

WVS*VORTEX(1).113010

1	*****	0001
2	* IBM-1130 I/O-EMULATION VERSION-1	0002
3	*****	0003
4	*****	0004
5	* IBM-1130 EMULATION MEMORY LAYOUT	0005
6	*****	0006
7	*****	0007
8	* LOCATION * USEAGE *	0008
9	*****	0009
10	* 000000 *	0010
11	* INTERRUPT TRAPS *	0011
12	* 000137 *	0012
13	*****	0013
14	* 000140 *	0014
15	* LINE PRINTER BUFFER *	0015
16	* 000332 *	0016
17	*****	0017
18	* 000333 *	0018
19	* (NOT USED) *	0019
20	* 000420 *	0020
21	*****	0021
22	* 000421 *	0022
23	* SYSTEM CONSTANTS *	0023
24	* 000477 *	0024
25	*****	0025
26	* 000500 *	0026
27	* WCS ENTRIES *	0027
28	* 000577 *	0028
29	*****	0029
30	* 000600 *	0030
31	* EMULATION BOOT STRAP *	0031
32	* (OVERLAYED BY CARD READER BUFFER & PUSH-POP *	0032
33	* INTERRUPT STACK) *	0033
34	* 000647 *	0034
35	*****	0035
36	* 000650 *	0036
37	* WCS DEBUGGING PROGRAM *	0037
38	* 000737 *	0038
39	* END OF OVERLAY *	0039
40	*****	0040
41	* 000740 *	0041
42	* I/O EMULATION CONTROL PROGRAM *	0042
43	* 017777 *	0043
44	*****	0044
45	* 020000 *	0045
46	* IBM-1130'S MEMORY *	0046
47	* 057777 *	0047
48	*****	0048
49	* 060000 *	0049
50	* (NOT USED) *	0050
51	* 077777 *	0051
52	*****	0052
53	* EJECT *	0053
54	*****	0054
55	* CONSOLE OPERATIONS *	0055
56	*****	0056

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57 * IBM-1130 * IBM-1130 EMULATION * 0057
58 * ***** * ***** * 0058
59 * IMM STOP * STEP/RUN * 0059
60 *.....*.....* 0060
61 * RESET * RESET,STEP/RUN * 0061
62 *.....*.....* 0062
63 * PROGRAM LOAD * BOOT, STEP/RUN * 0063
64 *.....*.....* 0064
65 * PROGRAM START * INTERRUPT (INT) * 0065
66 *.....*.....* 0066
67 *.....*.....* 0067
68 *.....*.....* 0068
69 *.....*.....* 0069
70 * KEYBOARD OPERATIONS * 0070
71 *.....*.....* 0071
72 * IBM-1130 * IBM-1130 EMULATION * 0072
73 * ***** * ***** * 0073
74 * INTERRUPT REQUEST * ESCAPE (ESC) * 0074
75 *.....*.....* 0075
76 * BACKSPACE * BACK ARROW * 0076
77 *.....*.....* 0077
78 * END OF FIELD * RETURN * 0078
79 *.....*.....* 0079
80 * ERASE FIELD * RUBOUT * 0080
81 *.....*.....* 0081
82 * EJEC * 0082
83 *.....*.....* 0083
84 * DEVICE ADDRESS * 0084
85 *.....*.....* 0085
86 TTY EQU 01 TELETYPE 0086
87 UASC EQU 02 UASC 0087
88 MT1 EQU 010 MAG TAPE 1 0088
89 MT2 EQU 011 MAG TAPE 2 0089
90 DISK EQU 016 DISK 0090
91 BIC1 EQU 020 BIC# 1 0091
92 BIC2 EQU 022 BIC# 2 0092
93 CR EQU 030 CARD READER 0093
94 LP EQU 035 LINE PRINTER 0094
95 PIM EQU 040 PIM 1 0095
96 RTC EQU 047 REAL-TIME CLOCK 0096
97 WCS EQU 074 WRITABLE CONTROL STORE 0097
98 CES EQU 077 CONSOLE SWITCHES 0098
99 *.....*.....* 0099
100 * 1130 EMULATION CONSTANTS * 0100
101 *.....*.....* 0101
102 BIAS SET 020000 1130'S BASE ADDRESS 0102
103 CSTYPE EQU 1 CORE SIZE TYPE (0 = 8K, 1 = 16K) 0103
104 IFT CSTYPE 0104
105 GOTO #16K 0105
106 CMASK SET 017777 8K MASK 0106
107 GOTO CONT 0107
108 #16K CONT 0108
109 CMASK SET 037777 16K MASK 0109
110 CONT CONT 0110
111 BCS OPSY MZE BRANCH TO CONTROL STORE 0111
112 PAGE1 EQU 05000 PAGE 1 0112
113 HOMETK EQU 2 DISK HOME TRACK 0113
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114	PM10	EQU	060	PIM 1 MASK	0114
115	PM20	EQU	0375	PIM 2 MASK (CARD COLUMN INTERRUPT)	0115
116	PM21	EQU	0377	PIM 2 MASK (ALL INTERRUPTS DISABLED)	0116
117	*				0117
118	A	EQU	10	HEX CONSTANT	0118
119	B	EQU	11	HEX CONSTANT	0119
120	C	EQU	12	HEX CONSTANT	0120
121	D	EQU	13	HEX CONSTANT	0121
122	E	EQU	14	HEX CONSTANT	0122
123	F	EQU	15	HEX CONSTANT	0123
124	PRBUF	EQU	0140	LINE PRINTER BUFFER	0124
125	CLKCNT	EQU	03	CLOCK TIME INTERVAL = 0.3 MILLISECOND	0125
126	SCANED	EQU	BIAS+39	LINE PRINTER SCAN ADDRESS (1130 ADDRESS 39)	0126
127	XREG	EQU	1	X=REGISTER	0127
128	BREG	EQU	2	B=REGISTER	0128
129	HEX	FORM	4,4,4,4		0129
130	*****				0130
131	*			1130'S BIT TEST	0131
132	*****				0132
133	ASET	EQU	000+15	A=REG BIT SET	0133
134	BSET	EQU	020+15	B=REG BIT SET	0134
135	ARESET	EQU	040+15	A=REG BIT RESET	0135
136	BRESET	EQU	060+15	B=REG BIT RESET	0136
137	EJEC				0137
138	*****				0138
139	*			USES VORTEX SYSTEM CONSTANTS - REFER TO VORTEX MANUAL	0139
140	*			REVERSE ORDER FOR 1130	0140
141	BS0	EQU	0440	BIT 0 SET	0141
142	BS1	EQU	0437	BIT 1 SET	0142
143	BS2	EQU	0436	BIT 2 SET	0143
144	BS3	EQU	0435	BIT 3 SET	0144
145	BS4	EQU	0434	BIT 4 SET	0145
146	BS5	EQU	0433	BIT 5 SET	0146
147	BS6	EQU	0432	BIT 6 SET	0147
148	BS7	EQU	0431	BIT 7 SET	0148
149	BS8	EQU	0430	BIT 8 SET	0149
150	BS9	EQU	0427	BIT 9 SET	0150
151	BS10	EQU	0426	BIT 10 SET	0151
152	BS11	EQU	0425	BIT 11 SET	0152
153	BS12	EQU	0424	BIT 12 SET	0153
154	BS13	EQU	0423	BIT 13 SET	0154
155	BS14	EQU	0422	BIT 14 SET	0155
156	BS15	EQU	0421	BIT 15 SET	0156
157	BR0	EQU	0460	BIT 0 RESET	0157
158	BR1	EQU	0457	BIT 1 RESET	0158
159	BR2	EQU	0456	BIT 2 RESET	0159
160	BR3	EQU	0455	BIT 3 RESET	0160
161	BR4	EQU	0454	BIT 4 RESET	0161
162	BR5	EQU	0453	BIT 5 RESET	0162
163	BR6	EQU	0452	BIT 6 RESET	0163
164	BR7	EQU	0451	BIT 7 RESET	0164
165	BR8	EQU	0450	BIT 8 RESET	0165
166	BR9	EQU	0447	BIT 9 RESET	0166
167	BR10	EQU	0446	BIT 10 RESET	0167
168	BR11	EQU	0445	BIT 11 RESET	0168
169	BR12	EQU	0444	BIT 12 RESET	0169
170	BR13	EQU	0443	BIT 13 RESET	0170

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171 BR14 EQU 0442 BIT 14 RESET * 0171
172 BR15 EQU 0441 BIT 15 RESET * 0172
173 ZERO EQU 0420 0 * 0173
174 THREE EQU 0464 3 * 0174
175 FIVE EQU 0465 5 * 0175
176 SIX EQU 0466 6 * 0176
177 SEVEN EQU 0467 7 * 0177
178 NINE EQU 0470 9 * 0178
179 TEN EQU 0471 10 * 0179
180 M000F EQU 0472 017 * 0180
181 M001F EQU 0473 037 * 0181
182 M003F EQU 0474 077 * 0182
183 M007F EQU 0475 0177 * 0183
184 M00FF EQU 0463 0377 * 0184
185 M01FF EQU 0476 0777 * 0185
186 M03FF EQU 0477 01777 * 0186
187 MFF00 EQU 0462 0177400 * 0187
188 ***** 0188
189 EJECT WCS ENTRIES 0189
190 ORG 0500 ***** 0190
191 IENTER EQU * INITIAL ENTRY TO WCS (START IBM=1130) 0191
192 * ***** 0192
193 LDB WRAP 0193
194 LDA BASE 0194
195 EXC 0300+RTC ENABLE VARIABLE INTERVAL INTERRUPTS 0195
196 EXC 0204+PIM ENABLE ALL PIMS 0196
197 BCS PAGE1+1 0197
198 ***** 0198
199 * WCS EXITS TO HERE * 0199
200 * IBM 1130 I/O EMULATION 0200
201 * ***** 0201
202 * ALL INTERRUPTS WILL TRAP OUT FROM HERE * 0202
203 * ***** 0203
204 EXC 0404+PIM DISABLE ALL PIMS 0204
205 EXC 0700+RTC INHIBIT VARIABLE INTERVAL INTERRUPT 0205
206 LDX INST,XREG GET INSTRUCTION PROCESSOR ADDRESS 0206
207 IJMP 0,XREG GO PROCESS INSTRUCTION 0207
208 INST DATA WAIT X=REG = 0 0208
209 DATA X10 X=REG = 1 0209
210 DATA RENTER X=REG = 2 (THIS WAS AN INTERRUPT) 0210
211 DATA WCSERR X=REG = 3 0211
212 DATA BOSC X=REG = 4 0212
213 DATA STEP X=REG = 5 0213
214 * * * * * 0214
215 INTSW ENTR INTERRUPT SWITCH INTERRUPT PROCESSOR 0215
216 * ***** 0216
217 * * * * * 0217
218 RENTER EQU * RETURN TO WCS AFTER HALT,X10,OR V72 INT 0218
219 * ***** 0219
220 LDA BASE 0220
221 EXC 0300+RTC ENABLE VARIABLE INTERVAL INTERRUPTS 0221
222 EXC 0204+PIM ENABLE ALL PIMS 0222
223 BCS PAGE1+2 0223
224 * * * * * 0224
225 SENSE1 EQU * SENSE INTERRUPT 0225
226 * ***** 0226
227 LDB AIL GET ACTIVE INTERRUPT LEVEL 0227
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285	*				0285
286	STEP	EQU	*	STEP KEY DETECT	0286
287	*			*****	0287
288	*				0288
289		HLT			0289
290		JMP	RENTER	RETURN TO 1130 MODE	0290
291		EJEC		BOOT STRAP TRAP	0291
292		ORG	0600	*****	0292
293	*				0293
294	RDBUF	EQU	*	CARD READER BUFFER	0294
295	STACK	EQU	RDBUF+80	INTERRUPT PUSH-POP STACK	0295
296	*				0296
297	*****				0297
298	*			OVERWRITTEN BY CARD READER BUFFER & INTERRUPT PUSH-POP STACK	0298
299	*****				0299
300	*				0300
301	SYSLOD	EQU	*	SYSTEM LOAD	0301
302	*			*****	0302
303	*				0303
304		EXC	0400+DISK	INITIALIZE DISK CONTROLLER	0304
305		EXC	BIC1+1	INITIALIZE BIC	0305
306		OME	BIC1,SYSLOW	LOW ADDRESS	0306
307		OME	BIC1+1,SYSHI	HIGH ADDRESS	0307
308		EXC	0300+DISK	SELECT SECTOR MODE	0308
309		OME	DISK,SECT#		0309
310		EXC	BIC1	ACTIVATE BIC	0310
311		EXC	DISK	READ/CONNECT BIC	0311
312		SEN	BIC1,++4	BIC NOT BUSY?	0312
313	JUMP	JMP	*=2	WAIT FOR BIC COMPLETE	0313
314		SEN	0500+DISK,SYSLOD	ERROR?	0314
315	*****				0315
316	*			DO NOT ALLOW ANY SCREW UPS BY IBM PROGRAMMERS	0316
317	*****				0317
318	*				0318
319		EXC	0400+DISK	INITIALIZE DISK CONTROLLER	0319
320		EXC	0200+DISK	SELECT SEEK MODE	0320
321		OME	DISK,DKHOME	SEEK TO 1130'S HOME TRACK	0321
322		SEN	0100+DISK,++4	SEEK COMPLETE ?	0322
323		JMP	*=2		0323
324		LDAI	015	CARRIAGE RETURN	0324
325		STA	PRBUF+122	END OF LINE PRINTER BUFFER	0325
326		JMP	LDWCS	LOAD WCS	0326
327	SECT#	DATA	5	SECTOR NUMBER (SYSTEM LOAD)	0327
328	SYSLOW	DATA	SYSORG	SYSTEM LOW ADDRESS	0328
329	SYSHI	DATA	SYSEND+2047+16+16	SYSTEM HIGH ADDRESS	0329
330		EJEC			0330
331		ORG	0650		0331
332	*				0332
333	*				0333
334	*			PATCH CCS	0334
335	*			SET DISPLAY TO REGISTER 0 (A REGISTER)	0335
336	*			FIRST HALT WILL DISPLAY WCS ADDRESS TO BE PATCHED.	0336
337	*			SUBSEQUENT HALTS WILL DISPLAY THE FIRST THROUGH FOURTH	0337
338	*			QUARTERS OF THE WCS WORD. TO MAKE CHANGES, ENTER INTO	0338
339	*			REGISTER 0 USING THE DISPLAY SWITCHES.	0339
340		DECR	1		0340
341		STA	PADW	INITIALIZE WCS WORD ADDRESS	0341

342	PCCS	INR	PADW		0342
343		LDA	PADW	PUT ADDRESS IN A FOR DISPLAY	0343
344		HLT	WCS	DISPLAY ADDRESS, ALLOW CHANGE	0344
345		ANA	MO1FF	USE 9 LOW-ORDER BITS ONLY	0345
346		STA	PADW	UPDATE PATCH ADDRESS CELL	0346
347		ASLA	2	MULTIPLY BY 4 (CCS HAS 64 BIT WORDS)	0347
348		ADDI	WCSBUF		0348
349		STA	PADR	ADDRESS IN CORE BUFFER OF WCS WORD	0349
350		TAX			0350
351		LDB	PLK3	LOOP COUNTER	0351
352		TZA			0352
353		STA	PL1H	INITIALIZE HALT COUNTER	0353
354	*	INPUT FOUR QUARTER-WORDS OF CCS INTO CORE BUFFER			0354
355	*	USING DISPLAY SWITCHES.			0355
356	PL1	INR	PL1H	UPDATE QUARTER NUMBER	0356
357		LDA	0,XREG	GET CURRENT CONTENTS OF QUARTER	0357
358	PL1H	HLT	***	WAIT FOR CHANGE	0358
359		STA	0,XREG	PUT CHANGED WORD IN CORE BUFFER	0359
360		JBZ	PLWR	GO WRITE WCS IF 4 QUARTERS INPUT	0360
361		DBR			0361
362		IXR			0362
363		JMP	PL1	GO GET ANOTHER QUARTER	0363
364	*	COPY BUFFER CONTENTS TO WCS			0364
365	PLWR	LDA	PADW	GET WCS ADDRESS	0365
366		ADD	CS	INCLUDE CCS FUNCTION WORD	0366
367		OAR	WCS		0367
368		LDX	PADR	GET CORE BUFFER ADDRESS	0368
369		LDBI	3	LOOP COUNTER	0369
370	PLK3	BES	0		0370
371		SEN	WCS,*	WAIT HERE WHILE WCS BUSY	0371
372	PL4	LDA	0,XREG	GET WORD FROM CORE BUFFER	0372
373		OAR	WCS+1	OUTPUT TO WCS	0373
374		JBZ	PCCS	EXIT IF 4 QUARTERS COPIED TO WCS	0374
375		IXR			0375
376		DBR			0376
377		JMP	PL4	GO COPY ANOTHER QUARTER	0377
378	PADR	DATA	0		0378
379	PADW	DATA	0		0379
380		EJEC			0380
381	*****				0381
382	*	END OF OVERWRITE			0382
383	*****				0383
384	SYSORG	ORG	0740	SECTOR "5"	0384
385	MODIFY	EQU	*	MODIFIER	0385
386	TIME	DATA	CLKCNT	CLOCK TIME INTERVAL	0386
387	BASE	DATA	BIAS	1130 BASE ADDRESS	0387
388	P1MSK0	DATA	PM10	PIM "1" MASK	0388
389	P2MSK0	DATA	PM20	PIM "2" MASK	0389
390	P2MSK1	DATA	PM21	PIM "2" MASK	0390
391	ISTACK	DATA	STACK	INTERRUPT PUSH-POP STACK	0391
392	WRAP	DATA	CMAK	WRAP-AROUND MASK	0392
393	*				0393
394	AIL	DATA	-1	ACTIVE INTERRUPT LEVEL	0394
395	*				0395
396		DATA	0	DEAD ZONE FOR ILSW	0396
397	ILSW	MZE	0	INTERRUPT-LEVEL STATUS WORD 0	0397
398		MZE	0	INTERRUPT-LEVEL STATUS WORD 1	0398

399	MZE	0	INTERRUPT-LEVEL STATUS WORD 2	0399
400	DATA	0	INTERRUPT-LEVEL STATUS WORD 3	0400
401	DATA	0	INTERRUPT-LEVEL STATUS WORD 4	0401
402	DATA	0	INTERRUPT-LEVEL STATUS WORD 5	0402
403	*			0403
404	CRSW DATA	0	CARD READER (2501) STATUS WORD	0404
405	CRPSW DATA	0	CARD READER/PUNCH STATUS WORD	0405
406	DKSW DATA	0	DISK STATUS WORD	0406
407	LPSW DATA	0	LINE PRINTER STATUS WORD	0407
408	MT1SW DATA	0	MAG TAPE #1 STATUS WORD	0408
409	MT2SW DATA	0	MAG TAPE #2 STATUS WORD	0409
410	TKSW DATA	0	TYPEWRITER/KEYBOARD STATUS WORD	0410
411	*			0411
412	CRSWS DATA	0	CARD READER (2501) STATUS WORD	0412
413	DKSWS DATA	0	DISK STATUS WORD	0413
414	MT1SWS DATA	0	MAG TAPE #1 STATUS WORD	0414
415	MT2SWS DATA	0	MAG TAPE #2 STATUS WORD	0415
416	TKSWS DATA	0	TYPEWRITER/KEYBOARD STATUS WORD	0416
417	*			0417
418	CRWORD EQU	*	CARD READER DATA WORD	0418
419	CS DATA	061000	SELECT CENTRAL CONTROL STORE (PAGE 1, LOC 0)	0419
420	KBWORD EQU	*	KEYBOARD DATA WORD	0420
421	DCSA DATA	0121000	SELECT DECODER "A" (PAGE 1, LOC 0)	0421
422	LPWORD EQU	*	LINE PRINTER DATA WORD	0422
423	DCSB DATA	0141000	SELECT DECODER "B" (PAGE 1, LOC 0)	0423
424	EJEC			0424
425	BIC2FL DATA	0	BIC "2" COMPLETE FLAG	0425
426	*		0 = MAG TAPE 1	0426
427	*		1 = MAG TAPE 2	0427
428	*		2 = LINE PRINTER (1132)	0428
429	*		3 = CARD READER (2501)	0429
430	CSWORD DATA	0	CONSOLE REGISTER DATA WORD	0430
431	SFLAG DATA	0	SENSE SWITCH SET FLAG	0431
432	SWRST DATA	0	DATA SWITCH RESET	0432
433	*			0433
434	KBSENT DATA	0	KEYBOARD SELECT ENTRY FLAG	0434
435	TYWORD DATA	0	TELETYPE DATA WORD	0435
436	TTYCNT DATA	0	TELETYPE CHARACTER COUNT	0436
437	ESC DATA	0233	ESCAPE (INTERRUPT REQUEST)	0437
438	CARR DATA	0215	CARRIAGE RETURN (EOF)	0438
439	LFEED DATA	0212	LINE FEED	0439
440	BELL DATA	0207	(KEYBOARD SELECT)	0440
441	BARROW DATA	0337	BACKARROW (BACKSPACE)	0441
442	RUBOUT EQU	MOOFF	TELETYPE RUBOUT	0442
443	*			0443
444	CDCNT DATA	=80	CARD COUNT	0444
445	COLCTR DATA	0	CARD COLUMN COUNTER	0445
446	ECRBUF DATA	RDBUF+79	CARD READER BUFFER END	0446
447	*			0447
448	CURCYL DATA	0	CURRENT CYLINDER	0448
449	DKHOME DATA	HOMETK	DISK HOME TRACK	0449
450	NXSECT DATA	0	NEXT SECTOR	0450
451	DKDLAY DATA	120/CLKCNT	DISK OPER. COMPLETE DELAY, 12 MILLISec.	0451
452	TSDLAY DATA	0	TRACK SEEK DELAY = SET FOR NO SEEK	0452
453	V72TRK DATA	HOMETK	V-72 DISK TRACK	0453
454	*			0454
455	CHAN DATA	1	PRINTER TAPE CHANNEL = INITIALLY CHAN 12	0455

456	LPLMAX	DATA	58	MAXIMUM # OF LINES	0456
457	LPLINE	DATA	0	LINE PRINTER LINE COUNTER	0457
458	LPEOP	DATA	0	LINE PRINTER END OF PAGE	0458
459	LPPRNT	DATA	0	LINE PRINTER STARTED FLAG	0459
460	LPCARS	DATA	0	LINE PRINTER CARRIAGE STARTED FLAG	0460
461	LPSPC	DATA	0	LINE PRINTER SPACE FLAG	0461
462	LPSPCE	EQU	TEN	CR=LF	0462
463	CAROUT	DATA	0	CARRIAGE REQUEST OUTPUT	0463
464	SPCOUT	DATA	0	SPACE OUTPUT REQUEST	0464
465	PRNOUT	DATA	0	LINE PRINTER REQUEST OUTPUT	0465
466	ELPBUF	DATA	PRBUF+122	END OF L. P. BUFFER	0466
467	WHEEL	DATA	-1	EMITTER WHEEL	0467
468	WHMAX	DATA	48	MAX WHEEL CHARACTERS	0468
469	*				0469
470	TEMP	EQU	*	TEMPORARY STORAGE	0470
471	INTERS	DATA	ISTRAP	INTERRUPT SERVICE TRAPS	0471
472	BS012	DATA	0160000	SET BITS 0,1,2	0472
473	BR012	DATA	017777	RESET BITS 0,1,2	0473
474	BR01	DATA	037777	RESET BITS 0,1	0474
475	BR34	DATA	0163777	RESET BITS 3,4	0475
476	EXCMT1	EXC2	0100+MT1	SELECT MAG TAPE 1	0476
477	EXCMT2	EXC2	0100+MT2	SELECT MAG TAPE 2	0477
478		EJEC			0478
479	CESR	EQU	*	READ CONSOLE	0479
480	*			*****	0480
481	*				0481
482		LDA	0,XREG	GET 1 ST WORD OF IOCC	0482
483		ANA	WRAP	MASK MEMORY SIZE WRAP-AROUND	0483
484		ADD	BASE	ADD IN 1130'S BASE ADDRESS	0484
485		TAB		DATA ADDRESS TO B-REGISTER	0485
486		LDA	CSWORD	GET CONSOLE DATA WORD	0486
487		STA	0,BREG	DATA TO DATA WORD ADDRESS	0487
488		JMP	RENTER	RETURN TO 1130 MODE	0488
489	* * *	* * *	* * *	* * *	0489
490	CRIR	EQU	*	CARD READER (2501) INITIATE READ	0490
491	*			*****	0491
492	*				0492
493		DATA	01006,RENTER	FOR ENABLE/DISABLE CARD READER	0493
494		LDA	JUMP		0494
495		STA	CRPC	DISABLE 1442 CARD READER	0495
496		STA	CRPSD	DISABLE 1442 CARD READER	0496
497		OME	PIM+1,P2MSK1	LOAD PIM #2 MASK REGISTER	0497
498		LDAI	CRENT	CHANGE ENTRY POINT FOR CARD READER	0498
499		STAE	CRJUMP	MODIFY JUMP ADDRESS	0499
500	CRENT	SEN	0300+CR,RENTER	BYPASS CARD READER IF HOPPER EMPTY	0500
501		SEN	BIC2,*+4	BIC NOT BUSY	0501
502		JMP	*-2	WAIT FOR BIC	0502
503		EXC	BIC2+1	INITIALIZE BIC	0503
504		EXC	CR	INITIALIZE CARD READER	0504
505		OME	BIC2,CRBUF	LOW ADDRESS TO BIC	0505
506		OME	BIC2+1,ECRBUF	HIGH ADDRESS TO BIC	0506
507		EXC	BIC2	ACTIVATE BIC	0507
508		EXC	0200+CR	READ CARD/CONNECT BIC	0508
509		LDA	THREE		0509
510		STA	BIC2FL	SET BIC FLAG	0510
511		ORA	CRSW		0511
512		STA	CRSW	SET BUSY	0512

513		LDA	0,XREG	GET 1 ST WORD OF IOCC	0513
514		ANA	WRAP	MASK MEMORY SIZE WRAP-AROUND	0514
515		ADD	BASE	ADD IN 1130'S BASE ADDRESS	0515
516		TAB		DATA ADDRESS TO B-REGISTER	0516
517		LDA	0,BREG	W.C.	0517
518		STA	CRWCT	SAVE W.C.	0518
519		INCR	021	A=B+1 (BUFFER ADDRESS)	0519
520		ORA	BS0	SET SHIFT BIT	0520
521		STA	CRBUFA	SAVE BUFFER ADDRESS	0521
522		JMP	RENTER	RETURN TO 1130 MODE	0522
523		EJEC			0523
524	CRSD	EQU	*	CARD READER (2501) SENSE DEVICE	0524
525	*			*****	0525
526	*				0526
527		DATA	01006,CRDAB	FOR ENABLE/DISABLE CARD READER	0527
528		LDX	CRSW		0528
529		LDB	MODIFY		0529
530		BT	BRESET-15,CRSEN	RESET ?	0530
531		TXA		YES	0531
532		ANA	BR34	RESET LAST CARD & OPERATION COMPLETE	0532
533		STA	CRSW		0533
534	CRSEN	TXA			0534
535		BT	ASET-14,CRSEX	EXIT IF BUSY	0535
536		SEN	0300+CR,*+3	HOPPER EMPTY ?	0536
537		DATA	01006	SKIP	0537
538		LDA	BS15	SET NOT READY	0538
539	CRSEX	TAB			0539
540		JMP	SENSE	RETURN SENSE TO 1130	0540
541	CRDAB	TZB		RETURN NO STATUS	0541
542		JMP	SENSE	RETURN SENSE TO 1130	0542
543	* * *				0543
544	CRCP	EQU	*	CARD READER COMPLETE INTERRUPT	0544
545	*			*****	0545
546	*				0546
547		BCS	PAGE1+C	XFER V-72 BUFFER TO 1130 BUFFER - SHIFT	0547
548	CRBUF	DATA	RDBUF	CARD READER BUFFER START	0548
549	CRBUFA	MZE	**	TO (ROTATED 4 BITS LEFT)	0549
550	CRWCT	DATA	**	CARD READER WORD COUNT	0550
551		LDA	BS4	SET OPERATION COMPLETE	0551
552		STA	CRSWS		0552
553		JMP*	BIC2CP		0553
554	* * *				0554
555	BIC1CP	EQU	*	BIC 1 COMPLETE INTERRUPT PROCESSOR	0555
556	*			*****	0556
557	* * *				0557
558	DKOCP	ENTR		DISK SEEK COMPLETE INTERRUPT PROCESSOR	0558
559	*			*****	0559
560	*				0560
561		LDA	BS1	SET OPERATION COMPLETE	0561
562		SEN	0500+DISK,DKERR		0562
563		DATA	01006	SKIP	0563
564	DKERR	ORA	BS0	SET DATA ERROR BIT	0564
565		STA	DKSWS		0565
566		JMP*	DKOCP		0566
567		EJEC			0567
568	CRPC	EQU	*	CONTROL - CARD READER PUNCH	0568
569	*			*****	0569

570	*				0570
571		DATA	01006,RENTER	FOR ENABLE/DISABLE CARD READER	0571
572		LDA	JUMP		0572
573		STA	CRIR	DISABLE 2501 CARD READER	0573
574		STA	CRSD	DISABLE 2501 CARD READER	0574
575		OME	PIM+1,P2MSK0	LOAD PIM #2 MASK REGISTER	0575
576		LDAI	CRPENT		0576
577		STAE	CRPJMP	MODIFY JUMP ADDRESS	0577
578	CRPENT	SEN	0300+CR,RENTER	BYPASS CARD READER IF HOPPER EMPTY	0578
579		LDA	MODIFY		0579
580		BT	ASET=13,STARTR		0580
581		BT	ASET=14,FDCYCL		0581
582		BT	ASET=15,STARTR		0582
583		BT	ASET=8,STACKR		0583
584		JMP	RENTER	RETURN TO 1130 MODE	0584
585	STARTR	EQU	*	START CARD READER	0585
586	*****			*****	0586
587	*				0587
588		EXC	CR	INITIALIZE CARD READER	0588
589		EXC	0200+CR	READ ONE CARD	0589
590	RPBUSY	LDA	THREE	SET READER BUSY	0590
591		ORA	CRPSW		0591
592		STA	CRPSW		0592
593		LDAI	077660	PZE -80	0593
594		STA	COLCTR		0594
595		JMP	RENTER	RETURN TO 1130 MODE	0595
596	FDCYCL	EQU	*	FEED CYCLE	0596
597	*****			*****	0597
598	*				0598
599		EXC	0300+CR	FEED CARDS CONTINUOUSLY	0599
600		JMP	RPBUSY		0600
601	STARTR	EQU	*	START PUNCH	0601
602	*****			*****	0602
603	*				0603
604	STACKR	EQU	*	STACKER	0604
605	*****			*****	0605
606	*				0606
607		JMP	RENTER	RETURN TO 1130 MODE	0607
608		EJEC			0608
609	CRR	EQU	*	READ ONE CARD COLUMN	0609
610	*			*****	0610
611	*				0611
612		LDA	0,XREG	GET 1 ST WORD OF IOCC	0612
613		ANA	WRAP	MASK MEMORY SIZE WRAP-AROUND	0613
614		ADD	BASE	ADD IN 1130'S BASE ADDRESS	0614
615		TAB		DATA ADDRESS TO B-REGISTER	0615
616		LDA	CRWORD		0616
617		STA	0,BREG	DATA TO DATA WORD ADDRESS	0617
618		JMP	RENTER	RETURN TO 1130 MODE	0618
619	*****			*****	0619
620	CRPSD	EQU	*	SENSE CARD READER/PUNCH STATUS	0620
621	*			*****	0621
622	*				0622
623		DATA	01006,CRDAB	FOR ENABLE/DISABLE CARD READER	0623
624		LDX	CRPSW	SAVE OLD STATUS WORD	0624
625		TXA			0625
626		LDB	MODIFY		0626

```
627      BT      BRESET=15,CKB14      RESET LEVEL 0 ?      0627
628      *                      RESET LEVEL 0      0628
629      ANA      BRO1      RESET READER & PUNCH RESPONSE      0629
630      STA      CRPSW      0630
631      CKB14 BT      BRESET=14,NOB14      RESET LEVEL 4 ?      0631
632      *                      RESET LEVEL 4      0632
633      ANA      BR4      RESET OPERATION COMPLETE      0633
634      STA      CRPSW      0634
635      NOB14 EQU      *      0635
636      MERG      043      RESTORE OLD STATUS WORD      X->A&B      0636
637      SEN      0300+CR,HOPMTY      HOPPER EMPTY ?      0637
638      SEN      0200+CR,*+4      READER ERROR ?      0638
639      JMP      SENSE      RETURN SENSE TO 1130      0639
640      ORA      BS2      SET ERROR BIT      0640
641      TAB      0641
642      JMP      SENSE      RETURN SENSE TO 1130      0642
643      HOPMTY BT      ASET=14,SENSE      RETURN IF BUSY      0643
644      LDB      BS15      SET NOT READY      0644
645      JMP      SENSE      RETURN SENSE TO 1130      0645
646      EJE      0646
647      CRBRI ENTR      CARD READER CHARACTER READY INTERRUPT      0647
648      *      *****      0648
649      *      0649
650      CIA      CR      GET CHARACTER      0650
651      LRLA      4      SET 1130 CARD READER FORMAT      0651
652      STA      CRWORD      0652
653      INR      COLCTR      0653
654      LDA      BS0      SET CARD READER RESPONSE      0654
655      ORA      CRPSW      0655
656      STA      CRPSW      0656
657      TZB      0657
658      * * * * *      0658
659      *****      0659
660      *      ACTIVATE 1130 INTERRUPT      0660
661      *****      0661
662      ACTINT LDA      AIL      0662
663      STA*      ISTACK      PUSH INTERRUPT      0663
664      INR      ISTACK      0664
665      STB      AIL      0665
666      JMP      INTRPT      GO INTERRUPT 1130      0666
667      EJE      0667
668      DKC      EQU      *      DISK CONTROL      0668
669      *      *****      0669
670      *****      0670
671      *      IBM=1130'S 2315 DISK      V=72 DISK      *      0671
672      *      *****      *      0672
673      *      8 SECTORS/TRACK      48 SECTORS/TRACK      *      0673
674      *      321 WORDS/SECTOR      120 WORDS/SECTOR      *      0674
675      *      0675
676      *      EMULATION      *      0676
677      *      *****      *      0677
678      *      3=V72 SECTORS/1130 SECTOR      *      0678
679      *      2=1130 TRACKS/V72 TRACK      *      0679
680      *      0680
681      *      1130'S EVEN SECTORS -> V72 SECTORS 0=23      *      0681
682      *      1130'S ODD SECTORS -> V72 SECTORS 24=47      *      0682
683      *      0683
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684 *      ABS TRACK = (CURCYL+(-1)**BIT13*CYL)/2+DKHOME *      0684
685 ***** 0685
686 *      0686
687      LDA      0,XREG      GET 1ST WORD OF IOCC (# OF CYLINDERS) 0687
688      ANA      MOIFF      GET RID OF DON'T CARES 0688
689      JAZ      RENTER      NO OP-COMplete ON SEEK "0" 0689
690      LDB      MODIFY      0690
691      BT       BRESET-13,FWD      DIRECTION OF SEEK 0691
692      CPA      BACKWARDS 0692
693      IAR      0693
694      FWD      ADD      CURCYL      ABSOLUTE 1130'S CYLINDER 0694
695      BT       ARESET-0,++3      BRANCH IF REQUEST IS POSITIVE 0695
696      TZA      SET TO ZERO IF NEGATIVE 0696
697      STA      CURCYL 0697
698      ASRA      1 0698
699      ADD      DKHOME      V72 TRACK NUMBER 0699
700      TAB      0700
701      SUB      V72TRK 0701
702      JAZ      NOSEEK      JUMP IF SAME TRACK 0702
703      STB      V72TRK 0703
704      EXC      0400+DISK      INITIALIZE CONTROLLER 0704
705      EXC      0200+DISK      TRACK SEEK MODE 0705
706      OBR      DISK 0706
707      SDKBSY   LDA      BS3      SET DISK BUSY 0707
708      ORA      DKSW 0708
709      STA      DKSW 0709
710      JMP      RENTER      RETURN TO 1130 MODE 0710
711      RDCHEK   EQU      *      READ CHECK 0711
712      NOSEEK   LDA      DKDLAY      SET UP OPERATION COMPLETE DELAY 0712
713      STA      TSDLAY 0713
714      JMP      SDKBSY 0714
715      EJEC     0715
716      DKIW     EQU      *      INITIATE WRITE 0716
717      *      ***** 0717
718      *      0718
719      JMPM     SECTSK      SEEK SECTOR 0719
720      EXC      0100+DISK      SET TO WRITE MODE/CONNECT BIC 0720
721      JMP      SDKBSY 0721
722      * * * * * 0722
723      DKIR     EQU      *      INITIATE READ 0723
724      *      ***** 0724
725      LDA      MODIFY 0725
726      BT       ASET-8,RDCHEK      READ CHECK 0726
727      JMPM     SECTSK      SEEK SECTOR 0727
728      EXC      DISK      SET TO READ MODE/CONNECT BIC 0728
729      JMP      SDKBSY 0729
730      * * * * * 0730
731      DKSD     EQU      *      SENSE DEVICE 0731
732      *      ***** 0732
733      *      0733
734      *      GET NEXT SECTOR 0734
735      LDA      NXSECT 0735
736      IAR      0736
737      ANA      THREE 0737
738      STA      NXSECT 0738
739      LDA      DKSW 0739
740      TAX      SAVE OLD STATUS WORD 0740

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741	LDB	MODIFY		0741
742	BT	BRESET-15,DKRDY	RESET ?	0742
743	ANA	BR01	RESET DATA ERROR & OPERATION COMPLETE	0743
744	STA	DKSW		0744
745	TXA		RESTORE OLD STATUS WORD	0745
746	DKRDY SEN	0600+DISK,DKNOTR		0746
747	DATA	01006	SKIP	0747
748	DKNOTR ORA	BS2	SET NOT READY	0748
749	BT	ASET-3,DKSEX	EXIT IF BUSY	0749
750	ANA	MFF00	RESET OLD SECTOR COUNT	0750
751	ORA	NXSECT	SET NEXT SECTOR	0751
752	LDB	CURCYL	CHECK FOR HOME	0752
753	JBNZ	DKSEX		0753
754	ORA	BS4	SET HOME BIT	0754
755	DKSEX TAB			0755
756	JMP	SENSE	RETURN SENSE TO 1130	0756
757	EJEC			0757
758	SECTSK ENTR		SECTOR SEEK	0758
759	*		*****	0759
760	LDA	MODIFY		0760
761	ANA	SEVEN	GET NEXT SECT	0761
762	STA	TEMP	MULTIPLY	0762
763	ASLA	1	BY	0763
764	ADD	TEMP	3	0764
765	LDB	CURCYL		0765
766	BT	BRESET-15,++4	JUMP IF EVEN CYLINDER	0766
767	ADDI 24		MOVE TO OTHER SURFACE	0767
768	EXC	0400+DISK	INITIALIZE CONTROLLER	0768
769	EXC	0300+DISK	SECTOR SEEK MODE	0769
770	QAR	DISK	OUTPUT SECTOR	0770
771	LDA	0,XREG	GET 1'ST WORD OF IOCC	0771
772	ANA	WRAP	MASK MEMORY SIZE WRAP-AROUND	0772
773	ADD	BASE	ADD IN 1130'S BASE ADDRESS	0773
774	TAB		DATA ADDRESS TO B-REGISTER	0774
775	ADD	0,BREG	ADD IN WORD COUNT	0775
776	IBR		INITIAL ADDRESS	0776
777	EXC	BIC1+1	INITIALIZE BIC	0777
778	OBR	BIC1		0778
779	QAR	BIC1+1		0779
780	EXC	BIC1	ACTIVATE BIC	0780
781	JMP*	SECTSK		0781
782	* * * * *			0782
783	BIC2CP ENTR		BIC "2" COMPLETE INTERRUPT PROCESSOR	0783
784	*		*****	0784
785	LDB	BIC2FL		0785
786	LD BE	++4,BREG		0786
787	IJMP	0,BREG	DISPATCH TO SERVICE ROUTINE	0787
788	DATA	MTCP	MAG TAPE 1 COMPLETE	0788
789	DATA	MTCP	MAG TAPE 2 COMPLETE	0789
790	DATA	LPCP	LINE PRINTER	0790
791	DATA	CRCP	CARD READER COMPLETE	0791
792	EJEC			0792
793	KEYBC EQU	*	KEYBOARD SELECT	0793
794	*		*****	0794
795	LDA	KBSENT		0795
796	JANZ	SETKBS	JUMP IF NOT FIRST ENTRY FOR LINE	0796
797	OME	TTY,BELL	RING BELL	0797

798		INR	KBSENT		0798
799	SETKBS	LDA	BS6	SET KEYBOARD BUSY	0799
800		ORA	TKSW		0800
801		STA	TKSW	SET BIT IN STATUS WORD	0801
802		JMP	RENTER	RETURN TO 1130 MODE	0802
803	*****				0803
804	KEYBR	EQU	*	READ SINGLE CHARACTER	0804
805	*			*****	0805
806	*				0806
807		LDA	BR6	RESET KB BUSY BIT	0807
808		ANA	TKSW		0808
809		STA	TKSW		0809
810		LDA	O,XREG	GET 1'ST WORD OF IOCC	0810
811		ANA	WRAP	MASK MEMORY SIZE WRAP-AROUND	0811
812		ADD	BASE	ADD IN 1130'S BASE ADDRESS	0812
813		TAB		DATA ADDRESS TO B-REGISTER	0813
814		LDA	KBWORD		0814
815		STA	O,BREG	DATA TO DATA WORD ADDRESS	0815
816		JMP	RENTER	RETURN TO 1130 MODE	0816
817	*****				0817
818	TKSD	EQU	*	SENSE TYPEWRITER/KEYBOARD	0818
819	*			*****	0819
820	*				0820
821		LDX	TKSW	SAVE OLD STATUS WORD	0821
822		LDA	MODIFY		0822
823		BT	ARESET=15,TKSDEX		0823
824		TXA			0824
825		ANA	BR012	RESET PRINTER,KEYBOARD & INTERRUPT REQ	0825
826		STA	TKSW		0826
827	TKSDEX	TXB		LOAD 1130'S A-REG	0827
828		JMP	SENSE	RETURN SENSE TO 1130	0828
829		EJEC			0829
830	KEYBI	ENTR		KEYBOARD INTERRUPT SERVICE	0830
831	*			*****	0831
832	*				0832
833		CIAB	TTY	INPUT CHAR	0833
834		SUB	ESC	INTERRUPT REQUEST ?	0834
835		JAZ	IR		0835
836		LDA	TKSW		0836
837		BT*	ARESET=6,KEYBI	RETURN IF NOT SELECTED	0837
838		TBA			0838
839		SUB	CARR	EOF ?	0839
840		JAZ	EOF		0840
841		TBA			0841
842		SUB	BARROW	BACKSPACE ?	0842
843		JAZ	BS		0843
844		TBA			0844
845		SUB	RUBOUT	ERASE ?	0845
846		JAZ	ERASE		0846
847		TBA			0847
848		LDBI	ASCII	GET ASCII TABLE	0848
849		BCS	PAGE1+D	TRANSLATE	0849
850		LDDE	CDCODE,BREG	GET CONVERTED CHARACTER	0850
851	KBIEX	STB	KBWORD		0851
852		LDA	BS1	SET KEYBOARD RESPONSE BIT	0852
853	TKSTAT	STA	TKSWS	SAVE STATUS WORD	0853
854		JMP*	KEYBI		0854

855	IR	LDA	BS2	SET INTERRUPT REQUEST BIT	0855
856		JMP	TKSTAT		0856
857	EOF	TZA			0857
858		STA	KBSNT	RESET TO 1 ST ENTRY SELECT	0858
859		LDB	BS12	SET EOF BIT	0859
860		JMP	KBIEX		0860
861	BS	LDB	BS13	SET BS BIT	0861
862		JMP	KBIEX		0862
863	ERASE	LDB	BS14	SET ERASE BIT	0863
864		JMP	KBIEX		0864
865		EJEC			0865
866	TTYW	EQU	*	TYPE SINGLE CHARACTER	0866
867	*			*****	0867
868	*				0868
869		LDA	0,XREG	GET 1 ST WORD OF IOCC	0869
870		ANA	WRAP	MASK MEMORY SIZE WRAP-AROUND	0870
871		ADD	BASE	ADD IN 1130'S BASE ADDRESS	0871
872		TAB		DATA ADDRESS TO B-REGISTER	0872
873		LDA	0,BREG	GET CHARACTER	0873
874		ANA	MFF00	GET RID OF DON'T CARES	0874
875		LDBI	CPCODE		0875
876		BCS	PAGE1+D	TRANSLATE	0876
877		LDBE	ASCII,BREG	GET CONVERTED CHARACTER	0877
878		OBR	TTY	OUTPUT CHARACTER	0878
879		STB	TYWORD		0879
880		INR	TTYCNT		0880
881		LDA	BS4	SET CONSOLE PRINTER BUSY	0881
882		ORA	BS5	SET CONSOLE PRINTER NOT READY	0882
883		JMP	SETKBS+1		0883
884		EJEC			0884
885	TTYWI	ENTR		CONSOLE PRINTER COMPLETE INTERRUPT SERVICE	0885
886	*			*****	0886
887		LDA	TTYCNT		0887
888		JAZ	TTYWI	RETURN IF V-72 DID TYPING	0888
889		LDA	TYWORD		0889
890		SUB	CARR	WAS LAST CHARACTER A CARRIAGE RETURN?	0890
891		JANZ	CKLFED		0891
892		STA	TTYCNT	YES - RESET COUNT	0892
893		JMP	FEEDL		0893
894	CKLFED	LDA	TYWORD		0894
895		SUB	LFEED	WAS LAST CHARACTER A LINE FEED	0895
896		JANZ	CKCNT		0896
897		LDA	TTYCNT		0897
898		JAZ	TTIEX		0898
899		DAR		DECREMENT COUNT	0899
900		STA	TTYCNT		0900
901	CKCNT	LDA	TTYCNT		0901
902		SUBI	72	MAX CHARACTERS	0902
903		JANZ	TTIEX		0903
904		STA	TTYCNT	RESET COUNT	0904
905		OME	TTY,CARR	RETURN CARRIAGE	0905
906		SEN	0100+TTY,FEEDL	READY TO WRITE ?	0906
907		JMP	*-2		0907
908	FEEDL	OME	TTY,LFEED	LINE FEED	0908
909		SEN	0100+TTY,TTIEX	TYPE COMPLETE	0909
910		JMP	*-2		0910
911	TTIEX	LDA	BS0	SET PRINTER RESPONSE	0911

912		STA	TKSWS	SAVE STATUS WORD	0912
913		JMP	TTYWI		0913
914		EJEC			0914
915	LPC	EQU	*	LINE PRINTER CONTROL	0915
916	*			*****	0916
917	*				0917
918		SEN	LP,0+4	LINE PRINTER READY?	0918
919		JMP	RENTER	DON'T GIVE CONTROL IF L.P. NOT READY	0919
920		LDA	MODIFY		0920
921		BT	ASET-8,PRNSTR	START PRINTER EMITTER INTERRUPTS	0921
922		BT	ASET-9,PRNSTP	STOP PRINTER EMITTER INTERRUPTS	0922
923		BT	ASET-13,CARSTR	START CARRIAGE CHANNEL INTERRUPTS	0923
924		BT	ASET-14,CARSTP	STOP CARRIAGE CHANNEL INTERRUPTS	0924
925		BT	ASET-15,CARSPC	SPACE CARRIAGE	0925
926		JMP	RENTER	RETURN TO 1130 MODE	0926
927	*****				0927
928	LPISER	EQU	*	LINE PRINTER INTERRUPT SERVER	0928
929	*			*****	0929
930	*				0930
931		LDA	CAROUT	CARRIAGE OUTPUT REQUEST ?	0931
932		ORA	SPCOUT	SPACE OUTPUT REQUEST ?	0932
933		ORA	PRNOUT	PRINT OUTPUT REQUEST ?	0933
934		JANZ	RTCI	BUSY - GET OUT	0934
935		LDA	LPSPC		0935
936		JANZ	CSPI	SPACE CARRIAGE STARTED	0936
937		LDA	LPCARS		0937
938		JANZ	CSTI	CARRIAGE STARTED	0938
939		LDA	LPPRNT		0939
940		JANZ	LPSTI	PRINTER STARTED	0940
941		JMP	SAML2		0941
942		EJEC			0942
943	CARSPC	EQU	*	SPACE CARRIAGE	0943
944	*			*****	0944
945	*				0945
946		STA	LPSPC	SET SPACE FLAG	0946
947		LDA	LPSPCE		0947
948		STA	SPCOUT	SET SPACE OUTPUT REQUEST	0948
949		JMP	RENTER	RETURN TO 1130 MODE	0949
950	*****				0950
951	CSPI	EQU	*	PRINTER INTERRUPT AFTER CARRIAGE SPACE	0951
952	*			*****	0952
953		TZA			0953
954		STA	LPSPC		0954
955		INR	LPLINE	ADVANCE LINE COUNTER	0955
956		LDB	LPLINE	CHECK LINE COUNT	0956
957		SRE	LPLMAX,7,020	SKIP IF LINE AT MAX	0957
958		JMP	*+4	NOT YET	0958
959		STB	LPEOP	SET END OF PAGE FLAG	0959
960		STA	LPLINE	RESET LINE COUNTER	0960
961		LDA	BS2	SET SPACE RESPONSE	0961
962		JMP	ACTL1	ACTIVATE LEVEL 1	0962
963	*****				0963
964	CARSTR	EQU	*	START CARRIAGE	0964
965	*			*****	0965
966	*				0966
967		STA	LPCARS	SET CARRIAGE FLAG	0967
968		JMP	RENTER	RETURN TO 1130 MODE	0968

```
969 * * * * * 0969
970 CSTI EQU * PRINTER INTERRUPT AFTER CARRIAGE START 0970
971 * ***** 0971
972 * 0972
973 LDA CHAN SET CHANNEL BIT 0973
974 BT ASET-15,*+4 JUMP IF LAST CHANNEL 0974
975 ASRA 1 GET NEXT CHANNEL 0975
976 DATA 01006 SKIP 0976
977 LRLA 7 RESTART CHANNEL SCAN 0977
978 STA CHAN 0978
979 ORA BS1 SET SKIP RESPONSE 0979
980 JMP ACTL1 ACTIVATE LEVEL 1 0980
981 EJEC 0981
982 CARSTP EQU * STOP CARRIAGE 0982
983 * ***** 0983
984 * 0984
985 LDA BS8 SET VFU BIT 0985
986 LDB CHAN 0986
987 BT BSET-15,SETCH CHANNEL 12? 0987
988 BT BSET-14,SETCH+1 CHANNEL 9? 0988
989 BT BSET-13,SETCH+2 CHANNEL 6? 0989
990 BT BSET-12,SETCH+3 CHANNEL 5? 0990
991 BT BSET-11,SETCH+4 CHANNEL 4? 0991
992 BT BSET-10,SETCH+5 CHANNEL 3? 0992
993 BT BSET-9,SETCH+6 CHANNEL 2? 0993
994 BT BSET-8,SETCH+7 CHANNEL 1? 0994
995 SETCH ADD THREE CHANNEL 12 0995
996 ADD THREE CHANNEL 9 0996
997 IAR CHANNEL 6 0997
998 IAR CHANNEL 5 0998
999 IAR CHANNEL 4 0999
1000 IAR CHANNEL 3 1000
1001 IAR CHANNEL 2 1001
1002 STA CAROUT SET CARRIAGE REQUEST FLAG 1002
1003 ERA BS8 GET CHANNEL 1003
1004 JANZ *+3 1004
1005 STA LPLINE RESET LINE COUNTER 1005
1006 TZA 1006
1007 STA LPCARS RESET FLAG 1007
1008 JMP RENTER RETURN TO 1130 MODE 1008
1009 EJEC 1009
1010 PRNSTR EQU * START PRINTER 1010
1011 * ***** 1011
1012 * 1012
1013 STA LPPRNT SET FLAG 1013
1014 JMP RENTER RETURN TO 1130 MODE 1014
1015 * * * * * 1015
1016 PRNSTP EQU * STOP PRINTER 1016
1017 * ***** 1017
1018 * 1018
1019 STA PRNOUT SET PRINT REQUEST FLAG 1019
1020 TZA 1020
1021 STA LPPRNT RESET EMITTER WHEEL INTERRUPT SERVER 1021
1022 JMP RENTER RETURN TO 1130 MODE 1022
1023 * * * * * 1023
1024 LPSD EQU * SENSE DEVICE 1024
1025 * ***** 1025
```

1026	*				1026
1027		LDA	LPSPC	SPACE BUSY?	1027
1028		ORA	LPCARS	CARRIAGE BUSY?	1028
1029		TAB			1029
1030		LDX	LPSW	SAVE OLD STATUS WORD	1030
1031		LDA	MODIFY		1031
1032		BT	ARESET=15,SENLP		1032
1033		TXA			1033
1034		ANA	BRO12	RESET EMITTER,SKIP & SPACE RESPONSE	1034
1035		STA	LPSW		1035
1036	SENLP	TXA		RESTORE OLD STATUS WORD	1036
1037		SEN	LP,++3	READY?	1037
1038		ORA	BS5	SET NOT READY	1038
1039		JBZ	++3		1039
1040		ORA	BS3	SET CARRIAGE BUSY	1040
1041		LDB	LPPRNT	CHECK PRINTER BUSY	1041
1042		JBZ	++3		1042
1043		ORA	BS6	SET PRINTER BUSY	1043
1044		LDB	LPEOP	CHECK FOR END OF PAGE	1044
1045		JBZ	LPSEX		1045
1046		ORA	BS15	SET CHAN 12	1046
1047		TZB			1047
1048		STB	LPEOB	RESET END OF PAGE FLAG	1048
1049	LPSEX	TAB			1049
1050		JMP	SENSE	RETURN SENSE TO 1130	1050
1051		EJEC			1051
1052	LPSTI	EQU	*	PRINTER INTERRUPT AFTER START	1052
1053	*			*****	1053
1054		LDB	WHEEL		1054
1055		IBR			1055
1056		SRE	WHMAX,7,020	SKIP IF WHEEL AT MAX	1056
1057		JMP	++3		1057
1058		TZB			1058
1059		STB	WHEEL		1059
1060		LDAE	PV72,BREG	GET ASCII CHARACTER	1060
1061	*			LINE PRINTER SCAN	1061
1062		LDB	LPWORD	GET WHEEL CHARACTER	1062
1063		STA	LPWORD	SET UP FOR NEXT	1063
1064		LDA	BASE		1064
1065		LDX	LPBUF		1065
1066		BCS	PAGE1+6	LINE PRINTER SCAN	1066
1067	*			SCAN CHECK	1067
1068		LDA	BS0	SET EMITTER RESPONSE	1068
1069		LDBE	SCANED		1069
1070		BT	BSET=15,ACTL1	CHECK FOR SCAN CHECK	1070
1071		ORA	BS4	SET SCAN CHECK	1071
1072		JMP	ACTL1	ACTIVATE LEVEL 1	1072
1073	* * * * *				1073
1074	LPEDIT	EQU	*	READ EMITTER WHEEL	1074
1075	*			*****	1075
1076	*				1076
1077		LDA	O,XREG	GET 1 ST WORD OF IOCC	1077
1078		ANA	WRAP	MASK MEMORY SIZE WRAP-AROUND	1078
1079		ADD	BASE	ADD IN 1130'S BASE ADDRESS	1079
1080		TAB		DATA ADDRESS TO B-REGISTER	1080
1081		LDX	WHEEL	GET WHEEL POINTER	1081
1082		LDAE	P1130,XREG	GET EMITTER CODE	1082

1083		STA	O,BREG	DATA TO DATA WORD ADDRESS	1083
1084		JMP	RENTER	RETURN TO 1130 MODE	1084
1085		EJEC			1085
1086	PRINT	EQU	*	PRINT ROUTINE	1086
1087	*			*****	1087
1088		LDA	PRNOUT		1088
1089		JAN*	RTCI	PRINTER BUSY	1089
1090		LDA	SPCOUT	SPACE OUTPUT REQUEST ?	1090
1091		STA	PRBUF+120	SET SPACE	1091
1092		LDA	CAROUT	CARRIAGE OUTPUT REQUEST ?	1092
1093		STA	PRBUF+121	SET CARRIAGE	1093
1094		ORA	SPCOUT	SPACE OUTPUT REQUEST ?	1094
1095		ORA	PRNOUT	PRINT OUTPUT REQUEST ?	1095
1096		JAZ	SAMLQ		1096
1097		TZA			1097
1098		STA	SPCOUT	RESET SPACE REQUEST	1098
1099		STA	CAROUT	RESET CARRIAGE REQUEST	1099
1100		EXC	O400+LP	INITIALIZE LINE PRINTER	1100
1101		EXC	BIC2+1	INITIALIZE BIC	1101
1102		OME	BIC2,LPBUF	INITIAL ADDRESS	1102
1103		OME	BIC2+1,ELPBUF	FINAL ADDRESS	1103
1104		EXC	BIC2	ACTIVATE BIC	1104
1105		EXC	O100+LP	CONNECT LINE PRINTER TO BIC	1105
1106		CPA			1106
1107		STA	PRNOUT	SET OUTPUT FLAG	1107
1108		LDA	BS14	2	1108
1109		STA	BIC2FL		1109
1110		JMP*	RTCI	GET OUT	1110
1111	* * *				1111
1112	LPCP	EQU	*	LINE PRINTER COMPLETE INTERRUPT	1112
1113	*			*****	1113
1114	*				1114
1115		BCS	PAGE1+C	CLEAR PRINTER BUFFER	1115
1116		MZE	ZERO		1116
1117	LPBUF	DATA	PRBUF	LINE PRINTER BUFFER	1117
1118		DATA	122	WORD COUNT	1118
1119		TZA			1119
1120		STA	PRNOUT	RESET PRINT REQUEST	1120
1121		JMP*	BIC2CP		1121
1122		EJEC			1122
1123	MT1C	EQU	*	MAG TAPE #1 CONTROL	1123
1124	*			*****	1124
1125	*				1125
1126		EXC2	O100+MT1	SELECT MAG TAPE #1	1126
1127		DATA	O1006	SKIP	1127
1128	MT2C	EQU	*	MAG TAPE #2 CONTROL	1128
1129	*			*****	1129
1130	*				1130
1131		EXC2	O100+MT2	SELECT MAG TAPE #2	1131
1132		LDA	MODIFY		1132
1133		BT	ASET=15,WEOf1		1133
1134		BT	ASET=14,SREC1		1134
1135		BT	ASET=13,BSREC1		1135
1136		BT	ASET=12,REWND1		1136
1137		JMP	RENTER	RETURN TO 1130 MODE	1137
1138	WEOf1	EXC	O400+MT1	WRITE FILE MARK	1138
1139	*			*****	1139

1140	*				1140
1141		JMP	RENTER	RETURN TO 1130 MODE	1141
1142	SREC1	EXC	0500+MT1	SKIP FORWARD ONE RECORD	1142
1143	*			*****	1143
1144	*				1144
1145		JMP	RENTER	RETURN TO 1130 MODE	1145
1146	BSREC1	EXC	0600+MT1	BACKSPACE ONE RECORD	1146
1147	*			*****	1147
1148	*				1148
1149		JMP	RENTER	RETURN TO 1130 MODE	1149
1150	REWND1	EXC	0700+MT1	REWIND	1150
1151	*			*****	1151
1152	*				1152
1153		JMP	RENTER	RETURN TO 1130 MODE	1153
1154	* * *			* * * * *	1154
1155	MTCP	EQU	*	MAG TAPE COMPLETE	1155
1156	*			*****	1156
1157		LDA	BS0		1157
1158		LDB	BIC2FL		1158
1159		STA	MT1SWS,BREG		1159
1160		JMP*	BIC2CP		1160
1161		EJEC			1161
1162	MT1IW	EQU	*	INITIATE WRITE - MAG TAPE #1	1162
1163	*			*****	1163
1164	*				1164
1165		LDA	EXCMT1	SELECT MAG TAPE 1	1165
1166		DATA	01006	SKIP	1166
1167	MT2IW	EQU	*	INITIATE WRITE - MAG TAPE #2	1167
1168	*			*****	1168
1169	*				1169
1170		LDA	EXCMT2	SELECT MAG TAPE 2	1170
1171		JMPM	GETBIC	SET UP BIC	1171
1172		EXC	0200+MT1	SELECT WRITE/CONNECT BIC	1172
1173		JMP	RENTER	RETURN TO 1130 MODE	1173
1174	* * *			* * * * *	1174
1175	MT1IR	EQU	*	INITIATE READ - MAG TAPE #1	1175
1176	*			*****	1176
1177	*				1177
1178		LDA	EXCMT1	SELECT MAG TAPE 1	1178
1179		DATA	01006	SKIP	1179
1180	MT2IR	EQU	*	INITIATE READ - MAG TAPE #2	1180
1181	*			*****	1181
1182	*				1182
1183		LDA	EXCMT2	SELECT MAG TAPE 2	1183
1184		JMPM	GETBIC	SET UP BIC	1184
1185		EXC	MT1	SELECT READ/CONNECT BIC	1185
1186		JMP	RENTER	RETURN TO 1130 MODE	1186
1187	* * *			* * * * *	1187
1188	GETBIC	ENTR		BIC SETUP	1188
1189	*			*****	1189
1190	*				1190
1191		STA	*+1	STORE SELECT INSTRUCTION	1191
1192		EXC2	*-*	SELECT MAG TAPE *-*	1192
1193		ANA	BS15		1193
1194		STA	BIC2FL	SET BIC FLAG	1194
1195		EXC	BIC2+1	INITIALIZE BIC	1195
1196		LDA	0,XREG	GET 1'ST WORD OF IOCC	1196

1197	ANA	WRAP	MASK MEMORY SIZE WRAP-AROUND	1197
1198	ADD	BASE	ADD IN 1130'S BASE ADDRESS	1198
1199	TAB		ADDRESS OF WCA & BUFFER ADDRESS	1199
1200	LDA	0,BREG	GET WORD COUNT ADDRESS	1200
1201	ANA	WRAP	WRAP-AROUND	1201
1202	ADD	BASE	1130 BIAS	1202
1203	TAX			1203
1204	LDA	1,BREG	GET BUFFER ADDRESS	1204
1205	ANA	WRAP	WRAP-AROUND	1205
1206	ADD	BASE	1130 BIAS	1206
1207	TAB			1207
1208	ADD	0,XREG	ADD WORD COUNT	1208
1209	DAR		FINAL ADDRESS	1209
1210	OBR	BIC2		1210
1211	OAR	BIC2+1		1211
1212	EXC	BIC2	ACTIVATE BIC	1212
1213	JMP*	GETBIC		1213
1214	EJEC			1214
1215	MT1SD	EQU	* SENSE DEVICE - MAG TAPE #1	1215
1216	*		*****	1216
1217	TZB			1217
1218	DATA	01006	SKIP	1218
1219	MT2SD	EQU	* SENSE DEVICE - MAG TAPE #2	1219
1220	*		*****	1220
1221	INCR	2		1221
1222	LDX	MT1SW,BREG	SAVE OLD STATUS WORD	1222
1223	LDA	MODIFY		1223
1224	BT	ARESET-15,SMT1		1224
1225	TXA			1225
1226	ANA	BR0	RESET OPERATION COMPLETE	1226
1227	STA	MT1SW,BREG		1227
1228	TXA			1228
1229	SMT1	LDBE	EXCMT1,BREG	1229
1230	STB	*+1	SELECT MAG TAPE 1	1230
1231	EXC2	*=*	STORE SELECT INSTRUCTUON	1231
1232	SEN	MT1,*+3	SELECT MAG TAPE **	1232
1233	DATA	01006	PARITY?	1233
1234	ORA	BS15	SKIP	1234
1235	SEN	0100+MT1,*+3	SET PARITY BIT	1235
1236	ORA	BS14	BUFFER READY?	1236
1237	SEN	0200+MT1,*+3	SET BUFFER NOT READY	1237
1238	ORA	BS13	READY?	1238
1239	SEN	BIC2,*+3	SET NOT READY	1239
1240	ORA	BS13	BIC NOT BUSY	1240
1241	SEN	0300+MT1,*+3	SET BUSY	1241
1242	DATA	01006	FILE MARK?	1242
1243	ORA	BS12	SKIP	1243
1244	SEN	0400+MT1,*+4	SET FILE MARK BIT	1244
1245	ANA	BR11	HIGH DENSITY	1245
1246	DATA	01006	RESET HIGH DENSITY BIT	1246
1247	ORA	BS11	SKIP	1247
1248	SEN	0500+MT1,*+3	SET HIGH DENSITY BIT	1248
1249	DATA	01006	END OF TAPE?	1249
1250	ORA	BS10	SKIP	1250
1251	SEN	0600+MT1,*+3	SET END OF TAPE BIT	1251
1252	DATA	01006	BEGINNING OF TAPE?	1252
1253	ORA	BS9	SKIP	1253
			SET BEGINNING OF TAPE BIT	

1254		SEN	0700+MT1,++3	REWINDING?	1254
1255		DATA	01006	SKIP	1255
1256		ORA	BS8	SET REWINDING BIT	1256
1257		TAB			1257
1258		JMP	SENSE	RETURN SENSE TO 1130	1258
1259		EJEC			1259
1260	RTCI	ENTR		REAL TIME CLOCK INTERRUPT PROCESSOR	1260
1261	*			*****	1261
1262	*				1262
1263		EXC	0600+RTC	INITIALIZE VARIABLE INTERVAL COUNTER	1263
1264		LDA	COLCTR	CHECK CARD READER	1264
1265		JAZ	++4	CARD READER NOT BUSY	1265
1266		JAP*	RTCI	BUSY, GET OUT	1266
1267		JMPM	CONSW	READ CONSOLE SWITCHES	1267
1268	*			CHECK STATUS OF I/O	1268
1269	*			TIME OUT SEEK COMPLETE	1269
1270		LDA	TSDLAY		1270
1271		JAZ	CKPRNT		1271
1272		DAR			1272
1273		STA	TSDLAY		1273
1274		JANZ	CKPRNT	JUMP IF TIME NOT UP	1274
1275		LDA	BS1	SET OP-COMplete	1275
1276		STA	DKSWS		1276
1277	CKPRNT	EQU	*	CHECK IF LINE PRINTER NEEDS OUTPUT	1277
1278		SEN	BIC2,PRINT	BIC NOT BUSY	1278
1279		JMP*	RTCI	GET OUT	1279
1280	SAML0	LDA	AIL	IS LEVEL 0 ACTIVE	1280
1281		JAZ*	RTCI	YES	1281
1282	SAML1	LDA	AIL	IS LEVEL 1 ACTIVE?	1282
1283		DAR			1283
1284		JAZ*	RTCI	YES	1284
1285		SEN	BIC2,LPI SER	BIC NOT BUSY	1285
1286		JMP*	RTCI		1286
1287	ACTL1	STA	LPSW		1287
1288		INCR	2	ACTIVATE LEVEL 1	1288
1289		JMP	ACTINT		1289
1290	SAML2	LDA	AIL	IS LEVEL 2 ACTIVE ?	1290
1291		SUB	BS14	2	1291
1292		JAZ*	RTCI	YES	1292
1293		TZB			1293
1294		LDA	DKSWS		1294
1295		JAZ	SAML3	JUMP IF NO RESPONSE	1295
1296		STA	DKSW		1296
1297		STB	DKSWS		1297
1298		LDB	BS14	ACTIVATE LEVEL 2	1298
1299		JMP	ACTINT		1299
1300		EJEC			1300
1301	SAML3	LDA	AIL	IS LEVEL 3 ACTIVE?	1301
1302		SUB	THREE		1302
1303		JAZ*	RTCI	YES	1303
1304		LDA	MTISWS		1304
1305		JAP	CKMT2I	CHECK FOR MAG TAPE 2 SERVICE	1305
1306		STA	MTISW		1306
1307		STB	MTISWS		1307
1308		LDA	BS1	SET MAG TAPE 1 COMPLETE INTERRUPT	1308
1309	ACTL3	STA	ILSW+3		1309
1310		LDB	THREE	ACTIVATE LEVEL 3	1310

1311		JMP	ACTINT		1311
1312	CKMT21	LDA	MT2SWS		1312
1313		JAP	SAML4	IF NO LEVEL 3 REQUEST, GO ON	1313
1314		STA	MT2SW		1314
1315		STB	MT2SWS		1315
1316		JMP	ACTL3		1316
1317	SAML4	LDA	AIL	IS LEVEL 4 ACTIVE ?	1317
1318		SUB	BS13	4	1318
1319		JAZ*	RTCI	YES	1319
1320		SEN	CR,CKTTY	CARD IN READ STATION?	1320
1321		LDA	CRSWS		1321
1322		JAZ	CK1442	JUMP IF NO 2501 INTERRUPT	1322
1323		STA	CRSW		1323
1324		LDA	BS3	SET 2501 RESPONSE	1324
1325		STB	CRSWS		1325
1326		JMP	ACTL4		1326
1327	CK1442	LDA	COLCTR		1327
1328		JAZ	CKTTY		1328
1329		STB	COLCTR	RESET CARD COLUMN COUNTER	1329
1330		LDA	BS4	SET OPERATION COMPLETE	1330
1331		STA	CRPSW		1331
1332		LDA	BS2	SET READER RESPONSE	1332
1333		JMP	ACTL4		1333
1334	CKTTY	LDA	TKSWS		1334
1335		JAZ*	RTCI		1335
1336		STA	TKSW		1336
1337		LDA	BS1		1337
1338		STB	TKSWS		1338
1339	ACTL4	STA	ILSW+4		1339
1340		LDB	BS13	ACTIVATE LEVEL 4	1340
1341		JMP	ACTINT		1341
1342		EJEC			1342
1343	CONSW	ENTR		CHECK CONSOLE SWITCH SETTING	1343
1344	*			*****	1344
1345	*				1345
1346		JSS1	S1SET	CHECK FOR DISPLAY OF DATA SWITCHES	1346
1347		JSS2	S2SET	CHECK FOR RESET OF DATA SWITCHES	1347
1348	*				1348
1349		BCS	PAGE1+5	GET 1130'S ACCUMULATOR	1349
1350		OAR	CES		1350
1351		TZA		RESET FLAG	1351
1352		STA	SWRST		1352
1353	CEX	STA	SFLAG		1353
1354		JMP*	CONSW		1354
1355	*				1355
1356	S1SET	EQU	*	DATA SWITCH SET*DISPLAY REQUESTED	1356
1357		LDA	SFLAG	CHECK 1'ST ENTRY	1357
1358		JANZ	NOTFST		1358
1359		INR	SFLAG		1359
1360		OME	CES,GSWORD		1360
1361		JMP*	CONSW		1361
1362	NOTFST	CIA	CES	CONSOLE SETTING	1362
1363		ORA	CSWORD	SET SETTINGS	1363
1364		STA	CSWORD		1364
1365		JMP*	CONSW		1365
1366	*				1366
1367	S2SET	EQU	*	DATA SWITCH RESET REQUESTED	1367

1368	LDA	SFLAG	1 ST ENTRY	1368
1369	JANZ	GETSWR		1369
1370	OAR	CES	CLEAR CONSOLE REGISTER	1370
1371	INCR	1	SET ENTRY FLAG	1371
1372	JMP	CEX		1372
1373	GETSWR CIA	CES	CONSOLE SETTING	1373
1374	ORA	SWRST		1374
1375	STA	SWRST		1375
1376	CPA			1376
1377	ANA	CSWORD	RESET SETTINGS	1377
1378	STA	CSWORD		1378
1379	JMP*	CONSW		1379
1380	EJEC			1380
1381	***** TABLE 1 *****			1381
1382	***** ASCII TO HOLLERITH *****			1382
1383	***** CARD*CODE *****			1383
1384	CDCODE DATA	69	WORD COUNT	1384
1385	HEX	8,1,1,0	HT (HORIZONTAL TAB) 0211	1385
1386	HEX	4,2,1,0	RES (RESTORE)	1386
1387	HEX	4,1,1,0	NL (NEW LINE) 0215	1387
1388	HEX	4,0,9,0	BS (BACKSPACE) 0337	1388
1389	HEX	2,1,1,0	LF (LINE FEED) 0212	1389
1390	HEX	0,1,1,0	RS (READER STOP)	1390
1391	HEX	0,0,0,0	(BLANK) 0240	1391
1392	HEX	8,8,2,0	(CENT)	1392
1393	HEX	8,4,2,0	° (PERIOD) 0256	1393
1394	HEX	8,2,2,0	<	1394
1395	HEX	8,1,2,0	(	1395
1396	HEX	8,0,A,0	+	1396
1397	HEX	8,0,6,0	(LOGICAL OR)	1397
1398	HEX	8,0,0,0	6 0246	1398
1399	HEX	4,8,2,0	0241	1399
1400	HEX	4,4,2,0	\$ 0244	1400
1401	HEX	4,2,2,0	° 0252	1401
1402	HEX	4,1,2,0	) 0251	1402
1403	HEX	4,0,A,0	0273	1403
1404	HEX	4,0,6,0	(LOGICAL NOT)	1404
1405	HEX	4,0,0,0	- (DASH) 0255	1405
1406	HEX	3,0,0,0	/ 0257	1406
1407	HEX	2,4,2,0	, (COMMA) 0254	1407
1408	HEX	2,2,2,0	8 0245	1408
1409	HEX	2,1,2,0	(UNDERSCORE)	1409
1410	HEX	2,0,A,0	> 0276	1410
1411	HEX	2,0,6,0	? 0277	1411
1412	HEX	0,8,2,0	: 0272	1412
1413	HEX	0,4,2,0	# 0243	1413
1414	HEX	0,2,2,0	@ 0300	1414
1415	HEX	0,1,2,0	' (APOSTROPHE) 0247	1415
1416	HEX	0,0,A,0	= 0275	1416
1417	HEX	0,0,6,0	" 0242	1417
1418	HEX	9,0,0,0	A 0301	1418
1419	HEX	8,8,0,0	B 0302	1419
1420	HEX	8,4,0,0	C 0303	1420
1421	HEX	8,2,0,0	D 0304	1421
1422	HEX	8,1,0,0	E 0305	1422
1423	HEX	8,0,8,0	F 0306	1423
1424	HEX	8,0,4,0	G 0307	1424

1425	HEX	8,0,2,0	H	0310	1425
1426	HEX	8,0,1,0	I	0311	1426
1427	HEX	5,0,0,0	J	0312	1427
1428	HEX	4,8,0,0	K	0313	1428
1429	HEX	4,4,0,0	L	0314	1429
1430	HEX	4,2,0,0	M	0315	1430
1431	HEX	4,1,0,0	N	0316	1431
1432	HEX	4,0,8,0	O	0317	1432
1433	HEX	4,0,4,0	P	0320	1433
1434	EJEC				1434
1435	HEX	4,0,2,0	Q	0321	1435
1436	HEX	4,0,1,0	R	0322	1436
1437	HEX	2,8,0,0	S	0323	1437
1438	HEX	2,4,0,0	T	0324	1438
1439	HEX	2,2,0,0	U	0325	1439
1440	HEX	2,1,0,0	V	0326	1440
1441	HEX	2,0,8,0	W	0327	1441
1442	HEX	2,0,4,0	X	0330	1442
1443	HEX	2,0,2,0	Y	0331	1443
1444	HEX	2,0,1,0	Z	0332	1444
1445	HEX	2,0,0,0	0	0260	1445
1446	HEX	1,0,0,0	1	0261	1446
1447	HEX	0,8,0,0	2	0262	1447
1448	HEX	0,4,0,0	3	0263	1448
1449	HEX	0,2,0,0	4	0264	1449
1450	HEX	0,1,0,0	5	0265	1450
1451	HEX	0,0,8,0	6	0266	1451
1452	HEX	0,0,4,0	7	0267	1452
1453	HEX	0,0,2,0	8	0270	1453
1454	HEX	0,0,1,0	9	0271	1454
1455	HEX	0,0,0,0	(BLANK)	0240	1455
1456	EJEC				1456
1457	*****	*****	*****	*****	1457
1458	*****	*****	*****	*****	1458
1459	CPCODE	DATA	69	WORD COUNT	1459
1460	HEX	4,1,0,0	HT (HORIZONTAL TAB)	0211	1460
1461	HEX	0,5,0,0	RES (RESTORE)		1461
1462	HEX	8,1,0,0	NL (NEW LINE)	0215	1462
1463	HEX	1,1,0,0	BS (BACKSPACE)	0337	1463
1464	HEX	0,3,0,0	LF (LINE FEED)	0212	1464
1465	HEX	0,9,0,0	RS (READER STOP)		1465
1466	HEX	2,1,0,0	(BLANK)	0240	1466
1467	HEX	0,2,0,0	(CENT)		1467
1468	HEX	0,0,0,0	. (PERIOD)	0256	1468
1469	HEX	0,E,0,0	<	0274	1469
1470	HEX	F,E,0,0	(	0250	1470
1471	HEX	D,A,0,0	+	0253	1471
1472	HEX	C,6,0,0	(LOGICAL OR)		1472
1473	HEX	4,4,0,0	&	0246	1473
1474	HEX	4,2,0,0		0241	1474
1475	HEX	4,0,0,0	\$	0244	1475
1476	HEX	D,6,0,0	*	0252	1476
1477	HEX	F,6,0,0	)	0251	1477
1478	HEX	D,2,0,0	:	0273	1478
1479	HEX	F,2,0,0	(LOGICAL NOT)		1479
1480	HEX	8,4,0,0	- (DASH)	0255	1480
1481	HEX	B,C,0,0	/	0257	1481

1482	HEX	8,0,0,0	,	(COMMA)	0254	1482
1483	HEX	0,6,0,0	8		0245	1483
1484	HEX	B,E,0,0		(UNDERSCORE)		1484
1485	HEX	4,6,0,0	>		0276	1485
1486	HEX	8,6,0,0	?		0277	1486
1487	HEX	8,2,0,0	:		0272	1487
1488	HEX	C,0,0,0	#		0243	1488
1489	HEX	0,4,0,0	@		0300	1489
1490	HEX	E,6,0,0	'	(APOSTROPHE)	0247	1490
1491	HEX	C,2,0,0	=		0275	1491
1492	HEX	E,2,0,0	"		0242	1492
1493	HEX	3,C,0,0	A		0301	1493
1494	HEX	1,8,0,0	B		0302	1494
1495	HEX	1,C,0,0	C		0303	1495
1496	HEX	3,0,0,0	D		0304	1496
1497	HEX	3,4,0,0	E		0305	1497
1498	HEX	1,0,0,0	F		0306	1498
1499	HEX	1,4,0,0	G		0307	1499
1500	HEX	2,4,0,0	H		0310	1500
1501	HEX	2,0,0,0	I		0311	1501
1502	HEX	7,C,0,0	J		0312	1502
1503	HEX	5,8,0,0	K		0313	1503
1504	HEX	5,C,0,0	L		0314	1504
1505	HEX	7,0,0,0	M		0315	1505
1506	HEX	7,4,0,0	N		0316	1506
1507	HEX	5,0,0,0	O		0317	1507
1508	HEX	5,4,0,0	P		0320	1508
1509	EJEC					1509
1510	HEX	6,4,0,0	Q		0321	1510
1511	HEX	6,0,0,0	R		0322	1511
1512	HEX	9,8,0,0	S		0323	1512
1513	HEX	9,C,0,0	T		0324	1513
1514	HEX	8,0,0,0	U		0325	1514
1515	HEX	8,4,0,0	V		0326	1515
1516	HEX	9,0,0,0	W		0327	1516
1517	HEX	9,4,0,0	X		0330	1517
1518	HEX	A,4,0,0	Y		0331	1518
1519	HEX	A,0,0,0	Z		0332	1519
1520	HEX	C,4,0,0	0		0260	1520
1521	HEX	F,C,0,0	1		0261	1521
1522	HEX	D,8,0,0	2		0262	1522
1523	HEX	D,C,0,0	3		0263	1523
1524	HEX	F,0,0,0	4		0264	1524
1525	HEX	F,4,0,0	5		0265	1525
1526	HEX	D,0,0,0	6		0266	1526
1527	HEX	D,4,0,0	7		0267	1527
1528	HEX	E,4,0,0	8		0270	1528
1529	HEX	E,0,0,0	9		0271	1529
1530	HEX	2,1,0,0		(BLANK)	0240	1530
1531	EJEC					1531
1532	*****			CARD CODE TO ASCII	*****	1532
1533	* ASCII	DATA	69	SYMBOL	CARD CODE	1533
1534	ASCII	DATA	0211	WORD COUNT		1534
1535		DATA	0215	HT	8110	1535
1536		DATA	0337	RES	4210	1536
1537		DATA		NL	4110	1537
1538		DATA		BS	4090	1538

1539	DATA	0212	LF	2110
1540	DATA		RS	0110
1541	DATA	0240	BLANK	0000
1542	DATA		CENT	8820
1543	DATA	0256	.	8420
1544	DATA	0274	<	8220
1545	DATA	0250	(	8120
1546	DATA	0253	+	80A0
1547	DATA		OR	8060
1548	DATA	0246	&	8000
1549	DATA	0241		4820
1550	DATA	0244	\$	4420
1551	DATA	0252	.	4220
1552	DATA	0251	)	4120
1553	DATA	0273	:	40A0
1554	DATA		NOT	4060
1555	DATA	0255	=	4000
1556	DATA	0257	/	3000
1557	DATA	0254	.	2420
1558	DATA	0245	8	2220
1559	DATA		U=SCORE	2120
1560	DATA	0276	>	20A0
1561	DATA	0277	?	2060
1562	DATA	0272	:	0820
1563	DATA	0243	#	0420
1564	DATA	0300	@	0220
1565	DATA	0247	'	0120
1566	DATA	0275	=	00A0
1567	DATA	0242	"	0060
1568	DATA	0301	A	9000
1569	DATA	0302	B	8800
1570	DATA	0303	C	8400
1571	DATA	0304	D	8200
1572	DATA	0305	E	8100
1573	DATA	0306	F	8080
1574	DATA	0307	G	8040
1575	DATA	0310	H	8020
1576	DATA	0311	I	8010
1577	DATA	0312	J	5000
1578	DATA	0313	K	4800
1579	DATA	0314	L	4400
1580	DATA	0315	M	4200
1581	DATA	0316	N	4100
1582	DATA	0317	O	4080
1583	DATA	0320	P	4040
1584	EJEC			
1585	DATA	0321	Q	4020
1586	DATA	0322	R	4010
1587	DATA	0323	S	2800
1588	DATA	0324	T	2400
1589	DATA	0325	U	2200
1590	DATA	0326	V	2100
1591	DATA	0327	W	2080
1592	DATA	0330	X	2040
1593	DATA	0331	Y	2020
1594	DATA	0332	Z	2010
1595	DATA	0260	O	2000

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1596	DATA	0261	1	1000
1597	DATA	0262	2	0800
1598	DATA	0263	3	0400
1599	DATA	0264	4	0200
1600	DATA	0265	5	0100
1601	DATA	0266	6	0080
1602	DATA	0267	7	0040
1603	DATA	0270	8	0020
1604	DATA	0271	9	0010
1605	DATA	0240	BLANK	0000

EJEC

***** TABLE 2 *****
***** V-72 PRINTER CODE *****

1609	PV72 DATA	061	F1
1610	DATA	062	F2
1611	DATA	063	F3
1612	DATA	064	F4
1613	DATA	065	F5
1614	DATA	066	F6
1615	DATA	067	F7
1616	DATA	070	F8
1617	DATA	071	F9
1618	DATA	060	F0
1619	DATA	075	7E
1620	DATA	044	5B
1621	DATA	056	4B
1622	DATA	047	7D
1623	DATA	054	6B
1624	DATA	051	5D
1625	DATA	055	60
1626	DATA	050	4D
1627	DATA	053	4E
1628	DATA	057	61
1629	DATA	052	5C
1630	DATA	046	50
1631	DATA	0112	D1
1632	DATA	0113	D2
1633	DATA	0114	D3
1634	DATA	0115	D4
1635	DATA	0116	D5
1636	DATA	0117	D6
1637	DATA	0120	D7
1638	DATA	0121	D8
1639	DATA	0122	D9
1640	DATA	0105	C5
1641	DATA	0107	C7
1642	DATA	0127	E6
1643	DATA	0130	E7
1644	DATA	0131	E8
1645	DATA	0132	E9
1646	DATA	0101	C1
1647	DATA	0102	C2
1648	DATA	0103	C3
1649	DATA	0104	C4
1650	DATA	0106	C6
1651	DATA	0110	C8
1652	DATA	0111	C9

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1653	DATA	0123	E2	S	1653
1654	DATA	0124	E3	T	1654
1655	DATA	0125	E4	U	1655
1656	DATA	0126	E5	V	1656
1657	EJEC				1657
1658	***** 1130 PRINTER CODE *****				1658
1659	P1130	HEX	F,1,0,0	1	1659
1660		HEX	F,2,0,0	2	1660
1661		HEX	F,3,0,0	3	1661
1662		HEX	F,4,0,0	4	1662
1663		HEX	F,5,0,0	5	1663
1664		HEX	F,6,0,0	6	1664
1665		HEX	F,7,0,0	7	1665
1666		HEX	F,8,0,0	8	1666
1667		HEX	F,9,0,0	9	1667
1668		HEX	F,0,0,0	0	1668
1669		HEX	7,E,0,0	=	1669
1670		HEX	5,B,0,0	\$	1670
1671		HEX	4,B,0,0	,	1671
1672		HEX	7,D,0,0	!	1672
1673		HEX	6,B,0,0	,	1673
1674		HEX	5,D,0,0	)	1674
1675		HEX	6,0,0,0	-	1675
1676		HEX	4,D,0,0	(	1676
1677		HEX	4,E,0,0	+	1677
1678		HEX	6,1,0,0	/	1678
1679		HEX	5,C,0,0	*	1679
1680		HEX	5,0,0,0	&	1680
1681		HEX	D,1,0,0	J	1681
1682		HEX	D,2,0,0	K	1682
1683		HEX	D,3,0,0	L	1683
1684		HEX	D,4,0,0	M	1684
1685		HEX	D,5,0,0	N	1685
1686		HEX	D,6,0,0	O	1686
1687		HEX	D,7,0,0	P	1687
1688		HEX	D,8,0,0	Q	1688
1689		HEX	D,9,0,0	R	1689
1690		HEX	C,5,0,0	E	1690
1691		HEX	C,7,0,0	G	1691
1692		HEX	E,6,0,0	W	1692
1693		HEX	E,7,0,0	X	1693
1694		HEX	E,8,0,0	Y	1694
1695		HEX	E,9,0,0	Z	1695
1696		HEX	C,1,0,0	A	1696
1697		HEX	C,2,0,0	B	1697
1698		HEX	C,3,0,0	C	1698
1699		HEX	C,4,0,0	D	1699
1700		HEX	C,6,0,0	F	1700
1701		HEX	C,8,0,0	H	1701
1702		HEX	C,9,0,0	I	1702
1703		HEX	E,2,0,0	S	1703
1704		HEX	E,3,0,0	T	1704
1705		HEX	E,4,0,0	U	1705
1706		HEX	E,5,0,0	V	1706
1707		EJEC			1707
1708	*	DEVICE-FUNCTION TABLE			1708
1709	DFT	EQU	*		1709

1710	*	D.C.	0000	NO DEVICE	1710
1711		DATA	RENTER	NO FUNCTION CODE	1711
1712		DATA	RENTER	NO FUNCTION CODE	1712
1713		DATA	RENTER	NO FUNCTION CODE	1713
1714		DATA	SENSEI	SENSE INTERRUPT	1714
1715		DATA	RENTER	NO FUNCTION CODE	1715
1716		DATA	RENTER	NO FUNCTION CODE	1716
1717		DATA	RENTER	NO FUNCTION CODE	1717
1718		DATA	SENDEV	SENSE DUMMY DEVICE	1718
1719	*				1719
1720	*	D.C.	0001	CONSOLE KEYBOARD AND PRINTER	1720
1721		DATA	RENTER	NO FUNCTION CODE	1721
1722		DATA	TTYW	WRITE SINGLE WORD	1722
1723		DATA	KEYBR	READ SINGLE WORD	1723
1724		DATA	SENSEI	SENSE INTERRUPT	1724
1725		DATA	KEYBC	CONTROL	1725
1726		DATA	RENTER	NO FUNCTION CODE	1726
1727		DATA	RENTER	NO FUNCTION CODE	1727
1728		DATA	TKSD	SENSE DEVICE STATUS	1728
1729	*				1729
1730	*	D.C.	0010	1442 CARD READER-PUNCH	1730
1731		DATA	RENTER	NO FUNCTION CODE	1731
1732		DATA	CPW	WRITE SINGLE WORD	1732
1733		DATA	CRR	READ SINGLE WORD	1733
1734		DATA	SENSEI	SENSE INTERRUPT	1734
1735	CRPJMP	DATA	CRPC	CONTROL	1735
1736		DATA	RENTER	NO FUNCTION CODE	1736
1737		DATA	RENTER	NO FUNCTION CODE	1737
1738		DATA	CRPSD	SENSE DEVICE STATUS	1738
1739	*				1739
1740	*	D.C.	0011	PAPER TAPE READER-PUNCH	1740
1741		DATA	RENTER	NO FUNCTION CODE	1741
1742		DATA	PTW	WRITE SINGLE WORD	1742
1743		DATA	PTR	READ SINGLE WORD	1743
1744		DATA	SENSEI	SENSE INTERRUPT	1744
1745		DATA	PTC	CONTROL	1745
1746		DATA	RENTER	NO FUNCTION CODE	1746
1747		DATA	RENTER	NO FUNCTION CODE	1747
1748		DATA	PTSD	SENSE DEVICE STATUS	1748
1749	*				1749
1750	*	D.C.	0100	CPU SINGLE DISK	1750
1751		DATA	RENTER	NO FUNCTION CODE	1751
1752		DATA	RENTER	NO FUNCTION CODE	1752
1753		DATA	RENTER	NO FUNCTION CODE	1753
1754		DATA	SENSEI	SENSE INTERRUPT	1754
1755		DATA	DKC	CONTROL	1755
1756		DATA	DKIW	INITIATE WRITE	1756
1757		DATA	DKIR	INITIATE READ	1757
1758		DATA	DKSD	SENSE DEVICE STATUS	1758
1759		EJEC			1759
1760	*	D.C.	0101	1627 PLOTTER	1760
1761		DATA	RENTER	NO FUNCTION CODE	1761
1762		DATA	RENTER	NO FUNCTION CODE	1762
1763		DATA	RENTER	NO FUNCTION CODE	1763
1764		DATA	SENSEI	SENSE INTERRUPT	1764
1765		DATA	RENTER	NO FUNCTION CODE	1765
1766		DATA	RENTER	NO FUNCTION CODE	1766

1767		DATA	RENTER	NO FUNCTION CODE	1767
1768		DATA	SENDEV	SENSE DUMMY DEVICE	1768
1769	*				1769
1770	*	D.C.	0110	1132 PRINTER	1770
1771		DATA	RENTER	NO FUNCTION CODE	1771
1772		DATA	RENTER	NO FUNCTION CODE	1772
1773		DATA	LPEMIT	READ EMITTER	1773
1774		DATA	SENSEI	SENSE INTERRUPT	1774
1775		DATA	LPC	CONTROL	1775
1776		DATA	RENTER	NO FUNCTION CODE	1776
1777		DATA	RENTER	NO FUNCTION CODE	1777
1778		DATA	LPSD	SENSE DEVICE STATUS	1778
1779	*				1779
1780	*	D.C.	0111	CONSOLE ENTRY SWITCHES	1780
1781		DATA	RENTER	NO FUNCTION CODE	1781
1782		DATA	RENTER	NO FUNCTION CODE	1782
1783		DATA	CESR	READ SINGLE WORD	1783
1784		DATA	SENSEI	SENSE INTERRUPT	1784
1785		DATA	RENTER	NO FUNCTION CODE	1785
1786		DATA	RENTER	NO FUNCTION CODE	1786
1787		DATA	RENTER	NO FUNCTION CODE	1787
1788		DATA	SENDEV	SENSE DUMMY DEVICE	1788
1789	*				1789
1790	*	D.C.	1000	1231 OPTICAL MARK PAGE READER	1790
1791		DATA	RENTER	NO FUNCTION CODE	1791
1792		DATA	RENTER	NO FUNCTION CODE	1792
1793		DATA	RENTER	NO FUNCTION CODE	1793
1794		DATA	SENSEI	SENSE INTERRUPT	1794
1795		DATA	RENTER	NO FUNCTION CODE	1795
1796		DATA	RENTER	NO FUNCTION CODE	1796
1797		DATA	RENTER	NO FUNCTION CODE	1797
1798		DATA	SENDEV	SENSE DUMMY DEVICE	1798
1799	*				1799
1800	*	D.C.	1001	2501 CARD READER	1800
1801		DATA	RENTER	NO FUNCTION CODE	1801
1802		DATA	RENTER	NO FUNCTION CODE	1802
1803		DATA	RENTER	NO FUNCTION CODE	1803
1804		DATA	SENSEI	SENSE INTERRUPT	1804
1805		DATA	RENTER	NO FUNCTION CODE	1805
1806		DATA	RENTER	NO FUNCTION CODE	1806
1807	CRJUMP	DATA	CRIR	INITIATE CARD READER	1807
1808		DATA	CRSD	CARD READER SENSE DEVICE	1808
1809		EJEC			1809
1810	*	D.C.	1010	SYNCHRONOUS COMMUNICATION ADAPTER	1810
1811		DATA	RENTER	NO FUNCTION CODE	1811
1812		DATA	RENTER	NO FUNCTION CODE	1812
1813		DATA	RENTER	NO FUNCTION CODE	1813
1814		DATA	SENSEI	SENSE INTERRUPT	1814
1815		DATA	RENTER	NO FUNCTION CODE	1815
1816		DATA	RENTER	NO FUNCTION CODE	1816
1817		DATA	RENTER	NO FUNCTION CODE	1817
1818		DATA	SENDEV	SENSE DUMMY DEVICE	1818
1819	*				1819
1820	*	D.C.	1011	NOT USED	1820
1821		DATA	RENTER	NO FUNCTION CODE	1821
1822		DATA	RENTER	NO FUNCTION CODE	1822
1823		DATA	RENTER	NO FUNCTION CODE	1823

1824		DATA	SENSEI	SENSE INTERRUPT	1824
1825		DATA	RENTER	NO FUNCTION CODE	1825
1826		DATA	RENTER	NO FUNCTION CODE	1826
1827		DATA	RENTER	NO FUNCTION CODE	1827
1828		DATA	SENDEV	SENSE DUMMY DEVICE	1828
1829	*				1829
1830	*	D.C.	1100	IBM SYSTEM /7	1830
1831		DATA	RENTER	NO FUNCTION CODE	1831
1832		DATA	RENTER	NO FUNCTION CODE	1832
1833		DATA	RENTER	NO FUNCTION CODE	1833
1834		DATA	SENSEI	SENSE INTERRUPT	1834
1835		DATA	RENTER	NO FUNCTION CODE	1835
1836		DATA	RENTER	NO FUNCTION CODE	1836
1837		DATA	RENTER	NO FUNCTION CODE	1837
1838		DATA	SENDEV	SENSE DUMMY DEVICE	1838
1839	*				1839
1840	*	D.C.	1101	MAG TAPE 1	1840
1841		DATA	RENTER	NO FUNCTION CODE	1841
1842		DATA	RENTER	NO FUNCTION CODE	1842
1843		DATA	RENTER	NO FUNCTION CODE	1843
1844		DATA	SENSEI	SENSE INTERRUPT	1844
1845		DATA	MT1C	MAG TAPE 1 CONTROL	1845
1846		DATA	MT1IW	INITIATE WRITE	1846
1847		DATA	MT1IR	INITIATE READ	1847
1848		DATA	MT1SD	SENSE DEVICE STATUS	1848
1849	*				1849
1850	*	D.C.	1110	MAG TAPE 2	1850
1851		DATA	RENTER	NO FUNCTION CODE	1851
1852		DATA	RENTER	NO FUNCTION CODE	1852
1853		DATA	RENTER	NO FUNCTION CODE	1853
1854		DATA	SENSEI	SENSE INTERRUPT	1854
1855		DATA	MT2C	MAG TAPE 2 CONTROL	1855
1856		DATA	MT2IW	INITIATE WRITE	1856
1857		DATA	MT2IR	INITIATE READ	1857
1858		DATA	MT2SD	SENSE DEVICE STATUS	1858
1859		EJEC			1859
1860	*	D.C.	1111	NO DEVICE	1860
1861		DATA	RENTER	NO FUNCTION CODE	1861
1862		DATA	RENTER	NO FUNCTION CODE	1862
1863		DATA	RENTER	NO FUNCTION CODE	1863
1864		DATA	SENSEI	SENSE INTERRUPT	1864
1865		DATA	RENTER	NO FUNCTION CODE	1865
1866		DATA	RENTER	NO FUNCTION CODE	1866
1867		DATA	RENTER	NO FUNCTION CODE	1867
1868		DATA	SENDEV	SENSE DUMMY DEVICE	1868
1869	*				1869
1870	*	D.C.	10000	NO DEVICE	1870
1871		DATA	RENTER	NO FUNCTION CODE	1871
1872		DATA	RENTER	NO FUNCTION CODE	1872
1873		DATA	RENTER	NO FUNCTION CODE	1873
1874		DATA	SENSEI	SENSE INTERRUPT	1874
1875		DATA	RENTER	NO FUNCTION CODE	1875
1876		DATA	RENTER	NO FUNCTION CODE	1876
1877		DATA	RENTER	NO FUNCTION CODE	1877
1878		DATA	SENDEV	SENSE DUMMY DEVICE	1878
1879	*				1879
1880	*	D.C.	10001	2310/11 DISK STORAGE, DR 1	1880

1881	DATA	RENTER	NO FUNCTION CODE	1881	
1882	DATA	RENTER	NO FUNCTION CODE	1882	
1883	DATA	RENTER	NO FUNCTION CODE	1883	
1884	DATA	SENSEI	SENSE INTERRUPT	1884	
1885	DATA	RENTER	NO FUNCTION CODE	1885	
1886	DATA	RENTER	NO FUNCTION CODE	1886	
1887	DATA	RENTER	NO FUNCTION CODE	1887	
1888	DATA	SENDEV	SENSE DUMMY DEVICE	1888	
1889	•			1889	
1890	•	D.C.	10010	2310/11 DISK STORAGE, DR 2	1890
1891	DATA	RENTER	NO FUNCTION CODE	1891	
1892	DATA	RENTER	NO FUNCTION CODE	1892	
1893	DATA	RENTER	NO FUNCTION CODE	1893	
1894	DATA	SENSEI	SENSE INTERRUPT	1894	
1895	DATA	RENTER	NO FUNCTION CODE	1895	
1896	DATA	RENTER	NO FUNCTION CODE	1896	
1897	DATA	RENTER	NO FUNCTION CODE	1897	
1898	DATA	SENDEV	SENSE DUMMY DEVICE	1898	
1899	•			1899	
1900	•	D.C.	10011	2310/11 DISK STORAGE, DR 3	1900
1901	DATA	RENTER	NO FUNCTION CODE	1901	
1902	DATA	RENTER	NO FUNCTION CODE	1902	
1903	DATA	RENTER	NO FUNCTION CODE	1903	
1904	DATA	SENSEI	SENSE INTERRUPT	1904	
1905	DATA	RENTER	NO FUNCTION CODE	1905	
1906	DATA	RENTER	NO FUNCTION CODE	1906	
1907	DATA	RENTER	NO FUNCTION CODE	1907	
1908	DATA	SENDEV	SENSE DUMMY DEVICE	1908	
1909	EJEC			1909	
1910	•	D.C.	10100	2310/11 DISK STORAGE, DR 4	1910
1911	DATA	RENTER	NO FUNCTION CODE	1911	
1912	DATA	RENTER	NO FUNCTION CODE	1912	
1913	DATA	RENTER	NO FUNCTION CODE	1913	
1914	DATA	SENSEI	SENSE INTERRUPT	1914	
1915	DATA	RENTER	NO FUNCTION CODE	1915	
1916	DATA	RENTER	NO FUNCTION CODE	1916	
1917	DATA	RENTER	NO FUNCTION CODE	1917	
1918	DATA	SENDEV	SENSE DUMMY DEVICE	1918	
1919	•			1919	
1920	•	D.C.	10101	1403 PRINTER	1920
1921	DATA	RENTER	NO FUNCTION CODE	1921	
1922	DATA	RENTER	NO FUNCTION CODE	1922	
1923	DATA	RENTER	NO FUNCTION CODE	1923	
1924	DATA	SENSEI	SENSE INTERRUPT	1924	
1925	DATA	RENTER	NO FUNCTION CODE	1925	
1926	DATA	RENTER	NO FUNCTION CODE	1926	
1927	DATA	RENTER	NO FUNCTION CODE	1927	
1928	DATA	SENDEV	SENSE DUMMY DEVICE	1928	
1929	•			1929	
1930	•	D.C.	10110	2311 DISK STORAGE, DR2, DK5	1930
1931	DATA	RENTER	NO FUNCTION CODE	1931	
1932	DATA	RENTER	NO FUNCTION CODE	1932	
1933	DATA	RENTER	NO FUNCTION CODE	1933	
1934	DATA	SENSEI	SENSE INTERRUPT	1934	
1935	DATA	RENTER	NO FUNCTION CODE	1935	
1936	DATA	RENTER	NO FUNCTION CODE	1936	
1937	DATA	RENTER	NO FUNCTION CODE	1937	

1938		DATA	SENDEV	SENSE DUMMY DEVICE	1938
1939	*				1939
1940	*	D.C.	10111	2311 DISK STORAGE, DR2, DK 1-5	1940
1941		DATA	RENT	NO FUNCTION CODE	1941
1942		DATA	RENT	NO FUNCTION CODE	1942
1943		DATA	RENT	NO FUNCTION CODE	1943
1944		DATA	SENSEI	SENSE INTERRUPT	1944
1945		DATA	RENT	NO FUNCTION CODE	1945
1946		DATA	RENT	NO FUNCTION CODE	1946
1947		DATA	RENT	NO FUNCTION CODE	1947
1948		DATA	SENDEV	SENSE DUMMY DEVICE	1948
1949	*				1949
1950	*	D.C.	11000	NO DEVICE	1950
1951		DATA	RENT	NO FUNCTION CODE	1951
1952		DATA	RENT	NO FUNCTION CODE	1952
1953		DATA	RENT	NO FUNCTION CODE	1953
1954		DATA	SENSEI	SENSE INTERRUPT	1954
1955		DATA	RENT	NO FUNCTION CODE	1955
1956		DATA	RENT	NO FUNCTION CODE	1956
1957		DATA	RENT	NO FUNCTION CODE	1957
1958		DATA	SENDEV	SENSE DUMMY DEVICE	1958
1959		EJEC			1959
1960	*	D.C.	11001	2250 DISPLAY	1960
1961		DATA	RENT	NO FUNCTION CODE	1961
1962		DATA	RENT	NO FUNCTION CODE	1962
1963		DATA	RENT	NO FUNCTION CODE	1963
1964		DATA	SENSEI	SENSE INTERRUPT	1964
1965		DATA	RENT	NO FUNCTION CODE	1965
1966		DATA	RENT	NO FUNCTION CODE	1966
1967		DATA	RENT	NO FUNCTION CODE	1967
1968		DATA	SENDEV	SENSE DUMMY DEVICE	1968
1969	*				1969
1970	CPW	EQU	*	PUNCH ONE CARD COLUMN	1970
1971	PTW	EQU	*	PUNCH ONE CHARACTER - PAPER TAPE	1971
1972	PTR	EQU	*	READ ONE CHARACTER - PAPER TAPE	1972
1973	PTC	EQU	*	CONTROL - PAPER TAPE	1973
1974		JMP	RENT	RETURN TO 1130 MODE	1974
1975	PTSD	EQU	*	SENSE PAPER TAPE STATUS	1975
1976	SENDEV	TZB		== 06 0	1976
1977		EJEC			1977
1978	LDWCS	EQU	*	LOAD WRITABLE CONTROL STORE	1978
1979	*			*****	1979
1980	*				1980
1981	*			LOAD CENTRAL CONTROL STORE	1981
1982		LDA	CS	GET CENTRAL CONTROL STORE FUNCTION	1982
1983		TZB			1983
1984		OAR	WCS	OUTPUT FUNCTION WORD	1984
1985		SEN	WCS, *	WCS BUSY ?	1985
1986	LCCSLP	LDAE	WCSBUF, BREG		1986
1987		OAR	WCS+1	OUTPUT TO CONTROL STORE	1987
1988		IBR			1988
1989		BT	073, LCCSLP	JUMP IF BIT 11 = 0, < 512 WORDS XFERRED	1989
1990	*			LOAD DECODER A	1990
1991	*			*****	1991
1992	*				1992
1993		LDA	DCSA	GET DECODER "A" FUNCTION	1993
1994		OAR	WCS	OUTPUT FUNCTION WORD	1994

1995		SEN	WCS,*	WCS BUSY ?	1995
1996	LDALP	LDAE	WCSBUF,BREG		1996
1997		OAR	WCS+1	OUTPUT TO CONTROL STORE	1997
1998		IBR			1998
1999		BT	064,LDALP	JUMP IF BIT 4 = 0, < 16 WORDS	1999
2000	*			LOAD DECODER B	2000
2001	*			*****	2001
2002	*				2002
2003		LDA	DCSB	GET DECODER "B" FUNCTION	2003
2004		OAR	WCS	OUTPUT FUNCTION WORD	2004
2005		SEN	WCS,*	WCS BUSY ?	2005
2006	LDBLP	LDAE	WCSBUF,BREG		2006
2007		OAR	WCS+1	OUTPUT TO CONTROL STORE	2007
2008		IBR			2008
2009		BT	065,LDBLP	JUMP IF BIT 5 = 0, < 16 WORDS	2009
2010		EJEC			2010
2011	SYSST	EQU	*	LOAD INTERRUPT TRAP LOCATIONS	2011
2012	*			*****	2012
2013		LDX	INTERS		2013
2014		LDB	BS9	START OF PIM TRAP LOCATIONS	2014
2015	LDLOOP	LDA	0,XREG		2015
2016		STA	0,BREG		2016
2017		IXR			2017
2018		IBR			2018
2019		BT	065,LDLOOP	BRANCH IF (BREG)<0140	2019
2020		LDA	0,XREG		2020
2021		STA	0		2021
2022		LDA	1,XREG		2022
2023		STA	1		2023
2024		LDA	2,XREG		2024
2025		STA	044		2025
2026		LDA	3,XREG		2026
2027		STA	045		2027
2028	* * * * *				2028
2029		LDXI	SYSGO	GET MESSAGE ADDRESS	2029
2030		LDB	FIVE	GET WORD COUNT	2030
2031	TYPELP	LDA	0,XREG	GET TWO CHARACTERS	2031
2032		SOF			2032
2033	TYPNXT	LRLA	8	PUT CHARACTER IN POSITION	2033
2034		SEN	0100+TTY,*+4	READY TO WRITE?	2034
2035		JMP	*+2	WAIT	2035
2036		OAR	TTY	OUTPUT CHARACTER	2036
2037		JOF	TYPNXT		2037
2038		IXR			2038
2039		DBR			2039
2040		JBNZ	TYPELP		2040
2041		EJEC		LOAD MODE EMULATION PROGRAM	2041
2042	*			*****	2042
2043	*				2043
2044	LDMODE	CALL	CONSW	READ CONSOLE SWITCHES	2044
2045		SEN	0300+CR,LDMODE	WHILE WAITING FOR HOPPER, READ CONSOLE	2045
2046		SEN	0600+CR,*+4	READY?	2046
2047		JMP	LDMODE	READ CONSOLE WHILE WAITING	2047
2048		LDX	CDCNT		2048
2049		EXC	CR	INITIALIZE READER	2049
2050		EXC	0200+CR	READ A CARD	2050
2051	CDSSEN	SEN	0100+CR,*+4	CHARACTER READY?	2051

2052	JMP	*-2	WAIT	2052
2053	CIA	CR	CHAR TO A	2053
2054	LLSR	7	TRANSFORM (RIGHT LONG SHFT 7)	2054
2055	ASRB	1	INTO	2055
2056	LRLA	3	LOAD	2056
2057	LLRL	8	MODE	2057
2058	STAE	BIAS+80,XREG	STORE IN MAIN MEM	2058
2059	JXR		INCREMENT ADDRESS	2059
2060	JXNZ	CDSN		2060
2061	*			2061
2062	BCS	PAGE1+C	CLEAR PRINTER BUFFER	2062
2063	MZE	ZERO		2063
2064	PZE	PRBUF		2064
2065	DATA	122	WORD COUNT	2065
2066	*			2066
2067	EXC	0100+PIM	CLEAR PIM#1 INTERRUPT REGISTER	2067
2068	EXC	0101+PIM	CLEAR PIM#2 INTERRUPT REGISTER	2068
2069	OME	PIM,PIMSKO	LOAD PIM #1 MASK REGISTER	2069
2070	OME	RTC,TIME	SET CLOCK INTERVAL	2070
2071	EXC	0600+RTC	INITIALIZE VARIABLE INTERVAL COUNTER	2071
2072	JMP	IENTER	GO START IBM-1130 EMULATION	2072
2073	EJEC			2073
2074	ISTRAP EQU	*	INTERRUPT SERVICE TRAPS	2074
2075	*		*****	2075
2076	*			2076
2077	*		PIM #1	2077
2078	JMPM	BIC1CP	BIC #1 COMPLETE	2078
2079	JMPM	BIC2CP	BIC #2 COMPLETE	2079
2080	JMPM	DKQCP	DISK "0" SEEK COMPLETE	2080
2081	JMPM	DKQCP	DISK "1" SEEK COMPLETE	2081
2082	NOP		UASC RECEIVE DATA READY	2082
2083	NOP			2083
2084	NOP		UASC XMIT DATA READY	2084
2085	NOP			2085
2086	JMPM	KEYBI	TELETYPE READ READY	2086
2087	JMPM	TTYWI	TELETYPE WRITE READY	2087
2088	*		PIM #2	2088
2089	NOP		MAG TAPE MOTION STOP	2089
2090	NOP			2090
2091	JMPM	CRBRI	CARD READER CHARACTER READY	2091
2092	NOP		END OF CARD	2092
2093	NOP			2093
2094	NOP			2094
2095	NOP			2095
2096	NOP			2096
2097	NOP			2097
2098	NOP			2098
2099	NOP			2099
2100	NOP			2100
2101	NOP			2101
2102	NOP			2102
2103	NOP			2103
2104	*			2104
2105	JMPM	INTSW	CONSOLE INTERRUPT SWITCH	2105
2106	JMPM	RTCI	REAL TIME CLOCK INTERRUPT	2106
2107	EJEC			2107
2108	RDWCS EQU	*	READ CENTRAL CONTROL STORE	2108

2109	*			*****	2109
2110	*				2110
2111		EXC	0404+PIM	DISABLE ALL PIMS	2111
2112		EXC	0400+RTC	INITIALIZE REAL-TIME CLOCK	2112
2113		LDA	CS	GET CENTRAL CONTROL STORE FUNCTION	2113
2114		TZB			2114
2115		OAR	WCS	OUTPUT FUNCTION WORD	2115
2116		SEN	WCS,*	WCS BUSY ?	2116
2117	RCCSLP	CIA	WCS+1	INPUT FROM CONTROL STORE	2117
2118		STAE	WCSBUF,BREG		2118
2119		IBR			2119
2120		BT	073,RCCSLP	JUMP IF BIT 11 = 0 , < 512 WORDS XFERRD	2120
2121	*			READ DECODER A	2121
2122	*			*****	2122
2123	*				2123
2124		LDA	DCSA	GET DECODER "A" FUNCTION	2124
2125		OAR	WCS	OUTPUT FUNCTION WORD	2125
2126		SEN	WCS,*	WCS BUSY ?	2126
2127	RDALP	CIA	WCS+1	INPUT FROM CONTROL STORE	2127
2128		STAE	WCSBUF,BREG		2128
2129		IBR			2129
2130		BT	064,RDALP	JUMP IF BIT 4 = 0, < 16 WORDS	2130
2131	*			READ DECODER B	2131
2132	*			*****	2132
2133	*				2133
2134		LDA	DCSB	GET DECODER "B" FUNCTION	2134
2135		OAR	WCS	OUTPUT FUNCTION WORD	2135
2136		SEN	WCS,*	WCS BUSY ?	2136
2137	RDBLP	CIA	WCS+1	INPUT FROM CONTROL STORE	2137
2138		STAE	WCSBUF,BREG		2138
2139		IBR			2139
2140		BT	065,RDBLP	JUMP IF BIT 5 = 0, < 16 WORDS	2140
2141		EJEC			2141
2142	LDISK	EQU	*	LOAD DISK WITH 1130 EMULATION	2142
2143	*			*****	2143
2144	*				2144
2145		EXC	0400+DISK	INITIALIZE DISK CONTROLLER	2145
2146		EXC	0200+DISK	TRACK SEEK MODE	2146
2147		LDA	BS1	SET BIT 14 FOR REMOVABLE DISK	2147
2148		OAR	DISK	SEEK TRACK "0"	2148
2149		EXC	BIC1+1	INITIALIZE BIC	2149
2150		TZA			2150
2151		STA	0	SET HALT	2151
2152		OAR	BIC1	OUTPUT STARTING ADDRESS	2152
2153		OME	BIC1+1,SYSH1	OUTPUT ENDING ADDRESS	2153
2154		SEN	DISK,*+4	SEEK COMPLETE ?	2154
2155		JMP	*-2		2155
2156		EXC	0300+DISK	SELECT SECTOR MODE	2156
2157		LDA	BS1	SET BIT 14 FOR REMOVABLE DISK	2157
2158		IAR		SECTOR "1"	2158
2159		OAR	DISK	SECTOR SELECT	2159
2160		EXC	BIC1	ACTIVATE BIC	2160
2161		EXC	0100+DISK	SELECT WRITE/CONNECT BIC	2161
2162		SEN	BIC1,*+4	BIC NOT BUSY?	2162
2163		JMP	*-2	WAIT FOR BIC COMPLETE	2163
2164		SEN	0500+DISK,LDISK	ERROR?	2164
2165		JMP	0	HALT	2165

2166	SYSGO	DATA	'IBM-1130'		2166
2167		DATA	0106612	CR=LF	2167
2168	*	*	*	*	2168
2169	*	*	*	*	2169
2170	WCSBUF	BSS	1		2170
2171	SYSEND	EQU	*=1	SYSTEM END	2171
2172		EJEC			2172
2173		END	RDWCS		2173

CPU:0533 CTP:048 SUPS:9.923

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PRESS 09/15/77

CPU:1.788 CTP:014 SUPS:7.308

@HDG,P

SOURCE DECK: 491

620

@PRT,S PFPFILE,620
FURPUR 27-S 08/16/78 10:14:13