Z501/1

THE ENGLISH ELECTRIC CO., LTD.

Tel. 700 NELSON RESEARCH LABORATORIES STAFFORD

DEUCE Subroutine No. 89 (A01F/1)	Report No. NS t 80
	Date 17.10.55
	Reference
	Order No.
	Report by Dr. V. Price.

Front Sheet.

Data Sheet 1.

Figure sheets S6/10305,6,7.

SUMMARY.

The attached document contains details of a DEUCE Subroutine which has been prepared by N.R.L. and tested on N.P.L. machine.

V. Price.

MATHEMATICAL PHYSICS LABORATORY.

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NELSON RESEARCH LABORATORIES NS t 80
STAFFORD E. E. CO. LTD. Sheet No.: 1

Description. Performs the same floating operations as A01F (No.58), but the section "PREPARE", which is used after every floating operation, is 3 m.s. faster in general, and the sections "ADD" and "SUBTRACT" are 1 m.s. faster in about 50% of the occasions in which they are used. It also uses 3 fewer instructions. First Order. Superseded by A131 - A161 (nos. 236 - 9)

Data. $x_1 = a_1 . 2^{b_1}$ and $x_2 = a_2 . 2^{b_2}$, two floating binary numbers in standard form, or $a_1 . 2^{b_1}$ not in standard form in the case of PREPARE.

Result. $x_3 = x_1 \pm x_2$, or $x_1 x_2$ in standard floating binary form, or $x_3 = x_1$ in standard floating binary form in the case of PREPARE.

NOTE: $a.2^b = 0$ is a s.f.b. number only if $a = b = 0$.

Instructions for Use.

ADD, SUBTRACT, MULTIPLY.

Stores Used.	13	14	15	16	19_2	20	21
Contents at Entry.	-	-	-	-	link	x_2	x_1
Contents at Exit.	b_3	a_3	-	-	link	x_2	x_3

PREPARE

Stores Used.	13	14	15	19_2	21
Contents at Entry.	b_1	-	-	link	a_1
Contents at Exit.	b_3	a_3	(-P3)	link	x_3

Occupies. D.L. $2_{0-15, 17-31}$, 3_{0-31}

NB T.S.15 does not necessarily contain $-P_3$ at exit.

Entry.

ADD	2_{14}	(same as for A01F)
SUBTRACT	2_8	
MULTIPLY	2_{21}	
PREPARE	3_{28}	

Constants Available.

0, 13-0, 0, 0	in 2_6
P5	in 3_{14}
-P3	in 3_{22}

Preparation.

3_{28} $19_2 - 1_{30}$

3_{30} $21_{2,3} - 28$

z / nz

3_1 $30 - 13$ 3_2 $21_3 - 14$

2_5 $24 - 15$

3_7 $26 - 27$ Are the top two digits of 21_3 different?

\+ no / − yes

2_9 $21 - 22_{2,3}$ 2_{10} $22 - 21_{2,3}$

2_{19} $27 - 26$ 3_{13} $27 - 25$

2_{15} $24 - 14$ (2 mc.)

2_{18} $21_2 - 23_2$ Round off (and clear 21_2)

3_{20} $3_{22} - 15$ $\left[P_{3,4 \ldots\ldots 32}\right]$

2_{22} $26 - 28$ Has rounding off made the contents of 21_3 either +1 or −½?

nz / z

2_{25} $21_3 - 14$ 2_{24} $0 - 0$

2_{28} $13 - 21_2$

1_{30}.

Multiply.

2_{21} $21_2 - 13$ b_1

3_{24} $30 - 21_2$

3_{27} $20_3 - 16$ a_2

2_{30} $21_3 - 14$ a_1

2_3 $0 - 24$

2_4 $16 - 27$

\+ / −

3_{31} $30 - 29$ 3_0 $14 - 23_3$ (mc. 7)

2_7 $14 - 27$

\+ / −

2_{11} $30 - 29$ 2_{12} $16 - 23_3$

3_{16} $21 - 22$ (4 mc.)

3_{21} $20_2 - 25$ b_2

3_{28} Prep.

FLOW DIAGRAM FOR DEUCE PROGRAMME NO. 89. (A01F/1).

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Add.

2_{14} $20_3 - 16$
2_{17} $21_2 - 13$
2_{20} $20_2 - 26$
3_{23} $13 - 27$

Subtract.

2_8 $30 - 13$
3_{10} $20_3 - 26$
2_{13} $13 - 16$

$+$ $b_1 \geqslant b_2$

3_{25} $13 - 14$
2_{27} $24 - 26$
2_{29} $21_3 - 14$ a_1
2_{31} $16 - 21_3$ $\pm a_2$
2_2 $21_2 - 15$ b_1
3_4 $30 - 21_2$
3_6 $14 - 28$

$-$ $b_1 < b_2$

3_{26} $20_2 - 15$ b_2
3_{29} $16 - 14$ $\pm a_2$

z

3_8 $15 - 25$
3_{28} Prepare.

nz.

3_9 $13 - 28$

z. $b_1 = b_2$

3_{11} $14 - 22_3$
2_{26} $15 - 13$
3_{28} Prep

nz.

3_{12} $3_{14} - 25$ $[16P_1]$
3_{15} $13 - 27$

$+$

3_{17} $13 - 25$ (17 m.c.)
3_3 $3_5 - 25$
2_6 $13 - 0$
Q_8 $(22 - 21)$
2_{23} $14 - 22_3$

$-$ $|b_1 - b_2| > 16.$

3_{18} $22 - 21$ (32 mc.)
3_{19} $16 - 28$

z $|b_1 - b_2| > 32$

2_0 $30 - 21_{2,3}$

nz.

2_1 $30 - 16.$

FLOW DIAGRAM FOR DEUCE PROGRAMME NO. 89. (AOIF/1).	Date File Ref. Sheet Ref. S6/10306.

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N.110

THE ENGLISH ELECTRIC CO. LTD. Sheet No. S6/10307

Deuce Programme

Coding For Deuce Programme no. 89. (A01F/1)

D.L. 2 Track							D.L. 3 Track							D.L. Track							
Card Nos. 1, 2, 3,							Card Nos. 4, 5, 6.							Card Nos.							
mc	NIS	S	D	C	W	T	mc	NIS	S	D	C	W	T	mc	NIS	S	D	C	W	T	
																					Y
																					X
																					0
																					1
0	3	30	21	2	0	9	0	2	14	23		5	5	0							2
1	3	30	16		0	9	1	2	30	13		0	22	1							3
2	3	21	15		0	0	2	2	21	14		1	1	2							4
3	2	0	24		0	31	3	2	3	25		0	1	3							5
4	3	16	27		0	25	4	3	30	21	-	0	0	4							6
5	3	24	15		0	0	5	2	22	21	1	14	13	5							7
6	0	13	0		0	0	6	3	14	28		0	0	6							8
7	2	14	27		0	2	7	2	26	27		0	0	7							9
8	3	30	13		0	0	8	3	15	25		0	18	8							Y
9	2	21	22	2	1	8	9	3	13	28		0	0	9							X
10	3	22	21	2	0	1	10	2	20	26		1	1	10							0
11	3	30	29		0	3	11	2	14	22		0	13	11							1
12	3	16	23		1	2	12	3	3	25		0	1	12							2
13	2	13	16		0	2	13	2	27	25		0	0	13							3
14	2	20	16		1	1	14		P5					14							4
15	2	24	14	2	0	1	15	3	13	27		0	0	15							5
16							16	3	21	22	1	0	3	16							6
17	2	21	13		1	1	17	3	13	25	1	0	16	17							7
18	3	21	23		0	0	18	3	22	21	1	0	31	18							8
19	3	27	26		0	13	19	2	16	28		0	11	19							9
20	3	20	26		0	1	20	2	3	15		0	0	20							Y
21	3	21	13		1	1	21	3	20	25		1	5	21							X
22	2	26	28		0	0	22		P3....32					22							0
23	2	14	22		0	1	23	3	13	27		0	0	23							1
24	3	0	0		0	8	24	3	30	21		0	1	24							2
25	2	21	14		0	1	25	2	13	14		0	0	25							3
26	3	15	13		0	0	26	3	20	15		0	1	26							4
27	2	24	26		0	0	27	2	20	16		0	1	27							5
28	1	13	21		0	0	28	3	19	1		0	0	28							6
29	2	21	14		0	0	29	3	16	14		0	5	29							7
30	2	21	14		1	3	30	3	21	28	2	0	1	30							8
31	2	16	21		0	1	31	2	30	29		0	6	31							9