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1      .TITLE ROOTIT
2      .GLOBL ROOTIT,.DA
3      00000 R 740040 A  ROOTIT XX
4      00001 R 120121 E  JMS* .DA
5      00002 R 600005 R  JMP .+3
6      00003 R 000000 A  DELTAX 0
7      00004 R 000000 A  DELTAY 0
8      00005 R 220003 R  LAC* DELTAX
9      00006 R 745100 A  SPA!CLL
10     00007 R 740031 A  TCA
11     00010 R 040012 R  DAC MULT
12     00011 R 653122 A  MUL
13     00012 R 000000 A  MULT 0
14     00013 R 640601 A  LLS 1
15     00014 R 040003 R  DAC DELTAX
16     00015 R 750000 A  CLA
17     00016 R 640621 A  LLS 21
18     00017 R 040012 R  DAC MULT
19     00020 R 220004 R  LAC* DELTAY
20     00021 R 745100 A  SPA!CLL
21     00022 R 740031 A  TCA
22     00023 R 040025 R  DAC MULT2
23     00024 R 653122 A  MUL
24     00025 R 000000 A  MULT2 0
25     00026 R 640601 A  LLS 1
26     00027 R 040004 R  DAC DELTAY
27     00030 R 750000 A  CLA
28     00031 R 640621 A  LLS 21
29     00032 R 340012 R  TAD MULT
30     00033 R 652000 A  LMQ
31     00034 R 754000 A  CLA!CLL
32     00035 R 640601 A  LLS 1
33     00036 R 340004 R  TAD DELTAY
34     00037 R 340003 R  TAD DELTAX
35     00040 R 640501 A  LRS 1
36     00041 R 100043 R  JMS SQRT
37     00042 R 620000 R  JMP* ROOTIT

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/
/          SUBROUTINE SQRT
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/  FINDS THE SQUARE ROOT OF A NUMBER IN THE AC,MQ
/  AND RETURNS THE RESULT IN THE AC.
/  METHOD USED IS THE WELL KNOWN ONE WHERE TWO
/  DIGITS AT A TIME ARE SHIFTED INTO THE REMAINDER
/  AND THE NEXT DIGIT DETERMINED. THIS DIGIT IS
/  THEN ADDED TWICE INTO THE DIVISOR'
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49
50     00043 R 000000 A  SQRT 0
51     00044 R 040117 R  DAC RES#
52     00045 R 641002 A  LACQ

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PAGE	2	ROOTIT SRC	ROOTIT
53		00046 R 040114 R	DAC LESSIG#
54		00047 R 200117 R	LAC RES
55		00050 R 652000 A	LMQ
56		00051 R 777776 A	LAW -2
57		00052 R 040120 R	DAC TWOCNT#
58		00053 R 140117 R	DZM RES /RESULT
59		00054 R 140113 R	DZM DIV# /'DIVISOR'
60		00055 R 140116 R	DZM REM# /REMAINDER AT EACH STAGE
61		00056 R 777767 A	ON3 LAW -11
62		00057 R 040115 R	DAC NINCNT# /COUNTS SHIFTS THROUGH EACH WORD
63		00060 R 200113 R	ON5 LAC DIV /SHIFT DIVISOR FOR NEXT STAGE
64		00061 R 744010 A	RCL
65		00062 R 040113 R	DAC DIV
66		00063 R 200117 R	LAC RES /SHIFT RESULT FOR NEXT BIT
67		00064 R 744010 A	RCL
68		00065 R 040117 R	DAC RES
69		00066 R 200116 R	LAC REM /GET REMAINDER + NEXT TWO BITS IN AC
70		00067 R 640602 A	LLS 2
71		00070 R 040116 R	DAC REM /STORE NEW REMAINDER
72		00071 R 740031 A	TCA
73		00072 R 340113 R	TAD DIV
74		00073 R 723001 A	AAC 1
75		00074 R 740300 A	SMA!SZA /NEW BIT IN RESULT 0 OR 1?
76		00075 R 600103 R	JMP GOON /0
77		00076 R 440113 R	ISZ DIV /1
78		00077 R 440113 R	ISZ DIV /UPDATE 'DIVISOR'
79		00100 R 440117 R	ISZ RES /ADD BIT INTO RESULT
80		00101 R 740031 A	TCA
81		00102 R 040116 R	DAC REM /STORE NEW REMAINDER
82		00103 R 440115 R	GOON ISZ NINCNT /FIRST WORD FINISHED?
83		00104 R 600060 R	JMP ON5 /NO
84		00105 R 200114 R	LAC LESSIG /YES, SET UP FOR LEAST SIG BIT
85		00106 R 652000 A	LMQ
86		00107 R 440120 R	ISZ TWOCNT /SKIP IF BOTH WORDS DONE
87		00110 R 600056 R	JMP ON3
88		00111 R 200117 R	LAC RES
89		00112 R 620043 R	JMP* SQRT
90		000000 A	.END
		00121 R 000121 E	*E
		SIZE=00122	NO ERROR LINES

PAGE 3 ROOTIT CROSS REFERENCE

DELTA	00003	6*	8	15	34			
DELTA	00004	7*	19	26	33			
DIV	00113	59	63	65	73	77	78	
GOON	00103	76	82*					
LESSIG	00114	53	84					
MULT	00012	11	13*	18	29			
MULT2	00025	22	24*					
NINCNT	00115	62	82					
ON3	00056	61*	87					
ON5	00060	63*	83					
REM	00116	60	69	71	81			
RES	00117	51	54	58	66	68	79	88
ROOTIT	00000	1	2	3*	37			
SQRT	00043	36	50*	89				
TWOCNT	00120	57	86					
.DA	00121	2	4					