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0000'

                        Title FDC MK I CONTROL ROUTINES
                              subttl Version DS 2.2 13/11/80

                              .Z80
0000'                         ASEG
                              ORG 0100H
                              .Comment *

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                              For use with the Henelec Disk
Controller card with Nascom 1 or 2 or
RICZ80 computer.

Ammendment notes:
1)      Format changed to 11 bytes in L6
        for use with Pertek drives. Bytes
        sent to disk changed to 0C08H.
        PC & RC typed DRH 2/11/80.
        Changed to 0C00H DRH 26/11/80
2)      Conditional assembly for D-DOS
        added.
        DRH 5/11/80.
3)      Jumps to LDDRS and LDCMD added to
        jump table.
        DRH 5/11/80.
4)      Side select, drive select and
        track select separated in LDDRS,
        DRSEL and SEEKTR.
        PC & RC typed DRH 12/11/80.
5)      Conditional assembly for RAM at
        8800H added.
        DRH 16/11/80.
6)      Format bytes changed to C00H.
        DRH 2/12/80

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of debugging faults within the Henelec
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0100
                        ; Conditional assembly. Allows assembly for
                        ; RICZ80 or NASCOM with either CP/M or
                        ; D-DOS V1.0.
FFFF                    TRUE    EQU 0FFFFH
0000                    FALSE   EQU NOT TRUE

FFFF                    NASCOM  EQU TRUE
0000                    RICZ80  EQU FALSE
FFFF                    CPM     EQU TRUE
0000                    DDOS    EQU FALSE
0000                    RAM     EQU FALSE
FFFF                    EPROM   EQU TRUE

                        ; PIO port addresses
                                IF NASCOM
                        ;FDC data port
0004                    DPORT   EQU 4
0006                    DCNTRL  EQU 6
                        ; FDC control port
0005                    CPORT   EQU 5
0007                    CCNTRL  EQU 7
                                ENDIF

                                IF RICZ80
                        ; FDC data port
                        DPORT   EQU 20H
                        DCNTRL  EQU 21H
                        ; FDC control port
                        CPORT   EQU 22H
                        CCNTRL  EQU 23H
                                ENDIF

                        ; Chip mask set to bits 6 & 7 input
00C0                    CPMASK  EQU 0C0H

                        ; Origins of CPM and D-DOS
F400                    CPMORG  EQU 0F400H
B400                    EDOSORG EQU 0B400H
8C00                    RDOSORG EQU 08C00H

                        ; Data table set up in first 10H bytes defines
                        ; the configuration of the system.
                                IF CPM
                                .PHASE CPMORG
F400    C3 0000         ORIGIN: JP 0
                        ; CPM workspace
F403    0048            WSPACE: DEFW 0048H
                                ENDIF

                                IF DDOS AND RAM
                                .PHASE RDOSORG-400H
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```
                        ORIGIN: JP RDOSORG
                        ; D-DOS workspace
                        WSPACE: DEFW 0C0BH
                                ENDIF

                                IF DDOS AND EPROM
                                .PHASE EDOSORG-400H
                        ORIGIN: JP EDOSORG
                        ; D-DOS workspace
                        WSPACE: DEFW 0C0BH
                                ENDIF

F405    1000            ISTACK: DEFW 1000H
F407    1000            BOOTST: DEFW 1000H
                        ; Format buffer
F409    1000            FMTBUF: DEFW 1000H
                        ; Maximum number of drives
F40B    03              DRIVES: DEFB 3
                        ; Maximum number of tracks per side
F40C    23              TRACKS: DEFB 35
                        ; Number of retries
F40D    05              NTRY:   DEFB 5
                                IF NASCOM
                        ; Timer delay count
F40E    F0              TDEL:   DEFB 0F0H
                                ENDIF
                        ; Timer delay count
                                IF RICZ80
                        TDEL:   DEFB 90H
                                ENDIF
                        ; Sides flag, 0 for single, 1 for double
F40F    01              DBLS:   DEFB 1

                        ; Jump table gives the ONLY legal access points
                        ; to the FDC software
F410    C3 F670                 JP READ
F413    C3 F6A5                 JP WRITE
F416    C3 F431                 JP INIT
F419    C3 F6DA                 JP FORMAT
F41C    C3 F7A1                 JP WRBOOT
F41F    C3 F573                 JP SEEKTR
F422    C3 F604                 JP RDENTR
F425    C3 F639                 JP WRENTR
F428    C3 F524                 JP DRSEL
F42B    C3 F507                 JP LDDRS
F42E    C3 F46A                 JP LDCMD

                        ; Set data port to input
F431    CD F457         INIT:   CALL IMODE
F434    3E FF                   LD A,0FFH
                        ; Set control port lines to 1
F436    D3 05                   OUT (CPORT),A
                        ; Set control port to bit mode
```

```
F438  D3 07           OUT (CCNTRL),A
                      ; Set up control port
F43A  3E C0           LD A,CPMASK
F43C  D3 07           OUT (CCNTRL),A
                      ; Set drive select to 0
F43E  AF              XOR A
F43F  CD F507         CALL LDDRS
                      ; Start motors
F442  CD F4E3         CALL MSTART
                      ; Master reset line to 0
F445  3E 2F           LD A,2FH
F447  D3 05           OUT (CPORT),A
                      ; Delay
F449  06 20           LD B,20H
F44B  05              RSLOOP: DEC B
F44C  C2 F44B         JP NZ,RSLOOP
                      ; Master reset line to 1
F44F  3E 3F           LD A,3FH
F451  D3 05           OUT (CPORT),A
                      ; Wait until command done
F453  CD F4C4         CALL WAITBY
F456  C9              RET

                      ; Subroutine to set data port to bit input mode
F457  F5              IMODE:  PUSH AF
                      ; Set to bit mode
F458  3E FF           LD A,0FFH
F45A  D3 06           OUT (DCNTRL),A
                      ; Set all bits to input
F45C  D3 06           OUT (DCNTRL),A
F45E  F1              POP AF
F45F  C9              RET

                      ; Subroutine to set data port to bit output mode
F460  F5              OMODE:  PUSH AF
                      ; Set to bit mode
F461  3E FF           LD A,0FFH
F463  D3 06           OUT (DCNTRL),A
                      ; Set all bits to output
F465  AF              XOR A
F466  D3 06           OUT (DCNTRL),A
F468  F1              POP AF
F469  C9              RET

                      ; Subroutine to load contents of A reg to
                      ; FDC command reg
003C                  CMDREG  EQU 3CH
F46A  F5              LDCMD:  PUSH AF
                      ; Select command reg
F46B  3E 3C           LD A,CMDREG
F46D  D3 05           OUT (CPORT),A
F46F  CD F460         CALL OMODE
F472  F1              POP AF
```

```
                        ; Send command to data port
F473    2F                      CPL
F474    D3 04                   OUT (DPORT),A
                        ; Pulse write enable
F476    3E 34                   LD A,CMDREG-8
F478    D3 05                   OUT (CPORT),A
F47A    F6 08                   OR 8
F47C    D3 05                   OUT (CPORT),A
                        ; Set data port back to input
F47E    CD F457                 CALL IMODE
F481    C9                      RET


                        ; Subroutine to load E reg into FDC sector reg
003E                    SECREG  EQU 3EH
                        ; Select sector reg
F482    3E 3E           LDSEC:  LD A,SECREG
F484    D3 05                   OUT (CPORT),A
F486    CD F460                 CALL OMODE
F489    7B                      LD A,E
F48A    2F                      CPL
F48B    D3 04                   OUT (DPORT),A
                        ; Pulse write enable
F48D    3E 36                   LD A,SECREG-8
F48F    D3 05                   OUT (CPORT),A
F491    F6 08                   OR 8
F493    D3 05                   OUT (CPORT),A
F495    CD F457                 CALL    IMODE
F498    C9                      RET

                        ; Subroutine to read FDC status reg to A reg
003C                    STAREG  EQU 3CH
                        ; Select status reg
F499    3E 3C           RDSTAT: LD A,STAREG
F49B    D3 05                   OUT (CPORT),A
F49D    CD F457                 CALL IMODE
                        ; Read enable to 0
F4A0    3E 38                   LD A,STAREG-4
F4A2    D3 05                   OUT (CPORT),A
                        ; Read status reg
F4A4    DB 04                   IN A,(DPORT)
F4A6    2F                      CPL
                        ; Set flags
F4A7    B7                      OR A
F4A8    F5                      PUSH AF
                        ; Read enable to 1
F4A9    3E 3C                   LD A,STAREG
F4AB    D3 05                   OUT(CPORT),A
F4AD    F1                      POP AF
F4AE    C9                      RET

                        ; Subroutine to read FDC track reg to A reg
003D                    TRKREG  EQU 3DH
```

```
                        ; Select track reg
F4AF   3E 3D            RDTRK:  LD A,TRKREG
F4B1   D3 05                    OUT (CPORT),A
F4B3   CD F457                  CALL IMODE
                        ; Read enable to 0
F4B6   3E 39                    LD A,TRKREG-4
F4B8   D3 05                    OUT (CPORT),A
                        ; Read track reg
F4BA   DB 04                    IN A,(DPORT)
F4BC   2F                       CPL
F4BD   F5                       PUSH AF
                        ; Read enable to 1
F4BE   3E 3D                    LD A,TRKREG
F4C0   D3 05                    OUT (CPORT),A
F4C2   F1                       POP     AF
F4C3   C9                       RET

                        ; Subroutine to check that drive motor is on
                        ; and that busy flag = 0
F4C4   CD F499          WAITBY: CALL RDSTAT
F4C7   F2 F4CD                  JP P,MOTON
                        ; Start motors
F4CA   CD F4E3          MSTRT:  CALL MSTART
F4CD   CD F499          MOTON:  CALL RDSTAT
                        ; Restart motors
F4D0   FA F4CA                  JP M,MSTRT
                        ; Busy bit to Carry flag
F4D3   1F                       RRA
F4D4   DA F4CD                  JP C,MOTON
F4D7   C9                       RET

                        ; Subroutine to check if command has timed out
                        ; If so reset FDC using force interrupt
                        ; FDC FORCE INTERRUPT
00D0                    FRCINT  EQU 0D0H
                        ; Return if top bit = 0
F4D8   B7               TIMOUT: OR A
F4D9   F0                       RET P
F4DA   3E D0                    LD A,FRCINT
                        ; Reset FDC busy bit
F4DC   CD F46A                  CALL LDCMD
                        ; Load timeout error code
F4DF   3E 80                    LD A,80H
F4E1   B7                       OR A
F4E2   C9                       RET

                        ; Subroutine to turn on drive motors
                        ; Dummy WRITE to turn on motors
F4E3   CD F482          MSTART: CALL LDSEC
F4E6   E5                       PUSH HL
                        ; Delay for 1 second
F4E7   21 03E8                  LD HL,1000
F4EA   CD F560                  CALL MSEC
```

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F4ED  E1              POP HL
F4EE  C9              RET

                      ; Subroutine to load A to FDC track reg
F4EF  F5              LDTRK:  PUSH AF
                      ; Select track reg
F4F0  3E 3D                   LD A,TRKREG
F4F2  D3 05                   OUT (CPORT),A
F4F4  CD F460                 CALL OMODE
F4F7  F1                      POP AF
F4F8  2F                      CPL
F4F9  D3 04                   OUT (DPORT),A
                      ; Pulse write enable
F4FB  3E 35                   LD A,TRKREG-8
F4FD  D3 05                   OUT (CPORT),A
F4FF  3E 3D                   LD A,TRKREG
F501  D3 05                   OUT (CPORT),A
F503  CD F457                 CALL IMODE
F506  C9                      RET

                      ; Subroutine to load A to FDC Drive select reg
F507  E5              LDDRS:  PUSH HL
F508  2A F403                 LD HL,(WSPACE)
                      ; A reg to workspace
F50B  77                      LD (HL),A
F50C  E1                      POP HL
F50D  F5                      PUSH AF
F50E  3E 3F                   LD A,3FH
F510  D3 05                   OUT (CPORT),A
F512  CD F460                 CALL OMODE
F515  F1                      POP AF
F516  D3 04                   OUT (DPORT),A
                      ; Pulse drive select load
F518  3E 1F                   LD A,1FH
F51A  D3 05                   OUT (CPORT),A
F51C  3E 3F                   LD A,3FH
F51E  D3 05                   OUT (CPORT),A
F520  CD F457                 CALL IMODE
F523  C9                      RET

                      ; Subroutine to select drive specified in C reg
                      ; Current drive number stored in WSPACE
                      ; Drive numbers are 0, 2 or 4.
                      ; Subroutine will read new track number from
                      ; the drive
F524  E5              DRSEL:  PUSH HL
                      ; Get current drive number
F525  2A F403                 LD HL,(WSPACE)
F528  7E                      LD A,(HL)
                      ; Remove side select bit
F529  E6 FE                   AND 0FEH
F52B  B9                      CP C
F52C  CA F55D                 JP Z,SAMEDR
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```
F52F  3A F40B          ; Get number of drives
                       LD A,(DRIVES)
                       ; Correct max drive number
F532  07               RLCA
F533  3D               DEC A
                       ; Compare against new drive number
F534  B9               CP C
F535  D2 F53D          JP NC,DNUMOK
                       ; Load drive select fail code
F538  3E 1F            SLFAIL: LD A,1FH
F53A  B7               OR A
F53B  E1               POP HL
F53C  C9               RET
                       ; Store new drive number
F53D  79               DNUMOK: LD A,C
                       ; Load drive select reg
F53E  CD F507          CALL LDDRS
                       ; 100 mS delay
F541  21 0064          LD HL,100
F544  CD F560          CALL MSEC
                       ; Get address of buffer for read addess
F547  2A F403          LD HL,(WSPACE)
F54A  23               INC HL
F54B  23               INC HL
                       ; Load read address command
F54C  3E C0            LD A,0C0H
F54E  CD F604          CALL RDENTR
F551  C2 F538          JP NZ,SLFAIL
                       ; Get current track number
F554  2A F403          LD HL,(WSPACE)
F557  23               INC HL
F558  23               INC HL
F559  7E               LD A,(HL)
                       ; Load this to FDC track reg
F55A  CD F4EF          CALL LDTRK
F55D  E1               SAMEDR: POP HL
F55E  AF               XOR A
F55F  C9               RET

                       ; Timing subroutine
                       ; Delay number of millisecs specified in HL
F560  C5               MSEC:   PUSH BC
                       ; Adjust TDEL for 1 mS
F561  3A F40E          MS1:    LD A,(TDEL)
F564  47               LD B,A
F565  05               MS2:    DEC B
F566  0E 00            LD C,0
F568  C2 F565          JP NZ,MS2
F56B  2B               DEC HL
F56C  7C               LD A,H
F56D  B5               OR L
F56E  C2 F561          JP NZ,MS1
F571  C1               POP BC
```

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F572  C9                  RET

                          ; Subroutine to perform seek command to
                          ; track specified in D reg
003F                      DATREG  EQU 3FH
001F                      SEEKCM  EQU 1FH
000F                      RESTOR  EQU 0FH
F573  C5                  SEEKTR: PUSH BC
                          ; C reg holds side number
F574  0E 00               LD      C,0
                          ; Get number of tracks on disk
F576  3A F40C             LD A,(TRACKS)
                          ; Correct max track number
F579  3D                  DEC A
                          ; Compare against requested track
F57A  BA                  CP D
F57B  D2 F591             JP NC,SIDE
F57E  47                  LD B,A
                          ; Test for double sided drive
F57F  3A F40F             LD A,(DBLS)
F582  B7                  OR A
                          ; Jump if single sided
F583  CA F5CF             JP Z,TOOBIG
                          ; Calculate new track number for second side
F586  7A                  LD A,D
F587  90                  SUB B
F588  3D                  DEC A
                          ; Check that new number < tracks per side
F589  0E 01               LD C;1
F58B  57                  LD D,A
F58C  78                  LD A,B
F58D  BA                  CP D
                          ; Jump if too big
F58E  DA F5CF             JP C,TOOBIG
F591  E5                  SIDE:   PUSH HL
F592  2A F403             LD HL,(WSPACE)
                          ; Get drive number
F595  46                  LD B,(HL)
F596  E1                  POP HL
F597  78                  LD A,B
F598  E6 01               AND 1
F59A  B9                  CP C
F59B  CA F5AD             JP Z,CPTRK
F59E  78                  LD A,B
                          ; Get drive number
F59F  E6 FE               AND 0FEH
                          ; Add side select bit
F5A1  B1                  OR C
F5A2  CD F507             CALL LDDRS
F5A5  E5                  PUSH HL
                          ; Delay for side select to settle
F5A6  21 0001             LD HL,1
F5A9  CD F560             CALL MSEC
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```
F5AC   E1                POP HL
F5AD   C1                CPTRK: POP BC
F5AE   CD F4AF           CALL RDTRK
F5B1   92                SUB D
                         ; Already on correct track
F5B2   C8                RET Z
                         ; Look for new track
F5B3   CD F5D4           CALL SEEKS
                         ; Return if seek ok
F5B6   C8                RET Z
                         ; Return if drive not ready
F5B7   F8                RET M
                         ; Seek failed, do a reseek
                         ; Restore to track 0
F5B8   3E 0F             RESEEK: LD A,RESTOR
F5BA   CD F46A           CALL LDCMD
                         ; Wait for head to home
F5BD   DB 05             RWAIT: IN A,(CPORT)
F5BF   E6 40             AND 40H
                         ; Wait for IRQ
F5C1   CA F5BD           JP Z,RWAIT
F5C4   CD F499           CALL RDSTAT
F5C7   CD F4D8           CALL TIMOUT
F5CA   F8                RET M
                         ; Try again
F5CB   CD F5D4           CALL SEEKS
F5CE   C9                RET
F5CF   C1                TOOBIG: POP BC
                         ; Load error code for invalid track
F5D0   3E 10             LD A,10H
F5D2   B7                OR A
F5D3   C9                RET

                         ; Seek new track
F5D4   CD F4C4           SEEKS: CALL WAITBY
                         ; Select data reg
F5D7   3E 3F             LD A,DATREG
F5D9   D3 05             OUT (CPORT),A
F5DB   CD F460           CALL OMODE
F5DE   7A                LD A,D
F5DF   2F                CPL
F5E0   D3 04             OUT (DPORT),A
                         ; Pulse write enable
F5E2   3E 37             LD A,DATREG-8
F5E4   D3 05             OUT (CPORT),A
F5E6   F6 08             OR 8
F5E8   D3 05             OUT (CPORT),A
F5EA   CD F457           CALL IMODE
                         ; Send a seek command
F5ED   3E 1F             LD A,SEEKCM
F5EF   CD F46A           CALL LDCMD
F5F2   DB 05             SWAIT: IN A,(CPORT)
                         ; Mask out IRQ input
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F5F4  E6 40                   AND 40H
                            ; Wait until IRQ = 1
F5F6  CA F5F2                 JP Z,SWAIT
                            ; Read status
F5F9  CD F499                 CALL RDSTAT
                            ; Mask error bits
F5FC  E6 98                   AND 98H
                            ; Check for timeout
F5FE  CD F4D8                 CALL TIMOUT
F601  C9                      RET

                            ; Subroutine to read a sector from the current
                            ; track into memory
                            ; On entry:
                            ;    Sector number = E
                            ;    Buffer start  = HL
                            ; On exit:
                            ;    End of buffer = HL
                            ;    FDC status    = A
0088                        RDCMD   EQU 88H
                            ; Read sector comand to A reg
F602  3E 88                 RDSECT: LD A,RDCMD
                            ; Entry point for other read commands
F604  C5                    RDENTR: PUSH BC
F605  F5                      PUSH AF
F606  CD F4C4                 CALL WAITBY
F609  06 3F                   LD B,DATREG
F60B  0E 3B                   LD C,DATREG-4
                            ; Load FDC sector reg
F60D  CD F482                 CALL LDSEC
                            ; Retrieve command
F610  F1                      POP AF
                            ; Load command to FDC
F611  CD F46A                 CALL LDCMD
F614  78                      LD A,B
F615  D3 05                   OUT (CPORT),A
F617  DB 05                 RDWAIT: IN A,(CPORT)
                            ; Mask DRQ and INTRQ
F619  E6 C0                   AND 0C0H
                            ; Loop if no requests
F61B  CA F617                 JP Z,RDWAIT
                            ; Jump if INTRQ
F61E  F2 F62F                 JP P,RDIRQ
F621  79                      LD A,C
                            ; FDC read enable to 0
F622  D3 05                   OUT (CPORT),A
                            ; Read data byte
F624  DB 04                   IN A,(DPORT)
F626  2F                      CPL
                            ; Store in buffer
F627  77                      LD (HL),A
F628  78                      LD A,B
                            ; FDC read enable to 1
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```
F629  D3 05           OUT (CPORT),A
F62B  23              INC HL
F62C  C3 F617         JP RDWAIT
F62F  CD F499         RDIRQ:  CALL RDSTAT
                      ; Check for timeout
F632  CD F4D8         CALL TIMOUT
F635  C1              POP     BC
F636  C9              RET

                      ; Subroutine to write from memory to sector
                      ; on current track
                      ; On entry:
                      ;    Sector number = E
                      ;    Buffer start  = HL
                      ; On exit:
                      ;    Buffer finish = HL
                      ;    FDC status    = A
00A8                  WRCMD   EQU 0A8H
                      ; Write sector command to A reg
F637  3E A8           WRSECT: LD A,WRCMD
                      ; Entry point for other write commands
F639  C5              WRENTR: PUSH BC
F63A  F5              PUSH AF
F63B  CD F4C4         CALL WAITBY
F63E  06 3F           LD B,DATREG
F640  0E 37           LD C,DATREG-8
                      ; Load FDC sector reg
F642  CD F482         CALL LDSEC
                      ; Retrieve command
F645  F1              POP AF
                      ; Load write command to FDC command reg
F646  CD F46A         CALL LDCMD
                      ; Set DPORT to output mode
F649  CD F460         CALL OMODE
F64C  78              LD A,B
                      ; Set CPORT to address FDC data reg
F64D  D3 05           OUT (CPORT),A
                      ; Get a data byte
F64F  7E              WBYTEL: LD A,(HL)
F650  23              INC HL
F651  2F              CPL
                      ; Output the data to DPORT
F652  D3 04           OUT (DPORT),A
F654  DB 05           WRWAIT: IN A,(CPORT)
                      ; Mask DRQ and INTRQ
F656  E6 C0           AND 0C0H
                      ; Loop if no requests
F658  CA F654         JP Z,WRWAIT
                      ; Jump if INTRQ
F65B  F2 F667         JP P,WRIRQ
                      ; Set FDC write enable to 0
F65E  79              LD A,C
F65F  D3 05           OUT (CPORT),A
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```
                        ; Set FDC write enable to 1
F661  78                        LD A,B
F662  D3 05                     OUT (CPORT),A
F664  C3 F64F                   JP      WBYTEL
                        ; Read FDC status
F667  CD F499           WRIRQ:  CALL RDSTAT
                        ; Check for timeout
F66A  CD F4D8                   CALL TIMOUT
F66D  C1                        POP BC
                        ; Correct buffer pointer
F66E  2B                        DEC HL
F66F  C9                        RET

F670  CD F524           READ:   CALL DRSEL
F673  C0                        RET NZ
F674  CD F573                   CALL SEEKTR
F677  C0                        RET NZ
F678  C5                        PUSH BC
                        ; Save buffer start
F679  E5                        PUSH HL
F67A  3A F40D                   LD A,(NTRY)
F67D  47                        LD B,A
F67E  0E 02                     LD C,2
                        ; Start of buffer
F680  E1                RFLOOP: POP HL
F681  E5                        PUSH HL
F682  CD F602                   CALL RDSECT
                        ; Jump if read ok
F685  CA F6A0                   JP Z,RDEXIT
                        ; Jump if motor off
F688  FA F6A1                   JP M,RFEXIT
F68B  05                        DEC B
                        ; Try again
F68C  C2 F680                   JP NZ,RFLOOP
F68F  0D                        DEC C
F690  CA F6A1                   JP Z,RFEXIT
                        ; Reset heads to track 0
F693  CD F5B8                   CALL RESEEK
F696  C2 F6A1                   JP NZ,RFEXIT
F699  3A F40D                   LD A,(NTRY)
F69C  47                        LD B,A
                        ; Try reading again
F69D  C3 F680                   JP RFLOOP
F6A0  E3                RDEXIT: EX (SP),HL
F6A1  E1                RFEXIT: POP HL
F6A2  C1                        POP BC
                        ; Set flags
F6A3  B7                        OR A
F6A4  C9                        RET

F6A5  CD F524           WRITE:  CALL DRSEL
F6A8  C0                        RET NZ
F6A9  CD F573                   CALL SEEKTR
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F6AC  C0                RET NZ
F6AD  C5                PUSH BC
F6AE  E5                PUSH HL
F6AF  3A F40D           LD A,(NTRY)
F6B2  47                LD B,A
F6B3  0E 02             LD C,2
F6B5  E1          WFLOOP: POP HL
F6B6  E5                PUSH HL
F6B7  CD F637           CALL WRSECT
                        ; Exit if write ok
F6BA  CA F6D5           JP Z,WREXIT
                        ; Exit if motor off
F6BD  FA F6D6           JP M,WFEXIT
F6C0  05                DEC B
F6C1  C2 F6B5           JP NZ,WFLOOP
F6C4  0D                DEC C
F6C5  CA F6D6           JP Z,WFEXIT
                        ; Restore to track 0
F6C8  CD F5B8           CALL RESEEK
                        ; Exit if seek fails
F6CB  C2 F6D6           JP NZ,WFEXIT
F6CE  3A F40D           LD A,(NTRY)
F6D1  47                LD B,A
F6D2  C3 F6B5           JP WFLOOP
F6D5  E3          WREXIT: EX (SP),HL
F6D6  E1          WFEXIT: POP HL
F6D7  C1                POP BC
                        ; Set flags
F6D8  B7                OR A
F6D9  C9                RET

                        ; Subroutine to format disk
                        ; Track addresses from 0 to TRACKS
                        ; Sector addresses from 1 to 18

005B                    STEPIN  EQU 5BH
F6DA  CD F431     FORMAT: CALL INIT
                        ; Load initial track address
F6DD  16 00             LD D,0
                        ; Load initial sector address
F6DF  1E 01       TRACKL: LD E,1

                        ; Set up memory image of track data
F6E1  2A F409           LD HL,(FMTBUF)
                        ; 14 bytes to FF
F6E4  3E 0E             LD A,14
F6E6  36 FF       L1:   LD (HL),0FFH
F6E8  23                INC HL
F6E9  3D                DEC A
F6EA  C2 F6E6           JP NZ,L1
                        ; 6 bytes to 0 for sync
F6ED  3E 06       SECTL: LD A,6
F6EF  36 00       L2:   LD (HL),0
```

```
F6F1  23                    INC HL
F6F2  3D                    DEC A
F6F3  C2 F6EF               JP NZ,L2
                          ; ID address mark
F6F6  36 FE                 LD (HL),0FEH
F6F8  23                    INC HL
                          ; Track address
F6F9  72                    LD (HL),D
F6FA  23                    INC HL
F6FB  36 00                 LD (HL),0
F6FD  23                    INC HL
                          ; Sector address
F6FE  73                    LD (HL),E
F6FF  23                    INC HL
F700  36 00                 LD (HL),0
F702  23                    INC HL
                          ; ID field CRC
F703  36 F7                 LD (HL),0F7H
F705  23                    INC HL
                          ; 11 bytes to FF
F706  3E 0B                 LD A,11
F708  36 FF               L4: LD (HL),0FFH
F70A  23                    INC HL
F70B  3D                    DEC A
F70C  C2 F708               JP NZ,L4
                          ; 6 bytes to 0 for sync
F70F  3E 06                 LD A,6
F711  36 00               L3: LD (HL),0
F713  23                    INC HL
F714  3D                    DEC A
F715  C2 F711               JP NZ,L3
                          ; Data address mark
F718  36 FB                 LD (HL),0FBH
F71A  23                    INC HL
                          ; 128 bytes data field
F71B  3E 80                 LD A,128
F71D  36 E5               L5: LD (HL),0E5H
F71F  23                    INC HL
F720  3D                    DEC A
F721  C2 F71D               JP NZ,L5
                          ; Data field CRC
F724  36 F7                 LD (HL),0F7H
F726  23                    INC HL
                          ; 11 bytes to FF
F727  3E 0B                 LD A,11
F729  36 FF               L6: LD (HL),0FFH
F72B  23                    INC HL
F72C  3D                    DEC A
F72D  C2 F729               JP NZ,L6
                          ; Increment sector counter
F730  1C                    INC E
                          ; Test for 18th sector
F731  7B                    LD A,E
```

```
F732  FE 13               CP 19
                        ; More to do, so round again
F734  C2 F6ED             JP NZ,SECTL
                        ; 255 bytes to FF. End of track gap
F737  3E FF               LD A,255
F739  36 FF             L7: LD (HL),0FFH
F73B  23                  INC HL
F73C  3D                  DEC A
F73D  C2 F739             JP NZ,L7

                        ; Write the data using the write track command
F740  3A F40F             LD A,(DBLS)
F743  F5                SDLP: PUSH AF
                        ; Side select
F744  CD F507             CALL LDDRS
F747  2A F409             LD HL,(FMTBUF)
                        ; Write entire track command
F74A  3E F4               LD A,0F4H
                        ; Write it
F74C  CD F639             CALL WRENTR
F74F  B7                  OR A
                        ; Return if error in write
F750  C0                  RET NZ
F751  E5                  PUSH HL
F752  2A F409             LD HL,(FMTBUF)
                        ; Check that 0C00 bytes have been written
F755  01 0C00             LD BC,0C00H
F758  09                  ADD HL,BC
F759  4D                  LD C,L
F75A  44                  LD B,H
F75B  E1                  POP HL
F75C  7D                  LD A,L
F75D  91                  SUB C
F75E  7C                  LD A,H
F75F  98                  SBC A,B
F760  DA F781             JP C,FERR
F763  F1                  POP AF
F764  B7                  OR A
                        ; Jump if side select = 0
F765  CA F76C             JP Z,SDNXT
F768  3D                  DEC A
F769  C3 F743             JP SDLP
F76C  14                SDNXT: INC D
F76D  3A F40C             LD A,(TRACKS)
F770  92                  SUB D
F771  C8                  RET Z
F772  3E 5B             NEXTTR: LD A,STEPIN
F774  CD F46A             CALL LDCMD
F777  DB 05             STWAIT: IN A,(CPORT)
F779  E6 40               AND 40H
F77B  CA F777             JP Z,STWAIT
F77E  C3 F6DF             JP TRACKL
F781  F1                FERR: POP AF
```

```
                        ; Format error code
F782  3E FF                     LD A,0FFH
F784  C9                        RET

                        ; Bootstrap program
                        ; Reads sector 1 of track 0 into memory then
                        ; jumps to it
F785  2A F405           START:  LD HL,(ISTACK)
F788  F9                        LD SP,HL
                        ; NAS-SYS set up call
F789  CD 000D                   CALL 000DH
                        ; Set up drives
F78C  CD F431                   CALL INIT
                        ; Set drive 0
F78F  0E 00                     LD C,0
                        ; Sector 1 track 0
F791  11 0001                   LD DE,1
F794  2A F407                   LD HL,(BOOTST)
F797  CD F670                   CALL READ
                        ; Try again if read fails
F79A  C2 F785                   JP NZ,START
F79D  2A F407                   LD HL,(BOOTST)
                        ; Jump to bootstrap
F7A0  E9                        JP (HL)

                        ; Subroutine to write bootstrap to disk

F7A1  CD F431           WRBOOT: CALL INIT
F7A4  0E 00                     LD C,0
F7A6  11 0001                   LD DE,1
F7A9  2A F407                   LD HL,(BOOTST)
F7AC  CD F6A5                   CALL WRITE
F7AF  C9                        RET

F7B0  20 43 4F 50               DEFM " COPYRIGHT (C) DONDENE LTD. 1980 "
F7B4  59 52 49 47
F7B8  48 54 20 28
F7BC  43 29 20 44
F7C0  4F 4E 44 45
F7C4  4E 45 20 4C
F7C8  54 44 2E 20
F7CC  31 39 38 30
F7D0  20

                        .DEPHASE

                        END
```

Macros:

Symbols:

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| BOOTST | F407 | CCNTRL | 0007 | CMDREG | 003C | CPM | FFFF |
| CPMASK | 00C0 | CPMORG | F400 | CPORT | 0005 | CPTRK | F5AD |
| DATREG | 003F | DBLS | F40F | DCNTRL | 0006 | DDOS | 0000 |
| DNUMOK | F53D | DPORT | 0004 | DRIVES | F40B | DRSEL | F524 |
| EDOSOR | B400 | EPROM | FFFF | FALSE | 0000 | FERR | F781 |
| FMTBUF | F409 | FORMAT | F6DA | FRCINT | 00D0 | IMODE | F457 |
| INIT | F431 | ISTACK | F405 | L1 | F6E6 | L2 | F6EF |
| L3 | F711 | L4 | F708 | L5 | F71D | L6 | F729 |
| L7 | F739 | LDCMD | F46A | LDDRS | F507 | LDSEC | F482 |
| LDTRK | F4EF | MOTON | F4CD | MS1 | F561 | MS2 | F565 |
| MSEC | F560 | MSTART | F4E3 | MSTRT | F4CA | NASCOM | FFFF |
| NEXTTR | F772 | NTRY | F40D | OMODE | F460 | ORIGIN | F400 |
| RAM | 0000 | RDCMD | 0088 | RDENTR | F604 | RDEXIT | F6A0 |
| RDIRQ | F62F | RDOSOR | 8C00 | RDSECT | F602 | RDSTAT | F499 |
| RDTRK | F4AF | RDWAIT | F617 | READ | F670 | RESEEK | F5B8 |
| RESTOR | 000F | RFEXIT | F6A1 | RFLOOP | F680 | RICZ80 | 0000 |
| RSLOOP | F44B | RWAIT | F5BD | SAMEDR | F55D | SDLP | F743 |
| SDNXT | F76C | SECREG | 003E | SECTL | F6ED | SEEKCM | 001F |
| SEEKS | F5D4 | SEEKTR | F573 | SIDE | F591 | SLFAIL | F538 |
| STAREG | 003C | START | F785 | STEPIN | 005B | STWAIT | F777 |
| SWAIT | F5F2 | TDEL | F40E | TIMOUT | F4D8 | TOOBIG | F5CF |
| TRACKL | F6DF | TRACKS | F40C | TRKREG | 003D | TRUE | FFFF |
| WAITBY | F4C4 | WBYTEL | F64F | WFEXIT | F6D6 | WFLOOP | F6B5 |
| WRBOOT | F7A1 | WRCMD | 00A8 | WRENTR | F639 | WREXIT | F6D5 |
| WRIRQ | F667 | WRITE | F6A5 | WRSECT | F637 | WRWAIT | F654 |
| WSPACE | F403 | | | | | | |

No Fatal error(s)