

UNIVERSITY OF ILLINOIS
DIGITAL COMPUTER

AUXILIARY
LIBRARY ROUTINE X 17 - 287

TITLE: Maximum Speed Sexadecimal Input Preparation for Magnetic Drum and/or Williams Memory with Punch Error Detection

TYPE: Complete program

NUMBER OF WORDS: 250

PURPOSE: This routine contains Library Routine X 15 to punch the sexadecimal output tape. This output tape is read in immediately and compared with the data on the drum for possible punching errors.

METHOD OF USE: The program is read in and the specification tape is placed in the reader as described in X 15. After the output tape has been punched, the computer stops on OF. Rewind the output tape and place it in the reader. Execute a Skip Start (white switch up and down). Errors are indicated by FF stops as described in the table. At every FF stop, mark the tape, write down the address, and execute a skip start. From the information available from the punch, the sexadecimal tape may be corrected by reperforation.

STOP ORDER	REASON	PUNCH OUTPUT
FF 101	Drum clear incorrect.	None.
FF 102	Sexadecimal word error.	10 characters.
FF 103	Directive error.	4 characters.
FF 104	5th hole punched in sexadecimal word.	None.
FF 105	5th hole missing on directive.	None.
FF 106	Number of symbolic addresses punched incorrectly.	3 characters.
FF 107	Specification order incorrect.	5 characters.
FF 10N	Read in Sum Check error.	None (hold start program tape at string of spaces near front).

SPEED: The punching time is exactly that as given in X 15. The reading time is approximately $0.05 n + 15$ seconds where n is the number of words punched.

ERRORS:

The errors indicated may be corrected by re-perforation. Note that no 5th hole characters may be added or deleted when re-perforating. To correct a sexadecimal word error, locate the 10 characters on the tape by means of the previously made mark and the INCORRECT indication on the error tape. Replace the INCORRECT characters with the CORRECT characters. The number of symbolic addresses and the specification order are corrected in a similar manner. The directive appears on the sexadecimal tape as a 5th hole character followed by 3 sexadecimal characters. The error tape shows only the sexadecimal part of the 5th hole character and the 3 following sexadecimal characters. The 5th hole of the first character must be replaced when re-perforating, and no other 5th holes introduced.

RESTARTING:

After the output tape has been checked, the drum is still undisturbed. A second translation may be performed by reading in the program with a hold start placing the tape in the reader at the string of spaces.

DATE	January 25, 1960
WRITTEN BY	<i>Maurice E. Schreier</i>
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LOCATION	ORDER	NOTES	PAGE 1	X 17
	00 K	} Record WM on drum.		
	85 11F			
	40 F			
	26 F			
	00 F			
	26 1469N			
	↑			
	D.O.I			
	↓			
	00 3K	S parameters		
	00 F	sexadecimal word		
	00 197F	error routine		
	00 F	directive error		
	00 205F	routine		
	00 F	routine to search		
	00 214F	drum for non-zero word		
	00 F	routine to fill WM with		
	00 222F	non-zero words		
	00 F			
	00 6F	Routine to print headings		
	00 19K			
19	7L 4095F	} $1 - 9 \times 2^{-39}$		
	LL 4087F			
20	00 F			
	00 F			
21	N1 20F			
	L5 F	} constants		
22	80 F			
	00 F			
23	41 20F			
	L5 1023F			
	00 24K			
24	81 4F			

LOCATION	ORDER	NOTES	PAGE 2	X 17
25	40 2F L0 238F		}	Check Drum Clear
26	40 1F L3 1F		}	
27	32 27F FF 257F			FF 101, drum clear incorrect
28	91 4F 36 50F 81 40F		}	
29	40 2F L5 147F		}	Check input program.
30	40 3F F5 30F		}	
31	26 S3 F5 29F		}	
32	42 29F L0 239F		}	
33	32 28F L3 102F		}	
34	32 36F L5 7S5		}	jump if WS start modify end tests if BS start.
35	40 6S5 L5 15S6		}	
36	40 14S6 26 37F			read 1
37	91 4F 36 53F			out if not directive
38	L0 240F 36 76F			out if final directive
39	L4 240F 80 12F			finish tape directive
40	40 2F L5 5S6			tape directive in 2.
41	40 3S5 F5 41F			preset search routine

LOCATION	ORDER		NOTES	PAGE 3	X 17
42	26 S5 50 3S5		find non zero word on drum.		
43	J0 241F S5 F				
44	40 3F F5 44F		correct directive in 3.		
45	26 S4 L5 3S5		compare		
46	40 5S6 F5 46F		preset		
47	26 S6 L5 6S6		FILL WM		
48	42 21F L5 4S6		for sum check preset compare loop		
49	42 61F 26 37F		re-enter loop		
50	10 4F L5 2F		from 28		
51	00 4F 80 32F		compose digits read. Enter program		
52	26 29F 00 F				
53	40 2F L5 19F		from 37		
54	40 1F 91 4F		set counter read 9 digits, check for		
55	10 4F 32 56F		5th hole error.		
56	49 20F L5 2F		mark error		
57	00 4F 40 2F		compose digits		
58	F5 1F 40 1F		count		
59	32 54F L3 20F				

LOCATION	ORDER		NOTES	PAGE 4	X 17
60	32 61F FF 260F		FF 104 5th hole error		
61	41 20F L5 250F		reset error		
62	40 3F F5 62F		drum word in 3		
63	26 S3 F5 61F		compare		
64	42 61F L0 21F				
65	36 37F L5 61F		re-enter loop if more words to compare here when WM used up		
66	L0 23F 36 70F		jump if at end of WM		
67	91 4F 32 68F				
68	22 37F FF 261F		FF 105 5th hole missing on directive		
69	L4 22F 22 37F		replace 5th hole Enter loop		
70	91 4F 40 2F		from 66		
71	32 72F 22 37F				
72	00 F F5 72F				
73	26 S6 L5 4S6		refill WM		
74	42 61F L5 6S6		reset		
75	42 21F 22 53F		compute new sum check		
76	81 40F 40 2F		from 38; here if final directive; sum check in 2		
77	L3 F 40 3F				

LOCATION	ORDER	NOTES	PAGE 5	X 17
78	JO F		Waste	
	F5 78F			
79	26 S3		compare	
	81 12F		read symbolic addresses	
80	40 2F			
	LO 142F			
81	40 1F		compare	
	L3 1F		jump if OK	
82	32 88F			
	JO F			
83	50 242F			
	50 83F			
84	26 S7		print heading	
	L5 2F			
85	00 28F		punch error info.	
	82 12F			
86	92 995F		incorrect number	
	L5 142F		of symbolic addresses	
87	00 28F		FF 106;	
	82 12F		read transfer order	
88	FF 262F			
	81 20F			
89	40 2F			
	50 196F			
90	JO 241F			
	SO F			
91	40 1F		compare transfer order	
	L3 1F			
92	36 99F			
	JO F			
93	50 242F		punch	
	50 93F		error	
94	26 S7		info.	
	L5 2F			
95	00 20F			
	82 20F			

LOCATION	ORDER		NOTES	PAGE 6	X 17
96	92 987F L5 196F				
97	00 20F 82 20F		transfer order incorrect		
98	FF 263F 26 99F		FF 107		
99	OF F OF F Words 100-139 in X 15 unchanged				
180	OF F 26 24F Words 141-196 in X 15 unchanged		X 15 stop Skip start to checker routine		
197	00 197K 42 2L L5 2F	S3	Link; check sexadecimal words in 2 and 3		
198	L0 3F 40 1F				
199	L3 1F 32 F		out if zero		
200	50 242F 50 3L				
201	26 S7 L5 2F		heading		
202	82 40F 92 967F				
203	L5 3F 82 40F				
204	FF 258F 23 2L 00 205K		FF 102. Sexadecimal word error. WS out		
205	42 2L L5 2F	S4	Link; check directives in 2 and 3.		
206	L0 3F 40 1F				

LOCATION	ORDER		NOTES	PAGE 7	X 17
207	L3 1F 32 F		out if zero		
208	50 242F 50 3L				
209	26 S7 L5 2F		heading		
210	00 24F 82 16F				
211	92 991F L5 3F				
212	00 24F 82 16F				
213	FF 259F 23 2L		FF 103. Directive error		
214	00 214K 42 2L	S5	Link		
215	26 3L F5 3L				
216	40 3L L0 6L				
217	32 F 85 11F				
218	00 2560F 40 1F		read word		
219	L3 1F 36 1L		search drum		
220	23 2L 85 11F		for non-zero		
221	00 12800F 85 11F		word.		
222	00 11058F 00 222K		End test.		
223	42 8L L5 14L		End test for BS start		
223	L0 3S5		link		

LOCATION	ORDER	NOTES	PAGE 8	X 17
224	32 11L L4 13L 40 12L		Form end test	
225	L5 4L 42 6L		preset WM store	
226	26 5L 00 250F		enter loop	
227	85 11F 00 2560F		Fill WM from 250-1022 or stop when a zero	
228	40 1F 40 250F		word is reached.	
229	F5 5L 40 5L		step drum	
230	L3 1F 32 F		exit if zero	
231	F5 6L 42 6L		step WM	
232	L0 12L 36 5L			
233	23 8L 27 2L		out if end of WM from 1L	
234	00 F 00 F		end test	
235	N0 1F 40 1023F			
236	85 11F 00 12027F		12,800-773	
237	85 11F 00 10285F			
238	00 238K 00 F			
239	00 12F N0 2F			
240	L5 195F 80 F		constants	

LOCATION	ORDER		NOTES	PAGE 9	X 17	
	00 4F					
241	00 F					
	LL 4095F					
	00 242K					
242	K6 1468F		Code words to print headings.			
	N1 258F					
243	6S 3567F					
	KS 1652F					
244	12 3757F					
	9J 665F					
245	00 F					
	00 8F					
	00 6K					
6	K5 F	S7	routine to print headings			
	42 42L					
7	10 20F					
	42 2L					
8	41 4F					
	L5 F					
9	40 1F					
	50 4F					
10	L3 1F					
	32 F					
11	L5 1F					
	10 5F					
12	40 1F					
	01 1F					
13	42 9L					
	01 10F					
14	F4 9L					
	42 9L					
15	J0 F					
	93 F					
16	L5 4F					
	L4 1L					

LOCATION	ORDER	NOTES	PAGE 10 X 17
17	40 4F		
	36 4L		
18	F5 2L		
	22 1L		
	00 246K		
246	8F 3936F		
	JJ 1839F		sum check.
247	L7 F		
	L4 2F		
248	40 F		
	F5 1L		sum check
249	42 1L		routine
	L0 7L		
250	36 1L		
	L3 F		
251	36 100F		
	FF 268F		FF 10N
252	82 40F		
	26 100F		
253	77 F		
	L4 247F		end test
	00 196K		set DOI
	27 248N		enter sum check routine.