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NELSON RESEARCH LABORATORIES
STAFFORD
MATHEMATICAL PHYSICS LABORATORY.
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Report No. NS t 22
Date 5.4.55
Reference
Order No.

Front Sheet.
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DEUCE Subroutine No. 27 (R01)

Report by
A. Gilmour.

SUMMARY.

The attached document contains details of a DEUCE subroutine for reading one decimal number from a card and converting it into binary.

The subroutine was originally prepared at R.A.E., has been corrected and tested on the N.P.L. DEUCE at Blackheath, and has been copied into all instruction delay lines and tested in each.

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MATHEMATICAL PHYSICS LABORATORY.

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NS t 22
Sheet No.: 1

Description. Reads one decimal integer from a card and converts to binary. The integer may be punched in any S+1 consecutive columns of the DEUCE field with the sign in DEUCE column n and the number in DEUCE columns n+1 to n+S. No failure indications are provided with the subroutine as it is assumed that cards are punched to specification and checked. If cards are not punched to specification the wrong result will be obtained. The rest of the card need not be blank except that any punching in the X row in the DEUCE field will be treated as a negative sign. First Order subroutine.

Data.
a = decimal integer on card.
S = number of digits in a. $1 \leq S \leq 9$
Card nth DEUCE col: sign (Y positive, X negative)
(n+1)th to (n+S)th col: S decimal digits.

Result. Card read and a converted to binary form.

Instructions for Use.

Stores used.	13	14	15	16	21_2	21_3
Contents at entry.	-	-	Link	-	-	-
Contents at exit.	Zero	Zero	P_1	X row of card	P_{S+1}	Result

Occupies. m.c. 0-1, 3-6, 9-28.

Entry. m.c. 21.

Parameters. $P_1, P_2, P_3, \ldots, P_{S+1}$ in m.c. 4

(34-n) as wait number in m.c. 14

In m.c. 27 timing number is 17 if $n > 1$.
19 if $n = 1$.

Waste Instruction. 1 8-8, 0, 0 in m.c.28.

Clear Read. There is no instruction in the subroutine to clear read. The waste instruction in m.c.28 may be used for this purpose if required.

12 - 24 Stim read.

15 - 1_{30} Plant link.

2_4 - 21_2 [$P_{1,2}$ ..... s+1] Put marker word in 21_2

30 - 21_3 X Clear 21_3 and allow Y row to pass.

0 - 16 X Send X row to TS16

30 - 13 clear TS13

0 - 14 X, Send r's row to TS14.

2 - 24 Has 9's row been reached?

8 2_{27} 2_4 - 15 Put marker word in TS15

2_{14} 23 - 14 ([n-1] mcs.) Shift r's row into standard position.

2_{10} 25 - 14 Puts into TS14 the digits of the r's row which lie in the P_1-s+1 positions.

2_{18} 23 - 14 Move digits in TS14 down 1 place.

2_{20} 21_2 - 15

2_{22} 26 - 14

2_{24} 14 - 21_2

$\left.\begin{array}{l}\text{15}\\ \text{14}\\ 21_2\end{array}\right\}$ modifications of marker word. when r's row contains a digit in the n th position a P_{n-1} is removed from the marker word.

2_{26} 27 - 15 Put P_1 in TS15.

2_1 25 - 25 Add P_1 in TS13 every time there is a digit in the P_1 position in TS14.

2_3 23 - 14 Shift down contents of TS14.

2_5 26 - 28 Test if S digit positions have been examined.

28 2_{10} 13 - 15

2_{13} 15 - 25 (9mc)

$\left.\begin{array}{l}\text{15}\\ \text{25 (9mc)}\end{array}\right\}$ Multiply contents of TS13 by 10.

2_{12} 13 - 23_3

positive add r's row
TS21_2 if not subtract it

Date

File Ref.

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CODING AND FLOW DIAGRAM FOR DEUCE SUBROUTINE NO. 27 (RC1)

Read one decimal number.

NELSON RESEARCH LABORATORIES,
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STAFFORD, ENGLAND.

2302/29

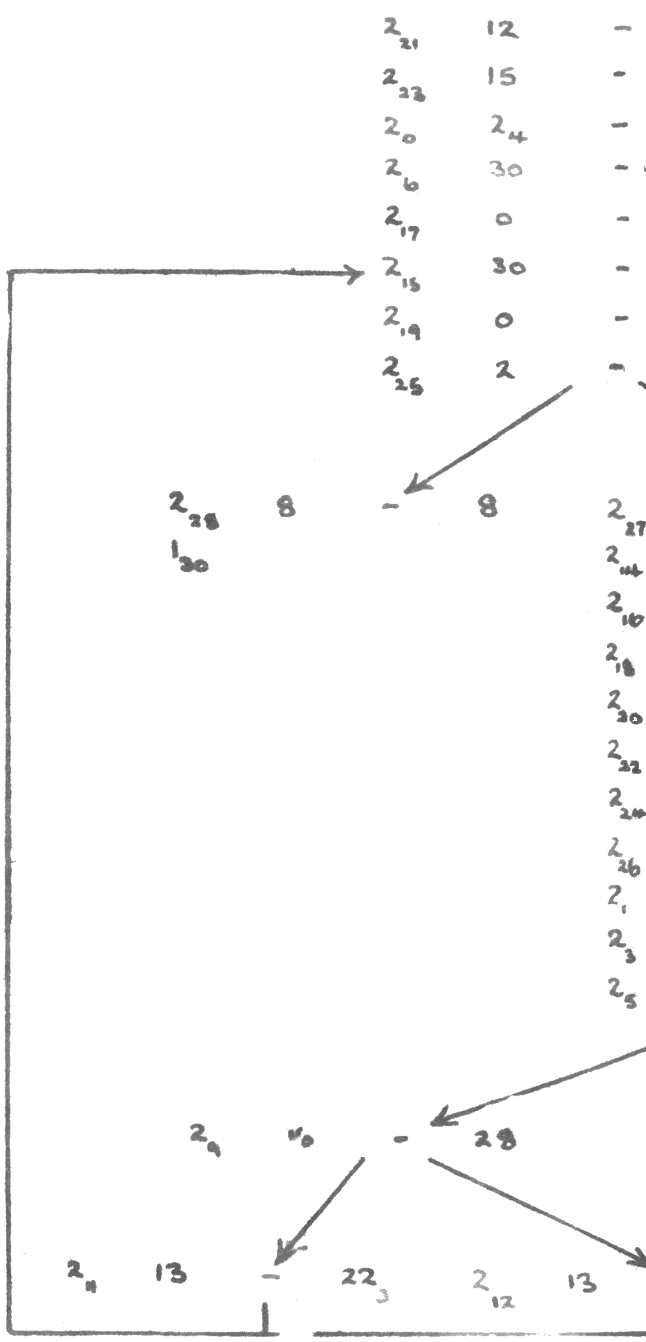
D.L. 2 Track

Card Nos.

mc	NIS	S	D	C	W	T	
0	2	2	21		2	4	
1	2	25	25		0	0	
2							
3	2	23	14		0	0	
4		$P_{1,2}$ ----			S+1		
5	2	26	28		0	2	
6	2	30	21		1	9	X
7							
8							
9	2	16	28		0	0	
10	2	13	15		0	1	
11	2	13	22		0	2	
12	2	13	23		1	1	
13	2	15	25	1	3	11	
14	2	23	14	1	34-n	0	
15	2	30	13		0	2	
16	2	25	14		0	0	
17	2	0	16		0	28	X
18	2	23	14		0	0	
19	2	0	14		0	4	X
20	2	21	15		0	0	
21	2	12	24		0	0	
22	2	26	14		0	0	
23	2	15	1		5	7	
24	2	14	21		0	0	
25	2	2	24		0	0	
26	2	27	15		0	5	
27	2	2	15		7	T	
28	1	8	8		0	0	
29							
30							
31							

D.L. Track

Card Nos.



If number is positive ad

contribution to $DS21_2$ if not