7410      EPAR, TSTLPR          /TEST FOR SUB-EXPRESSION
1213      1712 5355          SKP
1214      1713 1130          JMP EPAR2          /GO EVALUATE EXPRESSION
1215      1714 4503          TAD LASTOP          /CONTINUE READING THE EXPRESSION
1216      1715 1154          PUSHA          /SAVE "LASTOP".
1217      1716 3320          TAD PT1
1218      1717 4504          DCA ,+2
1219      1720 0000          PUSHF          /SAVE LAST ARGUMENT
1220      1721 1147          TAD THISOP          /MORE TO COME
1221      1722 3130          DCA LASTOP
1222      1723 4506      ARGNXT, GETC          /READ 1ST CHAR OF AN ARG.
1223      1724 4525          TESTC          /DO SPECIAL CHECK
1224      1725 5353          JMP ELPAP          /COULD BE LEFT PAREN
1225      1726 5332          JMP FNUM          /N
1226      1727 5342          JMP EFUN          /F
1227      1730 5206          JMP OPNEXT-2      /L
1228      1731 2026      OPTARL, OPTARS
1229      ////

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1230
1231 1732 4504 ENUR, PUSHF /TO PROCESS A NUMBER,SAVE AC
1232 1733 0044          FLAC
1233 1734 1100          TAD FLARGP /SET PRINTER AS FOR A VARIABLE.
1234 1735 3154          DCA P11
1235 1736 4473          JMS I FINPUT /READ TEXT NUMBER => (PT1)
1236 1737 4505          PUSHF /RESTORE THE AC
1237 1740 0044                   FLAC
1238 1741 5210          JMP OPNEXT /CONTINUE
1239
1240 1742 3274          EFUN, DCA FLOPP /SET CODE
1241 1743 4500          GETC /READ FUNCTION NAME,(1,2,OR 3 LETTERS)
1242 1744 4511          SOUTC /LOOK FOR TERMINATION CHARACTER.
1243 1745 2000                   TERMS-1
1244 1746 5364          JMP EFUN2 /YES
1245 1747 1274          TAD FLOPP /NO
1246 1750 7104          CLL HAL /MISH-MASH HASH CODE
1247 1751 1142          TAD CHAR
1248 1752 5342          JMP EFUN
1249 1753 4523          ELPAR, TSTLPR
1250 1754 4526          ERROR4 /DOUBLE OPERATORS
1251 1755 1127          EPAR2, TAD SORTCN /LEFT PARENS FOUND.
1252 1756 4503          PUSHA
1253 1757 1130          TAD LASTOP /SAVE DATA
1254 1760 4503          PUSHA
1255 1761 4501          PUSHJ /EVALUATE THE EXPRESSION
1256 1762 1600                   FVAL-1
1257 1763 5500          JMP I EFUN3I
1258
1259 1764 1127          ///
1260 1765 4503          EFUN2, TAD SORTCN /SAVE 'SORTCN','LASTOP',AND FUNC CODE
1261 1766 1130          PUSHA
1262 1767 4503          TAD LASTOP
1263 1770 1274          PUSHA /SAVE FUNCTION CODE.
1264 1771 4503          PUSHA
1265 1772 4523          TSTLPR
1266 1773 4526          ERROR4 /MUST BE FOLLOWED BY PARENS TO SET ARGUMENT
1267 1774 4501          PUSHJ /YES
1268 1775 1600                   FVAL-1
1269 1776 1413          POPA /BRANCH ON FUNCTION CODE:RETURN VIA EFUN3I.
1270 1777 4510          SORTJ
1271 2000 2207          FNTABL-1
1272 2001 6361          FNTARF-FNTABL
1273 2002 4526          FRROR2 /ILLEGAL FUNCTION NAME.
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1275
1276      2003 0241      241  /:
1277      2004 0242      242  /"
1278      2005 0256      256  /, -FOR INPUT NUMBERS
1279      2006      TERMS=, /TERMINATOR TABLE FOR 'EVAL' AND 'GETVAR'
1280      2006 0240      240  /SPACE 0
1281      2007 0253      253  /+ 1
1282      2010 0255      255  /- 2
1283      2011 0257      257  // 3
1284      2012 0252      252  /* 4
1285      2013 0336      336  /UP ARR 5
1286      2014 0250      250  /C 6 L-PARS
1287      2015 0333      333  /C 7
1288      2016 0274      274  /< 10
1289      2017 0251      251  /) 11 R-PARS
1290      2020 0335      335  /] 12
1291      2021 0276      276  /> 13
1292      2022 0254      254  /, 14
1293      2023 0273      273  /; 15
1294      2024 0215      215  /C.R. 16
1295      2025 0275      275  /= TO END GETARG FROM 'SET'
1296      2026 5554      OPTARS, FGT I PT1
1297      2027 1554      FAD I PT1
1298      2030 2554      FSB I PT1
1299      2031 4554      FUV I PT1
1300      2032 3554      FMY I PT1
1301      2033 0554      FPW I PT1
1302
1303      2034 0000      FLAG, 0 /DATA TEMPORARY STORAGE
1304      2035 0000      0
1305      2036 0000      0
1306
1307      /FOCAL TEXT FOR "HELLO" COMMAND
1308      2037 7056      HPT, 7056 /LT X] 0.4;
1309      2040 6473      6473
1310      2041 1740      1740 /OPTION K,T,I,F,.,S;
1311      2042 1354      1354
1312      2043 2454      2454
1313      2044 1154      1154
1314      2045 0554      0554
1315      2046 7254      7254
1316      2047 2373      2373
1317      2050 0540      0540 /ERASE ALL
1318      2051 0177      0177
1319      2052 1500      1500
1320
1321      /ABSOLUTE VALUE FUNCTION
1322      2053 1045      XABS, TAB FLAC1
1323      2054 7710      SPA CLA
1324      2055 4450      NEGATE

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1325          /CONTINUATION OF FUNCTION CALLS.
1326
1327      2056 1413      EFUN3.  PUPA          /RESTORE LAST OPERATION
1328      2057 3130      DCA LASTOP
1329      2060 4407      FEXT
1330      2061 7000      FRF          /NORMALIZE FUNCTION RETURN
1331      2062 6259      FPT FLARG
1332      2063 0000      FEXT
1333      2064 1160      TAD FLARGP      /SET POINTER
1334      2065 3154      DCA PT1
1335      2066 1413      PUPA          /GET LAST PAREN CODE.
1336      2067 7041      CIA          /CHECK FOR PAREN MATCH.
1337      2070 1066      TAD M3
1338      2071 1127      TAD SURTCN      /STILL SET FROM THE LAST "EVAL"
1339      2072 7640      SZA CLA          /SKIP IF MATCH
1340      2073 4526      ERKUP4        /PAREN ERROR
1341      2074 4526      GETC          /MOVE PAST R-PAR, AND RETURN TO OPNEX.
1342      2075 5676      JMP I .+1      /FUNCTION RETURN IS OK
1343      2076 1610      OPNEXT
1344
1345      ////
1346      2077 0000      LPRTSI. 0          /SKIP IF LEFT PAREN. - 'STLPR'
1347      2100 1127      TAD SURTCN
1348      2101 1070      TAD M11
1349      2102 7700      SMA CLA
1350      2103 5677      JMP I LPRTST
1351      2104 1127      TAD SURTCN
1352      2105 1067      TAD M5
1353      2106 7740      SMA SZA CLA
1354      2107 2277      ISZ LPRTSI
1355      2110 5677      JMP I LPRTST
1356

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1357                                     /THE DELETE A LINE ROUTINE
1358
1359      2111  4516  DELETE, FINDLN /SETS "THISLN" AND "LASTLN".
1360      2112  5502  POPJ                                     /ALREADY GONE
1361      2113  2151  IS/ DEBGSW                               /DISABLE TRACE
1362      2114  4506  GETC                                     /MEASURE LENGTH
1363      2115  1142  TAD CHAR
1364      2116  1065  TAD MCR
1365      2117  7640  SZA CLA
1366      2120  5314  JMP .-4
1367      2121  1017  TAD AXOUT                               /SAVE LAST ADDRESS
1368      2122  7040  CMA
1369      2123  1146  TAD THISLN
1370      2124  3132  DCA CNTR                               /LENGTH < 0
1371      2125  1546  TAD I THISLN                          /DISCONNECT
1372      2126  3550  DCA I LASTLN
1373      2127  1075  TAD CERS                               /START LIST AT TOP
1374      2130  3157  DOK, DCA T2                          /EXAMINATION ADDRESS
1375      2131  1557  TAD I T2                               /GET THE NEXT ADDR.
1376      2132  7450  SNA                                    /TEST FOR END
1377      2133  5346  JMP DONE                               /YES-WRAP UP ALL.
1378      2134  3156  DCA T1                               /SAVE NEXT ADDRESS.
1379      2135  1146  TAD THISLN                          /COMPARE LINE POSITIONS
1380      2136  7141  CIA CLL
1381      2137  1156  TAD T1
1382      2140  7630  SZA CLA                               /SKIP IF THISLN > X
1383      2141  1132  TAD CNTR                               /CHANGE (X) TO ACCOUNT FOR
1384      2142  1156  TAD T1                               /GARBAGE COLLECTION.
1385      2143  3557  DCA I T2
1386      2144  1156  TAD T1                               /GET NEXT
1387      2145  5330  JMP DOK
1388
      //

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1389
1390
1391      2146  7040
1392      2147  1146
1393      2150  3011
1394      2151  1132
1395      2152  7040
1396      2153  1146
1397      2154  3012
1398      2155  1132
1399      2156  1134
1400      2157  3134
1401      2160  1010
1402      2161  7040
1403      2162  1012
1404      2163  3156
1405      2164  1010
1406      2165  1132
1407      2166  3010
1408      2167  1412
1409      2170  3411
1410      2171  2156
1411      2172  5367
1412      2173  5311
1413
1414
1415      2174  6457
1416      2175  6453
1417      2176  3237
1418      2177  3234
1419      2200  3303
1420      2201  3302
1421      2202  3244
1422      2203  3243
1423      2204  3252
1424      2205  3253
1425      2206  3256
1426      2207  3271
1427
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1429      2210  2533
1430      2211  2650
1431      2212  2636
1432      2213  2565
1433      2214  2630
1434      2215  2623
1435      2216  2517
1436      2217  2572
1437      2220  2624
1438      2221  2625
1439      2222  2654
1440      2223  2575
1441      2224  2702
1442      2225  2631

      /GARBAGE COLLECTION
JUNE,   CMA
        TAP THISEN
        DCA XRT
        TAP CNTR
        CMA
        TAP THISEN
        DCA XRT2
        TAP CNTR
        TAP BUFR
        DCA BUFR
        TAP AXIN
        CMA
        TAP XRT2
        DCA T1
        TAP AXIN
        TAP CNTR
        DCA AXIN
        TAP I XRT2
        DCA I XRT
        ISZ T1
        JMP .-3
        JMP DELETE

      /BACKUP L FOR YR
      /SETUP END OF HOSE
      /CORRECT END OF BUFFER POINTER.
      /COMPUTE COUNT
      /STPHON LOWER PART.
      /RESET 'LASTLN', 'THISEN', AND DATA FIELD.

/////
/OPTION TABLE
OPTPL, OPTK
OPTK    /SWITCH TO KEYBOARD INPUT
OPTK    /READER INPUT
OPTT    /TTY OUTPUT
OPTP    /PUNCH OUTPUT
OPTI    /INTERPRETIVE/NUMERIC I/O
OPTC    /SINGLE CHARACTER I/O
OPTCOL  /PRINT ":" AT "ASK"
OPTX    /SUPPRESS ":"
OPTE    /ECHO KEYBOARD INPUT
OPTN    /NO ECHO
OPTS    /SET VARIABLE TERMINATOR
OPTM    /START DISK MONITOR

ENTABL=:
2533    /ARS
2650    /SGN
2636    /ITR
2565    /DIS
2630    /KAN
2623    /DXS
2517    /ADC
2572    /ATH
2624    /EXP
2625    /LOG
2654    /SIN
2575    /COS
2702    /SGI
2631    /NEW

      /LIST OF CODED FUNCTION NAMES

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1443 /ERASE SINGLE LINES, GROUPS, OR VARIABLES
1444 2226 1142 ERASE, TAD CHAR /SFE IF "ALL"
1445 2227 1003 TAD MINUSA
1446 2230 7640 SZA CLA
1447 2231 5240 JMP FRVX
1448 2232 1077 TAD FNUT /YES, ERASE ALL TEXT
1449 2233 3134 DCA RUFK
1450 2234 3475 DCA I CERS
1451 2235 1134 FRV, TAD STARTV /ERASE VARIABLES
1452 2236 3155 DCA LASTV
1453 2237 5177 JMP START /PROGRAM EXECUTION ENDS
1454
1455 2240 4515 /****
1456 2241 1143 FRVX, GETLN /GET LINE NUMBFR
1457 2242 7640 TAD LINENO /SEE IF ZERO OR NONE
1458 2243 5250 SZA CLA
1459 2244 1134 JMP ERL /NO, ERASE LINES
1460 2245 3154 TAD STARTV /YES, ERASE VARIABLES
1461 2246 5647 DCA LASTV
1462 2247 0016 JMP I .+1 /CONTINUE PROCESSING
1463
1464 2250 1134 /****
1465 2251 3010 ERL, TAD RUFK /ERASE LINES
1466 2252 4501 DCA AXIN
1467 2253 2111 ERG, PUSHJ /EXTRACT ONE LINE
1468 2254 2146 DELFTE
1469 2255 1141 ISZ THISLN
1470 2256 7700 TAD MAGSK
1471 2257 1546 SMA CLA
1472 2260 4524 TAD I THISLN
1473 2261 5235 TSTGRP /IF GROUP, SEE IF END OF GROUP
1474 2262 1546 JMP ERV /YES
1475 2263 3143 TAD I THISLN /NO, CONTINUE FRASING GROUP
1476 2264 5252 DCA LINENO
JMP ERG

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1477          /ROUTINE CALLED VIA "FINDLN":
1478
1479          /SEARCH FOR A GIVEN LINE I.D. =C "LINENO" ]
1480          /1ST RETURN IF NOT FOUND,
1481          /2ND IF FOUND,
1482          /"THISLN" = FOUND LINE OR NEXT LARGER,
1483          /"LASTLN" = LESSER AND/OR LAST,
1484          /"TEXTIP" IS SET
1485
1486          2265 0000  XFIN0, 0
1487          2266 1075          TAD CFRS          /INITIALIZE POINTERS TO FIRST LINE
1488          2267 3150          DCA LASTLN
1489          2270 1075          TAD CFRS
1490          2271 3146  FINDM,  DCA THISLN          /SAVE THIS ONE
1491          2272 1146          TAD THISLN
1492          2273 3012          DCA XRT2
1493          2274 1143          TAD LINENO
1494          2275 7041          CIA
1495          2276 1412          TAD I XRT2          /LINENO=M WILL ALSO BE FOUND
1496          2277 7450          SNA
1497          2300 2265          ISZ XFIN0          /FOUND IT (2ND EXIT)
1498          2301 7700          SNA CLA
1499          2302 5310          JMP FEND3          /PAST IT,
1500          2303 1146          TAD THISLN          /MOVE POINTERS
1501          2304 3150          DCA LASTLN
1502          2305 1546          TAD I THISLN
1503          2306 7440          SZA          /SKIP IF END OF TEST
1504          2307 5271          JMP FINDM
1505          2310 1146  FEND3,  TAD THISLN
1506          2311 7001          IAC
1507          2312 3017          DCA AXOUT          /SET "TEXTIP",
1508          2313 3020          DCA XCT
1509          2314 5665          JMP I XFIN0

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1510
1511 2315 0000  UTRA,  0           /UNPACK CHARACTER. - "GETC"
1512 2316 4351          JMS GET1
1513 2317 7710  UTF,    SPA CLA          /NOOP X EXTEND
1514 2320 1006          TAD C100          /300-337 & 340-376
1515 2321 1377          TAD M137          /200-276 & 200-236
1516 2322 1142          TAD CHAR
1517 2323 7450          SNA
1518 2324 5357          JMP UTX           /"?" FOUND
1519 2325 1054          TAD F337
1520 2326 3142  UTU,    DCA CHAR
1521 2327 1151          TAD DEBGSW
1522 2330 1152          TAD DMPSW
1523 2331 7650          SNA CLA          /PRINT ONLY IF BOTH ARE ZERO.
1524 2332 4512          PRINTC
1525 2333 5715          JMP I UTRA
1526
1527 2334 4351  /////
1528 2335 7040  EXTN,  JMS GET1
1529 2336 5317          CMA
1530
1531 2337 1151  ///
1532 2340 7040  UTX,    TAD DEBGSW          /IFST FOR TRACE-ENABLED
1533 2341 5347          SPA CLA
1534 2342 1152          JMP .+6
1535 2343 7650          TAD DMPSW          /FLIP THE TRACE FLOP
1536 2344 7001          SNA CLA
1537 2345 3152          TAC
1538 2346 5316          DCA DMPSW
1539 2347 1032          JMP UTRA+1          /GET NEXT CHARACTER INSTEAD.
1540 2350 5326          TAD P277          /TRACE DISABLED = RETURN "?"
1541
1542 2351 0000  GET1,  0
1543 2352 2070          ISZ XCT
1544 2353 5366          JMP GET3
1545 2354 1021          TAD GETM
1546 2355 0071  GEND,  AND P77
1547 2356 3142          DCA CHAR          /SAVE
1548 2357 1142          TAD CHAR
1549 2360 1023          TAD M77
1550 2361 7650          SNA CLA
1551 2362 5334          JMP EXTR          /EXTENDED
1552 2363 1142          TAD CHAR
1553 2364 1376          TAD M40
1554 2365 5751          JMP I GET1
1555  /////

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1556
1557 2366 1417 GET3, TAB I AXDUT /(X-MEM)
1558 2367 3021 DCA GTEM
1559 2370 7040 CMA
1560 2371 3020 DCA XCT
1561 2372 1021 TAB GTEM
1562 2373 4520 RIL6
1563 2374 7004 RAL
1564 2375 5355 JMP GEND
1565 2376 7740 M40, -40
1566 2377 7641 M137, -137
1567
1568 //
1569 2400 0313 /OPTION LIST
1570 2401 0322 OPTLST, "K
1571 2402 0324 "R
1572 2403 0320 "T
1573 2404 0311 "P
1574 2405 0303 "I
1575 2406 0272 "C
1576 2407 0330 ":"
1577 2410 0305 "X
1578 2411 0316 "E
1579 2412 0323 "N
1580 2413 0315 "S
1581 "M
1582 //
1583 2414 6004 /ANALOG-DIGITAL CONVERSION
1584 2415 3045 XADC, 6004
1585 2416 5500 DCA FLAC1 /ARG MUST BE 0
RETURN

```

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1586
1587      2417 0000      XENDLN, 0      /TERMINATE THE BUFFERED LINE - "ENDLN"
1588      2420 1550      TAD I LASTLN   /SAVE OLD POINTER
1589      2421 3534      DCA I BUFR
1590      2422 1134      TAD RUF8      /POINT TO NEW LAST LINE
1591      2423 3550      DCA I LASTLN
1592      2424 1135      TAD A00      /CHECK FOR EXTRA INFO
1593      2425 7440      SZA
1594      2426 3410      DCA I AXIN
1595      2427 1010      TAD AXIN      /COMPUTE NEW END OF BUFFER
1596      2430 7001      IAC
1597      2431 3134      DCA RUF8
1598      2432 1134      TAD STARTV   /RESET VARIABLE LIST
1599      2433 3155      DCA LASTV
1600      2434 5617      JMP I XENDLN
1601
1602      2435 0000      TTXSAV, 0      /SAVE CHAR AND TEXT POINTERS
1603      2436 4504      PUSHF
1604      2437 0017      TEXTP
1605      2440 1142      TAD CHAR
1606      2441 4503      PUSHA
1607      2442 5635      JMP I TTXSAV
1608
1609      2443 0000      TTXRES, 0      /RESTORE SAME
1610      2444 1413      PUPA
1611      2445 3142      DCA CHAR
1612      2446 4505      POPF
1613      2447 0017      TEXTP
1614      2450 5643      JMP I TTXRES
1615
1616      2451 0000      GRPTST, 0      /AC VS LINENO - *TSTGRP*
1617      2452 0024      AND P7600
1618      2453 7041      CIA
1619      2454 3157      DCA T2
1620      2455 1143      TAD LINENO
1621      2456 0024      AND P7600
1622      2457 1157      TAD T2
1623      2460 7650      SNA CLA
1624      2461 2251      ISZ GRPTST
1625      2462 5651      JMP I GRPTST

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1626          /I-O SUBROUTINES
1627
1628          2463  VAL=,
1629  2463 0000  CHIN, 0          /READ IN A CHARACTER SUBR. - "READC"
1630  2464 4540          JMS I INDEV
1631  2465 3142          DCA CHAR
1632  2466 4511          SORTC          /LINEFEED OR RUBOUT?
1633  2467 1611          ECHOLST-1
1634  2470 5663          JMP I CHIN          /YFS
1635  2471 4512  ECHO, PRINTC
1636  2472 1142          TAD CHAR          /SEE IF 200 (L/T)
1637  2473 1024          TAD P7600
1638  2474 7640          SZA CLA
1639  2475 5663          JMP I CHIN          /NO, EXIT
1640  2476 5264          JMP CHIN+1        /YES, GET ANOTHER
1641
1642  2477 0000  /****
1643  2500 7450  OUT, 0          /OUTPUT A CHARACTER - "PRINTC"
1644  2501 1142          SNA          /USE (AC) OR (CHAR)
1645  2502 1065          TAD CHAR
1646  2503 7450          TAD MCR
1647  2504 5310          SNA
1648  2505 1060          JMP OUTCR
1649  2506 4537          TAD CCR
1650  2507 5677  OUTX, JMS I OUTDEV
1651  /****
1652  2510 1060  OUTCR, TAD CCR
1653  2511 4537          JMS I OUTDEV
1654  2512 1057          TAD CLF
1655  2513 5306          JMP OUTX-1
1656  /****
1657  /TEST FOR A COMMA, SEMICOLON, OR CR - "TSTERM"
1658  /RETURNS: OTHER, ; OR CR, COMMA
1659  /GETS NEXT CHARACTER AFTER COMMA OR OTHER
1660  2514 0000  XTSTER, 0
1661  2515 4511          SORTC          /LOOK FOR ,;CR
1662  2516 1141          TLIST-1
1663  2517 7410          SKP
1664  2520 5326          JMP .+6          /OTHER, GO PAST IT
1665  2521 1127          TAD SORTCN        /FOUND ONE, SEE WHAT IT IS
1666  2522 2314          ISZ XTSTER
1667  2523 7640          SZA CLA
1668  2524 5714          JMP I XTSTER        /; OR CR: 2ND EXIT
1669  2525 2314          ISZ XTSTER        /COMMA, 3RD EXIT
1670  2526 4506          GETC
1671  2527 5714          JMP I XTSTER
1672  /****
1673
1674          2527  COMEIN=-1          /COMMAND-INPUT BUFFER LIVES HERE.
1675
1676          2600  COMOUT=2600

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1677          2600  *COMOUT
1678
1679          /INTERRUPT PROCESSOR.
1680
1681          2600  0000  SAVAC,  0          /CONTENTS OF AC
1682          2601  0000  SAVLK,  0          /CONTENTS OF LINK
1683          2602  7575  MBREAK, -203       /CONTROL-C
1684          2603  3200  INTRPT, DCA SAVAC   /SAVE WORKING DATA
1685          2604  7010  RAR
1686          2605  3201  DCA SAVLK
1687          2606  6031  KSF          /CHECK FOR KEYBOARD FIRST
1688          2607  5225  JMP TINT
1689          2610  6036  KRB          /READ BUFFER AND CLEAR FLAG TO FETCH NEXT
1690          2611  0026  AND P177       /IGNORE PARITY BIT
1691          2612  1015  TAD C200
1692          2613  3306  DCA SIN
1693          2614  1306  TAD SIN
1694          2615  1202  TAD MBREAK   /MANUAL STOP?
1695          2616  7650  SNA CLA
1696          2617  5345  JMP RECOVR
1697          2620  1264  TAD INBUF   /ANY SPACE?
1698          2621  7640  SZA CLA
1699          2622  4526  ERROR2      /WILL WAIT FOR OUTPUT BUFFER
1700          2623  1306  TAD SIN
1701          2624  3264  DCA INBUF   /SAVE INPUT
1702          2625  6041  TINT,  TSF
1703          2626  5244  JMP EXIT
1704          2627  6042  TCF
1705          2630  3260  DCA TELSW   /TURN OFF THE IN-PROGRESS FLAG.
1706          2631  1663  TAD I OPTRI
1707          2632  7450  SNA
1708          2633  5244  JMP EXIT    /DONE
1709          2634  6044  TPC          /TYPE NEXT.
1710          2635  3260  DCA TELSW   /CLEAR AC AND TURN ON THE FLAG.
1711          2636  3663  DCA I OPTRI /ZERO OUT THE DATA AREA
1712          2637  1263  TAD OPTRI
1713          2640  7001  IAC
1714          2641  0031  AND P17
1715          2642  1261  TAD OPTRO
1716          2643  3263  DCA OPTRI
1717          2644  6244  EXIT,  6244   /RESTORE MEMORY FIELD
1718          2645  6101  6101       /SMP
1719          2646  7000  NOP          /HLT)-IF YOU HAVE MEMORY PARITY
1720          2647  6011  RSF          /TEST H.S. READER FLAG
1721          2650  5253  JMP .+3
1722          2651  6012  RRB          /READ BUFFER AND CLEAR FLAG
1723          2652  3037  DCA HINBUF   /SAVE CHARACTER
1724          2653  1201  TAD SAVLK
1725          2654  7104  RAL CLL
1726          2655  1200  TAD SAVAC
1727          2656  6001  ION
1728          2657  5400  EXITJ, JMP I 0

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1729
1730 2660 0001 TELSW, 1 /INPUT SWITCH
1731 2661 3400 OPTRO, IOBUF /OUTPUT POINTERS
1732 2662 3400 OPTRO, IOBUF /VARS
1733 2663 3400 OPTRI, IOBUF
1734 2664 0000 INBUF, 0 /KEYBOARD BUFFER.
1735
1736 2665 0000 XI33, 0 /VIA (INDEV)
1737 2666 1264 TAD INBUF /ANY INPUT?
1738 2667 7550 SPA SNA
1739 2670 5266 JMP ,-2 /NO = WAIT
1740 2671 3275 DCA XOUTL
1741 2672 3264 DCA INBUF /CLEAR INPUT BUFFER
1742 2673 1275 TAD XOUTL
1743 2674 5665 JMP I XI33
1744
1745 2675 0000 XOUTL, 0 /VIA (OUTDEV)
1746 2676 3265 DCA XI33 /SAVE CURRENT CHARACTER.
1747 2677 1265 TAD XI33 /IS IT A CR?
1748 2700 1065 TAD MCR
1749 2701 7650 SNA CLA
1750 2702 3053 DCA TABCTR /YES, RESET CARRIAGE INDEX
1751 2703 1265 TAD XI33
1752 2704 4732 JMS I SKPNP /SKIP IF A NON-PRINTING CHARACTER
1753 2705 2053 ISZ TABCTR /PRINTING: INCREMENT INDEX
1754 2706 0000 SIN, 0
1755 2707 6001 ION /BE SURE INTERRUPT IS ON.
1756 2710 1662 TAD I OPTRO /ANY ROOM?
1757 2711 7640 SZA CLA /A CHARACTER IS NON-ZERO
1758 2712 5310 JMP ,-2 /NO = WAIT.
1759 2713 1260 TAD TELSW /IN PROGRESS?
1760 2714 7640 SZA CLA
1761 2715 5322 JMP ,+5
1762 2716 1265 TAD XI33 /NO
1763 2717 6046 TLS /TYPE CHARACTER.
1764 2720 3260 DCA TELSW /SET IN-PROGRESS FLAG.
1765 2721 5675 JMP I XOUTL /RETURN
1766 2722 1265 TAD XI33 /SEND DATA
1767 2723 3662 DCA I OPTRO
1768 2724 1262 TAD OPTRO /SET POINTERS
1769 2725 7001 IAC
1770 2726 0031 AND P17
1771 2727 1261 TAD OPTRO
1772 2730 3262 DCA OPTRO
1773 2731 5675 JMP I XOUTL
1774
1775 2732 3014 SKPNP, SKPNP

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1776          4526  ERROR2=ERROR; ERROR3=EPROR; FRFOR4=ERROR
1777          4526
1778          4526
1779          2733  3225  WAITP,  OWAIT
1780          2734  3203  OPTDOP, OPTTDO
1781          2735  3336  ERROR5, DCA ,+1  /ERROR CALLED FROM A TABLE
1782          2736  0000  FRR2,  0          /LIMIT EXCEEDED
1783          2737  7240          CLA CMA          /COMPUTE CALLING ADDRESS (ALSO "SPACE")
1784          2740  1336          TAD FRR2          /AND USE IT AS ERROR NUMBER.
1785          2741  3143          DCA LINENO          /SAVE FRROR CODE.
1786          2742  4733          JMS I WAITP          /WAIT FOR OUTPUT TO FINISH
1787          2743  6002          IOF          /DISABLE INTERRUPT FOR INITIALIZATIONS
1788          2744  5347          JMP ,+3
1789          2745  1015  RECOVR, TAD C200
1790          2746  3143          DCA LINENO          /SAVE FRROR NUMBER
1791          2747  2260          ISZ TELSW          /TURN ON IN-PROGRESS SWITCH
1792          2750  1025          TAD M20          /SETUP INIT COUNT
1793          2751  3132          DCA CNTR
1794          2752  7040          CMA
1795          2753  1261          TAD OPTRO
1796          2754  3011          DCA XRT          /INIT I/O BUFFERS.
1797          2755  3411          DCA I XRT
1798          2756  2132          ISZ CNTR
1799          2757  5355          JMP ,-2
1800          2760  3264          DCA INBUF          /INIT KEY-BUFR.
1801          2761  1261          TAD OPTRO          /INIT TTY POINTERS.
1802          2762  3263          DCA OPTRI
1803          2763  1261          TAD OPTRO
1804          2764  3262          DCA OPTRO
1805          2765  4734          JMS I OPTDOP          /SET TO TTY OUTPUT
1806          2766  1161          TAD PICH          /RESET "READC"
1807          2767  3113          DCA 113          /IF AN ERROR OCCURS.
1808          2770  7040          CMA          /PREPARE A STOP BIT FOR TTY
1809          2771  6046          TLS          /AND RAISE FLAG
1810          2772  7200          CLA
1811          2773  1060          TAD CCR          /PRINT A CR
1812          2774  4512          PRINTC
1813          2775  1032          TAD P277          /MAKE A ?
1814          2776  4512          PRINTC          /AND TURN ON THE INTERRUPT
1815          2777  4514          PRNTLN          /PRINT ERROR NUMBER AND,
1816          3000  2145          ISZ PC
1817          3001  1545          TAD I PC          /UNLESS IT IS ZERO, (X-MEM)
1818          3002  7450          SNA
1819          3003  5211          JMP ,+6
1820          3004  3143          DCA LINENO
1821          3005  1002          TAD P7700
1822          3006  4512          PRINTC
1823          3007  4512          PRINTC          /PRINT SPACE AGAIN AND
1824          3010  4514          PRNTLN          /PRINT LINE OF ERROR.
1825          3011  1060          TAD CCR
1826          3012  4512          PRINTC
1827          3013  5177          JMP START          /INTERRUPT WILL BE RE-ENABLED SOON.
1828

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/////



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1829 /SKIP IE (AC) IS A NON-PRINTING CHARACTER
1830 3014 0000 SKIPNP, 0
1831 3015 4520 RTL6 /PRINTING CHARACTERS ARE 240-337
1832 3016 7710 SPA CLA
1833 3017 7020 CML
1834 3020 7420 SNL
1835 3021 2214 ISZ SKIPNP
1836 3022 5614 JMP I SKIPNP
1837
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/////  
 /PACK A CHARACTER INTO THE BUFFER - "PACKC"  
 PACBUF, 0  
 SORTJ /LOOK FOR ? OR RUBOUT  
 PACLST-1  
 PACLS2-PACLST  
 TAD CHAR  
 JMS SKIPNP /PRINTING CHARACTER?  
 JMP .+3 /YES  
 TAD P77 /NO, PACK 77 FIRST  
 JMS PCK1  
 TAD CHAR /PACK 6-BIT CHARACTER  
 AND P77  
 JMS PCK1  
 JMP I PACBUF

/////  
 PQUEB, TAD P337 /USE 337 FOR ?  
 JMP .-4

/////  
 /PACK ONE 6-BIT WORD  
 PCK1, 0  
 ISZ XCTIN  
 JMP ROT /PACK LEFT HALF  
 TAD ADD /PACK RIGHT HALF AND STORE  
 DCA I AXIN  
 TAD PULXP /CHECK FOR SPACE  
 CLL CIA  
 TAD P13  
 TAD AXIN  
 SZI CLA  
 ERROR /BUFFER OR STORAGE OVERFLOW  
 JMP I PCK1

/////  
 PACLS1, 277 /?  
 377 /RUBOUT

/////  
 RUT, RTL6 /SAVE LEFT HALF  
 DCA ADD  
 CMA  
 DCA XCTIN  
 JMP I PCK1

1878			/RUBOUT ONE CHARACTER	
1879	3065	1010	RUB1, TAD AXIN	/SAVE POINTER
1880	3066	3242	DCA PCK1	
1881	3067	1136	TAD XCTIM	/CHARACTER IN ADD?
1882	3070	7640	SZA CLA	
1883	3071	5277	JMP RUB2	/YES
1884	3072	1010	TAD AXIN	/NO, BEGINNING OF BUFFER?
1885	3073	7041	CIA	
1886	3074	1153	TAD PACKST	
1887	3075	7700	SMA CLA	
1888	3076	5322	JMP PKZERO	/YES, IGNORE
1889	3077	1324	RUB2, TAD SPLAT	/ECHO A BACKSLASH
1890	3100	4512	PRINTC	
1891	3101	2136	ISZ XCTIM	
1892	3102	5310	JMP RUB3	/BACKUP STORAGE
1893	3103	1642	TAD I PCK1	/KILL ADD AND CHECK FOR 77
1894	3104	0071	AND P77	/IN 2ND HALF OF LAST STORED WORD
1895	3105	1023	TAD M77	
1896	3106	7640	SZA CLA	
1897	3107	5322	JMP PKZERO	/NO, DONE
1898	3110	1642	RUB3, TAD I PCK1	/KILL 2ND HALF OF LAST STORED WORD
1899	3111	0062	AND P7700	
1900	3112	3135	DCA ADD	
1901	3113	7040	CMA	/BACKUP POINTER
1902	3114	1010	TAD AXIN	
1903	3115	3010	DCA AXIN	
1904	3116	1135	TAD ADD	/TEST FOR 77 IN ADD
1905	3117	1006	TAD C100	
1906	3120	7640	SZA CLA	
1907	3121	7040	CMA	
1908	3122	3136	PKZERO, DCA XCTIM	
1909	3123	5623	JMP I PACBUF	
1910	3124	0334	SPLAT, 334	

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1911          /DUMP THE SYMBOL TABLE CONTENTS
1912      3125 4504 TDUMP, PUSHF          /SAVE TEXT POINTERS
1913      3126 0017          TEXTP
1914      3127 7040          CMA
1915      3130 1134          TAD STARTV          /START VARIABLE LIST
1916      3131 3014 TULOOP, DCA FLTXP
1917      3132 1014          TAD FLTXF          /TEST FOR END OF LIST
1918      3133 7040          CMA
1919      3134 1155          TAD LASTV
1920      3135 7650          SNA CLA
1921      3136 5370          JMP TDEND          /END FOUND
1922      3137 1375          TAD TDTEXT          /NO, SET UP POINTERS
1923      3140 3017          DCA AXOUT
1924      3141 3020          DCA XCT
1925      3142 1414          TAD I FLTXR          /2 LETTERS OF VAR. NAME
1926      3143 3376          DCA TDTEXT+1
1927      3144 4501          PUSHJ          /PRINT NAME AND "("
1928      3145 1241          TQUOT
1929      3146 1414          TAD I FLTXR          /GET AND PRINT SUBSCRIPT
1930      3147 4774          JMS I TDOUTP
1931      3150 4501          PUSHJ          /PRINT ")"=
1932      3151 1241          TQUOT
1933      3152 1005          TAD P13          /SPACE TO 11TH COLUMN
1934      3153 3046          DCA FLAC2
1935      3154 4501          PUSHJ
1936      3155 1374          TAB+12
1937      3156 2014          ISZ FLTXP
1938      3157 4407          FENT          /PICK UP VALUE
1939      3160 5414          FGT I FLTXR          /DOES NOT AUTOINDEX
1940      3161 0000          FEXT
1941      3162 4472          JMS I FOUTPUT          /PRINT VALUE
1942      3163 1060          TAD CCR          /AND A C.R.
1943      3164 4512          PRINTC
1944      3165 1014          TAD FLTXR          /INCREMENT FOR NEXT VAR.
1945      3166 1035          TAD P2
1946      3167 5331          JMP TULOOP
1947      3170 4505 TDEND, POPF          /RESTORE TEXT POINTERS
1948      3171 0017          TEXTP
1949      3172 5773          JMP I .+1
1950      3173 1252          TASK4
1951      3174 6100 TDOUTP, SIGOUT
1952      3175 3175 TOTEXT, .          /THE FOLLOWING IS FOCAL TEXT
1953      3176 0000          0          /VAR. NAME GOES HERE
1954      3177 5077          5077          / "(" AND C.R.
1955      3200 1551          1551          / ")"= AND C.R.
1956      3201 7577          7577
1957      3202 1500          1500

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1958          /OPTION ROUTINES
1959          /
1960          /ROUTINE TO SET UP OUTPUT
1961  3203 0000 OPTTDO, 0
1962  3204 1220          TAD CTSF
1963  3205 3021          DCA I OPTTL      /TSF
1964  3206 1621          TAD I OPTTL
1965  3207 7001          IAC
1966  3210 3022          BCA I OPTTL+1    /TCF
1967  3211 1622          TAD I OPTTL+1
1968  3212 1035          TAD P2
1969  3213 3023          DCA I OPTTL+2    /TPC
1970  3214 1623          TAD I OPTTL+2
1971  3215 1035          TAD P2
1972  3216 3024          DCA I OPTTL+3    /TLS
1973  3217 5003          JMP I OPTTDO
1974  3220 6041          CTSF, TSF
1975  3221 2625          OPTTL, TINT
1976  3222 2627          TINT+2
1977  3223 2634          TINT+7
1978  3224 2717          SIN+11
1979          /
1980          /ROUTINE TO WAIT UNTIL OUTPUT FINISHES
1981  3225 0000 OWAIT, 0
1982  3226 6001          ION              /((SNAP) - FOR 2+USER
1983  3227 1633          TAD I TSWP        /LOOK AT TELSW
1984  3230 7640          SZA CLA
1985  3231 5226          JMP ,-3
1986  3232 5625          JMP I OWAIT
1987  3233 2660          TSWP, TELSW
1988          /
1989  3234 4225          OPTP, JMS OWAIT    /SET UP FOR PUNCH OUTPUT
1990  3235 1025          TAD M20          /CONVERT TO PSF; ETC.
1991  3236 7410          SKP
1992  3237 4225          OPTI, JMS OWAIT    /SET UP FOR TTY OUTPUT
1993  3240 4203          JMS OPTTDO
1994  3241 5642          OPTXIT, JMP I ,+1  /EXIT OPTIONS
1995  3242 6461          OPTRET

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1996
1997      3243 1250 OPTX, TAD OPTC1 /SUPPRESS "!" ON ASK
1998      3244 1247 OPTCOL, TAD CPRINT /RESTORE "!"
1999      3245 3651 DCA I COLP
2000      3246 5241 JMP OPTXIT
2001      3247 4512 CPRINT, PRINTC
2002      3250 2466 OPTC1, CLA-PRINTC
2003      3251 1222 CULP, TASKCL
2004      3252 1247 OPTC, TAD CPRINT /SFT UP FOR KEYBOARD ECHO
2005      3253 3655 OPTN, DCA I ECHP /SUPPRESS ECHO
2006      3254 5241 JMP OPTXIT
2007      3255 2471 ECHP, ECHO
2008      3256 4506 OPTS, GLTC /SFT UP USER TERMINATOR FOR "ASK"
2009      3257 4511 SORTC
2010      3260 2003 TERMS-3
2011      3261 7410 SKP
2012      3262 5256 JMP ,-4
2013      3263 4501 PUSHJ /GFT CHARACTER
2014      3264 1601 FVAL
2015      3265 4452 FIX
2016      3266 3670 DCA I USERTP
2017      3267 5241 JMP OPTXIT
2018      3270 6002 USERTP, USERT
2019      3271 4225 OPTM, JMS DWAIT /EXIT TO DISK MONITOR
2020      3272 6002 IOF
2021      3273 5424 JMP I P7000
2022      3274 1301 /THIS IS THE INITIALIZATION COMMAND
2023      3275 3017 HELLO, TAD HP
2024      3276 3020 DCA AXOUT
2025      3277 4501 DCA XCT
2026      3300 1260 PUSHJ /START BY SETTING FORMAT
2027      3301 2036 HP, HPT-1 /FOCAL TEXT "%8.4;0 K,T;I,E,;S;E A"

```

```

2034 / I/O MODE OPTIONS
2035 3302 7240 OPTC, CLA CMA
2036 3303 3305 OPTI, DCA IOSW
2037 3304 5241 JMP OPTXIT
2038
2039 3305 0000 IOSW, 0
2040 / I/O MODE: "I" = 0000 = INTERPRETIVE INPUT, NUMERIC OUTPUT
2041 / "C" = 7777 = SINGLE CHARACTER I/O
2042
2043
2044 /"ASK" MASTER ROUTINE
2044 3306 0000 INTASK, 0
2045 3307 1154 TAD PT1 /SAVE VAR. POINTER
2046 3310 3225 DCA OWAIT
2047 3311 1305 TAD IOSW /WHAT MODE OF INPUT?
2048 3312 7650 SNA CLA
2049 3313 5323 JMP STRING /INTERPRETIVE
2050 3314 4513 READC /SINGLE CHARACTER
2051 3315 1142 TAD CHAR /CONVERT CHARACTER CODE TO FLOATING
2052 3316 4430 FLOAT /POINT NUMBER
2053 3317 4407 ASKEND, FENT /SAVE VALUE
2054 3320 6625 FPT I OWAIT
2055 3321 0000 FEXT
2056 3322 5706 JMP I INTASK
2057 /INTERPRETIVE BUFFERED INPUT
2058 3323 1013 STRING, TAD PDLXR /SAVE PUSHDOWN LIST POINTER
2059 3324 3203 DCA OPTDO
2060 3325 1364 TAD BUFTOP /PROTECT TOP OF ASKBUF
2061 3326 3013 DCA PDLXR
2062 3327 2151 ISZ DEBGSW /DISABLE TRACE
2063 3330 1363 INBARR, TAD RUFBOT /INITIALIZE ASKBUF
2064 3331 3010 DCA AXIN
2065 3332 3136 DCA XCTIM
2066 3333 1363 TAD RUFBOT
2067 3334 3153 DCA PACKST
2068 3335 4513 READC /IGNORE SPACES
2069 3336 4511 SORTC
2070 3337 0032 C240-1
2071 3340 5335 JMP .-3
2072 3341 4510 SORTJ /SEARCH FOR TERMINATOR
2073 3342 5775 ASKLS2-1
2074 3343 0774 ASKLS2-ASKLS1
2075 3344 4507 INGT, PACKC /PACK INTO BUFFER
2076 3345 4513 READC
2077 3346 5341 JMP .-5

```

```

2078 /TERMINATOR FOUND, PROCESS INPUT
2079 3347 1060 INTERM, TAD CCR /PACK A.C.R.
2080 3350 3142 DCA CHAR
2081 3351 4507 PACKC
2082 3352 4507 PACKE
2083 3353 1203 TAD OPTTD0 /RESTORE PDLXR
2084 3354 3013 DCA PDLXR
2085 3355 1363 TAD RUFBOT /INITIALIZE UNPACKING
2086 3356 3017 DCA AXOUT
2087 3357 3020 DCA XCF
2088 3360 4501 PUSHJ /EVALUATE EXPRESSION
2089 3361 1600 FVAL-1
2090 3362 5317 JMP ASKEND
2091
2092 3363 7550 RUFBOT, ASKBUF /BOTTOM OF BUFFER
2093 3364 5212 RUFTOP, ASKBUF:177+13 /TOP+12 OF BUFFER
2094
2095 //
2096 3365 0000 /"TYPE" OUTPUT
2097 3366 1305 OUTPT, 0
2098 3367 7640 TAD IOSW /WHAT KIND OF OUTPUT
2099 3370 5373 SZA CLA
2100 3371 4472 JMP COUTPT /SINGLE CHARACTER
2101 3372 5765 JMS I FOUTPT /NUMERIC OUTPUT; PRINT VALUE
2102 JMP I OUTPT
2103 //
2104 3373 4452 COUTPT, FIX /GET CODE FOR CHARACTER
2105 3374 7450 SNA /MODULO 256
2106 3375 7130 CLL CML PAR /TO ALLOW ZERO CODE TO BE PRINTED
2107 3376 4512 PRINTC
2108 3377 5765 JMP I OUTPT
/NOTE: "TDUMP" PRINTS ONLY IN NUMERIC MODE

```

2109	3400	10BUF=3400	
2110		/	
2111	3420	*10BUF=20	
2112	3420 0000	FNST, 0	/TEXT POINTER
2113	3421 0000	0000	/DUMMY LINE NO
2114	3422 0355	0355	/ C-
2115	3423 0617	0617	/ FO
2116	3424 0301	0301	/ CA
2117	3425 1454	1454	/ L,
2118	3426 4040	4040	
2119	3427 6557	6557	/ 5/
2120	3430 6671	FNSTX, 6671	/ 69
2121	3431 7715	7715	
2122	3432	BUFBEQ=;	
2123		////	
2124	2735	LIBRARY=ERROR5	/COMMAND NOT AVAILABLE



/\*\*\*\*\* FOCAL, 5/69 \*\*\*\*\*/ PAL10 V141 6-JUL-70 11:38 PAGE 55  
2125 PAUSE

```

2126          /FOCAL INITIALIZATION ROUTINE
2127          *START-1
2128      0176 3432      BEGIN
2129          *BUFREG
2130      3432 7300      BEGIN, CLA CLL
2131      3433 1377      TAD (RECOVR+1 /RESTORE RESTART
2132      3434 3176      DCA START-1
2133      3435 6002      IOF /CLEAR FLAGS TO PREVENT INTERRUPT
2134      3436 6022      6022 /PCF
2135      3437 6032      6032 /KCC
2136      3440 6203      6203 /CDF CIF 00
2137      3441 6402      6402 /CLEAR PT00'S
2138      3442 6412      6412
2139      3443 6422      6422
2140      3444 6432      6432
2141      3445 6442      6442
2142      3446 6452      6452
2143      3447 6462      6462
2144      3450 6472      6472
2145      3451 6764      6764 /CLEAR DECTAPE
2146      3452 6772      6772
2147      3453 7200      CLA
2148      3454 6046      TLS /START LOW SPEED OUTPUT
2149      3455 3414      DCA I FLTXR /CLEAR OUTPUT BUFFER
2150      3456 7376      ISZ (-20
2151      3457 5255      JMP ,-2
2152      3460 1027      TAD BOTTOM /INITIALIZE PUSHDOWN LIST
2153      3461 3013      DCA PDLXR
2154      3462 6001      ION
2155      3463 4512      PRINTC /CHAR IS A C,R
2156      3464 4512      PRINTC
2157      3465 4512      PRINTC
2158      3466 4501      PUSHJ /TYPE FOCAL HEADING
2159      3467 0641      WRITE
2160      3470 5671      JMP I ,+1
2161      3471 2232      ERV-3 /ERASE ALL

```

2162	3576	7760		
2163	3577	2746		
		5600	*5600	
2164			/DECIMAL TO BINARY CONVERSION 2/10/69	
2165	5600	0000	DBCONV, 0	
2166	5601	4430	FLOAT	/FLOAT A ZERO
2167	5602	3364	DCA DECEXP	/INITIALIZE
2168	5603	7040	CMA	
2169	5604	3260	DCA PSWIT	
2170	5605	1363	TAD C43 /35(10)	
2171	5606	3044	DCA FLACP	
2172	5607	4755	JMS I SGNST	/SIGN OF MANTISSA
2173	5610	3365	DCA INSIGN	
2174	5611	5215	JMP NEWDIG+1	
2175	5612	2260	PERIOD, ISZ PSWIT	/, FOUND, SEE IF FIRST
2176	5613	4526	ERROR	/DOUBLE PERIODS
2177	5614	4506	NEWDIG, GETC	/LOOK FOR A DIGIT
2178	5615	4522	TESTN	
2179	5616	5212	JMP PERIOD	/, FOUND
2180	5617	5250	JMP NOTDIG	/NOT FOUND
2181	5620	1260	TAD PSWIT	/DECREMENT DECIMAL EXPONENT
2182	5621	7700	SMA CLA	/IF AFTER .
2183	5622	7040	CMA	
2184	5623	1364	TAD DECEXP	
2185	5624	3364	DCA DECEXP	
2186	5625	4342	JMS MULTI0	/MULTIPLY FLAC BY 1%
2187	5626	1127	TAD SORTCN	/ADD NEW DIGIT
2188	5627	3043	DCA FLOP3	
2189	5630	3042	DCA FLOP2	
2190	5631	3041	DCA FLOP1	
2191	5632	4313	JMS TRPLAD	
2192	5633	1162	OVCHK, TAD REMAIN	/CHECK FOR OVERFLOW
2193	5634	7640	SZA CLA	
2194	5635	5241	JMP .+4	
2195	5636	1045	TAD FLAC1	
2196	5637	7700	SMA CLA	
2197	5640	5214	JMP NEWDIG	/NO OVERFLOW
2198	5641	1361	TAD IOVRL	/OVERFLOW, ROTATE RIGHT
2199	5642	3760	DCA I IKARAC	/SET UP RETURN TO OVCHK
2200	5643	1162	TAD REMAIN	/ROTATE REMAIN
2201	5644	7110	CLL RAR	
2202	5645	3162	DCA REMAIN	
2203	5646	1045	TAD FLAC1	
2204	5647	5762	JMP I ROTRAC	/ROTATE REST OF FLAC

2205				
2206	5650	4511	NOTDIG, SORTC	/TEST FOR LETTER E
2207	5651	6145	C305-1	
2208	5652	5301	JMP EINPUT	/FOUND E
2209	5653	2365	DBTERM, ISZ INSIGN	/END OF INPUT, AFFIX SIGN
2210	5654	4450	NEGATE	
2211	5655	1366	TAD CFNR	/SET UP TO NORMALIZE
2212	5656	3260	DBLOOP, DCA .+2	
2213	5657	4407	FENT	
2214	5660	7000	PSWIT, FNR	/OR FMY BY 10 OR .10
2215	5661	6554	FPT I PT1	/SAVE RESULT
2216	5662	0000	FEXT	
2217	5663	1364	TAD DECEXP	/CHECK DECIMAL EXPONENT
2218	5664	7450	SNA	
2219	5665	5600	JMP I DBCONV	/DONE
2220	5666	7500	SMA	
2221	5667	5273	JMP .+4	
2222	5670	7001	IAC	/NEGATIVE, SET UP TO FMY BY .10
2223	5671	3364	DCA DECEXP	
2224	5672	5277	JMP .+5	
2225	5673	7240	CLA CMA	/POSITIVE, SET UP TO FMY BY 10
2226	5674	1364	TAD DECEXP	
2227	5675	3364	DCA DECEXP	
2228	5676	1066	TAD M3	
2229	5677	1367	TAD FLINST	/INSTRUCTION FMY FLTEN OR FLPTEN
2230	5700	5256	JMP DBLOOP	
2231	5701	4506	EINPUT, GETC	/FOUND "E"
2232	5702	4755	JMS I SGNST	/TEST FOR SIGN
2233	5703	3040	DCA FLOP0	
2234	5704	4757	JMS I DECIN1	/INPUT A DECIMAL INTEGER
2235	5705	1164	TAD DECNUM	
2236	5706	2040	ISZ FLOP0	/CHECK SIGN
2237	5707	7041	CIA	
2238	5710	1364	TAD DECEXP	
2239	5711	3364	DCA DECEXP	
2240	5712	5253	JMP DBTERM	

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2241          /ADD FLOP TO FLAC TRIPLE PRECISION WITH OVERFLOW
2242          TRPLAD, 0
2243          5713 0000          CLA GLL
2244          5714 7300          TAD FLOP3
2245          5715 1043          TAD FLAC3
2246          5716 1047          DCA FLAC3
2247          5717 3047          RAL
2248          5720 7004          TAD FLOP2
2249          5721 1042          TAD FLAC2
2250          5722 1046          DCA FLAC2
2251          5723 3046          RAL
2252          5724 7004          TAD FLOP1
2253          5725 1041          TAD FLAC1
2254          5726 1045          DCA FLAC1
2255          5727 3045          RAL
2256          5730 7004          TAD REMAIN
2257          5731 1162          DCA REMAIN
2258          5732 3162          JMP I TRPLAD
2259          5733 5713
2259          /MULTIPLY FLAC BY 2
2260          MULT2, 0
2261          5734 0000          JMS I MULT2I
2262          5735 4756          TAD REMAIN
2263          5736 1162          RAL
2264          5737 7004          DCA REMAIN
2265          5740 3162          JMP I MULT2
2266          5741 5734
2266          /MULTIPLY FLAC BY 10
2267          MULT10, 0
2268          5742 0000          PUSHF
2269          5743 4504          /FLAC=>FLOP
2270          5744 0045          FLAC1
2271          5745 4505          POPF
2272          5746 0041          FLOP1
2272          5747 3162          DCA REMAIN
2273          5750 4334          /CLEAR OVERFLOW
2274          5751 4334          JMS MULT2
2275          5752 4313          /FLAC*10 = (FLAC*2*2+FLAC)*2
2276          5753 4334          JMS MULT2
2277          5754 5742          JMS TRPLAD
2278          5755 6030          JMS MULT2
2279          5756 7037          JMP I MULT10
2280          5757 6010          SGNTSI, TSTSGN
2281          5760 7251          MULT2I, RALAC
2282          5761 5633          DECIN1, DECINT
2283          5762 7256          INAKAC, RARAC
2284          5763 0043          IOVRL, OVCHK
2285          5764 0000          ROTRAC, RARAC+5
2286          5765 0000          C43, 43
2287          5766 7000          DECEXP, 0
2288          5767 3373          /IMPLICIT DECIMAL EXPONENT
2289          5770 0004          INSIGN, 0
2290          5771 2400          /SIGN OF MANTISSA
2291          5772 0000          CFNR, FNR
2292          5773 7775          FLINST, FMY ,+4
2293          5774 3146          FLTEN, 7775
2294          5775 3147          /10(10) FLOATING
2295          0162          /1.10(10) FLOATING
                REMAIN=TEMP1

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2296			/CHARACTER LIST FOR "ASK"
2297	5776	0215	ASKLST, 215 /CR
2298	5777	0214	214 /FF
2299	6000	0337	337 /BA
2300	6001	0254	254 /COMMA
2301	6002	0000	USERT, 0 /USER-SELECTED CHARACTER
2302	6003	0212	212 /LF

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2303                                     /POWER OF 10 TABLE
2304      6004  6030      INTARL, -1750 /1000
2305      6005  7634      -144 /100
2306      6006  7766      -12 /10
2307      6007  7777      -1 /1
2308                                     /INPUT A DECIMAL INTEGER <2048
2309      6010  0000      DECINT, 0
2310      6011  3164      DCA DECNUM
2311      6012  4522      TESTN /GET A DIGIT
2312      6013  7000      NOP
2313      6014  5010      JMP I DECINT /NONE FOUND
2314      6015  4506      GETC
2315      6016  1164      TAD DECNUM /MULTIPLY PREV. # BY 10
2316      6017  7106      CLL RTL
2317      6020  7530      SPA S&L
2318      6021  5226      JMP .+5 /OVERFLOW (>2047)
2319      6022  1164      TAD DECNUM
2320      6023  7004      RAL
2321      6024  1127      TAD SORTCN /ADD NEW DIGIT
2322      6025  7530      SPA S&L
2323      6026  4526      FRROR
2324      6027  5211      JMP DECINT+1
2325      6041  0164      DECNUM=TEMP3
2326                                     /TEST FOR A SIGN
2327      6030  0000      TSTSGN, 0
2328      6031  4521      SPNOR
2329      6032  3127      DCA SORTCN
2330      6033  4511      SORTC /LOOK FOR + OR -
2331      6034  6114      SNLIST-1
2332      6035  4506      GETC /SIGN FOUND
2333      6036  4521      SPNOR /NOT FOUND
2334      6037  7240      CLA CMA
2335      6040  1127      TAD SORTCN /SORTCN: 0=+, 1=-
2336      6041  5630      JMP I TSTSGN /AC: 7777=+, 0=-
2337      6041  0163      DIGIT=TEMP2

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2338          /PRINT A 2-4 DIGIT UNSIGNED DECIMAL INTEGER
2339          /FIRST 2 LEADING ZEROES NOT PRINTED
2340      6042  0000      INTOUT, 0
2341          6043  3164      DCA DECNUM
2342          6044  1314      TAD INTPTR          /POWER OF 10 POINTER
2343          6045  3260      DCA INTSUB
2344          6046  3210      DCA DECINT          /DECINT=0 MEANS SKIP 0 OUTPUT
2345          6047  4255      JMS INTDO          /1ST DIGIT (1000S)
2346          6050  4255      JMS INTDO          /2ND DIGIT (100S)
2347          6051  2210      ISZ DECINT          /DECINT>0 MEANS PRINT WS
2348          6052  4255      JMS INTDO          /3RD DIGIT (10S)
2349          6053  4255      JMS INTDO          /4TH DIGIT (UNITS)
2350          6054  5642      JMP I INTOUT
2351          6055  0000      INTDO, 0
2352          6056  3163      DCA DIGIT          /INITIALIZE
2353          6057  1164      TAD DECNUM
2354          6060  1204      INTSUB, TAD INTARL      /SUBTRACT A POWER OF 10
2355          6061  7510      SPA
2356          6062  5267      JMP INTNEG
2357          6063  3164      DCA DECNUM          /POSITIVE RESULT
2358          6064  2163      ISZ DIGIT          /NONZERO DIGIT, SO IGNORE NO
2359          6065  2210      ISZ DECINT          /FURTHER ZEROES
2360          6066  5257      JMP INTSUB-1
2361          6067  7300      INTNEG, CLA CLL          /NEGATIVE RESULT
2362          6070  2260      ISZ INTSUB          /SET UP NEXT POWER OF 10
2363          6071  1210      TAD DECINT          /IS IT A LEADING 0?
2364          6072  7650      SNA CLA
2365          6073  5655      JMP I INTDO          /YES, SKIP IT
2366          6074  1163      TAD DIGIT          /NO, PRINT DIGIT
2367          6075  1036      TAD C260
2368          6076  4512      PRINTC
2369          6077  5655      JMP I INTDO
2370          /OUTPUT A SIGNED INTEGER IN AC
2371          SIGOUT, 0
2372          6101  3164      DCA DECNUM          /SAVE NUMBER
2373          6102  1164      TAD DECNUM
2374          6103  7710      SPA CLA
2375          6104  1035      TAD P2          /MAKE A -
2376          6105  1315      TAD C253          /MAKE A +
2377          6106  4512      PRINTC
2378          6107  1164      TAD DECNUM          /OUTPUT ABSOLUTE VALUE
2379          6110  7510      SPA
2380          6111  7041      CIA
2381          6112  4242      JMS INTOUT          /OUTPUT THE NUMBER
2382          6113  5700      JMP I SIGOUT
2383          6114  1204      INTPTR, TAD INTARL
2384          6115          SNLIST=:          /FOR SIGN TESTING
2385          6115  0253      C253, 253          /+
2386          6116  0255          255          /-

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2387                                /E FORMAT OUTPUT ROUTINE
2388      6117 7200      XXX,  CLA                                /CONVERT TO E FORMAT ON OVERFLOW
2389      6120 1051      TAD TOTDIG
2390      6121 7410      SKP
2391      6122 1133      FLOUT, TAD DECP                                /E FORMAT (%0) FLOATING OUTPUT
2392      6123 7041      CIA
2393      6124 7450      SNA
2394      6125 1347      TAD MUIG                                /6 DIGITS IF 0 GIVEN
2395      6126 3164      DCA DECNUM                                /DIGIT COUNTER
2396      6127 1022      TAD PER                                /PFRIND
2397      6130 4512      PRINTC
2398      6131 1412      FLDIG, TAD I XRT2                            /NEXT DIGIT
2399      6132 2157      ISZ T2                                /OUT OF SIG DIGITS?
2400      6133 5336      JMP .+3                                /NO, PRINT DIGIT
2401      6134 7240      CLA CMA                                /YES, RESET POINTER AND PRINT 0
2402      6135 3157      DCA T2
2403      6136 4750      JMS I OUTP
2404      0137 7410      SKP                                /FIELD NOW FILLED, PRINT EXPONENT
2405      6140 5331      JMP FLDIG
2406                                /B-D CONV EXPONENT OUTPUT
2407      6141 1346      TAD C305                                /PRINT LETTER E
2408      6142 4512      PRINTC
2409      6143 1156      TAD T1                                /OUTPUT THE EXPONENT
2410      6144 4300      JMS SIGOUT
2411      6145 5770      BEND,  JMP I BDCONV                            /DONE
2412      6146 0305      C305,  305                                /E
2413      6147 7772      MUIG,  -DIGITS
2414      6150 6437      OUTP,  OUTA
2415                                /PRINT A LINE NUMBER - "PRNTLN"
2416      6151 0000      XPRNTL, 0
2417      6152 1143      TAD LINENO
2418      6153 4520      RTL6
2419      6154 0071      AND P77
2420      6155 4242      JMS INTOUT                                /2-DIGIT PART NUMBER
2421      6156 1022      TAD PER
2422      6157 4512      PRINTC                                /DECIMAL POINT
2423      6160 1143      TAD LINENO
2424      6161 0026      AND P177                                /2-DIGIT STEP NUMBER
2425      6162 4242      JMS INTOUT
2426      6163 1033      TAD C240                                /SPACE
2427      6164 3142      DCA CHAR
2428      6165 4512      PRINTC
2429      6166 5751      JMP I XPRNTL

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2430
2431      6167 0015      NEGSGN, 255-240
2432      /BINARY TO DECIMAL CONVERSION AND OUTPUT
2433      RUCONV, 0
2434      6170 0000      TAD FLAC1      /CHECK SIGN
2435      6172 7700      SMA CLA
2436      6173 5376      JMP .+3
2437      6174 4450      NEGATE      /NEGATIVE, TAKE ABSOLUTE VALUE
2438      6175 1367      TAD NEGSGN  /MAKE A -
2439      6176 1033      TAD C240   /MAKE A SPACE
2440      6177 4512      PRINTC
2441      6200 7240      CLA CMA      /DECREMENT BINARY EXPONENT
2442      6201 1044      TAD FLAC0
2443      6202 3044      DCA FLAC0
2444      6203 3156      BUSCAL, DCA T1      /INITIALIZE DECIMAL EXPONENT
2445      6204 1044      TAD FLAC0  /START SCALING: -4<EXP<W?
2446      6205 7500      SMA
2447      6206 5220      JMP SDOWN   /TOO BIG, SCALE DOWN
2448      6207 1631      TAD I TEMPT
2449      6210 7700      SMA CLA
2450      6211 5244      JMP SCALED  /WITHIN LIMITS, DONE
2451      6212 4407      FENT      /TOO SMALL, SCALE UP
2452      6213 3631      FMY I TEMPT
2453      6214 0000      FEXT
2454      6215 7240      CLA CMA
2455      6216 1156      TAD T1      /DECREMENT DECIMAL EXPONENT
2456      6217 5203      JMP BUSCAL
2457      6220 4407      SDOWN, FENT      /SCALE DOWN
2458      6221 3632      FMY I PTENPT
2459      6222 0000      FEXT
2460      6223 7001      IAC      /INCREMENT DECIMAL EXPONENT
2461      6224 5216      JMP .-6
2462      /CONSTANTS
2463      6225 7771      DCOUNT, -DIGITS-1
2464      6226 7772      MDIGIT, -DIGITS
2465      6227 0007      RND2, DIGITS+1
2466      6230 7766      M12, -12
2467      /POINTERS
2468      6231 5770      TENPT, FLTEN
2469      6232 5773      PTENPT, FLPTEN
2470      6233 5734      MULT2P, MULT2
2471      6234 5742      MUL10P, MULT10
2472      6235 7544      BUFST, DIGBUF-1
2473      6236 6122      FLOUTP, FLOUT
2474      6237 6117      XXXP, XXX
2475      /ROUTINE TO DECREMENT THE DIGIT POINTER
2476      6240 7040      DECR, CMA
2477      6241 1040      TAD FLOP0
2478      6242 3040      DCA FLOP0
2479      6243 5351      JMP RET

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2480 /FINISHED SCALING, GENERATE DIGITS
2481 6244 4633 SCALFD, JMS I MUL10P /ROTATE FLAC LEFT
2482 6245 1235 TAD RUFST /INITIALIZE DIGIT BUFFER
2483 6246 3012 DCA XRT2
2484 6247 4634 JMS I MUL10P /MULTIPLY BY 10
2485 6250 1162 TAD REMAIN /OVERFLOW
2486 6251 5266 JMP RUC1
2487 6252 7110 RUC0, CLL RAR
2488 6253 3004 DCA FNEGSW /TEMP STORAGE OF FIRST DIGIT
2489 6254 1045 TAD FLAC1 /ROTATE FLAC RIGHT
2490 6255 7010 RAR
2491 6256 3045 DCA FLAC1
2492 6257 1046 TAD FLAC2
2493 6260 7010 RAR
2494 6261 3046 DCA FLAC2
2495 6262 1047 TAD FLAC3
2496 6263 7010 RAR
2497 6264 3047 DCA FLAC3
2498 6265 1004 TAD FNEGSW /PREV. OVERFLOW
2499 6266 2044 RUC1, ISZ FLAC0 /CHECK ROTATE COUNT
2500 6267 5252 JMP RUC0
2501 6270 7440 SZA
2502 6271 5301 JMP RUC2
2503 6272 7240 CLA CMA /FIRST DIGIT IS 0, IGNORE
2504 6273 1156 TAD T1 /DECREMENT DECIMAL EXPONENT
2505 6274 3156 DCA T1
2506 6275 1045 TAD FLAC1
2507 6276 7650 SNA CLA
2508 6277 3156 DCA T1 /EXP=0 IF MANTISSA=0
2509 6300 7410 SKP
2510 6301 3412 RUC2, DCA I XRT2 /FIRST DIGIT WAS NOT 0
2511 6302 1225 TAD DCOUNT /SET TO COUNT DIGITS
2512 6303 3044 DCA FLAC0
2513 6304 4634 JMS I MUL10P /MULTIPLY BY 10
2514 6305 1162 TAD REMAIN
2515 6306 3412 DCA I XRT2 /SAVE DIGIT JUST GENERATED
2516 6307 2044 ISZ FLAC0
2517 6310 5304 JMP .-4
2518 6311 1235 TAD RUFST /REINITIALIZE POINTER
2519 6312 3012 DCA XRT2
2520 6313 1225 TAD DCOUNT /DIGITS AVAILABLE
2521 6314 3157 DCA T2
2522 6315 1051 TAD TOTDIG /DIGITS WANTED
2523 6316 7450 SNA
2524 6317 5340 JMP R6 /E FORMAT, ROUND TO 6 PLACES
2525 6320 7041 CIA /COMPUTE FIELD SIZES
2526 6321 1133 TAD DECP
2527 6322 7550 SPA SNA
2528 6323 5327 JMP .+4 /COMPARE DECP TO TOTDIG
2529 6324 7200 CLA /MORE DECP THAN TOTAL DIGITS
2530 6325 1051 TAD TOTDIG
2531 6326 3133 DCA DECP
2532 6327 1156 TAD T1 /COMPARE EXPONENT TO FIELD SIZE
2533 6330 7500 SMA
2534 6331 7200 CLA /INTEGER FIELD >= EXPONENT

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2535	6332	1051		TAU TOTDIG	
2536	6333	7510		SPA	
2537	6334	5362		JMP FPRNT-2	/NO ROUNDING NEEDED
2538	6335	1226		TAD MDIGIT	/ROUND TO DECP+EXP PLACES
2539	6336	7500		SMA	
2540	6337	7200		CLA	
2541	6340	1227	RO,	TAU RND2	/START ROUNDING
2542	6341	3004		DCA FNEGSW	/PLACES TO ROUND TO
2543	6342	1235		TAD RUFST	/ROUNDING START ADDRESS
2544	6343	1004		TAU FNEGSW	/SET UP ROUND COUNT
2545	6344	3000		DCA FLOP0	
2546	6345	1004		TAD FNEGSW	
2547	6346	7041		CIA	
2548	6347	3004		DCA FNEGSW	/START ROUNDING PROCESS BY
2549	6350	1631		TAD I TENPT	/ADDING 4 TO FIRST DIGIT
2550	6351	2440	RET,	ISZ I FLOP0	/INCREMENT CURRENT DIGIT
2551	6352	1440		TAU I FLOP0	
2552	6353	1230		TAU M12	
2553	6354	7710		SPA CLA	/DIGIT>9?
2554	6355	5364		JMP FPRNT	/NO, END ROUNDING
2555	6356	3440		DCA I FLOP0	/YES, SET DIGIT TO 0 AND CARRY
2556	6357	2004		ISZ FNEGSW	/BEGINNING OF BUFFER?
2557	6360	5240		JMP DECR	/NO DECREMENT BUFFER ADDRESS
2558	6361	2440		ISZ I FLOP0	/YES, FAKE CARRY FROM FIRST DIGIT
2559	6362	2156		ISZ T1	
2560	6363	7200		CLA	

2561					
2562	6364	1051	FPRNT,	TAD TOTDIG	/SET UP FIELD SIZES
2563	6365	7450		SNA	
2564	6366	5636		JMP I FLOUTP	/E FORMAT OUTPUT
2565	6367	7041		CIA	
2566	6370	3164		DCA DECNUM	/NUMBER OF PLACES TO PRINT
2567	6371	1164		TAD DECNUM	
2568	6372	1156		TAD T1	
2569	6373	7540		SMA SZA	
2570	6374	5637		JMP I XXXP	/TOO BIG, PRINT F FORMAT
2571	6375	1133		TAD DECP	/OK, TEST DECIMAL PLACES
2572	6376	7500		SMA	
2573	6377	7200		CLA	/ADJUST DECIMAL POINT
2574	6400	7041		CIA	
2575	6401	1156		TAD T1	
2576	6402	7141		CLL CIA	
2577	6403	3004		DCA FNEGSW	/NUMBER OF INTEGER PLACES
2578	6404	7430		SZL	
2579	6405	5222		JMP IN+4	/NO INTEGER PLACES

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2580                                /START PRINTING
2581      6406 1156      HACK,      TAD T1
2582      6407 1004      TAD FNEGSW
2583      6410 7650      SNA CLA
2584      6411 5225      JMP DIG                                /PRINT A DIGIT
2585      6412 1004      TAD FNEGSW
2586      6413 7001      IAC
2587      6414 7710      SPA CLA                                /PRINT 0 IF ONE INTEGER PLACE LEFT
2588      6415 1025      TAD M20                                /OTHERWISE A SPACE
2589      6416 4237      IN,        JMS OUTA                                /PRINT A CHARACTER
2590      6417 5645      JMP I BUENDF                                /FIELD FILLED, EXIT
2591      6420 2004      ISZ FNEGSW
2592      6421 5206      JMP BACK                                /CONTINUE
2593      6422 1022      TAD PER                                /DECIMAL POINT
2594      6423 4512      PRINTC
2595      6424 5206      JMP BACK
2596      6425 7040      DIG,      CMA
2597      6426 1156      TAD T1                                /DECREMENT DECIMAL EXPONENT
2598      6427 3156      DCA T1
2599      6430 2157      ISZ T2                                /CHECK SIG DIGIT COUNT
2600      6431 5235      JMP .+4                                /SOME LEFT
2601      6432 7040      CMA                                /ALL USED UP
2602      6433 3157      DCA T2
2603      6434 5216      JMP IN                                /PRINT A 0
2604      6435 1412      TAD I XRT2                                /PRINT A SIG DIGIT
2605      6436 5216      JMP IN
2606                                /DIGIT PRINT ROUTINE FOR BDCONV
2607      6437 0000      OUTA,      0
2608      6440 1036      TAD C260                                /CONVERT TO ASCII
2609      6441 4512      PRINTC
2610      6442 2164      ISZ DECNUM                                /FIELD FILLED?
2611      6443 2237      ISZ OUTA                                /NO, GO TO SECOND RETURN
2612      6444 5637      JMP I OUTA
2613      6445 6145      BUENDF, BUENDF

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2614 / "OPTION" PROCESSOR
2615 6446 4521 OPTION, SPNOF /GET OPTION LETTER
2616 6447 4510 SORTJ
2617 6450 2377 OPTLST-1
2618 6451 7574 OPTTRL-OPTLST
2619 6452 4526 ERROR /ILLEGAL OPTION NAME
2620
2621 6453 7240 OPTK, CLA CMA /SWAP INPUT TO HIGH SPEED READER
2622 6454 3037 DCA HINBUF
2623 6455 6014 RFC /START READER
2624 6456 1317 TAD RESTR /POINT TO "HREAD"
2625 6457 1161 OPTK, TAD PTCH /SWAP TO KEYBOARD IF CALLED HERE
2626 6460 3113 DCA 113
2627
2628 6461 4565 OPTRET, TSTERM /MOVE TO ;SCR
2629 6462 5261 JMP .-1
2630 6463 5665 JMP I .+2 /END OF OPTIONS
2631 6464 5240 JMP OPTION /CONTINUE PROCESSING OPTIONS
2632 6465 0616 PROC
2633
2634
2635 6466 0000 /HIGH SPEED INPUT ROUTINE
HREAD, 0
2636 6467 1067 TAD M5 /SET UP READ TIMER
2637 6470 3156 DCA T1
2638 6471 3157 DCA T2
2639 6472 6001 HREAD2, IOM / (SWAP) - FOR 2-USER
2640 6473 1037 TAD HINBUF /WAIT FOR INPUT
2641 6474 7700 SMA CLA
2642 6475 5306 JMP HSGO /CHARACTER READY
2643 6476 2157 ISZ T2 /NOT YET, CHECK TIMER
2644 6477 5272 JMP HREAD2
2645 6500 2156 ISZ T1
2646 6501 5272 JMP HREAD2
2647 6502 1161 TAD PTCH /TIME'S UP, OUT OF TAPE
2648 6503 3113 DCA 113 /SWAP TO KEYBOARD INPUT
2649 6504 1054 TAD P337 /RETURN A R.A. TO KILL UNENDED LINE
2650 6505 5315 JMP RESTR-2 /OR SPURIOUS CHARACTER
2651
2652 6506 7040 HSGO, CMA /FOUND CHARACTER
2653 6507 3037 DCA HINBUF /SET TO READ NFXI
2654 6510 6016 RRR RFC
2655 6511 0026 AND P177 /IGNORE PARITY AND BLANK
2656 6512 7450 SNA
2657 6513 5267 JMP HREAD+1
2658 6514 1015 TAD C200
2659 6515 3142 DCA CHAK
2660 6516 5666 JMP I HREAD
2661
2662 6517 4003 RESTR, HREAD-CHIN

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2663			PAGE	
2664		6600		
2665			/FLOATING POINT PACKAGE	
2666			/ARITHMETIC INTERPRETER	
2667	6600	0000	FPNT, 0	
2668	6601	7300	CLA CLL	
2669	6602	1600	TAD I FPNT	/FLOATING INSTRUCTION
2670	6603	7450	SNA	
2671	6604	5600	JMP I FPNT	/FEXT
2672	6605	0015	AND C200	/GET PAGE BIT
2673	6606	7640	SZA CLA	
2674	6607	1200	TAD FPNT	/CURRENT PAGE
2675	6610	0024	AND P7600	
2676	6611	3231	DCA FLADDR	/START ADDRESS OF ADDRESSED PAGE
2677	6612	1600	TAD I FPNT	/GET ADDRESS BITS
2678	6613	0026	AND P177	
2679	6614	1231	TAD FLADDR	
2680	6615	3231	DCA FLADDR	/FULL 12-BIT ADDRESS
2681	6616	1600	TAD I FPNT	
2682	6617	2200	ISZ FPNT	
2683	6620	7106	CLL RTL	/OP BITS =>AC9-11
2684	6621	7006	RTL	/INDIRECT BIT =>LINK
2685	6622	0031	AND P17	
2686	6623	1236	TAD DRECTR	/SET UP OP POINTER
2687	6624	3235	DCA DIRECT	
2688	6625	1631	TAD I FLADDR	/INDIRECT?
2689	6626	7430	SZL	
2690	6627	3231	DCA FLADDR	/YES
2691	6630	4504	PUSHF	/NO, GET OPERAND
2692	6631	0000	FLADDR, 0	
2693	6632	4505	POPF	
2694	6633	0040	FLOP	
2695	6634	3043	DCA FLOP3	/CLEAR LOW ORDER OPERAND
2696	6635	5637	DIRECT, JMP I .+2	/OP DIRECT INSTRUCTION
2697	6636	5637	DRECTR, JMP I .+1	/OP TABLE
2698	6637	7406	FLPOW	
2699	6640	6720	FLADD	
2700	6641	6717	FLSUR	
2701	6642	7077	FLMUL	
2702	6643	7171	FLDIV	
2703	6644	6647	FLGET	
2704	6645	6653	FLPUT	
2705	6646	6762	FLNOR	



2706					
2707	6647	4504	FLGET,	PUSHF	/OP 5: GET FLAC FROM STORAGE
2708	6650	0040		FLOP	
2709	6651	1254		TAD .+3	/SET UP POINTER TO FLAC
2710	6652	5256		JMP .+4	
2711	6653	4504	FLPUT,	PUSHF	/OP 6: PUT FLAC IN STORAGE
2712	6654	0044		FLAC	
2713	6655	1231		TAD FLADDR	/SET UP POINTER TO STORAGE
2714	6656	3260		DCA .+2	
2715	6657	4505		POPF	
2716	6660	0000		0	/ADDRESS OF STORAGE LOCATION
2717	6661	5201		JMP FPNT+1	
2718	6662	0000	NEGOP,	0	/ROUTINE TO NEGATE FLOP
2719	6663	1042		TAD FLOP2	
2720	6664	7141		CLL CIA	
2721	6665	3042		DCA FLOP2	
2722	6666	7024		CML HAL	
2723	6667	1041		TAD FLOP1	
2724	6670	7041		CIA	
2725	6671	3041		DCA FLOP1	
2726	6672	1004		TAD FNEGSW	/FNEGSW IS COMPLEMENTED WHEN
2727	6673	7140		CLL CMA	/FLOP OR FLAC IS NEGATED
2728	6674	3004		DCA FNEGSW	
2729	6675	5662		JMP I NEGOP	
2730	6676	0000	NEGAC,	0	/ROUTINE TO NEGATE FLAC - "NEGATE"
2731	6677	7300		CLA CLL	/TRIPLE PRECISION
2732	6700	1047		TAU FLAC3	
2733	6701	7041		CIA	
2734	6702	3047		DCA FLAC3	
2735	6703	7024		CML HAL	
2736	6704	1046		TAD FLAC2	
2737	6705	7041		CIA	
2738	6706	3046		DCA FLAC2	
2739	6707	7024		CML HAL	
2740	6710	1045		TAD FLAC1	
2741	6711	7041		CIA	
2742	6712	3045		DCA FLAC1	
2743	6713	1004		TAU FNEGSW	
2744	6714	7140		CLL CMA	
2745	6715	3004		DCA FNEGSW	
2746	6716	5676		JMP I NEGAC	

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2747                                     /ARITHMETIC OPERATIONS
2748                                     /BOTH FLAC AND FLOP MUST BE NORMALIZED FOR
2749                                     /+*/ (FAD,FSD,FMY,FDV,FXP)
2750      6717  4262      FLSUP,   JMS -NEGOP      /OP 2: SUBTRACT OP (NEGATE AND ADD)
2751      6720  1045      FLADD,   TAD FLAC1      /OP 1: ADD OP
2752      6721  7650      SNA CLA
2753      6722  5247      JMP FLGET      /RESULT=OPERAND IF FLAC=0
2754      6723  1041      TAD FLOP1
2755      6724  7650      SNA CLA
2756      6725  5201      JMP FPNT+1      /RESULT=FLAC IF FLOP=0
2757      6726  1040      TAD FLOP0      /COMPARE EXPONENTS
2758      6727  7041      CIA
2759      6730  1044      TAD FLACK
2760      6731  7450      SNA
2761      6732  5357      JMP CMBINE      /EQUAL, GO ADD TOGETHER
2762      6733  7500      SNA
2763      6734  5346      JMP SHFLOP      /NOT EQUAL, NEED SHIFTING
2764      6735  1365      TAD P27      /FLAC>FLOP, SHIFT FLOP
2765      6736  7510      SPA
2766      6737  5247      JMP FLGET      /TOO FAR TO SHIFT, TREAT AS IF FLAC=0
2767      6740  1364      TAD M27
2768      6741  3235      DCA DIRECT      /NUMBER OF PLACES TO SHIFT
2769      6742  4767      JMS I RARAC1    /SHIFT FLAC 1 TO RIGHT
2770      6743  2235      ISZ DIRECT
2771      6744  5342      JMP .-2
2772      6745  5357      JMP CMBINE      /NUMBERS NOW ALIGNED
2773      6746  7041      SHFLOP, CIA    /ROUTINE TO SHIFT FLOP
2774      6747  1365      TAD P27
2775      6750  7510      SPA
2776      6751  5201      JMP FPNT+1      /FLOP TOO SMALL, TREAT AS 0
2777      6752  1364      TAD M27
2778      6753  3235      DCA DIRECT
2779      6754  4766      JMS I RAROP1    /SHIFT FLOP 1 TO RIGHT
2780      6755  2235      ISZ DIRECT
2781      6756  5354      JMP .-2
2782      6757  4767      CMBINE, JMS I RARAC1 /NOW SHIFT BOTH TO PREVENT OVERFLOW
2783      6760  4766      JMS I RAROP1
2784      6761  4770      JMS I FLAD3
2785      6762  4771      FLNOR, JMS I NORF      /ADD TRIPLE PRECISION
2786      6763  5201      JMP FPNT+1      /OP 7: NORMALIZE FLAC
2787      6764  7751      M27,   -27
2788      6765  0027      P27,   27
2789      6766  7271      RAROP1, RAROP
2790      6767  7251      RARAC1, RARAC
2791      6770  5713      FLAD3, TRPLAD
2792      6771  7000      NORF,  FNORM

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2793			/DIRECTORY FOR	INTERPRETIVE INPUT
2794	6772	3347	ASKLS2, INTERM	/CR, TERMINATOR
2795	6773	3347	INTERM	/FF, TERMINATOR
2796	6774	3330	INERR	/BA, RESTART INPUT
2797	6775	3347	INTERM	/COMMA, TERMINATOR
2798	6776	3347	INTERM	/USER-SPECIFIED TERMINATOR
2799	6777	3345	INGT	/LF, IGNORE

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2800
2801      7000      0000      MULPLK=
2802      7000      0000      FNORM, 0
2803      7001      7340      CLL CLA CMA
2804      7002      3004      DCA FNEGSW
2805      7003      1045      TAD FLAC1
2806      7004      7450      SNA
2807      7005      1046      TAD FLAC2
2808      7006      7450      SNA
2809      7007      1047      TAD FLAC3
2810      7010      7650      SNA CLA
2811      7011      5232      JMP NOREND
2812      7012      1045      TAD FLAC1
2813      7013      7710      SPA CLA
2814      7014      4450      NEGATE
2815      7015      3255      DCA NORC
2816      7016      1045      NKLOOP, TAD FLAC1
2817      7017      7104      CLL RAL
2818      7020      7710      SPA CLA
2819      7021      5225      JMP NMEXIT
2820      7022      4237      JMS RALAC
2821      7023      2255      ISZ NORC
2822      7024      5216      JMP NKLOOP
2823      7025      2004      NMEXIT, ISZ FNEGSW
2824      7026      4450      NEGATE
2825      7027      1255      TAD NORC
2826      7030      7041      CIA
2827      7031      1044      TAD FLAC0
2828      7032      3044      NUREND, DCA FLAC0
2829      7033      3047      DCA FLAC3
2830      7034      5600      JMP I FNDRM
2831      7035      6601      FLTPT, FPNT+1
2832      7036      6662      NEGOP1, NEGOP
2833      7037      7037      PRDOP1=
2834      7037      0000      RALAC, 0
2835      7040      1047      TAD FLAC3
2836      7041      7104      CLL RAL
2837      7042      3047      DCA FLAC3
2838      7043      4245      JMS DRAL
2839      7044      5637      JMP I RALAC
2840      7045      0000      DRAL, 0
2841      7046      1046      TAD FLAC2
2842      7047      7044      RAL
2843      7050      3046      DCA FLAC2
2844      7051      1045      TAD FLAC1
2845      7052      7004      RAL
2846      7053      3045      DCA FLAC1
2847      7054      5645      JMP I DRAL
2848      7055      7055      NORC=,

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/Routine to normalize FLAC
/initialize sign switch
/TEST FOR ZERO
/SIGN IS NEGATIVE
/SHIFT COUNTER
/SHIFT NEEDED?
/NO, BIT 1=1
/RECORD A SHIFT
/RESTORE SIGN
/CORRECT EXPONENT
/NORMALIZED # IS 3 WORDS
/ROUTINE TO ROTATE FLAC 1 TO LEFT
/CALL DOUBLE RAL
/ROTATE FLAC 1 LEFT, DOUBLE PRECISION

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2849          /ROUTINE TO TEST SIGNS OF FLAC AND FLOP,
2850          /PLACE FLAC IN TEMP, FOR FLMUL AND FLDIV
2851      7055 0000      FIXSGN, 0
2852      7056 7340          CLL CLA CMA
2853      7057 3004          DCA FNEGSW
2854      7060 1045          TAD FLAC1      /TEST FLAC
2855      7061 7450          SNA
2856      7062 5035          JMP I FLTPT      /ZERO, NO OPERATION NEEDED
2857      7063 7710      SPACLA, SPA CLA
2858      7064 4450          NEGATE      /TAKE ABS VAL OF FLAC
2859      7065 1045          TAD FLAC1      /TRANSFER TO TEMP
2860      7066 3162          DCA TEMP1
2861      7067 1046          TAD FLAC2
2862      7070 3163          DCA TEMP2
2863      7071 1041          TAD FLOP1
2864      7072 7710      SGNSKI, SPA CLA      /SPA CLA FOR *, SMA CLA FOR /
2865      7073 4630          JMS I NEGOP1      /TAKE ABS VAL OF FLOP
2866      7074 1004          TAD FNEGSW
2867      7075 3157          DCA T2      /STORE SIGN OF RESULT
2868      7076 5655          JMP I FIXSGN

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2869					
2870	7077	1263	FLMUL,	TAD SPACLA	/OP 3: MULTIPLY BY OPERAND
2871	7100	3272		DCA SGNSWT	/WANT POSITIVE OPERAND HERE
2872	7101	4255		JMS FIXSGN	
2873	7102	1042		TAD FLOP2	
2874	7103	4333		JMS SUMULT	/MULTIPLY (TEMP1 TEMP2) BY FLOP2
2875	7104	7301		CLA CLL IAC	/IGNORE LOW ORDER RESULT
2876	7105	1044		TAD FLAC0	/ADD EXPONENTS
2877	7106	1040		TAD FLOP0	
2878	7107	3044		DCA FLAC0	
2879	7110	1272		TAD PROD2	/SAVE PARTIAL RESULTS
2880	7111	3047		DCA FLAC3	
2881	7112	1237		TAD PROD1	
2882	7113	3046		DCA FLAC2	
2883	7114	1041		TAD FLOP1	
2884	7115	4333		JMS SUMULT	/MULTIPLY (TEMP1 TEMP2) BY FLOP1
2885	7116	1047		TAD FLAC3	
2886	7117	3047		DCA FLAC3	/COMBINE RESULTS OF MULTIPLICATIONS
2887	7120	7004		RAL	
2888	7121	1272		TAD PROD2	
2889	7122	1046		TAD FLAC2	
2890	7123	3046		DCA FLAC2	
2891	7124	7004		RAL	
2892	7125	1237		TAD PROD1	
2893	7126	3045		DCA FLAC1	
2894	7127	4200		JMS FNORM	/NORMALIZE RESULTS
2895	7130	2157		ISE I2	/CHECK SIGN OF RESULT
2896	7131	4450		NEGATE	
2897	7132	5035		JMP I FLTPT	

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2898
2899      7133  0000  SUMULT, 0      /UNSIGNED MULTIPLY ROUTINE
2900      7134  3200          DCA MULPLR  /24 BY 12 BITS
2901      7135  3237          DCA PROD1
2902      7136  3272          DCA PROD2
2903      7137  1370          TAD M14
2904      7140  3255          DCA FIXSCN  /SET TO COUNT 12 MULTIPLICATIONS
2905      7141  7100          CLL
2906      7142  1200  SLOOP, TAD MULPLR  /NEW MULTIPLIER BIT INTO LINK
2907      7143  7010          RAR
2908      7144  3200          DCA MULPLR  /MULPLR ALSO ACCUMULATES LOW-ORDER
2909      7145  7420          SNL          /RESULTS
2910      7146  5355          JMP SSHIFT
2911      7147  7100          CLL          /ADD MULTIPLIER IF BIT=1
2912      7150  1163          TAD TEMP2
2913      7151  1272          TAD PROD2
2914      7152  3272          DCA PROD2
2915      7153  7004          HAL
2916      7154  1162          TAD TEMP1
2917      7155  1237  SSHIFT;TAD PROD1  /SHIFT PRODUCT ONE TO RIGHT
2918      7156  7010          RAR
2919      7157  3237          DCA PROD1
2920      7160  1272          TAD PROD2
2921      7161  7010          RAR
2922      7162  3272          DCA PROD2
2923      7163  2255          ISZ FIXSCN
2924      7164  5342          JMP SLOOP
2925      7165  1200          TAD MULPLR  /DONE, EXIT WITH LOW ORDER IN AL
2926      7166  7010          RAR
2927      7167  5733          JMP I SUMULT
2928      7072          PROD2=SGNSWT
2929      7170  7764          M14,  -14

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2930
2931 7171 1041 FLDIV, TAD FLOP1 /OP 4: DIVIDE BY OPERAND
2932 7172 7650 SNA CLA
2933 7173 4526 ERROR /TRIED TO DIVIDE BY 0
2934 7174 1062 TAD P7700 /=SMA CLA
2935 7175 3272 DCA SGNSWT
2936 7176 4255 JMS FIXSGN
2937 7177 1040 TAD FLOP0 /SUBTRACT EXPONENTS
2938 7200 7041 CIA
2939 7201 1044 TAD FLAC0
2940 7202 7001 IAC
2941 7203 3044 DCA FLAC0
2942 7204 3045 DCA FLAC1 /ZERO FLAC FOR QUOTIENT
2943 7205 3046 DCA FLAC2
2944 7206 1314 TAD M30 /SET COUNTER
2945 7207 3271 DCA DIVCNT
2946 7210 5226 JMP DVLOOP
2947 7211 7420 DVSETQ, SNL /LINK IS QUOTIENT BIT
2948 7212 5216 JMP ZERQ00
2949 7213 3162 DCA TEMP1
2950 7214 1164 TAD TEMP3 /RESTORE LOW ORDER RESULT
2951 7215 3163 DCA TEMP2
2952 7216 7200 ZERQ00, CLA /SHIFT RESULT BIT INTO QUOTIENT
2953 7217 4647 JMS I DRALP /ROTATE LEFT DOUBLE PRECISION
2954 7220 1163 TAD TEMP2 /SHIFT DIVIDEND
2955 7221 7004 RAL
2956 7222 3163 DCA TEMP2
2957 7223 1162 TAD TEMP1
2958 7224 7004 RAL
2959 7225 3162 DCA TEMP1
2960 7226 7100 DVLOOP, CLL
2961 7227 1042 TAD FLOP2 /SUBTRACT DIVISOR FROM DIVIDEND
2962 7230 1163 TAD TEMP2
2963 7231 3164 DCA TEMP3
2964 7232 7004 RAL
2965 7233 1041 TAD FLOP1
2966 7234 1162 TAD TEMP1
2967 7235 2271 ISZ DIVCNT
2968 7236 5211 JMP DVSETQ
2969 7237 7210 CLA RAR /DONE, USE RESULT OF LAST SUBTRACTION
2970 7240 3047 DCA FLAC3 /AS EXTRA PRECISION
2971 7241 4650 JMS I NGR2
2972 7242 2157 ISZ T2
2973 7243 5646 JMP I FLOT1 /RESTORE SIGN
2974 7244 4450 NEGATE
2975 7245 5646 JMP I FLOT1
2976 7246 6601 FLOT1, FPNT+1
2977 7247 7045 DRALP, DRAL
2978 7250 7000 NUR2, FNORM

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2979
2980 7251 0000 RARAC, 0 /ROUTINE TO ROTATE FLAG 1 RIGHT
2981 7252 7300 CLA CLL
2982 7253 1045 TAD FLAG1
2983 7254 7510 SPA
2984 7255 7020 CML /PROPAGATE SIGN BIT
2985 7256 7010 RAR /SHIFT
2986 7257 3045 DCA FLAG1
2987 7260 1040 TAD FLAG2
2988 7261 7010 RAR
2989 7262 3046 DCA FLAG2
2990 7263 1047 TAD FLAG3
2991 7264 7010 RAR
2992 7265 3047 DCA FLAG3
2993 7266 2044 ISZ FLAG0 /ADJUST EXPONENT
2994 7267 5651 JMP I RARAC
2995 7270 5651 JMP I RARAC
2996 7271 DIVCNT=
2997 7271 0000 RAROP, 0 /ROUTINE TO SHIFT FLOP 1 RIGHT
2998 7272 7300 CLA CLL
2999 7273 1041 TAD FLOP1
3000 7274 7510 SPA
3001 7275 7020 CML
3002 7276 7010 RAR
3003 7277 3041 DCA FLOP1
3004 7300 1042 TAD FLOP2
3005 7301 7010 RAR
3006 7302 3042 DCA FLOP2
3007 7303 1043 TAD FLOP3
3008 7304 7010 RAR
3009 7305 3043 DCA FLOP3
3010 7306 2040 ISZ FLOP0
3011 7307 5671 JMP I RAROP
3012 7310 5671 JMP I RAROP

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3013          /ROUTINE TO FIX FLAC - "FIX"
3014          /REMOVE FRACTIONAL PART BUT LEAVE FLOATING
3015          /FIXED NUMBER IN AC ON EXIT
3016  7311  0000  XFIX,  0
3017  7312  7300          CLA CLL
3018  7313  1044          TAD FLAC
3019  7314  7750  M30;  SPA SNA CLA  /TEST EXPONENT
3020  7315  3044          DCA FLAC  /IF -1<#<1, CLEAR ENTIRELY
3021  7316  1044          TAD FLAC  /EXCEPT FOR SIGN BIT
3022  7317  1331          TAD FIXC
3023  7320  3271          DCA DIVCNT
3024  7321  7430          S&L
3025  7322  5711          JMP I XFIX  /TOO BIG TO FIX
3026  7323  4251          JMS RARAC  /FIX BY ROTATING FRACTIONAL BITS
3027  7324  2271          ISZ DIVCNT  /OUT OF FLAC
3028  7325  5323          JMP .-2
3029  7326  3047          DCA FLAC+3  /CLEAR FRACTIONAL PART
3030  7327  1046          TAD FLAC+2
3031  7330  5711          JMP I XFIX
3032  7331  7751  FIXC,  -27
3033          /ROUTINE TO FLOAT C(AC) AS FLOATING PT, INTEGER
3034          /- "FLOAT"
3035  7332  0000  XFLOAT,  0
3036  7333  3045          DCA FLAC1  /SAVE NUMBER
3037  7334  3046          DCA FLAC2
3038  7335  3047          DCA FLAC3
3039  7336  1005          TAD P13  /INTEGER EXPONENT
3040  7337  3044          DCA FLAC0
3041  7340  4251          JMS RARAC  /IN CASE NUMBER WAS 4000
3042  7341  4650          JMS I NOR2  /NORMALIZE
3043  7342  5732          JMP I XFLOAT

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3044
3045 7343 7037 RFLAC, RALAC
3046 7344 5713 TFLAD, TRPLAD
3047 7345 7774 M4, -4
3048 7346 4421 RANDOM, 4421 /CURRENT RANDOM NUMBER
3049 7347 3040 3040
3050 7350 0001 0001
3051 /STATISTICAL RANDOM NUMBER GENERATOR
3052 /BASED ON DECUS 5-25, PAPER RESIDUE METHOD
3053 /NEW R=R*(2+17+3) MOD 36 BITS
3054 7351 4407 FRAN, FENT
3055 7352 5346 FGT RANDOM /R=OLD RANDOM NUMBER
3056 7353 0000 FEXT /ALREADY SHIFTED LEFT 12 BITS
3057 7354 4504 PUSHE
3058 7355 7346 RANDOM
3059 7356 4505 POPF
3060 7357 0041 FLOP1
3061 7360 1345 TAD M4 /SHIFT 4 MORE TO GET R*2+16
3062 7361 3156 DCA T1
3063 7362 4743 JMS I PFLAC
3064 7363 2150 ISZ T1
3065 7364 5362 JMP .-2
3066 7365 4744 JMS I TFLAD /*R = R*(2+16+1)
3067 7366 4743 JMS I PFLAC /*2 = R*(2+17+2)
3068 7367 4744 JMS I TFLAD /*R = R*(2+17+3)
3069 7370 4504 PUSHE
3070 7371 0045 FLAC1
3071 7372 4505 POPF
3072 7373 7346 RANDOM /SAVE NEW RANDOM NUMBER
3073 7374 3047 DCA FLAC3
3074 7375 3044 DCA FLAC0 /MAKE IT A 2-WORD FRACTION
3075 7376 1045 TAD FLAC1 /CHECK SIGN
3076 7377 7700 SMA CLA
3077 7400 5500 RETURN /POSITIVE
3078 7401 2040 ISZ FLAC2 /NEGATIVE, TAKE 1S COMPLEMENT
3079 7402 7410 SKP
3080 7403 2045 ISZ FLAC1
3081 7404 4450 NEGATE
3082 7405 5500 RETURN

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3083
3084      7406 1407  FLPOW, TAD I 7 /OP 0: RAISE FLAC TO POWER
3085      7407 4503  PUSHA /SAVE FLOATING POINTER
3086      7410 4504  PUSHF /SAVE FLAC
3087      7411 0044  FLAC
3088      7412 4505  POPF
3089      7413 7545  FLTEMP
3090      7414 4504  PUSHF /GET FLOP
3091      7415 0040  FLOP
3092      7416 4505  POPF
3093      7417 0044  FLAC
3094      7420 4452  FIX /FIX OPERAND
3095      7421 7710  SPA CLA
3096      7422 7001  IAC
3097      7423 1045  TAD FLAC1
3098      7424 7640  SZA CLA
3099      7425 4526  ERROR /RAISING TO TOO HIGH A POWER
3100      7426 1046  TAD FLAC2
3101      7427 3350  DCA XFL
3102      7430 4407  FENT /PUT 1. IN FLAC
3103      7431 5661  FGT I ONEP
3104      7432 0000  FEXT
3105      7433 1350  TAD XFL
3106      7434 7450  SNA
3107      7435 5255  JMP FLXEND /X*0=1, DO NOT MULTIPLY
3108      7436 7500  SMA
3109      7437 5246  JMP RAISTP /RAISE TO * POWER
3110      7440 4407  FENT /RAISE TO - POWER
3111      7441 4345  F0V FLTEMP
3112      7442 6345  FPT FLTEMP
3113      7443 5661  FGT I ONEP
3114      7444 0000  FEXT
3115      7445 5250  JMP .+3
3116      7446 7041  RAISTP, CIA
3117      7447 3350  DCA XFL /SET COUNTER
3118      7450 4407  FENT /DO MULTIPLICATIONS
3119      7451 3345  FMY FLTEMP
3120      7452 0000  FEXT
3121      7453 2350  ISZ XFL
3122      7454 5250  JMP .-4
3123      7455 1413  FLXEND, POPA /RESTORE FLOATING POINTER
3124      7456 3407  DCA I 7
3125      7457 5660  JMP I .+1
3126      7460 6601  FPNT+1
3127      7461 1573  ONEP, FLTONE

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3128 /FLOATING SQUARE ROOT FUNCTION
3129 7462 1045 FSQT, TAD FLAC1 /TEST SIGN
3130 7463 7510 SPA
3131 7464 4526 ERROR /SQUARE ROOT OF NEG NUMBER
3132 7465 7650 SNA CLA
3133 7466 5500 RETURN /ZERO, RESULT IS ZERO
3134 7467 1044 TAD FLAC0 /CONSTRUCT INITIAL APPROXIMATION
3135 7470 7510 SPA /BY HALVING EXPONENT
3136 7471 7020 CML
3137 7472 7010 RAR
3138 7473 3044 DCA FLAC0
3139 7474 1334 TAD SUC0N
3140 7475 3045 DCA FLAC1
3141 7476 4407 SUCLOOP, FENT /MAKE NEW APPROXIMATION
3142 7477 6345 FPT FLTEMP /NEW X=(N/X+X)/2
3143 7500 5560 FGT I FLARGP /ORIGINAL ARG
3144 7501 4345 FDV FLTEMP
3145 7502 1345 FAD FLTEMP
3146 7503 0000 FEXT
3147 7504 7040 CMA
3148 7505 1044 TAD FLAC0
3149 7506 3044 DCA FLAC0
3150 7507 1044 TAD FLAC0 /COMPARE OLD AND NEW APPROXIMATIONS
3151 7510 7041 CIA
3152 7511 1345 TAD FLTEMP
3153 7512 7640 SZA CLA
3154 7513 5276 JMP SUCLOOP /EXPONENTS NOT EQUAL
3155 7514 1045 TAD FLAC1
3156 7515 7041 CIA
3157 7516 1346 TAD FLTEMP+1
3158 7517 7640 SZA CLA
3159 7520 5276 JMP SUCLOOP /HIGH ORDER NOT EQUAL
3160 7521 1046 TAD FLAC2
3161 7522 7041 CIA
3162 7523 1347 TAD FLTEMP+2
3163 7524 7450 SNA
3164 7525 5500 RETURN /COMPARE LOW ORDERS TO
3165 7526 7500 SMA /WITHIN PLUS OR MINUS ONE BIT
3166 7527 7041 CIA
3167 7530 7001 IAC
3168 7531 7650 SNA CLA
3169 7532 5500 RETURN
3170 7533 5276 JMP SUCLOOP
3171 7534 3015 SUC0N, 3015

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3172                                     /FUNCTION TO EVALUATE SIGN PART OF FLAC
3173                                     /RESULTS: -1 FOR NEGATIVE, 0 FOR ZERO, +1 FOR POSITIVE
3174      7535 1045      ESGN:  TAD FLAC1
3175      7536 7450      SNA
3176      7537 5343      JMP .+4          /ZERO, SET RESULT TO 0
3177      7540 7710      SPA CLA
3178      7541 1034      TAD M2          /NEGATIVE (-1)
3179      7542 7001      IAC            /POSITIVE (+1)
3180      7543 4430      FLOAT          /FLOAT C(AC) = -1,0,1
3181      7544 5500      RETURN
3182                                     DIGBUF=  /OUTPUT DIGIT PUFFER (8 WORDS)
3183      7545 0000      FLTEMP, 0      /TEMPORARY REGISTERS
3184      7546 0000      0
3185      7547 0000      0
3186      7550      ASKBUF=  /"ASK" INPUT BUFFER (TO END OF PAGE)
3187      7550 0000      XFL, 0
3188      $

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4000  
4100  
  
4200  
4300  
  
4400  
4500  
  
4600  
4700

5000  
5100  
  
5200  
5300

5400  
5500

5600	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
5700	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111

6000	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
6100	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111

6200	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
6300	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111

6400	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
6500	11111111	11111111	00000000	00000000	00000000	00000000	00000000	00000000	00000000

6600	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
6700	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111

7000	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
7100	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111

7200	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
7300	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111

7400	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
7500	11111111	11111111	11111111	11111111	11111111	10000000	00000000	00000000	00000000

7600  
7700



ADD	0135	COMOUT	2600	ERG	2252	FLG11	7240
ALIST	1133	COUTPT	3373	ERL	2250	FLG12	6122
ARGNXT	1723	CPRINT	3247	ERR2	2736	FLG13	6236
ASK	1206	CTSF	3220	ERROR	4526	FLG14	7406
ASKBUF	7550	DBCONV	5600	ERROR2	4526	FLG15	5775
ASKEND	3317	DBLOOP	5656	ERROR3	4526	FLG16	6653
ASKLS2	6772	DBTERM	5653	ERROR4	4526	FLG17	6717
ASKLST	5776	DCONT	0462	ERROR5	2735	FLG18	7545
ATLIST	1561	DCOUNT	6225	ERV	2235	FLG19	5770
ATSW	0131	DERGSW	0151	ERVX	2240	FLG20	1570
AXIN	0010	DECEXP	5764	ETERM	1641	FLG21	7035
AXOUT	0017	DECIN1	5757	ETERM1	1615	FLG22	0214
BACK	6406	DECINT	6010	ETERM2	1647	FLG23	0215
BUC0	6252	DECNUM	0164	FFRKMN	1636	FLXEND	7465
BUC1	6266	DECP	0133	IVAL	1601	FRNGSW	0004
BUC2	6301	DECR	0240	EVLN	0370	FNORM	7004
BDCONV	6170	DELETE	2111	EXIT	2644	FNTARF	0571
BDEND	6145	DGRP	0423	EXITJ	2657	FNTARL	2210
BDENDP	6445	DGRP1	0432	EXTR	2334	FOM	0024
BOSCAL	6203	DIG	0425	FL0P	0414	FOUTPU	0272
BEGIN	3432	DIGBUF	7545	FCONT	1064	FP10P	0415
BOTTOM	0027	DIGIT	0163	FEND	1126	FPAT	6002
HUFBEQ	3432	DIGITS	0006	FEND3	2010	FPRNT	6344
HUFBOT	3363	DIRECT	6635	FINDLN	4516	FRAN	7351
HUFK	0134	DIVCNT	7271	FINDN	2271	FRSI	3420
HUFST	6235	DMPSW	0152	FINPUT	0073	FRSTX	3440
HUFTOP	3364	DO	0416	FIX	4452	FSGN	7535
C100	0006	DOK	2130	FIXC	7331	FSOT	7462
C200	0015	DONE	2146	FLXSGN	7055	FTXR	1125
C240	0033	DOONE	0454	FLAC	0044	FTXS	1124
C253	6115	DRAL	7045	FLAC0	0044	GEG	0356
C260	0036	DRALP	7247	FLAC1	0045	GENU	2350
C305	6146	DRFCTR	6636	FLAC2	0046	GET1	2351
C43	5763	DVLOOP	7226	FLAC3	0047	GET3	2360
C7700	0367	DVSETU	7211	FLAD3	6770	GETARG	1104
CCR	0060	ECHO	2471	FLADD	6720	GETC	4000
CFNR	5766	ECHOLS	1612	FLADDR	6631	GETLN	4510
CFRS	0075	ECHP	3255	FLARG	2034	GETVAR	1411
CFRSX	0227	EFOP	0131	FLARCP	0160	GEXIT	0332
CHAR	0142	EFUN	1742	FLD1C	6131	GFND1	1512
CHIN	2463	EFUN2	1764	FLD1V	7171	GINC	0140
CLF	0057	EFUN3	2056	FLGET	6647	GLIST	1001
CMRINE	6757	EFUN3I	0100	FLINST	5767	GOE	0000
CNTR	0132	FINPUT	5701	FLMUL	7077	GOT	0001
CUL	1233	FLPAR	1753	FLNOR	6762	GRPISI	2451
COLP	3251	FND	0076	FLOAT	4430	GS1	1443
COMBOT	0226	ENULN	4517	FLOP	0040	GS2	1447
COMBUF	0074	ENDT	0077	FLOP0	0040	GS3	1447
COMEIN	2527	ENUM	1732	FLOP1	0041	GS4	1444
COMGO	1164	EPAR	1710	FLOP2	0042	GS5	1520
COMLST	0756	EPAR2	1755	FLOP3	0043	GTEM	0021
COMMEN	0620	ERASE	2226	FLOPR	1674	GTESTA	0047

HELLO	3274	M20	0025	OPTION	6446	PER	0022
HINBUF	0037	M240	0063	OPTK	6457	PERIOD	5612
HP	3301	M27	6764	OPTLST	2400	PGOTO	1022
HPT	2037	M3	0066	OPTM	3271	PIAC	1122
HREAD	6466	M30	7314	OPTN	3253	PKFERU	3122
HREAD2	6472	M4	7345	OPTP	3234	PLPR	1023
HSGO	6506	M40	2376	OPTR	6453	POFA	1413
IBAR	0212	M5	0067	OPTR0	2661	POPF	4535
IF	0776	M77	0023	OPTRET	6461	POPJ	5502
IGNOR	0217	MBREAK	2602	OPTRI	2663	PQUES	3040
IN	6416	MCR	0065	OPTR0	2662	PRCP	1133
INBARR	3330	MDIG	6147	OPTS	3256	PRINTC	4512
INBUF	2664	MDIGIT	6226	OPTT	3237	PRFILE	4514
INDEV	0140	MF	0007	OPTTBL	2174	PRIC	0010
INGT	3345	MFLT	0066	OPTT00	3203	PRICES	0010
INLIST	0564	MINUSA	0003	OPTTL	3221	PRJ01	7037
INPINT	0366	MODIFY	1273	OPTX	3243	PRJ02	7072
INPUTX	0274	MPER	0064	OPTXIT	3241	PSBIT	5661
INSIGN	5765	MUL10P	6234	OUT	2477	PT1	0154
INTABL	6004	MULPLK	7000	OUTA	6437	PT2	1132
INTASK	3306	MULT10	5742	OUTCR	2510	PTCH	0161
INTDO	6055	MULT2	5734	OUTDEV	0137	PTENPT	6232
INTERM	3347	MULT21	5756	OUTP	6150	PUSHA	4503
INTERP	1226	MULT2P	6233	OUTPT	3365	PUSHF	4504
INTG	1272	NAGSW	0141	OUTS	1240	PUSHJ	4501
INTNEG	6067	NEGAC	6076	OUTX	2507	R6	6040
INTOUT	6042	NEGATE	4450	OVCHK	5633	RALSTP	7440
INTPTR	6114	NEGOP	6062	OWAIT	3225	RALAC	7037
INTRPT	2603	NEGOP1	7036	P0	1523	RANDB0R	7340
INTSUB	6060	NEGSGN	6167	P13	0005	RARAC	7251
IOBUF	3400	NEWDIG	5614	P17	0031	RARAC1	6767
IOSW	3305	NMEXIT	7025	P177	0026	RARUP	7271
IOVRL	5761	NOR2	7250	P2	0035	RARUP1	6760
IRARAC	5760	NORC	7055	P27	6765	REAUC	4510
IRETN	0230	NOREND	7032	P277	0032	RECOVR	2745
LASTLN	0150	NORF	6771	P337	0054	REMAIN	0162
LASTOP	0130	NOTDIG	5650	P4000	0225	RESTR	6517
LASTV	0155	NRLOOP	7016	P7600	0024	RET	6351
LIBRAR	2735	NTEXTIT	1550	P77	0071	RETURN	1554
LINENO	0143	NTST1	1552	P7700	0062	RETURN	5540
LIST3	0060	NTST2	1553	PACBUF	3023	RFLAC	7043
LIST6	0054	ONEINC	1117	PACKC	4507	RK12	6227
LISTGO	1402	ONFP	7461	PACKST	0153	ROT	3000
LNERR	0361	OPNEXT	1610	PACLS2	1204	RUTRAC	5762
LPRST	2077	OPTARL	1731	PACLS1	3056	RVL6	4500
M100	0062	OPTARS	2026	PC	0145	RUP1	7045
M11	0070	OPTC	3302	PC1	0620	RUP2	3077
M12	6230	OPTC1	3250	PCHK	0510	RUP3	3310
M13	1123	OPTCOL	3244	PCK1	3042	SAVAC	2000
M137	2377	OPTDOP	2734	PD2	0532	SAVLK	2001
M14	7170	OPTE	3252	PD3	0550	SBAR	1321
M2	0034	OPTI	3303	PDLXR	0013	SCALEU	6230

SCHAR	1312	TENPT	6231	XFIND	2265
SCONT	1307	TERMS	2006	YFIX	7311
SDLOOP	7142	TESTC	4525	YFL	7550
SDMULT	7133	TESTM	4522	XFLUAT	7332
SDOWN	6220	TEXTP	0017	XGFLN	0312
SDSHIF	7155	TFLAD	7344	XI33	2665
SET	1024	TGRP2	0473	XINT	1156
SEX	1357	THISLN	0146	XOUTL	2675
SEXC	0752	THISOP	0147	XPOPJ	1556
SFINAL	1060	TINT	2625	XPRNTL	6151
SFOUND	1325	TINTR	1260	XPUA	0501
SGNSWT	7072	TLIST	1142	XPUSHJ	0523
SGNST	5755	TLIST2	1405	XRT	0011
SGOT	1331	TLIST3	1162	XRT2	0012
SHFLUP	6746	TOTDIG	0051	XRT3	0016
SIGOUT	6100	TQUOT	1241	XRTL6	0005
SIN	2706	TRPLAD	5713	XSORTC	0733
SKIPNP	3014	TTERM	4565	XSPNOR	1524
SKPNP	2732	TSTGRP	4524	XTSTC	0713
SNLIST	6115	TSTLPR	4523	XTESTN	1533
SORTE	1333	TSTSGN	6030	XTSTER	2014
SORTC	4511	TSWP	3233	XXX	6117
SORTCN	0127	TTXTR	1237	XXXP	6237
SORTJ	4510	TTXTS	1236	ZERQUO	7216
SPACLA	7063	TXTRFS	2443		
SPLAT	3124	TXTSAV	2435		
SPNOR	4521	TYPE	1207		
SPCON	7534	TYPE2	1227		
SQLOOP	7476	USERT	6002		
SNLST	1376	USERTP	3270		
START	0177	UTE	2317		
STARTV	0134	UTO	2326		
STRING	3323	UTRA	2315		
SURS	1524	UTX	2337		
T1	0156	VAL	2463		
T2	0157	WAITP	2733		
TAB	1362	WALL	0671		
TABCTR	0053	WEXIT	0703		
TASK	1210	WRITE	0641		
TASK4	1252	WTEST2	0660		
TASKCL	1222	WTFSTG	0674		
TCRLF	1250	WTXR	0712		
TCRLF2	1254	WTXS	0711		
TDEND	3170	WX	0676		
TDLOOP	3131	X0	1161		
TDOUTP	3174	XABS	2053		
TDTEXT	3175	XADC	2414		
TDUMP	3125	XCT	0020		
TELSW	2660	XCTIN	0136		
TEMP1	0162	XDXS	1153		
TEMP2	0163	XDYS	1145		
TEMP3	0164	XENDLN	2417		

ERRORS DETECTED: 0

LINKS GENERATED: 0

RUN-TIME: 28 SECONDS

3K CORE USED

```

1      /FOCAL 5/69      EDWARD TAFT      6/10/69
2      /EXTENDED FUNCTION PACKAGE
3      /
4      /FSIN: SIN(X)          X IN RADIANS
5      /FCOS: COS(X)          X IN RADIANS
6      /FATN: ARC TAN(X)      RESULT IN RADIANS
7      /FEXP: EXP(X)
8      /FLOG: LN(X)
9      /////
10     /DEFINITIONS
11     FIXMRI FAD=1000
12     FIXMRI FSB=2000
13     FIXMRI FMY=3000
14     FIXMRI FDV=4000
15     FIXMRI FGT=5000
16     FIXMRI FPT=6000
17     7000 FNR=7000
18     4407 FNT=4407
19     0000 FEXT=0
20
21     FIXTAB
22     /////
23     4450 NEGATE= 4450
24     1045 GETSGN= 1045
25     5500 RETURN= 5500
26     0010 SN= 10
27     4452 FIX= 4452
28     4503 PUSHA= 4503
29     1413 PUPA= 1413
30     0044 FLAC= 44
31     7545 FLTEMP= 7545
32     1573 FLTONE= 1573
33     0013 PULXR= 13
34     4526 ERKUR= 4526
35     4430 FLOAT= 4430
36     0571 FNTAPF= 571
37     0027 RUITOM= 27
38     1164 CUMGO= 1164
39     4510 SURTJ= 4510
40     0067 MS= 67
41     0132 CNTR= 132
42     0010 AXIN= 10
43     4565 TSTERM= 4565
44     0616 PROC= 616
45     2735 ERRO5= 2735
46     5600 DBCONV= 5600

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```

46      0027      *BOTTOM
47      0027 5112      FCOS-1      /TOP OF TEXT
48      0600      *FNTABF+7
49      0600 5335      FATN      /POINTERS TO EXTENDED FUNCTIONS
50      0601 5242      FEXP
51      0602 5454      FLOG
52      0603 5117      FSTN
53      0604 5113      FCOS
54
55      //
56      /ENABLE A "LIBRARY DELETE" COMMAND
57      /WHICH WILL DELETE THE EXTENDED FUNCTIONS AND
58      /FREE MORE FOR USER AREA.
59      1174      *COMMCU+10
60      6556 6556      LIBRARY
61      6555 0304      LIRLST, "D"
62      //
63      6556 4510      LIBRARY;SURTJ      /"LIBRARY" - EXPANDABLE COMMAND
64      6557 6554      LIBLST-1
65      6560 0022      LIBGO-LIRLST
66      6561 4526      ERROR      /ILLEGAL LIBRARY COMMAND
67
68      //
69      6562 1067      LIRO, TAD M5      /DELETE THE EXTENDED FUNCTIONS
70      6563 3132      DCA CNTR
71      6564 1375      TAD EXTAP
72      6565 3010      DCA AXIN
73      6566 1175      TAD PERROK
74      6567 3410      DCA I AXIN      /SET ERRORS POINTERS
75      6570 2132      ISZ CNTR
76      6571 5366      JMP ,-3
77      6572 1376      TAD DTOP
78      6573 3027      DCA BOTTOM      /MOVE TOP POINTER UP
79      6574 5261      JMP 6461      /OPTRET (TO REACH END OF COMMAND)
80
81      //
82      6575 0577      EXTAR, FNTABF+6
83      6576 5577      DTOP, DBCONV-1
84      6577 6562      LIBGO, LIRO
85      0175      *175
86      0175 2735      PERROK, ERRORS

```

```

85          /FOCAL EXTENDED FUNCTIONS
86          *5113
87          /
88          5113 4450 FCOS,  COSINE
89          5114 4407 FENT   NEGATE      /COS(X)=SIN(PI/2-X)
90          5115 1772 FAD I P12
91          5116 0000 FEXT   FAD I P12
92          //
93          /
94          5117 1045 FSIN,  SINE
95          5120 7450 GETSGN
96          5121 5500 SNA
97          5122 7710 RETURN   /SIN(0)=0
98          5123 4771 JMS I NEG2 /SIN(-X)=-SIN(X)
99          5124 3010 DCA SN
100         5125 4407 FENT
101         5126 4374 FDV TWOPI /REDUCE MODULO 2 PI
102         5127 6773 FPT I X2
103         5130 0000 FEXT
104         5131 4452 FIX
105         5132 4450 NEGATE
106         5133 4407 FENT
107         5134 7000 FNR
108         5135 1773 FAD I X2
109         5136 3374 FMY TWOPI
110         5137 6773 FPT I X2
111         5140 2377 FSR PI
112         5141 0000 FEXT
113         5142 1045 GETSGN   /X<PI?
114         5143 7710 SPA CLA
115         5144 5353 JMP PCHECK /YES
116         5145 4407 FENT     /NO, SIN(X-PI)=-SIN(X)
117         5146 6773 FPT I X2
118         5147 0000 FEXT
119         5150 1010 TAD SN
120         5151 7040 CMA
121         5152 3010 DCA SN
122         5153 4407 PCHECK, FENT   /X<PI/2?
123         5154 5773 FGT I X2
124         5155 2772 FSR I PI2
125         5156 0000 FEXT
126         5157 1045 GETSGN
127         5160 7710 SPA CLA
128         5161 5367 JMP PALGO  /YEU
129         5162 4407 FENT     /NO, SIN(X)=SIN(PI-X)
130         5163 5377 FGT PI
131         5164 2773 FSR I X2
132         5165 6773 FPT I X2
133         5166 0000 FEXT
134         5167 5770 PALGO, JMP I .+1 /PERFORM POWER SERIES EXPANSION
135         5170 5540 PALG

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136					
137	5171	5321	NEG2,	FNEG	
138	5172	5413	PI2,	PIOT	
139	5173	5325	X2,	X	
140	5174	0003	TWOPI,	0003	
141	5175	3110		3110	
142	5176	3761		3761	
143	5177	0002	PI,	0002	
144	5200	3110		3110	
145	5201	3761		3761	
146			/	EXPONENTIAL	
147	5202	1045	FEXP,	GETSN	/TAKE ABSOLUTE VALUE
148	5203	7710		SPA CLA	
149	5204	4321		JMS FNEG	
150	5205	3010		DCA SN	
151	5206	4407		FENT	
152	5207	3272		FMY LG2E	
153	5210	6325		FPT X	
154	5211	0000		FEXT	
155	5212	4452		FIX	
156	5213	4503		PUSHA	/SAVE INTEGER PART
157	5214	4450		NEBATE	
158	5215	4407		FENT	
159	5216	7000		FNR	
160	5217	1325		FAU X	/RETAIN FRACTIONAL PART
161	5220	6325		FPT X	
162	5221	3325		FMY X	
163	5222	6330		FPT XSQR	
164	5223	1267		FAU DF	
165	5224	6733		FPT I TP	
166	5225	5264		FGT CF	
167	5226	4733		FDV I TP	
168	5227	2325		FSR X	
169	5230	1256		FAU AF	
170	5231	6733		FPT I TP	
171	5232	5261		FGT PF	
172	5233	3330		FMY XSQR	
173	5234	1733		FAU I TP	
174	5235	6733		FPT I TP	
175	5236	5325		FGT X	
176	5237	4733		FDV I TP	
177	5240	3275		FMY TWO	
178	5241	1734		FAU I ONEPT	
179	5242	0000		FEXT	
180	5243	1413		POPA	
181	5244	1044		TAD FLAC	
182	5245	3044		DCA FLAC	
183	5246	2010		ISZ SN	/EXP(-X)=1/EXP(X)
184	5247	5500		RETURN	
185	5250	4407		FENT	
186	5251	6325		FPT X	
187	5252	5734		FGT I ONEPT	
188	5253	4325		FDV X	
189	5254	0000		FEXT	
190	5255	5500		RETURN	



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191                                     /EXP AND ARCTANGENT CONSTANTS
192      5256 0004      AF,      0004
193      5257 2372                                     2372
194      5260 1402                                     1402
195      5261 7774      BF,      7774
196      5262 2157                                     2157
197      5263 5157                                     5157
198      5264 0012      CF,      0012
199      5265 5454                                     5454
200      5266 0343                                     0343
201      5267 0007      DF,      0007
202      5270 2566                                     2566
203      5271 5341                                     5341
204      5272 0001      LGPE,   0001
205      5273 2705                                     2705
206      5274 2435                                     2435
207      5275 0002      TWO,    0002
208      5276 2000                                     2000
209      5277 0000      RET1,   0000
210      5300 2427                                     2427
211      5301 2323                                     2323
212      5302 7775      RET2,   7775
213      5303 3427                                     3427
214      5304 7052                                     7052
215      5305 0000      RETz,   0000
216      5306 2437                                     2437
217      5307 1646                                     1646
218      5310 7773      ALF2,   7773
219      5311 3306                                     3306
220      5312 5454                                     5454
221      5313 7777      ALF1,   7777
222      5314 3304                                     3304
223      5315 4434                                     4434
224      5316 0000      ALFz,   0000
225      5317 2437                                     2437
226      5320 1643                                     1643
227                                     /////
228      /ROUTINE TO NEGATE FLAC AND RETURN WITH AC=7777
229      5321 0000      FNFG,    0
230      5322 4450                                     NEGATE
231      5323 7040                                     CMA
232      5324 5721                                     JMP I FNFG
233      /VARIABLES
234      5325 0000      X,      0
235      5326 0000                                     0
236      5327 0000                                     0
237      5330 0000      XSOR,   0
238      5331 0000                                     0
239      5332 0000                                     0
240      /POINTERS
241      5333 7545      TP,      FLTEMP
242      5334 1573      ONEPT,  FLTONE

```

243			/	ARC TANGFNT	
244	5335	1045	FATN,	GETSGN	/TAKE ABSOLUTE VALUE
245	5336	7710		SPA CLA	
246	5337	4321		JMS FNEG	
247	5340	3010		DCA SN	
248	5341	4407		FENT	
249	5342	6325		FPT X	
250	5343	5325		FGT X	
251	5344	2734		FSH I ONFPT	
252	5345	0000		FEXT	
253	5346	1045		GETSGN	
254	5347	7710		SPA CLA	
255	5350	5357		JMP GU	
256	5351	4407		FENT	
257	5352	5734		FGT I ONFPT	
258	5353	4325		FDV X	
259	5354	6325		FPT X	
260	5355	0000		FEXT	
261	5356	7040		CMA	
262	5357	4503	GU,	PUSHA	/SIGN FLAG
263	5360	4407		FENT	
264	5361	5325		FGT X	
265	5362	3325		FMY X	
266	5363	6330		FPT XSQR	
267	5364	3302		FMY HET2	
268	5365	1277		FAD HET1	
269	5366	3330		FMY XSQR	
270	5367	1305		FAD HET2	
271	5370	6733		FPT I TP	
272	5371	5310		FGT ALF2	
273	5372	3330		FMY XSQR	
274	5373	1313		FAD ALF1	
275	5374	3330		FMY XSQR	
276	5375	1316		FAD ALF2	
277	5376	3325		FMY X	
278	5377	4733		FDV I TP	
279	5400	0000		FEXT	
280	5401	2413		ISZ I PDLXR	/CHECK SIGN FLAG
281	5402	5207		JMP EXIT2	
282	5403	4450		NEGATE	/SUBTRACT FROM PI/2
283	5404	4407		FENT	
284	5405	1213		FAD PIOT	
285	5406	0000		FEXT	
286	5407	2010	EXIT2,	ISZ SN	/ARC TAN(-X)=-ARC TAN(X)
287	5410	5500		RETURN	
288	5411	4450		NEGATE	
289	5412	5500		RETURN	

			/ARCTANGENT AND LOG CONSTANTS AND POINTERS	
290				
291	5413	0001	PIOT,	0001 /PI/2
292	5414	3110		3110
293	5415	3761		3761
294	5416	7771	L8,	7771
295	5417	4544		4544
296	5420	1735		1735
297	5421	7774	L7,	7774
298	5422	2236		2236
299	5423	4304		4304
300	5424	7775	L6,	7775
301	5425	4746		4746
302	5426	0771		0771
303	5427	7776	L5,	7776
304	5430	2535		2535
305	5431	3301		3301
306	5432	7776	L4,	7776
307	5433	4113		4113
308	5434	7211		7211
309	5435	7777	L3,	7777
310	5436	2517		2517
311	5437	0307		0307
312	5440	7777	L2,	7777
313	5441	4000		4000
314	5442	4100		4100
315	5443	0000	L1,	0000
316	5444	3777		3777
317	5445	7742		7742
318	5446	0000	LUGL2,	0000
319	5447	2613		2613
320	5450	4414		4414
321	5451	7545	TP1,	FLTEMP
322	5452	1573	ONEP2,	FLTONE
323	5453	5325	X1,	X

324			/	LOGARITHM	
325	5454	1045	FLOG,	GETSGN	
326	5455	7550		SPA SNA	
327	5456	4526		ERROR	/ZFR0 OR NEGATIVE ARGUMENT
328	5457	4407		FENT	
329	5460	6651		FPT I TP1	
330	5461	2652		FSH I ONFP2	
331	5462	0000		FEXT	
332	5463	1045		GETSGN	
333	5464	7450		SNA	
334	5465	5336		JMP ZERGO	/LOG(1)=0
335	5466	7700		SMA CLA	
336	5467	5276		JMP STARTL	
337	5470	4407		FENT	/LOG(X)=-LOG(1/X)
338	5471	5652		FGT I ONFP2	
339	5472	4651		FDV I TP1	
340	5473	6651		FPT I TP1	
341	5474	0000		FEX	
342	5475	7040		CMA	
343	5476	3010	STARTL,	DCA SN	
344	5477	7040		CMA	
345	5500	1651		TAJ I TP1	
346	5501	4430		FLOAT	
347	5502	4407		FENT	
348	5503	3246		FMY LOGE2	
349	5504	6653		FPT I X1	
350	5505	0000		FEXT	
351	5506	7001		JAC	
352	5507	3651		DCA I TP1	
353	5510	4407		FENT	
354	5511	5651		FGT I TP1	
355	5512	2652		FSH I ONFP2	
356	5513	6651		FPT I TP1	
357	5514	3216		FMY L8	
358	5515	1221		FAD L7	
359	5516	3651		FMY I TP1	
360	5517	1224		FAD L6	
361	5520	3651		FMY I TP1	
362	5521	1227		FAD L5	
363	5522	3651		FMY I TP1	
364	5523	1232		FAD L4	
365	5524	3651		FMY I TP1	
366	5525	1235		FAD L3	
367	5526	3651		FMY I TP1	
368	5527	1240		FAD L2	
369	5530	3651		FMY I TP1	
370	5531	1243		FAD L1	
371	5532	3651		FMY I TP1	
372	5533	1653		FAU I X1	
373	5534	0000		FEXT	
374	5535	5207		JMP EXIT2	
375	5536	4430	ZERGO,	FLOAT	
376	5537	5500		RETURN	

```
377 /CONTINUATION OF SINE ROUTINE
378 5540 4407 PALG, FENT
379 5541 5653 FGT I X1
380 5542 4213 FDV PIOT
381 5543 6653 FPT I X1
382 5544 3653 FMY I X1
383 5545 6651 FPT I TP1
384 5546 3361 FMY C9
385 5547 1364 FAD C7
386 5550 3651 FMY I TP1
387 5551 1367 FAD C5
388 5552 3651 FMY I TP1
389 5553 1372 FAD C3
390 5554 3651 FMY I TP1
391 5555 1213 FAD PIOT
392 5556 3653 FMY I X1
393 5557 0000 FEXT
394 5560 5207 JMP EXIT2
395 /SINE CONSTANIS
396 5561 7764 C9, 7764
397 5562 2366 2366
398 5563 5735 5735
399 5564 7771 C7, 7771
400 5565 5466 5466
401 5566 6317 6317
402 5567 7775 C5, 7775
403 5570 2431 2431
404 5571 5053 5053
405 5572 0000 C3, 0000
406 5573 5325 5325
407 5574 0420 0420
408 $
```

0000	00000000	00000000	00000001	00000000	00000000	00000000	00000000	00000000
0100	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000

0200  
0300  
0400  
0500

0600	11111000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
0700	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000

1000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
1100	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000

1200  
1300  
1400  
1500  
1600  
1700

2000  
2100  
2200  
2300  
2400  
2500  
2600  
2700

3000  
3100  
3200  
3300  
3400  
3500  
3600  
3700

4000  
 4100  
 4200  
 4300  
 4400  
 4500  
 4600  
 4700

5000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
5100	00000000	00011111	11111111	11111111	11111111	11111111	11111111	11111111
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  
 5700

6000  
 6100  
 6200  
 6300

6400	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
6500	00000000	00000000	00000000	00000000	00000000	00000111	11111111	11111111

6600  
 6700

7000  
 7100  
 7200  
 7300  
 7400  
 7500  
 7600  
 7700

AF	5256	M5	0067
ALF1	5313	NEG2	5171
ALF2	5310	NEGATE	4450
ALFZ	5316	ONEP2	5452
AXIN	0010	ONEPT	5334
BET1	5277	PALG	5540
BET2	5302	PALGO	5167
RETZ	5305	PCHECK	5153
BF	5261	PDLXR	0013
BOTTOM	0027	PERKOR	0175
C3	5572	PI	5177
C5	5567	PI2	5172
C7	5564	PIOT	5413
C9	5561	PUPA	1413
CF	5264	PROC	0016
CNTR	0132	PUSHA	4503
COMGO	1164	RETURN	5500
DBCONV	5600	SN	0010
DF	5267	SORTJ	4510
DTOP	6576	STARTL	5476
ERROR	4526	TP	5333
ERROR5	2735	TP1	5451
EXIT2	5407	TSTERM	4565
EXTAB	6575	TWO	5275
FATN	5335	TWOPI	5174
FCOS	5113	X	5325
FEXP	5202	X1	5453
FIX	4452	X2	5173
FLAC	0044	XSOR	5330
FLOAT	4430	ZERGO	5536
FLOG	5454		
FLTEMP	7545		
FLTONE	1573		
FNEG	5321		
FNTABF	0571		
FSIN	5117		
GETSGN	1045		
GO	5357		
L1	5443		
L2	5440		
L3	5435		
L4	5432		
L5	5427		
L6	5424		
L7	5421		
L8	5416		
LG2E	5272		
LIBD	6562		
LIBGO	6577		
LIBLST	6555		
LIRRAR	6556		
LOGE2	5446		



ERRORS DETECTED: 0

LINKS GENERATED: 0

RUN-TIME: 4 SECONDS

2K CORE USED

AF	169	192#							
ALF1	221#	274							
ALF2	218#	272							
ALFZ	224#	276							
AXIN	41#	71	73						
BET1	209#	268							
BET2	212#	267							
BETZ	215#	270							
BF	171	195#							
BOTTOM	36#	46	77						
C3	389	465#							
C5	387	462#							
C7	385	399#							
C9	384	396#							
CF	166	198#							
CNTR	40#	69	74						
COMGU	37#	58							
DBCONV	45#	81							
DF	164	261#							
DTOP	76	81#							
ERROR	33#	66	327						
ERRORS	44#	84							
EXIT2	281	286#	374	394					
EXTAB	70	80#							
FATN	49	244#							
FCOS	47	53	80#						
FEXP	50	147#							
FIX	26#	104	155						
FLAC	29#	181	182						
FLOAT	34#	346	375						
FLOG	51	325#							
FLTEMP	30#	241	321						
FLTONE	31#	242	322						
FNEG	137	149	229#	232	246				
FNTABF	35#	48	80						
FSIN	52	94#							
GETSGN	23#	94	115	126	147	244	253	325	332
G0	255	262#							
L1	315#	370							
L2	312#	368							
L3	309#	366							
L4	306#	364							
L5	303#	362							
L6	300#	360							
L7	297#	358							
L8	294#	357							
LG2E	152	204#							
LIH0	68#	82							
LIH00	65	82#							
LIH1ST	61#	64	65						
LIBRAH	59	63#							
LOGF2	318#	348							
P5	39#	68							

























