

**Cromemco**  
**RDOS**

**Instruction  
Manual**

Five Dollars

# Cromemco RSDOS

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## Introduction

The Cromemco Resident Disk Operating System (RDOS) is a 1K-byte program supplied in ROM with each Cromemco model 4FDC disk controller card. The RDOS program is designed to execute beginning at location C000 in memory space.

RDOS includes a bootstrap loader for the Cromemco Disk Operating System (CDOS) supplied with Cromemco disk software. RDOS also includes a system monitor with over a dozen commands. Several of the RDOS monitor commands are the same as those used in the Cromemco Z-80 Monitor program. These include commands to transfer program control, display the contents of memory, change the contents of memory, move and compare blocks of memory, write data to output ports, and change the baud rate of the serial port on the 4FDC card. The RDOS monitor also has several unique commands designed specifically for disk operations. These include commands to select one of four disk drives, set the head seek rate, seek disk tracks, read blocks of data from the disk, and write blocks of data onto the disk.

To use RDOS, first be sure that the power-on jump address of your ZPU card is set to memory location C000 (see Table 1). If you wish to boot in CDOS from your disk without entering the RDOS monitor, then set Switch 3 of the 4FDC card to the ON position (this selects auto-boot mode). Once CDOS is booted in, you may return to the RDOS monitor by executing the "BYE" command in CDOS. If on power-up or reset you do wish to enter the RDOS monitor, then set Switch 3 of the 4FDC card to the OFF position (see Table 2). Once the RDOS monitor is entered, you can begin using the RDOS commands described in this manual.

ZPU Switch	Switch Position
A15	1
A14	1
A13	0
A12	0

Table 1

The power-on jump address switch on the ZPU card should be set as shown to begin automatic execution of RDOS at location C000 in memory space.

RDOS Mode	4FDC Switch 3
CDOS Bootstrap	ON
RDOS Monitor	OFF

Table 2

The setting of Switch 3 on the 4FDC card sets the RDOS mode of operation on power up. When this switch is ON, CDOS is automatically booted in from the system diskette. When this switch is OFF, the RDOS Monitor is entered.

## Command Format

The normal prompt of the monitor is a semi-colon, ';'. However, if a disk drive is selected the prompt changes in order to remind the user which drive is current. (See Select Disk Drive for details.)

The monitor is controlled by one and two-character commands from the terminal keyboard. The format is free-form with respect to spaces. All data is entered and printed in hexadecimal format.

In the following, DM is the Display Memory command and S is the Swath operator (see below). The four examples are equivalent commands. They display the contents of 100 hex bytes of memory beginning with location 1000 hex. ('(CR)' indicates carriage return).

```
;DM1000 10FF (CR)
;DM1000S100 (CR)
; D M 1000 10FF (CR)
; D M 1000 S 100 (CR)
```

When entering an address as an operand, only the last four digits typed in are retained. For example, '321000' is read as '1000'. Therefore, if a wrong digit is entered, continue typing until the last four digits are correct.

Only the last two digits typed are retained when a two-digit number such as a data byte is entered.

## Swath Operator

There are two ways to specify the address range of many commands. The first is to simply list the beginning and ending addresses (and, where appropriate, the destination address). For example, the first command displays the contents of memory between addresses E400 and E402. The second com-

mand moves (or copies) the first 1400 hex bytes of memory to memory starting at 2000 hex.

```
DM E400 E402
M 0 13FF 2000
```

Another way to do the same thing is to use the Swath operator, S, to specify the width of the address range rather than state the ending address explicitly.

```
DM E400S3
M 0 S1400 2000
```

## Errors and Escapes

When the monitor detects an error condition, the command is aborted and a '?' is printed followed by the prompt ';' for the next command.

Any command may be aborted from the keyboard either when the monitor is requesting further input, or during print-out, by depressing either of the ESCAPE or the ALT MODE key. (CONTROL-SEMI-COLON, CONTROL-SHIFT-'K', and '{' may also work, depending on the design of your CRT terminal.)

## Baud Rate Selection

When the monitor is entered, push carriage-return (up to four times) until the monitor responds with:

```
CROMEMCO RDOS
```

The monitor is capable of selecting 19200, 9600, 4800, 2400, 1200, 300, 150, or 110 baud. The maximum number of carriage-returns required to select any of these baud rates is four.

The baud rate can also be changed by using Initialize command. (See page 3.)

Some peripheral devices such as paper tape readers or punches may have no keyboards. The baud rate can also be set by outputting a data byte from the following table to port 0.

Baud Rates	Data Byte
110	01
150	82
300	84
1200	88
2400	90
4800	A0
9600	C0

The baud rate can be octupled by outputting 10 hex to port 2. Outputting 0 to this port brings the baud rate back to normal.

## System Stack

The RDOS stack normally resides in low memory between 40 and 80 hex. However, if it is in the way, it can be moved using the Kick Stack command. (See page 3.)

## Using the RDOS Monitor

Set the power-on jump switch on the ZPU card to C (1100 binary) and turn off DIP switch 3 on the 4FDC.

Depress carriage-return two to four times in order to set the UART on the 4FDC to the baud rate of the terminal being used.

The monitor will then respond:

```
CROMEMCO RDOS
```

followed by a prompt ';'. The monitor is then ready to accept commands from the keyboard.

## Commands

### Boot

(1) B (CR)

Boots CDOS from the diskette on drive-A. CDOS will then respond with its prompt 'A.'

### Display Memory

(2a) DM beginning-addr ending-addr (CR)

or

(2b) DM beginning-addr S swath-width

The contents of memory are displayed in hexadecimal form. Each line of the display is preceded by the address of its first byte. For example:

```
;DM100 S3
0100 : C3 34 7F
```

### Examine Input Port

(3) E port-number (CR)

Displays the current contents of the input port identified by port-number (in hex).

### Go

(4) G starting-addr (CR)

Execution begins at starting-address.



## Initialize Baud Rate

(5) I (CR)

After the carriage-return is typed, change the baud rate of the terminal to the desired value and then push carriage-return until the monitor responds with its prompt.

The monitor is capable of selecting 19200, 9600, 4800, 2400, 1200, 300, 150, or 110 baud. The maximum number of carriage returns required to select any of these baud rates is four.

## Kick Stack

(6) K new-stack-location (CR)

Moves the monitor's stack from normal location at 7C hex to any convenient location in RAM memory. Remember to leave 64 (40 hex) bytes for the system stack above its new location (including 4 bytes for temporary storage above the stack proper).

## Move

(7a) M source-addr source-end destination-addr (CR)  
or

(7b) M source-addr S swath-width destination-addr(CR)

Move (or copy) the contents of memory beginning with source-address and ending with source-end to destination-address. After the move, the monitor verifies that source and destination are the same. This will result in a print-out of discrepancies which are not really errors after certain types of overlapping moves. However, this print-out can be terminated by depressing ESCAPE or ALT Mode.

The move command can be used to fill a block of memory with a constant. For example, to enter zeros between locations 100 and 108, use the Substitute Memory command to enter 0 at location 100, and then move 100 through 107 to 101:

```
M 100 107 101
or
M 100 S 8 101
```

Care should be taken not to overwrite the monitor's stack which resides in low memory between 40 and 80 hex unless changed with the Kick Stack command.

## Output

(8) O data-byte port-number (CR)

Writes data to the output port identified by port-number (in hex).

## Read Disk

(9a) RD destination-addr destination-end sector-number (CR)

or

(9b) RD destination-addr S swath-width sector-number (CR)

Before this command will be accepted the disk drive and track number must have been specified. (See the Select Disk Drive and Seek commands.)

This command reads enough sectors from the current drive to fill the specified memory area, starting with the specified sector of the current track. The first track and sector and the last track and sector read are then displayed. However, if the last sector of the last track on the diskette is read before the memory area is filled then a question mark is printed and the command is terminated. The track and sector designations for both 5" and 8" diskettes are shown in Table 3.

The command is also terminated if an error occurs in reading a sector. In this case, a message of the following type is printed:

R-ERR nn

where nn is a hex number which indicates the status:

Bit	Indication
7	Not Ready
6	Record Type
5	Record Type
4	Record Not Found
3	CRC Error
2	Lost Data
1	Data Request
0	Busy

The number of the last track accessed can be obtained from input port 31 hex and the number of the last sector accessed from input port 32 hex. (See the Examine Input Port command.)

	8" Diskette	5" Diskette
Tracks	0-4C hex	0-27 hex
Sectors	1-1A hex	1-12 hex

Table 3

Care should be taken not to overwrite the monitor's stack which normally resides in lower RAM

between 40 and 80 hex. If it is desired to load this region of memory from the disk, first move the stack using the Kick Stack command.

## Seek Track

(10) S track-number (CR)

Before this command will be accepted the disk drive must be specified. (See the Select Disk Drive command.)

This command seeks the specified track of the current drive.

If an error is made, a message of the following type is printed:

S-ERR nn

where nn is a hex number which indicates the status:

Bit	Indication
7	Not Ready
6	Write Protect
5	Head Engaged
4	Seek Error
3	CRC Error
2	Track 0
1	Index
0	Busy

## Substitute Memory

(11) SM address (CR)

Substitute Memory displays the contents of address and outputs a dot, '.', as a prompt for the substituted value. If no change is desired, type a space or another dot. Otherwise, enter the new value. The monitor accepts hex digits until it gets a delimiter, such as a space, dot, or carriage-return, retaining the last two digits entered as the value. Unless the delimiter is a carriage-return, the monitor then outputs the contents of the next sequential memory location with a dot prompt. A carriage-return terminates the command.

## Verify

(12a) V source-addr source-end destination-addr (CR)  
or

(12b) V source-addr S swath-width destination-addr (CR)

This command verifies that the block of memory between source-address and source-end contains the

same values as the block beginning at destination-address. The addresses and contents are printed for each discrepancy found (unless the print-out is terminated by ESCAPE or ALT MODE).

This command works by reading bytes from the source and destination and comparing them. If a discrepancy is found, the memory is read again for print-out. Thus it can happen that a discrepancy is printed-out with the source and destination contents indicated to be the same. This is caused by a defective memory element.

## Write Disk

(13a) WD source-addr source-end sector-number (CR)  
or

(13b) WD source S swath-width sector-number (CR)

Before this command will be accepted the disk drive and track number must have been specified. (See the Select Disk Drive and Seek commands).

This command writes the contents of the specified memory area to the current drive, starting with the specified sector of the current track. The first track and sector and the last track and sector written are then displayed (see Table 3). However, if part of the memory area remains after the last sector of the last track is written, a question mark is printed and the command is terminated.

The command is also terminated if an error is made in writing a sector. In this case, a message of the following type is made:

W-ERR nn

where nn is a hex number indicating the status:

Bit	Indication
7	Not Ready
6	Write Protect
5	Write Fault
4	Record Not Found
3	CRC Error
2	Lost Data
1	Data Request
0	Busy

The last track accessed can be obtained from port 31 hex. The last sector accessed from port 32 hex. (See Examine Input command.)



## Select Disk Drive

The 4FDC will control up to four disk drives, labelled "A", "B", "C", and "D". It can handle seek speeds from the slow seek appropriate to the mini floppy to the fast seek of Cromemco's large floppy. It can also handle the medium seek of some other large floppies. To select a drive and a seek speed, type the drive label followed by one semi-colon for the fast seek, and two semi-colons for medium seek, or three semi-colons for slow seek. For example, to select drive C with slow seek, type:

```
C;;; (CR)
```

To select drive A with fast seek, type:

```
A; (CR)
```

Until the drive selection is changed the normal monitor prompt, ';', will be replaced by the disk label and speed indicator as typed, 'C ; ; ;' in the first example.

All disk commands (Seek, Read Disk, and Write Disk) refer to the drive most recently selected.

Disk selection also restores the disk drive head to home, track 0. If an error is made in doing this a message of the following type is printed:

```
H-ERR nn
```

where nn is a hex number indicating the status:

Bit	Indication
7	Not Ready
6	Write Protect
5	Head Engaged
4	Seek Error
3	CRC Error
2	Track 0
1	Index
0	Busy



## An Illustrative Example

To illustrate a specific use of the RDOS commands, consider the situation where you wish to make a copy of a diskette. If you have two disk drives this can easily be done using the CDOS command XFER. But if you have only one disk drive, you can use RDOS to read the original diskette into memory, and then write from memory to the new diskette. Since the total amount of system RAM memory is typically less than the capacity of a diskette, the procedure will have to be repeated several times — a different portion of the diskette is copied with each iteration.

The following procedure explains how to use RDOS to make a back-up mini-diskette using only one drive. This procedure assumes that there is 32K of contiguous low memory; if the user has less memory, the procedure

can easily be adapted to a smaller configuration by decreasing the swath lengths of the READS and WRITES. Note that you must also keep track of the sector numbers when changing the following procedure. This is easily done by noting the starting and stopping track and sector numbers given after the completion of a READ or WRITE.

Throughout the following, note that the commands which are typed by the user are underlined. The other prompts and messages are those issued by RDOS. The messages enclosed in brackets are parenthetical remarks and should not be typed into the terminal.

*Get into RDOS and insert the disk to be copied, or the original disk, into the drive. Then type the following RDOS commands.*

```
A:~:~:~:
A:~:~:~: S0
A:~:~:~: RD100 S7E00 1
          0001 0D1Z
```

```
[INSERT BLANK DISK WHICH HAS BEEN INITIALIZED AND
WHICH WILL BE THE NEW BACK-UP DISK.]
```

```
A:~:~:~: S0
A:~:~:~: WD100 S7E00 1
          0001 0D1Z
```

```
[INSERT ORIGINAL DISK.]
```

```
A:~:~:~: SE
A:~:~:~: RD100 S7E00 1
          0E01 1B1Z
```

```
[INSERT BACK-UP DISK.]
```

```
A:~:~:~: SE
A:~:~:~: WD100 S7E00 1
          0E01 1B1Z
```

```
[INSERT ORIGINAL DISK.]
```

```
A:~:~:~: S1C
A:~:~:~: RD100 S6C00 1
          1C01 271Z
```

```
[INSERT BACK-UP DISK.]
```

```
A:~:~:~: S1C
A:~:~:~: WD100 S6C00 1
          1C01 271Z
```

```
A:~:~:~: S0
A:~:~:~: E
```

```
[HOME THE HEAD.]
```

```
[SYSTEM SHOULD BOOT UP INTO CDOS FROM THE
NEW BACK-UP DISK. TYPE THE DIRECTORY AND
VERIFY THAT THE TRANSFER IS CORRECT AND
COMPLETE BY TRYING SEVERAL OF THE FILES.]
```

## RDOS Program Listing

```

0000      0002 ; COPYRIGHT (C) 1977, CROMEMCO, INC.
          0003 ;
          0004 ;
          0005      ORG      0C000H ;START OF PROM
          0006 ;
          0007 ;
(007C)   0008 STACK: EQU    7CH    ;MUST LEAVE ROOM FOR
          0009 ;                ;4 BYTES OF TEMP STORAGE
          0010 ;                ;ABOVE THE STACK
          0011 ;                ;(STACK) = DISK FLAGS
          0012 ;                ;(STACK+1) = DISK LETTER (A - D)
          0013 ;                ;(STACK+2) - (STACK+3): ROOM FOR
          0014 ;                ;UP TO 2 SEMI-COLONS AS PART OF
          0015 ;                ;THE DISK PROMPT.
          0016 ;
          0017 ;
(0004)   0018 NDRIVES: EQU    4      ;MAX. NO. OF DISK DRIVES
          0019 ;
          0020 ; BIT ASSIGNMENT FOR THE DISK FLAGS
          0021 ;
(0007)   0022 FASTSEEK: EQU    7
(0005)   0023 DISKMODE: EQU    5
(0004)   0024 MAXI: EQU    4
          0025 ;THE DISK NUMBER (0 - 3) OCCUPIES BITS 0 & 1
          0026 ;
          0027 ;
(0030)   0028 DSTAT: EQU    30H    ;DISK STATUS PORT
(0030)   0029 DCOMMND: EQU    30H  ;DISK COMMAND PORT
(0032)   0030 DSEC: EQU    32H    ;DISK SECTOR PORT
(0033)   0031 DDATA: EQU    33H    ;DISK DATA PORT
(0034)   0032 DFLAGS: EQU    34H   ;DISK FLAGS PORT
(0034)   0033 DCONTR: EQU    34H   ;DISK CONTROL PORT
(0031)   0034 DTRACK: EQU    31H   ;DISK TRACK PORT
          0035 ;
(0003)   0036 IMASK: EQU    3      ;INTERRUPT MASK PORT
(0000)   0037 SAUD: EQU    0      ;BAUD RATE PORT
(0004)   0038 PARLEL: EQU    4     ;PARALLEL PORT
(0040)   0039 BOOTSW: EQU    40H   ;BOOT SWITCH
(0010)   0040 MAXIM: EQU    10H   ;MASK FOR MAXI DISK
(0020)   0041 HDLDM: EQU    20H   ;HEAD LOAD MASK
          0042 ;
          0043 ;
(0000)   0044 STAT: EQU    0      ;STATUS PORT
(0001)   0045 DATA: EQU    1     ;DATA PORT
(0002)   0046 COMMND: EQU    2    ;COMMAND PORT
(0040)   0047 DAV: EQU    40H    ;DATA-AVAILABLE MASK
(0080)   0048 TBE: EQU    80H    ;XMITTER-BUF-EMPTY MSK
          0049 ;
(0000)   0050 CASE: EQU    0
          0051 ;
(000D)   0052 CR: EQU    0DH
(000A)   0053 LF: EQU    0AH
(001B)   0054 ESC: EQU    1BH
(007D)   0055 ALT: EQU    7DH
          0056 ;

```



```

0057 ;
0058 ;+++++
0059 ;
C000 217C00 0060 START: LD HL,STACK
C003 F9 0061 LD SP,HL
C004 EB 0062 EX DE,HL ;DE -> TEMP STORAGE
C005 F3 0063 DI
C006 CDEEC0 0064 CALL INITBAUD ;INIT. THE SERIAL PORT
C009 97 0065 SUB A
C00A D303 0066 OUT IMASK,A ;MASK OUT 4FDC INTERRUPTS
C00C DB34 0067 IN A,DFLAGS ;READ DISK FLAGS
C00E E640 0068 AND BOOTSW ;LOOK AT BOOT SWITCH
C010 2906 0069 JR Z,BOOTDK
C012 C30BC1 0070 JP MONITR
0071 ;
0072 ;
0073 ; MONITOR COMMAND
0074 ; QUIT THE MONITOR & BOOT CDOS IN.
0075 ;
C015 0076 BOOTMC:
C015 CD29C2 0077 CALL SKSGCR ;REQUIRE A CR
0078 ;
0079 ;
0080 ; BOOT DISK
0081 ;
C018 0082 BOOTDK:
C018 3ED0 0083 LD A,0D0H ;TERMINATE THE HOMING
C01A D330 0084 OUT DCOMMND,A ;OF THE DISK HEAD
C01C DB30 0085 BOT200: IN A,DSTAT
C01E 1F 0086 RRA
C01F 38FB 0087 JR C,BOT200
C021 F3 0088 DI
C022 3E10 0089 LD A,1 SHL MAXI ;MAXI FLAG
C024 0090 BOT300:
C024 218000 0091 LD HL,0080H ;INIT. BUFFER PNTR
C027 F9 0092 LD SP,HL ;& STACK PNTR
C028 F5 0093 PUSH AF ;SAVE MINI/MAXI FLAG
C029 44 0094 LD B,H ;0 [DISK A]
C02A CD3FC0 0095 CALL DHOME ;HOME DISK
C02D 200B 0096 JR NZ,BOT500 ;DISK ERROR
C02F F1 0097 POP AF ;GET MINI/MAXI FLAG
C030 F5 0098 PUSH AF
C031 44 0099 LD B,H ;0 [DISK A]
C032 1E01 0100 LD E,1 ;SECTOR 1
C034 CD8CC0 0101 CALL DREAD ;READ THE SECTOR
C037 CA8000 0102 JP Z,80H ;OK, GO EXECUTE
C03A F1 0103 BOT500: POP AF ;GET MINI/MAXI FLAG
C03B EE10 0104 XOR 1 SHL MAXI ;TOGGLE IT
C03D 18E5 0105 JR BOT300
0106 ;
0107 ;
0108 ;HOME DISK DRIVE
0109 ;
0110 ;INPUT - B CONTAINS DISK NUMBER (0,1,2,3)
0111 ; A BIT 4 CONTAINS 1 IF MAXI
0112 ;
0113 ;OUTPUT -- B CONTAINS STATUS
0114 ; ZERO FLAG RESET IF ERROR
0115 ;
0116 ;REGISTERS A,F,B,C ARE CHANGED
0117 ;
0118 ;

```

```

C03F CDCBC0      0119 DHOME:  CALL    SELECT      ;SELECT DISK
C042 D334        0120          OUT     DCONTR,A    ;OUTPUT SELECT BYTE
C044 1698        0121          LD      D,98H      ;ERROR MASK
C046 E610        0122          AND     MAXIM      ;MAXI DISK?
C048 3E7F        0123          LD      A,7FH     ;TURN OFF HIGH SPEED SEEK
C04A D304        0124          OUT     PARLEL,A  ;
C04C 3E0F        0125          LD      A,0FH     ;LOAD MINI RESTORE COMMAND
C04E 281A        0126          JR      Z,EXECUTE ;NO, ITS A MINI
C050 3E0D        0127          LD      A,0DH     ;MAXI RESTORE COMMAND
C052 1816        0128          JR      EXECUTE   ;EXEC COMMAND &
                    0129 ;                ;WAIT TIL DONE
                    0130 ;
                    0131 ;
                    0132 ;SEEK TO DESIRED TRACK
                    0133 ;
                    0134 ;TRACK REGISTER MUST HAVE BEEN PREVIOUSLY LOADED
                    0135 ;(MAY BE DONE BY INITIALLY DOING A HOME)
                    0136 ;
                    0137 ;INPUT -- B CONTAINS DISK DRIVE (0,1,2,3)
                    0138 ;          D CONTAINS TRACK
                    0139 ;          A BIT 7 = 1 FOR FAST SEEK
                    0140 ;          A BIT 4 = 1 FOR MAXI
                    0141 ;
                    0142 ;OUTPUT -- B CONTAINS STATUS
                    0143 ;          ZERO FLAG RESET IF ERROR
                    0144 ;
                    0145 ;REGISTERS A,F,B,C,D ARE CHANGED
                    0146 ;
C054 F5          0147 DSEEK:  PUSH    AF          ;SAVE DISK FLAGS
C055 CDCBC0      0148          CALL    SELECT      ;SELECT DISK
C058 D334        0149          OUT     DCONTR,A  ;OUTPUT CONTROL BYTE
C05A ED51        0150          OUT     (C),D     ;OUTPUT DESIRED TRACK
C05C 1698        0151          LD      D,98H     ;ERROR MASK
C05E F1          0152          POP     AF        ;GET FLAGS
C05F 17          0153          RLA     ;FAST SEEK?
C060 3814        0154          JR      C,DSK500
C062 E620        0155          AND     MAXIM SHL 1 ;MASK FOR MINI/MAXI
C064 3E1F        0156          LD      A,01FH    ;LOAD SEEK COMMAND FOR MINI
C066 2802        0157          JR      Z,EXECUTE ;MINI DISK
C068 3E1D        0158          LD      A,1DH     ;LOAD COMMAND FOR MAXI
                    0159 ;
                    0160 ;
C06A             0161 EXECUTE:
C06A D330        0162          OUT     DCOMMND,A ;OUTPUT COMMAND
                    0163 ;
C06C             0164 EXCCHK:
C06C DB34        0165          IN      A,DFLAGS  ;WAIT FOR COMPLETION
C06E 1F          0166          RRA     ;
C06F 30FB        0167          JR      NC,EXCCHK ;[UNTIL INTREQ]
C071             0168 EREXIT:
C071 DE30        0169          IN      A,DSTAT   ;DISK STATUS
C073 47          0170          LD      B,A       ;SAVE STATUS
C074 A2          0171          AND     D         ;MASK FOR ERRORS
C075 C9          0172          RET
                    0173 ;
                    0174 ;
C076 3E6F        0175 DSK500: LD      A,6FH     ;TURN ON FAST SEEK
C078 D304        0176          OUT     PARLEL,A  ;
C07A 3E18        0177          LD      A,18H     ;SEEK COMMAND
C07C CD6AC0      0178          CALL    EXECUTE   ;
C07F DE04        0179 DSK540: IN      A,PARLEL ;FAST SEEK DONE?
C081 E640        0180          AND     40H

```



```

C083 20FA      0181      JR      NZ,D5K540
C085 3E7F      0182      LD      A,7FH          ;TURN OFF FAST SEEK
C087 D304      0183      OUT     PARLEL,A
C089 97        0184      SUB     A              ;NO ERROR CHECKING, SAY OK
C08A 47        0185      LD      B,A
C08E C9        0186      RET
0187 ;
0188 ;
0189 ;READ 1 SECTOR FROM DISK
0190 ;
0191 ;INPUT - B CONTAINS DISK (0,1,2,3)
0192 ;      *E CONTAINS SECTOR
0193 ;      A BIT 4 = 1 FOR MAXI
0194 ;      HL CONTAINS BUFFER ADDRESS
0195 ;
0196 ;OUTPUT - B CONTAINS STATUS
0197 ;      Z FLAG IS SET IF NO ERRORS
0198 ;      HL PTS PAST BUFFER
0199 ;
0200 ;REGISTERS A,F,B,C,D,E,H,L ARE CHANGED
0201 ;
0202 ;
C08C CDB6C0    0203 DREAD: CALL     SETUP          ;SET UP FOR READ
C08F C688      0204      ADD     88H          ;ADD READ COMMAND TO
C091           0205           ;HEAD LOAD FLAG
C091 169C      0206      LD      D,9CH        ;ERROR MASK
0207 ;
0208           0208      OUT     DCOMMAND,A    ;OUTPUT READ COMMAND
C093 D330      0209 DRD250: IN      A,DFLAGS    ;WAIT FOR REQUEST
C095 DB34      0210      RRA                    ;CHECK FOR INTREQ
C097 1F        0211      JR      C,EREXIT      ;END OF SECTOR OR ERROR
C098 38D7      0212      INI                    ;READ A BYTE
C09A EDA2      0213      JP     NZ,DRD250      ;NOT DONE YET
C09C C295C0    0214      JR      EXCCHK        ;WAIT FOR INTREQ
C09F 18CB      0215 ;
0216 ;
0217 ;WRITE A SECTOR TO THE DISK
0218 ;
0219 ;INPUT - B CONTAINS DISK (0,1,2,3)
0220 ;      E CONTAINS SECTOR
0221 ;      A BIT 4 = 1 FOR MAXI
0222 ;      HL CONTAINS BUFFER ADDRESS
0223 ;
0224 ;OUTPUT - B CONTAINS STATUS
0225 ;      Z FLAG IS SET IF NO ERRORS
0226 ;      HL PTS PAST BUFFER
0227 ;
0228 ;REGISTERS A,F,B,C,D,E,H,L ARE CHANGED
0229 ;
0230 ;
C0A1 CDB6C0    0231 DWRITE: CALL    SETUP          ;SET UP FOR WRITE
C0A4 C6A8      0232      ADD     0A8H         ;ADD WRITE COMMAND TO
C0A6           0233           ;HEAD LOAD FLAG
C0A6 16FC      0234      LD      D,0FCH        ;ERROR MASK
C0A8 D330      0235      OUT     DCOMMAND,A    ;OUTPUT WRITE COMMAND
C0AA DB34      0236 DWR250: IN      A,DFLAGS    ;WAIT FOR REQUEST
C0AC 1F        0237      RRA                    ;CHECK FOR INTREQ
C0AD 38C2      0238      JR      C,EREXIT      ;END OF SECTOR OR ERROR
C0AF EDA3      0239      OUTI                   ;READ A BYTE
C0B1 C2AAC0    0240      JP     NZ,DWR250      ;NOT DONE YET
C0B4 18B6      0241      JR      EXCCHK        ;WAIT FOR INTREQ
0242 ;

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0243 ;
0244 ;SET UP FOR READ OR WRITE
0245 ;
0246 ;INPUT -- B CONTAINS DISK DRIVE (0,1,2,3)
0247 ;           E CONTAINS SECTOR
0248 ;           A BIT 4 CONTAINS 1 IF MAXI
0249 ;
0250 ;OUTPUT -- D CONTAINS SELECT BYTE
0251 ;           A CONTAINS HEAD LOAD FLAG
0252 ;           B CONTAINS 128 (# OF BYTES)
0253 ;           C CONTAINS DATA PORT
0254 ;
0255 ;REGISTERS A,F,B,C,D ARE CHANGED
0256 ;
0257 ;
C0B6 0258 SETUP:
C0B6 CDCBC0 0259         CALL    SELECT          ;GET SELECT BYTE
C0B9 F680   0260         OR      80H           ;TURN ON AUTO WAIT
C0BB 57     0261         LD      D,A          ;SAVE CONTROL BYTE
C0BC 7B     0262         LD      A,E          ;SECTOR #
C0BD D332   0263         OUT     DSEC,A
0264 ;
0265 ;CHECK WHETHER DISK HEAD LOADED
0266 ;
C0BF DE34   0267         IN      A,DFLAGS      ;READ FLAGS
C0C1 E620   0268         AND     HOLDM        ;HEAD LOADED?
C0C3 7A     0269         LD      A,D          ;CONTROL BYTE
C0C4 D334   0270         OUT     DCONTR,A      ;[THIS MUST BE DONE AFTER
0271 ;                                           ;THE INPUT FROM DFLAGS
0272 ;                                           ;BECAUSE OF AUTO WAIT]
C0C6 3E04   0273         LD      A,4          ;HEAD NOT LOADED
C0C8 C8     0274         RET      Z
C0C9 97     0275         SUB     A
C0CA C9     0276         RET
0277 ;
0278 ;
0279 ;SELECT DISK DRIVE
0280 ;
0281 ;INPUT -- B CONTAINS DISK DRIVE (0,1,2,3)
0282 ;           A BIT 4 CONTAINS 1 IF MAXI
0283 ;
0284 ;OUTPUT -- A CONTAINS SELECT BYTE
0285 ;           B CONTAINS 128
0286 ;           C CONTAINS DATA PORT #
0287 ;
0288 ;REGISTERS A,F,B,C ARE CHANGED
0289 ;
0290 ;
C0CB E610   0291 SELECT: AND     MAXIM          ;GET MAXI FLAG ONLY
C0CD 4F     0292         LD      C,A          ;SAVE FLAG
C0CE 04     0293         INC     B           ;CALCULATE DISK SELECT
C0CF 97     0294         SUB     A
C0D0 37     0295         SCF
C0D1 17     0296 SEL300: RLA
C0D2 10FD   0297         DJNZ   SEL300
C0D4 B1     0298         OR      C           ;MAXI FLAG
C0D5 F620   0299         OR      20H        ;MOTOR ON
C0D7 013380 0300         LD      EC,8000H+DDATA
C0DA C9     0301         RET
0302 ;
0303 ;
0304 ;

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0305 ; CHECK INPUT & RETURN WITH DATA IF READY.
0306 ;
C0DB D800 0307 CHKIN: IN      A,STAT
C0DD E340 0308      AND      DAV
C0DF C8    0309      RET      Z
C0E0 D801 0310      IN      A,DATA
C0E2 C9    0311      RET
0312 ;
0313 ;
0314 ; GET CHARACTER FROM INPUT.
0315 ;
C0E3 CDDBC0 0316 GBYTE: CALL     CHKIN
C0E6 28FB   0317      JR      Z,GBYTE
C0E8 E67F   0318      AND     7FH
C0EA C9     0319      RET
0320 ;
0321 ;
0322 ; COMMAND
0323 ; CHANGE BAUD RATE OF THE SERIAL PORT
0324 ;
C0EB       0325 INITER:
C0EB CD29C2 0326      CALL     SKSGCR          ;REQUIRE CR
0327 ;                                ;[CONTINUE BELOW]
0328 ;
0329 ;
0330 ; INITIALIZE BAUD RATE OF THE CURRENT DEVICE.
0331 ;
0332 ; PUSH CARRIAGE-RETURN TO SELECT THE PROPER BAUD
0333 ; RATE FOR THE CURRENT TERMINAL. (THE MAXIMUM
0334 ; NUMBER OF CARRIAGE-RETURNS REQUIRED IS FOUR.)
0335 ;
0336 ; ANY OF THE FOLLOWING BAUD RATES CAN BE SELECTED:
0337 ; 19200, 9600, 4800, 2400, 1200, 300, 150, 110.
0338 ;
C0EE 21CAC3 0339 INITBAUD: LD     HL,BAUDRS
C0F1 0E00   0340      LD      C,BAUD
C0F3 3E19   0341      LD      A,19H          ;OCTUPLE THE CLOCK
C0F5 D302   0342 IT1:  OUT     COMMND,A      ;& RESET CURRENT DEVICE.
C0F7 EDA3   0343      OUTI
C0F9 CDE3C0 0344      CALL     GBYTE
C0FC CDE3C0 0345      CALL     GBYTE
C0FF FE0D   0346      CP      CR
C101 3E09   0347      LD      A,9          ;SLOW THE CLOCK
C103 20F0   0348      JR      NZ,IT1
C105 C9     0349      RET
0350 ;
0351 ;
0352 ; COMMAND
0353 ; CHANGE LOCATION OF THE SYSTEM STACK
0354 ;
C106       0355 KICKSTK:
C106 CD85C2 0356      CALL     LINCR
C109 1813   0357      JR      LOADIX          ;IX STORES INITIAL SP VALUE
0358 ;
0359 ;
0360 ; -----
0361 ; MONITOR ENTRY POINT
0362 ; -----
0363 ;
0364 ; ENTER MONITOR WITH THE STK PNTR LOADED & WITH
0365 ; DE -> THE DISK FLAGS. (THIS IS ALSO
0366 ; THE TOP OF THE STACK.)

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0367 ;
C10B 0368 MONTR:
C10B CDF7C2 0369 CALL PMSGFOLLOWING
C10E 0D0D4352 0370 DB CR,CR,'CROMEMCO RDOS', '1'+80H
      4F4D454D
      434F2052
      444F53B1

0371 ;
C11E 0372 LOADIX:
C11E 97 0373 SUB A
C11F 12 0374 LD (DE),A ;CLEAR DISK MODE
C120 D5 0375 PUSH DE
C121 DDE1 0376 POP IX ;IX STORES INITIAL SP VALUE
      0377 ;
C123 0378 CLEANSTACK:
C123 DDF9 0379 LD SP,IX ;RE-INITIALIZE SP
      0380 ;
      0381 ;
      0382 ; GET COMMAND.
      0383 ; RETURNS VALUE IN HL & JUMPS TO THAT ADDR.
      0384 ;
C125 CDA9C1 0385 CALL CRLF
C128 2128C1 0386 CMND: LD HL,CMND ;SET-UP RETURN
C12B DDE5 0387 PUSH IX
C12D E3 0388 EX (SP),HL ;RETN ADDR ON STK
C12E 4E 0389 LD C,(HL) ;HL -> DISK FLAGS
C12F CB69 0390 BIT DISKMODE,C
C131 23 0391 INC HL ; -> DISK LETTER
C132 C4ECC2 0392 CALL NZ,PMSG ;DISK MODE PROMPT
C135 CDF7C2 0393 CALL PMSGFOLLOWING
C138 BB 0394 DB '1'+80H ;THE REGULAR PROMPT
      0395 ;
C139 CDBAC2 0396 CALL SKSG0 ;GET THE COMMAND
C13C 2005 0397 JR NZ,CM6
C13E DD360000 0398 LD (IX),0 ;CR. RESET DISK MODE.
C142 C9 0399 RET
      0400 ;
C143 D641 0401 CM6: SUB 'A'+CASE ; < 'A'?
C145 386E 0402 JR C,ERROR
C147 FE17 0403 CP 'W'-'A'+1 ; > 'W'?
C149 306A 0404 JR NC,ERROR
C14B 5F 0405 LD E,A
C14C 1600 0406 LD D,0
      0407 ;
C14E CDBAC2 0408 CALL SKSG0 ;NEXT COMMAND CHARACTER
C151 FE3B 0409 CP '1'
C153 280D 0410 JR Z,DISKSELECT
C155 EB 0411 EX DE,HL
C156 29 0412 ADD HL,HL ;TIMES 2
C157 11D2C3 0413 LD DE,CMNDTBL
C15A 19 0414 ADD HL,DE ; + TBL ADDR
C15B 5E 0415 LD E,(HL)
C15C 23 0416 INC HL
C15D 56 0417 LD D,(HL)
C15E EB 0418 EX DE,HL
C15F FE4D 0419 CP 'M'+CASE ;(USED IN SUBST & DISPL)
C161 E9 0420 JP (HL)
      0421 ;
      0422 ;
      0423 ; DISK SELECT
      0424 ; ENTER WITH E CONTAINING THE DISK NUMBER
      0425 ;

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C162          0426 DISKSELECT:
C162 7B      0427          LD      A,E          ;DISK NUMBER
C163 FE04    0428          CF      NDRIVES      ;A THROUGH D ONLY
C165 304E    0429          JR      NC,ERROR
C167 43      0430          LD      B,E          ;SAVE DISK #
C168 DDE5    0431          PUSH   IX
C16A E1      0432          POP    HL          ; -> DISK FLAGS
C16B F3B0    0433          OR     C1 SHL DISKMODE3+C1 SHL MAXI3+C1 SHL FASTSEEK3
C16D 77      0434          LD      (HL),A      ;DISK # & FLAGS
C16E 54      0435          LD      D,H
C16F 5D      0436          LD      E,L
C170 13      0437          INC    DE          ; -> DISK LETTER
C171 78      0438          LD      A,B
C172 C641    0439          ADD    'A'
C174 12      0440          LD      (DE),A      ;DISK LETTER
C175 CD19C2  0441          CALL   GCHR
C178 FE3B    0442          CF      ';'
C17A 2010    0443          JR      NZ,DS2
C17C CBBE    0444          RES   FASTSEEK,(HL) ;NOT FAST SEEK
C17E 13      0445          INC    DE
C17F 12      0446          LD      (DE),A      ;PART OF DISKMODE PROMPT
C180 CD19C2  0447          CALL   GCHR
C183 FE3B    0448          CF      ';'
C185 2005    0449          JR      NZ,DS2
C187 CBA6    0450          RES   MAXI,(HL)    ;MINI FLOPPY
C189 13      0451          INC    DE
C18A 12      0452          LD      (DE),A
C18B 97      0453          SUB    A
          0454 ;
C18C CD29C2  0455 DS2:    CALL   SKSGCR      ;ALSO EXCGS DE & HL
C18F C8FE    0456          SET    7,(HL)      ;MARK END-OF-MSG
          0457 ;
C191 1A      0458          LD      A,(DE)      ;DISK FLAGS
C192 CD3FC0  0459          CALL   DHOME
C195 3E48    0460          LD      A,'H'      ;IN CASE OF HOME ERROR
          0461 ;
C197          0462 DERRCK:
C197 C8      0463          RET    Z          ;IF NO ERROR, DONE
          0464 ;
C198          0465 PERRMSG:
C198 CDF7C2  0466          CALL   PMSGFOLLOWING
C19B 20455252 0467          DB    'ERR' , ' +80H'
          A0
C1A0 CDF1C1  0468          CALL   PCHR      ;ERROR LETTER
C1A3 78      0469          LD      A,B      ;ERROR NUMBER
          0470 ;
          0471 ;
          0472 ; PRINT THE 2 HEX DIGITS IN THE A-REGISTER
          0473 ; AND CLEAN STACK.
          0474 ;
C1A4          0475 P2HXCLEAN:
C1A4 CDD4C2  0476          CALL   P2HEX
C1A7 1810    0477          JR      CLEANV
          0478 ;
          0479 ;
          0480 ; PRINT CRLF
          0481 ;
C1A7          0482 CRLF:
C1A9 3E0D    0483          LD      A,CR
C1AB 1844    0484          JR      PCHR
          0485 ;
          0486 ;

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0487 ; COMMAND
0488 ; EXAMINE INPUT PORT
0489 ;
C1AD          0490 EXMINPUT:
C1AD CD85C2   0491          CALL    L1NCR
C1B0 4E       0492          LD      C,E          ;PORT #
C1B1 ED78     0493          IN      A,(C)
C1B3 18CF     0494          JR      P2HXCLEAN   ;PRINT THE VALUE, CRLF
0495 ;
0496 ;
0497 ; ERROR & ESCAPE, RETURNS TO CMND WITH SP
0498 ; RE-INITIALIZED.
0499 ;
C1B5          0500 ERROR:
C1B5 CDF7C2   0501          CALL    PMSGFOLLOWING
C1B8 BF       0502          DB      '?'+00H
C1B9          0503 ESCAPE:
C1B9          0504 CLEANV:
C1B9 C323C1   0505          JF      CLEANSTACK
0506 ;
0507 ;
0508 ; GET NEXT SECTOR FOR THE READ & WRITE DISK
0509 ; ROUTINES. PRESERVES HL AND, BEFORE RETURNING,
0510 ; POPS DE AND BC FROM THE STACK.
0511 ;
C1B0          0512 NEXTSC:
C1B0 D9       0513          EXX
C1B0 E1       0514          POP    HL          ;RETURN ADDR
C1BE D9       0515          EXX
C1BF D1       0516          POP    DE
C1C0 2805     0517          JR      Z,NS2      ;SKIP IF NO ERROR
C1C2 15       0518          DEC    D          ;TRY AGATN?
C1C3 28D3     0519          JR      Z,PERRMSG
C1C5 180A     0520          JR      NS4        ;YES, USE OLD MEM PNTR
0521 ;
C1C7 017FFF   0522 NS2:    LD      BC,-81H      ;NO ERROR
C1CA FD09     0523          ADD    IY,BC        ;BUMP THE INCREMENT
C1CC FD23     0524          INC    IY
C1CE E3       0525          EX    (SP),HL     ;USE LATEST MEM PNTR
C1CF 160A     0526          LD      D,10        ;RELOAD RETRIAL COUNTER
0527 ;
C1D1 E1       0528 NS4:    POP    HL          ;MEM PNTR
C1D2 C1       0529          POP    BC
C1D3 79       0530          LD      A,C          ;RELOAD DISK FLAGS
C1D4 D9       0531          EXX
C1D5 E5       0532          PUSH   HL          ;RETURN ADDR
C1D6 D9       0533          EXX
C1D7 C0       0534          RET    NZ          ;IF ERROR, DONE
0535 ;
C1D8 D4A2C3   0536          CALL   NC,PTRKSC   ;IF NEGATIVE, DONE!
C1D8 30DC     0537          JR      NC,CLEANV ;PRINT TRK, SEC, CLEAN STK.
0538 ;
C1DD 1C       0539          INC    E          ;BUMP SECTOR #
C1DE CDAEC3   0540          CALL   CHKSECNO
C1E1 D0       0541          RET    NC          ;DONE IF # OK
C1E2 DB31     0542          IN      A,DTRACK  ;GET TRACK #
C1E4 3C       0543          INC    A          ;BUMP IT
C1E5 5F       0544          LD      E,A
C1E6 C5       0545          PUSH   BC
C1E7 CD29C3   0546          CALL   SEEKNEXT   ;SEEK NEXT TRACK
C1EA C1       0547          POP    BC
C1EB 79       0548          LD      A,C          ;DISK FLAGS

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C1EC 1E01      0549          LD      E,r1          ;SECTOR 1
C1EE C9        0550          RET
                0551 ;
                0552 ;
                0553 ; PRINT SPACE.  ALTERS A.
                0554 ;
C1EF 3E20      0555 SPACE: LD      A,r' '          ;(CONTINUE BELOW)
                0556 ;
                0557 ;
                0558 ; PRINT THE CHARACTER IN THE A-REGISTER.
                0559 ; (CHKS INPUT FOR ESC.) PRESERVES ALL REGS.
                0560 ;
C1F1 F5        0561 PCHR:  PUSH   AF              ;SAVE THE CHAR
C1F2 E67F      0562 PC1:   AND    7FH
C1F4 FE1B      0563          CP      ESC
C1F6 28C1      0564          JR     Z,ESCAPE
C1F8 FE7D      0565          CP      ALT              ;ALT MODE?
C1FA 28BD      0566          JR     Z,ESCAPE
C1FC CDD8C0    0567          CALL  CHKIN
C1FF 20F1      0568          JR     NZ,PC1
                0569 ;
C201 DB00      0570 PC2:   IN     A,STAT
C203 E680      0571          AND   TBE
C205 28FA      0572          JR     Z,PC2
C207 F1        0573          POP   AF
C208 F5        0574          PUSH  AF
C209 E67F      0575          AND   7FH
C20B D301      0576          OUT  DATA,A
C20D FE0D      0577          CP      CR
C20F 2006      0578          JR     NZ,PC3
C211 CDF7C2    0579          CALL  FMSGFOLLOWING
C214 0A0080    0580          DB   LF,0,80H
C217 F1        0581 PC3:   POP   AF
C218 C9        0582          RET
                0583 ;
                0584 ;
                0585 ; GET CHARACTER. RETURNS IT IN A.
                0586 ; ALTERS F.
                0587 ;
C219 CDE3C0    0588 GCHR:  CALL  GBYTE
C21C CDF1C1    0589          CALL  PCHR
C21F FE61      0590          CP      61H              ;CONVERT LOWER CASE
C221 D8        0591          RET      C              ;TO UPPER.
C222 D620      0592          SUB  20H
C224 C9        0593          RET
                0594 ;
                0595 ;
                0596 ; LOADS HL WITH SOURCE ADDR, BC & DE
                0597 ; WITH THE INCREMENT.  ENDS WITH A CRLF.
                0598 ;
C225 97        0599 L2NCR0: SUB   A
                0600 ;
C226 CD64C2    0601 L2NCR: CALL  LD2N
                0602 ;
                0603 ; SKIP INITIAL SPACES.
                0604 ; IF DELIMITER NOT A CR, ERROR
                0605 ;
C229 CDB8C2    0606 SKSGCR: CALL  SKSG              ;WAIT FOR NON-SPACE
C22C 2087      0607          JR     NZ,ERROR        ;IF NOT CR, ERROR
C22E EB        0608          EX   DE,HL
C22F C9        0609          RET
                0610 ;

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0611 ;
0612 ; PRINT THE NUMBER IN HL, FOLLOWED BY A COLON,
0613 ; PRESERVES ALL REGISTERS EXCEPT A.
0614 ;
C230 CDA9C1 0615 PCADDR: CALL    CRLF
0616 ;
C233 CDCFC2 0617 PADDR:  CALL    FNHL
C236 3E3A    0618         LD      A, ':'
C238 18B7    0619         JR      PCHR
0620 ;
0621 ;
0622 ; COMMAND
0623 ;
C23A CD82C2 0624 VERIF:  CALL    L3NCR          ;GET 3 OPERANDS
0625 ;
0626 ; COMPARES TWO AREAS OF MEMORY.  ENTER WITH
0627 ; SOURCE IN HL, DESTINATION IN DE & COUNT
0628 ; IN BC.  ALTERS ALL REGISTERS.
0629 ;
C23D
C23D 1A      0630 VRFY:
C23E EDA1    0631         LD      A, (DE)
C240 2B      0632         CPI
                                ;COMPARE TO SOURCE
C241 C4CFC2 0633         DEC     HL
C244 C4C6C2 0634         CALL   NZ,PNHL          ;PRINT SOURCE ADDR
C247 EB      0635         CALL   NZ,PSNM          ; & CONTENTS
C248 C4C6C2 0636         EX     DE,HL
C24B C4CC2   0637         CALL   NZ,PSNM          ; & DEST CONTENTS
C24E C4A9C1 0638         CALL   NZ,PSNHL         ; & DEST ADDR
C251 EB      0639         CALL   NZ,CRLF
C252 23      0640         EX     DE,HL
C253 13      0641         INC     HL
C254 E0      0642         INC     DE
C255 18E6    0643         RET     PD          ; IF BC=0, DONE.
0644         JR      VRFY
0645 ;
0646 ; COMMAND
0647 ;
C257
C257 CD82C2 0648 MOVE:
C25A E5      0649         CALL   L3NCR          ;OPERANDS
C25B D5      0650         PUSH   HL
C25C C5      0651         PUSH   DE
C25D EDB0    0652         PUSH   BC
C25F C1      0653         LDIR
C260 D1      0654         POP    BC
C261 E1      0655         POP    DE
C262 18D9    0656         POP    HL
0657         JR      VRFY
0658 ;
0659 ;
0660 ;
0661 ; LOAD TWO NUMBERS.  LOADS DE WITH THE BEGINNING
0662 ; ADDR, N1.  LOADS BC & HL WITH THE INCREMENT
0663 ; N2-N1+1 (OR WITH N2 IF THE OPR IS 'S').
0664 ; RETURNS WITH LAST DELIMITER IN A.
0665 ;
0666 ;
C264 CD8EC2 0667 LD2N:  CALL    GNHL          ;N1 TO HL, DELIM TO A
C267 EB      0668         EX     DE,HL          ;SAVE N1 IN DE
C268 CDBEC2 0669         CALL   SKSG          ;GET NEXT NON-SPACE
C26B FE53    0670         CP     'S'+CASE        ;SWATH?
C26D 2005    0671         JR      NZ,L2N1
0672 ;

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C26F CD8AC2      0673      CALL   GNHL0      ;YES, INCREMENT TO HL.
C272 1807        0674      JR      L2N2
                  0675 ;
C274 CD8BC2      0676 L2N1:  CALL   GNHL      ;INCREMENT
C277 E7          0677      OR      A          ;CLEAR CY
C278 ED52        0678      SEC      HL,DE      ;N2-N1
C27A 23          0679      INC      HL        ;INCLUDE END POINT
C27B 44          0680 L2N2:  LD      B,H       ;
C27C 4D          0681      LD      C,L       ;BC GETS THE INCRM
C27D E5          0682      PUSH   HL        ;
C27E FDE1        0683      POP    IY        ;& SO DOES IY.
C280 C9          0684      RET
                  0685 ;
                  0686 ;
                  0687 ; LOAD 3 OPERANDS, HL GETS THE SOURCE, BC
                  0688 ; THE INCREMENT, AND DE THE 3RD OPERAND.
                  0689 ;
C281 97          0690 L3NCR:  SUB    A
                  0691 ;
C282 CD64C2      0692 L3NCR:  CALL   LD2N
                  0693 ; (CONTINUE BELOW)
                  0694 ;
                  0695 ;
                  0696 ; ENTER WITH SPACE OR THE FIRST DIGIT
                  0697 ; OF A NUMBER IN A. LOADS HL WITH
                  0698 ; WITH A NEW NUMBER & THEN EXCHANGES
                  0699 ; DE & HL. FINISHES WITH A CRLF.
                  0700 ;
C285 CD8BC2      0701 L1NCR:  CALL   GNHL      ;SKIP SPACES, LOAD HL
C288 189F        0702      JR      SKSGCR   ;WAIT FOR A CR
                  0703 ;
                  0704 ;
                  0705 ; CLEARS HL, IF ENTERED WITH HEX CHAR IN A,
                  0706 ; SHIFTS IT INTO HL, O/W, IGNORES LEADING
                  0707 ; SPACES, FIRST CHAR MUST BE HEX, CONTINUES
                  0708 ; SHIFT UNTIL A NON-HEX CHAR RECEIVED & THEN
                  0709 ; RETURNS WITH THE LATTER IN A.
                  0710 ; PRESERVES B,C,D,E.
                  0711 ;
                  0712 ;
C28A 97          0713 GNHL0:  SUB    A
                  0714 ;
C28B C5          0715 GNHL:  PUSH   BC          ;SAVE
C28C 210000      0716      LD      HL,0       ;CLEAR BUFFER
                  0717 ; STRIP LEADING SPACES & GET CHAR
C28F CDBBC2      0718      CALL   SKSG
                  0719 ; FIRST CHAR MUST BE HEX
C292 CDA3C2      0720      CALL   HEXSH      ;IF HEX, SHIFT INTO HL
C295 DAB5C1      0721      JP      C,ERROR    ;O/W, ERROR
C298 CD19C2      0722 GN1:  CALL   GCHR
C29B CDA3C2      0723      CALL   HEXSH      ;IF HEX SHIFT INTO HL
C29E 78          0724      LD      A,B       ;RESTORE CHAR
C29F 30F7        0725      JR      NC,GN1    ;IF HEX, CONTINUE
C2A1 C1          0726 (      POP    BC          ;IF NON-HEX, DONE
C2A2 C9          0727      RET
                  0728 ;
                  0729 ;
                  0730 ; IF A CONTAINS HEX CHAR, SHIFTS BINARY EQUIVALENT
                  0731 ; INTO HL. IF NOT HEX, RET WITH CY SET. SAVES
                  0732 ; ORIGINAL CHAR IN B
                  0733 ;
C2A3 47          0734 HEXSH:  LD      B,A

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C2A4 D630      0735      SUB      '0'          ; < '0'?
C2A6 D8        0736      RET      C
C2A7 C6E9      0737      ADD      '0'--[C 'G'+CASE]
C2A9 D8        0738      RET      C
C2AA D4FA      0739      SUB      'A'-'G'
C2AC 3003      0740      JR      NC,HX1        ;OK IF >= 'A'
C2AE C607      0741      ADD      [ 'A'+CASE]-[ '9'+1]
C2B0 D8        0742      RET      C
C2B1 C60A      0743 HX1:    ADD      '9'+1-'0'
                0744 ; THE A-REG NOW CONTAINS THE HEX DJGIT IN BINARY.
                0745 ; (THE HIGH-ORDER NIBBLE OF A IS 0.)
C2B3 29        0746 HXSH4:  ADD      HL,HL          ;SHIFT 4 BITS INTO HL
C2B4 29        0747      ADD      HL,HL
C2B5 29        0748      ADD      HL,HL
C2B6 29        0749      ADD      HL,HL
C2B7 B5        0750      OR      L
C2B8 6F        0751      LD      L,A
C2B9 C9        0752      RET
                0753 ;
                0754 ;
                0755 ; RETURNS WITH A NON-SPACE IN THE A-REG.
                0756 ; IF ENTERED WITH A-REG CONTAINING A NULL
                0757 ; OR A SPACE, GETS NEW CHARS UNTIL FIRST
                0758 ; NON-SPACE OCCURS. ALTERS AF.
                0759 ;
C2BA 97        0760 SKSG0:  SUB      A
                0761 ;
C2BB B7        0762 SKSG:   OR      A          ;DOES A CONTAIN NULL?
C2BC CC19C2    0763 SK1:   CALL   Z,GCHR
C2BF FE20      0764      CP      20H          ;SPACE?
C2C1 28F9      0765      JR      Z,SK1
C2C3 FE0D      0766      CP      CR
C2C5 C9        0767      RET
                0768 ;
                0769 ;
                0770 ;
                0771 ; PRINT SPACE FOLLOWED BY THE NUMBER POINTED
                0772 ; TO BY HL. ALTERS A ONLY.
                0773 ;
C2C6 CDEF C1   0774 PSNM:   CALL   SPACE
                0775 ; (CONTINUE BELOW)
                0776 ;
                0777 ; PRINTS THE NUMBER POINTED TO BY HL.
                0778 ; PRESERVES ALL REGISTERS BUT A.
                0779 ;
C2C9 7E        0780 PNM:   LD      A,(HL)
C2CA 1808      0781      JR      P2HEX
                0782 ;
                0783 ;
                0784 ;
                0785 ; PRINT THE NUMBER IN HL.
                0786 ; PRESERVES ALL BUT A.
                0787 ;
C2CC CDEF C1   0788 PSNHL:  CALL   SPACE
                0789 ;
C2CF 7C        0790 PNHL:   LD      A,H
C2D0 CDD4C2    0791      (      CALL   P2HEX
C2D3 7D        0792      LD      A,L
                0793 ;
                0794 ;
                0795 ; PRINT THE NUMBER IN THE A-REGISTER.
                0796 ; PRESERVES ALL REGISTERS.
                ;(CONTINUE BELOW)

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0797 ;
C2D4 CDD8C2 0798 P2HEX: CALL P1HEX
C2D7 1F 0799 RRA
C2D8 1F 0800 P1HEX: RRA
C2D9 1F 0801 RRA
C2DA 1F 0802 RRA
C2DB 1F 0803 RRA
C2DC F5 0804 PUSH AF
C2DD E60F 0805 AND 0FH ;MASK
C2DF FE0A 0806 CP 10D ; <= 9?
C2E1 3802 0807 JR C,PH1
C2E3 C607 0808 ADD 7 ;A THRU F
C2E5 C630 0809 PH1: ADD 30H ;ASCII BIAS
C2E7 CDF1C1 0810 CALL PCHR ;PRINT IT
C2EA F1 0811 POP AF
C2EB C9 0812 RET
0813 ;
0814 ;
0815 ; PRINT MESSAGE. ENTER WITH ADDR OF MSG
0816 ; IN HL. THE MESSAGE IS TERMINATED
0817 ; AFTER PRINTING A CHARACTER WHOSE
0818 ; PARITY BIT WAS SET.
0819 ; PRESERVES FLAGS, INCREMENTS HL.
0820 ;
0821 ;
0822 ;
C2EC F5 0823 MSG: PUSH AF ;SAVE
C2ED 7E 0824 PS1: LD A,(HL)
C2EE 23 0825 INC HL
C2EF CDF1C1 0826 CALL PCHR
C2F2 17 0827 RLA ;LAST CHARACTER?
C2F3 30F8 0828 JR NC,PS1 ;IF NOT, LOOP
C2F5 F1 0829 POP AF
C2F6 C9 0830 RET
0831 ;
0832 ;
0833 ; PRINTS THE MESSAGE FOLLOWING THE CALL
0834 ; TO THIS ROUTINE.
0835 ; PRESERVES ALL REGISTERS
0836 ;
C2F7 0837 MSGFOLLOWING:
C2F7 E3 0838 EX (SP),HL
C2F8 CDECC2 0839 CALL MSG
C2FB E3 0840 EX (SP),HL
C2FC C9 0841 RET
0842 ;
0843 ;
0844 ; COMMAND
0845 ;
0846 ; GO <ADDR>
0847 ; EXECUTION BEGINS AT ADDR.
0848 ;
C2FD 0849 GO:
C2FD E1 0850 POP HL ;CLEAN STACK
C2FE CD85C2 0851 CALL L1NCR ;GET ADDR
C301 EB 0852 EX DE,HL
C302 E9 0853 JP (HL)
0854 ;
0855 ;
0856 ; COMMAND. DISPLAY MEMORY.
0857 ;
0858 ; DH <STARTING ADDR> <ENDING ADDR OR SWATH>

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0859 ;
C303      0860 DSPM:
C303 2036 0861      JR      NZ,ERRORV      ;IF NOT 'M', ERROR
C305 CD25C2 0862      CALL     L2NCR0      ;GET OPERANDS
C308 1610 0863 DSPM1: LD      D,16      ;BYTE COUNT
C30A CD30C2 0864      CALL     PCADDR      ;ADDRESS
C30D CDC6C2 0865 DM2:  CALL     P5NM      ;MEM CONTENTS
C310 EDA1 0866      CPT      ;INC HL & DEC BC
C312 E2A9C1 0867      JF      PO,CRLF
C315 15 0868      DEC     D
C316 28F0 0869      JR      Z,DSPM1
C318 7A 0870      LD      A,D
C319 E403 0871      AND     3
C31B CCEFC1 0872      CALL     Z,SPACE
C31E 18ED 0873      JR      DM2
0874 ;
0875 ;
C320      0876 SHANDLER:
C320 281C 0877      JR      Z,SUBSM      ;IF 'M', SUBSM
0878 ;
0879 ;
0880 ; DISK SEEK
0881 ;
C322      0882 SEEKR:
C322 CB69 0883      BIT     DISKMODE,C
C324 2815 0884      JR      Z,ERRORV
C326 CD85C2 0885      CALL     L1NCR      ;E = TRACK #
C329      0886 SEEKNXT:
C329 3E4C 0887      LD      A,76      ;MAX TRACK #, MAXI DISK
C32B 1627 0888      LD      D,39      ;MAX TRACK #, MINI DISK
C32D CDB2C3 0889      CALL     CHKNO      ;CHECK #
C330 3809 0890      JR      C,ERRORV
C332 53 0891      LD      D,E      ;TRACK #
C333 CD54C0 0892      CALL     DSEEK
C336 3E53 0893      LD      A,'S'      ;IN CASE OF SEEK ERROR
0894 ;
C338 C397C1 0895 DERCKV: JF      DERRCK      ;DISK ERROR CHECK
0896 ;
0897 ;
C33B C3B5C1 0898 ERRORV: JF      ERROR
0899 ;
0900 ;
0901 ; COMMAND. SUBSTITUTE MEMORY LOCATION.
0902 ;
0903 ; SM <ADDR>
0904 ;
C33E      0905 SUBSM:
C33E 97 0906      SUB     A
C33F CD85C2 0907      CALL     L1NCR
C342 EB 0908      EX     DE,HL      ;HL GETS ADDR
C343 CC30C2 0909 SM1:  CALL     Z,PCADDR
C346 CCEFC1 0910      CALL     Z,SPACE
0911 ; PRINT CURRENT VALUE, REQUEST NEW VALUE &
0912 ; PRINT IT IF GIVEN
C349 CDC9C2 0913      CALL     PNM      ;PRINT (HL)
C34C CDF7C2 0914      CALL     PMSGFOLLOWING
C34F AE 0915      DB     ','+80H      ;THE PROMPT
C350 CD19C2 0916      CALL     GCHR
C353 FE2F 0917      CP     ','+1      ;IF <= ',',
C355 DCF1C1 0918      CALL     C,PCHR      ;NO SUBSTITUTION.
C358 3806 0919      JR      C,SM2
C35A EB 0920      EX     DE,HL

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C35E CD8BC2      0921      CALL      GNHL          ;GET NEW VALUE
C35E EB          0922      EX        DE,HL
C35F 73          0923      LD        (HL),E
C360 FE0D        0924 SM2:   CF        CR
C362 C4EFC1      0925      CALL     NZ,SPACE
              0926 ;
C365 C8          0927      RET      Z             ;IF CR, DONE.
C366 23          0928      INC     HL
C367 3E07        0929      LD      A,7           ;PRINT ADDRESS IF IT
C369 A5          0930      AND     L             ;IS A MULTIPLE OF 8
C36A 18D7        0931      JR      SM1
              0932 ;
              0933 ;
C36C             0934 RHANDLER:
C36C FE44        0935      CF      'D'+CASE
C36E 20CB        0936      JR      NZ,ERRORV
              0937 ;
              0938 ; READ DISK
              0939 ;
C370             0940 READDR:
C370 CD94C3      0941      CALL     SECSETUP
C373 C5          0942 RD2:   PUSH     BC
C374 E5          0943      PUSH    HL
C375 D5          0944      PUSH    DE
C376 CD8CC0      0945      CALL     DREAD
C379 3E52        0946      LD      A,'R'        ;IN CASE OF READ ERROR
C37B CDBCC1      0947      CALL     NEXTSC      ;NEXT SECTOR [POPS STK.]
C37E 18F3        0948      JR      RD2
              0949 ;
              0950 ;
C380             0951 WHANDLER:
C380 FE44        0952      CF      'D'+CASE
C382 20B7        0953      JR      NZ,ERRORV
              0954 ;
              0955 ; WRITE DISK
              0956 ;
C384             0957 WRITDR:
C384 CD94C3      0958      CALL     SECSETUP
C387 C5          0959 WD2:   PUSH     BC
C388 E5          0960      PUSH    HL
C389 D5          0961      PUSH    DE
C38A CDA1C0      0962      CALL     DWRITE
C38D 3E57        0963      LD      A,'W'        ;IN CASE OF WRITE ERROR
C38F CDBCC1      0964      CALL     NEXTSC      ;[POPS STACK]
C392 18F3        0965      JR      WD2
              0966 ;
              0967 ;
              0968 ; GET MEMORY ADDRESS, SECTOR # AND CHECK IT,
              0969 ; AND LOAD B & C.
              0970 ;
C394             0971 SECSETUP:
C394 CB69        0972      BIT     DISKMODE,C
C396 28A3        0973      JR      Z,ERRORV
C398 C5          0974      PUSH    BC
C399 CD81C2      0975      CALL     L3NCR0      ;BUFFER ADDR & SEC #
C39C C1          0976      POP     BC
C39D CDAEC3      0977      CALL     CHKSECNO
C3A0 3899        0978      JR      C,ERRORV
              0979 ;
              0980 ;
              0981 ; PRINT TRACK & SECTOR #'S
              0982 ;

```



C3A2	0783	PTRKSC:			
C3A2 DB31	0784	IN	A,DTRACK		
C3A4 57	0785	LD	D,A		
C3A5 EB	0786	EX	DE,HL		
C3A6 CDCCC2	0787	CALL	PSNHL		;PRINT TRK & SEC
C3A9 EB	0788	EX	DE,HL		
C3AA 79	0789	LD	A,C		;DISK FLAGS
C3AB 160A	0790	LD	D,10		;# OF RETRIALS
C3AD C9	0791	RET			
	0792	;			
	0793	;			
C3AE	0794	CHKSECND:			
C3AE 3E1A	0795	LD	A,26		;MAX SEC #, MAXI DISK
C3B0 1612	0796	LD	D,18		;MAX SEC #, MINI DISK
	0797	;			
	0798	;			
C3B2	0799	CHKND:			
C3B2 CB61	1000	BIT	MAXI,C		
C3B4 2001	1001	JR	NZ,CN2		
C3B6 7A	1002	LD	A,D		
C3B7 BB	1003	CN2:	CF	E	
C3B8 D8	1004	RET	C		
C3B9 79	1005	LD	A,C		
C3BA E603	1006	AND	NDRIVES-1		
C3BC 47	1007	LD	B,A		;DISK #
C3BD 79	1008	LD	A,C		;DISK FLAGS
C3BE C9	1009	RET			
	1010	;			
	1011	;			
	1012	;	COMMAND		
	1013	;	OUT <DATA-BYTE> <PORT NNUMBER>		
	1014	;			
C3BF CD8BC2	1015	OUTP:	CALL	GNHL	
C3C2 EB	1016		EX	DE,HL	;E GETS DATA
C3C3 CD85C2	1017		CALL	L1NCR	;GET PORT NUMBER
	1018	;			
C3C6 4B	1019		LD	C,E	; TO C
C3C7 ED69	1020		OUT	(C),L	
C3C9 C9	1021		RET		
	1022	;			
	1023	;			
	1024	;	BAUD RATES:		
	1025	;	19200, 9600, 4800, 2400, 1200, 300, 150, 110,		
	1026	;			
	1027	;			
C3CA 90C0A090 88848201	1028	BAUDRS:	DE	90H,0C0H,0A0H,90H,88H,84H,82H,1	
	1029	;			
	1030	;			
C3D2	1031	CMNDTBL:			
C3D2 B5C1	1032	DW	ERROR		;A
C3D4 15C0	1033	DW	BOOTMC		;BOOT CDOOS
C3D6 B5C1	1034	DW	ERROR		;C
C3D8 03C3	1035	DW	DSPM		;DISPLAY MEMORY
C3DA ADC1	1036	DW	EXMINPUT		;EXAMINE INPUT PORT
C3DC B5C1	1037	DW	ERROR		;F
C3DE FDC2	1038	DW	GO		;GO [TRANSFER OF CONTROL]
C3E0 B5C1	1039	DW	ERROR		;H
C3E2 EBC0	1040	DW	INITER		;INITIALIZE BAUD RATE
C3E4 B5C1	1041	DW	ERROR		;J
C3E6 06C1	1042	DW	KICKSTK		;KICK SYSTEM STACK
C3E8 B5C1	1043	DW	ERROR		;L

C3EA	57C2	1044	DW	MOVE	;MOVE A BLOCK OF MEMORY
C3EC	B5C1	1045	DW	ERROR	;N
C3EE	BFC3	1046	DW	OUTP	;OUTPUT
C3F0	B5C1	1047	DW	ERROR	;P
C3F2	B5C1	1048	DW	ERROR	;Q
C3F4	5CC3	1049	DW	RHANDLER	;READ DISK
C3F6	20C3	1050	DW	SHANDLER	;SUBSTITUTE MEM; SEEK TRACK
C3F8	B5C1	1051	DW	ERROR	;T
C3FA	B5C1	1052	DW	ERROR	;U
C3FC	3AC2	1053	DW	VERIF	;VERIFY BLOCKS OF MEMORY
C3FE	80C3	1054	DW	WHANDLER	;WRITE DISK
		1055	;		
		1056	;		
(C3FF)		1057	LASTBYTE: EQU	\$-1	
		1058	;		

0000 ERRORS

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CROMEMCO CDOS Z80 ASSEMBLER V.1.4A  
SYMBOL TABLE

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ALT	007D	BAUD	0000	BAUDRS	C3CA	BOOTDK	C018
BOOTMC	C015	BOOTSW	0040	BOT200	C01C	BOT300	C024
BOT500	C03A	CASE	0000	CHKIN	C0DB	CHKNO	C3E2
CHKSEC	C3AE	CLEANS	C123	CLEANV	C189	CM6	C143
CMND	C128	CMNDTB	C3D2	CN2	C3B7	COMMND	0002
CR	000D	CRLF	C1A9	DATA	0001	DAV	0040
DCOMMN	0030	DCONTR	0034	DDATA	0033	DERCKV	C338
DERRCK	C197	DFLAGS	0034	DHOME	C03F	DISKMO	0005
DTSKSE	C162	DM2	C30D	DRD250	C095	DREAD	C08C
DS2	C18C	DSEC	0032	DSEEK	C054	DSK500	C076
DSK540	C07F	DSPM	C303	DSPM1	C308	DSTAT	0030
DTRACK	0031	DWR250	C0AA	DWRITE	C0A1	EREXIT	C071
ERROR	C1B5	ERRORV	C33B	ESC	001B	ESCAPE	C1B9
EXCCHK	C06C	EXECUT	C06A	EXMINP	C1AD	FASTSE	0007
GBYTE	C0E3	GCHR	C219	GN1	C298	GNHL	C28E
GNHLO	C28A	GO	C2FD	HOLDM	0020	HEXSH	C2A3
HX1	C2B1	HXSH4	C2B3	IMASK	0003	INITBA	C0EE
INITBR	C0EB	IT1	C0F5	KICKST	C106	L1NCR	C285
L2N1	C274	L2N2	C27B	L2NCR	C226	L2NCR0	C225
L3NCR	C282	L3NCR0	C281	LASTBY	C3FF	LD2N	C264
LF	000A	LOADIX	C11E	MAXI	0004	MAXIM	0010
MONITR	C10B	MOVE	C257	NDRIVE	0004	NEXTSC	C1BC
NS2	C1C7	NS4	C1D1	OUTP	C3BF	P1HEX	C2D8
P2HEX	C2D4	P2HXCL	C1A4	PADDR	C233	PARLEL	0004
PC1	C1F2	PC2	C201	PC3	C217	PCADDR	C230
PCHR	C1F1	PERRMS	C198	PH1	C2E5	PMSG	C2EC
PMSGFO	C2F7	FNHL	C2CF	PNM	C2C9	PS1	C2ED
PSNHL	C2CC	PSNM	C2C6	PTRKSC	C3A2	RD2	C373
READDR	C370	RHANDL	C36C	SECSET	C394	SEEKNX	C329
SEEKR	C322	SEL300	C0D1	SELECT	C0CB	SETUP	C0B4
SHANDL	C320	SK1	C2BC	SKSG	C2BB	SKSG0	C2BA
SKSGCR	C229	SM1	C343	SM2	C360	SPACE	C1EF
STACK	007C	START	C000	STAT	0000	SUBSM	C33E
TBE	0080	VERIF	C23A	VRFY	C23D	WD2	C387
WHANDL	C380	WRITDR	C384				

## CROMEMCO CROSS REFERENCE LISTING V.1.0 FOR FILE RDOS

ALT	0055	0565										
BAUD	0037	0340										
BAUDRS	1028	0339										
BOOTDK	0082	0069										
BOOTMC	0076	1033										
BOOTSW	0039	0068										
BOT200	0085	0087										
BOT300	0090	0105										
BOT500	0103	0076										
CASE	0050	0401	0419	0670	0737	0741	0935	0952				
CHKIN	0307	0316	0567									
CHKNO	0999	0889										
CHKSEC	0994	0540	0977									
CLEANS	0378	0505										
CLEANV	0504	0477	0537									
CM6	0401	0397										
CMND	0386	0386										
CMNDB	1031	0413										
CN2	1003	1001										
COMMND	0046	0342										
CR	0052	0346	0370	0370	0483	0577	0766	0924				
CRLF	0482	0335	0615	0639	0867							
DATA	0045	0310	0576									
DAV	0047	0303										
DCOMMN	0029	0084	0162	0208	0235							
DCONTR	0033	0120	0149	0270								
DDATA	0031	0300										
DERCKV	0895											
DERRCK	0462	0895										
DFLAGS	0032	0067	0165	0209	0236	0267						
DHOME	0119	0095	0459									
DISKMD	0023	0390	0433	0883	0972							
DISKSE	0426	0410										
DM2	0865	0873										
DRD250	0209	0213										
DREAD	0203	0101	0945									
DS2	0455	0443	0449									
DSEC	0030	0263										
DSEEK	0147	0892										
DSK500	0175	0154										
DSK540	0179	0181										
DSPM	0860	1035										
DSPM1	0863	0869										
DSTAT	0028	0085	0169									
DTRACK	0034	0542	0984									
DWR250	0236	0240										
DWRITE	0231	0962										
EREXIT	0168	0211	0238									
ERROR	0500	0402	0404	0429	0607	0721	0898	1032	1034	1037	1039	1041
		1043	1045	1047	1048	1051	1052					
ERRORV	0898	0861	0884	0890	0936	0953	0973	0978				
ESC	0054	0563										
ESCAPE	0503	0564	0566									
EXGCHK	0164	0167	0214	0241								
EXECUT	0161	0126	0128	0157	0178							
EXMINP	0490	1036										
FASTSE	0022	0433	0444									



GBYTE	0316	0317	0344	0345	0508			
GCHR	0508	0441	0447	0722	0743	0916		
GN1	0722	0725						
GNHL	0715	0667	0676	0701	0921	1015		
GNHL 0	0713	0673						
GO	0849	1038						
HDLDM	0041	0268						
HEXSH	0734	0720	0723					
HX1	0743	0740						
HXSH4	0746							
IMASK	0036	0066						
INITBA	0339	0054						
INITBR	0325	1040						
IT1	0342	0348						
KICKST	0355	1042						
L1NCR	0701	0356	0491	0851	0885	0907	1017	
L2N1	0676	0671						
L2N2	0680	0674						
L2NCR	0601							
L2NCR0	0599	0862						
L3NCR	0672	0624	0649					
L3NCR0	0690	0975						
LASTBY	1057							
LD2N	0667	0601	0692					
LF	0053	0580						
LOADIX	0372	0357						
MAXI	0024	0039	0104	0433	0450	1000		
MAXIM	0040	0122	0155	0291				
MONITR	0368	0070						
MOVE	0648	1044						
NDRIVE	0018	0428	1006					
NEXTSC	0512	0947	0964					
NS2	0522	0517						
NS4	0528	0520						
OUTP	1015	1046						
P1HEX	0800	0798						
P2HEX	0798	0476	0781	0791				
P2HXCL	0475	0494						
PADDR	0617							
PARLEL	0038	0124	0176	0179	0183			
PC1	0562	0568						
PC2	0570	0572						
PC3	0581	0578						
PCADDR	0615	0864	0909					
PCHR	0561	0468	0484	0509	0619	0810	0826	0918
PERRMS	0465	0519						
PH1	0809	0807						
PMSG	0823	0372	0339					
PMSGFO	0837	0369	0393	0466	0501	0579	0914	
PNHL	0790	0617	0634					
PNM	0780	0913						
PS1	0824	0828						
PSNHL	0788	0638	0987					
PSNM	0774	0635	0637	0865				
PTRKSC	0983	0536						
RD2	0942	0948						
READDR	0940							
RHANDL	0934	1049						
SECSET	0971	0941	0958					
SEEKNX	0806	0546						
SEEKR	0882							
SEL300	0296	0297						

SELECT	0291	0119	0148	0259
SETUP	0258	0203	0231	
SHANDL	0876	1050		
SK1	0763	0765		
SKSG	0762	0606	0669	0718
SKSG0	0730	0396	0408	
SKSGCR	0606	0077	0326	0455 0702
SM1	0909	0931		
SM2	0924	0919		
SPACE	0555	0774	0788	0872 0910 0925
STACK	0008	0060		
START	0060			
STAT	0044	0307	0570	
SUBSM	0905	0877		
TBE	0048	0571		
VERIF	0624	1053		
VRFY	0630	0644	0657	
WD2	0959	0965		
WHANDL	0951	1054		
WRITDR	0957			

Part No. 023-0052

