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Library Routine X 14 - 266

TITLE: Sexadecimal Punchout and Input Routine - Williams Memory and Drum (SADOI Only)

TYPE: Complete program

PURPOSE: This routine will punch out in sexadecimal form a program which has been assembled in the memory between 2 - 998 and on the drum between 2560 - 11756. The output tape will be complete with its own bootstrap, read-in, sum check and drum transfer routine. All read-in will be sum checked before drum transfer takes place. The final section to be retained in the Williams Memory will be sum checked before control is transferred to the routine just read in.

Two major uses of this routine are:

(1) Preparing a sum checked sexadecimal program tape for long, often used symbolic programs stored either all in the Williams Memory or partially in the Williams Memory and partially on the drum.

(2) Stopping the computer at any time when A and Q contents do not matter and punching out any or all of the drum and the Williams Memory so that calculation can be resumed at a later time.

METHOD OF USE: After the drum and memory are ready to be punched out, this routine is placed in the machine with a hold start. The tape will stop on $24(064)_{16}$. The operator then reads in a specification tape with the black switch and the program will then punch out as specified.

The specification tape must be prepared as follows:

A series of order pairs of the form

00 nF
00 mF

where n is the drum lower address at which the drum information is stored and m - 1 is the upper address, $m - n \leq 997$.

These order pairs must be listed in the order in which the sections are desired from the drum. The sections will be replaced in this order also. If there is no program on the drum omit these order pairs.

Following the last drum reference should be the order pair:

00 11758F
00 12755F

to take care of the part of the program previously stored in the Williams Memory.

Following this order pair is a control transfer order pair of the 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 control transfer should take place.
T = 0 if no drum clear wanted.
T = N if drum clear wanted.

i.e., 2V nF will be the starting directive placed at the end of the program tape.

Following this order pair must be the starting directive

26 102N.

A specification tape thus will look like the following example:

00 2560F	May be omitted if not needed.
00 3556F	
00 3556F	
00 4552F	
00 4552F	
00 5100F	
00 11758F	Always present
00 12755F	
24 133F	Can vary as described above
NO F	
26 102N	Always present

DURATION: Punching time = 7.0 + .18n + 2k seconds where n is the total number of words to be punched and k is the number of sections taken from the drum.
Reading time = 1.5 + .04n + 2k seconds where n and k are the same as defined above.

NOTE: This program is a modification of X 13 - 250 extended for drum usage.

DATE May 12, 1959
PROGRAMMED BY W.C. Jacob
APPROVED BY J N Snyder

lgr

LOCATION	ORDER	NOTES	PAGE 1
	J		
	1 - hole delay		Switch to punch
	00 K		
	85 11F		
	40 F		Interlude to record current state
	26 F		of Williams Memory on drum
	00 F		
	26 1469N		
	↑		
	DOI		Read in following program without
	↓		affecting drum
	00 100K		
0	26 1021F		Start
	00 F		Modify DOI
1	L4 1F		
	40 107L		
2	L5 1017F		Read specification order pair
	L0 1L		and store in 63L
3	40 84L		
	92 63F		
4	F5 29L		
	40 29L		Punch leader
5	36 103L		
	22 3L		
6	L5 63L		
	00 20F		
7	36 8L		Punch drum clear if asked for
	92 770F		
8	92 63F		
	L5 30L		
9	82 40F		
	F5 8L		Punch tape bootstrap and input
10	42 8L		routine
	L0 51L		

LOCATION	ORDER	NOTES	PAGE 2
11	32 8L		
	26 63L		
12	85 11F	Clear for sum check Read word	
	00 11758F		
13	40 F		
	L3 F		
14	36 52L	If empty	
	L3 29L		
15	36 53L	If directive is to be punched	
	L5 F		
16	82 40F	Punch word	Main punching loop
	L5 F		
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 $999(3F7)_{16}$	
21	00 20F		
	82 8F		
22	L3 1F	Punch sum check	
	82 40F		
23	22 75L		
	00 F		
24	92 195F		
	L5 57L	Punch directive to $1012(3L4)_{16}$ to read in,	
25	00 8F	Overwrite word to stop input	
	82 8F		
26	L5 61L	Punch overwrite	
	82 40F		
27	26 63L		
	0F F	Stop	
28	40 1F	Modification of DOI	
	22 1L		

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 WM
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
47	L3 F	
	36 1000F	Jump to specified control transfer
48	FF F	or hang up
	26 1000F	Jump anyway
49	N1 F	Test constant for sum check loop
	L5 1000F	
50	22 1012F	Overwrites tape bootstrap to start
	00 F	Input routine
51	12 63F	Test constant
	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
56	00 6F	and punch directive
	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	
63	L3 84L	
	32 27L	
64	41 29L	
	L5 106L	

LOCATION	ORDER	NOTES PAGE 5
65	10 20F	
	L4 97L	
66	40 12L	
	L4 99L	
67	40 86L	
	41 1F	
68	00 20F	
	L4 98L	
69	40 60L	
	L4 99L	
70	40 93L	
	L5 84L	
71	L0 100L	
	40 84L	
72	F5 64L	
	42 64L	
73	L5 12L	
	L0 100L	
74	L0 100L	
	40 62L	
75	26 12L	
	L3 84L	
76	36 81L	
	L5 85L	Punch drum transfer section
77	82 40F	
	F5 76L	
78	42 76L	
	L0 101L	
79	32 76L	
	L5 102L	
80	42 76L	
	26 24L	
81	L5 64L	
	42 82L	
82	00 1F	
	L5 F	

LOCATION	ORDER		NOTES PAGE 6
83	82 40F		Punch specified
	26 24L		control transfer
84	00 F		No. of drum references
	00 F		
85	22 1000F		
	L5 2F		
86	86 11F		
	00 F		Drum transfer
87	22 1002F		routine
	41 2F		
88	F5 1000F		
	42 1000F		
89	42 1002F		
	F5 1001F		
90	40 1001F		
	L0 1008F		
91	32 1000F		
	L5 1009F		
92	40 1012F		
	26 1010F		
93	06 11F		
	00 F		
94	42 1015F		
	91 4F		
95	L5 1011F		
	42 1017F		
96	22 1012F		
	00 2F		
97	85 11F		
	00 F		Constants
98	05 11F		"
	00 F		
99	01 F		"
	00 F		
100	00 F		"
	00 1F		

LOCATION	ORDER		NOTES PAGE 7
101	S6 81L		Constants
	L5 97L		
102	00 F		"
	00 85L		
103	L5 1017F		
	L0 100L		
104	00 20F		
	46 6L		
105	26 6L		
	00 F		
	24 100N		