S.R.43

THE ENGLISH ELECTRIC CO., LTD.

NELSON RESEARCH LABORATORIES
STAFFORD
MATHEMATICAL PHYSICS LABORATORY.
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Report No. NS t 125
Date. 9.4.56.
Reference
Order No.

Front sheet.
Data sheet 1.
Figure sheets S6/10451-2

DEUCE Subroutine No.135/6 (F04 and F04/1)

Report by
R.A.E.

SUMMARY.

The attached document contains details of two DEUCE Subroutines which have been prepared and tested by "R.A.E.".

MATHEMATICAL PHYSICS LABORATORY.

HEF

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NS + 125

Description. Fast first order subroutines giving $\sqrt{a}$ to n binary places. F04/1 has larger range of error than F04, but the latter gives a biassed error. F04 will not work for n=31. Twice as fast as F1 (No. 20).

Data. a, a positive number in the range $0 \leq a \leq 1$, with n binary places. n, the number of binary places; $n \leq 30$ for F04 $n \leq 31$ for F04/1.

Result. $c = \sqrt{a}$ to n binary places. In F04 error is in the range $(-P_1, 0)$ and exact square root is given when a is a perfect square. F04/1 error is in the range $\pm P_1$ and is $+P_1$ when a is a perfect square.

Note These Subs. do not check that $a \geq 0$.

Instructions for Use.

Stores Used.	13	14	15
Contents at entry.	a	Link	-
Contents at Exit.	-	c	2c (F04) c-P_1 (F04/1)

Occupies. m.c. 0-6, 8, 9, 11, 13, 15-19, 22, 24-31. (F04)
0-3, 6-11, 13, 15-19, 22, 24-31. (F04/1)

Entry. m.c. 28

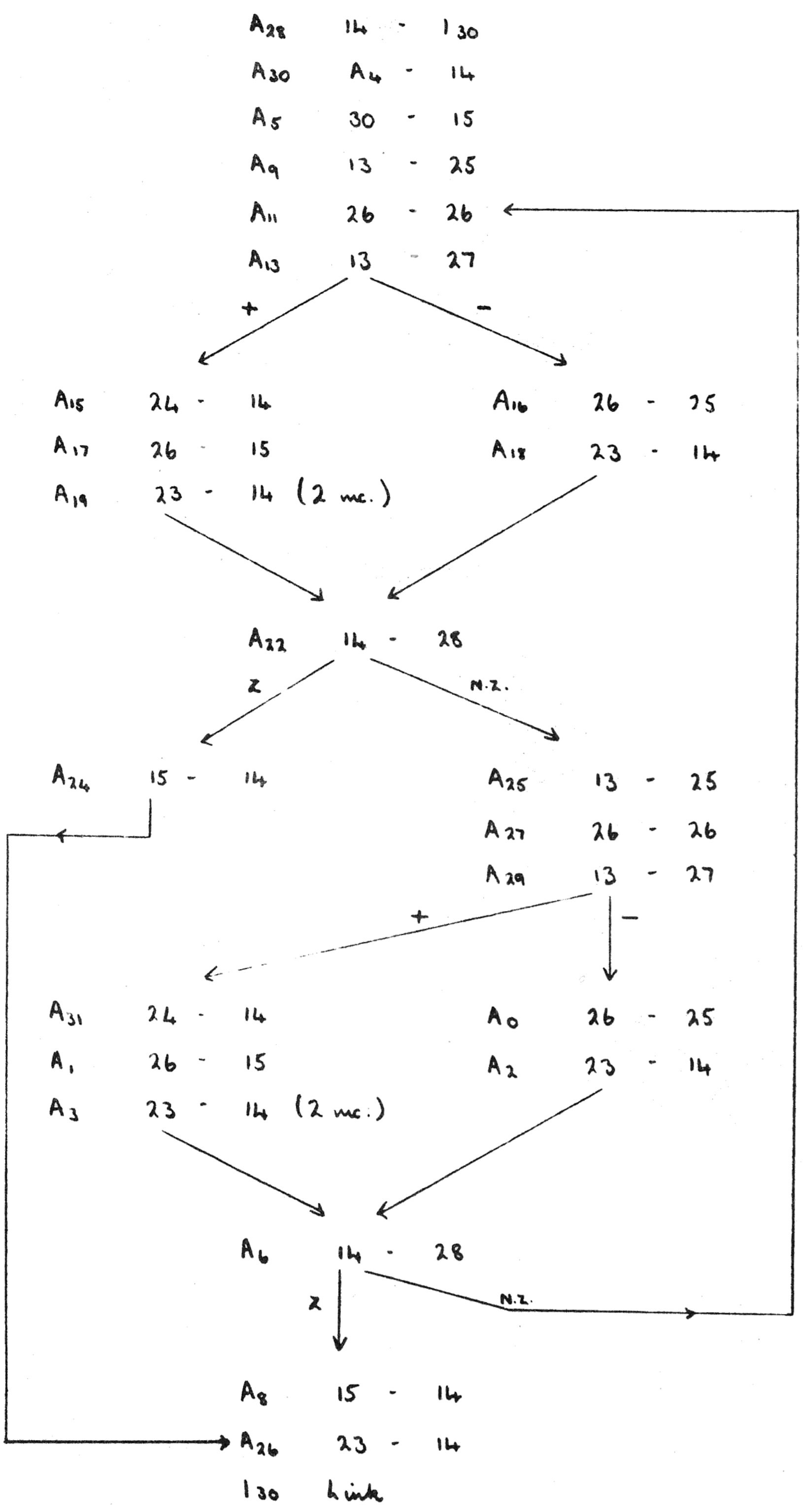
Time F04 $\frac{1}{2}(n+2)$, F04/1 $\frac{1}{2}n$ m.s. if n even; $\frac{1}{2}(n+1)$ m.s. if n odd.

Parameter. P_n in m.c. 4. for F04
P_{n-1} in m.c. 10 for F04/1

D.L. A Track

Card Nos.

mc	NIS	S	D	C	W	T		
								Y
								X
								0
								1
0	A	26	25		0	0		2
1	A	26	15		0	0		3
2	Ȧ	23	14		0	2		4
3	A	23	14	2	0	1		5
4								6
5	A	30	15		0	2		7
6	A	14	28		0	0		8
7								9
8	A	15	14		0	16		Y
9	A	13	25		0	0		X
10								0
11	A	26	26		0	0		1
12								2
13	A	13	27		0	0		3
14								4
15	A	24	14		0	0		5
16	A	26	25		0	0		6
17	A	26	15		0	0		7
18	A	23	14		0	2		8
19	A	23	14	2	0	1		9
20								Y
21								X
22	A	14	28		0	0		0
23								1
24	A	15	14		0	0		2
25	A	13	25		0	0		3
26	1	23	14		0	2		4
27	A	26	26		0	0		5
28	A	14	1		0	0		6
29	A	13	27		0	0		7
30	A	A	14		4	5		8
31	A	24	14		0	0		9



FLOW DIAGRAM AND CODING FOR SUBROUTINE No. 135 (F04). Square root of a single length No. n ≤ 30.

Date

File Ref. R.A.E. 140

Sheet Ref. 56/10451

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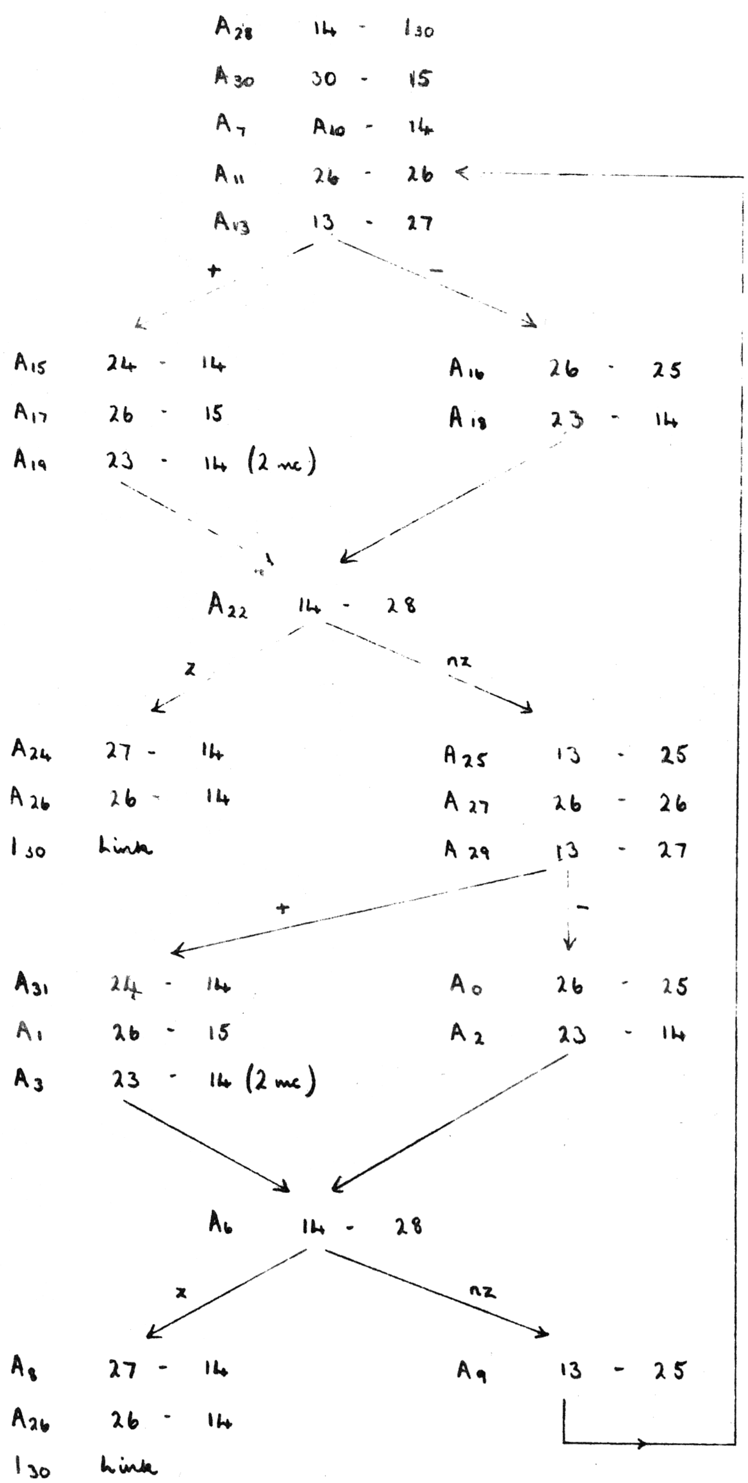
D.L. A Track

Card Nos.

mc	NIS	S	D	C	W	T	
							Y
							X
							0
							1
0	A	26	25		0	0	2
1	A	26	15		0	0	3
2	A	23	14		0	2	4
3	A	23	14	2	0	1	5
4							6
5							7
6	A	14	28		0	0	8
7	A	A	14		1	2	9
8	A	27	14		0	16	Y
9	A	13	25		0	0	X
10							0
11	A	26	26		0	0	1
12							2
13	A	13	27		0	0	3
14							4
15	A	24	14		0	0	5
16	A	26	25		0	0	6
17	A	26	15		0	0	7
18	A	23	14		0	2	8
19	A	23	14	2	0	1	9
20							Y
21							X
22	A	14	28		0	0	0
23							1
24	A	27	14		0	0	2
25	A	13	25		0	0	3
26	I	26	14		0	2	4
27	A	26	26		0	0	5
28	A	14	1		0	0	6
29	A	13	27		0	0	7
30	A	30	15		0	7	8
31	A	24	14		0	0	9



FLOW DIAGRAM AND CODING FOR SUBROUTINE No. 136 (F04/1)

Square root of a single length No. n ≤ 31

Date

File Ref. R.A.E. 141

Sheet Ref. S6/10452

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