Z501/1

THE ENGLISH ELECTRIC CO., LTD.

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Report No. NS t 138

Date 30.8.56.

DEUCE Subroutine No. 142. (A02F/1)

Reference

Order No.

Report by N.P.L.

Front Sheet.

Data Sheet 1.

Figure Sheets S6/10539 - 40.

SUMMARY.

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

S.J.M. Denison.

MATHEMATICAL PHYSICS LABORATORY.

HEF

Description. Performs the same floating operations as A02F (No. 59) but is faster and uses 3 fewer instructions. First order.
Superseded by A13F - A16F (not 236-9)

Data. $x\ (= 2^{b_1} \times a_1)$ $y (= 2^{b_2} \times a_2)$ both in standard floating form.

Result. $c\ (= 2^{b_3} \times a_3)$ in standard floating form,

$c = x \pm y$ for ADD / SUBTRACT : $c = xy$ for MULTIPLY:

$c = \frac{x}{y}$ for DIVIDE.

Note:- An s.f.b number $a.2^b$ is zero if and only if $a = b = 0$.

Instructions for Use.

Stores Used.	13	14	15	16	19_2	20	21
Contents at Entry.	-	-	-	-	link	y	x
Contents at Exit.	b_3	a_3	-	-	link	y	c

In PREPARE $x (= 2^b \times a)$ in non-standard form is put into standard form $(= 2^{b_3} \times a_3)$ b being put in TS13, a (double length) in DS21 and link in $DS19_2$.

Occupies. D.L.2, 3, $4_{3,4,20\text{-}29,31}$ (Incorporates A01F/1 (89)
Cards exist for these D.L.'s only.

Entry. 2_{14} ADD, 2_8 SUBTRACT 2_{21} MULTIPLY 2_{16} DIVIDE.
3_{28} PREPARE.

Failure instruction in Divide 4, 31-29 if divisor is zero.

Constants Available. 0 13-0 0 0 in 2_6

P_5 in 3_{14}: $-P_3$ in 3_{22}.

THE ENGLISH ELECTRIC CO. LTD. Sheet No. 56/10539

Deuce ~~Programme~~ Subroutine No. 142 (A02F/1)

Floating add, subtract, multiply, divide and prepare.

D.L. 2 Track Card Nos.							D.L. 3 Track Card Nos.							D.L. 4 Track 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	4	14	28		20	19	5
4	3	16	27		0	25	4	3	30	21		0	0	4	4	4	24		0	15	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	4	21	13		0	2	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	4	30	21		0	0	Y
21	3	21	13		1	1	21	3	20	25		1	5	21	4	14	21		0	0	X
22	2	26	28		0	0	22		P3-32					22	4	21	28		1	2	0
23	2	14	22		0	1	23	3	13	27		0	0	23	4	27	22		0	1	1
24	3	0	0		0	8	24	3	30	21		0	1	24	4	31	29		0	30	2
25	2	21	14		0	1	25	2	13	14		0	0	25	4	20	26		1	1	3
26	3	15	13		0	0	26	3	20	15		0	1	26	3	30	21		0	0	4
27	2	24	26		0	0	27	2	20	16		0	1	27	4	20	14		0	0	5
28	1	13	21		0	0	28	3	19	1		0	0	28	4	21	14		6	6	6
29	2	21	14		0	0	29	3	16	14		0	5	29	4	24	16		0	0	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	4	1	24		2	2	9

divide

2_{16} 21_2 – 13
4_{20} 30 – 21_2
4_{22} 21_3 – 28

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4_{26} 30 – 21_2
3_{28} Prepare

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4_{27} 20_3 – 14 (a_2)
4_{29} 24 – 16 ($2a_2$)
4_{31} 1 – 24 Stim divide.
4_3 14 – 28

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4_{24} 31 – 29

Failure if divisor is zero.

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4_{25} 20_2 – 26
4_{28} 21_2 – 14 in the 66th m.c. of division
4_4 4 – 24 clear TCB
4_{21} 14 – 21_3 Quotient without round-off.
4_{23} 27 – 22_3 P_1 as round-off.
4_{26} 30 – 21_2
3_{28} Prepare.