

# Peripheral Device Control

1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25  
26  
27  
28  
29  
30  
31  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60  
61  
62  
63  
64  
65  
66  
67  
68  
69  
70  
71  
72  
73  
74  
75  
76  
77  
78  
79  
80  
81  
82  
83  
84  
85  
86  
87  
88  
89  
90  
91  
92  
93  
94  
95  
96  
97  
98  
99  
100  
101  
102  
103  
104  
105  
106  
107  
108  
109  
110  
111  
112  
113

TITLE \* OX-10 63k MF-CP/M BIOS4 M1.3 \*

BASIC I/O SYSTEM FOR OX-10 CP/M V2.2  
( RS 232 C , LIGHTPEN , MASK1 )

created OX-10 63k MF-CP/M BIOS4  
M1.1 1983. 3. 10 by Yuicji Ushiyama  
Chisato Kobayashi  
updated M1.2 3. 18  
updated M1.3 4. 29

.PHASE 3000H  
.Z80

PUBLIC RSIOX, RSOPEN, RSCLOSE, RSINST, RSOUTST, RSIN, RSOUT, ORSI40  
PUBLIC MASK1  
PUBLIC LIGHTPEN  
PUBLIC LPENIR  
PUBLIC INTX1, INTX2, INTX3, INTX4, INTX5, INTX6, INTX7  
PUBLIC MRSP, STS  
EXTRN SRMBANK, ST50ML  
EXTRN SYSPIR, STCKIR  
EXTRN OINT1, OINT2, OINT3, OINT4, OINT5, OINT6, OINT7

CP/M SYSTEM FUNDAMENTAL CONSTANTS

F600 BIOS EQU JF800H ;63k  
FE00 PRMTAB EQU OFE00H ;

interface to BIOS1

F65D LOADX EQU BIOS+3\*31  
F660 STORX EQU BIOS+3\*32  
F663 LDIRX EQU BIOS+3\*33  
F675 LDAXX EQU BIOS+3\*39  
F678 STAXX EQU BIOS+3\*40

CONTROL CHARACTER DEFINITION

000D CR EQU 0DH  
000E SO EQU 0EH  
000F SI EQU 0FH  
000A LF EQU 0AH  
001B ESC EQU 1BH

SUBTTL RS 232 C CONTROLER. V01/L01

3000  
3000 21 7000  
3003 22 FE65  
3006 21 0200  
3009 22 FE67  
300C 21 FE60  
300F 11 FE69  
3012 01 0004  
3015 ED B0  
3017 3E FF  
3019 32 FE6D  
301C 06 10  
301E 21 FE65  
3021 18 18  
RSOPEN: LD HL, MRSEBUF ;main RS buffer address  
LD (MRSDATA), HL  
LD HL, MRSSIZE ;main RS buffer size  
LD (MRSDATA+2), HL  
LD HL, RSDAT  
LD DE, MRSDATA+4  
LD BC, 4  
LDIR  
LD A, 0FFH  
LD (RSV), A  
LD B, 10H  
LD HL, MRSDATA  
JR RSIOXM  
RSCLOSE: LD B, 20H  
DB 011H ;skip next instruction  
RSINST: LD B, 30H  
DB 011H ;skip next instruction  
RSOUTST: LD B, 40H  
DB 011H ;skip next instruction  
RSIN: LD B, 50H  
RSIOM: PUSH BC  
LD B, 0F0H  
CALL RSIOXM  
CALL Z, RSOPEN  
POP BC  
RSIOMO: LD HL, MRSDATA ;set RSIOX parameter

114	303B		RSIOXM:			
115	303B	ED 73 3696	LD	(SVSPRS), SP		
116	303F	31 381B	LD	SP, STCKRS		I
117	3042	FB	EI			I
118	3043	AF	XOR	A		I
119	3044	32 FE64	LD	(RSDFOP), A	:default RS buffer	
120	3047	32 FEF2	LD	(MBANKD), A	:parameter block memory bank	
121	304A	3E 20	LD	A, 20H		
122	304C	32 381B	LD	(RSXBANK), A	:buffer memory bank	
123	304F	18 2A	JR	RSIOXX		
124						
125						
126	3051		RSOUT:			I
127	3051	C5	PUSH	BC		I
128	3052		RSOUT1:			I
129	3052	CD 3029	CALL	RSOUTST		I
130	3055	20 FB	JR	NZ, RSOUT1	:Busy.	I
131	3057	C1	POP	BC		I
132	3058	06 60	LD	B, 60H		I
133	305A	18 DC	JR	RSIOM0	:EXECUTE RSOUT.	I
134						
135						
136						
137						
138						
139						
140						
141			*			
142			*****			
143			:* RS 232 C CONTROL ROUTINE *			
144			*****			
145			:			
146	305C		RSIOX:			I
147	305C	ED 73 3696	LD	(SVSPRS), SP		I
148	3060	31 381B	LD	SP, STCKRS		I
149	3063	FB	EI			I
150						
151	3064	3E FF	LD	A, -1	:use option buffer	
152	3066	32 FE64	LD	(RSDFOP), A		
153						
154	3069	C5	PUSH	BC		
155	306A	E5	PUSH	HL		
156	306B	2A FE9E	LD	HL, (MEMPTR)		
157	306E	7E	LD	A, (HL)	:memory bank on call	
158	306F	32 381B	LD	(RSXBANK), A	:buffer memory bank	
159	3072	CD 0000*	CALL	SRMBANK	:set memory bank no. to C	
160	3075	79	LD	A, C		
161	3076	32 FEF2	LD	(MBANKD), A	:save destination memory bank	
162	3079	E1	POP	HL		
163	307A	C1	POP	BC	:restore input parameter	
164						
165						
166						
167	307B		RSIOXX:			
168	307B	22 368B	LD	(SAVEHL), HL		
169						
170	307E	78	LD	A, B	: CHECK FUNCTION.	
171	307F	E6 F0	AND	0F0H		
172	3081	FE F0	CP	0F0H	: SENS ?	
173	3083	CA 365C	JP	Z, SENS	: YES.	
174	3086	0F	RRCA			
175	3087	0F	RRCA			
176	3088	0F	RRCA		: FUNCTION CODE / 8.	
177	3089	3D	DEC	A		
178	308A	3D	DEC	A	: A = B/16*2-2.	
179	308B	FE 12	CP	90H/8	: PARAMETER ERROR ?	
180	308D	38 05	JR	C, RSIOX00	: NO.	
181						
182			:	parameter error		
183						
184	308F		PERR:			
185	308F	3E 04	LD	A, 4		
186	3091	C3 3261	JP	RTN	: ERROR RETURN.	
187						
188						
189						
190	3094		RSIOX00:			
191	3094	E5	PUSH	HL		
192	3095	21 30A2	LD	HL, RSJMP	: MAKE JUMP ADDRESS.	
193	3098	16 00	LD	D, 0		
194	309A	5F	LD	E, A		
195	309B	19	ADD	HL, DE		
196	309C	5E	LD	E, (HL)		
197	309D	23	INC	HL		
198	309E	56	LD	D, (HL)		
199	309F	EB	EX	DE, HL		
200	30A0	E3	EX	(SP), HL		
201	30A1	C9	RET		: EXECUTE RSIOX FUNCTION.	
202						
203						
204						
205	30A2		RSJMP:		: RS 232 C FUNCTION JUMP TABLE.	
206	30A2	30B4	DW	OPEN		
207	30A4	33D7	DW	CLOSE		
208	30A6	33FF	DW	INSTS		
209	30A8	3446	DW	OUTSTS		
210	30AA	346D	DW	GET		
211	30AC	352E	DW	PUT		
212	30AE	35B4	DW	CTLIN		
213	30B0	3607	DW	SETCTL		
214	30B2	3643	DW	ERSTS		
215						
216						
217						
218						
219						
220						
221						
222						
223	30B4		OPEN:	RS 232 C OPEN *		
224						
225						
226	30B4	CD 3698	CALL	ISET	: SET IX. (IX = CONTROL TABLE)	

```

227 30B7 D2 308F JP NC,PERR ;
228 30BA A7 AND A ;
229 30BB CA 30D6 JP Z,OPN020 ; MAIN RS OPEN.
230 30BE DD 7E 05 LD A,(IX+FLAG) ;
231 30C1 A7 AND A ;
232 30C2 28 05 JR Z,OPN010 ; MULTI OPEN ?
233 30C4 3E 02 LD A,2 ; NO.
234 30C6 C3 3261 JP RTN ; SET MULTI OPEN CODE.
235 ; ; ERROR RETURN.
236 30C9 ;
237 30C9 CD 36B4 OPN010: CALL RSCHK ;check status.
238 30CC 3E FE LD A,OFEH ;
239 30CE DD BE 05 CP (IX+FLAG) ;opened ?
240 30D1 3E 01 LD A,1 ;set parameter code (error)
241 30D3 C2 3261 JP NZ,RTN ;No. return. ( no option board )
242 ;
243 30D6 ;
244 OPN020: ;
245 30D6 3A FEF2 LD A,(MBANKD)
246 30D9 F5 PUSH AF ;save memory bank on call
247 30DA 32 FEF1 LD (MBANKS),A
248 30DD 3E FF LD A,-1 ;system bank
249 30DF 32 FEF2 LD (MBANKD),A
250 30E2 2A 368B LD HL,(SAVEHL)
251 30E5 11 368D LD DE,SVARA
252 30E8 01 0009 LD BC,9
253 30EB CD F663 CALL LDIRX ;move RSIOX parameter to SVPARA
254 30EE F1 POP AF
255 30EF 32 FEF2 LD (MBANKD),A ;restore memory bank on call
256 ;
257 30F2 AF XOR A ;
258 30F3 DD 77 15 LD (IX+SISO),A ;clear GET SI/SO status
259 30F6 DD 77 17 LD (IX+LOCNT+0),A ;clear LOC.
260 30F9 DD 77 18 LD (IX+LOCNT+1),A ;
261 30FC 3D LD A ;
262 30FD DD 77 16 DEC A ;A=-1
263 ; ;set PUT SI/SO status
264 3100 FD 21 368D LD IY,SVARA
265 ;
266 3104 FD 6E 00 LD L,(IY+BADR)
267 3107 FD 66 01 LD H,(IY+BADR+1) ; HL = BUFFER ADDR.
268 310A FD 4E 02 LD C,(IY+BSIZ)
269 310D FD 46 03 LD B,(IY+BSIZ+1) ; BC = BUFFER SIZE.
270 3110 DD 75 06 LD (IX+GETP),L ; SET GET POINTER.
271 3113 DD 74 07 LD (IX+GETP+1),H ;
272 3116 DD 75 08 LD (IX+PUTP),L ; set PUT pointer.
273 3119 DD 74 09 LD (IX+PUTP+1),H ;
274 311C DD 75 0A LD (IX+BUFA),L ; set BUFFER ADDRESS.
275 311F DD 74 0B LD (IX+BUFA+1),H ;
276 3122 DD 71 0C LD (IX+BUFS),C ; set BUFFER SIZE.
277 3125 DD 70 0D LD (IX+BUFS+1),B ;
278 3128 FD 7E 04 LD A,(IY+BR) ; SET BIT RATE.
279 312B FE 10 CP 10H ; CHECK PARAMETER.
280 312D D2 308F JP NC,PERR ; PARAMETER ERROR.
281 3130 5F LD E,A ; KEEP BIT RATE.
282 3131 AF XOR A ;
283 3132 DD BE 00 CP (IX+ID) ; MAIN BOARD ?
284 3135 20 06 JR NZ,OPN043 ; NO.
285 3137 7B LD A,E ;
286 3138 FE 0F CP OFH ; 19200 BPS ?
287 313A CA 308F JP Z,PERR ; YES. PARAMETER ERROR.
288 ;
289 313D ;
290 313D CB 03 OPN043: RLC E ;
291 313F AF XOR A ;
292 3140 57 LD D,A ; DE=(bit rate parameter)/2
293 3141 DD BE 00 CP (IX+ID) ; MAIN BOARD ?
294 3144 20 05 JR NZ,OPN045 ; NO.
295 3146 21 3735 LD HL,RATEM ; main board bit rate table
296 3149 18 03 JR OPN047 ;
297 ;
298 314B ;
299 314B 21 3753 OPN045: LD HL,RATEO ;option board bit rate table
300 314E ;
301 314E 19 OPN047: ADD HL,DE ;
302 314F 5E LD E,(HL) ; BPS L.
303 3150 23 INC HL ;
304 3151 56 LD D,(HL) ; BPS H.
305 3152 ED 53 3726 LD (CLKRT),DE ; SET BPS.
306 3156 FD 7E 07 LD A,(IY+SB) ; SET STOP BIT.
307 3159 E6 03 AND 03H ;
308 315B 07 RLCA ;
309 315C 07 RLCA ;
310 315D FD 86 06 OR (IY+PRT) ; add parity.
311 3160 E6 0F OR OFH ;
312 3162 F6 40 OR 40H ;clock rate = X 16.
313 3164 32 372E LD (WR4D),A ;set WR4 data.
314 ;
315 3167 FD 7E 05 LD A,(IY+DCHR) ;make bit/character.
316 316A E6 03 AND 03H ;
317 316C 47 LD B,A ;keep.
318 316D 4F LD C,A ;
319 316E 0C LD C,A ;
320 316F 3E 0F INC C ;shift count
321 3171 ;
322 3171 07 OPN046: RLCA ;
323 3172 0D DEC C ;
324 3173 20 FC JR NZ,OPN046 ;
325 3175 F6 0F OR OFH ;
326 3177 DD 77 14 LD (IX+CHRMSK),A ;
327 317A 78 LD A,B ;
328 317B FE 02 CP 2 ;7bit/char ?
329 317D FD 7E 08 LD A,(IY+SPARAM) ;
330 3180 28 04 JR Z,OPN049 ;7bit/char.
331 3182 F6 0C OR 0CH ;not SHIFT IN/OUT.
332 3184 18 02 JR OPN050 ;
333 3186 ;
334 3186 F6 08 OPN049: OR ;
335 3188 ;
336 3188 E6 1C OPN050: AND ;
337 318A EE 1C XOR 1CH ;clear other flag.
338 318C DD 77 0F LD (IX+SKX),A ;reverse flag.
339 318F CB 67 BIT XXON,A ;store SI/SO,KANJI SHIFT, X-ON/X-OFF
;X-ON ?

```





```

566 32FF                                ORSRTN4:                                ;
567 32FF                                AND    RXCA                                ;data available ?
568 3301 C2 327A                          JP     NZ,ORSI05                          ;yes. get next data.
569 3304 03 20                            LD     A,20H                              ;NORMAL EOI
570 3306 D3 08                            OUT    (08H),A                            ;MASTER
571 3308 D3 0C                            OUT    (0CH),A                            ;SLAVE 8259.
572 330A E1                                POP    HL                                ;
573 330B D1                                POP    DE                                ;
574 330C C1                                POP    BC                                ;
575 330D F1                                POP    AF                                ;
576 330E D9                                EXX                                        ;
577 330F 08                                EX     AF,AF'                             ;
578 3310 FD E1                          POP    IY                                ;
579 3312 DD E1                          POP    IX                                ;
580 3314 C1                                POP    BC                                ;
581 3315 ED 7B 0000*                    LD     SP,(SVSP1R)                       ;
582 3319 C9                                RET                                        ;
583                                     ;
584                                     ;
585 331A                                ORSI40:                                ;
586 331A C5                                PUSH   BC                                ;
587 331B CD 35C4                          CALL   CTL00                              ; READ CONTROL LINE.
588 331E C1                                POP    BC                                ;
589 331F E6 88                            AND    88H                                ;
590 3321 DD B6 05                          OR     (IX+FLAG)                          ;
591 3324 DD 77 05                          LD     (IX+FLAG),A                        ; SET CONTROL LINE FLAG.
592 3327 AF                                XOR    A                                  ;
593 3328 DD BE 00                          CP     (IX+ID)                            ;main board ?
594 332B 20 01                          JR     NZ,ORSI50                          ;no.
595 332D 0D                                DEC    C                                  ;
596 332E                                ORSI50:                                ;
597 332E 0D                                DEC    C                                  ; C = DATA REG.
598 332F ED 40                            IN     B,(C)                              ;read received data.
599 3331 DD 7E 14                          LD     A,(IX+CHRMSK)                     ;received data mask.
600 3334 A0                                AND    B                                  ;mask data bit
601 3335 DD CB 0F 66                      BIT    XXON,(IX+SKX)                     ;X-ON ?
602 3339 28 12                          JR     Z,ORSI54                          ;No.
603 333B                                ORSI51:                                ;
604 333B FE 13                            CP     CTRLS                              ;CTRL-S ?
605 333D 20 05                          JR     NZ,ORSI52                          ;No.
606 333F DD CB 0F FE                      SET    RCTRLS,(IX+SKX)                  ;Set received CTRL-S Flag
607 3343 C9                                RET                                        ;Return.
608                                     ;
609                                     ;
610 3344                                ORSI52:                                ;
611 3344 FE 11                            CP     CTRLQ                              ;CTRL-Q ?
612 3346 20 05                          JR     NZ,ORSI54                          ;No.
613 3348 DD CB 0F BE                      RES    RCTRLQ,(IX+SKX)                  ;Reset CTRL-S FLAG.
614 334C C9                                RET                                        ;Return.
615                                     ;
616                                     ;
617 334D                                ORSI54:                                ;
618 334D DD CB 05 4E                      BIT    RSFULL,(IX+FLAG)                  ;buffer full ?
619 3351 28 05                          JR     Z,ORSI55                          ;no.
620 3353 DD CB 05 D6                      SET    BFOVER,(IX+FLAG)                  ;buffer overflow.
621 3357 C9                                RET                                        ;
622                                     ;
623 3358                                ORSI55:                                ;
624 3358 LD L,(IX+PUTP)                          ;
625 335B DD 6E 08                          LD     H,(IX+PUTP+1)                      ; HL = PUT POINTER.
626 335E E5                                PUSH   HL                                ;
627 3361 E5                                INC    HL                                ;
628 3362 EB                                PUSH   HL                                ;
629 3362 EX DE,HL                          ;
630 3365 DD 4E 0A                          LD     C,(IX+BUFA)                        ;
631 3368 DD 6E 0B                          LD     B,(IX+BUFA+1)                      ; BC = BUFFER TOP ADDRESS.
632 336B DD 6E 0C                          LD     L,(IX+BUFS)                        ;
633 336E DD 66 0D                          LD     H,(IX+BUFS+1)                      ; HL = BUFFER SIZE.
634 336F 09                                ADD    HL,BC                              ; HL = BUFFER END ADDR + 1.
635 3371 EB                                EX     DE,HL                              ; DE = BUFFER END ADDR + 1.
636 3373 ED 52                            OR     A                                  ; CY OFF.
637 3374 20 02                          SBC   HL,DE                              ; BUFFER END ?
638 3376 69                                POP    HL                                ;
639 3377 60                                JR     NZ,ORSI60                          ; NO.
640 3378 LD L,C                                ;
641 3378 LD H,B                                ; HL = BUFFER TOP ADDRESS.
642 3378                                ORSI60:                                ;
643 3378 PUSH HL                                ;
644 3379 LD E,(IX+GETP)                          ;
645 337C DD 5E 06                          LD     D,(IX+GETP+1)                      ;
646 337F B7                                OR     A                                  ; CLEAR CY.
647 3380 ED 52                            SBC   HL,DE                              ; BUFFER FULL ?
648 3382 E1                                POP    HL                                ;
649 3383 20 04                          JR     NZ,ORSI70                          ; NO.
650 3385 DD CB 05 CE                      SET    RSFULL,(IX+FLAG)                  ; BUFFER FULL.
651 3389                                ORSI70:                                ;
652 3389 LD L,(IX+PUTP),L                      ; RESTORE PUT POINTER.
653 338C DD 74 09                          LD     (IX+PUTP+1),H                      ;
654                                     ;
655 338F E1                                POP    HL                                ;store address
656 3390 F5                                PUSH   AF                                ;Save received data.
657 3391 08                                EX     AF,AF'                             ;A' ← data
658 3392 3A 381B                          LD     A,(RSXBANK)                       ;
659 3395 CD F678                          CALL   STAXX                              ;put received data
660                                     ;
661 3398 F1                                POP    AF                                ;Get received data.
662 3399 DD 6E 17                          LD     L,(IX+LOCNT+0)                     ;Get LOC.
663 339C DD 66 18                          LD     H,(IX+LOCNT+1)                     ;
664 339F DD CB 0F 56                      BIT    SHIFT,(IX+SKX)                     ;Check shift mode.
665 33A3 28 08                          JR     Z,ORSI74                          ;Non shift mode.
666 33A5 FE 0E                            CP     SO                                  ;SHIFT OUT Code ?
667 33A7 28 05                          JR     Z,ORSI76                          ;Yes.
668 33A9 FE 0F                            CP     SI                                  ;SHIFT IN Code ?
669 33AB 28 01                          JR     Z,ORSI76                          ;Yes.
670 33AD                                ORSI74:                                ;
671 33AD INC HL                                ;Increment LOC.
672 33AE                                ORSI76:                                ;
673 33AE LD L,(IX+LOCNT+0),L                  ;Save LOC.
674 33B1 DD 74 18                          LD     (IX+LOCNT+1),H                      ;
675 33B4                                OSRI78:                                ;
676 33B4 BIT XXON,(IX+SKX)                       ;X-ON ?
677 33B8 RET Z                                ;No. RETURN.
678 33B9 CD 36EC                          CALL   LOC                                ;Check LOC.
679 33BC DD 6E 10                          LD     L,(IX+XONS+0)                      ;
680 33BF LD H,(IX+XONS+1)                       ;

```

```

679 33C2 B7 OR A ;CY Off. I
680 33C3 ED 42 SBC HL,BC ;(Buffer size - Buffer size/4)-LOC I
681 33C5 D0 RET NC ; ; I
682 33C6 ; ; ; I
683 33C6 CD 36C8 ORS180: CALL WRSTS ;Check PUT buffer. I
684 33C9 28 FB JR Z,ORS180 ;PUT buffer full. I
685 33CB DD 4E 03 LD C,(IX+RSDREG) ;Get DATA Reg. I
686 33CE 3E 13 LD A,CTRLS ; ; I
687 33D0 ED 79 OUT (C),A ;put CTRL-S I
688 33D2 DD CB 0F F6 SET SCTRLS,(IX+SKX) ;Set Control S SEND flag. I
689 33D6 ; ; ; I
690 33D6 C9 ORS190: RET ; RETURN. . . . . I
691 ; ; ; I
692 ; ; ; I
693 ; ; ; I
694 ; ; ; I
695 ; ; ; I
696 ; ; ; I
697 ; ; ; I
698 ; ; ; I
699 33D7 ; ; ; I
700 ; ; ; I
701 ; ; ; I
702 33D7 CD 3698 ; ; ; I
703 33DA D2 308F ; ; ; I
704 33DD DD 4E 04 ; ; ; I
705 33E0 3E 01 ; ; ; I
706 33E2 ED 79 ; ; ; I
707 33E4 ED 78 ; ; ; I
708 33E6 E6 01 ; ; ; I
709 33E8 20 07 ; ; ; I
710 ; ; ; I
711 33EA 06 09 ; ; ; I
712 33EC CD 0000* CLS010: CALL ST50ML ; WAIT 450 ML. ;
713 33EF 10 FB DJNZ CLS010 ; ;
714 ; ; ; I
715 33F1 ; ; ; I
716 33F1 CD 0000* CLS020: CALL ST50ML ; ;
717 33F4 3E 18 LD A,018H ; CHANNEL RESET. ;
718 33F6 ED 79 OUT (C),A ; ;
719 33F8 AF XOR A ; ;
720 33F9 DD 77 05 LD (IX+FLAG),A ; CLEAR CONTROL FLAG. ;
721 33FC C3 3685 JP RSOVER ;RET return. ;
722 ; ; ; I
723 ; ; ; I
724 ; ; ; I
725 ; ; ; I
726 ; ; ; I
727 ; ; ; I
728 ; ; ; I
729 ; ; ; I
730 33FF ; ; ; I
731 ; ; ; I
732 ; ; ; I
733 33FF CD 3698 ; ; ; I
734 3402 D2 308F ; ; ; I
735 3405 28 33 ; ; ; I
736 3407 ; ; ; I
737 3407 DD E5 INST10: PUSH IX ; ;
738 3409 E1 POP HL ;IX copied to HL ;
739 340A 11 0005 LD DE,FLAG ; ;
740 340D 19 ADD HL,DE ; SET RETURN INFORMATION. ;
741 ; ; ; I
742 340E ; ; ; I
743 340E AF ; ; ; I
744 340F F3 ; ; ; I
745 3410 DD 4E 17 ; ; ; I
746 3413 DD 46 18 ; ; ; I
747 3416 FB ; ; ; I
748 3417 B9 ; ; ; I
749 3418 20 03 ; ; ; I
750 341A B8 ; ; ; I
751 341B 28 20 ; ; ; I
752 341D ; ; ; I
753 341D 3D INST30: DEC A ; ;
754 341E ; ; ; I
755 341E 5F RSRTN: LD E,A ; KEEP RETURN CODE. ;
756 341F AF XOR A ; Z FLAG = 1. ;
757 3420 7B LD A,E ; RESTORE REG A. ;
758 3421 F5 PUSH AF ;save return code ;
759 3422 C5 PUSH BC ;save received data bytes ;
760 3423 3E FF LD A,-1 ;system bank ;
761 3425 32 FEF1 LD (MBANKS),A ; ;
762 3428 ED 5B 368B LD DE,(SAVEHL) ; ;
763 342C 01 0009 LD BC,9 ; ;
764 342F CD F663 CALL LDIRX ; ;
765 3432 C1 ; ; ; I
766 3433 F1 POP BC ;restore received data count ;
767 3434 2A 368B POP AF ;restore return code ;
768 3437 C3 3685 LD HL,(SAVEHL) ; ;
769 ; ; ; I
770 ; ; ; I
771 ; ; ; I
772 ; ; ; I
773 343A ; ; ; I
774 343A 3E 03 INST80: LD A,3 ; SET RETURN CODE. ;
775 343D A7 AND A ;Zflag = 0 ;
776 343D 01 0000 INST90: LD BC,0 ;LOC=0 ;
777 3440 2A 368B LD HL,(SAVEHL) ; ;
778 3443 C3 3685 JP RSOVER ;error return ;
779 ; ; ; I
780 ; ; ; I
781 ; ; ; I
782 ; ; ; I
783 ; ; ; I
784 ; ; ; I
785 3446 ; ; ; I
786 ; ; ; I
787 ; ; ; I
788 3446 CD 3698 ; ; ; I
789 3449 D2 308F ; ; ; I
790 344C 28 EC ; ; ; I
791 ; ; ; I

```









```

1131
1132 3607
1133
1134
1135 3607 CD 3698
1136 360A D2 308F
1137 360D 28 F2
1138
1139 360F DD 7E 0E
1140 3612 E6 03
1141 3614 0F
1142 3615 0F
1143 3616 57
1144 3617 0F
1145 3618 5F
1146 3619 79
1147 361A DD 4E 04
1148 361D E6 03
1149 361F CB 47
1150 3621 28 04
1151
1152 3623 E6 02
1153 3625 F6 80
1154 3627
1155 3627 B3
1156 3628 F6 08
1157 362A 1E 05
1158 362C F3
1159 362D ED 59
1160 362F ED 79
1161 3631 78
1162 3632 E6 20
1163 3634 B2
1164 3635 F6 01
1165 3637 1E 03
1166 3639 ED 59
1167 363B ED 79
1168 363D FB
1169 363E 5F
1170 363F AF
1171 3640 7B
1172 3641 18 42
1173
1174
1175
1176
1177
1178
1179
1180
1181 3643
1182
1183
1184 3643 CD 3698
1185 3646 D2 308F
1186 3649 DD 7E 05
1187 364C 28 B3
1188
1189 364E 5F
1190 364F E6 03
1191 3651 DD 77 05
1192 3654 7B
1193 3655 E8 FC
1194 3657 5F
1195 3658 AF
1196 3659 7B
1197 365A 18 29
1198
1199
1200
1201
1202
1203
1204
1205
1206 365C
1207
1208
1209
1210 365C CD 3698
1211 365F D2 308F
1212 3662 AF
1213 3663 DD BE 00
1214 3666 20 05
1215 3668 DD BE 05
1216 366B 28 18
1217
1218
1219 366D
1220 366D 3C
1221 366E DD A6 05
1222 3671 20 0F
1223 3673 CD 36B4
1224 3676 AF
1225 3677 DD BE 05
1226 367A DD 77 05
1227 367D 20 05
1228 367F 3C
1229 3680 18 02
1230
1231 3682
1232 3682 3E 02
1233 3684
1234 3684 A7
1235
1236
1237
1238 3685
1239 3685 F3
1240 3686 ED 7B 3696
1241 368A C9
1242
1243

*****
SETCTL: ; SET CONTROL LINE *
*****
*
CALL ISET ; SET IX.
JP NC,PERR ;
JR Z,CTL90 ;Not opened.
;
LD A,(IX+BITPC) ; GET BIT/CHAR.
AND 03H ;
RRCA ;
RRCA ;
LD D,A ; KEEP BIT/CHAR.
RRCA ;
LD E,A ; KEEP BIT/CHAR.
LD A,C ; GET CONTROL DATA.
LD C,(IX+RSCREG) ; GET CONTROL REG.
AND 03H ; RTS. DTR ONLY.
BIT 0,A ; SET DTR ?
JR Z,SETC010 ; NO.
;
AND 02H ; CLEAR DTR DATA.
OR 80H ; SET DTR BIT.
SETC010:
OR E ; SET BIT/CHAR.
OR 08H ; TX ENABLE.
LD E,05H ;
DI ;
OUT (C),E ; SELECT WR5.
OUT (C),A ; SET WR5. (DTR OR RTS)
LD A,B ;
AND 020H ; AUTO ENABLE ONLY.
OR D ; SET BIT/CHAR.
OR 01H ; RX ENABLE.
LD E,03H ;
OUT (C),E ; SELECT WR3.
OUT (C),A ;
EI ;
LD E,A ;
XOR A ; Zflag=1
LD A,E ;
JR RSOVER ;
;
;
;
;
*****
ERSTS: ; READ ERROR STATUS *
*****
*
CALL ISET ; SET IX.
JP NC,PERR ;
LD A,(IX+FLAG) ;
JR Z,CTL90 ;NOT OPENed.
;
LD E,A ;keep.
AND 03H ;keep open flag & buffer full flag.
LD (IX+FLAG),A ;clear error flag.
LD A,E ;restore.
AND 0FCH ; CLEAR OPEN,GET.
LD E,A ;
XOR A ;Zflag=1
LD A,E ;
JR RSOVER ;
;
;
;
;
*****
SENS: ; SENSE RS STATUS *
*****
*
CALL ISET ;
JP NC,PERR ;
XOR A ;
CP (IX+ID) ; MAIN BOARD RS ?
JR NZ,SENS10 ; NO.
CP (IX+FLAG) ; OPEND ?
JR Z,RSOVER ;Zflag=1
;
;
SENS10:
INC A ; A = 1.
AND (IX+FLAG) ; MULTI OPEN ?
JR NZ,SNSRTN ; YES. ERROR RETURN.
CALL RSCHK ;
XOR A ;
CP (IX+FLAG) ; OPTION BOARD CONNECTED ?
LD (IX+FLAG),A ; CLEAR OPEN FLAG.
JR NZ,SNSRT1 ; YES.
INC A ; A = 1. OPTION NOTHING.
JR SNSRT1 ; RETURN.
;
SNSRTN:
LD A,2 ;set busy
SNSRT1:
AND A ;Zflag=0
JR RSOVER ;
;
;
RSOVER:
DI ;
LD SP,(SVSPRS) ;
RET ;
;
;
;

```



```

1357 36FF DD 66 09 LD H, (IX+PUTP+1) ; HL = PUT POINTER.
1358 3702 DD 5E 06 LD E, (IX+GETP) ;
1359 3705 DD 56 07 LD D, (IX+GETP+1) ; DE = GET POINTER.
1360 3708 B7 OR A ; CY OFF.
1361 3709 ED 52 SBC HL, DE ; PUT POINTER - GET POINTER.
1362 370B 30 14 JR NC, LOCRTN ; RETURN.
1363 370D DD 6E 08 LD L, (IX+PUTP) ;
1364 3710 DD 66 09 LD H, (IX+PUTP+1) ; HL = PUT POINTER.
1365 3713 EB EX DE, HL ;
1366 3714 B7 OR A ; CY OFF.
1367 3715 ED 52 SBC HL, DE ; GET POINTER - PUT POINTER.
1368 3717 EB EX DE, HL ;
1369 3718 DD 6E 0C LD L, (IX+BUFS) ;
1370 371B DD 66 0D LD H, (IX+BUFS+1) ; HL BUFFER SIZE.
1371 371E B7 OR A ;
1372 371F ED 52 SBC HL, DE ;
1373 3721 LOCRTN:
1374 3721 E5 PUSH HL ;
1375 3722 C1 POP BC ;
1376 3723 E1 POP HL ;
1377 3724 D1 POP DE ;
1378 3725 C9 RET ;
1379 ;
1380 ;
1381 ;
1382 ;
1383 ;
1384 ;
1385 ;
1386 ;
1387 ;
1388 ;*
1389 ;*****
1390 ;* RS 232 C DATA AREA ASSING. *
1391 ;*****
1392 ;*
1392 3726 RSDATA:
1393 3726 0000 CLKRT: DW 0 ;CLOCK RATE.
1394 3728 18 D7201: DB 018H ;CHANNEL RESET.
1395 3729 02 DB 002H ;WR2 A.
1396 372A 00 DB 000H ;NON VECT 85 mode.
1397 372B 02 WR2B: DB 002H ;WR2 B.
1398 372C 00 DB 000H ;INT VECTOR.
1399 372D 04 DB 004H ;WR4.
1400 372E 00 WR4D: DB 000H ;USER SELECT. STOP BIT, PARITY.
1401 372F 01 DB 001H ;WR1.
1402 3730 10 DB 010H ;ALL CHARACTER INT.
1403 3731 05 DB 005H ;WR5.
1404 3732 00 WR5D: DB 000H ;USER SELECT. TX BIT RATE.
1405 3733 03 DB 003H ;WR3.
1406 3734 00 WR3D: DB 000H ;USER SELECT. RX BIT RATE.
1407 ;
1408 3735 09C0 RATEM: DW 09C0H ; 50.
1409 3737 0680 DW 0680H ; 75.
1410 3739 046F DW 046FH ; 110.
1411 373B 039C DW 039CH ; 135.
1412 373D 0340 DW 0340H ; 150.
1413 373F 0270 DW 0270H ; 200.
1414 3741 01A0 DW 01A0H ; 300.
1415 3743 0138 DW 0138H ; 400.
1416 3745 00D0 DW 00D0H ; 600.
1417 3747 008B DW 008BH ; 900.
1418 3749 0068 DW 0068H ; 1200.
1419 374B 0045 DW 0045H ; 1800.
1420 374D 0034 DW 0034H ; 2400.
1421 374F 001A DW 001AH ; 4800.
1422 3751 000D DW 000DH ; 9600.
1423 ;
1424 3753 0780 RATEO: DW 0780H ; 50.
1425 3755 0500 DW 0500H ; 75.
1426 3757 0369 DW 0369H ; 110.
1427 3759 02C7 DW 02C7H ; 135.
1428 375B 0280 DW 0280H ; 150.
1429 375D 01E0 DW 01E0H ; 200.
1430 375F 0140 DW 0140H ; 300.
1431 3761 00F0 DW 00F0H ; 400.
1432 3763 00A0 DW 00A0H ; 600.
1433 3765 006B DW 006BH ; 900.
1434 3767 0050 DW 0050H ; 1200.
1435 3769 0035 DW 0035H ; 1800.
1436 376B 0028 DW 0028H ; 2400.
1437 376D 0014 DW 0014H ; 4800.
1438 376F 000A DW 000AH ; 9600.
1439 3771 0005 DW 0005H ;19200.
1440 ;
1441 ;
1442 3773 00 MRSP: DB 000H ;ID.
1443 3774 07 DB 007H ;
1444 3775 06 DB 006H ;
1445 3776 11 DB 011H ;
1446 3777 13 DB 013H ;
1447 3778 00 MRSFLG: DB 000H ;MAIN RS CTRL FLAG.
1448 3779 0000 MGETP: DW 0 ;MAIN RS GET POINTER.
1449 377B 0000 MPUTP: DW 0 ;MAIN RS PUT POINTER.
1450 377D 0000 MBUFA: DW 0 ;MAIN RS BUFFER ADDRESS.
1451 377F 0000 MBUFS: DW 0 ;MAIN RS BUFFER SIZE.
1452 3781 00 DB 0 ;KEEP BIT/CHR.
1453 3782 00 DB 0 ;SI/SO, KSHIFT, X-ON/X-OFF
1454 3783 0000 DW 0 ;X-ON BUFFER SIZE.
1455 3785 0000 DW 0 ;X-OFF BUFFER SIZE.
1456 3787 00 DB 0 ;received data mask.
1457 3788 00 DB 0 ;GET SISO
1458 3789 FF DB -1 ;PUT STS
1459 378A 0000 DW 0 ;LOC.
1460 ;
1461 378C 01 O1A: DB 1 ;ID.
1462 378D AB DB 0ABH ;
1463 378E A8 DB 0A8H ;
1464 378F A4 DB 0A4H ;
1465 3790 A5 DB 0A5H ;
1466 3791 00 O1AFLG: DB 000H ;
1467 3792 0000 O1AGETP: DW 0 ;
1468 3794 0000 O1APUTP: DW 0 ;
1469 3796 0000 O1ABFA: DW 0 ;

```

```

1470 3798 0000 01ABFS: DW 0 ;
1471 379A 00 DB 0 ;KEEP BIT/CHAR.
1472 379B 00 DB 0 ;SI/SO, KSHIFT, X-ON/X-OFF
1473 379C 0000 DW 0 ;X-ON BUFFER SIZE.
1474 379E 0000 DW 0 ;X-OFF BUFFER SIZE.
1475 37A0 00 DB 0 ;received data mask.
1476 37A1 00 DB 0 ;GET SISO
1477 37A2 FF DB -1 ;PUT STS
1478 37A3 0000 DW 0 ;LOC.
1479
1480 37A5 02 01B: DB 2 ; ID.
1481 37A6 A8 DB 0ABH ;
1482 37A7 A9 DB 0A9H ;
1483 37A8 A6 DB 0A6H ;
1484 37A9 A7 DB 0A7H ;
1485 37AA 00 DB 000H ;
1486 37AB 0000 01BFLG: DW 0 ;
1487 37AD 0000 01BGETP: DW 0 ;
1488 37AF 0000 01BPUP: DW 0 ;
1489 37B1 0000 01BBFA: DW 0 ;
1490 37B3 00 01BBFS: DW 0 ;
1491 37B4 00 DB 0 ;KEEP BIT/CHAR.
1492 37B5 0000 DW 0 ;SI/SO, KSHIFT, X-ON/X-OFF
1493 37B7 0000 DW 0 ;X-ON BUFFER SIZE.
1494 37B9 00 DW 0 ;X-OFF BUFFER SIZE.
1495 37BA 00 DB 0 ;received data mask.
1496 37BB FF DB 0 ;GET SISO
1497 37BC 0000 DB -1 ;PUT STS
1498 DW 0 ;LOC.
1499
1500 37BE 03 02A: DB 3 ; ID.
1501 37BF CB DB 0CBH ;
1502 37C0 C8 DB 0C8H ;
1503 37C1 C4 DB 0C4H ;
1504 37C2 C5 DB 0C5H ;
1505 37C3 00 DB 000H ;
1506 37C4 0000 02AFLG: DW 0 ;
1507 37C6 0000 02AGETP: DW 0 ;
1508 37C8 0000 02APUP: DW 0 ;
1509 37CA 0000 02ABFA: DW 0 ;
1510 37CC 00 02ABFS: DW 0 ;
1511 37CD 00 DB 0 ;KEEP BIT/CHAR.
1512 37CE 0000 DW 0 ;SI/SO, KSHIFT, X-ON/X-OFF
1513 37D0 0000 DW 0 ;X-ON BUFFER SIZE.
1514 37D2 00 DW 0 ;X-OFF BUFFER SIZE.
1515 37D3 00 DB 0 ;received data mask.
1516 37D4 FF DB 0 ;GET SISO
1517 37D5 0000 DB -1 ;PUT STS
1518 DW 0 ;LOC.
1519
1520 37D7 04 02B: DB 4 ; ID.
1521 37D8 CB DB 0CBH ;
1522 37D9 C9 DB 0C9H ;
1523 37DA C6 DB 0C6H ;
1524 37DB C7 DB 0C7H ;
1525 37DC 00 DB 000H ;
1526 37DD 0000 02BFLG: DW 0 ;
1527 37DF 0000 02BGETP: DW 0 ;
1528 37E1 0000 02BPUP: DW 0 ;
1529 37E3 0000 02BBFA: DW 0 ;
1530 37E5 00 02BBFS: DW 0 ;
1531 37E6 00 DB 0 ;KEEP BIT/CHAR.
1532 37E7 0000 DW 0 ;SI/SO, KSHIFT, X-ON/X-OFF
1533 37E9 0000 DW 0 ;X-ON BUFFER SIZE.
1534 37EB 00 DW 0 ;X-OFF BUFFER SIZE.
1535 37EC 00 DB 0 ;received data mask.
1536 37ED FF DB 0 ;GET SISO
1537 37EE 0000 DB -1 ;PUT STS
1538 DW 0 ;LOC.
1539
1540 37F0 3773 RTBL: DW MRSP ;CONTROL BLOCK ADDRESS TABLE.
1541 37F2 378C DW 01A ;
1542 37F4 37A5 DW 01B ;
1543 37F6 37BE DW 02A ;
1544 37F8 37D7 DW 02B ;
1545
1546 37FA INTD: DS 1 ;ID CHECK AREA.
1547
1548 37FB INTD: DS 32 ;STACK AREA.
1549 381B
1550
1551 0000 ID EQU 0 ;ID.
1552 0001 RSCOUNT EQU 1 ;8253-5.
1553 0003 RSDREG EQU 3 ;7201 DATA REG.
1554 0004 RSCREG EQU 4 ;7201 CONTROL REG.
1555 0005 FLAG EQU 5 ;CONTROL FLAG.
1556 0006 GETP EQU 6 ;GET POINTER.
1557 0008 PUP: EQU 8 ;PUT POINTER.
1558 000A BUFA EQU 10 ;BUFFER ADDRESS.
1559 000C BUFS EQU 12 ;BUFFER SIZE.
1560 000E BITPC EQU 14 ;BIT/CHAR.
1561 0010 SKX EQU 15 ;SI/SO, KSHIFT, X-ON/X-OFF
1562 0012 XONS EQU 16 ;X-ON SIZE.
1563 0014 XOFFS EQU 18 ;X-OFF SIZE.
1564 0016 CHRMSK EQU 20 ;Received data mask
1565 0017 SISO EQU 21 ;GET SI/SO status
1566 0018 STS EQU 22 ;PUT SI/SO status
1567 0019 LOCNT EQU 23 ;LOC.
1568
1569 0000 BADR EQU 0 ;BUFFER ADDRESS.
1570 0002 BSIZ EQU 2 ;BUFFER SIZE.
1571 0004 BR EQU 4 ;BIT RATE.
1572 0005 DCHR EQU 5 ;TX, RX BIT/CHAR.
1573 0006 PRT EQU 6 ;PARITY.
1574 0007 SB EQU 7 ;STOP BIT.
1575 0008 SPARAM EQU 8 ;CONTRL BIT SELECT.
1576
1577 0001 RXCA EQU 1 ;RRO RX CHAR AVAILABLE.
1578 0000 OPENF EQU 0 ;OPEN FLAG.
1579 0002 INTPND EQU 2 ;
1580
1581 0001 RSFULL EQU 1 ;buffer full
1582 0002 BFOVER EQU 2 ;buffer overflow
1583
1584 0000 GESC EQU 0 ;Get ESC code flag.
1585 0001 GESCE EQU 1 ;Get ESC code + 24H OR 28H.

```

```

1583      0002      SHIFT EQU 2      ;special parameter SI/SO bit
1584      0004      XXON EQU 4      ;special parameter X-ON/X-OFF bit
1585      ;
1586      0006      SCTRLS EQU 6      ;Send CTRL-S.
1587      0007      RCTRLS EQU 7      ;Receive CTRL-S.
1588      0007      RCTRLQ EQU 7      ;Receive CTRL-Q.
1589      ;
1590      0013      CTRLS EQU 013H      ;CTRL-S.
1591      0011      CTRLQ EQU 011H      ;CTRL-Q.
1592      ;
1593      7000      MRSBUF EQU 7000H      ;RS data default buffer
1594      0200      MRSSIZE EQU 200H      ;MRSBUF size
1595      ;
1596      ;
1597      381B      20      RSXBANK: DB 20H      ;RS buffer memory bank
1598      ;
1599      ;
1600      ;
1601      ;
1602      ;
1603      ;
1604      ;
1605      ;
1606      ;
1607      ;
1608      381C      INTX1:
1609      381C      INTX2:
1610      381C      INTX3:
1611      381C      INTX4:
1612      381C      INTX5:
1613      381C      INTX6:
1614      381C      INTX7:
1615      ;
1616      381C      IGPIB:
1617      381C      IOPCAL:
1618      381C      IADDA:
1619      381C      IKANJ11:
1620      381C      IKANJ12:
1621      381C      IMFONT:
1622      381C      LD A,20H      ;normal EOI
1623      381E      D3 08      ;MASTER
1624      3820      D3 0C      ;SLAVE
1625      3822      C9      ;
1626      ;
1627      ;
1628      ;
1629      ;
1630      ;
1631      ;
1632      ;
1633      ;
1634      ;
1635      ;
1636      ;
1637      3823      MASKI:
1638      3823      F3      DI
1639      3824      ED 73 3A42      LD (SVSPMSK), SP
1640      3828      31 3A6C      LD SP, STCKMSK
1641      ;
1642      382B      C5      PUSH BC
1643      382C      D5      PUSH DE
1644      382D      E5      PUSH HL
1645      ;
1646      382E      78      LD A,B
1647      382F      A7      AND A
1648      3830      C2 397A      JP NZ, MASKST ; MASK SET ?
1649      3833      79      LD A,C ; YES.
1650      3834      FE 0A      CP 0AH ;software timer fast ?
1651      3836      CA 3967      JP Z, SFTFRM ;yes.
1652      3839      FE 0B      CP 0BH ;software timer slow ?
1653      383B      CA 396D      JP Z, SFTSRM ;yes.
1654      383E      FE 3B      CP 3BH ; LIGHTPEN ?
1655      3840      CA 3957      JP Z, LPRSMK ; YES.
1656      3843      51      LD D,C ; KEEP ID.
1657      3844      01 0008      LD BC, OPTBLE-OPTBL
1658      3847      21 3A30      LD HL, OPTBL ; CHECK PARAMETER. (OPTION ID)
1659      384A      ED B1      CP IR
1660      384C      C2 3942      JP NZ, MIPERR ; PARAMETER ERROR.
1661      384F      4A      LD C,D ; RECOVERY OPTION ID.
1662      ;
1663      ;
1664      ;
1665      ;
1666      ;
1667      3850      2A 0001*      LD HL, (OINT1+1) ; MASK RESET PROCESS
1668      3853      22 3A22      LD (S1), HL ; KEEP CURRENT INT ADDR.
1669      3856      2A 0001*      LD HL, (OINT2+1)
1670      3859      22 3A24      LD (S2), HL
1671      385C      2A 0001*      LD HL, (OINT3+1)
1672      385F      22 3A26      LD (S3), HL
1673      3862      2A 0001*      LD HL, (OINT4+1)
1674      3865      22 3A28      LD (S4), HL
1675      3868      2A 0001*      LD HL, (OINT5+1)
1676      386B      22 3A2A      LD (S5), HL
1677      386E      2A 0001*      LD HL, (OINT6+1)
1678      3871      22 3A2C      LD (S6), HL
1679      3874      2A 0001*      LD HL, (OINT7+1)
1680      3877      22 3A2E      LD (S7), HL
1681      387A      21 39DE      LD HL, OPINT1 ; SET INT PROCESS ADDR.
1682      387D      22 0001*      LD (OINT1+1), HL
1683      3880      21 39E1      LD HL, OPINT2
1684      3883      22 0001*      LD (OINT2+1), HL
1685      3886      21 39E4      LD HL, OPINT3
1686      3889      22 0001*      LD (OINT3+1), HL
1687      388C      21 39E7      LD HL, OPINT4
1688      388F      22 0001*      LD (OINT4+1), HL
1689      3892      21 39EA      LD HL, OPINT5
1690      3895      22 0001*      LD (OINT5+1), HL
1691      3898      21 39ED      LD HL, OPINT6
1692      389B      22 0001*      LD (OINT6+1), HL
1693      389E      21 39F0      LD HL, OPINT7
1694      38A1      22 0001*      LD (OINT7+1), HL
1695      38A4      DB 09      IN A, (09H) ; KEEP CURRENT MASK. (MASTER)

```











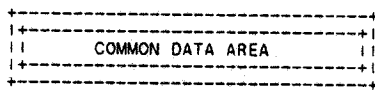


```

2261 3B65          LPIRTN:          ;
2262 3B65          POP          IY          ;
2263 3B67          DD          E1          ;
2264 3B69          C1          ;
2265 3B6A          ED          7B 0000*  ;
2266 3B6E          3E          20          ;
2267 3B70          D3          08          ;
2268 3B72          C9          ;
2269              ;
2270              ;
2271 3B73          ILPENBL:        OUT          (3BH),A  ;
2272 3B73          D3          3B          ;
2273 3B75          18          EE          ;
2274              ;
2275              ;
2276              ;
2277              ;
2278              ;
2279 3B77          00          ;
2280 3B78          0000         INT:         DB          0          ;
2281 3B7A          0000         LPAD:        DW          0          ;
2282              ;
2283              ;
2284 00DF          LPRSMS          EQU          11011111B  ; ENABLE LIGHTPEN.
2285 0020          LPMASK          EQU          00100000B  ; DISABLE LIGHTPEN.
2286 00FD          SFT1RM          EQU          11111101B  ; enable software timer fast.
2287 00DF          SFT2RM          EQU          11011111B  ; enable software timer slow.
2288 0002          SFT1SM          EQU          00000010B  ; disable software timer fast.
2289 0020          SFT2SM          EQU          00100000B  ; disable software timer slow.
2290              ;
2291              ;
2292              ;
2293              ;
2294              ;
2295              ;
2296              ;
2297              ;
2298              ;
2299              ;
2300              ;
2301              ;
2302              ;
2303              ;
2304              ;
2305 FE50          MBFLG          EQU          PRMTAB+50H
2306              ;
2307 FE5F          XRSCLSF          EQU          PRMTAB+5FH
2308 FE60          RSDAT          EQU          PRMTAB+60H
2309 FE60          CBRAT          EQU          PRMTAB+60H          ;BIT RATE.
2310 FE61          CDTCH          EQU          PRMTAB+61H          ;BIT/CHAR.
2311 FE62          CPRT          EQU          PRMTAB+62H          ;PARITY.
2312 FE63          CSTB          EQU          PRMTAB+63H          ;STOP BIT.
2313 FE64          RSDFOP          EQU          PRMTAB+64H          ;RS data buffer default(0)/option(FF)
2314 FE65          MRSDATA          EQU          PRMTAB+65H          ;RS232C main buffer address.
2315 FE69          BITRATE          EQU          MRSDATA+4          ;BIT RATE
2316 FE6A          DATACHR          EQU          MRSDATA+5          ;TX, RX BIT/CHARACTER.
2317 FE6B          PARITY          EQU          MRSDATA+6          ;PARITY.
2318 FE6C          STOPBIT          EQU          MRSDATA+7          ;STOP BIT
2319 FE6D          RSV          EQU          MRSDATA+8          ;reserved
2320              ;
2321              ;
2322 FE70          SPOS          EQU          PRMTAB+70H
2323              ;
2324 FE82          MFLG          EQU          PRMTAB+82H
2325              ;
2326 FE9B          GLPBIAS          EQU          PRMTAB+9BH          ;Green Graphic mode Lightpen
2327              ;
2328 FE9E          MEMPTR          EQU          PRMTAB+9EH
2329 FEAD          MEMBUF          EQU          PRMTAB+0A0H
2330              ;
2331              ;
2332 FEFO          MEMBANK          EQU          PRMTAB+0F0H
2333 FEF1          MBANKS          EQU          PRMTAB+0F1H
2334 FEF2          MBANKD          EQU          PRMTAB+0F2H
2335 FEF3          SVIBANK          EQU          PRMTAB+0F3H          ;memory bank calls interrupt
2336              ;
2337 FEF4          CLPBIAS          EQU          PRMTAB+0F4H          ;COLOR Lightpen
2338 FEF6          MLPBIAS          EQU          PRMTAB+0F6H          ;GREEN Character mode Lightpen
2339              ;
2340              ;
2341              ;
2342              ;
2343              ;
2344              ;
2345              ;
2346              ;

```

SUBTTL @ COMMON DATA AREA @



END

Macros:

Symbols:

39CE	ALLMSK	0000	BADR	0002	BFOVER
F600	BIOS	000E	BITPC	FE69	BITRATE
0004	BR	0002	BSIZ	000A	BUFA
000C	BUFS	FE60	CBRAT	FE61	CDTCH
0014	CHRMSK	3726	CLKRT	33D7	CLOSE
FEF4	CLPBIAS	33EC	CLS010	33F1	CLS020
FE62	CPRT	0000	CR	FE63	CSTB
35C4	CTL00	35D1	CTL10	35E7	CTL20
35E9	CTL30	35EB	CTL40	35EE	CTL50
3601	CTL90	35B4	CTLIN	0011	CTRL0
0013	CTRLS	3728	D7201	FE6A	DATACHR
0005	DCHR	39C4	DSFT	3944	ERR
3643	ERSTS	001B	ESC	3971	ESFT
0005	FLAG	0000	GESC	0001	GESCE
346D	GET	3475	GET10	348B	GET15
3492	GET16	344B	GET20	34CF	GET30
34ED	GET300	34DF	GET40	350F	GET700
3514	GET800	0006	GETP	3500	GETS1
3507	GETSO	FE9B	GLPBIAS	381C	IADDA
0000	ID	381C	IGP1B	381C	IKANJ11
381C	IKANJ12	3B73	ILPENBL	381C	IMFONT
3947	INHADD	3407	INST10	340E	INST20
341D	INST30	343A	INST80	343D	INST90

33FF	INSTS	3877	INT	37FA	INTD
0002	INTPND	381CI	INTX1	381CI	INTX2
381CI	INTX3	381CI	INTX4	381CI	INTX5
381CI	INTX6	381CI	INTX7	381C	IOPCAL
3698	ISET	3B7A	KPLPAD	F675	LDAXX
F663	LDIRX	000A	LF	3A6CI	LIGHTPEN
F65D	LOADX	36EC	LOC	36FC	LOCIO
0017	LOCNT	3721	LOCRTN	3B78	LPAD
3AA1	LPCHK	3AC0	LPDSBL	3A89	LPENBL
3ACCI	LPENIR	3A96	LPENRTN	3A9C	LPERR
3AE9	LPI010	3AFE	LPI020	3B08	LPI030
3B26	LPI035	3B2C	LPI040	3B30	LPI050
3B51	LPI070	3B5C	LPI080	3B65	LPIRTN
3A81	LPJTBL	0020	LPMASK	39B2	LPMSK
3A94	LPNOMAL	3AA6	LPRD	00DF	LPRSMS
3957	LPRSMSK	3A38	MASKBIT	3B23I	MASKI
397A	MASKST	FEF2	MBANKD	FEF1	MBANKS
FE50	MBFLG	377D	MBUFA	377F	MBOFS
FEF0	MEMBANK	FEA0	MEMBUF	FE9E	MEMPTR
FE82	MFLG	3779	MGETP	3A41	MINTD
3942	MIPERR	FEF6	MLPBIAS	377B	MPUTP
7000	MRSBUF	FE65	MRSDATA	3778	MRSFLG
3773I	MRSR	0200	MRSSIZE	399B	MST01
399D	MST02	393F	NOOP	378C	O1A
3796	O1ABFA	3798	O1ABFS	3791	O1AFLG
3792	O1AGETP	3794	O1APUTP	37A5	O1B
37AF	O1BBFA	37B1	O1BBFS	37AA	O1BFLG
37AB	O1BGETP	37AD	O1BPUTP	37BE	O2A
37C8	O2ABFA	37CA	O2ABFS	37C3	O2AFLG
37C4	O2AGETP	37C6	O2APUTP	37D7	O2B
37E1	O2BBFA	37E3	O2BBFS	37DC	O2BFLG
37DD	O2BGETP	37DF	O2BPUTP	39F2	OINT010
39FC	OINT020	39FF	OINT030	3A13	OINT040
3A16	OINT050	08FB*	OINT1	0901*	OINT2
0907*	OINT3	090D*	OINT4	0913*	OINT5
0919*	OINT6	091F*	OINT7	308A	OPEN
38BE	OPEN020	38C9	OPEN030	38D3	OPEN031
38DA	OPEN032	38F5	OPEN033	3933	OPEN035
3934	OPEN040	0000	OPENF	39DE	OPINT1
39E1	OPINT2	39E4	OPINT3	39E7	OPINT4
39EA	OPINT5	39ED	OPINT6	39F0	OPINT7
30C9	OPN010	30D6	OPN020	313D	OPN043
314B	OPN045	3171	OPN046	314E	OPN047
3186	OPN049	3188	OPN050	31A5	OPN0501
31BE	OPN0505	31C5	OPN051	31DA	OPN053
31FA	OPN060	3202	OPN070	3204	OPN080
3225	OPN090	3236	OPN100	3249	OPN120
36C4	OPN30	3A30	OPTBL	3A38	OPTBLE
327A	ORSI05	327E	ORSI10	3284	ORSI15
329E	ORSI20	32C1	ORSI30	331A1	ORSI40
332E	ORSI50	333B	ORSI51	3344	ORSI52
334D	ORSI54	3358	ORSI55	3378	ORSI60
3389	ORSI70	33AD	ORSI74	33AE	ORSI76
33C6	ORSI80	33D6	ORSI90	3268	ORSINT
32CF	ORSRTN	32DB	ORSRTN1	32E7	ORSRTN2
32F3	ORSRTN3	32FF	ORSRTN4	33B4	OSRI78
344E	OUTS010	345E	OUTS020	346A	OUTS030
3446	OUTSTS	FE6B	PARITY	308F	PERR
FE00	PRMTAB	0006	PRT	352E	PUT
3549	PUT100	354E	PUT150	3561	PUT200
357C	PUT700	3580	PUT900	358A	PUTCR
358A	PUTLF	0008	PUTP	359E	PUTSET
3735	RATEM	3753	RATEO	0007	RCTRLO
0007	RCTRLS	36D0	RDSTS	36E9	RDSTS01
36B4	RSCHK	3023I	RSCLOSE	0001	RSCOUNT
0004	RSCREG	FE60	RSDAT	3726	RSDATA
FE64	RSDFOP	0003	RSDREG	0001	RSFULL
302CI	RSIN	3026I	RSINST	302E	RSIOM
3038	RSIOM0	305CI	RSIOX	3094	RSIOX00
303B	RSIOXM	307B	RSIOXX	30A2	RSJMP
3000I	RSOPEN	3051I	RSOUT	3052	RSOUT1
3029I	RSOUTST	3685	RSOVR	341E	RSRTN
FE6D	RSV	381B	RSXBANK	37F0	RTBL
3261	RTN	0001	RXCA	3A22	S1
3A24	S2	3A26	S3	3A28	S4
3A2A	S5	3A2C	S6	3A2E	S7
368B	SAVEHL	3A3F	SAVEM	3A40	SAVES
0007	SB	0006	SCTRLS	365C	SENS
366D	SENS10	3627	SETC010	3607	SETCTL
00FD	SFT1RM	0002	SFTISM	00DF	SFT2RM
0020	SFT2SM	3967	SFTFRM	39BE	SFTFSM
396D	SFTSRM	39C2	SFTSSM	0002	SHIFT
000F	S1	0015	SISO	000F	SKX
3684	SNSRT1	3682	SNSRTN	000E	SO
0008	SPARAM	FE70	SPOS	0073*	SRMBANK
0AF0*	ST50ML	F678	STAXX	0AD1*	STCKIR
3A6C	STCKMSK	381B	STCKRS	FE6C	STOPBIT
F660	STORX	0016I	STS	FEF3	SVIBANK
368D	SVPARA	0B6C*	SVSPIR	3A42	SVSPMSK
3696	SVSPRS	372B	WR2B	3734	WR3D
372E	WR4D	3732	WR5D	36C8	WRSTS
0012	XOFFS	0010	XONS	FE5F	XRCLSFS
0004	XXON				

No Fatal error(s)

ALLMSK	1870	1937#												
BADR	266	267	1586#											
BFOVER	618	1579#												
BIOS	43#	50	51	52	54	55								
BITPC	369	1139	1557#											
BITRATE	2315#													
BR	278	1568#												
BSIZ	268	269	1567#											
BUFA	274	275	628	629	849	850	1555#							
BUFS	276	277	341	342	630	631	851	852	1352	1353	1369	1370		
	1556#													
CBRAT	2309#													
CDTCH	2310#													





MBOFA	1450#											
MBOFS	1451#											
MEMBANK	2332#											
MEMBUF	2329#											
MEMPTR	156	2328#										
MFLG	2219	2243	2324#									
MGETP	1448#											
MINTD	1704	1709	1734	1768	2013	2050#						
MIPERR	1660	1791#	1872									
MLPBIAS	2222	2338#										
MPUTP	1449#											
MRSBUF	76	1593#										
MRSDATA	77	79	81	87	112	2314#	2315	2316	2317	2318	2319	
MRSFLG	1447#											
MRSF	27	1442#	1537									
MRSIZE	78	1594#										
MST01	1874	1878#										
MST02	1876	1880#										
NOOP	1771	1788#										
O1A	493	530	1461#	1538								
O1ABFA	1469#											
O1ABFS	1470#											
O1AFLG	535	1466#										
O1AGETP	1467#											
O1APUTP	1468#											
O1B	530	1480#	1539									
O1BBFA	1488#											
O1BBFS	1489#											
O1BFLG	543	1485#										
O1BGETP	1486#											
O1BPUTP	1487#											
O2A	1499#											
O2ABFA	1507#											
O2ABFS	1508#											
O2AFLG	551	1504#										
O2AGETP	1505#											
O2APUTP	1506#											
O2B	1518#	1541										
O2BBFA	1526#											
O2BBFS	1527#											
O2BFLG	559	1523#										
O2BGETP	1524#											
O2BPUTP	1525#											
OINT010	1982#											
OINT020	1985	1989#										
OINT030	1987	1991#										
OINT040	2001	2005#										
OINT050	2003	2007#										
OINT1	30#	1667	1682	1750								
OINT2	30#	1669	1684	1752								
OINT3	30#	1671	1686	1754								
OINT4	30#	1673	1688	1756								
OINT5	30#	1675	1690	1758								
OINT6	30#	1677	1692	1760								
OINT7	30#	1679	1694	1762								
OPEN	206	223#										
OPEN020	1708#	1712										
OPEN030	1711	1714#										
OPEN031	1721#	1726										
OPEN032	1723	1727#										
OPEN033	1713	1747#										
OPEN035	1772#	1826	1850	1893	1907	1929	1945					
OPEN040	1774#	1795										
OPENF	495	536	544	552	560	1279	1575#					
OPINT1	1681	1955#										
OPINT2	1683	1959#										
OPINT3	1685	1963#										
OPINT4	1687	1967#										
OPINT5	1689	1971#										
OPINT6	1691	1975#										
OPINT7	1693	1979#										
OPN010	232	236#										
OPN020	229	243#										
OPN043	284	289#										
OPN045	294	298#										
OPN046	321#	324										
OPN047	296	300#										
OPN049	330	333#										
OPN050	332	335#										
OPN0501	345	349#										
OPN0505	340	347	362#									
OPN051	366	368#										
OPN053	378	381#										
OPN060	394	398#										
OPN070	400	404#										
OPN080	396	402	406#									
OPN090	421	425#										
OPN100	423	439#										
OPN120	451#											
OPN30	1296	1298#										
OPTBL	1657	1658	1717	1720	2029#							
OPTBLE	1657	1717	2037#									
ORSI05	492#	568										
ORSI10	494#	532										
ORSI15	497#											
ORSI20	496	507	509#									
ORSI30	519	526#										
ORSI40	22	508	585#									
ORSI50	594	596#										
ORSI51	603#											
ORSI52	605	609#										
ORSI54	602	611	615#									
ORSI55	617	621#										
ORSI60	637	640#										
ORSI70	647	649#										
ORSI74	663	668#										
ORSI76	665	667	670#									
ORSI80	682#	684										
ORSI90	689#											
ORSINT	477#	1802	1803									
ORSRTN	529	534#										
ORSRTN1	537	542#										
ORSRTN2	545	550#										



XONS	360	361	677	678	1559#		
XRSCLSF	2307#						
XXON	339	346	601	674	794	865	1584#

# Printer Control

1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25  
26  
27  
28  
29  
30  
31  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60  
61  
62  
63  
64  
65  
66  
67  
68  
69  
70  
71  
72  
73  
74  
75  
76  
77  
78  
79  
80  
81  
82  
83  
84  
85  
86  
87  
88  
89  
90  
91  
92  
93  
94  
95  
96  
97  
98  
99  
100  
101  
102  
103  
104  
105  
106  
107  
108  
109  
110  
111  
112  
113

TITLE \* OX-10 63k MF-CP/M BIOS5 M1.3 \*

```

created      OX-10 63k MF-CP/M BIOS5
             M1.1 1983. 3. 11 by Kaoru Nakabayashi
             Chisato Kobayashi
updated      M1.2      3. 18
updated      M1.3      4. 29

```

```

.Z80
.PHASE 4000H

```

```

LIST1:
XOR      A
LD       (LISTERR),A      ;clear BASIC mode printer error
LD       A,(PRINTER)
BIT     2,A
JP      NZ,LPOUT          ;MFBASIC BIT ON mode

BIT     0,A
JR      NZ,MX80@1        ;MX-80
BIT     1,A
JR      NZ,MX80          ;MX-80 TYPE 2 and 3
BIT     3,A
JR      NZ,MX82          ;MX-82 and MX-82 TYPE 3
BIT     4,A
JR      NZ,MX100         ;MX-100 and MX-100 TYPE 3
BIT     5,A
JR      NZ,FX80          ;FX-80
BIT     6,A
JR      NZ,FX100         ;FX-100
BIT     7,A
JR      NZ,OLIVET        ;OLIVETTI DY311
LD       A,(PRINTER+1)
BIT     0,A
JR      NZ,RX80          ;RX-80

JP      LPOUT

MX80@1:
OLIVET:
LD       A,(LPESC)
AND     A
JR      Z,LXI50

ESC sequence
INC     A
LD     (LPESC),A
DEC     A
DEC     A
JR      NZ,LXI90        ;80H,81H,82H

LD     A,C
LD     (LPESCS),A
CP     80H
RET     Z
CP     81H
RET     Z
CP     82H
RET     Z
CP     61H
JR      Z,LXI90         ;small A
CP     62H
JR      Z,LXI90         ;small B

PUSH   BC
LD     C,ESC
CALL   LPOUT
POP    BC
CALL   LPOUT

LXI90:
XOR    A
LD     (LPESC),A
LD     (LPESCS),A
RET

LXI50:
LD     A,C
CP     ESC
JP     NZ,LPOUT

ESC:
LD     A,1
LD     (LPESC),A
RET

```

```

4000
4000 AF
4001 32 FE9D
4004 3A FE55
4007 CB 57
4009 C2 4A72
400C CB 47
400E 20 22
4010 CB 4F
4012 20 5F
4014 CB 5F
4016 20 5B
4018 CB 67
401A 20 57
401C CB 6F
401E 20 53
4020 CB 77
4022 20 4F
4024 CB 7F
4026 20 0A
4028 3A FE56
402B CB 47
402D 20 44
402F C3 4A72
4032
4032
4032 3A FE8A
4035 A7
4036 28 2F
4038 3C
4039 32 FE8A
403C 3D
403D 3D
403E 20 1F
4040 79
4041 32 4A49
4044 FE 80
4046 C8
4047 FE 81
4049 C8
404A FE 82
404C C8
404D FE 61
404F 28 0E
4051 FE 62
4053 28 0A
4055 C5
4056 0E 1B
4058 CD 4A72
405B C1
405C CD 4A72
405F
405F AF
4060 32 FE8A
4063 32 4A49
4066 C9
4067
4067 79
4068 FE 1B
406A C2 4A72
406D 3E 01
406F 32 FE8A
4072 C9

```

```

MX80:
MX82:
MX100:
FX80:
FX100:
RX80:

```

```

114 4073
115 4073 3A FE8A
116 4076 A7
117 4077 CA 412C
118
119
120
121
122
123 407A
124 407A 3C
125 407B 32 FE8A
126 407E 3D
127 407F 3D
128 4080 20 3C
129
130 4082 79
131 4083 32 4A49
132 4086 FE 80
133 4088 C8
134 4089 FE 81
135 408B C8
136 408C FE 82
137 408E C8
138 408F FE 61
139 4091 28 12
140 4093 FE 62
141 4095 28 15
142 4097 FE 90
143 4099 C8
144
145 409A
146 409A CD 0081
147 409D
148 409D AF
149 409E 32 FE8A
150 40A1 32 4A49
151 40A4 C9
152
153
154 40A5
155 40A5 3E 21
156 40A7 21 FE7F
157 40AA 18 04
158
159 40AC
160 40AC AF
161 40AD 21 0000
162 40B0
163 40B0 32 442D
164 40B3 32 4485
165 40B6 22 442E
166 40B9 22 4486
167 40BC 18 DF
168
169
170 40BE
171 40BE 3A 4A49
172 40C1 FE 90
173 40C3 28 39
174 40C5 D6 80
175 40C7 28 08
176 40C9 3D
177 40CA 28 24
178 40CC 3D
179 40CD 28 28
180 40CF 18 CC
181
182
183
184 40D1
185 40D1 06 00
186 40D3 2A FE8D
187 40D6 09
188 40D7 22 FE8D
189 40DA 01 0800
190 40DD 09
191 40DE 22 FE8F
192 40E1 09
193 40E2 22 FE91
194 40E5 3E FF
195 40E7 32 C300
196 40EA CD 409D
197 40ED C3 41DA
198
199
200 40F0
201 40F0 79
202 40F1 32 FE88
203 40F4 C3 409D
204
205
206 40F7
207 40F7 79
208 40F8 32 FE89
209 40FB C3 409D
210
211
212
213
214 40FE
215 40FE 3A FE8A
216 4101 FE 03
217 4103 20 05
218 4105 79
219 4106 32 4A4A
220 4109 C9
221 410A
222 410A 41
223 410B 3A 4A4A
224 410E 4F
225 410F 21 C400
226 4112 09

```

```

LX100: LD A, (LPESC)
AND A
JP Z, LX200
;
;
;
; LIST ESCAPE sequence
;
LX110: INC A
LD (LPESC), A
DEC A
DEC A
JR NZ, LESPAS
;
LD A, C
LD (LPESCS), A
CP 80H ;put any dot spacing
RET Z ;continue
CP 81H ;set left space
RET Z
CP 82H ;set right space
RET Z
CP 61H ;small a
JR Z, LNONPR ;not proportional printing
CP 62H ;small b
JR Z, LPROP ;proportional printing
CP 90H ;printer head setting
RET Z ;continue
;
LXESER: CALL BUZZPU ;error sequence
;
LESEND: XOR A
LD (LPESC), A
LD (LPESCS), A
RET
;
;
LNONPR: LD A, 21H ; LD HL,
LD HL, 0FE7FH ; 0FE7FH
JR LEPROP
;
LPROP: XOR A ; NOP
LD HL, 0 ; NOP, NOP
;
LEPROP: LD (FMMX1), A
LD (FMMX2), A
LD (FMMX1+1), HL
LD (FMMX2+1), HL
JR LESEND
;
;
LESPAS: LD A, (LPESCS)
CP 90H
JR Z, LX180
SUB 80H
JR Z, LX150
DEC A
JR Z, LX160 ;=81H
DEC A
JR Z, LX170 ;=82H
JR LESEND ;not supported
;
;
; put any dot space
LX150: LD B, 0 ;BC: dot count
LD HL, (MFPT1)
ADD HL, BC
LD (MFPT1), HL
LD BC, MFSIZE
ADD HL, BC
LD (MFPT2), HL
ADD HL, BC
LD (MFPT3), HL
LD A, -1
LD (PRTBUF), A
CALL LESEND ;reset LPESC, LPESCS
JP LM800
;
;
;
LX160: LD A, C
LD (LSP), A
JP LESEND
;
;
;
LX170: LD A, C
LD (RSP), A
JP LESEND
;
;
;
; printer head setting
LX180: LD A, (LPESC)
CP 3
JR NZ, LX182
LD A, C
LD (LESHDL), A
RET
;
LX182: LD B, C
LD A, (LESHDL)
LD C, A
LD HL, MFBUF1
ADD HL, BC

```

227	4113	22 FE8D	LD	(MFPT1), HL	
228	4116	01 0800	LD	BC, MFSIZE	
229	4119	09	ADD	HL, BC	
230	411A	22 FE8F	LD	(MFPT2), HL	
231	411D	09	ADD	HL, BC	
232	411E	22 FE91	LD	(MFPT3), HL	
233	4121	3E FF	LD	A, -1	
234	4123	32 C300	LD	(PRTBUF), A	
235	4126	CD 409D	CALL	LESEND	:reset LPESC, LPESCS
236	4129	C3 41DA	JP	LM800	
237					
238					
239					
240					
241					
242	412C		LX200:		
243	412C	3A FE50	LD	A, (MBFLG)	:MF BASIC flag
244	412F	A7	AND	A	
245	4130	79	LD	A, C	
246	4131	20 06	JR	NZ, LX210	
247	4133	FE A0	CP	0A0H	
248	4135	38 02	JR	C, LX210	
249	4137	D6 80	SUB	80H	
250	4139		LX210:		
251	4139	4F	LD	C, A	
252					
253					
254					
255	413A	FE 20	CP	20H	
256	413C	30 2C	JR	NC, LX300	
257					
258	413E	FE 07	CP	07H	:Buzzer
259	4140	CA 4A72	JP	Z, LPOUT	
260	4143	FE 0A	CP	0AH	:Line Feed
261	4145	28 11	JR	Z, LX250	
262	4147	FE 0C	CP	0CH	:Form Feed
263	4149	28 15	JR	Z, LX260	
264	414B	FE 0D	CP	0DH	:Carriage Return
265	414D	28 09	JR	Z, LX250	
266	414F	FE 1B	CP	1BH	:ESC
267	4151	C0	RET	NZ	
268					
269					
270					
271	4152		LXESC:	[ ESC ]	
272	4152	3E 01	LD	A, 1	
273	4154	32 FE8A	LD	(LPESC), A	:set ESC flag
274	4157	C9	RET		
275					
276					
277					
278					
279	4158		LX250:	[ CR, LF ]	
280	4158	2A FE84	LD	HL, (PRTPNT)	
281	415B	77	LD	(HL), A	
282	415C	CD 42B9	CALL	PLINE	
283	415F	C9	RET		
284					
285					
286					
287					
288	4160		LX260:	[ FF ]	
289	4160	3E 0A	LD	A, 0AH	
290	4162	CD 4158	CALL	LX250	
291	4165	0E 0C	LD	C, 0CH	
292	4167	C3 4A72	JP	LPOUT	
293					
294					
295					
296					
297					
298	416A		LX300:		
299	416A	3A C300	LD	A, (PRTBUF)	
300	416D	A7	AND	A	
301	416E	20 1B	JR	NZ, LX320	
302	4170	3A FE95	LD	A, (KETA)	
303	4173	6F	LD	L, A	
304	4174	26 00	LD	H, 0	
305	4176	11 C301	LD	DE, PRTBUF+1	
306	4179	19	ADD	HL, DE	
307	417A	ED 5B FE84	LD	DE, (PRTPNT)	
308	417E	AF	XOR	A	
309	417F	ED 52	SBC	HL, DE	
310	4181	20 08	JR	NZ, LX320	
311	4183	3E 0A	LD	A, 0AH	
312	4185	12	LD	(DE), A	
313	4186	C5	PUSH	BC	
314	4187	CD 42D1	CALL	PL 100	:print 1 line
315	418A	C1	POP	BC	
316					
317	418B		LX320:		
318	418B	2A FE8D	LD	HL, (MFPT1)	
319	418E	22 4A47	LD	(SHELT1), HL	
320	4191	3A C300	LD	A, (PRTBUF)	
321	4194	32 4A4B	LD	(BIMAGE), A	
322	4197	79	LD	A, C	
323	4198	FE A0	CP	0A0H	
324	419A	30 2B	JR	NC, LX500	
325	419C	3A FE86	LD	A, (KSAVE)	
326	419F	A7	AND	A	
327	41A0	20 15	JR	NZ, LXMFER	
328					
329					
330					
331					
332	41A2	79	LD	A, C	
333	41A3	2A FE84	LD	HL, (PRTPNT)	
334	41A6	77	LD	(HL), A	
335	41A7	23	INC	HL	
336	41A8	22 FE84	LD	(PRTPNT), HL	
337	41AB	FE 7F	CP	7FH	
338	41AD	38 03	JR	C, LX330	
339	41AF	32 C300	LD	(PRTBUF), A	:7F-9F

```

340 41B2
341 41B2 CD 4315
342 41B5 18 23
343
344
345
346 41B7
347 41B7 AF
348 41B8 32 FE86
349 41BB 2A FE84
350 41BE 36 2E
351 41C0 23
352 41C1 71
353 41C2 23
354 41C3 22 FE84
355 41C6 C9
356
357
358
359
360
361 41C7
362
363
364
365 41C7 3A FE86
366 41CA A7
367 41CB 79
368 41CC 20 04
369
370
371
372 41CE 32 FE86
373 41D1 C9
374
375
376 41D2
377 41D2 CD 439A
378 41D5 3E 00
379 41D7 32 FE86
380
381
382
383
384 41DA
385 41DA 2A FE8D
386 41DD 11 C400
387 41E0 AF
388 41E1 ED 52
389 41E3 D8
390 41E4 22 FE8B
391 41E7 EB
392 41E8 2A FE96
393 41EB AF
394 41EC ED 52
395 41EE D0
396 41EF 3A 4A4B
397 41F2 A7
398 41F3 20 0A
399 41F5 2A FE84
400 41F8 36 0A
401 41FA CD 42F4
402 41FD 18 06
403 41FF
404 41FF 2A 4A47
405 4202 CD 487C
406
407 4205
408 4205 21 C300
409 4208 36 FF
410 420A 23
411 420B 22 FE84
412
413 420E ED 4B 4A47
414 4212 11 C400
415 4215 2A FE93
416 4218 AF
417 4219 ED 42
418 421B E5
419 421C 19
420 421D 22 FE93
421
422 4220 2A FE8D
423 4223 AF
424 4224 ED 42
425 4226 E5
426 4227 19
427 4228 22 FE8D
428
429 422B 01 0800
430 422E 09
431 422F 22 FE8F
432 4232 09
433 4233 22 FE91
434
435 4236 E1
436 4237 D1
437 4238 CD 4BCE
438 423B 30 01
439 423D EB
440 423E
441 423E 22 FE8B
442 4241 EB
443 4242 21 0800
444 4245 AF
445 4246 ED 52
446 4248 22 4A45
447
448
449
450 424B 2A 4A47
451 424E 11 C400
452 4251 ED 4B FE8B

```

```

LX330: CALL FORMAN
JR LM800
;
;
;
LXMFER: XOR A
LD (KSAVE), A
LD HL, (PRTPNT)
LD (HL),
LD HL,
INC HL
LD (HL), C
INC HL
LD (PRTPNT), HL
RET
;
;
;
LX500:
;
; [ Multi Font character ]
;
LD A, (KSAVE)
AND A
LD A, C
JR NZ, LX600 ;MF 2nd byte
;
; MF 1st byte
LD (KSAVE), A
RET
;
;
LX600: CALL FORMMF
LD A, 0
LD (KSAVE), A
;JP C, LMXXXX ;chara-gene read error
;
;
LM800: LD HL, (MFPT1)
LD DE, MFBUF1
XOR A
SBC HL, DE
RET C ;(RSP) < 0
LD (MFDOT), HL
EX DE, HL
LD HL, (DOTPL)
;dots per line
XOR A
SBC HL, DE
RET NC ;1 line over
LD A, (BIMAGE)
AND A
JR NZ, LM810
LD HL, (PRTPNT)
LD (HL), 0AH
CALL PL500
JR LM820 ;all < 7FH
;bit image
LM810: LD HL, (SHELT1)
CALL WRIT10 ;write till (SHELT1)
;
;
LM820: LD HL, PRTBUF
LD (HL), -1
INC HL
LD (PRTPNT), HL
;
;
LD BC, (SHELT1)
LD DE, MFBUF1
LD HL, (PTMAX)
XOR A
SBC HL, BC
PUSH HL
ADD HL, DE
LD (PTMAX), HL
;
;
LD HL, (MFPT1)
XOR A
SBC HL, BC
PUSH HL
ADD HL, DE
LD (MFPT1), HL
;
;
LD BC, MFSIZE
ADD HL, BC
LD (MFPT2), HL
ADD HL, BC
LD (MFPT3), HL
;
;
POP HL
POP DE
CALL CPHLDE
JR NC, LM840 ;HL>=DE
EX DE, HL
;
;
LM840: LD (MFDOT), HL
EX DE, HL
LD HL, MFSIZE
XOR A
SBC HL, DE
LD (COUNT), HL ;0 count
;
;
; translate remainder
;
LD HL, (SHELT1)
LD DE, MFBUF1
LD BC, (MFDOT)

```



```

453 4255 ED B0 LDIR
454 4257 C5 PUSH DE
455
456 4258 ED 4B 4A45 LD BC, (COUNT)
457 425C 09 ADD HL, BC
458 425D EB EX DE, HL
459 425E 09 ADD HL, BC
460 425F EB EX DE, HL
461 4260 ED 4B FE6B LD BC, (MFDOT)
462 4264 ED B0 LDIR
463
464 4266 ED 4B 4A45 LD BC, (COUNT)
465 426A 09 ADD HL, BC
466 426B EB EX DE, HL
467 426C 09 ADD HL, BC
468 426D EB EX DE, HL
469 426E ED 4B FE8B LD BC, (MFDOT)
470 4272 ED B0 LDIR
471
472 4274 E1 POP HL
473 4275 ED 4B 4A45 LD BC, (COUNT) ;0 count
474 4279 78 LD A, B
475 427A B1 OR C
476 427B C8 RET Z
477
478
479 427C 36 00 LD (HL), 0
480 427E 0B DEC BC
481 427F 78 LD A, B
482 4280 B1 OR C
483 4281 28 05 JR Z, LM860
484 4283 54 LD D, H
485 4284 5D LD E, L
486 4285 13 INC DE ;DE=HL+1
487 4286 ED B0 LDIR
488
489 4288 ED 4B FE8B LM860: LD BC, (MFDOT)
490 428C 09 ADD HL, BC
491 428D ED 4B 4A45 LD BC, (COUNT)
492 4291 36 00 LD (HL), 0
493 4293 0B DEC BC
494 4294 78 LD A, B
495 4295 B1 OR C
496 4296 28 05 JR Z, LM870
497 4298 54 LD D, H
498 4299 5D LD E, L
499 429A 13 INC DE ;DE=HL+1
500 429B ED B0 LDIR
501 429D
502 429D ED 4B FE8B LM870: LD BC, (MFDOT)
503 42A1 09 ADD HL, BC
504 42A2 ED 4B 4A45 LD BC, (COUNT)
505 42A6 36 00 LD (HL), 0
506 42A8 0B DEC BC
507 42A9 78 LD A, B
508 42AA B1 OR C
509 42AB C8 RET Z
510 42AC 54 LD D, H
511 42AD 5D LD E, L
512 42AE 13 INC DE ;DE=HL+1
513 42AF ED B0 LDIR
514 42B1 C9 RET
515
516
517
518
519
520 42B2 LMXXXX: CALL BUZZPU
521 42B3 CD 0081 CALL CLRMBF
522 42B5 CD 4921 RET
523 42B8 C9
524
525
526
527
528
529
530
531 42B9 PLINE: LD HL, PRIBUF
532 42B9 21 C300 LD A, (HL)
533 42BC 7E AND A
534 42BD A7 JR NZ, PL200
535 42BE 20 45
536
537 42C0 23 INC HL
538 42C1 7E LD A, (HL)
539 42C2 FE 0A CP 0AH
540 42C4 20 0B JR NZ, PL100
541 42C6 3A FE87 LD A, (LCRFLG)
542 42C9 A7 AND A
543 42CA 28 23 JR Z, PL110
544 42CC AF XOR A
545 42CD 32 FE87 LD (LCRFLG), A
546 42D0 C9 RET
547
548
549
550 I all < 7FH I
551 42D1 PLINE: LD A, (PREF)
552 42D1 3A FE98 LD D, A
553 42D4 57 LD A, (COUNTRY)
554 42D5 3A FE80 CP D ;compare last country to new country
555 42D8 BA D ;=
556 42D9 28 14 JR Z, PL110 ;save last country
557 42DB 32 FE98 LD (PREF), A ;put (ESC), 'R', 0-7
558 42DE 0E 1B LD C, ESC
559 42E0 CD 4A72 CALL LPOUT
560 42E3 0E 52 LD C, 'R'
561 42E5 CD 4A72 CALL LPOUT
562 42E8 3A FE80 LD A, (COUNTRY)
563 42EB 4F LD C, A
564 42EC CD 4A72 CALL LPOUT
565 42EF

```

566	42EF	CD 42F4	CALL	PL500
567	42F2	18 14	JR	PLZ
568			;	
569			;	
570	42F4		PL500:	
571	42F4	21 C300	LD	HL, PRTBUF
572	42F7		PL520:	
573	42F7	23	INC	HL
574	42F8	4E	LD	C, (HL)
575	42F9	CD 4A72	CALL	LPOUT
576	42FC	7E	LD	A, (HL)
577	42FD	FE 0D	CP	ODH
578	42FF	C8	RET	Z
579	4300	FE 0A	CP	0AH
580	4302	C8	RET	Z
581	4303	18 F2	JR	PL520
582			;	
583			;	
584	4305		PL200:	
585	4305	CD 486F	CALL	WRITE
586			;	
587	4308		PLZ:	
588	4308	CD 4921	CALL	CLRMBF
589	430B	21 C300	LD	HL, PRTBUF
590	430E	36 00	LD	(HL), 0
591	4310	23	INC	HL
592	4311	22 FE84	LD	(PRTPNT), HL
593	4314	C9	RET	
594			;	
595			;	
596			;	
597			;	
598			;	
599			;	
600			;	
601			;	
602			;	
603			;	[ Alphanumeric, Graphic ]
604	4315		FORMAN:	
605	4315	6F	LD	L, A
606	4316	26 00	LD	H, 0
607	4318	5D	LD	E, L
608	4319	54	LD	D, H
609	431A	29	ADD	HL, HL
610	431B	19	ADD	HL, DE
611	431C	29	ADD	HL, HL
612	431D	29	ADD	HL, HL
613	431E	11 8F80	LD	DE, PRTAB-12*20H
614	4321	19	ADD	HL, DE ;HL=PRTAB+(C-20H)*12
615	4322	E5	PUSH	HL
616	4323	FD E1	POP	IY ;HL copied to IY
617	4325	3A FE88	LD	A, (LSP) ;left space
618	4328	5F	LD	E, A
619	4329	16 00	LD	D, 0
620	432B	2A FE8F	LD	HL, (MFPT2)
621	432E	19	ADD	HL, DE
622	432F	22 FE8F	LD	(MFPT2), HL
623	4332	2A FE91	LD	HL, (MFPT3)
624	4335	19	ADD	HL, DE
625	4336	22 FE91	LD	(MFPT3), HL
626	4339	2A FE8D	LD	HL, (MFPT1)
627	433C	19	ADD	HL, DE
628			;	
629	433D	06 0A	LD	B, 10
630	433F		FMA20:	
631	433F	FD 7E 00	LD	A, (IY)
632	4342	B6	OR	(HL)
633	4343	77	LD	(HL), A
634	4344	FD 23	INC	IY
635	4346	23	INC	HL
636	4347	10 F6	DJNZ	FMA20
637			;	
638	4349	EB	EX	DE, HL
639	434A	2A FE93	LD	HL, (PTMAX) ;*
640	434D	AF	XOR	A
641	434E	ED 52	SBC	HL, DE
642	4350	EB	EX	DE, HL
643	4351	30 03	JR	NC, FMA28
644	4353	22 FE93	LD	(PTMAX), HL
645	4356		FMA28:	
646	4356	3A FE89	LD	A, (RSP) ;right space
647	4359	5F	LD	E, A
648	435A	16 00	LD	D, 0
649	435C	07	RLCA	
650	435D	30 02	JR	NC, FMA30
651	435F	16 FF	LD	D, -1
652	4361		FMA30:	
653	4361	19	ADD	HL, DE
654	4362	22 FE8D	LD	(MFPT1), HL
655			;	
656	4365	01 000A	LD	BC, 10
657	4368	2A FE8F	LD	HL, (MFPT2)
658	436B	09	ADD	HL, BC
659	436C	19	ADD	HL, DE
660	436D	22 FE8F	LD	(MFPT2), HL
661			;	
662	4370	FD 7E 00	LD	A, (IY)
663	4373	FD B6 01	OR	(IY+1)
664	4376	28 18	JR	Z, FMA50
665			;	
666	4378	FD 6E 00	LD	L, (IY)
667	437B	FD 66 01	LD	H, (IY+1)
668	437E	FD 2A FE91	LD	IY, (MFPT3)
669	4382	06 0A	LD	B, 10
670	4384		FMA40:	
671	4384	7E	LD	A, (HL)
672	4385	FD B6 00	OR	(IY)
673	4388	FD 77 00	LD	(IY), A
674	438B	23	INC	HL
675	438C	FD 23	INC	IY
676	438E	10 F4	DJNZ	FMA40
677	4390		FMA50:	
678	4390	2A FE91	LD	HL, (MFPT3)

```

679 4393 09 ADD HL,BC ;BC=10
680 4394 19 ADD HL,DE ;add right space
681 4395 22 FE91 LD (MFPT3),HL
682 ;
683 4398 AF XOR A ;reset carry
684 4399 C9 RET
685 ;
686 ;
687 ;
688 ;
689 ;
690 ;
691 ;
692 ;
693 ;
694 ; [ Multi Font ]
695 439A FORMMF: LD A,(LSP) ;left space
696 439A 3A FE88 LD E,A
697 439D 5F LD D,0
698 439E 16 00 LD HL,(MFPT1)
699 43A0 2A FE8D LD HL,DE
700 43A3 19 ADD HL,DE
701 43A4 22 FE8D LD (MFPT1),HL
702 43A7 2A FE8F LD HL,(MFPT2)
703 43AA 19 ADD HL,DE
704 43AB 22 FE8F LD (MFPT2),HL
705 43AE 2A FE91 LD HL,(MFPT3)
706 43B1 19 ADD HL,DE
707 43B2 22 FE91 LD (MFPT3),HL
708 ;
709 43B5 3A FE86 LD A,(KSAVE)
710 43B8 FE B0 CP 0B0H
711 43BA 30 31 JR NC,FMM50
712 43BC 79 LD A,C
713 43BD D6 A0 SUB 0A0H
714 43BF 6F LD L,A
715 43C0 26 00 LD H,0
716 43C2 29 ADD HL,HL
717 43C3 11 9800 LD DE,CKANTAB
718 43C6 19 ADD HL,DE
719 ;
720 43C7 4E LD C,(HL)
721 43C8 23 INC HL
722 43C9 3A FE86 LD A,(KSAVE)
723 43CC E6 0F AND 0FH
724 43CE 57 LD D,A
725 43CF 7E LD A,(HL)
726 43D0 32 FE86 LD (KSAVE),A
727 ;
728 43D3 3A FE86 LD A,(KSAVE)
729 43D6 FE D0 CP 0D0H
730 43D8 30 13 JR NC,FMM50
731 43DA FE B0 CP 0B0H
732 43DC 30 08 JR NC,FMM30
733 43DE 3E A0 LD A,0A0H
734 43E0 B2 OR D
735 43E1 32 FE86 LD (KSAVE),A
736 43E4 18 07 JR FMM50
737 43E6 7A FMM30: LD A,D
738 43E7 87 ADD A,A
739 43E8 C6 B1 ADD A,0B1H
740 43EA 32 FE86 LD (KSAVE),A
741 43ED 3A FE86 FMM50: LD A,(KSAVE)
742 43ED FE F7 CP 0F7H
743 43F0 20 09 JR NZ,FMM60
744 43F2 79 LD A,C
745 43F4 FE EE CP 0EEH
746 43F7 30 04 JR NC,FMM60
747 43F9 D6 A0 SUB 0A0H
748 43FB 30 6A JR NC,FG100 ;GAIJI
749 ;
750 ;
751 ;
752 ; [ normal 2bytes character ]
753 ;
754 43FD FMM60: LD A,(MFROM)
755 43FD 3A FED2 INC A
756 4400 3C JR NZ,NOMFROM ;no MF option board
757 4401 20 5F
758 ;
759 4403 CD 485D CALL KANCOD
760 4406 0E C0 LD C,0C0H
761 4408 CD 0087 CALL KCGOT
762 440B 4D LD C,L
763 440C CD 0087 CALL KCGOT
764 440F 4C LD C,H
765 4410 CD 0087 CALL KCGOT
766 ;
767 4413 CD 0084 ;STATUS
768 ;
769 4416 3A FE9A LD A,(KCG)
770 4419 A7 AND A
771 441A 28 05 JR Z,FMM70
772 441C 21 FE7F LD HL,0FE7FH
773 441F 18 0F JR FMM80
774 4421 FMM70: CALL KCGIN
775 4421 CD 0084 RES 7,C
776 4424 CB B9 LD L,C
777 4426 69 CALL KCGIN
778 4427 CD 0084 RES 0,C
779 442A CB 81 LD H,C
780 442C 61 FMMX1: NOP ;LD HL,0FE7FH if not proportional spacing
781 442D 00 NOP
782 442E 00 NOP
783 442F 00 FMM80: LD (PROP),HL ;proportional
784 4430 ;
785 4430 22 4A42 ;
786 ;
787 ;
788 4433 3E FE LD A,0FEH ;SET 7
789 4435 CD 44BF CALL FMSET
790 ;
791 4438 3E F6 LD A,0F6H ;SET 6

```

```

792 443A CD 44BF          CALL FMSET
793                                     ;3
794 443D 3E EE          LD A,0EEH          ;SET 5
795 443F CD 44BF          CALL FMSET
796                                     ;4
797 4442 3E E6          LD A,0E6H          ;SET 4
798 4444 CD 44BF          CALL FMSET
799                                     ;5
800 4447 3E DE          LD A,0DEH          ;SET 3
801 4449 CD 44BF          CALL FMSET
802                                     ;6
803 444C 3E D6          LD A,0D6H          ;SET 2
804 444E CD 44BF          CALL FMSET
805                                     ;7
806 4451 3E CE          LD A,0CEH          ;SET 1
807 4453 CD 44BF          CALL FMSET
808                                     ;8
809 4456 CD 4581          CALL FMSETB        ;
810                                     ;#
811 4459 CD 45C3          CALL FMSETC        ;restore MFPNT
812 445C 3E FF          LD A,-1
813 445E 32 C300         LD (PRTBUF),A
814 4461 C9              RET
815                                     ;
816                                     ;
817                                     ;
818 4462                                     ;no MF option board
819 4462 21 5411         LD HL,ILLCHR
820 4465 18 0C          JR FG200
821                                     ;
822                                     ;
823                                     ;
824 4467                                     ;FG100:
825 4467 6F             LD L,A
826 4468 26 00         LD H,0
827 446A 29             ADD HL,HL
828 446B 29             ADD HL,HL
829 446C 29             ADD HL,HL
830 446D 29             ADD HL,HL
831 446E 29             ADD HL,HL
832 446F 11 A300        LD DE,GAIJITB
833 4472 19             ADD HL,DE          ;HL=GAIJITB+A*32
834                                     ;
835 4473                                     ;FG200:
836 4473 11 4A4D        LD DE,GIJBUF
837 4476 01 0020       LD BC,32
838 4479 ED B0          LDIR
839                                     ;
840 447B FD 21 4A4D     LD IY,GIJBUF
841 447F FD 6E 00     LD L,(IY)
842 4482 FD 66 01     LD H,(IY+1)
843 4485 00           NOP
844 4486 00           NOP
845 4487 00           NOP
846 4488 22 4A42     LD (PROP),HL
847 448B FD 23       INC IY
848 448D FD 23       INC IY
849                                     ;1
850 448F 3E FE          LD A,0FEH          ;SET 7
851 4491 CD 45F9          CALL FMSETD
852                                     ;2
853 4494 3E F6          LD A,0F6H          ;SET 6
854 4496 CD 45F9          CALL FMSETD
855                                     ;3
856 4499 3E EE          LD A,0EEH          ;SET 5
857 449B CD 45F9          CALL FMSETD
858                                     ;4
859 449E 3E E6          LD A,0E6H          ;SET 4
860 44A0 CD 45F9          CALL FMSETD
861                                     ;5
862 44A3 3E DE          LD A,0DEH          ;SET 3
863 44A5 CD 45F9          CALL FMSETD
864                                     ;6
865 44A8 3E D6          LD A,0D6H          ;SET 2
866 44AA CD 45F9          CALL FMSETD
867                                     ;7
868 44AD 3E CE          LD A,0CEH          ;SET 1
869 44AF CD 45F9          CALL FMSETD
870                                     ;8
871 44B2 CD 46BD          CALL FMSETB        ;
872                                     ;#
873 44B5 CD 47A1          CALL FMSETF        ;
874 44B8 3E FF          LD A,-1
875 44BA 32 C300         LD (PRTBUF),A
876 44BD AF              XOR A
877 44BE C9              RET
878                                     ;
879                                     ;
880                                     ;
881                                     ;
882                                     ;
883                                     ;
884                                     ;
885 44BF                                     ;FMSET:
886 44BF 32 44FA        LD (FS1X+1),A
887 44C2 32 4502        LD (FS2X+1),A
888 44C5 32 4546        LD (FS3X+1),A
889 44C8 32 454E        LD (FS4X+1),A
890 44CB 32 4571        LD (FS5X+1),A
891                                     ;
892 44CE 2A FE8D         LD HL,(MFPT1)
893 44D1 CD 44D7         CALL FMS000
894                                     ;
895 44D4 2A FE8F         LD HL,(MFPT2)
896                                     ;
897 44D7                                     ;FMS000:
898 44D7 AF              XOR A
899 44D8 32 4A44        LD (PPAA),A
900                                     ;
901 44DB CD 0084         CALL KCGIN
902 44DE 3A 4A42        LD A,(PROP)
903 44E1 07             RLCA
904 44E2 CB B9          RES 7,C

```

905 44E4 06 07  
 906 44E6  
 907 44E6 07  
 908 44E7 30 21  
 909 44E9 57  
 910 44EA 3A 4A44  
 911 44ED A7  
 912 44EE 20 0C  
 913 44F0 3E FF  
 914 44F2 32 4A44  
 915 44F5 CB 79  
 916 44F7 28 02  
 917 44F9 CB FE  
 918 44FB  
 919 44FB 23  
 920 44FC  
 921 44FC 7A  
 922 44FD CB 71  
 923 44FF 28 02  
 924 4501 CB FE  
 925 4503  
 926 4503 23  
 927 4504  
 928 4504 CB 11  
 929 4506 10 DE  
 930 4508 18 1E  
 931  
 932 450A  
 933 450A 57  
 934 450B 3A 4A44  
 935 450E A7  
 936 450F 7A  
 937 4510 28 F2  
 938  
 939 4512 05  
 940 4513 28 07  
 941 4515 CD 4569  
 942 4518 CD 0084  
 943 451B C9  
 944 451C  
 945 451C CD 456C  
 946 451F CD 0084  
 947 4522 CB 39  
 948 4524 CD 456C  
 949 4527 C9  
 950  
 951 4528  
 952 4528 CD 0084  
 953 452B 3A 4A43  
 954 452E CB 39  
 955 4530 06 07  
 956 4532  
 957 4532 07  
 958 4533 30 23  
 959 4535 57  
 960 4536 3A 4A44  
 961 4539 A7  
 962 453A 20 0C  
 963 453C 3E FF  
 964 453E 32 4A44  
 965 4541 CB 79  
 966 4543 28 02  
 967 4545 CB FE  
 968 4547  
 969 4547 23  
 970 4548  
 971 4548 7A  
 972 4549 CB 71  
 973 454B 28 02  
 974 454D CB FE  
 975 454F  
 976 454F 23  
 977 4550 CB 11  
 978 4552 10 DE  
 979 4554 06 02  
 980 4556 18 24  
 981  
 982 4558  
 983 4558 57  
 984 4559 3A 4A44  
 985 455C A7  
 986 455D 20 07  
 987 455F 7A  
 988 4560 CB 11  
 989 4562 10 CE  
 990 4564 AF  
 991 4565 C9  
 992  
 993 4566  
 994 4566 05  
 995 4567 28 0E  
 996  
 997 4569  
 998 4569 CD 456C  
 999 456C  
 1000 456C CB 71  
 1001 456E 28 02  
 1002 4570 CB FE  
 1003 4572  
 1004 4572 23  
 1005 4573 CB 01  
 1006 4575 AF  
 1007 4576 C9  
 1008  
 1009 4577  
 1010 4577 CD 456C  
 1011 457A 06 01  
 1012  
 1013 457C  
 1014 457C 23  
 1015 457D 10 FD  
 1016 457F AF  
 1017 4580 C9

LD B, 7  
 FMS10: RLCA  
 JR NC, FMS20  
 LD D, A  
 LD A, (PPAA)  
 AND A  
 JR NZ, FMS15  
 LD A, -1  
 LD (PPAA), A  
 BIT 7, C  
 JR Z, FMS12  
 FS1X: SET 7, (HL)  
 FMS12: INC HL  
 FMS15: LD A, D  
 BIT 6, C  
 JR Z, FMS17  
 FS2X: SET 7, (HL)  
 FMS17: INC HL  
 FMS18: RL C  
 DJNZ FMS10  
 JR FMS30  
 ;  
 FMS20: LD D, A  
 LD A, (PPAA)  
 AND A  
 LD A, D  
 JR Z, FMS18  
 ;  
 DEC B  
 JR Z, FMS25  
 CALL FMS70  
 CALL KCGIN  
 RET  
 FMS25: CALL FMS71  
 CALL KCGIN  
 SRL C  
 CALL FMS71  
 RET  
 ;  
 FMS30: CALL KCGIN  
 LD A, (PROP+1)  
 SRL C  
 LD B, 7  
 FMS40: RLCA  
 JR NC, FMS50  
 LD D, A  
 LD A, (PPAA)  
 AND A  
 JR NZ, FMS45  
 LD A, -1  
 LD (PPAA), A  
 BIT 7, C  
 JR Z, FMS42  
 FS3X: SET 7, (HL)  
 FMS42: INC HL  
 FMS45: LD A, D  
 BIT 6, C  
 JR Z, FMS47  
 FS4X: SET 7, (HL)  
 FMS47: INC HL  
 RL C  
 DJNZ FMS40  
 LD B, 2  
 JR FMS90  
 ;  
 FMS50: LD D, A  
 LD A, (PPAA)  
 AND A  
 JR NZ, FMS60  
 LD A, D  
 RL C  
 DJNZ FMS40  
 XOR A  
 RET ;clear carry flag  
 ;  
 FMS60: DEC B  
 JR Z, FMS80  
 ;  
 FMS70: CALL FMS71  
 FMS71: CALL FMS71  
 BIT 6, C  
 JR Z, FMS72  
 FS5X: SET 7, (HL)  
 FMS72: INC HL  
 RLC C  
 XOR A  
 RET ;clear carry flag  
 ;  
 FMS80: CALL FMS71  
 LD B, 1  
 ;  
 FMS90: INC HL  
 DJNZ FMS90  
 XOR A  
 RET ;clear carry flag

1018					
1019					
1020					
1021					
1022					
1023	4581		FMSETB:	LD	A, 0C6H ;SET 0, (HL)
1024	4581	3E C6		LD	(FS1X+1), A
1025	4583	32 44FA		LD	(FS2X+1), A
1026	4586	32 4502		LD	(FS3X+1), A
1027	4589	32 4546		LD	(FS4X+1), A
1028	458C	32 454E		LD	(FS5X+1), A
1029	458F	32 4571		LD	
1030					
1031	4592	2A FE8D		LD	HL, (MFPT1)
1032	4595	CD 44D7		CALL	FMS000
1033					
1034	4598	EB		EX	DE, HL
1035	4599	2A FE93		LD	HL, (PTMAX)
1036	459C	AF		XOR	A
1037	459D	ED 52		SBC	HL, DE
1038	459F	EB		EX	DE, HL
1039	45A0	30 03		JR	NC, FMB08
1040	45A2	22 FE93		LD	(PTMAX), HL
1041	45A5		FMB08:	LD	A, (RSP) ;right space
1042	45A5	3A FE89		LD	C, A
1043	45A8	4F		LD	B, 0
1044	45A9	06 00		RLCA	
1045	45AB	07		JR	NC, FMB10
1046	45AC	30 02		LD	B, -1
1047	45AE	06 FF			
1048	45B0		FMB10:	ADD	HL, BC
1049	45B0	09		LD	(MFPT1), HL
1050	45B1	22 FE8D			
1051					
1052	45B4	C5		PUSH	BC
1053	45B5	2A FE8F		LD	HL, (MFPT2)
1054	45B8	CD 44D7		CALL	FMS000
1055	45BB	C1		POP	BC
1056	45BC	D8		RET	C
1057	45BD	09		ADD	HL, BC ;add right space
1058	45BE	22 FE8F		LD	(MFPT2), HL
1059	45C1	AF		XOR	A
1060	45C2	C9		RET	
1061					
1062					
1063					
1064	45C3		FMSETC:	LD	A, 0CEH ;SET 1, (HL)
1065	45C3	3E CE			
1066	45C5		FMC10:	LD	(FS1X+1), A
1067	45C5	32 44FA		LD	(FS2X+1), A
1068	45C8	32 4502		LD	(FS3X+1), A
1069	45CB	32 4546		LD	(FS4X+1), A
1070	45CE	32 454E		LD	(FS5X+1), A
1071	45D1	32 4571		LD	HL, (MFPT3)
1072	45D4	2A FE91		CALL	FMS000
1073	45D7	CD 44D7			
1074					
1075	45DA	3A FE9A		LD	A, (KCG)
1076	45DD	A7		AND	A
1077	45DE	28 08		JR	Z, FMC20
1078	45E0	AF		XOR	A
1079	45E1	32 FE9A		LD	(KCG), A
1080	45E4	3E C6		LD	A, 0C6H ;SET 0, (HL)
1081	45E6	18 DD		JR	FMC10
1082					
1083	45E8		FMC20:	LD	A, (RSP) ;right space
1084	45E8	3A FE89		LD	C, A
1085	45EB	4F		LD	B, 0
1086	45EC	06 00		RLCA	
1087	45EE	07		JR	NC, FMC30
1088	45EF	30 02		LD	B, -1
1089	45F1	06 FF			
1090	45F3		FMC30:	ADD	HL, BC
1091	45F3	09		LD	(MFPT3), HL
1092	45F4	22 FE91		XOR	A ;clear carry flag
1093	45F7	AF		RET	
1094	45F8	C9			
1095					
1096					
1097					
1098					
1099					
1100					
1101					
1102	45F9		FMSETD:	LD	(FS6X+1), A
1103	45F9	32 4636		LD	(FS7X+1), A
1104	45FC	32 463E		LD	(FS8X+1), A
1105	45FF	32 4685		LD	(FS9X+1), A
1106	4602	32 468D		LD	(FSAX+1), A
1107	4605	32 46AF			
1108					
1109	4608	2A FE8D		LD	HL, (MFPT1)
1110	460B	CD 4611		CALL	FMD000
1111					
1112	460E	2A FE8F		LD	HL, (MFPT2)
1113					
1114	4611		FMD000:	XOR	A
1115	4611	AF		LD	(PPAA), A
1116	4612	32 4A44			
1117					
1118	4615	FD 4E 00		LD	C, (1Y)
1119	4618	FD 23		INC	IY
1120	461A	3A 4A42		LD	A, (PROP)
1121	461D	07		RLCA	
1122	461E	CB B9		RES	7, C
1123	4620	06 07		LD	B, 7
1124	4622		FMD10:	RLCA	
1125	4622	07		JR	NC, FMD20
1126	4623	30 21		LD	D, A
1127	4625	57		LD	A, (PPAA)
1128	4626	3A 4A44		LD	A
1129	4629	A7		AND	A
1130	462A	20 0C		JR	NZ, FMD15

1131	462C	3E FF	LD	A, -1
1132	462E	32 4A44	LD	(PPAA), A
1133	4631	CB 79	BIT	7, C
1134	4633	28 02	JR	Z, FMD12
1135	4635	CB FE	SET	7, (HL)
1136	4637		FS6X:	
1137	4637	23	FMD12:	INC HL
1138	4638		FMD15:	
1139	4638	7A	LD	A, D
1140	4639	CB 71	BIT	6, C
1141	463B	28 02	JR	Z, FMD17
1142	463D	CB FE	FS7X:	SET 7, (HL)
1143	463F		FMD17:	INC HL
1144	463F	23	FMD18:	
1145	4640			
1146	4640	CB 11	RL	C
1147	4642	10 DE	DJNZ	FMD10
1148	4644	18 1F	JR	FMD30
1149				
1150	4646		FMD20:	
1151	4646	57	LD	D, A
1152	4647	3A 4A44	LD	A, (PPAA)
1153	464A	A7	AND	A
1154	464B	7A	LD	A, D
1155	464C	28 F2	JR	Z, FMD18
1156				
1157	464E	05	DEC	B
1158	464F	28 06	JR	Z, FMD25
1159	4651	CD 46A7	CALL	FMD70
1160	4654	FD 23	INC	IY
1161	4656	C9	RET	
1162	4657		FMD25:	
1163	4657	CD 46AA	CALL	FMD71
1164	465A	FD 4E 00	LD	C, (IY)
1165	465D	FD 23	INC	IY
1166	465F	CB 39	SRL	C
1167	4661	CD 46AA	CALL	FMD71
1168	4664	C9	RET	
1169				
1170	4665		FMD30:	
1171	4665	FD 4E 00	LD	C, (IY)
1172	4668	FD 23	INC	IY
1173	466A	3A 4A43	LD	A, (PROP+1)
1174	466D	CB 39	SRL	C
1175	466F	06 07	LD	B, 7
1176	4671		FMD40:	
1177	4671	07	RLCA	
1178	4672	30 23	JR	NC, FMD50
1179	4674	57	LD	D, A
1180	4675	3A 4A44	LD	A, (PPAA)
1181	4678	A7	AND	A
1182	4679	20 0C	JR	NZ, FMD45
1183	467B	3E FF	LD	A, -1
1184	467D	32 4A44	LD	(PPAA), A
1185	4680	CB 79	BIT	7, C
1186	4682	28 02	JR	Z, FMD42
1187	4684	CB FE	SET	7, (HL)
1188	4686		FS8X:	
1189	4686	23	FMD42:	INC HL
1190	4687		FMD45:	
1191	4687	7A	LD	A, D
1192	4688	CB 71	BIT	6, C
1193	468A	28 02	JR	Z, FMD47
1194	468C	CB FE	SET	7, (HL)
1195	468E		FS9X:	
1196	468E	23	FMD47:	INC HL
1197	468F	CB 11	RL	C
1198	4691	10 DE	DJNZ	FMD40
1199	4693	06 02	LD	B, 2
1200	4695	18 22	JR	FMD90
1201				
1202	4697		FMD50:	
1203	4697	57	LD	D, A
1204	4698	3A 4A44	LD	A, (PPAA)
1205	469B	A7	AND	A
1206	469C	20 06	JR	NZ, FMD60
1207	469E	7A	LD	A, D
1208	469F	CB 11	RL	C
1209	46A1	10 CE	DJNZ	FMD40
1210	46A3	C9	RET	
1211				
1212	46A4		FMD60:	
1213	46A4	05	DEC	B
1214	46A5	28 0D	JR	Z, FMD80
1215				
1216	46A7		FMD70:	
1217	46A7	CD 46AA	CALL	FMD71
1218	46AA		FMD71:	
1219	46AA	CB 71	BIT	6, C
1220	46AC	28 02	JR	Z, FMD72
1221	46AE	CB FE	SET	7, (HL)
1222	46B0		FSAX:	
1223	46B0	23	FMD72:	INC HL
1224	46B1	CB 01	RLC	C
1225	46B3	C9	RET	
1226				
1227	46B4		FMD80:	
1228	46B4	CD 46AA	CALL	FMD71
1229	46B7	06 01	LD	B, 1
1230				
1231	46B9		FMD90:	
1232	46B9	23	INC	HL
1233	46BA	10 FD	DJNZ	FMD90
1234	46BC	C9	RET	
1235				
1236				
1237				
1238				
1239				
1240				
1241				
1242	46BD		FMSETE:	
1243	46BD	3E C6	LD	A, 0C6H

:SET 0, (HL)

1244	46BF	32 4636	LD	(FS6X+1), A	
1245	46C2	32 463E	LD	(FS7X+1), A	
1246	46C5	32 4685	LD	(FS8X+1), A	
1247	46C8	32 468D	LD	(FS9X+1), A	
1248	46CB	32 46AF	LD	(FSAX+1), A	
1249					
1250	46CE	2A FE8D	LD	HL, (MFPT1)	
1251	46D1	CD 4611	CALL	FMD000	
1252					
1253	46D4	EB	EX	DE, HL	
1254	46D5	2A FE93	LD	HL, (PTMAX)	
1255	46D8	AF	XOR	A	
1256	46D9	ED 52	SBC	HL, DE	
1257	46DB	EB	EX	DE, HL	
1258	46DC	30 03	JR	NC, FME08	
1259	46DE	22 FE93	LD	(PTMAX), HL	
1260	46E1		FME08:		
1261	46E1	3A FE89	LD	A, (RSP)	right space
1262	46E4	4F	LD	C, A	
1263	46E5	06 00	LD	B, 0	
1264	46E7	07	RLCA		
1265	46E8	30 02	JR	NC, FME10	
1266	46EA	06 FF	LD	B, -1	
1267	46EC		FME10:		
1268	46EC	09	ADD	HL, BC	
1269	46ED	22 FE8D	LD	(MFPT1), HL	
1270	46FC	C5	PUSH	BC	
1271					
1272	46F1	AF	XOR	A	
1273	46F2	32 4A44	LD	(PPAA), A	
1274	46F5	FD 21 4A4D	LD	IY, GIJBUF	
1275	46F9	2A FE8F	LD	HL, (MFPT2)	
1276	46FC	3A 4A42	LD	A, (PROP)	
1277	46FF	07	RLCA		
1278	4700	06 07	LD	B, 7	
1279	4702	0E 00	LD	C, 0	
1280	4704	18 03	JR	FME22	
1281	4706		FME20:		
1282	4706	FD 4E 00	LD	C, (IY)	
1283	4709	FD 23	INC	IY	
1284	4708	FD 23	INC	IY	
1285	470D	07	RLCA		
1286	470E	30 21	JR	NC, FME30	
1287	4710	57	LD	D, A	
1288	4711	3A 4A44	LD	A, (PPAA)	
1289	4714	A7	AND	A	
1290	4715	20 0C	JR	NZ, FME26	
1291	4717	3E FF	LD	A, -1	
1292	4719	32 4A44	LD	(PPAA), A	
1293	471C	CB 79	BIT	7, C	
1294	471E	28 02	JR	Z, FME25	
1295	4720	CB C6	SET	0, (HL)	
1296	4722		FME25:		
1297	4722	23	INC	HL	
1298	4723		FME26:		
1299	4723	7A	LD	A, D	
1300	4724	FD CB 00 7E	BIT	7, (IY)	
1301	4728	28 02	JR	Z, FME27	
1302	472A	CB C6	SET	0, (HL)	
1303	472C		FME27:		
1304	472C	23	INC	HL	
1305	472D		FME28:		
1306	472D	10 D7	DJNZ	FME20	
1307	472F	18 0A	JR	FME40	
1308					
1309	4731		FME30:		
1310	4731	57	LD	D, A	
1311	4732	3A 4A44	LD	A, (PPAA)	
1312	4735	A7	AND	A	
1313	4736	7A	LD	A, D	
1314	4737	28 F4	JR	Z, FME28	
1315	4739	18 41	JR	FME65	
1316					
1317	473B		FME40:		
1318	473B	3A 4A43	LD	A, (PROP+1)	
1319	473E	06 07	LD	B, 7	
1320	4740		FME42:		
1321	4740	FD 4E 00	LD	C, (IY)	
1322	4743	FD 23	INC	IY	
1323	4745	FD 23	INC	IY	
1324	4747	07	RLCA		
1325	4748	30 23	JR	NC, FME50	
1326	474A	57	LD	D, A	
1327	474B	3A 4A44	LD	A, (PPAA)	
1328	474E	A7	AND	A	
1329	474F	20 0C	JR	NZ, FME45	
1330	4751	3E FF	LD	A, -1	
1331	4753	32 4A44	LD	(PPAA), A	
1332	4756	CB 79	BIT	7, C	
1333	4758	28 02	JR	Z, FME43	
1334	475A	CB C6	SET	0, (HL)	
1335	475C		FME43:		
1336	475C	23	INC	HL	
1337	475D		FME45:		
1338	475D	7A	LD	A, D	
1339	475E	FD CB 00 7E	BIT	7, (IY)	
1340	4762	28 02	JR	Z, FME47	
1341	4764	CB C6	SET	0, (HL)	
1342	4766		FME47:		
1343	4766	23	INC	HL	
1344	4767	10 D7	DJNZ	FME42	
1345	4769	06 02	LD	B, 2	
1346	476B	18 1C	JR	FME75	
1347					
1348	476D		FME50:		
1349	476D	57	LD	D, A	
1350	476E	3A 4A44	LD	A, (PPAA)	
1351	4771	A7	AND	A	
1352	4772	20 05	JR	NZ, FME60	
1353	4774	7A	LD	A, D	
1354	4775	10 C9	DJNZ	FME42	
1355	4777	18 13	JR	FME90	
1356					



1357	4779		FME60:	DEC	B	
1358	4779	05		JR	Z, FME70	
1359	477A	28 08				
1360	477C		FME65:	CALL	FMGEE	
1361	477C	CD 4793		CALL	FMGEE	
1362	477F	CD 4793		JR	FME90	
1363	4782	18 08				
1364						
1365	4784		FME70:	CALL	FMGEE	
1366	4784	CD 4793		LD	B, 1	
1367	4787	06 01				
1368	4789		FME75:	INC	HL	
1369	4789	23		DJNZ	FME75	
1370	478A	10 FD				
1371	478C		FME90:	POP	BC	
1372	478C	C1		ADD	HL, BC	add right space
1373	478D	09		LD	(MFPT2), HL	
1374	478E	22 FE8F		XOR	A	
1375	4791	AF		RET		
1376	4792	C9				
1377						
1378						
1379						
1380	4793		FMGEE:	BIT	7, (IY)	
1381	4793	FD CB 00 7E		JR	Z, FGEE0	
1382	4797	28 02		SET	0, (HL)	
1383	4799	CB C6				
1384	479B		FGEE0:	INC	IY	
1385	479B	FD 23		INC	IY	
1386	479D	FD 23		INC	HL	
1387	479F	23		RET		
1388	47A0	C9				
1389						
1390						
1391						
1392						
1393						
1394						
1395						
1396	47A1		FMSETF:	XOR	A	
1397	47A1	AF		LD	(PPAA), A	
1398	47A2	32 4A44		LD	IY, G1JBUF	
1399	47A5	FD 21 4A4D		INC	IY	
1400	47A9	FD 23		LD	HL, (MFPT3)	
1401	47AB	2A FE91		LD	A, (PROP)	
1402	47AE	3A 4A42		RLCA		
1403	47B1	07		LD	B, 7	
1404	47B2	06 07		LD	C, 0	
1405	47B4	0E 00		JR	FMF12	
1406	47B6	18 03				
1407						
1408	47B8		FMF10:	LD	C, (IY)	
1409	47B8	FD 4E 00		INC	IY	
1410	47BB	FD 23	FMF12:	INC	IY	
1411	47BD	FD 23		RLCA		
1412	47BF	07		JR	NC, FMF20	
1413	47C0	30 21		LD	D, A	
1414	47C2	57		LD	A, (PPAA)	
1415	47C3	3A 4A44		AND	A	
1416	47C6	A7		JR	NZ, FMF15	
1417	47C7	20 0C		LD	A, -1	
1418	47C9	3E FF		LD	(PPAA), A	
1419	47CB	32 4A44		BIT	0, C	
1420	47CE	CB 41		JR	Z, FMF13	
1421	47D0	28 02		SET	1, (HL)	
1422	47D2	CB CE				
1423	47D4		FMF13:	INC	HL	
1424	47D4	23				
1425	47D5		FMF15:	LD	A, D	
1426	47D5	7A		BIT	0, (IY)	
1427	47D6	FD CB 00 46		JR	Z, FMF17	
1428	47DA	28 02		SET	1, (HL)	
1429	47DC	CB CE				
1430	47DE		FMF17:	INC	HL	
1431	47DE	23				
1432	47DF		FMF18:	DJNZ	FMF10	
1433	47DF	10 D7		JR	FMF30	
1434	47E1	18 0A				
1435						
1436	47E3		FMF20:	LD	D, A	
1437	47E3	57		LD	A, (PPAA)	
1438	47E4	3A 4A44		AND	A	
1439	47E7	A7		LD	A, D	
1440	47E8	7A		JR	Z, FMF18	
1441	47E9	28 F4		JR	FMF60	
1442	47EB	18 41				
1443						
1444	47ED		FMF30:	LD	A, (PROP+1)	
1445	47ED	3A 4A43		LD	B, 7	
1446	47F0	06 07				
1447	47F2		FMF32:	LD	C, (IY)	
1448	47F2	FD 4E 00		INC	IY	
1449	47F5	FD 23		INC	IY	
1450	47F7	FD 23		RLCA		
1451	47F9	07		JR	NC, FMF40	
1452	47FA	30 23		LD	D, A	
1453	47FC	57		LD	A, (PPAA)	
1454	47FD	3A 4A44		AND	A	
1455	4800	A7		JR	NZ, FMF35	
1456	4801	20 0C		LD	A, -1	
1457	4803	3E FF		LD	(PPAA), A	
1458	4805	32 4A44		BIT	0, C	
1459	4808	CB 41		JR	Z, FMF33	
1460	480A	28 02		SET	1, (HL)	
1461	480C	CB CE				
1462	480E		FMF33:	INC	HL	
1463	480E	23				
1464	480F		FMF35:	LD	A, D	
1465	480F	7A		BIT	0, (IY)	
1466	4810	FD CB 00 46		JR	Z, FMF38	
1467	4814	28 02		SET	1, (HL)	
1468	4816	CB CE				
1469	4818		FMF38:			

1470	4818	23	INC	HL	
1471	4819	10 D7	DJNZ	FMF32	
1472	481B	06 02	LD	B, 2	
1473	481D	18 1C	JR	FMF80	
1474					
1475	481F		FMF40:		
1476	481F	57	LD	D, A	
1477	4820	3A 4A44	LD	A, (PPAA)	
1478	4823	A7	AND	A	
1479	4824	20 05	JR	NZ, FMF50	
1480	4826	7A	LD	A, D	
1481	4827	10 C9	DJNZ	FMF32	
1482	4829	18 13	JR	FMF90	
1483					
1484	482B		FMF50:		
1485	482B	05	DEC	B	
1486	482C	28 08	JR	Z, FMF70	
1487	482E		FMF60:		
1488	482E	CD 484F	CALL	FMGFF	
1489	4831	CD 484F	CALL	FMGFF	
1490	4834	18 08	JR	FMF90	
1491					
1492	4836		FMF70:		
1493	4836	CD 484F	CALL	FMGFF	
1494	4839	06 01	LD	B, 1	
1495	483B		FMF80:		
1496	483B	23	INC	HL	
1497	483C	10 FD	DJNZ	FMF80	
1498	483E		FMF90:		
1499	483E	3A FE89	LD	A, (RSP)	right space
1500	4841	4F	LD	C, A	
1501	4842	06 00	LD	B, 0	
1502	4844	07	RLCA		
1503	4845	30 02	JR	NC, FMF92	
1504	4847	06 FF	LD	B, -1	
1505	4849		FMF92:		
1506	4849	09	ADD	HL, BC	
1507	484A	22 FE91	LC	(MFPT3), HL	
1508	484D	AF	XOR	A	
1509	484E	C9	RET		
1510					
1511					
1512					
1513	484F		FMGFF:		
1514	484F	FD CB 00 46	BIT	0, (IY)	
1515	4853	28 02	JR	Z, FGFF0	
1516	4855	CB CE	SET	1, (HL)	
1517	4857		FGFF0:		
1518	4857	FD 23	INC	IY	
1519	4859	FD 23	INC	IY	
1520	485B	23	INC	HL	
1521	485C	C9	RET		
1522					
1523					
1524					
1525					
1526					
1527	485D		KANCOD:		
1528	485D	3A FE79	LD	A, (TSAVE)	
1529	4860	F5	PUSH	AF	
1530	4861	3A FE86	LD	A, (KSAVE)	
1531	4864	32 FE79	LD	(TSAVE), A	
1532	4867	CD 008A	CALL	CONVCD	
1533	486A	F1	POP	AF	
1534	486B	32 FE79	LD	(TSAVE), A	
1535	486E	C9	RET		
1536					
1537					
1538					
1539					
1540					
1541					
1542					
1543					
1544					
1545	486F		[ print line buffer ]		
1546	486F	2A FE8D	WRITE:		
1547	4872	ED 5B FE93	LD	HL, (MFPT1)	
1548	4876	CD 4BCE	LD	DE, (PTMAX)	
1549	4879	30 01	CALL	CPHLDE	HL:DE
1550	487B	EB	JR	NC, WRIT10	
1551	487C		EX	DE, HL	HL=(PTMAX)
1552	487C	11 C400	WRIT10:		
1553	487F	AF	LD	DE, MFBUF1	
1554	4880	ED 52	XOR	A	
1555	4882	C8	SBC	HL, DE	
1556	4883	22 4A45	RET	Z	
1557			LD	(COUNT), HL	
1558	4886	3A FE55	LD	A, (PRINTER)	
1559	4889	CB 6F	BIT	S, A	
1560	488B	20 5C	JR	NZ, WRITFX	
1561					
1562					
1563					
1564					
1565	488D	3E FF	MX-80, MX-82, MX100 TYPE 2, 3		
1566	488F	32 4A4C	LD	A, ON	set DISBRK flag
1567			LD	(DISBRK), A	
1568	4892	21 C400	LD	HL, MFBUF1	
1569	4895	CD 4945	CALL	WTBUFF	
1570	4898	0E 1B	LD	C, ESC	set a line spacing to 1/216
1571	489A	CD 4A72	CALL	LPOUT	
1572	489D	0E 4A	LD	C, 'J'	
1573	489F	CD 4A72	CALL	LPOUT	
1574	48A2	0E 01	LD	C, 1	
1575	48A4	CD 4A72	CALL	LPOUT	
1576					
1577	48A7	21 CC00	LD	HL, MFBUF2	
1578	48AA	CD 4945	CALL	WTBUFF	
1579	48AD	0E 1B	LD	C, ESC	
1580	48AF	CD 4A72	CALL	LPOUT	
1581	48B2	0E 4A	LD	C, 'J'	
1582	48B4	CD 4A72	CALL	LPOUT	

```

1583 48B7 0E 01 LD C, 1
1584 48B9 CD 4A72 CALL LPOUT
1585
1586 48BC CD 497E CALL WTBUF2
1587 48BF 0E 1B LD C, ESC
1588 48C1 CD 4A72 CALL LPOUT
1589 48C4 0E 4A LD C, 'J'
1590 48C6 CD 4A72 CALL LPOUT
1591 48C9 0E 01 LD C, 1
1592 48CB CD 4A72 CALL LPOUT
1593
1594 48CE CD 4982 CALL WTBUF2
1595 48D1 0E 1B LD C, ESC
1596 48D3 CD 4A72 CALL LPOUT
1597 48D6 0E 4A LD C, 'J'
1598 48D8 CD 4A72 CALL LPOUT
1599 48DB 0E 21 LD C, 33
1600 48DD CD 4A72 CALL LPOUT
1601
1602 48E0 AF XOR A ;clear DISBRK flag
1603 48E1 32 4A4C LD (DISBRK), A ;
1604
1605 48E4 3D DEC A ;A--1
1606 48E5 32 FE87 LD (LCRFLG), A ;
1607 48E8 C9 RET ;
1608
1609 ;
1610 ;
1611 ; FX-80
1612 ;
1613 ; WRITFX:
1614 48E9 LD A, ON ;set DISBRK flag
1615 48EB 32 4A4C LD (DISBRK), A ;
1616
1617 48EE 11 C400 LD DE, MFBUF1
1618 48F1 CD 49CE CALL WTBFX1
1619 48F4 0E 1B LD C, ESC ;set a line spacing to 1/216
1620 48F6 CD 4A72 CALL LPOUT
1621 48F9 0E 4A LD C, 'J'
1622 48FB CD 4A72 CALL LPOUT
1623 48FE 0E 01 LD C, 1
1624 4900 CD 4A72 CALL LPOUT
1625
1626 4903 11 CC00 LD DE, MFBUF2
1627 4906 CD 49D1 CALL WTBFX2
1628 4909 0E 1B LD C, ESC
1629 490B CD 4A72 CALL LPOUT
1630 490E 0E 4A LD C, 'J'
1631 4910 CD 4A72 CALL LPOUT
1632 4913 0E 23 LD C, 35
1633 4915 CD 4A72 CALL LPOUT
1634
1635 4918 AF XOR A ;clear DISBRK flag
1636 4919 32 4A4C LD (DISBRK), A ;
1637
1638 491C 3D DEC A ;A--1
1639 491D 32 FE87 LD (LCRFLG), A ;
1640 4920 C9 RET ;
1641
1642 ;
1643 ;
1644 ;
1645 ;
1646 4921 CLRMBF:
1647 4921 LD HL, MFBUF2
1648 4924 22 FE8F LD (MFPT2), HL
1649 4927 21 D400 LD HL, MFBUF3
1650 492A 22 FE91 LD (MFPT3), HL
1651 492D 21 C400 LD HL, MFBUF1
1652 4930 22 FE8D LD (MFPT1), HL
1653 4933 22 FE93 LD (PTMAX), HL
1654 4936 36 00 LD (HL), 0
1655 4938 11 C401 LD DE, MFBUF1+1
1656 493B 01 17FF LD BC, MFSIZE*3-1
1657 493E ED 80 LDIR
1658 4940 ED 43 FE8B LD (MFDOT), BC ;=0000
1659 4944 C9 RET ;
1660
1661 ;
1662 ;
1663 ;
1664 ;
1665 4945 WTBUFF:
1666 4945 LD D, H
1667 4946 5D LD E, L
1668 4947 ED 4B 4A45 LD BC, (COUNT)
1669 494B WT10:
1670 494B LD A, B
1671 494C B1 OR C
1672 494D C8 RET Z
1673 494E 1A LD A, (DE)
1674 494F A7 AND A
1675 4950 20 04 JR NZ, WT20
1676 4952 13 INC DE
1677 4953 0B DEC BC
1678 4954 18 F5 JR WT10
1679
1680 4956 WT20:
1681 4956 LD C, ESC ;dual-density bit image mode setting
1682 4958 CD 4A72 CALL LPOUT
1683 495B 0E 4C LD C, 'L'
1684 495D CD 4A72 CALL LPOUT
1685 4960 ED 5B 4A45 LD DE, (COUNT)
1686 4964 4B LD C, E
1687 4965 CD 4A72 CALL LPOUT
1688 4968 4A LD C, D
1689 4969 CD 4A72 CALL LPOUT
1690
1691 496C WT30:
1692 496C LD A, D
1693 496D B3 OR E
1694 496E 28 08 JR Z, WT50
1695 4970 4E LD C, (HL)

```

1696	4971	CD 4A72	CALL	LPOUT	
1697	4374	23	INC	HL	
1698	4975	1B	DEC	DE	
1699	4976	18 F4	JR	WT30	
1700					
1701	4978				
1702	4978	0E 0D	WT50:	LD	C, 0DH
1703	497A	CD 4A72	CALL	LPOUT	
1704	497D	C9	RET		
1705					
1706					
1707					
1708	497E		WTBUBF:	LD	
1709	497E	3E 4E	JR	A, 4EH	:BIT 1, (HL)
1710	4980	18 02		WTBC	
1711					
1712	4982				
1713	4982	3E 46	WTBUCF:	LD	A, 46H
1714	4984				:BIT 0, (HL)
1715	4984	32 4995	WTBC:	LD	(WTB1Y+1), A
1716	4987	32 498C		LD	(WTB2Y+1), A
1717	498A	21 D400		LD	HL, MFBUF3
1718	498D	ED 4B 4A45		LD	BC, (COUNT)
1719	4991		WTBC10:	LD	A, B
1720	4991	78	OR	C	
1721	4992	B1	RET	Z	
1722	4993	C8	WTB1Y:	BIT	1, (HL)
1723	4994	CB 4E	JR	NZ, WTBC20	
1724	4996	20 04	INC	HL	
1725	4998	23	DEC	BC	
1726	4999	0B	JR	WTBC10	
1727	499A	18 F5	WTBC20:	LD	C, ESC
1728	499C		CALL	LPOUT	
1729	499C	0E 1B	LD	C, 'L'	
1730	499E	CD 4A72	CALL	LPOUT	
1731	49A1	0E 4C	LD	DE, (COUNT)	
1732	49A3	CD 4A72	CALL	LPOUT	
1733	49A6	ED 5B 4A45	LD	C, E	
1734	49AA	4B	CALL	LPOUT	
1735	49AB	CD 4A72	LD	C, D	
1736	49AE	4A	CALL	LPOUT	
1737	49AF	CD 4A72	CALL	LPOUT	
1738					
1739	49B2	21 D400	WTBC30:	LD	HL, MFBUF3
1740	49B5		LD	A, D	
1741	49B5	7A	OR	E	
1742	49B6	B3	JR	Z, WTBC50	
1743	49B7	28 0F	LD	C, 0	
1744	49B9	0E 00	WTB2Y:	BIT	1, (HL)
1745	49BB	CB 4E	JR	Z, WTBC40	
1746	49BD	28 02	SET	0, C	
1747	49BF	CB C1	WTBC40:	CALL	LPOUT
1748	49C1		INC	HL	
1749	49C1	CD 4A72	DEC	DE	
1750	49C4	23	JR	WTBC30	
1751	49C5	1B	WTBC50:	LD	C, 0DH
1752	49C6	18 ED	CALL	LPOUT	
1753	49C8		RET		
1754	49C8	0E 0D			
1755	49CA	CD 4A72			
1756	49CD	C9			
1757					
1758					
1759					
1760					
1761					
1762	49CE		WTBFX1:	LD	A, 4EH
1763	49CE	3E 4E	DB	21H	:BIT 1, (HL)
1764	49D0	21			:skip next instruction
1765					
1766	49D1		WTBFX2:	LD	A, 46H
1767	49D1	3E 46	LD	(WTBF1Y+1), A	:BIT 0, (HL)
1768	49D3	32 49F6	LD	(WTBF2Y+1), A	
1769	49D6	32 4A2E			
1770					
1771	49D9	62		LD	H, D
1772	49DA	6B		LD	L, E
1773	49DB	ED 4B 4A45		LD	BC, (COUNT)
1774	49DF		WTF10:	LD	A, B
1775	49DF	78	OR	C	
1776	49E0	B1	JR	Z, WTF20	
1777	49E1	28 08	LD	A, (HL)	
1778	49E3	7E	AND	A	
1779	49E4	A7	JR	NZ, WTF50	
1780	49E5	20 16	INC	HL	
1781	49E7	23	DEC	BC	
1782	49E8	0B	JR	WTF10	
1783	49E9	18 F4			
1784					
1785	49EB		WTF20:	LD	HL, MFBUF3
1786	49EB	21 D400	LD	BC, (COUNT)	
1787	49EE	ED 4B 4A45			
1788	49F2		WTF22:	LD	A, B
1789	49F2	78	OR	C	
1790	49F3	B1	RET	Z	
1791	49F4	C8	WTBF1Y:	BIT	1, (HL)
1792	49F5	CB 4E	JR	NZ, WTF50	
1793	49F7	20 04	INC	HL	
1794	49F9	23	DEC	BC	
1795	49FA	0B	JR	WTF22	
1796	49FB	18 F5			
1797					
1798	49FD		WTF50:	LD	C, ESC
1799	49FD	0E 1B	CALL	LPOUT	:9-pin bit image mode setting
1800	49FF	CD 4A72	LD	C, 5EH	
1801	4A02	0E 5E	CALL	LPOUT	
1802	4A04	CD 4A72	LD	C, 1	:dual-density mode
1803	4A07	0E 01	CALL	LPOUT	
1804	4A09	CD 4A72	LD	A, (COUNT)	
1805	4A0C	3A 4A45	LD	C, A	
1806	4A0F	4F	CALL	LPOUT	
1807	4A10	CD 4A72	CALL	LPOUT	
1808	4A13	3A 4A46	LD	A, (COUNT+1)	

```

1809 4A16 4F LD C, A
1810 4A17 CD 4A72 CALL LPOUT
1811 ;
1812 4A1A 21 D400 LD HL, MFBUF3
1813 4A1D ED 4B 4A45 LD BC, (COUNT)
1814 ;
1815 4A21 78 WTF60: LD A, B
1816 4A22 B1 OR C
1817 4A23 28 17 JR Z, WTF70
1818 4A25 C5 PUSH BC
1819 4A26 1A LD A, (DE)
1820 4A27 4F LD C, A
1821 4A28 CD 4A72 CALL LPOUT
1822 4A2B 0E 00 LD C, 0
1823 4A2D CB 4E WTB2F2Y: BIT 1, (HL)
1824 4A2F 28 02 JR Z, WTF65
1825 4A31 0E 80 LD C, 80H
1826 4A33 ;
1827 4A33 CD 4A72 WTF65: CALL LPOUT
1828 4A36 13 INC DE
1829 4A37 23 INC HL
1830 4A38 C1 POP BC
1831 4A39 0B DEC BC
1832 4A3A 18 E5 JR WTF60
1833 ;
1834 4A3C ;
1835 4A3C 0E 0D WTF70: LD C, 0DH
1836 4A3E CD 4A72 CALL LPOUT
1837 4A41 C9 RET
1838 ;
1839 ;
1840 ;
1841 ;
1842 ;
1843 00FF ON EQU 0FFH
1844 ;
1845 000A LF EQU 0AH
1846 000D CR EQU 0DH
1847 001B ESC EQU 1BH
1848 007F DELCHR EQU 7FH
1849 ;
1850 4A42 FFFF PROP: DW 0FFFFH
1851 4A44 00 PPAA: DB 0
1852 4A45 0000 COUNT: DW 0
1853 ;
1854 4A47 C400 SHEL1: DW MFBUF1
1855 4A49 00 LPESCS: DB 0
1856 4A4A 00 LESHDL: DB 0
1857 4A4B 00 BIMAGE: DB 0
1858 4A4C 00 DISBRK: DB 0
1859 ;
1860 4A4D GIJBUF: DS 32
1861 ;
1862 ;
1863 ;
1864 ;
1865 ;
1866 ;
1867 ;
1868 ;
1869 0014 LPTDT EQU 14H ;W:data
1870 0015 LPTST EQU 15H ;R:status
1871 0017 LPTCMD EQU 17H ;W:command
1872 ;
1873 0008 LPTERR EQU 08H ;if error
1874 ;
1875 ;
1876 4A6D 00 LPTCT1: DB 0
1877 4A6E 00 LPTCT2: DB 0
1878 4A6F 00 LPTCT3: DB 0
1879 4A70 0000 SHEL3: DW 0
1880 ;
1881 ;
1882 ;
1883 ;
1884 4A72 ;
1885 4A72 3A FE9D LPOUT: LD A, (LISTERR) ;BASIC Device I/O error.
1886 4A75 A7 AND A ;
1887 4A76 C0 RET NZ ;
1888 4A77 3A FE2C LD A, (PRTHRU)
1889 4A7A A7 AND A
1890 4A7B C0 RET NZ
1891 ;
1892 4A7C DB 15 IN A, (LPTST) ;printer ready ?
1893 4A7E CB 6F BIT 5, A
1894 4A80 20 0E JR NZ, LPTBSY ;no.
1895 ;
1896 4A82 ;
1897 4A82 79 LPTROY: LD A, C
1898 4A83 D3 14 OUT (LPTDT), A ;out data
1899 4A85 AF XOR A ;
1900 4A86 D3 17 OUT (LPTCMD), A ;STROBE
1901 4A88 3C INC A ;
1902 4A89 D3 17 OUT (LPTCMD), A ;
1903 4A8B 3E 0D LD A, 0DH ;PIO enable
1904 4A8D D3 17 OUT (LPTCMD), A
1905 4A8F C9 RET
1906 ;
1907 ;
1908 ;
1909 4A90 ;
1910 4A90 AF LPTBSY: ;printer not ready
1911 4A91 32 4A6D XOR A
1912 4A94 32 4A6E LD (LPTCT1), A
1913 4A97 32 4A6F LD (LPTCT2), A
1914 ;
1915 4A9A ;
1916 4A9A 3A 4A4C LB10: LD A, (DISBRK) ;check DISBRK flag
1917 4A9D A7 AND A ;
1918 4A9E 20 06 JR NZ, LB12 ;
1919 ;
1920 4AA0 3A FE43 LD A, (BRKFLG) ;Break ?
1921 4AA3 A7 AND A

```

```

1922 4AA4 20 59 JR NZ, LB40 ;yes.
1923
1924 4AA6 LB12: IN A, (LPTST)
1925 4AA6 DB 15 BIT 5, A
1926 4AA8 CB 6F JR Z, LPTRDY
1927 4AAA 28 D6 JR LPTERR ;error ?
1928 4AAC E6 08 AND ;yes, error.
1929 4AAE 28 3B JR Z, LB20
1930
1931 ; no error
1932 4AB0 DB 15 IN A, (LPTST)
1933 4AB2 CB 6F BIT 5, A
1934 4AB4 28 CC JR Z, LPTRDY ;now, printer is ready
1935 4AB6 DB 15 IN A, (LPTST)
1936 4AB8 CB 6F BIT 5, A
1937 4ABA 28 C6 JR Z, LPTRDY
1938 4ABC DB 15 IN A, (LPTST)
1939 4ABE CB 6F BIT 5, A
1940 4AC0 28 C0 JR Z, LPTRDY
1941 4AC2 DB 15 IN A, (LPTST)
1942 4AC4 CB 6F BIT 5, A
1943 4AC6 28 BA JR Z, LPTRDY
1944 4AC8 DB 15 IN A, (LPTST)
1945 4ACA CB 6F BIT 5, A
1946 4ACC 28 B4 JR Z, LPTRDY
1947
1948 4ACE 3A 4A6D LD A, (LPTCT1)
1949 4AD1 3C INC A
1950 4AD2 32 4A6D LD (LPTCT1), A
1951 4AD5 20 C3 JR NZ, LB10
1952 4AD7 3A 4A6E LD A, (LPTCT2)
1953 4ADA 3C INC A
1954 4ADB 32 4A6E LD (LPTCT2), A
1955 4ADE 20 BA JR NZ, LB10
1956 4AE0 3A 4A6F LD A, (LPTCT3)
1957 4AE3 3C INC A
1958 4AE4 32 4A6F LD (LPTCT3), A
1959 4AE7 FE 03 CP 3
1960 4AE9 20 AF JR NZ, LB10
1961 4AEB
1962 4AEB E5 LB20: PUSH HL
1963 4AEC 2A FE21 LD HL, (INTPTR)
1964 4AEF 22 4A70 LD (SHELT3), HL ;save KB input pointer
1965 4AF2 E1 POP HL
1966 4AF3
1967 4AF3 3A 4A4C LB30: LD A, (DISBRK) ;
1968 4AF6 A7 AND A ;
1969 4AF7 20 30 JR NZ, LB50 ;
1970
1971 4AF9 3A FE43 LD A, (BRKFLG) ;
1972 4AFC A7 AND A ;
1973 4AFD 28 2A JR Z, LB50 ;
1974
1975 ; BREAK
1976
1977 4AFF LB40: LD A, (BASIC) ;
1978 4AFF 3A FED4 AND A ;BASIC mode ?
1979 4B02 A7 JP NZ, LB91 ;yes.
1980 4B03 C2 4B95 LD A, 1
1981 4B06 3E 01 LD (PRTHRU), A ;non ZERO if BREAK
1982 4B08 32 FE2C XOR A ;
1983 4B0B
1984 4B0B AF LD (KSAVE), A ;clear MultiFonts 1st byte
1985 4B0C 32 FE86 LD (LCRFLG), A ;clear CR flag
1986 4B0F 32 FE87 LD (LPESC), A ;clear ESC sequence flag
1987 4B12 32 FE8A DEC A ;A--1
1988 4B15 3D PUSH HL ;set last country code
1989 4B16 32 FE98 PUSH DE ;
1990 4B19 E5 PUSH BC ;
1991 4B1A D5 CALL PLZ ;clear PRTBUF, MFBUF1-3, MFDOT and set pointers
1992 4B1B C5 LD HL, MFBUF1
1993 4B1C CD 4308 LD (SHELT1), HL ;
1994 4B1F 21 C400 LD BC ;
1995 4B22 22 4A47 POP BC ;
1996 4B25 C1 POP DE ;
1997 4B26 D1 POP HL ;
1998 4B27 E1 POP HL ;
1999 4B28 C9 RET ;
2000
2001
2002 4B29 LB50: IN A, (LPTST)
2003 4B29 DB 15 BIT 5, A
2004 4B2B CB 6F JR Z, LPTRDY
2005 4B2D CA 4A82
2006
2007 4B30 CD 4B86 CALL TIMER
2008 4B33 D2 4A82 JP NC, LPTRDY
2009 4B36 CD 4B86 CALL TIMER
2010 4B39 D2 4A82 JP NC, LPTRDY
2011 4B3C CD 4B86 CALL TIMER
2012 4B3F D2 4A82 JP NC, LPTRDY
2013
2014 4B42 DB 15 IN A, (LPTST)
2015 4B44 CB 6F BIT 5, A
2016 4B46 CA 4A82 JR Z, LPTRDY
2017
2018 4B49 3A FED4 LD A, (BASIC) ;BASIC mode ?
2019 4B4C A7 AND A ;
2020 4B4D 20 42 JR NZ, LB90 ;yes.
2021
2022
2023 4B4F CD 4BA0 CALL BUZZON
2024 4B52 CD 4B86 CALL TIMER
2025 4B55 CD 4B8B CALL BUZZOFF
2026 4B58 D2 4A82 JP NC, LPTRDY
2027
2028 4B5B DB 15 IN A, (LPTST)
2029 4B5D CB 6F BIT 5, A
2030 4B5F CA 4A82 JR Z, LPTRDY
2031
2032 4B62 E5 PUSH HL
2033 4B63 D5 PUSH DE
2034 4B64 2A 4A70 LD HL, (SHELT3)

```

```

2035 4867 ED 5B FE21 LD DE, (INTPTR)
2036 4868 CD 4BCE CALL CPHLDE
2037 486E D1 POP DE
2038 486F E1 POP HL
2039 4870 28 81 JR Z, LB30 ;no key
2040 ;
2041 4872 ; LB70: ;wait
2042 4872 DB 15 IN A, (LPTST)
2043 4874 CB 6F BIT 5, A
2044 4876 CA 4A82 JP Z, LPTRDY
2045 ;
2046 4879 CD 48B6 CALL TIMER
2047 487C D2 4A82 JP NC, LPTRDY
2048 487F 3A 4A4C LD A, (DISBRK)
2049 4882 A7 AND A
2050 4883 20 ED JR NZ, LB70
2051 ;
2052 4885 3A FE43 LD A, (BRKFLG)
2053 4888 A7 AND A
2054 4889 28 E7 JR Z, LB70
2055 488B 32 FE2C LD (PRTHRU), A
2056 488E C3 4B0B JP LB45 ;non ZERO if BREAK
2057 ;
2058 ;
2059 ;
2060 ;
2061 4891 ; LB90: ;BASIC mode printer error
2062 4893 DB 15 IN A, (LPTST)
2063 4895 CB 6F BIT 5, A
2064 4895 CA 4A82 ;
2065 4898 F6 01 JP Z, LPTRDY
2066 489A 32 FE9D OR 1
2067 489D C3 4B0B LD (LISTERR), A
2068 ; JP LB45
2069 ;
2070 ;
2071 ;
2072 ;
2073 ;
2074 4BA0 ; BUZZON:
2075 4BA3 3A FEFO LD A, (MEMBANK)
2076 4BA5 CB D7 SET 2, A
2077 4BA8 32 FEFO LD (MEMBANK), A
2078 4BA8 03 18 OUT (18H), A
2079 4BA8 C9 RET
2080 ;
2081 ;
2082 48AB ; BUZZOFF:
2083 48AB 3A FEFO LD A, (MEMBANK)
2084 48AE CB 97 RES 2, A
2085 48B0 32 FEFO LD (MEMBANK), A
2086 48B3 D3 18 OUT (18H), A
2087 48B5 C9 RET
2088 ;
2089 ;
2090 ;
2091 48B6 ; TIMER:
2092 48B6 F5 PUSH AF
2093 48B7 E5 PUSH HL
2094 48B8 21 8000 LD HL, 8000H
2095 48BB ; TIM10:
2096 48BB DB 15 IN A, (LPTST)
2097 48BD CB 6F BIT 5, A
2098 48BF 28 09 JR Z, TIM90
2099 48C1 2B DEC HL
2100 48C2 7C LD A, H
2101 48C3 65 OR L
2102 48C4 20 F5 JR NZ, TIM10
2103 48C6 E1 POP HL
2104 48C7 F1 POP AF
2105 48C8 37 SCF
2106 48C9 C9 RET
2107 48CA ; TIM90:
2108 48CA E1 POP HL
2109 48CB F1 POP AF
2110 48CD AF XOR A ;=0, non carry
2111 48CD C9 RET
2112 ;
2113 ;
2114 ;
2115 48CE ; CPHLDE:
2116 48CE 7C LD A, H
2117 48CF BA CP D
2118 4BD0 C0 RET NZ
2119 4BD1 7D LD A, L
2120 4BD2 BB CP E
2121 4BD3 C9 RET
2122 ;
2123 ;
2124 ;
2125 ;
2126 ;
2127 ;m
2128 ;
2129 ;
2130 ;
2131 ;
2132 ;m
2133 ;
2134 ;
2135 ;
2136 ;
2137 ;
2138 ;
2139 ;
2140 ;
2141 ;
2142 ;
2143 ;
2144 ;
2145 ;
2146 ;
2147 ;

```

SUBTTL \*\*\* PSET \*\*\*

start at 4d00h

```

.....
HL: VRAM position 0 - 31999
B: data
C: 1(AND), 2(OR), 3(XOR)

```





```

2261 4DA8 3A 4EA1 LD A, (VRAMDAT)
2262 4DAB 32 4EA7 LD (VGDAT), A
2263
2264 4DAE DB 38 IN A, (XCRTS)
2265 4DB0 E6 06 AND 6
2266 4DB2 EE 04 XOR 4
2267 4DB4 20 F8 JR NZ, $-6
2268 4DB6 3E 0D LD A, 0DH ;dummy <START>
2269 4DB8 D3 39 OUT (XCRTC), A
2270 4DBA DB 38 IN A, (XCRTS)
2271 4DBC E6 06 AND 6
2272 4DBE EE 04 XOR 4
2273 4DC0 20 F8 JR NZ, $-6
2274 4DC2 3E 04 LD A, 4 ;Red
2275 4DC4 D3 2D OUT (2DH), A
2276 4DC6 CD 4DED CALL PREAD
2277 4DC9 3A 4EA5 LD A, (INCOL)
2278 4DCC 0F RRCA
2279 4DCD 0F RRCA
2280 4DCE 30 09 JR
2281 4DD0 CD 4E21 CALL NC, PCOLE
2282 4DD3 C2 4D45 CALL PFUNC
2283 4DD6 CD 4E43 JP NZ, PSETERR
2284 4DD9 CALL PWRITE
PCOLE:
2285 4DD9 3A 4EA1 LD A, (VRAMDAT)
2286 4DDC 32 4EA8 LD (VRDAT), A
2287
2288 4DDF 3A 4EA6 LD A, (VBDAT)
2289 4DE2 5F LD E, A
2290 4DE3 3A 4EA7 LD A, (VGDAT)
2291 4DE6 57 LD D, A
2292 4DE7 3A 4EA8 LD A, (VRDAT)
2293 4DEA C3 4D3C JP PSETY
2294
2295
2296
2297
2298
2299 ; read VRAM data
2300
2301 4DED PREAD:
2302 4DED 2A 5433 LD HL, (CURPOS)
2303 4DF0 0E 00 LD C, 0 ;P3=0
2304 4DF2 CD 53CE CALL CRSW ;<CRSW>
2305 4DF5 0E 01 LD C, 1
2306 4DF7 CD 53E4 CALL VECTW ;<VECTW> DIR=2, read 1 byte, 0
2307 4DFA CD 53FE CALL MASK ;<MASK>
2308
2309 4DFD DB 38 IN A, (XCRTS) ;status for <READ>
2310 4DFF E6 06 AND 6
2311 4E01 EE 04 XOR 4
2312 4E03 20 F8 JR NZ, $-6
2313 4E05 3A 4EA2 LD A, (EOFLAG)
2314 4E08 3C INC A
2315 4E09 20 06 JR NZ, PRDLOW
2316
2317 4E0B 3E B8 LD A, 0B8H ;odd
2318 4E0D D3 39 OUT (XCRTC), A ;<READ> higher 8 bit
2319 4E0F 18 04 JR PRDST
2320
2321 4E11 3E B0 PRDLOW: LD A, 0B0H ;even
2322 4E13 D3 39 OUT (XCRTC), A ;<READ> lower 8 bit
2323 4E15 PRDST:
2324 4E15 DB 38 IN A, (XCRTS) ;status for READ data
2325 4E17 E6 01 AND 1
2326 4E19 28 FA JR Z, PRDST
2327 4E1B DB 39 IN A, (XCRTD) ;read VRAM data
2328 4E1D 32 4EA1 LD (VRAMDAT), A
2329 4E20 C9 RET
2330
2331
2332
2333
2334
2335 4E21 PFUNC:
2336 4E21 3A 4EA4 LD A, (WTDAT)
2337 4E24 67 LD H, A ;H=B
2338 4E25 3A 4EA1 LD A, (VRAMDAT) ;L=VRAM data
2339 4E28 6F LD L, A
2340
2341 4E29 3A 4EA3 LD A, (FUNC)
2342 4E2C 3D DEC A
2343 4E2D 28 09 JR Z, PFC10 ;1: AND
2344 4E2F 3D DEC A
2345 4E30 28 0A JR Z, PFC20 ;2: OR
2346 4E32 3D DEC A
2347 4E33 C0 RET NZ ;error return
2348
2349 4E34 7C LD A, H ;3: XOR
2350 4E35 AD XOR L
2351 4E36 18 06 JR PFC30
2352 4E38
2353 4E38 7C PFC10: LD A, H ;AND
2354 4E39 A5 AND L
2355 4E3A 18 02 JR PFC30
2356 4E3C
2357 4E3C 7C PFC20: LD A, H ;OR
2358 4E3D B5 OR L
2359 4E3E
2360 4E3E 32 4EA1 PFC30: LD (VRAMDAT), A
2361 4E41 AF XOR A
2362 4E42 C9 RET
2363
2364
2365
2366 ; write VRAM data
2367
2368 4E43 PWRITE:
2369 4E43 CD 53FE CALL MASK ;<MASK>
2370
2371 4E46 DB 38 IN A, (XCRTS) ;empty check
2372 4E48 E6 06 AND 6
2373 4E4A EE 04 XOR 4

```







2713	5167		HC80:		
2714	5167		HC82:		
2715	5167		HC100:		
2716	5167		HCFX80:		
2717	5167		HCFX100:		
2718	5167		HCRX80:		
2719	5167	CD 53BC	CALL	COLCHK	
2720	516A	0E 0A	LD	C, 0AH	
2721	516C	CD 4A72	CALL	LPOUT	
2722	516F	0E 18	LD	C, ESC	:set amount of line spacing
2723	5171	CD 4A72	CALL	LPOUT	
2724	5174	0E 41	LD	C, 'A'	
2725	5176	CD 4A72	CALL	LPOUT	
2726	5179	0E 08	LD	C, 8	:8/72 inch
2727	517B	CD 4A72	CALL	LPOUT	
2728					
2729	517E	3E 32	LD	A, 50	:50 X 8 dot = 400 dot (Y)
2730	5180	32 5435	LD	(CRT400), A	
2731					
2732					
2733	5183	2A FE70	LD	HL, (SPOS)	:start address of VRAM
2734	5186	22 5431	LD	(CURBASE), HL	
2735					
2736					
2737	5189		LINE400:		
2738	5189	2A 5431	LD	HL, (CURBASE)	:VRAM address
2739	518C	22 5433	LD	(CURPOS), HL	
2740					
2741	518F	AF	XOR	A	:initialize
2742	5190	32 543A	LD	(N1), A	
2743	5193	32 5439	LD	(NN), A	
2744					
2745	5196	3E 50	LD	A, 80	:80 X 8 dot = 640 dot (X)
2746	5198	32 5436	LD	(CRT640), A	
2747					
2748					
2749	519B		L00:		
2750	519B	CD 529A	CALL	LINE640	:search of VRAM data
2751					
2752	519E	06 08	LD	B, 8	
2753	51A0	21 548D	LD	HL, DOTPIN	
2754	51A3		L10:		
2755	51A3	7E	LD	A, (HL)	
2756	51A4	FE 00	CP	0	
2757	51A6	20 09	JR	NZ, L20	
2758	51A8	23	INC	HL	
2759	51A9	10 F8	DJNZ	L10	
2760					
2761	51AB	21 543A	LD	HL, N1	:not exist dot
2762	51AE	34	INC	(HL)	
2763	51AF	18 0A	JR	L30	
2764	51B1		L20:		
2765	51B1	3A 543A	LD	A, (N1)	:exist dot
2766	51B4	3C	INC	A	
2767	51B5	32 543A	LD	(N1), A	
2768	51B8	32 5439	LD	(NN), A	
2769	51BB		L30:		
2770	51BB	3A 5436	LD	A, (CRT640)	
2771	51BE	3D	DEC	A	
2772	51BF	28 10	JR	Z, L40	
2773	51C1	32 5436	LD	(CRT640), A	
2774	51C4	CB 47	BIT	0, A	
2775	51C6	20 D3	JR	NZ, L00	
2776	51C8	2A 5433	LD	HL, (CURPOS)	
2777	51CB	23	INC	HL	
2778	51CC	22 5433	LD	(CURPOS), HL	
2779	51CF	18 CA	JR	L00	
2780	51D1		L40:		
2781	51D1	3A 5439	LD	A, (NN)	
2782	51D4	CB 47	BIT	0, A	
2783	51D6	28 04	JR	Z, L50	
2784	51D8	3C	INC	A	
2785	51D9	32 5439	LD	(NN), A	
2786	51DC		L50:		
2787	51DC	6F	LD	L, A	:make dual density bit image mode parameter
2788	51DD	26 00	LD	H, 0	:B:parameter#1, C:parameter2
2789	51DF	29	ADD	HL, HL	
2790	51E0	29	ADD	HL, HL	
2791	51E1	29	ADD	HL, HL	:HL=HL*8
2792	51E2	22 5437	LD	(XX), HL	
2793	51E5	11 0200	LD	DE, 512	
2794	51E8	A7	AND	A	
2795	51E9	ED 52	SBC	HL, DE	
2796	51EB	4D	LD	C, L	
2797	51EC	06 02	LD	B, 2	
2798	51EE	30 1A	JR	NC, L60	
2799	51F0	2A 5437	LD	HL, (XX)	
2800	51F3	11 0100	LD	DE, 256	
2801	51F6	A7	AND	A	:clear carry
2802	51F7	ED 52	SBC	HL, DE	
2803	51F9	4D	LD	C, L	
2804	51FA	06 01	LD	B, 1	
2805	51FC	30 0C	JR	NC, L60	
2806	51FE	2A 5437	LD	HL, (XX)	
2807	5201	7D	LD	A, L	
2808	5202	FE 00	CP	0	
2809	5204	CA 5273	JP	Z, LINEOVER	:1 line over
2810	5207	4D	LD	C, L	
2811	5208	06 00	LD	B, 0	
2812	520A		L60:		
2813	520A	3E FF	LD	A, ON	:set DISBRK flag
2814	520C	32 4A4C	LD	(DISBRK), A	
2815					
2816	520F	C5	PUSH	BC	
2817					
2818	5210	3A FE55	LD	A, (PRINTER)	
2819	5213	E6 1A	AND	IAH	
2820	5215	28 1D	JR	Z, L70	:FX-80, FX-100, RX-80
2821					
2822					
2823					
2824	5217	0E 1B	LD	C, ESC	:dual density bit image mode
2825	5219	CD 4A72	CALL	LPOUT	

```

2826 521C 0E 4C LD C, 'L'
2827 521E CD 4A72 CALL LPOUT
2828 5221 C1 POP BC
2829 5222 60 LD H, B
2830 5223 69 LD L, C
2831 5224 CB 3C SRL H
2832 5226 CB 1D RR L
2833 5228 09 ADD HL, BC
2834 5229 44 LD B, H
2835 522A 4D LD C, L
2836 522B CD 4A72 CALL LPOUT
2837 522E 48 LD C, B
2838 522F CD 4A72 CALL LPOUT
2839 5232 18 17 JR L80
2840
2841 ;
2842 ; FX-80, FX-100, RX-80
2843 ;
2844 5234 L70: LD C, ESC
2845 5236 CD 4A72 CALL LPOUT
2846 5239 0E 2A LD C, '*'
2847 523B CD 4A72 CALL LPOUT
2848 523E 0E 04 LD C, 4
2849 5240 CD 4A72 CALL LPOUT
2850 5243 C1 POP BC
2851 5244 CD 4A72 CALL LPOUT
2852 5247 48 LD C, B
2853 5248 CD 4A72 CALL LPOUT
2854
2855 524B L80: LD A, (NN)
2856 524B 3A 5439 LD (CRT640), A
2857 524E 32 5436 LD HL, (CURBASE)
2858 5251 2A 5431 LD (CURPOS), HL
2859 5254 22 5433
2860 5257 LINEPRINT: CALL LINE640
2861 5257 CD 529A CALL DOT
2862 525A CD 5372 LD A, (CRT640)
2863 525D 3A 5436 DEC A
2864 5260 3D JR Z, LINEOVER
2865 5261 28 10 LD (CRT640), A
2866 5263 32 5436 BIT 0, A
2867 5266 CB 47 JR NZ, LINEPRINT
2868 5268 20 ED LD HL, (CURPOS)
2869 526A 2A 5433 INC HL
2870 526D 23 LD (CURPOS), HL
2871 526E 22 5433 JR LINEPRINT
2872 5271 18 E4
2873
2874 ; 1 line over
2875 ;
2876 5273 LINEOVER: LD C, LF
2877 5273 0E 0A CALL LPOUT
2878 5275 CD 4A72 XOR A
2879 5278 AF LD (DISBRK), A
2880 5279 32 4A4C
2881
2882 527C 3A FE43 LD A, (BRKFLG)
2883 527F A7 AND A
2884 5280 C2 515F JP NZ, HCBREAK
2885
2886 5283 2A 5431 LD HL, (CURBASE)
2887 5286 11 0140 LD DE, 320
2888 5289 19 ADD HL, DE
2889 528A 22 5431 LD (CURBASE), HL
2890
2891 528D 3A 5435 LD A, (CRT400)
2892 5290 3D DEC A
2893 5291 32 5435 LD (CRT400), A
2894 5294 C2 5189 JP NZ, LINE400
2895
2896 5297 C3 5110 JP HC990
2897
2898 ;
2899 ;
2900 ;
2901 ;
2902 ;
2903 ;
2904 ;
2905 ;
2906 529A LINE640: LD HL, (CURPOS)
2907 529A 2A 5433 LD IX, DOTPIN
2908 529D DD 21 548D LD B, 8
2909 52A1 06 08
2910 52A3 LINE650: LD (IX+0), 0
2911 52A3 DD 36 00 00 IN A, (2CH)
2912 52A7 DB 2C RRCA
2913 52A9 0F JR C, LINE655
2914 52AA 38 06
2915
2916 ; Green CRT
2917 ;
2918 52AC CALL READIN
2919 52AF C3 5335 JP LINE660
2920
2921 ;
2922 ; Color CRT
2923 ;
2924 52B2 LINE655: IN A, (XCRTS)
2925 52B2 DB 38 AND 6
2926 52B4 E6 06 XOR 4
2927 52B6 EE 04 JR NZ, $-6
2928 52B8 20 F8 LD A, 0DH
2929 52BA 3E 0D OUT (XCRTC), A
2930 52BC D3 39 IN A, (XCRTS)
2931 52BE DB 38 AND 6
2932 52C0 E6 06 XOR 4
2933 52C2 EE 04 JR NZ, $-6
2934 52C4 20 F8 LD A, 1
2935 52C6 3E 01 LD (2DH), A
2936 52C8 D3 2D OUT READIN
2937 52CA CD 5343 CALL (BDATA), A
2938 52CD 32 549F LD

```

```

2939
2940 52D0 DB 38 IN A, (XCRTS)
2941 52D2 E6 06 AND 6
2942 52D4 EE 04 XOR 4
2943 52D6 20 F8 JR NZ, $-6
2944 52D8 3E 0D LD A, 0DH ;dummy <START>
2945 52DA D3 39 OUT (XCRTC), A
2946 52DC DB 38 IN A, (XCRTS)
2947 52DE E6 06 AND 6
2948 52E0 EE 04 XOR 4
2949 52E2 20 F8 JR NZ, $-6
2950 52E4 3E 02 LD A, 2 ;Green
2951 52E6 D3 2D OUT (2DH), A
2952 52E8 CD 5343 CALL READIN
2953 52EB 32 54A0 LD (GDATA), A
2954
2955 52EE DB 38 IN A, (XCRTS)
2956 52F0 E6 06 AND 6
2957 52F2 EE 04 XOR 4
2958 52F4 20 F8 JR NZ, $-6
2959 52F6 3E 0D LD A, 0DH ;dummy <START>
2960 52F8 D3 39 OUT (XCRTC), A
2961 52FA DB 38 IN A, (XCRTS)
2962 52FC E6 06 AND 6
2963 52FE EE 04 XOR 4
2964 5300 20 F8 JR NZ, $-6
2965 5302 3E 04 LD A, 4 ;Red
2966 5304 D3 2D OUT (2DH), A
2967 5306 CD 5343 CALL READIN
2968 5309 D9 EXX
2969 530A 57 LD D, A ;RDATA
2970 530B 3A FE7B LD A, (COLOR)
2971 530E 0F RRCA
2972 530F 0F RRCA
2973 5310 0F RRCA
2974 5311 0F RRCA
2975 5312 E6 07 AND 7
2976 5314 4F LD C, A ;C:back ground color
2977 5315 3A 549F LD A, (BDATA)
2978 5318 67 LD H, A
2979 5319 3A 54A0 LD A, (GDATA)
2980 531C 6F LD L, A
2981 531D 1E 00 LD E, 0
2982 531F 06 08 LD B, 8
2983
2984 5321 AF XOR A
2985 5322 CB 05 RLC ;rotate left circular ( Green data )
2986 5324 17 RLA ;rotate left
2987 5325 CB 02 RLC ;( Red data )
2988 5327 17 RLA ;
2989 5328 CB 04 RLC ;( Blue data )
2990 532A 17 RLA ;
2991 532B B9 CP ;= background color ?
2992 532C 28 01 JR Z, LINE657 ;0 if so
2993 532E 37 SCF ;set carry flag
2994
2995 532F CB 13 LINE657: RL E
2996 5331 10 EE DJNZ LINE656
2997 5333 7B LD A, E
2998 5334 D9 EXX
2999
3000 5335 LINE660: LD (IX+0), A
3001 5335 DD 77 00 INC IX
3002 5338 DD 23 LD DE, 40 ;next line VRAM address
3003 533A 11 0028 ADD HL, DE
3004 533D 19 DEC B
3005 533E 05 JP NZ, LINE650
3006 533F C2 52A3 RET
3007 5342 C9
3008
3009
3010
3011 5343 READIN: LD C, 0 ;P3 dAD = 0
3012 5343 CD 534E CALL CRSW ;<CRSW>
3013 5345 CD 534E LD C, 1
3014 5348 0E 01 CALL VECTW ;<VECTW> DIR=2, read 1 byte, P3=0
3015 534A CD 53E4 CALL MASK ;<MASK>
3016 534D CD 53FE
3017
3018 5350 DB 38 IN A, (XCRTS) ;status for <READ>
3019 5352 E6 06 AND 6
3020 5354 EE 04 XOR 4
3021 5356 20 F8 JR NZ, $-6
3022 5358 3A 5436 LD A, (CRT640)
3023 535B CB 47 BIT 0, A
3024 535D 28 06 JR Z, READLOW
3025 535F 3E B8 LD A, 0B8H ;even
3026 5361 D3 39 OUT (XCRTC), A ;<READ> higher 8 bit
3027 5363 18 04 JR READST
3028 5365
3029 5365 3E B0 READLOW: LD A, 0B0H ;odd
3030 5367 D3 39 OUT (XCRTC), A ;<READ> lower 8 bit
3031
3032 5369 READST: IN A, (XCRTS) ;status for READ data
3033 5369 DB 38 AND 1
3034 536B E6 01 JR Z, READST
3035 536D 28 FA
3036
3037 536F DB 39 IN A, (XCRTD) ;read VRAM data
3038 5371 C9 RET
3039
3040
3041
3042 5372 DOT: LD A, (PRINTER)
3043 5372 3A FE55 AND 1AH
3044 5375 E6 1A JR NZ, DOTMX80 ;MX-80, MX-82, MX-100
3045 5377 20 17
3046
3047 5379 06 08 LD B, 8 ;print dot 8 X 8
3048 537B DOTLOP: LD B, 8
3049 537B C5 PUSH BC
3050
3051 537C 21 5480 LD HL, DOTPIN

```

```

3052 537F 06 08
3053 5381
3054 5381 7E
3055 5382 0F
3056 5383 77
3057 5384 CB 11
3058 5386 23
3059 5387 10 F8
3060 5389 CD 4A72
3061
3062 538C C1
3063 538D 10 EC
3064 538F C9
3065
3066
3067
3068
3069 5390
3070 5392 06 04
3071 5392 C5
3072
3073 5393 21 548D
3074 5396 06 08
3075 5398
3076 5398 7E
3077 5399 0F
3078 539A 77
3079 539B CB 11
3080 539D 23
3081 539E 10 F8
3082 53A0 CD 4A72
3083
3084 53A3 21 548D
3085 53A6 06 08
3086 53A8
3087 53A8 7E
3088 53A9 0F
3089 53AA 77
3090 53AB CB 11
3091 53AD 23
3092 53AE 10 F8
3093 53B0 CD 4A72
3094
3095 53B3 0E 00
3096 53B5 CD 4A72
3097
3098 53B8 C1
3099 53B9 10 D7
3100 53BB C9
3101
3102
3103
3104
3105
3106
3107
3108 53BC
3109 53BC 21 40F6
3110 53BF DB 2C
3111 53C1 0F
3112 53C2 30 03
3113 53C4 21 0000
3114 53C7
3115 53C7 22 53F9
3116 53CA 22 4E89
3117 53CD C9
3118
3119
3120
3121 53CE
3122 53CE DB 38
3123 53D0 E6 06
3124 53D2 EE 04
3125 53D4 20 F8
3126 53D6 3E 49
3127 53D8 D3 39
3128 53DA 7D
3129 53DB D3 38
3130 53DD 7C
3131 53DE D3 38
3132 53E0 79
3133 53E1 D3 38
3134 53E3 C9
3135
3136
3137 53E4
3138 53E4 DB 38
3139 53E6 E6 06
3140 53E8 EE 04
3141 53EA 20 F8
3142 53EC 3E 4C
3143 53EE D3 39
3144 53F0 3E 02
3145 53F2 D3 38
3146 53F4 79
3147 53F5 D3 38
3148 53F7 3E 00
3149 53F9 00
3150 53FA 00
3151 53FB D3 38
3152 53FD C9
3153
3154
3155 53FE
3156 53FE DB 38
3157 5400 E6 06
3158 5402 EE 04
3159 5404 20 F8
3160 5406 3E 4A
3161 5408 D3 39
3162 540A 3E FF
3163 540C D3 38
3164 540E D3 38

```

```

LD B, 8
DLOP: LD A, (HL)
RRCA (HL), A
LD C
RL HL
INC DLOP
DJNZ LPOUT
CALL
;
POP BC
DJNZ DOTLOP
RET
;
;
;
DOTMX80: LD B, 4
;
DOTL81: PUSH BC
;
LD HL, DOTPIN
LD B, 8
DOTL82: LD A, (HL)
RRCA (HL), A
LD C
RL HL
INC DOTL82
DJNZ LPOUT
CALL
;
LD HL, DOTPIN
LD B, 8
DOTL83: LD A, (HL)
RRCA (HL), A
LD C
RL HL
INC DOTL83
DJNZ LPOUT
CALL
;
LD C, 0
CALL LPOUT
;
POP BC
DJNZ DOTL81
RET
;
;
;
;
COLCHK: LD HL, 40F6H
IN DB 2C
RRCA A, (2CH)
JR NC, CLCH10
LD HL, 0
;
;
;
CLCH10: LD (EXVCT1), HL
LD (EXVCT2), HL
RET
;
;
;
CRSW: IN A, (XCRTS)
AND 6
XOR 4
JR NZ, $-6
LD A, 49H
OUT (XCRTC), A
LD A, L
OUT (XCRTTP), A
LD A, H
OUT (XCRTTP), A
LD A, C
OUT (XCRTTP), A
RET
;
;
;
VECTW: IN A, (XCRTS)
AND 6
XOR 4
JR NZ, $-6
LD A, 4CH
OUT (XCRTC), A
LD A, 02H
OUT (XCRTTP), A
LD A, C
OUT (XCRTTP), A
LD A, 0
EXVCT1: LD (XCRTTP), A
OUT
RET
;
;
;
MASK: IN A, (XCRTS)
AND 6
XOR 4
JR NZ, $-6
LD A, 4AH
OUT (XCRTC), A
LD A, 0FFH
OUT (XCRTTP), A
OUT (XCRTTP), A

```

:MX-80, MX-82 2dots --> 3dots

:COLOR CHECK  
:[ OR 40H ]

:Green CRT  
:[ NOP ] [ NOP ]

:status for <VECTW>

:<VECTW>

:P1 DIR = 2

:P2 read C byte

:P3

: or [ OR 40H ]



```

3165      5410      C9              RET
3166      ;
3167      ;
3168      ;
3169      5411      ILLCHR:          ;Number sign
3170      5411      1E 78          DB      1EH, 78H
3171      5413      1E 78          DB      1EH, 78H
3172      5415      1E 78          DB      1EH, 78H
3173      5417      9E 79          DB      9EH, 79H
3174      5419      9E 79          DB      9EH, 79H
3175      541B      9E 79          DB      9EH, 79H
3176      541D      9E 79          DB      9EH, 79H
3177      541F      1E 78          DB      1EH, 78H
3178      5421      1E 78          DB      1EH, 78H
3179      5423      9E 79          DB      9EH, 79H
3180      5425      9E 79          DB      9EH, 79H
3181      5427      9E 79          DB      9EH, 79H
3182      5429      9E 79          DB      9EH, 79H
3183      542B      1E 78          DB      1EH, 78H
3184      542D      1E 78          DB      1EH, 78H
3185      542F      1E 78          DB      1EH, 78H
3186      ;
3187      ;
3188      0038      XCRTS EQU      38H      ;R status
3189      0039      XCRTD EQU      39H      ;R data
3190      0038      XCRTF EQU      38H      ;W parameter
3191      0039      XCRTC EQU      39H      ;W command
3192      ;
3193      ;
3194      5431      0000      CURBASE:   DW      0
3195      5433      0000      CURPOS:   DW      0
3196      5435      CRT400:   DS      1
3197      5436      CRT640:   DS      1
3198      5437      0000      XX:       DW      0
3199      5439      00        NN:       DB      0
3200      543A      00        N1:       DB      0
3201      543B      LINEPTR:  DS      2      ;buffer pointer
3202      543D      LINEBUF:  DS      80     ;1 line buffer
3203      548D      DOTPIN:   DS      16
3204      549D      0000      SHEL2:   DW      0      ;save stack
3205      549F      00        BDATA:   DB      0      ;Blue VRAM data
3206      54A0      00        GDATA:   DB      0      ;Green VRAM data
3207      ;
3208      54A1      0000      SAVSPD:   DW      0
3209      54A3      54C8      DS      2*20
3210      54C8      STACKD:   DS
3211      ;
3212      ;
3213      ;
3214      ;
3215      SUBTTL
3216      ;
3217      ;
3218      ;
3219      ;
3220      007B      Interface to BIOS2
3221      007E      DYCUSR EQU      3*41
3222      0081      CONOT1 EQU      3*42
3223      0084      BUZZPU EQU      3*43
3224      0087      KCGIN EQU      3*44
3225      008A      KCGOT EQU      3*45
3226      0E9A      CONVCD EQU      3*46
3227      0E9A      CONOT2 EQU      0E9AH
3228      ;
3229      ;
3230      ;
3231      ;
3232      ;
3233      9100      GLOBAL EQUATES
3234      9800      PRTAB EQU      9100H
3235      9800      CKANTAB EQU     9800H
3236      A300      ANTAB EQU      9900H
3237      A300      GAIJITB EQU     0A300H
3238      FE00      PRMTAB EQU      0FE00H
3239      FE21      INTPTR EQU      PRMTAB+21H      ;KB input pointer
3240      FE2C      PRTHRU EQU      PRMTAB+2CH
3241      FE43      BRKFLG EQU      PRMTAB+43H      ;keyboard break flag
3242      FE50      MBFLG EQU      PRMTAB+50H      ;MF BASIC flag
3243      FE55      PRINTER EQU     PRMTAB+55H
3244      FE70      SPOS EQU      PRMTAB+70H      ;screen starting address
3245      FE72      CSRDSP EQU     PRMTAB+72H      ;cursor on/off
3246      FE75      HPOS EQU      PRMTAB+75H
3247      FE76      VPOS EQU      PRMTAB+76H
3248      FE79      TSAVE EQU      PRMTAB+79H
3249      FE7B      COLOR EQU     PRMTAB+7BH
3250      FE80      COUNTRY EQU    PRMTAB+80H
3251      FE82      MFLG EQU      PRMTAB+82H
3252      FE84      PRTPNT EQU     PRMTAB+84H      ;MultiFonts flag
3253      FE86      KSAVE EQU      PRMTAB+86H
3254      FE87      LCRFLG EQU     PRMTAB+87H
3255      FE88      LSP EQU       PRMTAB+88H
3256      FE89      RSP EQU       PRMTAB+89H
3257      FE8A      LPESC EQU     PRMTAB+8AH
3258      FE8B      MFDOT EQU     PRMTAB+8BH
3259      FE8D      MFPT1 EQU     PRMTAB+8DH
3260      FE8F      MFPT2 EQU     PRMTAB+8FH
3261      FE91      MFPT3 EQU     PRMTAB+91H
3262      FE93      PTMAX EQU     PRMTAB+93H
3263      FE95      KETA EQU       PRMTAB+95H
3264      FE96      DOTPL EQU     PRMTAB+96H
3265      FE98      PREF EQU      PRMTAB+98H
3266      FE9A      KCG EQU       PRMTAB+9AH
3267      FE9D      LISTERR EQU    PRMTAB+9DH
3268      FED2      MFROM EQU     PRMTAB+0D2H      ;MF option board
3269      FED4      BASIC EQU     PRMTAB+0D4H
3270      FEF0      MEMBANK EQU    PRMTAB+0F0H
3271      ;
3272      ;
3273      C300      PRTBUF EQU      0C300H
3274      0800      MFSIZE EQU      800H
3275      C400      MFBUF1 EQU     0C400H
3276      C400      MFBUF2 EQU     MFBUF1+MFSIZE
3277      D400      MFBUF3 EQU     MFBUF1+MFSIZE*2

```

3278  
3279  
3280  
3281  
3282  
3283  
3284  
3285

END

Macros:

Symbols:

9900	ANTAB	FED4	BASIC	549F	BDATA
4A4B	BIMAGE	5096	BLKMAKE	FE43	BRKFLG
4BAB	BUZZOFF	4BA0	BUZZON	0081	BUZZPU
9800	CKANTAB	53C7	CLCH10	4921	CLRMBF
53BC	COLCHK	FE7B	COLOR	007E	CONOT1
0E9A	CONOT2	008A	CONVCD	4A45	COUNT
FE80	COUNTRY	4BCE	CPHLDE	000D	CR
53CE	CRSW	5435	CRT400	5436	CRT640
FE72	CSROSP	5431	CURBASE	5433	CURPOS
007F	DELCHR	4A4C	DISBRK	5381	DLOP
5372	DOT	5392	DOTL81	5398	DOTL82
53A8	DOTL83	537B	DOTLOP	5390	DOTMX80
548D	DOTP IN	FE96	DOTPL	007B	DYCUSR
4EA2	EOFLAG	001B	ESC	4D1B	EVEN
53F9	EXVCT1	4E89	EXVCT2	4467	FG100
4473	FG200	479B	FGEE0	4857	FGFF0
433F	FMA20	4356	FMA28	4361	FMA30
4384	FMA40	4390	FMA50	45A5	FMB08
45B0	FMB10	45C5	FMC10	45E8	FMC20
45F3	FMC30	4611	FMD000	4622	FMD10
4637	FMD12	4638	FMD15	463F	FMD17
4640	FMD18	4646	FMD20	4657	FMD25
4655	FMD30	4671	FMD40	4686	FMD42
4687	FMD45	468E	FMD47	4697	FMD50
46A4	FMD60	46A7	FMD70	46AA	FMD71
46B0	FMD72	46B4	FMD80	46B9	FMD90
46E1	FME08	46EC	FME10	4706	FME20
4709	FME22	4722	FME25	4723	FME26
472C	FME27	472D	FME28	4731	FME30
473B	FME40	4740	FME42	475C	FME43
475D	FME45	4766	FME47	476D	FME50
4779	FME60	477C	FME65	4784	FME70
4789	FME75	478C	FME90	4788	FMF10
47BB	FMF12	47D4	FMF13	47D5	FMF15
47DE	FMF17	47DF	FMF18	47E3	FMF20
47ED	FMF30	47F2	FMF32	480E	FMF33
480F	FMF35	4818	FMF38	481F	FMF40
482B	FMF50	482E	FMF60	4836	FMF70
483B	FMF80	483E	FMF90	4849	FMF92
4793	FMGEE	484F	FMGFF	43E6	FMM30
43ED	FMM50	43FD	FMM60	4421	FMM70
4430	FMM80	442D	FMMX1	4485	FMMX2
4407	FMS000	44E6	FMS10	44FB	FMS12
44FC	FMS15	4503	FMS17	4504	FMS18
450A	FMS20	451C	FMS25	4528	FMS30
4532	FMS40	4547	FMS42	4548	FMS45
454F	FMS47	4558	FMS50	4566	FMS60
4569	FMS70	456C	FMS71	4572	FMS72
4577	FMS80	457C	FMS90	44BF	FMSET
4581	FMSETB	45C3	FMSETC	45F9	FMSETD
46BD	FMSETE	47A1	FMSETF	4315	FORMAN
439A	FORMMF	44F9	FS1X	4501	FS2X
4545	FS3X	454D	FS4X	4570	FS5X
4635	FS6X	463D	FS7X	4684	FS8X
468C	FS9X	46AE	FSAX	4EA3	FUNC
4073	FX100	4073	FX80	A300	GAIJITB
54A0	GDATA	4A4D	G1JBUF	5167	HC100
5167	HC80	5165	HC80@1	5167	HC82
5110	HC990	514E	HC998	5151	HC999
515F	HCBREAK	5167	HCFX100	5167	HCFX80
5165	HCOLVT	5000	HCOPI	50EA	HCOPIG
5022	HCPY10	5167	HCRX80	FE75	HPOS
5411	ILLCHR	4EA5	INCOL	FE21	INTPTR
485D	KANCOD	FE9A	KCG	0084	KCGIN
0087	KCGOT	FE95	KETA	FE86	KSAVE
519B	L00	51A3	L10	51B1	L20
518B	L30	51D1	L40	51DC	L50
520A	L60	5234	L70	524B	L80
4A9A	LB10	4AA6	LB12	4AE8	LB20
4AF3	LB30	4AFF	LB40	4B0B	LB45
4B29	LB50	4B72	LB70	4B91	LB90
4B95	LB91	FE87	LCRFLG	40B0	LEPROP
409D	LESEND	4AA4	LESHDL	40BE	LESPAR
000A	LF	5189	LINE400	529A	LINE640
52A3	LINE650	52B2	LINE655	5321	LINE656
532F	LINE657	5335	LINE660	543D	LINEBUF
5273	LINEOVER	5257	LINEPRINT	543B	LINEPTR
4000	LIST1	FE9D	LISTERR	41DA	LM800
41FF	LM810	4205	LM820	423E	LM840
4288	LM860	429D	LM870	42B2	LMXXX
40A5	LNONPR	FE8A	LPESC	4A49	LPESCS
4A72	LPOUT	40AC	LPROP	4A90	LPTBSY
0017	LPTCMD	4A6D	LPTCT1	4A6E	LPTCT2
4A6F	LPTCT3	0014	LPTDT	0008	LPTERR
4A82	LPTRDY	0015	LPTST	FE88	LSP
4073	LX100	407A	LX110	40D1	LX150
40F0	LX160	40F7	LX170	40FE	LX180
410A	LX182	412C	LX200	4139	LX210
4158	LX250	4160	LX260	416A	LX300
418B	LX320	41B2	LX330	41C7	LX500
41D2	LX600	4152	LXESC	409A	LXESER
4067	LX150	405F	LXI90	41B7	LXMPER
53FE	MASK	FE50	MBFLG	FEF0	MEMBANK
C400	MFBUF1	CC00	MFBUF2	D400	MFBUF3
FE8B	MFDOT	FE82	MFLG	FE8D	MFPT1
FE8F	MFPT2	FE91	MFPT3	FED2	MFROM
0800	MFSIZE	4073	MX100	4073	MX80
4032	MX80@1	4073	MX82	543A	N1
5439	NN	4462	NOMFROM	4032	OLIVET
00FF	ON	4DD9	PCOLE	4D76	PCOLG
4DA8	PCOLR	4E38	PFC10	4E3C	PFC20

4E3E	PFC30	4E21	PFUNC	42D1	PL100
42EF	PL110	4305	PL200	42F4	PL500
42F7	PL520	42B9	PLINE	4308	PLZ
4A44	PPAA	4E11	PRDLOW	4E15	PRDST
4DED	PREAD	FE98	PREF	FE55	PRINTER
FE00	PRMTAB	4A42	PROP	9100	PRTAB
C300	PRTBUF	FE2C	PRTHRU	FE84	PRTPNP
4D00	PSET	4D49	PSETCOL	4D45	PSETERR
4D3C	PSETY	4D3F	PSETZ	FE93	PTMAX
4E43	PWRITE	4E6D	PWT10	5343	READIN
5365	READLOW	5369	READST	FE89	RSP
4073	RX80	4EA9	SAVSPC	54A1	SAVSPD
505A	SCD100	506B	SCD50	5098	SCD51
50AF	SCD70	50B4	SCD71	50BC	SCD72
50C2	SCD73	50CD	SCD74	4A47	SHELT1
549D	SHELT2	4A70	SHELT3	FE70	SPOS
4ED3	STACKC	54CB	STACKD	4BBB	TIM10
4BCA	TIM90	4BB6	TIMER	FE79	TSAVE
4EA6	VBDAT	53E4	VECTW	4EA7	VGDAT
FE76	VPOS	4EA1	VRAMDAT	4EA8	VRDAT
487C	WRIT10	486F	WRITE	48E9	WRITFX
494B	WT10	4956	WT20	496C	WT30
4978	WT50	4994	WTB1Y	49BB	WTB2Y
4984	WTBC	4991	WTBC10	499C	WTBC20
49B5	WTBC30	49C1	WTBC40	49C8	WTBC50
49F5	WTBF1Y	4A2D	WTBF2Y	49CE	WTBFX1
49D1	WTBFX2	497E	WTBUF8	4982	WTBUFC
4945	WTBUFF	4EA4	WTDAT	49DF	WTF10
49EB	WTF20	49F2	WTF22	49FD	WTF50
4A21	WTF60	4A33	WTF65	4A3C	WTF70
0039	XCRTC	0039	XCRTD	0038	XCRTP
0038	XCRTS	5437	XX		

No Fatal error(s)

ANTAB	3235#											
BASIC	1978	2018	3269#									
BDATA	2938	2977	3205#									
BIMAGE	321	396	1857#									
BLKMAKE	2554	2557#										
BRKFLG	1920	1971	2052	2603	2882	3241#						
BUZZOFF	2025	2081#										
BUZZON	2023	2073#										
BUZZPU	146	521	3223#									
CKANTAB	716	3234#										
CLCH10	3112	3114#										
CLRMBF	522	588	1646#									
COLCHK	2179	2719	3108#									
COLOR	2970	3249#										
CONOT1	3221#											
CONOT2	2484	2486	2674	2676	3226#							
CONVCD	1532	3225#										
COUNT	446	456	464	473	491	504	1556	1668	1685	1718	1733	1773
	1787	1805	1808	1813	1852#							
COUNTRY	554	562	3250#									
CPHLDE	437	1548	2036	2114#								
CR	1846#	2655										
CRSW	2304	2394	2539	3013	3121#							
CRT400	2730	2891	2893	3196#								
CRT640	2746	2770	2773	2857	2863	2866	3022	3197#				
CSRDSP	2476	2667	3245#									
CURBASE	2523	2527	2609	2612	2734	2738	2858	2886	2889	3194#		
CURPOS	2177	2302	2393	2528	2538	2568	2570	2739	2776	2778	2859	2869
	2871	2907	3195#									
DELCHR	1848#											
DISBRK	1566	1603	1615	1636	1858#	1916	1967	2048	2654	2664	2814	2880
DLOP	3053#	3059										
DOT	2862	3042#										
DOTL81	3070#	3099										
DOTL82	3075#	3081										
DOTL83	3086#	3092										
DOTLOP	3048#	3063										
DOTMX80	3045	3068#										
DOTPIN	2753	2908	3051	3073	3084	3203#						
DOTPL	391	3264#										
DYCUSR	2687	3220#										
EOfLAG	2173	2313	2388	2427#								
ESC	81	94	558	1570	1579	1587	1595	1619	1628	1681	1729	1799
	1847#	2483	2514	2657	2673	2722	2824	2844				
EVEN	2170	2172#										
EXVCT1	3115	3149#										
EXVCT2	2407#	3116										
FG100	749	824#										
FG200	820	835#										
FGEE0	1382	1384#										
FGFF0	1515	1517#										
FMA20	630#	636										
FMA28	643	645#										
FMA30	650	652#										
FMA40	670#	676										
FMA50	664	677#										
FMB08	1039	1041#										
FMB10	1046	1048#										
FMC10	1066#	1081										
FMC20	1077	1083#										
FMC30	1088	1090#										
FMD000	1110	1114#	1251									
FMD10	1124#	1147										
FMD12	1134	1136#										
FMD15	1130	1138#										
FMD17	1141	1143#										
FMD18	1145#	1155										
FMD20	1126	1150#										
FMD25	1158	1162#										
FMD30	1148	1170#										
FMD40	1176#	1198	1209									
FMD42	1186	1188#										
FMD45	1182	1190#										
FMD47	1193	1195#										

FMD50	1178	1202#							
FMD60	1206	1212#							
FMD70	1159	1216#							
FMD71	1163	1167	1217	1218#	1228				
FMD72	1220	1222#							
FMD80	1214	1227#							
FMD90	1200	1231#	1233						
FME08	1258	1260#							
FME10	1265	1267#							
FME20	1281#	1306							
FME22	1280	1283#							
FME25	1294	1296#							
FME26	1290	1298#							
FME27	1301	1303#							
FME28	1305#	1314							
FME30	1286	1309#							
FME40	1307	1317#							
FME42	1320#	1344	1354						
FME43	1333	1335#							
FME45	1329	1337#							
FME47	1340	1342#							
FME50	1325	1348#							
FME60	1352	1357#							
FME65	1315	1360#							
FME70	1359	1365#							
FME75	1346	1368#	1370						
FME90	1355	1363	1371#						
FMF10	1408#	1433							
FMF12	1406	1410#							
FMF13	1421	1423#							
FMF15	1417	1425#							
FMF17	1428	1430#							
FMF18	1432#	1441							
FMF20	1413	1436#							
FMF30	1434	1444#							
FMF32	1447#	1471	1481						
FMF33	1460	1462#							
FMF35	1456	1464#							
FMF38	1467	1469#							
FMF40	1452	1475#							
FMF50	1479	1484#							
FMF60	1442	1487#							
FMF70	1486	1492#							
FMF80	1473	1495#	1497						
FMF90	1482	1490	1498#						
FMF92	1503	1505#							
FMGEE	1361	1362	1366	1380#					
FMGFF	1488	1489	1493	1513#					
FMM30	731	736#							
FMM50	710	729	735	741#					
FMM60	744	747	754#						
FMM70	771	774#							
FMM80	773	784#							
FMMX1	163	165	781#						
FMMX2	164	166	843#						
FMS000	893	897#	1032	1054	1073				
FMS10	906#	929							
FMS12	916	918#							
FMS15	912	920#							
FMS17	923	925#							
FMS18	927#	937							
FMS20	908	932#							
FMS25	940	944#							
FMS30	930	951#							
FMS40	956#	978	989						
FMS42	966	968#							
FMS45	962	970#							
FMS47	973	975#							
FMS50	958	982#							
FMS60	986	993#							
FMS70	941	997#							
FMS71	945	948	998	999#	1010				
FMS72	1001	1003#							
FMS80	995	1009#							
FMS90	980	1013#	1015						
FMSET	789	792	795	798	801	804	807	885#	
FMSETB	809	1023#							
FMSETC	811	1064#							
FMSETD	851	854	857	860	863	866	869	1102#	
FMSETE	871	1242#							
FMSETF	873	1396#							
FORMAN	341	603#							
FORMMF	377	694#							
FS1X	886	917#	1025	1067					
FS2X	887	924#	1026	1068					
FS3X	888	957#	1027	1069					
FS4X	889	974#	1028	1070					
FS5X	890	1002#	1029	1071					
FS6X	1103	1135#	1244						
FS7X	1104	1142#	1245						
FS8X	1105	1187#	1246						
FS9X	1106	1194#	1247						
FSAX	1107	1221#	1248						
FUNC	2162	2341	2429#						
FX100	43	111#							
FX80	41	110#							
GAIJITB	832	3236#							
GDATA	2953	2979	3206#						
GIJBUF	836	840	1274	1399	1860#				
HC100	2640	2715#							
HC80	2636	2713#							
HC8001	2634	2705#							
HC82	2638	2714#							
HC990	2619	2652#	2703	2707	2896				
HC998	2682	2686#							
HC999	2669	2685	2689#						
HCBREAK	2605	2701#	2884						
HCFX100	2644	2717#							
HCFX80	2642	2716#							
HCOLVT	2646	2706#							
HCOPY	2464#								
HCOPYG	2497	2500	2503	2631#					
HCPY10	2479	2489#							





WTF70	1817	1834#										
XCRTC	2221	2244	2269	2318	2322	2376	2383	2401	2419	2548	2930	2945
	2960	3026	3030	3127	3143	3161	3191#					
XCRTD	2327	2552	3037	3189#								
XCRTP	2385	2403	2405	2408	2410	2412	3129	3131	3133	3145	3147	3151
	3163	3164	3190#									
XCRTS	2216	2222	2239	2245	2264	2270	2309	2324	2371	2378	2396	2414
	2543	2549	2925	2931	2940	2946	2955	2961	3018	3033	3122	3138
	3156	3188#										
XX	2792	2799	2806	3198#								

