APPLICATION NOTE

Cromemco® I/O Ports
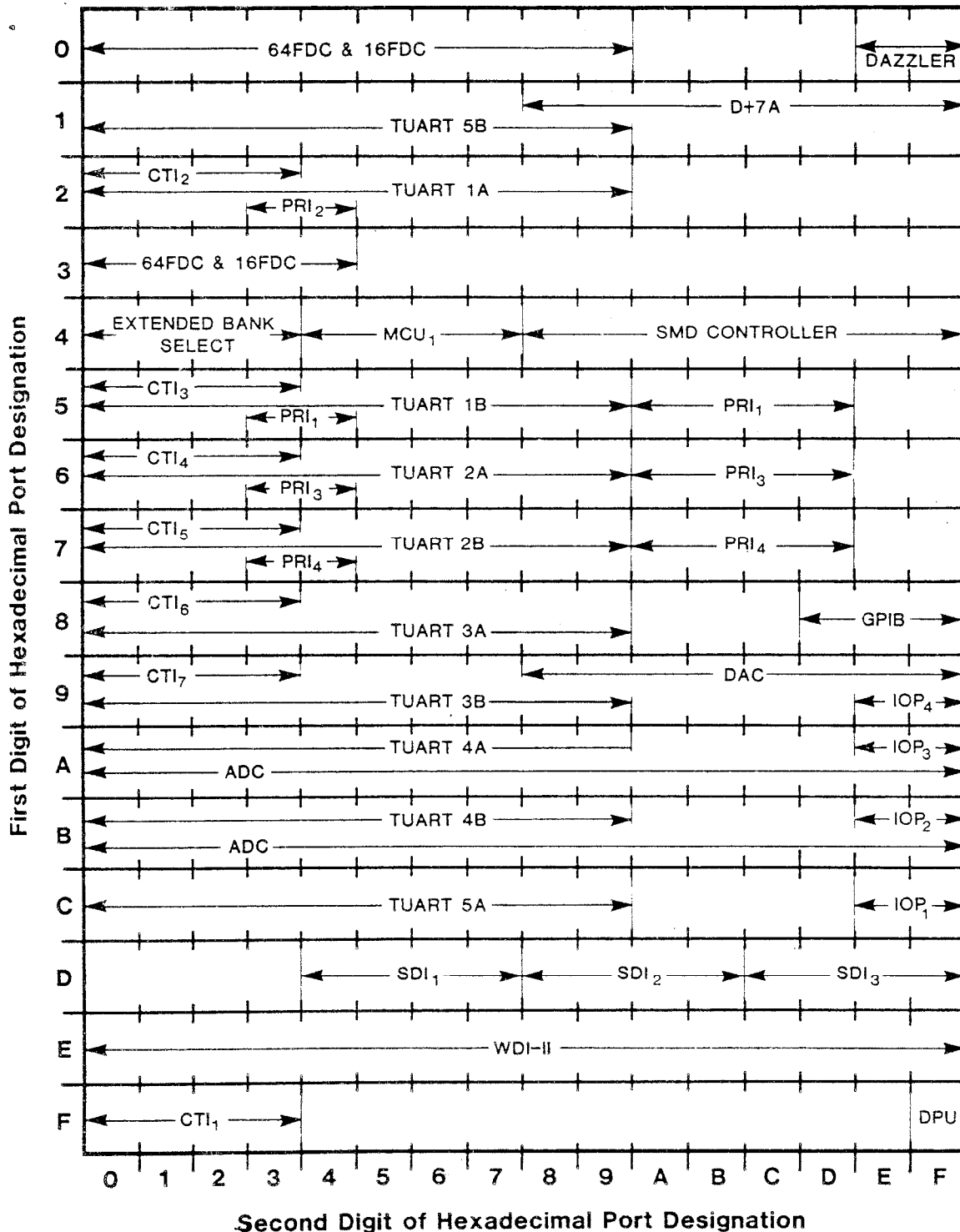
First Digit of Hexadecimal Port Designation (vertical axis, rows 0–F)

Second Digit of Hexadecimal Port Designation (horizontal axis, columns 0–F)

Row	Assignments
0	64FDC & 16FDC; DAZZLER
1	TUART 5B; D+7A
2	CTI$_2$; TUART 1A; PRI$_2$
3	64FDC & 16FDC
4	EXTENDED BANK SELECT; MCU$_1$; SMD CONTROLLER
5	CTI$_3$; TUART 1B; PRI$_1$
6	CTI$_4$; TUART 2A; PRI$_3$
7	CTI$_5$; TUART 2B; PRI$_4$
8	CTI$_6$; TUART 3A; GPIB
9	CTI$_7$; TUART 3B; DAC; IOP$_4$
A	TUART 4A; ADC; IOP$_3$
B	TUART 4B; ADC; IOP$_2$
C	TUART 5A; IOP$_1$
D	SDI$_1$; SDI$_2$; SDI$_3$
E	WDI-II
F	CTI$_1$; DPU

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APPLICATION NOTE

C-10 I/O PORT ASSIGNMENTS

CRT CONTROLLER 8275

Port		
00h		CRT parameter
01h	In	CRT status
	Out	CRT command
02h-0Fh		unassigned

DMA CONTROLLER 8257

Port			
10h	DMA Channel 0 address		
11h	DMA Channel 0 count		
12h	DMA Channel 1 address		
13h	DMA Channel 1 count		
14h	DMA Channel 2 address	CRT	
15h	DMA Channel 2 count		
16h	DMA Channel 3 address	Parallel port	
17h	DMA Channel 3 count		
18h In	DMA Status		
Out	DMA Mode		

For a detailed description of the CRT Controller and DMA Controller port functions, refer to the Intel component data catalog.

UARTS 6551

UART 0: Keyboard and Serial Printer

Port		
30h		Data
31h	In	Status
	Out	Reset
32h		Command
33h		Control
34h-37h		unassigned

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UART 1: Modem

Port   38h   Data

	38h		Data
	39h	In	Status
		Out	Reset
	3Ah		Command
	3Bh		Control
	3Ch-3Fh		Unassigned

For a detailed description of the UART 6551 functions, refer to the Synertek SY6551A Data Sheets.

DISK CONTROLLER 179313-02

Port	20h	In	Disk Status
		Out	Disk Command
	21h		Disk Track
	22h		Disk Sector
	23h		Disk Data
	24h-2Fh		Unassigned

For a detailed description of these functions, refer to the Western Digital specification sheet.

PORT 40h

In Revision B, any output to this port switches from RAM (Bank 0) to ROM (Bank 1), or from ROM to RAM. In Revision D, a 0 output to this port turns on RAM; a 1 output to this port turns on ROM. Only address space 4000h to BFFFh will switch. The RAM will stay on all the time in address space 0000h to 3FFFh and C000h to FFFFh. It is recommended that port 40 not be used in any way.

PARALLEL PORT

Port	50h	In	Parallel In
		Out	Parallel Out

AUXILIARY PORTS

In the following port assignment tables, **X** indicates that the setting of the corresponding bit has no effect.

Port 51h In

7	6	5	4	3	2	1	0
X	X	MONITOR TYPE		TEST MODE*	RING	RFU	CROM*

Bit 0:   0 indicates host system is a Cromemco system or a system with similar protocols.
1 indicates host system is different from a Cromemco system (cut jumper).
Bit 1:   Reserved for future use.
Bit 2:   Ring indicator from modem.
Bit 3:   If low, forces CROS to perform self-test.
Bit 4,5: These two jumpers identify monitor type used with C-10, for video intensity adjustment.

Port 51h Out

7	6	5	4	3	2	1	0
X	TIMER INT ENABLE	DRIVE SELECT OVER*	UART INT ENABLE	CRT INT ENABLE	DMA INT ENABLE	SIDE SELECT*	DISK INT ENABLE

Port 52h In

7	6	5	4	3	2	1	0
DRQ	TIMER INT	HEAD LOAD	UART INT	MOTOR ON	DMA INT	CRT INT	DISK INT (EOJ)

Port 52h Out

7	6	5	4	3	2	1	0
X	DDEN	MOTOR ON	MAXI	DS4	DS3	DS2	DS1

* Active low

Port 53h Out

Any output to this port will reset timer interrupt.

Port 60h-63h Out

These ports are used for video intensity control. Only D0-D3 are used (16 levels, 0-Fh).

Port   60h   Background level normal

        61h   Foreground level normal

        62h   Background level half-intensity

        63h   Foreground level half-intensity

7	6	5	4	3	2	1	0
X	X	X	X	V 3	V 2	V 1	V 0

Port 68h Out

7	6	5	4	3	2	1	0
SEL1	SEL0	FORCE DCD*	KBD TxD	X	X	X	X

Bit 4: A high level also causes beeper in keyboard to beep.
Bit 5: A low level forces DCD for modem to be active (Revision D only).
Bit 6,7: General purpose control bits for parallel port.

* Active low

4PIO
BASE ADDRESS LOGIC LEVELS

Page 8 of the 4PIO manual, Cromemco part number 023-0079, dated July 1979, illustrates the switch position labeling for the Base Address/Base Address Offset values incorrectly.

Switch positions 1 through 6 have address values of A7, A2, A5, A3, A6, A4, respectively.
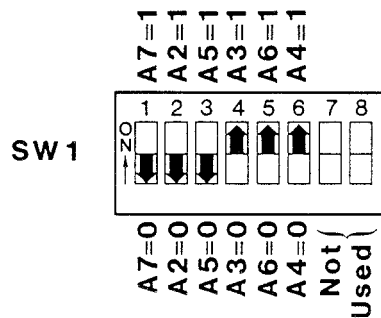
Note: The 4PIO schematic is correct.

J1 KEYBOARD CONNECTOR (base port 30h)
   (four-pin modular telephone connector)

pin	function
1	Serial data to keyboard (RS-232)
2	+12V
3	Ground
4	Serial data from keyboard (RS-232)

J6 DISK DRIVE CONNECTOR (base port 20h)
   (IEEE-488 type connector, stackable up to four deep)

pin	function
1	n/c
2	Ground
3	RDAT* (read data)
4	TR00* (track 00)
5	WDAT* (write data)
6	DS4* (drive select 4)
7	DS3* (drive select 3)
8	DS2* (drive select 2)
9	DS1* (drive select 1)
10	INDEX*
11	Ground
12	+5V
13	+12V
14	Ground
15	SIDE SELECT*
16	WPRT* (write protect)
17	WGATE* (write gate)
18	STEP*
19	DIRC*
20	MOTOR ON*
21	TG43*
22	n/c
23	Ground
24	Frame Ground

*Active low

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J2 PARALLEL PORT CONNECTOR
(DB-25 connector, labeled **ACCESSORY**)

Parallel Data Pins (base port 50h)

In: pin	function	Out: pin	function
7	DI0	13	DO0
19	DI1	25	DO1
6	DI2	12	DO2
18	DI3	24	DO3
5	DI4	11	DO4
17	DI5	23	DO5
4	DI6	10	DO6
16	DI7	22	* DO7

* Also 7-bit printer strobe

Serial Printer Signals (base port 30h)

pin	function
3	TxD (transmit data)
9	DSR (data set ready)

DMA Handshake and Auxiliary Signals

pin	function
15	n/c
14	Ground
21	SEL0 (auxiliary output pins)
8	SEL1 (also 8-bit parallel printer data strobe)
1	DRQ (DMA request)
2	DACK* (DMA acknowledge)

* Active low

J3 SERIAL PORT CONNECTOR (base port 38h)
(DB-9 connector, labeled **COMPUTER**)

pin	function
1	n/c
2	DCD (data carrier detect)
3	TxD (transmit data)
4	RxD (receive data)
5	GND (ground)
6	n/c
7	DTR (data terminal ready)
8	DSR (data set ready)
9	TST (pulled up to +12V)

USING THE C-10 CHARACTER SETS
AND TERMINAL FUNCTIONS

This application note describes the four C-10 character sets
and explains how to use them.   It also lists other C-10
graphics functions.

C-10 CHARACTER SETS

Figures 1 through 4 show all the characters in each of the four
character sets: Standard, Graphics, Boldface, and
Miscellaneous.   The row and column numbers for each character
correspond to its ASCII code.   For example, the character "n"
(row 6, column E) has the ASCII code 6E (hex).   Each ASCII code
corresponds to four different characters, one from each
character set.   Which of the four characters appears on the
screen depends on which of the four character sets has been
selected (this selection process is described in the section
Using the Character Sets and Video Attributes below).

VIDEO ATTRIBUTES

In addition to the four character sets, there are several video
attributes that determine how the characters will appear on the
screen.

       Normal (light characters, dark background)
       Reverse (dark characters, light background)
       Half-intensity (medium characters, dark background)
       Blinking (characters blink on and off)
       Underlined (underlined characters)

These video attributes can be used individually, or in
combination.   For example, you can have the screen display
underlined blinking half-intensity reverse characters, using
any of the four character sets.   You can select up to 16
different character set and video attribute combinations on
each line of the screen.

Figure 1: NORMAL CHARACTER SET

Figure 2: GRAPHICS CHARACTER SET

2

Figure 3: BOLDFACE CHARACTER SET

Figure 4: MISCELLANEOUS CHARACTER SET

3

USING THE CHARACTER SETS AND VIDEO ATTRIBUTES

A character set and video attribute combination is selected with a special sequence of characters: an ESCAPE character (1Bh), followed by a lower-case "d" (64h), and finally the code for the particular combination of character set and video attributes that you want. Table 1 shows the codes for all possible combinations.

Table 1: CHARACTER SET AND VIDEO ATTRIBUTE CODES

Character Set				Video Attribute
standard	graphics	bold	misc.	
@	D	H	L	normal
A	E	I	M	half-intensity
B	F	J	N	blinking
C	G	K	O	half-intensity blinking
P	T	X	\	reverse
Q	U	Y	]	half-intensity reverse
R	V	Z	^	blinking reverse
S	W	[	_	half-intensity blinking reverse
`	d	h	l	underlined
a	e	i	m	half-intensity underlined
b	f	j	n	blinking underlined
c	g	k	o	half-intensity blinking underlined
p	t	x	|	reverse underlined
q	u	y	}	half-intensity reverse underlined
r	v	z	~	blinking reverse underlined
s	w	{	DELETE	half-intensity blinking reverse underlined

For example, the sequence **ESCAPE dV** selects the graphics character set in blinking reverse video. The sequence **ESCAPE d@** reselects the standard character set and normal video attribute.

A video setting selected with the **ESCAPE d** command creates a video field that extends "downstream" from the current cursor position to the position of the next video setting on the screen (or to the end of the screen if no other video setting is encountered). Any characters you type in this video field, and any characters that were already typed there, will be displayed in the selected character set and video attribute combination.

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Once you have defined a particular video field by placing a video setting on the screen, you can redefine that field either by replacing the old video setting with a new one using the **ESCAPE d** command, or by erasing the old video setting with the **ESCAPE e** command. In either case, the cursor must be located at the position of the old setting when the command is given. See the section **Cursor Addressing** below for information on how to move the cursor to a given location on the screen.

ONLINE MODE AND LOCAL MODE

Before you can use the **ESCAPE d** command to select different character sets and video attributes, it is helpful to understand the difference between Online Mode and Local Mode, the two basic modes of operation of the C-10.

Online Mode

Online Mode is the normal mode of operation for the C-10. In Online Mode, characters typed on the keyboard are passed to the computer, and characters received from the computer are displayed on the screen. It may seem that you are typing characters directly on the screen, but it is in fact a two-step process. It is only because what you type goes through the computer that the computer is able to respond to the commands you give it. When the C-10 is in Online Mode, you **cannot** select character sets and video attributes by typing an **ESCAPE d** command on the keyboard. You can only change the character set and video attribute setting by running a program that contains an **ESCAPE d** command.

Local Mode

In Local Mode, characters typed on the keyboard are displayed directly on the screen, not passed through the computer. You can use the ARROW keys to move the cursor around the screen, typing characters in any location. When the C-10 is in Local Mode, you **can** select character sets and video attributes by typing an **ESCAPE d** command on the keyboard. In Local Mode, you can use the screen as a scratchpad, experimenting with the effects of different character set and video attribute combinations. You cannot save what you have typed on the screen.

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CONTROL-SHIFT-L Command

When you first turn on the C-10, it is in Online Mode. To select Local Mode, hold down both the CONTROL and SHIFT keys and press the L (as in Local) key. CONTROL-SHIFT-L toggles between Online Mode and Local Mode, so use the same command to select Online Mode again.

The Status Line

The status line shows the current mode of the C-10. To display the status line, hold down both the CONTROL and SHIFT keys and press the S (as in Status) key. The first word on the status line will be either LOCAL or ONLINE. This tells you what mode the C-10 is in. You can turn off the status line by typing CONTROL-SHIFT-S again, or you can leave the status line turned on.

MONITOR MODE

The first two rows of each character set (00h through 1Fh) correspond to nonprinting control characters. They are called control characters because they can be typed on the keyboard by holding down the CONTROL key while typing another key. The C-10 must be in Monitor Mode in order to display these characters.

In Monitor Mode, normal interpretation of control characters is suspended. For this reason, most C-10 commands do not work in Monitor Mode. For example, command sequences beginning with ESCAPE cannot be executed, because ESCAPE is a control character (CONTROL-[, 1Bh). Even the keyboard keys TAB (CONTROL-I, 09h) and RETURN (CONTROL-M, 0Dh) are control characters that are unable to perform their normal functions in Monitor Mode. Enter Monitor Mode only to display characters in the first two rows of each character set. Exit Monitor Mode immediately afterwards.

The sequence **ESCAPE :** (1Bh 3Ah) is used to enter Monitor Mode. The sequence **ESCAPE p** (1Bh 70h) is used to exit Monitor Mode. You can also use the sequence **ESCAPE *** (1Bh 2Ah) to exit Monitor Mode, but the keyboard beeps once when this command is executed.

The Cromemco Structured Basic programming example provided below illustrates the use of Monitor Mode to display control characters.

CURSOR ADDRESSING

The sequence **ESCAPE Y** (1Bh 46h) causes the C-10 to interpret the next two characters received as a line number and a column number, and to move the cursor to the specified position. If the indicated position is not on the screen, the cursor does not move.

Table 2 gives the line and column number codes for all possible screen positions.

The **ESCAPE Y** command can be given either from the keyboard in Local Mode, or from a program running on the C-10 in Online Mode. The sample programs provided below include an example of cursor addressing.

Table 2: C-10 CURSOR POSITION CODES

Line or Column	ASCII Char	Column	ASCII Char	Column	ASCII Char
1	SPACE	28	;	55	V
2	!	29	<	56	W
3	"	30	=	57	X
4	#	31	>	58	Y
5	$	32	?	59	Z
6	%	33	@	60	[
7	&	34	A	61	\
8	'	35	B	62	]
9	(	36	C	63	^
10	)	37	D	64	
11	*	38	E	65	_
12	+	39	F	66	a
13	,	40	G	67	b
14	-	41	H	68	c
15	.	42	I	69	d
16	/	43	J	70	e
17	0	44	K	71	f
18	1	45	L	72	g
19	2	46	M	73	h
20	3	47	N	74	i
21	4	48	O	75	j
22	5	49	P	76	k
23	6	50	Q	77	l
24	7	51	R	78	m
25	8	52	S	79	n
26	9	53	T	80	o
27	:	54	U		

PROGRAMMING EXAMPLE: STRUCTURED BASIC

The following program illustrates the use of character sets, video attributes, and cursor addressing from the Cromemco Structured Basic programming language.

```
10    Let Esc$=Chr$(27) : Rem            ASCII code for ESCAPE is 27.
20    Print Esc$;"E" : Rem               ESCAPE E clears the screen.
30    Print Esc$;"F%="; : Rem            ESCAPE F positions cursor.
40    Rem                                %= indicates cursor position 6,30
50    Rem
60    Rem   The sequence "ESCAPE d" followed by another character sets a
70    Rem   video attribute at the current location of the cursor.
80    Rem   The default video attribute is standard charset, normal video,
90    Rem   so no video attribute is set before the normal text in line 50.
100   Rem
110   Print"This is normal text"
120   Print
130   Print Esc$;"dA"; : Rem             ESCAPE dA -> standard charset,
140   Print"Half-intensity text"; : Rem                half-intensity
150   Print Esc$;"d@" : Rem              ESCAPE d@ -> standard charset,
160   Rem                                             normal video
170   Print
180   Print Esc$;"d`"; : Rem             ESCAPE d` -> standard charset,
190   Print"Underlined text"; : Rem                   underlined video
200   Print Esc$;"d@" : Rem              ESCAPE d@ -> standard charset,
210   Rem                                             normal video
220   Print
230   Print Esc$;"dP"; : Rem             ESCAPE dP -> standard charset,
240   Print"Reverse text"; : Rem                      reverse video
250   Print Esc$;"d@" : Rem              ESCAPE d@ -> standard charset,
260   Rem                                             normal video
270   Print
280   Print Esc$;"dH"; : Rem             ESCAPE dH -> boldface charset,
290   Print"Boldface text"; : Rem                     normal video
300   Print Esc$;"d@" : Rem              ESCAPE d@ -> standard charset,
310   Rem                                             normal video
320   Print
330   Print Esc$;"dD"; : Rem             ESCAPE dD -> graphics charset,
340   Print"`\a WY"; : Rem                            normal video
350   Print Esc$;"d@ <- Graphics" : Rem  ESCAPE d@ -> standard charset,
360   Rem                                             normal video
370   Print
380   Print Esc$;"dB"; : Rem             ESCAPE dB -> standard charset,
390   Print"Blinking text"; : Rem                     blinking video
400   Print Esc$;"d@" : Rem              ESCAPE d@ -> standard charset,
410   Rem                                             normal video
420   Print
430   Print Esc$;"dH"; : Rem             ESCAPE dH -> bolface charset,
440   Rem                                             normal video
450   Print ESC$;":"; : Rem              ESCAPE :  -> monitor mode on
460   Print Chr$(0);Chr$(1);Chr$(2);Chr$(3);
470   Print Esc$;"p" : Rem               ESCAPE p  -> monitor mode off
480   Rem                                Monitor mode must be turned off
490   Rem                                   to reposition the cursor.
500   Print Esc$;":"; : Rem              ESCAPE :  -> monitor mode on
510   Print Chr$(16);Chr$(17);Chr$(18);Chr$(19);
520   Print Esc$;"p" : Rem               ESCAPE p  -> monitor mode off
530   Print Esc$;"d@" : Rem              ESCAPE d@ -> standard charset,
540   Rem                                             normal video
550   Print
560   End
```

PROGRAMMING EXAMPLE: Z80 ASSEMBLY LANGUAGE

The following program illustrates the use of character sets, video attributes, and cursor addressing from Cromemco Z80 assembly language.

```
; This sample program shows how to clear the screen, position the cursor,
; and output text using the different character sets and video attributes.


ESC     EQU     1BH                             ; ESCAPE character


START:  LD      DE,CLEAR_SCREEN_COMMAND         ; ESCAPE E clears the screen
        CALL    PRINT_BUFFERED_LINE             ;  and positions cursor at 1,1

        LD      DE,POSITION_CURSOR_COMMAND      ; ESCAPE F positions cursor
        CALL    PRINT_BUFFERED_LINE             ;  at requested location

        LD      DE,NORMAL                       ; Line of normal video
        CALL    PRINT_BUFFERED_LINE             ; Print to CRT
        CALL    NEWLINE                         ; Cursor return, 2 line feeds

        LD      DE,REVERSE                      ; Line of reverse video
        CALL    PRINT_BUFFERED_LINE             ; Print to CRT
        CALL    NEWLINE                         ; Cursor return, 2 line feeds

        LD      DE,BOLD                         ; Line of boldface text
        CALL    PRINT_BUFFERED_LINE             ; Print to CRT
        CALL    NEWLINE                         ; Cursor return, 2 line feeds

        LD      DE,GRAPHIC                      ; Line of graphics and text
        CALL    PRINT_BUFFERED_LINE             ; Print to CRT
        CALL    NEWLINE                         ; Cursor return, 2 line feeds

        LD      DE,BLINK                        ; Line of blinking text
        CALL    PRINT_BUFFERED_LINE             ; Print to CRT
        CALL    NEWLINE                         ; Cursor return, 2 line feeds

        JP      0                               ; Return to CDOS


PRINT_BUFFERED_LINE:    LD      C,09            ; CDOS system call, prints a
                        CALL    5               ;  string of ASCII characters
                        RET

NEWLINE:    LD      DE,CRLF                     ; Cursor return & line feed
            CALL    PRINT_BUFFERED_LINE
            RET


CLEAR_SCREEN_COMMAND        DEFB    ESC,'E$'    ; ESCAPE E clears the screen

POSITION_CURSOR_COMMAND DEFB    ESC,'F%=$'      ; ESCAPE F positions cursor
                                                ; "%" = line 6, "=" = column 30

CRLF    DEFB    0DH,0AH,0AH,'$'                 ; Carriage return, 2 line feeds


; The sequence "ESCAPE d" followed by another character sets a video attribute
; at the current location of the cursor.

NORMAL  DEFB    'This is normal text$'                  ; '$' marks end of
REVERSE DEFB    ESC,'dP','This is reverse',ESC,'d@$'    ;  text for CDOS
BOLD    DEFB    ESC,'dH','This is boldface',ESC,'d@$'
GRAPHIC DEFB    ESC,'dD','ahijkpq',ESC,'d@ <= Graphics$'; "ESCAPE d@" sets nor-
BLINK   DEFB    ESC,'dB','This is blinking',ESC,'d@$'   ;  mal video attribute

        END     START
```

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GRAPHICS MODE

In Graphics Mode, certain ASCII characters are interpreted as specifying one of 11 different graphics symbols with one of four different video attributes. These symbols may be used in constructing line drawings, charts, etc.

Graphics Mode is **not** the same as the Graphics character set shown in Figure 2.

Table 3 shows the Graphics Mode symbols and their ASCII equivalents. Graphics Mode is turned on by **ESCAPE R** (1Bh 52h) and turned off by **ESCAPE S** (1Bh 53h). As with the commands for selecting character sets and video attributes, the commands **ESCAPE R** and **ESCAPE S** can be given either from the keyboard in Local Mode, or from a program running on the C-10 in Online Mode.

Table 3: ASCII EQUIVALENTS OF C-10 GRAPHICS SYMBOLS

Symbol	Display Mode			
	Normal	Half-Intensity	Blinking	Half-Intensity Blinking
	@	A	B	C
	D	E	F	G
	H	I	J	K
	L	M	N	O
	P	Q	R	S
	T	U	V	W
	X	Y	Z	[
	\	]	^	_
	`	a	b	c
	d	e	f	g
	h	i	j	k

C-10 ESCAPE CODES

C-10 Escape Code functions are invoked with an ESCAPE character followed by one or two identifying characters. For example, the command for turning off the cursor is **ESCAPE q** (1Bh 71h). Table 4 lists all of the Escape Code functions for the C-10.

Table 4: C-10 ESCAPE CODES

LSB \ MSB	Code Following ESCAPE (1Bh)					
	010	011	100	101	110	111
0000	SP (20h) Set Clock	0 (30h) not assigned	@ (40h) Insert Char Off	P (50h) Delete Char (Line)	` (60h) Delete Char (Page)	p (70h) Monitor Mode Off
0001	! (21h) Set to Page Send Mode	1 (31h) Display Message	A (41h) Cursor Up	Q (51h) Insert Char (Line) On	a (61h) Insert Char (Page) On	q (71h) Cursor Off
0010	" (22h) not assigned	2 (32h) Remove Message	B (42h) Cursor Down	R (52h) Graphics Mode On	b (62h) * Enable Keyboard	r (72h) Cursor On
0011	# (23h) Line Send Mode	3 (33h) not assigned	C (43h) Cursor Right	S (53h) Graphics Mode Off	c (63h) * Disable Keyboard	s (73h) Video Attrib. at Cursor Pos.
0100	$ (24h) not assigned	4 (34h) not assigned	D (44h) Cursor Left	T (54h) not assigned	d (64h) Enter Video Attribute	t (74h) not assigned
0101	% (25h) not assigned	5 (35h) not assigned	E (45h) Clear Screen	U (55h) not assigned	e (65h) Delete Video Attribute	u (75h) not assigned
0110	& (26h) not assigned	6 (36h) Write Control Mode	F (46h) Cursor Address	V (56h) Reset Terminal	f (66h) not assigned	v (76h) not assigned
0111	' (27h) Send Enter Code	7 (37h) not assigned	G (47h) * Read Cursor Character	W (57h) not assigned	g (67h) Screen Lock	w (77h) not assigned
1000	((28h) not assigned	8 (38h) Continuous Alarm On	H (48h) Home Cursor	X (58h) not assigned	h (68h) Screen Unlock	x (78h) not assigned
1001	) (29h) not assigned	9 (39h) Continuous Alarm Off	I (49h) Begin Page Send	Y (59h) Cursor Address	i (69h) Line Send	y (79h) not assigned
1010	* (2Ah) Monitor Mode Off (bell)	: (3Ah) Monitor Mode On	J (4Ah) Clear To End of Page	Z (5Ah) Cursor Toggle	j (6Ah) Turn On Printer	z (7Ah) not assigned
1011	+ (2Bh) not assigned	; (3Bh) * Store Message	K (4Bh) Clear To End of Line	[(5Bh) not assigned	k (6Bh) Turn Off Printer	{ (7Bh) not assigned
1100	, (2Ch) not assigned	< (3Ch) * Line Lock Mode	L (4Ch) Insert Line	\ (5Ch) * Send Cursor Position	l (6Ch) Start Blink		(7Ch) not assigned
1101	- (2Dh) Toggle Status Line	= (3Dh) * Line Unlock Mode	M (4Dh) Delete Line	] (5Dh) not assigned	m (6Dh) Normal Video	} (7Dh) not assigned
1110	. (2Eh) see next page	> (3Eh) Back Tab	N (4Eh) Enter Local Mode	^ (5Eh) * Use Invisible Cursor	n (6Eh) Go Online	~ (7Eh) not assigned
1111	/ (2Fh) not assigned	? (3Fh) * Unlock All Lines	O (4Fh) Send Status Message	_ (5Fh) * Send Invisible Cursor Char	o (6Fh) Begin Page Dump	DEL (7Fh) not assigned

* Available in Online Mode only

11

ADDITIONAL ESCAPE CODE FUNCTIONS

The following additional functions are invoked with an ESCAPE, followed by a period and one of the characters listed in Table 5. For example, the sequence **ESCAPE . C** changes the cursor to blinking reverse video.

These functions can be invoked either from the keyboard in Local Mode, or from a program running on the C-10 in Online Mode.

Table 5: COMMUNICATION CONTROL ESCAPE CODES

Character Following ESC-'.'	Function
0	Enable software handshaking (default)
1	Disable " "
4	Cursor pad transmits control codes when Online
5	Cursor pad operates locally, transmits nothing
6	Disable block transmissions (default)
7	Enable " "
8	Disable function keys when Online (default)
9	Enable " " " "
A	Select reverse-video cursor (default)
B	Select underline cursor
C	Select blinking reverse-video cursor
D	Select blinking underline cursor

Table 6: ASCII CHARACTER CODES

DEC.	HEX	CHAR.	DEC.	HEX	CHAR.	DEC.	HEX	CHAR.
000	00	NUL (CONTROL-@)	043	2B	+	086	56	V
001	01	SOH (CONTROL-A)	044	2C	,	087	57	W
002	02	STX (CONTROL-B)	045	2D	−	088	58	X
003	03	ETX (CONTROL-C)	046	2E	.	089	59	Y
004	04	EOT (CONTROL-D)	047	2F	/	090	5A	Z
005	05	ENQ (CONTROL-E)	048	30	0	091	5B	[
006	06	ACK (CONTROL-F)	049	31	1	092	5C	\
007	07	BEL (CONTROL-G)	050	32	2	093	5D	]
008	08	BS (CONTROL-H)	051	33	3	094	5E	^
009	09	HT (CONTROL-I)	052	34	4	095	5F	_
010	0A	LF (CONTROL-J)	053	35	5	096	60	`
011	0B	VT (CONTROL-K)	054	36	6	097	61	a
012	0C	FF (CONTROL-L)	055	37	7	098	62	b
013	0D	CR (CONTROL-M)	056	38	8	099	63	c
014	0E	SO (CONTROL-N)	057	39	9	100	64	d
015	0F	SI (CONTROL-O)	058	3A	:	101	65	e
016	10	DLE (CONTROL-P)	059	3B	;	102	66	f
017	11	DC1 (CONTROL-Q)	060	3C	<	103	67	g
018	12	DC2 (CONTROL-R)	061	3D	=	104	68	h
019	13	DC3 (CONTROL-S)	062	3E	>	105	69	i
020	14	DC4 (CONTROL-T)	063	3F	?	106	6A	j
021	15	NAK (CONTROL-U)	064	40	@	107	6B	k
022	16	SYN (CONTROL-V)	065	41	A	108	6C	l
023	17	ETB (CONTROL-W)	066	42	B	109	6D	m
024	18	CAN (CONTROL-X)	067	43	C	110	6E	n
025	19	EM (CONTROL-Y)	068	44	D	111	6F	o
026	1A	SUB (CONTROL-Z)	069	45	E	112	70	p
027	1B	ESC (CONTROL-[)	070	46	F	113	71	q
028	1C	FC (CONTROL-\)	071	47	G	114	72	r
029	1D	GS (CONTROL-])	072	48	H	115	73	s
030	1E	RS (CONTROL-^)	073	49	I	116	74	t
031	1F	US (CONTROL-_)	074	4A	J	117	75	u
032	20	SPACE	075	4B	K	118	76	v
033	21	!	076	4C	L	119	77	w
034	22	"	077	4D	M	120	78	x
035	23	#	078	4E	N	121	79	y
036	24	$	079	4F	O	122	7A	z
037	25	%	080	50	P	123	7B	{
038	26	&	081	51	Q	124	7C		
039	27	'	082	52	R	125	7D	}
040	28	(	083	53	S	126	7E	~
041	29	)	084	54	T	127	7F	DEL
042	2A	*	085	55	U			

LF=Line Feed   FF=Form Feed   CR=Carriage Return   DEL=Rubout   ESC=ESCAPE