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SEQ PG LIN  LABEL  OP    OPERANDS                                        SFX CT  LOCN  INSTRUCTION TYPE  CARD A-ADDR  B-ADDR

101                JOB   FORTRAN COMPILER -- ARITHMETIC PACKAGE -- PHASE 63
102                CTL   6611
103         *
104         * THIS PHASE COMPRISES THE ARITHMETIC ROUTINE WHICH IS
105         * LOADED BY GEAUX PHASE 2.
106         *
107                ORG   87                                                          0087
108     89  X1     DCW   000                                                 3  0089                      1
109     91         DC    00                                                  2  0091                      1
110     94  X2     DCW   000                                                 3  0094                      1
111     96         DC    00                                                  2  0096                      1
112     99  X3     DCW   000                                                 3  0099                      1
113    100         DC    0                                                   1  0100                      1
114         *
115         * ARITHMETIC INTERPRETER
116         *
117         * GENERAL FORM OF INTERPRETED STRING IS
118         * OPERAND [ OPERATOR OPERAND ... ],
119         * HOWEVER, IF OPERAND HAS A WORD MARK, IT'S AN OPERATOR,
120         * USUALLY A FUNCTION CALL.  OPERANDS ARE MACHINE ADDRESSES,
121         * WITH A TAG IN THE TENS DIGIT TO INDICATE TYPE: A- OR B-
122         * ZONE ALONE INDICATES INTEGER.  OPERATORS ARE ONE CHARACTER.
123         * SUBSCRIPT CALCULATIONS ARE SURROUNDED BY $...$.
124         *
125         * TWO ACCUMULATORS IN THE PRINT AREA ARE USED.  THE LOW-ORDER
126         * DIGIT OF AN OPERAND IS LOADED INTO ACCUMULATOR 1 AT 250; IT
127         * EXTENDS LEFTWARD  BY THE LENGTH OF THE OPERAND, AND RIGHTWARD
128         * FROM THE LEFT END BY THE MANTISSA WIDTH.  ACCUMULATOR 2 HAS ITS
129         * HIGH-ORDER DIGIT AT ACCHI&1; IT EXTENDS RIGHTWARD BY THE MANTISSA
130         * WIDTH.
131         *
132         * IN THE FORTRAN MANUAL C24-1455, THE HIGH-ORDER DIGIT OF
133         * ACCUM 2 IS LABELED ACCHI&1.
134         *
135         ACCHI  EQU   279                                                    0279
136         *
137         * MOSTLY, INDEX REGISTER USAGE IS
138         * X1 = OPERAND ADDRESS
139         * X2 = INTERPRETER'S COUNTER, LOW-ORDER DIGIT OF ACCUM 1
140         * X3 = OPERAND WIDTH
141         *
142         * ADDRESS IN PHASE 62
143         *
144                EXT62                                                                            MACRO
145         LDRET  EQU   235   SUBSCRIPT ROUTINE ENTRY                          0235                GEN
146         *
147                ORG   700                                                         0700
148 *  700  ARITF  SBR   X2                                                  4  0700  H 094               2   094
149    704         SBR   X1-3         INTERPRETER ADDRESS FOR DUMPS          4  0704  H 086               2   086
150    708         SBR   ERMSI&6      INTERPRETER ADDRESS FOR ERR MSGS       4  0708  H V06               2  1506
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SEQ PG LIN  LABEL   OP    OPERANDS                                    SFX CT  LOCN  INSTRUCTION TYPE  CARD A-ADDR  B-ADDR

151    712  NXTOP   MCW   2&X2,X1     X1 = OPERAND (RESULT) ADDRESS          7  0712  M 0!2 089          2   002+2   089
152    719         SAR   SX2A&6       SAVE X2-1                              4  0719  Q 765              2   765
153    723  NXTOP0 SBR   SX2B&6         TWICE                                4  0723  H S27              2  1227
154    727         BCE   DOSUB,0&X2,$  SUBSCRIPT?                           8  0727  B S06 0!0 $        2  1206     000+2
155    735         SBR   RES&6,0&X1  SAVE X1 (RESULT ADDRESS)               7  0735  H T75 0|0          3  1375     000+1
156    742         CS    303          CLEAR ACCUMUMULATORS                   4  0742  / 303              3   303
157    746         CS                                                       1  0746  /                  3
158    747         CS                                                       1  0747  /                  3
159    748         LCA   KZ1,ACCHI&1     SET HIGH-ORDER ZERO IN ACCUM 2     7  0748  L W85 280          3  1685     280
160    755  NXTOP1 S     X1&2         CLEAR X1                               4  0755  S 091              3   091
161    759  SX2A   SBR   X2,0-0       RECOVER X2 = ADDR(OPERAND) - 1         7  0759  H 094 000          3   094     000
162    766         C     4&X2,ASGOP   COMPARE OP TO ASSIGNMENT OP            7  0766  C 0!4 W86          4   004+2  1686
163    773         MCW   4&X2,SAVOP   SAVE WHATEVER OPERATOR IT IS           7  0773  M 0!4 924          4   004+2   924
164    780         SW    201                                                4  0780  , 201              4   201
165    784         BL    FUNC         FUNC IF ASSIGNMENT OP .LT. OPERATOR    5  0784  B T05 T           4  1305
166         *
167         * ASSIGNMENT OP GREATER OR EQUAL TO OPERATOR, I.E., OPERATOR IS
168         * BLANK, ., ) LOZENGE, } GROUP MARK, &, $, *, -, /, COMMA, %, #
169         *
170    789         SBR   NXTOP2&6,4&X2  SAVE ADDR OF OPERATOR               7  0789  H 874 0!4          4   874     004+2
171    796         BCE   DOSUB5,5&X2,$  SUBSCRIPT?                          8  0796  B /99 0!5 $        4  1199     005+2
172    804         MCW   7&X2,X1      SECOND OPERAND ADDRESS TO X1           7  0804  M 0!7 089          5   007+2   089
173    811         SAR   SX2A&6       SAVE 4&X2                              4  0811  Q 765              5   765
174    815  TSTZON BWZ   ARITI,X1-1,K  OPERAND 2 TAG IS B ZONE (INTEGER)?    8  0815  V V30 088 K        5  1530     088
175    823         BWZ   ARITI,X1-1,S  OPERAND 2 TAG IS A ZONE (INTEGER)?    8  0823  V V30 088 S        5  1530     088
176 *  831  SETFP  SBR   X3,0          LOADER PLUGS MANTISSA WIDTH INTO B     7  0831  H 099 000          5   099     000
177    838         CW    IFLAG        INDICATE FLOATING POINT                4  0838  ) W87              5  1687
178    842         MCW   0&X1,EXP1-1    SAVE EXPONENT 1                      7  0842  M 0|0 W82          6   000+1  1682
179    849         SAR   X1           SAVE MANTISSA 1 ADDRESS                4  0849  Q 089              6   089
180    853         MCW   0&X1,250     MANTISSA 1 TO ACCUMULATOR 1            7  0853  M 0|0 250          6   000+1   250
181         * FROM HERE, X2 INDEXES ACCUM 1, FIRST HIGH, THEN LOW DIGIT
182    860         SBR   X2           SET X2 TO ACCUM 1 ADDRESS - OP WIDTH   4  0860  H 094              6   094
183    864         LCA   KZ1          APPEND A HIGH-ORDER ZERO TO ACCUM 1    4  0864  L W85              6  1685
184    868  NXTOP2 BW    NOSIGN,0-0   WM UNDER OPERATOR?                     8  0868  V 883 000 1        6   883     000
185    876         MZ    250,ZAS      SIGN OF OPERAND 1 DETERMINES ZA OR ZS  7  0876  Y 250 |87          7   250    1087
186    883  NOSIGN S     KZ1,252&X3   ADD ZEROS BELOW MANTISSA               7  0883  S W85 2E2          7  1685     252+3
187    890         C     1&X2,KZ1     COMPARE OPERAND HIGH-ORDER DIGIT TO 0  7  0890  C 0!1 W85          7   001+2  1685
188    897         A     X3,X2        X2 NOW AT LOW-ORDER DIGIT OF ACCUM 1   7  0897  A 099 094          7   099     094
189    904         BCE   FDIV,SAVOP,/  DIVIDE?                              8  0904  B S33 924 /        7  1233     924
190    912         BCE   FMPY,SAVOP,*  MULTIPLY?                            8  0912  B S62 924 *        8  1262     924
191    920         S     SAVOP          TURN IT BACK TO ZA                  4  0920  S 924              8   924
192    924  SAVOP  ZA    ZAS            COPY THIS OP CODE                   4  0924  ? |87              8  1087
193    928         BCE   NMLZ1,ACCHI&1,0   HIGH-ORDER DIGIT OF ACCUM 2 ZERO? 8  0928  B |17 280 0        8  1017     280
194    936         BE    CLRWK          ACCUM 1 HIGH-ORDER DIGIT IS ZERO    5  0936  B /34 S            8  1134
195    941         S     EXP1-1,EXP2-1  EXP2 IS NOW EXP2 - EXP1              7  0941  S W82 W79          8  1682    1679
196    948         ZA    EXP2,X1&1      MOVE ABS(EXP2-EXP1) TO X1           7  0948  ? W80 090          9  1680     090
197    955         C     X3,X1  COMPARE MANTISSA WIDTH AND ABS(EXP2-EXP1)   7  0955  C 099 089          9   099     089
198    962         BM    E1GTE2,EXP2-1  EXP1 .GT. EXP2                      8  0962  V /65 W79 K        9  1165    1679
199    970         BH    EXDGMW         ABS(EXP2-EXP1) .GT. MANTISSA WIDTH  5  0970  B /88 U            9  1188
200    975         A     EXP2-1,EXP1-1  ADD EXP2-EXP1 TO EXP1               7  0975  A W79 W82          9  1679    1682
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SEQ PG LIN  LABEL  OP    OPERANDS                                    SFX CT  LOCN  INSTRUCTION TYPE  CARD A-ADDR  B-ADDR

201    982         ZA    250,250&X1    SHIFT MANTISSA RIGHT BY EXP2-EXP1      7  0982  ? 250 2V0          10   250     250+1
202    989         ZA    X3&1,X1&1     X1 AND X3 NOW BOTH MANTISSA WIDTH      7  0989  ? 100 090          10   100     090
203    996  ADDSUB MZ    ZAS,0&X2      SIGN OF ACCUM 1 DEPENDS ON OP          7  0996  Y |87 0!0          10  1087     000+2
204  1 003         A     ACCHI&X1,0&X2   ADD (SUBTRACT) MANTISSAS              7  1003  A 2X9 0!0          10   279+1   000+2
205          *
206          * RELOCATABLE FUNCTIONS RETURN HERE TOO
207          *
208  1 010  FRET   MZ    0&X2,ZAS                                            7  1010  Y 0!0 |87          10   000+2  1087
209          *
210          * NORMALIZE FLOATING-POINT RESULT OF A SINGLE ARITHMETIC
211          * OPERATION; PLACE THE NORMALIZED RESULT IN THE WORKING
212          * ACCUMULATOR.  IF EXPONENT OVERFLOW IS DETECTED, GO TO ERMSG TO
213          * PRINT MESSAGE (NOF); THEN GO TO STR99.  IF EXPONENT UNDERFLOW
214          * IS DETECTED, GO TO STRZE.  HERE, THE LOW-ORDER DIGIT OF THE
215          * RESULT IS INDEXED BY X2.
216          *
217          * THE NORMALIZED RESULT IS LEFT IN ACCUM 2.
218          *
219  1 017  NMLZ1  ZA    EXP1-1,EXP2-1                                       7  1017  ? W82 W79          11  1682    1679
220  1 024  NMLZ2  MCW   RM,1&X2    INSERT RM AFTER LOW-ORDER DIGIT           7  1024  M W75 0!1          11  1675     001+2
221  1 031         MZ              CHAIN                                     1  1031  Y                  11
222  1 032         MZ                TWO ZEROS                               1  1032  Y                  11
223  1 033         A               AND ADD ANOTHER ONE                       1  1033  A                  11
224  1 034         MN              DECR A AND B (COPIES JUNK TO UNUSED)      1  1034  D                  11
225  1 035         SBR   X1        X1 IS NOW TWO BELOW ACCUM 1 HIGH-ORDER    4  1035  H 089              11   089
226  1 039         S     ACCHI&2&X3    CLEAR ACCUM 2                         4  1039  S 2H1              12   281+3
227  1 043  NMLZL  BCE   STRZE,2&X1,|  RECORD MARK INDICATES ZERO RESULT     8  1043  B /42 0|2 |        12  1142     002+1
228  1 051         SBR   X1            BUMP X1                               4  1051  H 089              12   089
229  1 055         BCE   NMLZL,1&X1,0  ZERO MEANS MORE NORMALIZATION NEEDED  8  1055  B |43 0|1 0       12  1043     001+1
230  1 063         MCM   1&X1,ACCHI&1      NORMALIZE                         7  1063  P 0|1 280          12   001+1   280
231  1 070         S     X3,X2                                               7  1070  S 099 094          12   099     094
232  1 077         CW                  DECREASE AS AND BS TO                 1  1077  )                  12
233  1 078         CW                    REFER TO X2 AND X1                  1  1078  )                  13
234  1 079         S                   S    X2,X1                            1  1079  S                  13
235  1 080         S     X1,EXP2-1     STORE NORMALIZED EXPONENT             7  1080  S 089 W79          13   089    1679
236  1 087  ZAS    ZA    ACCHI&X3        ZS IF ACCUM 1 NEGATIVE              4  1087  ? 2G9              13   279+3
237  1 091         SW                                                        1  1091  ,                  13
238  1 092         BCE   CLRWK,EXP2-3,0                                     8  1092  B /34 W77 0        13  1134    1677
239  1 100         BM    STRZE,EXP2-1  EXPONENT UNDERFLOW                    8  1100  V /42 W79 K        13  1142    1679
240  1 108         B     ERMSG         EXPONENT OVERFLOW                     4  1108  B U71              14  1471
241  1 114         DCW   @NOF@                                               3  1114                     14
242          *
243          * EXPONENT OVERFLOW; SET RESULT MAGNITUDE EQUAL TO LARGEST
244          * VALUE POSSIBLE IN FLOATING-POINT NOTATION; SET RESULT SIGN
245          * AS APPROPRIATE.
246          *
247  1 115  STR99  ZA    KP99,EXP2-1   -99 TO EXP2                           7  1115  ? W89 W79          14  1689    1679
248  1 122         MN    KP99,ACCHI&X3   ALL 9'S                             7  1122  D W89 2G9          14  1689     279+3
249  1 129         MCW                   TO MANTISSA                         1  1129  M                  14
250  1 130         MCW   ACCHI-1&X3            IN ACCUM2                     4  1130  M 2G8              14   278+3
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SEQ PG LIN  LABEL  OP    OPERANDS                                          SFX CT  LOCN  INSTRUCTION TYPE  CARD A-ADDR  B-ADDR

251         *
252         * CLEAR ACCUM 1 AFTER AN INDIVIDUAL ARITHMETIC OPERATION
253         *
254  1 134  CLRWK  CS    ACCHI-1                                             4  1134  / 278             14   278
255  1 138         B     NXTOP1                                              4  1138  B 755             15   755
256         *
257         * EXPONENT UNDERFLOW, OR RESULT IS ZERO.  SET FLOATING-POINT
258         * RESULT TO ZERO
259         *
260  1 142  STRZE  S     EXP2-1  EXP2 = 0                                    4  1142  S W79             15  1679
261  1 146         S     ACCHI&X3  ACCUM 2 MANTISSA = 0                      4  1146  S 2G9             15   279+3
262  1 150         B     CLRWK                                               4  1150  B /34             15  1134
263         *
264         * DIVISION BY ZERO
265         *
266  1 154  DVERR  B     ERMSG                                               4  1154  B U71             15  1471
267  1 160         DCW   @DZE@  DIVIDE BY ZERO MESSAGE                       3  1160                    15
268  1 161         B     STR99  INSERT OVERFLOW EXPONENT                     4  1161  B /15             15  1115
269         *
270         * EXP1 IS GREATER THAN EXP2
271         *
272  1 165  E1GTE2 BH    NMLZ1  ABS(EXP2-EXP1) .GT. MANTISSA WIDTH           5  1165  B |17 U           16  1017
273  1 170         S     X3&1,X1&1  SUBTR MAN. WIDTH FROM ABS(EXP2-EXP1)     7  1170  S 100 090         16   100     090
274  1 177         MZ    ACCHI&X3,ACCHI&X1  MOVE ZONE OVER TO NEW WIDTH     7  1177  Y 2G9 2X9         16   279+3   279+1
275  1 184         B     ADDSUB  GO ADD (OR SUBTRACT) MANTISSAS              4  1184  B 996             16   996
276         *
277         * ABS(EXP2-EXP1) .GT. MANTISSA WIDTH
278         *
279  1 188  EXDGMW A     EXP1-1,EXP2-1  RESTORE EXP2                         7  1188  A W82 W79         16  1682    1679
280  1 195         B     CLRWK                                               4  1195  B /34             16  1134
281         *
282         * CALCULATE SUBSCRIPTED ADDRESS USING A RELOCATABLE ROUTINE THAT
283         * IS ONLY LOADED IF NEEDED.
284         *
285  1 199  DOSUB5 SBR   X2,5&X2  BUMP X2 TO BEGINNING OF SUBSCRIPT INFO     7  1199  H 094 0!5         17   094     005+2
286 *1 206  DOSUB  B     0-0  LOADER PLUGS SUBSCRIPT ROUTINE ADDRESS HERE     4  1206  B 000             17   000
287         *
288  1 210         MN    0&X2  SUBTRACT 4 FROM X2                            4  1210  D 0!0             17   000+2
289  1 214         MN                                                        1  1214  D                 17
290  1 215         MN                                                        1  1215  D                 17
291  1 216         MN                                                        1  1216  D                 17
292  1 217         SAR   SX2A&6                                              4  1217  Q 765             17   765
293  1 221  SX2B   BCE   NXTOP0,0-0,$                                        8  1221  B 723 000 $       18   723     000
294  1 229         B     TSTZON                                              4  1229  B 815             18   815
295         *
296         * FLOATING-POINT DIVIDE
297         *
298  1 233  FDIV   BE    DVERR     DIVIDE BY ZERO (COMPARE WAS AT NOSIGN)    5  1233  B /54 S           18  1154
299  1 238         MN    ACCHI&X3,1&X2                                       7  1238  D 2G9 0!1         18   279+3   001+2
300  1 245         MCW                                                       1  1245  M                 18
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SEQ PG LIN  LABEL   OP    OPERANDS                                        SFX CT  LOCN  INSTRUCTION TYPE  CARD A-ADDR  B-ADDR

301  1 246          MN                                                      1  1246  D                   18
302  1 247          D     0&X1,251  DIVIDE MANTISSAS.                     7  1247  % 0|0 251           18   000+1   251
303  1 254          ZS    EXP1-1    NEGATE EXPONENT                       4  1254  ! W82               19  1682
304  1 258          B     EXPS      GO ADD EXPONENTS, NORMALIZE, ETC.     4  1258  B S83               19  1283
305          *
306          * FLOATING-POINT MULTIPLY
307          *
308  1 262  FMPY    M     ACCHI&X3,251&X3  MULTIPLY MANTISSAS              7  1262  @ 2G9 2E1           19   279+3   251+3
309  1 269          SBR   X2,3&X2                                         7  1269  H 094 0!3           19   094     003+2
310  1 276          S     KP2,EXP2-1                                      7  1276  S W90 W79           19  1690    1679
311  1 283  EXPS    A     EXP1-1,EXP2-1  ADD EXPONENTS                    7  1283  A W82 W79           19  1682    1679
312  1 290          MZ    ACCHI&X3,*&1  PREPARE TO                       7  1290  Y 2G9 S97           20   279+3  1297
313  1 297          ZA    ZAS           SET SIGN OF RESULT                4  1297  ? |87               20  1087
314  1 301          B     NMLZ2       NORMALIZE                           4  1301  B |24               20  1024
315          *
316          * ASSIGNMENT OPERATOR IS LESS THAN CURRENT OPERATOR, I.E.,
317          * CURRENT OPERATOR IS ONE OF @, ?, A-I, !, J-R, |, S-Z, 0-9.
318          * IF NOT RECORD MARK, IT'S THE FIRST CHARACTER OF WHAT WOULD
319          * OTHERWISE BE AN OPERAND, SO BUMP THE OPERAND ADDRESS.
320          *
321  1 305  FUNC    BCE   DONE,4&X2,|  DONE (RECORD MARK)?                 8  1305  B T31 0!4 |          20  1331     004+2
322  1 313          SBR   SX2A&6,1&X2  BUMP OPERAND ADDR                   7  1313  H 765 0!1           20   765     001+2
323  1 320          C     ACCHI&1,KZ1      HIGH-ORDER ACCUM 2 MANTISSA DIGIT  7  1320  C 280 W85          20   280    1685
324          * THE LOADER PLUGS THE RELOCATABLE FUNCTION SELECTOR ADDRESS HERE
325 *1 327  QFUNCT B     0             GO TO FUNCTION SELECTOR             4  1327  B 000               21   000
326  1 331  DONE    BCE   RES,ACCHI&1,0    FLOATING-POINT RESULT ZERO?     8  1331  B T69 280 0         21  1369     280
327  1 339          BW    RES,IFLAG    INTEGER RESULT?                    8  1339  V T69 W87 1         21  1369    1687
328  1 347          BW    FPRES,4&X2   WM UNDER OPERATOR?                 8  1347  V T92 0!4 1         21  1392     004+2
329  1 355          SBR   X3,2&X3                                         7  1355  H 099 0?2           21   099     002+3
330  1 362  SEXP2   MCM   EXP2-2,ACCHI-1&X3  MOVE EXP2 TO ACCUM 2          7  1362  P W78 2G8           22  1678     278+3
331  1 369  RES     LCA   ACCHI&X3,0     STORE ACCUMULATOR TO SAVED B      7  1369  L 2G9 000           22   279+3   000
332  1 376          BW    5&X2,4&X2    RETURN IF DONE (WORD MARK)          8  1376  V 0!5 0!4 1         22   005+2   004+2
333  1 384          SAR   X2           BUMP X2 TO NEXT OPERAND             4  1384  Q 094               22   094
334  1 388          B     NXTOP                                           4  1388  B 712               22   712
335          *
336          * ROUND NONZERO FLOATING-POINT RESULT
337          *
338  1 392  FPRES   A     KP5,ACCHI-1&X3   ROUND MANTISSA                  7  1392  A W91 2G8           22  1691     278+3
339  1 399          BWZ   CARRY,ACCHI&1,S  CARRY IN ACC2 SHOWN BY A-ZONE?  8  1399  V U18 280 S         23  1418     280
340  1 407  CPZONE  MZ    ACCHI&X3,ACCHI-2&X3  MOVE ZONE FROM EXP TO MAN   7  1407  Y 2G9 2G7           23   279+3   277+3
341  1 414          B     SEXP2                                           4  1414  B T62               23  1362
342  1 418  CARRY   A     KP1,EXP2-1   BUMP EXPONENT                      7  1418  A W92 W79           23  1692    1679
343  1 425          BCE   FOVFL,EXP2-3,1  OVERFLOW?                       8  1425  B U48 W77 1         23  1448    1677
344  1 433          S     ACCHI&X3       CLEAR MANTISSA                   4  1433  S 2G9               23   279+3
345  1 437          LCA   K1B-1,ACCHI&1  AND PUT 1 IN ITS HIGH-ORDER DIGIT  7  1437  L W93 280          24  1693     280
346  1 444          B     CPZONE                                          4  1444  B U07               24  1407
347          *
348          * FLOATING-POINT OVERFLOW -- HIGH-ORDER DIGIT OF EXP2 IS 1
349          *
350  1 448  FOVFL   MN    KP99,ACCHI&X3  99 TO                            7  1448  D W89 2G9           24  1689     279+3
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SEQ PG LIN  LABEL  OP    OPERANDS                                  SFX CT  LOCN  INSTRUCTION TYPE  CARD A-ADDR  B-ADDR

351  1 455         MCW                EXPONENT                        1  1455  M                   24
352  1 456         MCW   ACCHI-1&X3     ALL 9S TO MANTISSA              4  1456  M 2G8               24   278+3
353  1 460         S     KP1,EXP2-1                                   7  1460  S W92 W79           24  1692    1679
354  1 467         B     CPZONE                                       4  1467  B U07               24  1407
355         *
356         * PRINT APPROPRIATE ERROR MESSAGES, WHICH INCLUDES A MNEMONIC
357         * THREE-CHARACTER CODE AND THE DISPLAY ADDRESS IN THE GENERATED
358         * PROCEDURE OF THE SOURCE PROGRAM STATEMENT BEING EXECUTED.  THIS
359         * SUBROUTINE IS USED TO RECORD CIRCUMSTANCES, OCCURRING DURING
360         * ARITHMETIC OPERATIONS, WHICH MAY AFFECT THE CALCULATION
361         * ADVERSELY.
362         *
363  1 471  ERMSG  SBR   ERSVX&6    SAVE RETURN ADDRESS              4  1471  H U92               25  1492
364  1 475         CS    202&X3                                       4  1475  / 2?2               25   202+3
365  1 479         SBR   ERSX3&6,0&X3  SAVE X3                       7  1479  H V25 0?0           25  1525     000+3
366  1 486  ERSVX  SBR   X3,0       RETURN ADDRESS TO X3             7  1486  H 099 000           25   099     000
367  1 493         MCW   2&X3,212   MNEMONIC TO PRINT AREA           7  1493  M 0?2 212           25   002+3   212
368  1 500  ERMSI  SBR   217,0      INTERPRETER ADDRESS TO PRINT AREA 7  1500  H 217 000           25   217     000
369  1 507         W                                                1  1507  2                   25
370  1 508         SW    201                                        4  1508  , 201               26   201
371  1 512         SBR   ERMSGX&3,3&X3  RETURN ADDRESS TO EXIT      7  1512  H V29 0?3           26  1529     003+3
372  1 519  ERSX3  SBR   X3,0       RESTORE X3                       7  1519  H 099 000           26   099     000
373  1 526  ERMSGX B     0                                          4  1526  B 000               26   000
374         *
375         * OPERAND TENS DIGIT HAS A OR B BUT NOT AB ZONE (INTEGER ARITH.)
376         *
377 *1 530  ARITI  SBR   X3,0          LOADER PUTS INTEGER SIZE IN B  7  1530  H 099 000           26   099     000
378  1 537         SW    IFLAG         INDICATE INTEGER               4  1537  , W87               26  1687
379  1 541         MCS   0&X1,250      OPERAND TO ACCUMULATOR 1       7  1541  Z 0|0 250           27   000+1   250
380  1 548         BCE   XDIV,SAVOP,/  DIVIDE?                       8  1548  B W23 924 /         27  1623     924
381  1 556         BCE   XMPY,SAVOP,*  MULTIPLY?                     8  1556  B V98 924 *         27  1598     924
382  1 564         BM    XSUB,SAVOP    SUBTRACT?                      8  1564  V V87 924 K         27  1587     924
383  1 572         A     0&X1,ACCHI&X3   ADD OPERAND TO ACCUMULATOR 2 7  1572  A 0|0 2G9           27   000+1   279+3
384  1 579  XSIGN  ZA    ACCHI&X3        PUT A SIGN ON THE ACCUMULATOR 4  1579  ? 2G9               28   279+3
385  1 583         B     CLRWK                                        4  1583  B /34               28  1134
386  1 587  XSUB   S     0&X1,ACCHI&X3   SUBTRACT OPERAND FROM ACCUMULATOR 2 7  1587  S 0|0 2G9       28   000+1   279+3
387  1 594         B     XSIGN                                        4  1594  B V79               28  1579
388  1 598  XMPY   LCA   0&X1,250      MOVE OPERAND TO ACCUMULATOR 1  7  1598  L 0|0 250           28   000+1   250
389  1 605         M     ACCHI&X3,251&X3                              7  1605  @ 2G9 2E1           28   279+3   251+3
390  1 612         MCW   251&X3,ACCHI&X3                             7  1612  M 2E1 2G9           29   251+3   279+3
391  1 619         B     CLRWK                                        4  1619  B /34               29  1134
392  1 623  XDIV   BCE   DVERR,250,    DIVIDE BY ZERO?                8  1623  B /54 250           29  1154     250
393  1 631         MCW   0&X1,250&X3                                  7  1631  M 0|0 2E0           29   000+1   250+3
394  1 638         MN                                                 1  1638  D                   29
395  1 639         SBR   MOVEQ&3       STORE ADDR TO MOVE TO ACCUM 2  4  1639  H W64               29  1664
396  1 643         LCA   ACCHI&X3                                     4  1643  L 2G9               29   279+3
397  1 647         ZA    ACCHI&X3,250&X3                              7  1647  ? 2G9 2E0           30   279+3   250+3
398  1 654         D     0&X1,251                                     7  1654  % 0|0 251           30   000+1   251
399  1 661  MOVEQ  MCW   249,ACCHI&X3                                 7  1661  M 249 2G9           30   249     279+3
400  1 668         B     CLRWK                                        4  1668  B /34               30  1134
```

```
SEQ PG LIN  LABEL  OP    OPERANDS                                    SFX CT  LOCN  INSTRUCTION TYPE  CARD A-ADDR  B-ADDR

401         *
402         * DATA
403         *
404  1 674          DCW   000      CHAINED TO RM                        3  1674                     30
405  1 675  RM      DCW   @|@                                           1  1675                     30
406  1 676          DCW   0                                            1  1676                     30
407  1 680  EXP2    DCW   @000|@   EXPONENT OF ACCUM 2, AND ZERO AND RM 4  1680                     31
408  1 683  EXP1    DCW   000      EXPONENT OF ACCUM 1, AND ZERO        3  1683                     31
409  1 684  K8      DCW   8                                            1  1684                     31
410  1 685  KZ1     DCW   0                                            1  1685                     31
411  1 686  ASGOP   DCW   @#@      ASSIGNMENT OPERATOR                  1  1686                     31
412  1 687  IFLAG   DCW   #1       WORD MARK INDICATES INTEGER          1  1687                     31
413  1 689  KP99    DCW   &99      USED FOR OVERFLOW                    2  1689                     31
414  1 690  KP2     DCW   &2                                           1  1690                     32
415  1 691  KP5     DCW   &5                                           1  1691                     32
416  1 692  KP1     DCW   &1                                           1  1692                     32
417  1 694  K1B     DCW   @1 @                                         2  1694                     32
418  1 695          DCW   0                                            1  1695                     32
419 *1 696  AGMWM   DCW   @}@                                         1  1696          GMARK      32
420                 XFR   LDRET                                                B 235               33   235
421                 END                                                        / 235 080                    235
```

SYMBOL	ADDRESS	SYMBOL	ADDRESS	SYMBOL	ADDRESS	SYMBOL	ADDRESS	SYMBOL	ADDRESS	SYMBOL	ADDRESS
ACCHI	0279: 0	ADDSUB	0996: 0	AGMWM	1696: 0	ARITF	0700: 0	ARITI	1530: 0	ASGOP	1686: 0
CARRY	1418: 0	CLRWK	1134: 0	CPZONE	1407: 0	DONE	1331: 0	DOSUB	1206: 0	DOSUB5	1199: 0
DVERR	1154: 0	E1GTE2	1165: 0	ERMSG	1471: 0	ERMSGX	1526: 0	ERMSI	1500: 0	ERSVX	1486: 0
ERSX3	1519: 0	EXDGMW	1188: 0	EXP1	1683: 0	EXP2	1680: 0	EXPS	1283: 0	FDIV	1233: 0
FMPY	1262: 0	FOVFL	1448: 0	FPRES	1392: 0	FRET	1010: 0	FUNC	1305: 0	IFLAG	1687: 0
K1B	1694: 0	K8	1684: 0	KP1	1692: 0	KP2	1690: 0	KP5	1691: 0	KP99	1689: 0
KZ1	1685: 0	LDRET	0235: 0	MOVEQ	1661: 0	NMLZ1	1017: 0	NMLZ2	1024: 0	NMLZL	1043: 0
NOSIGN	0883: 0	NXTOP	0712: 0	NXTOP0	0723: 0	NXTOP1	0755: 0	NXTOP2	0868: 0	QFUNCT	1327: 0
RES	1369: 0	RM	1675: 0	SAVOP	0924: 0	SETFP	0831: 0	SEXP2	1362: 0	STR99	1115: 0
STRZE	1142: 0	SX2A	0759: 0	SX2B	1221: 0	TSTZON	0815: 0	X1	0089: 0	X2	0094: 0
X3	0099: 0	XDIV	1623: 0	XMPY	1598: 0	XSIGN	1579: 0	XSUB	1587: 0	ZAS	1087: 0

UNREFERENCED SYMBOLS

AGMWM ARITF FRET K8 QFUNCT SETFP