```
CLEAR STORAGE 1     ,008015,022026,030037,044,049,053053N000000N00001026                                    1
CLEAR STORAGE 2     L068116,105106,110117B101/I9I#071029C029056B026/B001/0991,001/001117I0?                  2
BOOTSTRAP           ,008015,022029,036040,047054,061068,072/061039              ,0010011040                  3

                          1401  FORTRAN ARITH AND RELOCATABLE ROUTINES              50633              PAGE    1

 SEQ PG LIN  LABEL  OP    OPERANDS                                          SFX CT  LOCN  INSTRUCTION TYPE  CARD

 101  1 01   013    JOB   1401  FORTRAN ARITH AND RELOCATABLE ROUTINES
 102  1 02          CTL   644 11
 103  1 03   *
 104  1 04          SFX   B
 105  1 05   *
 106  1 06          XINIT XL1,XL2,XL3,,,,XXXX                                                          MACRO
 107         XXX    EQU   0                                                  B      0000              GEN
 108         XL1    EQU   089                                                B      0089              GEN
 109         089    DCW   000                                                B   3  0089              GEN      4
 110         091    DC    00                                                 B   2  0091              GEN      4
 111         XL2    EQU   094                                                B      0094              GEN
 112         094    DCW   000                                                B   3  0094              GEN      4
 113         096    DC    00                                                 B   2  0096              GEN      4
 114         XL3    EQU   099                                                B      0099              GEN
 115         099    DCW   000                                                B   3  0099              GEN      4
 116         100    DC    0                                                  B   1  0100              GEN      4
 117  1 07   *
 118  1 08          XNMBR                                                                              MACRO
 119         X1     EQU   089                                                B      0089              GEN
 120         X2     EQU   094                                                B      0094              GEN
 121         X3     EQU   099                                                B      0099              GEN
 122  1 09   *
 123  1 10   WKZON  EQU   200                                                B      0200
 124  1 11   TOP    EQU   WKZON&1                                            B      0201
 125  1 12   SPOT   EQU   WKZON&50                                           B      0250
 126  1 13   ACCHI  EQU   WKZON&79                                           B      0279
 127  1 14   *
 128  1 15          ORG   700                                                B             0700
 129  1 16   *
 130  1 17   *                     ARITHMETIC  ROUTINE  MONITOR
 131  1 18   *
 132  1 19   ARITF  SBR   X2                                                 B   4  0700  H 094                5
 133  1 20          SBR   086            STORE FIRST LOCATION OF ARITH STRING B   4  0704  H 086                5
 134  1 21          SBR   STMNM&6                                            B   4  0708  H V06                5
 135  1 22   ARITH  MCW   2&X2, X1                                           B   7  0712  M 0!2 089            5
 136  1 23          SAR   ALGRT&6                                            B   4  0719  Q 765                5
 137  1 24   SBBR1  SBR   BRWHR&6                                            B   4  0723  H S27                5
 138  1 25          BCE   STSUB,0&X2,$   CHECK FOR SUBSCRIPTED STORE LOCATION B   8  0727  B S06 0!0 $          5
 139  1 26          SBR   OUT2&6,0&X1                                        B   7  0735  H T75 0|0            6
 140  1 27          CS    WKZON&103      CLEAR WORK AREA                     B   4  0742  / 303                6
 141  1 28          CS                                                       B   1  0746  /                    6
 142  1 29          CS                                                       B   1  0747  /                    6
 143  1 30          LCA   @0@, ACCHI&1                                       B   7  0748  L W85 280            6
 144  1 31   CLRX   S     X1&2                                               B   4  0755  S 091                6
 145  1 32   ALGRT  SBR   XL2, XXX                                           B   7  0759  H 094 000            6
 146  1 33          C     4&X2, @#@                                          B   7  0766  C 0!4 W86            7
 147  1 34          MCW   4&X2, SIGNF                                        B   7  0773  M 0!4 924            7
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SEQ PG LIN  LABEL  OP    OPERANDS                                  SFX CT  LOCN  INSTRUCTION TYPE  CARD
148  1 35           SW    TOP                                        B   4  0780  , 201              7
149  1 36   EXIT    BL    QFUNCT                                     B   5  0784  B T05 T            7
150  1 37           SBR   NGBMP&6,4&X2                             B   7  0789  H 874 0!4           7
151  1 38           BCE   OPDSC,5&X2,$   CHECK FOR SUBSCRIPTED OPERAND B   8  0796  B /99 0!5 $       7
152  1 39           MCW   7&X2, XL1                                 B   7  0804  M 0!7 089           8
153  1 40           SAR   ALGRT&6                                   B   4  0811  Q 765              8
154  1 41   SBBR2   BWZ   XSIZE,X1-1,K  BRANCH IF FIXPT COMPUTATION B   8  0815  V V30 088 K       8
155  1 42           BWZ   XSIZE,X1-1,S                             B   8  0823  V V30 088 S        8
156  1 43   *
157  1 44   *                              FLOAT ARITHMETIC
158  1 45   *
159  1 46   FSIZE   SBR   X3,XXX         STORE FLOAT SIZE           B   7  0831  H 099 000          8
160  1 47           CW    FIXSW#1                                    B   4  0838  ) W87             8
161  1 48           MCW   0&X1,EXPB      STORE EXPONENT             B   7  0842  M 0|0 W82          9
162  1 49           SAR   XL1                                       B   4  0849  Q 089             9
163  1 50           MCW   0&X1,SPOT      INITIALIZE WORK AREA       B   7  0853  M 0|0 250          9
164  1 51           SBR   XL2                                       B   4  0860  H 094             9
165  1 52           LCA   @0@                                       B   4  0864  L W85             9
166  1 53   NGBMP   BW    *&8,0                                      B   8  0868  V 883 000 1        9
167  1 54           MZ    SPOT, NSIGN                                B   7  0876  Y 250 |87        10
168  1 55           S     @0@,SPOT&2&X3                              B   7  0883  S W85 2E2        10
169  1 56           C     1&X2, @0@                                  B   7  0890  C 0!1 W85        10
170  1 57           A     XL3, XL2                                   B   7  0897  A 099 094        10
171  1 58           BCE   FDIV,CODE,/    BRANCH FOR DIVISION        B   8  0904  B S33 924 /       10
172  1 59           BCE   FMPY,CODE,*    BRANCH FOR MULTIPLICATION - B   8  0912  B S62 924 *       11
173  1 60   *
174  1 61   *                                   FLOATING ADD / SUBTRACT
175  1 62   *
176  1 63           S     SIGNF                                      B   4  0920  S 924             11
177  1 64   SIGNF   ZA    NSIGN                                      B   4  0924  ? |87             11
178  1 65           BCE   NUVAL,ACCHI&1,0    BR, IF 1ST OPERAND OF COMPUTATION B   8  0928  B |17 280 0  11
179  1 66           BE    CLRWK                                      B   5  0936  B /34 S           11
180  1 67           S     EXPB,EXP                                   B   7  0941  S W82 W79         11
181  1 68           ZA    EXP&1,XL1&1                                B   7  0948  ? W80 090         12
182  1 69           C     XL3,XL1                                    B   7  0955  C 099 089         12
183  1 70           BM    RTN1,EXP                                   B   8  0962  V /65 W79 K       12
184  1 71           BH    CHGEX    BR IF PREV RESULT TO BE RETAINED IN WK ACC B   5  0970  B /88 U   12
185  1 72           A     EXP,EXPB                                   B   7  0975  A W79 W82         12
186  1 73           ZA    SPOT,SPOT&X1   INITIALIZE WORK AREA       B   7  0982  ? 250 2V0         13
187  1 74           ZA    XL3&1,XL1&1                                B   7  0989  ? 100 090         13
188  1 75   ASCOM   MZ    NSIGN,0&X2                                 B   7  0996  Y |87 0!0         13
189  1 76           A     ACCHI&X1,0&X2                              B   7  1003  A 2X9 0!0         13
190  1 77   MVZON   MZ    0&X2,NSIGN                                 B   7  1010  Y 0!0 |87         13
191  1 78   NUVAL   ZA    EXPB,EXP                                   B   7  1017  ? W82 W79         14
192  1 79   *
193  1 80   *                                   NORMALIZE
194  1 81   *
195  1 82   NMLZ1   MCW   RCDMK,1&X2                                 B   7  1024  M W75 0!1         14
196  1 83           MZ                                               B   1  1031  Y                14
197  1 84           MZ                                               B   1  1032  Y                14
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SEQ PG LIN  LABEL  OP    OPERANDS                                        SFX CT  LOCN  INSTRUCTION TYPE  CARD
198  1 85           A                                                     B   1  1033  A                   14
199  1 86           MN                                                    B   1  1034  D                   14
200  1 87           SBR   XL1                                             B   4  1035  H 089              14
201  1 88           S     ACCHI&2&X3                                      B   4  1039  S 2H1              15
202  1 89   NLOOP   BCE   STRZE,2&X1,|                                    B   8  1043  B /42 0|2 |        15
203  1 90           SBR   XL1                                             B   4  1051  H 089              15
204  1 91           BCE   NLOOP, 1&X1, 0                                 B   8  1055  B |43 0|1 0        15
205  1 92           MCM   1&X1, ACCHI&1                                   B   7  1063  P 0|1 280          15
206  1 93           S     XL3, XL2                                        B   7  1070  S 099 094          15
207  1 94           CW                                                    B   1  1077  )                   15
208  1 95           CW                                                    B   1  1078  )                   16
209  1 96           S                                                     B   1  1079  S                   16
210  1 97           S     XL1,EXP                                         B   7  1080  S 089 W79          16
211  1 98   NSIGN   ZA    ACCHI&X3       MOVE PROPER SIGN TO WORK ACCUMULATOR  B   4  1087  ? 2G9          16
212  1 99           SW                                                    B   1  1091  ,                   16
213  2 00           BCE   CLRWK,EXP-2,0                                   B   8  1092  B /34 W77 0        16
214  2 01           BM    STRZE,EXP      BRANCH ON EXPONENT UNDERFLOW     B   8  1100  V /42 W79 K       16
215  2 02   *
216  2 03   *                        EXPONENT OVERFLOW DUE TO NORMALIZATION
217  2 04   *
218  2 05           B     ERMSG                                           B   4  1108  B U71              17
219  2 06           DCW   @NOF@                                           B   3  1114                     17
220  2 07   *
221  2 08   * STORE  NINES  IN  WORK  ACCUMULATOR  AND  EXP  ON EXPONENT  OVFL
222  2 09   *
223  2 10   STR99   ZA    &99,EXP                                         B   7  1115  ? W89 W79          17
224  2 11           MN    &99,ACCHI&X3                                    B   7  1122  D W89 2G9          17
225  2 12           MCW                                                   B   1  1129  M                   17
226  2 13           MCW   ACCHI-1&X3                                      B   4  1130  M 2G8              17
227  2 14   CLRWK   CS    ACCHI-1                                         B   4  1134  / 278              17
228  2 15           B     CLRX                                            B   4  1138  B 755              18
229  2 16   *
230  2 17   *                          STORE  ZERO  IN  WORK  ACCUMULATOR
231  2 18   *
232  2 19   STRZE   S     EXP                                             B   4  1142  S W79              18
233  2 20           S     ACCHI&X3                                        B   4  1146  S 2G9              18
234  2 21           B     CLRWK                                           B   4  1150  B /34              18
235  2 22   *
236  2 23   *                          DIVISION  BY  ZERO  ATTEMPTED
237  2 24   *
238  2 25   DVERR   B     ERMSG                                           B   4  1154  B U71              18
239  2 26           DCW   @DZE@                                           B   3  1160                     18
240  2 27           B     STR99                                           B   4  1161  B /15              18
241  2 28   *
242  2 29   RTN1    BH    NUVAL          BRANCH TO STORE NEW VALUE IN WK ACC  B   5  1165  B |17 U           19
243  2 30           S     XL3&1,XL1&1    INITIALIZE INDEX REGISTERS       B   7  1170  S 100 090          19
244  2 31           MZ    ACCHI&X3,ACCHI&X1   INITIALIZE WORK ACCUMULATOR  B   7  1177  Y 2G9 2X9          19
245  2 32           B     ASCOM                                           B   4  1184  B 996              19
246  2 33   *
247  2 34   CHGEX   A     EXPB,EXP                                        B   7  1188  A W82 W79          19
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SEQ PG LIN  LABEL   OP    OPERANDS                                          SFX CT  LOCN  INSTRUCTION TYPE  CARD
248  2 35           B     CLRWK                                              B   4  1195  B /34              19
249  2 36    *
250  2 37    *                        SUBSCRIPTED  VARIABLES
251  2 38    *
252  2 39    OPDSC  SBR   X2,5&X2                                            B   7  1199  H 094 0!5           20
253  2 40    STSUB  B     XXX                                                B   4  1206  B 000              20
254  2 41           MN    0&X2                                               B   4  1210  D 0!0              20
255  2 42           MN                                                       B   1  1214  D                  20
256  2 43           MN                                                       B   1  1215  D                  20
257  2 44           MN                                                       B   1  1216  D                  20
258  2 45           SAR   ALGRT&6                                            B   4  1217  Q 765              20
259  2 46    BRWHR  BCE   SBBR1,XXX,$                                       B   8  1221  B 723 000 $         21
260  2 47           B     SBBR2                                              B   4  1229  B 815              21
261  2 48    *
262  2 49    *                                  FLOATING DIVIDE
263  2 50    *
264  2 51    FDIV   BE    DVERR                                              B   5  1233  B /54 S            21
265  2 52           MN    ACCHI&X3, 1&X2                                     B   7  1238  D 2G9 0!1           21
266  2 53           MCW                                                      B   1  1245  M                  21
267  2 54           MN                                                       B   1  1246  D                  21
268  2 55           D     0&X1, SPOT&1                                       B   7  1247  % 0|0 251          21
269  2 56           ZS    EXPB                                               B   4  1254  ! W82              22
270  2 57           B     NDMDV                                              B   4  1258  B S83              22
271  2 58    *
272  2 59    *                                  FLOATING MULTIPLY
273  2 60    *
274  2 61    FMPY   M     ACCHI&X3, SPOT&1&X3                                B   7  1262  @ 2G9 2E1          22
275  2 62           SBR   X2,3&X2                                           B   7  1269  H 094 0!3           22
276  2 63           S     &2,EXP                                             B   7  1276  S W90 W79          22
277  2 64    NDMDV  A     EXPB, EXP                                          B   7  1283  A W82 W79          22
278  2 65           MZ    ACCHI&X3, *&1                                      B   7  1290  Y 2G9 S97          23
279  2 66           ZA    NSIGN                                              B   4  1297  ? |87              23
280  2 67           B     NMLZ1                                              B   4  1301  B |24              23
281  2 68    *
282  2 69    *                                  EXIT ROUTINE
283  2 70    *
284  2 71    QFUNCT BCE   OUT1,4&X2,|    BR IF CONTENTS OF WK ACC TO BE STORED B   8  1305  B T31 0!4 |       23
285  2 72           SBR   ALGRT&6,1&X2                                       B   7  1313  H 765 0!1           23
286  2 73           C     ACCHI&1,@0@                                        B   7  1320  C 280 W85          23
287  2 74           B     XXX           BRANCH TO FUNCTION SELECTION ROUTINE B   4  1327  B 000              24
288  2 75    OUT1   BCE   OUT2,ACCHI&1,0                                     B   8  1331  B T69 280 0         24
289  2 76           BW    OUT2,FIXSW                                         B   8  1339  V T69 W87 1         24
290  2 77           BW    FINST,4&X2     BRANCH IF FINAL STORAGE OF COMP     B   8  1347  V T92 0!4 1        24
291  2 78           SBR   X3,2&X3                                           B   7  1355  H 099 0?2          24
292  2 79    MVEXP  MCM   EXP-1,ACCHI-1&X3                                  B   7  1362  P W78 2G8          25
293  2 80    OUT2   LCA   ACCHI&X3,XXX                                      B   7  1369  L 2G9 000          25
294  2 81           BW    5&X2,4&X2   BR TO PROG MAINLINE IF END OF ARITH STR B   8  1376  V 0!5 0!4 1       25
295  2 82           SAR   XL2                                                B   4  1384  Q 094              25
296  2 83           B     ARITH                                              B   4  1388  B 712              25
297  2 84    *
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SEQ PG LIN  LABEL  OP    OPERANDS                                  SFX CT  LOCN  INSTRUCTION TYPE  CARD

298  2 85   *              ROUNDING  FOR  FINAL  STORAGE
299  2 86   *
300  2 87   FINST  A     &5,ACCHI-1&X3                              B   7  1392  A W91 2G8          25
301  2 88          BWZ   RDOVF,ACCHI&1,S                            B   8  1399  V U18 280 S        26
302  2 89   ZONMV  MZ    ACCHI&X3,ACCHI-2&X3                        B   7  1407  Y 2G9 2G7         26
303  2 90          B     MVEXP                                      B   4  1414  B T62             26
304  2 91   RDOVF  A     &1,EXP                                     B   7  1418  A W92 W79         26
305  2 92          BCE   NORND,EXP-2,1                             B   8  1425  B U48 W77 1       26
306  2 93          S     ACCHI&X3                                   B   4  1433  S 2G9             26
307  2 94          LCA   @1@,ACCHI&1                               B   7  1437  L W93 280         27
308  2 95          B     ZONMV                                      B   4  1444  B U07             27
309  2 96   *
310  2 97   *              NO  ROUNDING  IF  EXPONENT  OVERFLOW  WOULD  OCCUR
311  2 98   *
312  2 99   NORND  MN    &99,ACCHI&X3                               B   7  1448  D W89 2G9         27
313  3 00          MCW                                            B   1  1455  M                 27
314  3 01          MCW   ACCHI-1&X3                               B   4  1456  M 2G8             27
315  3 02          S     &1,EXP                                     B   7  1460  S W92 W79         27
316  3 03          B     ZONMV                                      B   4  1467  B U07             27
317  3 04   *
318  3 05   *                        PRINT  ERROR  MESSAGE
319  3 06   *
320  3 07   ERMSG  SBR   STRX2&6                                    B   4  1471  H U92             28
321  3 08          CS    TOP&1&X3                                   B   4  1475  / 2?2             28
322  3 09          SBR   RINX2&6,0&X3                              B   7  1479  H V25 0?0         28
323  3 10   STRX2  SBR   X3,XXX                                    B   7  1486  H 099 000         28
324  3 11          MCW   2&X3,TOP&11                              B   7  1493  M 0?2 212         28
325  3 12   STMNM  SBR   TOP&16,XXX                                B   7  1500  H 217 000         28
326  3 13          W                                              B   1  1507  2                 28
327  3 14          SW    TOP                                        B   4  1508  , 201             29
328  3 15          SBR   ERMXT&3,3&X3                             B   7  1512  H V29 0?3         29
329  3 16   RINX2  SBR   X3,XXX                                    B   7  1519  H 099 000         29
330  3 17   ERMXT  B     XXX                                        B   4  1526  B 000             29
331  3 18   *
332  3 19   *                                FIXED POINT ENTRY
333  3 20   *
334  3 21   XSIZE  SBR   X3,XXX         STORE FIX-SIZE             B   7  1530  H 099 000         29
335  3 22          SW    FIXSW                                      B   4  1537  , W87             29
336  3 23   *
337  3 24   FIXPT  MCS   0&X1, SPOT                                 B   7  1541  Z 0|0 250         30
338  3 25          BCE   XDIV, CODE, /                             B   8  1548  B W23 924 /       30
339  3 26          BCE   XMPY, CODE, *                             B   8  1556  B V98 924 *       30
340  3 27   *
341  3 28   *                              FIXED ADD / SUBTRACT
342  3 29   *
343  3 30          BWZ   SUBTR, CODE, K     Q. SUBTRACT           B   8  1564  V V87 924 K       30
344  3 31          A     0&X1, ACCHI&X3                             B   7  1572  A 0|0 2G9         30
345  3 32   ADDRT  ZA    ACCHI&X3                                   B   4  1579  ? 2G9             31
346  3 33          B     CLRWK                                      B   4  1583  B /34             31
347  3 34   *
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SEQ  PG LIN  LABEL   OP    OPERANDS                                SFX CT  LOCN  INSTRUCTION TYPE  CARD
348   3 35   SUBTR   S     0&X1, ACCHI&X3                           B   7  1587  S 0|0 2G9          31
349   3 36           B     ADDRT                                    B   4  1594  B V79              31
350   3 37   *
351   3 38   *                                FIXED MULTIPLY
352   3 39   *
353   3 40   XMPY    LCA   0&X1, SPOT                              B   7  1598  L 0|0 250          31
354   3 41           M     ACCHI&X3, SPOT&1&X3                      B   7  1605  @ 2G9 2E1          31
355   3 42           MCW   SPOT&1&X3, ACCHI&X3                     B   7  1612  M 2E1 2G9          32
356   3 43           B     CLRWK                                    B   4  1619  B /34             32
357   3 44   *
358   3 45   *                                FIXED DIVIDE
359   3 46   *
360   3 47   XDIV    BCE   DVERR, SPOT,                            B   8  1623  B /54 250          32
361   3 48           MCW   0&X1,SPOT&X3                           B   7  1631  M 0|0 2E0          32
362   3 49           MN                                             B   1  1638  D                 32
363   3 50           SBR   MVQUT&3                                 B   4  1639  H W64             32
364   3 51           LCA   ACCHI&X3                               B   4  1643  L 2G9              32
365   3 52           ZA    ACCHI&X3, SPOT&X3                        B   7  1647  ? 2G9 2E0          33
366   3 53           D     0&X1, SPOT&1                             B   7  1654  % 0|0 251          33
367   3 54   MVQUT   MCW   SPOT-1,ACCHI&X3                         B   7  1661  M 249 2G9          33
368   3 55           B     CLRWK                                    B   4  1668  B /34             33
369   3 56   *
370   3 57           DCW   000                                      B   3  1674                    33
371   3 58   RCDMK   DCW   @|@                                     B   1  1675                    33
372   3 59           DCW   0                                        B   1  1676                    33
373   3 60   EXP     DCW   000                                      B   3  1679                    34
374   3 61           DC    @|@                                      B   1  1680                    34
375   3 62   EXPB    DCW   00                                       B   2  1682                    34
376   3 63           DC    0                                        B   1  1683                    34
377   3 64   CODE    EQU   SIGNF                                    B      0924
378   3 65   ZROSW   EQU   *&1                                     B      1684
379   3 66   BASEZ   EQU   *&1                                     B      1684
380   3 67   XPNUM   DCW   @8@                                      B   1  1684                    34
381   3 68           LTORG                                          B          1685
                      DCW   @0@                                    B   1  1685        LIT       34
                      DCW   @#@                                    B   1  1686        LIT       34
               FIXSWB DCW   #01                                    B   1  1687        AREA      34
                      DCW   &99                                    B   2  1689        LIT       34
                      DCW   &2                                     B   1  1690        LIT       35
                      DCW   &5                                     B   1  1691        LIT       35
                      DCW   &1                                     B   1  1692        LIT       35
                      DCW   @1@                                    B   1  1693        LIT       35
382   3 69           DS    1                                        B      1694
383   3 70           DCW   @0@                                      B   1  1695                    36
384   3 71           DCW   @}@              SYSTEM GROUP MARK       B   1  1696        GMARK     36
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SEQ	PG	LIN	LABEL	OP	OPERANDS	SFX	CT	LOCN	INSTRUCTION	TYPE	CARD
385	3	72		JOB	1401 FORTRAN RELOCATABLE PACKAGE						
386	3	73	DIVID	EQU	14000		B	14000			
387	3	74	CALC	EQU	DIVID&47		B	14047			
388	3	75	CALC1	EQU	DIVID&58		B	14058			
389	3	76	LOGM1	EQU	DIVID&149		B	14149			
390	3	77	LOGM2	EQU	DIVID&171		B	14171			
391	3	78	CALXT	EQU	DIVID&187		B	14187			
392	3	79	STR1	EQU	DIVID&191		B	14191			
393	3	80	LN10	EQU	DIVID&226		B	14226			
394	3	81	UPBY	EQU	DIVID&250		B	14250			
395	3	82	NCON	EQU	DIVID&253		B	14253			
396	3	83	NCTR	EQU	DIVID&256		B	14256			
397	3	84	DEC	EQU	DIVID&259		B	14259			
398	3	85	TWTCH	EQU	DIVID&260		B	14260			
399	3	86	DELTA	EQU	ACCHI-200		B	0079			
400	3	87		PARAM						MACRO	
401			PARAMA	EQU	686		B	0686		GEN	
402			XBEGIN	EQU	838		B	0838		GEN	
403			MONTOR	EQU	769		B	0769		GEN	
404			MONTER	EQU	700		B	0700		GEN	
405			TCLEAR	EQU	710		B	0710		GEN	
406			INITAP	EQU	780		B	0780		GEN	
407			INITXT	EQU	793		B	0793		GEN	
408			BCLEAR	EQU	833		B	0833		GEN	
409			FAILSW	EQU	184		B	0184		GEN	
410	3	88	XLINKS	EQU	840		B	0840			
411	3	89	ATANFN	EQU	894		B	0894			
412	3	90		RELOC						MACRO	
413				ORG	841		B		0841		
414			YUSR12	DS	3		B	0843		GEN	
415			YUSR11	DS	3		B	0846		GEN	
416			YUSR10	DS	3		B	0849		GEN	
417			YUSER9	DS	3		B	0852		GEN	
418			YUSER8	DS	3		B	0855		GEN	
419			YUSER7	DS	3		B	0858		GEN	
420			YUSER6	DS	3		B	0861		GEN	
421			YUSER5	DS	3		B	0864		GEN	
422			YUSER4	DS	3		B	0867		GEN	
423			YUSER3	DS	3		B	0870		GEN	
424			YUSER2	DS	3		B	0873		GEN	
425			YUSER1	DS	3		B	0876		GEN	
426			SQRTFN	DS	3		B	0879		GEN	
427			FLTFUN	DS	3		B	0882		GEN	
428			FIXFUN	DS	3		B	0885		GEN	
429			NEGTFN	DS	3		B	0888		GEN	
430			ABSVAL	DS	3		B	0891		GEN	
431			INVTFN	DS	3		B	0894		GEN	
432			XPNETL	DS	3		B	0897		GEN	
433			LOGFUN	DS	3		B	0900		GEN	
434			SINFUN	DS	3		B	0903		GEN	

SEQ	PG	LIN	LABEL	OP	OPERANDS	SFX	CT	LOCN	INSTRUCTION	TYPE	CARD
435			COMFN1	DS	3	B		0906		GEN	
436			DOSBSC	DS	3	B		0909		GEN	
437			OBLIST	DS	3	B		0912		GEN	
438			DOINIT	DS	3	B		0915		GEN	
439			DOADR3	DS	3	B		0918		GEN	
440			DOADR2	DS	3	B		0921		GEN	
441			DOADR1	DS	3	B		0924		GEN	

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SEQ PG LIN  LABEL  OP    OPERANDS                                SFX CT  LOCN  INSTRUCTION TYPE  CARD
442  3 91           JOB   1401 FORTRAN  OBJECT TIME DO
443  3 92           SFX   A
444  3 93   X1      EQU   089                                      A      0089
445  3 94   X2      EQU   94                                       A      0094
446  3 95   X3      EQU   099                                      A      0099
447  3 96           ORG   2000                                     A            2000
448  3 97   DO1     SBR   EXITL                                    A   4  2000  H J41              37
449  3 98           SBR   X2                                       A   4  2004  H 094              37
450  3 99           SBR   X2,4&X2                                  A   7  2008  H 094 0!4          37
451  4 00           B     INITL&4                                  A   4  2015  B !96              37
452  4 01   INITL   EQU   *&74                                     A      2092
453  4 02   EXITL   EQU   *&123                                    A      2141
454  4 03           XFR   0                                        A           B 000              38
455  4 04           ORG   2000                                     A            2000
456  4 05   DO2     SBR   X2                                       A   4  2000  H 094              41
457  4 06           MCW   11&X2,DO3&6                              A   7  2004  M 0J1 !46          41
458  4 07           MCW                                            A   1  2011  M                  41
459  4 08           MCW   5&X2,LIMT&3                              A   7  2012  M 0!5 !50          41
460  4 09           MCW   11&X2,SBIX&3                            A   7  2019  M 0J1 !57          41
461  4 10           MCW   14&X2,TESTL&3                          A   7  2026  M 0J4 !64          41
462  4 11           SBR   EXDO3&3,15&X2                          A   7  2033  H !72 0J5          42
463  4 12   DO3     EQU   *&1                                      A      2040
464  4 13   LIMT    EQU   *&8                                      A      2047
465  4 14   SBIX    EQU   *&15                                     A      2054
466  4 15   TESTL   EQU   *&22                                     A      2061
467  4 16   EXDO3   EQU   *&30                                     A      2069
468  4 17           XFR   0                                        A           B 000              43
469  4 18           ORG   2000                                     A            2000
470  4 19           A     0,0                                      A   7  2000  A 000 000          46
471  4 20           BFIXW ZA,000,FIXWORD                                                MACRO
472                 ZA                                             A   1  2007  ?            GEN   46
473                 DC    000                                      A   3  2010               GEN   46
474                 DC    @_0@               11-7-8,0            A   2  2012               GEN   46
475                 DC    0                                        A   1  2013               GEN   46
476  4 21           BFIXW S,000,FIXWORD                                                 MACRO
477                 S                                              A   1  2014  S            GEN   46
478                 DC    000                                      A   3  2017               GEN   46
479                 DC    @_0@               11-7-8,0            A   2  2019               GEN   46
480                 DC    0                                        A   1  2020               GEN   46
481  4 22           BFIXW BWZ,000,FIXWORD,,K                                            MACRO
482                 BWZ                                            A   1  2021  V            GEN   46
483                 DC    000                                      A   3  2024               GEN   46
484                 DC    @_0@               11-7-8,0            A   2  2026               GEN   46
485                 DC    0                                        A   1  2027               GEN   46
486                 DC    @K@                                      A   1  2028               GEN   46
487  4 23           B     0                                        A   4  2029  B 000              46
488  4 24           XFR   0                                        A           B 000              47
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SEQ PG LIN  LABEL  OP    OPERANDS                                    SFX CT  LOCN  INSTRUCTION TYPE  CARD

489  4 25          JOB   1401 FORTRAN  INITIALIZATION OF DO LOOPS FOR DO,LIST
490  4 26          ORG   2000                                        A            2000
491  4 27   INITIL SBR   EXITEL&3                                   A   4  2000  H !49              50
492  4 28          MCW   2&X2,*&4                                   A   7  2004  M 0!2 !14          50
493  4 29   *  NOTE - ADDRESS OF FIXWORD INITIALIZED BY LATER PASS
494  4 30          BFIXW ZA,000,FIXWORD                                                 MACRO
495                ZA                                               A   1  2011  ?           GEN     50
496                DC    000                                        A   3  2014              GEN     50
497                DC    @_0@              11-7-8,0                 A   2  2016              GEN     50
498                DC    0                                          A   1  2017              GEN     50
499  4 31          MCW   8&X2,*&4                                   A   7  2018  M 0!8 !28          50
500  4 32          BFIXW S,000,FIXWORD                                                  MACRO
501                S                                                A   1  2025  S           GEN     50
502                DC    000                                        A   3  2028              GEN     50
503                DC    @_0@              11-7-8,0                 A   2  2030              GEN     50
504                DC    0                                          A   1  2031              GEN     50
505  4 33          MCW   11&X2,*&7                                  A   7  2032  M 0J1 !45          50
506  4 34          AFIXW LCA,FIXWORD,,000                                               MACRO
507                LCA                                              A   1  2039  L           GEN     51
508                DC    @_0@              11-7-8,0                 A   2  2041              GEN     51
509                DC    0                                          A   1  2042              GEN     51
510                DC    000                                        A   3  2045              GEN     51
511  4 35   EXITEL B     000                                        A   4  2046  B 000              51
512  4 36          LTORG *                                          A            2050
513  4 37          XFR   0                                          A            B 000              52
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SEQ PG LIN  LABEL  OP    OPERANDS                                          SFX CT  LOCN  INSTRUCTION TYPE  CARD
514  4 38           JOB   1401 FORTRAN  OBJECT TIME LIST
515  4 39           ORG   2000                                              A            2000
516  4 40   OBJLST  SBR   X2                                                A   4  2000  H 094             55
517  4 41           SBR   BSTAN&6,2&X2                                     A   7  2004  H !93 0!2         55
518  4 42           SBR   XTLST&3,3&X2                                     A   7  2011  H !97 0!3         55
519  4 43           MCW   2&X2,ADLST#3                                     A   7  2018  M 0!2 L94         55
520  4 44   XYZ     MCW   ADLST,X2                                         A   7  2025  M L94 094         55
521  4 45           BW    SMPLE,0&X2                                       A   8  2032  V J04 0!0 1       56
522  4 46           BCE   ARRAY,0&X2,,                                     A   8  2040  B J22 0!0 ,       56
523  4 47           BCE   SUBSCR,0&X2,$                                    A   8  2048  B K53 0!0 $       56
524  4 48           BCE   INDX1,0&X2,%              BEGIN OF DO-TYPE       A   8  2056  B K75 0!0 %       56
525  4 49           BCE   INDX4,0&X2,)       END OF INNERMOST DO           A   8  2064  B L34 0!0 )       57
526  4 50           BCE   INDX2,0&X2,#              END OF OUTER DO-TYPE     A   8  2072  B K98 0!0 #       57
527  4 51           MCW   BLANK#3,X1                END OF LIST              A   7  2080  M L97 089         57
528  4 52   BSTAN   MCW   ADLST,0                                           A   7  2087  M L94 000         57
529  4 53   XTLST   B     0                                                A   4  2094  B 000             57
530  4 54   RAY     DCW   @XXXXXX@                                         A   6  2103                   58
531  4 55   SMPLE   MCW   2&X2,X1                                          A   7  2104  M 0!2 089         58
532  4 56           SBR   ADLST,3&X2                                      A   7  2111  H L94 0!3         58
533  4 57           B     BSTAN                                            A   4  2118  B !87            58
534  4 58   ARRAY   MZ    2136,*&8   FMTZON  CHANGE ON REASM OF OBJ FORMAT  A   7  2122  Y J36 J36        58
535  4 59           BCE   NOSWT,@2S@,2                                     A   8  2129  B K28 L99 2       58
536  4 60           BCE                                                    A   1  2137  B                59
537  4 61           BWZ   INRAY,RAY-4,2                                    A   8  2138  V J84 !99 2       59
538  4 62           MCW   6&X2,RAY                                         A   7  2146  M 0!6 J03         59
539  4 63           MN    PARAMA&4,SBRLT&6                                 A   7  2153  D 690 J97         59
540  4 64           MN                                                     A   1  2160  D                59
541  4 65           BWZ   *&9,RAY-4,K                                      A   8  2161  V J77 !99 K       59
542  4 66           MN    PARAMA&6,SBRLT&6                                 A   7  2169  D 692 J97         59
543  4 67           MN                                                     A   1  2176  D                60
544  4 68           MZ    *-4,RAY-4                                        A   7  2177  Y J79 !99         60
545  4 69   INRAY   MCW   RAY-3,X1                                         A   7  2184  M J00 089         60
546  4 70   SBRLT   SBR   X1,0&X1                                          A   7  2191  H 089 0|0         60
547  4 71           MCW   X1,RAY-3                                        A   7  2198  M 089 J00         60
548  4 72           C     RAY,RAY-3                                        A   7  2205  C J03 J00         60
549  4 73           BU    BSTAN                                            A   5  2212  B !87 /           61
550  4 74           MZ    *-6,RAY-4                                        A   7  2217  Y K17 !99         61
551  4 75           B     DUN1                                             A   4  2224  B K42             61
552  4 76   NOSWT   MCW   6&X2,RAY                                         A   7  2228  M 0!6 J03         61
553  4 77           MCW   @.@,X1                                          A   7  2235  M M00 089         61
554  4 78   DUN1    SBR   ADLST,7&X2                                      A   7  2242  H L94 0!7         61
555  4 79           B     BSTAN                                            A   4  2249  B !87            62
556  4 80   SUBSCR    T   DOSBSC                                          A   4  2253  T 909             62
557  4 81           MZ    *-4,X1-1                                         A   7  2257  Y K59 088         62
558  4 82           MCW   X2,ADLST                                        A   7  2264  M 094 L94         62
559  4 83           B     BSTAN                                            A   4  2271  B !87            62
560  4 84   INDX1   SBR   X2,1&X2                                         A   7  2275  H 094 0!1         62
561  4 85              T  DOINIT                                           A   4  2282  T 915             62
562  4 86           MN    0&X2                                             A   4  2286  D 0!0             63
563  4 87           SBR   X2                                               A   4  2290  H 094             63
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SEQ PG LIN  LABEL  OP    OPERANDS                                  SFX CT  LOCN  INSTRUCTION TYPE  CARD
564  4 88           B     SETUP                                      A  4  2294  B L05            63
565  4 89    INDX2  MCW   3&X2,X2                                    A  7  2298  M 0!3 094        63
566  4 90    SETUP  MCW   12&X2,INDX3&6                             A  7  2305  M 0J2 L47        63
567  4 91           MCW                                            A  1  2312  M                63
568  4 92           MCW   6&X2,LIMIT&3                             A  7  2313  M 0!6 L51        63
569  4 93           MCW   12&X2,SUBIX&3                            A  7  2320  M 0J2 L58        64
570  4 94           SBR   LPARN#3,0&X2       SAVE ADDR OF LEFT PAREN A  7  2327  H M03 0!0      64
571  4 95    INDX4  MCW   LPARN,X2           SET X2 TO ADDR OF LEFT PAREN A  7  2334  M M03 094  64
572  4 96    INDX3  A     0,0                                        A  7  2341  A 000 000       64
    ** ***  ** Non-blank in 73-75 would confuse "Real Autocoder"                                ERROR
573  4 97    *  NOTE - ADDRESS OF FIXWORD INIITIALIZED BY LATER PHASE OF COMPILER
574  4 98    LIMIT  BFIXW ZA,000,FIXWORD                                                       MACRO
575         LIMIT  ZA                                               A  1  2348  ?            GEN   64
576                DC    000                                        A  3  2351               GEN   64
577                DC    @_0@               11-7-8,0                A  2  2353               GEN   64
578                DC    0                                          A  1  2354               GEN   64
579  4 99    SUBIX  BFIXW S,000,FIXWORD                                                        MACRO
580         SUBIX  S                                                A  1  2355  S            GEN   64
581                DC    000                                        A  3  2358               GEN   64
582                DC    @_0@               11-7-8,0                A  2  2360               GEN   65
583                DC    0                                          A  1  2361               GEN   65
584  5 00    *  IMPORTANT NOTE - THE OPERAND -SATFY- IN THE FOLLOWING MACRO
585  5 01    *     WILL NOT BE CODED AS RELOCATABLE BY THE RELOCATABLE
586  5 02    *     CONDENSING ROUTINE.  THIS IS DUE TO THE FACT THAT THE
587  5 03    *     CONDENSER DOES NOT RECOGNIZE DC OR DCW STATEMENTS AS HAVING
588  5 04    *     RELOCATABLE OPERANDS.  IT IS NECESSARY TO MANUALLY ZONE THE
589  5 05    *     SET WORD MARK INSTRUCTION WITH AND 11-PUNCH TO CAUSE
590  5 06    *     RELOCATION.
591  5 07          BFIXW BWZ,SATFY,FIXWORD,,K                                                   MACRO
592                BWZ                                             A  1  2362  V            GEN   65
593                DC    SATFY                                      A  3  2365  L81          GEN   65
594                DC    @_0@               11-7-8,0                A  2  2367               GEN   65
595                DC    0                                          A  1  2368               GEN   65
596                DC    @K@                                        A  1  2369               GEN   65
597  5 08          SBR   ADLST,16&X2                                A  7  2370  H L94 0J6      65
598  5 09          B     XYZ                                        A  4  2377  B !25          65
599  5 10    SATFY  MCW   15&X2,ADLST                               A  7  2381  M 0J5 L94      65
600  5 11          B     XYZ                                        A  4  2388  B !25          66
601  5 12          LTORG *                                          A           2392
             ADLSTA DCW   #03                                       A  3  2394               AREA  66
             BLANKA DCW   #03                                       A  3  2397               AREA  66
                    DCW   @2S@                                      A  2  2399               LIT   66
                    DCW   @.@                                       A  1  2400               LIT   66
             LPARNA DCW   #03                                       A  3  2403               AREA  66
602  5 13          XFR   0                                          A           B 000            67
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SEQ PG LIN  LABEL  OP    OPERANDS                                      SFX CT  LOCN  INSTRUCTION TYPE  CARD

603  5 14          JOB   1401 FORTRAN  OBJECT TIME SUBSCRIPTS
604  5 15          ORG   2000                                           A            2000
605  5 16   OTSUB  SBR   EXITS&3                                       A   4  2000  H J78                70
606  5 17          MCW   3&X2,AAA#3                                     A   7  2004  M 0!3 J94            70
607  5 18          S     PROD#5                                         A   4  2011  S J99                70
608  5 19          BAV   *&1                                            A   5  2015  B !20 Z              70
609  5 20   SBR1   MCW   9&X2,LCA&3                                     A   7  2020  M 0!9 !44            70
610  5 21          MCW   6&X2,ZA&3                                      A   7  2027  M 0!6 !37            70
611  5 22   ZA     ZA    000,WORK#5                                     A   7  2034  ? 000 K04            71
612  5 23   LCA    LCA   000,BFEEL-6                                    A   7  2041  L 000 K09            71
613  5 24          M     WORK,BFEEL#11                                  A   7  2048  @ K04 K15            71
614  5 25          A     BFEEL,PROD                                     A   7  2055  A K15 J99            71
615  5 26          C     PROD-3,@15@                                    A   7  2062  C J96 K17            71
616  5 27          BL    OHALT                                          A   5  2069  B J79 T              72
617  5 28          BCE   PACK,10&X2,$                                   A   8  2074  B !93 0J0 $          72
618  5 29          SBR   X2,6&X2                                        A   7  2082  H 094 0!6            72
619  5 30          B     SBR1                                           A   4  2089  B !20                72
620  5 31   PACK   A     &96,PROD-3                                     A   7  2093  A K19 J96            72
621  5 32          BAV   PACK                                           A   5  2100  B !93 Z              72
622  5 33          MZ    PROD-4,PROD                                    A   7  2105  Y J95 J99            73
623  5 34          ZA    PROD-2,X1&1                                    A   7  2112  ? J97 090            73
624  5 35          MZ    ZONES-99&X1,PROD-2                             A   7  2119  Y !Z2 J97            73
625  5 36          MCW   PROD,X1                                        A   7  2126  M J99 089            73
626  5 37          MCW   X1,SBR&6                                       A   7  2133  M 089 J60            73
627  5 38          MZ    ZONES-2,SBR&5                                  A   7  2140  Y J89 J59            74
628  5 39          MCW   AAA,X1                                         A   7  2147  M J94 089            74
629  5 40   SBR    SBR   X1,0&X1                    COMPUTE ADDRESS     A   7  2154  H 089 0|0            74
630  5 41          MZ    AAA-1,X1-1                                     A   7  2161  Y J93 088            74
631  5 42          SBR   X2,11&X2                                       A   7  2168  H 094 0J1            74
632  5 43   EXITS  B     000                                            A   4  2175  B 000                74
633  5 44   OHALT  NOP   2002                                           A   4  2179  N !02                75
634  5 45          H                                                    A   1  2183  .                    75
635  5 46          B     OHALT                                          A   4  2184  B J79                75
636  5 47   ZONES  DCW   @2SKB@                                         A   4  2191                      75
637  5 48          LTORG *                                              A            2192
            AAA  A DCW   #03                                            A   3  2194             AREA     75
            PROD A DCW   #05                                            A   5  2199             AREA     75
            WORK A DCW   #05                                            A   5  2204             AREA     75
            BFEELA DCW   #11                                            A  11  2215             AREA     76
                   DCW   @15@                                           A   2  2217             LIT      76
                   DCW   &96                                            A   2  2219             LIT      76
638  5 49          XFR   0                                              A            B 000                77
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SEQ PG LIN  LABEL  OP    OPERANDS                                  SFX CT  LOCN  INSTRUCTION TYPE  CARD
639  5 50          JOB   1401 FLOATING POINT SINE - COSINE SUBROUTINE
640  5 51          SFX   B
641  5 52   *             INSERT FUNCTION COMMON DECK HERE
642  5 53          ORG   2000                                       B          2000
643  5 54   *
644  5 55   TRIGF  BCE   COSF,CODE,C                               B   8  2000  B !24 924 C         80
645  5 56   SINF   BE    STRZE              SINE 0 # 0             B   5  2008  B /42 S             80
646  5 57          MZ    ACCHI&X3,ZA1       SINE -X # -SINE X      B   7  2013  Y 2G9 K23           80
647  5 58          B     SNCS                                      B   4  2020  B !36              80
648  5 59   COSF   BE    STR1               COSINE 0 # 1           B   5  2024  B J9A S             80
649  5 60          MZ    &1,ZA1             COS -X # COS X         B   7  2029  Y M28 K23           80
650  5 61   SNCS   MCW   @ @,BOX                                   B   7  2036  M M29 M33          81
651  5 62          ZA    EXP,EXPB                                  B   7  2043  ? W79 W82          81
652  5 63          S     &1,EXP                                    B   7  2050  S M28 W79          81
653  5 64          BM    SMALL,EXP                                 B   8  2057  V L05 W79 K        81
654  5 65          A     &2,EXP                                    B   7  2065  A M30 W79          81
655  5 66          S     X3,EXP                                    B   7  2072  S 099 W79          82
656  5 67          BWZ   ARGLG,EXP,B                               B   8  2079  V L90 W79 B        82
657  5 68          ZA    EXPB,EXP                                  B   7  2087  ? W82 W79          82
658  5 69          SBR   X1,PIOV2&X3        REDUCE ARGUMENT        B   7  2094  H 089 M?5          82
659  5 70          ZA    EXP&1,X2&1                                B   7  2101  ? W80 095          82
660  5 71          B     DIVID              DIVIDE ARGUMENT BY PI/2 B   4  2108  B !0?             83
661  5 72          ZA    1&X1,X2&1                                 B   7  2112  ? 0|1 095          83
662  5 73   SUB4   S     &40,X2&1           DETERMINE QUADRANT IN WHICH B   7  2119  S M32 095       83
663  5 74          BWZ   SUB4,X2&1,B        ANGLE IS LOCATED AND WHETHER B   8  2126  V J19 095 B    83
664  5 75          BCE   *&8,CODE,C         SINE OR COSINE FUNCTION IS TO B   8  2134  B J49 924 C    83
665  5 76          SBR   X2,1&X2                                   B   7  2142  H 094 0!1          84
666  5 77          MZ    ZONZ&X2,NSIGN                             B   7  2149  Y M!0 |87          84
667  5 78          MN    ZONZ&X2,BOX#1                             B   7  2156  D M!0 M33          84
668  5 79          S     DEC                DEC # 0                B   4  2163  S K5I             84
669  5 80          S     EXP                                       B   4  2167  S W79             84
670  5 81          BCE   COS,BOX,2                                 B   8  2171  B K38 M33 2       84
671  5 82   *
672  5 83   *                          SINE INITIALIZATION
673  5 84   *
674  5 85   SINE   ZA    ACCHI&X3,TOP&1&X3                         B   7  2179  ? 2G9 2?2          85
675  5 86          B     SQRX                                      B   4  2186  B K64             85
676  5 87          ZA    TOP&1&X3,SPOT-1    FIRST TERM # X         B   7  2190  ? 2?2 249          85
677  5 88          ZA    SPOT&1                                    B   4  2197  ? 251            85
678  5 89          ZS    &2,NCON            NCON # -2              B   7  2201  ! M30 K5C          85
679  5 90   *
680  5 91   *              GENERAL INITIALIZATION FOR SERIES EVALUATION
681  5 92   *
682  5 93   SCGEN  ZA    &8,UPBY            UPBY # &8              B   7  2208  ? M34 K5?          85
683  5 94          S     NCTR               NCTR # 8               B   4  2215  S K5F             86
684  5 95          B     CALC                                      B   4  2219  B !4G             86
685  5 96   *
686  5 97   *                    PREPARE FIELDS FOR NORMALIZATION
687  5 98   *
688  5 99   ZA1    ZA    NSIGN                                     B   4  2223  ? |87             86
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SEQ PG LIN  LABEL   OP    OPERANDS                                  SFX CT  LOCN  INSTRUCTION TYPE  CARD
689  6 00           SBR   X2,TOP&X3                                  B  7  2227  H 094 2?1          86
690  6 01           B     NMLZ1                                      B  4  2234  B |24             86
691  6 02   *
692  6 03   *                                 COSINE INITIALIZATION
693  6 04   *
694  6 05   COS     B     SQRX                                       B  4  2238  B K64             86
695  6 06           MN    &1,0&X1             FIRST TERM # 1         B  7  2242  D M28 0|0          86
696  6 07           ZS    &6,NCON             NCON # -6              B  7  2249  ! M35 K5C          87
697  6 08           S     EXP                                        B  4  2256  S W79             87
698  6 09           B     SCGEN                                      B  4  2260  B K08             87
699  6 10   *
700  6 11   *                                 SQUARE ARGUMENT
701  6 12   *
702  6 13   SQRX    SBR   SQRXT&3                                    B  4  2264  H L04             87
703  6 14           MCW   ACCHI&X3,SPOT                              B  7  2268  M 2G9 250         87
704  6 15           SBR   X1                                         B  4  2275  H 089             87
705  6 16           LCA   @0@                                        B  4  2279  L M36             87
706  6 17           M     ACCHI&X3,SPOT&1&X3                         B  7  2283  @ 2G9 2E1         88
707  6 18           ZS    SPOT&2,ACCHI&X3     CHANGE TO -% X SQUARED ) B  7  2290  ! 252 2G9         88
708  6 19           S     SPOT&1                                     B  4  2297  S 251             88
709  6 20   SQRXT   B     XXX                                        B  4  2301  B 000             88
710  6 21   *
711  6 22   *                                 SMALL  VALUES  OF  X
712  6 23   *
713  6 24   SMALL   A     X3,EXP                                     B  7  2305  A 099 W79         88
714  6 25           BM    TSTFC,EXP                                  B  8  2312  V L71 W79 K       88
715  6 26           ZA    EXPB,EXP                                   B  7  2320  ? W82 W79         89
716  6 27           MZ    ACCHI&X3,ACCHI-1&X3      SHIFT CONTENTS OF ACCHI&X3 B  7  2327  Y 2G9 2G8         89
717  6 28           ZA    ACCHI-1&X3,ACCHI&X3      ONE POSITION RIGHT B  7  2334  ? 2G8 2G9         89
718  6 29           A     EXPB                                       B  4  2341  A W82             89
719  6 30           ZS    EXPB&1,DEC          DEC # 20*EXP           B  7  2345  ! W83 K5I          89
720  6 31           MZ    &1,NSIGN                                   B  7  2352  Y M28 |87          89
721  6 32           BCE   COS,CODE,C                                 B  8  2359  B K38 924 C       90
722  6 33           B     SINE                                       B  4  2367  B J79             90
723  6 34   TSTFC   BCE   STR1,CODE,C                                B  8  2371  B J9A 924 C       90
724  6 35           ZA    EXPB,EXP                                   B  7  2379  ? W82 W79         90
725  6 36           B     CLRWK                                      B  4  2386  B /34             90
726  6 37   ARGLG   B     ERMSG                                      B  4  2390  B U71             90
727  6 38           DCW   @SCL@                                      B  3  2396                  90
728  6 39           B     STRZE                                      B  4  2397  B /42             91
729  6 40   *
730  6 41   ZONZ    EQU   *                                          B     2400
731  6 42           DCW   @AKJBA@                                    B  5  2405                  91
732  6 43   *
733  6 44   PIOV2   EQU   *                                          B     2405
734  6 45           DCW   1570796326794896619231                     B 22  2427                  91
                    DCW   &1                                         B  1  2428          LIT     91
                    DCW   @ @                                        B  1  2429          LIT     91
                    DCW   &2                                         B  1  2430          LIT     91
                    DCW   &40                                        B  2  2432          LIT     91
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SEQ PG LIN  LABEL   OP    OPERANDS                                  SFX CT  LOCN  INSTRUCTION TYPE  CARD

            BOX   B DCW   #01                                        B   1  2433              AREA    92
                    DCW   &8                                         B   1  2434              LIT     92
                    DCW   &6                                         B   1  2435              LIT     92
                    DCW   @0@                                        B   1  2436              LIT     92
735  6 46           EX    TRIGF                                      B             B !00               93
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SEQ PG LIN  LABEL  OP    OPERANDS                                    SFX CT  LOCN  INSTRUCTION TYPE  CARD
736  6 47          JOB   1401 FLOATING POINT NATURAL LOGARITHM
737  6 48   *
738  6 49          ORG   2000                                         B          2000
739  6 50   *
740  6 51   LOGF   MZ    ACCHI&X3,BASEZ                              B   7  2000  Y 2G9 W84           96
741  6 52   LOGF2  BE    LOG99                                       B   5  2007  B K50 S             96
742  6 53          BM    LOGER, ACCHI&X3    Q. NEGATIVE ARGUMENT     B   8  2012  V K24 2G9 K         96
743  6 54   LOGF1  C     SPOT-2,ACCHI&X3                             B   7  2020  C 248 2G9           96
744  6 55          SAR   X1                                          B   4  2027  Q 089               96
745  6 56          SW    0&X1                                        B   4  2031  , 0|0               96
746  6 57          MN    &1, 2&X1           SET UP CONSTANT ONE      B   7  2035  D L15 0|2           97
747  6 58   * FOR FASTEST RATE OF CONVERGENCE, PLACE ARG BETWEEN .32 AND 3.2
748  6 59          C     ACCHI&2,@31@                                B   7  2042  C 281 L17           97
749  6 60          BH    NOSHF                                       B   5  2049  B !68 U             97
750  6 61          ZA    ACCHI-1&X3,ACCHI&X3                         B   7  2054  ? 2G8 2G9           97
751  6 62          A     &1, EXP            SHIFT DEC POINT 1 TO LEFT B   7  2061  A L15 W79           97
752  6 63   *
753  6 64   NOSHF  S     ACCHI&X3, SPOT-1   COMPUTE 1-X              B   7  2068  S 2G9 249           98
754  6 65          ZS    SPOT-1,LZONE       CORRECT SIGN             B   7  2075  ! 249 L14           98
755  6 66          S     &1, EXP            SHIFT DEC POINT 1 TO RIGHT B   7  2082  S L15 W79           98
756  6 67          A     &1, ACCHI&1        COMPUTE X&1              B   7  2089  A L15 280           98
757  6 68          S     &0, SPOT&X3        CREATE QUOTIENT FIELD    B   7  2096  S L18 2E0           98
758  6 69          D     ACCHI&X3, SPOT-1   COMPUTE U # X-1 / X&1    B   7  2103  % 2G9 249           99
759  6 70          LCA   SPOT-1, HOLD                                B   7  2110  L 249 L13           99
760  6 71          M     HOLD, SPOT&1&X3    COMPUTE U **2            B   7  2117  @ L13 2E1           99
761  6 72          ZA    SPOT-1, ACCHI&X3                            B   7  2124  ? 249 2G9           99
762  6 73          ZA    HOLD, SPOT&1                                B   7  2131  ? L13 251           99
763  6 74          ZA    LINIT,DEC          DEC  SET TO 0            B   7  2138  ? K87 K5I          100
764  6 75          ZA                       NCTR SET TO 1            B   1  2145  ?                  100
765  6 76          ZA                       NCON SET TO 2            B   1  2146  ?                  100
766  6 77          ZA                       UPBY SET TO 0            B   1  2147  ?                  100
767  6 78          SW    LOGM1,LOGM2                                 B   7  2148  , J4I J7A          100
768  6 79          SBR   LOGM1-4,HOLD                                B   7  2155  H J4E L13          100
769  6 80          SBR   LOGM2-1                                     B   4  2162  H J7?              100
770  6 81          SBR   CALXT&3,LOGRT                               B   7  2166  H J9? J77          101
771  6 82          B     CALC1                                       B   4  2173  B !5H              101
772  6 83   LOGRT  A     TOP&1&X3           DOUBLE RESULT            B   4  2177  A 2?2              101
773  6 84          MZ    LZONE, TOP&X3      GET PROPER SIGN          B   7  2181  Y L14 2?1          101
774  6 85          ZA    LN10&1&X3,SPOT-2                            B   7  2188  ? KBG 248          101
775  6 86          M     EXP, SPOT&2        COMPUTE N * LOG10        B   7  2195  @ W79 252          101
776  6 87          A     TOP&X3, SPOT&2     ADD N * LOG10 TO RESULT  B   7  2202  A 2?1 252          102
777  6 88          SBR   X2, SPOT&2                                  B   7  2209  H 094 252          102
778  6 89          S     EXPB                                        B   4  2216  S W82              102
779  6 90          B     MVZON                                       B   4  2220  B |10              102
780  6 91   *
781  6 92   LOGER  BW    *&8,4&X2                                    B   8  2224  V K39 0!4 1        102
782  6 93          B     ERMSG                                       B   4  2232  B U71              102
783  6 94          DCW   @LNN@                                       B   3  2238                     102
784  6 95          MZ    LINIT,ACCHI&X3     MAKE SIGN PLUS AND FIND  B   7  2239  Y K87 2G9          103
785  6 96          B     LOGF1                    LOG OF ABSOLUTE VALUE B   4  2246  B !20              103
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SEQ PG LIN  LABEL  OP    OPERANDS                                          SFX CT  LOCN  INSTRUCTION TYPE  CARD

786  6 97   LOG99  BW    POWER,4&X2                                         B   8  2250  V K76 0!4 1        103
787  6 98          B     ERMSG                                              B   4  2258  B U71              103
788  6 99          DCW   @LNZ@                                              B   3  2264                     103
789  7 00          MZ    -0,ACCHI&X3        GIVE LARGE NEG NUMBER AS RESULT B   7  2265  Y L19 2G9          103
790  7 01          B     STR99                                              B   4  2272  B /15              103
791  7 02   POWER  CW    ZROSW                                              B   4  2276  ) W84              104
792  7 03          B     STR1                                               B   4  2280  B J9A              104
793  7 04   *
794  7 05          DCW   &0                 UPBY                             B   1  2284                     104
795  7 06          DCW   &2                 NCON                             B   1  2285                     104
796  7 07          DCW   &1                 NCTR                             B   1  2286                     104
797  7 08   LINIT  DCW   &0                 DEC                              B   1  2287                     104
798  7 09   HOLD   DCW   #26                                                B  26  2313                     104
799  7 10   LZONE  DCW   #1                                                 B   1  2314                     105
                   DCW   &1                                                 B   1  2315             LIT     105
                   DCW   @31@                                               B   2  2317             LIT     105
                   DCW   &0                                                 B   1  2318             LIT     105
                   DCW   -0                                                 B   1  2319             LIT     105
800  7 11          EX    LOGF                                               B            B !00              106
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SEQ PG LIN  LABEL  OP    OPERANDS                                          SFX CT  LOCN  INSTRUCTION TYPE  CARD

801  7 12          JOB   1401 FORTRAN FLOATING POINT EXPONENTIAL
802  7 13   *
803  7 14          ORG   2000                                               B          2000
804  7 15   *
805  7 16   EXPF   MZ    ONE,NSIGN                                         B   7  2000  Y K90 |87          109
806  7 17          MN    XPNUM,*&8                                         B   7  2007  D W84 !21          109
807  7 18          BCE   OUTM1,@02468@,0                                  B   8  2014  B !40 K99 0        109
808  7 19          CHAIN 4                                                                 MACRO
809                BCE                                                     B   1  2022  B               GEN  109
810                BCE                                                     B   1  2023  B               GEN  109
811                BCE                                                     B   1  2024  B               GEN  109
812                BCE                                                     B   1  2025  B               GEN  109
813  7 20          MZ    BASEZ,NSIGN                                       B   7  2026  Y W84 |87          110
814  7 21          MN    @8@,XPNUM                                         B   7  2033  D L00 W84          110
815  7 22   OUTM1  BW    RUNML,ZROSW                                       B   8  2040  V !79 W84 1        110
816  7 23          SW    ZROSW         BASE IS ZERO                        B   4  2048  , W84              110
817  7 24          ZS    ACCHI&X3                                          B   4  2052  ! 2G9              110
818  7 25          BU    QSIGN     BRANCH IF ARG NOT ZERO                  B   5  2056  B J21 /            110
819  7 26          B     ERMSG                                             B   4  2061  B U71              110
820  7 27          DCW   @ZTZ@           ZERO TO ZERO POWER               B   3  2067                     111
821  7 28   PETTY  MZ    NSIGN,TWTCH                                       B   7  2068  Y |87 K6?          111
822  7 29          B     STR1                                              B   4  2075  B J9A              111
823  7 30   RUNML  BE    PETTY                                             B   5  2079  B !68 S            111
824  7 31   NRML   ZA    EXP,EXPB                                          B   7  2084  ? W79 W82          111
825  7 32          S     ONE,EXPB                                          B   7  2091  S K90 W82          111
826  7 33          BM    SML,EXPB           BRANCH IF EXP LESS OR # TO ZERO B   8  2098  V K45 W82 K        112
827  7 34          S     THREE,EXPB                                        B   7  2106  S K94 W82          112
828  7 35          BM    REDUC,EXPB         BRANCH IF EXP GREATER THAN ZERO B   8  2113  V J40 W82 K        112
829  7 36   *                                      AND LESS THAN FOUR
830  7 37   *
831  7 38   *              DETERMINE  WHETHER  EXPONENT  OVERFLOW  OR  UNDERFLOW
832  7 39   *
833  7 40   QSIGN  BM    STRZE,ACCHI&X3     BRANCH IF ARGUMENT NEGATIVE    B   8  2121  V /42 2G9 K        112
834  7 41          B     ERMSG              EXPONENT OVERFLOW              B   4  2129  B U71              112
835  7 42          DCW   @EOF@                                            B   3  2135                     112
836  7 43          B     STR99                                             B   4  2136  B /15              113
837  7 44   *
838  7 45   *                EXPONENT  #  &1,  &2,  OR  &3
839  7 46   *
840  7 47   REDUC  SBR   X1,LN10&X3         STORE ADDRESS OF DIVISOR       B   7  2140  H 089 KBF          113
841  7 48          ZA    EXP&1,X2&1                                        B   7  2147  ? W80 095          113
842  7 49          B     DIVID                                             B   4  2154  B !0?              113
843  7 50          C     0&X1,THC99                                        B   7  2158  C 0|0 K93          113
844  7 51          BL    QSIGN              BRANCH IF QUOT GREATER THAN 99 B   5  2165  B J21 T            113
845  7 52          ZA    0&X1,EXP                                          B   7  2170  ? 0|0 W79          114
846  7 53          MZ    ACCHI&X3,EXP                                      B   7  2177  Y 2G9 W79          114
847  7 54   *
848  7 55   *              PREPARE  FIELDS  FOR  SERIES  CALCULATION
849  7 56   *
850  7 57          S     DEC                                               B   4  2184  S K5I              114
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SEQ PG LIN  LABEL  OP    OPERANDS                                    SFX CT  LOCN  INSTRUCTION TYPE  CARD
851  7 58   FTERM  C     SPOT,ACCHI&X3      SET UP TERM DEVELOPMENT AREA  B  7  2188  C 250 2G9         114
852  7 59          SAR   X1                                          B   4  2195  Q 089              114
853  7 60          SW    0&X1                                        B   4  2199  , 0|0              114
854  7 61          S     SPOT&1             CLEAR TERM DEVELOPMENT AREA  B  4  2203  S 251              114
855  7 62          MN    ONE,0&X1           FIRST TERM # 1           B   7  2207  D K90 0|0          115
856  7 63          ZA    THC99-2,NCTR       SET NCTR # ZERO          B   7  2214  ? K91 K5F          115
857  7 64          ZA                       SET NCON # 1             B   1  2221  ?                 115
858  7 65          ZA                       SET UPBY # ZERO          B   1  2222  ?                 115
859  7 66          B     CALC                                        B   4  2223  B !4G              115
860  7 67   *
861  7 68   *               PREPARE  FIELDS  FOR  NORMALIZING
862  7 69   *
863  7 70          MZ    TOP&1&X3,TOP&X3                             B   7  2227  Y 2?2 2?1          115
864  7 71          SBR   X2,TOP&X3                                   B   7  2234  H 094 2?1          115
865  7 72          B     NMLZ1                                       B   4  2241  B |24              116
866  7 73   *
867  7 74   *               EXPONENTS  LESS  OR  #  TO  ZERO
868  7 75   *
869  7 76   SML    A     X3,EXPB                                     B   7  2245  A 099 W82          116
870  7 77          BM    PETTY,EXPB    BRANCH IF -E GREATER THAN PRECISION  B  8  2252  V !68 W82 K  116
871  7 78          ZS    EXP&1,DEC          SET DEC # E              B   7  2260  ! W80 K5I          116
872  7 79          S     EXP                                         B   4  2267  S W79              116
873  7 80          MZ    ACCHI&X3,ACCHI-1&X3    SET UP SERIES MULTIPLIER  B  7  2271  Y 2G9 2G8      116
874  7 81          ZA    ACCHI-1&X3,ACCHI&X3                         B   7  2278  ? 2G8 2G9          117
875  7 82          B     FTERM                                       B   4  2285  B J88              117
876  7 83          DCW   0                                           B   1  2289                    117
877  7 84   ONE    DCW   &1                                          B   1  2290                    117
878  7 85   THC99  DCW   &099                                        B   3  2293                    117
879  7 86   THREE  DCW   &3                                          B   1  2294                    117
                   DCW   @02468@                                     B   5  2299          LIT       117
                   DCW   @8@                                         B   1  2300          LIT       118
880  7 87          EX    EXPF                                        B          B !00               119
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SEQ PG LIN  LABEL   OP    OPERANDS                          SFX CT  LOCN  INSTRUCTION TYPE  CARD

881  7 88           JOB   1401 FLOATING POINT ARCTANGENT
882  7 89   *
883  7 90           ORG   2000                               B          2000
884  7 91   *
885  7 92   CASE1   BE    STRZE                             B   5  2000  B /42 S           122
886  7 93           MZ    &1,INITL                          B   7  2005  Y M61 L62         122
887  7 94           ZA    ACCHI-1&X3,ACCHI&X3               B   7  2012  ? 2G8 2G9        122
888  7 95           S     DEC                               B   4  2019  S K5I            122
889  7 96           S     TOP&1&X3                          B   4  2023  S 2?2            122
890  7 97           C     SPOT-2,ACCHI&X3                   B   7  2027  C 248 2G9        122
891  7 98           SAR   X1                                B   4  2034  Q 089            122
892  7 99           SW    0&X1                              B   4  2038  , 0|0            123
893  8 00           ZA    @0?@,SPOT&X3                      B   7  2042  ? M63 2E0        123
894  8 01           MCW   @0?@,EXPB                        B   7  2049  M M63 W82        123
895  8 02           MN    EXP,EXPB                          B   7  2056  D W79 W82        123
896  8 03           MN                                      B   1  2063  D               123
897  8 04           C     EXPB,@0?@                         B   7  2064  C W82 M63        123
898  8 05           BE    ZEREX                             B   5  2071  B K83 S          123
899  8 06           S     X3,EXPB                           B   7  2076  S 099 W82        124
900  8 07           BM    TEST,EXPB                         B   8  2083  V J50 W82 K      124
901  8 08           BM    CASE2,EXP                         B   8  2091  V J03 W79 K      124
902  8 09           B     CASE7                             B   4  2099  B J21            124
903  8 10   CASE2   MCW   ACCHI&X3,TOP&X3                  B   7  2103  M 2G9 2?1        124
904  8 11           A     &1,EXP                            B   7  2110  A M61 W79        125
905  8 12           B     SIGN                              B   4  2117  B J39            125
906  8 13   CASE7   S     EXP                               B   4  2121  S W79            125
907  8 14   ADDPI2  A     PIOV4&1&X3,TOP&1&X3               B   7  2125  A MA4 2?2        125
908  8 15   ADDPI4  A     PIOV4&1&X3,TOP&1&X3               B   7  2132  A MA4 2?2        125
909  8 16   SIGN    SBR   X2,TOP&X3                        B   7  2139  H 094 2?1        125
910  8 17           B     NMLZ1                             B   4  2146  B |24           126
911  8 18   TEST    BM    CASE3,EXP                         B   8  2150  V K47 W79 K      126
912  8 19           MN    &1,2&X1                           B   7  2158  D M61 0|2        126
913  8 20   SHIFT   ZA    SPOT-1&X3,SPOT&X3                 B   7  2165  ? 2D9 2E0        126
914  8 21           S     &1,EXP                            B   7  2172  S M61 W79        126
915  8 22           C     EXP,@0?@                          B   7  2179  C W79 M63        127
916  8 23           BL    SHIFT                             B   5  2186  B J65 T          127
917  8 24           D     ACCHI&X3,SPOT-1                   B   7  2191  % 2G9 249        127
918  8 25           C     2&X1,@042@                        B   7  2198  C 0|2 M66        127
919  8 26           BH    CASE6                             B   5  2205  B K32 U          127
920  8 27           ZS    INITL                             B   4  2210  ! L62            127
921  8 28           MCW   SPOT-3,ACCHI&X3                  B   7  2214  M 247 2G9        128
922  8 29           ZA    @0?@,SPOT&X3                      B   7  2221  ? M63 2E0        128
923  8 30           B     CASE4                             B   4  2228  B K95            128
924  8 31   CASE6   SBR   CALXT&3,ADDPI2                   B   7  2232  H J9? J25        128
925  8 32           ZS    INITL                             B   4  2239  ! L62            128
926  8 33           B     MLTPLY                            B   4  2243  B L41            128
927  8 34   CASE3   SBR   CALXT&3,SIGN                     B   7  2247  H J9? J39        129
928  8 35           ZA    EXP,EXPB                          B   7  2254  ? W79 W82        129
929  8 36           A     EXPB                              B   4  2261  A W82            129
930  8 37           ZS    EXPB&1,DEC                        B   7  2265  ! W83 K5I        129
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SEQ  PG LIN  LABEL   OP    OPERANDS                                  SFX CT  LOCN  INSTRUCTION TYPE  CARD
931   8 38           MCW   ACCHI&X3,SPOT-3                            B   7  2272  M 2G9 247          129
932   8 39           B     MLTPLY                                     B   4  2279  B L41              129
933   8 40   ZEREX   C     ACCHI&3,@042@                              B   7  2283  C 282 M66          130
934   8 41           BH    CASE3                                      B   5  2290  B K47 U            130
935   8 42   CASE4   SBR   CALXT&3,ADDPI4                           B   7  2295  H J9? J32          130
936   8 43           ZS    INITL                                      B   4  2302  ! L62              130
937   8 44           MN    &1,2&X1                                    B   7  2306  D M61 0|2          130
938   8 45           S     ACCHI&X3,SPOT-1                            B   7  2313  S 2G9 249          130
939   8 46           A     &1,ACCHI&1                                 B   7  2320  A M61 280          131
940   8 47           A     @0?@,SPOT&X3                               B   7  2327  A M63 2E0          131
941   8 48           D     ACCHI&X3,SPOT-1                            B   7  2334  % 2G9 249          131
942   8 49   MLTPLY  LCA   SPOT-1,HOLDD                              B   7  2341  L 249 M60          131
943   8 50           M     HOLDD,SPOT&2&X3                            B   7  2348  @ M60 2E2          131
944   8 51           ZS    SPOT-1,ACCHI&X3                            B   7  2355  ! 249 2G9          132
945   8 52   INITL   ZA    HOLDD                                      B   4  2362  ? M60              132
946   8 53           ZA    HOLDD,SPOT&1                               B   7  2366  ? M60 251          132
947   8 54           ZA    &2,NCON                                    B   7  2373  ? M67 K5C          132
948   8 55           S     UPBY                                       B   4  2380  S K5?              132
949   8 56           ZA    &1,NCTR                                    B   7  2384  ? M61 K5F          132
950   8 57           SW    LOGM1,LOGM2                                B   7  2391  , J4I J7A          133
951   8 58           SBR   LOGM1-4,HOLDD                           B   7  2398  H J4E M60          133
952   8 59           SBR   LOGM2-1                                  B   4  2405  H J7?              133
953   8 60           B     CALC1                                      B   4  2409  B !5H              133
954   8 61   PIOV4   EQU   *&1                                       B      2413                     
955   8 62           DCW   @07853981633974483096156 6@              B  24  2436                     134
956   8 63   HOLDD   DCW   #24                                       B  24  2460                     135
                     DCW   &1                                        B   1  2461            LIT    135
                     DCW   @0?@                                      B   2  2463            LIT    135
                     DCW   @042@                                     B   3  2466            LIT    135
                     DCW   &2                                        B   1  2467            LIT    135
957   8 64           EX    CASE1                                      B          B !00              136
```

```
SEQ PG LIN  LABEL  OP    OPERANDS                                        SFX CT  LOCN  INSTRUCTION TYPE  CARD

958  8 65          JOB   1401  ABSOLUTE  VALUE - NEGATE  SUBROUTINE
959  8 66   *
960  8 67          ORG   2000                                             B          2000
961  8 68   ABSVL  MZ    *&1,ACCHI&X3       NEGATE ABSOLUTE VALUE OF ARGUMENT B   7  2000  Y !07 2G9          139
962  8 69          EX    ABSVL                                            B            B !00                 140
963  8 70   *
964  8 71          ORG   2000                                             B          2000
965  8 72   NEGF   ZS    ACCHI&X3                                         B   4  2000  ! 2G9                 143
966  8 73          B     CLRWK                                            B   4  2004  B /34                 143
967  8 74          EX    NEGF                                             B            B !00                 144
```

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SEQ PG LIN  LABEL  OP    OPERANDS                                              SFX CT  LOCN  INSTRUCTION TYPE  CARD

968  8 75          JOB   FLOAT TO FIX CONVERSION
969  8 76   *
970  8 77          ORG   2000                                                   B          2000
971  8 78   *
972  8 79   FIXF   SW    FIXSW                                                 B   4  2000  , W87              147
973  8 80          SBR   X1,0&X3                                               B   7  2004  H 089 0?0          147
974  8 81          MCW   PARAMA&4,*&7                                          B   7  2011  M 690 !24          147
975  8 82          SBR   X3,000                                               B   7  2018  H 099 000          147
976  8 83          S     &1,EXP                                                B   7  2025  S J32 W79          147
977  8 84          BM    STRZE,EXP    STORE ZERO IF CHAR OF ARG LESS THAN 1    B   8  2032  V /42 W79 K        148
978  8 85          ZA    EXP&1,X2&1                                            B   7  2040  ? W80 095          148
979  8 86          C     X1,X2                                                 B   7  2047  C 089 094          148
980  8 87          BL    EXPLS                                                 B   5  2054  B J07 T            148
981  8 88          S     X1&1,X2&1                                             B   7  2059  S 090 095          148
982  8 89          C     X3,X2                                                 B   7  2066  C 099 094          149
983  8 90          BH    STRZE                                                 B   5  2073  B /42 U            149
984  8 91          S     SPOT&1&X2                                             B   4  2078  S 2N1              149
985  8 92          ZA    ACCHI&X1,SPOT                                         B   7  2082  ? 2X9 250          149
986  8 93          MZ    SPOT,SPOT&1&X2                                        B   7  2089  Y 250 2N1          149
987  8 94          ZA    SPOT&1&X2,ACCHI&X3   STORE FIXPT NUMBERS MODULO K     B   7  2096  ? 2N1 2G9          149
988  8 95          B     CLRWK                                                 B   4  2103  B /34             150
989  8 96   EXPLS  MZ    ACCHI&X1,ACCHI&1&X2  ADD ONLY INTEGER PLACES          B   7  2107  Y 2X9 2Q0          150
990  8 97          LCA   ACCHI&1&X2,SPOT                                       B   7  2114  L 2Q0 250          150
991  8 98          ZA    SPOT,ACCHI&X3                                         B   7  2121  ? 250 2G9          150
992  8 99          B     CLRWK                                                 B   4  2128  B /34             150
                   DCW   &1                                                    B   1  2132              LIT  150
993  9 00          EX    FIXF                                                  B          B !00             151
```

```
 SEQ PG LIN  LABEL  OP    OPERANDS                    SFX CT  LOCN  INSTRUCTION TYPE  CARD

 994  9 01          JOB   FIX  TO  FLOAT  CONVERSION
 995  9 02   *
 996  9 03          ORG   2000                         B            2000
 997  9 04   *
 998  9 05   FLOT   CW    FIXSW                       B   4  2000  ) W87              154
 999  9 06          BW    *&5,4&X2                    B   8  2004  V !16 0!4 1       154
1000  9 07          B     *&8                         B   4  2012  B !23             154
1001  9 08          MN    ACCHI&X3,XPNUM              B   7  2016  D 2G9 W84         154
1002  9 09          SBR   X2,SPOT                     B   7  2023  H 094 250         154
1003  9 10          LCA   ACCHI&X3                    B   4  2030  L 2G9             154
1004  9 11          MCW   PARAMA&6,*&7                B   7  2034  M 692 !47         155
1005  9 12          SBR   X3,000                      B   7  2041  H 099 000         155
1006  9 13          ZA    X3,EXPB                     B   7  2048  ? 099 W82         155
1007  9 14          B     MVZON                       B   4  2055  B |10             155
1008  9 15          EX    FLOT                        B            B !00             156
```

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 SEQ PG LIN  LABEL  OP    OPERANDS                                SFX CT  LOCN  INSTRUCTION TYPE  CARD

1009  9 16          JOB   1401 FLOATING POINT SQUARE ROOT
1010  9 17   *
1011  9 18          ORG   2000                                     B          2000               159
1012  9 19   *
1013  9 20   SQRTF  BM    QERR,ACCHI&X3      BRANCH IF ARGUMENT NEGATIVE  B   8  2000  V J87 2G9 K        159
1014  9 21          MN    ACCHI&X3,TOP&21&X3                      B   7  2008  D 2G9 2B2           159
1015  9 22          MCW                                           B   1  2015  M                  159
1016  9 23          SW                                            B   1  2016  ,                  159
1017  9 24          SBR   X1                                      B   4  2017  H 089              159
1018  9 25          LCA   &1,TOP             INITIALIZE SUBTRAHEND B   7  2021  L K09 201          159
1019  9 26          SBR   X2                                      B   4  2028  H 094              159
1020  9 27          ZA    EXP&1,ACCHI&4      DETERMINE EXPONENT OF ROOT  B   7  2032  ? W80 283          160
1021  9 28          A     &1, ACCHI&3                             B   7  2039  A K09 282          160
1022  9 29          M     &50,ACCHI&6                             B   7  2046  @ K11 285          160
1023  9 30          MN    ACCHI&4, EXP                            B   7  2053  D 283 W79          160
1024  9 31          MN                                            B   1  2060  D                  160
1025  9 32          BCE   CKSGN,ACCHI&5,0                        B   8  2061  B !80 284 0        160
1026  9 33          SBR   X1,1&X1                                B   7  2069  H 089 0|1          161
1027  9 34          B     QSTRT                                   B   4  2076  B !95             161
1028  9 35   CKSGN  BWZ   QSTRT,EXP,B                            B   8  2080  V !95 W79 B        161
1029  9 36          A     &1,EXP                                  B   7  2088  A K09 W79          161
1030  9 37   QSTRT  S     ACCHI&X3                                B   4  2095  S 2G9              161
1031  9 38   QRTN   S     &11,2&X2           ADJUST SUBTRAHEND    B   7  2099  S K13 0!2          161
1032  9 39          SW    21&X2                                   B   4  2106  , 0K1             162
1033  9 40          CW                                            B   1  2110  )                  162
1034  9 41          SBR   X2, 1&X2                                B   7  2111  H 094 0!1          162
1035  9 42          ZS    &1, CNTR#1                              B   7  2118  ! K09 K14          162
1036  9 43   QLOOP  A     &1,CNTR            COMPUTE RESULT DIGITS  B   7  2125  A K09 K14          162
1037  9 44          A     &2,1&X2            INCREASE SUBTRAHEND  B   7  2132  A K15 0!1          162
1038  9 45          S     1&X2,2&X1          DO ODD-INTEGER SUBTRACTIONS  B   7  2139  S 0!1 0|2          163
1039  9 46          BWZ   QLOOP, 2&X1, B                          B   8  2146  V J25 0|2 B        163
1040  9 47          A     1&X2, 2&X1                              B   7  2154  A 0!1 0|2          163
1041  9 48          MN    CNTR, DELTA&X2                          B   7  2161  D K14 0P9          163
1042  9 49          SBR   X1, 2&X1                               B   7  2168  H 089 0|2          163
1043  9 50          BWZ   QRTN, DELTA&X2, 2                       B   8  2175  V !99 0P9 2        164
1044  9 51          B     CLRWK                                   B   4  2183  B /34             164
1045  9 52   QERR   B     ERMSG                                   B   4  2187  B U71             164
1046  9 53          DCW   @SQN@                                   B   3  2193                    164
1047  9 54          MZ    &1,ACCHI&X3                             B   7  2194  Y K09 2G9          164
1048  9 55          CS    ACCHI-1                                 B   4  2201  / 278             164
1049  9 56          B     SQRTF&8                                 B   4  2205  B !08             164
                    DCW   &1                                      B   1  2209            LIT    165
                    DCW   &50                                     B   2  2211            LIT    165
                    DCW   &11                                     B   2  2213            LIT    165
              CNTR B DCW  #01                                     B   1  2214            AREA   165
                    DCW   &2                                      B   1  2215            LIT    165
1050  9 57          EX    SQRTF                                   B          B !00              166
```

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 SEQ PG LIN  LABEL  OP    OPERANDS                                  SFX CT  LOCN  INSTRUCTION TYPE  CARD
1051  9 58          JOB   1401 FORTRAN  USER FUNCTIONS
1052  9 59          SFX   A
1053  9 60          ORG   2000                                       A          2000
1054  9 61          DCW   @USER FUNCTION  1 GOES HERE@               A  26  2025                    169
1055  9 62          XFR   0                                          A          B 000                 170
1056  9 63          ORG   2000                                       A          2000
1057  9 64          DCW   @USER FUNCTION  2 GOES HERE@               A  26  2025                    173
1058  9 65          XFR   0                                          A          B 000                 174
1059  9 66          ORG   2000                                       A          2000
1060  9 67          DCW   @USER FUNCTION  3 GOES HERE@               A  26  2025                    177
1061  9 68          XFR   0                                          A          B 000                 178
1062  9 69          ORG   2000                                       A          2000
1063  9 70          DCW   @USER FUNCTION  4 GOES HERE@               A  26  2025                    181
1064  9 71          XFR   0                                          A          B 000                 182
1065  9 72          ORG   2000                                       A          2000
1066  9 73          DCW   @USER FUNCTION  5 GOES HERE@               A  26  2025                    185
1067  9 74          XFR   0                                          A          B 000                 186
1068  9 75          ORG   2000                                       A          2000
1069  9 76          DCW   @USER FUNCTION  6 GOES HERE@               A  26  2025                    189
1070  9 77          XFR   0                                          A          B 000                 190
1071  9 78          ORG   2000                                       A          2000
1072  9 79          DCW   @USER FUNCTION  7 GOES HERE@               A  26  2025                    193
1073  9 80          XFR   0                                          A          B 000                 194
1074  9 81          ORG   2000                                       A          2000
1075  9 82          DCW   @USER FUNCTION  8 GOES HERE@               A  26  2025                    197
1076  9 83          XFR   0                                          A          B 000                 198
1077  9 84          ORG   2000                                       A          2000
1078  9 85          DCW   @USER FUNCTION  9 GOES HERE@               A  26  2025                    201
1079  9 86          XFR   0                                          A          B 000                 202
1080  9 87          ORG   2000                                       A          2000
1081  9 88          DCW   @USER FUNCTION 10 GOES HERE@               A  26  2025                    205
1082  9 89          XFR   0                                          A          B 000                 206
1083  9 90          ORG   2000                                       A          2000
1084  9 91          DCW   @USER FUNCTION 11 GOES HERE@               A  26  2025                    209
1085  9 92          XFR   0                                          A          B 000                 210
1086  9 93          ORG   2000                                       A          2000
1087  9 94          DCW   @USER FUNCTION 12 GOES HERE@               A  26  2025                    213
1088  9 95          XFR   0                                          A          B 000                 214
```

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 SEQ PG LIN  LABEL  OP    OPERANDS                                  SFX CT  LOCN  INSTRUCTION TYPE  CARD
1089  9 96          JOB   1401 FORTRAN RELOCATABLE XLINKF
1090  9 97          ORG   2000                                       A          2000
1091  9 98   START  MCW   CLRCON,359     CHANG ON REASM OF FIXED XLINK A   7  2000  M !13 359         217
1092  9 99          B     337                                        A   4  2007  B 337             217
1093 10 00   CLRCON DCW   #3                                         A   3  2013                    217
1094 10 01          EX    START                                      A          B !00             218
```

```
 SEQ PG LIN  LABEL  OP    OPERANDS                                  SFX CT  LOCN  INSTRUCTION TYPE  CARD
1095 10 02          JOB   1401 FORTRAN  FUNCTION BRANCH ROUTINE
1096 10 03          ORG   2000                                       A            2000
1097 10 04             T  SINFUN,4&X2,S                            A   8  2000  T 903 0!4 S        221
1098 10 05          XFR   0                                        A            B 000              222
1099 10 06          ORG   2000                                       A            2000
1100 10 07             T  SINFUN,4&X2,C                            A   8  2000  T 903 0!4 C        225
1101 10 08          XFR   0                                        A            B 000              226
1102 10 09          ORG   2000                                       A            2000
1103 10 10             T  LOGFUN,4&X2,G                            A   8  2000  T 900 0!4 G        229
1104 10 11          XFR   0                                        A            B 000              230
1105 10 12          ORG   2000                                       A            2000
1106 10 13             T  XPNETL,4&X2,E                            A   8  2000  T 897 0!4 E        233
1107 10 14          XFR   0                                        A            B 000              234
1108 10 15          ORG   2000                                       A            2000
1109 10 16             T  ATANFN,4&X2,T                            A   8  2000  T 894 0!4 T        237
1110 10 17          XFR   0                                        A            B 000              238
1111 10 18          ORG   2000                                       A            2000
1112 10 19             T  ABSVAL,4&X2,A                            A   8  2000  T 891 0!4 A        241
1113 10 20          XFR   0                                        A            B 000              242
1114 10 21          ORG   2000                                       A            2000
1115 10 22             T  NEGTFN,4&X2,N                            A   8  2000  T 888 0!4 N        245
1116 10 23          XFR   0                                        A            B 000              246
1117 10 24          ORG   2000                                       A            2000
1118 10 25             T  FIXFUN,4&X2,X                            A   8  2000  T 885 0!4 X        249
1119 10 26          XFR   0                                        A            B 000              250
1120 10 27          ORG   2000                                       A            2000
1121 10 28             T  FLTFUN,4&X2,F                            A   8  2000  T 882 0!4 F        253
1122 10 29          XFR   0                                        A            B 000              254
1123 10 30          ORG   2000                                       A            2000
1124 10 31             T  SQRTFN,4&X2,Q                            A   8  2000  T 879 0!4 Q        257
1125 10 32          XFR   0                                        A            B 000              258
1126 10 33          ORG   2000                                       A            2000
1127 10 34             T  YUSER1,4&X2,R                            A   8  2000  T 876 0!4 R        261
1128 10 35          XFR   0                                        A            B 000              262
1129 10 36          ORG   2000                                       A            2000
1130 10 37             T  YUSER2,4&X2,U                            A   8  2000  T 873 0!4 U        265
1131 10 38          XFR   0                                        A            B 000              266
1132 10 39          ORG   2000                                       A            2000
1133 10 40             T  YUSER3,4&X2,P                            A   8  2000  T 870 0!4 P        269
1134 10 41          XFR   0                                        A            B 000              270
1135 10 42          ORG   2000                                       A            2000
1136 10 43             T  YUSER4,4&X2,W                            A   8  2000  T 867 0!4 W        273
1137 10 44          XFR   0                                        A            B 000              274
1138 10 45          ORG   2000                                       A            2000
1139 10 46             T  YUSER5,4&X2,Y                            A   8  2000  T 864 0!4 Y        277
1140 10 47          XFR   0                                        A            B 000              278
1141 10 48          ORG   2000                                       A            2000
1142 10 49             T  YUSER6,4&X2,Z                            A   8  2000  T 861 0!4 Z        281
1143 10 50          XFR   0                                        A            B 000              282
1144 10 51          ORG   2000                                       A            2000
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 SEQ PG LIN  LABEL  OP    OPERANDS                  SFX CT  LOCN  INSTRUCTION TYPE  CARD
1145 10 52            T   YUSER7,4&X2,J             A   8  2000  T 858 0!4 J        285
1146 10 53         XFR    0                         A             B 000              286
1147 10 54         ORG    2000                      A              2000
1148 10 55            T   YUSER8,4&X2,K             A   8  2000  T 855 0!4 K        289
1149 10 56         XFR    0                         A             B 000              290
1150 10 57         ORG    2000                      A              2000
1151 10 58            T   YUSER9,4&X2,L             A   8  2000  T 852 0!4 L        293
1152 10 59         XFR    0                         A             B 000              294
1153 10 60         ORG    2000                      A              2000
1154 10 61            T   YUSR10,4&X2,M             A   8  2000  T 849 0!4 M        297
1155 10 62         XFR    0                         A             B 000              298
1156 10 63         ORG    2000                      A              2000
1157 10 64            T   YUSR11,4&X2,D             A   8  2000  T 846 0!4 D        301
1158 10 65         XFR    0                         A             B 000              302
1159 10 66         ORG    2000                      A              2000
1160 10 67            T   YUSR12,4&X2,H             A   8  2000  T 843 0!4 H        305
1161 10 68         XFR    0                         A             B 000              306
1162 10 69         ORG    2000                      A              2000
1163 10 70            T   XLINKS,4&X2,I             A   8  2000  T 840 0!4 I        309
1164 10 71         XFR    0                         A             B 000              310
1165 10 72         END                              A             / 000 080
```

SYMBOL	ADDRESS	SYMBOL	ADDRESS	SYMBOL	ADDRESS	SYMBOL	ADDRESS	SYMBOL	ADDRESS	SYMBOL	ADDRESS	SYMBOL	ADDRESS
AAA A	2194	ABSVAL	891	ABSVLB	2000	ACCHIB	279	ADDPI2	2125	ADDPI4	2132	ADDRTB	1579
ADLSTA	2394	ALGRTB	759	ARGLGB	2390	ARITFB	700	ARITHB	712	ARRAYA	2122	ASCOMB	996
ATANFN	894	BASEZB	1684	BCLEAR	833	BFEELA	2215	BLANKA	2397	BOX B	2433	BRWHRB	1221
BSTANA	2087	CALC B	14047	CALC1B	14058	CALXTB	14187	CASE1B	2000	CASE2B	2103	CASE3B	2247
CASE4B	2295	CASE6B	2232	CASE7B	2121	CHGEXB	1188	CKSGNB	2080	CLRCON	2013	CLRWKB	1134
CLRX B	755	CNTR B	2214	CODE B	924	COMFN1	906	COS B	2238	COSF B	2024	DEC B	14259
DELTAB	79	DIVIDB	14000	DO1 A	2000	DO2 A	2000	DO3 A	2040	DOADR1	924	DOADR2	921
DOADR3	918	DOINIT	915	DOSBSC	909	DUN1 A	2242	DVERRB	1154	ERMSGB	1471	ERMXTB	1526
EXDO3A	2069	EXIT B	784	EXITEL	2046	EXITLA	2141	EXITSA	2175	EXP B	1679	EXPB B	1682
EXPF B	2000	EXPLSB	2107	FAILSW	184	FDIV B	1233	FINSTB	1392	FIXF B	2000	FIXFUN	885
FIXPTB	1541	FIXSWB	1687	FLOT B	2000	FLTFUN	882	FMPY B	1262	FSIZEB	831	FTERMB	2188
HOLD B	2313	HOLDDB	2460	INDX1A	2275	INDX2A	2298	INDX3A	2341	INDX4A	2334	INITAP	780
INITIL	2000	INITLA	2092	INITLB	2362	INITXT	793	INRAYA	2184	INVTFN	894	LCA A	2041
LIMITA	2348	LIMT A	2047	LINITB	2287	LN10 B	14226	LOG99B	2250	LOGERB	2224	LOGF B	2000
LOGF1B	2020	LOGF2B	2007	LOGFUN	900	LOGM1B	14149	LOGM2B	14171	LOGRTB	2177	LPARNA	2403
LZONEB	2314	MLTPLY	2341	MONTER	700	MONTOR	769	MVEXPB	1362	MVQUTB	1661	MVZONB	1010
NCON B	14253	NCTR B	14256	NDMDVB	1283	NEGF B	2000	NEGTFN	888	NGBMPB	868	NLOOPB	1043
NMLZ1B	1024	NORNDB	1448	NOSHFB	2068	NOSWTA	2228	NRML B	2084	NSIGNB	1087	NUVALB	1017
OBJLST	2000	OBLIST	912	OHALTA	2179	ONE B	2290	OPDSCB	1199	OTSUBA	2000	OUT1 B	1331
OUT2 B	1369	OUTM1B	2040	PACK A	2093	PARAMA	686	PETTYB	2068	PIOV2B	2405	PIOV4B	2413
POWERB	2276	PROD A	2199	QERR B	2187	QFUNCT	1305	QLOOPB	2125	QRTN B	2099	QSIGNB	2121
QSTRTB	2095	RAY A	2103	RCDMKB	1675	RDOVFB	1418	REDUCB	2140	RINX2B	1519	RTN1 B	1165
RUNMLB	2079	SATFYA	2381	SBBR1B	723	SBBR2B	815	SBIX A	2054	SBR A	2154	SBR1 A	2020
SBRLTA	2191	SCGENB	2208	SETUPA	2305	SHIFTB	2165	SIGN B	2139	SIGNFB	924	SINE B	2179
SINF B	2008	SINFUN	903	SMALLB	2305	SML B	2245	SMPLEA	2104	SNCS B	2036	SPOT B	250
SQRTFB	2000	SQRTFN	879	SQRX B	2264	SQRXTB	2301	STARTA	2000	STMNMB	1500	STR1 B	14191
STR99B	1115	STRX2B	1486	STRZEB	1142	STSUBB	1206	SUB4 B	2119	SUBIXA	2355	SUBSCR	2253
SUBTRB	1587	TCLEAR	710	TEST B	2150	TESTLA	2061	THC99B	2293	THREEB	2294	TOP B	201
TRIGFB	2000	TSTFCB	2371	TWTCHB	14260	UPBY B	14250	WKZONB	200	WORK A	2204	X1 A	89
X1 B	89	X2 A	94	X2 B	94	X3 A	99	X3 B	99	XBEGIN	838	XDIV B	1623
XL1 B	89	XL2 B	94	XL3 B	99	XLINKS	840	XMPY B	1598	XPNETL	897	XPNUMB	1684
XSIZEB	1530	XTLSTA	2094	XXX B	0	XYZ A	2025	YUSER1	876	YUSER2	873	YUSER3	870
YUSER4	867	YUSER5	864	YUSER6	861	YUSER7	858	YUSER8	855	YUSER9	852	YUSR10	849
YUSR11	846	YUSR12	843	ZA A	2034	ZA1 B	2223	ZEREXB	2283	ZONESA	2191	ZONMVB	1407
ZONZ B	2400	ZROSWB	1684										

***** ** 1 Errors ERROR