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Report No. NS t 9  
Date 4.4.55

Reference  
Order No.

Telephone:—Stafford 700.

Front Sheet.

Data Sheet 1.

Figure Sheet S6/10012.

DEUCE Subroutine No. 14 (M12)

Report by  
N. Dowell.

SUMMARY.

The attached document contains working details of a DEUCE subroutine for fast multiplication with fixed shift.

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

N. DOWELL.

MATHEMATICAL PHYSICS LABORATORY

NW

Description. Fast multiplication with fixed shift of two places.  
Compactness is sacrificed for speed.

Data. a, b

Result.  $c = 2^{-30} ab$

Error. Lies in range  $(-\frac{1}{2}, +\frac{1}{2})$ , but rounded off digits are available.

Instructions for Use.

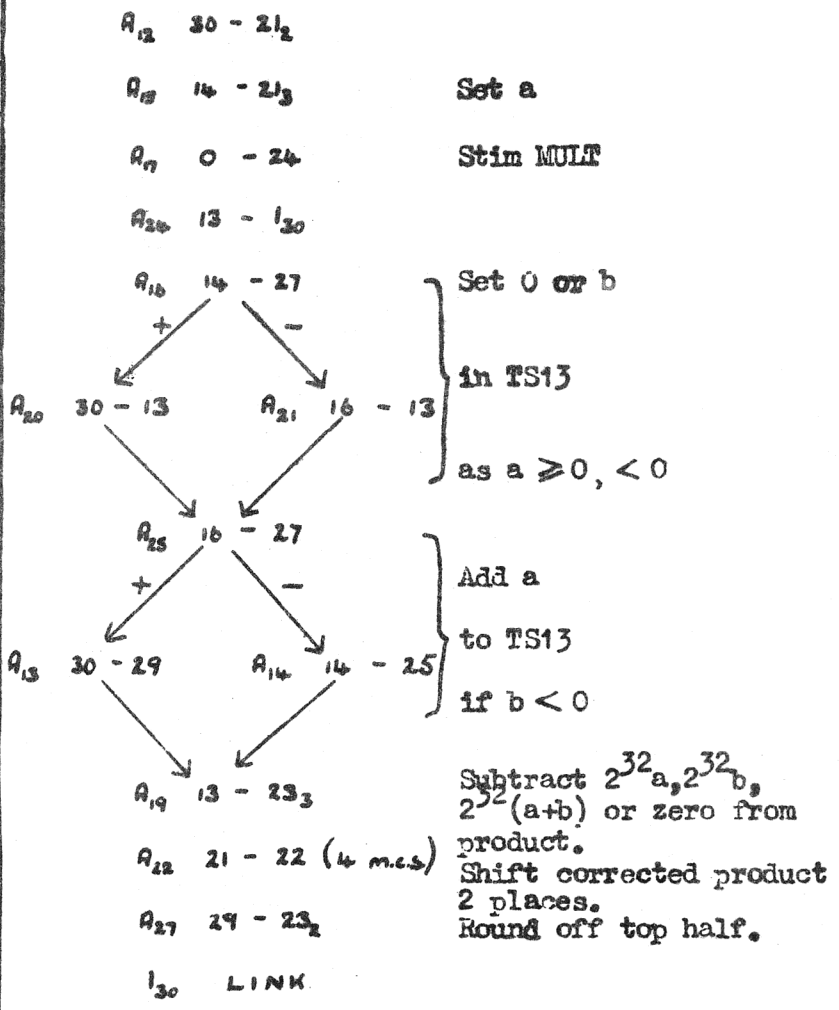
Stores Used.	13	14	16	$21_2$	$21_3$
Contents at Entry.	Link	a	b	-	-
Contents at Exit.	-	a	b	Rounded off digits of $ab(+ 2^{31})$	c

Occupies. m.c.'s 12-17, 19-22, 24, 25, 27 of D.L.A.

Entry. m.c. 12

Time.  $2\frac{2}{3}$  m.s.

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



NOTE: The four cases are:

<u>a</u>	<u>b</u>	<u>Result of Mult. (unsigned).</u>
+	+	ab
+	-	$a(2^{32} -  b ) = ab + 2^{32}a$
-	+	$(2^{32} -  a )b = ab + 2^{32}b$
-	-	$(2^{32} -  a )(2^{32} -  b ) = ab + 2^{32}(a + b)$

Flow diagram and Coding for subroutine M12 - Signed multiplication of two numbers with shift of two places.

Date  
File Ref.  
Sheet Ref. 86/10012