

.MAIN. - DSC/3, DSC/4 CP/M Floppy bootstrap loader

TESTBOOT.ASM

```

                .pabs
                .phex
0001    version ==      1
0000    revision==     0
0020    patch  ==      / /
;-----
; DSC/3, DSC/4 CP/M Floppy bootstrap loader
;
; Update history:
;
; 1.40   Initial release
; 1.424  Changed specify to 03,8F,02
; 1.426  Added boot from drive 1
; 1.427  Added serial number
; 1.430  Change boot disk code
; 1.431  Add floppy network option
; 1.434  Combine with CP/M 2.2
;
; TESTBOOT diagnostic 9/1/81 D.Stein
0038    restart =      38h ; addr of rst 7 (Prom restart)
;
; Conditional assembly options:
;
0001    CPMver =\      "
          Enter 1 for CP/M 1.4
          2 for CP/M 2.2 "
;
          .ife      CPMver-1,[
0000    FLOPboot =\    "
          Enter 0 for stand-alone system
          1 for floppy network master "
0001    NETboot == 1-FLOPboot
          ]
          .ife      CPMver-2,[
          FLOPboot== 0
          NETboot == 1
          ]
;-----
; Addresses of BIOS, BDOS, and CCP.
;
          .ife      CPMver-1,[
0400    lenBIOS =      400h ; lensth of BIOS kernal
0D00    lenBDOS ==     0D00h ; lensth of BDOS
0800    lenCCP  ==     800h  ; lensth of CCP
          ]
          .ife      CPMver-2,[
          lenBIOS =      800h ; lensth of BIOS kernal
          lenBDOS ==     0E00h ; lensth of BDOS
          lenCCP  ==     800h  ; lensth of CCP
          ]
0A00    lenBIOS = lenBIOS+600h ; floppy code always assembled
0C00    .ife      FLOPboot, [lenBIOS = lenBIOS+200h] ; hard disk
          .ife      NETboot, [lenBIOS = lenBIOS+400h] ; network
          .ife      NETboot, [lenBIOS = lenBIOS+300h] ; master
;

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1500          lenCPM ==          lenCCP+lenBDOS
F400          BIOS  ==          64*1024-lenBIOS ; address of BIOS
E706          BDOS  ==          BIOS-lenBDOS+6 ; address of BDOS
DF00          CPM   ==          BIOS-lenCPM   ; address of CCP
9000          BOOT  ==          09000h ; base of the BOOTstrap loader
F41B          SELDSK ==          BIOS+1Bh
F463          CPMMAP ==          BIOS+63h
;
; PROM Monitor entry points:
03F3          command ==          3F3h ; send command to floppy
03F6          result  ==          3F6h ; receive result from floppy
03F9          ioerr   ==          3F9h ; I/O error routine
;
; Port definitions:
;
0038          DMA    ==          38h ; DMA chip
0018          FLOPP  ==          18h ; Floppy DMA channel
0003          SETMAP ==          03h ; Set memory map register
0003          STOPFLOP ==          03h ; Stop floppy controller
0000          ONMAP  ==          00h ; Activate DSC/4 memory map
0002          OFFPROM ==          02h ; Deactivate DSC/3 PROM

```

```

;-----
; Bootstrap loader
;
; This program is loaded and executed by the 'BF'
; command of the PROM Monitor. It is stored on track 0
; sectors 1-2 of a standard CP/M diskette. It will do
; the following:
;
; (1) Set up the DSC/4 memory map, temporarily keeping
;     pages 0 and 9 in local memory.
; (2) Read the BIOS into page F.
; (3) Move remainder of bootstrap to page 4.
; (4) Map pages 0 and 9 to external memory on the DSC/4
;     and disable the PROM on the DSC/3.
; (5) Store active drive number for CP/M
; (6) Jump to the cold boot entry point of the BIOS.
;
; Note the step 1 is required for the DSC/4 only;
; it has no deleterious effect on the DSC/3.
9000      .loc    BOOT
9000      21 90EF      ; (0) Tell user he's starting the bootstrap
9003      DF          ;         lxi    H,BOOTmsg
;         rst     3      ; print log-on message
;
; (1) Set up a memory map, temporarily keeping pages 0
;     and 9 in local memory.
;
9004      DD2A 03FE      ;         lidx   3FEh    ; set serial number
9008      21 90A9      ;         lxi    H,memmap ; point to base of memory map
900B      01 0003      ;         lxi    B,0C8+SETMAP ; initialize res F first
900E      ED A3        domap: outi ←
9010      3E 11        ;         mvi    A,11h
9012      80          ;         add    B
9013      47          ;         mov    B,A    ; load next mm res no into B
9014      20 F8       ;         jrnz   domap
9016      DB 00       ;         in     ONMAP  ; activate DSC/4 memory map
;
; (2) Read the BIOS into memory.
;
; Setup drive number
9018      3A 9391      ;         lda    9391h  ; drive no. put here by PROM
901B      32 90BA      ;         sta    seekFLOP+1
901E      32 90C4      ;         sta    readFLOP+1
9021      08          ;         exaf   ; save boot drive no. for later
;
; Seek track 1
9022      reseek:
9022      21 90B9      ;         lxi    H,seekFLOP
9025      CD 03F3      ;         call   command
9028      21 90BD      sense: lxi    H,lsenseFLOP
902B      CD 03F3      ;         call   command
902E      CD 03F6      ;         call   result
9031      3A 9380      ;         lda    resbuf
9034      CB 5F       ;         bit    3,A    ; retry if not ready
9036      20 EA       ;         jrnz   reseek
    
```

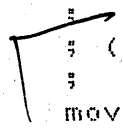
```

9038 CB6F bit 5,A ; wait until seek finished
903A 28EC Jrz sense
903C E6D0 ani 0D0h
903E C4 03F9 cnz ioerr
;
; Read track 1, beginning at sector 10
..RDsec:
9041 lxi H,specFLOP ; specify DMA mode
9044 call command
9047 lxi H,DMAcom ; load DMA chip
904A 01 1438 lxi B,DMA%<8+DMA
904D EDB3 outir
904F 3E90 mvi A,(DMAvect>8 & 0FFh)
9051 ED47 stai ; set up interrupts
9053 ED5E im2
9055 FB [ei]
9056 21 90C3 lxi H,readFLOP ; set up floppy command
9059 CD 03F3 [call command]
905C CD 03F6 [call result]
; ARE WE IN INFINITE TEST MODE? CHECK IF LOOPBYT<>0
905F 3A 90EE lda loopbyt
9062 B7 ora A
9063 20DC Jrnz ..RDsec ; loop indef. if loopbyt<>0

;*****lda resbuf
;*****ani 0C0h ; top 2 bits should be zeroes
;*****cnz ioerr
;----- Please take note!
;TESTBIOS mods.
; User enters: T for reading sectors again (TEST)
; M for exiting to PROM mon (MON)
; ? anything else continues bootstrap
..setcom:
9065 rst 4 ; space down a line
9066 21 90F5 lxi H,INFOmsa ; ask user for T,M or <CR>
9069 DF rst 3 ; print message
906A CF rst 1 ; set chr from user
906B FE4D cpi 'M' ; is it a M?
906D CA 0038 Jz restart ; Yes, Exit to prom
9070 FE54 cpi 'T' ; is it a T?
9072 2005 Jrnz ..cont ; NO. Finish bootstrap
9074 32 90EE sta loopbyt ; Yes, Make loopbyt non-zero
9077 18C8 Jmpr ..RDsec ; and start testing
; (3) Move remainder of bootstrap to external memory
..cont: lxi H,movit ; source
lxi D,4000h ; destination
lxi B,lenmov
9082 EDB0 ldir
9084 C3 4000 jmp 4000h ; JUMP to rest of bootstrap

; (4) Map pages 0 and 9 to external memory on the DSC/4
; and disable the PROM on the DSC/3
movit: lxi B,0<8+SETMAP
mvi A,0F0h
9087 01 0003 outp A ; page 0
908A 3EF0
908C ED79
    
```

*put at 4000h*



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908E 0690          mvi    B,90h
9090 3EF9          mvi    A,0F9h
9092 ED79          outp   A      ; page 9
9094 DB02          in     OFFFROM ; turn off DSC/3 PROM
;
; (5) Store active drive number for CP/M
9096 0E00          mvi    C,0
9098 CD F41B        call   SELDISK ; select drive 0
; ife CPMver-1,[
909B CD F463        call   CPMMAP  ; get pointer to map byte
; ]
909E E6C0          ani    0C0h   ; mask out device type
90A0 4F           mov    C,A
90A1 08           exaf           ; restore unit number
90A2 B1           ora    C      ; mask in device type
; ife CPMver-1,[
90A3 77           mov    M,A    ; overwrite map byte
; ]
; ife CPMver-2,[
; stax D        ; overwrite map byte
; ]
90A4 2B           dcx   H
90A5 77           mov    M,A    ; overwrite boot disk
;
; (6) Jump to the cold boot entry point of the BIOS.
90A6 C3 F400        jmp    BIOS
0022 lenmov ==     .-movit ; number of bytes to be moved
;
; Initial memory map for the DSC/4
memmap:
90A9 FF           .byte  0FFh   ; page F
90AA 00           .byte  0      ; page 0 (in local memory)
90AB F1           .byte  0F1h   ; page 1
90AC F2           .byte  0F2h   ; page 2
90AD F3           .byte  0F3h   ; page 3
90AE F4           .byte  0F4h   ; page 4
90AF F5           .byte  0F5h   ; page 5
90B0 F6           .byte  0F6h   ; page 6
90B1 F7           .byte  0F7h   ; page 7
90B2 F8           .byte  0F8h   ; page 8
90B3 00           .byte  0      ; page 9 (in local memory)
90B4 FA           .byte  0FAh   ; page A
90B5 FB           .byte  0FBh   ; page B
90B6 FC           .byte  0FCh   ; page C
90B7 FD           .byte  0FDh   ; page D
90B8 FE           .byte  0FEh   ; page E
;
; Floppy commands
0000 drive ==     0      ; BIOS drive number
0001 track ==     1      ; BIOS track number
; ife CPMver-1,[
000A sector ==    10     ; BIOS sector number
; ]
; ife CPMver-2,[
sector ==         11     ; BIOS sector number

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                                ]
00FF      endcom ==          OFFh      ; end-of-command character
90B9      seekFLOP:
90B9      0F                .byte      [15]      ; seek command
90BA      00                .byte      drive
90BB      01                .byte      track
90BC      FF                .byte      endcom
90BD      IsenseFLOP:
90BD      08                .byte      [8]      ; sense interrupt status
90BE      FF                .byte      endcom
90BF      specFLOP:
90BF      03                .byte      [3]      ; specify command
90C0      8F                .byte      8Fh      ; seek rate = 8ms
                                ; 35ms delay after head load
90C1      02                .byte      02h      ; 10ms delay after seek
                                ; DMA mode
90C2      FF                .byte      endcom
90C3      readFLOP:
90C3      46                .byte      [46h]      ; read double density command
90C4      00                .byte      drive      ; drive select
90C5      01                .byte      track      ; track address
90C6      00                .byte      0          ; head address
90C7      0A                .byte      sector    ; first sector number
90C8      01                .byte      1          ; double density
90C9      1A                .byte      26         ; last sector number
90CA      0E                .byte      0Eh       ; gap length
90CB      00                .byte      00         ; sector size (not used)
90CC      FF                .byte      endcom
9380      resbuf ==         9380h      ; result buffer is same
                                ; as used in the PROM

90CD      DMAcom:
90CD      C3                .byte      0C3h 2D
90CE      C7                .byte      0C7h 2D  RST Int A
90CF      CB                .byte      0CBh 2D  " Port B
90D0      7D                .byte      07Dh 1A  Port A by adr. xfer A->B
90D1      F400              .word      BIOS      ; load start address
90D3      0BFF              .word      lenBIOS-1
90D5      14                .byte      14h 1B
90D6      28                .byte      28h 1B
90D7      95                .byte      95h 2B
90D8      18                .byte      FLOPP Port
90D9      12                .byte      12h
90DA      E2                .byte      DMAvect&OFFh ; interrupt vector
90DB      9A                .byte      9Ah 2C  RTN = POSITIVE, stop end of disk, cs/wait mixed
90DC      CF                .byte      0CFh 2D  LD START ADDR both ports CLR ETR
90DD      01                .byte      1          2A xfer LD START ADDR
90DE      CF                .byte      0CFh 2D
90DF      AB                .byte      0ABh 2D  en int
90E0      87                .byte      87h 2D  en DMA all op ex int
0014      DMA$ ==          .-DMAcom
;
90E2      .loc              (.+1)&OFFFEh ; force at even address
90E2      90E4              DMAvect: .word DMAdone ; DMA interrupt vector
;
; DMA interrupt routine

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```
90E4          DMAdone:
90E4          F5          push    PSW
90E5          DB03        in      STOPFLOP ; stop the floppy
90E7          3EC3        mvi    A,0C3h ; reset the DMA chip
90E9          D338        out    DMA
90EB          F1          pop    PSW
90EC          ED4D        reti

;-----
; TESTBOOT messages
90EE          00          loopbyt:.byte 00 ; non-zero for infinite loop
90EF          5442        BOOTmse:.ascii 'TB'
90F1          31302000    .byte  version+'0',revision+'0',patch,0
90F5          542C4D2C3C43 INFOmse:.asciz 'T,M,<CR> #'
          .end
```

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+++++ SYMBOL TABLE +++++

BDS	E706	BIOS	F400	BOOT	9000	BOOTMS	90EF
COMMAN	03F3	CPM	DF00	CPMMAP	F463	CPMVER	0001
DMA	0038	DMACOM	90CD	DMADON	90E4	DMAVEC	90E2
DMA%	0014	DOMAP	900E	DRIVE	0000	ENDCOM	00FF
FLOPBO	0000	FLOPP	0018	INFOMS	90F5	IDERR	03F9
ISENSE	90BD	LENBDO	0D00	LENBIO	0C00	LENCCP	0800
LENCPM	1500	LENMOV	0022	LOOPBY	90EE	MEMMAP	90A9
MOVIT	9087	NETBDO	0001	OFFPRO	0002	ONMAP	0000
PATCH	0020	READFL	90C3	RESBUF	9380	RESEEK	9022
RESTAR	0038	RESULT	03F6	REVISI	0000	SECTOR	000A
SEEKFL	90B9	SELDISK	F41B	SENSE	9028	SETMAP	0003
SPECFL	90BF	STOPFL	0003	TRACK	0001	VERSID	0001
.BLNK.	0000:03 X	.DATA.	0000* X	.PRG.	0000 X		