DEUCE Programme No.35 (ZP13) Clear Drum.
" " " 36 (ZP14) Read to Drum.
" " " 37 (ZP15) Write Clock Track.
" " " 38 (ZP16) Synchronise and Enter Programme.

SUMMARY.

This report gives a description of the following set of programmes which are of use in programming and programme testing.

(i) Clear Drum.

(ii) Read to Drum.

(iii) Write Clock Track.

(iv) Synchronise and enter programme.

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OPERATING INSTRUCTIONS.

(1) Clear Drum ZP13 - No.35

Place this one card programme after an initial card and the drum will be cleared.

(2) Read to Drum ZP14 - No.36.

This is a two card programme for filling tracks of the drum. It occupies D.L.1 minor cycles 12 - 31, (Minor cycles 0 ~~-11~~ of D.L.1 should be blank when it is read in. This will usually be the case if the drum is filled before the D.L.s). It uses 13, 14, 15 and 16.

The triad to be read to track n of the drum should be punched with P_{15} and n x P_{17} in the Y row of its first card. However if the Y row of the first card of a triad is left blank, this triad will be read onto the next track of the drum. Thus a sequence of adjacent tracks can be filled very simply.

If a P_{31} is punched on the Y row of the first card of any triad, the routine will not be affected until the triad has been put on the drum, but normal reading will then be resumed, that is to say subsequent triads will be read beginning with a 0-0X instruction in m.c.0. Thus the Y row of the first card of the last triad to be read onto the drum should have a P31.

(3) Write Clock Track.

This is a one card programme, which as read in, puts a clock track 15/15 of the drum. It uses no storage space,

Minor cycle 0 of the track contains 1,30-1,1,31,30,

Minor cycles 1-31 of the track contain 1, 0-0, ,0,1

When brought down into D.L.1 and entered in any minor cycle, the track will send control to 1_0 with D.L.1 empty. It can thus be used to synchronise new data with that already on the drum, or to restart a programme already stored on the drum.

(4) Synchronise and Enter Programme.

This consists of one card. It can be put at the end of the pack of programme cards, or it can be run in with the initial input key to restart the programme from the beginning if the whole programme had been written on the magnetic drum.

It clears TCA,TCB,OPS, and the buzzer, brings down the clock track from track 15/15 into D.L.1 and enters it, so finding the correct minor cycles. It then brings down track a/b into D.I.N and enters it in minor cycle s, where a, b, N and S are punched on the card by the user.

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OPERATING INSTRUCTIONS CONT'D.

Parameters.

The user must punch

a P5 in the 4 row.

b P5 in the 7 row, where a/b is the first track of the programme.

N P_2, N P_{10}, (S+1) P_{17}, S P_{26} in the 9 row, where the first track is placed in D.L.N, and the order in minor cycle s is obeyed. (If N=8, the NIS is left blank).

1. CLEAR DRUM PROGRAMME.

This consists of 1 card, to be preceded by either an initial card or a blank card. Use initial input key, which clears D.L.11.

a. Card Punching.

```
Y  1,  0- 1, 1, 20, 27, X
X  1,  0- 1, 0, 30, 29, X
0  1,  0-30, 1,  0, 23
1  1, 12-24, 0,  0,  0
2  0, 21- 0, 0,  0,  0
3  0, 21- 0, 0,  0,  0
4  P5, P22
5  P1, P18
6  1, 1-21,  0,  4,  1
7  1, 1-22,  2,  0,  3
8  1, 0-21,  0,  1, 30, X
9  1, 0-31,  1,  0, 29      P54
```

Row 8 is obeyed Q_{25} as the card is read in and puts the 8's row into one of the minor cycles of 21 (into 21_2 if the initial card is used) and takes 1_{25} as its next instruction.

b. Flow diagram. (assuming initial card).

1_{25}	$1_{31} - 21_3$	At start 21_2 contains 1, 0-31, 1, 0, 29 which has been planted by the 8's row. This becomes a - 31 and the timing number changes when a becomes 16.
1_{28}	21_2 - 0	
Q_{30}	0 - 31(1)	
1_{29}	21_3 - 0	This becomes b - 30, and the timing number changes when a becomes 16.
Q_{31}	0 - 30(1)	
1_{24}	$1_{26,27}$-22	$1_{26,27}$ contain P1, P18 and P5, P22 respectively.
1_{30}	12 - 24	

If there is no initial card (only a blank one) it may be necessary to increase all m.c. numbers by 1. The programme still works. The only use of initial card is to place the zero word in T.S. Count which is the reason that a blank card will work just as well.

2. READ TO DRUM.

This is a two card programme for filling tracks of the drum. It occupies D.L.1 minor cycles 12 - 31, (Minor cycles 0 & 11 of D.L.1 should be blank when it is read in. This will usually be the case if the drum is filled before the D.L.s). It uses 13, 14, 15, and 16.

The triad to be read to track n of the drum should be punched with P_{15} and n x P_{17} in the Y row of its first card. However if the Y row of the first card of a triad is left blank, this triad will be read into the next track of the drum. Thus a sequence of adjacent tracks can be filled very simply.

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The Flow diagram No. S6/10478 is on the accompanying sheet.

3 WRITE CLOCK TRACK (1 CARD)

The card is punched:-

Y	blank
X	1, 15 - 31, 1, 0, 26
0	1 0 - 0 0 28
1	1 0 - 0 0 28
2	1 0 - 0 0 28
3	1 0 - 11, 1, 29, 28X
4	1 0 - 0 0 1
5	1 0 - 11 28, 28X
6	1 30 - 1 1 .31, 30
7	1 15 - 30 1 . 0, 28
8	1 30 - 11 1 .29, 28X
9	blank

4. SYNCHRONISE AND ENTER PROGRAMME

The card is punched.

Y	0, 0 - 0, 0, 0, 0, X
X	1,15 - 31, 0, 0, 26
0	1, 4 - 24, 0, 0, 28
1	1, 6 - 24, 0, 0, 28
2	1,15 - 30, 0, 0, 28
3	1,11 - 1, 1, 29, 28
4	1, a - 31, 0, 0, 28
5	1, 8 - 24, 0, 0, 28
6	1,16 - 16, 0, 0, 28
7	1, b - 30, 0, 0, 28
8	0, 0 - 0, 1, 0, 26, X
9	N 11 - N, 1,S+1, S. P54

The following sequence of instructions is entered in l_{21} with $P_1 - P_{14}$ in TS 15.

l_{31}	0 - 14 X		1st row read.
l_{2}	24 - 16 X		store in 16 to test for P_{31} at end
l_{11}	24 - 14 X (2mc)		Cut off any P_{31}
l_{20}	14 - 28 X		Test for blank row

Z:

l_{27}	1 - 14		

N.Z.:

l_{29}	23 - 14 (18mc)		Either send to next track, or track specified by top row.

l_{23}	l_{25} - 13 [1 0-11, 1, (15) 14 X]		
l_{27}	13 - 0		
Q_{21} (l_{25}	0 - 11 X)		Read rest of triad into DL11 use spill over to count
l_{14}	l_{16} - 13 [1 0-31 1, 3 16] l_{13}	28 - 25	
l_{17}	25 - 26		} 4 most sig. digits of n to 13.
l_{21}	14 - 25		}
l_{27}	13 - 0		
Q_{29} (l_{10}	a - 31 1)		
l_{15}	l_{19} - 13 [1 0-30 1, 0 19]		
l_{20}	25 - 25 (16mc)		4 least sig. digits of n-13 shifted up 4 places.
l_{27}	13 - 0		
Q_{21} (l_{19}	b - 30 1)		
l_{18}	14 - 13		} 14 increased by 1 to 13.
l_{22}	27 - 25		}
l_{24}	16 - 27		Test if 1st row read a P_{31}.
	+		
l_0	0 - 0		

1st Card Punched							Occupies mc.	2nd Card Punched							Occupies mc.
Y	1	0 - 1	1	8	27 X		-	Y	1	14 - 25		0	4		l_{21}
X	1	0 - 1		30	29 X		-	X	1	24 - 14	2	0	4 X		l_{20}
0	1	0 - 14		0	11 X		l_{31}	0	1	0 - 30	1	0	19		l_{19}
1	1	25 - 25	1	12	27		l_{30}	1	1	14 - 13		0	2		l_{18}
2	1	23 - 14	1	7	24		l_{29}	2	1	25 - 26		0	2		l_{17}
3	1	13 - 14		0	25		l_{28}	3	1	0 - 31	1	0	16		l_{16}
4	0	13 - 0		0	0		l_{27}	4	1	1 - 13		2	13		l_{15}
5	1	14 - 28		0	0 X		l_{26}	5	1	1 - 13		0	1		l_{14}
6	1	C - 11		1	(15) 14 X		l_{25}	6	1	28 - 25		0	12		l_{13}
7	1	16 - 27		0	5		l_{24}	7	1	24 - 16		0	6 X		l_{12}
8	1	1 - 13		0	2		l_{23}	8	1	0 - 15		0	16 X		-
9	1	27 - 25		0	0		l_{22}	9		$P_1 - P_{14}$					-

FLOW DIAGRAM AND CODING FOR DEUCE PROGRAMME No 36
Read to Drum. (ZP14).

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