

O T R O N A

Attache

Portable Computer

BIOS Source Listing

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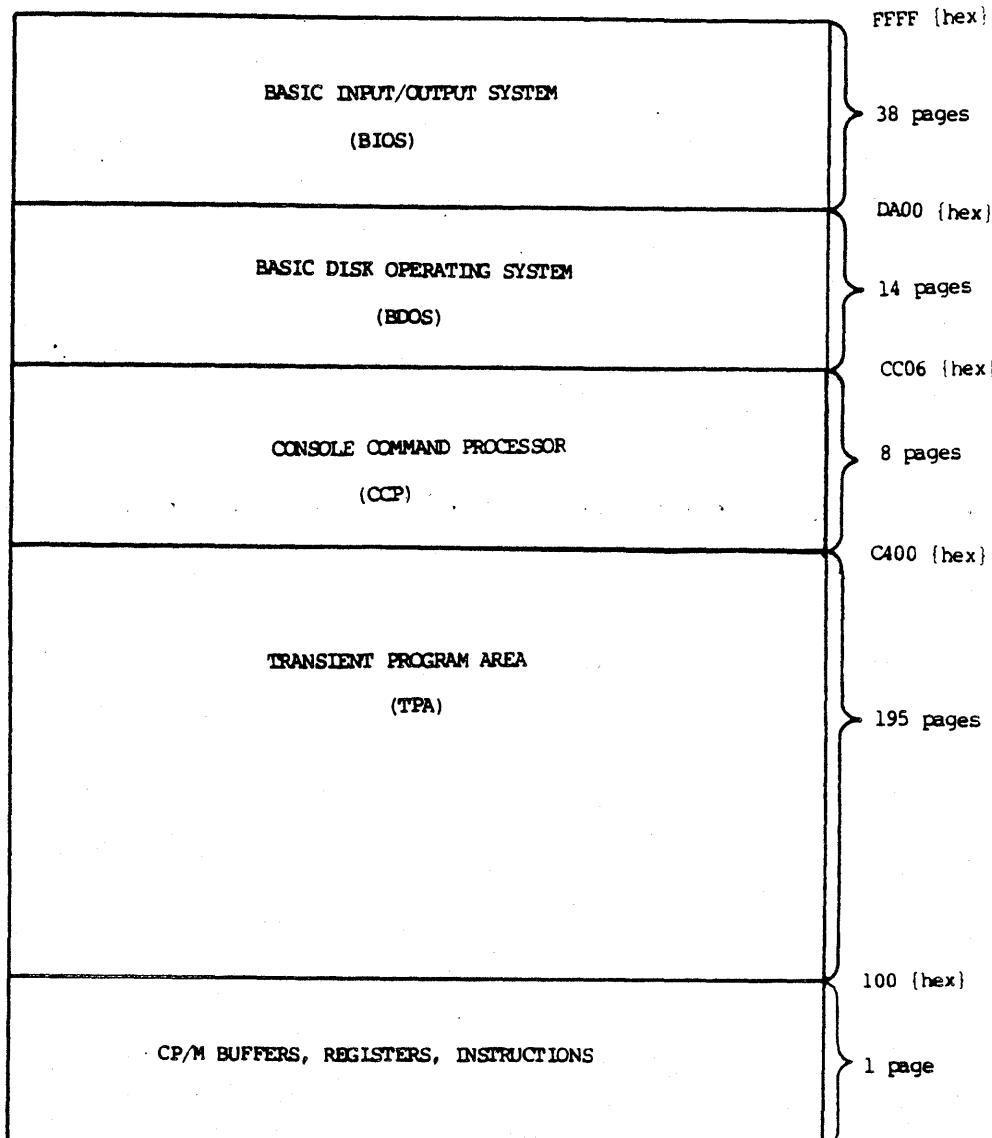
Introduction

This is the Attache Basic Input/Output (BIOS) source listing, version 2.2.3. "2.2" is the current version of CP/M. ".3" is Attache's current revision.

BIOS is the hardware dependent section of CP/M, (Attache's operating system). BIOS interfaces with the Basic Disk Operating System (BDOS) portion of CP/M to execute instructions at a physical level.

BIOS resides on the first three tracks of a system diskette, and is loaded into memory at power on if the system diskette is properly inserted in Drive A. An Erasable Programmable Read-Only Memory chip (EPROM) contains the initial software which loads the BIOS Bootstrap Loader from the disk.

The BIOS Bootstrap then loads the CP/M operating system into the 64K bytes (256 pages of 256 bytes each) of Attache memory as summarized in the following illustration.



CP/M MACRO ASSEM 2.0 #001 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.

TITLE 'ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.'
; BIOS FOR VALET AND BASIC GRAPHICS (REV 1.2)
; LAST 4 SECTORS ON SIDE 1 DELETED
; -----
; |
; | OTRONA 500 SERIES CP/M 2.2 BIOS & BOOT |
; |
; |-----|

; S.GRAY 11-08-1982
; R.LINGEMANN
; R.WINTER

; MACLIB Z80

;

; SELECT DISK PARAMETERS

0001 = SIDES EQU 1 ; SIDES 0=ONE <> 0=TWO
0000 = TPI EQU 0 ; TPI 0=48 <> 0=96
0006 = STPRAT EQU 6 ; STEP RATE IN MS (MUST BE BETWEEN 2
; AND 32 IN EVEN INCREMENTS.)
; CONFIGURATION
;
0000 = STACK EQU ENDMRK+1;TOP OF STACK
0038 = MSIZE EQU 56 ;CP/M VERSION MEMORY SIZE IN K-BYTES
9000 = BIAS EQU (MSIZE-20)*1024
C400 = CCP EQU 3400H+BIAS ;BASE OF CCP
CC06 = BDOS EQU CCP+806H ;BASE OF BDOS
DA00 = BIOS EQU CCP+1600H ;BASE OF BIOS
0002 = NDISK EQU 2 ; NUMBER OF DISKS IN SYSTEM
0004 = CDISK EQU 0004H ; CURRENT DISK NUMBER ADDR.
0003 = MNTR EQU 0003H ; EPROM MONITOR ENTRY
0006 = MDISKOP EQU 0006H ; EPROM DISKOP ENTRY
0009 = MDSPLY EQU 0009H ; EPROM DISPLAY DRIVER
0003 = IOBYTE EQU 0003H ; I/O BYTE LOCATION
0081 = IOINIT EQU 81H ; INITIAL IOBYTE VALUE
0010 = KBUFLN EQU 16 ; KEYBOARD BUFFER SIZE
FE00 = FILBUF EQU 0FEOOH ; BUFFER SPACE FOR FORMAT
; WILL BE CHANGED BY DISK ROUTINE
;
PAGE

```

;
; I/O CONSTANTS
;

0057 =      TIMCWO EQU    57H      ;TIMER CONTROL BYTE
0002 =      TIMTC0  EQU    02H      ;9600 BAUD
0002 =      TIMTC1  EQU    02H      ;9600 BAUD
;

; ASCII CODES
;

0007 =      BEL     EQU    7H      ;BELL
0008 =      BS      EQU    8H      ;BACKSPACE
000D =      CR      EQU    0DH     ;CARRIAGE RETURN
000A =      CTRLJ   EQU    0AH     ;CTRL-J
00C8 =      CTRLJH  EQU    0C8H    ;CTRL-JH
000B =      CTRLK   EQU    0BH     ;CTRL-K
000F =      CTRLO   EQU    0FH     ;CTRL-O
0010 =      CTRLP   EQU    10H    ;CTRL-P
00D3 =      CTRLPS  EQU    0D3H    ;CTRL-PS
0011 =      CTRLQ   EQU    11H    ;CTRL-Q
0090 =      CTRLQP  EQU    90H    ;CTRL-QP
0013 =      CTRLS   EQU    13H    ;CTRL-S
0018 =      CTRLX   EQU    18H    ;CTRL-X
001B =      ESC     EQU    1BH    ;ESCAPE
000C =      FF      EQU    0CH    ;FORM FEED
000A =      LF      EQU    0AH    ;LINE FEED
0020 =      SPC    EQU    20H    ;SPACE
;

; FLOPPY CONSTANTS
;

0043 =      RWCODE  EQU    40H+3  ;R/W COMMAND-2 OR 3
012C =      MTRTIM  EQU    300    ;5S MOTOR TIMEOUT
002D =      MTRDLY  EQU    45     ;750MS. MOTOR START DELAY
;

000D =      SRT     EQU    16-(STPRAT/2); HEAD STEP RATE
;

0010 =      DHLT    EQU    16     ;DISK HEAD LOAD TIME
000F =      DHUT    EQU    0FH    ;DISK HEAD UNLOAD TIME
0000 =      ND      EQU    0      ;DMA MODE
;

; CP/M DISK RETURN CODES
;

0000 =      WRALL   EQU    0      ;WRITE TO ALLOCATED
0001 =      WRDIR   EQU    1      ;WRITE TO DIRECTORY
0002 =      WRUAL   EQU    2      ;WRITE TO UNALLOCATED
;

; DISK DRIVE PARAMETERS
;

004C =      ALLTRK  EQU    36+(40*TPI)+SIDES*(40+(40*TPI))
0002 =      BLS     EQU    (TPI OR SIDES)+1
0800 =      BLKSIZ  EQU    1024*BLS; DIRECTORY BLOCK SIZE
0200 =      HSTSIZ  EQU    512     ;HOST DISK SECTOR SIZE
000A =      HSTSPT  EQU    10      ;HOST SECTORS PER TRACK (CYL)
00BE =      ALLDSK  EQU    ALLTRK*5/BLS
00B6 =      DSKSIZ  EQU    ALLDSK-(21-(BLS*7)+1)
0003 =      SYSTRK  EQU    3      ;SYSTEM RESERVED TRACKS

```

CP/M MACRO ASSEM 2.0 #003 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.

```
0002 =      CNTSEC EQU    2      ;HSTSIZ/PHYSICAL SECTOR SIZE
;
0004 =      HSTBLK EQU    HSTSIZ/128 ;CP/M SECT. PER HOST SECT.
0028 =      CPMSPT EQU    HSTBLK * HSTSPT ;CP/M SECTORS PER TRACK
0003 =      SECMSK EQU    HSTBLK-1   ;SECTOR MASK
C200 =      BADDR  EQU    CCP-HSTSIZ
0027 =      MAXTRK EQU    39+(40*TPI)
0080 =      DIRENT EQU    64*((SIDES OR TPI)+1)
0002 =      DIRALC EQU    DIRENT/(BLKSIZ/32)
;
IF        DIRALC=1
ALOC0  EQU    80H
ENDIF
IF        DIRALC=2
ALOC0  EQU    0COH
ENDIF
IF        DIRALC=4
ALOC0  EQU    OFOH
ENDIF
;
0100 =      TPA   EQU    100H
;
PAGE
```

```

;
; I/O PORTS
;

00E0 = FPYBCA EQU 0E0H ;FLOPPY STATUS PORT
00E1 = FPYBWR EQU 0E1H ;FLOPPY DATA PORT
00E2 = DSPBCA EQU 0E2H ;DISPLAY BASE & CURRENT ADDRESS
00E3 = DSPBWR EQU 0E3H ;DISPLAY BASE & WORD COUNT
00E4 = STDBCA EQU 0E4H ;STD BUS BASE & CURRENT ADDRESS
00E5 = STDBWR EQU 0E5H ;STD BUS BASE & WORD COUNT
00E6 = SIOBCA EQU 0E6H ;SIO BASE & CURRENT ADDRESS
00E7 = SIOBWR EQU 0E7H ;SIO BASE & WORD COUNT
00E8 = DMACCSR EQU 0E8H ;DMA COMMAND/STATUS REGISTER
00E9 = DMAWRR EQU 0E9H ;DMA WRITE REQUEST REGISTER
00EA = DMAWSM EQU 0EAH ;DMA WRITE SINGLE MASK BIT
00EB = DMAWMR EQU 0EBH ;DMA WRITE MODE REGISTER
00EC = DMACBP EQU 0ECH ;DMA CLEAR BYTE PTR FLIP-FLOP
00ED = DNATMP EQU 0EDH ;DMA TEMP REG & MASTER CLEAR
00EE = SDSPY EQU 0EEH ;DISPLAY COMMAND/STATUS
00EF = DMAWAM EQU 0EFH ;DMA WRITE ALL MASK REG BITS
00F0 = DCOMM EQU 0FOH ;COMM PORT DATA
00F1 = SCOMM EQU 0F1H ;COMM PORT STATUS
00F2 = DPRTR EQU 0F2H ;PRINTER PORT DATA
00F3 = SPRTR EQU 0F3H ;PRINTER PORT STATUS
00F4 = BAUDC EQU 0F4H ;BAUD TIMER FOR COMM PORT
00F5 = BAUDP EQU 0F5H ;BAUD TIMER FOR PRINTER PORT
00F6 = DSPINT EQU 0F6H ;DISPLAY INTERRUPT (60HZ)
00F7 = FPVINT EQU 0F7H ;FLOPPY INTERRUPT TIMER
00F8 = DPIOA EQU 0F8H ;PIO PORT A DATA
; A0-7 = LATCH DATA OUT
; L0 = MOTOR ON
; L1 = GRAPHICS ENABLE
; L2 = EPROM ENABLE
; L3 7 DISPLAY BRNS.
; A0-7 = 8910 DATA I/O
; A0-3 = 5832 D0-3 I/O
; A4-7 = 5832 A0-3 OUT
; A0-3 = 5101 D0-3 I/O
; A4-7 = 5101 A0-3 OUT

00FA = DPIOB EQU 0FAH ;PIO PORT B DATA
; B0-1 = 5101 A4-5
; B2-4 = OPERATION SELECT
; 0 = 8910 ADDR LOAD
; 1 = 8910 DATA LOAD
; 2 = 5832 WRITE
; 3 = 5832 READ
; 4 = 5101 WRITE
; 5 = 5101 READ
; 6 = LATCH LOAD
; 7 = NO-OP
; B5 = /'138 OPERATION STROBE
; B6 = /KEYBOARD DATA IN
; B7 = /KEYBOARD CLOCK OUT

00F9 = SPIOA EQU 0F9H ;PIO PORT A COMMAND
00FB = SPIOB EQU 0FBH ;PIO PORT B COMMAND
00FC = SFLPY EQU 0FCH ;FLOPPY COMMAND/STATUS

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CP/M MACRO ASSEM 2.0 #005 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.

00FD = DFLPY EQU OFDH ;FLOPPY DATA
00FE = DDSPY EQU OFEH ;DISPLAY DATA
00FF = DMAP EQU OFFH ;RAM VIRTUAL MAP DATA
;
PAGE

CP/M MACRO ASSEM 2.0 #006 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.

```
;  
;-----  
;|      BOOT - LOADED INTO FE00H BY PROM  
;-----  
  
;  
;BOOT CODE WILL BE SAVED IN SECTOR 1 OF TRACK 0  
;AND IS SET UP HERE TO ASSEMBLE ONE SECTOR LENGTH  
;AHEAD OF THE CCP. THE ADDRESS OFFSET FACTOR B#  
;IS ADDED WHERE NEEDED SO THE BOOT CODE WILL RUN  
;WHEN LOADED AT IT'S STARTING ADDRESS OF 0FE00H  
;THE BIOS CBOOT ROUTINE IS ALSO RUN HERE TO SAVE  
;SPACE AS THE ONLY TIME THIS ROUTINE IS USED IS  
;DIRECTLY FOLLOWING A SYSTEM RESET.  
;  
FE00 = MONSTK EQU 0FE00H ;ADDR OF MON. STACK & DISK BUFF.  
C200.= BTSTRT EQU CCP-HSTSIZ  
C200 ORG BTSTRT  
3C00 = BOFF EQU MONSTK-BTSTRT  
;  
;BOOT LOADER  
;  
C200 C377FF JMP BOOT+BOFF ;GETSYS VECTOR  
C203 A7 DB 0A7H ;INDICATES CP/M TO MONITOR  
;  
;-----  
;|      COLD BOOT  
;-----  
;  
C204+1824 CBOOT: JR CBOOT1  
DB 18H,CBOOT1-$-1  
;  
; CLEAR GRAPHICS & RESET SCREEN  
C206 1B5C1B3318SIGNON: DB ESC,'\',ESC,'3',18H  
C20B 43502F4D20 DB 'CP/M 2.2.3 Otrona ATTACHE <'  
C226 3536 DB '(MSIZE/10)+'0',(MSIZE MOD 10)+'0'  
C228 4BBE DB 'K','>'+80H  
;  
;  
C22A F3 CBOOT1: DI ;TURN OFF INTERRUPTS  
;  
; SET UP PERIPHERALS I/O VIA TABLE  
;  
C22B 215AFF LXI H,IOTBL+BOFF ;POINT TO I/O TABLE  
C22E 7E CBL1: MOV A,M  
C22F 4F MOV C,A ;C=PORT  
C230 3C INR A ;JUMP OUT IF DONE  
JRZ CBJ1  
C231+280B DB 28H,CBJ1-$-1  
C233 23 INX H ;B=COUNT  
C234 46 MOV B,M  
C235 23 INX H  
C236 7E CBL2: MOV A,M ;MANUAL BLOCK OUTPUT  
OUTP A ; SO SLOW DEVICES  
C237+ED79 DB 0EDH,A*8+41H  
C239 23 INX H ; CAN KEEP UP
```

CP/M MACRO ASSEM 2.0 #007 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.

C23A+10FA DJNZ CBL2
 DB 10H,CBL2-\$-1
 JR CBL1
C23C+18F0 DB 18H,CBL1-\$-1
;
C23E 212C01 CBJ1: LXI H,MTRTIM
C241 226DFA SHLD MTRCNT
C244 3E85 MVI A,85H
C246 3246FA STA LSTATE
; INIT VARIABLES & BUFFERS
C249 AF XRA A
;
C24A 21PAF9 LXI H,DSPCYC
C24D 062F MVI B,47
C24F 77 CBL3: MOV M,A
C250 23 INX H
 DJNZ CBL3
C251+10FC DB 10H,CBL3-\$-1
;
C253 324DFA STA OKIFLG
C256 3E81 MVI A,1INIT; SET INITIAL IOBYTE VALUE
C258 320300 STA IOBYTE
C25B 310000 LXI SP,STACK; SET STACK POINTER
;
; SET UP SYSTEM PARAMETERS FROM CMOS RAM
; ----- B = 0 FROM PREVIOUS OP
C25E CD63F2 CALL RD5101 ; MUST FIND XE,X5 IN 1ST TWO CMOS LOCATIONS
C261 FE0E CPI 0EH
 JRNZ STRM ; 1ST BYTE NOT XE, GO SET CMOS RAM AND BIOS VARS.
C263+2009 DB 20H,STRM-\$-1
C265 0601 MVI B,1
C267 CD63F2 CALL RD5101
C26A FE05 CPI 5 ; IF 2ND BYTE = X5
 JRZ STCM ; THEN READ CMOS RAM & SET BIOS VARIABLES
C26C+2838 DB 28H,STCM-\$-1
;
C26E 3E01 STRM: MVI A,1 ; ELSE SET CMOS RAM & BIOS VARIABLES
C270 CD26F2 CALL WRTTON ; SET KEYTONE
C273 3E1A MVI A,1AH
C275 CD06F2 CALL WRTBRT ;SET BRIGHTNESS
C278 3E09 MVI A,9
C27A CD2DF2 CALL WRTPNT ;SET PRINTER BAUD
C27D 3E09 MVI A,9
C27F CD31F2 CALL WRTCOM ;SET COMM. BAUD
C282 3EFF MVI A,0FFH
C284 CD18F2 CALL WRTBEL ;SET BELL TOGGLE
C287 3E0F MVI A,0FH
C289 CD1FF2 CALL WRTVOL ;SET VOLUME LEVEL
C28C AF XRA A
C28D CD35F2 CALL WRTSLK ;SET SHIFT LOCK
C290 3E0E MVI A,0EH
C292 0600 MVI B,0
C294 CD3AF2 CALL WR5101
C297 3E05 MVI A,5
C299 0601 MVI B,1
C29B CD3AF2 CALL WR5101

CP/M MACRO ASSEM 2.0 #008 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.

C29E 3E0F		MVI	A,0FH
C2A0 47		MOV	B,A
C2A1 CD3AF2		CALL	WR5101
		JR	IMPR
C2A4+182B		DB	18H,IMPR-\$-1
;			
C2A6 0609	STCM:	MVI	B,9 ; GET KEYTONE
C2A8 CD63F2		CALL	RD5101
C2AB 324EFA		STA	TONTYP ; SET BIOS VAR.
C2AE CD58EF		CALL	GTBRIT ; GET BRIGHTNESS
C2B1 324FFA		STA	BRTLEV ; SET BIOS VAR.
C2B4 0605		MVI	B,5
C2B6 CD63F2		CALL	RD5101 ; GET BELL TOGGLE
C2B9 3250FA		STA	CURBEL ; SET BIOS VAR.
C2BC 0606		MVI	B,6
C2BE CD63F2		CALL	RD5101 ; GET VOLUME LEVEL
C2C1 3251FA		STA	VOLEVLL ; SET BIOS VAR.
C2C4 060E		MVI	B,0EH
C2C6 CD63F2		CALL	RD5101 ; GET SHIFT LOCK
C2C9 B7		ORA	A
		JRZ	SLOK ; 0=OFF, 0FFH=ON
C2CA+2802		DB	28H,SLOK-\$-1
C2CC 3EFF		MVI	A,0FFH
C2CB 3252FA	SLOK:	STA	SHLOCK ; SET BIOS VAR.
;			
C2D1 2123F6	IMPR:	LXI	H,NOTONE-15 ; SET CURRENT KEYTONE POINTER
C2D4 3A4EFA		LDA	TONTYP
C2D7 3C		INR	A
C2D8 47		MOV	B,A
C2D9 110F00		LXI	D,15
C2DC 19	IML1:	DAD	D
		DJNZ	IML1
C2DD+10FD		DB	10H,IML1-\$-1
C2DF 2284DA		SHLD	CLIKAD ; STORE KEYTONE POINTER
C2E2 3A4FFA		LDA	BRTLEV ; SET PHYSICAL DEVICES:
C2E5 CD47EF		CALL	BRTADJ ; BRIGHTNESS LATCH
C2E8 CD26EF		CALL	ADJPNT ; PRINTER BAUD
C2EB CD2DEF		CALL	ADJCOM ; COMM. BAUD
C2EE 3A51FA		LDA	VOLEVLL ; VOLUME BYTES IN SOUND TABLE
C2F1 CD67EF		CALL	VOLADJ
C2F4 3EC7		MVI	A,0C7H
C2F6 32BEEB		STA	GRFBIT+1 ; SET GRAPHICS ROUTINE TO PLOT BRIGHT
;			
; CHECK FOR CLOCK CHIP TYPE			
;			
C2F9 0604		MVI	B,4
C2FB C5	CCL4:	PUSH	B
C2FC 060D		MVI	B,0DH
C2FE CD75F2		CALL	R58174
C301 FE0F		CPI	0FH
C303 C1		POP	B
		JRNZ	NSCK ; <> 0FH = NATIONAL SEMI CLOCK
C304+201B		DB	20H,NSCK-\$-1
		DJNZ	CCL4
C306+10F3		DB	10H,CCL4-\$-1
C308 21050C		LXI	H,0C05H ; ELSE MODIFY ROUTINES FOR OKI CLOCK

CP/M MACRO ASSEM 2.0 #009 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.

C30B 2282E7	SHLD	DATCNG
C30E 21FF05	LXI	H,5FFH
C311 223BE7	SHLD	TIMCNG
C314 3EAC	MVI	A,0A8H
C316 325AF2	STA	W58174+14
C319 3EA8	MVI	A,0A8H
C31B 3284F2	STA	R58174+15
C31E 324DFA	STA	OKIFLG
;		
; CHECK FOR CLOCK SET		
;		
C321 0603	NSCK:	MVI B,3 ; MUST FIND XE,X5 IN TWO CMOS BYTES (3 & 4)
C323 CD63F2	CALL	RD5101 ; TO INDICATE CLOCK HAS BEEN SET
C326 FE0E	CPI	0EH
C328+200C	JRNZ	SETINT ; NO MATCH, SKIP TO SET INTERRUPT
C32A 0604	DB	20H,SETINT-\$-1
C32C CD63F2	MVI	B,4
C32F FE05	CALL	RD5101
CPI	5	
C331+2003	JRNZ	SETINT ; NO MATCH, SKIP TO SET INTERRUPT
C333 32ADDA	DB	20H,SETINT-\$-1
;	STA	CLKFLG ; ELSE SET CLKFLG <> 0 (CLOCK SET)
;		
; SET UP THE INTERRUPT STRUCTURE		
;		
C336 3EDA	SETINT:	MVI A,V60HZ/256 ;SET VECTOR AREA
	STAI	
C338+ED47	DB	0EDH,47H
	IM2	;MODE 2
C33A+ED5E	DB	0EDH,5EH
C33C FB	EI	;INTERRUPTS ON
;		
; SIGN ON		
;		
C33D 2106FE	LXI	H,SIGNON+BOFF
C340 CD4DE1	CALL	MESSG
;		
; SET UP DISK PARAMETERS		
;		
C343 CDA4DE	CALL	CLRFLG
C346 2162F8	LXI	H,SPCTBL ;SETUP SPECIFY TABLE
C349 CDC7DE	CALL	DISKOP
C34C FB	EI	
C34D AF	XRA	A
C34E 320400	STA	CDISK ;SELECT DRIVE 0
C351 3284FA	STA	HSTHD
C354 CD4BDB	CALL	GOCPM
C357 C300C4	JMP	CCP
;		

```
;  
;  
;-----|  
; I/O SETUP TABLE |  
;-----|  
;  
; FORMAT: PORT#, # OF BYTES, BYTES  
; PORT ENTRY OF OFFH TERMINATES  
;  
; TIMERS  
;  
C35A F4    IOTBL: DB     BAUDC ; COMM PORT  
C35B 04      DB     4  
C35C 03      DB     3 ; RESET  
C35D B8      DB     (V60HZ-4) MOD 256 ; INT. VECTOR  
C35E 57      DB     TIMCWO ; CONTROL WORD  
C35F 02      DB     TIMTCO ; COMM. BAUD (9600)  
;  
C360 F6      DB     DSPINT ; 60 HZ. INTERRUPT  
C361 03      DB     3  
C362 03      DB     3 ; RESET  
C363 D5      DB     0D5H ; + EDGE, INT. ON  
C364 01      DB     1 ; COUNT OF 1  
;  
C365 F7      DB     FPYINT ; FLOPPY INTERRUPT  
C366 03      DB     3  
C367 03      DB     3 ; RESET  
C368 D5      DB     0D5H ; + EDGE, INT. ON  
C369 01      DB     1  
;  
; DISABLE EPROM, TURN ON MOTOR  
;  
C36A F9      DB     SPIOA ; SET DIRECTION OUT  
C36B 02      DB     2  
C36C CF      DB     0CFH  
C36D 00      DB     0  
;  
C36E F8      DB     DPIOA ; DATA FOR LATCH  
C36F 01      DB     1  
C370 85      DB     85H  
;  
C371 FA      DB     DPIOB ; STROBE DATA INTO LATCH  
C372 03      DB     3  
C373 FB      DB     0FBH  
C374 DB      DB     0DBH  
C375 FB      DB     0FBH  
C376 FF      DB     0FFH ; TERMINATOR  
;  
;  
PAGE
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;-----| ;-----|
;      |      BOOT LOADER      |
;-----| ;-----|
;

;-----| ;-----|
;      |      BOOT:    LXIX    BOT1+BOFF      ; ERROR RETURN ADDR.
;      |      DB      0DDH,21H
;      |      DW      BOT1+BOFF
;      |      MVI     B,10       ; 10 RETRIES
;      |      BOTO:   PUSH    B
;      |      LXI     H,BRCTBL+BOFF ; HL<- START OF RECAL TABLE
;      |      CALL    MDISKOP ; RECAL DRIVE
;      |      POP     B
;      |      JR      BOT2
;      |      DB      18H,BOT2-$-1
;      |      C387 C1  BOT1:   POP     B      ; ARRIVE HERE IF RECAL ERROR
;      |      DJNZ    BOTO
;      |      DB      10H,BOT0-$-1
;      |      JR      GOMON      ; IF 10 BAD TRIES, BACK TO MON.
;      |      DB      18H,GOMON-$-1
;      |      C38A+1857
;      |      C38C 0E1B  BOT2:   MVI     C,27      ; READ 27 SECTORS
;      |      BOT3:   LXIX    BOT5+BOFF ; ERROR RETURN ADDR.
;      |      DB      0DDH,21H
;      |      DW      BOT5+BOFF
;      |      MVI     B,10       ; 10 RETRIES
;      |      BOTO:   PUSH    B
;      |      LXI     H,BRDTBL+BOFF ; HL <- START OF READ TABLE
;      |      CALL    MDISKOP
;      |      JR      BOT6
;      |      DB      18H,BOT6-$-1
;      |      C39D C1  BOT5:   POP     B      ; ARRIVE HERE IF READ ERROR
;      |      DJNZ    BOT4
;      |      DB      10H,BOT4-$-1
;      |      JR      GOMON      ; IF 10 BAD TRIES, BACK TO MON.
;      |      DB      18H,GOMON-$-1
;      |      C3A0+1841
;      |      C3A2 C1  BOT6:   POP     B
;      |      C3A3 0D    DCR     C      ; DCR SECTOR COUNTER
;      |      JRZ     BTOV      ; IF SECTOR = 0, THEN BOOT DONE
;      |      DB      28H,BTOV-$-1
;      |      C3A4+2836
;      |      LDA     BRDTBL+BOFF+2 ; ELSE INC LOAD POINTER BY 200H
;      |      C3A6 3AE8FF
;      |      ADI     2
;      |      C3A9 C602
;      |      STA     BRDTBL+BOFF+2
;      |      C3AB 32E8FF
;      |      LXI     H,BRREC+BOFF ; INC PHYSICAL SECTOR
;      |      C3AE 21EFFF
;      |      INR     M
;      |      C3B1 34    MVI     B,10      ; RESET RETRY COUNTER
;      |      C3B2 060A
;      |      MOV     A,C
;      |      C3B4 79    CPI     18      ; AT 1ST TRACK BOUNDARY ?
;      |      C3B5 FE12
;      |      JRZ     BOT7      ; IF YES, GO ..BOT7
;      |      DB      28H,BOT7-$-1
;      |      C3B7+2804
;      |      CPI     8
;      |      C3B9 FE08
;      |      JRNZ    BOT4      ; ELSE AT 2ND TRACK BOUNDARY ?
;      |      DB      20H,BOT4-$-1
;      |      C3BB+20D7
;      |      LDA     BRCYL+BOFF ; INCREMENT TRACK
;      |      C3BD 3AEDFF
;      |      INR     A
;      |      C3C0 3C    STA     BRCYL+BOFF
;      |      C3C1 32EDFF
;      |      BOT7:   LDA     BRCYL+BOFF
;
```

CP/M MACRO ASSEM 2.0 #012 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.

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C3C4 32F7FF      STA     BSKADD+BOFF
C3C7 3E01        MVI     A,1          ; RESET PHYSICAL SECTOR
C3C9 32EFFF      STA     BRREC+BOFF
                  LXIX   BOT9+BOFF   ; ERROR RETURN ADDR.
C3CC+DD21        DB      0DDH,21H
C3CE+E0FF        DW      BOT9+BOFF
C3D0 060A        MVI     B,10         ; 10 RETRIES
C3D2 C5          BOT8:  PUSH    B
C3D3 21F4FF      LXI     H,BSKTBL+BOFF ; HL <- START OF SEEK TABLE
C3D6 CD0600      CALL    MDISKOP    ; SEEK TO NEXT TRACK
C3D9 C1          POP     B
                  JR     BOT3         ; GO GET NEXT SECTOR
C3DA+18B2        DB      18H,BOT3-$-1

; C3DC F3          BTOV:  DI      BIOS           ; SYSTEM HAS BEEN BOOTTED
C3DD C300DA      JMP     BIOS          ; GOTO TO BIOS INIT ROUTINE
;
C3E0 C1          BOT9:  POP     B              ; ARRIVE HERE IF SEEK ERROR
                  DJNZ   BOT8
                  DB      10H,BOT8-$-1
C3E1+10EF        GOMON: JMP     MNTR         ; IF 10 BAD TRIES, THEN BACK TO MON.
C3E3 C30300      ;

;-----|          DISK TABLES          |
;-----|
;
;-----|          READ A SECTOR          |
;-----|
C3E6 39          BRDTBL: DB     39H
C3E7 00C4        DW     CCP
C3E9 FF01        DW     512-1
C3EB 46          DB     40H+6
C3EC 00          DB     0          ;UNIT
C3ED 00          BRCYL: DB     0          ;C
C3EE 00          DB     0          ;H
C3EF 02          BRREC: DB     2          ;R
C3F0 02          DB     2          ;N
C3F1 0A          DB     10         ;EOT
C3F2 0F          DB     15         ;GP2
C3F3 FF          DB     0FFH       ;DTL

;
;-----|          SEEK TO NEW CYLINDER          |
;-----|
C3F4 23          BSKTBL: DB     23H
C3F5 0F          DB     0FH
C3F6 00          DB     0          ;HEAD & UNIT
C3F7 00          BSKADD: DB     0          ;NEW CYLINDER

;
;-----|          RECALIBRATE TO CYLINDER 0          |
;-----|
C3F8 22          BRCTBL: DB     22H
C3F9 07          DB     7
C3FA 00          DB     0

;
;-----|          PAGE          |
;-----|

```

```

;
;-----|                                |
;       BIOS                            |
;-----|                                |
;

DA00      ORG    BIOS
;
; JUMP VECTORS
;
DA00 C304FB    JMP    CBOOT+B0FF ;COLD START
DA03 C3CADA    WBOOTE: JMP    WBOOT   ;WARM START
DA06 C3C1E0    JMP    CONST   ;CONSOLE STATUS
DA09 C36EE0    JMP    CONIN   ;CONSOLE CHAR. IN
DA0C C37EE0    JMP    CONOUT  ;CONSOLE CHAR. OUT
DA0F C3B1E0    JMP    LIST    ;LIST CHAR. OUT
DA12 C39DE0    JMP    PUNCH   ;PUNCH CHAR. OUT
DA15 C38CE0    JMP    READER  ;READER CHAR. IN
DA18 C38ADB    JMP    HOME   ;MOVE HEAD TO HOME POS.
DA1B C38BDB    JMP    SELDSK  ;SELECT DISK
DA1E C3A1DB    JMP    SETTRK  ;SET TRACK #
DA21 C3A6DB    JMP    SETSEC  ;SET SECTOR #
DA24 C3ABDB    JMP    SETDMA  ;SET DMA ADDRESS
DA27 C3B4DB    JMP    READ    ;READ FROM DISK
DA2A C3CCDB    JMP    WRITE   ;WRITE TO DISK
DA2D C3ECB0    JMP    LISTST  ;RETURN LIST STATUS
DA30 C3B0DB    JMP    SECTRA  ;SECTOR TRANSLATION

;
;DISK PARAMETER TABLE
;
;
DA33 =      DPBASE EQU    $      ; BASE OF DISK PARAMETER BLKS.
;
; DISK 00
;
0000 =      XLTO   EQU    0      ; NO XULATION TABLE
0000 =      XLT1   EQU    XLTO
DA33 00000000 DW     XLTO,0    ; XLATE TABLE
DA37 00000000 DW     0,0      ; SCRATCH AREA
DA3B 8BFA53DA DW     DIRBUF,DPB0 ; DIR BUFF, PARM BLOCK
DA3F 24FB0CFB DW     CSV0,ALV0 ; CHECK, ALLOC VECTORS

;
; DISK 01
;
DA43 00000000 DW     XLT1,0    ; XLATE TABLE
DA47 00000000 DW     0,0      ; SCRATCH AREA
DA4B 8BFA53DA DW     DIRBUF,DPB1 ; DIR BUFF, PARM BLOCK
DA4F 5CFB44FB DW     CSV1,ALV1 ; CHECK, ALLOC VECTORS

;
; DISK PARAMETER BLOCK, COMMON TO ALL DISKS
;
DA53 2800      DPB0:  DW     CPMSPT  ; SEC PER TRACK
DA55 04        DB     3+BLS-1 ; BLOCK SHIFT
DA56 0F        DB     7+((BLS-1)*8) ; BLOCK MASK

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CP/M MACRO ASSEM 2.0 #014 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.

;
IF SIDES
DA57 01 EXM: DB TPI XOR 1
ELSE
EXM: DB TPI
ENDIF
;
DA58 B500 DW DSKSIZ-1 ; DISKSIZE-1
DA5A 7F00 DW DIRENT-1 ; DIRECTORY MAX
DA5C C0 DB ALOC0 ; ALLOC0
DA5D 00 DB 0 ; ALLOC1
DA5E 2000 DW DIRENT/4 ; CHECK SIZE
DA60 0300 DW SYSTRK ; OFFSET
DA53 = DPB1 EQU DPBO ; EQUIVALENT PARAMETERS
;
; RESERVED FOR 3 INTERRUPT VECTORS (I=ODAH)
;
DA62 INT1: DS 2
DA64 INT2: DS 2
DA66 INT3: DS 2
;
; JUMP TABLE FOR EXTERNAL USE
;
DA68 C37CDD JMPTBL: JMP DISK ; VECTOR TO DISK
DA6B C3B5E1 JMP VALDSP ; VALET CRTOUT
DA6E C31BE1 JMP TSTTTY ; TEST COMM. PORT
DA71 C3FBEO JMP TTYIN ; INPUT FROM COMM.
DA74 C303E1 JMP TTYOUT ; OUTPUT TO COMM.
DA77 C378E1 JMP SOUND ; TABLE DRIVEN SOUND
DA7A C3EEFO JMP PUTVAL ; EXIT VALET OVERLAY
DA7D C35FEB JMP LINDSP+3 ; FOR BASIC GRAPHICS
;
; VARIABLES FOR EXTERNAL USE
;
DA80 00 WSFLAG: DB 0
DA81 FF VALSTP: DB OFFH
DA82 FF DSKFLG: DB OFFH
DA83 00 VALPND: DB 0
DA84 41F6 CLIKAD: DW CLICK
DA86 00 VALCMD: DB 0
DA87 00 VALTIM: DB 0
;
; VECTORS
;
DA88 C37BEP JMP OUTBLK
DA8B C31AED JMP CLNVAL
DA8E C326EF JMP ADJPNT ; READ CMOS & CHANGE PRINT BAUD
DA91 C32DEF JMP ADJCOM ; READ CMOS & CHANGE COMM. BAUD
DA94 C3EEADA JMP DOBOOT ; DO WARM BOOT BUT DON'T GO TO CCP
DA97 C34BDB JMP GOCPM ; INITIALIZE ENVIRONMENT
DA9A C371E2 JMP CMPOFF ; RETURN HL W/PROPER LINE OFFSET
DA9D DS 3 ; RESERVED FOR ONE MORE JMP VECTOR
;
; MORE VARIABLES
;
DAA0 DS 2 ; RESERVED FOR MORE VARIABLES

CP/M MACRO ASSEM 2.0 #015 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.

DAA2 FFF9 PARPNT: DW CURCHR
DAA4 00 LINOFS: DB 0
DAA5 00 DSPFLG: DB 0
DAA6 00 ALMWAT: DB 0
DAA7 00 ALMCNT: DB 0 ; COUNTS # OF ALARM TONES
DAA8 DS 1
DAA9 5802 ALMFLG: DW 600
DAAB 32F6 VALTON: DW NOTONE
DAAD 00 CLKFLG: DB 0
DAAE FF TIMFLG: DB OFFH
DAAF 00 NUMFLG: DB 0
DAB0 94F6 KEYADR: DW KEYTBL
DAB2 43F8 FLPTBL: DW FMTTBL
DAB4 DS 4
;
;-----|
; INTERRUPT VECTORS - MUST BE ON A |
; BOUNDARY OF AN EVEN MULTIPLE OF 8 |
;-----|
;
DAB8 DS 2 ; RESERVED FOR CTC CH. 0
DABA DS 2 ; RESERVED FOR CTC CH. 1
DABC C2F2 V60HZ: DW SRV60 ; 60 HZ TIMER (CTC CH. 2)
DABE 43DF DW SRVFPY ; FLOPPY INT. (CTC CH. 3)
;
; MORE USER INTERRUPTS
;
DAC0 INT4: DS 2
DAC2 INT5: DS 2
DAC4 INT6: DS 2
DAC6 INT7: DS 2
DAC8 INT8: DS 2
;
;-----|
; WARM BOOT - RE-READ UP TO THE BIOS |
;-----|
;
DACA F3 WBOOT: DI
DACB 3EFF MVI A,OFFH
DADC 3281DA STA VALSTP ; INHIBIT VALET AT THIS POINT
DADO 310000 LXI SP,STACK; RESET STACK POINTER
DAD3 FB EI
DAD4 CDEEDA CALL DOBOOT
DAD7 B7 ORA A
JRZ WB1
DAD8+280E DB 28H,WB1-\$-1
DADA CD7CDD CALL DISK
DADD 21ECF8 LXI H,WBTRY
DAE0 CD4DE1 CALL MESSG
DAE3 CD6EE0 CALL CONIN
JR WBOOT
DAE6+18E2 DB 18H,WBOOT-\$-1
;
DAE8 CD4DBB WB1: CALL GOCPM ; INITIALIZE ENVIRONMENT
DAEB C303C4 JMP CCP+3 ; & GOTO CCP+3 (CLEAR COMMAND BUFF 1ST)
;

CP/M MACRO ASSEM 2.0 #016 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.

DAE8 3E0B DOBOOT: MVI A,11
DAF0 323FFA STA SECCNT ; READ 11 SECTORS
DAF3 320BFB STA RECNT ; RETRY 11 TIMES
; THROUGH, 10 THEREAFTER
DAF6 3E03 MVI A,3 ; SET COMMAND TO READ
DAF8 010001 LXI B,100H ; XFER 1 SECTOR AT A TIME
; SELECT DRIVE 0
DAFB 110200 LXI D,2 ; START AT TRACK 0, SECTOR 2
DAFE 2100C4 LXI H,CCP ; LOAD START ADDRESS (BEGINNING OF CCP)
;
;
DB01 F5 RWONE: PUSH PSW ; SAVE LOAD DATA
DB02 C5 PUSH B ;
DB03 D5 PUSH D ;
;
IF SIDES ; CHECK FOR SECOND SIDE
DB04 F5 PUSH PSW
DB05 7A MOV A,D
DB06 FE28 CPI MAXTRK+1
JRC RWJ1
DB08+3803 DB 38H,RWJ1-\$-1
DB0A D6A8 SUI MAXTRK+81H
DB0C 57 MOV D,A
DB0D F1 RWJ1: POP PSW
ENDIF ;
DB0E E5 PUSH H ;
DB0F CD7CDD CALL DISK ; LOAD SECTOR
DB12 3A7CFB RWL1: LDA DSKCYC
DB15 B7 ORA A ; IF DSKCYC = 0
JRZ RWOK ; THEN TRACK LOADED OK
DB16+2810 DB 28H,RWOK-\$-1
DB18 E6E0 ANI 0E0H ; ELSE SEE IF DISK OP DONE OR ERROR
JRZ RWL1 ; IF DISK OP NOT DONE, THEN LOOP TO WAIT
DB1A+28F6 DB 28H,RWL1-\$-1
DB1C 210BFB LXI H,RECNT ; ELSE TRY AGAIN
DB1F 35 DCR M ; DECREMENT RETRY COUNTER
DB20 E1 POP H ; RESTORE DISK COMMAND DATA
DB21 D1 POP D
DB22 C1 POP B
JRZ RWNFG ; IF 10 RETRYS, THEN ERROR
DB23+281F DB 28H,RWNFG-\$-1
DB25 F1 POP PSW
JR RWONE ; TRY AGAIN
DB26+18D9 DB 18H,RWONE-\$-1
;
DB28 213FFA RWOK: LXI H,SECCNT; DECREMENT SECTOR COUNTER
DB2B 35 DCR M
DB2C B1 POP H ; RESTORE DISK COMMAND DATA
DB2D D1 POP D
DB2E C1 POP B
JRZ RWDONE ; IF SECTOR = 0 THEN GOTO CCP
DB2F+2817 DB 28H,RWDONE-\$-1
DB31 3E0A MVI A,10 ; ELSE SET RETRY COUNTER
DB33 320BFB STA RECNT
DB36 24 INR H ; INCREMENT LOAD POINTER BY

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DB37 24 INR H ; BY 200H (PHYSICAL SECTOR LENGTH)
DB38 7B MOV A,E
DB39 FEOA CPI 10 ; IS LAST READ SECTOR <> 10 ?
DB3B+2003 JRNZ RWUPSC ; IF NOT, THEN GOT UPSC
DB3D 14 INR D ; ELSE INCREMENT TRACK COUNT
DB3E 1E00 MVI E,0 ; & SECTOR COUNT = 0 (NEXT INSTR. SETS TO 1)
DB40 1C RWUPSC: INR E ; INCREMENT SECTOR COUNT
DB41 F1 POP PSW ; RESTORE DISK COMMAND
DB42+18BD JR RWONE ; GET NEXT SECTOR
DB42+18BD DB 18H,RWONE-\$-1
;
DB44 F1 RWNFG: POP PSW
DB45 3E09 MVI A,9
DB47 C9 RET
;
DB48 F1 RWDONE: POP PSW ; RECTIFY SP.
DB49 AF XRA A
DB4A C9 RET
;
;COMMON CODE FOR BOOTS
;
DB4B AF GOCPM: XRA A ; INITIALIZE ACT. REG.
DB4C 3280DA STA WSFLAG ; WORDSTR FLAG OFF
DB4F 3282FA STA HSTACT ; HOST BUFFER INACTIVE
DB52 3271FA STA UNACNT ; CLEAR UNALLOC COUNT
DB55 3253FA STA NOKEY ; CLEAR VALET INHIBIT
DB58 3EFD MVI A,-3 ;TURN OFF GRAPHICS
DB5A CD27E1 CALL LLATCH
DB5D CD75DB CALL SETPG0
DB60 018000 LXI B,80H ;DEFAULT DMA ADDRESS IS 80H
DB63 CDABDB CALL SETDMA
DB66 21E8F8 LXI H,WBNIT; GET ADDR OF SCREEN INITIALIZATION CHARS.
DB69 CD4DE1 CALL MESSG ; TURN OFF GRAPHICS & CLEAR TO EOS
DB6C 3A0400 LDA CDISK ; SEND CURRENT DISK # TO CCP
DB6F 4F MOV C,A
DB70 AF XRA A
DB71 3282DA STA DSKFLG ; CLEAR DSKFLG
DB74 C9 RET
;
DB75 3EC3 SETPG0: MVI A,JMP ;JMP INSTRUCTION
DB77 320000 STA 0 ;STORE JMP TO WBOOT
DB7A 2103DA LXI H,WBOOTE ;WBOOT ENTRY POINT
DB7D 220100 SHLD 1 ;STORE JMP TO BDOS0
DB80 320500 STA 5
DB83 2106CC LXI H,BDOS ;BDOS ENTRY POINT
DB86 220600 SHLD 6
DB89 C9 RET
;
PAGE

CP/M MACRO ASSEM 2.0 #018 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.

;

DB8A C9 HOME: RET

DB8B 210000 SELDSK: LXI H,0 ;SET ERROR CODE

DB8E 79 MOV A,C ;SELECTED DISK NUMBER

DB8F 3279FA STA SEKDSK ;SEEK DISK NUMBER

DB92 FE02 CPI NDISK ;TRAP THE ERROR

DB94 D0 RNC ;RETURN IF DISK NOT ON SYSTEM

DB95 6F MOV L,A ;DISK NUMBER TO HL

DB96 2600 MVI H,0

DB98 29 DAD H ;MULTIPLY BY 16

DB99 29 DAD H

DB9A 29 DAD H

DB9B 29 DAD H

DB9C 1133DA LXI D,DPBASE ;BASE OF PARM BLOCK

DB9F 19 DAD D ;HL=.DPB(CURDSK)

DBA0 C9 RET

;

;-----|
;SET TRACK GIVEN BY REGISTER BC|
;-----|

;

SETTRK: SBCD SEKTRK ;TRACK TO SEEK

DBA1+ED43 DB 0EDH,43H

DBA3+7AFA DW SEKTRK

DBA5 C9 RET

;

;-----|
;SET SECTOR GIVEN BY REGISTER CI|
;-----|

;

DBA6 79 SETSEC: MOV A,C

DBA7 327CFA STA SEKSEC ;SECTOR TO SEEK

DBAA C9 RET

;

;-----|
; SET DMA ADDRESS GIVEN BY BC |
;-----|

;

SETDMA: SBCD DMAADR

DBAB+ED43 DB 0EDH,43H

DBAD+89FA DW DMAADR

DBAF C9 RET

;

;-----|
; TRANSLATE SECTOR NUMBER BC |
;-----|

;

DBB0 2600 SECTRA: MVI H,0

DBB2 69 MOV L,C

DBB3 C9 RET

;

;-----|
; READ A SECTOR |
;-----|

;

CP/M MACRO ASSEM 2.0 #019 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.

DBB4 AF READ: XRA A ;ACCUM=0
DBB5 3271FA STA UNACNT ;UNACNT=0
DBB8 2F CMA ;DISABLE VALET INT.
DBB9 3282DA STA DSKFLG
DBC0 3E01 MVI A,1
DBB8 3287FA STA READOP ;READ OPERATION
DBC1 3286FA STA RSFLAG ;MUST READ DATA
DBC4 3E02 MVI A,WRUAL
DBC6 3288FA STA WRTYPE ;TREAT AS UNALLOC
DBC9 C338DC JMP RWOPER ;TO PERFORM THE READ

;
;-----|
;| WRITE A SECTOR |
;-----|
;
DBCC AF WRITE: XRA A ;0 TO ACCUMULATOR
DBC0 3287FA STA READOP ;NOT A READ OPERATION
DBD0 79 MOV A,C ;WRITE TYPE IN C
DBD1 3288FA STA WRTYPE
DBD4 FE02 CPI WRUAL ;WRITE UNALLOCATED?
JRNZ CHKUNA ;CHECK FOR UNALLOC
DBD6+201A DB 20H,CHKUNA-\$-1

;
; WRITE TO UNALLOCATED, SET PARAMETERS
;
DBD8 3E10 MVI A,BLKSIZ/128 ;NEXT UNALLOC RECS
DBDA 3282DA STA DSKFLG ; DISABLE VALET INT.
DBDD 3271FA STA UNACNT
DBE0 3A79FA LDA SEKDSK ;DISK TO SEEK
DBE3 3272FA STA UNADSK ;UNADSK = SEKDSK
DBE6 2A7AFA LHLD SEKTRK
DBE9 2273FA SHLD UNATRK ;UNATRK = SECTRK
DBEC 3A7CFA LDA SEKSEC
DBEF 3275FA STA UNASEC ;UNASEC = SEKSEC

;
DBF2 3EFF CHKUNA: MVI A,0FFH ;DISABLE VALET INT.
DBF4 3282DA STA DSKFLG

;
; CHECK FOR WRITE TO UNALLOCATED SECTOR
;
DBF7 3A71FA LDA UNACNT ;ANY UNALLOC REMAIN?
DBFA B7 ORA A
JRZ ALLOC ;SKIP IF NOT
DBFB+2833 DB 28H,ALLOC-\$-1

;
; MORE UNALLOCATED RECORDS REMAIN
;
DBFD 3D DCR A ;UNACNT = UNACNT-1
DBFE 3271FA STA UNACNT
DC01 3A79FA LDA SEKDSK ;SAME DISK?
DC04 2172FA LXI H,UNADSK
DC07 BE CMP M ;SEKDSK = UNADSK?
JRNZ ALLOC ;SKIP IF NOT
DC08+2026 DB 20H,ALLOC-\$-1

;
; DISKS ARE THE SAME

CP/M MACRO ASSEM 2.0 #020 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.

DC0A 2173FA ;
DC0D CDCFDC LXI H,UNATRK
DC10+201E CALL SEKCMR ;SEKTRK = UNATRK?
JRNZ ALLOC ;SKIP IF NOT
DB 20H,ALLOC-\$-1

; TRACKS ARE THE SAME

DC12 3A7CFA LDA SEKSEC ;SAME SECTOR?
DC15 2175FA LXI H,UNASEC
DC18 BE CMP M ;SEKSEC = UNASEC?
JRNZ ALLOC ;SKIP IF NOT
DC19+2015 DB 20H,ALLOC-\$-1

; MATCH, MOVE TO NEXT SECTOR FOR FUTURE REF

DC1B 34 INR M ;UNASEC = UNASEC+1
DC1C 7E MOV A,M ;END OF TRACK?
DC1D FE28 CPI CPMSPT ;COUNT CP/M SECTORS
JRC NOOVF ;SKIP IF NO OVERFLOW
DC1F+3809 DB 38H,NOOVF-\$-1

; OVERFLOW TO NEXT TRACK

DC21 3600 MVI M,0 ;UNASEC = 0
DC23 2A73FA LHLD UNATRK
DC26 23 INX H
DC27 2273FA SHLD UNATRK ;UNATRK = UNATRK+1

; MATCH FOUND, MARK AS UNNECESSARY READ

DC2A AF NOOVF: XRA A ;0 TO ACCUMULATOR
DC2B 3286FA STA RSFLAG ;RSFLAG = 0
JR RWOPER ;TO PERFORM THE WRITE
DC2E+1808 DB 18H,RWOPER-\$-1

; NOT AN UNALLOCATED RECORD, REQUIRES PRE-READ

DC30 AF ALLOC: XRA A ;0 TO ACCUM
DC31 3271FA STA UNACNT ;UNACNT = 0
DC34 3C INR A ;1 TO ACCUM
DC35 3286FA STA RSFLAG ;RSFLAG = 1

;-----!
;| COMMON CODE FOR READ AND WRITE FOLLOWS |
;-----!

DC38 AF RWOPER: XRA A ;ZERO TO ACCUM
DC39 3285FA STA ERFLAG ;NO ERRORS (YET)
DC3C 3282DA STA DSKFLG ;ENABLE VALET INT.
DC3F 3A7CFA LDA SEKSEC ;COMPUTE HOST SECTOR

DC42 B7 ORA A ;--!
DC43 1F RAR ;--!
DC44 B7 ORA A ;--! # OF (ORA A/RAR) DEPENDANT
DC45 1F RAR ;--! ON VALUE OF HSTBLK
DC46 3281FA STA SEKHST ;HOST SECTOR TO SEEK

CP/M MACRO ASSEM 2.0 #021 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.

; ; ACTIVE HOST SECTOR?
DC49 2182FA LXI H,HSTACT ;HOST ACTIVE FLAG
DC4C B8 MOV A,M
DC4D 3601 MVI M,1 ;ALWAYS BECOMES 1
DC4F B7 ORA A ;WAS IT ALREADY?
JRZ FILHST ;FILL HOST IF NOT
DC50+2821 DB 28H,FILHST-\$-1
;
; HOST BUFFER ACTIVE, SAME AS SEEK BUFFER?
DC52 3A79FA LDA SEKDSK
DC55 217DFA LXI H,HSTDISK ;SAME DISK?
DC58 BE CMP M ;SEKDSK = HSTDISK?
JRNZ NOMATCH
DC59+2011 DB 20H,NOMATCH-\$-1
;
; SAME DISK, SAME TRACK?
DC5B 217EFA LXI H,HSTTRK
DC5E C4DFDC CALL SEKCMP ;SEKTRK = HSTTRK?
JRNZ NOMATCH
DC61+2009 DB 20H,NOMATCH-\$-1
;
; SAME DISK, SAME TRACK, SAME BUFFER?
DC63 3A81FA LDA SEKHST
DC66 2180FA LXI H,HSTSEC ;SEKHST = HSTSEC?
DC69 BE CMP M
JRZ MATCH ;SKIP IF MATCH
DC6A+2824 DB 28H,MATCH-\$-1
;
; PROPER DISK, BUT NOT CORRECT SECTOR
DC6C 3A83FA NOMATCH:LDA HSTWRT ;HOST WRITTEN?
DC6F B7 ORA A
DC70 C4DBDC CNZ WRITEH ;CLEAR HOST BUFF
;
; MAY HAVE TO FILL THE HOST BUFFER
DC73 3A79FA FILHST: LDA SEKDSK
DC76 327DFA STA HSTDISK
DC79 2A7AFA LHLD SEKTRK
DC7C 227BFA SHLD HSTTRK
DC7F 3A81FA LDA SEKHST
DC82 3280FA STA HSTSEC
DC85 3A86FA LDA RSFLAG ;NEED TO READ?
DC88 B7 ORA A
DC89 C4DFDC CNZ READHS ;YES, IF 1
DC8C AF XRA A ;O TO ACCUM
DC8D 3283FA STA HSTWRT ;NO PENDING WRITE
;
; COPY DATA TO OR FROM BUFFER

CP/M MACRO ASSEM 2.0 #022 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.

DC90 3A7CFA MATCH: LDA SEKSEC ;MASK BUFFER NUMBER
DC93 E603 ANI SECMSK
DC95 6F MOV L,A ;READY TO SHIFT
DC96 2600 MVI H,0 ;DOUBLE COUNT
DC98 29 DAD H
DC99 29 DAD H
DC9A 29 DAD H
DC9B 29 DAD H
DC9C 29 DAD H
DC9D 29 DAD H
DC9E 29 DAD H
; HL HAS RELATIVE HOST BUFFER ADDRESS
DC9F 11B1FB LXI D,HSTBUF
DCA2 19 DAD D ;HL = HOST ADDRESS
DCA3 EB XCHG ;NOW IN DE
DCA4 2A89FA LHLD DMAADR ;GET/PUT CP/M DATA
; MVI C,128 ;LENGTH OF MOVE
DCA7 3A87FA LDA READOP ;WHICH WAY?
DCAA B7 ORA A
JRNZ RWMOVE ;SKIP IF READ
DCAB+2006 DB 20H,RWMOVE-\$-1
;
; WRITE OPERATION, MARK AND SWITCH DIRECTION
;
DCAD 3E01 MVI A,1
DCAF 3283FA STA HSTWRT ;HSTWRT = 1
DCB2 EB XCHG ;SOURCE/DEST SWAP
;
; DE IS SOURCE, HL IS DEST, MOVE 128 BYTES
;
DCB3 EB RWMOVE: XCHG ; LDIR MOVES (DE)<-(HL)
DCB4 018000 LXI B,128 ; MOVE 128 BYTES
LDIR ; DO MOVE
DCB7+EDB0 DB 0EDH,0BOH
;
; DATA HAS BEEN MOVED TO/FROM HOST BUFFER
;
DCB9 3A88FA LDA WRTYPE ;WRITE TYPE
DCBC FE01 CPI WRDIR ;TO DIRECTORY?
DCBE 3A85FA LDA ERFLAG ;IN CASE OF ERRORS
DCC1 C0 RNZ ;NO FURTHER PROCESSING
;
; CLEAR HOST BUFFER FOR DIRECTORY WRITE
;
DCC2 B7 ORA A ;ERRORS?
DCC3 C0 RNZ ;SKIP IF SO
DCC4 AF XRA A ;0 TO ACCUM
DCC5 3283FA STA HSTWRT ;BUFFER WRITTEN
DCC8 CDDBDC CALL WRITEH
DCCB 3A85FA LDA ERFLAG
DCC8 C9 RET
;
;-----
; UTILITY SUBROUTINE FOR 16-BIT COMPARE
;-----
;

SEKCMP:

DCCF EB ;HL = .UNATRK OR .HSTTRK, COMPARE WITH SEKTRK
DCD0 217AFA XCHG
DCD3 1A LXI H,SEKTRK
DCD4 BE LDAX D ;LOW BYTE COMPARE
DCD5 C0 CMP M ;SAME?
DCD6 13 RNZ ;RETURN IF NOT
DCD7 23 ;LOW BYTES EQUAL, TEST HIGH IS
DCD8 1A INX D
DCD9 BE INX H
DCDA C9 LDAX D
DCDB 0A CMP M ;SETS FLAGS
DCDC C9 RET
;
PAGE

```

;
;
;-----|
;| WRITEHST PERFORMS THE PHYSICAL WRITE TO      |
;| THE HOST DISK, READHST READS THE PHYSICAL      |
;| DISK.                                         |
;-----|
;

;HSTDISK = HOST DISK #, HSTTRK = HOST TRACK #,
;HSTSEC = HOST SECT #. WRITE 'HSTSIZ' BYTES
;FROM HSTBUF AND RETURN ERROR FLAG IN ERFLAG.
;RETURN ERFLAG NON-ZERO IF ERROR

DCDB 3E02    WRITEH: MVI   A,2
              JR    RDH1
              DB    18H, RDH1-$-1
DCDD+1802    READHS: MVI   A,3
DCDF 3E03    RDH1: STA   DSKCMD
DCE1 3270FA   RDH2: MVI   A,10 ; SET FOR 10 RETRYS
DCE4 3E0A     STA   DSKFLG ; INHIBIT VALET
DCE6 3282DA   HSL1: STA   RECNT ; STORE RETRY
DCE9 320BFB   CALL  GSTUFF ; GET REGS. FOR DISK
DCEC CD62DD   LDA   DSKCMD ; GET COMMAND FOR DISK
DCEF 3A70FA   CALL  DISK  ; DO DISK OPERATION
DCF2 CD7CDD   HSL2: LDA   DSKCYC ; GET DSKCYC
DCF5 3A7CFB   ORA   A     ; IF DSKCYC <> 0
DCF8 B7      JRNZ HSL3  ; THEN ..L3
DCF9+2015    DB    20H,HSL3-$-1
DCF9 3A70FA   LDA   DSKCMD ; ELSE TEST LAST OP
DCF8 FE02    CPI   2     ;IF READ JUST FINISHED
              JRNZ HSI1  ; THEN CONTINUE
DD00+2009    DB    20H,HSI1-$-1
;

DD02 0E03    HSL5: MVI   C,3  ; ELSE FORMAT OR WRITE JUST
DD04 06CD    HSL6: MVI   B,OCDH ; DONE SO DELAY TO GIVE TIME
              DJNZ HSL6  ; FOR TUNNEL ERASE FIELD TO
DD06+10FB    DB    10H,HSL6-$-1
DD08 0D      DCR   C     ; DECAY.
              JRNZ HSL5
DD09+20F9    DB    20H,HSL5-$-1
;

DD0B AF      HSI1: XRA   A     ; OPERATION DONE
DD0C 3282DA   STA   DSKFLG ; ENABLE VALET
DD0F C9      RET
DD10 E6E0    HSL3: ANI   0EOH ; IF NOT ERRONEOUS COMPLETION
              JRZ  HSL2  ; THEN TEST DSKCYC AGAIN
DD12+28E1    DB    28H,HSL2-$-1
DD14 3A0BFB   LDA   RECNT ; ELSE DCR. RETRY RETRY
DD17 3D      DCR   A     ; COUNTER. IF <> 0
              JRNZ HSL1  ; THEN RETRY
DD18+20CF    DB    20H,HSI1-$-1
DD1A 3E09    MVI   A,9  ; ELSE REPORT ERROR
DD1C CD7CDD   CALL  DISK
DD1F 2107F9   HSR1: LXI   H,OPTMSG; PUT UP OPTION MESSG.
DD22 CD46DD   CALL  DOERR
DD25 CD50DD   HSJ2: CALL  ERRKEY ; GET KEY (CLEAR BUFFER 1ST)

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CP/M MACRO ASSEM 2.0 #025 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.

```

    DD28 FE57      CPI   'W'      ; IF KEY = W
    DD2A+2810     JRZ   HSR2      ; THEN WARM BOOT
    DD2C FE49      DB    28H,HSR2-$-1
    DD2E+28DB     CPI   'I'      ; ELSE IF KEY = I
    DD30 FE12      JNZ   RDH2      ; THEN RETRY DISK OP.
    DD32 C2E4DC     MVI   A,8      ; ELSE REPORT FDC RESULT BYTES
    DD35 3E08      CALL  DISK
    DD37 CD7CDD     JR   HSR1      ; LOOP TO OPTIONS AGAIN
    DD3A+18E3     DB    18H,HSR1-$-1

    ; HSR2: LDA SETFLG
    DD3C 3AFCF9     ORA   A        ; IF IN VALET
    DD3F B7          CNZ   CLNVAL   ; THEN RESET VALET VARIABLES
    DD40 C41ABD     JMP   WBOOT    ; WARM BOOT
    ; DOERR: LDA SETFLG
    DD46 3AFCF9     ORA   A        ; IF NOT IN VALET
    DD49 B7          JZ    MESSG    ; THEN MESSG
    DD4A CA4DE1     JMP   VALMSG   ; ELSE VALMSG
    ; ERRKEY: XRA A
    DD50 AF          LXI   H,KEYBUF
    DD51 212BFA     DI
    DD54 F3          STA   KEYCNT  ; CLEAR KEYBOARD BUFFER
    DD55 32FBF9     SHLD  KEYPNT
    DD58 223BFA     EI
    DD5B FB          CALL  CONIN   ; GET KEY
    DD5C CD6EE0     ANI   ODFH    ; MAKE UPPER CASE
    DD61 C9          RET

    ;SET UP DATA FOR WRITEH & READHS
    ; GSTUFF: LXI H,HSTBUF
    DD62 21B1FB     LDA   HSTTRK
    DD65 3A7EFA     MOV   D,A
    ; IF SIDES
    DD69 FE28      CPI   MAXTRK+1
    JRC   GSSIDO
    DD6B+3803     DB    38H,GSSIDO-$-1
    DD6D D6A8      SUI   MAXTRK+81H
    DD6F 57          MOV   D,A
    ENDIF
    ; GSSIDO: LDA HSTSEC
    DD70 3A80FA     INR   A
    DD73 3C          MOV   E,A
    DD74 5F          LDA   HSTDISK
    DD75 3A7DFA     MVI   B,1
    DD78 0601     MOV   C,A
    DD7A 4F          RET
    ; PAGE
  
```

```

;
;GENERAL FLOPPY HANDLER
;STARTS MOTOR, HOMES IF NEEDED,
;SEEKS IF NEEDED, AND INITIATES
;READ, WRITE, OR FORMAT
;
;ENTRY PARAMETERS
;
;      A = OPERATION CODE
;      0 = RETURN CURRENT STATUS
;      1 = FORMAT TRACK
;      2 = SECTOR WRITE
;      3 = SECTOR READ
;      8 = DISPLAY FDC RESULT BYTE ERROR MSG.
;      9 = DISPLAY ENGLISH DISK ERROR MSG.
;
;      B = # OF SECTORS TO TRANSFER (MUST = 1)
;      C = DRIVE #
;      D = TRACK TO BEGIN TRANSFER (BIT 7 = SIDE)
;      E = SECTOR TO BEGIN TRANSFER
;      HL = ADDRESS TO TRANSFER TO/FROM
;
;DSKCYC CODES
;
;      0 = SUCCESSFUL COMPLETION
;      1 = DFM DATA FORMAT
;      2 = DWR DATA WRITE
;      3 = DRD DATA READ
;      4 = RC1 RECAL 1
;      5 = SK1 SEEK TO 4
;      6 = RC2 RECAL 2
;      7 = SK2 SEEK TO TRACK
;      8 = WFR WAITING FOR READY
;
;ERROR IS INDICATED BY SETTING UPPER BIT(S) OF
;THE DSKCYC SEQUENCE CODE.
;
;      BIT 7      = U765 ERRONEOUS COMPLETION
;      BITS 7,6    = OPERATION TIME OUT
;      BITS 7,6,5 = U765 NOT READY
;
;
;-----|
; REPORT DSKYC |
;-----|
;

DD7C B7      DISK: ORA      A      ;IF ACC. <>0
                JRNZ    DSJ1    ; THEN GO NEXT TEST
DD7D+2006    DB      20H,DSJ1-$-1
DD7F 3A7CFB   LDA      DSKCYC ; ELSE TEST DSKCYC
                BIT      7,A
DD82+CB7F    DB      0CBH,7*8+A+40H
DD84 C9      RET
;
;-----|

```

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;I REPORT ERROR WITH FDC RESULT BYTES |
;-----|

DD85 FE08 DSJ1: CPI 8 ;IF ACC. <> 8
JRNZ DSJ2 ; THEN GO ..J2
DB 20H,DSJ2-\$-1
CALL CRLF
LXI H,DERMSG
CALL MESSG
LDA RESULT
MOV B,A
INR B
LXI H,DSKCYC
DD9A 0E20 DSL1: MVI C,SPC
CALL CONOUT
DD9C CD7EB0 PUSH B
DD9F C5 MOV B,M
DDA0 46 CALL DSHEX
DDA1 CD60B1 INX H
DDA4 23 POP B
DDA5 C1 DJNZ DSL1
DDA6+10F2 DB 10H,DSL1-\$-1
DDA8 C9 RET

;
;-----|
;I REPORT ERROR WITH ENGLISH MESSAGE |
;-----|

DDA9 FE09 DSJ2: CPI 9
JRNZ DSJ3
DB 20H,DSJ3-\$-1
LXI H,VCRLF
CALL DOERR
LDA RWUNIT
ANI 1
ADI 41H
STA DRVNUM
LDA DSKCYC
MOV B,A
ANI 0EOH
;
DDC3 2148F9 LXI H,TERR ; NODISK
DDC6 FEC0 CPI 0COH
JRZ DSV1
DDC8+281A DB 28H,DSV1-\$-1
;
DDCA FE00 CPI 0EOH
JRNZ DSV2
DB 20H,DSV2-\$-1
MVI B,0 ; SYSTEM
;
DDD0 78 DSV2: MOV A,B ; ALL OTHERS
DDD1 E60F ANI 0FH
DDD3 FE04 CPI 4
JRC DSV2A
DDD5+3802 DB 38H,DSV2A-\$-1

CP/M MACRO ASSEM 2.0 #028 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.

DDD7 E605		ANI	5	; I.E. 7=5,6=4
DDD9 3C	DSV2A:	INR	A	
DDDA 47		MOV	B,A	
DDDB 2149F9		LXI	H,CERR-6	
DDDE 110600		LXI	D,6	
DDE1 19	DSV3:	DAD	D	
		DJNZ	DSV3	
DDE2+10FD		DB	10H,DSV3-\$-1	
DDE4 CD46DD	DSV1:	CALL	DOERR	
DDE7 2135F9		LXI	H,DERMSG	
DDEA C346DD		JMP	DOERR	

;

PAGE

```

;
;-----|
; DO DISK OPERATION |
;-----|
;
;      SAVE DISK PARAMETERS
;

DDED 3270FA DSJ3: STA DSKCMD ;SET UP DISK OP. TABLES
DDF0 7A      MOV A,D   ;--HD & UNIT
DDF1 E680      ANI 80H
DDF3 07      RLC
DDF4 3259F8      STA RWHD
DDF7 07      RLC
DDF8 07      RLC
DDF9 B1      ORA C
DDFA 3249F8      STA FMUNIT
DDFD 3257F8      STA RWUNIT
DE00 3261F8      STA SDUNIT
DE03 3268F8      STA SKUNIT
DE06 E603      ANI 3
DE08 3250F8      STA RCUNIT
DE0B 7A      MOV A,D   ;--CYLINDER
DE0C E67F      ANI 7FH
DE0E 3258F8      STA RWCYL
DE11 3269F8      STA SKCYL
DE14 7B      MOV A,E   ;--SECTOR
DE15 325AF8      STA RWREC

;
DE18 2244F8      SHLD FMADDR ;--DATA ADDRESS
DE1B 2252F8      SHLD RWADDR
DE1E+CB00      RLCR B
DE20 0E00      DB 0CBH, 00H + B
DE22 0B      MVI C,0
DE23+ED43      DCX B
DE25+54F8      SBCD RWCNT ; DATA COUNT
DE27 3A70FA      DB 0EDH,43H
DE2A FE01      DW RWCNT

;
DE2C+2812      LDA DSKCMD
DE2E 4F      CPI 1
DE2F 3E43      JRZ DSJ5 ; IF COMMAND = FORMAT, THEN SKIP
DE31 81      DB 28H,DSJ5-$-1
DE32 3256F8      MOV C,A ; ELSE SET UP RWTBL
DE35 3E39      MVI A,RWCODE
DE37+CB41      ADD C
DE39+2002      STA RWCMD
DE3B F640      MVI A,39H
DE3D 3251F8      BIT 0,C
DE40 F3      DB 0CBH,0*8+C+40H
DE41 2A6DFA      JRNZ DSJ4
DSJ4: DSJ5: STA RWTBL
DSJ5: DI
LHLD MTRCNT ;EXAMINE MOTOR COUNT

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CP/M MACRO ASSEM 2.0 #030 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.

DE44 7C MOV A,H
DE45 B5 ORA L ;IF MOTOR ON
DE46 212C01 LXI H,MTRTIM
DE49 226DFA SHLD MTRCNT
JRZ STRMTR
DE4C+2846 DB 28H,STRMTR-\$-1
;
DE4E FB EI
DE4F CDB5DE CALL SNSTAT
BIT 5,A
DE52+CB6F DB 0CBH,5*8+A+40H
JRNZ DSJ5A
DE54+2009 DB 20H,DSJ5A-\$-1
DE56 210000 LXI H,0
DE59 226DFA SHLD MTRCNT
DE5C C30BDF JMP NOTRDY
DE5F CD77DE DSJ5A: CALL GTFLGS ; EXAMINE PROPER HMFLG.
DE62 7E MOV A,M
DE63 B7 ORA A ;IF HMFLG = 0
JRZ DSJ8
DE64+2807 DB 28H,DSJ8-\$-1
DE66 3E07 MVI A,7 ; DSKCYC = 7
DE68 2166F8 LXI H,SKTBL
JR DSJ10
DE6B+1805 DB 18H,DSJ10-\$-1
;
DE6D 3E04 DSJ8: MVI A,4 ; DSKCYC = 4
DE6F 214EP8 LXI H,RCLTBL
DE72 CDBCDE DSJ10: CALL DORCSK
DE75 FB EI
DE76 C9 RET
;
PAGE

```

;
;-----|
; MISC. DISK ROUTINES
;-----|
;

DE77 3A57F8 GTFLGS: LDA     RWUNIT ; GET PROPER HMPLG
DE7A 2176FA           LXI     H,HMFLGS
                      BIT     0,A
DE7D+CB47           DB      0CBH,0*8+A+40H
DE7F C8             RZ
DE80 23             INX     H
DE81 C9             RET

;
DE82 3E3C SETDT: MVI     A,60   ;SET OPERATION TIMEOUT
DE84 32A9FB          STA     DSKCNT ; (DECREMENTED BY SRV60)
DE87 AF              XRA     A
DE88 E5              PUSH    H
DE89 0608            MVI     B,8    ; AND CLEAR RESULT BYTES
DE8B 217DFB          LXI     H,STO
DE8E 77             SDTL1: MOV     M,A
DE8F 23             INX     H
                  DJNZ    SDTL1
DE90+10FC           DB      10H,SDTL1-$-1
DE92 E1             POP     H
DE93 C9             RET

;
; START DRIVE MOTORS
;

DE94 3E28 STRMTR: MVI     A,40
DE96 CD84DE          CALL    SETDT+2 ; 1/2 SECOND FOR DRIVE UP TO SPEED
DE99 3E08            MVI     A,8    ; DSKCYC = 8
DE9B 327CFB          STA     DSKCYC
DE9E D607            SUI     7
DEA0 CD27E1          CALL    LLATCH
DEA3 FB              EI

;
; CLEAR HOME FLAGS
;

DEA4 210000 CLRFLG: LXI     H,0
DEA7 2276FA          SHLD    HMPLGS
DEAA C9             RET

;
; CLEAR ANY RESULT BYTES FROM FDC
; AND ISSUE ILLEGAL COMMAND TO RESET
;

DEAB 0608 CLRFDL: MVI     B,8    ; CLEAR FDC
DEAD 48 CFL1:  MOV     C,B
DEAE CD2EDF          CALL    R765
DEB1 41             MOV     B,C
                  DJNZ    CFL1
DEB2+10F9           DB      10H,CFL1-$-1
DEB4 C9             RET

;
PAGE

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```

;
;-----+
;| BASIC FLOPPY DRIVER
;| SETS UP BOTH FLOPPY CONTROLLER AND DMA FOR
;| A FLOPPY OPERATION AND DELIVERS COMMAND.
;| SEE FLOPPY COMMAND TABLES FOR TABLE FORMAT.
;| RETURNS WITH Z FLAG SET IF A TIMEOUT OCCURS.
;| 'A' CONTAINS ST3 ON EXIT FOR 'SENSE DRIVE'
;| STATUS' COMMANDS
;-----+
;

;----- LEAVES INTERRUPT DISABLED -----

DEB5 215FF8 SNSTAT: LXI H,SDSTBL ; SENSE DRIVE STATUS
DEB8 3E01 MVI A,1
                JR DORCS1
DEBA+1805 DB    18H,DORCS1-$-1
;

DEBC 327CFB DORCSK: STA DSKCYC ; SEEK OR RECALIBRATE
DEBF 3E02 MVI A,2
DEC1 326FFA DORCS1: STA RESULT
DEC4 CD82DE CALL SETDT
;      DROP THROUGH TO DISKOP
;

DEC7 54 DISKOP: MOV D,H
DEC8 5D     MOV E,L
             BIT 4,M
DEC9+CB66 DB   0CBH,4*8+M+40H
             JRZ DOJ3 ;Z=SKIP DMA SETUP
DECB+281F DB   28H,DOJ3-$-1
DEC9 3E44 MVI A,44H ;--SET UP DMA MODE
             BIT 6,M
DEC9+CB76 DB   0CBH,6*8+M+40H
             JRZ DOJ2
DED1+2802 DB   28H,DOJ2-$-1
DED3 3E48 MVI A,48H
DED5 D3EB DOJ2: OUT DMAWMR
DED7 E5     PUSH H
DED8 23     INX  H
DED9 0EE0 MVI C,FPYBCA
             OUTI
DED9+EDA3 DB   0EDH,0A3H
             OUTI
DED9+EDA3 DB   0EDH,0A3H
DED9 0EE1 MVI C,FPYBWR
             OUTI
DEE1+EDA3 DB   0EDH,0A3H
             OUTI
DEE3+EDA3 DB   0EDH,0A3H
DEE5 3E00 MVI A,0
DEE7 D3EA OUT DMAWSM ;--MASK OFF
DEE9 2B     DCX  H
DEEA EB     XCHG
DEEB E1     POP  H
DEEC E5     DOJ3: PUSH H ;SEND 765 COMMANDS

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CP/M MACRO ASSEM 2.0 #033 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.

DEED 7E
DEEE E60F
DEF0 47
DEF1 62
DEF2 6B
DEF3 F3
DEF4 23
DEF5 4E
DEF6 C5
DEF7 CD18DF
DEFA C1
DEFB+280D
DEFD+10F5
DEFF E1
DF00+CB7E
DF02 C8
;
DF03 0601
DF05 CD00E0
DF08 C0
DF09 E5
;
DF0A E1
DOJ5: POP H ;KEEP SP CURRENT
;
DF0B CDABDE
DF0E 3A7CFB
DF11 F6E0
DF13 327CFB
DF16 AF
DF17 C9
;
;THIS ROUTINE WILL WAIT FOR NEXT BYTE READY THEN SEND THE
;COMMAND PASSED IN THE C REG TO THE FLOPPY CONTROLLER
;
DF18 061F
W765: MVI B,1FH
W7L1: DJNZ W7L1 ;DELAY 36 US.(4 MHZ)
DF1A+10FE
DB 10H,W7L1-\$-1
DF1C 060A
MVI B,10
DF1E DBFC
W7L2: IN SFLPY ;READ STATUS
DF20 E6C0
ANI 0C0H ;
DF22 FE80
CPI 80H ;WE WANT B7 ON & B6 OFF
JRZ W7J1 ;GO SEND BYTE
DF24+2803
DB 28H,W7J1-\$-1
DJNZ W7L2 ;DEC CNT LOOP
DF26+10F6
DB 10H,W7L2-\$-1
DF28 C9
RET
DF29 B7
W7J1: ORA A ;CLEAR THE Z
DF2A 79
MOV A,C
DF2B D3FD
OUT DFLPY ;SEND COMMAND
DF2D C9
RET
;
;THIS ROUTINE WILL WAIT NEXT BYTE READY THEN INPUT THE
;NEXT STATUS BYTE FROM THE FDC

CP/M MACRO ASSEM 2.0 #034 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.

;
DF2E 061F R765: MVI B,1FH
R7L1: DJNZ R7L1 ;DELAY 36 US.(4 MHZ)
DF30+10FE DB 10H,R7L1-\$-1
DF32 060A MVI B,10 ;SETUP COUNT
DF34 DBFC R7L2: IN SFLPY ;READ STATUS
DF36 E6C0 ANI 0COH ;
DF38 FEC0 CPI 0COH ;WE WANT B7 & B6 ON
JRZ R7J1
DF3A+2803 DB 28H,R7J1-\$-1
DJNZ R7L2 ;DEC CNT & LOOP
DB 10H,R7L2-\$-1
DF3C+10F6 RET
DF3E C9
DF3F B7 R7J1: ORA A ;RESET Z
DF40 DBFD IN DFLPY ;READ A BYTE
DF42 C9 RET
;
PAGE

```

;
;-----|||-----;
;| FLOPPY INTERRUPT ROUTINE |||-----;
;-----|||-----;

;
SRVFPY: SSPD    TEMSTK
DF43+ED73      DB     0EDH,73H
DF45+49FA      DW     TEMSTK
DF47 31C2FF    LXI    SP,INTSTK
DF4A E5        PUSH   H
DF4B D5        PUSH   D
DF4C C5        PUSH   B
DF4D F5        PUSH   PSW
DF4E DBFC      IN     SLPY
DF50 E610      ANI    10H    ; IF FDC NOT BUSY
                         JRZ    FPJ2    ; THEN SENSE INT. STATUS
DF52+2811      DB     28H,FPJ2-$-1

;
;-----|||-----;
;| RESULT PHASE FOR READ, WRITE OR FORMAT ! |-----;
;-----|||-----;

;
DF54 0607      MVI    B,7    ; ELSE READ 7 RESULT BYTES
DF56 CD00E0      CALL   REDRES
                  JRZ    FPJ3    ; DIDN'T READ ALL BYTES
DF59+2822      DB     28H,FPJ3-$-1
DF5B 3A7DFB      LDA    STO    ; CHECK STO
DF5E E6F8        ANI    0F8H    ; IF STO NOT OK
DF60 217CFB      LXI    H,DSKCYC
                  JRNZ   FPJ5    ; THEN ERROR
DF63+202C      DB     20H,FPJ5-$-1

;
;-----|||-----;
;| RESULT PHASE FOR SEEK, RECAL OR READY CHANGE ! |-----;
;-----|||-----;

;
DF65 0E08      FPJ2: MVI    C,8
DF67 CD18DF      CALL   W765    ; ISSUE SENSE INT. STATUS
                  JRZ    FPJ3    ; IF ERROR, THEN GO DERTIM
DF6A+2811      DB     28H,FPJ3-$-1
DF6C CD2EDF      CALL   R765
                  JRZ    FPJ3    ; READ 1ST RESULT BYTE
DF6F+280C      DB     28H,FPJ3-$-1
DF71 4F        MOV    C,A    ; SAVE STO
DF72 FE80        CPI    80H    ; IF INVALID COMMAND WAS ISSUED
                  JRZ    FPOK    ; THEN WE ARE DONE
DF74+281F      DB     28H,FPOK-$-1
DF76 217DFB      LXI    H,STO
DF79 71        MOV    M,C    ; ELSE STORE STO
DF7A CD2EDF      CALL   R765    ; READ NEXT BYTE
DF7D CA29E0      FPJ3: JZ     DERTIM ; FDC NOT READY
DF80 23        INX    H
DF81 77        MOV    M,A    ; STORE ST1

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CP/M MACRO ASSEM 2.0 #036 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.

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    DF82 79      MOV   A,C
    DF83 E6F8      ANI   0F8H
    DF85 FE20      CPI   20H ; IF SEEK OR RECAL JUST DONE
                    JRZ   FPJ2 ; THEN CHECK FOR HIDDEN INT.
    DF87+28DC     DB    28H,FPJ2-$-1
    DF89 217CFB    LXI   H,DSKCYC; ELSE READY LINE HAS CHANGED STATE
    DF8C 7E      MOV   A,M
    DF8D FE08      CPI   8 ; IF WAITING FOR READY
                    FPJ4: JRZ   IIEND ; THEN EXIT
    DF8F+2845      DB    28H,IIEND-$-1
                    FPJ5: SETB 7,M ; ELSE ERROR
    DF91+CBFE     DB    0CBH,7*8+M+0COH
                    JR    FPJ2 ; CHECK FOR HIDDEN INT.
    DF93+18D0     DB    18H,FPJ2-$-1
    ;
    ;-----|
    ;       CHECK FOR NEXT OPERATION
    ;-----|
    ;
    DF95 AF      FPOK: XRA   A
    DF96 32A9FB    STA   DSKCNT ; CLEAR DSKCNT
    DF99 217CFB    FPJ8: LXI   H,DSKCYC; AND CHECK DSKCYC
    DF9C 7E      MOV   A,M
                    BIT   7,A ; IF BIT 7 SET
    DF9D+CB7F     DB    0CBH,7*8+A+40H
                    JRNZ FPC7 ; THEN ERROR
    DF9F+2039     DB    20H,FPC7-$-1
    DFA1 3600      MVI   M,0 ; ELSE CLEAR DSKCYC
    DFA3 D604      SUI   4 ; IF DSKCYC = 0,1,2, OR 3
                    JRC   IIEND ; THEN EXIT
    DFA5+382F     DB    38H,IIEND-$-1
    DFA7+200B     JRNZ FPC1 ; ELSE IF DSKCYC <> 4 THEN ..C1
                    DB    20H,FPC1-$-1
    ;
    DFA9 3E04      MVI   A,4 ; DSKCYC NOW = 4
    DFAE 3269F8    STA   SKCYL ; SO DO SEEK TO TRACK 4
    DFAE 3C      INR   A ; NEW DSKCYC = 5
    DFAF 2166F8    LXI   H,SKTBL
                    JR    FPC9
    DFB2+181F     DB    18H,FPC9-$-1
    ;
    DFB4 3D      FPC1: DCR   A ; IF DSKCYC <> 5
                    JRNZ FPC2 ; THEN ..C2
    DFB5+2007     DB    20H,FPC2-$-1
    DFB7 214EF8    LXI   H,RCLTBL; DSKCYC NOW = 5
    DFAA 3E06      MVI   A,6 ; SO DO 2ND RECALIBRATE
                    JR    FPC9
    DFBC+1815     DB    18H,FPC9-$-1
    ;
    DFBE 3D      FPC2: DCR   A ; IF DSKCYC <> 6
                    JRNZ FPC5 ; THEN ..C5
    DFBF+2018     DB    20H,FPC5-$-1
    ;
    DFC1 CD77DE    CALL  GTFLGS ; DSKCYC NOW = 6
    DFC4 34      INR   M ; SO SET PROPER HMFLG
    ;
  
```

CP/M MACRO ASSEM 2.0 #037 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.

DPC5 3A58F8 LDA RWCYL ; THEN SEEK TO DESIRED TRACK
DFC8 B7 ORA A
 JRZ FPC6
DPC9+2811 DB 28H,FPC6-\$-1
DFCB 3269F8 STA SKCYL ; STORE TRACK IN SEEK TABLE
DFCE 2166F8 LXI H,SKTBL
DFD1 3E07 MVI A,7 ; NEW DSKCYC = 7
DFD3 CDBCDE FPC9: CALL DORCSK ; SEEK TO TRACK
DFD6 C309F5 IIEND: JMP IEND
 ;
DFD9 3D FPC5: DCR A ; IF DSKCYC <> 7
 FPC7: JRNZ DSKERR ; THEN ERROR, ARE NO OTHERS
DFDA+2040 DB 20H,DSKERR-\$-1
DFDC 3E07 FPC6: MVI A,7 ; DSKCYC NOW = 7
DFDE 326FFA STA RESULT
DFE1 212C01 LXI H,MTRTIM; SO RESET MOTOR TIMER
DFE4 226DFA SHLD MTRCNT
DFE7 3A70FA LDA DSKCMD ; NEW DSKCYC = 1,2, OR 3
DFEA 327CFB STA DSKCYC
DFED 3D DCR A ; IF DSKCYC <> = 1
 JRNZ FPC3 ; THEN ..C3
DFFE+2005 DB 20H,FPC3-\$-1
DFF0 2143F8 LXI H,FMTTBL; ELSE NEXT OP IS FORMAT
 JR FPC4
DFF3+1803 DB 18H,FPC4-\$-1
DFF5 2151F8 FPC3: LXI H,RWTBL ; NEXT OP IS READ OR WRITE
DFF8 CD82DE FPC4: CALL SETDT ; CLEAR RESULT BYTES & RESET TIMEOUT COUNTER
 CALL DISKOP ; ISSUE COMMAND
 JR IIEND
DFFE+18D6 DB 18H,IIEND-\$-1
 ;
 ;-----|
 ;| READ RESULTS (B) TIMES |
 ;-----|
 ;
E000 117DFB REDRES: LXI D,ST0 ; ELSE READ RESULTS
E003 2184FB LXI H,RESNUM
E006 C5 RDRSL1: PUSH B
 CALL R765 ;READ 1 BYTE FROM FDC
E00A C1 POP B
E00B C8 RZ ; ERROR, Z BIT SET
E00C 12 STAX D ; SAVE BYTE
E00D 13 INX D
E00E 34 INR M ; INCR COUNTER
 DJNZ RDRSL1 ; READ NEXT BYTE
E00F+10F5 DB 10H,RDRSL1-\$-1
E011 04 INR B ; CLEAR Z BIT
E012 C9 RET
 ;
 ;-----|
 ;| DISK ERRORS |
 ;-----|
 ;
E013 210000 WFRBAD: LXI H,0 ; -ERROR WHEN WAITING FOR READY
E016 226DFA SHLD MTRCNT ; CLEAR MTRCNT SO MOTOR IS STARTED
E019 C3E7F4 JMP TIMEOUT ; DSKCYC OR WITH OC0H

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;
E01C CDABDE DSKERR: CALL CLRFD C ; NORMAL OPERATION ERROR
E01F 3A7CFB LDA DSKCYC ; DSKCYC OR WITH 80H
E022 F680 ORI 80H
E024 327CFB STA DSKCYC
JR IIEND
E027+18AD DB 18H,IIEND-\$-1
;
E029 CD0BDF DERTIM: CALL NOTRDY ; U765 NOT READY ERROR
JR IIEND ; DSKCYC OR WITH 0E0H
E02C+18A8 DB 18H,IIEND-\$-1
;

PAGE

```

;
;-----| I/O DRIVERS |-----|
;
;OUTPUT A CHARACTER TO THE DISPLAY
;
E02E 0E0A    CRLF:   MVI     C,0AH
E030 CD7EE0    CALL    CONOUT
E033 0E0D    MVI     C,0DH
                JR      CONOUT
E035+1847    DB      18H,CONOUT-$-1
;
E037 AF        CRTOUT: XRA     A
E038 3245FA    STA      CONFLG
E03B C3A9E1    JMP      DISPLAY
;
;INPUT A CHARACTER FROM THE KEYBOARD
;
E03E FB        CRTIN:  EI
E03F 3AAEDA    LDA      TIMFLG
E042 B7        ORA      A
E043 CC91EE    CZ       DSPTIM
E046 F3        DI
E047 3AFBF9    LDA      KEYCNT ;LOOP UNTIL CHAR.
E04A B7        ORA      A
                JRZ      CRTIN
E04B+28F1    DB      28H,CRTIN-$-1
E04D E5        PUSH    H
E04E D5        PUSH    D
E04F C5        PUSH    B
E050 212CFA    LXI     H,KEYBUF+1
E053 112BFA    LXI     D,KEYBUF
E056 010F00    LXI     B,KBUFLN-1
E059 1A        LDAX    D
                LDIR
E05A+EDB0    DB      0EDH,0BOH
E05C 2A3BFA    LHLD    KEYPNT
E05F 2B        DCX     H
E060 223BFA    SHLD    KEYPNT
E063 21FBF9    LXI     H,KEYCNT
E066 35        DCR     M
E067 FB        EI
E068 E67F    ANI     7FH      ;MASK OFF BIT 7
E06A C1        POP     B
E06B D1        POP     D
E06C E1        POP     H
E06D C9        RET
;
E06E 3A0300    CONIN:  LDA     IOBYTE
E071 E603    ANI     3
E073 CAFBEO    JZ      TTYIN
E076 3D        DCR     A
                JRZ      CRTIN
E077+28C5    DB      28H,CRTIN-$-1

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CP/M MACRO ASSEM 2.0 #040 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.

E079 3D	DCR	A
	JRZ	PTRIN
E07A+2868	DB	28H,PTRIN-\$-1
	JR	CRTIN
E07C+18C0	DB	18H,CRTIN-\$-1
;		
E07E 3A0300	CONOUT: LDA	IOBYTE
E081 E603	ANI	3
E083 CA03E1	JZ	TTYOUT
	BIT	0,A
E086+CB47	DB	OCBH,0*8+A+40H
	JRZ	LPTOUT
E088+284A	DB	28H,LPTOUT-\$-1
	JR	CRTOUT
E08A+18AB	DB	18H,CRTOUT-\$-1
;		
E08C 3A0300	READER: LDA	IOBYTE
E08F 1F	RAR	
E090 1F	RAR	
E091 E603	ANI	3
	JRZ	TTYIN
E093+2866	DB	28H,TTYIN-\$-1
E095 3D	DCR	A
	JRZ	PTRIN
E096+284C	DB	28H,PTRIN-\$-1
E098 3D	DCR	A
	JRZ	CRTIN
E099+28A3	DB	28H,CRTIN-\$-1
	JR	TTYIN
E09B+185E	DB	18H,TTYIN-\$-1
;		
E09D 3A0300	PUNCH: LDA	IOBYTE
E0A0 1F	RAR	
E0A1 1F	RAR	
E0A2 1F	RAR	
E0A3 1F	RAR	
E0A4 E603	ANI	3
	JRZ	TTYOUT
E0A6+285B	DB	28H,TTYOUT-\$-1
E0A8 3D	DCR	A
E0A9 CA37E0	JZ	CRTOUT
E0AC 3D	DCR	A
	JRZ	LPTOUT
E0AD+2825	DB	28H,LPTOUT-\$-1
	JR	TTYOUT
E0AF+1852	DB	18H,TTYOUT-\$-1
;		
E0B1 3A0300	LIST: LDA	IOBYTE
E0B4 17	RAL	
E0B5 17	RAL	
E0B6 17	RAL	
E0B7 E603	ANI	3
	JRZ	TTYOUT
E0B9+2848	DB	28H,TTYOUT-\$-1
E0BB 3D	DCR	A
E0BC CA37E0	JZ	CRTOUT

CP/M MACRO ASSEM 2.0 #041 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.

```

        JR      LPTOUT
E0BF+1813   DB      18H,LPTOUT-$-1
;
;TEST KEYBOARD STATUS
;
E0C1 3A0300 CONST: LDA    IOBYTE
E0C4 E603     ANI    3
                JRZ    TSTTTY
E0C6+2853     DB     28H,TSTTTY-$-1
                BIT    0,A
E0C8+CB47     DB     0CBH,0*8+A+40H
                JRZ    LISTST
E0CA+2820     DB     28H,LISTST-$-1
E0CC 3AFBF9   LDA    KEYCNT
E0CF B7       ORA    A
E0D0 C8       RZ     ;NO CHAR: A=0
E0D1 3EFF     MVI    A,0FFH ;CHAR. : A=0FFH
E0D3 C9       RET
;
;OUTPUT A CHARACTER TO THE LIST DEVICE
;
E0D4 3E10     LPTOUT: MVI   A,10H
E0D6 D3F3     OUT   SPRTR
E0D8 DBF3     IN    SPRTR
E0DA E624     ANI   24H
E0DC FE24     CPI   24H
                JRNZ  LPTOUT
E0DE+20F4     DB    20H,LPTOUT-$-1
E0E0 79       MOV   A,C
E0E1 D3F2     OUT   DPRTR
E0E3 C9       RET
;
;INPUT A CHARACTER FROM THE LIST DEVICE
;
E0E4 CD13E1   PTRIN: CALL  TSTLPT
                JRZ   PTRIN
E0E7+28FB     DB    28H,PTRIN-$-1
E0E9 DBF2     IN    DPRTR
E0EB C9       RET
;
;TEST LIST DEVICE STATUS
;
E0EC 3A0300   LISTST: LDA   IOBYTE
E0EF 17       RAL
E0F0 17       RAL
E0F1 17       RAL
E0F2 E603     ANI   3
                JRZ   TSTTTY
E0F4+2825     DB    28H,TSTTTY-$-1
E0F6 3D       DCR
                JRZ   TSTLPT
E0F7+281A     DB    28H,TSTLPT-$-1
E0F9 AF       XRA
E0FA C9       RET
;
EOFB CD1BE1   TTYIN: CALL  TSTTTY

```

CP/M MACRO ASSEM 2.0 #042 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.

E0FE+28FB	JRZ	TTYIN
E100 DBF0	DB	28H,TTYIN-\$-1
E102 C9	IN	DCOMM
	RET	
;		
E103 3E10	TTYOUT: MVI	A,10H
E105 D3F1	OUT	SCOMM
E107 DBF1	IN	SCOMM
E109 E624	ANI	24H
E10B FE24	CPI	24H
	JRNZ	TTYOUT
E10D+20F4	DB	20H,TTYOUT-\$-1
E10F 79	MOV	A,C
E110 D3F0	OUT	DCOMM
E112 C9	RET	
;		
E113 3E10	TSTLPT: MVI	A,10H
E115 D3F3	OUT	SPRTR
E117 DBF3	IN	SPRTR
	JR	TTYCOM
E119+1806	DB	18H,TTYCOM-\$-1
;		
E11B 3E10	TSTTTY: MVI	A,10H
E11D D3F1	OUT	SCOMM
E11F DBF1	IN	SCOMM
E121 E601	TTYCOM: ANI	1
E123 C8	RZ	
E124 3EFF	MVI	A,OFFH
E126 C9	RET	
;		
;CHANGE STATUS LATCH - ENTER WITH BITS TO		
;BE CHANGED IN A. IF Z IS SET, LATCH WILL		
;BE ANDED WITH A VALUE - OTHERWISE ORED.		
;DISABLES INTERRUPT		
;(A,B)		
;		
E127 F5	LLATCH: PUSH	PSW
E128 3ECF	MVI	A,0CFH
E12A F3	DI	
E12B D3F9	OUT	SPIOA
E12D AF	XRA	A
E12E D3F9	OUT	SPIOA
E130 3A46FA	LDA	LSTATE
E133 47	MOV	B,A
E134 F1	POP	PSW
	JRZ	LLJ1
E135+2803	DB	28H,LLJ1-\$-1
E137 B0	ORA	B
	JR	LLJ2
E138+1801	DB	18H,LLJ2-\$-1
E13A A0	LLJ1: ANA	B
E13B 3246FA	LLJ2: STA	LSTATE
E13E D3F8	OUT	DPIOA
E140 3EB8	MVI	A,0B8H
E142 D3FA	OUT	DPIOB
E144 3E98	MVI	A,98H

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```

E146 D3FA      OUT    DPIOB
E148 3EB8      MVI    A,0B8H
E14A D3FA      OUT    DPIOB
E14C C9        RET

;
;GENERAL MESSAGE ROUTINE
;

E14D 4E        MESSG: MOV    C,M
                  BIT    7,C
E14E+CB79      DB     0CBH,7*8+C+40H
                  RES    7,C
E150+CBB9      DB     0CBH,7*8+C+80H
E152 23        INX    H
E153 C27EE0      JNZ   CONOUT
E156 CD7EE0      CALL   CONOUT
                  JR    MESSG
E159+18F2      DB     18H,MESSG-$-1

;
;DISPLAY H AS FOUR ASCII CHARS.
E15B 44        DSADDR: MOV    B,H
E15C CD60E1      CALL   DSHEX
E15F 45        MOV    B,L

;
;DISPLAY B AS TWO ASCII CHARACTERS
;

E160 78        DSHEX: MOV    A,B
E161 07        RLC
E162 07        RLC
E163 07        RLC
E164 07        RLC
E165 CD69E1      CALL   DHJ1
E168 78        MOV    A,B
E169 E60F        DHJ1: ANI    0FH
E16B C630      ADI    30H
E16D FE3A      CPI    3AH
E16F FA74E1      JM    DHJ2
E172 C607      ADI    7
E174 4F        DHJ2: MOV    C,A
E175 C37EE0      JMP    CONOUT

;
;MAKE THE SOUND SPECIFIED BY THE 14 BYTE TABLE
; POINTED TO BY H-L (R14 OF THE SOUND GENERATOR
; IS FIRST, R0 LAST)
;

E178 7E        SOUND: MOV    A,M
E179 3231F6      STA    TONPER
E17C 23        INX    H
E17D 3ECF      MVI    A,OCFH
E17F F3        DI
E180 D3F9      OUT   SPIOA
E182 AF        XRA    A
E183 D3F9      OUT   SPIOA
E185 3EFF      MVI    A,OFFH
E187 D3FA      OUT   DPIOB
E189 01F80E      LXI    B,14*256+DPIOA
E18C 05        SOL1: DCR    B
  
```

CP/M MACRO ASSEM 2.0 #044 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.

E18D+ED41	OUTP	B
E18F 04	DB	0EDH,B*8+41H
E190 3EC3	INR	B
E192 D3FA	MVI	A,0C3H
E194 3EE3	OUT	DPIOB
E196 D3FA	MVI	A,0E3H
	OUT	DPIOB
	OUTI	;SEND THE DATA
E198+EDA3	DB	0EDH,0A3H
E19A 3EE7	MVI	A,0E7H
E19C D3FA	OUT	DPIOB
E19E 3EC7	MVI	A,0C7H
E1A0 D3FA	OUT	DPIOB
E1A2 3EE7	MVI	A,0E7H
E1A4 D3FA	OUT	DPIOB
	JRNZ	SOL1
E1A6+20E4	DB	20H,SOL1-\$-1
E1A8 C9	RET	

PAGE

```
;;
;-----|
;|      500 DISPLAY & KEYBOARD DRIVER      |
;|
;-----|
;|      CONTROL CODES      |
;-----|
;|      CTRL/G  (07H) BELL
;|      CTRL/H  (08H) BACKSPACE
;|      CTRL/I  (09H) TAB
;|      CTRL/J  (0AH) LINE FEED
;|      CTRL/K  (0BH) REV. LINE FEED
;|      CTRL/L  (0CH) RIGHT CURSOR
;|      CTRL/M  (0DH) CARRIAGE RETURN
;|      CTRL/X  (0EH) CLEAR KEYBOARD BUFFER
;|      CTRL/Z  (1AH) CLEAR ACTIVE REG. & HOME CURSOR
;|      CTRL/^  (1EH) CURSOR HOME
;|
;|      BS      (08H) BACKSPACE
;|      CR      (0DH) CARRIAGE RETURN
;|      LF      (0AH) LINE FEED
;|
;-----|
;|      ESCAPE CODES      |
;-----|
;|      ESC 0XXXX PLOT POINT
;|      ESC 1XXXX PLOT VECTOR
;|      ESC 2XXYYXXYY  BLOCK DRAW
;|      ESC 3      CLEAR GRAPHICS & PLOT BRIGHT
;|      ESC 4XXYYXXYY  BLOCK FILL
;|      ESC 5 M1M2      SET MASKS
;|      ESC 6      DISABLE GRAPHIC IMAGE
;|      ESC 7      ENABLE GRAPHIC IMAGE
;|      ESC 8      SET TO PLOT BRIGHT
;|      ESC 9      SET TO PLOT DARK
;|      ESC :      READ DATE
;|      ESC ;      SET PRINTER BAUD FROM CMOS RAM
;|      ESC <      SET COMM. BAUD FROM CMOS RAM
;|      ESC =LC DIRECT CURSOR MOVE
;|      ESC >      READ TIME
;|      ESC ?A      READ CMOS RAM
;|      ESC @AD WRITE TO CMOS RAM (CONSULT CMOS ALLOCATION)
;|      ESC A      CURSOR UP
;|      ESC B      CURSOR DOWN
;|      ESC C      CURSOR RIGHT
;|      ESC D      CURSOR LEFT
;|      ESC E      -- NOT USED --
;|      ESC F      -- NOT USED --
;|      ESC G      -- NOT USED --
;|      ESC H      HOME
```

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ESC I	REVERSE LINE FEED
ESC J	ERASE TO END OF SCREEN
ESC K	ERASE TO END OF LINE
ESC L	INSERT LINE
ESC M	DELETE LINE
ESC N	SET TABS
ESC O	CLEAR TABS
ESC P	DELETE CHAR.
ESC Q	INSERT CHAR. MODE ON
ESC R	INSERT CHAR. MODE OFF
ESC SA	SELECT CHAR. SIZE
ESC TA	SELECT CHAR. SET
ESC UA	SELECT ATTRIBUTE
ESC VA	SELECT ALT. LEAD-IN
ESC WS1...S15	LOAD TONE TABLE AND EXECUTE
ESC XTB	SET ACTIVE REGION
ESC YLC	DIRECT CURSOR MOVE
ESC Z	RESET PARAMETERS
ESC [SAVE PARAMETERS (SYSTEM USE ONLY)
ESC \	CLR. SCN. & RESET PAR.
ESC]	RECALL PARAMETERS (SYSTEM USE ONLY)
ESC ^	WORD WRAP OFF
ESC -	WORD WRAP ON
ESC `	WSFLAG SET (ON)
ESC A	WSFLAG RESET (OFF)
ESC B	SOUND TONE FROM TONE TABLE
ESC C	CURSOR OFF
ESC D	CURSOR ON

PAGE

```

;
;-----|  

;       DISPLAY ENTRY (CHARACTER IN C) |  

;-----|  

;  

;       |-----|  

;       | MASTER MODULE |  

;       |-----|  

;  

DISPLAY: SSPD    DSPSTK ; SAVE STACK POINTER  

E1A9+ED73      DB      0EDH,73H  

E1AB+4BFA      DW      DSPSTK  

E1AD 31EAPP    LXI    SP,DSPTEM ; SET STACK POINTER TO DISPLAY STACK  

E1B0 3EFF      MVI    A,OFFH ; SET DSPPLG TO INHIBIT VALET  

E1B2 32A5DA    STA    DSPPLG  

E1B5 E5        VALDSP: PUSH   H      ; SAVE REGISTERS  

E1B6 D5        PUSH   D  

E1B7 C5        PUSH   B  

E1B8 F5        PUSH   PSW  

;  

;       ADD OFFSET TO LINE#  

;  

E1B9 CD6EE2    LFAGN: CALL    CMPOF1 ; CALCULATE LINE OFFSET  

;  

;       CHECK CYCLE  

;  

E1BC 3AFAF9    LDA    DSPCYC  

E1BF B7        ORA    A      ; IF DSPCYC <> 0  

E1C0 C275E3    JNZ    ESCCHK ; THEN GO CHECK DSPCYC  

;  

;       IS CHARACTER ESCAPE ?  

;  

RES   7,C      ; ELSE MAKE SURE CHAR. IS ASCII  

E1C3+CBB9    DB      0CBH,7*8+C+80H  

;  

E1C5 79        MOV    A,C  

E1C6 FE1B      CPI    ESC      ; IF CHAR. = ESC.  

;  

E1C8+2806    JRZ    DSPJ1 ; THEN DSPJ1  

E1CA 3A06FA    DB      28H,DSPJ1-$-1  

E1CD B9        LDA    LEADIN ; ELSE  

;  

E1CE+2005    CMP    C      ; IF CHAR. <> LEADIN  

E1D0 3E01      JRNZ   DSPJ2 ; THEN OUTPUT IT TO DISPLAY DRIVER  

E1D2 C3F8E1    DB      20H,DSPJ2-$-1  

;  

DSPJ1: MVI    A,1      ; ELSE SET DSPCYC = 1  

JMP    EXIT3 ; AND EXIT  

;  

;       IS CHARACTER CONTROL ?  

;  

E1D5 79        DSPJ2: MOV    A,C  

E1D6 E660      ANI    60H      ; IF CHAR. IS A CONTROL CHAR.  

E1D8 CA97E2      JZ     CTROL ; THEN GO TO CONTROL CASE  

;  

;       TRANSLATE CHARACTER TO ALTERNATE  

;       SET, IF NEEDED.  

;

```

CP/M MACRO ASSEM 2.0 #048 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.
 E1DB CD7DE2 CALL CHKCHR ; ELSE Xlate to alternate set if needed
 ;
 ; OUTPUT CHAR. TO SCREEN AND
 ; INCREMENT H ACCORDINGLY
 ;
 E1DE CD17E2 CHRRET: CALL OUTCHR ; OUTPUT CHAR. TO SCREEN
 ;
 ; IF END OF LINE, EXIT.
 ;
 E1E1 F5 PUSH PSW
 E1E2 3A01FA LDA WRPFGLG
 E1E5 B7 ORA A ; IF LINE WRAP ON
 JRZ DSPJ3 ; THEN ..J1
 E1E6+2805 DB 28H,DSPJ3-\$-1
 ;
 E1E8 F1 POP PSW ; ELSE LINE WRAP OFF
 JRNZ DSPRET
 E1E9+2010 DB 20H,DSPRET-\$-1
 JR CUSTH
 E1EB+1803 DB 18H,CUSTH-\$-1
 ;
 E1ED F1 DSPJ3: POP PSW
 JRNZ LFAGN ; WRAP IF NEEDED
 E1EE+20C9 DB 20H,LFAGN-\$-1
 ;
 ; STORE NEW H IN CHRADR+1
 ;
 E1F0 7C CUSTH: MOV A,H ; STORE POSITION OF NEXT CHAR.
 E1F1 3208FA STA CHRADR+1
 ;
 ; OUTPUT CURSOR TO (H)+1,(L)
 ;
 E1F4 CD57B2 CRSRET: CALL OUTCUR ; OUTPUT CURSOR
 ;
 ; EXIT POINTS
 ;
 E1F7 AF EXIT2: XRA A ; CLEAR DSPCYC
 E1F8 32FAF9 EXIT3: STA DSPCYC ; STORE DSPCYC
 E1FB 3A45FA DSPPRET: LDA CONFLG
 E1FE B7 ORA A ; IF IN VALET
 JRNZ DSPJ4 ; THEN DSPJ4
 E1FF+2011 DB 20H,DSPJ4-\$-1
 E201 3C INR A ; ELSE
 E202 3245FA STA CONFLG ; SET CONFLG <> 0
 E205 AF XRA A ; DSPFLG = 0
 E206 32A5DA STA DSPPFLG
 E209 F1 POP PSW ; RESTORE REGISTERS
 E20A C1 POP B
 E20B D1 POP D
 E20C E1 POP H
 LSPD DSPSTK ; RESTORE STACK POINTER
 E20D+ED7B DB 0EDH,07BH
 E20F+4BFA DW DSPSTK
 E211 C9 RET ; RETURN
 E212 F1 DSPJ4: POP PSW
 E213 C1 POP B

CP/M MACRO ASSEM 2.0 #049 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.

E214 D1 POP D
E215 E1 POP H
E216 C9 RET

PAGE

```

;
;-----|
; MISC. ROUTINES FOR      |
; MASTER MODULE           |
;-----|
;

; OUTPUT CHAR. TO HL

E217 5F    OUTCHR: MOV    E,A
E218 1601   MVI    D,1
E21A 3A00FA  LDA    CURATT
              BIT    4,A
E21D+CB67   DB     0CBH,4*8+A+40H
              JRZ    OUTCR1
E21F+2801   DB     28H,OUTCR1-$-1
E221 14    INR    D
E222 7D    OUTCR1: MOV    A,L
              MOV    B,H
              ORI    0EOH
              OUT    SDSPY
              MVI    C,DDSPY
              OUTP   E
              DB     0EDH,E*8+41H
              ANI    0DFH
              OUT    SDSPY
              ANI    1FH
              MOV    L,A
              LDA    CURATT
              OUTP   A
              DB     0EDH,A*8+41H
              MOV    A,H
              CPI    79

; E23B F5    PUSH   PSW
E23C 3A01FA LDA    WRPFLG
E23F B7    ORA    A
              JRNZ   WP1
E240+2010   DB     20H,WP1-$-1

; E242 F1    POP    PSW
              JRZ    OUTEXT ; DO IF WRAP ON
E243+2805   DB     28H,OUTEXT-$-1

; E245 24    OUTCR2: INR    H
E246 15    DCR    D
              JRNZ   OUTCR1 ;IF NOT DOUBLE CHAR.
E247+20D9   DB     20H,OUTCR1-$-1
E249 C9    RET    ; THEN RETURN, ELSE DO SECOND HALF

; E24A AF    OUTTEXT: XRA   A
E24B 3208FA STA    CHRADR+1
E24E 0EOA   MVI    C,LF
E250 B1    ORA    C
E251 C9    RET

```

CP/M MACRO ASSEM 2.0 #051 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.

;
E252 F1 WP1: POP PSW ; DO IF WRAP OFF
JRNZ OUTCR2
E253+20F0 DB 20H,OUTCR2-\$-1
E255 14 INR D
E256 C9 RET
;
; OUTPUT CURSOR TO HL
;
E257 3A02FA OUTCUR: LDA CURCTL
E25A B7 ORA A
E25B C0 RNZ
E25C 3EAC MVI A,0ACH
E25E D3EE OUT SDSPY
E260 7C MOV A,H
E261 3C INR A
E262 D3FE OUT DDSPY
E264 3BAD MVI A,0ADH
E266 D3EE OUT SDSPY
E268 7D MOV A,L
E269 E61F ANI 1FH
E26B D3FE OUT DDSPY
E26D C9 RET
;
; ADD OFFSET TO LINE#
;
E26E 2A07FA CMPOF1: LHLD CHRADR
E271 3AA4DA CMPOFF: LDA LINOPS
E274 85 ADD L
E275 FE18 CPI 24
JRC CMPJ1
E277+3802 DB 38H,CMPJ1-\$-1
E279 C6E8 ADI -24
E27B 6F CMPJ1: MOV L,A
E27C C9 RET
;
; TRANSLATE ALT. CHAR. SET
;
E27D 79 CHKCHR: MOV A,C
E27E FE40 CPI '8'
E280 D8 RC ; --- ADDED ---
E281 FE7F CPI 7FH
E283 D0 RNC ; --- ADDED ---
E284 E63F ANI 3FH
E286 F5 PUSH PSW
E287 118CF6 LXI D,CHRTBL
E28A EB XCHG
E28B 3AFFF9 LDA CURCHR
E28E 4F MOV C,A
E28F 0600 MVI B,0
E291 09 DAD B
E292 7E MOV A,M
E293 C1 POP B
E294 BB XCHG
E295 B0 ORA B
E296 C9 RET

CP/M MACRO ASSEM 2.0 #052 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.

PAGE

```

;
;-----|
;|      CONTROL CASE      |
;-----|
;

E297 79    CTROL: MOV     A,C
;
;-----|
;| BACK SPACE   |
;-----|
;

E298 FE08    CTROL2: CPI     BS
                JRNZ    CLCR
E29A+2024    DB      20H,CLCR-$-1
E29C 3A00FA    LDA    CURATT
                BIT     4,A
E29F+CB67    DB      0CBH,4*8+A+40H
                JRZ    CLJ1
E2A1+2801    DB      28H,CLJ1-$-1
E2A3 25      DCR     H
E2A4 25      CLJ1:   DCR     H
E2A5 3EFF    MVI     A,OFFH
E2A7 BC      CMP     H
E2A8 FAFOE1    JM      CUSTH
E2AB 3A01FA    LDA    WRPPFLG
E2AB B7      ORA     A
                JRNZ    CLJ2
E2AF+200A    DB      20H,CLJ2-$-1
E2B1 7C      MOV     A,H
E2B2 D6B0    SUI     176
E2B4 3208FA    STA    CHRADR+1
E2B7 67      MOV     H,A
E2B8 C39BE4.    JMP    REVLF
;
E2BB 2600    CLJ2:   MVI     H,O
E2BD C3F0E1    JMP    CUSTH
;
;-----|
;| CARRIAGE RETURN   |
;-----|
;

E2C0 FE0D    CLCR:   CPI     CR
                JRNZ    CLF
E2C2+2005    DB      20H,CLF-$-1
E2C4 2600    MVI     H,O
E2C6 C3F0E1    JMP    CUSTH
;
;-----|
;| LINE FEED   |
;-----|
;

E2C9 FE0A    CLF:    CPI     LF
                JRNZ    CLBL
E2CB+2049    DB      20H,CLBL-$-1
E2CD 3A04FA    CLF1:   LDA    BOTACT ;IF NOT AT BOTTOM

```

CP/M MACRO ASSEM 2.0 #054 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.

```

E2D0 47      MOV    B,A
E2D1 3A07FA   LDA    CHRADR
E2D4 B8      CMP    B
              JRNZ   CLF4 ; THEN MOVE CURSOR
E2D5+2034   DB     20H,CLF4-$-1
E2D7 3A05FA   LDA    MAGACT ; ELSE IF REGION NOT
E2DA FE17      CPI    23    ; FULL SCREEN
              JRNZ   CLF3 ; THEN SOFTWARE SCROLL
E2DC+2028   DB     20H,CLF3-$-1
;
E2DE 2E00      MVI    L,0
E2E0 CD71E2   CALL   CMPOFF
E2E3 CD1DE8   CALL   LFCLR1
E2E6 3AA4DA   LDA    LINOPS ;GRAPHIC SCROLL
E2E9 57      MOV    D,A
E2EA 0601      MVI    B,1 ;CLEAR ONE LINE
E2EC CDC9EC   CALL   GRPCLR+4
E2EF 3EAB      MVI    A,0ABH ; ELSE HARDWARE SCROLL
E2F1 D3EE      OUT   SDSPY
E2F3 D3FE      OUT   DDSPY
E2F5 21A4DA   LXI    H,LINOPS
E2F8 7E      MOV    A,M
E2F9 3C      INR    A
E2FA FE18      CPI    24
              JRNZ   CLF2
E2FC+2001   DB     20H,CLF2-$-1
E2FE AF      XRA    A
E2FF 77      CLF2: MOV    M,A
E300 CD6EE2   CALL   CMPOF1
E303 C3F4E1   JMP    CRSRET ; END HARDWARE SCROLL
;
E306 CDC7E7   CLF3: CALL   SCRLUP ; BEGIN SOFTWARE SCROLL
              JR     CLEXT ; END SOFTWARE SCROLL
E309+181D   DB     18H,CLEXT-$-1
;
E30B 3C      CLF4: INR    A ; BEGIN MOVE CURSOR DOWN
E30C 3207FA   STA    CHRADR
E30F 6F      MOV    L,A
E310 CD71E2   CALL   CMPOFF
E313 C3F4E1   JMP    CRSRET ; END MOVE CURSOR DOWN
;
;-----|
;| BELL |
;-----|
;
E316 FE07   CLBL: CPI    BEL
              JRNZ   CLTB
E318+2011   DB     20H,CLTB-$-1
E31A 3A50FA   LDA    CURBEL
              BIT    0,A
E31D+CB47   DB     0CBH,0*8+A+40H
              JRNZ   CLEXT
E31F+2007   DB     20H,CLEXT-$-1
E321 217DF6   LXI    H,BELLTN
E324 CD78E1   CALL   SOUND
E327 FB      EI
  
```

CP/M MACRO ASSEM 2.0 #055 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.

E328 C3F7B1 CLEXT: JMP EXIT2

;
;-----|
; TAB |
;-----|
;

E32B FE09 CLTB: CPI 09H

JRNZ CLRV

E32D+2003 DB 20H,CLRV-\$-1

E32F C393E8 JMP MOVTAB

;
;-----|
; REV. LINE FEED |
;-----|
;

E332 FE0B CLRV: CPI 0BH

JRNZ CLRT

E334+2003 DB 20H,CLRT-\$-1

E336 C39BE4 JMP REVLF

;
;-----|
; CURSOR RIGHT |
;-----|
;

E339 FE0C CLRT: CPI 0CH

JRNZ CLHM

E33B+2003 DB 20H,CLHM-\$-1

E33D C36BE4 JMP RITCUR

;
;-----|
; CURSOR HOME |
;-----|
;

E340 FE1E CLHM: CPI 1EH

JRNZ CLCLR

E342+2003 DB 20H,CLCLR-\$-1

E344 C38DE4 JMP HOMCUR

;
;-----|
; CLEAR ACTIVE REGION |
;-----|
;

E347 FE1A CLCLR: CPI 1AH

JRNZ CTLX

E349+2018 DB 20H,CTLX-\$-1

E34B 3A03FA LDA TOPACT

E34E 6F MOV L,A

E34F 2600 MVI H,O

E351 2207FA CTRLZ: SHLD CHRADR

CALL CMPOFF

E357 CD57E2 CALL OUTCUR

E35A CD4AB9 CALL CLTOND

E35D CDC5EC CALL GRFCLR

E360 C3F7B1 CLZ: JMP EXIT2

;
;-----|

CP/M MACRO ASSEM 2.0 #056 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.

;I CLEAR KEYBOARD BUFFER I

;-----|

;

E363 FE18	CTLX:	CPI	CTRLX
		JRNZ	CLZ
E365+20F9		DB	20H,CLZ-\$-1
E367 212BFA		LXI	H,KEYBUF
E36A AF		XRA	A
E36B F3		DI	
E36C 32FBF9		STA	KEYCNT
E36F 223BFA		SHLD	KEYPNT
E372 FB		EI	
E373+18EB		JR	CLZ
		DB	18H,CLZ-\$-1

;

PAGE

```

;
;-----|  

;      ESCAPE CASE  
|  

;-----|
;  

E375 3D    ESCCHK: DCR    A  

            JRZ    ESCCK1  

E376+280B   DB      28H,ESCCK1-$-1  

;  

E378 3D    DCR    A  

E379 FE15   CPI    15H  

            JRNC   J19B  

E37B+3068   DB      30H,J19B-$-1  

E37D E5     PUSH   H  

E37E 2119F8  LXI    H,CYCTBL  

            JR      ESCCK2  

E381+180D   DB      18H,ESCCK2-$-1  

;  

;      CALCULATE ADDRESS OF VECTOR FROM CHAR.  

;      GET VECTOR, PUSH IT AND EXECUTE (RET)  

;      TO JUMP TO IT.  

;  

E383 79    ESCCK1: MOV    A,C      ; MOVE NEXT CHAR. TO A  

E384 D630   SUI    '0'       ; SUBTRACT OFFSET  

            JRC    NFGESC ; IF CARRY, THEN INVALID CHAR.  

E386+3813   DB      38H,NFGESC-$-1  

E388 FE35   CPI    '5'       ; IF GREATER THAN 64H (NOW 34H)  

            JRNC   NFGESC ; THEN INVALID CHAR.  

E38A+300F   DB      30H,NFGESC-$-1  

E38C E5     PUSH   H  

E38D 21AFF7  LXI    H,ESCTBL  

;  

E390 07    ESCCK2: RLC    ; ELSE MULTIPLY BY 2  

E391 5F    MOV    B,A      ; MOVE TO LSB OF OFFSET  

E392 1600   MVI    D,0      ; MSB OF OFFSET = 0  

E394 19    DAD    D        ; HL=(HL + DE) POINTS TO VECTOR  

E395 5E    MOV    B,M      ; MOVE LSB OF VECTOR TO E  

E396 23    INX    H  

E397 56    MOV    D,M      ; MOVE MSB OF VECTOR TO D  

E398 E1    POP    H        ; RESTORE CURSOR ADDRESS  

E399 D5    PUSH   D        ; PUSH VECTOR ON STACK  

E39A C9    RET    ; JUMP TO VECTOR ADDRESS  

;  

E39B 79    NFGESC: MOV    A,C  

E39C E67F   ANI    7FH  

E39E C3DEE1  JMP    CHRRET  

;  

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```

```

;
;-----|
; 0 - PLOT POINT  |
;-----|
;

E3A1 32EAF9 PPOINT: STA     GRFCMD
E3A4 AF      PPNT1: XRA     A      ; CLEAR GRAPHICS ERROR FLAG
E3A5 32FDF9   STA     GRFERR
E3A8 3E0E     MVI     A,0EH    ; DSPCYC = 0EH
                JR      J19C
E3AA+182F     DB      18H,J19C-$-1

;
;-----|
; 1 - PLOT VECTOR  |
;-----|
;

E3AC 3E01 PVCTOR: MVI     A,1
E3AE 32EAF9 PVCT1: STA     GRFCMD
E3B1 2AF2F9   LHLD    GRX
E3B4 22F4F9   SHLD    GRX1
E3B7 2265FA   SHLD    GRX12
E3BA AF       XRA     A
E3BB 32F7F9   STA     GRY+1
E3BE 2AF6F9   LHLD    GRY
E3C1 22F8F9   SHLD    GRY1
E3C4 2267FA   SHLD    GRY12
                JR      PPNT1
E3C7+18DB     DB      18H,PPNT1-$-1

;
;-----|
; 2 - BLOCK DRAW  |
;-----|
;

E3C9 3E03 BLKDRW: MVI     A,3
                JR      PPOINT
E3CB+18D4     DB      18H,PPOINT-$-1

;
;-----|
; 3 - CLEAR GRAPHICS  |
;-----|
;

E3CD CDC5EC CLRGRF: CALL    GRFCLR
                JR      PTBRT
E3D0+181B     DB      18H,PTBRT-$-1

;
;-----|
; 4 - BLOCK FILL  |
;-----|
;

E3D2 3E02 BLKFIL: MVI     A,2
                JR      PPOINT
E3D4+18CB     DB      18H,PPOINT-$-1

;
;-----|
; 5 - SET MASKS FOR FILL  |
;-----|

```

CP/M MACRO ASSEM 2.0 #059 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.

```
;-----|
;
E3D6 3E0D    SETMSK: MVI    A,0DH
E3D8 32EAF9    STA     GRFCMD
E3DB C3F8E1    J19C:   JMP    EXIT3
;
;-----|
; 6 - DISABLE GRAPHIC IMAGE  |
;-----|
;
E3DE AF      DSBGRF: XRA    A
E3DF 3EFD    MVI    A,-3 ; Z BIT SET ALREADY
E3E1 CD27E1    L6:    CALL   LLATCH
E3E4 FB      EI
E3E5 C3F7E1    J19B:   JMP    EXIT2
;
;-----|
; 7 - ENABLE GRAPHIC IMAGE  |
;-----|
;
E3E8 3E02    BNBRGF: MVI    A,2
E3EA B7      ORA    A       ; A=2, Z BIT IS CLEAR
                JR     L6
E3EB+18F4    DB     18H,L6-$-1
;
;-----|
; 8 - SET TO PLOT BRIGHT  |
;-----|
;
E3ED 3EC7    PTBRT: MVI    A,0C7H
E3EF 32BEEB    PTBRI: STA    GRFBIT+1
                JR     J19B
E3F2+18F1    DB     18H,J19B-$-1
;
;-----|
; 9 - SET TO PLOT DARK   |
;-----|
;
E3F4 3E87    PTDRK: MVI    A,87H
                JR     PTBRI
E3F6+18F7    DB     18H,PTBRI-$-1
;
;-----|
; : - READ DATE  |
;-----|
;
E3F8 CD54E7    REDDAT: CALL   READAT
E3FB 21AAFB    LXI    H,OKIBYT
E3FE 010700    LXI    B,7
E401 FE3F      CPI    '?'
                JRNZ   RDAT1
E403+2004    DB     20H,RDAT1-$-1
E405 010100    LXI    B,1
E408 77      MOV    M,A
E409 CD81F5    RDAT1: CALL   PUSHKY
                JR     J19B
```

CP/M MACRO ASSEM 2.0 #060 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.

E40C+18D7 DB 18H,J19B-\$-1

;
;-----|
; - SET PRINTER BAUD FROM CMOS RAM |
;-----|

E40E CD26EF CMOSPN: CALL ADJPNT
E411 C3F7E1 A513: JMP EXIT2

;
;-----|
; < - SET COMM. BAUD FROM CMOS RAM |
;-----|

E414 CD2DEF CMOSCM: CALL ADJCOM
JR A513
E417+18F8 DB 18H,A513-\$-1

;
;-----|
; = - DIRECT CURSOR MOVE |
;-----|

E419 3E02 DRCTMV: MVI A,2
JR J19C
E41B+18BE DB 18H,J19C-\$-1

;
;-----|
; > - READ TIME |
;-----|

E41D CD2EE7 REDTIM: CALL READTM
E420 21ABFB LXI H,SCNDS
E423 010600 LXI B,6
E426 FE3F CPI '?'
JRNZ REDTM1
E428+2004 DB 20H,REDTM1-\$-1
E42A 010100 LXI B,1
E42D 77 MOV M,A
E42E CD81F5 REDTM1: CALL PUSHKY
JR A513
E431+18DE DB 18H,A513-\$-1

;
;-----|
; ? - READ CMOS RAM |
;-----|

E433 3E12 REDRAM: MVI A,12H
JR J19C
E435+18A4 DB 18H,J19C-\$-1

;
;-----|
; @ - WRITE CMOS RAM |
;-----|

E437 3E13 WRTRAM: MVI A,13H
JR J19C
E439+18A0 DB 18H,J19C-\$-1

CP/M MACRO ASSEM 2.0 #061 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.

```
;  
;-----|  
;| A - UP CURSOR |  
;-----|  
;  
E43B 3A07FA    UPCUR: LDA     CHRADR  
E43E 47          MOV      B,A  
E43F 3A03FA    LDA     TOPACT  
E442 B8          CMP      B      ;IF TOP OF ACT. REG.  
                  JRZ     A45A   ; THEN RETURN  
E443+286D    DB      28H,A45A-$-1  
E445 2D          UPCUR1: DCR     L      ; ELSE MOVE CURSOR UP  
E446 F24BE4    JP      UPCUR2  
E449 2E17          MVI      L,23  
E44B 05          UPCUR2: DCR     B  
E44C 78          MOV      A,B  
E44D 3207FA    STA     CHRADR  
                  JR      A42B  
E450+1819    DB      18H,A42B-$-1  
  
;  
;-----|  
;| B - DOWN CURSOR |  
;-----|  
;  
E452 3A07FA    DWNCUR: LDA     CHRADR  
E455 47          MOV      B,A  
E456 3A04FA    LDA     BOTACT  
E459 B8          CMP      B      ;IF BOTTOM OF ACT. REG.  
E45A CAF7E1    JZ      EXIT2   ; THEN RETURN  
E45D 2C          DNCUR1: INR     L      ; ELSE MOVE CURSOR DOWN  
E45E 3E18          MVI      A,24  
E460 BD          CMP      L  
E461 C266E4    JNZ     DNCUR2  
E464 2E00          MVI      L,0  
E466 04          DNCUR2: INR     B  
E467 78          MOV      A,B  
E468 3207FA    STA     CHRADR  
E46B C3F4E1    A42B: JMP     CRSRET  
  
;  
;-----|  
;| C - RIGHT CURSOR |  
;-----|  
;  
E46E 3A00FA    RITCUR: LDA     CURATT  
                  BIT      4,A      ;DOUBBLE WIDTH MODE ?  
E471+CB67    DB      0CBH,4*8+A+40H  
                  JRZ     A431  
E473+2801    DB      28H,A431-$-1  
E475 24          INR      H  
E476 24          A431: INR     H  
E477 3E4F          MVI      A,79  
E479 BC          CMP      H      ;IF NOT AT RIGHT BOUNDARY  
E47A F2F0E1    JP      CUSTH   ; THEN MOVE CURSOR  
  
;  
E47D 3A01FA    LDA     WRPFLG  
E480 B7          ORA      A      ; IF WRAP OFF
```

CP/M MACRO ASSEM 2.0 #062 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.

```

E481+202F      JRNZ   A45A    ; THEN EXIT2
                DB     20H,A45A-$-1

;
E483 CD4AE2      CALL   OUTTEXT ; ELSE CLEAR COLOUMN #
E486 AF          XRA    A
E487 32FAF9      STA    DSPCYC
E48A C3B9E1      JMP    LFAGN   ; AND DO A LINE FEED

;
;-----|
;| D - LEFT CURSOR |
;-----|
;

;-----|
;| IS CTROL2+4 IN ESCtbl |
;-----|
;

;-----|
;| E - NOT USED |
;-----|
;

;-----|
;| IS EXIT2 IN TABLE |
;-----|
;

;-----|
;| F - NOT USED |
;-----|
;

;-----|
;| IS EXIT2 IN TABLE |
;-----|
;

;-----|
;| G - NOT USED |
;-----|
;

;-----|
;| IS EXIT2 IN TABLE |
;-----|
;

;-----|
;| H - HOME CURSOR |
;-----|
;

E48D 3A03FA      HOMCUR: LDA    TOPACT
E490 6F          MOV    L,A
E491 2600        MVI    H,0
E493 2207FA      SHLD   CHRADR
E496 CD71E2      CALL   CMPOFF
                JR     A49A
E499+1811        DB     18H,A49A-$-1

;
;-----|
;| I - REV. LINE FEED |
;-----|
;

E49B 3A07FA      REVLF: LDA    CHRADR
E49E 47          MOV    B,A
E49F 3A03FA      LDA    TOPACT
E4A2 B8          CMP    B      ;IF NOT AT TOP OF A.R.
E4A3 C245E4      JNZ    UPCUR1 ; THEN MOVE CURSOR
E4A6 CDF0E7      CALL   SCRLDN ; ELSE SCROLL A.R
E4A9 CD6EE2      CALL   CMPOF1
E4AC C3F4E1      A49A: JMP    CRSRET

```

CP/M MACRO ASSEM 2.0 #063 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.

```
;  
;-----|  
; J - CLEAR TO END OF ACTIVE REGION |  
;-----|  
;  
E4AF CD4AE9 CLREND: CALL CLTOND  
E4B2 C3F7E1 A45A: JMP EXIT2  
;  
;-----|  
; K - CLEAR TO END OF LINE |  
;-----|  
;  
E4B5 CD42E8 CLRELN: CALL LFCLR2  
                  JR A49A  
E4B8+18F2         DB 18H,A49A-$-1  
;  
;-----|  
; L - INSERT LINE |  
;-----|  
;  
E4BA 3A07FA INSLIN: LDA CHRADR  
E4BD 47          MOV B,A  
E4BE 3A04FA      LDA BOTACT  
E4C1 90          SUB B ;IF AT BOTTOM  
                  JRZ A4C1 ; THEN CLEAR LINE & EXIT  
E4C2+2805      DB 28H,A4C1-$-1  
E4C4 CDF6E7     CALL SCRDN1 ; ELSE INSERT BLANK LINE  
                  JR EXXIT2  
E4C7+181D      DB 18H,EXXIT2-$-1  
E4C9 CD1DE8     A4C1: CALL LFCLR1  
                  JR EXXIT2  
E4CC+1818      DB 18H,EXXIT2-$-1  
;  
;-----|  
; M - DELETE LINE |  
;-----|  
;  
E4CE 3A07FA DELLIN: LDA CHRADR  
E4D1 47          MOV B,A  
E4D2 3A04FA      LDA BOTACT  
E4D5 90          SUB B ;IF AT TOP  
                  JRZ A4C1 ; THEN CLEAR LINE AND EXIT  
E4D6+28F1      DB 28H,A4C1-$-1  
E4D8 68          MOV L,B ; ELSE SCROLL REGION  
E4D9 47          MOV B,A ; UP & CLEAR BOTTOM LINE  
E4DA CDCFE7     CALL SCRUP1  
                  JR EXXIT2  
E4DD+1807      DB 18H,EXXIT2-$-1  
;  
;-----|  
; N - SET TABS |  
;-----|  
;  
E4DF 3E0A SETTAB: MVI A,0AH  
                  JR A51A  
E4E1+180D         DB 18H,A51A-$-1
```

CP/M MACRO ASSEM 2.0 #064 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.

```
;  
;-----|  
; I - CLEAR TABS |  
;-----|  
;  
E4E3 CD0FE9 CLRTAB: CALL CLRTBS  
E4E6 C3F7E1 EXXIT2: JMP EXIT2  
;  
;-----|  
; P - DELETE CHAR. |  
;-----|  
;  
E4E9 CD78E9 DELLCR: CALL DELCHR  
              JR EXXIT2  
E4EC+18F8     DB 18H,EXXIT2-$-1  
;  
;-----|  
; Q - INSERT CHAR. MODE ON |  
;-----|  
;  
E4EE 3E0C INSCON: MVI A,0CH  
E4F0 C3F8E1 A51A: JMP EXIT3  
;  
;-----|  
; R - INSERT CHAR. MODE OFF |  
;-----|  
;  
; IS EXIT2 IN ESCTBL  
;  
;-----|  
; S - SELECT CHAR. SIZE |  
;-----|  
;  
E4F3 3E09 CHRSIZ: MVI A,9  
              JR A51A  
E4F5+18F9     DB 18H,A51A-$-1  
;  
;-----|  
; T - SELECT CHAR. SET |  
;-----|  
;  
E4F7 3E08 CHRSET: MVI A,8  
              JR A51A  
E4F9+18F5     DB 18H,A51A-$-1  
;  
;-----|  
; U - SELECT ATTRIBUTES |  
;-----|  
;  
E4FB 3E07 SELATR: MVI A,7  
              JR A51A  
E4FD+18F1     DB 18H,A51A-$-1  
;  
;-----|  
; V - SELECT ALT. LEAD-IN |  
;-----|
```

CP/M MACRO ASSEM 2.0 #065 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.

```
; E4FF 3E0B      SELDIN: MVI    A,0BH
;                   JR     A51A
E501+18ED      DB     18H,A51A-$-1
;
;-----|
;| W - LOAD TONE TABLE (15 BYTES) & EXECUTE |
;-----|
;
E503 3E16      DSPSND: MVI    A,16H
;                   JR     A51A
E505+18E9      DB     18H,A51A-$-1
;
;-----|
;| X - SET ACTIVE REGION |
;-----|
;
E507 3E05      SETACR: MVI    A,5
;                   JR     A51A
E509+18E5      DB     18H,A51A-$-1
;
;-----|
;| Y - DIRECT CURSOR MOVE |
;-----|
;
;-----|
; IS DRCTMV IN ESCTBL
;
;-----|
;| Z - RESET PARAMETERS |
;-----|
;
E50B CDEFE8      RESPAR: CALL    RSTPAR
;                   JR      EXXIT2
E50E+18D6      DB     18H,EXXIT2-$-1
;
;-----|
;| I - SAVE PARAMETERS |
;-----|
;
E510 CD1DE9      SAVVPR: CALL    SAVPAR
;                   JR      EXXIT2
E513+18D1      DB     18H,EXXIT2-$-1
;
;-----|
;| \ - CLEAR SCREEN & RESET PARAMETERS |
;-----|
;
;-----|
; IS CLSCRN IN ESCTBL
;
;-----|
;| J - RECALL PARAMETERS |
;-----|
;
E515 CD29E9      RCLPAR: CALL    RSTORP ;RESTORE PARAMETERS
E518 CD6EE2      CALL    CMPOF1 ; MOVE CURSOR TO
E51B C3F4E1      JMP     CRSRET ; PREVIOUS POSITION
```

CP/M MACRO ASSEM 2.0 #066 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.

```
;  
;-----|  
;| ^ - WRAP OFF |  
;-----|  
;  
E51E 3EFF WRPOFF: MVI A,0FFH  
              JR WRPGEN  
E520+1801     DB 18H,WRPGEN-$-1  
  
;  
;-----|  
;| _ - WRAP ON |  
;-----|  
;  
E522 AF WRPON: XRA A  
E523 3201FA WRPGEN: STA WRPFLG  
E526 C3F7E1 A5F0: JMP EXIT2  
;  
;-----|  
;| ` - WSFLAG SET (ON) |  
;-----|  
;  
E529 3EFF SETWS: MVI A,0FFH  
              JR A512  
E52B+1801     DB 18H,A512-$-1  
  
;  
;-----|  
;| A - WSFLAG RESET (OFF) |  
;-----|  
;  
E52D AF CLRWS: XRA A  
E52E 3280DA A512: STA WSFLAG  
              JR A5F0  
E531+18F3     DB 18H,A5F0-$-1  
  
;  
;-----|  
;| B - MAKE SOUND FROM TABLE |  
;-----|  
;  
; IS XXXXXXXX IN TABLE  
;  
;-----|  
;| C - CURSOR OFF |  
;-----|  
;  
E533 2651 OFFCUR: MVI H,81  
E535 CD57E2     CALL OUTCUR  
E538 3EFF     MVI A,0FFH  
E53A 3202FA     STA CURCTL  
              JR A5F0  
E53D+18E7     DB 18H,A5F0-$-1  
  
;  
;-----|  
;| D - CURSOR ON |  
;-----|  
;
```

CP/M MACRO ASSEM 2.0 #067 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.

E53F AF ONCUR: XRA A
E540 3202FA STA CURCTL
E543 C3F4E1 JMP CRSRET

;

PAGE

```

;
;-----|
;|      MULTI - CHAR. SEQUENCE HANDLERS   |
;|-----|
;

;
;-----|
;|      02H - DIRECT CURSOR POSITION LINE NUMBER  |
;|-----|
;

E546 79      LINCHK: MOV     A,C
E547 D620     SUI      20H
E549 47      MOV     B,A
E54A 3A04FA    LDA     BOTACT
E54D B8      CMP     B
E54E FA6BES    JM      LNCKJ3
E551 3A03FA    LDA     TOPACT
E554 B8      CMP     B
                JRZ     LNCKJ1
E555+2803    DB      28H,LNCKJ1-$-1
E557 F26BES    JP      LNCKJ3
E55A 78      LNCKJ1: MOV     A,B
E55B 3207FA    STA     CHRADR
E55E 6F      MOV     L,A
E55F CD71E2    CALL    CMPOFF
E562 7D      MOV     A,L
E563 3229FA    LNCKJ2: STA     TEMLIN
E566 3E03     MVI     A,3
E568 C3F8E1    JMP     EXIT3
E56B 3EFF     LNCKJ3: MVI     A,OFFH
                JR      LNCKJ2
E56D+18F4    DB      18H,LNCKJ2-$-1
;

;
;-----|
;|      03H - DIRECT CURSOR POSITION COLUMN NUMBER  |
;|-----|
;

E56F 3A29FA    COLCHK: LDA     TEMLIN
E572 FFFF     CPI     OFFH
E574 CAF7E1    JZ      EXIT2
E577 6F      MOV     L,A
E578 79      MOV     A,C
E579 D620     SUI     20H
E57B 67      MOV     H,A
E57C C3F1E1    JMP     CUSTH+1
;

;
;-----|
;|      04H - NOT USED  |
;|-----|
;

;
;|      IS EXIT2 IN TABLE
;
;-----|
;|      05H - TOP OF ACTIVE REGION  |
;
```

CP/M MACRO ASSEM 2.0 #069 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.

```
;-----|
;-----|
E57F 79      TACTCK: MOV    A,C
E580 D620     SUI    20H
E582 3203FA   STA    TOPACT
E585 3E06     MVI    A,6
E587 C3F8E1   JMP    EXIT3
;
;-----|
;-----|
; 06H - BOTTOM OF ACTIVE REGION
;-----|
;

E58A 79      BACTCK: MOV    A,C
E58B D620     SUI    20H
E58D 2103FA   LXI    H,TOPACT
E590 46      MOV    B,M ; GET TOPACT
E591 23      INX    H
E592 77      MOV    M,A ; STORE BOTACT
E593 90      SUB    B      ; CALCULATE MAGACT
E594 23      INX    H
E595 77      MOV    M,A ; STORE MAGACT
E596 C38DE4   JMP    HOMCUR
;
;-----|
; 07H - SCREEN ATTRIBUTE
;-----|
;

E599 79      ATTCHK: MOV    A,C
E59A C620     ADI    20H
E59C E638     ANI    38H
E59E 07      RLC
E59F 57      MOV    D,A
E5A0 79      MOV    A,C
E5A1 E607     ANI    7H
E5A3 B2      ORA    D
E5A4 07      RLC
E5A5 57      MOV    D,A
E5A6 2100FA   LXI    H,CURATT
E5A9 7E      MOV    A,M
E5AA E611     ANI    11H
E5AC B2      ORA    D
E5AD 77      MOV    M,A
JR    EXXT2
E5AE+1806   DB    18H,EXT2-$-1
;
;-----|
; 08H - ALTERNATE CHAR. SET
;-----|
;

E5B0 79      ALTCHK: MOV    A,C
E5B1 E607     ANI    7H
E5B3 32FFF9   STA    CURCHR
E5B6 C3F7E1   EXXT2: JMP    EXIT2
;
;-----|
; 09H - SELECT CHAR. SIZE
;-----|
```

CP/M MACRO ASSEM 2.0 #070 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.

```
;-----|
;
E5B9 3A00FA    SIZCHK: LDA    CURATT
E5BC E6EF      ANI    0EFH
E5BE 47        MOV    B,A
E5BF 79        MOV    A,C
E5C0 D630      SUI    30H
                  JRZ    SZCKJ1
E5C2+2802      DB     28H,SZCKJ1-$-1
E5C4 3E10      MVI    A,10H
E5C6 B0        SZCKJ1: ORA    B
E5C7 3200FA      STA    CURATT
                  JR     EXXT2
E5CA+18EA      DB     18H,EXXT2-$-1
;
;-----|
; 0AH - SET TABS
;-----|
;
E5CC 79        TABCHK: MOV    A,C
E5CD FE1B      CPI    ESC
                  JRZ    EXXT2
E5CF+28E5      DB     28H,EXXT2-$-1
E5D1 D620      SUI    20H
E5D3 FAF7E1      JM    EXIT2
E5D6 FE50      CPI    50H
                  JRNZ   TBJ0
E5D8+2006      DB     20H,TBJ0-$-1
E5DA CDOFE9      CALL   CLRTBS
E5DD C3FBE1      JMP    DSPRET
E5E0 F2F7E1      TBJ0: JP     EXIT2
E5E3 47        MOV    B,A
E5E4 3A09FA      LDA    LASTAB
E5E7 B8        CMP    B
E5E8 78        MOV    A,B
                  JRNc   TBOK
E5E9+3003      DB     30H,TBOK-$-1
E5EB 3209FA      STA    LASTAB
E5EB E607      TBOK: ANI    7H
E5F0 3C        INR    A
E5F1 47        MOV    B,A
E5F2 3E80      MVI    A,80H
                  JR     TBJ1
E5F4+1802      DB     18H,TBJ1-$-1
;
TBJ2: SRLR   A
E5F6+CB3F      DB     0CBH, 38H + A
;
TBJ1: DJNZ   TBJ2
E5F8+10FC      DB     10H,TBJ2-$-1
E5FA 47        MOV    B,A
E5FB 79        MOV    A,C
E5FC CDDFE8      CALL   GTEFAD
E5FF 7E        MOV    A,M
E600 B0        ORA    B
E601 77        MOV    M,A
                  JR     SCHK1
E602+182E      DB     18H,SCHK1-$-1
```

```

;
;-----|
; OBH - ALTERNATE LEAD IN |
;-----|
;

E604 79 LEDCHK: MOV A,C
E605 3206FA STA LEADIN
                JR EXXT2
E608+18AC       DB 18H,EXXT2-$-1

;
;-----|
; OCH - INSERT MODE ON |
;-----|
;

E60A 3A06FA INSCHK: LDA LEADIN
E60D B9        CMP C
                JRNZ INCKJ2
E60E+2005       DB 20H,INCKJ2-$-1
E610 3E01       INCKJ1: MVI A,1
E612 C3F8E1       JMP EXIT3
E615 3E1B       INCKJ2: MVI A,ESC
E617 B9        CMP C
                JRZ INCKJ1
E618+28F6       DB 28H,INCKJ1-$-1
E61A C5        PUSH B
E61B E5        PUSH H
E61C CD6AE9       CALL INSCHR
E61F E1        POP H
E620 C1        POP B
E621 CD7DE2       CALL CHKCHR
E624 CD17E2       CALL OUTCHR
E627 7A        MOV A,D
E628 B7        ORA A
                JRNZ SCHK1
E629+2007       DB 20H,SCHK1-$-1
E62B 7C        MOV A,H
E62C 3208FA       STA CHRADR+1
E62F CD57E2       CALL OUTCUR
E632 C3FB E1      SCHK1: JMP DSPRET
;

```

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CP/M MACRO ASSEM 2.0 #072 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.

```
;  
;-----|  
; ODH - GET MASK |  
;-----|  
;  
E635 3AEAF9    GRFCHK: LDA      GRFCMD  
E638 FE0D        CPI      0DH  
                      JRNZ    GRCK1 ;MASKS FOR FILL  
E63A+200B        DB       20H,GRCK1-$-1  
E63C 79          MOV      A,C  
E63D 326AF8        STA      MASK  
E640 AF          XRA      A  
E641 32EAFF        STA      GRFCMD  
E644 C3FBEB        JMP      DSPRET  
E647 79          GRCK1: MOV      A,C  
E648 326FEA        STA      XMASK  
E64B C3F7E1        JMP      EXIT2  
;  
;-----|  
; OEH - GET X MSB |  
;-----|  
;  
E64E 79          GRCK1: MOV      A,C ;X MSB'S  
E64F FE05        CPI      5  
                      JRC      GRCK2  
E651+3803        DB       38H,GRCK2-$-1  
E653 32FDF9        STA      GRFERR  
                      GRCK2: BIT      2,C  
E656+CB51        DB       0CBH,2*8+C+40H  
E658 3E01          MVI      A,1  
                      JRNZ    GRCK3  
E65A+2001        DB       20H,GRCK3-$-1  
E65C AF          XRA      A  
E65D 32F3F9        GRCK3: STA      GRX+1  
E660 79          MOV      A,C  
E661 0F          RRC  
E662 0F          RRC  
E663 E6C0          ANI      0COH  
E665 32F2F9        STA      GRX  
E668 3E0F          MVI      A,0FH  
E66A C3F8E1        JMP      EXIT3  
;  
;-----|  
; OEH - GET X LSB |  
;-----|  
;  
E66D 79          GRFCK2: MOV      A,C ;X LSB'S  
E66E 21F2F9        LXI      H,GRX  
E671 B6          ORA      M  
E672 77          MOV      M,A  
E673 AF          XRA      A  
E674 2AF2F9        LHLD    GRX  
E677 114001        LXI      D,320  
                      DSBC    D  
E67A+ED52        DB       0EDH,D*8+42H
```

CP/M MACRO ASSEM 2.0 #073 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.

E67C+3804 JRC GRCK4
E67E 2F DB 38H,GRCK4-\$-1
E67F 32FDF9 CMA
E682 3E10 STA GRFERR
E684 C3F8E1 GRCK4: MVI A,10H
; JMP EXIT3
;
;-----|
; 10H - GET Y MSB |
;-----|
;
E687 79 GRFCK3: MOV A,C ;Y MSB'S
E688 FE04 CPI 4
JRC GRCK5
E68A+3803 DB 38H,GRCK5-\$-1
E68C 32FDF9 STA GRFERR
E68F 0F GRCK5: RRC
E690 0F RRC
E691 E6C0 ANI 0COH
E693 32F6F9 STA GRY
E696 3E11 MVI A,11H
E698 C3F8E1 JMP EXIT3
;
;-----|
; 11H - GET Y LSB |
;-----|
;
E69B 79 GRFCK4: MOV A,C ;Y LSB'S
E69C 21F6F9 LXI H,GRY
E69F B6 ORA M
E6A0 77 MOV M,A
E6A1 FEFO CPI 240
JRNZ GREXT2
E6A3+300F DB 30H,GREXT2-\$-1
E6A5 3AFDF9 LDA GRFERR
E6A8 B7 ORA A
JRNZ GREXT2
E6A9+2009 DB 20H,GREXT2-\$-1
E6AB 3AEAF9 LDA GRFCMD
E6AE B7 ORA A
JRNZ GRCK6
E6AF+2006 DB 20H,GRCK6-\$-1
E6B1 CDA1EB CALL PPLOT
E6B4 C3F7E1 GREXT2: JMP EXIT2
E6B7 3D GRCK6: DCR A
JRNZ GRCK7
E6B8+2005 DB 20H,GRCK7-\$-1
E6BA CD16EC CALL VPLOT
JR GREXT2
E6BD+18F5 DB 18H,GREXT2-\$-1
E6BF 3D GRCK7: DCR A
JRNZ GRDOIT
E6C0+2005 DB 20H,GRDOIT-\$-1
E6C2 3E04 MVI A,4
E6C4 C3AEE3 GRCK8: JMP PVCT1
E6C7 3D GRDOIT: DCR A

CP/M MACRO ASSEM 2.0 #074 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.

	JRNZ	GROK
E6C8+2004	DB	20H,GROK-\$-1
E6CA 3E05	MVI	A,5
	JR	GRCK8
E6CC+18F6	DB	18H,GRCK8-\$-1
E6CE 3D	GROK:	DCR A
	JRNZ	GRCK9
E6CF+2005	DB	20H,GRCK9-\$-1
E6D1 CDE3E9	CALL	FILL
	JR	GREXT2
E6D4+18DE	DB	18H,GREXT2-\$-1
E6D6 CDEBEB	GRCK9:	CALL DRWBLK
	JR	GREXT2
E6D9+18D9	DB	18H,GREXT2-\$-1

;

PAGE

```

;
;-----|
; 12H - READ CMOS RAM  |
;-----|
;

E6DB 41      GRFCK5: MOV     B,C
E6DC CD63F2    CALL    RD5101
E6DF FB        EI
E6E0 E60F      ANI     0FH
E6E2 F630      ORI     30H
E6E4 21B0FB    LXI     H,HRS10
E6E7 77        MOV     M,A
E6E8 010100    LXI     B,1
E6EB CD81F5    CALL    PUSHKY
E6EE+1812    JR      EXXX2
                DB      18H,EXXX2-$-1
;

;-----|
; 13H - GET ADDRESS FOR CMOS WRITE  |
;-----|
;

E6F0 79      GRFCK6: MOV     A,C
E6F1 32ADFB    STA     MINS
E6F4 3E14      MVI     A,14H
E6F6 C3F8E1    JMP     EXIT3
;

;-----|
; 14H - WRITE CMOS RAM  |
;-----|
;

E6F9 3AADFB    GRFCK7: LDA     MINS
E6FC 47        MOV     B,A
E6FD 79        MOV     A,C
E6FE CD3AF2    CALL    WR5101
E701 FB        EI
E702 C3F7E1    EXXX2: JMP     EXIT2
;

;-----|
; 15H - FILL TONE TABLE  |
;-----|
;

E705 2142FA    GETSND: LXI     H,SNDcnt
E708 35        DCR     M
                JRZ     DOSND
E709+280B      DB      28H,DOSND-$-1
E70B 2A40FA    LHLD    SNDADR
E70E 71        GTSND1: MOV     M,C
E70F 23        INX     H
E710 2240FA    SHLD    SNDADR
E713 C3FBE1    JMP     DSPRET
;

E716 2154FA    DOSND: LXI     H,SNDtbl
E719 CD78E1    CALL    SOUND
E71C FB        EI

```

CP/M MACRO ASSEM 2.0 #076 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.

E71D+18E3 JR EXXX2
 DB 18H,EXXX2-\$-1
;
;-----|
; 16H - GET 1ST BYTE OF TONE TABLE |
;-----|
;
E71F 3E0E SET SND: MVI A,14
E721 3242FA STA SND CNT
E724 3E15 MVI A,15H
E726 32FAF9 STA DSP CYC
E729 2154FA LXI H,SND TBL
 JR GTS ND1
E72C+18E0 DB 18H,GTS ND1-\$-1
;
PAGE

```

;
;-----|  

;       DISPLAY SUBROUTINES  

;-----|
;  

E72E 0603    READTM: MVI     B,3  

E730 CD63F2    CALL    RD5101  

E733 FE0E      CPI     0EH  

                JRNZ    RDTM2  

E735+2011      DB      20H,RDTM2-$-1  

E737 060A      MVI     B,10  

E739 C5        RDTM1: PUSH   B  

E73A 010107    TCHG:    LXI     B,701H  

E73D 21B0FB    LXI     H,HRS10  

E740 CDAEE7    CALL    GETCLK  

E743 C1        POP     B  

                JRNZ    RDTM3  

E744+2005      DB      20H,RDTM3-$-1  

                DJNZ    RDTM1  

E746+10F1      DB      10H,RDTM1-$-1  

E748 3E3F      RDTM2: MVI     A,'?'  

E74A C9        RET  

E74B 3AB0FB    RDTM3: LDA     HRS10  

E74E E6F3      ANI     0F3H  

E750 32B0FB    STA     HRS10  

E753 C9        RET  

;  

E73B =         TIMCHG EQU     TCHG+1  

;  

E754 0604      READAT: MVI     B,4  

E756 CD63F2    CALL    RD5101  

E759 FB05      CPI     5  

                JRNZ    RDDT3  

E75B+2031      DB      20H,RDDT3-$-1  

E75D 21B0FB    LXI     H,HRS10  

E760 3A4DFA    LDA     OKIFLG  

E763 B7        ORA     A  

E764 F5        PUSH   PSW  

                JRNZ    RDDT1  

E765+2016      DB      20H,RDDT1-$-1  

E767 010B0D    LXI     B,0D0BH  

E76A EB        XCHG  

E76B 2163F2    LXI     H,RD5101  

E76E 22B1E7    SHLD    GETCLK+3  

E771 EB        XCHG  

E772 CDAEE7    CALL    GETCLK  

E775 EB        XCHG  

E776 2175F2    LXI     H,R58174  

E779 22B1E7    SHLD    GETCLK+3  

E77C EB        XCHG  

E77D 060A      RDDT1: MVI     B,10  

E77F C5        RDDT2: PUSH   B  

E780 E5        PUSH   H  

E781 01070C    DCHG:    LXI     B,0C07H  

E784 CDAEE7    CALL    GETCLK

```

CP/M MACRO ASSEM 2.0 #078 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.

E787 E1	POP	H
E788 C1	POP	B
	JRNZ	RDDT4
E789+2006	DB	20H,RDDT4-\$-1
	DJNZ	RDDT2
E78B+10F2	DB	10H,RDDT2-\$-1
E78D C1	POP	B
E78E 3E3F	RDDT3:	MVI A,'?'
E790 C9	RET	
E791 F1	RDDT4:	POP PSW
E792 F5		PUSH PSW
	JRNZ	RDDT5
E793+200C	DB	20H,RDDT5-\$-1
E795 3AACFB	LDA	SECS10
E798 2AAAFB	LHLD	OKIBYT
E79B 22ABFB	SHLD	SCNDS
E79E 32AAFB	STA	OKIBYT
E7A1 21ACFB	RDDT5:	LXI H,SECS10
E7A4 7E	MOV	A,M
E7A5 E6F3	ANI	0F3H
E7A7 77	MOV	M,A
E7A8 F1	POP	PSW
E7A9 C8	RZ	
E7AA 2B	DCX	H
E7AB 2B	DCX	H
E7AC 34	INR	M
E7AD C9	RET	
	;	
E782 =	DATCHG	EQU DCHG+1
	;	
E7AB E5	GETCLK:	PUSH H
E7AF C5		PUSH B
E7B0 CD75F2	CALL	R58174
E7B3 FB	EI	
E7B4 E60F	ANI	0FH
E7B6 FE0F	CPI	0FH
E7B8 C1	POP	B
E7B9 E1	POP	H
E7BA C8	RZ	
E7BB F630	ORI	30H
E7BD 77	MOV	M,A
E7BE 2B	DCX	H
E7BF 05	DCR	B
E7C0 78	MOV	A,B
E7C1 B9	CMP	C
	JRNZ	GETCLK
E7C2+20EA	DB	20H,GETCLK-\$-1
E7C4 C602	ADI	2
E7C6 C9	RET	
	;	SCROLL ACTIVE REGION UP
E7C7 47	SCRLUP:	MOV B,A
E7C8 B7		ORA A
	JRZ	LFCLR0
E7C9+284F	DB	28H,LFCLR0-\$-1
E7CB 3A03FA	LDA	TOPACT
E7CE 6F	MOV	L,A

CP/M MACRO ASSEM 2.0 #079 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.

E7CF CD71E2 SCRUP1: CALL CMPOFF
E7D2 5D MOV E,L
E7D3 7D MOV A,L
E7D4 3C INR A
E7D5 FE18 CPI 24
E7D7+2001 JRNZ SCRUP2
E7D9 AF XRA A
E7DA 57 SCRUP2: MOV D,A
E7DB D5 SCRUP3: PUSH D
E7DC C5 PUSH B
E7DD CD65E8 CALL MOVLIN
E7E0 C1 POP B
E7E1 D1 POP D
E7E2 5A MOV E,D
E7E3 14 INR D
E7E4 3E18 MVI A,24
E7E6 BA CMP D
E7E7+2002 JRNZ SCRUP4
E7E9 1600 MVI D,0
E7EB+10EE SCRUP4: DJNZ SCRUP3
E7ED 6B DB 10H,SCRUP3-\$-1
E7EE+182D MOV L,E
JR LFCLR1
DB 18H,LFCLR1-\$-1
;
;
SCROLL ACTIVE REGION DOWN
;
;
E7F0 3A05FA SCRLDN: LDA MAGACT
E7F3 B7 ORA A
JRZ LFCLR0
E7F4+2824 DB 28H,LFCLR0-\$-1
E7F6 47 SCRDN1: MOV B,A
E7F7 3A04FA LDA BOTACT
E7FA 6F MOV L,A
E7FB CD71E2 CALL CMPOFF
E7FE 5D MOV E,L
E7FF 7D MOV A,L
E800 B7 ORA A
JRNZ SCRDN2
E801+2002 DB 20H,SCRDN2-\$-1
E803 3E18 MVI A,24
E805 3D SCRDN2: DCR A
E806 57 MOV D,A
E807 D5 SCRDN3: PUSH D
E808 C5 PUSH B
E809 CD65E8 CALL MOVLIN
E80C C1 POP B
E80D D1 POP D
E80E 7A MOV A,D
E80F 5A MOV E,D
E810 B7 ORA A
JRNZ SCRDN4
E811+2002 DB 20H,SCRDN4-\$-1
E813 3E18 MVI A,24

CP/M MACRO ASSEM 2.0 #080 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.

E815 3D SCRDN4: DCR A
E816 57 MOV D,A
 DJNZ SCRDN3
E817+10EE DB 10H,SCRDN3-\$-1
E819 6B MOV L,B

;
;-----|
; CLEAR LINE L |
;-----|
;

E81A CD6EE2 LFCLR0: CALL CMPOF1
E81D 2600 LFCLR1: MVI H,0
E81F 7D MOV A,L
E820 F6C0 ORI 0COH
E822 6F MOV L,A
E823 112000 LXI D,SPC
E826 01EE4F LXI B,79*256+SDSPY
E829 C5 PUSH B
 OUTP L
E82A+ED69 DB 0EDH,L*8+41H
E82C 0EFE MVI C,DDSPY
 LFCL1: OUTP D
E82E+ED51 DB 0EDH,D*8+41H
 DJNZ LFCL1
E830+10FC DB 10H,LFCL1-\$-1
 OUTP D
E832+ED51 DB 0EDH,D*8+41H
E834 C1 POP B
 SETB 5,L
E835+CBED DB 0CBH,5*8+L+0COH
 OUTP L
E837+ED69 DB 0EDH,L*8+41H
E839 0EFE MVI C,DDSPY
 LFCL2: OUTP E
E83B+ED59 DB 0EDH,E*8+41H
 DJNZ LFCL2
E83D+10FC DB 10H,LFCL2-\$-1
 OUTP E
E83F+ED59 DB 0EDH,E*8+41H
E841 C9 RET

;
; CLEAR LINE L FROM POSITION H TO END OF LINE
;

E842 7D LFCLR2: MOV A,L
E843 F6C0 ORI 0COH
E845 6F MOV L,A
E846 112000 LXI D,SPC
E849 44 MOV B,H
E84A 3E50 MVI A,80
E84C 0EEE LFCL3: MVI C,SDSPY
E84E B8 CMP B
E84F C8 RZ
 OUTP L :CLEAR ATTRIBUTE
E850+ED69 DB 0EDH,L*8+41H
E852 0EFE MVI C,DDSPY
 OUTP D

CP/M MACRO ASSEM 2.0 #081 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.

```

E854+ED51      DB     0EDH,D=8+41H
E856 0EEE      MVI    C,SDSPY
                SETB   5,L
E858+CBED      DB     0CBH,5*8+L+0COH
                OUTP   L ;CLEAR CHARACTER
E85A+ED69      DB     0EDH,L=8+41H
E85C 0EEF       MVI    C,DDSPY
                OUTP   B
E85E+ED59      DB     0EDH,E=8+41H
                RES    5,L
E860+CBAD      DB     0CBH,5*8+L+80H
E862 04        INR    B
                JR    LFCL3
E863+18E7      DB     18H,LFCL3-$-1
;
;
; MOVE LINE D TO LINE E
;
;
E865 7A        MOVLIN: MOV   A,D ;SET UP
E866 F6C0      ORI   0COH
E868 57        MOV   D,A
E869 7B        MOV   A,E
E86A F6C0      ORI   0COH
E86C 5F        MOV   E,A
E86D 064F      MVI   B,79
E86F E5        PUSH  H
E870 C5        PUSH  B
E871 CD7AE8      CALL  MOVLN1 ;MOVE ATTRIBUTES
E874 C1        POP   B
E875 E1        POP   H
                SETB   5,D ;MOVE CHARACTERS
E876+CBEA      DB     0CBH,5*8+D+0COH
                SETB   5,E
E878+CBEB      DB     0CBH,5*8+E+0COH
E87A 0EEE      MOVLN1: MVI   C,SDSPY
                OUTP   D
E87C+ED51      DB     0EDH,D=8+41H
E87E 2193F9      LXI   H,DSPBUF
E881 E5        PUSH  H
E882 C5        PUSH  B
E883 0EEF      MVI   C,DDSPY
                INIR
E885+EDB2      DB     0EDH,0B2H
                INI
E887+EDA2      DB     0EDH,0A2H
E889 C1        POP   B
E88A 04        INR   B
E88B E1        POP   H
                OUTP   E
E88C+ED59      DB     0EDH,E=8+41H
E88E 0EEF      MVI   C,DDSPY
                OUTIR
E890+EDB3      DB     0EDH,0B3H
E892 C9        RET
;
;
;-----|
; MOVE CURSOR TO NEXT TAB |

```

CP/M MACRO ASSEM 2.0 #082 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.

;-----|
E893 3A09FA MOV TAB: LDA LASTAB
E896 BC CMP H
E897 FAF7E1 JM EXIT2
JRZ TBDON
E89A+2840 DB 28H,TBDON-\$-1
E89C E5 PUSH H
E89D 44 MOV B,H
E89E 7C MOV A,H
E89F E678 ANI 78H
E8A1 CDE1E8 CALL GTEFAD+2
E8A4 78 MOV A,B
E8A5 E607 ANI 7H
E8A7 47 MOV B,A
E8A8 FE07 CPI 7
JRZ MOVTB3
E8AA+2813 DB 28H,MOVTB3-\$-1
E8AC C6F8 ADI 0F8H
E8AE 2F CMA
E8AF 57 MOV D,A
E8B0 7E MOV A,M
E8B1 04 INR B
MOVTB1: RLCR A
E8B2+CB07 DB 0CBH, 00H + A
DJNZ MOVTB1
E8B4+10FC DB 10H,MOVTB1-\$-1
E8B6 42 MOV B,D
MOVTB2: BIT 7,A
E8B7+CB7F DB 0CBH,7*8+A+40H
JRNZ TBIT
E8B9+2010 DB 20H,TBIT-\$-1
RLCR A
E8BB+CB07 DB 0CBH, 00H + A
DJNZ MOVTB2
E8BD+10F8 DB 10H,MOVTB2-\$-1
E8BF 3E09 MOVTB3: MVI A,9
E8C1 BB CMP E
JRZ TBOVR
E8C2+2817 DB 28H,TBOVR-\$-1
E8C4 1C INR E
E8C5 23 INX H
E8C6 7E MOV A,M
E8C7 0608 MVI B,8
JR MOVTB2
E8C9+18EC DB 18H,MOVTB2-\$-1
E8CB 78 TBIT: MOV A,B
E8CC C6F7 ADI 0F7H
E8CE 2F CMA
E8CF 47 MOV B,A
E8D0 7B MOV A,E
E8D1 A7 ANA A
E8D2 17 RAL
E8D3 17 RAL
E8D4 17 RAL
E8D5 B0 ORA B
E8D6 E1 POP H

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E8D7 67 MOV H,A
E8D8 C3F0E1 JMP CUSTH
E8DB E1 TBOVR: POP H
E8DC C3F7E1 TBDON: JMP EXIT2
;
E8DF D620 GTEFAD: SUI 20H
SRLR A
E8E1+CB3F DB OCBH, 38H + A
SRLR A
E8E3+CB3F DB OCBH, 38H + A
SRLR A
E8E5+CB3F DB OCBH, 38H + A
E8E7 5F MOV E,A
E8E8 1600 MVI D,0
E8EA 210AFA LXI H,TABS
E8ED 19 DAD D
E8EE C9 RET

;
;
; RESET PARAMETERS

;
;
E8EF 21FFF9 RSTPAR: LXI H,CURCHR
E8F2 AF XRA A
E8F3 0605 MVI B,5
E8F5 77 RSTL1: MOV M,A
E8F6 23 INX H
DJNZ RSTL1
E8F7+10FC DB 10H,RSTL1-\$-1
E8F9 3E17 MVI A,23
E8FB 3204FA STA BOTACT
E8FE 3205FA STA MAGACT
E901 3E1B MVI A,ESC
E903 3206FA STA LEADIN

;
;
; RESET OR CLEAR TABS

;
;
E906 3E4F RSTABS: MVI A,4FH
E908 3209FA STA LASTAB
E90B 3E01 MVI A,1
JR DOTABS
E90D+1804 DB 18H,DOTABS-\$-1

;
;
E90F AF CLRTBS: XRA A
E910 3209FA STA LASTAB

;
;
E913 210AFA DOTABS: LXI H,TABS
E916 060A MVI B,10
E918 77 DOTBJ1: MOV M,A
E919 23 INX H
DJNZ DOTBJ1
E91A+10FC DB 10H,DOTBJ1-\$-1
E91C C9 RET

;
;
; SAVE SCREEN PARAMETERS

;
;
E91D 21FFF9 SAVPAR: LXI H,CURCHR
E920 1114FA LXI D,TEMPAR

CP/M MACRO ASSEM 2.0 #084 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.

```

E923 011500      LXI     B.21
                  LDIR
E926+EDB0        DB      0EDH,0B0H
E928 C9          RET

;
; RESTORE SCREEN PARAMETERS
;

E929 2114FA      RSTORP: LXI     H,TEMPAR
E92C 11FFF9      LXI     D,CURCHR
E92F 011500      LXI     B.21
                  LDIR
E932+EDB0        DB      0EDH,0B0H
E934 C9          RET

;
; CLEAR SCREEN & RESET PARAMETERS
;

E935 CDEFE8      CLSCRN: CALL   RSTPAR
E938 AF           XRA    A
E939 32A4DA      STA    LINOPS
E93C 3EA6           MVI   A,0A6H
E93E D3EE           OUT   SDSPY
E940 3E17           MVI   A,23
E942 D3FE           OUT   DDSPY
E944 210000      LXI    H,0
E947 C351E3      JMP    CTRLZ

;
; CLEAR TO END OF ACTIVE REGION
;

E94A CD42E8      CLTOND: CALL   LFCLR2
E94D 3A07FA      LDA    CHRADR
E950 47           MOV    B,A
E951 3A04FA      LDA    BOTACT
E954 90           SUB    B
                  JRZ    CLND3
E955+2812      DB     28H,CLND3-$-1
E957 47           MOV    B,A
E958 7D           CLND1: MOV    A,L
E959 E61F           ANI   1FH
E95B 3C           INR    A
E95C FE18           CPI   24
                  JRNZ   CLND2
E95E+2001      DB     20H,CLND2-$-1
E960 AF           XRA    A
E961 6F           CLND2: MOV    L,A
E962 C5           PUSH   B
E963 CD1DE8      CALL   LFCLR1
E966 C1           POP    B
                  DJNZ   CLND1
E967+10EF      DB     10H,CLND1-$-1
E969 C9           CLND3: RET

;
; INSERT OR DELETE CHAR.
;

E96A E5           INSCHR: PUSH   H           ;SET UP FOR INSERT
E96B 2194F9      LXI    H,DSPBUR+1
E96E 22E7F9      SHLD   MOVBEG
  
```

CP/M MACRO ASSEM 2.0 #085 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.

```

E971 3E23      MVI   A,23H      ;INX   H
E973 32A1E9    STA   MODX
                JR    INSDEL
E976+180C     DB    18H,INSDEL-$-1
;
E978 E5        DELCHR: PUSH  H      ;SET UP FOR DELETE
E979 2192F9    LXI   H,DSPBFL+1
E97C 22E7F9    SHLD  MOVBEG
E97F 3E2B      MVI   A,2BH      ;DCX   H
E981 32A1E9    STA   MODX
;
E984 AF        INSDEL: XRA   A
E985 CDBDE9    CALL  FILBFF    ; INSERT OR DELETE
E988 E1        POP   H
E989 E5        PUSH  H
E98A 7D        MOV   A,L
E98B F6C0      ORI   0COH
E98D 6F        MOV   L,A
E98E E5        PUSH  H
E98F CDC7E9    CALL  INPLIN
E992 E1        POP   H
E993 7D        MOV   A,L
E994 5C        MOV   E,H
E995 D3EE      OUT   SDSPY
E997 2AE7F9    LHLD  MOVBEG
E99A 3A00FA    LDA   CURATT
                BIT   4,A
E99D+CB67     DB    0CBH,4*8+A+40H
                JRZ  INDEL1
E99F+2801     DB    28H,INDEL1-$-1
E9A1 2B        MODX: DCX   H      ;MODIFIABLE CODE
E9A2 E5        INDEL1: PUSH  H
E9A3 CDD8E9    CALL  OUTLIN
E9A6 3E20      MVI   A,20H
E9A8 CDBDE9    CALL  FILBFF
E9AB D1        POP   D
E9AC E1        POP   H
E9AD D5        PUSH  D
E9AE 7D        MOV   A,L
E9AF F6E0      ORI   0EOH
E9B1 6F        MOV   L,A
E9B2 E5        PUSH  H
E9B3 CDC7E9    CALL  INPLIN
E9B6 E1        POP   H
E9B7 7D        MOV   A,L
E9B8 5C        MOV   E,H
E9B9 E1        POP   H
E9BA C3D8E9    JMP   OUTLIN
;
E9BD 2191F9    FILBFF: LXI   H,DSPBFL  ;FILL BUFFER WITH (A)
E9C0 0654      MVI   B,84
E9C2 77        FLBF1: MOV   M,A
E9C3 23        INX   H
                DJNZ  FLBF1
E9C4+10FC     DB    10H,FLBF1-$-1
E9C6 C9        RET
  
```

CP/M MACRO ASSEM 2.0 #086 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.

;
E9C7 D3EE INPLIN: OUT SDSPY ;INPUT PART OF LINE
E9C9 7C MOV A,H ;TO PART OF BUFFER
E9CA 3D DCR A
E9CB 064F MVI B,79
E9CD 0EFE MVI C,DDSPY
E9CF 2193F9 LXI H,DSPBUF
INPLN1:INI
E9D2+EDA2 DB 0EDH,0A2H
E9D4 B8 CMP B
JRNZ INPLN1
E9D5+20FB DB 20H,INPLN1-\$-1
E9D7 C9 RET
;
E9D8 0650 OUTLIN: MVI B,80 ;OUTPUT PART OF BUFFER
E9DA 7B MOV A,E ;TO PART OF LINE
E9DB 0EFE MVI C,DDSPY
OUTLN1:OUTI
E9DD+EDA3 DB 0EDH,0A3H
E9DF B8 CMP B
JRNZ OUTLN1
E9E0+20FB DB 20H,OUTLN1-\$-1
E9E2 C9 RET
;
PAGE

```

;
;FILL COMMAND
;

E9E3 =      GRFSTR EQU $           ;  

;  

;  

E9E3 3AF6F9  FILL: LDA GRY      ;SET UP GRY,GRY1  

E9E6 47       MOV B,A  

E9E7 3AF8F9  LDA GRY1     ;AND GRX,GRX1 IN RIGHT ORDER  

E9EA 90       SUB B  

E9EB DCDCEB  CC SWPY  

E9EE AF       XRA A      ;ZERO CARRY  

E9EF 2AF2F9  LHLD GRX  

               LDDE GRX1  

E9F2+ED5B    DB 0EDH,5BH  

E9F4+F4F9    DW GRX1  

               DSBC D  

E9F6+ED52    DB 0EDH,D*8+42H  

E9F8 DCCDEB  CC SWPX  

E9FB 3A6FEA  LDA XMASK   ;CHECK MASKS  

E9FE 47       MOV B,A    ;FOR BOTH = 0  

E9FF 216AF8  LXI H,MASK  

EA02 7E       MOV A,M  

EA03 B0       ORA B  

EA04 78       MOV A,B  

EA05 326EF8  STA CLFLG  

               JRNZ FILL1  

EA08+200B    DB 20H,FILL1-$-1  

EA0A 3EA2     MVI A,0A2H ;ANA D  

EA0C 32C4EA  STA ORAD    ;PREPARE TO CLEAR BLOCK  

EA0F 3EFF     MVI A,OFFH ;MAKE MASKS 'FF' FOR NOW AND COMPLEMENT  

EA11 77       MOV M,A    ;AFTER FIXING EDGES  

EA12 326FEA  STA XMASK  

EA15 23       FILL1: INX H  

EA16 77       MOV M,A    ;MASK2  

EA17 23       INX H  

EA18 23       INX H  

EA19 77       MOV M,A    ;CURMSK  

EA1A AF       XRA A  

EA1B 326FF8  STA CYC    ;START CYCLE AT ZERO  

EA1E CD5CEB  CALL LINDSP  ;CACULATE LINE  

EA21 2AF2F9  LHLD GRX  

EA24 CDFAEA  CALL PIX     ;PIX FINDS OUT WHICH BIT THE  

EA27 326CFA  STA PIXBT2  ;PIXEL IS IN  

EA2A CD8AEB  CALL XDDR  

EA2D 326AFA  STA STRX   ;START FOR X  

EA30 3AF8F9  LDA GRY1   ;DO THE SAME FOR  

EA33 CD5FEB  CALL LINDSP+3  

EA36 2AF4F9  LHLD GRX1  ;OTHER POINT  

EA39 CDFAEA  CALL PIX  

EA3C 0EOF     MVI C,OFH   ;FIX TOP  

EA3E E5       PUSH H  

EA3F CD50EB  CALL FIXNIB ;FIX MASK FOR TOP EDGE  

EA42 E1       POP H  

EA43 CD8AEB  CALL XDDR

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CP/M MACRO ASSEM 2.0 #088 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.

```

EA46 3269FA      STA    STRX1 ;START FOR X2
EA49 3AF6F9      DOMSK: LDA    GRY    ;START LINE HERE
EA4C 47          MOV    B,A
EA4D 3AF8F9      LDA    GRY1
EA50 B7          ORA    A       ;IF GRY1 IS AT LAST LINE
                           JRZ    LSTLIN ;THEN DO IT AND LEAVE
EA51+283C        DB     28H,LSTLIN-$-1
EA53 90          SUB    B
                           JRC    EXIT1 ;DONE IF PAST GRY
EA54+382B        DB     38H,EXIT1-$-1
EA56 CC4AEB      CZ
EA59 CDC8EA      CALL   LINE
EA5C CDB5EA      DOCOL: CALL   COLUMN ;LOOP UNTIL ALL COLUMNS ARE DONE
EA5F CD09EB      CALL   NXTBYT ;FIND NEXT BYTE
                           JRNZ   DOCOL
EA62+20F8        DB     20H,DOCOL-$-1
EA64 3A6FF8      LDA    CYC    ;GET NEW MASK
EA67 B7          ORA    A
                           JRC    MSKDON ;CYCLE TELLS US WHICH ONE
EA68+280E        DB     28H,MSKDON-$-1
EA6A AF          XRA    A
EA6B 326FF8      STA    CYC
EA6E 3EFF        XMSK: MVI    A,0FFH ;MODIFIED MASK
EA70 326BF8      MSKOK: STA    MASK2
EA73 326DF8      STA    CURMSK
                           JR    DOMSK
EA76+18D1        DB     18H,DOMSK-$-1
EA78 3C          MSKDON: INR    A
EA79 326FF8      STA    CYC
EA7C 3A6AF8      LDA    MASK
                           JR    MSKOK
EA7F+18EF        DB     18H,MSKOK-$-1
EA6F =           ;      XMASK EQU    XMSK+1
;
EA81 3A6BFA      EXIT1: LDA    PIXBIT ;WE HAVE TO MAKE SURE TO GET
EA84 E604        ANI    4
                           JRNZ   EXIT   ;LAST LINE IF NEEDED.
EA86+2015        DB     20H,EXIT-$-1
EA88 3A6CFA      LDA    PIXBT2
EA8B E604        ANI    4
                           JR    EXIT
EA8D+280E        DB     28H,EXIT-$-1
;
EA8F CDC8EA      LSTLIN: CALL   LINE ;IF WE ARE AT THE LAST LINE
EA92 CD4AEB      CALL   FIXBOT
EA95 CDB5EA      LSTLN1: CALL   COLUMN ;WE DO IT AND EXIT
EA98 CD09EB      CALL   NXTBYT
                           JRNZ   LSTLN1 ;FALL INTO EXIT
EA9B+20F8        DB     20H,LSTLN1-$-1
;
;
EA9D 3A6EF8      EXIT:  LDA    CLFLG ;IF WE WERE CLEARING
EA9E B7          ORA    A
EA9F C0          RNZ    ;A BLOCK WE NEED
EA9G 326AF8      STA    MASK

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CP/M MACRO ASSEM 2.0 #089 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.

```

EAA5 326FEA      STA    XMASK ;TO RESTORE EVERYTHING
EAA8 3EB2        MVI    A,0B2H ;ORA D
EAAA 32C4EA      STA    ORAD
EAAD 326EF8      STA    CLFLG
EAB0 C9          RET

; DNLIN: MOV M,A
EAB1 77          POP PSW
EAB2 F1          JR LSTLIN
EAB3+18DA        DB 18H,LSTLIN-$-1
;

EAB5 3A6EF8      COLUMN: LDA CLFLG ;IF WE ARE
EAB8 B7          ORA A ;CLEARING A BLOCK
EAB9 3A6BF8      LDA MASK2
                  JRNZ CLMN1
EABC+2001        DB 20H,CLMN1-$-1
EABE 2F          CMA ;THEN COMPLEMENT THE MASK AND
EABF 57          CLMN1: MOV D,A
EAC0 0EFE        MVI C,DDSPY ;AND IT INSTEAD OF ORING IT
                  INP A
EAC2+ED78        DB OEDH,A*8+40H
EAC4 B2          ORAD: ORA D ;MODIFIED TO AND D FOR CLEAR
                  OUTP A
EAC5+ED79        DB OEDH,A*8+41H
EAC7 C9          RET

; LINE: LDA STRX ;IF THE BLOCK IS LESS THAN
EACB 4F          MOV C,A
EACC 3A69FA      LDA STRX1 ;4 PIXELS WIDE
EACF 91          SUB C
EAD0 FE04        CPI 4 ;WE NEED TO FIX THE RIGHT EDGE
EAD2 DC32EB      CC FIXRGT
EAD5 3AF8F9      LDA GRY1 ;FIND SDSPY FOR NEW LINE
EAD8 CD5FEB      CALL LINDSP+3
EADB D3EE        OUT SDSPY
EADD 3A6BFA      FIXLFT: LDA PIXBIT ;FIX THE LEFT EDGE
EAE0 E603        ANI 03H
EAE2 D603        SUI 3 ;TAKE PIXELS OFF THE EDGES
                  JRZ FXLFT2
EAE4+280F        DB 28H,FXLFT2-$-1
                  NEG ;PIXBIT TELLS US HOW MANY
EAE6+ED44        DB OEDH,44H
EAE8 47          MOV B,A
EAE9 216BF8      LXI H,MASK2 ;PIXELS TO TAKE OFF
EAEC 7E          MOV A,M
EAED 1677        MVI D,77H
EAEF A2          FXLFT1: ANA D
                  RRCR D
EAF0+CB0A        DB 0CBH, 08H + D
                  DJNZ FXLFT1
EAF2+10FB        DB 10H,FXLFT1-$-1
EAF4 77          MOV M,A
EAF5 3A69FA      FXLFT2: LDA STRX1 ;WE NEED STRX1 IN B
EAF8 47          MOV B,A ;FOR COL
EAF9 C9          RET

```

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;
;
EAFA CD91EB PIX: CALL SETBIT ;SET BIT TELLS US WHICH
RRCR A ;BIT IN A NIBBLE
EAFD+CBOF DB 0CBH, 08H + A
RRCR A
EAFF+CBOF DB 0CBH, 08H + A
RRCR A ;MOVE FROM BITS 3,4,5
EB01+CBOF DB 0CBH, 08H + A
EB03 E607 ANI 07H ;TO 0,1,2
EB05 326BFA STA PIXBIT
EB08 C9 RET
;
;
EB09 3A69FA NXBYT: LDA STRX1 ;IF WE JUST FINISHED WITH
EB0C B8 CMP B ;THE FIRST BYTE
JRNZ NXBYT1
EB0D+200D DB 20H,NXBYT1-\$-1
EB0F 216DF8 LXI H,CURMSK ;WE MUST UNFIX
EB12 4E MOV C,M ;THE LEFT EDGE
EB13 2B DCX H ;MMASK
EB14 7E MOV A,M ;MMASK TELLS US IF THE TOP
EB15 A1 ANA C ;WAS FIXED OR NOT
EB16 2B DCX H ;MASK2
EB17 77 MOV M,A ;MASK2 IS THE FIXED MASK
EB18 3EFF MVI A,OFFH ;MAKE MMASK 'FF'
EB1A 23 INX H
EB1B 77 MOV M,A ;MMASK
EB1C 04 NXBYT1: INR B ;POINT TO NEXT BYTE
EB1D 3A6AFA LDA STRX
EB20 B8 CMP B ;COMPARE TO LAST BYTE
JRZ FIXRGT ;IF EQUAL FIX RIGHT EDGE
EB21+280F DB 28H, FIXRGT-\$-1
EB23 D0 RNC ;IF LESS DO IT
EB24 21F8F9 LXI H,GRY1 ;ELSE DECREMENT GRY1 TWICE
EB27 7E MOV A,M
EB28 B7 ORA A ;TO GET TO NEXT LOWER BYTE
EB29 C8 RZ ;DO NOT GO BELOW ZERO
EB2A 3D DCR A ;DOWN TWO LINES
EB2B CAB1EA JZ DNLIN
EB2E 3D DCR A
EB2F 77 MOV M,A
EB30 AF XRA A ;SET ZERO FLAG TO START A NEW LINE
EB31 C9 RET
;
;
EB32 3A6CFA FIXRGT: LDA PIXBT2 ;PIXBT2 IS FOR THE RIGHT EDGE
EB35 E603 ANI 03
JRZ FXRGT2 ;IF ZERO THEN NO FIXING NEEDED
EB37+280F DB 28H,FXRGT2-\$-1
EB39 C5 PUSH B ;SAVE X
EB3A 47 MOV B,A
EB3B 16EE MVI D,0EEH ;TAKE OFF 'PIXBT2' BITS
EB3D 216BF8 LXI H,MASK2 ;OFF RIGHT EDGE
EB40 7E MOV A,M
EB41 A2 FXRGT1: ANA D

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EB42+CB02	RLCR	D
	DB	OCBH, 00H + D
	DJNZ	FXRG1
EB44+10FB	DB	10H,FXRG1-\$-1
EB46 77	MOV	M,A ;SAVE IN MASK2
EB47 C1	POP	B ;GET X
EB48 3C	FXRG2: INR	A
EB49 C9	RET	
	;	
	;	
EB4A 0EFO	FIXBOT: MVI	C,0FOH ;BOTTOM EDGE
EB4C 3A6CFA	LDA	PIXBT2 ;BIT 2 OF PIXBIT TELLS
EB4F 2F	CMA	;US WHICH NIBBLE WE ARE IN
EB50 E604	FIXNIB: ANI	4 ;FIXNIB IS USED BY PIXTOP ALSO
EB52 C0	RNZ	;RETURN IF NO FIXING NEEDED
EB53 216BF8	LXI	H,MASK2
EB56 79	MOV	A,C ;AND MASK2 WITH F0 OR OF
EB57 A6	ANA	M ;TO TAKE OFF TOP OR BOTTOM LINE
EB58 77	MOV	M,A
EB59 23	INX	H
EB5A 71	MOV	M,C ;PUT OF OR F0 IN MMASK
EB5B C9	RET	;TO REMEMBER
	;	
0179 =	GRFPEND EQU	\$-GRFSTR
	;	
EB5C 3AF6F9	LINDSP: LDA	GRY
EB5F C610	ADI	16 ;FIND OUT WHICH NIBBLE
EB61 2F	CMA	
EB62 216BFA	LXI	H,PIXBIT
	RES	5,M
EB65+CBAA	DB	OCBH,5*8+M+80H
	BIT	0,A
EB67+CB47	DB	OCBH,0*8+A+40H
	JRNZ	LNDSP1
EB69+2002	DB	20H,LNDSP1-\$-1
	SETB	5,M
EB6B+CBEE	DB	OCBH,5*8+M+0COH
	LNDSP1: SRLR	A
EB6D+CB3F	DB	OCBH, 38H + A
EB6F 06FF	MVI	B,-1 ;AND WHICH LINE
EB71 04	LNDSP2: INR	B
EB72 C6FB	ADI	-5
	JRC	LNDSP2
EB74+38FB	DB	38H,LNDSP2-\$-1
EB76 C605	ADI	5
EB78 0F	RRC	
EB79 0F	RRC	
EB7A 0F	RRC	
EB7B 4F	MOV	C,A
EB7C 3AA4DA	LDA	LINOPS
EB7F F5	PUSH	PSW ;SAVE LINOPS
EB80 80	ADD	B
EB81 FE18	CPI	24
	JRC	LNDSP3
EB83+3802	DB	38H,LNDSP3-\$-1
EB85 C6E8	ADI	-24

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EB87 B1 LNDSP3: ORA C
EB88 C1 POP B ;IN B FOR EXTERNAL USE
EB89 C9 RET

; EB8A 7D XDDR: MOV A,L ;X COORDIDNATE IN [HL]
EB8B E6FC ANI 0FCH
EB8D B4 ORA H
EB8E 0F RRC
EB8F 0F RRC
EB90 C9 RET

; EB91 7D SETBIT: MOV A,L ;FIND OUT WHICH BIT
EB92 07 RLC
EB93 07 RLC ;IN THE NIBBLE
EB94 07 RLC

EB95 E618 ANI 18H
EB97 47 MOV B,A
EB98 3A6BFA LDA PIXBIT
EB9B E6E7 ANI 0E7H
EB9D B0 ORA B
EB9E EE18 XRI 18H
EBA0 C9 RET

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;PLOT POINT SPECIFIED BY GRX,GRY

EBA1 3ABEEB PPLOT: LDA GRFBIT+1
EBA4 326BFA STA PIXBIT
EBA7 CD5CEB CALL LINDSP ;INVERT Y
EBAA D3EE OUT SDSPY
EBAC 2AF2F9 LHLD GRX
EBAF CD91EB CALL SETBIT ;GET X
EBB2 32BEEB STA GRFBIT+1
EBB5 CD8AEB CALL XDDR ;SET X ADDRESS
EBB8 47 MOV B,A
EBB9 0EFE MVI C,DDSPY
EBBB+ED78 INP A
GRFBIT: DB 0EDH,A*8+40H
EBBD+CBC7 SETB 0,A ;MODIFIED BIT SET
OUTP DB 0CBH,0*8+A+0C0H
EBBF+ED79 DB 0EDH,A*8+41H
EBC1 C9 RET

;
;
EBC2 32F1F9 CMPH: STA GRMODE
EBC5 7D MOV A,L
EBC6 2F CMA
EBC7 6F MOV L,A
EBC8 7C MOV A,H
EBC9 2F CMA
EBCA 67 MOV H,A
EBCB 23 INX H
EBCC C9 RET

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;

EBCD 2AF2F9 SWPX: LHLD GRX ;EXCHANGE GRX & GRX1
LDED GRX1

EBD0+ED5B DB 0EDH,5BH

EBD2+F4F9 DW GRX1

EBD4 22F4F9 SHLD GRX1
SDED GRX

EBD7+ED53 DB 0EDH,53H

EBD9+F2F9 DW GRX

EBDB C9 RET

;

EBDC 2AF6F9 SWPY: LHLD GRY ;EXCHANGE GRY & GRY1
LBCD GRY1

EBOF+ED4B DB 0EDH,4BH

EBE1+F8F9 DW GRY1

EBE3 22F8F9 SHLD GRY1
SBCD GRY

EBE6+ED43 DB 0EDH,43H

EBE8+F6F9 DW GRY

EBEA C9 RET

;

EBBB 2AF2F9 DRWBLK: LHLD GRX
EBEE E5 PUSH H
EBEF 22F4F9 SHLD GRX1
EBF2 CD16EC CALL VPLOT
EBF5 2A65FA LHLD GRX12
EBF8 E5 PUSH H
EBF9 22F4F9 SHLD GRX1
EBFC CD16EC CALL VPLOT
EBFF E1 POP H
EC00 22F2F9 SHLD GRX
EC03 22F4F9 SHLD GRX1
EC06 CDA1EB CALL PPLOT
EC09 3A67FA LDA GRY12
EC0C 32F6F9 STA GRY
EC0F CD16EC CALL VPLOT
EC12 E1 POP H
EC13 22F2F9 SHLD GRX

;
;PLOT VECTOR FROM X1,Y1 TO X,Y

;
;CALCULATE DELTA X

EC16 CDCDEB VPLOT: CALL SWPX
EC19 E5 PUSH H
EC1A AF XRA A ;CLEAR CARRY & A
EC1B 32F1F9 STA GRMODE ;INITIALIZE DELTA SIGNS
DSBC D

EC1E+ED52 DB 0EDH,D=8+42H
JRNC VPLOT1

EC20+3004 DB 30H,VPLOT1-\$-1

EC22 3C INR A ;HANDLE -X

EC23 CDC2EB CALL CMPH ;COMPLEMENT H

EC26 EB VPLOT1: XCHG ;LEAVE DELTA X IN D

EC27 CDDCEB ; CALCULATE DELTA Y
CALL SWPY

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EC2A E5 PUSH H
EC2B AF XRA A ;CLEAR CARRY
EC2C 3AF1F9 LDA GRMODE
 DSBC B
EC2F+ED42 DB 0EDH,B*8+42H
 JRNC VPLLOT2
EC31+3005 DB 30H,VPLLOT2-\$-1
 SETB 1,A ;HANDLE -Y
EC33+CBCF DB 0CBH,1*8+A+0COH
EC35 CDC2EB CALL CMPH
 ; HL = DELTA Y
 ; COMPARE DELTA X AND DELTA Y
EC38 E5 VPLLOT2: PUSH H
EC39 AF XRA A ;CLEAR CARRY
EC3A 3AF1F9 LDA GRMODE
 DSBC D
EC3D+ED52 DB 0EDH,D*8+42H
EC3F E1 POP H
 JRC VPLLOT3
EC40+3801 DB 38H,VPLLOT3-\$-1
EC42 EB XCHG ;SET UP FOR DELTA Y >= DELTA X
EC43 42 VPLLOT3: MOV B,D ;SET UP FOR DELTA X > DELTA Y
EC44 4B MOV C,E
 SDED GDELL
EC45+ED53 DB 0EDH,53H
EC47+EDF9 DW GDELL
EC49 22EBF9 SHLD GDELS
EC4C 21F2F9 LXI H,GRX
EC4F 11F6F9 LXI D,GRY
 JRC VPLLOT4
EC52+380A DB 38H,VPLLOT4-\$-1
EC54 EB XCHG
 BIT 0,A ;SWAP BITS 1 & 0
EC55+CB47 DB 0CBH,0*8+A+40H
EC57 1F RAR
 RES 1,A
EC58+CB8F DB 0CBH,1*8+A+80H
 JRZ VPLLOT4
EC5A+2802 DB 28H,VPLLOT4-\$-1
 SETB 1,A
EC5C+CBCF DB 0CBH,1*8+A+0COH
EC5E 2292EC VPLLOT4: SHLD GLL
EC61 2296EC SHLD GLS
EC64 EB XCHG
EC65 22ABEC SHLD GSL
EC68 22B0EC SHLD GSS
 BIT 1,A
EC6B+CB4F DB 0CBH,1*8+A+40H
EC6D F5 PUSH PSW
EC6E 3E13 MVI A,13H ;INX H
 JRZ VPLLOT5
EC70+2802 DB 28H,VPLLOT5-\$-1
EC72 3E1B MVI A,1BH ;DCX H
EC74 32ADEC VPLLOT5: STA GSI ;SET LONG DIMENSION INCREMENT
EC77 F1 POP PSW
 BIT 0,A

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    EC78+CB47      DB     0CBH,0*8+A+40H
    EC7A 3E23      MVI    A,23H
                    JRZ    VPLOT6
    EC7C+2802      DB     28H,VPLOT6-$-1
    EC7E 3E2B      MVI    A,2BH
    EC80 3294EC    VPLOT6: STA   GLI
                    ; PLOT ACTUAL VECTOR
    EC83 60        MOV    H,B    ;GRK=GDELL/2
    EC84 69        MOV    L,C
    SRLR   H
    EC85+CB3C      DB     0CBH, 38H + H
                    RARR   L
    EC87+CB1D      DB     0CBH, 18H + L
    EC89 22EFF9    SHLD   GRK
    EC8C 78        VPLOT7: MOV   A,B
    EC8D B1        ORA    C
                    JRZ    VPLOT9
    EC8E+282C      DB     28H,VPLOT9-$-1
    EC90 C5        PUSH   B
    EC91 2AF2F9    GLL1: LHLD   GRX    ;MODIFIABLE CODE
    EC94 23        GLI:   INX    H      ;MODIFIABLE CODE
    EC95 22F2F9    SHLD   GRX    ;MODIFIABLE CODE
    EC98 2AEFF9    LHLD   GRK
                    LDDE   GDELS
    EC9B+ED5B      DB     0EDH,5BH
    EC9D+EBF9      DW     GDELS
    EC9F B7        ORA    A
    DSBC   D
    ECA0+ED52      DB     0EDH,D*8+42H
                    JRNC   VPLOT8
    ECA2+300E      DB     30H,VPLOT8-$-1
                    LDDE   GDELL
    ECA4+ED5B      DB     0EDH,5BH
    ECA6+EDF9      DW     GDELL
    ECA8 19        DAD    D
                    LDDE   GRY    ;MODIFIABLE CODE
    ECA9+ED5B      DB     0EDH,5BH
    ECAB+F6F9      DW     GRY
    ECAD 13        INX    D      ;MODIFIABLE CODE
                    SDDE   GRY    ;MODIFIABLE CODE
    ECAE+ED53      DB     0EDH,53H
    ECB0+F6F9      DW     GRY
    ECB2 22EFF9    VPLOT8: SHLD   GRK
    ECB5 CDA1EB    CALL   PPLOT
    ECB8 C1        POP    B
    ECB9 0B        DCX    B
                    JR     VPLOT7
    ECBA+18D0      DB     18H,VPLOT7-$-1
    ECBC E1        VPLOT9: POP   H      ;RESTORE GRX & GRY
    ECBD 22F6F9    SHLD   GRY
    ECC0 E1        POP    H
    ECC1 22F2F9    SHLD   GRX
    ECC4 C9        RET
                    ;
    EC92 =         GLL    EQU    GLL1+1
    EC96 =         GLS    EQU    GLL+4
  
```

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ECAB =	GSL	EQU	GLL+25
ECAD =	GSI	EQU	GLL+27
ECB0 =	GSS	EQU	GLL+30
;			
;CLEAR GRAPHIC MEMORY			
;			
ECC5 0618	GRFCLR: MVI	B,24	;SET UP
ECC7 1600	MVI	D,0	
ECC9 C5	GRFCL1: PUSH	B	;--LOOP 24 LINES
ECCA 0605	MVI	B,5	
ECCC C5	GRFCL2: PUSH	B	;----LOOP 5 SCAN PAIRS
ECCD 7A	MOV	A,D	
ECCE D3EE	OUT	SDSPY	
ECDO 01FE4F	LXI	B,79*256+DDSPY	
ECD3 AF	XRA	A	
GRFCL3: OUTP A ;-----LOOP 80 CHAR POS.			
ECD4+ED79	DB	0EDH,A*8+41H	
	DJNZ	GRFCL3	;-----END LOOP
ECD6+10FC	DB	10H,GRFCL3-\$-1	
	OUTP	A	
ECD8+ED79	DB	0EDH,A*8+41H	
ECDA 7A	MOV	A,D	
ECDB C620	ADI	20H	
ECDD 57	MOV	D,A	
ECDE C1	POP	B	
DJNZ GRFCL2 ;-----END LOOP			
ECDF+10EB	DB	10H,GRFCL2-\$-1	
ECE1 7A	MOV	A,D	
ECE2 3C	INR	A	
ECE3 E61F	ANI	1FH	
ECE5 57	MOV	D,A	
ECE6 C1	POP	B	
DJNZ GRFCL1 ;--END LOOP			
ECE7+10E0	DB	10H,GRFCL1-\$-1	
ECE9 C9	RET		

;

PAGE

```

;
;-----|          |
;-----|      VALET      |
;-----|
;

ECHA 2A49FA    VALCHK: LHLD    TEMSTK
ECED 2247FA    SHLD     VALPNT
ECF0 F1         POP      PSW
ECF1 C1         POP      B
ECF2 D1         POP      D
ECF3 E1         POP      H
ECF4 319DFF    LXI      SP,VALSTK
ECF7 E5         PUSH     H
ECF8 D5         PUSH     D
ECF9 C5         PUSH     B
ECFA F5         PUSH     PSW
ECFB 21FAF9    LXI      H,DSPCYC
ECFB 7E         MOV      A,M
ECFF 3600    MVI      M,O
ED01 F5         PUSH     PSW
ED02 21AFDA    LXI      H,NUMFLG
ED05 7E         MOV      A,M
ED06 3600    MVI      M,O
ED08 3243FA    STA      NUMSAV
ED0B 2180DA    LXI      H,WSFLAG
ED0E 7E         MOV      A,M
ED0F 3600    MVI      M,O
ED11 3244FA    STA      WSSAVE
ED14 216BED    LXI      H,VALENT
ED17 E5         PUSH     H
RETI
ED18+ED4D    DB      0EDH,4DH

;
ED1A F3         CLNVAL: DI
ED1B AF         XRA      A
ED1C CD7BEF    CALL     OUTBLK
ED1F 2174F8    LXI      H,VALCLN
ED22 3A3EFA    LDA      LSAVE
BIT 1,A
ED25+CB4F    DB      0CBH,1*8+A+40H
JRNZ CLNVL1
ED27+2002    DB      20H,CLNVL1-$-1
ED29 23         INX      H
ED2A 23         INX      H
ED2B CDE4EF    CLNVL1: CALL  VALMSG
ED2E AF         XRA      A
ED2F 3281DA    STA      VALSTP
ED32 3287DA    STA      VALTIM
ED35 3245FA    STA      CONFLG
ED38 32FCF9    STA      SETFLG
ED3B 3253FA    STA      NOKEY
ED3E 2F         CMA
ED3F 32AEDA    STA      TIMFLG
ED42 3A43FA    LDA      NUMSAV
ED45 32AFDA    STA      NUMFLG

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 ED48 3A44FA LDA WSSAVE
 ED4B 3280DA STA WSFLAG
 ;
 ED4E 215802 RSTALM: LXI H,600
 ED51 AF RSTAL1: XRA A
 ED52 32A7DA RSTAL2: STA ALMCNT
 ED55 22A9DA SHLD ALMFLG
 ED58 C9 RET
 ;
 ED59 CD1AED VALEXT: CALL CLNVAL
 ED5C F3 DI
 ED5D 3193FF LXI SP,VALSTK-10
 ED60 F1 POP PSW
 ED61 32FAF9 STA DSPCYC
 ED64 F1 POP PSW
 ED65 C1 POP B
 ED66 D1 POP D
 ED67 E1 POP H
 LSPD VALPNT
 ED68+ED7B DB 0EDH,07BH
 ED6A+47FA DW VALPNT
 ED6C FB EI
 ED6D C9 RET
 ;
 ED6E AF VALENT: XRA A
 ED6F 3283DA STA VALPND
 ED72 2F CMA
 ED73 3245FA STA CONFLG
 ED76 FB EI
 ED77 CD7BEP CALL OUTBLK
 ED7A 3A46FA LDA LSTATE
 ED7D 323EFA STA LSAVE
 ED80 2178F8 LXI H,VALPAR
 ED83 CDE4EF CALL VALMSG
 ED86 3EFF VALRTN: MVI A,0FFH
 ED88 3287DA STA VALTIM
 ED8B 213720 LXI H,2037H
 ED8E CD2FF0 CALL POSCUR
 ED91 012050 LXI B,5020H
 ED94 CDB5E1 VLLOOP: CALL VALDSP
 DJNZ VLLOOP
 ED97+10FB DB 10H,VLLOOP-\$-1
 ED99 CD45F0 CALL BRTDSP ;DISPLAY CURRENT
 ED9C CD3AF0 CALL VOLDSP ;PARAMETERS
 ED9F CDFFEF CALL KEYDSP
 EDA2 CD0AF0 CALL COMUP
 EDA5 CD12F0 CALL PNTUP
 EDA8 CDF2EF CALL BELDSP
 EDAB FB VLVEX1: EI ;POSITION CURSOR
 EDAC 3A86DA LDA VALCMD
 EDAF FE21 CPI '?' ; IF VALCMD IS !
 JRZ VLV2 ; THEN GOTO OVERLAY
 EDB1+2822 DB 28H,VLV2-\$-1
 EDB3 CD6EE0 CALL CONIN ; ELSE GET KEY
 EDB6 B7 ORA A ; IF = CTRL/ESC
 JRZ VLV0 ; THEN EXIT SET-UP MODE

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EDB7+280C		DB 28H,VLV0-\$-1
EDB9 FE09		CPI 9 ; ELSE IF = ASCII TAB
		JRZ VLV2 ; THEN GOTO OVERLAY
EDBB+2818		DB 28H,VLV2-\$-1
EDBD FE3A		CPI 3AH ; ELSE IF > ASCII 9
		JRNC VLV1 . ; THEN ..V1
EDBF+3007		DB 30H,VLV1-\$-1
EDC1 FE29		CPI 29H ; ELSE IF > ASCII 0
		JRNC VLV3 ; THEN ..V3
EDC3+3013		DB 30H,VLV3-\$-1
EDC5 C359BD	VLV0:	JMP VALEXT ; ELSE EXIT SET-UP MODE
EDC8 B6DF	VLV1:	ANI 0DFH ; CHANGE TO UPPER CASE
EDCA FE41		CPI 'A' ; IF < ASCII 'A'
		JRC VLV0 ; THEN EXIT SET UP MODE
EDCC+38F7		DB 38H,VLV0-\$-1
EDCE FE5B		CPI 'Z'+1 ; ELSE IF > ASCII 'Z'
		JRNC VLV0 ; THEN EXIT SET-UP MODE
EDD0+30F3		DB 30H,VLV0-\$-1
EDD2 3286DA		STA VALCMD ; ELSE STORE CHARACTER
EDD5 C36AF0	VLV2:	JMP GETVAL ; GOTO OVERLAY
EDD8 D630	VLV3:	SUI 30H ; SET ASCII NUMERIC TO 0 OFFSET
EDDA 21ABED		LXI H,VLVEX1
EDDD E5		PUSH H
	:	
		JRNZ VLBRIT ;0 - BELL TOGGLE
EDDE+200A		DB 20H,VLBRIT-\$-1
EDE0 3A50FA		LDA CURBEL ;COMPLEMENT CURBEL
EDE3 2F		CMA
EDE4 CD18F2		CALL WRTBEL ;SAVE IN CMOS RAM
EDE7 C3F2EF		JMP BELDSP ;DISPLAY CURRENT STATE
	:	
EDEA 3D	VLBRIT:	DCR A ;1 - BRIGHT UP
EDEB 214FFA		LXI H,BRTLEV
		JRNZ VLBDTN
EDEB+2007		DB 20H,VLBDTN-\$-1
EDF0 7E		MOV A,M ;CHECK CURRENT BRIGHTNESS
EDF1 FE1F		CPI 1FH ;FOR MAX
EDF3 C8		RZ ;IF MAX-GET KEY
EDF4 3C		INR A ;ELSE INCREASE BRIGHTNESS
		JR VLDOBT
EDF5+1807		DB 18H,VLDOBT-\$-1
EDF7 3D	VLBDTN:	DCR A ;2 - BRIGHT DOWN
		JRNZ VLVLUP
EDF8+2011		DB 20H,VLVLUP-\$-1
EDFA 7E		MOV A,M ;CHECK CURRENT BRIGHTNESS
EDFB B7		ORA A ;FOR MINIMUM
EDFC C8		RZ ;IF MIN-GET KEY
EDFD 3D		DCR A ;ELSE DECREASE BRIGHTNESS
EDFE F5	VLDOBT:	PUSH PSW
EDFF CD06F2		CALL WRTBRT
EE02 F1		POP PSW
EE03 F5		PUSH PSW
EE04 CD47EF		CALL BRTADJ ;ADJUST BRIGHTNESS TO NEW VALUE
EE07 F1		POP PSW
EE08 C348F0		JMP BRTDSP+3
EE0B 3D	VLVLUP:	DCR A

CP/M MACRO ASSEM 2.0 #100 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.

EE0C 2151FA	LXI	H,VOLEV
EE0F+2007	JRNZ	VLVLDN
EE11 7E	DB	20H,VLVLDN-\$-1
EE12 FEOF	MOV	A,M ;READ CURRENT VOLUME
EE14 C8	CPI	0FH ;MAX?
EE15 3C	RZ	;YES-GET KEY
	INR	A ;ELSE INCREASE
	JR	VLDVOL ;AND ADJUST
EE16+1807	DB	18H,VLDVOL-\$-1
EE18 3D	VLVLDN:	DCR A ;4 - VOLUME DOWN
		JRNZ VLCLKS
EE19+2017	DB	20H,VLCLKS-\$-1
EE1B 7E	MOV	A,M ;READ CURRENT VOLUME
EE1C B7	ORA	A ;MIN?
EE1D C8	RZ	;YES-GET KEY
EE1E 3D	DCR	A ;ELSE DECREASE
EE1F F5	VLDVOL:	PUSH PSW
EE20 CD1FF2		CALL WRTVOL
EE23 F1		POP PSW
EE24 F5		PUSH PSW
EE25 CD67EF		CALL VOLADJ ;ADJUST VOLUME TO NEW VALUE
EE28 215FF6		LXI H,MIDA
EE2B CD78E1		CALL SOUND ;OUTPUT SOUND
EE2E F1		POP PSW
EE2F C33DF0		JMP VOLDSP+3;AND DISPLAY NEW VALUE
EE32 3D	VLCLKS:	DCR A ;5 - CHANGE CLICK
		JRNZ VLCOM
EE33+2023		DB 20H,VLCOM-\$-1
EE35 3A4EFA		LDA TONTYP ;READ CURRENT CLICK
EE38 2A84DA		LHLD CLIKAD ;POINT TO CLICK TABLE
EE3B 010F00		LXI B,15 ;POINT TO NEXT CLICK
EE3E 09		DAD B
EE3F 3C		INR A
EE40 FE05		CPI 5 ;IF PAST END OF TABLE
		JRNZ VLCLK1 ;RESET POINTER
EE42+2004		DB 20H,VLCLK1-\$-1
EE44 2132F6		LXI H,NOTONE;TO START OF TABLE
EE47 AF		XRA A
EE48 F5	VLCLK1:	PUSH PSW
EE49 E5		PUSH H
EE4A CD26F2		CALL WRTTON ;WRITE CURRENT CLICK TO
EE4D E1		POP H ;CMOS RAM
EE4E 2284DA		SHLD CLIKAD
EE51 CD78E1		CALL SOUND ;OUTPUT A CLICK
EE54 F1		POP PSW
EE55 C302F0		JMP KEYDSP+3;DISPLAY NEW VALUE
EE58 3D	VLCOM:	DCR A
		JRNZ VLCMDN
EE59+2009		DB 20H,VLCMDN-\$-1
EE5B CD5DF2		CALL REDCOM
EE5E FE0A		CPI 10
EE60 C8		RZ
EE61 3C		INR A
		JR VLDOCM
EE62+1809		DB 18H,VLDOCM-\$-1
EE64 3D	VLCMDN:	DCR A

CP/M MACRO ASSEM 2.0 #101 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.

EE65+200F	JRNZ	VLPTUP
EE67 CD5DF2	DB	20H,VLPTUP-\$-1
EE6A B7	CALL	REDCOM
EE6B C8	ORA	A
EE6C 3D	RZ	
EE6D CD31F2	DCR	A
EE70 CD0AF0	VLDOM: CALL	WRTCOM
EE73 C32DEF	CALL	COMUP
	JMP	ADJCOM
;		
EE76 3D	VLPTUP: DCR	A
	JRNZ	VLPTDN
EE77+2009	DB	20H,VLPTDN-\$-1
EE79 CD61F2	CALL	REDPNT
EE7C FE0A	CPI	10
EE7E C8	RZ	
EE7F 3C	INR	A
	JR	VLDOPT
EE80+1806	DB	18H,VLDOPT-\$-1
EE82 CD61F2	VLPDN: CALL	REDPNT
EE85 B7	ORA	A
EE86 C8	RZ	
EE87 3D	DCR	A
EE88 CD2DF2	VLDOPT: CALL	WRTPNT
EE8B CD12F0	CALL	PNTUP
EE8E C326EF	JMP	ADJPNT
;		
PAGE		

CP/M MACRO ASSEM 2.0 #102 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.

;
EE91 E5 DSPTIM: PUSH H
EE92 D5 PUSH D
EE93 C5 PUSH B
EE94 2A07FA LHLD CHRADR
EE97 112020 LXI D,2020H
EE9A 19 DAD D
EE9B E5 PUSH H
EE9C 3AADD A LDA CLKFLG
EE9F B7 ORA A
JRNZ DSPTM3
EEA0+200F DB 20H,DSPTM3-\$-1
EEA2 213720 DSPTM1: LXI H,2037H
EEA5 CD2FF0 CALL POSCUR
EEA8 21D9F8 DSPTM2: LXI H,NOTSET
EEAB CDE4EF CALL VALMSG
EEAE C316EF JMP DSPTM9
;
EEB1 213720 DSPTM3: LXI H,2037H
EEB4 CD2FF0 CALL POSCUR
EEB7 CD2EE7 CALL READTH
EEBA FE3F CPI '?'
JRZ DSPTM2
EEBC+28EA DB 28H,DSPTM2-\$-1
EEBE 21B0FB LXI H,HRS10
EEC1 7E MOV A,M ;SUPPRSS LEADING ZERO
EEC2 E6F3 ANI 0F3H
EEC4 FE30 CPI 30H
JRNZ DSPTMA
EEC6+2002 DB 20H,DSPTMA-\$-1
EEC8 E62F ANI 2FH
EECA 4F DSPTMA: MOV C,A ;DISPLAY TIME
EECB CDB5E1 CALL VALDSP
EECE 2B DCX H
EECF 4E MOV C,M
EED0 CDB5E1 CALL VALDSP
EED3 1E02 MVI E,2
EED5 0E3A DSPTM4: MVI C,':'
EED7 CDB5E1 CALL VALDSP
EEDA 0602 MVI B,2
EEDC 2B DSPTM5: DCX H
EEDD 4E MOV C,M
EEDE CDB5E1 CALL VALDSP
DJNZ DSPTM5
EEE1+10F9 DB 10H,DSPTM5-\$-1
EEE3 1D DCR E
JRNZ DSPTM4
EEE4+20EF DB 20H,DSPTM4-\$-1
EEE6 0E20 MVI C,','
EEE8 CDB5E1 CALL VALDSP
EEE9 CD54E7 CALL READAT
EEEE FE3F CPI '?'
JRZ DSPTM1
EEF0+28B0 DB 28H,DSPTM1-\$-1
EEF2 21AEFB LXI H,MINS10

CP/M MACRO ASSEM 2.0 #103 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.

EEF5 7E MOV A,M
EEF6 E6F3 ANI 0F3H
EEF8 FE30 CPI 30H
JRNZ DSPTM6
EEFA+2002 DB 20H,DSPTM6-\$-1
EEFC 3E20 MVI A,20H
EEFE 77 DSPTM6: MOV M,A
EEFF 0602 MVI B,2
EF01 4E DSPTM7: MOV C,M ;DISPLAY DATE
EF02 CDB5E1 CALL VALDSP
EF05 2B DCX H
DJNZ DSPTM7
EF06+10F9 DB 10H,DSPTM7-\$-1
EF08 0E2F MVI C,'/'
EF0A CDB5E1 CALL VALDSP
EF0D 0602 MVI B,2
EF0F 4E DSPTM8: MOV C,M
EF10 2B DCX H
EF11 CDB5E1 CALL VALDSP
DJNZ DSPTM8
EF14+10F9 DB 10H,DSPTM8-\$-1
EF16 E1 DSPTM9: POP H
EF17 CD2FF0 CALL POSCUR ;CURSOR TO LOWER RIGHT CORNER
EF1A 3EFF MVI A,0FFH
EF1C 32AEDA STA TIMFLG ;SET FLAGS FOR SRV60 & CONIN
EF1F 3287DA STA VALTIM
EF22 C1 POP B
EF23 D1 POP D
EF24 E1 POP H
EF25 C9 RET
;
EF26 CD61F2 ADJPNT: CALL REDPNT
EF29 1EF5 MVI E,BAUDP
JR BAUDGN
EF2B+1805 DB 18H,BAUDGN-\$-1
;
EF2D CD5DF2 ADJCOM: CALL REDCOM
EF30 1EF4 MVI E,BAUDC
;
EF32 07 BAUDGN: RLC ;OUTPUT TWO BYTES
EF33 4F MOV C,A ;FROM BAUD
EF34 0600 MVI B,0 ;TABLE
EF36 21BBF5 LXI H,BTABL
EF39 09 DAD B ;CONTROL WORD AND TIME CONSTANT WORD
EF3A F3 DI
EF3B 4B MOV C,E
EF3C 7E MOV A,M ;MASK OUT INT. ENAB. BIT
EF3D E670 ANI 70H
EF3F F607 ORI 7
OUTP A
EF41+ED79 DB 0EDH,A*8+41H
EF43 23 INX H
OUTI
EF44+EDA3 DB 0EDH,0A3H
EF46 C9 RET
;

CP/M MACRO ASSEM 2.0 #104 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.

EF47 E61F BRTADJ: ANI 1FH ;SHIFT LEVEL INTO
EF49 07 RLC ; CORRECT POSITION
EF4A 07 RLC ; FOR LATCH
EF4B 07 RLC
EF4C 57 MOV D,A ; SAVE NEW LEVEL
EF4D AF XRA A
EF4E 3E07 MVI A,7
EF50 CD27E1 CALL LLATCH ; CLEAR PRESENT LEVEL
EF53 B7 ORA A
EF54 7A MOV A,D
EF55 C327E1 JMP LLATCH ; OR IN NEW LEVEL

;
EF58 060A GTBRIT: MVI B,0AH ;GET MSB AND LSB
EF5A CD63F2 CALL RD5101 ;OF BRIGHTNESS LEVEL
EF5D F5 PUSH PSW ;FROM CMOS RAM
EF5E 060B MVI B,0BH
EF60 CD63F2 CALL RD5101
EF63 C1 POP B
EF64 C3B5F2 JMP PACK ;PACK INTO ONE BYTE

;
EF67 2136F6 VOLADJ: LXI H,NOTONE+4
EF6A 0605 MVI B,5 ;CHANGE VOLUME BY CHANGING
EF6C C5 VOL1: PUSH B ;3 BYTES IN EACH
EF6D 0603 MVI B,3 ;OF 5 SOUNDS
EF6F 77 VOL2: MOV M,A
EF70 23 INX H
 DJNZ VOL2
EF71+10FC DB 10H,VOL2-\$-1
EF73 110C00 LXI D,000CH
EF76 19 DAD D
EF77 C1 POP B
 DJNZ VOL1
EF78+10F2 DB 10H,VOL1-\$-1
EF7A C9 RET

;
EF7B 4F OUTBLK: MOV C,A
EF7C 111800 LXI D,18H
EF7F 211600 LXI H,16H
EF82 CD71E2 OTB3: CALL CMPOFF
EF85 7D MOV A,L
EF86 F6C0 ORI 0COH
EF88 6F MOV L,A
EF89 0605 OTB4: MVI B,5
EF8B C5 OTB1: PUSH B
EF8C 79 MOV A,C
EF8D B7 ORA A ;0 = MOVE FROM MEMORY TO
EF8E F5 PUSH PSW ;SCREEN
 JRNZ OTB5
EF8F+2001 DB 20H,OTB5-\$-1
EF91 EB XCHG
EF92 CDB9EF OTB5: CALL RED16
EF95 EB XCHG
EF96 CDC9EF CALL WRT16
EF99 F1 POP PSW
 JRZ OTB6
EF9A+2801 DB 28H,OTB6-\$-1

CP/M MACRO ASSEM 2.0 #105 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.

EF9C EB	XCHG	
EF9D 1600	OTB6:	MVI D,0 ;COLUMN 0-15
EF9F 7B		MOV A,E ;SCAN PAIRS 0-4
EFA0 C620		ADI 20H
EFA2 5F		MOV E,A
EFA3 C1		POP B
		DJNZ OTB1
EFA4+10E5		DB 10H,OTB1-\$-1
EFA6 7B		MOV A,E
EFA7 C602		ADI 2
EFA9 E61F		ANI 1FH
EFAB 5F		MOV E,A
EFAC C8		RZ
EFAD FE1C		CPI 1CH
EFAF 2600		MVI H,0
		SETB 5,L ;READ CHARACTERS
EFB1+CBED		DB 0CBH,5*8+L+0COH
		JRNZ OTB4
EFB3+20D4		DB 20H,OTB4-\$-1
EFB5 2E17	OTB2:	MVI L,17H
		JR OTB3
EFB7+18C9		DB 18H,OTB3-\$-1
	:	
	:	
EFB9 D5	RED16:	PUSH D
EFBA CDD9EF		CALL SETBUF
EFBD C5	RED1:	PUSH B
EFBE 44		MOV B,H
		INP A
EFBF+ED78		DB 0EDH,A*8+40H
EFC1 12		STAX D
EFC2 24		INR H
EFC3 13		INX D
EFC4 C1		POP B
		DJNZ RED1
EFC5+10F6		DB 10H,RED1-\$-1
EFC7 D1		POP D
EFC8 C9		RET
	:	
EFC9 D5	WRT16:	PUSH D
EFCA CDD9EF		CALL SETBUF
EFCD C5	WRT1:	PUSH B
EFCE 44		MOV B,H
EFCF 1A		LDAX D
		OUTP A
EFDD+ED79		DB 0EDH,A*8+41H
EFD2 24		INR H
EFD3 13		INX D
EFD4 C1		POP B
		DJNZ WRT1
EFD5+10F6		DB 10H,WRT1-\$-1
EFD7 D1		POP D
EFD8 C9		RET
	:	
EFD9 11B1FD	SETBUF:	LXI D,BYTBUF
EFDC 0610		MVI B,16

CP/M MACRO ASSEM 2.0 #106 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.

EFDE 7D MOV A,L
EFDF D3EE OUT SDSPY
EFE1 0EFE MVI C,DDSPY
EFE3 C9 RET
;
EFE4 4E VALMSG: MOV C,M ;OUTPUT CHARACTERS TO SCREEN
BIT 7,C
DB 0CBH,7*8+C+40H
RES 7,C ;LAST CHARACTER HAS BIT 7=1
DB 0CBH,7*8+C+80H
EFE7+CBB9 INX H
EFE9 23 JNZ VALDSP
EFEA C2B5E1 CALL VALDSP
EFED CDB5E1 JR VALMSG
EFF0+18F2 DB 18H,VALMSG-\$-1
;
EFF2 3A50FA BELDSP: LDA CURBEL ;SET HL TO CURSOR POSITION
EFF5 E601 ANI 1
EFF7 213769 LXI H,6937H ;DE POINTS TO BELL TABLE
EFFA 1108F6 LXI D,BELTBL
JR BAUD1
EFFD+181C DB 18H,BAUD1-\$-1
;
EFFF 3A4EFA KEYDSP: LDA TONTYP
F002 213746 LXI H,4637H ;DE POINTS TO CLICK TABBBLE
F005 110DF6 LXI D,KNMTBL
JR BAUD1
F008+1811 DB 18H,BAUD1-\$-1
;
F00A CD5DF2 COMUP: CALL REDCOM ; GET COMM. BAUD RATE
F00D 213751 LXI H,5137H ;DE POINTS TO BAUD TABLE
JR BAUDO
F010+1806 DB 18H,BAUDO-\$-1
;
F012 CD61F2 PNTUP: CALL REDPNT ; GET PRINTER BAUD RATE
F015 213760 LXI H,6037H ;DE POINTS TO BAUD TABLE
F018 11D1F5 BAUDO: LXI D,BNMTBL
F01B B7 BAUD1: ORA A
F01C F5 PUSH PSW
F01D CD2FF0 CALL POSCUR ;POSITION CURSOR
F020 F1 POP PSW
JRZ BAUD2
F021+2804 DB 28H,BAUD2-\$-1
F023 47 MOV B,A ;ADD INDEX TO TABLE POINTER
F024 07 RLC
F025 07 RLC
F026 80 ADD B
F027 4F BAUD2: MOV C,A
F028 0600 MVI B,0
F02A EB XCHG
F02B 09 DAD B
F02C C3E4EF JMP VALMSG ;DISPLAY CURRENT PARAMETER
;
F02F+CBFC POSCUR: SETB 7,H ;POSITION CURSOR TO
F031 2272F8 DB 0CBH,7*8+H+OC0H
SHLD POSITN

CP/M MACRO ASSEM 2.0 #107 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.

F034 2170F8	LXI	H,GOPOS
F037 C3E4EF	JMP	VALMSG
;		
F03A 3A51FA	VOLDSP:	LDA VOLEVL
F03D 21373F		LXI H,3F37H ;DISPLAY CURRENT VOLUME
F040 CD2FF0		CALL POSCUR
F043+1809		JR BTDSP1
	DB	18H,BTDSP1-\$-1
;		
F045 3A4FFA	BRTDSP:	LDA BRTLEV
F048 213734		LXI H,3437H ;POSITION CURSOR
F04B CD2FF0		CALL POSCUR
F04E 3C	BTDSP1:	INR A ;CONVERT NUMBER IN A
F04F 0E30		MVI C,30H
F051 D60A	BTDSP2:	SUI 0AH ;TO ASCII
F053 FA59F0		JM BTDSP3
F056 0C		INR C ;MOST SIGNIFICANT DIGIT IN C
F057+18F8		JR BTDSP2
F059 C63A	BTDSP3:	DB 18H,BTDSP2-\$-1
F05B 47		ADI 3AH ;LEAST SIGNIFICANT DIGIT IN A
F05C 79		MOV B,A
F05D FE30		MOV A,C ;IN MSD IS 0
		CPI 30H ;THEN SUPPRESS IT
P05F+2002		JRNZ BTDSP4
F061 0E20		DB 20H,BTDSP4-\$-1
F063 CDB5E1	BTDSP4:	MOV MVI C,20H
F066 48		CALL VALDSP ;DISPLAY
F067 C3B5E1		MOV C,B
	JMP VALDSP	
;		
PAGE		

NOTICE

Code from address F067 through F205 has been intentionally omitted. This is the Valet code, which is proprietary to Otrona Advanced Systems Corporation. This code will not be required by anyone wishing to understand the operation of the Attache BIOS.

```

;
;-----+
;      CLOCK AND BACKUP RAM I/O ROUTINES
;-----+
;

F206 324FFA    WRTBRT: STA     BRTLEV
F209 F5          PUSH    PSW
F20A 07          RLC
F20B 07          RLC
F20C 07          RLC
F20D 07          RLC
F20E 060A        MVI     B,0AH
F210 CD3AF2      CALL    WR5101
F213 F1          POP     PSW
F214 060B        MVI     B,0BH
                JR      WR5101
F216+1822       DB      18H,WR5101-$-1
;

F218 3250FA      WRTBEL: STA     CURBEL
F21B 0605        MVI     B,5
                JR      WR5101
F21D+181B       DB      18H,WR5101-$-1
;

F21F 3251FA      WRTVOL: STA     VOLEV
F222 0606        MVI     B,6
                JR      WR5101
F224+1814       DB      18H,WR5101-$-1
;

F226 324EFA      WRTTON: STA     TONTYP
F229 0609        MVI     B,9
                JR      WR5101
F22B+180D       DB      18H,WR5101-$-1
;

F22D 0607        WRTPNT: MVI     B,7
                JR      WR5101
F22F+1809       DB      18H,WR5101-$-1
;

F231 0608        WRTCOM: MVI     B,8
                JR      WR5101
F233+1805       DB      18H,WR5101-$-1
;

F235 3252FA      WRTSLK: STA     SHLOCK
F238 060E        MVI     B,0EH
;

F23A CDA8F2      WR5101: CALL   SU5101
F23D AF          XRA     A
F23E CD90F2      CALL    RWPORT
F241 7A          MOV     A,D
F242 D3F8          OUT    DPIOA
F244 0EFA        MVI     C,DPIOB
F246 7B          MOV     A,E
F247 F6B0        ORI     OBOH
F249 C39AF2      JMP     WCOMMON
;

F24C CDB5F2      W58174: CALL   PACK

```

CP/M MACRO ASSEM 2.0 #114 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.

F24F 57 MOV D,A
F250 AF XRA A
F251 CD90F2 CALL RWPORT
F254 7A MOV A,D
F255 D3F8 OUT DPIOA
F257 0EFA MVI C,DPIOB
F259 3EA8 MVI A,0A8H
F25B+183D JR WCOMON
DB 18H,WCOMON-\$-1

F25D 0608 ;
REDCOM: MVI B,8
JR RD5101
F25F+1802 DB 18H,RD5101-\$-1

F261 0607 ;
REDPNT: MVI B,7

F263 CDA8F2 RD5101: CALL SU5101
F266 3EOF MVI A,0FH
F268 CD90F2 CALL RWPORT
F26B 7A MOV A,D
F26C D3F8 OUT DPIOA
F26E 0EFA MVI C,DPIOB
F270 7B MOV A,E
F271 F6B4 ORI 0B4H
JR RCOMON
F273+1810 DB 18H,RCOMON-\$-1

F275 CDB5F2 R58174: CALL PACK
F278 57 MOV D,A
F279 3EOF MVI A,0FH
F27B CD90F2 CALL RWPORT
F27E 7A MOV A,D
F27F D3F8 OUT DPIOA
F281 0EFA MVI C,DPIOB
F283 3EAC MVI A,0ACH

RCOMON: OUTP A
F285+ED79 DB 0EDH,A*8+41H
F287 E6DF ANI 0DFH
OUTP A
F289+ED79 DB 0EDH,A*8+41H
F28B DBF8 IN DPIOA
F28D 47 MOV B,A
JR DSLC
F28E+1810 DB 18H,DSLC-\$-1

F290 0EF9 RWPORT: MVI C,SPIOA
F292 06CF MVI B,0CFH
F294 F3 DI
OUTP B
F295+ED41 DB 0EDH,B*8+41H
OUTP A
F297+ED79 DB 0EDH,A*8+41H
F299 C9 RET

WCOMON: OUTP A

CP/M MACRO ASSEM 2.0 #115 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.

F29A+ED79		DB	0EDH,A*8+41H
F29C E6DF		ANI	0DFH
		OUTP	A
F29E+ED79		DB	0EDH,A*8+41H
F2A0 3EA0	DSLC:	MVI	A,0A0H
		OUTP	A
F2A2+ED79		DB	0EDH,A*8+41H
F2A4 78		MOV	A,B
F2A5 E60F		ANI	0FH
F2A7 C9		RET	
;			
F2A8 CDB5F2	SU5101:	CALL	PACK
F2AB 57		MOV	D,A
F2AC 79		MOV	A,C
F2AD E630		ANI	30H
F2AF 0F		RRC	
F2B0 0F		RRC	
F2B1 0F		RRC	
F2B2 0F		RRC	
F2B3 5F		MOV	E,A
F2B4 C9		RET	
;			
F2B5 48	PACK:	MOV	C,B
F2B6 E60F		ANI	0FH
F2B8 57		MOV	D,A
F2B9 78		MOV	A,B
F2BA E60F		ANI	0FH
F2BC 07		RLC	
F2BD 07		RLC	
F2BE 07		RLC	
F2BF 07		RLC	
F2C0 B2		ORA	D
F2C1 C9		RET	
;			
PAGE			

```

;
;-----|
;|      60 HZ INTERRUPT ROUTINE      |
;|-----|
;

;60 HZ INTERRUPT

SRV60: SSPD    TEMSTK
F2C2+ED73   DB      0EDH,73H
F2C4+49FA   DW      TEMSTK
F2C6 31C2FF  LXI    SP,INTSTK
F2C9 E5      PUSH   H      ;SAVE REGISTERS
F2CA D5      PUSH   D
F2CB C5      PUSH   B
F2CC F5      PUSH   PSW

;-----|
;|      CHECK KEYCLICK SHUTDOWN      |
;|-----|
;

F2CD 2131F6  LXI    H,TONPER
F2D0 7E      MOV    A,M
F2D1 B7      ORA    A
                JRZ    SRV60A
F2D2+2807  DB      28H,SRV60A-$-1
F2D4 35      DCR    M
                JRNZ   SRV60A
F2D5+2004  DB      20H,SRV60A-$-1
F2D7 23      INX    H
F2D8 CD78E1  CALL   SOUND

;-----|
;|      HANDLE KEYBOARD      |
;|-----|
;

F2DB DBFA    SRV60A: IN     DPIOB  ;CHECK FOR KEY
                BIT    6,A
F2DD+CB77   DB      OCBH,6*8+A+40H
F2DF CA46F4   JZ     CHKALM ; NO KEY PRESENT
F2E2 2A84DA  LHLD   CLIKAD ;SOUND THE KEY
F2E5 CD78E1  CALL   SOUND
F2E8 0609  MVI    B,9
F2EA DBFA    SRV60B: IN     DPIOB  ;BIT INTO CARRY
F2EC 07      RLC
F2ED 07      RLC
F2EE 3F      CMC
                RARR   L
F2EF+CB1D   DB      OCBH, 18H + L
F2F1 3E7F   MVI    A,7FH ;CLOCK DOWN
F2F3 D3FA   OUT    DPIOB
F2F5 3EFF   MVI    A,OFFH ;CLOCK UP
F2F7 D3FA   OUT    DPIOB
                DJNZ   SRV60B
F2F9+10EF   DB      10H,SRV60B-$-1

;

;-----|
;|      TRANSLATE KEYCODE      |
;|-----|
;
```

CP/M MACRO ASSEM 2.0 #117 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.

```
;-----|
;-----|
F2FB 2600      MVI    H,0
F2FD 4D        MOV    C,L
F2FE 1194F6    LXI    D,KEYTBL
F301 19        DAD    D
F302 46        MOV    B,M
;
;-----|
;-----|
; EVALUATE KEYCODE
;-----|
;
F303 3A80DA    LDA    WSFLAG
F306 B7        ORA    A
F307+2825    JRZ    CHKCTL ; NOT IN WORDSTAR
                DB    28H,CHKCTL-$-1
;
;-----|
;-----|
; CHANGE NORMAL CODES TO WS CODES
;
F309 79        MOV    A,C
F30A FEFE    CPI    OFEH
                JRNZ   WSCOD1
F30C+2002    DB    20H,WSCOD1-$-1
F30E 0686    MVI    B,86H
F310 FE50    WSCOD1: CPI    50H
                JRNZ   WSCOD2
F312+2002    DB    20H,WSCOD2-$-1
F314 06A8    MVI    B,0A8H
F316 FE8C    WSCOD2: CPI    8CH
                JRNZ   WSCOD3
F318+2002    DB    20H,WSCOD3-$-1
F31A 0613    MVI    B,13H
F31C FE8D    WSCOD3: CPI    8DH
                JRNZ   WSCOD4
F31E+2002    DB    20H,WSCOD4-$-1
F320 0604    MVI    B,4
F322 FE8E    WSCOD4: CPI    8EH
                JRNZ   WSCOD5
F324+2002    DB    20H,WSCOD5-$-1
F326 0605    MVI    B,5
F328 FE8F    WSCOD5: CPI    8FH
                JRNZ   CHKCTL
F32A+2002    DB    20H,CHKCTL-$-1
F32C 0618    MVI    B,18H
;
;-----|
;-----|
; CONTROL CODE ?
;
CHKCTL: BIT    7,B
F32E+CB78    DB    0CBH,7*8+B+40H
                JRNZ   CHKSPL ; CONTROL CODE
F330+202F    DB    20H,CHKSPL-$-1
;
;-----|
;-----|
; KEYPAD MODE ?
;
F332 3AAFDA    LDA    NUMPLG
F335 B7        ORA    A
```


CP/M MACRO ASSEM 2.0 #119 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.

F36D 32AFDA	STA	NUMFLG
	JR	CKSPL4
F370+1815	DB	18H,CKSPL4-\$-1
F372 AF	XRA	A
F373 3252FA	STA	SHLOCK
	JR	CKSPL1
F376+18F4	DB	18H,CKSPL1-\$-1
;	;	HANDLE CAPS LOCK KEY
;	;	;
F378 FFFE	CKSPL3: CPI	0FEH
	JRNZ	CKVLKY
F37A+2013	DB	20H,CKVLKY-\$-1
F37C AF	XRA	A
F37D 32AFDA	STA	NUMFLG
F380 3A52FA	LDA	SHLOCK
F383 2F	CMA	
F384 3252FA	STA	SHLOCK
F387 060E	MVI	B,0EH
F389 CD3AP2	CALL	WR5101
F38C C346F4	JMP	CHKALM
;	;	HANDLE SET-UP KEY
;	;	;
F38F FFFF	CKVLKY: CPI	0FFH
	JRNZ	ALMDLY
F391+202F	DB	20H,ALMDLY-\$-1
F393 3A53FA	CKVLK1: LDA	NOKEY
F396 B7	ORA	A ; IF IN VALET OVERLAY
F397 C2B1F4	JNZ	CHKMTR ; THEN IGNORE CTRL/ESC
F39A 3A81DA	LDA	VALSTP ; ELSE
F39D 47	MOV	B,A ; IF NOT IN W OR C BOOT OR DISK OPERATION
F39E 3A82DA	LDA	DSKFLG ; OR DISPLAY DRIVER
F3A1 B0	ORA	B
F3A2 47	MOV	B,A
F3A3 3AA5DA	LDA	DSPFLG
F3A6 B0	ORA	B
	JRZ	DOVLY
F3A7+2808	DB	28H,DOVLY-\$-1
;	;	;
F3A9 3EFF	MVI	A,0FFH ; ELSE SET VALET PENDING FLAG TO WAIT
F3AB 3283DA	STA	VALPND ; FOR OK TIME TO ENTER OR EXIT VALET
F3AE C3B1F4	JMP	CHKMTR
;	;	;
F3B1 3AFCF9	DOVLY: LDA	SETFLG
F3B4 2F	CMA	
F3B5 32FCF9	STA	SETFLG
F3B8 B7	ORA	A
F3B9 CA43F4	JZ	GOADDK
F3BC CD4EED	CALL	RSTALM
F3BF C3EAEC	JMP	VALCHK
;	;	;
;	;	ALARM DELAY (5 MINUTES)
;	;	;
F3C2 FEFC	ALMDLY: CPI	0FCH
	JRNZ	CHKBRK

CP/M MACRO ASSEM 2.0 #120 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.

F3C4+200D DB 20H,CHKBRK-\$-1
F3C6 3EFF MVI A,OFFH
F3C8 32A6DA STA ALMWAT
F3CB 217DF6 LXI H,BELLTN
F3CE CD78E1 CALL SOUND
JR CHKALM
F3D1+1873 DB 18H,CHKALM-\$-1

; ; ALL OTHER CONTROL CHARACTERS

F3D3 FEFB CHKBRK: CPI 0FBH
JRNZ CKWSFL
F3D5+201B DB 20H,CKWSFL-\$-1
F3D7 3E05 MVI A,5
F3D9 D3F1 OUT SCOMM
F3DB DBF1 IN SCOMM
F3DD F610 ORI 10H
F3DF 323DFA STA BRKSAV
F3E2 3E05 MVI A,5
F3E4 D3F1 OUT SCOMM
F3E6 3A3DFA LDA BRKSAV
F3E9 D3F1 OUT SCOMM
F3EB 3E78 MVI A,120
F3ED 32FEF9 STA BRKCNT
JR CHKALM
F3F0+1854 DB 18H,CHKALM-\$-1

F3F2 47 CKWSFL: MOV B,A
F3F3 3A80DA LDA WSFLAG
F3F6 B7 ORA A : IF NOT IN WS
F3F7 78 MOV A,B
JRZ GOADDK ; THEN DON'T DO XLATION
F3F8+2849 DB 28H,GOADDK-\$-1

; ; WORDSTAR SPECIAL TRANSLATION

F3FA 322AFA STA CTLCOD ; ELSE Xlate to WS SEQUENCE
F3FD E660 ANI 60H ; WHICH PREFIX?
JRNZ WSCOD7
F3FF+2007 DB 20H,WSCOD7-\$-1
F401 3E11 MVI A,CTRLQ ;CTRL-Q
F403 CD37F4 WSCOD6: CALL WSCODB
JR CHKALM
F406+183E DB 18H,CHKALM-\$-1

; ;

F408 FE20 WSCOD7: CPI 20H
JRNZ WSCOD8
F40A+200D DB 20H,WSCOD8-\$-1
F40C 3E0B MVI A,CTRLK ;CTRL-K
F40E CD37F4 CALL WSCODB
F411 FE13 CPI CTRL
JRNZ CHKALM
F413+2031 DB 20H,CHKALM-\$-1
F415 3E90 MVI A,CTRLQP ;CTRL-KSQP
JR CKWSFL
F417+18D9 DB 18H,CKWSFL-\$-1

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;
F419 FE40 WSCOD8: CPI 40H
JRNZ CHKALM
F41B+2029 DB 20H,CHKALM-\$-1
F41D 3A2AFA LDA CTLCOD ;CTRL-J, O, OR P
F420 FEC8 CPI CTRLJH
JRNZ WSCOD9
F422+2004 DB 20H,WSCOD9-\$-1
F424 3E0A MVI A,CTRLJ ;CTRL-JH
JR WSCOD6
F426+18DB DB 18H,WSCOD6-\$-1
;
F428 FED3 WSCOD9: CPI CTRLPS
JRNZ WSCODA
F42A+2004 DB 20H,WSCODA-\$-1
F42C 3E10 MVI A,CTRLP ;CTRL-PS
JR WSCOD6
F42E+18D3 DB 18H,WSCOD6-\$-1
;
F430 3EOF WSCODA: MVI A,CTRLO ;CTRL-O
F432 CD37F4 CALL WSCODB
JR CHKALM
F435+180F DB 18H,CHKALM-\$-1
;
F437 CD67F5 WSCODB: CALL ADDKEY
F43A 3A2AFA LDA CTLCOD
F43D E61F ANI 1FH
F43F CD67F5 CALL ADDKEY
F442 C9 RET
;
F443 CD67F5 GOADDK: CALL ADDKEY
;
;-----|
;| CHECK ALARMS |
;-----|
;
F446 2AA9DA CHKALM: LHLD ALMFLG
F449 2B DCX H
F44A 22A9DA SHLD ALMFLG
F44D 7C MOV A,H
F44E B5 ORA L
JRNZ VALP
F44F+204C DB 20H,VALP-\$-1
;
F451 3AA7DA LDA ALMCNT ; SEE IF ALMCNT SHOULD BE RESET
BIT 6,A
F454-CB77 DB 0CBH,6*8+A+40H
F456 CC4EED CZ RSTALM
;
F459 060F MVI B,0FH ; CMOS RAM MONTH
F45B CD63F2 CALL RD5101
F45E FE0F CPI 0FH
JRZ VALP
F460+283B DB 28H,VALP-\$-1
F462 F5 PUSH PSW
F463 CD54E7 CALL READAT

CP/M MACRO ASSEM 2.0 #122 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.

F466 FE3F CPI '?'
F468 C1 POP B
F469+2832 JRZ VALP
F46B 21AEFB DB 28H,VALP-\$-1
F46E 7E LXI H,MINS10
F46F E60F MOV A,M ; 10'S OF MONTH
F471 2B ANI 0FH
F472 7E DCX H
F473+2802 MOV A,M ;UNITS OF MONTH
JRZ CKALM1
F475 C60A DB 28H,CKALM1-\$-1
F477 E60F ADI 0AH
F479 B8 CKALM1: ANI 0FH
CMP B
JRZ CKALM2
F47A+2805 DB 28H,CKALM2-\$-1
F47C D214F5 JNC ALARM
JR VALP
F47F+181C DB 18H,VALP-\$-1
F481 2B CKALM2: DCX H
F482 011210 LXI B,1012H ; CMOS RAM DAY10
F485 CD57F5 CALL CHKMOS
F488 DA14F5 JC ALARM
JRNZ VALP
F48B+2010 DB 20H,VALP-\$-1
F48D CD2EE7 CALL READTM
F490 011612 LXI B,1216H ; CMOS RAM HRS. & MINS.
F493 21B0FB LXI H,HRS10
F496 CD57F5 CALL CHKMOS
JRZ ALARM
F499+2879 DB 28H,ALARM-\$-1
JRC ALARM
F49B+3877 DB 38H,ALARM-\$-1
;
;-----|
;| VALET PENDING ? |
;-----|
;
F49D 3A83DA VALP: LDA VALPN
F4A0 B7 ORA A
F4A1 C293F3 JNZ CKVLK1
;
; DISPLAY TIME AND DATE ?
;
F4A4 3A87DA LDA VALTIM
F4A7 B7 ORA A
JRZ CHKMTR
F4A8+2807 DB 28H,CHKMTR-\$-1
F4AA AF XRA A
F4AB 32AEDA STA TIMFLG
F4AE 3287DA STA VALTIM
;
;-----|
;| FLOPPY MOTOR SHUT-DOWN |
;-----|
;

CP/M MACRO ASSEM 2.0 #123 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.

F4B1 2A6DFA CHKMTR: LHLD MTRCNT ;GET MOTOR TIMER
F4B4 7C MOV A,H ;TEST FOR ZERO
F4B5 B5 ORA L
JRNZ CKNTR1 ;IF <>0 ,THEN DECREMENT
F4B6+2006 DB 20H,CKMTR1-\$-1
F4B8 3EFFE MVI A,-2 ; (Z BIT ALREADY SET)
F4BA CD27E1 CALL LLATCH ; ELSE SHUT OFF MOTORS
F4BD 23 INX H
F4BE 2B CKMTR1: DCX H
F4BF 226DFA SHLD MTRCNT
;
;-----
;| HANDLE DISK TIME OUT |
;-----
;
F4C2 3AA9FB LDA DSKCNT
F4C5 B7 ORA A
JRZ BREAK ; DSKCNT ALREADY = 0
F4C6+282A DB 28H,BREAK-\$-1
F4C8 3D DCR A
F4C9 32A9FB STA DSKCNT
JRNZ BREAK ; DSKCNT <> 0
F4CC+2024 DB 20H,BREAK-\$-1
F4CE 3A7CFB LDA DSKCYC
F4D1 FE08 CPI 8 ; IF NOT WAITING FOR READY
JRNZ TIMEOUT ; THEN ERROR
F4D3+2012 DB 20H,TIMOUT-\$-1
;
F4D5 CDB5DE CALL SNSTAT ; ELSE SENSE DRIVE STATUS
BIT 5,A ; IF DRIVE NOT OK
F4D8+CB6F DB 0CBH,5*8+A+40H
F4DA CA13E0 J2 WFRBAD ; THEN WAITING FOR READY ERROR
F4DD 214EF8 LXI H,RCLTBL; ELSE START 1ST RECAL
F4E0 3E04 MVI A,4 ; NEW DSKCYC = 4
F4E2 CDBCDE CALL DORCSK
JR BREAK
F4E5+180B DB 18H,BREAK-\$-1
;
;
F4E7 CDABDE TIMEOUT: CALL CLRFDC ; -ALL OTHER TIMEOUT ERRORS
F4EA 3A7CFB LDA DSKCYC ; CLEAR OUT FDC
F4ED F6C0 ORI 0COH ; DSKCYC OR WITH 0COH
F4EF 327CFB STA DSKCYC
;
F4F2 3AFEF9 BREAK: LDA BRKCNT
F4F5 B7 ORA A
JRZ IEND
F4F6+2811 DB 28H,IEND-\$-1
F4F8 3D DCR A
F4F9 32FEF9 STA BRKCNT
JRNZ IEND
F4FC+200B DB 20H,IEND-\$-1
F4FE 3E05 MVI A,5
F500 D3F1 OUT SCOMM
F502 3A3DFA LDA BRKSAV
F505 E6EF ANI 0E8H

CP/M MACRO ASSEM 2.0 #124 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.

F507 D3F1 OUT SCOMM

;
:-----
: EXIT SRV60 (ALSO USED BY SRVFPPY)
:-----

;
F509 F1 IEND: POP PSW
F50A C1 POP B
F50B D1 POP D
F50C E1 POP H
LSPD TEMSTK
F50D+ED7B DB 0EDH,07BH
F50F+49FA DW TEMSTK
F511 FB EI
RETI
F512+ED4D DB 0EDH,4DH

;

PAGE

```

;
;-----+
; MISC. SRV60 SUBROUTINES
;-----+
;
;-----+
; SOUND VALET ALARM
;-----+
;

F514 3AA7DA    ALARM: LDA     ALMCNT
F517 F640        ORI      40H
F519 FE40        CPI      40H
                    JRNZ    ALJ3
F51B+201A       DB      20H,ALJ3-$-1
F51D 21A6DA     LXI      H,ALMWAT
F520 3600        MVI      M,0
;
F522 3C          ALJ0:   INR     A
F523 217800     LXI      H,120
;
F526 CD52ED     ALJ1:   CALL    RSTAL2
F529 3E21        MVI      A,'?'
F52B 3286DA     STA      VALCMD
F52E 2126F6     ALJ2:   LXI      H,ALMSND
F531 CD78E1     CALL    SOUND
F534 C39DF4     JMP      VALP
;
F537 FE42        ALJ3:   CPI      42H
                        JRC      ALJ0
F539+38E7        DB      38H,ALJ0-$-1
;
F53B 3AA6DA     LDA      ALMWAT
F53E B7          ORA      A
                    JRNZ    ALJ4
F53F+2010       DB      20H,ALJ4-$-1
F541 0617        MVI      B,17H
F543 CD63F2     CALL    RD5101
F546 E602        ANI      2
                    JRZ      ALJ4
F548+2807       DB      28H,ALJ4-$-1
F54A 3EFF        MVI      A,OFFH
F54C 3283DA     STA      VALPND
                    JR      ALJ2
F54F+18DD       DB      18H,ALJ2-$-1
;
F551 214038     ALJ4:   LXI      H,14400
F554 7D          MOV      A,L      ; L=40H
                    JR      ALJ1
F555+18CF       DB      18H,ALJ1-$-1
;
;-----+
; COMPARE CMOS RAM TIME WITH REAL TIME
;-----+

```

CP/M MACRO ASSEM 2.0 #126 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.

```
;  
F557 C5      CHKMOS: PUSH    B  
F558 CD63F2    CALL     RD5101  
F55B C1      POP      B  
F55C F630    ORI      30H  
F55E BE      CMP      M  
F55F 2B      DCX      H  
F560 C0      RNZ  
F561 04      INR      B  
F562 78      MOV      A,B  
F563 B9      CMP      C  
                JRNZ    CHKMOS  
F564+20F1    DB      20H,CHKMOS-$-1  
F566 C9      RET  
  
;  
;-----|  
; ADD KEY TO END OF KEYBOARD BUFFER |  
;-----|  
;  
F567 47      ADDKEY: MOV      B,A  
F568 3AFBF9    LDA      KEYCNT  
F56B FE10    CPI      KBUFLN ;IF BUFFER FULL  
F56D 217DF6    LXI      H,BELLTN  
F570 CA78E1    JZ      SOUND ; SOUND BELL, BUFFER FULL  
F573 3C      INR      A ; ELSE ADD KEY  
F574 32FBF9    STA      KEYCNT  
F577 2A3BFA    LHLD    KEYPNT  
F57A 78      MOV      A,B  
F57B 77      MOV      M,A  
F57C 23      INX      H  
F57D 223BFA    SHLD    KEYPNT  
F580 C9      RET  
  
;  
;-----|  
; PUSH KEY(S) INTO KEYBOARD BUFER |  
;-----|  
;  
F581 C5      PUSHY: PUSH    B  
F582 E5      PUSH    H  
F583 F3      DI  
F584 3AFBF9    LDA      KEYCNT  
F587 2A3BFA    LHLD    KEYPNT  
F58A 09      DAD      B  
F58B 81      ADD      C  
F58C FE11    CPI      KBUFLN+1  
                JRC      PSHKY1  
F58E+380D    DB      38H,PSHKY1-$-1  
F590 217DF6    LXI      H,BELLTN  
F593 C5      PUSH    B  
F594 CD78E1    CALL    SOUND  
F597 C1      POP      B  
F598 213BFA    LXI      H,KEYBUF+16  
F59B 3E10    MVI      A,KBUFLN  
F59D 32FBF9    PSHKY1: STA      KEYCNT  
F5A0 223BFA    SHLD    KEYPNT  
F5A3 3E10    MVI      A,16
```

CP/M MACRO ASSEM 2.0 #127 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.

F5A5 91	SUB	C
F5A6 213AFA	LXI	H,KEYBUF+15 ;MOVE OLD CHARS. UP BY BC
F5A9 E5	PUSH	H
	RLCR	B
F5AA+CB00	DB	OCBH, 00H + B
	DSBC	B
F5AC+ED42	DB	0EDH,B*8+42H
F5AE D1	POP	D
F5AF 4F	MOV	C,A
	LDDR	
F5B0+EDB8	DB	0EDH,0B8H
F5B2 E1	POP	H
F5B3 C1	POP	B
F5B4 112BFA	LXI	D,KEYBUF
	LDIR	
F5B7+EDB0	DB	0EDH,0B0H
F5B9 FB	EI	
F5BA C9	RET	

;

PAGE

```

;
;-----!
;      BAUD TABLE
;-----!
;
```

F5BB	370D57AF57BTABL:	DB	37H,0DH,57H,0AFH,57H,8FH
F5C1	5780574057	DB	57H,80H,57H,40H,57H,20H
F5C7	5710570857	DB	57H,10H,57H,08H,57H,04H
F5CD	57025701	DB	57H,02H,57H,01H
F5D1	20202037B5BNMTBL:	DB	' 7','5'+80H
F5D6	20203131B0	DB	' 11','0'+80H
F5DB	3133342EB5	DB	'134.','5'+80H
F5E0	20203135B0	DB	' 15','0'+80H
F5E5	20203330B0	DB	' 30','0'+80H
F5EA	20203630B0	DB	' 60','0'+80H
F5EF	20313230B0	DB	'120','0'+80H
F5F4	20323430B0	DB	' 240','0'+80H
F5F9	20343830B0	DB	' 480','0'+80H
F5FB	20393630B0	DB	' 960','0'+80H
F603	31393230B0	DB	'1920','0'+80H
F608	204F4E20A0BELTBL:	DB	' ON ',' '+'+80H
F60D	204F4646A0KNMTBL:	DB	' OFF',' '+'+80H
F612	434C4943CB	DB	'CLIC','K'+80H
F617	2044494ECB	DB	' DIN','K'+80H
F61C	42454550B1	DB	'BEEP','1'+80H
F621	42454550B2	DB	'BEEP','2'+80H

```

;
;-----!
;      SOUND TABLES
;-----!
;
```

;KEYCLICK

F626	000320201FALMSND:	DB	0,3,20H,20H,1FH,0,0,0F8H,0,41H
F630	87	DB	87H
F631	00	TONPER:	DB 0
F632	000000000FNOTONE:	DB	0,0,0,0,0FH,0FH,0FH,0FFH,0,0,0,0,0,0
F641	010400000FCCLICK:	DB	1,4,0,0,0FH,0FH,0FH,0,80H ;SNAPS
F64A	471D20F6AF	DB	47H,1DH,20H,0F6H,0AFH,0EDH
F650	020200000FBEEP:	DB	2,2,0,0,0FH,0FH,0FH,32H,54H,20H ;SHORT DINK
F65A	3256203E25	DB	32H,56H,20H,3EH,25H
F65F	020000000FMIDA:	DB	2,0,0,0,0FH,0FH,0FH,0F8H,1FH,0,0FEH
F66A	000000000	DB	0,0,0,0
F66E	020000000FAUP30:	DB	2,0,0,0,0FH,0FH,0FH,0F8H,1FH,2,0FAH
F679	000000000	DB	0,0,0,0
F67D	020200000FBELLTN:	DB	2,2,0,0,0FH,0FH,0FH,32H,54H,20H ; BELL TONE
F687	3256203E25	DB	32H,56H,20H,3EH,25H

;-----!

; ALTERNATE CHARACTER SET TRANSLATION TABLE

;-----!

;

F68C	40	CHRTBL:	DB 40H	;0 = STANDARD SET
F68D	00		DB 00H	;1 = FORMS RULING

CP/M MACRO ASSEM 2.0 #129 ATTACHE BIOS & BOOT; COPYRIGHT 1981, OTRONA CORP.

F68E 80 DB 80H ;2 = GREEK & LANGUAGES
F68F C0 DB 0COH ;3 = MATH & WORD PROCESSING
F690 00000000 DB 0,0,0,0

;
;-----|
; KEYCODE TRANSLATION TABLE (WORDSTAR VERSION) |
;-----|
;
;
;
; NO CTRL, SHIFT
;
F694 08090A0000KEYTBL: DB 8,9,0AH,0,0,0DH,0,0FEH ;BS TAB LF NA NA CR NA LOCK
F69C 2000001B01 DB 20H,0,0,1BH,1,6,1AH,17H ;SP NA NA ESC LFT RT UP DN
F6A4 5E21402324 DB 5EH,21H,40H,23H,24H,25H,26H,2AH ;^ EXCL @#\$%&*
F6AC 2829223A3C DB 28H,29H,22H,3AH,3CH,2BH,3EH,3FH ;()":<+>?
F6B4 7E41424344 DB 7EH,41H,42H,43H,44H,45H,46H,47H ;ABCDEFG
F6BC 48494A4B4C DB 48H,49H,4AH,4BH,4CH,4DH,4EH,4FH ;HIJKLMNO
F6C4 5051525354 DB 50H,51H,52H,53H,54H,55H,56H,57H ;PQRSTUVW
F6CC 58595A7B7C DB 58H,59H,5AH,7BH,7CH,7DH,5FH,7 ;XYZ(1)_DEL

;
;
; CTRL, SHIFT
;
F6D4 08090A0000 DB 8,9,0AH,0,0,0DH,0,0FDH ;BS TAB LF NA NA CR NA LOCK
F6DC 200000FF93 DB 20H,0,0,0FFH,93H,84H,92H,83H ;SP NA NA ESC LFT RT UP DN
F6E4 1E85C8D3B3 DB 1EH,85H,0C8H,0D3H,0B3H,0B0H,0A2H,0ABH ;^ EXCL @#\$%&*
F6EC B6A3273B2C DB 0B6H,0A3H,27H,3BH,2CH,0CH,2EH,2FH ;()":<+>?
F6F4 0001020304 DB 0,1,2,3,4,5,6,7 ;CTRL-ABCDEFG
F6FC 08090A0B0C DB 8,9,0AH,0BH,0CH,0DH,0EH,0FH ;CTRL-HIJKLMNO
F704 1011121314 DB 10H,11H,12H,13H,14H,15H,16H,17H ;CTRL-PQRSTUVW
F70C 18191A1B1C DB 18H,19H,1AH,1BH,1CH,1DH,0CH,19H ;CTRL-XYZ(1)_DEL

;
;
; NO SHIFT OR CTRL
;
F714 08090A0000 DB 8,9,0AH,0,0,0DH,0,0FEH ;BS TAB LF NA NA CR NA LOCK
F71C 2000001B08 DB 20H,0,0,1BH,8,0CH,0BH,0AH ;SP NA NA ESC LFT RT UP DN
F724 3031323334 DB 30H,31H,32H,33H,34H,35H,36H,37H ;01234567
F72C 3839273B2C DB 38H,39H,27H,3BH,2CH,3DH,2EH,2FH ;89';=./
F734 6061626364 DB 60H,61H,62H,63H,64H,65H,66H,67H ;ABCDEFG
F73C 68696A6B6C DB 68H,69H,6AH,6BH,6CH,6DH,6EH,6FH ;HIJKLMNO
F744 7071727374 DB 70H,71H,72H,73H,74H,75H,76H,77H ;PQRSTUVW
F74C 78797A5B5C DB 78H,79H,7AH,5BH,5CH,5DH,2DH,7FH ;XYZ[\]-DEL

;
;
; CTRL, NO SHIFT
;
F754 FC09FB0000 DB 0FCH,9,0FBH,0,0,0DH,0,0FDH ;BS TAB LF NA NA CR NA LOCK
F75C 200000FF01 DB 20H,0,0,0FFH,1,6,12H,3 ;SP NA NA ESC LFT RT UP DN
F764 CE110A0F10 DB 0CEH,11H,0AH,0FH,10H,0BH,16H,2 ;01234567
F76C D8C9273B2C DB 0D8H,0C9H,27H,3BH,2CH,81H,2EH,2FH ;89';=./
F774 0001020304 DB 00,01,02,03,04,05,06,07 ;CTRL-ABCDEFG
F77C 08090A0B0C DB 08,09,0AH,0BH,0CH,0DH,0EH,0FH ;CTRL-HIJKLMNO
F784 1011121314 DB 10H,11H,12H,13H,14H,15H,16H,17H ;CTRL-PQRSTUVW
F78C 18191A1B1C DB 18H,19H,1AH,1BH,1CH,1DH,1FH,14H ;CTRL-XYZ[\]-DEL

;
;
; KEYPAD TABLE
;
F794 2A2C3D2E2FPADTBL: DB 2AH,2CH,3DH,2EH,2FH ;*,=./

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F799 6061626364 DB 60H,61H,62H,63H,64H,65H,66H,67H ;ABCDEFG
F7A1 6835313233 DB 68H,35H,31H,32H,33H,30H,6EH,36H ;H51230N6
F7A9 2B71727374 DB 2BH,71H,72H,73H,74H,34H ;+QRST4

PAGE

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;
;-----|
; ESCAPE SEQUENCE VECTOR TABLE |
;-----|
;

F7AF A1E3    ESCTBL: DW      PPOINT ; PLOT POINT
F7B1 ACE3     DW      PVCTOR ; PLOT VECTOR
F7B3 C9E3     DW      BLKDRW ; BLOCK DRAW
F7B5 CDE3     DW      CLRGRF ; CLEAR GRAPHICS MEM.
F7B7 D2E3     DW      BLKFIL ; BLOCK FILL
F7B9 D6E3     DW      SETMSK ; SET MASK FOR BLOCK FILL
F7BB DEE3     DW      DSBRGF ; DISABLE GRAPHICS
F7BD E8E3     DW      ENBGRF ; ENABLE GRAPHICS
F7BF EDE3     DW      PTBRT ; SET TO PLOT BRIGHT
F7C1 F4E3     DW      PTDRK ; SET TO PLOT DARK
F7C3 F8E3     DW      REDDAT ; READ DATE FROM CLOCK CHIP
F7C5 0EE4     DW      CMOSPN ; SET PRINTER BAUD FROM CMOS RAM
F7C7 14E4     DW      CMOSCM ; SET COMM. BAUD FROM CMOS RAM
F7C9 19E4     DW      DRCTMV ; DIRECT CURSOR MOVEMENT
F7CB 1DE4     DW      REDTIM ; READ TIME FROM CLOCK CHIP
F7CD 33E4     DW      REDRAM ; READ CMOS RAM
F7CF 37E4     DW      WRTRAM ; WRITE CMOS RAM
F7D1 3BE4     DW      UPCUR ; CURSOR UP
F7D3 52E4     DW      DWNCUR ; CURSOR DOWN
F7D5 6EE4     DW      RITCUR ; CURSOR RIGHT
F7D7 9CE2     DW      CTROL2+4; CURSOR LEFT
F7D9 9BE3     DW      NFGESC ; -- NOT USED --
F7DB 9BE3     DW      NFGESC ; -- NOT USED --
F7DD 9BE3     DW      NFGESC ; -- NOT USED --
F7DF 8DE4     DW      HOMCUR ; CURSOR HOME
F7E1 9BE4     DW      REVLF ; REVERSE LINE FEED
F7E3 AFE4     DW      CLREND ; CLEAR TO END OF ACTIVE REGION
F7E5 B5E4     DW      CLRELN ; CLAR TO. END OF LINE
F7E7 BAE4     DW      INSLIN ; INSERT LINE
F7E9 CEE4     DW      DELLIN ; DELETE LINE
F7EB DFE4     DW      SETTAB ; SET TAB
F7ED E3E4     DW      CLRTAB ; CLEAR TAB
F7EF B9E4     DW      DELLCR ; DELETE CHARACTER
F7F1 EEE4     DW      INSCON ; INSERT CHAR. MODE ON
F7F3 F7E1     DW      EXIT2 ; INSERT CHAR. MODE OFF
F7F5 F3E4     DW      CHRSIZ ; SELECT CHAR. SIZE
F7F7 F7E4     DW      CHRSET ; SELECT CHAR. SET
F7F9 FBE4     DW      SELATR ; SELECT CHAR. ATTRIBUTE
F7FB FFE4     DW      SELDIN ; SELECT ALT. LEAD-IN
F7FD 03E5     DW      DSPSND ; SOUND GENERATOR
F7FF 07E5     DW      SETACR ; SET ACTIVE REGION
F801 19E4     DW      DRCTMV ; DIRECT CURSOR MOVE
F803 0BE5     DW      RESPAR ; RESET PARAMETERS
F805 10E5     DW      SAVVPR ; SAVE PARAMETERS (SYSTEM USE ONLY)
F807 35E9     DW      CLSCRN ; CLEAR SCREEN & RESET PARAMETERS
F809 15E5     DW      RCLPAR ; RECALL PARAMETERS (SYSTEM USE ONLY)
F80B 1EE5     DW      WRPOFF ; WORD WRAP OFF
F80D 22E5     DW      WRPON ; WORD WRAP ON
F80F 29E5     DW      SETWS ; SET WSFLAG (ON)
F811 2DE5     DW      CLRWS ; RESET WSFLAG (OFF)

```

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F813 16E7 DW DOSND ; SOUND TONE FROM TONE TABLE
F815 33E5 DW OFFCUR ; CURSOR OFF
F817 3FE5 DW ONCUR ; CURSOR ON

;

PAGE

```
;  
;-----|  
;! DSPCYC VECTOR TABLE !  
;-----|  
;  
F819 46E5 CYCTBL: DW LINCHK ; LINE NUMBER FOR DIRECT CURSOR  
F81B 6FE5 DW COLCHK ; COLOUML NUMBER FOR '  
F81D F7E1 DW EXIT2 ;-- NOT USED --  
F81F 7FE5 DW TACTCK ; TOP OF ACTIVE REGION  
F821 8AE5 DW BACTCK ; BOTTOM OF ACTIVE REGION  
F823 99E5 DW ATTCHK ; NEW ATTRIBUTE  
F825 B0E5 DW ALTCHK ; ALTERNATE CHAR. SET  
F827 B9E5 DW SIZCHK ; NEW SIZE  
F829 CC85 DW TABCHK ; NEW TAB  
F82B 04E6 DW LEDCHK ; SOFT ESCAPE CHAR.  
F82D 0AE6 DW INSCHK ; INSERT MODE ON  
F82F 35E6 DW GRFCHK ; GET MASK  
F831 4EE6 DW GRFCK1 ; GET X MSB  
F833 6DE6 DW GRFCK2 ; GET X LSB  
F835 87E6 DW GRFCK3 ; GET Y MSB  
F837 9BE6 DW GRFCK4 ; GET Y LSB  
F839 DBE6 DW GRFCK5 ; GET ADDR. FOR CMOS READ  
F83B F0E6 DW GRFCK6 ; GET ADDR. FOR CMOS WRITE  
F83D F9E6 DW GRFCK7 ; GET DATA FOR CMOS WRITE  
F83F 05E7 DW GETSND ; GET SOUND BYTES AFTER 1ST ONE  
F841 1FE7 DW SET SND ; GET 1ST SOUND BYTE  
;  
PAGE
```

```

;
;-----|
; FLOPPY COMMAND TABLES |
;-----|
;

;FORMAT...
; COMMAND INFO
; NNNNNNNN
; ??????
; ?????? BYTES TO 765
; ??0=NO, 1=YES FOR DMA
; ??0=NO, 1=YES FOR INT
; 0=RD, 1=WR TO DISK
; 0=NO, 1=YES TO READ ST3
; ADDR TO START DATA XFER (IF NEEDED)
; BYTE COUNT-1 (IF NEEDED)
; COMMAND TO 765
; UNIT # + 4*HEAD
; CYLINDER
; HEAD
; RECORD
; BYTES/SECTOR
; SECTORS/TRACK
; GAP 2 LENGTH
; DATA LENGTH
;
```

```
;----- FORMAT -----
```

F843 76	FMTTBL:	DB	76H
F844 00FE	FMADDR:	DW	FILBUF
F846 2700	FMCNT:	DW	40-1
F848 4D		DB	40H+ODH
F849 00	FMUNIT:	DB	0
F84A 02		DB	2
F84B 0A		DB	HSTSPT
F84C 1E		DB	30
F84D E5		DB	0E5H

```
;----- RECALIBRATE -----
```

F84E 22	RCLTBL:	DB	22H
F84F 07		DB	7
F850 00	RCUNIT:	DB	0

```
;----- READ OR WRITE -----
```

F851 39	RWTBL:	DB	39H
F852 B1FB	RWADDR:	DW	HSTBUF
F854 FF01	RWCNT:	DW	HSTSIZ - 1
F856 46	RWCMD:	DB	40H+6H
F857 00	RWUNIT:	DB	0
F858 00	RWCYL:	DB	0
F859 00	RWHD:	DB	0
F85A 01	RWREC:	DB	1
F85B 02		DB	2

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F85C 0A DB HSTSPT
F85D 0F DB 15 ;GP2
F85E FF DB 0FFH
;
;----- SENSE DRIVE STATUS -----
;
F85F 82 SDSTBL: DB 82H
F860 04 DB 4
F861 00 SDUNIT: DB 0
;
;----- SPECIFY -----
;
F862 03 SPCTBL: DB 3
F863 03 DB 3
F864 DF DB SRT*16+DHUT
F865 20 DB DHLT*2+ND
;
;----- SEEK & RECALIBRATE -----
;
F866 23 SKTBL: DB 23H
F867 0F DB 0FH
F868 00 SKUNIT: DB 0 ;UNIT+HD=4
F869 00 SKCYL: DB 0 ;NCN
;

PAGE

```

;
;      GRAPHICS VARIABLES (INITIALIZED VALUES)
;

F86A FF      MASK:   DB     0FFH    ;THESE MUST
F86B 00      MASK2:  DB     00H     ;STAY IN
F86C FF      MMASK:  DB     0FFH    ;ORDER
F86D          CURMSK: DS     1       ;TO HERE
F86E FF      CLFLG:  DB     0FFH
F86F 00      CYC:    DB     0

;
;      MESSAGES
;

F870 1B3D      GOPOS:  DB     ESC,'=' ; FOR DIRECT CURSOR MOVE
F872          POSITN: DS     2       ; IN VALET
;

F874 1B371BDD  VALCLN: DB     ESC,'7',ESC,'J'+80H
F878 1B361B5B1BVALPAR: DB    ESC,'6',ESC,'I',ESC,'Z',ESC,'c',ESC,'~'
F882 1B5836371B    DB     ESC,'X',36H,037H,ESC,'U',22H ;CURSOR HOME,REV. VIDEO
F889 202054494D    DB     ' TIME   DATE   BRIGHTNESS   VOLUME'
F8AC 202020204B    DB     ' KEY    COMMUNICATIONS   PRINTER'
F8CF 2020204245    DB     ' BELL  ',' '+'80H
F8D9 2020434C4FNOTSET: DB    ' CLOCK NOT SE','T'+80H
F8E8 1B5A1BCA  WBINIT: DB    ESC,'Z',ESC,'J'+80H
F8EC 0D0A      WBTRY:  DB    CR,LF
F8EE 5245534554    DB    'RESET OR ANY KEY TO RETR','Y'+80H
F907 0D0A      OPTMSG: DB    CR,LF
F909 4F5054494F    DB    'OPTIONS: (R)ETRY,(W)ARM BOOT,(I)GNOR','E'+80H
F92E 0D0A      VALLER: DB    CR,LF
F930 464154414C    DB    'FATAL'
F935 204552524FDERMSG: DB   ' ERROR ON DISK '
F944          DRVNUM: DS    1
F945 BA        DB     ':'+'80H
F946 0D8A      VCRLF:  DB    CR,LF+'80H
F948 4E4F204449TERR: DB    'NO DIS','K'+80H
F94F 5359535445CERR: DB    'SYSTE','M'+80H
F955 464F524D41FERR: DB    'FORMA','T'+80H
F95B 2057524954WERR: DB    ' WRIT','E'+80H
F961 2020524541RERR: DB    ' REA','D'+80H
F967 2020484F4DRLERR: DB    ' HOM','E'+80H
F96D 2020534545SKERR: DB    ' SEE','K'+80H
;

F973 0D0A      OPTV1:  DB    0DH,0AH
F975 435220544F    DB    'CR TO WARM BOO','T'+80H
F984 0D0A      OPTV2:  DB    0DH,0AH
F986 435220544F    DB    'CR TO ABOR','T'+80H
;

```

```

;
;-----|
;      VARIABLES & BUFFERS      |
;-----|
;
;DISPLAY VARIABLES & BUFFERS
;
F991    DSPBFL: DS     2
F993    DSPBUF: DS   80 ; BUFFER FOR MOVING LINES
F9E3    DS     2
F9E5    BUFPNT: DS   2 ; USED BY SCROLL ROUTINES
F9E7    MOVBEG: DS   2 ; USED BY INSDEL
F9E9    CHRPNTR: DS  1 ; CHARACTER POINTER
F9EA    GRFCMD: DS   1 ; GRAPHICS COMMAND
F9EB    GDELS: DS    2 ; VECTOR SHORT DELTA
F9ED    GDELL: DS    2 ; VECTOR LONG DELTA
F9EF    GRK: DS     2 ; VECTOR ERROR ACCUMULATOR
F9F1    GRMODE: DS   1 ; VECTOR DIRECTION POINTERS
F9F2    GRX: DS     2 ; X COORDINATE
F9F4    GRX1: DS    2 ; VECTOR X START POINT
F9F6    GRY: DS     2 ; Y COORDINATE
F9F8    GRY1: DS    2 ; VECTOR Y START POINT
; NEXT 47 BYTES MUST STAY AS A BLOCK W/DSPCYC FIRST
F9FA    DSPCYC: DS   1 ; DISPLAY CYCLE COUNTER
;          0 = NORMAL CHAR
;          1 = ESC PENDING
;          2 = LINE # PNDG. DIR. CUR.
;          3 = CHAR # PNDG.   '
;          4 = SCROLL FILL PENDING
;          5 = LINE # PENDING; TOP ACT.
;          6 =           ' BOT. ACT.
;          7 = ATTRIBUTE PENDING
;          8 = CHAR. SET PENDING
;          9 = CHAR. SIZE PENDING
;          A = NEW TABS PENDING
;          B = ALT. LEAD IN PENDING
;          C = INSERT CHAR. PENDING
;          D = BRIGHTNESS CHAR. PENDING
F9FB    KEYCNT: DS   1 ; # OF KEYS IN BUFFER
F9FC    SETFLG: DS   1 ; SETUP MODE FLAG
F9FD    GRFERR: DS   1 ; OVERFLOW IN X OR Y COORD.
F9FE    BRKCNT: DS   1 ; COUNTER FOR BREAK DURATION
;
; NEXT 21 BYTES MUST REMAIN IN THIS ORDER
;
F9FF    CURCHR: DS   1 ; CURRENT CHARACTER SET
FA00    CURATT: DS   1 ; CURRENT ATTRIBUTE CODE
FA01    WRPFGLG: DS   1 ; WRAP 0=ON, 0FFH=OFF
FA02    CURCTL: DS   1 ; CURSOR 0=ON, OFFH=OFF
FA03    TOPACT: DS   1 ; TOP OF ACTIVE REGION
FA04    BOTACT: DS   1 ; BOTTOM OF ACTIVE REGION
FA05    MAGACT: DS   1 ; LINES IN ACTIVE REGION-1
FA06    LEADIN: DS   1 ; SOFT ESCAPE CHARACTER
FA07    CHRADR: DS   2 ; CHARACTER ADDRESS
;          H=CHAR POSITION (0=LEFT)

```

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FA09 LASTAB: DS 1 ; L=LINE# (0=TOP, 23=BOTTOM)
FA0A TABS: DS 10 ; TAB KEY
FA14 TEMPAR: DS 21 ; SAVE PARAMETERS HERE
FA29 TEMLIN: DS 1 ; TEMPORARY STORAGE FOR LINE#

;
; KEYBOARD VARIABLES
;
FA2A CTLCOD: DS 1 ; CONTROL KEY CODE
FA2B KEYBUF: DS KBUFLN ; KEYBOARD BUFFER
FA3B KEYPNT: DS 2 ; POINTER TO KEYBUF

;
;MISC. VARIABLES
;
FA3D BRKSAV: DS 1 ; SAVE WR5 STATUS DURING BREAK
FA3E LSAVE: DS 1 ; SAVE LSTATE IN VALET
FA3F SECCNT: DS 1 ; SECTOR COUNTER FOR WBOOT
FA40 SNDADR: DS 2 ; POINTER TO SOUND TABLE
FA42 SNDCTN: DS 1 ; COUNTER FOR SOUND TABLE INPUT
FA43 NUMSAV: DS 1 ; SPACE TO SAVE NUMFLG
FA44 WSSAVE: DS 1 ; SPACE TO SAVE WSFLAG
FA45 CONFLG: DS 1 ; VALET CONOUT FLAG
FA46 LSTATE: DS 1 ; L0-7 STATE
FA47 VALPNT: DS 2 ; SAVE SP IN VALET
FA49 TEMSTK: DS 2 ; SAVE SP IN SRV60
FA4B DSPSTK: DS 2 ; SAVE SP IN DISPLAY
FA4D OKIFLG: DS 1 ; 0=NAT., <>0 = OKI
FA4E TONTYP: DS 1 ; KEYTONE
FA4F BRTLEV: DS 1 ; BRIGHTNESS LEVEL
FA50 CURBEL: DS 1 ; BELL TOGGLE
FA51 VOLEV: DS 1 ; VOLUME LEVEL
FA52 SHLOCK: DS 1 ; SHIFT LOCK
FA53 NOKEY: DS 1 ; VALET INHIBIT FLAG
FA54 SNDTBL: DS 15 ; SOUND TABLE FOR USER TONES
FA63 VALOP: DS 1 ; R/W COMMAND FOR VALET DISK IO
FA64 VALCNT: DS 1 ; # OF A.U.'S TO READ IN VALET DISK IO

;
; GRAPHICS VARIABLES
;
FA65 GRX12: DS 2
FA67 GRY12: DS 2
FA69 STRX1: DS 1 ; USED IN FILL ROUTINE
FA6A STRX: DS 1
FA6B PIXBIT: DS 1
FA6C PIXBT2: DS 1

;
; FLOPPY VARIABLES
;
; ALL VARIABLES FROM HERE TO THE END MUST REMAIN AS THEY
; ARE NOW. THEIR RELATIVE POSITIONS MUST NOT CHANGE.
;
FA6D MTRCNT: DS 2 ; MOTOR TIMER
FA6F RESULT: DS 1 ; # OF BYTES TO GET FROM U765
FA70 DSKCMD: DS 1 ; DISK COMMAND
FA71 UNACNT: DS 1 ; UNALLOC REC CNT
FA72 UNADSK: DS 1 ; LAST UNALLOC DISK

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FA73	UNATRK:	DS	2	; LAST UNALLOC TRACK
FA75	UNASEC:	DS	1	; LAST UNALLOC SECTOR
FA76	HMFGLGS:	DS	NDISK	; HOME BEEN HERE BEFORE FLAG
FA78	SAVECH:	DS	1	
FA79	SEKDSK:	DS	1	; SEEK DISK NUMBER
FA7A	SEKTRK:	DS	2	; SEEK TRACK NUMBER
FA7C	SEKSEC:	DS	1	; SEEK SECTOR NUMBER
FA7D	HSTDISK:	DS	1	; HOST DISK NUMBER
FA7E	HSTRRK:	DS	2	; HOST TRACK NUMBER
FA80	HSTSEC:	DS	1	; HOST SECTOR NUMBER
FA81	SEKHST:	DS	1	; SEEK SHR SEC SHF
FA82	HSTACT:	DS	1	; HOST ACTIVE FLAG
FA83	HSTWRT:	DS	1	; HOST WRITTEN FLAG
FA84	HSTHD:	DS	1	; HOST HD (SIDE) FLAG
FA85	ERFLAG:	DS	1	; ERROR REPORTING
FA86	RSFLAG:	DS	1	; READ SECTOR FLAG
FA87	READOP:	DS	1	; 1 IF READ OPERATION
FA88	WRTYPE:	DS	1	; WRITE OPERATION TYPE
FA89	DMAADR:	DS	2	; CPM DMA ADDRESS
FA8B	DIRBUF:	DS	128	; SCRATCH DIRECTORY AREA
FB0B	RECNT:	DS	1	; RETRY COUNT
FB0C	ALVO:	DS	DSKSIZ/8+2	; ALLOCATION VECTORS
FB24	CSVO:	DS	DIRENT/4	; CHECK VECTORS
FB44	ALV1:	DS	DSKSIZ/8+2	
FB5C	CSV1:	DS	DIRENT/4	

;
; THE NEXT 9 ITEMS MUST STAY IN THIS ORDER
;

FB7C	DSKCYC:	DS	1	; DISK CYCLE
FB7D	ST0:	DS	1	; STATUS 0
FB7E	ST1:	DS	1	; STATUS 1
FB7F	ST2:	DS	1	; STATUS 2
FB80	CSTAT:	DS	1	; CYL AT STATUS TIME
FB81	HSTAT:	DS	1	; HEAD AT STATUS TIME
FB82	RSTAT:	DS	1	; SECTOR AT STATUS TIME
FB83	NSTAT:	DS	1	; # OF DATA BYTES AT STATUS TIME
FB84	RESNUM:	DS	1	; NUMBER OF RESULT BYTES ACTUALLY READ

;
FB85 FCBV: DS 16 ; FCB FOR VALET
FB95 AU1: DS 16 ; PART OF FCB, START OF A.U. FIELD
FBAS CURREC: DS 4 ; FOR RANDOM ACCESS

;
FBA9 DSKCNT: DS 1 ; DISKOP TIMEOUT COUNTER
FBAA OKIBYT: DS 1 ; STORAGE FOR CLOCK
FBAB SCNDS: DS 1 ;
FBAC SECS10: DS 1 ;
FBAD MINS: DS 1 ;
FBAE MINS10: DS 1 ;
FBAG HRS: DS 1 ;
FBBO HRS10: DS 1 ;

;
FBB1 HSTBUF: DS HSTSIZ ; HOST BUFFER
FDB1 BYTBUF: DS 16 ; FOR VALET SCREEN SAVE
0093 = NUMBER EQU RECNT-SAVECH
FDC1 = ENDRAM EQU \$

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```
;      STACK AREA  
;  
FF60      ORG      CCP+3B60H  
FF60      DS       61  
FF9D      VALSTK: DS      1  
FF9E      DS       36  
FFC2      INTSTK: DS     1  
FFC3      DS       39  
FFE4      DSPEM: DS     1  
FFEB      DS       20  
FFFF =    ENDMRK EQU      $  
;  
FFFF      END
```