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                                TITLE  BOOTSTRAPLOADER VERS 6.5 (03.02.83)
                                ;
                                .Z80
                                .PHASE 0H
                                ;=====
0001  ;EPC EQU 0 ; EPC I WANTED
      EPC EQU 1 ; FDC 5 or 8/5
      ;=====
      ;
      ; **** I/O-PORTS ****
      ;
      IFF EPC
      .PRINTX / EPC I selected /
      FDC EQU 0F2H ; FLOPPY STATUS
      MSTART EQU 8000H
      ELSE
      .PRINTX / FDC 8-5 selected /
0000  FDC EQU 0 ; FLOPPY STATUS
0000  MSTART EQU 2000H
00EC  PAGE0 EQU 0ECH ; REGISTER FOR 0000..3FFF
00ED  PAGE4 EQU PAGE0+1 ; REGISTER FOR 4000..7FFF
00EE  PAGE8 EQU PAGE4+1 ; REGISTER FOR 8000..BFFF
00EF  PAGEC EQU PAGE8+1 ; REGISTER FOR C000..FFFF
      ENDIF
0001  FDD EQU FDC+1 ; FLOPPY DATA
0002  FTC EQU FDC+2 ; FLOPPY TERMINATE
0003  DMA EQU FDC+3 ; DMA - PORT
      ;
00EA  CTC EQU 0EAH ; BAUDRATE
00E3  CONB EQU 0E3H ; SID B STATUS
      ;
      ; **** ENTRYPOINT ****
      ;
0000  31 FFD0 BOOT:: LD SP,0FFD0H ; STACK IS NOT USED
0003  C3 0334 JP BOBOOT
      ;
      ; **** TABLE FOR Z-80 INTERRUPT MODE 2 ****
      ;
0006  0638 VECTOR: DEFW TERM1
FFFF  CL EQU 0FFFFH
0008  FFFF FFFF DEFW CL,CL,CL,CL,CL,CL,CL,CL,CL,CL,CL,CL,CL,CL,CL,CL
000C  FFFF FFFF
0010  FFFF FFFF
0014  FFFF FFFF
0018  FFFF FFFF
001C  FFFF FFFF

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;
;
; **** PATCH AREA FOR JUMPS INTO ****
; **** USER-ROUTINES, LOCATED AT ****
; **** END OF PROGRAM (LOC: LAST) ***
;
; **** USER ROUTINES MUST NOT USE STACK ****
;
; **** USE ONLY THE ALLOWED REGISTERS ****
;
; **** USER FUNCTION 0 ****
; ***** SWITCH ON RAM *****
;
; FREE REGISTERS: AF,BC,DE,HL,IY
; RETURN      JP (IX)
;
;
0020 USER0: EMPTY ; INITIALIZE I/O
;
; **** USER FUNCTION 1 ****
; *** INIT USER-CONSOLE ***
;
; FREE REGISTERS: AF,BC,DE,HL,IY
; RETURN:      JP (IX)
;
;
0023 USER1: EMPTY
;
; **** USER FUNCTION 2 ****
; ***** SEND MESSAGE *****
;
; FREE REGISTERS: AF,BC,DE
; RETURN:      JP (IX)
; HL POINTS TO MESSAGE
; MESSAGE ENDS ON '$'
;
;
0026 USER2: EMPTY
;
; **** USER FUNCTION 3 ****
; ***** CHECK MEMORY *****
;
; FREE REGISTERS: AF,BC,DE,IY
; RETURN:      JP (IX)
;
; SET      IY = HIGHEST AVAILABLE RAM
;
;
0029 USER3: EMPTY
;
; **** USER FUNCTION 4 ****
; ***** DEFINE MODE *****
;
; FREE REGISTERS: AF,BC,DE,HL
; RETURN:      JP (IX)
; SET      ZERO-FLAG IF DMA-MODE
; SET      NON-ZERO-FLAG IF NON-DMA
;
;
002C USER4: EMPTY

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;
; **** USER FUNCTION 5 ****
; ** SPECIFY DISK TIMING **
; *** NON-DMA-MODE ONLY ***
;
; FREE REGISTERS: AF,BC,DE,HL
; RETURN:      JP (IX)
;
002F      USER5: EMPTY
;
; **** USER FUNCTION 6 ****
; ** SPECIFY DISK TIMING **
; ***** DMA-MODE-ONLY *****
;
; FREE REGISTERS: AF,BC,DE,HL
; RETURN:      JP (IX)
;
0032      USER6: EMPTY
;
; **** USER FUNCTION 7 ****
; **** EXECUTED BEFORE ****
; **** JP TO HEAS-BOOT ****
;
; FREE REGISTERS: AF,BC,DE
; RETURN:      JP (IX)
;
0035      USER7: EMPTY
;
; **** USER FUNCTION 8 ****
; ***** CONSOLE INPUT *****
;
; FREE REGISTERS: AF,BC,DE,HL
; RETURN:      JP (IX)
;
0038      USER8: EMPTY
; OFF
;
; **** DISK ROUTINES ****
;
; **** EQUATES ****
;
000A      RETRY EQU 10 ; RETRY COUNTER
;
00F0      HLT EQU 240 ; MS HEADLOAD TIME (8MHZ)
000E      SRT EQU 14 ; MS STEP RATE TIME (8 MHZ)
00F0      HUT EQU 240 ; HEADUNLOAD TIME
;
00EE      HLTS EQU ((HLT-1)/2)*2 ; COMPUTED VALUES FOR UPD 765
000F      HUTS EQU (HUT+15)/16
0002      SRTS EQU 16-SRT
; OFF

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;
; **** SPECIFY DISK TIMING FOR NON-DMA-MODE ****
;
0234 21 023E SPEC: LD HL,SPCT ; .SPEC TABLE
0237 06 03 LD B,3 ; 3 BYTES COMMAND
0239 CD 02E3 CALL DMFD
RETURN
023E 03 2F EF SPCT: DEFB 03H,SRTS*16+HUTS,HLTS+1
;
; **** SPECIFY FOR DMA-MODE ****
;
0241 21 024B SPCTD: LD HL,SPCTD
0244 06 03 LD B,3
0246 CD 02D0 CALL MOTO
RETURN
024B 03 2F EE SPCTD: DEFB 3,SRTS*16+HUTS,HLTS
OFF
;
; **** MAIN PROGRAM ****
;
0334 GOBOOT: IFT EPC ; CPU - II only (not EPC I)
0334 3E 00 LD A,0 ; SET MEMORY-PAGE-REGISTERS
0336 D3 EC OUT (PAGE0),A ; TO NORMAL CONFIGURATION
0338 3E 04 LD A,4
033A D3 ED OUT (PAGE4),A
033C 3E 08 LD A,8
033E D3 EE OUT (PAGE8),A
0340 3E 0C LD A,0CH
0342 D3 EF OUT (PAGEC),A
ENDIF
EXE USER0 ; INITIALIZE
034F 21 008E LD HL,NOBAUD
0352 D9 EXX ; SAVE MESSAGE
EXE USER1,INIT ; HL' = .BAUDRATE
0361 21 00CA LD HL,SGDN ; "BOOTSTRAPLOADER..."
EXE USER2,SENDM ; SEND MESSAGE
RUN CBR ; SEND BAUDRATE
EXE USER2,SENDM
0387 21 0130 LD HL,BDMES ; "BAUD"
EXE USER2,SENDM
0398 21 0148 BDR9: LD HL,MEMORY ; "MEMORY OK"
EXE USER3,CHECK ; CHECK MEMORY
03A9 7E LD A,(HL) ; ERROR ?
03AA 23 INC HL
03AB 0B EX AF,AF'
EXE USER2,SENDM ; "MEMORY OK/FAILED"
03BA FD DEFB OFDH ; LD A,HIGH(IY)
03BB 7C LD A,H
03BC 1F RRA ; COMPUTE SIZE
03BD 1F RRA
03BE 1F RRA
03BF 1F RRA
03C0 E6 0C AND 0CH
03C2 21 0138 LD HL,MSIZE
03C5 06 00 LD B,0

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03C7	4F	LD	C, A	
03C8	09	ADD	HL, BC	
		EXE	USER2, SENDM	; 64K/48K/32K/16K
03D7	08	EX	AF, AF'	
03D8	B7	OR	A	
03D9	20 FE	STOP: JR	NZ, STOP	; IF ERROR STOP
03DB	AF	XOR	A	
03DC	08	EX	AF, AF'	; A' = 0
03DD	FD	DEFB	OFDH	; SET STACK POINTER
03DE	7C	LD	A, H	; LD A, HIGH(IY)
03DF	67	LD	H, A	
03E0	FD	DEFB	OFDH	
03E1	7D	LD	A, L	; LD A, LOW(IY)
03E2	6F	LD	L, A	
03E3	11 002F	LD	DE, 2FH	
03E6	B7	OR	A	
03E7	ED 52	SBC	HL, DE	
03E9	F9	LD	SP, HL	; STACK=HIGHEST_MEM-2FH
03EA	EB	EX	DE, HL	
03EB	21 06CD	LD	HL, CMDTAB	; COPY COMMAND-TABLES
03EE	01 002E	LD	BC, CMDLEN	
03F1	ED B0	LDIR		
03F3	F3	DI		; SET INTERRUPT MODE 2
03F4	3E 00	LD	A, HIGH(VECTOR)	
03F6	ED 47	LD	I, A	
03F8	ED 5E	IM	2	
03FA	FB	EI		
		EXE	USER4, MODE	; DMA OR NON DMA MODE ?
0409	CA 04AB	JP	Z, DMAMOD	
040C	D9	EXX		
040D	16 01	LD	D, 1	; NON DMA FLAG
040F	D9	EXX		
0410	21 017B	LD	HL, NONMES	; NON DMA MODE
		EXE	USER2, SENDM	
			5, 25", DD, 512 BYTE, 10 SEC'S, INVERTED DATA	
0421		NONAGA:		
0421	CD 0227	RDNDMA: CALL	INIFDC	; SOFT RESET
		EXE	USER5, SPEC	; SPEC DISK TIMING
0432	CD 024E	CALL	RECAL	
0435	CD 024E	CALL	RECAL	
0438	06 0A	LD	B, RETRY	; NORM. 10 TIMES
043A	C5	RDLP0: PUSH	BC	; SAVE
043B	FD E5	PUSH	IY	; HIGHEST RAM
043D	E1	POP	HL	
043E	11 1FFF	LD	DE, 1FFFH	
0441	B7	OR	A	
0442	ED 52	SBC	HL, DE	; START OF ZDOS
0444	E5	PUSH	HL	
0445	21 0496	LD	HL, RD0	; READ TRACK 0 NONDMA
0448	06 09	LD	B, 9	
044A	CD 02D0	CALL	MOTO	; TRANSFER COMMAND
044D	E1	POP	HL	; ADDRESS
044E	16 0A	LD	D, 10	; 10 SECTORS
0450	CD 02B7	RDLO: CALL	RDDATA	
0453	15	DEC	D	

0454	20 FA	JR	NZ, RDLO	; 10 DONE ?
0456	D3 02	OUT	(FTC), A	; TERMINATE
0458	CD 029D	CALL	RESULT	; ERROR ?
045B	C1	POP	BC	
045C	28 07	JR	Z, RDT1	; NO: READ TRACK 1
045E	10 DA	DJNZ	RDLPO	; YES: TRY AGAIN
0460	CD 02F4	CALL	RDERR	
0463	18 BC	JR	RDNDMA	
0465	CD 0261	RDT1: CALL	SEEK1	; TRACK 1
0468	06 0A	LD	B, RETRY	
046A	C5	RDLP1: PUSH	BC	
046B	FD E5	PUSH	IY	; SET UP PARAMETERS
046D	E1	POP	HL	
046E	11 0BFF	LD	DE, 0BFFH	
0471	B7	OR	A	
0472	ED 52	SBC	HL, DE	
0474	E5	PUSH	HL	
0475	21 049F	LD	HL, RD1	
0478	06 09	LD	B, 9	
047A	CD 02D0	CALL	MOTO	; TRANSFER COMMAND
047D	E1	POP	HL	
047E	16 05	LD	D, 5	
0480	CD 0287	RDL1: CALL	RDDATA	; READ TRACK
0483	15	DEC	D	
0484	20 FA	JR	NZ, RDL1	
0486	D3 02	OUT	(FTC), A	
0488	CD 029D	CALL	RESULT	; ERROR ?
048B	C1	POP	BC	
048C	CA 0643	JP	Z, LOADED	; NO: IS LOADED
048F	10 D9	DJNZ	RDLP1	; TRY AGAIN
0491	CD 02F4	CALL	RDERR	
0494	18 8B	JR	RDNDMA	
0496	46 00 00 00	RDO: DEFB	46H, 0, 0, 0, 1, 2, 10, 10H, 2	
049A	01 02 0A 10			
049E	02			
049F	46 00 01 00	RDL1: DEFB	46H, 0, 1, 0, 1, 2, 10, 10H, 2	
04A3	01 02 0A 10			
04A7	02			
04A8		; DMA MOD:		
04A8	D9	EXX		
04A9	16 00	LD	D, 0	; DMA FLAG
04AB	D9	EXX		
04AC	21 018A	LD	HL, DMAMES	; DMA MODE
		EXE	USER2, SENDM	
04BD		DMAAGA:		
04BD	CD 0227	CALL	INIFDC	
		EXE	USER6, SPEC	; SPECIFY TIMING
04CE	CD 024E	CALL	RECAL	; SEEK TRACK 0
04D1	CD 024E	CALL	RECAL	
		; ***** SINGLE OR DOUBLE DENSITY *****		
		; TRYDD:		
04D4	06 0A	LD	B, RETRY	
04D6	C5	TRYLP: PUSH	BC	

04D7	06 02	LD	B, 2	
04D9	21 04FC	LD	HL, RDDDT	; READ ID (DOUBLE DENSITY)
04DC	CD 02D0	CALL	MOTO	
04DF	CD 029D	CALL	RESULT	
04E2	C1	POP	BC	
04E3	28 1B	JR	Z, RDDD	; OK: DOUBLE DENSITY
04E5	C5	PUSH	BC	
04E6	06 02	LD	B, 2	; ERROR: TRY SINGLE DENSITY
04E8	21 04FE	LD	HL, RDSDT	
04EB	CD 02D0	CALL	MOTO	
04EE	CD 029D	CALL	RESULT	
04F1	C1	POP	BC	
04F2	CA 05A7	JP	Z, RDS D	; OK: SINGLE DENSITY
04F5	10 DF	DJNZ	TRYLP	; TRY AGAIN
04F7	CD 02F4	CALL	RDERR	
04FA	18 D8	JR	TRYDD	
04FC	4A 00	RDDDT:	DEFB 4AH, 0	
04FE	0A 00	RDSDT:	DEFB 0AH, 0	
		:		
		:	**** READ IN DOUBLE DENSITY ****	
		:		
0500	06 0A	RDD:	LD B, RETRY	; NOM. 10 TIMES
0502	C5	RDDL:	PUSH BC	; SAVE
			OFF	; SET UP PARAMETERS
0524	E5	PUSH	HL	
0525	06 09	LD	B, 9	
0527	21 0595	LD	HL, RDDO	
052A	CD 02D0	CALL	MOTO	; READ TRACK 0
052D	01 1203	LD	BC, RDLEN*256+DMA	
0530	E1	POP	HL	
0531	ED B3	OTIR		; START DMA
0533	CD 02AA	CALL	RESDMA	; ERRORS ?
0536	C1	POP	BC	
0537	CA 0643	JP	Z, LOADED	; NO: IS LOADED
053A	FE 40	CP	40H	; ONLY 10 SECTORS READ ?
053C	20 0A	JR	NZ, NOT5	
053E	7A	LD	A, D	
053F	FE 04	CP	4	
0541	20 05	JR	NZ, NOT5	
0543	7B	LD	A, E	
0544	FE 0B	CP	11	
0546	2B 08	JR	Z, RDDT1	; YES: READ TRACK 1 TOO
0548	10 4B	NOT5:	DJNZ RDDO	; ERROR, TRY AGAIN
054A	CD 02F4	CALL	RDERR	
054D	C3 04BD	JP	DMAAGA	
0550	CD 0261	RDDT1:	CALL SEEK1	; READ TRACK 1
0553	06 0A	LD	B, RETRY	
0555	C5	RDDL1:	PUSH BC	
			OFF	; SET UP PARAMETERS
0577	E5	PUSH	HL	
0578	06 09	LD	B, 9	
057A	21 059E	LD	HL, RDD1T	
057D	CD 02D0	CALL	MOTO	; TRANSFER COMMAND
0580	01 1203	LD	BC, RDLEN*256+DMA	
0583	E1	POP	HL	

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0584 ED B3          OTIR          ; START DMA
0586 CD 029D        CALL RESULT
0589 C1             POP BC
058A CA 0643        JP Z,LOADED    ; NO ERROR: IS LOADED
058D 10 C6          DJNZ RDDLP1    ; ERROR: TRY AGAIN
058F CD 02F4        CALL RDERR
0592 C3 04BD        JP DMAAGA
0595 46 00 00 00    RDD0: DEFB 46H,0,0,0,1,2,15,10H,2
0599 01 02 0F 10
059D 02
059E 46 00 01 00    RDD1T: DEFB 46H,0,1,0,1,2,10,10H,2
05A2 01 02 0A 10
05A6 02

;
; **** READ IN SINGLE DENSITY ****
; ***** 8" FLOPPY'S ONLY : *****
;
05A7 RDSD:
05A7 06 0A          LD B,RETRY
05A9 C5             RDSLPO: PUSH BC
                        OFF          ; SET UP PARAMETERS
05CB E5             PUSH HL
05CC 06 09          LD B,9
05CE 21 0626        LD HL,RDSOT
05D1 CD 02D0        CALL MOTO      ; READ TRACK 0 (SD)
05D4 01 1203        LD BC,RDLEN*256+DMA
05D7 E1             POP HL
05D8 ED B3          OTIR          ; START DMA
05DA CD 029D        CALL RESULT    ; ERROR ?
05DD C1             POP BC
05DE 2B 08          JR Z,RDST1    ; NO: READ TRACK 1
05E0 10 C7          DJNZ RDSLPO    ; ERROR: TRY AGAIN
05E2 CD 02F4        CALL RDERR
05E5 C3 04BD        JP DMAAGA
05E8 CD 0261        RDST1: CALL SEEK1 ; READ TRACK 1
05EB 06 0A          LD B,RETRY
05ED C5             RDSLPI: PUSH BC
                        OFF          ; SET UP PARAMETERS
0608 E5             PUSH HL
0609 06 09          LD B,9
060B 21 062F        LD HL,RDS1T
060E CD 02D0        CALL MOTO      ; TRANSFER COMMAND
0611 01 1203        LD BC,RDLEN*256+DMA
0614 E1             POP HL
0615 ED B3          OTIR          ; START DMA
0617 CD 029D        CALL RESULT    ; ERROR ?
061A C1             POP BC
061B CA 0643        JP Z,LOADED    ; NO: IS LOADED
061E 10 CD          DJNZ RDSLPI    ; YES: TRY AGAIN
0620 CD 02F4        CALL RDERR
0623 C3 04BD        JP DMAAGA
0626 06 00 00 00    RDSOT: DEFB 6,0,0,0,1,0,26,7,128
062A 01 00 1A 07
062E 80
062F 06 00 01 00    RDS1T: DEFB 6,0,1,0,1,0,26,7,128

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0633 01 00 1A 07
0637 80

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;
; **** TERMINATE READ-COMMAND ****
;
0638 D3 02      TERMI: OUT      (FTC),A      ; TERMINATE UPD 765
063A F5          PUSH      AF
063B 3E C3      LD        A,0C3H      ; RESET DMA
063D D3 03      OUT      (DMA),A
063F F1          POP       AF
0640 FB          EI
0641 ED 4D      RETI
;
; **** SYSTEM LOADED, CHECK IT ! ****
;
0643            LOADED:
;                OFF          ; CHECK ZD05 !
067C 11 1400    G0D05: LD      DE,1400H      ; HL = START OF SYSTEM
067F 19          ADD      HL,DE      ; HL = .HEAS-COLDSTART
0680 D9          EXX
0681 7E          LD      A,(HL)      ; BAUDRATE VALUE
0682 D9          EXX
0683 F5          PUSH     AF          ; SAVE
;                EXE      USER7
068F F1          POP      AF
0690 E9          JP      (HL)      ; GO TO COLDSTART
;
;                OFF
071B FFFF      LAST:  DEFW    CL          ; ROOM FOR USER
;                END

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