

# Personal Computer MZ-80B Owner's Manual

## SUPPLEMENT

### Complete MZ-80B IPL Assembly Listing

*This supplement shows the complete MZ-80B IPL (Initial Program Loader) assembly listing. Although operation of IPL is described in the Owner's Manual, this booklet is prepared for users who want to know operational details of IPL. This booklet is for reference only. The Sharp Corporation is not obliged to answer any questions about the contents of this assembly listing.*

*IPL includes the following routines: the CMT CONTROL routine, which loads programs from the cassette tape into the memory and executes them; the MFM MINIFLOPPY CONTROL routine, which loads programs from the floppy diskette into the memory and executes them; and the INTRAM-EXROM routine, which loads programs from ROM connected to the extension port of the MZ-80B into the memory and executes them. Each routine name is shown in the remarks column.*

*The Sharp Corporation reserves all rights to the contents of this publication.*

# SHARP

# **MZ-80B BEDIENUNGSANLEITUNG**

## **SUPPLEMENT**

### **Komplettes MZ-80B IPL Assemblerprotokoll**

*Diese Ergänzung führt das komplette MZ-80B IPL (Initial Program Loader/Urlader) Assemblerprotokoll auf. Wenngleich die IPL-Operation in der Bedienungsanleitung beschrieben wird, wurde diese Broschüre für Anwender zusammengestellt, die Betriebsdetails des IPL wissen möchten. Diese Broschüre ist nur zur Referenz. Die Sharp Corporation ist nicht verpflichtet, irgendwelche Fragen über die Inhalte dieses Assemblerprotokolls zu beantworten.*

*IPL umfaßt die folgenden Routinen: die CMT CONTROL Routine, die Programme vom Kassettenband in den Speicher lädt und sie ausführt; die MFM MINIFLOPPY CONTROL Routine, die Programme von der Floppy Diskette in den Speicher lädt und sie ausführt und die INTRAM-EXROM Routine, die Programme vom am Erweiterungsport des MZ-80B angeschlossenen ROM in den Speicher lädt und sie ausführt. Jeder Routinenname ist in der Spalte "Bemerkungen" aufgeführt.*

*Die Sharp Corporation behält sich alle Rechte bezüglich der Inhalte dieser Veröffentlichung vor.*

# **SHARP**

```

0000 ;*****
0000 ;
0000 ;   Personal Computer
0000 ;   MZ-80B
0000 ;
0000 ;   Initial
0000 ;   Program
0000 ;   Loader
0000 ;
0000 ;*****
0000 ;
0000 1004           JR   START
0002 ;*****
0002 ; NST RESET
0002 ;
0002 3E03 NST:     LD   A,3H
0004 D3E3           OUT  (E3H),A
0006 ;*****
0006 ; INITIALIZE
0006 ;
0006 3E82 START:   LD   A,82H           ;8255 A=OUT B=IN C=OUT
0008 D3E3           OUT  (E3H),A
000A 3E0F           LD   A,0FH           ;PIO A=OUT
000C D3E9           OUT  (E9H),A
000E 3ECF           LD   A,CFH           ;PIO B=IN
0010 D3EB           OUT  (EBH),A
0012 3EFF           LD   A,FFH
0014 D3EB           OUT  (EBH),A
0016 3E58           LD   A,58H           ;BST=1 OPEN=1 WRITE=1
0018 D3E2           OUT  (E2H),A
001A 3E12           LD   A,12H
001C D3E0           OUT  (E0H),A
001E AF            XOR   A
001F D3F4           OUT  (F4H),A
0021 31E0FF        LD   SP,FF00H
0024 210000        LD   HL,0000H
0027 3EB3           LD   A,83H
0029 D3E8           OUT  (E8H),A
002B 3600 CLEAR:   LD   (HL),00H           ;DISPLAY CLEAR
002D 23            INC  HL
002E 7C            LD   A,H
002F B5            OR   L
0030 20F9          JR   NZ,CLEAR
0032 3E13           LD   A,13H
0034 D3E8           OUT  (E8H),A
0036 AF            XOR   A
0037 32ECFF        LD   (DRIND),A
003A 32E6FF        LD   (MTFG),A
003D CD4B00 KEYIN:  CALL KEYS1
0040 CB5F           BIT   3,A
0042 2827          JR   Z,CMT
0044 CB47           BIT   0,A
0046 CAEF05        JP   Z,EXRONT
0049 180C          JR   NKIN
004B ;
004B 0614 KEYST1: LD   B,14H           ;KEY STROBE OUT
004D DBE8 KEYST:  IN   A,(E8H)
004F E6F0          AND  F0H
0051 B0            OR   B
0052 D3E8           OUT  (E8H),A
0054 DBEA          IN   A,(EAH)
0056 C9            RET
0057 ;
0057 ;
0057 CD5F00 NKIN:  CALL FDCC
005A CA3C03        JP   Z,FD
005D 180C          JR   CMT
005F ;
005F 3EA5 FDCC:  LD   A,A5H
0061 47            LD   B,A

```

```

0062 D3D9          OUT   (D9H),A
0064 CDD605       CALL  DLY80U
0067 DBD9         IN    A,(D9H)
0069 B8           CP    B
006A C9           RET
006B              ;
006B              ;
006B              ; CMT CONTROL ;
006B              ;
006B              ;
006B              ;
006B CDE501       CMT:   CALL  MSTOP
006E CD1D02       CALL  DEL6
0071 CDCE01       CALL  KYEMES
0074 CD4E00       CALL  ?RDI
0077 3817         JR    C,ST1
0079 CD3002       CALL  LDMSG
007C 2101CF       LD    HL,NAME
007F 1E10         LD    E,10H
0081 0E10         LD    C,10H
0083 CD3902       CALL  DISP2
0086 3A00CF       LD    A,(ATRB)
0089 FE01         CP    1
008B 2011         JR    NZ,MISMCH
008D CDCF00       CALL  ?RDD
0090 F5           ST1:  PUSH AF
0091 CD1D02       CALL  DEL6
0094 CD0E02       CALL  REM
0097 F1           POP  AF
0098 DA5F05       JP    C,TRYAG
009B C30200       JP    NST
009E              ;
009E 212603       MISMCH: LD  HL,MES16
00A1 1E0A         LD  E,0AH
00A3 0E0F         LD  C,15
00A5 CD4602       CALL DISP
00A8 CDE501       CALL MSTOP
00AB 37           SCF
00AC 18E2         JR  ST1
00AE              ;
00AE              ; READ INFORMATION
00AE              ; CF=1:ERROR
00AE              ;
00AE RDINF: ENT
00AE F3           ?RDI: DI
00AF 1604         LD  D,4
00B1 010000       LD  BC,0000H
00B4 2100CF       LD  HL,IBUFE
00B7 CD0E01       RD1:  CALL MOTOR
00BA 380E         JR  C,STPEIR
00BC CD5201       CALL TMARK
00BF 3809         JR  C,STPEIR
00C1 CDD800       CALL RTAPE
00C4 3804         JR  C,STPEIR
00C6 C85A         RET2S: BIT 3,D
00C8 2803         JR  Z,EIRTH
00CA CDE501       STPEIR: CALL MSTOP
00CC FB          EIRTH: EI
00CE C9          RET
00CF              ;
00CF              ;
00CF              ; READ DATA
00CF              ;
00CF RDDAT: ENT
00CF F3           ?RDD: DI
00D0 1608         LD  D,8
00D2 ED4B12CF    LD  BC,(SIZE)
00D6 210080       LD  HL,8000H
00D9 18DC         JR  RD1
00DB              ;
00DB              ;
00DB              ; READ TAPE
00DB              ; BC=SIZE

```

```

000B      :      DE=LOAD ADDRESS
000B D5   RTAPE:  PUSH DE
000C C5   PUSH BC
000D E5   PUSH HL
000E 2602 LD   H,2
000F CD7A01 RTP2:  CALL SPDIN
0010 3838 JR   C,TRTN1
0011 28F9 JR   Z,RTP2
0012 54   LD   D,H
0013 210000 LD  HL,0000H
0014 22E0FF LD  (SUMDT),HL
0015 E1   POP  HL
0016 C1   POP  BC
0017 C5   PUSH BC
0018 E5   PUSH HL
0019 CD3201 RTP3:  CALL RBYTE
001A 3826 JR   C,TRTN1
001B 77   LD  (HL),A
001C 23   INC  HL
001D 0B   DEC  BC
001E 78   LD  A,B
001F B1   OR   C
0020 20F4 JR   NZ,RTP3
0021 2AE0FF LD  HL,(SUMDT)
0022 CD3201 CALL RBYTE
0023 3817 JR   C,TRTN1
0024 5F   LD  E,A
0025 CD3201 CALL RBYTE
0026 3811 JR   C,TRTN1
0027 B0   CP   L
0028 2004 JR   NZ,RTP5
0029 7B   LD  A,E
002A BC   CP   H
002B 280A JR   Z,TRTN1
002C 15   DEC  D
002D 2803 JR   Z,RTP6
002E 62   LD  H,D
002F 18C7 JR   RTP2
0030 CD3F02 RTP6:  CALL BOOTER
0031 37   SCF
0032 E1   POP  HL
0033 C1   POP  BC
0034 D1   POP  DE
0035 C9   RET
0036      :EDGE
0037 0121 EDGE:  IN   A,(E1H)
0038 2F   CPL
0039 07   RLCA
003A 08   RET  C
003B 07   RLCA
003C 30F8 JR   NC,EDGE
003D 06E1 EDGE1:  IN   A,(E1H)
003E 2F   CPL
003F 07   RLCA
0040 08   RET  C
0041 07   RLCA
0042 38F8 JR   C,EDGE1
0043 C9   RET
0044      : 1 BYTE READ
0045      : DATA=A
0046      : SUMDT STORE
0047 0132 RBYTE:  PUSH HL
0048 210000 LD  HL,0000H
0049 CD7A01 RBV1:  CALL SPDIN
004A 3815 JR   C,RBV3
004B 280A JR   Z,RBV2
004C E5   PUSH HL
004D 2AE0FF LD  HL,(SUMDT)
004E 23   INC  HL
004F 22E0FF LD  (SUMDT),HL

```

```

0145 E1          POP  HL
0146 37          SCF
0147 CB15        RBV2:  RL  L
0149 25          DEC  H
014A 20EA        JR   NZ,RBY1
014C CD2101      CALL EDGE
014F 7D          LD   A,L
0150 E1          RBV3:  POP  HL
0151 C9          RET
0152             ;TAPE MARK DETECT
0152             :      E=L: INFORMATION
0152             :      E=S: DATA
0152 E5          TMARK: PUSH HL
0153 211414      LD   HL,1414H
0156 CB5A        BIT  3.0
0158 2001        JR   NZ,TM0
015A 29          ADD  HL,HL
015B 22E2FF      TM0:  LD   (TMCNT),HL
015E 2AE2FF      TM1:  LD   HL,(TMCNT)
0161 CD7A01      TM2:  CALL SPDIN
0164 38EA        JR   C,RBY3
0166 28F6        JR   Z,TM1
0168 25          DEC  H
0169 20F6        JR   NZ,TM2
016B CD7A01      TM3:  CALL SPDIN
016E 38E0        JR   C,RBY3
0170 20EC        JR   NZ,TM1
0172 20          DEC  L
0173 20F6        JR   NZ,TM3
0175 CD2101      CALL EDGE
0178 18D6        JR   RBY3
017A             ;
017A CD2101      SPDIN: CALL EDGE
017D D8          RET  C
017E CD2902      CALL DLV2
0181 DBE1        IN   A,(E1H)
0183 E640        AND  40H
0185 C9          RET
0186             ;
0186             ;
0186             ;MOTOR ON
0186 D5          MOTOR: PUSH DE
0187 C5          PUSH BC
0188 E5          PUSH HL
0189 DBE1        IN   A,(E1H)
018B E620        AND  20H
018D 281F        JR   Z,MOTRD
018F 218B02      LD   HL,MES6
0192 1E0A        LD   E,AH
0194 0E0E        LD   C,14D
0196 CD4602      CALL DISP
0199 CDC201      CALL OPEN
019C DBEA        MOT1:  IN   A,(EAH)
019E 2F          CPL
019F 07          RLCA
01A0 380F        JR   C,MOTR
01A2 DBE1        IN   A,(E1H)
01A4 E620        AND  20H
01A6 20F4        JR   NZ,MOT1
01A8 CDCE01      CALL KYEMES
01AB CD2302      CALL DEL1M
01AE CDD901      MOTRD: CALL PLAY
01B1 E1          MOTR:  POP  HL
01B2 C1          POP  BC
01B3 D1          POP  DE
01B4 C9          RET
01B5             ;
01B5             ;
01B5             ;MOTOR STOP
01B5 3E0D        MSTOP: LD   A,0DH

```

```

01B7 D3E3          OUT   (E3H),A          ; READ MODE
01B9 3E1A          LD    A,1AH
01BB D3E0          OUT   (E0H),A
01BD CD1D02        CALL  DEL6
01C0 182D          JR    BLK3
01C2              ; EJECT
01C2 3E08          OPEN: LD    A,08H
01C4 D3E3          OUT   (E3H),A
01C6 CD1D02        CALL  DEL6
01C9 3E09          LD    A,09H
01CB D3E3          OUT   (E3H),A
01CD C9           RET
01CE              ;
01CE              ;
01CE 216F02        KYEMES: LD   HL,MES3
01D1 1E04          LD    E,4H
01D3 0E1C          LD    C,28D
01D5 CD4602        CALL  DISP
01D8 C9           RET
01D9              ;
01D9              ; PLAY
01D9 CDF401        PLAY: CALL  FR
01DC CD1D02        CALL  DEL6
01DF 3E16          LD    A,16H
01E1 D3E0          OUT   (E0H),A
01E3 180A          JR    BLK3
01E5 CD1D02        BLK1: CALL  DEL6
01E8 CDEF01        CALL  BLK3
01EB 3E13          LD    A,13H
01ED D3E0          BLK2: OUT   (E0H),A
01EF 3E12          BLK3: LD    A,12H
01F1 D3E0          OUT   (E0H),A
01F3 C9           RET
01F4              ;
01F4              ;
01F4 3E12          FR:   LD    A,12H
01F6 D3E0          FR1:  OUT   (E0H),A
01F8 CD1D02        CALL  DEL6
01FB 3E0B          LD    A,0BH
01FD D3E3          OUT   (E3H),A
01FF CD1D02        CALL  DEL6
0202 3E0A          LD    A,0AH
0204 D3E3          OUT   (E3H),A
0206 C9           RET
0207 3E10          RR:   LD    A,10H
0209 18EB          JR    FR1
020B              ; REWIND
020B              ;
020B CD0702        REW:  CALL  RR
020E 18D5          JR    BLK1
0210              ;
0210              ; TIMING
0210 F5           DIM:  DEL
0211 AF           PUSH  AF
0212 3D           XOR   A
0213 20FD        JR    NZ,-1
0215 0B           DEC  BC
0216 78           LD   A,B
0217 B1           OR   C
0218 20F7        JR    NZ,DIM+1
021A F1           POP  AF
021B C1           POP  BC
021C C9           RET
021D C5           DEL6: PUSH  BC
021E 01E900      LD    BC,233
0221 18ED        JR    DIM
0223 C5           DEL1M: PUSH  BC
0224 010F06      LD    BC,1551
0227 18E7        JR    DIM
0229              ;
0229              ; TAPE DELV TIMING

```

```

0229      ;
0229      ;
0229 3E31  DLY2: LD   A,31H
022B 3D    DEC   A
022C C22B02 JP   NZ,DLY2+2
022F C9    RET
0230      ;
0230      ;
0230      ;
0230      ;
0230      ;
0230      ;
0230 P     IBUFE: EQU  CF00H
0230 P     ATRB: EQU  CF00H
0230 P     NAME: EQU  CF01H
0230 P     SIZE: EQU  CF12H
0230 P     DTADR: EQU  CF14H
0230 P     SUMDT: EQU  FFE0H
0230 P     TMCNT: EQU  FFE2H
0230      ;
0230      ;
0230 216102 LDMSG: LD   HL,MES1
0233 1E00  LD   E,0H
0235 0E0E  LD   C,14D
0237 180D  JR   DISP
0239      ;
0239 3E93  DISP2: LD   A,93H
023B D3E8  OUT  (E8H),A
023D 1817  JR   DISP1
023F      ;
023F 219902 BOOTER: LD   HL,MES8
0242 1E0A  LD   E,AH
0244 0E0D  LD   C,13D
0246      ;
0246 3E93  DISP:  LD   A,93H
0248 D3E8  OUT  (E8H),A
024A D9    EXX
024B 2100D0 LD   HL,D000H
024E 3600  DISP3: LD   (HL),00H
0250 23    INC  HL
0251 7C    LD   A,H
0252 B5    OR   L
0253 20F9  JR   NZ,DISP3
0255 D9    EXX
0256 AF  DISP1: XOR  A
0257 47    LD   B,A
0258 16D0  LD   D,D0H
025A ED00  LDIR
025C 3E13  LD   A,13H
025E D3E8  OUT  (E8H),A
0260 C9    RET
0261      ;
0261      ;
0261 49504C20 MES1:  DEFM  'IPL is loading'
0265 6973206C
0269 6F616469
026D 6E67
026F 49504C20 MES3:  DEFM  'IPL is looking for a program'
0273 6973206C
0277 6F6F6869
027B 6E672066
027F 6F722061
0283 2070726F
0287 6772616D
028B 4D616E65 MES6:  DEFM  'Make ready CMT'
028F 20726561
0293 64792043
0297 4D54
0299 4C6F6164 MES8:  DEFM  'Loading error'
029D 696E672D
02A1 6572726F
02A5 72

```



```

0330 P      DR: EQU DBH      ;DATA REG PORT
0330 P      DM: EQU DCH      ;MOTOR/DRIVE PORT
0330 P      HS: EQU DDH      ;HEAD SIDE SELECT PORT
0330      :
0330      ;*****
0330      ;FD
0330 DD2100CF FD: LD IX,IBADR1
0340 AF      XOR A
0341 321ECF LD (CF1EH),A
0344 321FCF LD (CF1FH),A
0347 FD21E0FF LD IV,FFE0H
034B 210001 LD HL,0100H
034E FD7502 LD (IV+2),L
0351 FD7403 LD (IV+3),H
0354 CD7A04 CALL BREAD
0357 2100CF LD HL,CF00H      ;INFORMATION INPUT
035A 113503 LD DE,IPLMC      ;MASTER CHECK
035D 0606 LD B,6
035F 4E      MCHECK: LD C,(HL)
0360 1A      LD A,(DE)
0361 B9      CP C
0362 C24A05 JP NZ,NMASTE
0365 23      INC HL
0366 13      INC DE
0367 10F6    DJNZ MCHECK
0369 CD3002 CALL LDMSG
036C 2107CF LD HL,CF07H
036F 1E10    LD E,10H
0371 0E0A    LD C,AH
0373 CD3902 CALL DISP2
0376 DD210080 LD IX,IBADR2
037A 2A14CF LD HL,(CF14H)
037D FD7502 LD (IV+2),L
0380 FD7403 LD (IV+3),H
0383 CD7A04 CALL BREAD
0386 CDF303 CALL MOFF
0389 C30200 JP NST
038C      ;
038C      ;
038C 21A602 NODISK: LD HL,MES9
038F 1E0A    LD E,AH
0391 0E00    LD C,DH
0393 CD4602 CALL DISP
0396 C35905 JP ERROR1
0399      ;
0399      ; READY CHECK
0399      ;
0399      ;
0399      ;
0399 3AE6FF    READY: ENT
039C 0F      LD A,(MTFG)
039D 0400B3 RRCA
03A0 3AECFF CALL NC,MTON
03A3 F6B4    LD A,(DRIND)      ;DRIVE NO GET
03A5 03DC    OR 84H
03A7 AF      OUT (DM),A      ;DRIVE SELECT MOTON
03A8 CDE405 CALL DLY60M
03AB 210000 LD HL,00H
03AE 28      REDY0: DEC HL
03AF 7C      LD A,H
03B0 B5      OR L
03B1 2809    JR Z,NODISK
03B3 DBD8    IN A,(CR)      ;STATUS GET
03B5 2F      CPL
03B6 07      RLCA
03B7 38F5    JR C,REDY0
03B9 3AECFF LD A,(DRIND)
03BC 4F      LD C,A
03BD 21E7FF LD HL,CLBF0
03C0 0600    LD B,00H
03C2 09      ADD HL,BC

```

```

0303 0B46          BIT    0, (HL)
0305 00           RET    NZ
0306 CD0904       CALL   RCLB
0309 0B06         SET    0, (HL)
030B 09           RET
030C             ;
030C             ; MOTOR ON
030C             ;
030C             ;
030C             ; MTON: ENT
030C 3E00         LD     A, 80H
030E D30C         OUT   (DM), A
0300 060A         LD     B, 10
0302 21193C       MTD1:  LD   HL, 3C19H
0305 2B          MTD2:  DEC   HL
0306 7D          LD     A, L
0307 04          OR    H
0308 20FB        JR    NZ, MTD2,
030A 10F6        DJNZ  MTD1
030C 3E01         LD     A, 1
030E 32E6FF      LD     (MTFG), A
03E1 09           RET
03E2             ;
03E2             ; SEEK TREATMENT
03E2             ;
03E2             ;
03E2             ; SEEK: ENT
03E2 3E1B         LD     A, 1BH
03E4 2F          CPL
03E5 D308        OUT   (CR), A
03E7 CD2104       CALL   BUSY
03EA CDE405       CALL   DLY60M
03ED DBD8        IN    A, (CR)
03EF 2F          CPL
03F0 E699        AND   99H
03F2 09           RET
03F3             ;
03F3             ; MOTOR OFF
03F3             ;
03F3             ;
03F3             ; MOFF: ENT
03F3 CDD005       CALL   DLY1M
03F6 AF          XOR   A
03F7 D30C        OUT   (DM), A
03F9 32E7FF      LD     (CLBF0), A
03FC 32E8FF      LD     (CLBF1), A
03FF 32E9FF      LD     (CLBF2), A
0402 32EAFF      LD     (CLBF3), A
0405 32E6FF      LD     (MTFG), A
0408 09           RET
0409             ;
0409             ; RECALIBRATION
0409             ;
0409             ;
0409             ; RCLB: ENT
0409 E5           PUSH  HL
040A 3E0B        LD     A, 0BH
040C 2F          CPL
040D D308        OUT   (CR), A
040F CD2104       CALL   BUSY
0412 CDE405       CALL   DLY60M
0415 DBD8        IN    A, (CR)
0417 2F          CPL
0418 E695        AND   85H
041A EE04        XOR   04H
041C E1          POP   HL
041D 08          RET   Z
041E C35605      JP    ERROR
0421             ;
0421             ; BUSY AND WAIT
0421             ;
0421             ;
0421             ; BUSY: ENT
0421 D5           PUSH  DE
0422 E5           PUSH  HL

```

```

0423 CDD605          CALL  DLY80U
0426 1E07           LD      E,7
0428 210000        BUSY2: LD      HL,00H
042B 2B            BUSY0: DEC     HL
042C 7C            LD      A,H
042D B5            OR      L
042E 2809          JR      Z,BUSY1
0430 DBD8          IN      A,(CR)
0432 2F            CPL
0433 0F            RRC A
0434 38F5          JR      C,BUSY0
0436 E1            POP    HL
0437 D1            POP    DE
0438 C9            RET
0439 1D            BUSY1: DEC     E
043A 20EC          JR      NZ,BUSY2
043C C35605        JP      ERROR
043F
043F :DATA CHECK
043F
043F 0600          CONURT: LD     B,0
0441 111000        LD     DE,16
0444 2A1ECF        LD     HL,(CF1EH)
0447 AF            XOR    A
0448 ED52          TRANS: SBC   HL,DE
044A 3803          JR      C,TRANS1
044C 04            INC    B
044D 18F9          JR      TRANS
044F 19            TRANS1: ADD  HL,DE
0450 60            LD     H,B
0451 2C            INC    L
0452 FD7404        LD     (IY+4),H
0455 FD7505        LD     (IY+5),L
0458 3AECFF        DCHK:  LD     A,(DRIND)
045B FE04          CP     4
045D 3018          JR      NC,DTCK1
045F FD7E04        LD     A,(IY+4)
0462 FE46          CP     70
0464 3011          JR      NC,DTCK1
0466 FD7E05        LD     A,(IY+5)
0469 B7            OR     A
046A 280B          JR      Z,DTCK1
046C FE11          CP     17
046E 3007          JR      NC,DTCK1
0470 FD7E02        LD     A,(IY+2)
0473 FDB603        OR     (IY+3)
0476 C0            RET    NZ
0477 C35605        DTCK1: JP    ERROR
047A
047A :SEGMENTAL READ
047A
047A :
047A BREAD: ENT
047A DI
047A F3            CALL  CONURT
047E CD3F04        LD     A,10
047E 3E0A          LD     (RETRY),A
0480 32EBFF        READ1: CALL  READY
0483 CD9903        LD     D,(IY+3)
0486 FD5603        LD     A,(IY+2)
0489 FD7E02        OR     A
048C B7            JR      Z,RE0
048D 2801          INC    D
048F 14            RE0:  LD     A,(IY+5)
0490 FD7E05        LD     (IY+1),A
0493 FD7701        LD     A,(IY+4)
0496 FD7E04        LD     (IY+0),A
0499 FD7700        PUSH  IX
049C DDE5          POP    HL
049E E1            RE8:  SRL  A
049F CB3F          CPL
04A1 2F

```

04A2	D3DB		OUT	(DR),A	
04A4	3004		JR	NZ,RE1	
04A6	3E01		LD	A,01H	
04A8	1802		JR	RE2	
04AA	3E00	RE1:	LD	A,00	
04AC	2F	RE2:	CPL		
04AD	D3DD		OUT	(HS),A	
04AF	CDE203		CALL	SEEK	
04B2	206A		JR	NZ,REE	
04B4	0EDB		LD	C,0BH	
04B6	FD7E00		LD	A,(IV+0)	
04B8	CB3F		SRL	A	
04BB	2F		CPL		
04BC	D3DD		OUT	(TR),A	
04BE	FD7E01		LD	A,(IV+1)	
04C1	2F		CPL		
04C2	D3DA		OUT	(SCR),A	
04C4	D9		EXX		
04C5	21F704		LD	HL,RE3	
04C8	E5		PUSH	HL	
04C9	D9		EXX		
04CA	3E94		LD	A,94H	;READ & CMD
04CC	2F		CPL		
04CD	D3DB		OUT	(CR),A	
04CF	CD2D05		CALL	WAIT	
04D2	0600	RE6:	LD	B,00H	
04D4	DBD8	RE4:	IN	A,(CR)	
04D6	0F		RRCA		
04D7	D8		RET	C	
04D8	0F		RRCA		
04D9	38F9		JR	C,RE4	
04DB	EDA2		INI		
04DD	20F5		JR	NZ,RE4	
04DF	FD3401		INC	(IV+1)	
04E2	FD7E01		LD	A,(IV+1)	
04E5	FE11		CP	17	
04E7	2805		JR	Z,RETS	
04E9	15		DEC	D	
04EA	20E6		JR	NZ,RE6	
04EC	1801		JR	RE5	
04EE	15	RETS:	DEC	D	
04EF	3ED8	RE5:	LD	A,D8H	;FORCE INTER RUPT
04F1	2F		CPL		
04F2	D3DB		OUT	(CR),A	
04F4	CD2104		CALL	BUSY	
04F7	DBD8	RE3:	IN	A,(CR)	
04F9	2F		CPL		
04FA	E6FF		AND	FFH	
04FC	2020		JR	NZ,REE	
04FE	D9		EXX		
04FF	E1		POP	HL	
0500	D9		EXX		
0501	FD7E01		LD	A,(IV+1)	
0504	FE11		CP	17	
0506	2008		JR	NZ,REX	
0508	3E01		LD	A,01H	
050A	FD7701		LD	(IV+1),A	
050D	FD3400		INC	(IV+0)	
0510	7A	REX:	LD	A,D	
0511	B7		OR	A	
0512	2005		JR	NZ,RE7	
0514	3E00		LD	A,00H	
0516	D3DC		OUT	(DM),A	
0518	C9		RET		
0519	FD7E00	RE7:	LD	A,(IV+0)	
051C	18B1		JR	RE8	
051E	3AEBFF	REE:	LD	A,(RETRY)	
0521	3D		DEC	A	
0522	32EBFF		LD	(RETRY),A	
0525	282F		JR	Z,ERROR	

```

0527 CD0904          CALL  RCLB
052A C38304          JF    READ1
052D                ;
052D                ; WAIT AND BUSY OFF
052D                ;
052D D5             WAIT:  PUSH  DE
052E E5             PUSH  HL
052F CD0605         CALL  DLY80U
0532 1E08           LD    E,8
0534 210000         WAIT2: LD    HL,00H
0537 2B             WAIT0: DEC  HL
0538 7C             LD    A,H
0539 B5             OR    L
053A 2809           JR    Z,WAIT1
053C DB08           IN    A,(CR)
053E 2F             CPL
053F 0F             RRCA
0540 30F5           JR    NC,WAIT0
0542 E1             POP   HL
0543 D1             POP   DE
0544 C9             RET
0545 1D             WAIT1: DEC  E
0546 20EC           JR    NZ,WAIT2
0548 180C           JR    ERROR
054A                ;
054A 21EE02         NMASTE: LD    HL,MES14
054D 1E07           LD    E,7H
054F 0E1B           LD    C,27D
0551 CD4602         CALL  DISP
0554 1803           JR    ERROR1
0556                ;
0556                ; ::::::::::::::::::::::::::::::::::::
0556                ;
0556                ; ERROR OR BREAK
0556                ;
0556                ; ::::::::::::::::::::::::::::::::::::
0556                ;
0556 CD3F02         ERROR:  CALL  BOOTER
0559 CDF303         ERROR1: CALL  MOFF
055C 31E0FF        TRYAG2: LD    SP,FF0H
055F                ;
055F                ; TRYAG
055F                ;
055F CD5F00        TRYAG:  CALL  FDCC
0562 2047           JR    NZ,TRYAG3
0564 21B302         LD    HL,MES10
0567 1E5A           LD    E,5AH
0569 0E0C           LD    C,12D
056B CD3902         CALL  DISP2
056E 1EAB           LD    E,ABH
0570 0E11           LD    C,17D
0572 CD3902         CALL  DISP2
0575 1ED3           LD    E,D3H
0577 0E0F           LD    C,15D
0579 CD3902         CALL  DISP2
057C CD4E00        TRYAG1: CALL  KEYS1
057F C85F           BIT   3,A
0581 CA6B00         JF    Z,CNT
0584 C877           BIT   6,A
0586 2802           JR    Z,DNO
0588 18F2           JR    TRYAG1
058A 21DF02         DNO:   LD    HL,MES13          ;DRIVE NO SELECT
058D 1E0A           LD    E,AH
058F 0E0F           LD    C,7H
0591 CD4602         CALL  DISP
0594 1612           DNO10: LD    D,12H
0596 CDC105         CALL  DNO8
0599 3009           JR    NC,DNO3
059B 1618           LD    D,18H
059D CDC105         CALL  DNO8
05A0 3002           JR    NC,DNO3

```



```

05EF          ; INTRAM-EXROM ;
05EF          ;
05EF          ?????????????????????
05EF 210000    EXROMT: LD    HL,3000H
05F2 D021F805 LD    IX,EROM1
05F6 181A     JR    SEROMA
05F8 DBF9     EROM1: IN    A,(F9H)
05FA FE00     CP    00H
05FC C25700   JP    NZ,NKIN
05FF D0210506 LD    IX,EROM2
0603 180D     EROMT1: JR   SEROMA
0605 DBF9     EROM2: IN    A,(F9H)
0607 77       LD    (HL),A
0608 23       INC   HL
0609 7D       LD    A,L
060A B4       OR    H
060B 20F6     JR    NZ,EROMT1
060D D3F8     OUT   (F8H),A
060F C30200   JP    NST
0612          ;
0612 7C       SEROMA: LD    A,H
0613 D3F8     OUT   (F8H),A
0615 7D       LD    A,L
0616 D3F9     OUT   (F9H),A
0618 1604     LD    D,4
061A 15       SEROMD: DEC   D
061B 20FD     JR    NZ,SEROMD
061D DDE9     JP    (IX)
061F          ;
061F          ;
061F          END
    
```

3RDD	00CF	?RDI	00AE	ATRB	CF00	BLK1	01E5	BLK2	01ED
BLK3	01EF	BOOTER	023F	BREAD	047A	BSize	FFE2	BUSV	0421
BUSV0	042B	BUSV1	0439	BUSV2	0428	CLBF0	FFE7	CLBF1	FFE8
CLBF2	FFE9	CLBF3	FFEA	CLEAR	002B	CMT	006B	CONURT	043F
CR	0008	DIM	0210	DCHK	0458	DEL1M	0223	DEL6	021D
DISP	0246	DISP1	0256	DISP2	0239	DISP3	024E	DLYIM	0500
DLY2	0229	DLY60M	05E4	DLY80U	05D6	DLYT	05E8	DM	000C
DNO	058A	DNO0	05C1	DNO1	05CF	DNO10	0594	DNO3	05A4
DR	000B	DRINO	FFEC	DTADR	CF14	DTCK1	0477	EDGE	0121
EDGE1	0129	EIRTN	00CD	EROM1	05F8	EROM2	0605	EROMT1	0603
ERROR	0556	ERROR1	0559	EXROMT	05EF	FD	033C	FDCC	005F
FR	01F4	FR1	01F6	HS	00DD	IBADR1	CF00	IBADR2	0000
IBUFE	CF00	IPLMC	0335	KEYIN	003D	KEYS	004D	KEYS1	0048
KVEMES	01CE	LDMSG	0230	MCHECK	035F	MES1	0261	MES10	02B3
MES11	02BF	MES12	02D0	MES13	02DF	MES14	02EE	MES15	0309
MES16	0326	MES3	026F	MES6	020B	MES8	0299	MES9	02A6
MISMCH	009E	MOFF	03F3	MOT1	019C	MOTOR	0186	MOTR	01B1
MOTRD	01AE	MSTOP	01B5	MTD1	03D2	MTD2	03D5	MTFG	FFE6
MTON	03CC	NAME	CF01	NKIN	0057	NMASTE	054A	NODISK	038C
NSECT	FFE1	NST	0002	NTRACK	FFE0	OPEN	01C2	PLAY	01D9
RBV1	0136	RBV2	0147	RBV3	0150	RBYTE	0132	RCLB	0409
RD1	00B7	RDDAT	00CF	RDINF	00AE	RE0	0490	RE1	04AA
RE2	04AC	RE3	04F7	RE4	04D4	RE5	04EF	RE6	0402
RE7	0519	RE8	049F	READ1	0483	READY	0399	REDV0	03AE
REE	051E	RET2S	00C6	RETRY	FFEB	RETS	04EE	REW	020B
REX	0510	RR	0207	RTAPE	000B	RTP2	00E0	RTP3	00F2
RTP5	0113	RTP6	0119	SCR	00DA	SEEK	03E2	SEROMA	0612
SEROMD	061A	SIZE	CF12	SPDIN	017A	ST1	0090	START	0006
STPEIR	00CA	STSE	FFE5	STYR	FFE4	SUMDT	FFE0	TM0	015B
TM1	015E	TM2	0161	TM3	016B	TMARK	0152	TMCNT	FFE2
TR	00D9	TRANS	0448	TRANS1	044F	TRTN1	011D	TRYAG	055F
TRYAG1	057C	TRYAG2	055C	TRYAG3	05AB	TRYAG4	05B5	TRYAG5	05B7
WAIT	052D	WAIT0	0537	WAIT1	0545	WAIT2	0534		