STANDARD BRICK : SCHEME B.

Description:

A 64 column general decimal matrix read programme which does not stop the reader between cards and which will deal with any layout from 1 to 64 signed numbers on a card, storing them on the drum from track 'c' onwards, normalised in Scheme B form, or shifted up a specified number of binary places, or with zero b.p.

Signs may either precede the number or may be overpunched.

A number may be partly in the α and partly in the β field (i.e. it need not be wholly in the α or wholly in the β field) and may have from 1 to 9 decimal digits. Either field may be blank. Numbers on the same card need not have the same number of decimal digits.

A check is carried out on the decimal punching. Columns punched outside the specified field are ignored. Numbers greater than $2^{31} - 1 = 2,147,483,647$ will be read but converted incorrectly. There is no failure indication in this case.

Because of the way the brick is organised extra tracks on the drum are required if there are less than 10 numbers per card: For r numbers/card, r<10, the space required is $\frac{(10-r)s}{32}$ tracks, where s = no. of cards, starting at track c.

Operation:

The dimensions of matrix and layout are specified on a parameter card.

Y α row: m P17 rows

X α row: n P17 columns

0 α row: leave blank to indicate normalising required or shift up, p P17 + P32, $0 \le p \le 31$.

1 row in α and β fields: Ones to indicate digit columns to be read (N.B. for case where signs precede the number, digit columns only)

2 row in α and β fields: Punch the column that contains the first digit of each number

3 α row: (1) Zero if signs above first digits
(2) Non-zero if signs precede the first digits

3 β row: (1) Zero if sign punching check to be ignored. + signs need not be punched.
(2) Non-zero if sign punching check required. + signs should be punched.

If the last card is not filled, + signs and zeros must be punched to complete the field.

Can be used with S.I.P.

If the brick is obeyed from the reader, the data should be inserted between Sections 2 and 3, cards 15 and 16.

STANDARD BRICK : SCHEME B

Occupies: 15 tracks, 4 sections, type II.

Data: The numbers are punched consecutively on the cards from left to right in the order

a_{11} a_{12} a_{13} ...... a_{1n} a_{21} a_{22} ...... a_{2n} ......

without gaps between rows.

When reading matrices with a small number of columns, e.g. a 50×1, these may be punched with as many numbers/card as convenient, viz

a_{11} a_{21} a_{31} a_{41} .... across the card.

Failures:

4, 21 - 29 X Signs not punched correctly or card non-decimally punched. Faulty column(s) in 21_2 (α) and 21_3 (β). Single shot to re-read.

0, 24 - 31 X Shift specified is too great. Single shot normalises.

Organisation of Programme:

Each card is read and the binary-coded decimal for the α and β fields is stored, together with signs, directly on the drum in blocks of ten consecutive mcs.

When all the cards have been read, the binary-coded decimal and signs for each card are then brought to the high speed store and the read routine again entered to convert the B.C.D. to binary, which is then stored, overwriting the B.C.D. on the drum.

Obviously, in the case where there are fewer than ten numbers on a card, extra storage space on the drum is required; but this is the price one must pay for continuous read.

Time required for computing after the last card has been read is $48+8\frac{1}{2}n+1\frac{1}{2}d$ m.secs per card, where n=number of nos./card and d=number of punched columns plus number of blank columns. Blank columns to the right of the last digit in the α and/or β field are not included. E.g. for a 6,000 element matrix (100 x 64) and 64 nos./card, total time ~ 70 secs.

Normalising is achieved with an unusually quick and neat method using TCA.

The programme has been prepared with STAC.

The average time used between cards for computing is 35 Mcs. When there are more than 40 nos./card, this periodically increases to 42 Mcs because of a track interlock of (16 - 4) Mcs. When there are more than 58 nos./card, the maximum time occurs when a head shift is necessary, with the result that a track is delayed from being written till after the next card. This time is :

22 Mcs main loop
15 Mcs for 3 entries into WRITE SRT
(16-2) Mcs max. for track interlock
6 Mcs sundries

57 Mcs max.

Uses: Modified versions of subroutines R25T, R26T and B17.

DEUCE Programme No. 738 (Standard Brick LR23BM).

General Decimal (Matrix) Read to Drum.

PART 1 : READ CARDS.

4_{20} 12 - 24
1_{21} 10 - 11 ℓ 32mcs
2_{31} 0 - 9_1 × m

Read parameter card
and plant links.

2_9 0 - 21_3
2_0 0 - 9_2 × n
2_{10} 0 - 16

row Y m
X n
0 p
1 field (digit cols.)
2 starters (α, β)
3_α pre / over } punched signs
3_β ignore sign check
4-9 ignored.

2_1 0 - 9_3 × p (b.p.)
5_{10} 30 - 21_2
5_{20} 0 - 24 mc 23
5_{11} 21_2 - 13 mc 24. mn. P_{17}
6_{10} 13 - 12_{12}.

6_{20} R26T MOD.
(6_{20} 0_α - 21_2 ×)
6_0 0_β - 21_3 mc 27.
6_{31} ⋮
.
6_{29} 0_β - 28
nz / z
6_{26} 8_{27} - 3_{27} Ignore sign check.
[$Q_{27}(8_{27})$ 1 - 1 → 4_1]
6_{27} 20 - 2_{31} ℓ 3mcs. set shifts for signs.
6_1 19 - 22_2 d
6_2 ⋮
6_9 21_3 - 5_{11} β ends.

6_{28} 28 - 26
6_{30} 11 - 6 ℓ 32mcs.
8_{31} 13 - 8_{31} card counter.
8_9 30 - 13
8_{18} 21_3 - 27 $21_{2,3}$ contain α, β ends.
− / +

Find the no. of nos. in α and β fields.

6_{24}. 28 - 25
6_{23} 21_2 - 28 d.
nz / z
7_{12} 21 - 22_2 d
7_{11} 13 - 18_3 T
7_{17} 2 - 24 X
TIL

Determine "c" of matrix.

7_{18} 18_2 - 14 c × P_5
7_{23} 24 - 14 ℓ 12mcs. Initial elem. counter.
1_{24} 4_1 - 21_3 Link
1_L $\boxed{\text{PREP STORE}}$
Q_{29} (4_1 18_2 - 13)
4_{10} Next Page.

and B17.

↓ from previous page

4_{10} 13 − 25 ℓ 17mcs. $H \times P_{22}$
7_{24} 13 − 12_6 Initial track.
6_{10} 28 − 25 ℓ 4mcs.
7_{15} 13 − 18_2
8_{24} 9_1 − 13
8_{23} 9_2 − 25 d
8_{15} 13 − 8_{18} Σa_{ij}
$4_{28} \xrightarrow{\text{next page}}$ 8_4 8_8 − 18_0
4_5 $\boxed{\text{R25T}}$ Read a card.
3_{28} 8_{31} − 21_3 d
7_0 18_3 − 23_3 r Subtract no. of elem. on this card.
7_3 21_3 − 27 Last card?

\+ no yes −

7_8 21_3 − 8_{31} 7_9 9 − 24
7_{31} 21_2 − 28 Was track delayed from being written?

nz

1_3 6_5 − 21_3 Link.
1_1 $\boxed{\text{SRT}}$ Write D.L. 9 on drum.
Q_{29}(6_5 21_2 − 18_2) New element track.

z

1_2 18_2 − 14
1_7 10_{15} − 16
1_{10} 5 − 24
1_{14} 10_{16} − 15 P_{17-21}
7_{16} 8_{18} − 21_2 d
7_{19} 25 − 22_3
$1_{15} \xrightarrow{\text{next page}}$ 1_{22} 16 − 22_2 Σa_{ij}
1_{25} 28 − 22_3
1_{27} 21_3 − 0
Q_{29}(8_{19} 16 − 9_{31} J=15)

spill

1_{31} 8_1 − 21_3 Link
1_1 $\boxed{\text{SRT write}}$
Q_{29}(8_1 8_{19} − 21_3)

normal

1_{30} 18_0 − 0 $P_{17} + P_{22}$

either or

Q_0(8_8 10_{31} − 16 J=11) Q_0(8_{12} 10_{11} − 16 J=11)

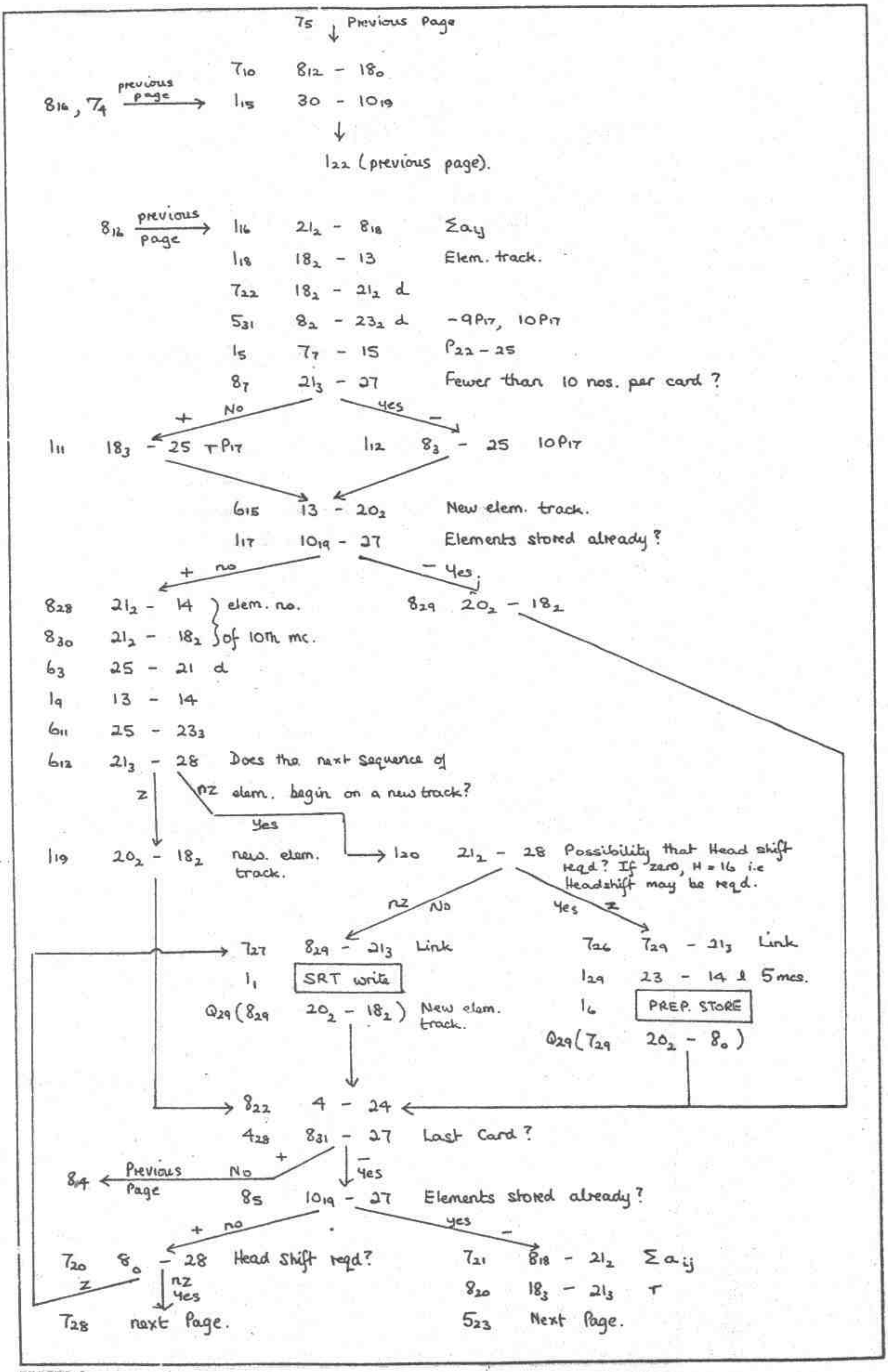
Normal Spill normal spill on 10_{11} − 1

7_4 8 − 8 7_5 5_{10} − 16 1_{15} next page 1_{16} next

1_{15} ↓ Next Page 7_{10} ↓ Next Page

DEUCE Programme No. 738 (Standard Brick LR23BM)

General Decimal (Matrix) Read to Drum.



116

7_{28} 4_1 - 14
(5_{24} 14 - 0)
Q_{26}(7_{25} 0 - 31 ℓ) Shift heads.
↓
T_{27}. Store and Exit.
(Previous page)

5_{23} 29 - 13
5_{25} 12 - 1 ℓ 32mcs.
↓
1_{30}. CALL IN NEXT SECTION.

SRT (WRITE A TRACK)

1_1	18_2 - 14		
6_6	3_{10} - 15	P_{5-8}	
8_{10}	9 - 11 ℓ 32mcs.		
6_{17}	29 - 10_{19}	marker.	
6_{19}	23 - 14 ℓ 5mcs.		
8_{25}	14 - 17_2		
7_1	7_6 - 13		
8_6	23 - 14 ℓ 12mcs ($\times P_5$)		
1_{26}	25 - 25		
1_{28}	13 - 0		
Q_{30}(7_6	0 - 30 ℓ)		
1_0	17_2 - 0	P_{17} (Post addition)	
1_4	17_2 - 14		
PREP STORE → 1_6	23 - 14 ℓ 16mcs.	($P \times P_{25}$)	
6_{31}	3_{10} - 15	P_{5-8}	
1_{23}	7_{25} - 13		
8_{26}	25 - 25		
4_{30}	13 - 4_1	To be obeyed on Y row of next card.	
7_{30}	30 - 8_0	Clear marker.	
1_{27}	21_3 - 0		
Q_{29}	LINK		

↓

[4_1] Q_1(7_{25} 0 - 31 ℓ)
7_2 10_{14} - 21_2 d
2_{31} first page.

PART 2: CONVERT B.C.D. TO BINARY.

Uses: B17, position 6, altered to use D.L.11 as buffer.

```
            Q31     9  -  24
            1_1     12_6 - 13       Initial track "c" x P22.
            7_6     28 - 25 l 3mcs.
            7_17    13 - 17_0 l 4mcs.   Initial counters.
            1_23    30 - 12_8
            8_13    30 - 13
            8_7     12_12 - 26      mn
            8_15    21_3 - 7_17     r
            7_31    13 - 10_2
            7_2     7_5 - 4_5       Link for R25T
4_5 next page
but one  →  7_5     6_7 - 15        Link      → 7_14  6_19 - 19_3   Buffer elements
            7_15    17_1 - 0        P17         7_20  7_27 - 20_3   converted thus
            7_19    17_1 - 13                   7_1   11 - 9 l 32mcs.  far into D.L.9.
            6_21    [B17 FETCH]                 7_2   30 - 7_27
         Q30(6_7    7_0 - 17_0)
            8_8     16 - 10_10      α minus signs.
          → 7_10    1_12 - 15       Link
            7_12    16 - 23_2       Σaij
            7_15    17_1 - 0        P17
           (7_19    17_1 - 13)
            6_24    [B17 FETCH]
        Q30(1_12    17_0 - 0 l) P17 + P22
        Q0 (7_0     16 - 18_3 J=12)   B.C.D.
      normal               ↓ spill
            7_11    1_13 - 15       Link.
           (7_12     FETCH )
        Q30(1_13    8_4 - 17_0)
            7_7     16 - 5_10       β minus signs.
           (7_10    FETCH)
        Q30(1_12    17_0 - 0 l) P17 + P22
        Q0 (8_4     16 - 10_11 J=12)  B.C.D.
      Normal               spill on 16 - 10_15
7_8     1 - 1          7_9     16 - 23_2     Σaij
8_16  19_3 - 6_19      1_15    7_17 - 21_3         } adjust element
8_20  20_3 - 7_27      8_19    8_21 - 23_3  10P17  } tracks.
8_27  9 - 11 32mcs.    8_22    next Page.
```

8_{19} ↓ Previous page

8_{22} $21_3 - 27$ Fewer than 10 nos./card?

− yes + no

8_{26} $21_2 - 10_0$ Store Σa_{ij} ← 8_{25} $17_1 - 22_3$ Add s−10.

8_{10} $2_{12} - 4_{12}$ d 8_{29} $21_3 - 17_1$

1_{18} $5_{20} - 4_{20}$ β starts

7_{29} $10_{31} - 16$ Reset Links

1_4 $10_6 - 14$ for R25T.

8_9 $16 - 10_{11}$ Last β markers

7_{18} $14 - 10_{20}$ α starts

5_{26} $5_{30} - 19_2$ Link.

4_3 $10_6 - 28$ Any digits in α?

yes nz no z

5_{27} $10_9 - 14$

5_9 $\boxed{B \rightarrow \alpha}$

5_{28} $10_{30} - 17_2$ ← $Q_{26}(10_9$ $4 - 4)$

2_2 $19_2 - 0$

$Q_4(5_{20}$ $10_6 - 28)$ Any digits in α?

yes nz no z

1_8 $5_{10} - 10_{10}$ d } set links.

1_{11} $2_{13} - 4_{13}$

1_9 $27 - 16$ ←

4_6 $\boxed{\text{R26T MOD. CONVERT PATTERNS}}$

1_{27} $13 - 16$

1_{29} $10_0 - 25$ Σa_{ij}

1_0 $10_2 - 21_2$

1_2 $28 - 22_2$

1_5 $1_7 - 15$ Link.

1_{10} $13 - 20_2$

7_{13} $17_3 - 0_{15}$ P_{17}

7_{16} $17_3 - 13$

7_{22} $\boxed{\text{B17 STORE}}$

$Q_{30}(1_7$ $20_2 - 10_0)$

8_0 $21_2 - 10_2$ Counter

1_3 $30 - 21_3$

1_6 $12_5 - 13$

6_9 $16 - 27$ x

+ −

8_{11} $16 - 26$ 8_{12} $16 - 25$

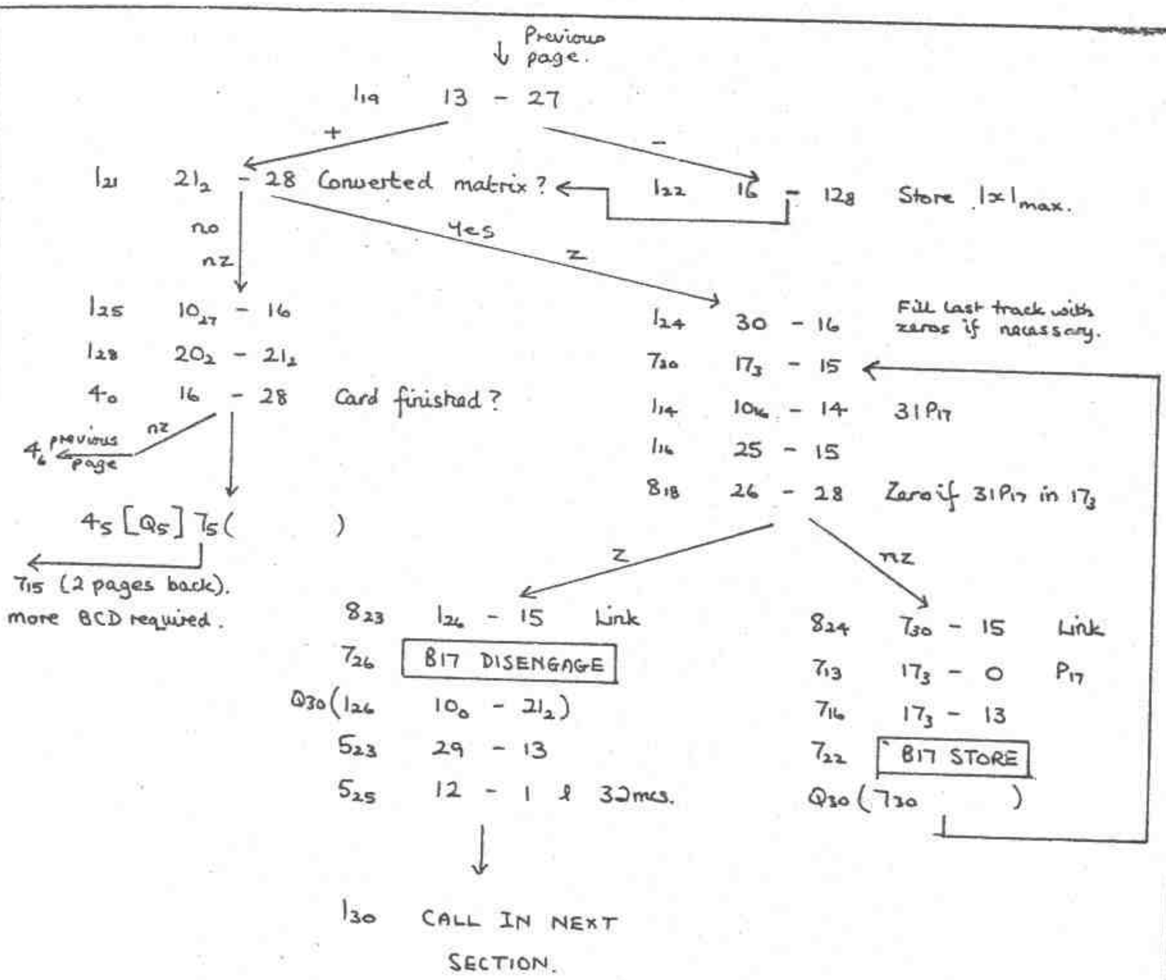
1_{19} next page 8_{14} $16 - 23_3$ Change sign.

8_{17} $21_3 - 16$ $|x|$

1_{19} next page

DEUCE Programme No. 738 (Standard Brick LR23BM)

General Decimal (Matrix) Read to Drum.



Uses:

7_{28} 13 - 0 → 8_{30}
10_0 Σa_{ij}
12_6 parameter (initial track)
12_8 $|x|_{max}$.
12_{12} parameter (mn)

This section leaves
Σa_{ij} stored in 21_2
$|x|_{max}$ stored in 12_8.

Part 3
~~Section~~ to normalize, or to shift up p places $(0 \le p \le 31)$

Assumes: 21_2 has sum check.

Q_{31} 9 − 24
1_{22} $30-17_3$ Initialize count for No. of shifts
1_{30} 8_2-18_2 Link, for a variable shift (8, 24-14 & 27(1)26)
8_6 12_8-14 |x| max
8_8 14 − 28 Zero matrix?

no / NZ →
1_6 24 − 27 P_{31}? (actually, overnormalized)
− yes / + no
1_{16} 24 − 14
1_{17} 24 − 27 P_{30}? Normalized?
− Yes / + no
1_4 18_2-0 $-P_{17}$ Adjust link
1_{13} 17_3-0 $+P_{17}$ Increment the No. of shifts (which becomes the no. of shifts required to normalize)

yes
1_5 12_6-13 Initial track $\times 32 P_{17}$ ie, P_{22}
8_{12} $13-17_1$
1_{19} $1_{21}-15$ Link
6_{21} $\boxed{\text{B17 Fetch}}$ first track
Q_{30} (1_{21}) 11_3-14 Obtain shift up required.
8_5 $14-23_2$ Adjust Σa_{ij}
8_9 14 − 27 Require specific shift up, p P_{17}?

no + / yes −
8_{14} 17_3-13 No. of shifts required to normalize
8_{19} 24 − 14 Remove P_{32} from specified shift.
8_{21} 23 − 26 Subtract specified shift from max shift.
8_{23} 28 − 25
8_{25} 13 − 27 Too many shifts?
− yes / + no
8_{29} 24 − 31 X Shift specified is too great.
to normalize

8_{13} 17_3-11_3 b.p.
1_7 17_3-14
8_{11} $14-22_2$
adjust Σa_{ij}
normalize

8_{28} $23-11_3$ b.p.
8_7 $23-22_2$ Σ
1_{27} 8_2-13 Link, for a variable shift
8_{15} 23 − 26 Insert specified shift into the link
8_{17} $13-18_2$

8_{24} 11 − 9 (32)
1_{26} $30-11_0$ (4) zero first 4 m.c.
1_3 9_3-28 b.p. shift needed?

no Z / yes NZ

from next page → 1_{10} 12_6-13 address of Σa_{ij}
8_{16} 21 − 16 Σa_{ij}
1_{20} $8_{22}-15$
7_{22} $\boxed{\text{STORE}}$ Σa_{ij}
Q_{30} (8_{22}) 9_1-11_1 (3) m, n, p
8_3 $8_{18}-15$
B17 7_{26} $\boxed{\text{DISENGAGE}}$
Q_{30} (8_{18}) 30 − 13
5_{25} 12 − 1(32)
1_{30} FINISH

1_{11} $12_{19}-13$ trip count $m \times n$
1_{15} 28 − 25 (3) $mn + 3$
8_{20} $13-18_0$ trip count, to allow for m, n, p
1_{24} 18_2-8_2 Plant the variable shift link.
from next page → 1_9 8_4-15 link
$(7_{19}$ $17_1-13)$
6_{21} $\boxed{\text{B17 FETCH}}$
Q_{30} (8_4) 11 − 10 (32)
8_0 3 − 24
1_2 27 − 13 → 1_{25} next page

1_2 ↓ Previous page.

1_{25} 31 - 7_{27}

→ 1_{29} 10_0 - 14

1_0 14 - 23_2

Q_2 (8_2 24 - 14 & J=1) 32 mcs.

8_{30} 16 - 10 & 32mcs.

8_{31} 14 - 10_1

1_1 17_1 - 0 P_{17}

1_8 14 - 22_2

1_{12} 13 - 25

1_{14} 18_0 - 0 $-P_{17}$

1_{18} 13 - 28

nz (back to 1_{29}) ↓ z

1_{28} 10 - 11 & 32 mcs.

8_1 18_0 - 27 Matrix finished?

\+ → 1_9 Previous Page

− Yes. → 1_{10} Previous Page.

B17 MODIFICATIONS

1. 6_5 and 6_7 are deleted.
   7_{26} is altered to read:

   7_{26} 6_{12} - 13 $15P_5 + 255P_{22}$

   6_{21} $7_{23}'$ - 21_3

2. 6_{26} is altered to read:

   6_{26} 25 - 25

   7_{28} 13 - 0

   Q_{30} LINK

3. Delete 6_9 and 6_{30} and alter 6_{11} and 6_{18} to read:

   6_{11} 6_0 - 13 Q_{30} (6_{18} h - 30)

   6_{14} 6_{22}

R25T MODIFICATIONS

1. $\boxed{\beta - \alpha}$

S6/11486 of R25T

Replace α field markers by β field markers.

5_9 $10_{12} - 18_0$ l 4mcs
4_{15} $4_{20} - 10_{20}$
5_{29} $5_{12} - 4_{12}$ d 5_{23} deleted.
5_{16} $30 - 4_{20}$
5_{24} $14 - 0$
0_{26} LINK

2. $[4_1]$ Q_1 (7_{25}) $0 - 31$ l

S6/11487

7_2 $10_{14} - 21_2$ d
2_{31} $21_2 - \left.\begin{matrix}22\\21\end{matrix}\right\}$ d
3_4 $30 - 10_{12}$ l 4mcs
3_{15} $21_3 - 15$
3_{30} $15 - 5_{10}$
3_{31} $21_2 - 10_{10}$
2_{17} $10_{21} - 17_1$ d
2_{22} ⋮

Deleted: 4_1, 5_{26}, 4_{14}, 5_{31}

3. Delete 3_{10} to read:

4_5 $12 - 24$
5_0 $10_5 - 21_3$ d α, β starts
4_7 $0 - 14$ x
2_0 $\left\{\begin{matrix}22\\21\end{matrix}\right.$ $- 21_2$ d
3_5 ⋮

This was altered because R25T fouled the timing specification for 64 column reading. The β field was read $3\frac{1}{2}$ Mcs after the single shot. (Spec. is 2 max).

R25T MODIFICATIONS - CONT.

4. Mod. to allow α field to be blank.

	5_{26}	$5_{30} - 19_2$	Link	Deleted:	5_{25}
S6/11486 of R25T.	4_3	$10_6 - 28$			5_{26}
		nz ↙ ↓ z			5_{30}
	5_{27}	$10_9 - 14$	Link		4_3
	5_9	$\boxed{\beta \rightarrow \alpha}$			4_{10}
	Q_{26} (10_9	$4 - 4$)			4_{28}
	→ 5_{28}	$10_{30} - 17_2$			4_{30}
	2_2	$19_2 - 0$			3_{28}
	Q_4 (5_{30}	$10_6 - 28$)			
		nz ↙ ↓ z			
	1_8	$5_{10} - 10_{10}$	α		
	1_{11}	$2_{13} - 4_{13}$	Link		
	→ 1_9	$27 - 16$			
	4_6	$16 - 14$			
	4_8	$10_{10} - 15$	α or β minus signs.		
	2_{14}	$25 - 10_{17}$	preserve sign.		
	5_{17}	⋮			

5. S6/11486 of R25T

4_{25}	$16 - 10_{27}$	preserve marker.	
1_{27}			

ENGLISH ELECTRIC-LEO COMPUTERS LTD. KIDSGROVE. K/AA t 1528

DEUCE Programme No. 738 (Standard Brick LR23BM)

General Decimal (Matrix) Read to Drum.

D.L. 10 Track

Card Nos. 1 - 3

mc	A	NIS	S	D	C	W	T	
		1	0	2	l	29	28	X
		2	0	10		30	31	X
		2	0	2		27	28	X
		1	0	10		30	31	X
0								
1								
2								
3		1	25	21	d	1	4	
4			R25T					
5		1	21	18		3	3	
6		0	3	15		2	2	
7								
8			R25T					
9								
10		7	28	25	l	0	3	
11		6	25	23		0	0	
12								
13		1	21	28		0	4	
14								
15		1	13	20		1	0	
16			P_{17-21}					
17		6	29	10		0	0	
18			R25T					
19		0	23	14	l	0	4	
20								
21			R25T					
22			R25T					
23		7	21	28	d	1	18	
24		7	28	25		0	18	
25								
26								
27			R25T					
28								
29								
30								
31		1	3	15		9	22	

D.L. 8 Track

Card Nos. 4 - 6 α

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

D.L. 7 Track

Card Nos. 4 - 6 β

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

DEUCE Programme No. 738 (Standard Brick LR23BM)

General Decimal (Matrix) Read to Drum.

D.L. 6 Track
Card Nos. 7 – 9 α

mc	A	NIS	S	D	C	W	T	
		1	0	6	ℓ	27	26	
		6	0	5	ℓ	28	27	
		5	0	6		30	30	x
0		6	0	21		25	29	
1		6	19	22	d	1	31	
2								
3								
4								
5			R26T					
6								
7								
8								
9		6	21	5		0	17	
10		6	13	12		0	8	
11								
12								
13								
14								
15			R26T					
16								
17								
18								
19								
20		6	0	21		0	10	x
21								
22								
23			R26T					
24								
25								
26		6	8	3		31	31	
27		6	20	2	ℓ	2	4	
28		6	28	26		0	0	
29		6	0	28		7	27	
30		0	11	6	ℓ	0	31	
31			R26T					

D.L. 5 Track
Card Nos. 7 – 9 β

mc	A	NIS	S	D	C	W	T	
		5	0	6		30	30	x
		6	0	5		30	31	
		5	0	5		30	22	
0		4	10	21	d	3	5	
1								
2								
3								
4								
5			R25T					
6								
7								
8								
9		4	10	18	ℓ	1	4	
10		5	30	21		0	8	
11		6	21	13		11	29	
12								
13								
14								
15			R25T					
16								
17								
18								
19								
20		5	0	24		1	21	
21			R25T					
22			R25T					
23		5	29	13		0	0	
24			R25T					
25		1	12	1	ℓ	4	3	
26		4	5	19		2	7	
27								
28			R25T					
29								
30		1	10	28		0	2	
31		1	8	23	d	1	4	

D.L. 4 Track
Card Nos. 10 – 12 α

mc	A	NIS	S	D	C	W	T	
		1	0	4	ℓ	27	26	
		4	0	3	ℓ	28	27	
		3	0	4		30	30	x
0		4	16	28		0	3	
1		4	18	13		3	11	
2			R25T					
3		5	10	28		1	22	
4			R25T					
5		5	12	24		0	25	
6			R25T					
7		2	0	14		0	23	x
8		2	10	15		0	4	
9			R25T					
10		7	13	25	ℓ	28	12	
11								
12			R25T					
13								
14								
15		5	4	10		3	12	
16								
17			R25T					
18								
19								
20		1	12	24		0	31	
21								
22			R25T					
23								
24								
25		1	16	10		0	0	
26			R25T					
27			R25T					
28		0	8	27		1	6	
29			R25T					
30		7	13	4		1	30	
31			R25T					

DEUCE Programme No. 738 (Standard Brick LR23BM)

General Decimal (Matrix) Read to Drum.

D.L. 3 Track
Card Nos. 10 - 12 β

mc	A	NIS	S	D	C	W	T	
		3	0	4		30	30	X
		4	0	3		30	31	
		1	0	3		30	31	
0								
1								
2								
3								
4								
5			R25T					
6								
7								
8								
9								
10			15 P5					
11								
12			R25T					
13								
14								
15		3	21	15		0	13	
16								
17								
18								
19								
20								
21			R25T					
22								
23								
24								
25								
26								
27								
28		7	8	21	d	1	2	
29			R25T					
30		3	15	5		10	31	
31		2	21	10		9	16	

D.L. 2 Track
Card Nos. 13 - 15 α

mc	A	NIS	S	D	C	W	T	
		1	0	2	ℓ	27	26	
		2	0	1	ℓ	28	27	
		1	0	2		30	30	X
0		2	0	9		0	8	X
1		5	0	9		0	7	X
2								
3								
4								
5			R25T					
6								
7								
8								
9		2	0	21		0	21	
10		2	0	16		0	21	
11								
12								
13								
14			R25T					
15								
16								
17		2	10	17	d	2	3	
18								
19								
20								
21								
22								
23								
24			R25T					
25								
26								
27								
28								
29								
30								
31		2	0	9		0	8	X

D.L. 1 Track
Card Nos. 13 - 15 β.

mc	A	NIS	S	D	C	W	T	
		1	0	2		30	30	X
		2	0	1		30	31	
		4	0	1		30	19	
0		1	17	0		0	2	
1		6	18	14		3	3	
2		1	18	14		2	3	
3		1	6	21		0	28	
4		1	17	14		0	0	
5		0	7	15		0	0	
6		6	23	14	ℓ	8	23	
7		7	10	16		1	1	
8								
9		6	13	14		0	0	
10		1	5	24		0	2	
11		6	18	25		2	2	
12		6	8	25		21	1	
13								
14		7	10	15		0	0	
15		1	30	10		2	5	
16		1	21	8		0	0	
17		0	10	27		0	9	
18		7	18	13		2	2	
19		0	20	18		1	1	
20		7	21	28		0	4	
21		2	10	11	ℓ	9	8	
22		1	16	22		0	1	
23		0	7	13		0	1	
24		1	4	21		7	12	
25		1	28	22		0	0	
26		1	25	25		0	0	
27		0	21	0		0	0	
28		0	13	0		0	0	
29		1	23	14	ℓ	3	7	
30		14P1	18	0	ℓ	0	0	
31		1	8	21		0	0	

ENGLISH ELECTRIC-LEO COMPUTER LIBRARY SERVICE
ENGLISH ELECTRIC-LEO COMPUTERS LTD. KIDSGROVE.

DEUCE Programme No. 738 (Standard Brick LR23BM)

General Decimal (Matrix) Read to Drum.

D.L. 8 Track
Card Nos. 16 – 18 α

mc	A	NIS	S	D	C	W	T	
		1	0	8	l	27	26	
		0	0	7	l	28	27	
		7	0	8		30	30	X
0		1	21	10		0	1	
1								
2								
3								
4		7	16	10		9	(12) 6	
5								
6								
7		0	12	26		3	6	
8		7	16	10		0	0	
9		7	16	10		0	7	
10		1	2	4	d	0	6	
11		1	16	26		0	6.	
12		0	16	25		0	0	
13		0	30	13		0	24	
14		0	16	23		1	1	
15		7	21	7		0	14	
16		0	19	6		1	2	
17		1	21	16		0	0	
18		0	26	28		0	3	
19		0	8	23		0	1	
20		0	20	7		5	5	
21			10P17					
22		0	21	27		1	1	
23		7	1	15		1	1	
24		7	7	15		4	19	
25		0	17	22		2	2	
26		0	21	10		4	14	
27		1	9	11	l	19	18	
28								
29		0	21	17		2	27	
30								
31								

D.L. 7 Track
Card Nos. 16 – 18 β

mc	A	NIS	S	D	C	W	T	
		7	0	8		30	30	X
		0	0	7		30	31	
		1	0	7		30	31	
0		7	16	18		1	(12) 8	
1		7	11	9	l	0	31	
2		7	30	7		23	11	
3		7	7	4		0	0	
4								
5		7	6	15		0	7	
6		7	28	25	l	7	9	
7		7	16	5		1	1	
8		7	1	1		0	0	
9		1	16	23		1	5	
10		7	1	15		0	0	
11		7	1	15		0	31	
12		7	16	23		0	1	
13		14P1	17	0		0	1	
14		7	6	19		3	4	
15		14P1	17	0		0	2	
16		7	17	13		1	4	
17		1	13	17	l	1	4	
18		5	14	10		0	6	
19		6	17	13		0	0	
20		7	7	20		5	11	
21			B17					
22			B17					
23	(1)	1	11	16		1	31	
24			B17					
25		1	16	11		1	31	
26		6	6	13		16	25	
27			B17					
28		0	13	0		0	0	
29		1	10	16		0	5	
30		1	17	15		3	14	
31		7	13	10		1	2	

D.L. 6 Track
Card Nos. 19 – 21 α

mc	A	NIS	S	D	C	W	T	
		1	0	6	l	27	26	
		6	0	1	l	28	27	
		1	0	6		30	30	X
0								
1								
2			B17					
3								
4								
5								
6			B17					
7		0	7	13		0	8	
8			B17					
9		0	16	27		0	0	
10			B17					
11		6	6	13		19	1	
12			B17					
13		6	25	15		0	0	
14								
15			B17					
16								
17								
18		6	0	30		0	22	
19								
20								
21								
22			B17					
23								
24								
25								
26		7	25	25		0	0	
27			B17					
28			B17					
29			B17					
30								
31			B17					

ENGLISH ELECTRIC-LEO COMPUTERS LTD. KIDSGROVE.

K/AA t 1528

DEUCE Programme No. 738 (Standard Brick LR23BM)

General Decimal (Matrix) Read to Drum.

SECTION 3.

D.L. 1 Track

Card Nos. 19 - 21 β

mc	A	NIS	S	D	C	W	T	
		1	0	6		30	30	x
		6	0	1		30	31	
		1	9	24		0	0	
0		1	10	21		0	0	
1		7	12	13		3	3	
2		1	28	22		0	1	
3		1	30	21		0	1	
4		0	10	14		0	3	
5		1	1	15		0	3	
6		6	12	13		0	1	
7		0	20	10		0	0	
8		1	5	10	d	0	1	
9		4	27	16		0	27	
10		7	13	20		0	1	
11		1	2	4		0	28	
12		6P₁	17	0	l	0	0	
13		7	8	17		4	7	
14		1	10	14		0	0	
15		0	7	21		0	2	
16		0	25	15		0	0	
17								
18		7	5	4		0	9	
19		1	13	27		0	0	
20								
21		1	21	28		1	1	
22		1	16	12		16	29	
23		0	30	12		15	20	
24		7	30	16		0	4	
25		1	10	16		0	1	
26		5	10	21		0	23	
27		1	13	16		0	0	
28		4	20	21		0	2	
29		1	10	25		1	1	
30								
31								

SECTION 4.

D.L. 8 Track

Card Nos. 22 - 24 α

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

SECTION 4.

D.L. 1 Track

Card Nos. 22 - 24 β.

mc	A	NIS	S	D	C	W	T	
		1	0	8		30	30	X
		0	0	1		30	31	
		1	9	24		0	21	
0		0	14	23		0	0	
1		2P₁	17	0		2	5	
2		1	27	13		0	21	
3		1	9	28		30	5	
4		2P₁	18	0		0	7	
5		0	12	13		31	5	
6		1	24	27		0	8	
7		0	17	14		2	2	
8		1	14	22		0	2	
9		7	8	15		25	8	
10		0	12	13		26	4	
11		1	12	13		31	2	
12		1	13	25		0	0	
13		2P₁	17	0		0	1	
14		2P₁	18	0		0	2	
15		0	28	25	l	1	3	
16		1	24	14		0	31	
17		1	24	27		0	17	
18		1	13	28		0	8	
19		6	1	15		0	0	
20		7	8	15		0	0	
21		0	11	14		3	5	
22		1	30	17		3	6	
23								
24		1	18	8		8	15	
25		1	31	7		0	2	
26		1	30	11	l	4	7	
27		0	8	13		5	18	
28		0	10	11	l	4	3	
29		1	10	14		1	1	
30		0	8	18		2	6	
31								