

# Appendix A

## Bibliography

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# Appendix B

## QX-10 Error Messages

The error messages listed below offer several courses of action. They are:

- |              |  |
|--------------|--|
| (R)etry -    | Attempt I/O operation again.   |
| (A)bort -    | Cancel current operation and program. Invoke a system warm boot.   |
| (C)ontinue - | Continue operation and return error code to BDOS.  |
| (I)gnore -   | Alter disk I/O return code to indicate a successful I/O operation and return to BDOS. Printer operations ignored until next warm boot. |

### Printer Error and Status Messages

The QX-10 reports four printer-related messages:

PRINTER NOT CONNECTED - (R)etry/(A)bort/(I)gnore output  
Cause: the printer is disconnected from the system.

PRINTER POWER OFF - (R)etry/(A)bort/(I)gnore output  
Cause: the printer is connected but power is off.

PRINTER OFFLINE - (R)etry/(A)bort/(I)gnore output  
Cause: the printer is connected and powered on, but off-line.

PRINTER PAPER OUT - (R)etry/(A)bort/(I)gnore output  
Cause: the printer is connected, powered on, on-line but out of paper.

## Floppy Disk Error and Status Messages

The four messages relating to the floppy disk subsystem can have several different causes:

DRIVE X - SELECT ERROR: (R)etry/(A)bort

Cause: a non-existent drive has been selected.

DRIVE X - SEEK ERROR: (R)etry/(A)bort/(C)ontinue/(I)gnore

Possible causes:

- a bad diskette
- corrupted data
- erroneous program instruction

DRIVE X - RD/WR ERROR: (R)etry/(A)bort/(C)ontinue/(I)gnore

Possible causes:

- a bad diskette
- corrupted data
- the diskette has a write protect tab on it

DRIVE X - NOT READY: (R)etry/(A)bort/(C)ontinue/(I)gnore

Possible causes:

- the PUSH button on the disk drive has not been depressed
- a diskette has not been inserted in the selected drive
- the selected drive does not exist

## COPYDISK Error Messages

The QX-10 COPYDISK utility has two error messages.

DRIVE X IS NOT READY

TYPE ANY KEY OR RETRY OR CONTROL "C" TO CANCEL

Possible causes:

- the PUSH button on the disk drive has not been depressed
- a diskette has not been inserted into the RIGHT drive

FORMAT OF DISKETTE TO BE COPIED IS INVALID

HIT ANY KEY TO CONTINUE:

Cause: the diskette in the LEFT drive is not in the QX-10 format.

## **SETUP Error Messages**

There are two error messages in the QX-10 SETUP utility.

### **DRIVE A MUST BE ASSIGNED**

**Cause:** when making disk drive assignments, you failed to assign one of your physical disks to logical drive A. The system will not allow you to exit from SETUP until you assign drive A.

### **\*\*PROTECTED SYSTEM MANAGER RESERVED KEY**

**Cause:** You are attempting to program a reserved key; it is not a programmable function throughout the SETUP utility.



# Appendix C

## CP/M Error Messages\*

Messages come from several different sources. CP/M displays error messages when there are errors in calls to the Basic Disk Operating System (BDOS). CP/M also displays messages when there are errors in command lines. Each utility supplied with CP/M has its own set of messages. The following lists CP/M messages and utility messages. One might see messages other than those listed here if one is running an application program. Check the application program's documentation for explanations of those messages.

Message	Meaning
. ?	DDT. This message has four possible meanings: <ol style="list-style-type: none"><li>1) DDT does not understand the assembly language instruction.</li><li>2) The file cannot be opened.</li><li>3) A checksum error occurred in a HEX file.</li><li>4) The assembler/disassembler was overlaid.</li></ol>
ABORTED	PIP. You stopped a PIP operation by pressing a key.

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- ASM Error Messages**
- D Data error: data statement element cannot be placed in specified data area.
  - E Expression error: expression cannot be evaluated during assembly.
  - L Label error: label cannot appear in this context (might be duplicate label).
  - N Not implemented: unimplemented feature, such as macros, are trapped.
  - O Overflow: expression is too complex to evaluate.
  - P Phase error: label value changes on two passes through assembly.
  - R Register error: the value specified as a register is incompatible with the code.
  - S Syntax error: improperly formed expression.
  - U Undefined label: label used does not exist.
  - V Value error: improperly formed operand encountered in an expression.

**BAD DELIMITER** STAT. Check command line for typing errors.

**Bad Load** CCP error message, or SAVE error message.

**Bdos Err on d:** Basic Disk Operating System Error on the designated drive: CP/M replaces d: with the drive specification of the drive where the error occurred. This message is followed by one of the four phrases in the situations described below.

**Bdos Err On d: Bad Sector**

This message appears when CP/M finds no disk in the drive, when the disk is improperly formatted, when the drive latch is open, or when power to the drive is off. Check for one of these situations and try again. This could also indicate a hardware problem or a worn or improperly formatted disk. Press **^C** to terminate the program and return to CP/M, or press **RETURN** to ignore the error.

### Bdos Err On d: File R/O

You tried to erase, rename, or set file attributes on a Read Only file. The file should first be set to Read Write (RW) with the command: "STAT filespec \$R/W."

### Bdos Err On d: R/O

Drive has been assigned Read Only status with a STAT command, or the disk in the drive has been changed without being initialized with a ^C. CP/M terminates the current program as soon as you press any key.

### Bdos Err on d: Select

CP/M received a command line specifying a nonexistent drive. CP/M terminates the current program as soon as you press any key. Press **RETURN** or ^C to recover.

### Break "x" at c

ED. "x" is one of the symbols described below and c is the command letter being executed when the error occurred.

- # Search failure. ED cannot find the string specified in an F, S, or N command.
- ? Unrecognized command letter c. ED does not recognize the indicated command letter, or an E, H, Q or O command is not alone on its command line.
- O The file specified in an R command cannot be found.
- > Buffer full. ED cannot put any more characters in the memory buffer, or the string specified in an F, N, or S command is too long.
- E Command aborted. A keystroke at the console aborted command execution.
- F Disk or directory full. This error is followed by either the disk or directory full message. Refer to the recovery procedures listed under these messages.

**CANNOT CLOSE DESTINATION FILE-(filespec)**

PIP. An output file cannot be closed. You should take appropriate action after checking to see if the correct disk is in the drive and that the disk is not write-protected.

**Cannot close, R/OCANNOT CLOSE FILES**

CP/M cannot write to the file. This usually occurs because the disk is write-protected.

ASM. An output file cannot be closed. This is a fatal error that terminates ASM execution. Check to see that the disk is in the drive, and that the disk is not write-protected.

DDT. The disk file written by a W command cannot be closed. This is a fatal error that terminates DDT execution. Check if the correct disk is in the drive and that the disk is not write-protected.

SUBMIT. This error can occur during SUBMIT file processing. Check if the correct system disk is in the A drive and that the disk is not write-protected. The SUBMIT job can be restarted after rebooting CP/M.

**CANNOT READ**

PIP. PIP cannot read the specified source. Reader may not be implemented.

**CANNOT WRITE**

PIP. The destination specified in the PIP command is illegal. You probably specified an input device as a destination.

**Checksum error**

PIP. A hex record checksum error was encountered. The hex record that produced the error must be corrected, probably by recreating the hex file.

**CHECKSUM ERROR**  
**LOAD ADDRESS hhhh**  
**ERROR ADDRESS hhhh**  
**BYTES READ:**

**hhhh:** LOAD. File contains incorrect data. Regenerate hex file from the source.

**Command Buffer Overflow**

SUBMIT. The SUBMIT buffer allows up to 2048 characters in the input file.

**Command too long**

SUBMIT. A command in the SUBMIT file cannot exceed 125 characters.

**CORRECT ERROR, TYPE RETURN OR CTL-Z**

PIP. A hex record checksum was encountered during the transfer of a hex file. The hex file with the checksum error should be corrected, probably by recreating the hex file.

**DESTINATION IS R/O, DELETE (Y/N)?**

PIP. The destination file specified in a PIP command already exists and it is Read Only. If you type Y, the destination file is deleted before the file copy is done.

**Directory full**

ED. There is not enough directory space for the file being written to the destination disk. You can use the OXfilespec command to erase any unnecessary files on the disk without leaving the editor.

SUBMIT. There is not enough directory space to write the \$\$\$SUB file used for processing SUBMITs. Erase some files or select a new disk and retry.

**Disk full**

ED. There is not enough disk space for the output file. This error can occur on the W, E, H, or X commands. If it occurs with X command, you can repeat the command prefixing the filename with a different drive.

**DISK READ ERROR-(filespec)**

PIP. The input disk file specified in a PIP command cannot be read properly. This is usually the result of an unexpected end-of-file. Correct the problem in your file.

**DISK WRITE ERROR-(filespec)**

DDT. A disk write operation cannot be successfully performed during a W command, probably due to a full disk. You should either erase some unnecessary files or get another disk with more space.

PIP. A disk write operation cannot be successfully performed during a PIP command, probably due to a full disk. You should either erase some unnecessary files or get another disk with more space and execute PIP again.

SUBMIT. The SUBMIT program cannot write the \$\$\$SUB file to the disk. Erase some files, or select a new disk and try again.

**ERROR: BAD PARAMETER**

PIP. You entered an illegal parameter in a PIP command. Retype the entry correctly.

**ERROR: CANNOT OPEN SOURCE, LOAD ADDRESS hhhh**

LOAD. Displayed if LOAD cannot find the specified file or if no filename is specified.

**ERROR: CANNOT CLOSE FILE, LOAD ADDRESS hhhh**

LOAD. Caused by an error code returned by a BDOS function call. Disk may be write-protected.

**ERROR: CANNOT OPEN SOURCE, LOAD ADDRESS hhhh**

LOAD. Cannot find source file. Check disk directory.

**ERROR: DISK READ, LOAD ADDRESS hhhh**

LOAD. Caused by an error code returned by a BDOS function call.

**ERROR: DISK WRITE, LOAD ADDRESS hhhh**  
LOAD. Destination Disk is full.

**ERROR: INVERTED LOAD ADDRESS, LOAD ADDRESS hhhh**  
LOAD. The address of a record was too far from the address of the previously-processed record. This is an internal limitation of LOAD, but it can be circumvented. Use DDT to read the hexfile into memory, then use a SAVE command to store the memory image file on disk.

**ERROR: NO MORE DIRECTORY SPACE, LOAD ADDRESS hhhh**  
LOAD. Disk directory is full.

**Error on line nnn message**

SUBMIT. The SUBMIT program displays its messages in the format shown above, where nnn represents the line number of the SUBMIT file. Refer to the message following the line number.

**FILE ERROR**

ED. Disk or directory is full, and ED cannot write anything more on the disk. This is a fatal error, so make sure there is enough space on the disk to hold a second copy of the file before invoking ED.

**FILE EXISTS**

You have asked CP/M to create or rename a file using a file specification that is already assigned to another file. Either delete the existing file or use another file specification.

REN. The new name specified is the name of a file that already exists. You cannot rename a file with the name of an existing file. If you want to replace an existing file with a newer version of the same file, either rename or erase the existing file, or use the PIP utility.

**File exists, erase it**

ED. The destination filename already exists when you are placing the destination file on a different disk than the source. It should be erased or another disk selected to receive the output file.

**\*\*FILE IS READ/ONLY\*\***

ED. The file specified in the command to invoke ED has the Read Only attribute. ED can read the file so that the user can examine it, but ED cannot change Read Only file.

**File Not Found**

CP/M cannot find the specified file. Check that you have entered the correct drive specification or that you have the correct disk in the drive.

ED. ED cannot find the specified file. Check that you have entered the correct drive specification or that you have the correct disk in the drive.

STAT. STAT cannot find the specified file. The message might appear if you omit the drive specification. Check to see if the correct disk is in the drive.

**FILE NOT FOUND-(filespec)**

PIP. An input file that you have specified does not exist.

**Filename required**

ED. You typed the ED command without a filename. Re-enter the ED command followed by the name of the file you want to edit or create.

**hhhh??=dd**

DDT. The ?? indicates that DDT does not know how to represent the hexadecimal value dd encountered at address hhhh in 8080 assembly language. dd is not an 8080 machine instruction opcode.

**Insufficient memory**

DDT. There is not enough memory to load the file specified in an R or E command.

**Invalid Assignment** STAT. You specified an invalid drive or file assignment, or misspelled a device name. This error message might be followed by a list of the valid file assignments that can follow a filename. If an invalid drive assignment was attempted the message "Use: d:=RO" is displayed, showing the proper syntax for drive assignments.

**Invalid control character** SUBMIT. The only valid control characters in the SUBMIT files of type SUB are ^A through ^Z. Note that in a SUBMIT file the control character is represented by typing the circumflex, ^, not by pressing the control key.

**INVALID DIGIT-(filespec)** PIP. An invalid hex digit has been encountered while reading a hex file. The hex file with the invalid hex digit should be corrected, probably by recreating the hex file.

**Invalid Disk Assignment** STAT. Might appear if you follow the drive specification with anything except =R/O.

**INVALID DISK SELECT** CP/M received a command line specifying a nonexistent drive, or the disk in the drive is improperly formatted. CP/M terminates the current program as soon as you press any key.

**INVALID DRIVE NAME (Use A, B, C, or D)** SYSGEN. SYSGEN recognizes only drives A, B, C, and D as valid destinations for system generation.

**Invalid File Indicator** STAT. Appears if you do not specify R/O, R/W, DIR, or SYS.

**INVALID FORMAT** PIP. The format of your PIP command is illegal. See the description of the PIP command.

**INVALID HEX DIGIT**  
**LOAD ADDRESS hhhh**  
**ERROR ADDRESS hhhh**  
**BYTES READ:**

**hhhh** LOAD. File contains incorrect hex digit.

**INVALID MEMORY SIZE**

MOVCPM. Specify a value less than 64K or your computer's actual memory size.

**INVALID SEPARATOR**

PIP. You have placed an invalid character for a separator between two input filenames.

**INVALID USER NUMBER**

PIP. You have specified a user area number greater than 15. User areas are in the range 0 to 15.

**n?**

USER. You specified a number greater than fifteen for a user area number. For example, if you type USER 18, <cr> the screen displays 18?.

**NO DIRECTORY SPACE**

ASM. The disk directory is full. Erase some files to make room for PRN and HEX files. The directory can usually hold only 64 file-names.

**NO DIRECTORY SPACE-(filespec)**

PIP. There is not enough directory space for the output file. You should either erase some unnecessary files or get another disk with more directory space and execute PIP again.

**NO FILE-(filespec)**

DIR, ERA, REN, PIP. CP/M cannot find the specified file, or no files exist.

ASM. The indicated source or included file cannot be found on the indicated drive.

DDT. The file specified in an R or E command cannot be found on the disk.

**NO INPUT FILE PRESENT ON DISK**

DUMP. The file you requested does not exist.

**No memory**

There is not enough (buffer?) memory available for loading the program specified.

**NO SOURCE FILE ON DISK**

SYSGEN. SYSGEN cannot find CP/M either in CPMxx.com form or on the system tracks of the source disk.

**NO SOURCE FILE PRESENT**

ASM. The assembler cannot find the file you specified. Either you mistyped the filespecification in your command line, or the file is not type ASM.

**NO SPACE**

SAVE. Too many files are already on the disk, or no room is left on the disk to save the information.

**No SUB file present**

SUBMIT. For SUBMIT to operate properly, you must create a file with file type of SUB. The SUB file contains usual CP/M commands. Use one command per line.

**NOT A CHARACTER SOURCE**

PIP. The source specified in your PIP command is illegal. You have probably specified an output device as a source.

**\*\*NOT DELETED\*\***

PIP. PIP did not delete the file, which may have had the R/O attribute.

**NOT FOUND**

PIP. PIP cannot find the specified file.

**OUTPUT FILE WRITE ERROR**

ASM. You specified a write-protected diskette as the destination for the PRN and HEX files, or the diskette has no space left. Correct the problem before assembling your program.

**Parameter error**

SUBMIT. Within the SUBMIT file of type sub, valid parameters are \$0 through \$9.

**PARAMETER ERROR, TYPE RETURN TO IGNORE**

SYSGEN. If you press **RETURN**, SYSGEN proceeds without processing the invalid parameter.

**QUIT NOT FOUND** PIP. The string argument to a Q parameter was not found in your input file.

**Read error** TYPE. An error occurred when reading the file specified in the type command. Check the disk and try again. The STAT filespec command can diagnose trouble.

**READER STOPPING** PIP. Reader operation interrupted.

**Record Too Long** PIP. PIP cannot process a record longer than 128 bytes.

**Requires CP/M 2.0 or later**

XSUB. XSUB requires the facilities of CP/M 2.0 or newer version.

**Requires CP/M 2.0 or newer for operation**

PIP. This version of PIP requires the facilities of CP/M 2.0 or newer version.

**START NOT FOUND**

PIP. The string argument to an S parameter cannot be found in the source file.

**SOURCE FILE INCOMPLETE**

SYSGEN. SYSGEN cannot use your CP/M source file.

**SOURCE FILE NAME ERROR**

ASM. When you assemble a file, you cannot use the wildcard characters \* and ? in the filename. Only one file can be assembled at a time.

## **SOURCE FILE READ ERROR**

ASM. The assembler cannot understand the information in the file containing the assembly language program. Portions of another file might have been written over your assembly language file, or information was not properly saved on the diskette. Use the TYPE command to locate the error. Assembly language files contain the letters, symbols, and numbers that appear on your keyboard. If your screen displays unrecognizable output or behaves strangely, you have found where computer instructions have crept into your file.

## **SYNCHRONIZATION ERROR**

MOVCPM. The MOVCPM utility is being used with the wrong CP/M system.

## **"SYSTEM" FILE NOT ACCESSIBLE**

You tried to access a file set to SYS with the STAT command.

## **\*\*TOO MANY FILES\*\***

STAT. There is not enough memory for STAT to sort the files specified, or more than 512 files were specified.

## **UNEXPECTED END OF HEX FILE-(filespec)**

PIP. An end-of-file was encountered prior to a termination hex record. The hex file without a termination record should be corrected, probably by recreating the hex file.

## **Unrecognized Destination**

PIP. Check command line for valid destination.

## **Use: STAT d:=R/O**

STAT. An invalid STAT drive command was given. The only valid drive assignment in STAT is STAT d:=R/O.

**VERIFY ERROR:-(filespec)**

PIP. When copying with the V option, PIP found a difference when re-reading the data just written and comparing it to the data in its memory buffer. Usually this indicates a failure of either the destination disk or drive.

**WRONG CP/M VERSION (REQUIRES 2.0)**

**XSUB ACTIVE**           SUBMIT. XSUB has been invoked.

**XSUB ALREADY PRESENT**  
SUBMIT. XSUB is already active in memory.

**Your input?**           If CP/M cannot find the command you specified, it returns the command name you entered followed by a question mark. Check that you have typed the command line correctly, or that the command you requested exists as a .COM file on the default or specified disk.

# Appendix D

## QX-10 8-Bit Graphic Characters

If you know BASIC or assembly language programming, you can send the hexadecimal codes for the QX-10 graphic characters to the display screen. To print the contents of a screen containing graphic characters, use **^PRINT**.

		LSD															
		0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
MSD	A	α	β	γ	δ	λ	μ	π	σ	Σ	Δ	Θ	∞	♥	♦	♣	♠
	B	≤	≥	≈	≡	┌	└	z	✓	∞	«	»	±	÷	°	½	¼
	C	£	¥	ƒ	₣	¢	Ⓔ	Ⓕ	←	→	↑	↓	■	□	▣	○	
	D	⊖	⊗	⊘	⊙	⊕	⊖	⊗	⊘	⊙	⊕	⊖	⊗	⊘	⊙	⊕	⊖
	E	▣	▤	▥	▦	▧	▨	▩	▪	▫	▬	▭	▮	▯	▰	▱	▲
	F	△	▴	▵	▶	▷	▸	▹	►	▻	▼	▽	▾	▿	◀	▶	↔

LSD - Least Significant Digit  
MSD - Most Significant Digit

*Figure D-1. Hexadecimal codes for 8-bit graphic characters*



## Appendix E

### Serial Port Pin Settings (RS-232C Interface)

<b>Pin No.</b>	<b>Signal Symbol</b>	<b>Signal Direction</b>	<b>Description of Signal</b>
1	FG	-	Frame ground
2	TXD	OUT	Transmitted data
3	RXD	IN	Received data
4	RTS	OUT	Request to send
5	CTS	IN	Clear to send
6	DSR	IN	Data set ready
7	GL	-	Signal ground
8	DCD	IN	Carrier detect
9 - 10	-	-	NC (unused)
11	REV	-	Reverse channel
12 - 14	-	-	NC (unused)
15	DB	IN	Transmitter signal element timing
16	-	-	NC (unused)
17	RXC	IN	Receiver clock
18 - 23	-	-	NC (unused)
24	TXC	OUT	Transmitter clock



## Appendix F

### TVI-920 Control and Escape Sequences

Function	CTRL/ESC Seq	Hex Code	Sup- ported
Bell	CTRL G	07	X
Carriage return	CTRL M	0D	X
Cursor left	CTRL H	08	X
Cursor right	CTRL L	0C	X
Cursor down	CTRL J	0A	X
Cursor up	CTRL K	0B	X
Cursor home	CTRL ^	1E	X
Address cursor	* ESC = rc	1B,3D rc	X
Read cursor	ESC ?	1B,3F	X
Linefeed	CTRL J	0A	X
Tab	CTRL I	09	X
Backtab	ESC I	1B,49	X
Clear screen	CTRL Z	1A	X
Clear all to space	ESC +	1B,2B	X
Character insert	ESC Q	1B,51	X
Character delete	ESC W	1B,57	X
Line insert	ESC E	1B,45	X
Line delete	ESC R	1B,52	X
Reverse video	ESC j	1B,6A	X
End of reverse video	ESC k	1B,6B	X
Start underline	ESC l	1B,6C	**
End underline	ESC m	1B,6D	**
Start blink field	ESC ^	1B,5E	X
Start blank field	ESC	1B,20	X
End blink/blank	ESC q	1B,71	X
Erase EOL with spaces	ESC T	1B,54	X
Erase EOP with spaces	ESC Y	1B,59	X
Lock keyboard	ESC #	1B,23	X
Unlock keyboard	ESC "	1B,22	X
High intensity off	ESC (	1B,28	X

Function	CTRL/ESC Seq	Hex Code	Supported
High intensity on	ESC )	1B,29	X
New line	CTRL _	1F	
Set block mode	ESC B	1B,42	
Set conversation mode	ESC C	1B,43	
Protect mode on	ESC &	1B,26	
Protect mode off	ESC '	1B,27	
Set column TAB	ESC 1	1B,31	
Clear TAB	ESC 2	1B,32	
Clear all TAB	ESC 3	1B,33	
TAB	ESC i	1B,69	
Send line unprotected to cursor position	ESC 4	1B,34	
Send page unprotected to cursor position	ESC 5	1B,35	
Send whole page unprotected	ESC S	1B,53	
Send line all to Cursor position	ESC 6	1B,36	
Send page all to cursor position	ESC 7	1B,37	
Send whole page	ESC s	1B,73	
Clear all to NULL	ESC *	1B,2A	
Clear unprotected to NULL	ESC :	1B,3A	
Line erase to NULL	ESC t	1B,74	
Page erase to NULL	ESC y	1B,79	
Toggle page	ESC K	1B,4B	
Load cursor (PAGE,ROW,COLUMN)	ESC -	1B,2D	
Read cursor (PAGE,ROW,COLUMN)	ESC /	1B,2F	
Auto flip on	ESC v	1B,76	
Auto flip off	ESC w	1B,77	
Extension port on	ESC @	1B,40	
Extension port off			
page print mode on	ESC A	1B,41	
Print page	ESC P	1B,50	X

\*Direct cursor positioning is accomplished by the following escape sequence:  
ESC = Row + 20H Col + 20H where Row = 1 - 24, Col = 1 - 80

\*\*These attributes will have no effect but will result in a space (blank) being written in their place. This will insure proper cursor positioning relative to the TVI-920.

## Appendix G

### HASCII Hexadecimal Keyboard Mapping

KEY	SCAN CODE	AL	AU	CL	CU	GL	GU	
STOP	73	00	00	00	00	00	00	
HELP	72	00	00	00	00	00	00	
COPYDISK	71	00	00	00	00	00	00	
UNDO	01	00	00	00	00	00	00	
STORE	03	00	00	00	00	00	00	
RETRIEVE	04	00	00	00	00	00	00	
PRINT	05	00	00	00	00	00	00	
INDEX	06	00	00	00	00	00	00	
MAIL	07	00	00	00	00	00	00	
MENU	08	00	00	00	00	00	00	
CALC	0A	00	00	00	00	00	00	
SCHED	0B	00	00	00	00	00	00	
DRAW	0C	00	00	00	00	00	00	
BOLD	0E	00	00	00	00	00	00	
ITALIC	0F	00	00	00	00	00	00	
SIZE	1F	00	00	00	00	00	00	
STYLE	1E	00	00	00	00	00	00	
MAR REL	74	1B	1B	1B	1B	00	00	
^	75	BB	5E	00	1E	A0	AC	
! 1	76	31	21	11	01	A1	AD	

LEGEND: AL - NO SHIFT KEYS  
 AU - SHIFT  
 CL - CONTROL  
 CU - CONTROL SHIFT  
 GL - GRAPH SHIFT  
 GU - GRAPH SHIFT SHIFT

KEY	SCAN CODE	AL	AU	CL	CU	GL	GU	
@ 2	61	32	40	12	00	A2	AE	
# 3	62	33	23	13	03	A3	AF	
\$ 4	63	34	24	14	04	A4	A9	
% 5	64	35	25	15	05	A5	AA	
6	65	36	C4	16	00	E6	E4	
& 7	66	37	26	17	06	DD	DA	
* 8	67	38	2A	18	0A	ED	EA	
( 9	68	39	28	19	08	FD	FA	
) 0	69	30	29	10	09	F6	F4	
_ -	6A	2D	5F	0D	1F	60	C6	
+ =	6B	3D	2B	1D	0B	7C	C7	
\	6C	5C	BD	1C	00	7E	C0	
< x	6D	08	08	08	08	00	00	
TAB	77	09	09	09	09	00	00	
Q q	51	71	51	11	11	A6	B8	
W w	52	77	57	17	17	A7	A8	
E e	53	65	45	05	05	B0	B9	
R r	54	72	52	12	12	B1	BA	
T t	55	74	54	14	14	E2	E0	
Y y	56	79	59	19	19	F2	F0	
U u	57	75	55	15	15	E9	F9	
I i	58	69	49	09	09	DE	DB	
O o	59	6F	4F	0F	0F	EE	EB	
P p	5A	70	50	10	10	FE	FB	
¼ ½	5B	BE	BF	00	00	D7	D8	
[ <	5C	3C	5B	1C	1B	7B	C2	
] >	5D	3E	5D	1E	1D	7D	C3	
TAB REL	41	00	00	00	00	00	00	
SHIFT LOCK	42	00	00	00	00	00	00	
A a	43	61	41	01	01	CC	CD	
S s	44	73	53	13	13	B2	B3	
D d	45	64	44	04	04	BC	B4	
F f	46	66	46	06	06	B7	B6	
G g	47	67	47	07	07	E3	E1	
H h	48	68	48	08	08	F3	F1	
J j	49	6A	4A	0A	0A	E8	F8	
K k	4A	6B	4B	0B	0B	DF	DC	

LEGEND: AL - NO SHIFT KEYS  
AU - SHIFT  
CL - CONTROL  
CU - CONTROL SHIFT  
GL - GRAPH SHIFT  
GU - GRAPH SHIFT SHIFT

KEY	SCAN CODE	AL	AU	CL	CU	GL	GU	
L I	4B	6C	4C	0C	0C	EF	EC	
;	4C	3B	3A	1B	1A	FF	FC	
" "	4D	27	22	07	02	D7	C1	
RETURN	4E	0D	0D	0D	0D	00	00	
TAB SET	78	00	00	00	00	00	00	
SHIFT	86 87	00	00	00	00	00	00	
Z z	33	7A	5A	1A	1A	CE	CF	
X x	34	78	58	18	18	AB	B5	
C c	35	63	43	03	03	D0	D4	
V v	36	76	56	16	16	D1	D5	
B b	37	62	42	02	02	D2	C5	
N n	38	6E	4E	0E	0E	D3	D6	
M m	39	6D	4D	0D	0D	E7	E5	
, ,	3A	2C	2C	0C	0C	C8	CA	
..	3B	2E	2E	0E	0E	C9	CB	
? /	4F	2F	3F	0F	0F	F7	F5	
SHIFT	84 85	00	00	00	00	00	00	
CTRL	8A 8B	00	00	00	00	00	00	
SPACE BAR	32	20	20	20	20	20	20	
GRPH SHIFT	8C 8D	00	00	00	00	00	00	
CTRL	8E 8F	00	00	00	00	00	00	
X >	6E	7F	7F	7F	7F	00	00	
LINE	6F	0A	0A	0A	0A	00	00	
INSERT	5E	00	00	00	00	00	00	
WORD	5F	1E	1E	1E	1E	00	00	
↑	3C	0B	12	0B	12	00	00	
←	3D	08	01	08	01	00	00	
→	3E	0C	06	0C	06	00	00	
↓	3F	0A	03	0A	03	00	00	
DEC.TAB	2F	00	00	00	00	00	00	
DIVISION	2E	2F	2F	2F	2F	00	00	
X	2D	2A	2A	2A	2A	00	00	
-	2C	2D	2D	2D	2D	00	00	+/-
7	2B	37	37	37	37	00	00	
8	2A	38	38	38	38	00	00	
9	29	39	39	39	39	00	00	

LEGEND: AL - NO SHIFT KEYS  
 AU - SHIFT  
 CL - CONTROL  
 CU - CONTROL SHIFT  
 GL - GRAPH SHIFT  
 GU - GRAPH SHIFT SHIFT

KEY	SCAN CODE	AL	AU	CL	CU	GL	GU	
+	28	2B	2B	2B	2B	00	00	-
4	1B	34	34	34	34	00	00	
5	1A	35	35	35	35	00	00	
6	19	36	36	36	36	00	00	
=	18	3D	3D	3D	3D	00	00	+
1	27	31	31	31	31	00	00	
2	26	32	32	32	32	00	00	
3	25	33	33	33	33	00	00	
ENTER	15	0D	0D	0D	0D	00	00	ENTER =
0	17	30	30	30	30	00	00	
.	16	2E	2E	2E	2E	00	00	

LEGEND: AL - NO SHIFT KEYS  
 AU - SHIFT  
 CL - CONTROL  
 CU - CONTROL SHIFT  
 GL - GRAPH SHIFT  
 GU - GRAPH SHIFT SHIFT

# Appendix H

## HASCI Hexadecimal Keyboard Mapping

### - Scan Code Sequence

SCAN CODE	KEY	AL	AU	CL	CU	GL	GU	
00								
01	UNDO	00	00	00	00	00	00	
02								
03	STORE	00	00	00	00	00	00	
04	RETRIEVE	00	00	00	00	00	00	
05	PRINT	00	00	00	00	00	00	
06	INDEX	00	00	00	00	00	00	
07	MAIL	00	00	00	00	00	00	
08	MENU	00	00	00	00	00	00	
0A	CALC	00	00	00	00	00	00	
0B	SCHED	00	00	00	00	00	00	
0C	DRAW	00	00	00	00	00	00	
0D								
0E	BOLD	00	00	00	00	00	00	
0F	ITALIC	00	00	00	00	00	00	
10								
11								
12								

LEGEND: AL - NO SHIFT KEYS  
 AU - SHIFT  
 CL - CONTROL  
 CU - CONTROL SHIFT  
 GL - GRAPH SHIFT  
 GU - GRAPH SHIFT SHIFT

SCAN CODE	KEY	AL	AU	CL	CU	GL	GU	
13								
14								
15	ENTER	0D	0D	0D	0D	00	00	ENTER =
16	.	2E	2E	2E	2E	00	00	
17	0	30	30	30	30	00	00	
18		3D	3D	3D	3D	00	00	
19	6	36	36	36	36	00	00	
1A	5	35	35	35	35	00	00	
1B	4	34	34	34	34	00	00	
1C	-	2C	2C	2C	2C	00	00	/+
1D								
1E	STYLE	00	00	00	00	00	00	
1F	SIZE	00	00	00	00	00	00	
20								
21								
22								
23								
24								
25	3	33	33	33	33	00	00	
26	2	32	32	32	32	00	00	
27	1	31	31	31	31	00	00	
28	+	2B	2B	2B	2B	00	00	+
29	9	39	39	39	39	00	00	
2A	8	38	38	38	38	00	00	
2B	7	37	37	37	37	00	00	
2C	-	2D	2B	2B	2B	00	00	-
2D	X	2A	2A	2A	2A	00	00	
2E	DIVISION	2F	2F	2F	2F	00	00	
2F	DEC.TAB	00	00	00	00	00	00	
30								
31								
32	SPACE BAR	20	20	20	20	20	20	
33	Z z	7A	5A	1A	1A	CE	CF	
34	X x	78	58	18	18	AB	B5	
35	C c	63	43	03	03	D0	D4	
36	V v	76	56	16	16	D1	D5	
37	B b	62	42	02	02	D2	C5	

LEGEND: AL - NO SHIFT KEYS  
AU - SHIFT  
CL - CONTROL  
CU - CONTROL SHIFT  
GL - GRAPH SHIFT  
GU - GRAPH SHIFT SHIFT

SCAN CODE	KEY	AL	AU	CL	CU	GL	GU	
38	N n	6E	4E	0E	0E	D3	D6	
39	M m	6D	4D	0D	0D	E7	E5	
3A	, ,	2C	2C	0C	0C	C8	CA	
3B	. .	2E	2E	0E	0E	C9	CB	
3C	↑	0B	12	0B	12	00	00	
3D	←	08	01	08	01	00	00	
3E	→	0C	06	0C	06	00	00	
3F	↓	0A	03	0A	03	00	00	
40								
41	TAB REL	00	00	00	00	00	00	
42	SHIFT LOCK	00	00	00	00	00	00	
43	A a	61	41	01	01	CC	CD	
44	S s	73	53	13	13	B2	B3	
45	D d	64	44	04	04	BC	B4	
46	F f	66	46	06	06	B7	B6	
47	G g	67	47	07	07	E3	E1	
48	H h	68	48	08	08	F3	F1	
49	J j	6A	4A	0A	0A	E8	F8	
4A	K k	6B	4B	0B	0B	DF	DC	
4B	L l	6C	4C	0C	0C	EF	EC	
4C	: ;	3B	3A	1B	1A	FF	FC	
4D	" "	27	22	07	02	D7	C1	
4E	RETURN	0D	0D	0D	0D	00	00	
4F	? /	2F	3F	0F	1F	F7	F5	
50								
51	Q q	71	51	11	11	A6	B8	
52	W w	77	57	17	17	A7	A8	
53	E e	65	45	05	15	B0	B9	
54	R r	72	52	12	12	B1	BA	
55	T t	74	54	14	14	E2	E0	
56	Y y	79	59	19	19	F2	F0	
57	U u	75	55	15	15	E9	F9	
58	I i	69	49	09	09	DE	DB	
59	O o	6F	4F	0F	0F	EE	EB	
5A	P p	70	50	10	10	FE	FB	
5B	¼ ½	BE	BF	00	00	D7	D8	
5C	[ <	3C	5B	1C	1B	7B	C2	

LEGEND: AL - NO SHIFT KEYS  
AU - SHIFT  
CL - CONTROL  
CU - CONTROL SHIFT  
GL - GRAPH SHIFT  
GU - GRAPH SHIFT SHIFT

SCAN CODE	KEY	AL	AU	CL	CU	GL	GU	
5D	] >	3E	5D	1E	1D	7D	C3	
5E	INSERT	00	00	00	00	00	00	
5F	WORD	1E	1E	1E	1E	00	00	
60								
61	@ 2	32	40	12	00	A2	AE	
62	# 3	33	23	13	03	A3	AF	
63	\$ 4	34	24	14	04	A4	A9	
64	% 5	35	25	15	05	A5	AA	
65	6	36	C4	16	00	E6	E4	
66	& 7	37	26	17	06	DD	DA	
67	* 8	38	2A	18	0A	ED	EA	
68	( 9	39	28	19	08	FD	FA	
69	) 0	30	29	10	09	F6	F4	
6A	_ -	2D	5F	0D	1F	60	C6	
6B	+ =	3D	2B	1D	0B	7C	C7	
6C	\	5C	BD	1C	00	7E	C0	
6D	< X	08	08	08	08	00	00	
6E	X >	7F	7F	7F	7F	00	00	
6F	LINE	0A	0A	0A	0A	00	00	
70								
71	COPYDISK	F03	F20	00	00	00	00	
72	HELP	F02	F19	S06	00	00	00	
73	STOP	F01	00	S05	00	00	00	
74	MAR REL	1B	1B	1B	1B	00	00	
75	^	BB	5E	00	1E	A0	AC	
76	! 1	31	21	11	01	A1	AD	
77	TAB	09	09	09	09	00	00	
78	TAB SET	00	00	00	00	00	00	
79								
7A								
7B								
7C								
7D								
7E								
7F								
84 85	SHIFT	00	00	00	00	00	00	

LEGEND: AL - NO SHIFT KEYS  
AU - SHIFT  
CL - CONTROL  
CU - CONTROL SHIFT  
GL - GRAPH SHIFT  
GU - GRAPH SHIFT SHIFT

<b>SCAN CODE</b>	<b>KEY</b>	<b>AL</b>	<b>AU</b>	<b>CL</b>	<b>CU</b>	<b>GL</b>	<b>GU</b>	
86 87	SHIFT	00	00	00	00	00	00	
8A 8B	CTRL	00	00	00	00	00	00	
8C 8D	GRPH SHIFT	00	00	00	00	00	00	
8E 8F	CTRL	00	00	00	00	00	00	

LEGEND: AL - NO SHIFT KEYS  
AU - SHIFT  
CL - CONTROL  
CU - CONTROL SHIFT  
GL - GRAPH SHIFT  
GU - GRAPH SHIFT SHIFT



# Appendix I

## Glossary

ambiguous filename	A filename that can have more than one meaning. The CP/M-80 <i>wildcards</i> , * and ?, are ambiguous.
ASCII	American Standard Code for Information Interchange. ASCII is a standard set of 7-bit numeric character codes used to represent characters in memory.
base page	The bottom portion of memory, which contains all the data that CP/M-80 needs to monitor what's happening in the computer.
BDOS	Basic Disk Operating System. BDOS handles all transactions that relate to the information on a disk.
BIOS	Basic Input/Output System. The part of CP/M-80 that communicates directly with all the peripheral devices that make up the computer system.
bit	The smallest unit of data used by the computer, which can take on the value of 0 or 1.
bit 7 masking	A procedure that masks off bit 7, the most significant bit. The presence or absence of bit 7 masking affects the appearance of graphic characters.
byte	A letter, digit, or symbol, consisting of eight bits.

CCP	Console Command Processor. The part of CP/M-80 that stands directly between the QX-10 and you, and accepts your commands.
cold boot	System initialization, caused either by powering the computer ON, by pressing <b>RESET</b> , or by holding down the <b>GRPH SHIFT</b> and <b>CTRL</b> keys, then pressing <b>STOP</b> .
DDT debugger	A transient command that allows dynamic interactive testing of programs and can create a memory image of disk files. DDT.COM is CP/M-80's system debugger.
disk	The collective term for both hard disks and floppy disks.
disk access attribute	A characteristic assigned to a disk that determines whether the disk can be read and written to (R/W) or read only (R/O).
diskette	A floppy disk.
file	A set of related data.
file access attribute	A characteristic assigned to a file that determines whether the file can be read and written to (R/W) or read only (R/O), or whether the file displays in the directory (DIR) or does not display in the directory (SYS).
file name	The first name of a file.
file type	The optional last name of a file. Also known as the file <i>extension</i> .
filename	A file's full name, whether it's a file name only or a file name and file type.
formatted	A diskette that the COPYDISK utility has divided diskette into tracks and sectors, to create addressable locations on the diskette.

function key	Specified keys in the top row of keys on the HASCI keyboard, which produce a pre-selected character or string of characters.
interrupt mode	When the interrupt mode of the serial port is selected, the serial port interrupts the operating system when it has data for the system.
IOBYTE	A reserved byte of memory that advises your QX-10 of the current assignments of the printer, modem, and other peripheral devices attached to it.
logged drive	The drive that the system is currently using (reading and writing to).
logical disk drive	A drive name (A-P) that is assignable to any actual, or physical, disk drive connected to the computer system. For CP/M-80 to handle physical drives, they must be assigned to logical drives.
peripheral device	Any physical device—e.g., a printer, modem, or disk drive—that is not integral to your computer system.
physical disk	The LEFT and RIGHT diskette drives of your QX-10, or a hard disk.
polling mode	When the serial port is set to the polling mode, the operating system must query the serial port to check if it has data.
program	A disk file that consists of related machine executable instructions.
RAM	Random Access Memory. A specific portion of memory that your QX-10 can both read and write to.
recoverable error	Also described as a <i>soft</i> error, a recoverable error is any error that your system can recover from with no assistance from you.

resident commands	The six CP/M-80 commands (DIR, ERA, REN, SAVE, TYPE, and USER) that go wherever CPM-80's CCP goes.
sectors	Addressable locations on the tracks of a diskette.
system diskette	Any diskette that contains the operating system (tracks 0 and 1, and the CPM2.SYS file).
text file	A file consisting of related lines of text.
TPA	Transient Program Area. The part of memory in which application programs execute and store data while in operation.
tracks	Addressable concentric circles on a diskette, resembling the grooves on a record, which help to divide the diskette into usable areas.
transient commands	Executable programs that are stored on disk as .COM files.
unambiguous filename	A filename that is specific and has only one possible meaning. Any filename that does not consist in part of the CP/M-80 wildcards.
unrecoverable error	Also described as a <i>hard</i> error, an unrecoverable error is any error that the system cannot correct without your assistance.
utility	A transient command that was not developed by Digital Research.
warm boot	Partial system initialization (initializes the CCP and BDOS only), caused by holding the <b>CTRL</b> key down, then pressing <b>C</b> .
wildcard	The characters ? and *, which can be used to refer to more than one file on a diskette.
write protect tab	A small piece of opaque adhesive that fits over the notch in a diskette to protect the contents of the diskette from being overwritten.