

Draft for Programming Staff Note, January 10, 1966

To: R. G. Mills

From: A. W. Wilson

Re: Programming Considerations for the 120-Character
Print Chain

The planned addition* of a print chain containing the expanded character set has implications in at least two areas. First, it is necessary that the MAC and the Computation Center systems remain as similar as possible, at both the 7094 and the 1401 levels. Second, and far less important, it is desirable that the requisite changes be effected with relatively little programming effort and change in present logic.

Disk Editor Changes

There² are two programs affected by the addition of the 120-character chain: the 7094 disk editor and the 1401 dual-printer program. The disk editor writes all requested print files (and only print files) on tape for later printing by the 1401. The disk editor performs all head-of-forms and vertical spacing specification, and its tape output appears to the 1401 as one continuous print file containing occasional, and completely arbitrary, carriage control information. Although a facsimile of the user's request appears on the print tape, it is never considered by

the 1401. There is never any difficulty with regard to which of the two printers is to be addressed for any block of data since information from drive A is always directed to printer A, and printer B always receives data from drive B.

However, since the 120-character chain will be permanently installed on one printer, it is necessary that the print program be able to distinguish individual files on the input tapes and, depending upon the user's request, to address the appropriate printer. The first modification to the disk editor, then, should be provision for the insertion of file delineators after each file or at the point where printing mode is to be changed. This is most easily accomplished by writing tape marks (17K) at the appropriate places between files. An EOT could be signaled by two consecutive tape marks. Physical EOR presents no difficulty. Exit from the tape-writing routine after the first tape mark is written and after EOR is sensed will produce 1401 conditions identical to those resulting from two consecutive tape marks.

A second modification to the disk editor is made necessary by certain characters included in the expanded set. The disk editor presently accepts a line containing no more than 131 characters. Longer lines are truncated. The presence of horizontal backspace and overstrike codes in the output file, however, requires that the disk editor accept lines of 393 characters.

A possible third change in the disk editor depends on the form of the output file. It is not clear whether it is more useful to accept for 12PRNTing any 12-bit file containing CTSS codes only, or to reject CTSS-code files and accept for APRINTing only those files prepared in 9-bit ASCII format. The implied disk editor modification arises from the 1401 requirement for 12-bit character codes. If the 9-bit ASCII format is desired, then the disk editor must expand each character to its 12-bit equivalent.

Changes to MIDSP4

The 1401 program to utilize the larger character set will differ from the present print program in only one important respect. Because the program will treat as files separate elements on the print tapes (rather than, as at present, treating each reel as one gigantic file), it must be able to address either printer from either tape, depending on the nature of the request line. Files requiring 12-bit printing must always be directed to the appropriate printer, no matter from which drive the file comes. (In the present program, again, each drive is always associated with one and only one printer.)

In the interest of keeping both printers busy for as great a percentage of the required total printing time as possible, it may be necessary to rearrange requested files with respect to desired action. This can be done by the request

processor and the disk editor, by the disk editor alone, or, indeed, by the 1401. This action should not be taken, however, until some estimate can be made of the volume of printing to be done with the 120-character chain.

Center Compatibility

Because of the structure of the 1401 print program, it will be possible for modifications to the disk editor at the Center to be identical to those at MAC. The print programs will likewise be identical, with the exception of the contents of their character tables. Twelve-bit print requests will require a table lookup for each character. At MAC, the proper character will be delivered to the print area with its word mark set properly. At the Computation Center, standard 6-bit characters will be returned. Word marks will not be used. Special characters will be remapped into the limited group of the 48-character set. Introduction of the EBCDIC set at the Center will thus necessitate only corrections to the table.

* Bob Surtees assures me today (Monday) that he will have a firm delivery date by Wednesday or Thursday.

index	chr	slay	1401	index
0	DEL			32
1		120	#	33
2	Σ	111	F	34
3	T	96	Q	35
4	Σ	112	G	36
5	Σ	72	-	37
6	y	71	≡	38
7	x	70	0	39
8	w	69	9	40
9	v	68	8	41
10	u	67	7	42
11	t	66	6	43
12	s	65	5	44
13	v	64	4	45
14	q	63	3	46
15	p	62	2	47
16	o	61	1	48
17	n	60	#	49
18	m	59	#	50
19	l	58	#	51
20	k	57	>	52
21	j	56	•	53
22	i	55	+	54
23	h	54	I	55
24	g	53	H	56
25	f	52	G	57
26	e	51	F	58
27	d	50	E	59
28	c	49	D	60
29	b	48	C	61
30	a	47	B	62
31	@	73	1401	63

slay	1401	chr	slay
118	125	^	
106	A]	
110	E	~	
105	127	[
109	D	Z	
21	W	Y	
20	V	X	
19	U	W	
18	T	V	
17	S	U	
16	/	T	
15	+ (A-B)	S	
14	> (6-B)	R	
33	L	Q	
32	K	P	
31	J	O	
30	SM (078)	N	
29	I (068)	M	
28	- (B)	L	
27	(K	
26	3	J	
25	#	I	
45	Δ (11-7-8)	H	
44	(11-6-8)	G	
43	CR (11-5-8)	F	
42	*	E	
41	\$	D	
40	o	C	
39	R	B	
38	Q	A	
37	P	/	
107	B		

index	chr	slay	1401	index
64	?	75	+	96
65	>	103	CR	97
66	=	11	=	98
67	<	1001	1166	99
68	;	76	/	100
69	:	36	∅	101
70	9	9	9	102
71	8	8	8	103
72	7	7	7	104
73	6	6	6	105
74	5	5	5	106
75	4	4	4	107
76	3	3	3	108
77	2	2	2	109
78	1	1	1	110
79	0	10	0	111
80	/	13	58	112
81	•	12	8	113
82	-	34	M	114
83	∩	22	X	115
84	+	46	A	116
85	*	20	V	117
86)	100	o	118
87	(99	R	119
88	/	108	C	120
89	8	24	M	121
90	%	81	S	122
91	#	79	C	123
92	✖	23	Y	124
93	"	35	Z	125
94	!	78	I	126
95	π	0	20	127