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NELSON RESEARCH LABORATORIES  
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MATHEMATICS DEPARTMENT.

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Front Sheet.  
Data Sheet 1.  
Figure Sheet S6/11242.

DEUCE Subroutine No. 255 (D20M)

Report by  
J.P. O'Brien.

SUMMARY.

The attached document contains details of a DEUCE Subroutine which has been prepared and tested by E.E. Luton.

*R.A. Smith.*

MATHEMATICS DEPARTMENT.

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NS t 226  
 Sheet No. : 1.

Description. Division, using automatic divider, of single length number by single length number with round-off, unless answer has 31 significant binary figures, and with shift. Divisor need not be numerically greater than dividend. Similar to D17 but uses six less instructions and will fit into a delay line with M15/1, No. 254 sharing m.c. 28.  
 Zero Order.

Data. a such that  $|a| < 2^{30}$  uses AIM.  
 b  $\neq 0$

Result.  $c = 2^{31-s} \left(\frac{a}{b}\right)$ ,  $0 \leq s \leq 17$ , if this single length.  
 If  $b = 0$  it will stick in the initial loop. If  $|a| \geq 2^{30}$  it may stick in the initial loop, fail or give either the right or wrong answer.

Failures. 7-24X loading to link if c is not single length.

Instructions for Use.

Stores Used.	13	14	15	16	17	21 <sub>2</sub>	21 <sub>3</sub>	TCB
Contents at Entry.	-	-	Link	b	-	-	a	-
Contents at Exit.	-	-	Link	$2^N b$	-	c	-	ON
Occupies.	m.c.s. 1-4, 6-8, 11, 13-16, 18, 20, 21, 23, 24, 27, 28, 30 and 31 with M15/1 in same D.L. m.c.s. 0-11 and 13-31 are occupied.							
Entry.	m.c. 31.							
Time.	3-34 m.s. i.e. (N+4) m.s. for $s > N+1$ (where N is shift applied) (N+3) m.s. for $s \leq N+1$ (to b so that $ 2^N b  >  a $ )							
Parameters.	(34-2s) as wait No. in A <sub>3</sub> .							

NOTE: This subroutine uses the automatic instruction modifier.

If  $s = 0$  or 1 the math. in A<sub>3</sub>  
 becomes A 22-21 1 2, 0 ~~06~~  
 or A 22-21 1, 0 ~~06~~ respectively

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

