

UNIVERSITY OF ILLINOIS
DIGITAL COMPUTER LABORATORY

AUXILIARY
LIBRARY ROUTINE X 13 - 250

TITLE: Maximum Speed Sexadecimal Input Preparation (SADOI Only)
TYPE: Complete Program
NUMBER OF WORDS: 63
PURPOSE: This routine causes any program previously assembled in the Williams Memory (by any method) from 2 through 998 to be punched out in sexadecimal form, skipping all empty locations. The output tape, having its own bootstrap, read-in and sum-check program on the front, can be read into the machine without further modification at the maximum speed of the reader in a minimum of time. This read-in program performs a sum check in order to detect punching and reading errors.

The routine should have two major uses:

- (1) translating long, often-used programs with many symbolic addresses and/or interludes not actively involving the drum into tapes which effect a reasonable savings of read-in time and
- (2) stopping the computer at a convenient point in a calculation (where the contents of A and Q are unimportant) and punching out the W.M. so that the calculation may be resumed at any later time.

METHOD OF USE: After the W.M. is ready to be punched out, the routine is placed in the machine with a hold start. The tape will be read in and stop on $24\ 064_{16}$. The operator must then read in with the black switch a specification control transfer order pair of the following form:

2V nF
TO F

where V = 0, 1, 2, 3, 4, 5, 6, 7, 9, S, J, L,
n = (decimal) address to which the above specified control transfer should take place, and
T = either 0 (if no drum clear is wanted)
or N (if a drum clear is wanted).

i.e. 2V nF will be the starting directive placed at the end of the output tape and used on its subsequent read-in. The output tape will first clear or not clear the drum according as T is N or O. The output tape should be immediately rewound and read into the machine with a clear start in order to test it for errors in punching what was read from the drum. Upon reading this tape, if the sum check fails the computer will stop on FF 000, which can be bypassed with the white switch. Otherwise, the computer will obey the specified control transfer. If this control transfer is a stop transfer such that the computer is not allowed to begin immediately, then a comparison post mortem will reveal any errors which may have occurred in reading from the drum. These two operations immediately after the operation of this routine will thus verify with a high degree of certainty the agreement of the sexadecimal tape with the original state of the W.M. It must be remembered that only locations 2 through 998 are so treated.

SPEED:

The time necessary to punch such a sexadecimal tape can be approximately determined from the formula:

$$\text{Punching time} = 7.0 + 0.18n \text{ seconds}$$

where n is the number of words to be punched.

The time necessary to read such a sexadecimal tape into the computer is given by:

$$\text{Reading time} = 1.5 + 0.038n \text{ seconds}$$

where n is the number of words to be read.

On a program of maximum length (996 words) these times were measured as follows:

Maximum punching time: 3.1 minutes

Maximum reading time: 39.2 seconds

DATE January 7, 1959

SUBMITTED BY W.W. Lichtenberger

APPROVED BY J. Snyder

LOCATION	ORDER		NOTES	PAGE 1
	J 1-hole delay 00 K 85 11F 40 F 26 F 00 F 26 1469N ↑ DOI ↓		switch to Punch interlude to record current state of W.M. on drum read in following program without affecting drum	
0	00 100K L5 28L 40 1018F		start modify DOI	
1	26 1021F			
2	L3 L 32 3L 41 L		read specification order pair and store in 63 L	
3	26 1021F			
4	92 63F F5 29L 40 29L		punch leader	
5	36 6L			
6	22 3L L5 63L 00 20F			
7	36 8L 92 770F		punch drum clear if asked for	
8	92 63F L5 30L			
9	82 40F F5 8L			
10	42 8L L0 51L		punch tape bootstrap and input routine	

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A.A.

LOCATION	ORDER	NOTES	PAGE 2	K13 AUA
11	32 8L 41 1F			
12	85 11F 00 11758F	clear for sum check read word		
13	40 F L3 F			
14	36 52L L3 29L	if empty		
15	36 53L L5 F	if directive is to be punched		
16	82 40F L5 F	punch word		} main punching loop
17	L6 1F 40 1F	sum check		
18	F5 12L 40 12L			
19	L0 60L 36 12L			
20	92 195F L5 61L	punch directive to 3FL		
21	00 20F 82 8F			
22	L3 1F 82 40F	punch sum check		
23	L5 63L 82 40F	punch specified control transfer		
24	92 195F L5 57L	punch directive to 3L4 to read in		
25	00 8F 82 8F	overwrite word to stop input		
26	L5 61L 82 40F	punch overwrite		
27	0F F 00 F	stop		
28	40 1F 22 1L	modification for DOI		

LOCATION	ORDER	NOTES	PAGE 3
29	LL 4095F		counter and switch
	LL 4091F		
30	80 40F		
	40 1F		
31	42 F		
	26 F		
32	80 40F		
	40 1011F		
33	26 F		special tape bootstrap -
	00 1010F		does not use location 2 in W
34	F5 1009F		
	42 1009F		
35	80 40F		
	40 1012F		
36	00 F		
	00 F		
37	26 1009F		
	00 F		
38	42 1015F		
	91 4F		
39	36 1015F		
	80 8F		
40	42 1015F		sexadecimal input routine
	81 4F		
41	80 36F		
	40 F		
42	F5 1015F		
	26 1012F		
43	41 F		
	L5 2F		
44	L6 F		
	40 F		sum check routine
45	F5 1017F		
	42 1017F		
46	L0 1023F		
	32 1017F		

LOCATION	ORDER	NOTES	PAGE 4	X13 Aux.
47	L3 F			
	36 1000F		} jump to specified control transfer or hang up	
48	FF F			
	26 1000F		} jump anyway	
49	N1 F		} test constant for sum check loop	
	L5 1000F			
50	22 1012F		} overwrites tape bootstrap to start input routine	
	00 F		} test constant	
51	12 63F			
	L5 51L			
52	41 29L		} open directive switch	
	26 18L			
53	49 29L			
	L5 12L			
54	L0 62L			
	40 2F			
55	10 8F			
	50 57L		} close directive switch and punch directive	
56	00 6F			
	42 57L			
57	06 3905F			
	92 F			
58	L5 2F			
	00 32F			
59	82 8F			
	22 15L			
60	05 11F		} test constant	
	00 12755F			
61	26 1017F		} overwrite word	
	F7 F			
62	85 11F		} test constant	
	00 11756F			
	24 100N			